

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

**APPLICATION OF GOODNIGHT MIDSTREAM  
PERMIAN, LLC TO AMEND ORDER NO. R-7767 TO  
EXCLUDE THE SAN ANDRES FORMATION FROM  
THE EUNICE MONUMENT OIL POOL WITHIN THE  
EUNICE MONUMENT SOUTH UNIT AREA, LEA  
COUNTY, NEW MEXICO.**

**CASE NO. 24277**

**APPLICATION OF GOODNIGHT MIDSTREAM  
PERMIAN, LLC TO AMEND ORDER NO. R-7765, AS  
AMENDED TO EXCLUDE THE SAN ANDRES  
FORMATION FROM THE UNITIZED INTERVAL OF  
THE EUNICE MONUMENT SOUTH UNIT, LEA  
COUNTY, NEW MEXICO.**

**CASE NO. 24278**

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

**CASE NOS. 23614-23617**

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

**CASE NOS. 24018-24027**

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

**CASE NO. 23775**

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

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

**GOODNIGHT'S MOTION TO ISSUE A DEPOSITION SUBPOENA AND  
SHOWING GOOD CAUSE TO DEPOSE EMPIRE NEW MEXICO, LLC**

Pursuant to NMSA 1978, §70-2-8 and 19.15.4.16.A NMAC, Rules 1-026 and 1-030(B) NMRA, Goodnight Midstream Permian, LLC (“Goodnight”), by and through undersigned counsel, hereby files this motion requesting the New Mexico Oil Conservation Commission issue

the attached deposition subpoena to Empire New Mexico, LLC (“Empire”) based upon the following showing of good cause.

### INTRODUCTION

Empire’s plan to develop the alleged residual oil zone (“ROZ”) in the San Andres formation within the Empire Monument South Unit (“EMSU”) is centrally important to evaluating whether any such alleged hydrocarbons are economically recoverable. Empire will need to testify as to its plan at the September 23-27 hearing. Goodnight has asked for that plan multiple times. In September 2023, Eugene Sweeney testified for Empire that it was developing such a plan. In January 2024, Jack Wheeler stated under oath, again, that Empire planned to develop a CO<sub>2</sub> recovery project. But in February 2024, Empire explained the only ‘plan’ Empire had was a document from the prior unit operator outlining the potential for ROZ recovery that did not even extend into Goodnight’s injection zone – i.e., they had no plan at all. As recently as May 2024, counsel for Empire confirmed it had already produced plans of development in its possession, and that Empire could not be compelled to produce documents it does not possess.

Suddenly now, on June 28, 2024, Empire has produced a new document it suggests is its plan to develop the San Andres ROZ – dated January 15, 2024. While the newly produced document suggests the existence of a full plan of development, and does include some relevant information, it is inconsistent with Empire’s prior representations to Goodnight and the Commission that it had no written plans and, most importantly, it lacks the detailed information necessary to evaluate Empire’s claim that the San Andres contains an economic ROZ. Either Empire has prepared those detailed assessments—including operational parameters, reservoir simulations, and cost estimates—and has refused to produce them, or it has no detailed plans. Either way, Empire is going to have to put on an affirmative case at the September Hearing that it can economically produce hydrocarbons from the purported San Andres ROZ. Goodnight has a

right to evaluate those plans but has been denied the opportunity based on Empire's assertion that it has no written plans that are responsive. If Empire is asserting this affidavit is its "plan", the only way for Goodnight to obtain the information necessary to assess Empire's "plan" is to depose a company representative or representatives on the details of Empire's "plan."

These matters present the extraordinary circumstances contemplated by Section 19.15.4.16.A NMAC that substantiate good cause to require a limited deposition of Empire regarding its alleged San Andres EMSU ROZ plan. As a matter of fairness, Goodnight must be permitted the opportunity to depose Empire on its plan to develop the alleged San Andres ROZ.

### FACTUAL BASIS

Empire initiated these contested hearings claiming Goodnight's saltwater injection activities into the San Andres formation within the EMSU are impairing Empire's correlative rights to recover economically recoverable hydrocarbons in an alleged ROZ within the San Andres formation. Empire made that claim, alluded to the existence of work done to substantiate a production plan, and has even testified, under oath, that the initial stages of ROZ recovery work have *been planned*. See, e.g., September 15, 2023 Hearing Transcript in Case No. 22626, p. 238:18-22 [Testimony of Eugene Sweeney], relevant excerpts attached as **Exhibit 1**.

Despite numerous requests by Goodnight for the alleged San Andres ROZ workplans, the sole Empire document received by Goodnight is the attached internal memo purportedly created by Darrel W. Davis on January 15, 2024, which suggests Empire has documents and email communications related to the San Andres ROZ workplan that have not been produced. See Davis Memo, Doc. No. OCD 23614-17 03483 through 03521, attached as **Exhibit 2**. Empire's internal memo briefly discusses Empire's intent, but not its plans for how, to use the Grayburg main pay zone ("MPZ") improvements as a springboard for ROZ recovery. *Id.*, pp. 12-17.

At this point, Goodnight believes that either: (i) Empire has a workplan for recovery of the alleged San Andres ROZ that it refuses to provide to Goodnight or (ii) Empire does not have a full written workplan, and instead, a plan for recovery exists in the mind(s) of Empire's principal(s), consult(s), and/or employee(s). In either case, Empire undoubtedly plans to testify at the hearing in this matter, now set for September 23-27, 2024 (the "September Hearing"), as to how and why it believes there exist *economically* recoverable hydrocarbons in the San Andres formation within the EMSU. To avoid a prejudicial surprise and to promote a full and fair adjudication of the issues at the September Hearing, Goodnight shows good cause to depose, and therefore must be permitted to depose, Empire's corporate representative(s) about its San Andres ROZ development plans. Based on this showing in this motion which meets Goodnight's prima facie burden, the Commission should promptly issue the attached deposition subpoena on or before July 19, 2024, and should order that Empire may, within a time certain thereafter, file a motion to quash should Empire seek to establish a meritorious basis to do so.

### **ARGUMENT**

#### **A. Legal Standard**

"The commission and director or the director's authorized representative *shall* issue subpoenas for witness depositions in advance of the hearing only in extraordinary circumstances for good cause shown." NMAC 19.15.4.16(A) (emphasis added). Thus, if the Commission determines these are extraordinary circumstances and Goodnight has shown good cause to depose Empire's corporate representative, then the Commission *shall* issue the attached deposition subpoena. The Commission should issue the attached deposition subpoena on or before July 19, 2024, given that this motion sufficiently meets Goodnight's prima facie burden under Section 19.15.4.16(A) NMAC and thereupon should order Empire to file a motion to quash, should Empire choose to do so, within a time certain prior to the scheduled deposition. This procedure ensures that Empire shall have a "reasonable opportunity" to respond in opposition to the deposition if it

believes such a response to be necessary. NMAC 19.15.4.16(C) (“[T]he director or division examiner shall . . . allow interested parties an opportunity, reasonable under the circumstances, to respond to the motion.”).

**B. Empire Has Failed to Provide Goodnight with A Plan to Produce the Alleged Economically Recoverable ROZ in the San Andres Formation Despite Claiming Such a Plan Exists.**

Empire’s failure to provide Goodnight with *any* complete written plan for economic recovery of Empire’s claimed ROZ within the San Andres formation, despite Empire’s assertion that it has such a plan, and despite Goodnight’s numerous requests, presents exactly the sort of extraordinary circumstances that justify a deposition in advance of the September Hearing.

One of Empire’s central claims underlying its position in every one of the above-captioned cases is that a large target of oil exists in the ROZ in the San Andres formation below the historic producing zone in the EMSU that Empire believes can be economically developed and that Empire plans to produce:

Empire currently operates the EMSU as a water flood project recovering hydrocarbons from the Grayburg – San Andres formation. The EMSU waterflood currently produces approximately 830 BOPD; 67,600 BWPD; 540 MCFPD and injects approximately 67,600 BWPD into the unitized Grayburg / San Andres Reservoir. **Empire plans to further develop the EMSU through CO2 injection to enhance recovery in the Grayburg and San Andres formation and to recover oil within residual oil zones (“ROZ”) in the San Andres formation.** By CO2 flooding this San Andres ROZ interval, Empire estimates that 270 million barrels or more of this residual oil can be recovered, in addition to an estimated 300 million barrels of tertiary oil recovered from the Grayburg.

Empire Motion to Refer Case Nos. 23614-17, 24018-24027, and 23775 to the Commission, p. 2, ¶ 3 (emphasis added), attached as **Exhibit 3**; *see also id.* at Exh. A, *Affidavit of Jack E. Wheeler*, ¶ 3 (making same claims under oath).

Indeed, whether there exists an economically recoverable zone of hydrocarbons in San Andres formation within the EMSU is a touchstone issue for the September Hearing. The Commission has ruled, in part, that

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 the Eunice Monument South Unit (“EMSU”) by produced water injection activities undertaken by Goodnight.

Joint Order on Goodnight Midstream Permian, L.L.C.’s Motion to Limit Scope of Hearing on Cases Within the Eunice Monument South Unit and the Oil Conservation Motion Concerning the Scope of the Evidentiary Hearing Set for September 23-27, 2024 (the “Scope Order”), p. 2 ¶ 2, dated July 2, 2024 (emphasis added).

Extraordinarily, Empire has never fully outlined its “plan” to develop the San Andres ROZ within the EMSU. Such a plan *must* exist if Empire truly intends to develop the San Andres formation as an ROZ. Empire suggested its existence (referring to different documents) under oath, on at least two occasions. *See* Exh. 1 (Sweeney Testimony at September 15, 2023 Hearing Transcript in Case No. 22626) and Exh. 3, at Exh. A (Wheeler Affidavit dated January 3, 2024). It was not until June 28, 2024, in a supplemental response to Goodnight’s March 5, 2024 subpoena, that Empire has now supplied the Davis Memo, titled “Eunice Monument & Arrowhead Field CO2 Development Plan.” *See* Exh. 2.

The Davis Memo mentions the alleged San Andres ROZ numerous times but dedicates merely two paragraphs on pages 26 and 27 to discussing that portion of a development project spanning multiple intervals in the EMSU and the Arrowhead Grayburg Unit. The most direct statement about the alleged San Andres ROZ plan is that “Empire plans to develop this San Andres ROZ interval using the same facilities it will use for developing the Grayburg MPZ.” Exh. 2, p. 27. While the memo discusses a phase one “CO2 Flood Design” in the Grayburg formation main pay zone (“MPZ”), little discussion is specific to using “the same facilities” for the San Andres ROZ or plans specific to the EMSU. Once again, Empire refers to a “plan” for development of the alleged San Andres ROZ but fails to lay out that detailed plan for evaluation.

Moreover, the production of the Davis Memo, purportedly written on January 15, 2024, is inconsistent with Empire's subpoena responses and briefing statements that no such plan exists. For example, in Empire's February 1, 2024 Second Supplemental Response to Goodnight's Subpoena in Case Nos. 23614-17, Empire provides the following misleading response:

**REQUEST NO. 4:**

A copy of Empire's written plan, including all drafts, to evaluate the San Andres formation for production of hydrocarbons identified by Eugene Sweeney in Case No. 22626 at the hearing on September 15, 2023. *See* Tr. 238:18-22.

**RESPONSE:**

See Responses to Requests Nos. 2 and 3.

**SUPPLEMENTAL RESPONSE:**

On information and belief, Mr. Sweeney was referring to documents provided to Empire by XTO, which were produced to Goodnight in Case No. 22626. Empire is not reproducing those documents here.

*See* Empire Second Supplemental Response, attached as **Exhibit 4**. Before Empire served that second supplemental response, Goodnight's counsel conferred with counsel for Empire to clarify any potential ambiguity about the existence of any plans.

To the extent Empire might rely on any ambiguity about whether the plan Mr. Sweeney or Mr. Wheeler said Empire was working on developing is the Davis Memo, Goodnight's counsel's efforts to obtain a response to the request involved clarifying the issue. In part, Goodnight's counsel sent the following email on January 9, 2024:

Empire's attached witness statement alleges Empire can recover approximately 270 million barrels or more of residual oil from the San Andres – apparently based on some evaluation for how it can recovery hydrocarbons from the San Andres. In sworn testimony from September 2022, Empire's former COO stated that Empire has a written plan for how it is going to evaluate the San Andres for oil recovery. Request No. 4 and 5 ask for a copy of Empire's plan to evaluate the San Andres and related communications and documents. In its response to the subpoena, Empire stated "any intended plan or analysis that may have been formulated by Empire was contained in Eugene Sweeney's testimony in OCD Case 22626."

It may be that Empire's witness was not telling the truth on the stand at the OCD and Empire did not have a written plan. It is not clear why he would prevaricate on that question. But that is essentially what Empire implied in its response to the subpoena: "... Empire states that any intended plan or analysis that may have been formulated by Empire was contained in Eugene Sweeney's testimony in OCD Case 22626."

It now appears—based on Jack Wheeler's sworn statement—that Empire has prepared some form of evaluation or plan that is responsive to the request. Under Rule 26(E), Empire has an obligation to "seasonably supplement" its discovery to the extent it has a written evaluation/plan and any related internal communications and documents.

Please provide the evaluation referred to in Mr. Wheeler's sworn statement and any related internal communications and documents, including any responsive documents created during or after Empire's due diligence review of its EMSU purchase.

Email dated January 9, 2024 from Adam Rankin to Dana Hardy, et al., part of email thread attached as **Exhibit 5**. Empire's counsel did not respond to the email, and so Goodnight's counsel followed up, again, to be very clear about what Empire was saying:

I understand based on our discussion that the "written plan" referred to in Sweeney's testimony is the XTO documents presented as Empire Exhibits E and F in the Piazza Case No. 22626. Our understanding is that Empire's response to the subpoena referring to Sweeney's testimony for the "written plan" intended to refer to those Exhibits as the plan. I just want to confirm that is what Empire meant in the response to the Subpoena.

**Exh. 5**, (email dated January 30, 2024 from Adam Rankin to Dana Hardy, et al.). Although Empire's counsel never responded to those emails, Empire did affirmatively represent in May 2024, in Empire's reply in support of a motion to quash Goodnight's March 5, 2024, the following:

Goodnight neglects to inform the Commission that, in response to this request, Empire produced plans of development within its possession. . . Empire cannot be compelled to produce documents from the past 40 years that are not in its possession. Any other plans of development from previous operators are publicly available through the State Land Office.

Empire's May 6, 2024 Reply in Support of Motion to Quash Goodnight's Subpoena Duces Tecum, p. 9 (addressing Request No. 10, which reiterates a request for any ROZ production plan). Empire



*affirmatively* took the position in May 2024 that the *only* plans out there were Empire Exhibits E and F in the Piazza Case No. 22626.

While production of the Davis Memo contradicts Empire's May 2024 representation, it does little to add to Mr. Sweeney's or Mr. Wheeler's testimony about what an alleged plan to develop the San Andres ROZ entails and whether it is technically or economically feasible. The Davis Memo fails to provide necessary information underlying an economic plan to recover hydrocarbons from the San Andres formation. For example, it does not provide:

- Reservoir engineering data and analyses that would, at a minimum, need to include:
  - Reservoir characterization studies;
  - Pilot holes to gather actual data on target zone;
  - Geologic studies on target zone;
  - Analysis of existing core data, acquisition of additional cores and core analysis;
  - Miscibility studies including laboratory tests;
  - Project staging and number of deepened or new drill wells;
  - Reservoir simulation studies;
  - Injection scheme study and design;
  - Production and recycle facility design;
  - CO2 requirements and schedule;
- Costs for each of the above enumerated items, estimates of project capital expenses and operating expenses;<sup>1</sup>
- Estimates of future production and revenue used to perform economic analyses using all project costs, and the economic analyses;<sup>2</sup>
- Sensitivity studies using ranges of future revenue and costs to judge the profit margin, if any, from such economic analyses.

All these enumerated items, some of which are partly addressed in the Davis Memo, are essential parts of any plan to produce hydrocarbons from the proposed San Andres ROZ, and, are necessary to evaluate the economy of recovering any hydrocarbons existing in the San Andres formation.

Indeed, absent that information in a plan for recovery, Empire cannot establish that Goodnight's disposal wells inject water into the San Andres at depths that Empire alleges contain

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<sup>1</sup> The Davis Memo does seem to provide some costs related to infrastructure necessary for phase one of the tertiary recovery plan for the Grayburg MPZ. *See* Exh. 2, p. 32.

<sup>2</sup> Again, the Davis Memo does include some economic analysis, but not specific to justifying the cost of a San Andres ROZ plan. *See* Exh. 2, p. 33-38.

the ROZ oil target or that will impact the alleged ROZ. If oil exists in a San Andres ROZ, its recovery will require an expensive and complicated project to inject carbon dioxide to free the supposed oil for production across more than 1,000 vertical feet of reservoir using outdated existing wells and infrastructure. Without some basic level of reservoir engineering and economic analyses, Empire cannot plausibly claim that a viable ROZ project can be justified and implemented. Certainly, Goodnight is prejudicially prevented from meaningfully testing that claim were Empire to testify to all these aspects of a plan for the first time at the September Hearing.

Empire has orchestrated circumstances where that plan, central to Empire's claims and Goodnight's defenses in these proceedings, is yet unknown to Goodnight, to the Division, and to the Commission. It is *exceptional* that lynchpin plan upon is undisclosed, but it is *extraordinary* that Empire has avoided providing it, despite multiple requests, and no less than three months from a the September Hearing.

These are exactly the sorts of "exceptional circumstances" in cases that seek discovery of trial preparation materials that courts find justify disclosure of otherwise privileged information. Here, Goodnight is not asking for privileged information, but these sorts of cases provide a helpful framework for the undue prejudice caused to Goodnight by the present discovery issue. For example, multiple "cases hold that 'exceptional circumstances' allowing for discovery of a non-testifying expert's opinion exist where the object or condition observed is not observable by an expert of the party seeking discovery." *Pinal Creek Grp. v. Newmont Mining Corp*, No. CV-91-1764-PHX-DAE-(LOA), 2006 U.S. Dist. LEXIS 45015, at \*18 (D. Ariz. June 30, 2006) (quoting *Hartford Fire Ins. Co. v. Pure Air on the Lake, Ltd. P'ship*, 154 F.R.D. 202, 208 (N.D. Ind. 1993) (citing multiple cases)). In other cases, exceptional circumstances have been shown where a non-testifying expert's report will be used as the basis for an expert opinion. *Id.* (citations omitted); *c.f.* *Disidore v. Mail Contractors of Am., Inc.*, 196 F.R.D. 410, 417 (D. Kan. 2000) (exceptional

circumstances to depose a consulting expert where “the object or condition observed by the non-testifying expert is no longer observable by an expert of the party seeking discovery”).

Inasmuch as the forgoing enumerated items are necessary to evaluate Empire’s purported plan to develop an alleged ROZ in the San Andres formation, those elements are also necessary to meaningfully evaluate *which* plan Empire believes to be economically viable. While Goodnight could guess at a plan Empire might choose to implement, the significant work Goodnight would need its own experts to do to develop that plan and to test whether it is viable is quite significant. That work represents an undue hardship because it would merely be a guess: all that would be pointless at the September Hearing if Empire’s purported plan deals with the hundreds of variables in a different manner. Without Empire’s plan, this undue hardship cannot be avoided.

While Goodnight does not believe there exists *any* viable plan for recovery of hydrocarbons from the San Andres formation, it is not some hypothetical plan that Goodnight might put together which is at issue, but rather Empire’s actual, and presumably its best, plan for development. Empire’s plan must be tested to determine whether economically recoverable hydrocarbons exist in the formation. It is fundamentally unfair for Goodnight to be left guessing at what that plan might be until the September Hearing.

At bottom, “[t]he discovery process delineated in the Federal Rules of Civil Procedure is intended to allow litigants to ‘prepare for trial in a manner that will promote the just, speedy, and inexpensive determination of the action...’. . . .” *Baez-Eliza v. Instituto Psicoterapeutico De P.R.*, No. 09-1990 (SEC), 2011 U.S. Dist. LEXIS 937, at \*20 (D.P.R. Jan. 5, 2011) (quoting 8 C. Wright, A. Miller, & R. Marcus, *Federal Practice and Procedure* § 2001, p. 22 (3rd ed. 2010); see *Burlington Northern & Santa Fe Ry. Co. v. United States District Court for the District of Montana*, 408 F.3d 1142, 1149 (9th Cir. 2005)). The discovery process, here, has the same goal. Goodnight should not be deprived of an opportunity to explore Empire’s plan to develop the alleged ROZ.

Moreover, this issue has ramifications beyond just Goodnight's interests. The September Hearing deals with issues pertinent to *all* applications between Empire and Goodnight within the EMSU, and also, will result in rulings binding on both parties, intervenors, and rulings that are potentially dispositive to numerous other applications. All of this turns on whether Empire can prove the existence of an economically recoverable ROZ in the San Andres in the EMSU.

**C. Goodnight Shows Good Cause to Depose Empire on Its Plan for Development of the Alleged San Andres ROZ Because Goodnight has Substantial Need of Those Materials and Is Unable Without Undue Hardship to Obtain the Substantial Equivalent of those Materials by Other Means.**

Goodnight has *repeatedly* made the straightforward ask: what is the plan? What is the plan Empire is expected to testify about regarding an economically recoverable ROZ project in the San Andres? Goodnight cannot obtain that plan from anyone other than Empire – it is Empire's plan. Quite simply: there is no alternative to obtaining the plan from Empire.

Goodnight has directly requested this plan on multiple occasions through the subpoena process under Section 19.15.4.16.A NMAC. Example requests are resupplied below:

Request No. of Goodnight's subpoena dated September 22, 2023, in Case Nos. 23601-17:

4. A copy of Empire's written plan, including all drafts, to evaluate the San Andres formation for production of hydrocarbons identified by Eugene Sweeney in Case No. 22626 at the hearing on September 15, 2023. See Tr. 238:18-22.
5. Documents, communications, correspondence, emails, data, and summaries, including but not limited to internal and external correspondence and memoranda, that address, reflect on, or concern Empire's plan to evaluate the San Andres formation for production of hydrocarbons identified by Eugene Sweeney in Case No. 22626 at the hearing on September 15, 2023. See Tr. 238:18-22.

Request No. 10 of Goodnight's subpoena dated March 5, 2024:

10. All plans of development for the EMSU submitted to the New Mexico State Land Office from approval of the EMSU to the present, including all internal and external communications, emails, memoranda, and summaries, that reflect on, discuss, reference, or concern such plans of development.

Request Nos. 11 and 12 of Goodnight's subpoena dated July 2, 2024:

11. Documents, data, analyses, reports, and summaries, including but not limited to internal and external correspondence, that address, reflect on, or concern studies prepared by Empire on the feasibility of conducting tertiary recovery operations in the San Andres formation within the EMSU using carbon dioxide.
12. Documents, data, analyses, reports, and summaries, including internal and external correspondence, that address, reflect on, or concern assessments for capital costs and expenditures estimated to be necessary to institute a tertiary recovery operation in the San Andres formation within the EMSU using carbon dioxide.

Goodnight, thus, has directly sought a copy of these plans *since September 2023*.

Once again, although this is not a circumstance where Goodnight is seeking work product production, caselaw dealing with production of trial preparation materials and fact work product is instructive. In a parallel sort of issue, even "[o]rdinary work product. . . is subject to disclosure upon a showing by the party seeking discovery of substantial need and its inability to obtain the materials by other means." *S. Union Co. v. Sw. Gas Corp.*, 205 F.R.D. 542, 549 (D. Ariz. 2002); *Upjohn Co. v. United States*, 449 U.S. 383, 401 (1981) (recognizing that ordinary work product is discoverable upon a showing of substantial need and inability to obtain materials without undue hardship). While Empire's plan of development is not subject to any sort of work product immunity, good cause to depose Empire about that plan exists because Empire has not produced that complete plan, that plan is centrally necessary information for Goodnight to test Empire's allegations that the San Andres has an economically recoverable ROZ, and Goodnight has no other source for Empire's plan than from the documents or testimony of Empire.

Either (i) Empire has a workplan for recovery of the alleged San Andres ROZ that it refuses to provide to Goodnight or (ii) Empire does not have a written workplan, and instead, that plan for recovery exists in the mind(s) of Empire's principal(s), consult(s), and/or employee(s). In either case, Empire undoubtedly plans to testify at the September Hearing as to how and why it believes

there exist *economically* recoverable hydrocarbons in the San Andres formation within the EMSU – without doing so, Empire cannot meet its evidentiary burden.

Goodnight cannot meaningfully evaluate Empire’s purported plan of development without a copy of that plan. Given no written plan has been provided, Goodnight has good cause to depose Empire on the aspects of that plan that may be retained by Empire as outlined above. Because Goodnight has, and can, “specifically articulat[e] the nature of its need” to depose Empire about Empire’s alleged plan for development of the San Andres ROZ and has “explain[e]d why [it] cannot obtain equivalent information by other means,” Goodnight has reasonably shown good cause for the deposition. *c.f. Santa Fe Pac. Gold Corp. v. United Nuclear Corp.*, 2007-NMCA-133, ¶ 54, 175 P.3d 309 (finding burden to produce work product met upon such a showing).

Anything less would result in an unfair surprise to Goodnight at the September Hearing and would undercut the Commission’s obligation to promote a full and fair opportunity to litigate this issue. Goodnight, thus, shows good cause to depose Empire’s corporate representative(s) on the topic of Empire’s plans to develop the alleged San Andres ROZ, as set forth in the corporate deposition subpoena. *See Exhibit 6*. The Commission, thus, must issue the attached deposition subpoena. *See* 19.15.4.16.A NMAC.

### **CONCLUSION**

For this reason, Goodnight respectfully requests that the Commission issue the deposition subpoena attached as **Exhibit 6**, immediately or no later than July 19, 2024, that it order Empire shall be permitted to file a motion to quash the subpoena within a time certain after issuance of the deposition subpoena, should Empire choose to do so, and for such other and further relief as the Commission may deem appropriate and necessary.

DATED: July 16, 2024

Respectfully submitted,

**HOLLAND & HART LLP**

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**CERTIFICATE OF SERVICE**

I hereby certify that on July 16, 2024, I served a copy of the foregoing document to the following counsel of record via Electronic Mail to:

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

IN THE MATTER OF THE HEARING DOCKET NO.  
CALLED BY THE OIL CONSERVATION 21-22 OCD  
DIVISION FOR THE PURPOSE OF  
CONSIDERING:

AMENDED APPLICATION OF MEWBOURNE CASE NUMBER:  
OIL COMPANY FOR COMPULSORY POOLING 22093  
AND APPROVAL OF AN OVERLAPPING  
HORIZONTAL WELL SPACING UNIT,  
EDDY COUNTY, NEW MEXICO.

APPLICATION OF ASCENT ENERGY, LLC CASE NUMBERS:  
FOR A HORIZONTAL SPACING AND 22112, 22184  
PRORATION UNIT AND COMPULSORY  
POOLING, EDDY COUNTY, NEW MEXICO.

APPLICATION OF ALPHA ENERGY CASE NUMBERS:  
PARTNERS, LLC FOR COMPULSORY 22171, 22172  
POOLING, EDDY COUNTY, NEW MEXICO.

**EXHIBIT - 1**

1 APPLICATION OF MEWBOURNE OIL CASE NUMBER :  
 2 COMPANY FOR COMPULSORY POOLING, 22349  
 3 EDDY COUNTY, NEW MEXICO.

4  
 5 APPLICATION OF GOODNIGHT MIDSTREAM CASE NUMBER :  
 6 PERMIAN, LLC FOR APPROVAL OF A SALT 22626  
 7 WATER DISPOSAL WELL, LEA COUNTY,  
 8 NEW MEXICO.

9  
 10 APPLICATION OF MEWBOURNE OIL CASE NUMBERS :  
 11 COMPANY FOR COMPULSORY POOLING, 22633 - 22636  
 12 LEA COUNTY, NEW MEXICO.

13  
 14 APPLICATION OF MATADOR PRODUCTION CASE NUMBERS :  
 15 COMPANY TO AMEND ORDER R-21811 TO 22875, 22876  
 16 ADD ADDITIONAL POOLED PARTIES,  
 17 EDDY COUNTY, NEW MEXICO.

18  
 19 APPLICATION OF COLGATE OPERATING, CASE NUMBERS :  
 20 LLC FOR COMPULSORY POOLING, 22937 - 22942  
 21 EDDY COUNTY, NEW MEXICO.

22  
 23 APPLICATION OF TEXAS STANDARD CASE NUMBER :  
 24 OPERATING NM LLC FOR COMPULSORY 23005  
 25 POOLING, LEA COUNTY, NEW MEXICO.

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VIDEOCONFERENCE HEARING  
DATE: Thursday, September 15, 2022  
TIME: 9:18 a.m.  
BEFORE: Hearing Examiner Bill Brancard  
Hearing Examiner Phillip Goetze  
Technical Examiner Leonard Lowe  
LOCATION: Remote Proceeding  
Santa Fe, NM 87501  
REPORTED BY: Dana Fulton, Notary Public  
JOB NO.: 5425124

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A P P E A R A N C E S

ON BEHALF OF ENERGY, MINERALS AND NATURAL RESOURCES  
DEPARTMENT:

MARLENE SALVIDREZ  
Energy, Minerals and Natural Resources Department  
1220 South Street, Francis Drive  
Oil Conservation Division  
Santa Fe, NM 87505  
marlene.salvidrez@state.nm.us  
(505) 469-5527

ALSO PRESENT:

Ernest Padilla, Esquire  
Michael Feldewert, Esquire, Holland & Hart  
Darin Savage, Esquire, Abadie & Schill  
Dana Hardy, Esquire, Hinkle Shanor  
Jesse Tremaine, Assistant General Counsel, New  
Mexico EMNRD  
Bryce Smith, Esquire, Modrall Sperling  
Scott Morgan, Esquire, Cavin & Ingram  
James Bruce, Esquire  
James Parrot, Esquire, Beatty & Wozniak  
Joby Rittenhouse, Esquire  
Matthew Beck, Esquire  
Earl DeBrine, Esquire

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A P P E A R A N C E S (Cont'd)

ALSO PRESENT (Cont'd):

Denise Greer, Esquire

Paula Vance, Esquire, Holland & Hart

Adam Rankin, Esquire, Holland & Hart

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I N D E X  
CASE 22626

PAGE

OPENING STATEMENT By Mr. Rankin	102
OPENING STATEMENT By Mr. Padilla	106
CLOSING STATEMENT By Mr. Padilla	264
CLOSING STATEMENT By Mr. Rankin	268

WITNESSES: DX CX RDX RCX

NATHAN ALLEMAN

By Mr. Rankin 109 134

By Mr. Padilla 121

STEVE ALLEN DRAKE

By Mr. Rankin 138 184

By Mr. Padilla 162

EUGENE SWEENEY

By Mr. Padilla 188 260

By Mr. Rankin 203

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E X H I B I T S

NO.	DESCRIPTION	ID/EVD
MewBourne Oil Company (Cases 22633, 22634, 22635 and 22636):		
Exhibit 1	Unknown	56/63
Exhibit 2	Unknown	56/63
Exhibit 3	Geologist Affidavit of Jordan Carrell	56/63
Exhibit 4	Affidavit of Mailing	56/63
Exhibit 5	Unknown	56/63
Exhibit 6	Pooling Checklist	56/63
Exhibit 8	Supplemental Exhibit	56/63
Exhibit 9	Supplemental Exhibit	56/63

(Exhibits retained by counsel.)

NO.	DESCRIPTION	ID/EVD
Texas Standard Operating (Case 23005):		
Exhibit 1	Unknown	67/69
Exhibit 2	Landman Affidavit of Matt Roberson	67/69
Exhibit 3	Geologist Affidavit of David Ensminger	67/69
Exhibit 4	Affidavit of Mailing	67/69
Exhibit 5	Pooling Checklist	67/69

(Exhibits retained by counsel.)

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E X H I B I T S (Cont'd)

NO.	DESCRIPTION	ID/EVD
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Colgate Operating (Cases 22937, 22938, 22939, 23940 and 23941):

Exhibit A	Self-Affirmed Statement of Landman Travis Macha	73/79
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Exhibit B	Self-Affirmed Statement of Geologist David DaGian	73/79
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Exhibit C	Notice Affidavit	73/79
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(Exhibits retained by counsel.)

NO.	DESCRIPTION	ID/EVD
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Matador Production Company (Cases 22875 and 22876):

Exhibit A	Affidavit of Landman Rob Helbing	81/
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Exhibit B	Self-Affirmed Statement of Notice with Sample Letters	81/
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Exhibit C	Affidavit of Notice of Publication	81/
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(Exhibits retained by counsel.)



E X H I B I T S (Cont'd)		
NO.	DESCRIPTION	ID/EVD
Goodnight Midstream (Case 22626):		
Exhibit A	C108 Application	120/121
Exhibit B	Self-Affirmed Statement of Nathan Alleman	120/121
Exhibit B1	Resume of Nathan Alleman	120/121
Exhibit B2	Notification of Protest	120/121
Exhibit C	Self-Affirmed Statement of Steve Drake	160/
Exhibit D	Self-Affirmed Statement of Adam Rankin	186/187

(Exhibits retained by counsel.)

NO.	DESCRIPTION	ID/EVD
Empire New Mexico LLC (Case 22626):		
Exhibit N/A	Unknown	201/202

(Exhibits retained by counsel.)

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1 P R O C E E D I N G S

2 THE HEARING EXAMINER BRANCARD: Good  
3 morning, everyone. It is September 15, 2022. These  
4 are the hearings of the New Mexico Oil Conservation  
5 Division. I am your hearing examiner, Bill Brancard.  
6 With me today is our technical examiner, Mr. Leonard  
7 Lowe. Good morning, Mr. Lowe.

8 THE TECHNICAL EXAMINER: Good morning,  
9 Mr. Brancard.

10 THE HEARING EXAMINER BRANCARD:  
11 Excellent. As always, the worksheet for today's  
12 agenda is posted on our website. I believe there are  
13 34 cases listed today, so we might be able to get  
14 through them today.

15 But I have a few announcements before  
16 we get going. One is you all probably should be  
17 getting an email at some point, a blast, but as of  
18 Saturday, all of us here at Energy, Minerals and  
19 Natural Resources Department will have a different  
20 email address; okay? And it will be the same address,  
21 the name that you've always looked for, like  
22 bill.brancard, but now instead of @state.nm.us, it  
23 will be @emnrd.nm.gov.

24 But don't freak out because all your  
25 emails that go to the old addresses will get routed to

Page 10

1 company's analytical plan for tracking the performance  
2 of its wells and capability of producing in the San  
3 Andres?

4 A That's -- so our plan as far as going  
5 forward, we're -- we're in the appraise stage. Again,  
6 we're in the appraise phase of what we -- what -- what  
7 our possibilities are and our options are for  
8 producing the hydrocarbons which we are confident are  
9 present across the interval and we have not moved to a  
10 select -- what you're talking about, it sounds to me  
11 like you're looking for more like you would like our  
12 selections and -- and albeit confidential selection  
13 documents and -- and selection phase that we're  
14 in -- that we're into and -- and we are not in that  
15 stage yet.

16 Q Okay. I guess what I'm trying to find out  
17 is do you have a written -- any written plan or  
18 document that outlines what your proposal is going  
19 forward? How are you going to actually do this  
20 appraisal?

21 A How we are going to do the appraising?  
22 We -- we are appraising the -- we are appraising the  
23 project. We're in the appraise phase of the project,  
24 sir. Mr. Rankin, that's all I can tell you.

25 Q Okay.

Page 237

1           A     Do -- do -- if -- if you want -- you know,  
2     what -- what -- again, what it seems like you're  
3     asking for is -- is what -- what are we selecting to  
4     do on -- on it and we're not there yet. And I -- I  
5     wish I could move at a different pace that was more  
6     comfortable with Goodnight, but we're -- but we're not  
7     and we've already made -- we're -- we are -- we are  
8     proceeding with it and we've made a multi-million  
9     dollar bet on this deal. So you better be sure that  
10    we're going to -- we're going to be systematic and in  
11    control the way we exploit this -- you know, our  
12    field.

13           Q     Mr. Sweeney, I'm asking you because you're  
14    going to be systematic and in control, do you have a  
15    written plan about how you're going to evaluate this  
16    field, including the San Andres?

17           A     Yes.

18           Q     Okay. Mr. Sweeney, I'm asking you to  
19    produce that plan because it's responsive to our  
20    requests for documents; okay? That's what I just want  
21    to make clear. And any emails or correspondence  
22    relating to that plan should be reproduced.

23           A     Well --

24           Q     That's -- that's what I'm trying to get  
25    across. All right. Now, are you also tracking --

## Memo To File

From: Darrell W Davis  
Senior Production & Reservoir Engineer

Date: January 15, 2024

Reference: **Eunice Monument & Arrowhead Field CO2 Development Plan**  
Lea County, New Mexico

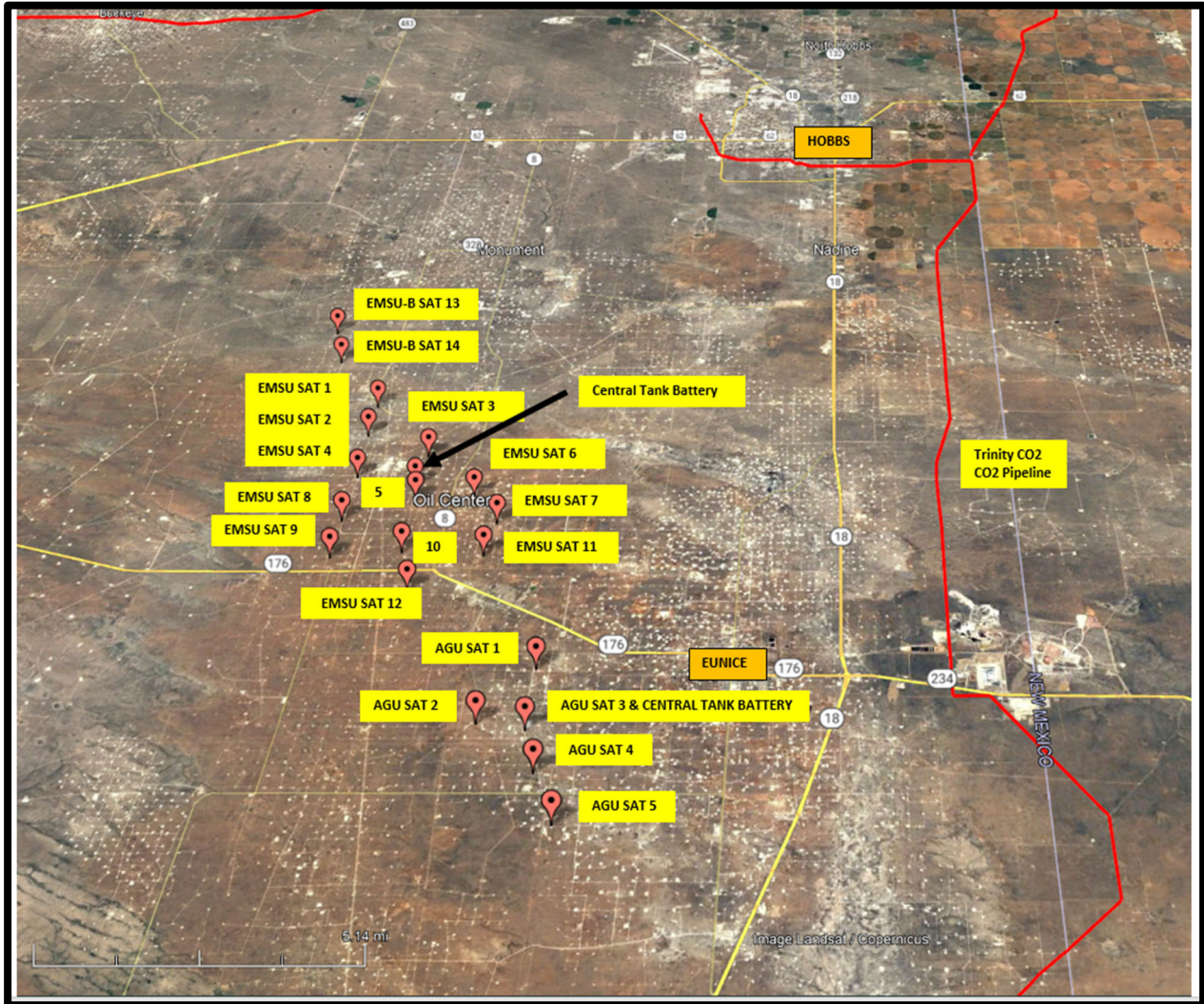
**EXHIBIT - 2**

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OCD 23614-17 03482

# Empire Petroleum Corporation Eunice Monument & Arrowhead Field CO<sub>2</sub> Development Plan

Figure 1 – Location Map with Production Satellites



## Introduction

Injecting CO<sub>2</sub> into an oil reservoir has proven to be one of the most effective ways to increase oil recovery from the reservoir. Residual oil is held to the reservoir rock by capillary pressure and interfacial tension, therefore waterflooding will not recover this oil. By injecting CO<sub>2</sub> and building reservoir pressure above minimum miscibility pressure, the interfacial tension and capillary pressure will be reduced to zero and the oil is allowed to flow. CO<sub>2</sub> swells the oil and reduces its

viscosity in addition to removing these binding forces. The injected CO<sub>2</sub> displaces the water and oil from the reservoir and reaches the producing well and facilities where it is separated from the oil and water and reinjected back into the reservoir. CO<sub>2</sub> has a density less than water so it has a tendency to sweep the upper portions of the reservoir first and results in low vertical sweep efficiency due to gravity override. To improve the vertical sweep efficiency, water is pumped in stages with the CO<sub>2</sub> after an initial large slug is injected, in an alternating process called Water-Alternating-Gas or WAG. The WAG cycle improves the vertical sweep efficiency but also reduces the amount of CO<sub>2</sub> which is purchased, thus reducing compression requirements at the surface facilities. The total CO<sub>2</sub> injected (MCF) divided by the amount of incremental oil recovered (BBL) is the Gross CO<sub>2</sub> Utilization Factor (MCF/BBL). The purchase amount of CO<sub>2</sub> injected (MCF) divided by the amount of incremental oil recovered (BBL) is the Net CO<sub>2</sub> Utilization Factor (MCF/BBL). These are Key Performance Indicators (KPI's) for a CO<sub>2</sub> flood.

To improve the areal sweep efficiency of a CO<sub>2</sub> flood, the field is often developed on smaller spacing so that the CO<sub>2</sub> and water injection streamlines will not bypass as much oil. Eunice Monument and Arrowhead fields are developed on 40-acre spacing with the water injector recovering oil from an 80-acre patterns, with the water injector 1320 feet from the surrounding 4 producers. Infill wells were drilled in both fields to reduce the spacing to 20-acres in some areas, and this reduced the spacing between injector and producer to 933 feet. At Eunice Monument South Unit (EMSU) there were 125 new wells drilled from March 1985 to November 2005 to complete the 40-acre infills for the waterflood and to drill some 20-acre infills for improved oil recovery. From March 1998 to September 2005, 20 new wells were drilled at Arrowhead Grayburg Unit (AGU) and only 4 new wells at EMSU-B from January 1991 to September 1993. There will be additional 20-acre infill wells drilled in 2024-2026 to improve oil recovery from these 3 UNITS and to prepare for the CO<sub>2</sub> flood. Oil recovery efficiency is based on the following equation:

**Recovery Efficiency = (Displacement Efficiency) x (Aerial Sweep Efficient) x (Vertical Sweep Efficiency)**

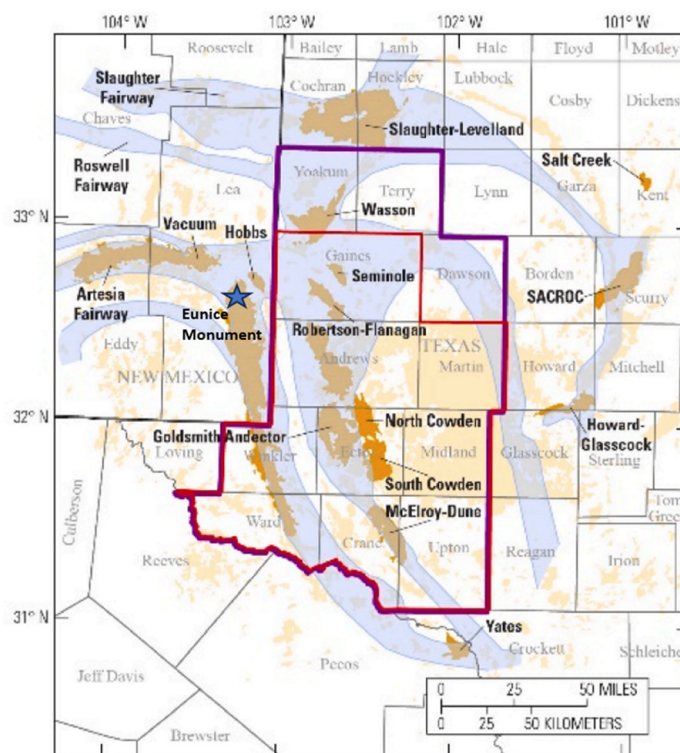
The displacement efficiency can be close to 100% if miscible conditions between the oil and CO<sub>2</sub> can be developed in the reservoir. If we mix water and oil in a jug and shake it up, the oil rises to the top and the water falls to the bottom for low density oils. (immiscible condition) If however, we mix CO<sub>2</sub> and oil at a pressure and temperature where miscibility is achieved, the CO<sub>2</sub> and oil becomes one phase and there is no capillary pressure or interfacial tension. (miscible condition) This is why a waterflood leaves large quantities of oil in the reservoir because there is a strong interfacial tension holding the oil to the rock. For Eunice Monument and Arrowhead fields, there is a Residual Oil Zone (ROZ) in the San Andres beneath the Grayburg where mother nature could not strip the oil away from the rock. For the Grayburg interval, there was a large moveable oil volume which the waterflood displaced to the producers, but due to nonuniform areal sweep

efficiency and poor vertical sweep efficiency, there still remains a large moveable oil volume and a residual oil volume. Infill drilling and CO2 flooding will recovery this oil, therefore increasing the Oil Recovery Efficiency.

Empire Petroleum Corporation acquired the Eunice Monument and Arrowhead assets from XTO Energy in 2021. Empire saw this as an opportunity to increase oil production from an underperforming asset which has high remaining oil-in-place in the waterflooded Grayburg interval and a residual oil zone (ROZ) in the San Andres interval of the Unitized carbonate reservoir. Water injection in the Eunice Monument South Unit (EMSU), Eunice Monument South Unit "B" (EMSU-B), and Arrowhead Grayburg Unit (AGU) began in Nov-1986, Mar-1991, and Sep-1992 respectively. Chevron obtained unitization on these properties in Feb-1985, Dec-1990, and Jun-1991 respectively.

Empire plans to drill wells during 2024 to increase oil recovery from the Grayburg interval. Conformance work (pattern modification, cement squeeze, gel treatments, etc.) will also be done to reduce water production from high permeability intervals within the Grayburg and to shut off zones which have reached high water saturation. This write-up will discuss activities performed thus far to define the scope of work for the CO2 flood and highlight some of the data gathering activities which will take place during the drilling programs in 2024-2026.

**Figure 2 – Eunice Monument in Relation to Other Oil Fields**

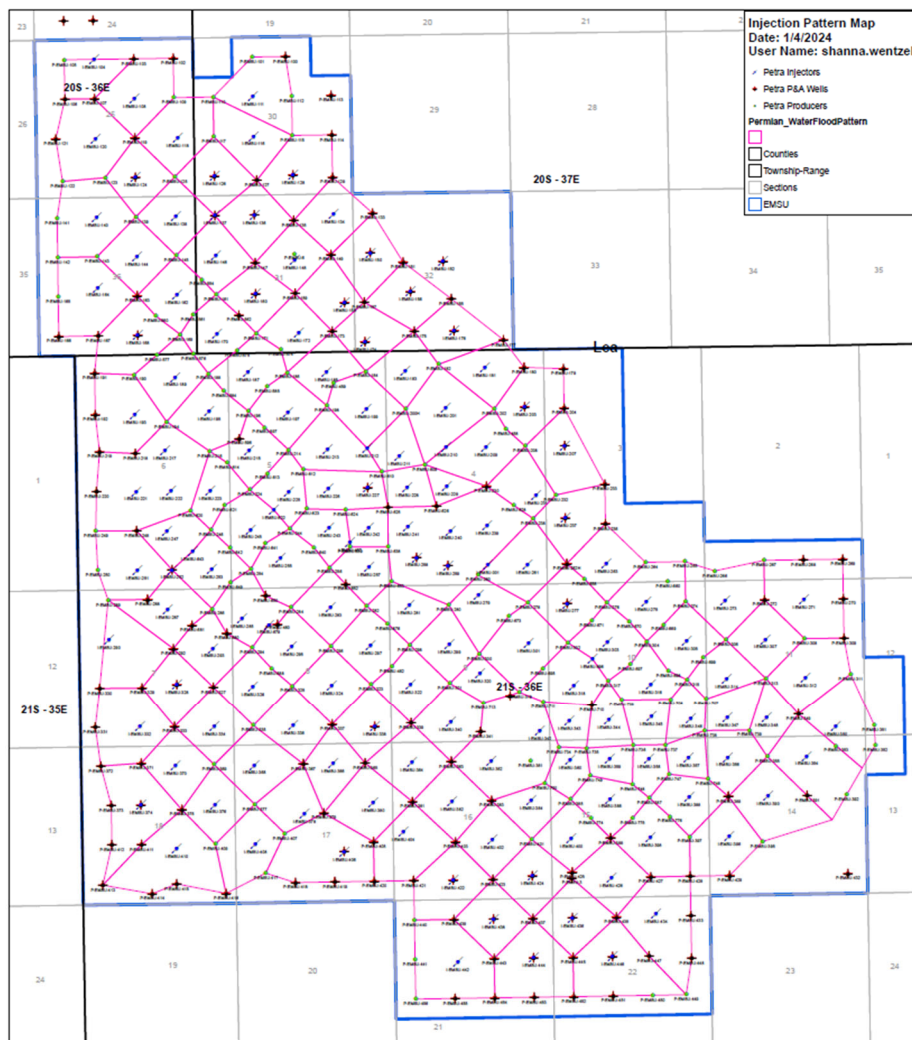




# Eunice Monument South Unit (EMSU)

As shown by the cover page, EMSU is located roughly 21 miles southwest of Hobbs in Lea County, New Mexico. This Grayburg and San Andres 14,190 acre unitized interval has been developed using 417 wells thus far. Primary production occurred from the early 1930's to November 1986 when water injection began. Reservoir pressure in the Grayburg had dropped from 1450 psi to 250 psi at the start of the waterflood. From March 1985 to November 2005, 126 new wells were drilled at EMSU to establish the 40-acre spacing for waterflood and to improve oil recovery with some 20-acre infills. In June, 1989 there were 205 producers, 133 water injectors, and 6 water supply wells. San Andres water was produced by these supply wells to pressure up the Grayburg interval. The UNIT currently has 111 producers, 103 water injectors, and 2 water supply wells. Production is 830 BOPD; 67,600 BWPD, and 540 MCFPD with all produced water reinjected.

Figure 3 - Eunice Monument South Unit – Waterflood Patterns



Information from the February 27, 1990 Working Interest Owner’s meeting provided the following information regarding reservoir properties and oil in place for EMSU Grayburg interval. Based on this average data, each 80-acre drainage area would have 3.881 MMBO OOIP or 4.657 MMRB Hydrocarbon Pore Volume (HCPV) which is used in CO2 oil production forecasting. In addition to the 671.5 million barrels of original oil-in-place in the Grayburg, ExxonMobil (XTO Energy) estimated 912 million barrels of oil in the San Andres ROZ interval down to a subsea depth of -700 feet. Core data taken in the EMSU-679 showed oil down to -750 feet subsea indicating a potentially larger ROZ OOIP. By definition of ROZ, none of this oil has been produced by primary production and waterflood of the Grayburg interval. New wells drilled will provide additional insight into San Andres oil volume.

**TABLE 1 – EMSU Reservoir Parameters Based on 1990 Working Interest Owner’s Meeting**

<b>EMSU RESERVOIR PARAMETERS</b>	
<b>UNIT AREA</b>	<b>14190 ACRES</b>
<b>INITIAL RESERVOIR PRESSURE</b>	<b>1450 PSI</b>
<b>RESERVOIR PRESSURE AT START OF WATERFLOOD</b>	<b>250 PSI</b>
<b>SATURATION PRESSURE</b>	<b>1372 PSI</b>
<b>SOLUTION GOR</b>	<b>423 SCF/STB</b>
<b>CURRENT PRODUCING GOR</b>	<b>4007 SCF/STB</b>
<b>RESERVOIR TEMPERATURE</b>	<b>90 DEG F</b>
<b>OIL GRAVITY</b>	<b>32 DEG API</b>
<b>INITIAL FORMATION VOLUME FACTOR</b>	<b>1.20 RB/STB</b>
<b>CURRENT FORMATION VOLUME FACTOR</b>	<b>1.05 RB/STB</b>
<b>AVERAGE NET PAY</b>	<b>134 FT</b>
<b>AVERAGE POROSITY</b>	<b>8.0 %</b>
<b>INITIAL WATER SATURATION</b>	<b>30.0 %</b>
<b>OIL SATURATION AT START OF WATERFLOOD</b>	<b>50.0 %</b>
<b>RESIDUAL OIL SATURATION</b>	<b>25.0 %</b>
<b>VOLUMETRIC SWEEP EFFICIENCY</b>	<b>60 %</b>
<b>ULTIMATE PRIMARY RECOVERY</b>	<b>134.3 MMBO</b> <b>20 % OOIP</b>
<b>OOIP</b>	<b>671.5 MMBO</b>
<b>ESTIMATED SECONDARY RECOVERY</b>	<b>65.8 MMBO</b> <b>9.8 % OOIP</b>
<b>SECONDARY TO PRIMARY RATIO</b>	<b>49 %</b>
<b>ESTIMATED RECOVERY DUE TO INFILL DRILLING</b>	<b>5 % OOIP</b> <b>33 MMBO</b>
<b>ESTIMATED RECOVERY DUE TO CO2 FLOODING</b>	<b>10 % OOIP</b> <b>67 MMBO</b>

Based on Table 1, Chevron estimated during 1990 that EMSU ultimate recovery with waterflood would be around 200.1 MMBO or 29.8% OOIP (134.3 MMBO primary, 65.8 MMBO waterflood) and that infill drilling could add an additional 33 MMBO, resulting in 230.1 MMBO ultimate recovery. Cumulative oil to date is approximately 123.6 MMBO (18.4% OOIP) therefore the waterflood did not perform as well as predicted. This leaves a large target oil for conformance work, infill drilling, and CO2 flooding.

As highlighted in SPE paper #49201 written in 1998 by Chevron, waterflood patterns suffered from rapid water breakthrough due to high permeability streaks in the lower half of Zones 1 and 2, and also had slow pressure increase due to low injection to withdrawal (production) ratios. In all, the oil production rate decreased in 70% of the wells and total field oil production dropped after the waterflood was implemented. In 1996 Chevron started the EMSU Waterflood Conformance Project to characterize the flood conformance and squeeze off the high permeability streaks which caused cycling of injected water and bypassed oil. The project focus area consisted of 16 contiguous 80-acre producer centered patterns. The EMSU reservoir characterization was a long process that included the creation of conformance cross-sections, mapping of high perm streaks, calculating the percent hydrocarbon pore volume (HCPV) swept for each major zone, and production diagnostics. Unfortunately this information was not conveyed to Empire Petroleum and it is having to be re-created.

Conformance problems were observed over the entire EMSU when evaluated during 1996. It was confirmed during the study that (1) the reservoir contained natural fractures and extensive permeability streaks and (2) large volumes of water were being injected into the secondary gas cap formed when the reservoir pressure dropped from discovery in 1929 to start of the waterflood in 1986. The steps taken to increase oil production and decrease cycling of water between injector and producer were (1) eliminate water injection into the gas cap, including the Penrose interval which overlies the Grayburg and (2) stimulation of under processed zones in both injection and production wells. Injection of water into the gas cap was initially allowed to prevent oil from being pushed into the gas cap and the high water injection rates into the gas cap reduced the time to pressure up the reservoir. Cement squeezes were applied when there was a barrier isolating the thief zone from the rest of the productive interval. Gel treatments were also applied to achieve deep penetration into the matrix and fractures.

This conformance work which occurred from March 1997 to April 1998 is described in this document so that everyone is aware of the challenges which will be faced during the CO2 flood. To prevent CO2 cycling through the high permeability intervals in Zones 1 and 2 of the Grayburg, the CO2 flood will focus on Layers 3, 4, and 5 of the Grayburg and the entire ROZ interval of the San Andres. CO2 flood design will be discussed later in more detail.

Tables 2 thru 5 show the water injection rates and production rates for each well at EMSU. The tables have 109 producers and 97 water injectors, with 3 wells shut-in. The water injection rates provide some insight into what the probable CO2 injection rate for each well will be. The average water injection rate is 506 BWPD which would suggest a CO2 injection rate of around 1000 MCF/day (54 tons per day per well). This is dependent upon the pressure coming off the CO2 pipeline.

**TABLE 2 – EMSU Water Injector Rates (Page 1 of 2)**

Lease	Well No	Type Well	API	BWPD Injecti
EMSU	108	INJ	30025043300000	39
EMSU	118	INJ	30025295980000	84
EMSU	120	INJ	30025043320000	575
EMSU	134	INJ	30025063060000	14
EMSU	140	INJ	30025044250000	89
EMSU	146	INJ	30025063040000	984
EMSU	148	INJ	30025299460000	110
EMSU	162	INJ	30025044190000	875
EMSU	164	INJ	30025298200000	97
EMSU	170	INJ	30025062970000	95
EMSU	172	INJ	30025299120000	1124
EMSU	181	INJ	30025044790000	24
EMSU	183	INJ	30025044930000	124
EMSU	187	INJ	30025045150000	307
EMSU	189	INJ	30025296140000	295
EMSU	193	INJ	30025045350000	322
EMSU	195	INJ	30025045320000	434
EMSU	197	INJ	30025045110000	493
EMSU	199	INJ	30025045100000	263
EMSU	201	INJ	30025044720000	138
EMSU	210	INJ	30025044690000	178
EMSU	211	INJ	30025296150000	321
EMSU	213	INJ	30025045030000	486
EMSU	215	INJ	30025045080000	363
EMSU	217	INJ	30025299110000	416
EMSU	221	INJ	30025087060000	1514
EMSU	222	INJ	30025045310000	956
EMSU	223	INJ	30025045300000	309
EMSU	226	INJ	30025045010000	543
EMSU	228	INJ	30025044900000	322
EMSU	229	INJ	30025044670000	6
EMSU	231	INJ	30025044640000	176
EMSU	239	INJ	30025044680000	254
EMSU	240	INJ	30025298670000	637
EMSU	241	INJ	30025044890000	322
EMSU	242	INJ	30025045190000	336
EMSU	245	INJ	30025044980000	935
EMSU	247	INJ	30025295750000	455
EMSU	251	INJ	30025045200000	1107
EMSU	253	INJ	30025087020000	798
EMSU	255	INJ	30025200720000	658
EMSU	257	INJ	30025044960000	731
EMSU	261	INJ	30025044710000	259
EMSU	263	INJ	30025044560000	771
EMSU	271	INJ	30025046120000	321
EMSU	273	INJ	30025046090000	464
EMSU	275	INJ	30025045980000	1
EMSU	279	INJ	30025045810000	701
EMSU	281	INJ	30025045770000	954

**TABLE 3 – EMSU Water Injector Rates (Page 2 of 2)**

Lease	Well No	Type Well	API	BWPD Injecti
EMSU	283	INJ	30025045690000	536
EMSU	285	INJ	30025245630000	933
EMSU	287	INJ	30025299090000	657
EMSU	293	INJ	30025045390000	334
EMSU	297	INJ	30025045680000	794
EMSU	301	INJ	30025045870000	678
EMSU	303	INJ	30025045940000	1205
EMSU	305	INJ	30025045970000	988
EMSU	307	INJ	30025087080000	328
EMSU	314	INJ	30025046050000	566
EMSU	316	INJ	30025298820000	1045
EMSU	318	INJ	30025299010000	84
EMSU	320	INJ	30025045780000	239
EMSU	322	INJ	30025045740000	671
EMSU	326	INJ	30025045590000	99
EMSU	340	INJ	30025045720000	139
EMSU	343	INJ	30025045890000	295
EMSU	344	INJ	30025045920000	526
EMSU	345	INJ	30025298230000	589
EMSU	346	INJ	30025298810000	641
EMSU	347	INJ	30025046060000	276
EMSU	350	INJ	30025046140000	516
EMSU	354	INJ	30025046400000	300
EMSU	356	INJ	30025046290000	742
EMSU	357	INJ	30025046430000	364
EMSU	358	INJ	30025046420000	182
EMSU	359	INJ	30025046510000	853
EMSU	360	INJ	30025046490000	1478
EMSU	362	INJ	30025046620000	352
EMSU	366	INJ	30025046990000	171
EMSU	368	INJ	30025046970000	341
EMSU	370	INJ	30025046840000	852
EMSU	376	INJ	30025046800000	380
EMSU	378	INJ	30025046870000	221
EMSU	382	INJ	30025046630000	217
EMSU	386	INJ	30025046520000	282
EMSU	388	INJ	30025046410000	830
EMSU	396	INJ	30025046330000	109
EMSU	398	INJ	30025046470000	199
EMSU	400	INJ	30025046530000	206
EMSU	404	INJ	30025046880000	270
EMSU	408	INJ	30025046920000	563
EMSU	410	INJ	30025302810000	1910
EMSU	434	INJ	30025296020000	1470
EMSU	442	INJ	30025295840000	1495
EMSU	643	INJ	30025305120000	795
EMSU	679	INJ	30025310090000	266
EMSU	696	INJ	30025341370000	294

**TABLE 4 – EMSU Oil Production Rates (Page 1 of 2)**

Lease	Well No	Type Well	API	Total Flu	BOPD	BWPD
EMSU	101	PROD	30025302200000	313	7	306
EMSU	115	PROD	30025062950000	28	1	27
EMSU	117	PROD	30025293960000	1120	5	1115
EMSU	122	PROD	30025302770000	101	6	96
EMSU	125	PROD	30025043220000	202	3	199
EMSU	141	PROD	30025044290000	317	7	309
EMSU	142	PROD	30025044280000	329	1	327
EMSU	145	PROD	30025125450000	886	12	875
EMSU	161	PROD	30025063050000	804	6	798
EMSU	169	PROD	30025295830000	186	5	181
EMSU	171	PROD	30025062960000	552	1	550
EMSU	182	PROD	30025298680000	28	2	26
EMSU	184	PROD	30025045130000	275	5	270
EMSU	188	PROD	30025045330000	383	7	376
EMSU	190	PROD	30025045360000	133	3	130
EMSU	196	PROD	30025045140000	816	2	814
EMSU	198	PROD	30025296820000	4	4	0
EMSU	209	PROD	30025044730000	1710	28	1682
EMSU	212	PROD	30025045040000	330	3	326
EMSU	214	PROD	30025045070000	1091	8	1082
EMSU	224	PROD	30025045060000	485	9	476
EMSU	238	PROD	30025044660000	197	10	187
EMSU	244	PROD	30025044970000	363	4	359
EMSU	246	PROD	30025045270000	490	6	485
EMSU	249	PROD	30025045250000	1033	11	1023
EMSU	250	PROD	30025045260000	297	8	289
EMSU	254	PROD	30025045000000	1825	27	1798
EMSU	260	PROD	30025044630000	520	15	505
EMSU	265	PROD	30025044590000	166	4	162
EMSU	266	PROD	30025261010000	105	3	102
EMSU	267	PROD	30025044400000	147	1	146
EMSU	274	PROD	30025046020000	967	12	955
EMSU	276	PROD	30025046030000	1444	3	1441
EMSU	280	PROD	30025045730000	230	3	227
EMSU	282	PROD	30025219020000	476	5	471
EMSU	284	PROD	30025045610000	970	10	960
EMSU	286	PROD	30025045400000	878	5	874
EMSU	289	PROD	30025087070000	250	4	247
EMSU	290	PROD	30025045430000	17	0	16
EMSU	294	PROD	30025045620000	2035	19	2017
EMSU	296	PROD	30025045660000	478	7	471
EMSU	300	PROD	30025045790000	312	3	309
EMSU	306	PROD	30025046040000	644	18	627
EMSU	308	PROD	30025046180000	392	7	384
EMSU	313	PROD	30025046080000	570	11	559
EMSU	315	PROD	30025046000000	1271	7	1264
EMSU	317	PROD	30025045900000	786	6	780
EMSU	319	PROD	30025045840000	744	13	731
EMSU	321	PROD	30025045700000	704	9	694
EMSU	323	PROD	30025045550000	239	5	234
EMSU	325	PROD	30025045560000	1686	22	1664
EMSU	351	PROD	30025046220000	99	3	96
EMSU	352	PROD	30025046250000	114	8	107
EMSU	355	PROD	30025046360000	164	13	151
EMSU	361	PROD	30025046550000	1469	8	1461

**TABLE 5 – EMSU Oil Production Rates (Page 2 of 2)**

Lease	Well No	Type Well	API	Total Flu	BOPD	BWPD
EMSU	377	PROD	30025046890000	435	5	430
EMSU	385	PROD	30025046500000	1042	18	1025
EMSU	387	PROD	30025046450000	517	11	506
EMSU	395	PROD	30025298210000	19	2	17
EMSU	401	PROD	30025046670000	3114	13	3101
EMSU	407	PROD	30025245880000	193	1	192
EMSU	440	PROD	30025047350000	1810	13	1796
EMSU	449	PROD	30025253510000	68	1	67
EMSU	462	PROD	30025296220000	517	2	514
EMSU	554	PROD	30025348450000	184	8	176
EMSU	560	PROD	30025354610000	535	1	534
EMSU	574	PROD	30025351600000	140	3	137
EMSU	575	PROD	30025348240000	300	2	298
EMSU	576	PROD	30025346400000	140	10	130
EMSU	584	PROD	30025341390000	291	6	284
EMSU	609	PROD	30025314060000	430	7	423
EMSU	610	PROD	30025314070000	343	4	339
EMSU	612	PROD	30025351590000	166	2	164
EMSU	613	PROD	30025351610000	605	5	601
EMSU	614	PROD	30025354530000	517	2	514
EMSU	620	PROD	30025305110000	365	2	362
EMSU	621	PROD	30025331860000	305	2	303
EMSU	624	PROD	30025314080000	877	6	871
EMSU	628	PROD	30025372790000	30	4	26
EMSU	638	PROD	30025314260000	132	4	127
EMSU	639	PROD	30025314090000	487	6	481
EMSU	640	PROD	30025342120000	53	1	53
EMSU	641	PROD	30025331890000	630	2	628
EMSU	642	PROD	30025309580000	1055	11	1044
EMSU	653	PROD	30025342130000	1914	36	1878
EMSU	658	PROD	30025372800000	760	8	753
EMSU	660	PROD	30025373190000	173	4	169
EMSU	669	PROD	30025341380000	384	6	378
EMSU	670	PROD	30025342140000	269	5	263
EMSU	671	PROD	30025354560000	500	2	498
EMSU	673	PROD	30025373200000	10	6	3
EMSU	676	PROD	30025354570000	1269	8	1262
EMSU	688	PROD	30025352050000	1223	8	1216
EMSU	699	PROD	30025342150000	363	3	360
EMSU	707	PROD	30025351640000	130	7	123
EMSU	709	PROD	30025348490000	518	4	514
EMSU	711	PROD	30025348500000	733	1	732
EMSU	713	PROD	30025373210000	146	3	143
EMSU	735	PROD	30025348260000	694	10	684
EMSU	736	PROD	30025348520000	658	7	651
EMSU	737	PROD	30025348530000	518	13	505
EMSU	738	PROD	30025351650000	942	14	928
EMSU	739	PROD	30025354580000	522	4	518
EMSU	746	PROD	30025373560000	334	4	330
EMSU	748	PROD	30025346320000	1140	14	1126
EMSU	749	PROD	30025346410000	849	10	839
EMSU	750	PROD	30025351680000	2174	8	2165
EMSU	774	PROD	30025351660000	880	26	854
EMSU	776	PROD	30025354600000	1610	10	1601

## Arrowhead Grayburg Unit (AGU)

AGU consists of 5,922.26 acres of unitized interval in the Grayburg and San Andres formations. For AGU, the top of the UNIT is defined as -150' subsea or the top of the Grayburg, whichever is shallowest, and the base is defined as -1500' subsea. Essentially all oil produced from the unit was produced from the Grayburg. Some tests were made in the San Andres on new wells drilled during the 1998-2006 time period, and although oil rates were higher than what was seen at EMSU, the San Andres is considered a ROZ (residual oil zone) for all three units. Plans are to CO2 flood both the Grayburg and San Andres intervals.

AGU was discovered May 24, 1938 by Continental's State J-2 Well No. 1 and produces from the Grayburg carbonate (predominately dolomite) formation with average porosity of 8% and average net thickness of 85 feet. The field was developed on 40 acre spacing and completions were typically open-hole and included both the Penrose (Queen lowest member) and Grayburg formations. Chevron estimated OOIP of 175.4 million barrels 34<sup>o</sup> API oil based on initial water saturation of 25% and oil formation volume factor of 1.2 RB/STB. The reservoir had produced 30.8 million barrels as of 12-31-1988 (based on Unitization document) and was expected to recover an additional 5.23 million barrels with depletion drive, resulting in 36.03 million barrels (21% primary oil recovery factor). Reservoir pressure dropped from 1460 psi to 450 psi by 1964 and by the time first water injection occurred in September 1992, reservoir pressure had dropped below 300 psi. At the time the UNIT was proposed in September, 1989, the field was producing 1083 BOPD, 8255 BWPD, and 4223 MCFPD with watercut of 88.4% and GOR of 3899 scf/stb. Initial solution GOR was approximately 432 scf/stb and bubble point pressure 1372 psi based on Eunice Monument South Unit values.

Chevron estimated incremental oil reserves of 15 MMBO for the waterflood. This would have resulted in 51.1 MMBO ultimate recovery or 29.13% OOIP. The waterflood did not perform well due to the low initial reservoir pressure, high initial gas saturation at the start of the waterflood, and high permeability intervals in the Upper Grayburg interval. Cumulative production to date is approximately 36.2 MMBO which is very close to the predicted primary recovery without waterflood. This leaves a large target oil for conformance work, infill drilling, and CO2 flood. The field still produces approximately 190 BOPD; 25,000 BWPD, and 221 MCFPD while injecting the 25,000 BWPD. Watercut is 99.25%.

The cumulative oil map on the next page was used to determine the oil recovery from each well as of 12/31/1988, the date used for the unitization document. (A similar approach was used at EMSU.) Sixty-eight (68) wells did not have cumulative oil volumes in the "IHS" database so this identified 14.9 MMBO which needed to be added. The "IHS" cumulative volume as of 12/31/1988



on 58 wells matched the volumes on the cumulative oil map and therefore no correction was required on those wells. The 19 new producers drilled at the start of the waterflood and thereafter produced a total of 1.362 MMBO, an average of 71,667 barrels per well. The waterflood used 51 five-spot patterns as shown on page 3, with the pattern designation indicating the water injector in the center of the pattern. Cumulative water injection is 457.8 MMBW with incremental oil recovery since 12/31/1988 of 6.4 MMBO based on this analysis.

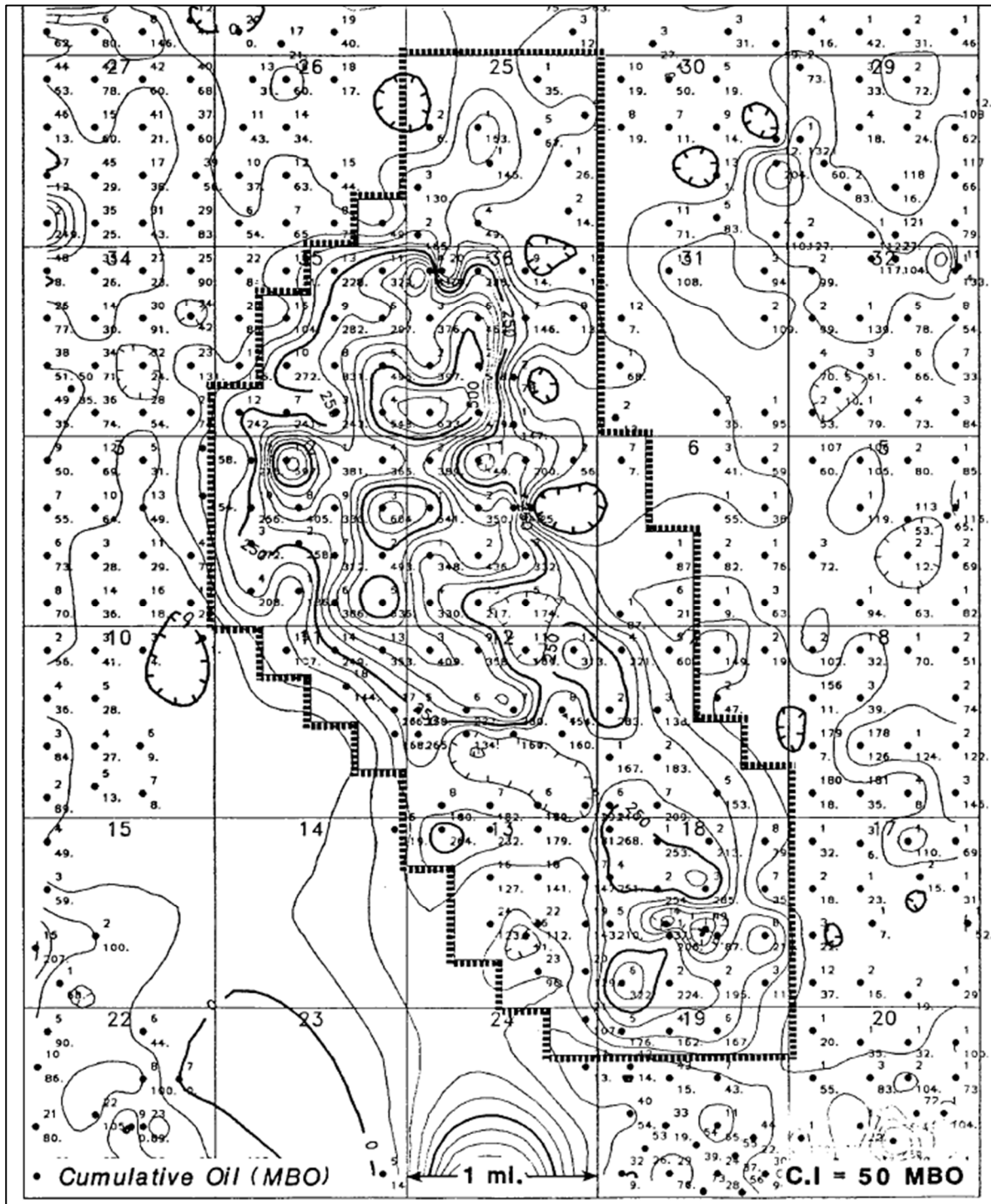
**TABLE 6 – AGU Reservoir Parameters based on Sept-1989 Technical Committee Report**

PROPOSED ARROWHEAD GRAYBURG UNIT PERTINENT RESERVOIR DATA	
Pool Discovery Well:	Continental State J-2 No. 1
Discovery Date:	5-24-38
Producing Formation:	Grayburg
Lithology:	Dolomite
Average Porosity:	8%
Average Net Thickness:	85 ft
Swi:	25%
Initial Reservoir Pressure (250 S.S.):	1460 psi
Reservoir Temperature:	90° F
Oil Gravity (API):	34°
Cumulative Oil Recovery (12-31-88):	30.8 MMSTBO
Predicted Ultimate Primary Recovery:	36.1 MMSTBO
OOIP:	175.4 MMSTBO

The predicted ultimate primary recovery in this table is without waterflood or additional infill drilling. Current cumulative oil production is 36.2 MMBO after the waterflood and infill drilling.

Based on this average data, each 80-acre drainage area would have 2.638 MMBO OOIP or 3.165 MMRB Hydrocarbon Pore Volume (HCPV) which is used in CO<sub>2</sub> oil production forecasting to be discussed later.

Figure 4 - Cumulative Oil by Well – December 31, 1988



**Table 7 - Arrowhead Grayburg Unit – Production Rates by Well**

Lease	Well No	Type Well	API	Total Flu	BOPD	BWPD
AGU	107	PROD	30025216200000	96	2	94
AGU	108	PROD	30025239490000	44	2	42
AGU	120	PROD	30025290930000	113	5	108
AGU	125	PROD	30025314330000	123	4	119
AGU	127	PROD	30025049330000	2421	6	2416
AGU	135	PROD	30025049170000	1830	9	1821
AGU	140	PROD	30025049210000	1981	7	1974
AGU	142	PROD	30025049280000	97	2	95
AGU	149	PROD	30025087330000	1317	14	1303
AGU	157	PROD	30025087400000	1019	8	1011
AGU	166	PROD	30025087240000	113	4	109
AGU	168	PROD	30025087270000	1342	15	1326
AGU	170	PROD	30025314350000	1149	3	1146
AGU	186	PROD	30025317220000	417	3	414
AGU	195	PROD	30025088820000	347	7	340
AGU	197	PROD	30025316310000	665	8	658
AGU	204	PROD	30025264780000	3205	10	3195
AGU	211	PROD	30025315340000	576	10	567
AGU	213	PROD	30025315820000	62	2	60
AGU	215	PROD	30025317510000	228	4	224
AGU	219	PROD	30025316090000	2064	11	2053
AGU	247	PROD	30025103620000	29	6	23
AGU	328	PROD	30025372820000	325	4	321
AGU	335	PROD	30025346360000	182	11	171
AGU	336	PROD	30025342970001	570	7	563
AGU	342	PROD	30025346370000	1006	8	998
AGU	343	PROD	30025348440000	963	7	956
AGU	351	PROD	30025349270000	550	5	545
AGU	390	PROD	30025342990000	586	6	580

**Table 8 - Arrowhead Grayburg Unit – Water Injection Rates by Well**

Lease	Well No	Type Well	API	BWPD Injecti
AGU	106	INJ	30025233240000	115
AGU	113	INJ	30025315190000	904
AGU	115	INJ	30025239390000	1991
AGU	119	INJ	30025049320000	1972
AGU	124	INJ	30025049160000	739
AGU	128	INJ	30025241050000	557
AGU	132	INJ	30025049290000	602
AGU	133	INJ	30025049390000	328
AGU	134	INJ	30025049200000	997
AGU	139	INJ	30025313050000	1041
AGU	141	INJ	30025049380000	583
AGU	143	INJ	30025049400000	182
AGU	148	INJ	30025313930000	671
AGU	150	INJ	30025087410000	943
AGU	151	INJ	30025087380000	914
AGU	158	INJ	30025087210000	776
AGU	159	INJ	30025087230000	543
AGU	160	INJ	30025242720000	476
AGU	167	INJ	30025087280000	421
AGU	169	INJ	30025087390000	1644
AGU	175	INJ	30025087450000	597
AGU	177	INJ	30025087290000	973
AGU	179	INJ	30025087260000	797
AGU	187	INJ	30025088860000	398
AGU	189	INJ	30025088720000	533
AGU	194	INJ	30025088810000	617
AGU	196	INJ	30025088830000	1985
AGU	198	INJ	30025100920000	820
AGU	199	INJ	30025315600000	368
AGU	201	INJ	30025316750000	63
AGU	203	INJ	30025313790000	2048
AGU	205	INJ	30025266590000	559
AGU	210	INJ	30025263910000	616
AGU	217	INJ	30025315620000	247
AGU	220	INJ	30025314370000	605
AGU	225	INJ	30025314100000	115
AGU	227	INJ	30025312450000	1211
AGU	229	INJ	30025317400000	334
AGU	233	INJ	30025258780000	222
AGU	240	INJ	30025316320000	834
AGU	241	INJ	30025315350000	28
AGU	242	INJ	30025313290000	342
AGU	600	INJ	30025312340000	3808

**Table 9 -Cumulative Oil Volumes and Acreage for 51 Patterns at AGU**

	TOTALS	3,945.92	460,545,536	36,190,158	29,826,699	6,363,459	
#	Pattern Designation	Acreage	Cumulative Water Injection	CUM OIL 8/31/2023	CUM OIL 12/31/1988	Incremental Oil BBLs	Incremental % of Primary
1	AGU-106	99.80	3,930,424	319,634	242,952	76,682	31.6%
2	AGU-110 P&A	98.07	2,932,017	346,848	324,641	22,207	6.8%
3	AGU-113	78.75	9,217,524	337,579	284,260	53,319	18.8%
4	AGU-115	59.47	1,662,697	118,357	114,469	3,889	3.4%
5	AGU-119	69.66	12,354,000	503,795	415,927	87,868	21.1%
6	AGU-121 P&A	93.29	5,690,848	604,811	558,479	46,332	8.3%
7	AGU-124	80.29	9,386,016	871,366	774,231	97,135	12.5%
8	AGU-126 P&A	80.61	5,736,204	777,944	632,390	145,555	23.0%
9	AGU-128	79.84	7,090,348	295,173	255,167	40,006	15.7%
10	AGU-132	76.70	5,009,630	936,751	826,932	109,819	13.3%
11	AGU-134	77.31	12,668,503	1,216,868	1,003,566	213,302	21.3%
12	AGU-139	82.30	13,852,450	1,064,663	916,455	148,208	16.2%
13	AGU-141	80.07	8,077,883	1,486,450	1,084,432	402,018	37.1%
14	AGU-143	69.35	7,412,703	378,303	342,007	36,296	10.6%
15	AGU-146 P&A	73.27	1,929,685	156,827	153,296	3,532	2.3%
16	AGU-148	79.77	7,854,274	614,081	402,691	211,390	52.5%
17	AGU-150	79.87	13,498,012	1,247,967	837,688	410,279	49.0%
18	AGU-152 P&A	77.07	2,519,648	1,485,191	1,430,096	55,095	3.9%
19	AGU-156	78.25	15,504,519	1,063,953	871,781	192,173	22.0%
20	AGU-158	80.08	10,874,569	1,293,129	960,715	332,415	34.6%
21	AGU-160	79.68	10,429,676	476,118	412,719	63,399	15.4%
22	AGU-167	86.09	7,611,414	909,838	774,262	135,576	17.5%
23	AGU-169	71.80	16,713,886	1,316,411	966,720	349,690	36.2%
24	AGU-171 P&A	78.44	10,770,159	1,030,798	920,138	110,659	12.0%
25	AGU-175	76.12	13,048,808	1,089,168	904,591	184,577	20.4%
26	AGU-177	82.31	15,405,955	969,259	730,710	238,549	32.6%
27	AGU-179	79.86	9,194,996	422,395	380,069	42,326	11.1%
28	AGU-181	81.40	2,741,832	365,982	297,789	68,193	22.9%
29	AGU-185 P&A	84.31	3,368,416	545,241	466,371	78,870	16.9%
30	AGU-187	94.89	7,487,158	733,790	639,634	94,156	14.7%
31	AGU-189	82.20	11,681,631	1,076,604	982,002	94,603	9.6%
32	AGU-194	50.85	8,112,384	897,289	835,602	61,688	7.4%
33	AGU-196	76.64	15,197,838	724,698	584,171	140,527	24.1%
34	AGU-198	78.12	5,227,806	647,557	534,533	113,024	21.1%
35	AGU-201	86.98	5,154,170	380,573	346,000	34,573	10.0%
36	AGU-203	62.59	14,951,626	571,663	312,500	259,163	82.9%
37	AGU-205	84.66	10,431,255	715,586	595,084	120,503	20.2%
38	AGU-210	67.27	8,832,383	634,653	397,762	236,891	59.6%
39	AGU-212	65.67	15,453,567	601,611	433,250	168,361	38.9%
40	AGU-214	73.41	5,537,366	387,005	302,583	84,422	27.9%
41	AGU-218 P&A	66.29	7,462,504	673,171	533,083	140,087	26.3%
42	AGU-220	59.35	8,291,121	515,200	361,846	153,354	42.4%
43	AGU-222 P&A	69.53	2,169,336	756,089	725,355	30,734	4.2%
44	AGU-225	72.53	10,890,436	412,409	403,409	9,000	2.2%
45	AGU-227	78.85	12,075,196	640,247	470,750	169,497	36.0%
46	AGU-229	82.62	9,050,967	623,212	581,419	41,793	7.2%
47	AGU-233	66.35	5,596,450	650,007	478,586	171,421	35.8%
48	AGU-235	82.27	6,871,479	518,717	457,063	61,654	13.5%
49	AGU-240	80.58	10,993,597	741,540	624,970	116,570	18.7%
50	AGU-242	74.04	4,102,761	471,516	446,086	25,430	5.7%
51	AGU-246 P&A	76.39	1,326,000	572,125	495,470	76,655	15.5%
52	AGU-133		4,997,737	Converted to Water Injector April 2001			
53	AGU-151		9,340,882	Converted to Water Injector April 2001			
54	AGU-159		9,738,704	Converted to Water Injector April 2001			
55	AGU-199		2,141,755	Converted to Water Injector March 2008			
56	AGU-217		498,457	Converted to Water Injector March 2010			
57	AGU-241		443,874	Converted to Water Injector November 2007			

**Table 10 - Cumulative Oil & Water Injection for Wells at AGU (Page 1 of 4)**

			29,826,699	36,190,158	6,363,459
	Converted		Cum Oil	Cum Oil	Incremental
#	to INJ	Producer	12/31/1988	8/31/2023	BBLs
1		AGU-101 P&A	35,102	49,970	14,868
2		104	6,000	6,000	-
3		AGU-105 P&A	153,000	153,845	845
4	INJ	AGU-106	66,641	66,641	-
5		AGU-107	58,709	120,100	61,391
6		AGU-108	25,891	46,522	20,631
7	INJ	AGU-110 P&A	145,000	145,000	-
8		AGU-111	130,000	130,000	-
9		112	49,000	49,000	-
10	INJ	AGU-113	165,000	191,713	26,713
11		AGU-114 P&A	49,000	53,614	4,614
12	INJ	AGU-115	83,815	83,815	-
13		AGU-116 P&A	13,737	16,472	2,735
14		117	1,000	1,000	-
15		AGU-118	14,000	14,000	-
16	INJ	AGU-119	315,000	341,410	26,410
17		AGU-120	70,040	171,848	101,808
18	INJ	AGU-121 P&A	328,219	332,378	4,159
19		122	228,000	228,000	-
20		AGU-123 P&A	103,554	113,461	9,907
21	INJ	AGU-124	282,000	287,461	5,461
22		AGU-125	297,000	363,884	66,884
23	INJ	AGU-126 P&A	376,000	432,089	56,089
24		AGU-127	262,000	401,410	139,410
25	INJ	AGU-128	146,000	150,162	4,162
26		129	13,000	13,000	-
27		AGU-131 P&A	78,000	80,974	2,974
28	INJ	AGU-132	516,781	530,638	13,857
29	INJ	AGU-133	396,518	403,784	7,266
30	INJ	AGU-134	493,063	510,717	17,654
31		AGU-135	330,281	525,419	195,138
32		136	271,000	271,000	-
33		137	242,000	242,000	-
34		AGU-138Y	241,000	281,227	40,227
35	INJ	AGU-139	243,000	243,000	-
36		AGU-140	546,786	749,551	202,765
37	INJ	AGU-141	632,169	649,184	17,015
38		AGU-142	478,084	594,183	116,099
39	INJ	AGU-143	146,403	151,520	5,117
40		AGU-144 P&A	-	940	940

**Table 11 - Cumulative Oil & Water Injection for Wells at AGU (Page 2 of 4)**

			29,826,699	36,190,158	6,363,459
	Converted		Cum Oil	Cum Oil	Incremental
#	to INJ	Producer	12/31/1988	8/31/2023	BBLs
41		145	7000	7000	-
42	INJ	AGU-146 P&A	56,185	58,445	2,260
43		AGU-147 P&A	200,332	203,105	2,773
44	INJ	AGU-148	49,000	49,000	-
45		AGU-149	387,664	674,518	286,854
46	INJ	AGU-150	358,821	393,249	34,428
47	INJ	AGU-151	379,324	393,124	13,800
48	INJ	AGU-152 P&A	595,432	607,638	12,206
49		153	278,000	278,000	-
50		154	256,000	256,000	-
51		AGU-155	405,000	462,976	57,976
52	INJ	AGU-156	328,193	333,107	4,914
53		AGU-157	601,694	826,915	225,221
54	INJ	AGU-158	539,657	555,533	15,876
55	INJ	AGU-159	348,685	362,575	13,890
56	INJ	AGU-160	125,000	161,878	36,878
57		AGU-161 P&A	80,055	80,272	217
58		163	87,000	87,000	-
59		AGU-166	331,312	398,051	66,739
60	INJ	AGU-167	435,857	442,448	6,591
61		AGU-168	346,187	611,818	265,631
62	INJ	AGU-169	493,000	539,783	46,783
63		AGU-170	312,000	450,944	138,944
64	INJ	AGU-171 P&A	258,000	258,000	-
65		AGU-172 P&A	270,805	288,516	17,711
66		AGU-174	186,000	263,774	77,774
67	INJ	AGU-175	381,841	408,038	26,197
68		AGU-176	635,000	957,665	322,665
69	INJ	AGU-177	329,163	341,770	12,607
70		AGU-178	217,000	235,556	18,556
71	INJ	AGU-179	173,132	176,614	3,482
72		AGU-180	-	999	999
73	INJ	181	87,000	87,219	219
74		182	21,000	21,000	-
75		183	59,573	121,950	62,377
76		AGU-184	219,007	328,364	109,357
77	INJ	AGU-185 P&A	312,619	318,147	5,528
78		AGU-186	169,000	215,503	46,503
79	INJ	AGU-187	356,787	364,789	8,002
80		AGU-188 P&A	408,000	429,088	21,088

**Table 12 - Cumulative Oil & Water Injection for Wells at AGU (Page 3 of 4)**

			29,826,699	36,190,158	6,363,459
	Converted		Cum Oil	Cum Oil	Incremental
#	to INJ	Producer	12/31/1988	8/31/2023	BBLs
81	INJ	AGU-189	353,067	356,265	3,198
82		AGU-190 P&A	249,000	257,182	8,182
83		191	137,000	137,000	-
84		192	144,000	144,000	-
85		AGU-193 P&A	206,369	209,120	2,751
86	INJ	AGU-194	258,000	258,000	-
87		AGU-195	337,388	497,901	160,513
88	INJ	AGU-196	379,074	389,046	9,972
89		AGU-197	154,000	253,724	99,724
90	INJ	AGU-198	282,494	284,536	2,042
91	INJ	AGU-199	138,000	150,141	12,141
92		AGU-200	-	16,424	16,424
93	INJ	201	183,000	183,000	-
94		AGU-202	167,000	216,360	49,360
95	INJ	AGU-203	160,000	160,000	-
96		AGU-204	160,000	375,478	215,478
97	INJ	AGU-205	134,000	137,005	3,005
98		AGU-206 P&A	264,404	294,090	29,686
99		AGU-207 P&A	167,736	167,874	138
100		208	180,000	180,000	-
101		AGU-209 P&A	182,000	207,764	25,764
102	INJ	AGU-210	160,000	164,398	4,398
103		AGU-211	129,000	374,592	245,592
104	INJ	AGU-212	240,000	240,000	-
105		AGU-213	209,000	240,801	31,801
106	INJ	AGU-214	153,000	153,000	-
107		AGU-215	-	46,023	46,023
108		AGU-216 P&A	79,000	140,844	61,844
109	INJ	AGU-217	213,000	217,866	4,866
110	INJ	AGU-218 P&A	253,000	253,000	-
111		AGU-219	268,000	509,930	241,930
112	INJ	AGU-220	181,000	181,000	-
113		AGU-221 P&A	179,383	195,937	16,554
114	INJ	AGU-222 P&A	232,214	235,166	2,952
115		AGU-223	264,129	279,184	15,055
116		224	127,000	127,000	-
117	INJ	AGU-225	141,000	141,000	-
118		AGU-226 P&A	147,000	160,081	13,081
119	INJ	AGU-227	251,000	251,000	-
120		AGU-228 P&A	254,000	300,374	46,374



**Table 13 - Cumulative Oil & Water Injection for Wells at AGU (Page 4 of 4)**

			<b>29,826,699</b>	<b>36,190,158</b>		<b>6,363,459</b>
	Converted		Cum Oil	Cum Oil		Incremental
#	to INJ	Producer	12/31/1988	8/31/2023		BBLs
121	INJ	AGU-229	285,000	285,000		-
122		230	35,000	35,000		-
123		AGU-231	214,720	235,841		21,121
124		AGU-232 P&A	87,037	89,804		2,767
125	INJ	AGU-233	206,000	300,949		94,949
126		AGU-234	210,000	435,304		225,304
127	INJ	AGU-235	143,000	143,000		-
128		AGU-236 P&A	111,626	114,809		3,183
129		237	123,000	123,000		-
130		238	96,000	96,000		-
131		AGU-239 P&A	119,000	119,932		932
132	INJ	AGU-240	322,000	322,000		-
133	INJ	AGU-241	224,000	226,359		2,359
134	INJ	AGU-242	195,000	195,000		-
135		243	11,000	11,000		-
136		AGU-245	167,000	200,755		33,755
137	INJ	AGU-246 P&A	162,000	162,000		-
138		AGU-247	173,940	292,316		118,376
139		248	107,000	107,000		-
140		AGU-324	-	21,247		21,247
141		AGU-328	-	17,149		17,149
142		AGU-329	-	84,350		84,350
143		AGU-330	-	58,554		58,554
144		AGU-335	-	144,908		144,908
145		AGU-336	-	175,702		175,702
146		AGU-337Y P&A	-	666		666
147		AGU-342	-	146,884		146,884
148		AGU-343	-	64,130		64,130
149		AGU-344	-	68,064		68,064
150		AGU-351	-	41,774		41,774
151		AGU-352	-	63,311		63,311
152		AGU-359	-	66,273		66,273
153		AGU-360	-	22,664		22,664
154		AGU-369	-	48,977		48,977
155		AGU-390	-	160,868		160,868
156		AGU-391	-	52,380		52,380
157		AGU-398	-	48,130		48,130
158		AGU-408	-	75,649		75,649

Pattern analysis was performed to determine the oil recovery in each of the 51 patterns. Water injection began in Sept-1992 in a majority of the wells. The information on the left side of the table indicates AGU-105, 107, 101, and 109 are the four producers west, east, north, and south respectively of the AGU-106 water injector and that AGU-104 is also impacted by its water injection. Six additional water injectors (highlighted in blue) were added during 2001 to 2010 to increase water injection in the areas where the 20-acre infill wells were drilled from 1998 to 2005 and in areas where water injection had to be increased. The water injection wells recovered 14 MMBO prior to water injection and the producers recovered the additional 22.2 MMBO, resulting in 36.2 MMBO oil recovery. For this analysis we assumed that for a fully developed 5-spot pattern, one quarter of the production is produced by four separate patterns.

If we assume 8% porosity, 25% initial water saturation, 85 feet thickness, and 1.2 RB/STB for each pattern with actual pattern acreage (Table 7) used in the calculation of OOIP, we calculate 130 MMBO OOIP. Chevron's more detailed estimate of 175.4 MMBO included the unaccounted for OOIP contained in the one pattern where AGU-165 would be located if drilled, and volumes in the outlying areas around the patterns. The table below shows that 11 patterns have recovered over 1 million barrels of oil which would be 38% OOIP of a standard 80-acre pattern.

**Table 14 - Cumulative Oil Recovery (BBLs) as of 8/31/2023 by Pattern**

Wells Impacted by Injection													Oil Volume Produced By Each Well per Pattern													
457,803,704													14,005,751													36,190,158
#	Injector	Cumulative Water (MM)	Start-up	West Prod-1	East Prod-2	North Prod-3	South Prod-4	New1	New2	New3	New4	Injector CUM	West	East	North	South	New1	New2	New3	New4	TOTAL					
1	AGU-106	3,930,624		105	107	101	109	104				66,641	76,923	120,100	49,970	6,000					319,634					
2	AGU-110 P&A	2,932,017		111	109	105	114	108				145,000	65,000		76,923	13,404	46,322				346,848					
3	AGU-119	9,217,524		112	114	111	120					191,713	28,500	13,404	65,000	42,962					337,579					
4	AGU-115	1,662,697		114	116	109	118					83,815	13,404	16,472	4,667						118,357					
5	AGU-119	12,354,000		120	118	114	127	117				341,410	42,962	4,667	13,404	100,353	1,000				503,795					
6	AGU-121 P&A	5,690,848		122	120	112	125					332,378	114,000	42,962	24,500	90,971					604,811					
7	AGU-124	9,386,016		123	125	122	135	136				287,461	113,461	90,971	114,000	175,140	90,333				871,366					
8	AGU-126 P&A	5,736,204		125	127	120	133	324				432,089	90,971	100,353	42,962	100,946	10,624				777,944					
9	AGU-128	7,090,348		127	129	118	131					150,162	100,353	13,000	4,667	26,991					295,173					
10	AGU-132	5,009,630		133	131	127	142	330				530,638	100,946	26,991	100,353	148,546	29,277				936,751					
11	AGU-133	4,997,737	Apr-01																							
12	AGU-134	12,668,503		135	133	125	140	324	329	328	136	510,717	175,140	100,946	90,971	187,388	10,624	42,175	8,575	90,333	1,216,868					
13	AGU-139	13,852,450		138	140	135	151	328	337	136	137	243,000	140,614	187,388	175,140	98,281	8,575	33,333	90,333	121,000	1,064,663					
14	AGU-141	8,077,883		140	142	133	149	329	330	335	336	649,184	187,388	148,546	100,946	168,630	42,175	29,277	72,454	87,851	1,486,450					
15	AGU-143	7,412,703		142	144	131	147					151,520	148,546	470	26,991	50,776					378,303					
16	AGU-146 P&A	1,929,685		147	145	144	161					58,445	50,776	7,000	470	40,136					156,827					
17	AGU-148	7,854,274		149	147	142	159	335	344			49,000	168,630	50,776	148,546	90,644	72,454	34,032			614,081					
18	AGU-150	13,498,012		151	149	140	157	337	336	343	342	393,249	98,281	168,630	187,388	206,729	333	87,851	32,065	73,442	1,247,967					
19	AGU-151	9,340,882	Apr-01																							
20	AGU-152 P&A	2,519,648		153	151	138	155	137	154			607,638	278,000	98,281	140,614	154,325	121,000	85,333			1,485,191					
21	AGU-156	15,591,519		155	157	151	170	342	154			333,107	154,325	206,729	98,281	112,736	73,442	85,333			1,063,953					
22	AGU-158	10,754,569		157	159	149	168	343	344	351	352	555,333	206,729	90,644	168,630	152,955	32,065	34,032	20,887	31,656	1,293,129					
23	AGU-159	9,738,704	Apr-01																							
24	AGU-160	10,429,676		159	161	147	166					161,978	90,644	40,136	50,776	132,684					476,119					
25	AGU-167	7,611,414		168	166	159	178	351	360			442,448	152,955	132,684	90,644	58,889	20,887	11,332			909,838					
26	AGU-169	16,713,886		170	168	157	176	359	352			539,783	112,736	152,955	206,729	239,416	33,137	31,656			1,316,411					
27	AGU-171 P&A	10,770,159		172	170	155	174	154				258,000	288,516	112,736	154,325	131,887	85,333				1,030,798					
28	AGU-175	13,048,808		174	176	170	190	191				408,038	131,887	239,416	112,736	128,591	68,500				1,089,168					
29	AGU-177	15,405,955		176	178	168	188	359	360	369		347,780	239,416	58,889	152,955	107,272	33,137	11,332	24,489		969,259					
30	AGU-179	9,194,996		178	180	166	186					176,614	58,889	333	132,684	53,876					422,395					
31	AGU-181			180	182	164	184	163	183			87,219	333	21,000	-	109,455	87,000	60,975			365,982					
32	AGU-185 P&A	3,368,416		186	184	180	197					318,147	53,876	109,455	333	63,431					545,241					
33	AGU-187	7,487,158		188	186	178	195	369				364,789	107,272	53,876	58,889	124,475	24,489				733,790					
34	AGU-189	11,681,631		190	188	176	193	191	192			356,265	128,591	107,272	239,416	104,560	68,500	72,000			1,076,640					
35	AGU-194	8,112,384		193	195	188	206	192	207			258,000	104,560	124,475	107,272	147,045	72,000	83,937			897,289					
36	AGU-196	15,197,838		195	197	186	204					389,046	124,475	63,431	53,876	93,870					724,698					
37	AGU-198	5,227,806		197	199	184	202	183				284,336	63,431	75,071	109,455	54,090	60,975				647,557					
38	AGU-199	2,141,755	Mar-08																							
39	AGU-201	5,154,170		202	200	199	213					183,000	54,090	8,212	75,071	60,200					380,573					
40	AGU-203	14,951,626		204	202	197	211	390	391			160,000	93,870	54,090	63,431	93,648	80,434	26,190			571,663					
41	AGU-205	10,431,255		206	204	195	209	207	208			137,005	147,045	93,870	124,475	69,255	83,937	60,000			715,586					
42	AGU-210	8,832,383		209	211	204	221	398	390	208		164,398	69,255	93,648	93,870	48,984	24,865	80,434	60,000		634,653					
43	AGU-212	15,453,367		211	213	202	219	391				240,000	93,648	60,200	54,090	127,483	26,190				601,611					
44	AGU-214	5,527,366		213	215	200	217	216				153,000	60,200	46,023	8,212	72,622	46,948				387,005					
45	AGU-217	498,457	Mar-10																							
46	AGU-218 P&A	7,462,504		219	217	213	228	408	216			253,000	127,483	72,622	60,200	75,094	37,825	46,948			673,171					
47	AGU-220	8,291,121		221	219	211	226	398				181,000	48,984	127,483	93,648	40,020	24,065				515,200					
48	AGU-222 P&A	2,169,336		223	221	209	224	208				235,166	279,184	48,984	69,255	63,500	60,000				756,089					
49	AGU-225	10,890,436		224	226	221	236	237				141,000	63,500	40,020	48,984	57,405	61,500				412,409					
50	AGU-227	12,075,196		226	228	219	234	408				251,000	40,020	75,094	127,483	108,826	37,825				640,247					
51	AGU-229	9,050,967		228	230	217	232	216	231			285,000	75,094	35,000	72,622	29,935	46,948	78,614			623,212					
52	AGU-233	5,596,450		234	232	228	241	231				300,949	108,826	29,935	75,094	56,590	78,614				650,007					
53	AGU-235	6,871,479		236	234	226	239	237	238			143,000	57,405	108,826	40,020	59,966	61,500	48,000			518,717					
54	AGU-240	10,993,597		239	241	234	247	238				322,000	59,966	56,590	108,826	146,158	48,000				741,540					
55	AGU-241	443,874	Nov-07																							
56	AGU-242	4,102,761		241	243	232	245	231				195,000	56,590	11,000	29,935	100,378	78,614				471,516					
57	AGU-246 P&A	1,326,000		247	245	241	248					162,000	146,158	100,378	56,590	107,000					572,125					

Figure 5 – Arrowhead Grayburg Unit Injection Pattern Map

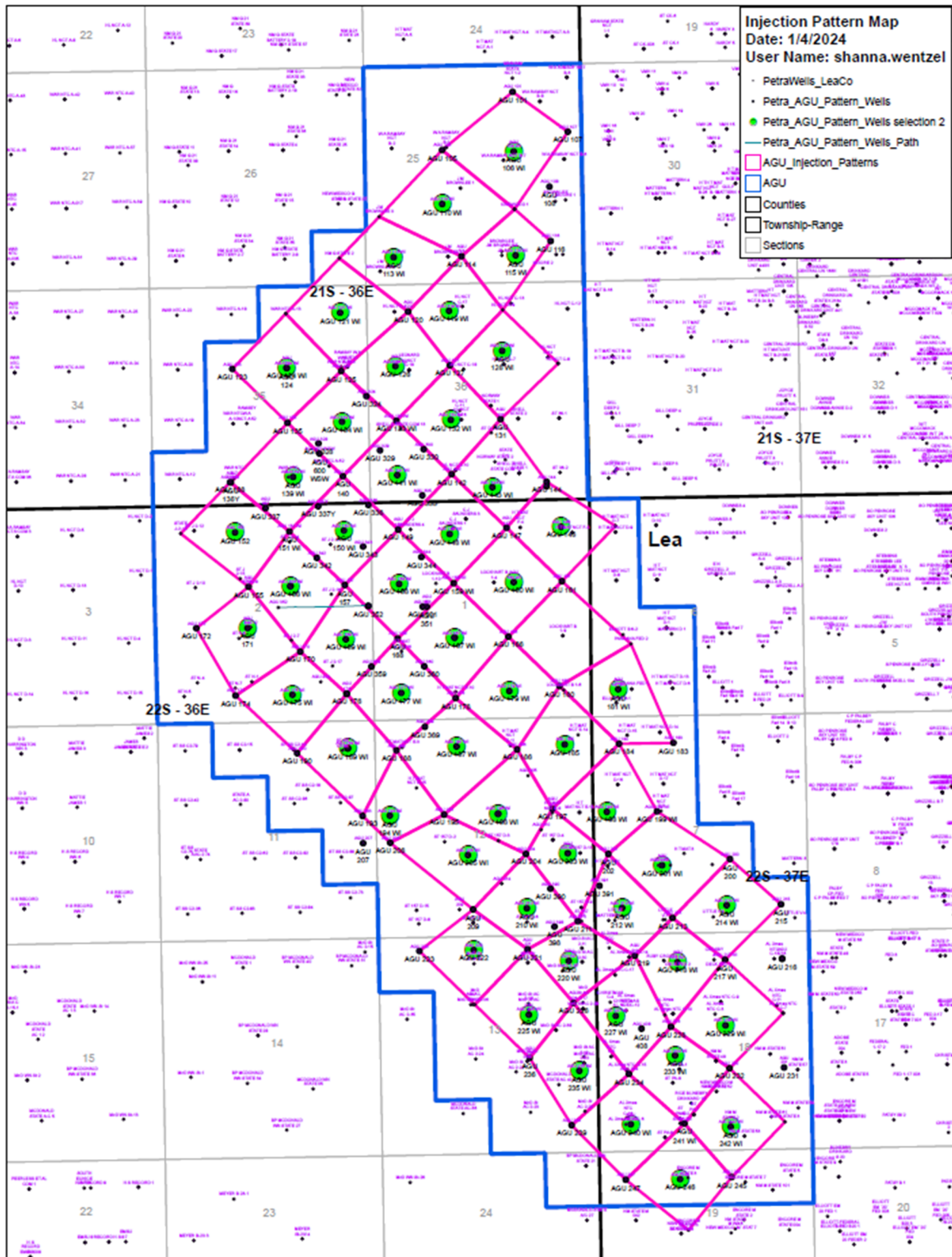
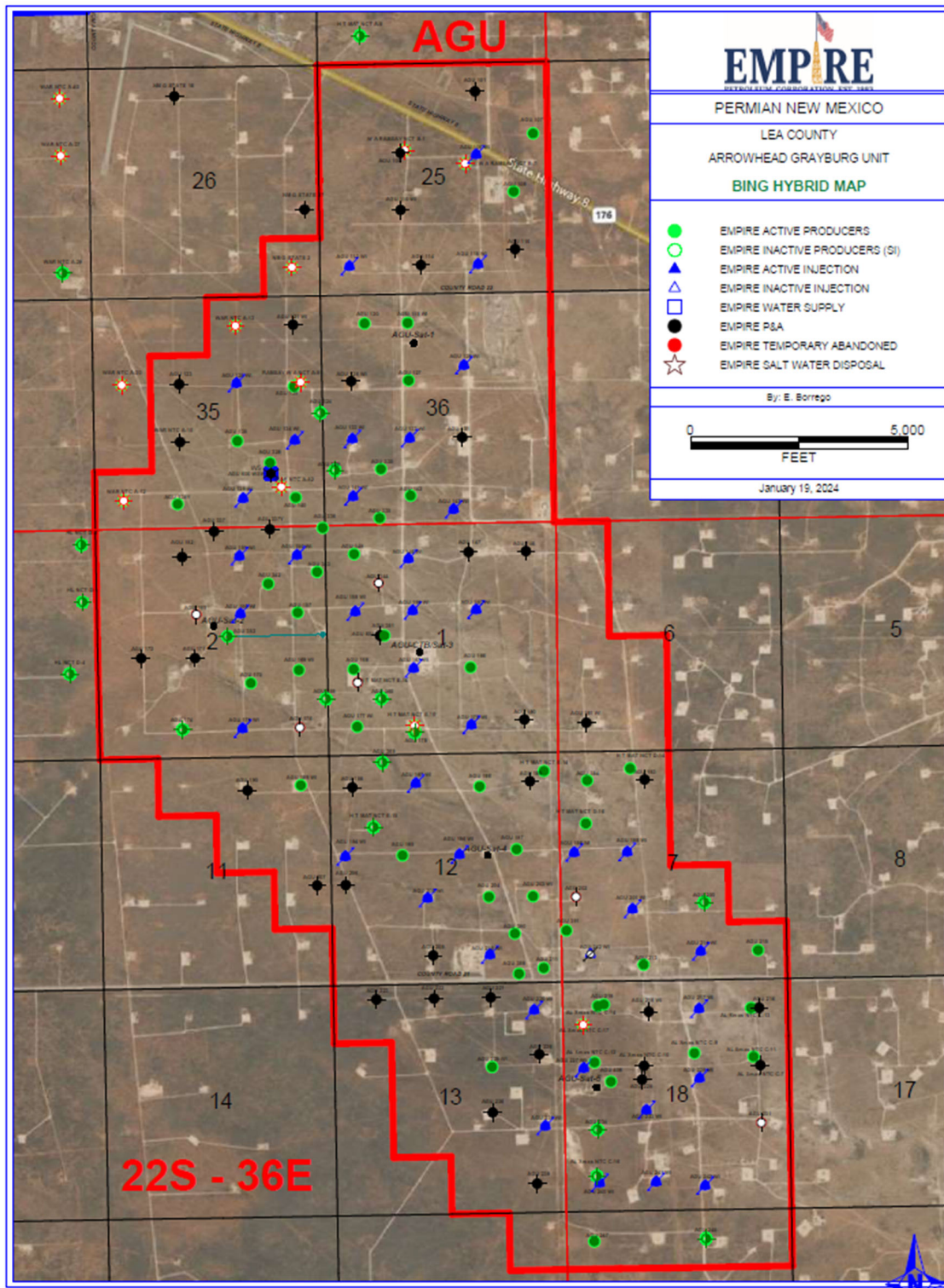


Figure 6 – AGU Map Showing Well Status





The table below has additional production and water injection data for each AGU well. It also has formations tops provided on the wellbore diagrams by XTO, with Empire tops being very similar. On average Zone 1 of the Grayburg is 39' thick, Zone 2 is 64', Zone 3 is 37', Zone 4 is 47', and Zone 5 is 45' for total of 231' thick. Table 6 shows an average net thickness of 85' therefore the average net-to-gross is approximately 36.8%.

**Table 16 – AGU Well Information Including XTO Formation Tops (Page 1 of 2)**

Arrowhead Grayburg Unit																			
#	Well	Type Well	Wellhead Pressure	BWPD Injection	Comments	BOPD	MCFPD	BWPD	Casing	Lift	Current Completion Interval	Queen	Penrose	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	San Andres
1	600	WSW								ESP	4132-5000	3432	3540	3725	3764	3821	3858	3912	
2	106	INJ	609	177					4-1/2"	INJ	Z1, Z2, Z3, Z4, Z5		3497	3672	3705	3762	3793	3835	3878
3	107	PROD				1.8	3	88.9	4-1/2"	ROD	Z1, Z2, Z3, Z4, Z5	3378	3485	3654	3689	3750	3785	3829	3862
4	108	PROD				1.8	4	41.0	5-1/2"	ROD	Z1, Z2, Z3, Z4, Z5	3392	3506	3689	3724	3782	3812	3853	
5	110	P&A																	
6	113	INJ	631	1111					5-1/2"	INJ	Z1, Z2, Z3, Z4	3410	3537	3710	3746	3804	3840	3883	3920
7	115	INJ	583	63					5-1/2"	INJ	Z1, Z2, Z3, Z4, Z5	3380	3491	3673	3712	3764	3795	3837	3870
8	119	INJ	7	930						INJ									
9	120	PROD			Z1 not perforated	4.5	4	114	5-1/2"	ROD	Z3, Z4, Z5	3382	3499	3671	3746	3774	3805	3849	
					Casing leaks @ 815-819 and 939-943. Last injected in 2019														
10	121	SI-INJ							5-1/2"	SI-INJ	Openhole Z1,Z2,Z3,Z4,Z5	3452	3545	3734	3774	3842	3876	3926	3968
11	124	INJ	626	620					5-1/2"	INJ									
12	125	PROD				2.9	3	113	5-1/2"	ROD	Z3, Z4, Z5	3429	3536	3713	3758	3818	3859	3909	3954
13	126	P&A																	
14	127	PROD				5.5	4	2325	5-1/2"	ESP	Openhole			3652	3674	3752	3768	3815	
15	128	INJ	653	557					5-1/2"	INJ	Z2, Z3, Z4, Z5	3356	3437	3648	3690	3758	3803	3837	3887
16	132	INJ	625	613					4-1/2"	INJ				3654	3682	3744	3778	3826	3863
17	133	INJ	552	317					4"	INJ		3367	3468	3648	3688	3752	3786	3825	
18	134	INJ	572	841					4-1/2"	INJ	Z1, Z2, Z3, Z4, Z5			3722	3757	3813	3854	3906	3945
19	135	PROD				8.6	7	1776	5-1/2"	ESP	Penrose & Openhole	3472	3592	3780	3818	3886	3918	3970	4010
20	138Y	PROD			Z1 & Z5 not perforated	3.6	17	137	5-1/2"	ROD	Penrose, Z2, Z3, Z4	3538	3659	3830	3866	3930	3968	4020	4051
21	139	INJ	no reading	1067					5-1/2"	INJ	Z1 squeezed Z2,Z3,Z4,Z5			3752	3790	3849	3886	3938	3986
22	140	PROD				6.4	7	1975	6"	ESP	Z1 & Openhole Z2, Z3, Z4, Z5	3411	3529	3712	3747	3810	3846	3896	3944
23	141	INJ	534	624					5"	INJ	Z1 & Z2 squeezed, Z3	3377	3485	3672	3705	3764	3800	3848	3893
24	142	PROD				11.1	3	540	4-1/2"	ROD	Z3, Z4	3349	3449	3643	3679	3739	3776	3824	3866
25	143	INJ	351	143						INJ	no WBD								
26	146	P&A																	
27	148	INJ	701	681					5-1/2"	INJ	Z1, Z2, Z3, Z4, Z5	3368	3478	3670	3704	3766	3803	3852	3891
28	149	PROD				22.4	6	1258	7"	ESP	Z1	3382	3485	3671	3706	3772	3809	3863	3904
29	150	INJ	514	934					4"	INJ	Z1, Z2, Z3, Z4			3688	3721	3778	3822		
30	151	INJ	394	917					4"	INJ	Openhole Z3, Z4, Z5	3443	3561	3740	3777	3839	3873	3926	3966
31	155	SI-OIL		Waiting on Rig to RTP	Zone of >10% porosity not perf'd at 3865-3889'				5-1/2"	ROD	Penrose, Z1, Z2, Z3, Z4, Z5	3477	3590	3773	3810	3881	3918	3970	4013
32	156	INJ							5-1/2"	INJ	Openhole Z2, Z3, Z4, Z5			3724	3762	3830	3868	3918	
33	157	PROD			Currently on well. Can perf Z1 and acidize on next job	1.5	1	185	5-1/2"	ESP	Z2, Z3, Z4, Z5 Openhole	3387	3503	3690	3729	3794	3830	3884	3928
34	158	INJ	543	778					5-1/2"	INJ	Openhole Z2, Z3, Z4, Z5	3375	3482	3668	3708	3769	3814	3870	3914
35	159	INJ	436	548					3-1/2"	INJ	Z1, Z2, Z3, Z4	3370	3476	3666	3703	3756	3788	3836	
36	160	INJ	377	508					7"	INJ	Z1, Z2, Z3, Z4, Z5	3360	3467	3666	3704	3768	3800	3845	
37	165	SI-INJ			No wellbore diagram, No information on well					SI-INJ									
38	166	PROD				0.5	1	17	5-1/2"	ROD	Penrose & Openhole All Zones	3374	3474	3682	3720	3788	3820	3863	3902
39	167	INJ	3	243					4-1/2"	INJ	Z2, Z3, Z4, Z5	3367	3481	3676	3717	3781	3814	3860	3900
40	168	PROD			Well deepened. Has squeezed casing leaks at 600' and 1000'-1200'.	14.6	5	1288	6"	ROD	Openhole Z2, Z3, Z4, Z5	3378	3495	3683	3720	3799	3829	3877	3921
41	169	INJ	67	1401					4"	INJ	Z1, Z2, Z3			3695	3737	3792	3828		
42	170	PROD			Z1 squeezed	2.6	8	1067	5-1/2"	ROD	Z2, Z3, Z4, Z5	3404	3525	3704	3745	3816	3854	3904	3939
43	171	P&A																	
44	174	SI-OIL		Waiting on Rig to RTP	Perf'd in Penrose & GRBG - drilled through most zones in GRBG - western down-dip edge. Z1 perfs squeezed				5-1/2"	ROD	Penrose, Z2, Z3, Z4, Z5	3522	3638	3835	3875	3946	3981	4032	4069
45	175	INJ	353	505					4"	INJ	Penrose, Z1, Z2, Z3			3747	3791				
46	176	TA							4"		Z1, Z2	3396	3513	3712	3756	3823	3854	3900	3946
47	177	INJ	95	956					4-1/2"	INJ	Z1, Z2, Z3, Z4, Z5								
48	178	SI-OIL		Waiting on Rig to RTP					5-1/2"	SI-PROD	Z4		3496	3691	3748	3800	3838		
49	179	INJ	694	854					5-1/2"	INJ	Openhole Z2, Z3, Z4, Z5	3368	3478	3640					
50	181	INJ							5-1/2"	INJ	Z2, Z3, Z4, Z5			3665	3700	3765	3799	3841	3875
51	184	TA		TA Failed - May P&A	Last produced in Oct-2022. Well TA'd but had leaks.	3	18	198	5-1/2"	ROD	Z1, openhole Z2, Z3, Z4, Z5	3327	3433	3629	3666	3736	3776	3823	3864
52	185	P&A																	
53	186	PROD			Z1 not perforated	2.7	5	402	5-1/2"	ROD	Penrose, Z2, Z3, Z4, Z5	3331	3442	3648	3687	3752	3791	3834	3867
54	187	INJ	686	394					4-1/2"	INJ	Z1, Z2, Z3, Z4		3498	3690	3730	3787	3823	3868	3904
55	189	INJ	17	458					5-1/2"	INJ	Penrose Squeezed Z1, Z2, Z3			3741	3780	3850	3886	3938	
56	194	INJ	683	657					4"	INJ	Z2, Z3		3567	3752	3795	3856	3890	3939	3979
57	195	PROD			Used Sonic Hammer with 180 barrels brine and acidized with 5500 gallons 20% 90/10 acid	6.4	19	330	5-1/2"	ROD	Openhole 3669'-3904'	3404	3510	3709	3751	3808	3843	3890	3930
58	196	INJ	no reading	2026					5-1/2"	INJ	Openhole Z1,Z2,Z3,Z4,Z5	3354	3471	3664	3704	3767	3806	3850	3897
59	197	PROD				7.3	19	639	5-1/2"	INJ	Z2, Z3	3317	3441	3637	3679	3756	3791	3836	3872
60	198	INJ	289	391					4-1/2"	INJ	Z2, Z3, Z4, Z5	3323	3423	3630	3673	3737	3772	3820	3858
61	199	INJ	241	374					5-1/2"	INJ	Z2, Z3, Z4, Z5	3350	3451	3642	3681	3760	3801	3845	3884
62	200	SI-OIL		Waiting on Rig to RTP	Last produced in 2018. Run RST and set CIBP to isolate bottom perfs.	0.7	13	61	5-1/2"	ROD	Z1, Z2, Z3, Z4, Z5	3347	3450	3631	3668	3740	3776	3820	3858
63	201	INJ	712	76					5-1/2"	INJ	Z1, Z2, Z3			3644	3682	3752	3790	3836	3875
64	202	TA							5-1/2"	INJ	Z2, Z3	3322	3425	3637	3674	3738	3778	3825	3867
65	203	INJ	69	1589					5-1/2"	INJ	Z1, Z2, Z3, Z4	3297	3425	3626	3668	3746	3782	3831	
66	204	PROD			Squeezed off bottom of Z4 and Z5	9.1	10	3103	5-1/2"		Z1, Z2, Z3, Z4	3340	3450	3656	3694	3756	3794	3842	3885

**Table 17 – AGU Well Information Including XTO Formation Tops (Page 2 of 2)**

Arrowhead Grayburg Unit																			
#	Well	Type Well	Wellhead Pressure	BWPD Injection	Comments	BOPD	MCFPD	BWPD	Casing	Lift	Current Completion Interval	Queen	Penrose	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	San Andres
67	205	INJ	446	646					5-1/2"	INJ	Z2, Z3, Z4, Z5	3362	3480	3680	3717	3780	3816	3866	
68	209	P&A							5-1/2"			3380	3505	3701	3738	3800	3836	3885	3928
69	210	INJ	442	630					5-1/2"	INJ	Z2, Z3	3346	3461	3663	3700	3766	3801	3844	3902
70	211	PROD				9.1	10	550	5-1/2"	ROD	Penrose, Z1, Z2, Z3	3328	3450	3650	3686	3748	3786	3833	3874
71	212	SI-INJ							3-1/2"	SI-INJ	Z1 only	3305	3423	3623	3664	3704	3735	3774	3858
72	213	PROD				1.8	3	58	5-1/2"		Penrose, Z1, Z2, Z3, Z4, Z5	3328	3438	3648	3682	3746	3786	3828	3868
73	214	INJ	703	240					4-1/2"	INJ	3646-3830'								
74	215	PROD				3.6	9	218	5-1/2"		Penrose, Z1, Z2, Z3, Z4, Z5	3357	3460	3638	3675	3732	3778	3824	3859
75	216	P&A		Submitting Paperwork					5-1/2"		Penrose, Z1, Z2	3345	3450	3634	3671	3742	3782	3828	3866
76	217	INJ	674	248					5-1/2"	INJ	Z2, Z3	3331	3434	3635	3671	3741	3783	3828	3869
77	218	P&A							5-1/2"		Z1, Z2, Z3	3314	3435	3633	3671	3736	3775	3820	
78	219	PROD				10.0	13	1994	5-1/2"		Penrose, Z1, Z2, Z3, Z4	3333	3454	3654	3688	3751	3789	3833	3874
79	220	INJ	689	639					5-1/2"	INJ	Z1, Z2, Z3, Z5 No Z4??	3337	3468	3656	3691	3753	3790	3838	3880
80	222	P&A																	
81	225	INJ	3	81					5-1/2"	INJ	Z2, Z3, Z4, Z5	3375	3498	3692	3724	3786	3822	3867	3906
82	226	P&A																	
83	227	INJ	460	1226					5-1/2"	INJ	Z1, Z2, Z3	3316	3438	3630	3665	3734	3768	3814	3856
84	229	INJ	445	349					5-1/2"	INJ	3667-3810'								
85	231	TA		Submitting Paperwork	Last produced in 2022	1	1	130	5-1/2"	ROD	3430'-3680'	no tops picked							
86	233	INJ	677	231					5-1/2"	INJ	3602'-3770'								
87	234	SI-OIL		Waiting on Rig to RTP	Last produced at high rate in 2018	8	32	6300	5-1/2"	ESP	Z1, Z2, Z3, Z4, Z5	3318	3435	3625	3665	3724	3767	3817	3853
88	235	SI-INJ							5-1/2"	SI-INJ	Z1, Z2, Z3, Z4, Z5			3652	3687	3754	3792	3841	3879
89	240	INJ	644	1185					5-1/2"	INJ	Z1, Z2, Z3, Z4	3341	3460	3651	3687	3752	3785	3835	3875
90	241	INJ	672	34					5-1/2"	INJ	3690'-3770'								
91	242	INJ	684	477					5-1/2"	INJ	Z1, Z2, Z3, Z4	3328	3438	3632	3665	3726	3760	3810	3850
92	245	SI-OIL		Waiting on Rig to RTP	Penrose & GRBG perms - OH from 3718-3813' - no log after 3700' - cum'd 180 mbo, Casing leak @ 1600' sqzed	2	18	100	5-1/2"	ROD		Tops not provided							
93	247	PROD			Openhole Z1-Z5	5.5	13	23	5-1/2"		Penrose, Z1, Z2, Z3, Z4, Z5								
94	324	TA		Waiting on Rig to RTP	RAS candidate - cum'd Z1 mmo - porosity is 10-20% throughout open interval. Set CIBP & perf Z1	2	2	741	7"	ROD	Z2, Z3, Z4	3375	3482	3669	3708	3774	3809	3851	
95	328	PROD				3.6	5	293	5-1/2"		Z2, Z3, Z4				3735	3770	3830	3865	3920
96	329	SI-OIL		Waiting on Rig to RTP	Last produced steady in 2018. Z3 only making lots of fluid	3.5	11	2350	7"	ESP	Z3	3383	3483	3675	3712	3768	3808	3854	
97	330	SI-OIL			Currently on well. Everything squeezed off except Z3 and Z4	7	6	900	7"	ESP	Z3, Z4	3364	3469	3648	3686	3744	3786	3834	
98	335	PROD				10.8	5	168	5-1/2"		Z2, Z3, Z4			3658	3691	3753	3789		
99	336	PROD				6.5	4	532	7"		Openhole Z1, Z2, Z3, Z4	3346	3493	3676	3737	3787	3820		3950
100	342	PROD				7.3	9	977	5-1/2"		Z3, Z4, Z5			3701	3739	3806	3839	3892	3964
101	343	PROD			High Perm Zone 3736'-3746'	5.4	4	756	7"		Z2, Z3, Z4	3396	3500	3682	3716	3785	3821	3876	
102	344	TA		Waiting on Rig to TA	Made 200 BW in 2019 Can perf Zone Z1	0	0	200	5-1/2"	ROD	Z2, Z3, Z4		3486	3674	3708	3778	3813	3869	
103	351	PROD			Lufkin 640-365-168	3.8	5	532	7"	ROD	Z3, Z4	3380	3489	3675	3709	3780	3814		
104	352	TA		Waiting on Rig to RTP		No wellbore diagram													
105	359	SI-OIL		Waiting on Rig to RTP	Last produced continuously in 2020. Zone 1 not perforated.	3	5	900	7"	ESP	3752'-3832'	3381		3691	other tops not shown				
106	360	SI-OIL		Waiting on Rig to RTP	Z1 interval not perforated. Last produced in 2018	3	6	1000	5-1/2"	ESP	Z2, Z3, Z4, Z5, Z6			3685	3724	3787	3825	3871	3950
107	369	SI-OIL		Waiting on Rig to RTP	Last produced in 2022.	4	10	2200	7"	ESP	Openhole Z1, Z2, Z3	3389	3512	3700	3749	3802			3931
108	390	PROD				5.5	4	563	7"	ROD	Openhole Z2, Z3, Z4	3327	3434	3617	3667	3714	3750		
109	391	PROD				4.5	10	3064	5-1/2"	ESP	Z2, Z3, Z4	3280		3618					3897
110	392																		
111	398	SI-OIL		Waiting on Rig to TA	Last produced in 2022. Approved to RTP. Z1 never perforated	3	6	300	5-1/2"	ROD	Z2, Z2A, Z3			3660	3696	3760	3797	3845	3926
112	408	PROD				No Test Yet			5-1/2"		Z2, Z3, Z4	3316	3415	3620	3648	3720	3762	3805	3904

## Residual Oil Zone (ROZ)

A residual oil zone (ROZ) is an interval of reservoir rock containing immobile oil, with respect to water, at residual oil saturation levels generally less than 40% (Sanguinito et al., 2020). ROZs form due to regional tectonic tilting, leakage from traps, or hydrodynamic activity, which naturally waterflood the oil-bearing intervals, causing remobilization of the moveable oil out of the reservoir by hydrodynamic forces (Melzer, 2006). The Eunice Monument San Andres ROZ can be classified as brownfield, where the ROZ occurs below the producing oil-water contact (OWC) of

the Grayburg main pay zone (MPZ). Empire plans to develop this San Andres ROZ interval using the same facilities it will use for developing the Grayburg MPZ.

Several detailed studies of selected formations in the Permian Basin of the United States have shown that ROZs can be as common as traditional conventional oil reservoir traps, suggesting significant resources for potential additional hydrocarbon recovery and subsurface CO2 sequestration via CO2-EOR. Core data at EMSU and AGU show that the San Andres ROZ interval could extend to -750' subsea and based on XTO Energy's estimate using -700' subsea as the oil water contact, 912 MMBO oil-in-place target is available for CO2-EOR.

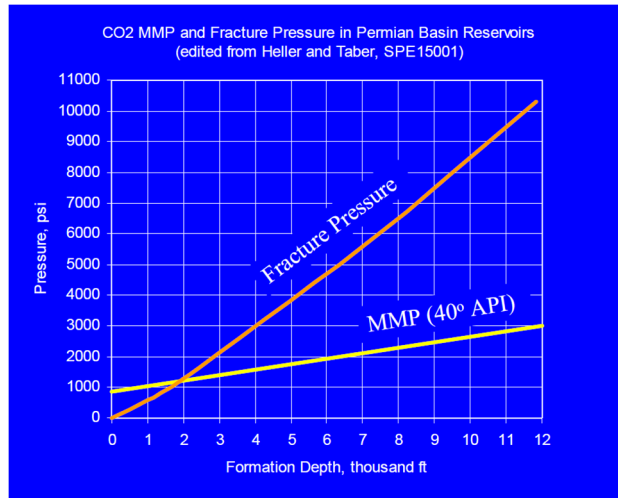
## **CO2 Flood Design Considerations**

For the first 10 years of field operation, CO2 purchases are the single largest operating expense in CO2 EOR floods. Kinder Morgan and others in the Permian Basin typically charge 2% of oil price for CO2 purchase, therefore at \$75/BO the CO2 purchase price will be roughly \$1.50/MCF. With CO2 being captured from industrial plants and sequestered in oil and saline aquifers, there is an opportunity to purchase the CO2 at a reduced rate and allow the seller to receive 45-Q tax credits for sequestering the CO2. Empire has spoken with CO2 suppliers and will work out the most cost effective means of securing large volumes of CO2. Net CO2 utilization (purchased CO2 volume per barrel of incremental oil recovered) is often around 5 MCF/bbl for WAG CO2 floods. If we assume 50 million barrels incremental oil recovery, we would expect to purchase around 375 billion cubic feet (BCF) of CO2. At \$1.50/MCF the CO2 would cost \$375 million but the oil at \$75/bbl would be worth \$3.75 billion.



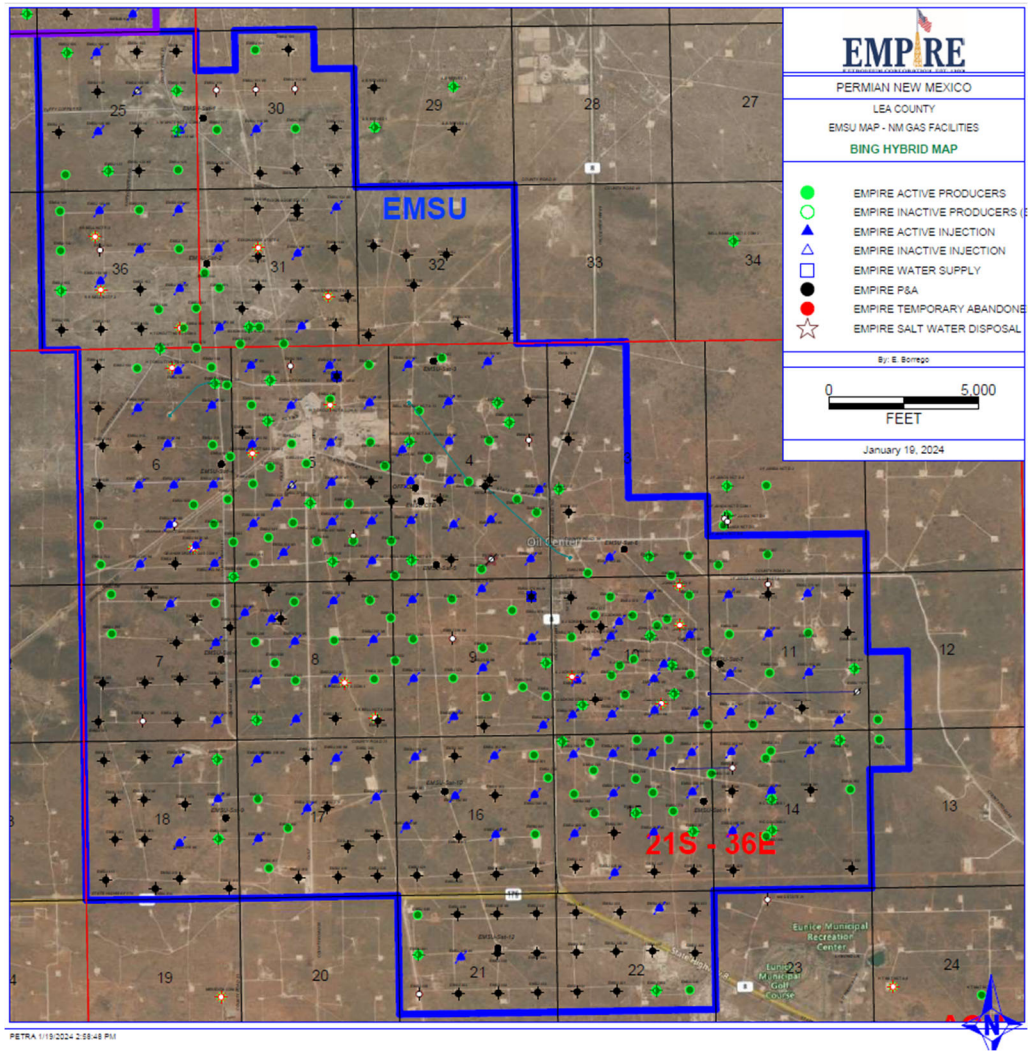
Figure 7 shows a plot of MMP and Fracture pressure for Permian Basin reservoirs with an API Gravity of 40<sup>0</sup> API. It shows at a depth of 4000 feet that the reservoir pressure needs to be around 1600 psi to be miscible. CO2 will be used to pressurize the reservoir to maximize oil recovery.

**Figure 7 – CO2 Minimum Miscibility Pressure & Fracture Pressure**



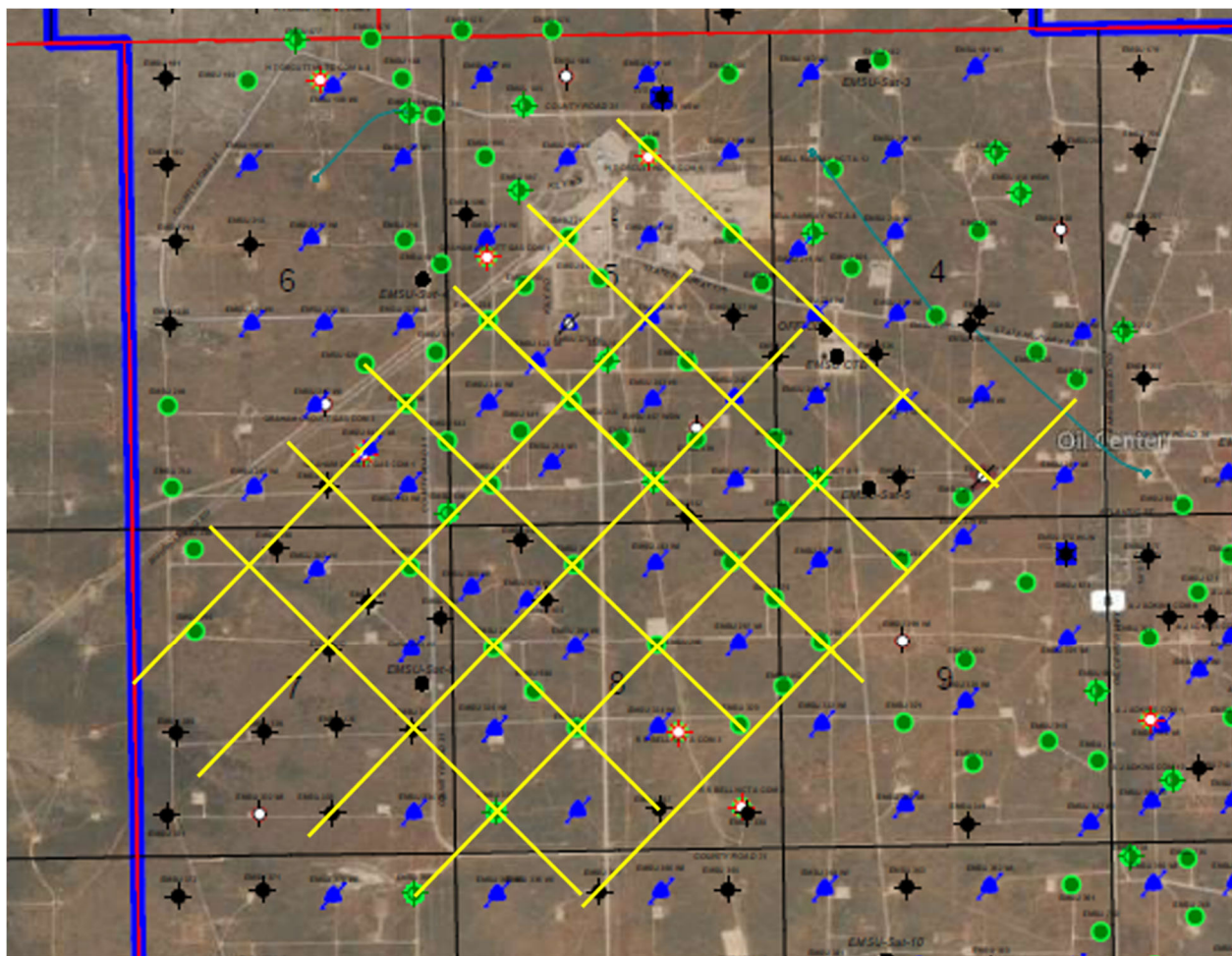
For field scale miscible CO2 EOR floods, projected incremental recoveries range from 7 to 23% of the original oil in place (OOIP) and the net (purchased) amount of CO2 required is estimated to be between 2.5 to 11 MCF/STB of incremental recovery with an average value of 6 to 7 MCF/STB. For EMSU and AGU we anticipate an oil recovery of 15% OOIP which will result in 127 MMBO being produced from the Grayburg (OOIP = 847 MMBO) and 137 MMBO from the San Andres ROZ (OOIP = 912 MMBO) if all areas of the reservoir are CO2 flooded. Figure 8 shows the oil producers with green dots, water injectors with blue triangles, and plugged wells with black dots. It is seen that there are many plugged wells in the northern and southern areas of EMSU therefore the central area is the preferred location to start the CO2 flood. The CO2 flood at EMSU will likely start on the western portion of the reservoir in sections 4, 5, 6, 7, 8, and 9 as seen in Figures 9 and 10, due to good reservoir characteristics and high remaining well count of producers and injectors.

Figure 8 – EMSU Map Showing Well Status

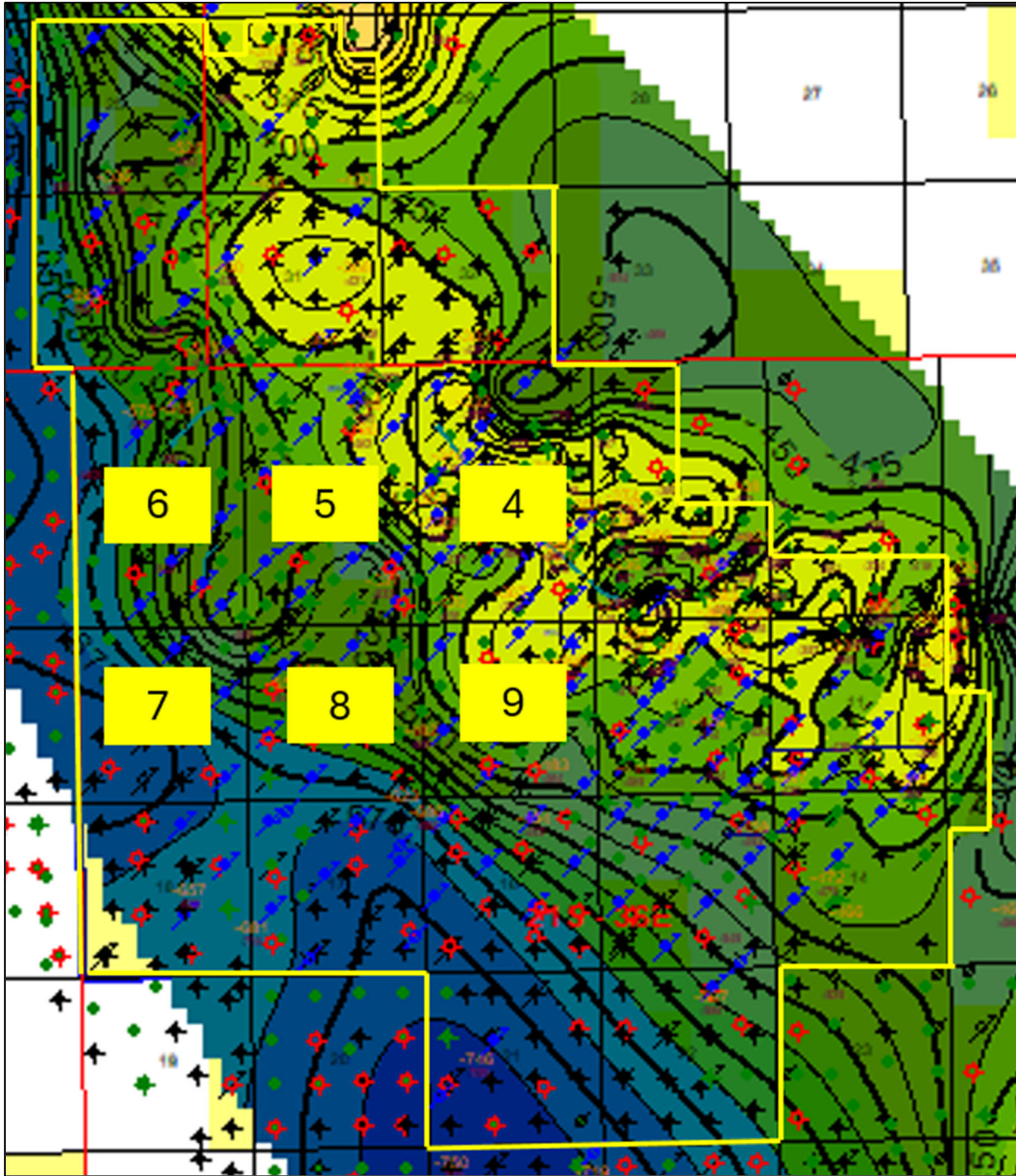


Shown below in Figure 9 is the possible area for Phase 1 CO2 development of the Grayburg at EMSU. It has twenty 80-acre 5-spot patterns (1600 acres) which would contain approximately 77.6 MMBO OOIP based on average reservoir properties shown in Table 1 on page 5. Assuming 15% OOIP EOR oil recovery during the CO2 flood, this area will recover 11.64 MMBO. In addition to CO2 flooding this area, a portion of the San Andres shown on Figure 10 will also be CO2 flooded using the same facilities as the Grayburg. Sections 4 through 9 are labeled to indicate where the Grayburg patterns are located. Section 4 will be a good location to start the San Andres CO2 flood because it is structurally high and contains 960 acres of ROZ interval. The yellow area of Figure 10 represents a subsea elevation of -400 feet, indicating gross oil column of 350 feet assuming -750 subsea for the oil-water contact. Assuming 75% net-to-gross, 35% oil saturation, and 10% porosity, the OOIP over this 960 acres will be approximately 57 MMBO. Based on 15% oil recovery, this would equate to 8.55 MMBO EOR oil. Total EOR oil recovery over this Grayburg and San Andres interval would be 20.19 MMBO.

**Figure 9 – EMSU Map Showing Possible Phase 1 CO2 Project Area**



**Figure 10 – Top of San Andres Interval with EMSU Unit Outline**  
**(Highlights Sections 4, 5, 6, 7, 8, and 9 where Grayburg Phase 1 CO2 Project May Occur)**



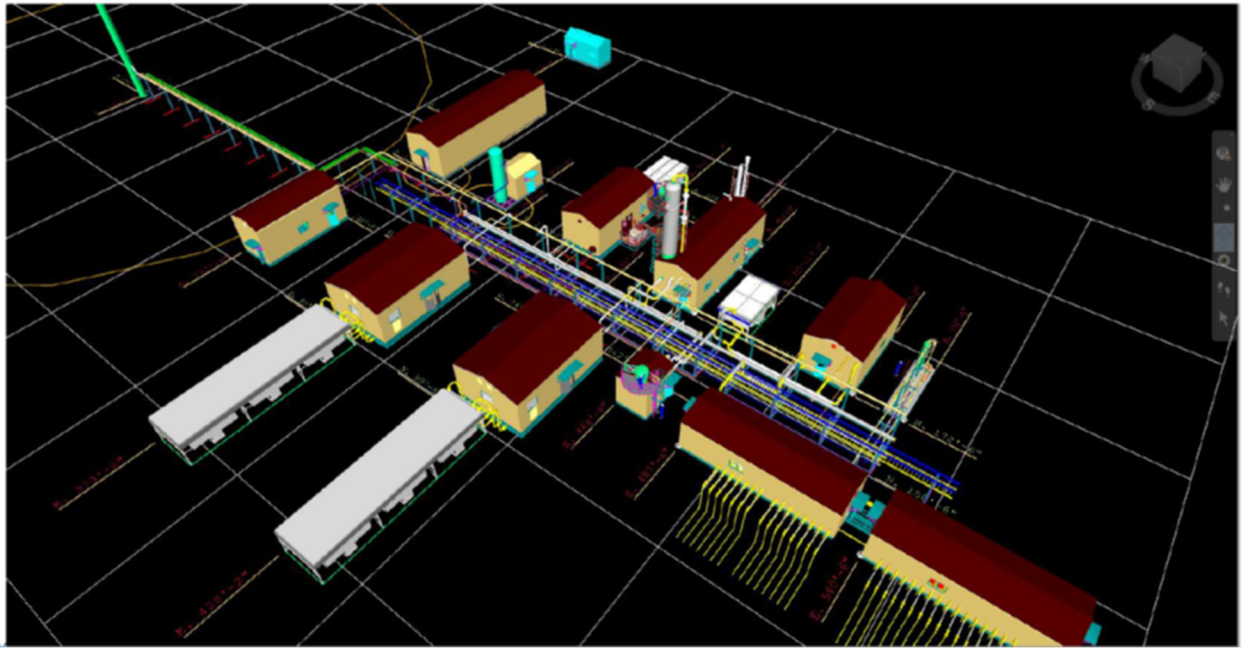
## Capital Cost

Phase 1 of the CO2 project will require that an 8-mile CO2 pipeline be installed from Trinity Midstream's CO2 pipeline running north-south east of EMSU at an estimated cost of \$20 million. Based on 25 CO2 injection wells, peak CO2 injection could be 25 MMCFPD during Phase 1 and CO2 recycle compression of 20 MMCFPD will be needed. Initial electrical driven compressor with 5 MMCFPD capacity has installed cost of \$14.5 million. Gas driven compressors with 16.8 MMCFPD capacity can be installed for \$5.5 million based on costs from another project so these will be utilized where possible to meet the CO2 recycle gas demand. It is estimated that Phase 1 can recover 20 MMBO EOR oil which has a value of \$1.5 billion based on \$75/bbl so the CO2 project can support this investment.

**TABLE 18 – Phase 1 Capital Cost Estimate**

Item	Number of Items	Cost Per Unit (\$MM)	Total Cost (\$MM)
CO2 Pipeline	8 miles	\$2.5/mile	\$20.00
Production Well Modifications	40 wells	\$0.25/well	\$10.00
Injection Well Modifications	25 wells	\$0.30/well	\$7.50
Drill New Producers and Injectors	10 wells	\$1.0/well	\$10.00
Injection Well Lines	25 wells	\$0.20/well	\$5.00
Production Well Lines	40 wells	\$0.20/well	\$8.00
Plug and Abandon	15 wells	\$0.10/well	\$1.50
CO2 Compressor and Well Header System	1	\$14.50	\$14.50
2 <sup>nd</sup> Compressor	1	\$5.00	\$5.00
Dehydration Unit	1	\$3.50	\$3.50
Separators, Tanks	1	\$10.00	\$10.00
Fabrication	1	\$10.00	\$10.00
Electrical Upgrade	1	\$3.50	\$3.50
Engineering Survey	1	\$0.50	\$0.50
Right-of-Ways	1	\$2.50	\$2.50
Environmental	1	\$1.00	\$1.00
10% Contingencies			\$11.25
<b>Total</b>			<b>\$123.75</b>

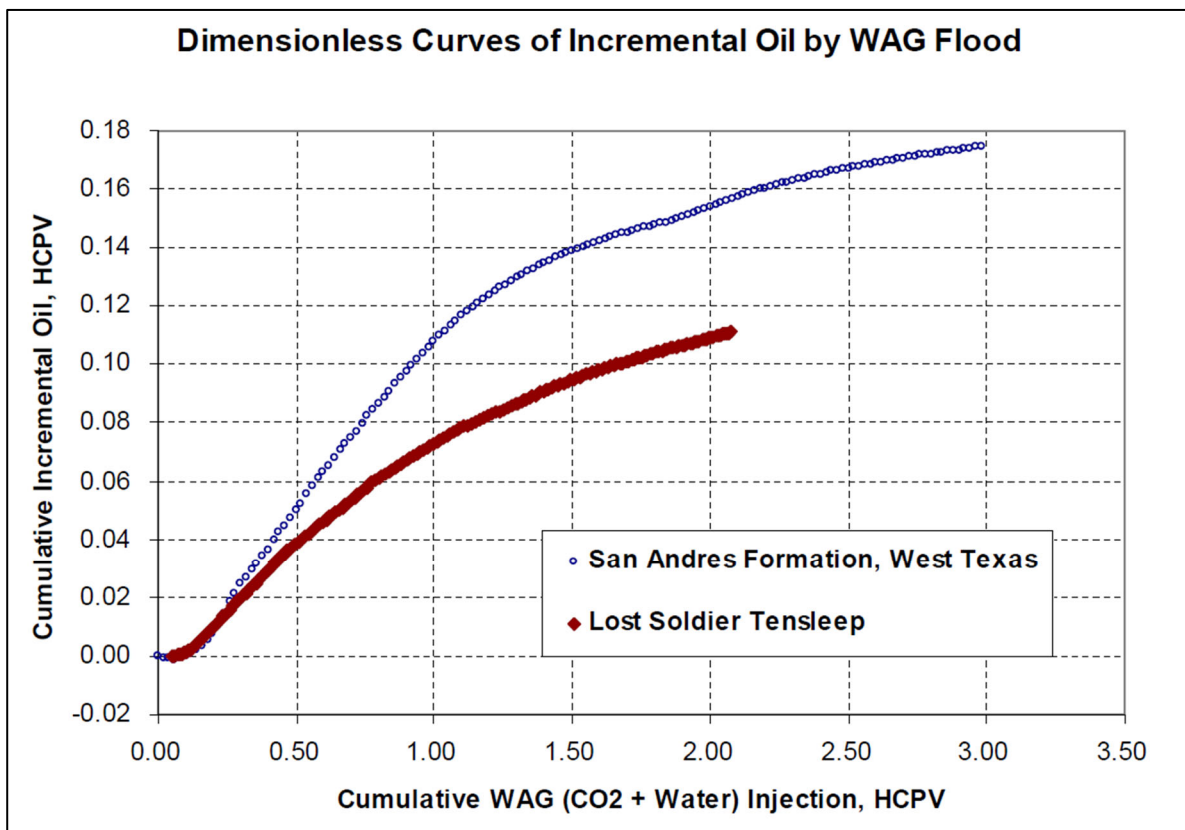
Figure 11 – Example CO2 Recycle Facility Layout



## CO2 Oil Production Forecasting

The most common way to forecast oil production for a CO2 project is to use dimensionless curves (% OOIP oil recovered versus HCPV CO2 + water injected) which are developed for a typical pattern. Figure 12 shows a typical San Andres formation CO2 injection response where 3 HCPV's of CO2 and water injected, the pattern has produced 18% OOIP. This curve is included in a presentation entitled "CO2 Demand Estimates for Major Oil Fields in Wyoming Basins" by Shaochang Wo from University of Wyoming. It shows that the San Andres formation recovered more oil with the same amount of CO2 and water injected. Since we are dealing with the San Andres and Grayburg intervals, we use the top curve for our analysis.

**Figure 12 – Dimensionless CO2-EOR Oil Recovery Curves**



Hydrocarbon Pore Volume (HCPV) is calculated as the OOIP (Original Oil-in-Place) multiplied by the oil formation volume factor, providing the number of Reservoir Barrels the pattern will hold. After we inject 0.5 (or 50%) of a HCPV of CO2 into the pattern, the curve indicates that we will recover approximately 5.5% OOIP. After injecting one full HCPV (100%) we will have recovered approximately 11% OOIP and after 1.5 HCPV's (or 150%) we will have recovered 14% OOIP. If we

continue to inject until we have injected 3 HCPV's, we can expect around 18% OOIP. This oil recovery in the incremental oil recovery as a result of CO2 injection and does not include the primary and waterflood oil already being produced.

For EMSU we indicated on page that for an 80-acre pattern we would expect an OOIP of 3.881 MMBO and a HCPV of 4.657 MMRB. The reservoir temperature at EMSU is 90<sup>0</sup> F so the table below indicates that at 1500 psia that it takes 2.29 MCF CO2 to fill up 1 reservoir barrel downhole in the well. So to fill up the entire HCPV of an 80-acre pattern, we have to the following:

$$80\text{-acre HCPV of CO}_2 = 4.657 \text{ MMRB} \times 2.29 \text{ MCF/RB} = 10.66 \text{ million MCF CO}_2 \text{ or } 10.66 \text{ BCF}$$

If we assume that we inject 2000 MCFPD (2 MMCFPD) per pattern, it will take 14.61 years to inject 1 HCPV in the 80-acre pattern. This explains why CO2 floods often take 30-40 years to complete and how important CO2 injection rate per well is a determining factor on process rate. For the San Andres, CO2 injection rate should not be a major issue based on water disposal rates currently being achieved by Goodnight Midstream Permian, LLC., whereas for the Grayburg interval it will be a concern especially if we do not inject into the high permeability layers within zones 1 and 2.

**TABLE 19 – Properties of CO2 at 90<sup>0</sup> F and Various Pressures**

Temperature	Pressure	Density	Compressibility	Heat Capacity	Heat Ratio	Velocity	Enthalpy	Entropy	Viscosity		Factor	Factor	Factor
F	PSIA	LB/CF	FACTOR	BTU/LB*F	CP/CV	Fr/Sec	BTU/LB	BTU/LB*F	cp	PHASE	CF/SCF	res bbl/Mcf	Mcf/res bbl
90	14.696	0.11016	0.99534	0.20501	1.2904	890.99	220.27	0.659	0.015281	V	1.053191	187.631126	
90	100	0.77098	0.96777	0.21456	1.3236	877.02	217.99	0.56949	0.015335	D	0.150479	26.808549	
90	200	1.5978	0.93386	0.22769	1.3702	860.03	215.16	0.53452	0.015425	D	0.072608	12.935534	
90	300	2.4918	0.89822	0.2436	1.4276	842.28	212.14	0.51223	0.015551	D	0.046558	8.294573	
90	400	3.4684	0.86042	0.26342	1.4999	823.61	208.89	0.49487	0.015722	D	0.033449	5.959133	
90	500	4.5494	0.81996	0.28895	1.5939	803.83	205.35	0.47996	0.015953	D	0.025501	4.543131	0.22
90	600	5.7675	0.77615	0.32338	1.7212	782.68	201.43	0.46626	0.016264	D	0.020115	3.583662	0.28
90	700	7.1751	0.72786	0.37291	1.9039	759.75	197.02	0.45299	0.016693	D	0.016169	2.880596	0.35
90	800	8.8656	0.67323	0.45147	2.1911	734.29	191.86	0.43938	0.017304	D	0.013086	2.331342	0.43
90	900	11.036	0.60842	0.59912	2.7194	704.78	185.49	0.42437	0.018243	D	0.010512	1.872809	0.53
90	1000	14.264	0.52303	1.0036	4.1019	666.45	176.54	0.40537	0.019964	D	0.008133	1.448969	0.69
90	1100	28.23	0.29071	29.72	76.332	524.55	145.76	0.34743	0.031977	D	0.00411	0.732150	1.37
90	1200	41.913	0.21361	1.4657	5.8064	889.39	126.09	0.31078	0.052356	D	0.002768	0.493143	2.03
90	1300	44.406	0.21841	1.0531	4.3873	1032.5	122.88	0.30416	0.057399	D	0.002613	0.465438	2.15
90	1400	46.013	0.227	0.89211	3.8143	1134.7	120.88	0.29978	0.060951	D	0.002521	0.449190	2.23
90	1500	47.232	0.23694	0.80189	3.4834	1216.7	119.41	0.29638	0.063826	D	0.002456	0.437602	2.29
90	1600	48.227	0.24752	0.74243	3.2601	1286.5	118.24	0.29355	0.0663	D	0.002406	0.428571	2.33
90	1700	49.075	0.25845	0.69951	3.0959	1348	117.28	0.29112	0.068502	D	0.002364	0.421173	2.37
90	1800	49.816	0.26958	0.66669	2.9683	1403.5	116.47	0.28895	0.070507	D	0.002329	0.414904	2.41
90	1900	50.478	0.28082	0.64059	2.8655	1454.3	115.77	0.287	0.07236	D	0.002298	0.409456	2.44
90	2000	51.077	0.29214	0.61921	2.7804	1501.3	115.15	0.28522	0.074091	D	0.002271	0.404663	2.47

Another observation from this calculation is that we need 10.66 BCF CO2 to completely displace one 80-acre pattern. This CO2 would have to be purchased if not for CO2 being produced back by the producers. For Gulf Coast sandstones 5 to 6 HCPV's of CO2 is injected to recover 17% OOIP. Each well is capable of injecting 5-10 MMCFPD so it usually only takes 5 years to displace 1 HCPV and 25-30 years to complete the project. Depending on CO2 cost, the Operator may choose to



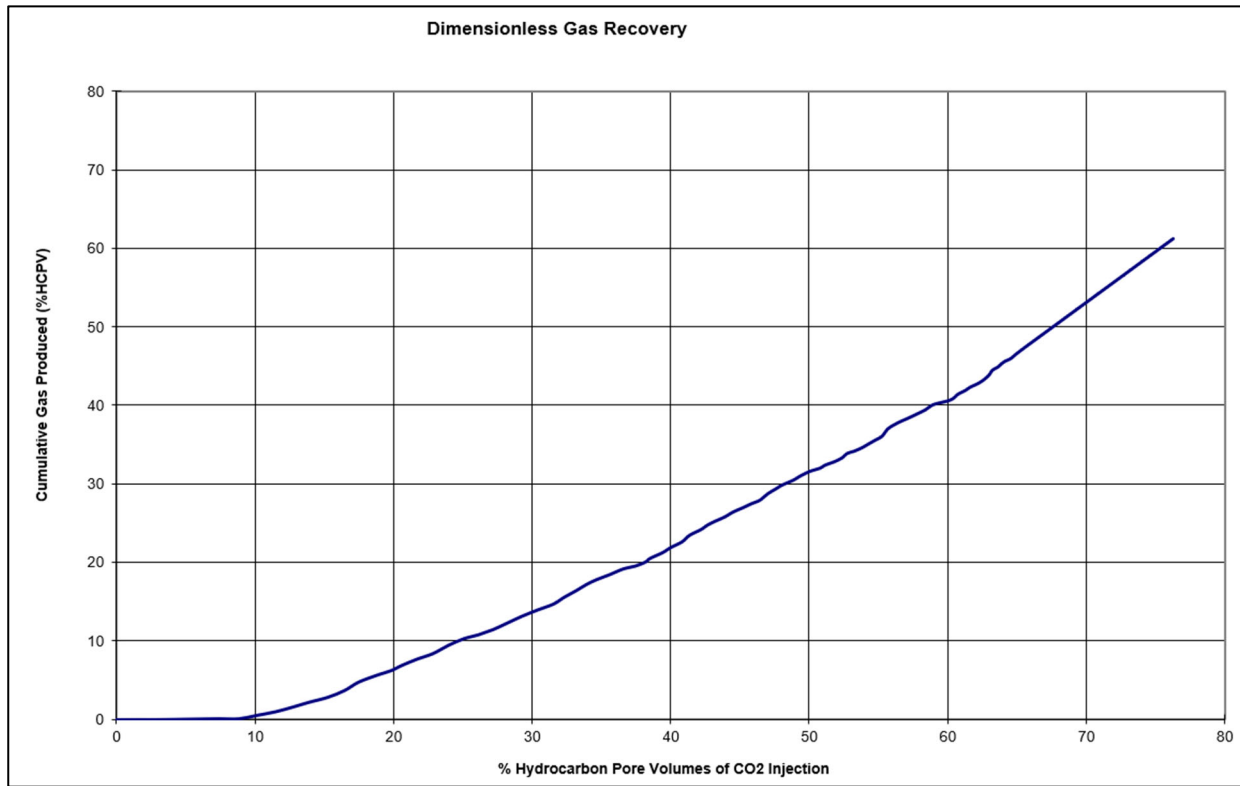
not inject water in these high permeability sands and therefore the wells are able to flow at high pressure (>800 psi). After 1 HCPV most of the CO<sub>2</sub> injected is produced back so there is very little CO<sub>2</sub> purchase required. CO<sub>2</sub> net utilization (purchase) on these CO<sub>2</sub> floods is usually 10-15 MCF/BBL and Gross CO<sub>2</sub> utilization (Total CO<sub>2</sub> Injection) can be on the order of 50-100 MCF/BBL with lots of CO<sub>2</sub> recycle.

For West Texas, since the reservoirs are so large and CO<sub>2</sub> is more expensive, water is used to reduce the amount of CO<sub>2</sub> required to perform the CO<sub>2</sub> flood. The Operators often inject 30-40% of 1 HCPV of pure CO<sub>2</sub> and then begin injecting water on a 1 to 1 volume ratio with the CO<sub>2</sub> and then gradually taper off the CO<sub>2</sub> injected. For the 80-acre pattern example for EMSU, if we inject 30% of the HCPV with pure CO<sub>2</sub> at a rate of 2000 MCFPD (2 MMCFPD), it will take 4.38 years to reach the 30% HCPV slug and then we begin injecting water for one or two months followed by CO<sub>2</sub> for the same on one or two month cycles. This process is known as Water-Alternating-Gas (WAG) with a 1:1 WAG cycle. This 1:1 WAG is carried out for an extended period of time and then water may be injected for 2 months followed by CO<sub>2</sub> for 1 month in what is known as 2:1 WAG ratio. By tapering off on the CO<sub>2</sub> injected the Operator can reduce CO<sub>2</sub> purchase and allow the purchased CO<sub>2</sub> to be used for other patterns.

To calculate the amount of CO<sub>2</sub> produced over time, a dimensionless curve of Cumulative Gas Produced (% HCPV) versus HCPV's of CO<sub>2</sub> injected is developed using reservoir simulation or analogs to other CO<sub>2</sub> floods. The size of the pattern and thickness of the zone will impact this curve. Figure 13 is an example of how this curve should look. It can be seen that CO<sub>2</sub> breakthrough doesn't occur until approximately 10% of a HCPV of CO<sub>2</sub> is injected. For the 80-acre EMSU pattern this would mean that we will begin producing CO<sub>2</sub> after 1 BCF CO<sub>2</sub> is injected.

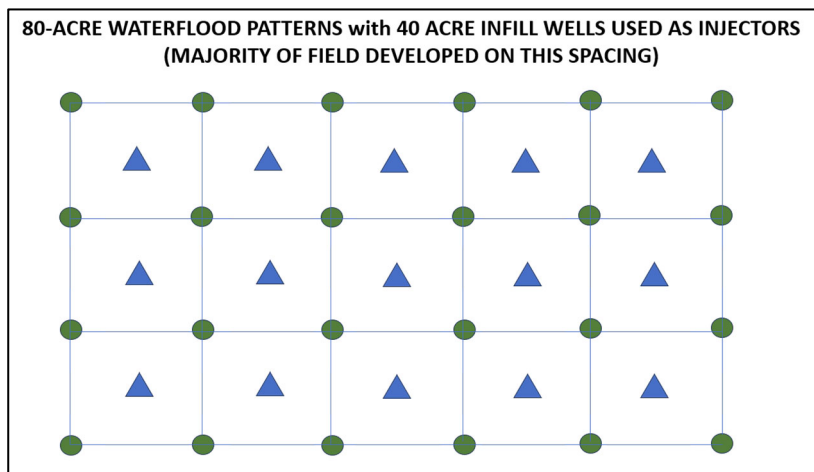
The chart shows that after 60% HCPV CO<sub>2</sub> (6.4 BCF) is injected, we will have produced 40% HCPV (4.27 BCF) back, resulting in 20% HCPV CO<sub>2</sub> (2.13 BCF) purchase. At \$1.50/MCF the CO<sub>2</sub> purchase will cost \$3.2 million.

Figure 13 – Dimensionless CO2 Production Curve

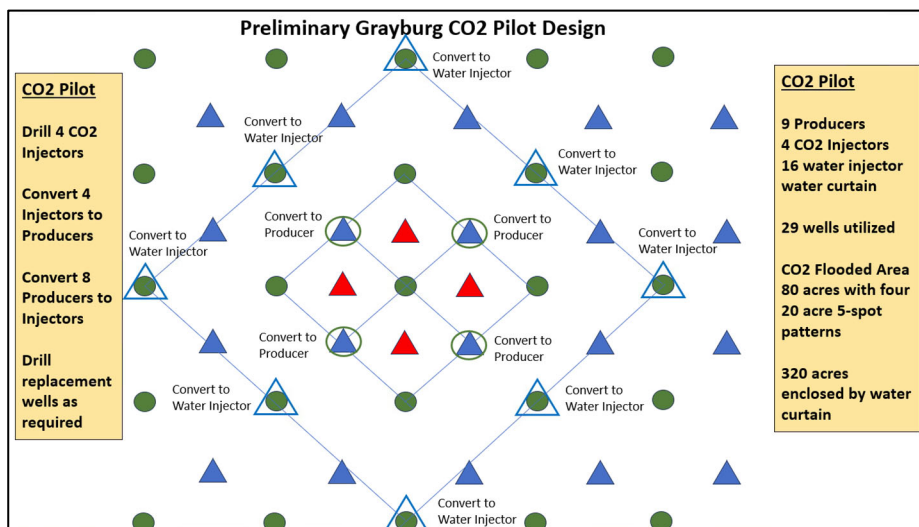


EMSU is developed on 40-acre spacing with the water injector located in the center of the 80-acre pattern as shown by the simplified drawing in Figure 14. Consideration will be given to converting the 80-acre patterns to 40-acre patterns for faster response during the pilot CO2 flood by drilling additional 20-acre injection wells and converting some producers to injectors and some injectors to producers as shown by Figure 15. A water curtain (row of water injectors) will be established around the 320-acre area to prevent CO2 movement outside the pattern. Four (4) new wells will be drilled, four (4) wells will be converted to producers, and eight (8) wells will be converted to water injectors.

**Figure 14 – Simplified Map of 80-acre 5-spot Patterns**



**Figure 15 – Method to Convert Pattern to 40-acre 5-spot Patterns for CO2**



## Conclusions

EMSU, EMSU-B, and AGU waterflood units operated by Empire Petroleum have high remaining oil volumes which can be produced by CO2 injection. A CO2 pipeline within 8 miles of the field can be tied into to provide a reliable source of CO2. Design of the CO2 flood will take into account learnings from the waterflood where two high permeability intervals caused poor vertical sweep, with water bypassing the oil. Preliminary cost estimate of \$124 million is required to initiate Phase 1 of the project where 20 MMBO will be recovered from the Grayburg and San Andres intervals.

The performance of Phase 1 will be based upon CO2 response obtained by injecting 25 MMCFPD CO2 into the Grayburg and San Andres patterns, and increasing CO2 injection as CO2 is produced back. This is a preliminary design and it will be refined during 2024-2025 by results of the infill drilling program.

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

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

**CASE NOS. 23614-23617**

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

**CASE NOS. 24018-24027**

**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**

**EMPIRE NEW MEXICO LLC'S MOTION TO REFER CASES TO NEW MEXICO OIL  
CONSERVATION COMMISSION**

In accordance with the Hearing Examiner's request at the December 21, 2023 status conference, Empire New Mexico LLC ("Empire") submits this motion in response to Goodnight Midstream Permian, LLC's ("Goodnight") oral request that the Director of the New Mexico Oil Conservation Division ("Division") refer a select portion of the above-captioned cases (referred to collectively as the "Cases") to the New Mexico Oil Conservation Commission ("Commission") pursuant to 19.15.4.20(B) NMAC while seeking to stay others. Empire opposes any request to refer only some of the Cases to the Commission, while staying others, because the Cases involve the same common issues and nearly identical evidence, and a stay would cause unnecessary and unreasonable delay that would only serve to further damage the correlative rights in the reservoir that are owned by Empire, the State of New Mexico and the United States. In support of this motion, Empire states the following.

1. These applications arise from Goodnight's proposed and existing injection of

**EXHIBIT - 3**

produced water into the San Andres formation within and surrounding the 14,189.84-acre Eunice Monument South Unit (“EMSU”) operated by Empire. The EMSU has existed since 1984, when it was approved by the Commission via Order Nos. R-7765, R-7766, and R-7767. Empire also operates the Arrowhead Grayburg Unit (“AGU”), which is located approximately 1 mile to the southeast of the EMSU, under Order No. R-9482. *See* Self-Affirmed Statement of Jack E. Wheeler at 1, ¶ 2, attached hereto as Exhibit A.

2. Order No. R-7765 established the EMSU with the vertical limits including the San Andres formation, *see* Order No. R-7765 at Ordering ¶ 3, and Commission Order No. R-7766 also included the San Andres formation as part of the Unitized Interval. Commission Order No. R-7767 realigned the vertical limits for the shallower Eumont Gas Pool and the deeper Eunice Monument Oil pool [Eunice Monument Grayburg-San Andres pool; pool code 23000]. *See* Order No. R-7767 at Ordering ¶¶ 1 and 2. This order also reaffirmed the lower limit of the Eunice Monument Oil pool as the base of the San Andres formation.

3. Empire currently operates the EMSU as a water flood project recovering hydrocarbons from the Grayburg – San Andres formation. The EMSU waterflood currently produces approximately 830 BOPD; 67,600 BWPD; 540 MCFPD and injects approximately 67,600 BWPD into the unitized Grayburg / San Andres Reservoir. Empire plans to further develop the EMSU through CO<sub>2</sub> injection to enhance recovery in the Grayburg and San Andres formation and to recover oil within residual oil zones (“ROZ”) in the San Andres formation. By CO<sub>2</sub> flooding this San Andres ROZ interval, Empire estimates that 270 million barrels or more of this residual oil can be recovered, in addition to an estimated 300 million barrels of tertiary oil recovered from the Grayburg. Exhibit A at 1-2, ¶ 3.

4. In Division Case Nos. 23614-23617, Goodnight seeks orders authorizing injection

of produced water for disposal into the San Andres formation between approximately 4,100 and 5,300 feet. Goodnight proposes to drill all four wells<sup>1</sup> within the EMSU, which would impair Empire's ability to produce hydrocarbons from its unitized interval. *Id.* at 2, ¶ 5.

5. In Division Case Nos. 24018-24027, Empire seeks orders revoking Goodnight's existing permits to inject produced water into the San Andres formation for the same reasons it opposes Goodnight's applications in Case Nos. 23614-23617. Case Nos. 24018, 24019, 24020, and 24025 involve Goodnight's four active wells that are located within the EMSU – the Andre Dawson SWD #1 (30-025-50634), the Ernie Banks SWD #1 (30-025-50633), the Sosa SWD #1(30-025-47947), and the Ryno SWD #1 (30-025-43901), respectively. Case Nos. 24022, 24024, 24026, and 24027 involve Goodnight's four active disposal wells that are located within approximately one mile of the EMSU – the Pedro SWD #1 (30-025-50079), the Nolan Ryan SWD #1 (30-025-45349), the Ted SWD #1(30-025-44386), and the Yaz SWD #1 (30-025-46382), respectively. The Yaz SWD #1 is located approximately 200 feet from the EMSU boundary. Case Nos. 24023 and 24021 involve Goodnight's permitted Verlander SWD #1 (30-025-50632) and Rocket SWD #1 (30-025-pending), respectively, which are also located within approximately one mile of the EMSU. In Division Case No. 23775, Goodnight seeks authorization to increase the rate of injection into the Andre Dawson SWD #1 within the EMSU. *Id.* at 2-3, ¶ 6.

6. All of the Cases are related to Commission Case No. 24123, in which Goodnight has sought a de novo hearing on Division Order No. R-22869-A. Exhibit A at 2, ¶ 4. In that order, the Division denied Goodnight's application for authorization to inject into its proposed Piazza

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<sup>1</sup> In Case No. 23614, Goodnight proposes to drill the Doc Gooden SWD #1, located in Unit J, Section 3, T21S, R36E. In Case No. 23615, Goodnight proposes to drill the Hernandez SWD #1, located in Unit P, Section 10, T21S, R36E. In Case No. 23616, Goodnight proposes to drill the Seaver SWD #1, located in Unit K, Section 10, T21S, R36E. In Case No. 23617, Goodnight proposes to drill the Hodges SWD #1, located in Lot 11, Section 4, T21S, R36E.

SWD #1, which is located within the EMSU, because the proposed injection would impair production of hydrocarbons. *See* Order No. R-22869-A. Specifically, the Division found that Goodnight's proposed well "would expand the use of the San Andres formation as a disposal interval" and "encroach towards the northeast and the interior of the EMSU and the use of the San Andres formation as a compatible source of make-up water for waterflood operations." *Id.* at ¶ 10.

The Division concluded:

Empire has provided sufficient evidence for continued assessment of the Unitized Interval for potential recovery of any additional hydrocarbon resources remaining in place. Approval of the Proposed Well would contradict the responsibility of the OCD 'to prevent the drowning by water of any stratum or part thereof capable of producing oil or gas or both oil and gas in paying quantities and to prevent the premature and irregular encroachment of water or any other kind of water encroachment that reduces or tends to reduce the total ultimate recovery of crude petroleum oil or gas or both oil and gas from any pool.'"

*Id.* at ¶ 11.

7. At hearing, Empire will demonstrate that Goodnight's current and proposed injection of millions of barrels of produced water into the San Andres formation, both within and in proximity to the EMSU, will impair Empire's production within the EMSU and result in the waste of hydrocarbons for at least five reasons: (1) the proposed injection will impair Empire's ability to recover hydrocarbons from the ROZ in the San Andres formation through CO<sub>2</sub> injection and from the Grayburg formation; (2) vertical fractures allow communication between the San Andres and Grayburg formations; (3) injection of large volumes of water into the San Andres formation will prematurely water out Empire's wells, resulting in the loss of oil and gas, vastly increase operating costs, and increase plugging and abandonment liabilities decades earlier than would otherwise be necessary<sup>2</sup>; (4) injection of such volumes preclude use and potential storage

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<sup>2</sup> Significant recent increases in well failure and well costs lead Empire to believe this is already occurring from the massive amounts of water being injected into the formations.



of CO<sub>2</sub> for recovery of hydrocarbons in both the San Andres and the Grayburg formations; and (5) injection of large water volumes will cause higher pressures in the ROZ, and higher potential for hydraulic fracturing and vertical communication, thereby impairing Empire's ability to produce hydrocarbons. In Division Case Nos. 23614-23617, Empire has submitted affidavits and exhibits of seven witnesses, including reservoir engineers and geologists, to substantiate its position. Exhibit A at 3-4, ¶ 8.

8. Division Rule 19.15.4.20 NMAC authorizes the Division Director to direct the Commission to hear certain matters. In the past, the Director has referred cases to the Commission when they involve issues of substantial public importance and/or the referral will conserve resources of the parties and the Division. *See, e.g.*, Order No. R-21831 (referring application that involved an interstate well to the Commission).

9. These Cases are of substantial public importance because they involve the injection of millions of barrels of produced water that will significantly impair hydrocarbon production within a Commission-approved, 14,189.84-acre unit in which the United States, State of New Mexico, working interest owners, and royalty owners hold an interest. Exhibit A at 4, ¶ 9.

10. In addition, referring all of the Cases directly to the Commission would promote administrative economy by avoiding the need for multiple hearings. If the Division is required to hold an initial hearing on any of these cases, the party that does not prevail will certainly seek a *de novo* hearing before the Commission due to the importance of the issues at stake, as demonstrated by Goodnight's application for a *de novo* hearing of the order in Division Order No. R-22869-A. In this regard, referral to the Commission would conserve resources of the Division and the parties.

11. Referral of all cases is also appropriate because all of the cases pending before the Division involve similar facts and circumstances to those at issue in Goodnight's application for

*de novo* hearing regarding Order No. R-22869-A in Case No. 24123, which is already pending before the Commission. Exhibit A at 3, ¶ 4. Thus, again, referral of all Cases would conserve resources of the parties.

12. Moreover, referral of the Cases is appropriate because they are related and arise from similar facts and circumstances. As discussed above, Empire's evidence will demonstrate that all of Goodnight's current and proposed injection – both within and adjacent to the EMSU – will impair production within Empire's unitized San Andres formation. In fact, one of the wells outside the EMSU, the Yaz SWD #1, is located approximately 200 feet from the unit boundary and will certainly impact production within the unit. As a result, there is no basis to refer some of the cases to the Commission and not others. *Id.* at 2-3, ¶ 6.

13. It is Empire's understanding that Goodnight agrees that the cases involving wells within the EMSU should be referred to the Commission but is taking the untenable position that the cases involving wells outside of the EMSU should remain before the Division, and should be stayed, until the Commission issues a ruling on the EMSU cases. Goodnight's position must be rejected for several reasons. First, as discussed above, Empire will present similar geological and engineering evidence in all of the Cases, and all of the Cases involve injection that is impairing, or will impair, the production of hydrocarbons within the unit. *Id.* at 3, ¶ 7. In this regard, there is no basis to distinguish between wells located within the EMSU and wells located within one mile of the EMSU, one of which is approximately 200 feet away. Second, Goodnight's proposal would allow it to continue injecting massive amounts of produced water into the area immediately adjacent to the unit, and thereby damage Empire's unitized interval, to the economic detriment of the United States, the State of New Mexico, working interest owners, and royalty owners. Third, Goodnight's proposal is nonsensical because if there were any basis to distinguish the wells within

the EMSU from the wells outside the EMSU, then Goodnight's proposed stay of the non-EMSU cases serves no purpose because the Commission's order on the EMSU wells would have no bearing on the non-EMSU wells. This fact demonstrates that the true purpose of Goodnight's proposal is to allow it to continue injection that is damaging Empire's unitized interval.

14. For the reasons discussed above, all of the Cases should be referred to the Commission. Referral is appropriate and necessary to address the public interest issues at stake, conserve resources of the parties and the Division, and facilitate an expedient decision. Since the Division requested that Empire file its brief responding to Goodnight's oral proposal to remove cases to the Commission in advance of Goodnight's motion and given the significant interests involved in these matters, Empire also requests authorization to file a reply to any response submitted by Goodnight.

Respectfully submitted,

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**CERTIFICATE OF SERVICE**

I hereby certify that a true and correct copy of the foregoing was served on the following counsel by electronic mail on January 3, 2024:

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**APPLICATIONS OF GOODNIGHT MIDSTREAM  
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IN ITS ANDRE DAWSON SWD #1,  
LEA COUNTY, NEW MEXICO.**

**CASE NO. 23775**

**SELF-AFFIRMED STATEMENT OF JACK E. WHEELER IN SUPPORT OF  
EMPIRE'S MOTION TO REFER CASES TO  
NEW MEXICO OIL CONSERVATION COMMISSION**

I, Jack E. Wheeler state as follows:

1. I am over the age of 18. I am employed by Empire Petroleum Corporation as Vice President-Land & Legal and have personal knowledge of the above-referenced cases ("Cases") and the facts contained in Empire New Mexico LLC's ("Empire") Motion to Refer Cases to New Mexico Oil Conservation Commission.

2. These applications arise from Goodnight's proposed and existing injection of produced water into the San Andres formation within and surrounding the 14,189.84-acre Eunice Monument South Unit ("EMSU") operated by Empire. The EMSU has existed since 1984, when it was approved by the Commission via Order Nos. R-7765, R-7766, and R-7767. Empire also operates the Arrowhead Grayburg Unit ("AGU"), which is located approximately 1 mile to the southeast of the EMSU, under Order No. 9482.

**EXHIBIT A**

3. Empire currently operates the Eunice Monument South Unit (“EMSU” or “Unit”) as a water flood project recovering hydrocarbons from the Grayburg – San Andres formation. The EMSU waterflood currently produces approximately 830 BOPD; 67,600 BWPD; and 540 MCFPD and injects approximately 67,600 BWPD into the unitized Grayburg / San Andres Reservoir. Empire plans to further develop the EMSU through CO<sub>2</sub> injection to enhance recovery in the Grayburg – San Andres formation and to recover oil within residual oil zones (“ROZ”) in the San Andres formation. By CO<sub>2</sub> flooding this San Andres ROZ interval, Empire estimates that 270 million barrels or more of this residual oil can be recovered, in addition to an estimated 300 million barrels of tertiary oil recovered from the Grayburg.

4. All of the Cases pending before the Division involve similar facts and circumstances to those at issue in Goodnight’s application for *de novo* hearing regarding Order No. R-22869-A in Case No. 24123, currently pending before the Commission.

5. In Division Case Nos. 23614-23617, Goodnight seeks orders authorizing injection of produced water for disposal into the San Andres formation between approximately 4,100 and 5,300 feet. Goodnight proposes to drill all four wells<sup>1</sup> within the EMSU, which would impair Empire’s ability to produce hydrocarbons from its unitized interval.

6. In Division Case Nos. 24018-24027, Empire seeks orders revoking Goodnight’s existing permits to inject produced water into the San Andres formation for the same reasons it opposes Goodnight’s applications in Case Nos. 23614-23617. Case Nos. 24018, 24019, 24020, and 24025 involve Goodnight’s four active wells that are located within the EMSU – the Andre

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<sup>1</sup> In Case No. 23614, Goodnight proposes to drill the Doc Gooden SWD #1, located in Unit J, Section 3, T21S, R36E. In Case No. 23615, Goodnight proposes to drill the Hernandez SWD #1, located in Unit P, Section 10, T21S, R36E. In Case No. 23616, Goodnight proposes to drill the Seaver SWD #1, located in Unit K, Section 10, T21S, R36E. In Case No. 23617, Goodnight proposes to drill the Hodges SWD #1, located in Lot 11, Section 4, T21S, R36E.

Dawson SWD #1 (30-025-50634), the Ernie Banks SWD #1 (30-025-50633), the Sosa SWD #1(30-025-47947), and the Ryno SWD #1 (30-025-43901), respectively. Case Nos. 24022, 24024, 24026, and 24027 involve Goodnight's four active disposal wells that are located within approximately one mile of the EMSU – the Pedro SWD #1 (30-025-50079), the Nolan Ryan SWD #1 (30-025-45349), the Ted SWD #1(30-025-44386), and the Yaz SWD #1 (30-025-46382), respectively. The Yaz SWD #1 is located approximately 200 feet from the EMSU boundary. Case Nos. 24023 and 24021 involve Goodnight's permitted Verlander SWD #1 (30-025-50632) and Rocket SWD #1 (30-025-pending), respectively, which are also located within approximately one mile of the EMSU. In Division Case No. 23775, Goodnight seeks authorization to increase the rate of injection into the Andre Dawson SWD #1 within the EMSU.

7. Empire will present similar geological and engineering evidence in all of the Cases, and all of the Cases involve injection that is impairing, or will impair, the production of hydrocarbons within the unit.

8. At hearing, Empire will demonstrate that Goodnight's current and proposed injection of millions of barrels of produced water into the San Andres formation, both within and in proximity to the EMSU, will impair Empire's production within the EMSU and/or AGU and result in the waste of hydrocarbons for at least five reasons: (1) the proposed injection will impair Empire's ability to recover hydrocarbons from the ROZ in the San Andres formation through CO<sub>2</sub> injection and from the Grayburg formation; (2) vertical fractures allow communication between the San Andres and Grayburg formations; (3) injection of large volumes of water into the San Andres formation will prematurely water out Empire's wells, resulting in the loss of oil and gas, vastly increase operating costs, and increase plugging and abandonment liabilities decades earlier

than would otherwise be necessary<sup>2</sup>; (4) injection of such volumes preclude use and potential storage of CO<sub>2</sub> for recovery of hydrocarbons in both the San Andres and the Grayburg formations; and (5) injection of large water volumes will cause higher pressures in the ROZ, and higher potential for hydraulic fracturing and vertical communication, thereby impairing Empire's ability to produce hydrocarbons. In Division Case Nos. 23614-23617, Empire has already submitted affidavits and exhibits of seven witnesses, including reservoir engineers and geologists, to substantiate its position.

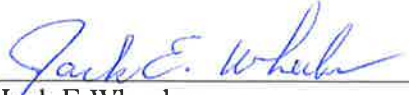
9. The Cases involve the injection of millions of barrels of produced water that will significantly impair hydrocarbon production within a Commission-approved, 14,189.84-acre unit in which the United States, State of New Mexico, working interest owners, and royalty owners hold an interest.

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<sup>2</sup> Significant recent increases in well failure and well costs lead Empire to believe this is already occurring from the massive amounts of water being injected into the formations.



I understand that this Self-Affirmed Statement will be used as written testimony in these cases. 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.



\_\_\_\_\_  
Jack E Wheeler  
Vice President Land and Legal  
Empire Petroleum Corporation

January 3, 2024  
Date

{01670691-1}5

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

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

**CASE NOS. 23614-23617**

**EMPIRE NEW MEXICO LLC'S SECOND SUPPLEMENTAL RESPONSE TO  
GOODNIGHT MIDSTREAM PERMIAN, LLC'S SUBPOENA**

Empire New Mexico LLC (Empire) states the following for its second supplemental response to Goodnight Midstream Permian LLC's subpoena.

**REQUEST NO. 1:**

Documents, communications, correspondence, emails, data, analyses, reports, and summaries, including but not limited to internal and external correspondence, memoranda, and assessments, that address, reflect on, or concern the existence or non-existence of hydrocarbons in the San Andres formation within the Eunice Monument South Unit.

**RESPONSE:**

Empire objects to this request because it seeks information that is protected by the attorney-client privilege, the attorney work-product doctrine, and exemptions afforded consulting experts. Goodnight seeks information currently being formulated by Empire's expert witnesses and consultants in coordination with Empire's attorneys for the hearing of the instant cases. Subject to that objection, in addition to the documents submitted by Eugene Sweeney in his testimony in Case 22626, Empire submits the documents in the attached Index of Produced Documents.

**SUPPLEMENTAL RESPONSE:**

Subject to and without waiving the objections set forth in Empire's response, Empire is producing the following additional documents in response to this request:

- Robert F. Lindsey publications dated 1998, 2014 (dissertation), 2016, and 2022. Mr. Lindsey's materials from 1993-1994 are not available, as they were presented on 35 mm slides that cannot be located. However, the pertinent illustration addressed in those materials is included in his dissertation and in his 2022 publication.
- Fracture Study of the EMSU Well No. 679 Oriented Core
- Two raster logs for the core wells
- Fracture study
- Empire's communications with its expert witnesses that contain: (1) the experts' requested scope of work; and (2) information Empire provided to the experts for use in their analysis.

**EXHIBIT - 4**

Empire does not have other documents, including mudlogs or internal well files, that are responsive to this request.

## **SECOND SUPPLEMENTAL RESPONSE:**

As an initial matter, Empire objects to Goodnight repeatedly using this extremely broad request as a vehicle to repeatedly raise new requests for additional information. As demonstrated by Empire's multiple rounds of document production and the discussion below, Empire has gone to great lengths to fully respond to the subpoena and will object to further requests for supplementation as a misuse of the Division's subpoena.

Subject to and without waiving its objections, Empire is producing responsive, non-privileged internal communications and communications among its former employees and experts (OCD 23614-23617 02978-3230). Empire identified other communications among its former employees and Empire's counsel, which are subject to the attorney-client privilege, and communications among its employees regarding communications with counsel and preparation for the hearing in New Mexico Oil Conservation Division Case No. 24123, which are protected from disclosure by the work product doctrine and attorney-client privilege.

Empire is also producing a complete copy of the July 1, 1987 Waterflood Performance and Cash Flow Projections for Eunice Monument South Unit, Lea County, New Mexico, prepared by William M. Cobb & Associates, Inc. (OCD 23614-17 03231-03277). This report was previously produced but certain pages contained notes that blocked text.

In addition, Empire previously produced the following documents in response to this request:

- Resistivity Log for the EMSU 679 Well (OCD 23614-23617 02811-30025310090000\_MIC.pdf)
- EMSU Well 679 Core Analysis (Jan. 24, 1991) (OCD 23614-23617 02812-02850)
- EMSU-679 Core Description (OCD 23614-23617 02851)
- Infill Drilling and Waterflood Potential for Eunice Monument South Unit, Lea County, New Mexico, as of January 1, 1988, prepared by William M. Cobb & Associates, Inc. (OCD 23614-23617 02852-2872)
- Routine Core Analysis, Amerada Hess Corporation, NMGSAU #522 Well (OCD 23614-23617 02873-02930)
- July 1, 1987 Waterflood Performance and Cash Flow Projections for Eunice Monument South Unit, Lea County, New Mexico, prepared by William M. Cobb & Associates, Inc. (OCD 23614-17 02931-02977).

Please also note that Empire's initial response to the subpoena included the following documents responsive to this request:

- BO/d Bubble Maps, Log Data Coverage, EMSU "A" – CO2 Pilot High-Grade
- Exploiting the ROZ in Lithuania, Presented at 19<sup>th</sup> Annual CO2 Flooding Conference, December 14, 2013, Midland Texas;
- Residual Oil Saturation Determination for EOR Projects in Means Field, October 2012 SPE Reservoir Evaluation & Engineering

- Residual Oil Zones: The Long Term Future of Enhanced Oil Recovery in the Permian Basin and Elsewhere, 5<sup>th</sup> Annual EORI CO2 Workshop, Casper, Wyoming
- What is a Residual Oil Zone and What Makes it a Huge Oil Resource?, Melzer Consulting, September 2023
- Stranded Oil in the Residual Oil Zone, Prepared for Advances Resources International and U.S. Department of Energy, L. Stephen Melzer, February 2006
- Two Geological Case Histories of Residual Oil Zones in the Permian Basin by Independent Operators: with Core Observations, B. Trentham,

In Case No. 22626, Empire produced documents to Goodnight that were prepared by XTO in relation to the Unit. Those documents are in Goodnight's possession and are not being reproduced here.

Empire also filed its hearing testimony and exhibits in these matters on October 27, 2023. Those exhibits include approximately 370 pages of discussion and analysis that is responsive to this request. Empire is not reproducing those documents here.

Goodnight requested that Empire produce its internal well file for the EMSU #660 well under this request. That file was previously produced.

Empire is not in possession, custody, or control of other documents responsive to this request.

**REQUEST NO. 3:**

Documents, communications, correspondence, emails, data, and summaries, including but not limited to internal and external correspondence and memoranda, that address, reflect on, or concern the analysis identified in Paragraph 4 of Empire's Motion to Stay Issuance of Order, filed with the Division in Case Nos. 23614-23617 on August 25th, 2023.

**RESPONSE:**

Empire objects to this request because it seeks information that is protected by the attorney-client privilege, the attorney work-product doctrine, and exemptions afforded consulting experts. Goodnight seeks information currently being formulated by Empire's expert witnesses and consultants in coordination with Empire's attorneys for the hearing of the instant cases. Subject to that objection, please see response to Request No. 2.

**SUPPLEMENTAL RESPONSE:**

Please refer to Empire's Second Supplemental Response to Request No. 1.

**REQUEST NO. 4:**

A copy of Empire's written plan, including all drafts, to evaluate the San Andres formation for production of hydrocarbons identified by Eugene Sweeney in Case No. 22626 at the hearing on September 15, 2023. See Tr. 238:18-22.

**RESPONSE:**

See Responses to Requests Nos. 2 and 3.

**SUPPLEMENTAL RESPONSE:**

On information and belief, Mr. Sweeney was referring to documents provided to Empire by XTO, which were produced to Goodnight in Case No. 22626. Empire is not reproducing those documents here.

**REQUEST NO. 5:**

Documents, communications, correspondence, emails, data, and summaries, including but not limited to internal and external correspondence and memoranda, that address, reflect on, or concern Empire's plan to evaluate the San Andres formation for production of hydrocarbons identified by Eugene Sweeney in Case No. 22626 at the hearing on September 15, 2023. See Tr. 238:18-22.

**RESPONSE:**

See responses to Request Nos. 2, 3, and 4.

**SUPPLEMENTAL RESPONSE:**

Please refer to Empire's supplemental response to Request Nos. 3 and 4.

**REQUEST NO. 6:**

Documents, communications, correspondence, emails, data, analyses, reports, and summaries, including but not limited to internal and external correspondence, memoranda, and assessments, that address, reflect on, or concern evidence that there is communication between the proposed injection intervals in Case Nos. 23614-23617 and the overlying Grayburg formation, including core analyses.

**RESPONSE:**

Empire objects to this request because it seeks information that is protected by the attorney-client privilege, the attorney work-product doctrine, and exemptions afforded consulting experts. Goodnight seeks information currently being formulated by Empire's expert witnesses and consultants in coordination with Empire's attorneys for the hearing of the instant cases. Subject to

that objection, in addition to the documents submitted by Eugene Sweeney in his testimony in Case 22626, Empire submits the documents in the attached Index of Produced Documents.

**SUPPLEMENTAL RESPONSE:**

Please refer to Empire's supplemental response to Request No. 1.

**SECOND SUPPLEMENTAL RESPONSE:**

Please refer to Empire's Second Supplemental Response to Request No. 1. Regarding documents that show plumes of water and changes in water chemistry in the Grayburg, please refer to the paper "Utilization of Geological Mapping Techniques to Track Scaling Tendencies in the Eunice Monument South Unit Waterflood, Lea County, New Mexico," Corrosion 96, NACE International Annual Conference and Exposition (Strickland et al., March 1996), which is being produced (OCD 03278-03297). In addition, please refer to the USGS Water Chemistry Database (filtering for Lea County and Grayburg/San Andres) at: <https://data.usgs.gov/datacatalog/data/USGS:59d25d63e4b05fe04cc235f9>

Empire is also aware of water chemistry analyses that are in the possession, custody and control of Chevron.

**REQUEST NO. 7:**

Documents, communications, correspondence, emails, reports, and summaries identifying Empire's geologic pick for the top of the San Andres formation within the Eunice Monument South Unit, including references to the measured depth and/or subsea depth for the top of the San Andres formation.

**RESPONSE:**

See response to Request No. 6. The vertical limits of the Eunice Monument South Pool are defined in Oil Conservation Division Orders Nos. R-7767 and R-7767-A.

**SUPPLEMENTAL RESPONSE:**

Empire witness Nicholas Cestari prepared a structure map, which is included in Empire's hearing exhibits as Exhibit F-1. The San Andres formation top is evident in the structure map and is also identified in the cross sections Empire has provided in its hearing exhibits and the NuTech logs that Empire has produced. Empire does not have a document beyond what has been provided that identifies the San Andres formation tops and is not required to prepare documents for Goodnight.

Respectfully submitted by:

HINKLE SHANOR LLP

/s/ Dana S. Hardy

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**From:** Adam Rankin  
**Sent:** Tuesday, January 30, 2024 12:09 PM  
**To:** Dana Hardy; Ernest Padilla; Sharon T. Shaheen  
**Cc:** Jaclyn McLean; Samantha Catalano; Everett Holmes; Paula M. Vance; Julia Broggi; Michael Feldewert  
**Subject:** RE: NMOCD Cases 23614-23617 Empire NM's Response to Subpoena - a few remaining issues

Dana,

Good morning. When we spoke following your 1/9 email, Empire was in the process of providing additional responsive documents and communications, which I understand you were reviewing for privilege. Any updates on timing?

Also, I understand based on our discussion that the "written plan" referred to in Sweeney's testimony is the XTO documents presented as Empire Exhibits E and F in the Piazza Case No. 22626. Our understanding is that Empire's response to the subpoena referring to Sweeney's testimony for the "written plan" intended to refer to those Exhibits as the plan. I just want to confirm that is what Empire meant in the response to the Subpoena.

All best and talk soon,  
Adam

**Adam Rankin**  
Partner, Holland & Hart LLP

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**From:** Adam Rankin  
**Sent:** Tuesday, January 9, 2024 2:14 PM  
**To:** 'Dana Hardy' <DHardy@hinklelawfirm.com>; 'Ernest Padilla' <padillalawnm@outlook.com>; 'Sharon T. Shaheen' <sshahen@montand.com>  
**Cc:** 'Jaclyn McLean' <JMcLean@hinklelawfirm.com>; 'Samantha Catalano' <scatalano@montand.com>; 'Everett Holmes' <eholmes@hinklelawfirm.com>; Paula M. Vance <PMVance@hollandhart.com>; Julia Broggi <JBroggi@hollandhart.com>; Michael Feldewert <MFeldewert@hollandhart.com>  
**Subject:** RE: NMOCD Cases 23614-23617 Empire NM's Response to Subpoena - a few remaining issues

Dana,

Thank you for letting us know Empire is working to prepare a supplemental production. We appreciate Empire's cooperation.

In addition to the issues outlined in the 12/20 email, we have identified concerns based on the motion to refer these cases to the Commission. Empire's attached witness statement alleges Empire can recover approximately 270 million barrels or more of residual oil from the San Andres – apparently based on some evaluation for how it can recovery hydrocarbons from the San Andres. In sworn testimony from September 2022, Empire's former COO stated that Empire has a written plan for how it is going to evaluate the San Andres for oil recovery. Request No. 4 and 5 ask for a copy of Empire's plan to evaluate the San Andres and related communications and documents. In its response to the subpoena, Empire stated "any intended plan or analysis that may have been formulated by Empire was contained in Eugene Sweeney's testimony in OCD Case 22626."

**EXHIBIT - 5**



It may be that Empire's witness was not telling the truth on the stand at the OCD and Empire did not have a written plan. It is not clear why he would prevaricate on that question. But that is essentially what Empire implied in its response to the subpoena: "... Empire states that any intended plan or analysis that may have been formulated by Empire was contained in Eugene Sweeney's testimony in OCD Case 22626."

It now appears—based on Jack Wheeler's sworn statement—that Empire has prepared some form of evaluation or plan that is responsive to the request. Under Rule 26(E), Empire has an obligation to "seasonably supplement" its discovery to the extent it has a written evaluation/plan and any related internal communications and documents.

Please provide the evaluation referred to in Mr. Wheeler's sworn statement and any related internal communications and documents, including any responsive documents created during or after Empire's due diligence review of its EMSU purchase.

As to the issues identified in the 12/20 email below, if you can let us know in advance what documents Empire is agreeing to produce in its supplemental production it would be helpful so we can assess where we stand in our effort to meet and confer. Otherwise, we have to wait to review the production to evaluate what has or has not been produced. If Empire continues to believe certain documents we have requested are outside the scope of the subpoena, please let us know so we can consider preparing a new subpoena.

All best,  
Adam

**Adam Rankin**  
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**From:** Adam Rankin  
**Sent:** Wednesday, December 20, 2023 5:12 PM  
**To:** 'Dana Hardy' <[DHardy@hinklelawfirm.com](mailto:DHardy@hinklelawfirm.com)>; Ernest Padilla <[padillalawnm@outlook.com](mailto:padillalawnm@outlook.com)>; Sharon T. Shaheen <[sshaheen@montand.com](mailto:sshaheen@montand.com)>  
**Cc:** Jaclyn McLean <[JMcLean@hinklelawfirm.com](mailto:JMcLean@hinklelawfirm.com)>; Samantha Catalano <[scatalano@montand.com](mailto:scatalano@montand.com)>; Everett Holmes <[eholmes@hinklelawfirm.com](mailto:eholmes@hinklelawfirm.com)>; Paula M. Vance <[PMVance@hollandhart.com](mailto:PMVance@hollandhart.com)>; Julia Broggi <[JBroggi@hollandhart.com](mailto:JBroggi@hollandhart.com)>; Michael Feldewert <[MFeldewert@hollandhart.com](mailto:MFeldewert@hollandhart.com)>  
**Subject:** RE: NMOCD Cases 23614-23617 Empire NM's Response to Subpoena - a few remaining issues

Dana,

This email is an effort continue to confer over discovery that we believe remains outstanding.

Rather than expanding the scope of Goodnight Midstream's discovery, as Empire asserts, we believe we are working to narrow the focus of our dispute to the specific categories of documents responsive to the subpoena that appear to have been withheld from production by Empire.

**External Communications including to/from Testifying Experts (Request Nos. 1, 3, 5, 6, ,and 7):**

As noted in the email I sent to the Division hearing examiner yesterday, we understand we have reached agreement over Empire's obligation to produce communications to/from Empire and its testifying experts. Thank you. You have

confirmed with me via phone and email that Empire has produced all material responsive communications to/from its testifying experts, at least as with respect to Empire's current employees.

We appreciate Empire's efforts to identify, review, and produce communications to/from its prior employees, including its prior COO Eugene Sweeney, and Cobb – and any other of Empire's testifying experts. We will wait to hear from you on whether those emails are responsive.

**Internal Communications (Request Nos. 1, 3, 5, 6, ,and 7):**

Based on our communications, it is apparent Empire has not produced all responsive internal emails and communications. Request Nos. 1, 3, 5, 6, and 7 each seek "internal and external" "communications, correspondence, emails" on the specified topic. We have received no internal emails between or among Empire's current or former employees, including its former COO Eugene Sweeney. This is a critical deficiency.

Empire objected to Request Nos. 1, 3, 5, 6, and 7 on the grounds of "attorney-client privilege, attorney work-product doctrine, and exemptions afforded consulting experts." We are not seeking privileged communications to/from counsel. Nor are we seeking communications reflecting the mental impressions of counsel. We are seeking and have a right to all internal communications between and among Empire employees responsive to Request Nos. 1, 3, 5, 6, and 7.

For example, Empire acquired the EMSU property and its underlying leases in the first half of 2021. In its papers filed with the OCD, Empire has asserted that when it evaluated purchasing the EMSU it considered materials provided to Empire regarding ROZ potential in the San Andres component of the unit. See Empire Resp. to MTC at 5. It is therefore difficult to believe Empire has generated no internal responsive emails regarding the presence/absence of hydrocarbons in the San Andres responsive to Request No. 1. For the same reason, we also find it also difficult to believe there are no internal emails, communications, or memoranda reflecting Empire's plan to evaluate the San Andres for ROZ that would be responsive to Request No. 5.

As I pointed out in my email conferring over our discovery dispute on November 28, Goodnight Midstream produced internal emails and communications among its employees responsive to Empire's subpoena. Pulling those emails from Goodnight Midstream's Outlook folders, reviewing them for responsiveness, etc. and preparing them for production was a time-consuming effort that required an extension of time to comply with the subpoena deadline. We expect at least a commensurate effort and responsiveness from Empire with respect to its discovery obligations involving internal emails and communications.

If Empire's position is that all of its internal emails, correspondence, communications, memoranda, etc. are protected as under the doctrine of "attorney work product," please explain the basis for that assertion. We had discussed not preparing a privilege log, but if we are unable to understand or agree on the basis for withholding every internal email and communication, then we may need to revisit that agreement.

**Request No. 1 – Ex. G EMSU #660 full well file**

Empire produced responsive documents from its internal well file for the EMSU #660. Thank you.

Because Empire relies on this well to show hydrocarbons in the San Andres, the entire internal well file is responsive. Please confirm the entire internal well file for the EMSU #660 has been produced.

**Request No. 6 – Communication between SA/GB**

As noted in Exhibit B to Goodnight Midstream's Motion to Compel, Goodnight has a right to documents, studies, data, etc. referred to in Empire's testimony showing that plumes of water and changes in water chemistry in the Grayburg before waterflooding are from the San Andres. See, e.g., William West Para. A8 PDF p. 337 of 369; Empire Ex. G-5 at p.

353 of 369; Lindsay statement B7, p. 240 of 369 (referencing water chemistry studies that verify plumes of water were sourced from the underlying San Andres).

We have not identified anything produced by Empire that provides water chemistry analyses for any zone in the EMSU before waterflooding commenced in 1986. Nor have we identified any data, document, analysis, report or memo that confirms there is a change in sulfur content after waterflooding commenced in 1986. Please confirm all responsive documents regarding water chemistry analyses before 1986, or that there was an increase in sulfur content after waterflooding commenced in 1986, have been produced or confirm that Empire does not have such documents in its possession or control.

#### **Request No. 7 – Geologic Pick for the Top of the San Andres**

Request No. 7 specifically asks for Empire's geologic pick for the top of the San Andres (as well as internal/external communications etc. related to Empire's pick). We agreed that the discovery would not be applicable to information/documents available on the OCD website (the limitation is not as broad as publicly available data), but also agreed that limitation "applies only to information and data that was actually filed with NMOCD and not documents that contain or were compiled from OCD data." See our agreement attached.

It appears from Empire's Exhibit F-1, that Empire created a document, spreadsheet or a database that includes its geologic picks for the top of the San Andres because it apparently used that information to build a structure map (Exhibit F-1). That document, spreadsheet or database is directly responsive to the request to produce – along with any related communications, emails, etc. It also is expressly excluded from our agreement about what is not required to be produced.

If, instead of creating its own geologic picks for the San Andres or pulling geologic picks from the OCD well files, Empire simply created a structure map for the San Andres based on some defined thickness of the Grayburg and therefore does not have documents or a spreadsheet reflecting its SA picks, then please confirm it does not have responsive documents.

#### **Dr. Lindsay's Chevron Database (Request Nos. 1-7)**

Our understanding is that Empire is unable to produce a copy of Dr. Lindsay's Chevron database that he relied on to prepare his statement because it is in the possession/control of Chevron. Please confirm.

### **Adam Rankin**

Partner, Holland & Hart LLP

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**From:** Dana Hardy <[DHardy@hinklelawfirm.com](mailto:DHardy@hinklelawfirm.com)>

**Sent:** Monday, December 18, 2023 2:48 PM

**To:** Adam Rankin <[AGRankin@hollandhart.com](mailto:AGRankin@hollandhart.com)>; Ernest Padilla <[padillalawnm@outlook.com](mailto:padillalawnm@outlook.com)>; Sharon T. Shaheen <[sshaheen@montand.com](mailto:sshaheen@montand.com)>

**Cc:** Jaclyn McLean <[JMcLean@hinklelawfirm.com](mailto:JMcLean@hinklelawfirm.com)>; Samantha Catalano <[scatalano@montand.com](mailto:scatalano@montand.com)>; Everett Holmes <[eholmes@hinklelawfirm.com](mailto:eholmes@hinklelawfirm.com)>; Paula M. Vance <[PMVance@hollandhart.com](mailto:PMVance@hollandhart.com)>; Julia Broggi <[JBroggi@hollandhart.com](mailto:JBroggi@hollandhart.com)>; Michael Feldewert <[MFeldewert@hollandhart.com](mailto:MFeldewert@hollandhart.com)>; Dana Hardy <[DHardy@hinklelawfirm.com](mailto:DHardy@hinklelawfirm.com)>

**Subject:** RE: NMOCD Cases 23614-23617 Empire NM's Response to Subpoena - a few remaining issues

External Email

Adam,

Thanks for speaking with me this afternoon. Per our call, the second Cobb report is available at the following link, along with the other documents we produced last week:

<https://montand.sharefile.com/d-s66c796310a614feb81e95be2bc7e57a5>

Regarding the footage depths and wells that were used to create the structure map provided as Empire hearing exhibit F-1, that information is beyond the scope of the subpoena and is publicly available. Goodnight seems to be expanding the scope of its subpoena requests (to which Empire objected) to include ever increasing types of information. If Goodnight wants to request specific types of additional information, it should seek another subpoena and Empire will respond accordingly. It is inappropriate for Goodnight to continue to add new requests under the umbrella of its original subpoena. In addition, the type and number of these requests is unduly burdensome, particularly in an NMOCD proceeding where discovery is limited.

Regarding emails between Empire’s prior employees and Cobb, we will see if we are able to locate them and if any are responsive to the subpoena.

Also based on our call, I understand that you will file a supplemental motion to compel that addresses the outstanding issues, and Empire will file a response.

Please don’t hesitate to call if you’d like to further discuss these issues.

Thanks,  
Dana



Dana S. Hardy  
Partner  
Hinkle Shanor LLP  
218 Montezuma  
Santa Fe, New Mexico 87501  
(505) 982-4554 telephone  
(505) 930-5702 direct  
(505) 982-8623 facsimile  
[dhardy@hinklelawfirm.com](mailto:dhardy@hinklelawfirm.com)

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---

**From:** Adam Rankin <[AGRRankin@hollandhart.com](mailto:AGRRankin@hollandhart.com)>  
**Sent:** Monday, December 18, 2023 10:44 AM  
**To:** Dana Hardy <[DHardy@hinklelawfirm.com](mailto:DHardy@hinklelawfirm.com)>; Ernest Padilla <[padillalawnm@outlook.com](mailto:padillalawnm@outlook.com)>; Sharon T. Shaheen

<sshahen@montand.com>

**Cc:** Jaclyn McLean <JMclean@hinklelawfirm.com>; Samantha Catalano <scatalano@montand.com>; Everett Holmes <eholmes@hinklelawfirm.com>; Paula M. Vance <PMVance@hollandhart.com>; Julia Broggi <JBroggi@hollandhart.com>; Michael Feldewert <MFeldewert@hollandhart.com>

**Subject:** RE: NMOCD Cases 23614-23617 Empire NM's Response to Subpoena - a few remaining issues

Dana,

We have reviewed the materials provided to us by Empire on Friday afternoon. Thank you for working with us to produce this additional responsive material. Because the missing emails to/from Cobb include Empire's former COO who testified at length on Empire's behalf in the Piazza case and provide important context that we do not have the benefit of understanding, it is imperative that Empire produce those missing emails to Goodnight. Please let me know if Empire will agree to withdraw its objection to producing these emails. If not, it appears we are at an impasse and will have to brief the issue with the Division.

On the data Empire used to produce the San Andres structure map (SA top picks for each well), please advise whether Empire will produce the requested data/information. If not, we will include that issue in the briefing.

Finally, we understand Empire is working to provide a second Cobb report as a complete copy. We appreciate your cooperation to provide that report. We understand that once the second report is produced, all Cobb reports that were prepared for or provided to Empire will have been produced. Please correct my understanding if I am mistaken.

All best,  
Adam

## Adam Rankin

Partner, Holland & Hart LLP

agrankin@hollandhart.com | T: (505) 954-7294 | M: (505) 570-0377

CONFIDENTIALITY NOTICE: This message is confidential and may be privileged. If you believe that this email has been sent to you in error, please reply to the sender that you received the message in error; then please delete this email.

---

**From:** Adam Rankin

**Sent:** Friday, December 15, 2023 4:36 PM

**To:** 'Dana Hardy' <DHardy@hinklelawfirm.com>; Ernest Padilla <padillalawnm@outlook.com>; Sharon T. Shaheen <sshahen@montand.com>

**Cc:** Jaclyn McLean <JMclean@hinklelawfirm.com>; Samantha Catalano <scatalano@montand.com>; Everett Holmes <eholmes@hinklelawfirm.com>; Paula M. Vance <PMVance@hollandhart.com>; Julia Broggi <JBroggi@hollandhart.com>; Michael Feldewert <MFeldewert@hollandhart.com>

**Subject:** RE: NMOCD Cases 23614-23617 Empire NM's Response to Subpoena - a few remaining issues

Dana,

On the emails involving Empire's former employees, I understand from our call that Empire does not have ready access to them because those individuals are no longer employed by Empire and it would take some time and effort to retrieve them. We expect that those emails are being preserved, however. While I initially indicated we would not demand Empire produce those emails at this time under this OCD subpoena, we must reserve the right to do so after we have a chance to review the Cobb reports being produced today and, of course, reserve the right to pursue them in other proceedings or at a later time.

As to the structure map exhibit (Empire Exhibit F-1), I learned after we spoke earlier today that what we don't have from Empire are the data points and wells used to create the San Andres structure in Empire Exhibit F-1. The footage depths

and wells are the data points that are missing and what are responsive. Can you please confirm Empire will provide us that responsive information?

Thank you.

**Adam Rankin**

Partner, Holland & Hart LLP

agrarkin@hollandhart.com | T: (505) 954-7294 | M: (505) 570-0377

CONFIDENTIALITY NOTICE: This message is confidential and may be privileged. If you believe that this email has been sent to you in error, please reply to the sender that you received the message in error; then please delete this email.

---

**From:** Dana Hardy <DHardy@hinklelawfirm.com>

**Sent:** Friday, December 15, 2023 3:23 PM

**To:** Adam Rankin <AGRankin@hollandhart.com>; Ernest Padilla <padillalawnm@outlook.com>; Sharon T. Shaheen <sshahen@montand.com>

**Cc:** Jaclyn McLean <JMcLean@hinklelawfirm.com>; Samantha Catalano <scatalano@montand.com>; Everett Holmes <eholmes@hinklelawfirm.com>; Paula M. Vance <PMVance@hollandhart.com>; Julia Broggi <JBroggi@hollandhart.com>; Michael Feldewert <MFeldewert@hollandhart.com>; Dana Hardy <DHardy@hinklelawfirm.com>

**Subject:** RE: NMOCD Cases 23614-23617 Empire NM's Response to Subpoena - a few remaining issues

**External Email**

Adam,

Empire's responses to your requests are set out below in red font. The documents referenced below are available at this link: <https://montand.sharefile.com/d-s42b6291543c244d287d72a0d743156be>

**First**, on September 14, 2022, Deacon Marek sent an email to Thomas Pritchard, Josh Cornell, and Eugene Sweeney at Empire, with copies to Ernie and Don Bailey and Robert Williams with William M. Cobb & Associates forwarding PDF copies of prior reports that Cobb prepared for the EMSU. See Empire Bates OCD 23614-17 02793. This email was sent the day before the Piazza hearing in Case No. 22093. We were not provided previous emails in the email chain and cannot make out the contents of the reports from the limited emails that were provided; however, it appears likely the Cobb reports referenced in the email are responsive to the subpoena because they were provided in response to the Piazza case going forward the next day and the emails transmitting them were included in the supplemental production. In addition, it is apparent that there were earlier emails in this chain that would reflect Empire's request to Cobb for the reports.

Please let us know if Empire will provide a copy of the Cobb reports transmitted in this 9/14/22 email and any earlier emails between Empire and Cobb. I've copied a screen grab image of the email for reference below.

---

**From:** Deacon Marek <[dmarek@wmcobb.com](mailto:dmarek@wmcobb.com)>  
**Sent:** Wednesday, September 14, 2022 2:49 PM  
**To:** Thomas Pritchard <[tommyp@empirepetrocorp.com](mailto:tommyp@empirepetrocorp.com)>; Josh Cornell <[josh@empirepetrocorp.com](mailto:josh@empirepetrocorp.com)>; Eugene Sweeney <[eugene@empirepetrocorp.com](mailto:eugene@empirepetrocorp.com)>; Ernest Padilla <[PadillaLawNM@outlook.com](mailto:PadillaLawNM@outlook.com)>  
**Cc:** Don Bailey <[dbailey@wmcobb.com](mailto:dbailey@wmcobb.com)>; Robert Williams <[rwilliams@wmcobb.com](mailto:rwilliams@wmcobb.com)>  
**Subject:** Prior Cobb reports

Gentlemen:

Attached are PDF copies of our prior reports for the EMSU. I did get permission from the prior client to send this to you.

Best regards,

Deacon

F. J. "Deacon" Marek, P.E.  
Senior VP - Technical Advisor  
William M. Cobb & Associates, Inc.  
12770 Coit Road, Suite 907  
Dallas, TX 75251  
(972) 385-0354 office  
(972) 672-7479 cell  
[dmarek@wmcobb.com](mailto:dmarek@wmcobb.com)

[EXTERNAL]

OCD 23614-17 02793

Two prior reports were provided by Cobb. One report is attached, and we are in the process of obtaining a complete copy of the second report and will provide it. As we discussed during our call this morning, Empire objects to providing emails between its former employees and Cobb and understands that Goodnight agrees they need not be produced at this time in these NMOCD proceedings.

**Second**, Empire provided 2 copies of a porosity log for the EMSU 679, but not the resistivity log for that well. The resistivity log is responsive because it provides the basis for the oil saturation calculations that were done as part of Empire's petrophysical analysis. Please provide the resistivity log for the EMSU 679 so we can evaluate the analysis that was performed.

The resistivity log was obtained from a public database and is attached.

**Third**, in an email dated September 11, 2023, Darrell Davis states that Empire is constructing a San Andres top of structure map. See Empire Bates OCD 23614-17 02789. That structure map is responsive to the request to produce documents reflecting Empire's pick for the top of the San Andres. Please produce it.

A screen grab showing the email and Bates page is copied below for reference:

**From:** Darrell W. Davis <[ddavis@empirepetrocorp.com](mailto:ddavis@empirepetrocorp.com)>  
**Sent:** Monday, September 11, 2023 3:22 PM  
**To:** Lucy King <[lucy@empirepetrocorp.com](mailto:lucy@empirepetrocorp.com)>; Deacon Marek <[dmarek@wmcobb.com](mailto:dmarek@wmcobb.com)>; Don Bailey <[dbailey@wmcobb.com](mailto:dbailey@wmcobb.com)>  
**Cc:** Jack Wheeler <[jack@pieoperating.com](mailto:jack@pieoperating.com)>; Robert Williams <[rwilliams@wmcobb.com](mailto:rwilliams@wmcobb.com)>; William West <[william@empirepetrocorp.com](mailto:william@empirepetrocorp.com)>; Nicholas Cestari <[NCestari@empirepetrocorp.com](mailto:NCestari@empirepetrocorp.com)>; Anibal Araya <[aaraya@empirepetrocorp.com](mailto:aaraya@empirepetrocorp.com)>  
**Subject:** RE: Prior Cobb reports - Empire Petroleum  
**Sensitivity:** Confidential

Deacon,

We would like for Cobb & Associates to conduct a study to determine a range of oil-in-place volumes for the San Andres Residual Oil Zone which lies beneath the Empire Petroleum operated Eunice Monument oil field.

We have core and log data which can be used in this evaluation, along with geologic maps of the Grayburg formation.

We are constructing a San Andres top of structure map and can provide information as we obtain it, but will require your assistance in finalizing the map so that P-10, P-50, and P-90 volumes can be determined.

This study and exhibits (affidavit for hearing, write-up, figures, etc.) need to be completed by Oct-23-2023 so that our attorneys can review it before the Nov-2-2023 hearing.

Please confirm that Cobb & Associates can conduct this study and meet our Oct-23 timeline. We would also like to know an approximate cost for this work and expert witness testimony.

If you would like to have a video meeting to go over what is needed, just let us know.

Thanks,

Darrell W. Davis P.E.  
Senior Reservoir / Production Engineer

Empire Petroleum Corporation  
25025 Interstate 45 North, STE 420  
The Woodlands, TX, 77380  
Mobile: (832) 525-7575  
email: [ddavis@empirepetrocorp.com](mailto:ddavis@empirepetrocorp.com)




---

**From:** Lucy King <[lucy@empirepetrocorp.com](mailto:lucy@empirepetrocorp.com)>  
**Sent:** Thursday, August 31, 2023 12:56 PM  
**To:** Deacon Marek <[dmarek@wmcobb.com](mailto:dmarek@wmcobb.com)>; Don Bailey <[dbailey@wmcobb.com](mailto:dbailey@wmcobb.com)>; Mike Morrisett <[mike@empirepetrocorp.com](mailto:mike@empirepetrocorp.com)>

OCD 23614-17 02789

The structure map has been provided twice and is included in Empire’s hearing exhibits as Exhibit F-1.

**Fourth**, in an email dated September 25, 2023, from Deacon Marek to Darrel Davis and Don Bailey at Empire, Mr. Marek identifies a list of core data that Empire provided Cobb; however, the list is not visible in the PDF that was produced and it is not clear why—perhaps due to an issue converting the email file to PDF. See Empire Bates OCD 23614-17 02784.



Please provide the list of core data referenced in the email. A copy of the email showing how the list is not visible is copied below for reference. If any of the core data in the list was not provided to Goodnight Midstream please also provide that.

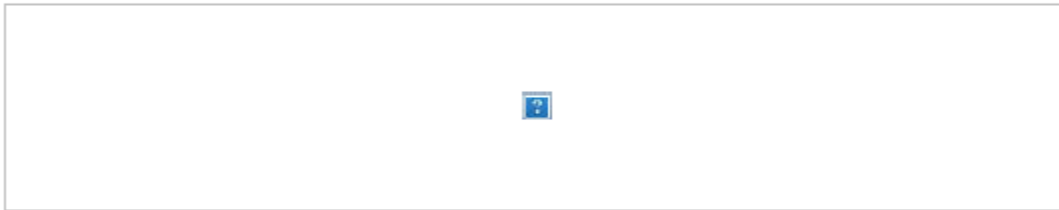
---

**From:** Deacon Marek <[dmarek@wmcobb.com](mailto:dmarek@wmcobb.com)>  
**Sent:** Monday, September 25, 2023 9:40 AM  
**To:** Darrell W. Davis <[ddavis@empirepetrocorp.com](mailto:ddavis@empirepetrocorp.com)>; Don Bailey <[dbailey@wmcobb.com](mailto:dbailey@wmcobb.com)>  
**Cc:** Robert Williams <[rwilliams@wmcobb.com](mailto:rwilliams@wmcobb.com)>; Nicholas Cestari <[NCestari@empirepetrocorp.com](mailto:NCestari@empirepetrocorp.com)>;  
Jack Wheeler <[jwheeler@empirepetrocorp.com](mailto:jwheeler@empirepetrocorp.com)>  
**Subject:** RE: Prior Cobb reports - Empire Petroleum  
**Sensitivity:** Confidential

**Caution:** This is an external email. Please take care when clicking links or opening attachments.  
When in doubt, contact your IT Department

Darrell:

This is a list of the core data you have sent me:



Unless you have any more data, I think w have what we need.

Thanks,

Deacon

F. J. "Deacon" Marek, P.E.  
Senior VP - Technical Advisor  
William M. Cobb & Associates, Inc.  
12770 Coit Road, Suite 907  
Dallas, TX 75251  
(972) 385-0354 office  
(972) 672-7479 cell  
[dmarek@wmcobb.com](mailto:dmarek@wmcobb.com)

---

OCD 23614-17 02784

The data consisted of three core analyses, copies of which are attached.

**Finally**, very few emails were provided to/from Steve Melzer and Nicolas Cestari. Please confirm that all material responsive emails from these individuals have been produced.

All material responsive emails have been produced.

Thanks,  
Dana



Dana S. Hardy  
Partner  
Hinkle Shanor LLP  
218 Montezuma  
Santa Fe, New Mexico 87501  
(505) 982-4554 telephone  
(505) 930-5702 direct  
(505) 982-8623 facsimile  
[dhardy@hinklelawfirm.com](mailto:dhardy@hinklelawfirm.com)

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**From:** Adam Rankin <[AGRankin@hollandhart.com](mailto:AGRankin@hollandhart.com)>  
**Sent:** Thursday, December 14, 2023 5:43 PM  
**To:** Dana Hardy <[DHardy@hinklelawfirm.com](mailto:DHardy@hinklelawfirm.com)>; Ernest Padilla <[padillalawnm@outlook.com](mailto:padillalawnm@outlook.com)>; Sharon T. Shaheen <[sshaheen@montand.com](mailto:sshaheen@montand.com)>  
**Cc:** Jaclyn McLean <[JMclean@hinklelawfirm.com](mailto:JMclean@hinklelawfirm.com)>; Samantha Catalano <[scatalano@montand.com](mailto:scatalano@montand.com)>; Everett Holmes <[eholmes@hinklelawfirm.com](mailto:eholmes@hinklelawfirm.com)>; Paula M. Vance <[PMVance@hollandhart.com](mailto:PMVance@hollandhart.com)>; Julia Broggi <[JBroggi@hollandhart.com](mailto:JBroggi@hollandhart.com)>; Michael Feldewert <[MFeldewert@hollandhart.com](mailto:MFeldewert@hollandhart.com)>  
**Subject:** RE: NMOCD Cases 23614-23617 Empire NM's Response to Subpoena - a few remaining issues

Dana,

Just checking on the remaining discovery issues outlined below. Will follow up tomorrow.

**Adam Rankin**  
Partner, Holland & Hart LLP

[agrarkin@hollandhart.com](mailto:agrarkin@hollandhart.com) | **T:** (505) 954-7294 | **M:** (505) 570-0377

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**From:** Dana Hardy <[DHardy@hinklelawfirm.com](mailto:DHardy@hinklelawfirm.com)>  
**Sent:** Monday, December 11, 2023 2:55 PM  
**To:** Adam Rankin <[AGRankin@hollandhart.com](mailto:AGRankin@hollandhart.com)>; Ernest Padilla <[padillalawnm@outlook.com](mailto:padillalawnm@outlook.com)>; Sharon T. Shaheen <[sshaheen@montand.com](mailto:sshaheen@montand.com)>  
**Cc:** Jaclyn McLean <[JMclean@hinklelawfirm.com](mailto:JMclean@hinklelawfirm.com)>; Samantha Catalano <[scatalano@montand.com](mailto:scatalano@montand.com)>; Everett Holmes <[eholmes@hinklelawfirm.com](mailto:eholmes@hinklelawfirm.com)>; Paula M. Vance <[PMVance@hollandhart.com](mailto:PMVance@hollandhart.com)>; Julia Broggi <[JBroggi@hollandhart.com](mailto:JBroggi@hollandhart.com)>; Michael Feldewert <[MFeldewert@hollandhart.com](mailto:MFeldewert@hollandhart.com)>; Dana Hardy <[DHardy@hinklelawfirm.com](mailto:DHardy@hinklelawfirm.com)>  
**Subject:** RE: NMOCD Cases 23614-23617 Empire NM's Response to Subpoena - a few remaining issues

**External Email**

Hi Adam,

We're fine with extending the briefing deadline to Monday, 12/18. We're working with Empire on you requests and will get back to you.

Thanks,  
Dana



Dana S. Hardy  
Partner  
Hinkle Shanor LLP  
218 Montezuma  
Santa Fe, New Mexico 87501  
(505) 982-4554 telephone  
(505) 930-5702 direct  
(505) 982-8623 facsimile  
[dhardy@hinklelawfirm.com](mailto:dhardy@hinklelawfirm.com)

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---

**From:** Adam Rankin <[AGRankin@hollandhart.com](mailto:AGRankin@hollandhart.com)>

**Sent:** Monday, December 11, 2023 8:42 AM

**To:** Dana Hardy <[DHardy@hinklelawfirm.com](mailto:DHardy@hinklelawfirm.com)>; Ernest Padilla <[padillalawnm@outlook.com](mailto:padillalawnm@outlook.com)>; Sharon T. Shaheen <[sshaheen@montand.com](mailto:sshaheen@montand.com)>

**Cc:** Jaclyn McLean <[JMcLean@hinklelawfirm.com](mailto:JMcLean@hinklelawfirm.com)>; Samantha Catalano <[scatalano@montand.com](mailto:scatalano@montand.com)>; Everett Holmes <[eholmes@hinklelawfirm.com](mailto:eholmes@hinklelawfirm.com)>; Paula M. Vance <[PMVance@hollandhart.com](mailto:PMVance@hollandhart.com)>; Julia Broggi <[JBroggi@hollandhart.com](mailto:JBroggi@hollandhart.com)>; Michael Feldewert <[MFeldewert@hollandhart.com](mailto:MFeldewert@hollandhart.com)>

**Subject:** RE: NMOCD Cases 23614-23617 Empire NM's Response to Subpoena - a few remaining issues

Counsel,

We have completed our review of Empire's supplemental production. Thank you for your cooperation to work through concerns to this point on Empire's responses. We have identified five remaining issues that we would like to confer further on, including three documents that appear to be responsive but not produced.

**First**, on September 14, 2022, Deacon Marek sent an email to Thomas Pritchard, Josh Cornell, and Eugene Sweeney at Empire, with copies to Ernie and Don Bailey and Robert Williams with William M. Cobb & Associates forwarding PDF copies of prior reports that Cobb prepared for the EMSU. See Empire Bates OCD 23614-17 02793. This email was sent the day before the Piazza hearing in Case No. 22093. We were not provided previous emails in the email chain and cannot make out the contents of the reports from the limited emails that were provided; however, it appears likely the Cobb reports referenced in the email are responsive to the subpoena because they were provided in response to the Piazza case going forward the next day and the emails transmitting them were included in the supplemental production. In addition, it is apparent that there were earlier emails in this chain that would reflect Empire's request to Cobb for the reports.

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**Sent:** Wednesday, September 14, 2022 2:49 PM  
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**Cc:** Don Bailey <[dbailey@wmcobb.com](mailto:dbailey@wmcobb.com)>; Robert Williams <[rwilliams@wmcobb.com](mailto:rwilliams@wmcobb.com)>  
**Subject:** Prior Cobb reports

Gentlemen:

Attached are PDF copies of our prior reports for the EMSU. I did get permission from the prior client to send this to you.

Best regards,

Deacon

F. J. "Deacon" Marek, P.E.  
Senior VP - Technical Advisor  
William M. Cobb & Associates, Inc.  
12770 Coit Road, Suite 907  
Dallas, TX 75251  
(972) 385-0354 office  
(972) 672-7479 cell  
[dmarek@wmcobb.com](mailto:dmarek@wmcobb.com)

[EXTERNAL]

OCD 23614-17 02793

**Second**, Empire provided 2 copies of a porosity log for the EMSU 679, but not the resistivity log for that well. The resistivity log is responsive because it provides the basis for the oil saturation calculations that were done as part of Empire's petrophysical analysis. Please provide the resistivity log for the EMSU 679 so we can evaluate the analysis that was performed.

**Third**, in an email dated September 11, 2023, Darrell Davis states that Empire is constructing a San Andres top of structure map. See Empire Bates OCD 23614-17 02789. That structure map is responsive to the request to produce documents reflecting Empire's pick for the top of the San Andres. Please produce it.

A screen grab showing the email and Bates page is copied below for reference:

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**Sent:** Monday, September 11, 2023 3:22 PM  
**To:** Lucy King <[lucy@empirepetrocorp.com](mailto:lucy@empirepetrocorp.com)>; Deacon Marek <[dmarek@wmcobb.com](mailto:dmarek@wmcobb.com)>; Don Bailey <[dbailey@wmcobb.com](mailto:dbailey@wmcobb.com)>  
**Cc:** Jack Wheeler <[jack@pieoperating.com](mailto:jack@pieoperating.com)>; Robert Williams <[rwilliams@wmcobb.com](mailto:rwilliams@wmcobb.com)>; William West <[william@empirepetrocorp.com](mailto:william@empirepetrocorp.com)>; Nicholas Cestari <[NCestari@empirepetrocorp.com](mailto:NCestari@empirepetrocorp.com)>; Anibal Araya <[aaraya@empirepetrocorp.com](mailto:aaraya@empirepetrocorp.com)>  
**Subject:** RE: Prior Cobb reports - Empire Petroleum  
**Sensitivity:** Confidential

Deacon,

We would like for Cobb & Associates to conduct a study to determine a range of oil-in-place volumes for the San Andres Residual Oil Zone which lies beneath the Empire Petroleum operated Eunice Monument oil field.

We have core and log data which can be used in this evaluation, along with geologic maps of the Grayburg formation.

We are constructing a San Andres top of structure map and can provide information as we obtain it, but will require your assistance in finalizing the map so that P-10, P-50, and P-90 volumes can be determined.

This study and exhibits (affidavit for hearing, write-up, figures, etc.) need to be completed by Oct-23-2023 so that our attorneys can review it before the Nov-2-2023 hearing.

Please confirm that Cobb & Associates can conduct this study and meet our Oct-23 timeline.

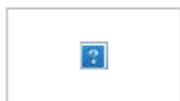
We would also like to know an approximate cost for this work and expert witness testimony.

If you would like to have a video meeting to go over what is needed, just let us know.

Thanks,

Darrell W. Davis P.E.  
Senior Reservoir / Production Engineer

Empire Petroleum Corporation  
25025 Interstate 45 North, STE 420  
The Woodlands, TX, 77380  
Mobile: (832) 525-7575  
email: [ddavis@empirepetrocorp.com](mailto:ddavis@empirepetrocorp.com)




---

**From:** Lucy King <[lucy@empirepetrocorp.com](mailto:lucy@empirepetrocorp.com)>  
**Sent:** Thursday, August 31, 2023 12:56 PM  
**To:** Deacon Marek <[dmarek@wmcobb.com](mailto:dmarek@wmcobb.com)>; Don Bailey <[dbailey@wmcobb.com](mailto:dbailey@wmcobb.com)>; Mike Morrisett <[mike@empirepetrocorp.com](mailto:mike@empirepetrocorp.com)>

OCD 23614-17 02789

**Fourth**, in an email dated September 25, 2023, from Deacon Marek to Darrel Davis and Don Bailey at Empire, Mr. Marek identifies a list of core data that Empire provided Cobb; however, the list is not visible in the PDF that was produced and it is not clear why—perhaps due to an issue converting the email file to PDF. See Empire Bates OCD 23614-17 02784. Please provide the list of core data referenced in the email. A copy of the email showing how the list is not visible is

copied below for reference. If any of the core data in the list was not provided to Goodnight Midstream please also provide that.

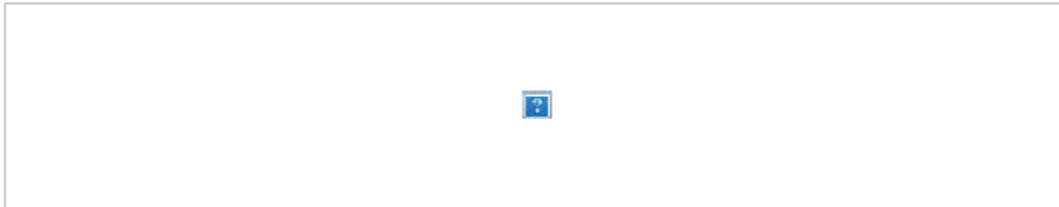
---

**From:** Deacon Marek <[dmarek@wmcobb.com](mailto:dmarek@wmcobb.com)>  
**Sent:** Monday, September 25, 2023 9:40 AM  
**To:** Darrell W. Davis <[ddavis@empirepetrocorp.com](mailto:ddavis@empirepetrocorp.com)>; Don Bailey <[dbailey@wmcobb.com](mailto:dbailey@wmcobb.com)>  
**Cc:** Robert Williams <[rwilliams@wmcobb.com](mailto:rwilliams@wmcobb.com)>; Nicholas Cestari <[NCestari@empirepetrocorp.com](mailto:NCestari@empirepetrocorp.com)>; Jack Wheeler <[jwheeler@empirepetrocorp.com](mailto:jwheeler@empirepetrocorp.com)>  
**Subject:** RE: Prior Cobb reports - Empire Petroleum  
**Sensitivity:** Confidential

**Caution:** This is an external email. Please take care when clicking links or opening attachments. When in doubt, contact your IT Department

Darrell:

This is a list of the core data you have sent me:



Unless you have any more data, I think we have what we need.

Thanks,

Deacon

F. J. "Deacon" Marek, P.E.  
Senior VP - Technical Advisor  
William M. Cobb & Associates, Inc.  
12770 Coit Road, Suite 907  
Dallas, TX 75251  
(972) 385-0354 office  
(972) 672-7479 cell  
[dmarek@wmcobb.com](mailto:dmarek@wmcobb.com)

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OCD 23614-17 02784

**Finally**, very few emails were provided to/from Steve Melzer and Nicolas Cestari. Please confirm that all material responsive emails from these individuals have been produced.

While we work through these remaining discovery issues, I would like to request an extension to 12/18 on the additional briefing in anticipation that we can reach agreement on these remaining issues and hopefully avoid having to brief anything further.

I will be available today to discuss at your convenience.

All best,  
Adam

**Adam Rankin**  
Partner, Holland & Hart LLP

agrarkin@hollandhart.com | T: (505) 954-7294 | M: (505) 570-0377

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**From:** Everett Holmes <eholmes@hinklelawfirm.com>  
**Sent:** Monday, December 4, 2023 4:59 PM  
**To:** Michael Feldewert <MFeldewert@hollandhart.com>; Adam Rankin <AGRankin@hollandhart.com>; Julia Broggi <JBroggi@hollandhart.com>; Paula M. Vance <PMVance@hollandhart.com>  
**Cc:** Dana Hardy <DHardy@hinklelawfirm.com>; Jaclyn McLean <JMcLean@hinklelawfirm.com>; Ernest Padilla <padillalawnm@outlook.com>; Sharon T. Shaheen <sshahen@montand.com>; Samantha Catalano <scatalano@montand.com>  
**Subject:** NMOCD Cases 23614-23617 Empire NM's Response to Subpoena

**External Email**

Good afternoon counsel,

Please see the attached Supplemental Response to Subpoena, along with the link below to the relevant documents.

<https://montand.sharefile.com/d-s498c85b42ad64d8fa21a097fd53e4ef8>

Thank you,  
Everett



Everett Holmes  
Paralegal  
Hinkle Shanor LLP  
P.O. Box 2068  
Santa Fe, New Mexico 87504  
505.982.4554 - office  
505.982.8623 - fax  
[eholmes@hinklelawfirm.com](mailto:eholmes@hinklelawfirm.com)

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

**APPLICATION OF GOODNIGHT  
MIDSTREAM PERMIAN, LLC TO AMEND  
ORDER NO. R-7767 TO EXCLUDE THE SAN  
ANDRES FORMATION FROM THE EUNICE  
MONUMENT OIL POOL WITHIN THE  
EUNICE MONUMENT SOUTH UNIT AREA,  
LEA COUNTY, NEW MEXICO.**

**CASE NO. 24277**

**APPLICATION OF GOODNIGHT  
MIDSTREAM PERMIAN, LLC TO AMEND  
ORDER NO. R-7765, AS AMENDED TO  
EXCLUDE THE SAN ANDRES FORMATION  
FROM THE UNITIZED INTERVAL OF THE  
EUNICE MONUMENT SOUTH UNIT,  
LEA COUNTY, NEW MEXICO.**

**CASE NO. 24278**

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

**CASE NOS. 23614-23617**

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

**CASE NO. 23775**

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

**CASE NOS. 24018-24027**

**EXHIBIT - 6**



**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**

**SUBPOENA**

To: Empire New Mexico, LLC  
c/o Padilla Law Firm, P.A.  
Attn: Ernest L. Padilla  
Post Office Box 2523  
Santa Fe, New Mexico 87504  
(505) 988-7577 telephone  
padillalawnm@outlook.com

Dana S. Hardy  
Jaclyn M. McLean  
HINKLE SHANOR LLP  
P.O. Box 2068  
Santa Fe, NM 87504-2068  
(505) 982-4554  
dhardy@hinklelawfirm.com  
jmclean@hinklelawfirm.com

Sharon T. Shaheen  
Montgomery & Andrews, P.A.  
Post Office Box 2307  
Santa Fe, NM 87504-2307  
(505) 986-2678  
sshhaheen@montand.com  
cc: wmcginnis@montand.com

**YOU ARE HEREBY COMMANDED** pursuant to NMSA 1978, §70-2-8 and

Rule 19.15.4.16.A NMAC TO APPEAR as follows:

Place: Holland & Hart LLP, 110 North Guadalupe, Santa Fe, New Mexico, 87501

Date: August 2, 2024      Time: 10:00 a.m.

to testify at the taking of the deposition of Empire New Mexico, LLC's Rule 1-30(B)(6)  
Representative, with knowledge known, or reasonably available to Empire New Mexico, LLC,

pertaining to the topics listed in **Exhibit A**. It will be recorded by a certified court reporter and videotaped by Bean & Associates. This deposition testimony may be used at trial for any and all purposes permitted by the New Mexico Rules of Civil Procedure and the New Mexico Rules of Evidence.

**YOU ARE ALSO COMMANDED** pursuant to Section 70-2-8 and Rule 19.15.4.16.A to bring with you the following document(s) or object(s):

Any documents requested in **Exhibit B**.

to produce the following documents at the offices of Holland & Hart LLP, 110 North Guadalupe, Santa Fe, New Mexico, 87501, contemporaneous with the taking of the deposition of Empire New Mexico, LLC.

This subpoena is issued on application of Goodnight Midstream Permian, LLC through its attorney, Adam G. Rankin of Holland & Hart LLP.

Dated this \_\_\_\_ day of July 2024.

**NEW MEXICO OIL CONSERVATION COMMISSION**

**BY:** \_\_\_\_\_

**Date:** \_\_\_\_\_

## EXHIBIT A: CORPORATE REPRESENTATIVE TOPICS

Goodnight Midstream Permian, LLC respectfully requests a corporate representative of Empire New Mexico, LLC to testify regarding the following topics:

1. Engineering and reservoir plans for recovery of the alleged San Andres ROZ as a part of Empire's project plan;
2. The reservoir engineering data and analyses underlying Empire's alleged project to inject carbon dioxide "CO<sub>2</sub>" to free the supposed San Andres ROZ oil for production, including but not limited to:
  - a. Reservoir characterization studies for the San Andres ROZ target zone;
  - b. Pilot holes to gather actual data on the San Andres ROZ target zone;
  - c. Geologic studies on the San Andres ROZ target zone;
  - d. Analysis of existing core data, acquisition of additional cores and core analysis;
  - e. Miscibility studies including laboratory tests;
  - f. Project staging and number of deepened or new drill wells;
  - g. Reservoir simulation studies;
  - h. Injection scheme study and design;
  - i. Production and recycle facility design;
  - j. CO<sub>2</sub> requirements, sourcing, and schedule;
3. Costs for each of the above enumerated items, estimates of project capital expenses and operating expenses, and the economic tools used to generate such estimates;
4. Estimates of future production and revenue and their references used to perform economic analyses using all project costs;
5. Any sensitivity studies using ranges of potential future revenues and costs to judge the profit margin, if any, from such economic analyses.

**EXHIBIT B: DOCUMENT REQUESTS PURSUANT TO RULE 1-034 NMRA**

Plaintiffs request production of the following documents contemporaneous with the deposition of Empire New Mexico, LLC:

1. All documents reviewed, referred to or relied upon by the witnesses to prepare for their deposition.
2. All documents used to refresh the recollection of the witnesses to prepare for their deposition.
3. All documents reviewed by witnesses as part of their preparation for the deposition on the topics above.

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