

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

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

COMM. CASE NO. 24123

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

DIV. CASE NOS. 23614-23617

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

DIV. CASE NO. 23775

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

DIV. CASE NOS. 24018-24020,

**EMPIRE NEW MEXICO, LLC'S MOTION FOR ISSUANCE OF WITNESS
DEPOSITION SUBPOENAS AND SUBPOENA FOR DOCUMENTS**

Pursuant to NMSA 1978, §70-2-8 and 19.15.4.16.A NMAC, Rules 1-026 and 1-030(B) NMRA, Empire New Mexico, LLC, ("Empire"), by and through its undersigned counsel of record, submits this motion requesting the New Mexico Oil Conservation Commission ("Commission") issue the attached deposition subpoenas to Goodnight Midstream Permian, LLC's ("Goodnight") witnesses Thomas E. Tomastik, William J. Knights, Dr. James A. Davidson, John McBeath, and Dr. Larry Lake, based upon the following showing of good cause.

FACTUAL BACKGROUND

This consolidated proceeding – now comprised of nine (9) related matters [*see* Joint Order on Goodnight's Motion to Limit Scope of Hearing (July 2, 2024)] – centers on Goodnight's ability

to continue injecting enormous quantities of produced water into the Eunice Monument South Unit (“EMSU”), and the damaging effects of this injection. The evidentiary hearing set for September 23 through September 27, 2024, will raise complex and highly technical factual issues, including: (1) whether an economically viable residual oil zone (“ROZ”) exists in the portion of the San Andres formation that lies within the EMSU; and (2) whether injection of produced water into that formation will cause waste, impair correlative rights, or otherwise interfere with the operations in the EMSU. Fully addressing these issues will require extensive expert testimony and, by extension, expert discovery.

On June 3, 2024, the Commission issued a subpoena *duces tecum* to Goodnight ordering Goodnight to produce, *inter alia*:

- the identity of each expert Goodnight may call to testify at the hearing, and the subject matter of each expert’s expected testimony;
- the substance of the facts and opinions on which each expert is expected to testify, and the grounds for each opinion;
- any reports prepared by the expert related to these consolidated proceedings; and
- a list of all publications published by the expert in the last ten (10) years and of any other cases in which the expert has testified.

See June 3, 2024, Commission Subpoena (the “Subpoena”), ¶ 31. The purpose of these requests was to allow Empire to evaluate Goodnight’s proposed expert opinions *before* the evidentiary hearing and formulate appropriate direct testimony. The Subpoena also sought voluminous documentation related to Goodnight’s injection operations, including modeling data (¶ 1), bottomhole and reservoir pressure information (¶¶ 9-10), water analyses (¶ 4), open hole logs (¶ 5), and reports reflecting concerns for hydrocarbons within the San Andres formation (¶ 22).

On July 8, 2024, Goodnight moved to quash the Subpoena and objected to each and every request for production of documents contained in it. *See* July 9, 2024, Motion to Quash, In Part, Empire’s Subpoena Duces Tecum Date June 3, 2024. Instead of complying with the Subpoena, Goodnight produced a threadbare “Witness Disclosure” containing the names of Goodnight’s experts and a short, bulleted list describing the general subject matter each expert’s expected testimony. *See* **Exhibit 1**, Goodnight’s Witness Disclosure (July 8, 2024). For example, the disclosure states that one witness will testify regarding an “Overview of Goodnight’s administrative applications” and “Well corrosion issues in the EMSU.” *See* July 8, 2024, Witness Disclosure. Goodnight’s Witness Disclosure fails to address the items set forth in the Subpoena and does not include “the substance of the facts and opinions on which each expert is expected to testify.” It also provides far less detail and clarity than Empire’s witness disclosure, produced on the same date. *See* **Exhibit 2**, Empire’s Witness Disclosure (July 8, 2024).

Pursuant to the Commission’s June 3, 2024, Pre-Hearing Order, the parties must submit written direct testimony and supporting exhibits, including any expert testimony, by August 26, 2024. *See* Pre-Hearing Order, ¶ 7 (June 3, 2024). The last day for issuance of subpoenas, including deposition subpoenas, is July 19, 2024. *Id.* ¶ 5. For the reasons that follow, Empire requests that the Commission issue the attached subpoenas to allow Empire to depose Goodnight’s proposed experts before preparing direct testimony and to obtain pertinent documents not previously requested. Given the complex issues in this case, it will benefit the Commission for the parties to adequately explore, prior to hearing and submission of written testimony and exhibits, the facts and opinions that the witnesses will testify about and all documents supporting such opinions.

ARGUMENT

A. Legal Standard

Commission Rule 19.15.4.16(A) directs the Commission to issue subpoenas for pre-hearing witness depositions “in extraordinary circumstances for good cause shown.” It provides, in relevant part, that “[t]he 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.” 19.15.4.16(A) NMAC (emphasis added). Thus, if the Commission determines there are extraordinary circumstances and that Empire has shown good cause to depose Goodnight’s experts, then the Commission should issue the attached deposition subpoenas.

In this case, the Commission should promptly issue the attached subpoenas. This motion meets Empire’s burden under Section 19.15.4.16(A) NMAC. Further, promptly issuing the requested subpoenas would allow the parties enough time to complete depositions before the deadline to submit direct testimony and exhibits. This procedure would also ensure that Goodnight has a “reasonable opportunity” to oppose the depositions if Goodnight so elects. 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.”).

Further, as set forth below, the following circumstances establish good cause to allow Empire to depose Goodnight’s witnesses *before* the deadline to submit direct testimony and supporting exhibits.

B. There is good cause for the Commission to issue witness deposition subpoenas.

First, this case involves unusually complex technical and geological issues that would benefit from early examination through pre-hearing depositions. As already noted, these issues include: (1) whether an economically viable ROZ exists in the portion of the San Andres formation that lies within the EMSU; and (2) whether injection of produced water into that formation will cause waste, impair correlative rights, or otherwise interfere with the operations in the EMSU. Resolving these questions will require extensive geological analyses and evidentiary presentation on produced water migration within the EMSU. Given the complexity of these issues, it will promote administrative efficiency, and benefit the Commission and the parties, to allow the parties to develop their respective positions *before* submitting pre-filed testimony. Empire should not have to wait until rebuttal to address Goodnight's technical data and arguments, which will presumably be extensive and have not yet been disclosed. *C.f. Williamson v. First Choice Ins. Co.*, 2022 WL 18777464, at *2 (N.D. Ga. Dec. 12, 2022) (holding that expert discovery is "designed to allow both sides in a case to prepare their cases adequately and to prevent surprise") ("The expert-disclosure rules allow the opposing party adequate opportunity to depose the expert and name its own rebuttal expert.") (citing *Reese v. Herbert*, 527 F.3d 1253, 1266 (11th Cir. 2008)).

Second, given the substantial public and private interests at stake in this proceeding, the Commission should allow fulsome and comprehensive discovery, including pre-hearing depositions. Empire's investment in the EMSU is significant, and the public has a legitimate interest in protecting correlative rights. The Oil and Gas Act requires the Commission to conserve oil and gas and prevent the drowning of strata by water. *See* NMSA 1978, Sections 70-2-11 and 70-2-12(B)(4). If Goodnight's injection practices are causing the waste of oil and gas, Empire has the right to explore how and why.

Third, Goodnight's witness disclosures and responses to written discovery provide scant information about their expected hearing testimony – especially when compared to Empire's more robust disclosures – warranting depositions. Although Goodnight has repeatedly asserted that there is no ROZ within the San Andres formation and that its injection wells are not harming Empire operations, Goodnight's expert disclosures do not give any reason why. Further, Goodnight has objected to every single document request that Empire served. Empire specifically requested that Goodnight set forth its experts' opinions, but Goodnight has not done so. It would be unreasonable to allow Goodnight to both (1) refuse to provide discoverable information about their expert testimony during written discovery, and (2) preclude Empire from eliciting those opinions before the direct testimony deadline.

For these reasons, these matters present the extraordinary circumstances contemplated by Section 19.15.4.16.A NMAC that substantiate good cause to require depositions of Goodnight's expert witnesses.

CONCLUSION

Accordingly, Empire respectfully requests that the Commission issue the deposition subpoenas attached as **Exhibits 3 through 8**; that it order Goodnight to file any related motion to quash within ten days after issuance of the deposition subpoenas, should Goodnight choose to do so, and for such other and further relief as the Commission may deem appropriate and necessary.

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CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing motion was provided to the following counsel of record by electronic mail on this 18th day of July, 2024

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/s/ Dana S. Hardy

Exhibit 1

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. 24123

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

CASE NOS. 23614-23617

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

CASE NO. 23775

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

CASE NOS. 24018-24027

GOODNIGHT MIDSTREAM’S WITNESS DISCLOSURE

Goodnight Midstream Permian, LLC (“Goodnight Midstream”), through undersigned counsel, respectfully submits the following witness disclosures as required under Order No. R-23208.

<u>Witness</u>	<u>Area of Expertise</u>	<u>Subject Matter of Testimony</u>
Nathan Alleman	OCD Regulatory Matters and SWD Permitting, Ace Energy Advisors	<ul style="list-style-type: none"> • Overview of Goodnight’s administrative applications
Preston McGuire	Petroleum Geology and Reservoir Engineering, Goodnight Midstream	<ul style="list-style-type: none"> • Overview of Goodnight • Overview of Goodnight’s existing and proposed injection • Overview of geologic setting and discussion of Grayburg and San Andres formations • Overview of geologic barriers isolating the target San Andres disposal zone • Confirmation that disposal of produced water in the San Andres will not affect underground sources of drinking water or freshwater • Overview addressing claims that San Andres disposal impairs EMSU operations • Overview addressing claims that San Andres is an economic residual oil zone in the EMSU
Thomas E. Tomastik	Petroleum Geology, Petroleum Engineering, UIC Regulatory and Geochemistry, ALL Consulting	<ul style="list-style-type: none"> • Overview and history of Eunice and Monument fields • Overview of development of EMSU and waterflood operations • Geochemical analysis and overview of water chemistry

		<p>and formation compatibility issues in the EMSU</p> <ul style="list-style-type: none"> • Well corrosion issues in the EMSU • Overview of Goodnight’s chemical treatment and filtering protocols and injection well operation parameters • Assessment and evaluation of EMSU operations and wells • Overview and addressing claims of communication between Grayburg and San Andres formations
William J. Knights	Petroleum Geology and Geophysics, Netherland, Sewell & Associates, Inc.	<ul style="list-style-type: none"> • Geology and depositional environment of the San Andres and Grayburg at the EMSU • Overview of Mother Nature’s Waterflood • San Andres development history around the EMSU • Evaluation of geologic barriers between the Grayburg and San Andres • OIP assessment for San Andres at the EMSU
Dr. James A. Davidson	Petrophysics, Ph.D., Netherland, Sewell & Associates, Inc.	<ul style="list-style-type: none"> • Petrophysical interpretation of core and log data for San Andres formation • Evaluation and assessment of the presence of oil and potential for an ROZ in the San Andres within the EMSU • Evaluation of geologic barriers between the Grayburg and San Andres formations
John McBeath	Reservoir Engineering, P.E., Austin Consulting Petroleum Engineers	<ul style="list-style-type: none"> • Evaluation of ROZ projects and what is required

		<ul style="list-style-type: none"> • Evaluation and assessment of Empire’s plans to conduct ROZ operation in San Andres within the EMSU • Assessment and evaluation of economic feasibility of San Andres ROZ operation • Analysis and assessment of impacts from injection to EMSU operations
<p>Dr. Larry Lake</p>	<p>Reservoir Engineering and Enhanced Oil Recovery, Ph.D.</p>	<ul style="list-style-type: none"> • Summary analysis of Empire’s proposal to develop San Andres as ROZ • Summary analysis of Empire’s claims that San Andres disposal impairs EMSU operations • Summary analysis on suitability of San Andres formation as a produced water disposal zone

Discovery is ongoing and Goodnight reserves the right to supplement this expert witness disclosure and the scope of opinions as additional information becomes available. Goodnight reserves the right to call and/or rely upon expert testimony by any expert identified by any other party. Goodnight reserves the right to identify and call rebuttal experts in response to expert witness testimony that Empire discloses or elicits.

DATED: July 8, 2024

Respectfully submitted,

HOLLAND & HART LLP

/s/ Nathan R. Jurgensen

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CERTIFICATE OF SERVICE

I hereby certify that on July 8, 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
DEPARTMENT OF ENERGY, MINERALS AND NATURAL RESOURCES
OIL CONSERVATION COMMISSION**

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

CASE NOS. 23614-23617

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

CASE NOS. 24018-24027

APPLICATION OF GOODNIGHT MIDSTREAM PERMIAN LLC TO AMEND ORDER NO. R-22024/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 WITNESS DISCLOSURE

In accordance with the New Mexico Oil Conservation Commission’s (“Commission”) Pre-Hearing Order issued on June 3, 2024, Empire New Mexico LLC (“Empire”) hereby discloses the following witnesses who may be called to testify at the contested hearing before the Commission on September 23 through September 27, 2024.

1. Jack E. Wheeler

Mr. Wheeler is an attorney, landman, and oil and gas executive with 45 years of oil and gas experience. He currently serves as Vice President of Land and Legal for Empire. Mr. Wheeler has worked in all of the major oil and gas producing basins in the United States and has exclusively focused on New Mexico land and legal matters for the past five (5) years. For further details regarding Mr. Wheeler’s professional experience and qualifications. A copy of Mr. Wheeler’s curriculum vitae is attached as Exhibit A.

Mr. Wheeler is expected to testify regarding the following, *inter alia*:

- A. The prospective impact of Goodnight's existing and proposed saltwater disposal injection on Empire's correlative rights to recovery of hydrocarbons and residual hydrocarbons within the Eunice Monument South Unit ("EMSU");
- B. Historical and prospective oil production from the EMSU;
- C. Interest ownership within the EMSU;
- D. Development plans by current and former operators within the EMSU;
- E. Unit Agreement and associated geographic and geologic information concerning the Unitized Substances contained within the Unit Agreement, including Empire's interests in the oil delineated materials within and produced from the Unitized Formation that will be impacted by Goodnight's existing and proposed saltwater disposal;
- F. Geologic information regarding Empire's leasehold interests in the area;
- G. Empire and its predecessors' use of water supply wells; and
- H. Empire and its predecessors' disposal of produced water.

For further information regarding the subject areas of Mr. Wheeler's testimony, *see* Exhibit A and Attachment to Exhibit A, Empire Exhibits at pdf pages 17-234, Case Nos. 23614-23617 (Nov. 2, 2023).

2. Dr. Robert F. Lindsay

Dr. Lindsay is a geologist with 47 years of experience in the petroleum industry, and specific expertise in reservoir characterization. Dr. Lindsay's work over the past 14 years has involved the Eunice Monument complex of unitized oil fields. He completed his doctoral dissertation on the Grayburg formation, which involved a dataset built by Dr. Lindsay on the Eunice Monument's unitized oil fields, other oil fields, and mountain range outcrops. Dr. Lindsay is also a member of the American Association of Petroleum Geologists, the Society for Sedimentary Geology, the Society of Independent Professional Earth Scientists, Past-President and

honorary life member of the West Texas Geological Society, Past-President and honorary life member of the Permian Basin Section for Society for Sedimentary Geology, and a licensed member of the Texas Board of Professional Geoscientists (#1386). A copy of Dr. Lindsay's curriculum vitae is attached as Exhibit B.

Dr. Lindsay is expected to testify regarding the following, *inter alia*:

A. The existence of a Residual Oil Zone within the San Andres formation underlying the EMSU, the Eunice Monument South Unit Expansion Area B, and the Arrowhead Grayburg Unit;

B. Vertical fractures and plumes indicating that vertical migration of saltwater from the San Andres to the Grayburg formation cannot be prevented;

C. Goodnight's existing and proposed saltwater disposal operations will impair current waterflood operations and result in waste by,

i. Negatively impacting production within the Grayburg reservoir and EMSU, thereby impairing Empire's correlative rights to hydrocarbons and residual hydrocarbons; and

ii. Contaminating the fresh water contained within the Goat Seep Aquifer from downward communication, which will cause negative public health impacts.

For further information regarding the subject areas of Dr. Lindsay's testimony, *see id.* at pdf pages 235-82.

3. Laurence Stephen Melzer

Mr. Melzer is a licensed consulting engineer (Texas Professional Engineer # 46859), and the lead engineer for Melzer CO2 Consulting. He received a Master of Science in Engineering degree from Purdue University. Mr. Melzer has 40 years of oil and gas experience that involves waterfloods and enhanced oil recovery projects and includes specialized work in CO2 enhanced

oil recovery and 22 years of research regarding Residual Oil Zones. A copy of Mr. Melzer's curriculum vitae is attached as Exhibit C.

Mr. Melzer is expected to testify regarding the following, *inter alia*, from the perspective of a petroleum engineer:

- A. The history and process of Residual Oil Zone mapping, exploration, and hydrocarbon recovery, including relevant diagnostic tools;
- B. The presence and production history of already productive Residual Oil Zones in the San Andres oilfields;
- C. International Residual Oil Zone study areas; and
- D. The detrimental impact of large-volume water disposal within the united San Andres fault on feasible and economically viable hydrocarbon recovery and emission-captured CO2 storage potential at EMSU.

For further information regarding the subject areas of Mr. Melzer's testimony, *see id.* at pdf pages 263-82.

4. Frank J. Marek

Mr. Marek is a registered professional engineer in Texas and serves as the Senior Vice President of William M. Cobb & Associates. He received a Bachelor of Science degree in Petroleum Engineering from Texas A&M University in 1977 and has since been involved with numerous carbonate waterfloods in the Permian Basin. Mr. Marek's experience in carbonate waterfloods includes prior studies to evaluate the EMSU's waterflood potential based on well spacing and a later study examining the potential for additional infill drilling and waterflooding. He is a member of the Society of Petroleum Engineers, both the International Section and Dallas Section, and the Society of Petroleum Evaluation Engineers. Mr. Marek specializes in oil, gas, and CO2 reserve evaluation and economic analysis, waterflood and CO2 enhanced oil recovery

feasibility and performance analysis, and reservoir simulation studies. A copy of Mr. Marek's curriculum vitae is attached as Exhibit D.

Mr. Marek is expected to testify regarding the following, *inter alia*:

A. His evaluation of the impact of saltwater disposal operations within the San Andres interval and the EMSU using NuTech to analyze oil saturation for the presence of residual hydrocarbons in the San Andres interval;

B. Evidence that water is being injected into the San Andres interval and the documented Residual Oil Zone along with its resulting impairment of Empire's correlative rights to hydrocarbon retrieval; and

C. The negative impact of Goodnight's existing and proposed injection of saltwater into the unitized interval on Empire's ability to recover hydrocarbons and the resultant waste of oil and gas.

For further information regarding the subject areas of Mr. Marek's testimony, see *id.* at pdf pages 284-92.

5. Galen Dillewyn

Mr. Dillewyn is an expert in subsurface characterization with a Bachelor of Science in Chemical Engineering from Texas Tech University awarded in May of 2000. Mr. Dillewyn has worked as an engineer for NUTECH Energy Alliance in Houston, Texas, since July of 2009, in geological, completion engineering and optimization, petrophysical, and reservoir engineering. His responsibilities have included analyzing wireline logs to characterize wells for reservoir quality, porosity, permeability, and saturation. NUTECH has previously characterized eight other wells in the same field involved in this case. A copy of Mr. Dillewyn's curriculum vitae is attached as Exhibit E.

Mr. Dillewyn is expected to testify regarding the following, *inter alia*:

A. The analysis of raw raster images received by NuTech and provided by Empire to characterize the reservoir quality, porosity, permeability, and saturation of ten (10) wells within the San Andres and Grayburg formations for presence of residual hydrocarbons;

B. Methodology, data validation, calculations, and testing conducted using NuTech NuLook to analyze wireline data; and

C. The results of the characterizations for the San Andres and Grayburg formations.

For further information regarding the subject areas of Mr. Dillwyn's testimony, see *id.* at pdf pages 264-3006.

6. Joe McShane

Mr. McShane is employed by Empire as a Senior Geologist, where he focuses on characterization, management, and development of conventional oil and gas assets across the Central Basin Platform and Northwest Permian Basin Shelf. Mr. McShane obtained a Bachelor of Science degree in Geology from Stephen F. Austin University in 2001 and conducted post-graduate work there from 2005 through 2008. Mr. McShane is responsible for field level geologic characterization, mapping, and well log interpretation. A copy of Mr. McShane's curriculum vitae is attached as Exhibit F.

Mr. McShane is expected to testify regarding the following subject areas, *inter alia*:

A. The results of geologic review and study of the EMSU unitized interval, including the underlying data, methodology, and analytical tools employed;

B. Evidence of a Residual Oil Zone within the San Andres Reservoir;

C. Characteristics of the geologic barrier between the Grayburg and San Andres reservoirs, which allow for communication between the two; and

D. The negative impact of Goodnight's proposed saltwater disposal on Empire's correlative rights within EMSU and the resulting waste of hydrocarbons that could otherwise be recovered due to developments in enhanced oil recovery methods.

7. William West

Mr. West is a petroleum engineer and Senior Vice President of Operations for Empire Petroleum. He has been employed in the oil and gas industry since graduating from Marietta College with his Bachelor of Science in Petroleum Engineering in May 1999. Mr. West has over 25 years of oil and gas experience, including in most of New Mexico's major oil and gas producing basins, and is a Certified Professional Engineer in Wyoming (# 12599). Mr. West is responsible for developing the tertiary recovery CO2 project in the EMSU. A copy of Mr. West's curriculum vitae is attached as Exhibit G.

Mr. West is expected to testify regarding the following, *inter alia*:

A. The projected damage resulting from Goodnight's existing and proposed saltwater disposal to primary, secondary, and tertiary hydrocarbon recovery at 1, 5, 10, and 20 years, including the underlying data, analytical tools, and methodology employed in the analysis;

B. Historical evidence of communication between the San Andres interval and Grayburg interval prior to creation of the Unitized Formation;

C. The presence of extractable hydrocarbons within EMSU that will be produced by enhanced oil recovery methods like CO2 flooding;

D. EMSU's ability to provide valuable hydrocarbons, which will be wasted if Goodnight's pending SWD applications are approved and its existing disposal continues;

E. Evidence of communication between the Grayburg and San Andres intervals and the resulting impact of Goodnight's produced water injection into the San Andres on the EMSU;

F. The impairment of Empire's correlative rights to hydrocarbon recovery resulting from Goodnight's existing and proposed saltwater disposal injection, including increased degradation and failure of wells and facilities as a result of heightened corrosion; and

G. Increases to Empire's operational costs due to Empire's continuing injection into the San Andres.

For further information regarding the subject areas of Mr. West's testimony, *see id.* at pdf pages 334-69.

8. Dr. James L. Buchwalter

Dr. Buchwalter obtained his Bachelor of Science in Chemical Engineering and Master of Science in Chemical Engineering from Ohio State University before receiving a Ph.D. in Chemical Engineering from Rice University in 1994. Dr. Buchwalter currently serves as the President of Gemini Solutions, Inc., which he co-founded in 1998. He has extensive experience in reservoir simulation, having completed more than 70 simulation studies globally and assisted clients of Gemini Solutions, Inc., with over 1,000 studies. A copy of Dr. Buchwalter's curriculum vitae is attached as Exhibit H.

Dr. Buchwalter is expected to testify regarding the following, *inter alia*:

A. His simulation model detailing projections for the EMSU according to production and injection rates, including the underlying data, processes, and methodology utilized to generate the projections;

B. Communication and migration of produced water between the San Andres formation and the Grayburg formation;

C. Additional injection of saltwater increases pressure in the San Andres formation, causing additional water to migrate through fractures; and

D. Higher pressure in the San Andres formation waters out Grayburg wells and causes migration to the Goat Seep aquifer.

9. Dr. Robert Trentham

Dr. Trentham is a professor with the Geoscience Department at the University of Texas El Paso. He obtained his Bachelor of Science and Master of Science in Geology from City College of New York prior to receiving his D.G.S. from the University of Texas El Paso. His research and experience focus on enhanced oil recovery, including CO2 flooding, carbon capture and storage technologies, and Residual Oil Zones. In 2023, Dr. Trentham received the 2023 American Association of Petroleum Geologists Distinguished Educator Award. Dr. Trentham has also served as an Investigator or Principal Investigator for a variety of Department of Energy Projects concerning Residual Oil Zones and CO2 flooding. A copy of Dr. Trentham's curriculum vitae is attached as Exhibit I.

Dr. Trentham is expected to testify regarding the following, *inter alia*, from the perspective of a geologist:

- A. Background information regarding how Residual Oil Zones have formed over time;
- B. The history of development of and successful recovery from Residual Oil Zones in the Permian Basin, including the Seminole, Tall Cotton, and Goldsmith fields; and
- C. The impact of Goodnight's continued injection and resulting impairment to the economics of enhanced oil recovery in the San Andres and Grayburg within the EMSU.

Respectfully submitted,

By: /s/ Sharon T. Shaheen

Sharon T. Shaheen

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ATTORNEY, LANDMAN AND OIL AND GAS EXECUTIVE

Highly accomplished, meticulously organized, skilled advocate, strategic planner, negotiator and experienced dynamic corporate oil and gas specialist with more than forty years diversified experience in the oil and gas petroleum industry providing expert legal counsel and directing company policy on a broad range of issues. Demonstrated expertise in all land and legal areas domestically and internationally; offshore and onshore; Federal Lands and Indian Lands; unleased acreage and acreage held by production. Have extensive dealings with the Bureau of Land Management (BLM), Bureau of Indian Affairs (BIA) and individual Indian Tribes.

A proven leader, adept at strategic planning, evaluating and integrating multi-well drilling programs and opportunities with land and legal compliance and ability to be able to communicate complete, concise, logical, objective and persuasive ideas in both oral and written communications to Senior Management. Broad legal oil and gas background in governmental regulations related to regulatory pooling and unitization statutes and horizontal spacing and density statutes. Land and legal experience has ranged from preparing stand-up drilling and title opinions to legal representation in litigation to negotiating and closing over \$4 Billion of Acquisitions.

CAREER OVERVIEW

EMPIRE PETROLEUM CORPORATION, Houston, Texas 2023 to Present
Vice President – Land and Legal

Responsible for all Land and Legal matters related to Subsidiaries, Empire New Mexico LLC; Empire North Dakota LLC; Empire Texas LLC and Empire Louisiana LLC. Duties include overseeing work with New Mexico Oil Conservation Division, preparing title opinions on producing properties, preparation of all legal documents required for operations and similar land and legal matters.

ATTORNEY AND OIL AND GAS CONSULTANT 2014 to Present

Oil and Gas Attorney who provides Financial, Land, Legal, Operations, Production and Regulatory Services to Clients in the Oil and Gas Industry. Principal States of Operation have been in Colorado, Kansas, Louisiana, New Mexico and Texas. Services have included preparing Stand-up Title Opinions; preparing run sheets and Mineral Ownership Reports; preparing curative for title opinions; managing in- house land and legal departments; making regulatory filings with various State Agencies; testifying before State Oil and Gas Commissions; assisting in the preparation of 10-Q's and 10-K's; serving as an Expert Witness in Trials and Hearings, assisting in the preparation of Reserve Reports and researching surface, mineral and working interest ownership of properties.

PATRIOT ENERGY, LLC, Windsor, Colorado

2011 - 2013

General Counsel Land Manager

Hired to manage assets of Company to resolve all existing land, legal and operational obligations of Oil and Gas and Real Estate Development Company. Helped to restructure debt, assisted with a joint venture agreement to have multiple horizontal wells drilled on Company minerals and helped raise third party capital to fund development of oil and gas properties and unfinished lots in sub-divisions.

Favorably settled defense of a Multi-Million Lawsuit with major Independent Oil and Gas Company. Prepared acquisition, joint operating, gas balancing and pooling agreements; complex surface damage agreements; division orders; drilling contracts; unit designations and related land and legal documents. Responsible for securing title opinions and curing title for properties and drill sites. Serve as company liaison with creditors, financial institutions, landowners, local, city, county, state and federal regulatory agencies. Work with local, State and Federal regulatory agencies to provide necessary information in order to comply with the regulatory requirements.

Served as General Counsel for Water Valley Land Company; LLC - Northern Colorado's premier resort-style lakefront/golf course development that encompassed over 1,200 acres with 2,000 homes. Infrastructure included irrigation systems, pump stations, boulevards and vast areas of open space with 400 acres of lakes plus businesses and shopping centers.

TUSCANY OIL AND GAS, Oklahoma City, Oklahoma

2002 - 2010

Managing Partner and Owner

Responsible for multifaceted investment portfolio related to the acquisition, development, management and operation of several oil and gas related businesses including a workover drilling company, gas gathering system, oilfield tool rental company, oil and gas marketing company, producing oil and gas properties and pipeline construction company. Operated one hundred eighty-six (186) wells and five (5) producing water-flood properties. Operated sixty (60) mile pipeline from Stroud, Oklahoma to Cushing, Oklahoma. Had three (3) gathering systems collecting gas from over thirty (30) operators and one hundred and fifteen (115) wells. Responsible for the management of field and office personnel. Directly responsible for all legal affairs affecting diversified company. Responsible for the successful location and negotiation of financing including equity investments and asset-based debt financing with multiple banks and the USDA.

COTTON VALLEY RESOURCES CORPORATION

1994-2002

Dallas, Texas and Oklahoma City, Oklahoma

Chairman, Chief Executive Officer and Founder with initial investment of \$325,000.00 built a publicly traded oil and gas company valued at over \$125 Million. Acquired interest in over nine hundred (900) producing properties located primarily in Texas, Colorado, Oklahoma, Louisiana and New Mexico with additional wells in California, Mississippi, North Dakota, Pennsylvania, Utah, Wyoming and Canada. Also acquired royalty interest in twelve hundred eight (1,208) wells. All acquisitions were either by cash payment or stock purchase. With a staff of forty-four (44) employees managed operations on approximately thirty-five (35) percent of the producing properties.

Jack E. Wheeler Sr. Resume

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Did amalgamation with existing American Stock Exchange Public Company and private company, East Wood Equity Ventures, Inc. Successfully navigated the Company through an IPO to form Aspen Group Resources listed on Toronto Exchange. Responsible for the successful location and negotiation of financing including equity investments and asset-based debt financing. Responsible for timely and accurate preparation and filing of SEC documents including 10 - Q's, 10 - K's and creation and implementation of a company wide Sarbanes-Oxley legislation and related rules compliance and general ethics policy. Recommended and developed company policy and position on all legal issues. Responsible for tax planning and compliance; development and maintenance of operating and capital budgets.

EL PASO NATURAL GAS, Houston, Texas 1990- 1994
Vice President - Assistant General Counsel and Assistant Secretary
Senior Vice-President - Business Development

Primary attorney responsible for the negotiation and documentation of over 300 acquisitions of producing properties exceeding \$2 Billion for subsidiary, Sonat Exploration. Responsible for handling all due diligence analysis of land and title and insuring the timely delivery of information required. Coordinated with the accounting due diligence team to make all purchase price adjustments based on discovered title defects during due diligence. Following closing of each acquisition coordinated with the respective regional land department to integrate all wells and leases into their respective operational systems. In addition managed day-to-day operation within legal department while managing five in-house lawyers in Houston location and seven in-house lawyers in field offices and supervised all outside counsel. Position required the ability to be successful at communicating complex business and legal issues to senior corporate management and personnel.

Implemented revised corporate contracts procedures by drafting a multi-volume set of approved Corporate Legal Forms for use by the entire Corporation related to the drafting, review, execution and control of all land and legal contracts for the oil and gas and pipeline operations. Initiated and established corporate environmental policies by drafting the Corporate Environmental Safety Manual which instituted an environmental employee development program with an alcohol and drug testing and substance abuse control program.

THE ST. PAUL COMPANIES, St. Paul, Minnesota 1988-1990
Vice President - Land and Legal for St. Paul Oil and Gas Investments

Corporate attorney responsible for negotiation, closing and documentation of annual budgeted \$750 Million in oil and gas and real estate investments. Handled all legal matters related to acquisitions, divestitures and operations. Responsible for securing title opinions and curing title for acquired properties and drill sites. Prepared acquisition, joint operating, gas balancing and pooling agreements; drilling contracts; division orders; unit designations and related land and legal documents. Designed and implemented a contract review and contract administration system for a business featuring more than five thousand seven hundred fifty (5,750) active, unique files and leases. Resolved five Take-or-Pay Contract disputes for ultimate settlements exceeding \$38 Million. Settled nineteen lawsuits having

total potential claims of \$44 Million for less than \$600,000.00. Managed a litigation portfolio of nearly one hundred (100) active lawsuits or claims in a variety of states and legal jurisdictions.

KRITI EXPLORATION, INC.

1984 – 1988

Stamford, Connecticut, New York City and Houston

Vice President Land & Legal

Served as General Counsel for the U.S. and certain of the foreign subsidiaries of holding companies of Vardis Vardinogiannis who has interests in oil, publishing, real estate, shipping (Avin International S.A.) and television broadcasting. Motor Oil (Hellas) is an independent oil refinery in Corinth, Greece. Vegas Oil and Gas S.A. is an Exploration and Production Company based in Egypt with assets in the United States, Egypt and Yemen whose primary assets are the Alam El Shawish Concession, the East Ghazalat Concession and the NW Gemsa Concession in Egypt. It operates its activities in the United States as Kriti Holdings, Inc. with a primary focus on oil and gas production and the construction, sale and operation of certain real estate holdings including The Corinthian that is a 57-story residential and commercial development located at 330 East 38th Street (between Second Avenue and First Avenue) in New York City.

Responsible for handling all of the legal affairs of these various operating companies and managing the legal staff. Participated in the review, screening and evaluation of all drilling prospects and if approved handled the preparation and execution of all land and legal agreements. Provided counsel to ensure compliance with all laws and regulations. Supervised all litigation matters and selected and managed outside legal counsel. Coordinated all matters related to insurance issues including review of coverage and policies and securing and maintaining insurance certificates from all operators, suppliers and subcontractors. Negotiated and drafted various contracts and agreements including employment agreements, international concession agreements, leases, non-disclosure/confidentiality agreements, offshore operating agreements, purchase agreements, sales contracts, and subcontract agreements.

TEXACO, INC., New Orleans and Houston

1980 – 1984

Corporate Attorney

Provided land and legal counsel to management on oil and gas matters including acquisitions, divestitures, operational and environmental matters, litigation, document preparation and review, FERC/gas regulatory matters, domestic exploration and production. Developed field expertise in reviewing records and determining record title ownership of counties in various states. Prepared and/or approved farmout/farmin agreements, joint-operating agreements, stand-up title opinions, unitization agreements and other legal documents and agreements. Evaluated disputes and claims and either negotiated settlements or supervised and managed litigation efforts of outside legal counsel. Represented the Company before Federal and State Governmental Agencies.

SOUTHERN AIR TRANSPORT, Miami, Florida
Executive Director of International Contracts

1977 – 1980

Responsible for handling all contract negotiations for civilian Air Charter Company owned by CIA whose aircraft operated on all seven continents and in over a hundred countries. Negotiated contracts with the UN, CARITAS, the International Committee of the Red Cross and numerous governments to provide humanitarian aid and food for the helpless saving countless thousands of lives in developing countries in Africa, Asia, Eastern Europe, Latin America and South America. Job responsibilities ranged from being involved in famine and disaster relief efforts in countries such as Angola, El Salvador, Kenya and Nicaragua to supporting Chevron's drilling activities operations in the central highlands of Papua New Guinea.

Law Clerk, Honorable William M. Schultz, Houston, Texas
United States Bankruptcy Judge, Southern District of Texas

1976 - 1977

EDUCATION

Juris Doctor - Bates College of Law, University of Houston

Master of Arts - University of Colorado

Bachelor of Arts - Texas A & M University

CONTINUING EDUCATION

Harvard Business School Executive Education - Advance Management Program

Harvard Business School Executive Education - Strategic Financial Analysis for Business Evaluation

LICENSURE & AFFILIATIONS

AMERICAN BAR ASSOCIATION

ASSOCIATION OF CORPORATE COUNSEL

STATE BAR OF LOUISIANA

MILITARY

UNITED STATES ARMY

01/1970 - 12/1973

Distinguished Disabled Vietnam Combat Veteran having served with 5th Special Forces and received numerous commendations for bravery and valor including the Silver Star, RVN Gallantry Cross, Purple Heart, Bronze Star for Valor, Air Medal, Army Commendation Medal for Valor and Combat Infantryman's Badge. Rated by the Veterans Administration as One Hundred (100%) Percent disabled for wounds suffered in Vietnam.

Robert F. Lindsay
5308 Green Tree Blvd
Midland, Texas 79707

Summary

Developed a strong background in the following: 1) reservoir characterization; 2) evaluation of reservoir potential in exploration wells; 3) assessing new play concepts; 4) unconventional carbonate source rock reservoir potential; and 5) teaching and mentoring. This includes integration of seismic, synthetic seismograms, well logs, cores, petrophysics, engineering and production data to fully evaluate and characterize reservoirs. Performed wellsite geology on exploration and development wells. Good computer skills. Excellent verbal and written communication skills. Conducted field work, measured numerous outcrop sections, and led numerous field trips. Taught graduate level geology courses (MS & PhD).

Professional Experience

Geologic Consultant, Lindsay Consulting LLC, 2016-Present, Midland, Texas

- Core description and reservoir evaluation: Conventional, tight, and unconventional reservoirs
- Field trip leader, Guadalupe Mountains and Apache Mountains, West Texas, building regional-scale sequence stratigraphic models
- Teaching graduate level courses, Affiliate Professor, Brigham Young University, describing cores, assessing reservoir potential, identifying up-dip stratigraphic traps, building reservoir-scale sequence stratigraphic models
- Adjunct Professor, University of Texas at the Permian Basin

Sr. Geological Consultant, Geological Consultant, & Geological Specialist, Carbonate Sedimentology & Sequence Stratigraphy, 2002-2015, Saudi Aramco, Dhahran, Saudi Arabia
Geological Technical Services Division (GLTSD)

- Described cores and evaluated reservoir potential in development and exploration wells from the following formations, which in stratigraphic order are:
 - Miocene;
 - Wadi WAQB
 - Palaeocene-Eocene;
 - Umm Er Radhuma
 - Cretaceous;
 - Maastrichtian
 - Aruma
 - Mishrif
 - Maaddud
 - Shu'aiba
 - Upper Ratawi
 - Jurassic;
 - Manifa
 - Hith Stringers
 - Rimthan
 - Arab-A
 - Arab-B
 - Arab-C
 - Arab-D
 - Jubaila
 - Hanifa
 - Hadriya source rock

- Upper Fadhili
- Lower Fadhili
- Sharar
- Faridah
- Marrat
- Triassic;
 - Jilh
 - Khuff-A
 - Upper Khuff-B
- Permian;
 - Lower Khuff-B
 - Khuff-C
 - Khuff-D
- Described outcrops and led field trips through the following formations, which in stratigraphic order are:
 - Miocene;
 - Dam
 - Rus
 - Dammam
 - Cretaceous;
 - Aruma
 - Hausiyan
 - Shu'aiba equivalent
 - Biyadh
 - Sulaiy
 - Jurassic;
 - Manifa equivalent
 - Hith
 - Arab-A-C Collapse Breccia
 - Arab-D
 - Jubaila J2
 - Jubaila J1
 - Hanifa Ullaya Member
 - Hanifa Hawatah Member
 - Tuwaiq Mtn T1
 - Tuwaiq Mtn T2
 - Tuwaiq Mtn T1
 - Dhurma D7 Hisyan Shale
 - Dhurma D7 Atash
 - Dhurma D6
 - Dhurma D5
 - Dhurma D4
 - Dhurma D2 Dhibi
 - Marrat
 - Triassic;
 - Minjur
 - Jilh
 - Upper Khuff-B
 - Permian;
 - Lower Khuff-B
 - Khuff-C
- Ghawar field Arab-D reservoir sequence stratigraphy and depositional model (6-8 year study)
- Regional Arab-D stratigraphic trap study

- Unconventional Jurassic carbonate source rock studies
- Khuff A regional sequence stratigraphy and depositional model
- Khuff B regional sequence stratigraphy and depositional model
- Evaluated Shaybah field-Early Cretaceous Shu'aiba porosity development and diagenesis (meso & microporosity)
- Evaluated Exploration Core Laboratory to improve its efficiency
- Evaluated carbonate reservoirs within the Partitioned Neutral Zone for contract renewal with Chevron
- Frac sand regional study throughout Saudi Arabia
- Geology subject matter expert (SME) for the upstream professional development center (UPDC)
- Purchasing laboratory equipment: Minipermeameter
- Interview potential carbonate sedimentologists and geologists, via face to face and video conferencing from Dhahran, at AAPG conventions, and in Calgary, Colombia and Argentina
- Ph.D. titled "Grayburg Formation Reservoir-Scale Architecture and Sequence Stratigraphy, Permian Basin, USA" (Started 2004, Graduated July 7, 2014, University of Aberdeen, Scotland)
- Taught Ph.D. graduate course on carbonate sedimentology at King Faud University of Petroleum and Minerals (KFUPM) (2011 and 2013)
- Presented numerous talks and poster sessions at AAPG and Geo conferences and Dhahran Geoscience Society (DGS)
- Mentored several young geologists and helped locate graduate schools to attend
- Assisted in planning and presented in Predicting Stratigraphic Traps Workshop, 2014, Key note address speaker and presented poster session
- Assisted in planning and presented in Jurassic Workshop 2006
- Assisted in planning and presented in Second Jurassic Workshop 2011
- Assisted in planning and presented in Khuff Workshop
- Taught carbonate reservoir part of Advanced Petroleum Geology Workshop 2009
- Taught Jurassic Petroleum Systems field trip and core workshop 2014
- Taught How To Describe A Core to summer intern students
- Unconventional Jurassic carbonate source rocks, 2013-Present
- Regional Khuff Workshop in Bahrain (2007)
 - Presented talk on Khuff Formation of Saudi Arabia
- Gave Dhahran Geoscience Society (DGS) talks on:
 - Permian Basin: Frontier to Oil Province (2005)
 - Syria Field Trip (2006)
 - Distinguished Lecturer 2013-2014

Staff Geologist, Stratigrapher, 1990-2002, Chevron USA, Midland, Texas

Evaluation and characterization of numerous Permian Basin reservoirs for infill, horizontal, and development wells:

- Created sequence stratigraphic models with facies, rock types, engineering data, and production information superimposed on model to understand reservoir architecture in several large oil fields
- Pioneered use of high pressure Hg porosimetry to calculate effective vs. ineffective porosity and apply to reservoirs to determine volumetrics and economics
- Worked on the following productive intervals in the Permian Basin, which in stratigraphic order are:
 - Middle Permian (Guadalupian);
 - Queen
 - Grayburg
 - San Andres
 - Lower Permian (Leonardian);
 - San Angelo

- Clear Fork
- Tubb
- Drinkard
- Abo
- Lower Permian (Wolfcampian);
 - Wolfcamp
 - Bursum
- Pennsylvanian;
 - Cisco
 - Strawn
- Mississippian;
 - Barnett
- Devonian;
 - Woodford
 - 31 Formation
- Silurian;
 - Fusselman
- Ordovician;
 - Montoya
 - Simpson
 - Ellenberger
- Characterize pore systems, wettability and ability to drain reservoir by primary, secondary and tertiary recovery
- Side projects evaluating reservoirs in Gulf of Mexico, Kazakhstan, Syria, and offshore India
- Conducted outcrop studies of Permian (Guadalupian-Leonardian) Grayburg, Munn and San Andres formations (129 measured sections) as analogs to build subsurface reservoir models
- Led numerous field trips (30+) to study outcrop equivalents of subsurface reservoirs for geologists, geophysicists, engineers, land representative, office services, summer interns and management
- Characterized Late Ordovician Montoya horizontal drilling play
- Taught MS level classes (UTPB) and taught short courses on carbonate sedimentology and reservoir characterization

Senior Geologist, Sr. Carbonate Petrographer, 1988-1990, Chevron USA, Hobbs, New Mexico

Reservoir evaluation and characterization of Permian Basin reservoirs, such as, new waterfloods, new discoveries, and mature waterfloods

- Characterized new discovery, correlating porosity, facies distribution, karst overprints, and built a stand up, see through, three dimensional model to utilize in solving day to day production problems
- Conformance work redirecting injection more effectively within a reservoir experiencing water cycling
- Well completion work utilizing core when open-hole logs could not be run in rough hole, completed well for 304 BO and no water
- Initiated outcrop studies to gain better insight into reservoir architecture of the Permian (Guadalupian) Grayburg Formation

Laboratory Supervisor, 1987-1988, Chevron USA, Denver, Colorado

Supervised in-house laboratory to support Rocky Mountain and Midcontinent Exploration and Development Divisions

- Core layout tables to describe cores, slabbing saws, and polishing wheels
- Rock petrophysics via thin sections, SEM, Xray and Hg porosimetry

- Geochemistry of produced oil and water, via gas chromatography and ICAP

Geologist, Carbonate Petrographer, 1985-1987, Chevron USA, Denver, Colorado

Evaluated and estimated reservoir potential and prediction of porosity occurrence in Midcontinent Exploration Division

- Conducted regional study of Middle Ordovician Simpson Group siliciclastic porosity distribution in Southern Oklahoma
- Conducted similar regional study of Early Ordovician-Late Cambrian Arbuckle Group carbonates
- Characterized carbonate and siliciclastic reservoirs in Central Oklahoma, Western Kansas, Northeast Oklahoma, and Michigan to assess reservoir potential
- Conducted field work and co-led field trips to Arbuckle and Wichita mountains to assess the Cambrian – Ordovician stratigraphy, structural geology, and reservoir potential of southern Oklahoma

Sr. Project Geologist, Lithostratigraphy, 1983-1985, Gulf Exploration Technology Center, Houston, Texas

Responsible for worldwide core descriptions, reservoir assessment and characterization

- Described offshore Zaire Early Cretaceous Pinda and Toca cores, identifying porosity types and permeability controls
- Identified Permian Basin injectivity problem, caused by precipitation of iron sulphide and carry over oil combing to create “black gunk” that occluded injection wells
- Work included Gulf of Mexico oil seeps, East coast Jurassic shelf margin core description, and Utah outcrops

Geologist, Senior Geologist & Supervisor Enhanced Oil Recovery Geology, 1977-1983, Gulf Oil, Oklahoma City, Oklahoma

Implemented enhanced oil recovery techniques, such as, CO₂, nitrogen, polymer, micellar polymer, alkaline, fire floods, etc. in various Rocky Mountain and Midcontinent reservoirs

- Responsible for site selection and all geologic work for a successful CO₂ pilot and unitization efforts, in Little Knife field, North Dakota
- Little Knife field unitization study
- Created geologic data base on all North Dakota unitized fields
- Characterized Permian Minnelusa reservoir in Powder River basin, built 3-d structural/stratigraphic fence diagram of complete field
- Characterized other oil fields in Oklahoma, Wyoming, Texas Panhandle, Utah, etc.

Geologist, 1976-1977, Gulf Energy & Minerals, Oklahoma City, Oklahoma

Responsible for development of western Kansas oil and gas fields and wellsite geology throughout the Midcontinent on Development and Exploration wells

- Drilled, cored and performed wellsite production geology on 27 wells, without mud loggers, in Oklahoma, North Texas, Texas Panhandle, Kansas, and Michigan
- Associated with two development discoveries

Education

B.S. Geology, 1974, Weber State College

M.S. Geology, 1976, Brigham Young University

Ph.D. Geology, 2014, University of Aberdeen (Scotland)

Military

U.S. Army Special Forces, 19th Special Forces Group (Airborne), Medical Specialist – Honorable Discharge

Professional Associations

American Association Petroleum Geologists
SEPM
West Texas Geological Society
Permian Basin Section SEPM
Dhahran Geoscience Society
National Spleological Society
SPE
SIPES

Honors

President West Texas Geological Society, 2000-2001
President Permian Basin Section–SEPM, 1995-1996
AAPG Distinguished Lecturer, 1994-1995
Honorary Life Membership Permian Basin Section–SEPM, 1999
Honorary Life Membership West Texas Geological Society, 2005
AAPG Delegate, West Texas Geological Society and Dhahran Geoscience Society
Member of Board of Professional Geoscientists in the State of Texas, #1386
Distinguished Lecturer Dhahran Geoscience Society (DGS) 2013-2014
Secretary, Society of Independent Earth Scientists, Midland Chapter SIPES

RESUME FOR L. STEPHEN MELZER

(432) 682-7664 (wk)

e-mail: melzerls@aol.com

Texas A&M University: BS, Geological Engineering (1968)

Purdue University: MSE, Civil Engineering/Rock Mechanics (1969)

Registered Professional Engineer -Texas (#46859)

Member, Society of Petroleum Engineers and American Association of Petroleum Geologists

WORK EXPERIENCE SUMMARY

Mr. Melzer combines his forty years of technical oil and gas industry experience with extensive familiarity with the design, project evaluation, regulatory environment, and business of waterfloods and enhanced oil recovery projects. This background involves advising U.S. and International organizations on enhanced oil recovery, carbon capture and storage, and private clients on business strategies. He assists clients and regulators with evolving policy involving CO₂ Enhanced Oil Recovery and utilization of CO₂ for geologic storage. He also conducts reservoir characterization, engineering, and project planning studies on oil and gas projects and has served on the Texas Governor's Panel for the FutureGen project. His very recent work has been focused on advancing the understanding of residual oil zones, their origins, properties and amenability to EOR recovery with its associated CO₂ storage. For the past five years he has taught courses with several large independent oil companies and coauthored key reports for the National Petroleum Council and National Coal Council. He has consulted on a variety of projects and initiatives which include the following sponsors: Shell International Exploration and Production, Inc., Pioneer Natural Resources, Exxon/Mobil, Denbury Resources, Kinder Morgan Energy Partners, L.P., Great Plains Institute, Linde/Praxair Corporation, Citation Oil and Gas, numerous independent oil and gas companies, the Interstate Oil and Gas Compact Commission, The Plains CO₂ Reduction Partnership, The Midwest Geological Sequestration Consortium, The University of Texas System, The University of Wyoming's Enhanced Oil Recovery Institute, the National Research Center for Coal and Energy, US Army, US Air Force, U.S. Dept. of Energy, and the Defense Advanced Research Projects Agency. Noteworthy recent projects include:

- Teaching multi-day short courses on CO₂ EOR for Denbury Resources, Occidental and the CO₂ Conference in Midland, TX
- Acting as Principal Investigator for three large publicly sponsored research projects investigating the origins, distribution, and flood response of residual oil zones (ROZs) and recruiting a multidisciplinary team for the effort.
- Directing the 28 long-running series of annual CO₂ Flooding Conferences in Midland, Texas attended by all of the leading CO₂ flooding professionals (www.CO2Conference.net),
- Research on the newly understood issues of large volume water injection and its analog to deep saline formation, large volume CO₂ injection (CCS) projects.
- Planning and directing the 18 CO₂ Shortcourses (the most recently held in December 2022 and entitled "Carbon Capture and Geological Storage; Preserving Sound Practices in the Field),
- Organizing and teaching a CO₂ School, a four-day immersion in all aspects of CO₂ flooding with modules related to CO₂ storage.
- Contributing Author to the National Petroleum Council's 2018 report on Petroleum, the Dual Challenge and the Interstate Oil and Gas Compact Commission's 2010 report entitled "A Policy, Legal, and Regulatory Evaluation of the Feasibility of a National Pipeline Infrastructure for the Transport and Storage of Carbon Dioxide,"

Exhibit C

- Co-Chairing the University of Texas School of Law's Continuing Education Conference on "Carbon and Climate Change" in Austin, Texas (February 3-4, 2009),
- Chairing the Carbon Sequestration Development and Finance Summit in Houston, Texas (July 11-13, 2007),
- Keynote Speaker for Enhanced Oil Recovery Institute's (Wyoming) CO₂ related events (May 2009, July 2012, and July 2022).
- Directing the full-day pre-conference seminar and coauthoring three papers at the 2009 SPE International Conference on CO₂ Capture, Storage, & Utilization, San Diego, CA, Nov 2-4, 2009
- Conducting the short course entitled "EOR and the Expanding Field of CO₂ Flooding" in Association with the 2006 AAPG National Convention, April 8, 2006, Houston, Texas,
- Contributing Author to the Interstate Oil and Gas Compact Commission 2005 report entitled "A Regulatory Framework for Carbon Capture and Storage (CCS),"
- Authoring the CO₂ EOR portions of the Clean and Diversified Energy Advisory Committee of the Western Governors Association 2006 report on Clean Energy, A Strong Economy and a Healthy Environment,
- Chairing the International Conference on Carbon Sequestration for the Oil, Gas and Power Industry – London, England, June 2001,
- Conduct of numerous oil and gas field resource evaluations including CO₂ flooding resource estimations, waterflood unitization studies, CO₂ and waterflood design reports, drill site recommendations, oil and gas leasing, and oil field operations;
- Participation in the design, conduct, and surveillance of the Pioneer Natural Resources Spraberry CO₂ Pilot Program at the E. T. O'Daniel Lease in Midland County, Texas,
- Planning and directing a Department of Energy Workshop on Carbonate Reservoirs and Pioneer Natural Resource Corporation's Spraberry Symposium,
- Formulating the strategic plans and economic modeling for a \$800 million helium and CO₂ field project with Ridgeway Petroleum of Calgary, Alberta Canada,
- Planning and directing a shallow offshore drilling, logging, and seismic project to develop insights on the nuclear craters at the Enewetak Atoll in the Marshall Islands of the Pacific Ocean, and
- Conducting a detailed hydrologic modeling study of a carbonate aquifer in Kentucky for the U.S. Army Waterways Experiment Station, Vicksburg, MS.

For the past ten years, Mr. Melzer has provided enhanced oil recovery consulting services for the oil and gas industry. From his extensive familiarity with a large percentage of waterfloods and a majority of the CO₂ floods in the Permian Basin, he has helped companies redefine their EOR targets to include vertical expansions to transition and residual oil zones and evaluate and select analogs for forecasting oil response. Prior to forming his consulting practice, he was the initial Director of the Petroleum Industry Alliance, a part of the University of Texas System and located at the Center for Energy and Economic Diversification between Midland and Odessa, Texas. His responsibilities included defining and directing all oil and gas research efforts, defining and directing area wide technology transfer activities, and assisting with economic development in the Permian Basin area. His organization also represented and assisted the oil and gas professionals and their companies within the Permian Basin in their dealings with Federal and State research and regulatory agencies.

Mr. Melzer was formerly a Department Manager and Senior Geotechnical Engineer for Science Applications International Corporation, a large consulting firm headquartered in San Diego, California. He headed the Midland, Texas office for SAIC from 1978 until October 1992.

Mr. Melzer has been actively engaged in oil and gas exploration and development through a family-owned business, Melzer Exploration Company. The partnership, formed with

his father in 1978, has invested in more than 85 successful oil and gas wells. Prior to accepting the post at the Center for Energy and Economic Diversification, he supervised drilling and production operations in over twenty-five company-operated wells.

SPECIFIC PROFESSIONAL EXPERIENCE

Melzer Consulting (May 1997 to Present)

Consultant, Midland, Tx. Mr. Melzer performs consulting services for a variety of commercial energy companies, non-governmental organizations and associations. His clients have included Shell International Exploration and Production Inc., Eastman Chemical Company, KinderMorgan CO₂ Company, Praxair, Inc., Plains CO₂ Reduction Partnership, Mobil Exploration and Producing, U.S., Inc., PetroSource Carbon Company, Pioneer Natural Resources, Colorado Interstate Gas (El Paso Corporation), The University of Texas of the Permian Basin, Permian Basin Petroleum Association, Illinois Geological Survey, and others. The work includes providing background materials and advising clients of business strategies related to CO₂ EOR and CCS, conducting economic evaluations of State and Federal policy matters, CO₂ market reports, water and CO₂ flood project economic projections, and conduct of shortcourses and seminars on CO₂ flooding.

Center for Energy and Economic Diversification (Oct 1992 - May 1997)

Director, Petroleum Industry Alliance - Midland, Texas. In October of 1992, Mr. Melzer was named to be the initial Director of the Center for Energy & Economic Diversification/Petroleum Industry Alliance. The organization is a part of the University of Texas System and represents a cooperative government/industry alliance with startup funding from the University of Texas Lands and the University of Texas of the Permian Basin. Mr. Melzer was instrumental in identifying the need and formulating the concept of the Petroleum Industry Alliance. Mr. Melzer is the director of the annual CO₂ Flooding Conference in Midland and continues to perform those duties for the Petroleum Industry Alliance.

Melzer Exploration Company (1978 to Present)

Partner and Co-owner. Mr. Melzer formed a family partnership with his father, Mr. Larry S. Melzer, in May of 1978 for the purpose of exploring for and developing oil and gas properties. He oversaw the generation of prospects for in-house drilling and reviewed other prospects for participation recommendation to an investor group. The Company does not currently generate prospects nor operate wells but remains active in investing in new prospects for drilling.

Science Applications International Corporation (1978 to Oct 1992)

Department Manager and Senior Geotechnical Engineer - Midland, TX. Managed four-person office in southwest Texas performing geotechnical studies and analyses. Provided site characterization capabilities to the DOD for the execution of field tests including a multi-million dollar field test program in a very specific geological environment at Ft. Knox, KY. Also planned and provided cost estimates for two oil industry/Department of Energy cost share programs for enhanced oil recovery field projects, and performed drilling and completion of wells at the ASARCO and US Bureau of Mines in-situ copper leaching pilot cost share project near Casa Grande, Az.

Air Force Weapons Laboratory, Kirtland AFB (Albuquerque), NM (1969-1978)

Active Duty Air Force Project Officer and Civil Service Research Engineer (GS-13). Developed airblast and ground shock weapon effects test requirements, formulated test site selection criteria, performed test site selection, and was program manager for material property determination for use in theoretical calculations of conventional and nuclear weapon effects. Conducted studies of soil and rock response to blast loadings in a wide variety of soil and rock types. Was test director for large, multimillion dollar high explosive test program code-named MIDDLE GUST located in southeastern Colorado.

CURRENT AFFILIATIONS

Mr. Melzer is the past president of the Texas Carbon and Capture and Storage Association based out of Austin, Texas. He is the immediate past president of the Applied Petroleum Technology Academy, a Midland based technology training non-profit corporation, and a member of the City of Midland's Convention Center Advisory Board. He is an active member in the Society of Petroleum Engineers, American Association of Petroleum Geologists, West Texas Geological Society, and the Society for Independent Professional Earth Scientists.

RECENT AWARDS

Mr. Melzer was recently honored with 2023 Midland College Buno Hanson Environmental Excellence award and the Plains CO₂ Reduction Partnership Pioneer Award recognizing efforts in CO₂ Sequestration. He was also recognized and received the 2007 Hearst Energy Award for Technology in the Oil & Gas Industry. In 2004 he was given the Regional Service Award in the Southwestern North America Region of the Society of Petroleum Engineering in recognition of his significant industry publications, his time and effort in developing, directing and continuing to improve the Permian Basin CO₂ Conference and being instrumental in its success.

PUBLICATIONS (Page 1)**L. Stephen Melzer**

“The San Andres Play: Observations and Challenges in Horizontal Wells on the Central Basin Platform, Permian Basin,” Alimahomed, F., Melzer, L.S. et al, SPE-189865-MS, Presented at the SPE Hydraulic Fracturing Technology Conf, The Woodlands, TX, USA, 23-25 January 2018

ROZ Science, Activity Updates on Horizontal Depressuring the San Andres Formation and ROZ EOR, a Seminar at the 2017 CO₂ and ROZ Conference, Dec 2017, Melzer L.S. (editor and contributor), Midland Tx, www.CO2Conference.net

“Quantifying CO₂ Storage Efficiency Factors in Hydrocarbon Reservoirs: A Detailed Look at CO₂ Enhanced Oil Recovery,” Peck, W.D., Nicholas A. Azzolina, N.A. Melzer, L.S. (Dec 2017), et al, International Journal of Greenhouse Gas Control, <https://doi.org/10.1016/j.ijggc.2017.12.005>

Identifying and Developing Technology for Enabling Small Producers to Pursue the Residual Oil Zone (ROZ) Fairways in the Permian Basin San Andres Formation, Coauthor with Trentham, R.C. & Vance. D. (2016) Research Partnership to Secure Energy for America and U.S. Dept of Energy Final Report, www.netl.doe.gov/file%20library/research/oil-gas/10123-17-final-report.pdf

Using Next Generation” CO₂ EOR Technologies to Optimize the Residual Oil Zone CO₂ Flood at the Goldsmith-Landreth Unit, Ector County, Texas, U.S. DOE Project, Award # DE-0005889, Coauthor with Trentham, R.C., Mr. Vello Kuuskraa, V. & Koperna, G. (2016) , U.S. Dept of Energy Report <http://www.netl.doe.gov/File%20Library/Research/Oil-Gas/enhanced%20oil%20recovery/DE-FE0005889-Final-Report.pdf>

“Origins, Processes and Exploitation of Residual Oil Zones,” (Director and Contributor), Seminar conducted at the 2015 CO₂ Conference, Dec 9, 2015 (www.CO2Conference.net)

Produced Water Management for CO₂ EOR and Unconventional Plays, Melzer, L.S. (editor), Applied Petroleum Technology Academy Shortcourse #17 on Carbon Dioxide Flooding, Presented at the Annual CO₂ Flooding Conference, Midland, Tx, December 10, 2014.

Technical Challenges in the Conversion of CO₂-EOR Projects to CO₂ Storage Projects, Report Prepared for the CSLF Technical Group by the CSLF Task Force on Technical Challenges in the Transition from CO₂-EOR to CCS, Stefan Bachu, Alberta Innovates; Paulo Roberto da Motta Pires; Mingyuan Li; Francisco Guzmán; Lars Ingolf Eide; Ahmed Aleidan, Saudi Aramco; Mark Ackiewicz, U.S. DOE/NETL, Stephen Melzer. Melzer Consulting Sep 2013, http://www.cslforum.org/publications/documents/CO2-EORtoCCS_FinalReport.pdf

Surveillance and Monitoring of CO₂ Injection Projects, Melzer, L.S. (editor), Applied Petroleum Technology Academy Shortcourse #16 on Carbon Dioxide Flooding, Presented at the Annual CO₂ Flooding Conference, Midland, Tx, December 11, 2013

Member of National Coal Council Study Task Force and coauthor of Chapter 4: Enhanced Oil Recovery Technology in NCC Report entitled Harnessing Coal's Carbon Content to Advance the Economy, Environment, and Energy Security, Nat'l Coal Council, 6-22,12, http://www.nationalcoalcouncil.org/reports/07-10-12-NCC_Harnessing_Coals_Carbon_Content_to_Advance_Economy_Environment_EnergySecurity.pdf

Member of On-shore Oil Resource Committee, National Petroleum Council & coauthor of Topic Paper #1-5 entitled “Conventional Onshore Oil Including Enhanced Oil Recovery,” dtd 9-15-11, Nat'l Petr Council, http://www.npc.org/Prudent_Development-Topic_Papers/1-5_Onshore_Conventional_Oil_Incl_EOR_Paper.pdf

(Coauthor) A Policy, Legal, and Regulatory Evaluation of the Feasibility of a National Pipeline Infrastructure for the Transport and Storage of Carbon Dioxide, Interstate Oil and Gas Compact Commission Rpt dtd 12/31/11.

PUBLICATIONS (Cont'd)

L. Stephen Melzer

PAGE 2

"The Emergence of Residual Oil Zones, Price, and CO₂ Factors Usher in a New Day for CO₂ EOR," Prepared for *Cryogas International*, May '11 - CO₂ Edition

(http://www.cryogas-digital.com/cryogas-comp/201105c?sub_id=ghoALiFRqsE5&folio=30#pg32)

"The Excitement In Oil And Gas: Two Ongoing Revolutions," Prepared for *Cryogas International*, March '11 - Oil and Gas Edition (http://www.cryogas-digital.com/cryogas-comp/201104c?sub_id=ghoALiFRqsE5&folio=22#pg24)

"Residual Oil Zones, CO₂ EOR and the Environment: A Model For New Oil Reserve Potential While Offering Opportunity For Significant Carbon Emission Reductions," *American Oil & Gas Reporter* Feb '11, pp 104-113.

GCCSI (2011), (Coauthor) Bridging the Commercial Gap for Carbon Capture and Storage, Global Carbon Capture and Storage Institute July 2011, <http://www.globalccsinstitute.com/publications/bridging-commercial-gap-carbon-capture-and-storage>

A Policy, Legal, and Regulatory Evaluation of the Feasibility of a National Pipeline Infrastructure for the Transport and Storage of Carbon Dioxide, Interstate Oil and Gas Compact Commission Rpt dtd 12/31/11.

Optimization Of CO₂ Storage In CO₂ Enhanced Oil Recovery Projects, Prepared w/ Advanced Resources International, Inc. for: Department of Energy & Climate Change (DECC), Office of Carbon Capture & Storage, Nov 30, 2010 (<http://www.adv-res.com/pdf/1006-optimization-of-co2-storage-in-co2-enhanced-oil-re.pdf>)

"CO₂ EOR: A Model for Significant Carbon Reductions," w/ C. Michael Ming (coauthor), Paper Presented at the Symp on the Role of EOR in Accelerating the Deployment of CCS, July 23, 2010, Massachusetts Institute of Technology. <https://rfflibrary.wordpress.com/2011/05/25/role-of-enhanced-oil-recovery-in-accelerating-the-deployment-of-carbon-capture-and-sequestration/>

"Permian Basin Key to Future CO₂ EOR," American Oil and Gas Reporter, Oct 2010, pp. 144-147.

"Energy Angst and the Concept of Carbon Capture and Storage," Article Prepared for and published in the *CryoGas International Periodical*, V 46, No. 5, May 2008, pp 24-26.

CO₂ Injection in Subsurface Reservoirs: Geological Parameters Affecting CO₂ EOR and CO₂ Storage, Melzer, L.S. (editor), Center for Energy and Economic Diversification CO₂ Short Course #14, Presented at the Annual CO₂ Flooding Conference, Midland, Tx, December 5, 2007.

CO₂ for EOR May Be Enabling Pathway to Sequestration, Article Prepared for and published in the *Natural Gas & Electricity Periodical*, DOI 10.1002/gas, June 2007, pp 22-27.

CO₂ Sourcing for Enhanced Oil Recovery, Melzer, L.S. (editor), Center for Energy and Economic Diversification Short Course #13 on Carbon Dioxide Flooding, Presented at the Annual CO₂ Flooding Conference, Midland, Tx, December 6, 2006.

"The Origin and Resource Potential of Residual Oil Zones," SPE paper 102964, w/ G.J. Koperna and V.A. Kuuskraa, presented at the SPE Annual Technical Conference and Exhibition, San Antonio, Tx Sept 24-27, 2006.

"Recovery of Oil Resources from the Residual and Transitional Oil Zones of the Permian Basin", SPE 102972, w/ G.J. Koperna and V.A. Kuuskraa presented at the SPE Annual Technical Conference and Exhibition, San Antonio, TX, Sept 24-27, 2006.

PUBLICATIONS (Cont'd)

L. Stephen Melzer

PAGE 3

Stranded Oil in the Residual Zone, U.S. Department of Energy Report, February 2006.

CO₂ Flood Surveillance and Monitoring, Melzer, L.S. (editor.), Center for Energy and Economic Diversification Short Course #4A on Carbon Dioxide Flooding, Presented at the Annual CO₂ Flooding Conference, Midland, Tx, December 2004.

Health and Safety of CO₂ Operations, Melzer, L.S. and Young, P. (editor), Center for Energy and Economic Diversification Short Course #4A on Carbon Dioxide Flooding, Presented at the Annual CO₂ Flooding Conference, Midland, Tx, December 2004.

"Carbon Dioxide's Growing Use in Enhanced Oil Recovery," CryoGas International Magazine, Vol. 42, No. 8, Aug/Sep 2004, pp 48-57.

"Experiences Gained for CO₂ Capture, Transportation and Geologic Storage from the 30-year History of CO₂ Flooding in the Permian Basin," w/ Stevens, S.H. (Advanced Resources International), Presented at the GHGT-7 International Conference, Vancouver, Canada, Sep 2004.

"McElmo Dome and St. Johns Natural CO₂ Deposits: Analogs for Geologic Sequestration," w/ Scott H. Stevens - Advanced Resources International, Inc. and Charles E. Fox, Kinder Morgan CO₂ Company, LP, Presented at the GHGT-5 International Conference, Kyoto, Japan, Oct 2003

"Oxy Permian's Cogdell Unit CO₂ Flood Responds Rapidly to CO₂ Injection," with Pennell, S., World Oil June 2003, pp. 60-64.

"An Updated Look At The Potential For Carbon Dioxide Flooding Near The Waste Isolation Pilot Plant, Eddy And Lea Counties, New Mexico," Washington TRU Solutions, LLC Carlsbad, NM Report Dated June 15, 2003.

Wellbore Management in CO₂ Floods, Kiker, R.D. and Melzer, L.S. (editors), Center for Energy and Economic Diversification Short Course #11 on Carbon Dioxide Oil Flooding, December 2002.

Reservoir Simulation and Modeling for CO₂ Flooding, Melzer, L.S. (editor), et al, Center for Energy and Economic Diversification Short Course #10 on Carbon Dioxide Flooding, December 2001.

"The Permian Basin CO₂ Sequestration Model and Ridgeway Petroleum's St. Johns Project", Paper Presented at the International Conference on Carbon Sequestration for the Oil, Gas and Power Industry, June 27-28, 2001, London, England.

Issues for Beginning CO₂ Flooders, Melzer, L.S. (editor), et al, Center for Energy and Economic Diversification Short Course #9 on Carbon Dioxide Oil Flooding, December 2000.

"Evaluation of the Flood Potential of the South House (Blinbry) field, Lea County, New Mexico: Data Acquisition and Final Analysis Report," Melzer, L.S., U.S. Department of Energy Grant #DE-FG-99BC-15249, Dec 2000.

CO₂ Flooding: Sandstones vs. Carbonate Reservoirs, Melzer, L.S. (editor), et al, Center for Energy and Economic Diversification Short Course #8 on Carbon Dioxide Oil Flooding, December 1999.

CO₂ Facilities and Plants, Melzer, L.S. (editor), et al, Center for Energy and Economic Diversification Short Course #7 on Carbon Dioxide Oil Flooding, December 1998.

CO₂ Measurements and Metering, Melzer, L.S. (editor), et al, Center for Energy and Economic Diversification Short Course #6 on Carbon Dioxide Oil Flooding, December 1997.

PUBLICATIONS (Cont'd)

L. Stephen Melzer

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"Petroleum Applications of Game Theoretics: Issues in Forming a Typical Modern Flood (Unitization)," w/ Hodges, P.F., Stiles, L.H., and Andrews, M. (1997), UT Permian Basin's Center for Energy and Economic Diversification Research Report, April 1997.

"Recent Studies of the Status of Unitization in the Permian Basin Regions of New Mexico and Texas," w/ Stiles, L.F. (1997), UT Permian Basin's Center for Energy and Economic Diversification Research Report, May 1997.

How to Put Together a CO₂ Flood, Melzer, L.S. (editor), et al, Center for Energy and Economic Diversification Short Course #5 on Carbon Dioxide Oil Flooding, December 1996.

"Permian Basin Drives CO₂ Technology," with Stiles, L.H., American Oil and Gas Reporter, Permian Basin Oil Show Program Edition, Vol 39, No. 10, Oct 1996, pp. 149-152.

How CO₂ Flood Surveillance Helps Assure a Successful EOR Program, Melzer, L.S. (editor), et al, Center for Energy and Economic Diversification Short Course #4 on Carbon Dioxide Oil Flooding, May 1996.

Improving Production in Shallow Shelf Carbonates (Class 2) Reservoirs - A Workshop Sponsored by the US Dept of Energy and BDM Oklahoma Inc., L.S. Melzer (editor), Midland, TX, May 15, 1996

Equipping and Day-to-Day Operations of a CO₂ Flood, Melzer, L.S. (editor), et al, Center for Energy and Economic Diversification Short Course #3 on Carbon Dioxide Oil Flooding, December 1995.

"Alliances Cut Risks For CO₂ Projects," with Stiles, L.H., American Oil and Gas Reporter, Nov 1995, pp. 37-43.

Is My Field a Candidate for CO₂ Flooding?, Melzer, L.S. (editor), et al, Center for Energy and Economic Diversification Short Course #2 on Carbon Dioxide Oil Flooding, September 1995.

"Financing Options Lower Risk for CO₂ Miscible Injection," with Stiles, L.H., American Oil and Gas Reporter, Sept 1995, pp.81-87.

Making Money on CO₂ Flooding...Some Innovative Development Concepts for Independents..., Melzer, L.S. (editor), et al, Center for Energy and Economic Diversification Short Course #1 on Carbon Dioxide Oil Flooding, May and July (repeat) 1995.

"A Proposed Energy Mission for: THE CENTER FOR ENERGY AND ECONOMIC DIVERSIFICATION: DOE/Industry Cost Shares," A White Paper prepared for the University of Texas System, July 1992.

Laboratory Rock Testing and Hydrologic Calculations to Support the Underground Technology Program," w/ Chitty, D.E. and Blouin, S.E. , DNA-TR-96-10, Defense Special Weapons Agency, Alexandria, VA, April 1998.

"Effects of Hydrologic Pumping of the Underground Technology Program Access Adit on the Mechanical Properties of Rock," Technical Report for the US Army Waterways Experiment Station, Vicksburg, MS., Jan 1995

"Test Design Geotechnical Report - Underground Technology Program (UTP), Ft. Knox, Kentucky," Defense Nuclear Agency Report DNA-TR-92-142, January 1993.

"Geotechnical Design Summary Report for the Underground Technology Program (UTP), Ft. Knox, Kentucky," w/ Lachel, D., Defense Nuclear Agency Report, Lachel & Associates, Golden Colorado, Sep 91.

Frank J. "Deacon" Marek

EDUCATION: B.S., Petroleum Engineering
Texas A&M University, May 1977

WORK EXPERIENCE:

1985 - Present

William M. Cobb & Associates, Inc.

Technical Advisor / Senior Vice

President

- Specializes in oil, gas, and CO₂ reserve evaluation and economic analysis, waterflood and CO₂ EOR feasibility and performance analysis, and reservoir simulation studies
- Conduct in-house workshops to assist clients in evaluating waterflood potential
- Considerable experience in providing reserve and economic evaluations of offshore oil and gas properties located in the Gulf of Mexico, including deep water projects

1982 - 1985

Cornell Oil Company

Reservoir Engineering Manager

- Responsible for surveillance and reservoir management of a 5,000 BOPD West Texas waterflood and a smaller Oklahoma waterflood
- Developed economic analysis of an anticipated CO₂ project for the West Texas property which included CO₂ supply alternatives, CO₂ transportation, field production performance, and infill drilling
- Responsible for reservoir engineering and economic evaluation of exploration prospects
- Developed annual internal reserve reports and supervised preparation of external, third-party, company reserve reports

FRANK J. MAREK
PAGE 2

1981 - 1982

***Buttes Resources Company
Rocky Mountain District Engineer***

- Responsible for all operations in Montana, Wyoming, and Colorado, including management and surveillance of certain waterflood and polymer flood projects
- Designed and recommended development and exploration wells, well completions, and well workovers

1977 - 1981

***Hughes & Hughes Oil & Gas
Petroleum Engineer***

- Prepared company's annual reserve report
- Evaluated drilling prospects
- Designed and analyzed pressure transient well tests
- Developed internal petroleum economics computer model
- Responsible for the design and implementation of development and exploration drill wells, new well completions, and workovers

TECHNICAL AND PROFESSIONAL SOCIETIES:

- Society of Petroleum Engineers - International (SPEI)
 - Management & Information Awards Committee 2003; Chairman, 2004
 - Economic and Evaluation Award Committee, 2002
 - Admissions Committee, 1994-1995
- Society of Petroleum Engineers – Dallas Section (SPE)
 - Chairman, 2004-2005
 - Hydrocarbon Economics & Evaluation Symposium

FRANK J. MAREK
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- General Chairman, 1999
- Arrangements Chairman, 1997
- Arrangements Committee, 1995
- Program Committee, 1989

- Dallas Section Membership Chairman, 1993-1994
- Dallas Section Arrangements Chairman, 1991-1993
- Dallas Section Continuing Education Chairman, 1990-1991
- Dallas Section Secretary, 1989-1990

- Society of Petroleum Evaluation Engineers (SPEE), Dallas Chapter
 - Chairman 1993-1994
 - Membership Chairman, 1994-1995
 - Secretary and Treasurer, Dallas Chapter, 1991-1993

HONORS AND AWARDS:

- SPE Regional Service Award, 2007
- SPE Dallas Section Outstanding Engineer Award, 2005
- SPE Dallas Section Service Award, 1994

REGISTRATION:

- Registered Professional Engineer, State of Texas

PUBLICATIONS:

- Cobb, W.M., and Marek, F.J.: "Determination of Volumetric Sweep Efficiency in Mature Waterfloods Using Production Data." Presented at SPE Annual Technical Conference and Exhibition, San Antonio, Texas, October 5-8, 1997 SPE 38902.

FRANK J. MAREK
PAGE 4

- Cobb, W.M., and Marek, F.J.: “Net Pay Determination for Primary and Waterflood Depletion Mechanisms.” Presentation at 1998 SPE Annual Technical Conference and Exhibition, New Orleans, Louisiana, September 27-30, 1998 SPE 48952.

TECHNICAL PRESENTATIONS:

- “Waterflood – A Tried and True Technique for Secondary Oil Recovery” presented to:
NAPAC Conference, Dallas, TX, May 2012
Austin Bar Association Oil, Gas and Mineral Section, Austin, TX, October 2012
- “Waterflood Evaluation...In A Hurry” presented to:
SPEE Midland Chapter, Midland, TX., January 6, 2009.
Dallas Wildcatter’s Luncheon Meeting, Dallas, TX., May 29, 2008.
The SPE East Texas Section, Tyler, TX., November, 2005.
The SPE North Texas Section in Wichita Falls, TX., April 2005.
- “Tertiary Oil Recovery Processes” presented to:
NAPAC Convention, Dallas, TX., May 2001.
- “Due Diligence In Petroleum Property Evaluation” presented to:
Desk and Derrick Society, Dallas, TX. September 2000.
NAPAC Convention, Dallas, TX., May 2000.

COMMUNITY INVOLVEMENT

- Director and Secretary for Retina Foundation of the Southwest (RFSW), 2009 to 2018. The RFSW is an Eye Research Institute in Dallas, focusing on finding treatment and cures for debilitating diseases of the eye.

03/13

Galen P. Dillewyn

4106 Pine Breeze Dr, Kingwood, Texas 77345

Telephone: (713) 857-0856

E-Mail: gdillewyn@hotmail.com

PROFILE

Extensive Engineering, Management, Business Development and Technical Sales experience in the Gas and Oilfield Industry: including, but not limited to: sales, wireline operations, personnel management, account management, petrophysics, completions design, geology and field optimization, SaaS development and commercialization, lateral integration across business units, and acquisition and divestiture assistance to clients.

EDUCATION

Texas Tech University, Lubbock, TX

Bachelor of Science in Chemical Engineering (2000)

PROFESSIONAL EXPERIENCE

NuTech Energy Alliance

VP Business Development

2017-Present

- Responsible for marketing and social media content
- Created the commercial interaction of the IRAD SaaS platform and handled customer support
- Added 79 client companies during COVID-19
- Acted as the lone sales person and have kept company with enough work to keep staffing levels constant for the last 36 months
- The technical liaison between clients and consultants to ensure accuracy and completeness of projects.
- Helped clients transact over \$120B worth of assets from 2016-2023

Houston Sales Manager

2014-2017

- Lead sales and growth in Texas
- Grew regional study sales 100%

Area Account Manager

2009-2014

- Responsible for liaising with clients and NuTech's technical staff to provide petrophysical interpretation, hydraulic fracture design, reservoir modeling, and core analysis products
- Represent NuTech in San Antonio, Corpus Christi, Austin, College Station, Dallas, and Houston
- Accountable for over \$4MM in sales per annum (25% of company total)

Schlumberger Technology Corporation

2000 - 2009

Dedicated Sales Account Engineer, Houston TX

2008-2009

- Coordinated and resolved quality-related issues, contract renegotiation, account maintenance, and opportunity exploitation
- Increased revenue from \$8.2MM to \$13.2MM and saved ExxonMobil more than \$10MM in completion costs thru implementation of new technology

Operations Manager, Abilene, TX

2006-2008

ATTACHMENT

- Oversaw day-to-day in 21 counties
- Managed and reviewed financial performance including P&L statement, asset allocation, inventory management, and procurement (successfully grew the location from 18 to 45 individuals including 2 Sales Engineers, a safety officer, and 10 field engineers.
- Managed personnel, including performing quarterly evaluation, mentoring, hiring/firing, and training
- Coordinated internal audits, special investigations, emergency plans, and business continuity plans
- Accomplishments:
 - Increased Revenue generation from \$4.3MM to \$13.6MM through increased sales, market share, and increased productivity and increased net from 18% to 28%
 - Awarded the North American Service Quality Award in 2008

General Field Engineer, Houston, TX

2001-2005

- Performed evaluation, inspection, and completion services for oil and gas well evaluation in the Gulf of Mexico
- Radiation Safety Officer responsible for regulatory management of radioactive material, employee training, and management consultation
- Led Quality Steering Committee to investigate and report trends, failures, and limit lost time
- Accomplishments:
 - Rewrote the wipe test procedures for radioactive sources for Schlumberger's Radiation Manual
 - Completed 2 Texas State Dept of Health audits with no violations
 - Exceeded operating efficiency of 99.9% during offshore tenure

Field Engineer, Laurel, MS

2000-2001

Junior Field Engineer, Belle WV

2000

PROFESSIONAL ASSOCIATIONS & TRAINING

- Houston Geological Society
- SPE
- Basic Geology
- Advanced Petrophysics
- Hydraulic Fracturing
- Reservoir Modelling
- Imaging and down hole sonic applications
- Nuclear Regulatory Commission and Auditing
- Production Logging and interpretation
- Perforation and Optimization
- Finance Training for Non-Financial People & Advanced Finance
- Incident Investigation Training
- Regulatory Risk Management
- Management Essentials
- Management Seminar on motivation and retention
- Trade Control and Compliance
- Bid and Sales Management
- Presenter at AAPG "Making Money with Mature Fields" 2016

ATTACHMENT

- Presenter at SIPES “The New Austin Chalk” 2016

COMPUTER SKILLS

Computer skills include but are not limited to Windows, MS Office Suite, SAP, Powerlog, and Petra

REFERENCES

Available upon request

Joe McShane
 31403 Imperial Bluff Ct
 Spring, TX 77386
 832-588-6715
 mcshane.joseph@gmail.com

SUMMARY

- 19 years industry experience with 17 years supervising exploration and development projects in emerging unconventional plays and reviewing A&D projects.
- Extensive background specializing in Mesozoic shale and tight gas sand plays in Texas & Louisiana and Late Devonian/Early Mississippian in North Dakota, Lower Permian Midland and Delaware Basins
- Additional experience of similar age carbonate systems and reservoirs of the Gulf Coast Region
- Operational experience on >100 vertical tight gas sand and >300 horizontal shale wells
- Background incorporating and analyzing unconventional data (core, petrophysical logs, geochemical and geomechanical data) in order to create basin models
- Experience creating and executing optimal development plans based on geologic data

PROFESSIONAL EXPERIENCE

Geology Consultant-Multiple Clients, Houston, TX

Geology Consultant, 2019– 2024

Geologic Consulting in Multiple Basins including Upper and Lower Eagleford/ Austin Chalk, Permian /Delaware Basin, Williston Basin, and Ark-La-Tex (Haynesville, Cotton Valley, Travis Peak, Pettit/Sligo etc)

- A&D Activities including technical analysis
- Provided leasing & acquisition recommendations for all property submittals in the above basins
- Developed the science program for a potential new start up from scratch in order to appraise and value company assets and aid in the development of a multi rig drilling program as well as high grading of recompletion candidates.
- Analysis and interpretation of core and petrophysical data in order to assist in the development of Basin models
- Worked with Reservoir team to analyze decline curves, develop type wells, and continually review inventory of wells including evaluations of behind pipe potential and to help maximize reserves and production potential.
- Completion reviews of wells analyzing effectiveness of completion techniques.
- Geosteered wells for multiple clients

Ajax Resources, Houston, TX

Geologic Manager, 2015 – 2018

Permian Spraberry and Wolfcamp Shale Exploration & Development

- Geologic manager in charge of geologists/geophysicists and geotechs who are involved in daily operations activities including geosteering, development mapping, and coordinating with other team assets (drilling engineers, etc) for Midland Basin assets located in Andrews and Martin Counties, TX.
- Developed the science program for a new start up from scratch in order to appraise and value company assets and aid in the development of a multi rig drilling program as well as high grading of recompletion candidates.
- Directed analysis and interpretation of core and petrophysical data in order to assist in the development of regional basin models
- Worked closely with Reservoir team to analyze decline curves, develop type wells, and continually review inventory of wells including evaluations of behind pipe potential and to help maximize reserves and production potential.
- Completion reviews of wells analyzing effectiveness of completion techniques.
- Responsible for developing and maintaining the geosciences department budget
- Provided leasing & acquisition recommendations for all property submittals in the above basin

Halcón Resources, Houston, TX

Senior Geologist/Lead Operations Geology, 2012 – 2015

Eagle Ford Shale Exploration & Development , Tuscaloosa Marine Shale Exploration & Development , Williston Bakken and Threeforks Shale Exploration & Development

- Lead Operations Geologist in charge of geologists and geotechs who were involved in daily operations activities including geosteering, development mapping, and coordinating with other team assets (drilling engineers, etc)
- Worked closely with Reservoir team to analyze decline curves, develop type wells, and continually review inventory of wells including evaluations of behind pipe potential and to help maximize reserves and production potential.
- Completion reviews of wells analyzing effectiveness of completion techniques.
- Worked to map the various depositional environments in each of the above shale basins and create fairway play maps Including HCPV, and OGIP maps
- Analysis and interpretation of core and petrophysical data in order to assist in the development of Basin models
- Provided leasing & acquisition recommendations for all property submittals in the above basins
- Coordinated master development plans with Land/ Drilling/ Reservoir counterparts
- Negotiated data trades with numerous companies ranging from small independents to majors
- Steering experience drilling 72 wells with ~10,000' laterals; drilled to ~21,000' MD

Comstock Resources, Frisco, TX

Senior Contract Geologist, 2011 – 2012

Eagle Ford Shale and Haynesville Shale Exploration & Development, and Permian/ Delaware Basin Wolfcamp/ Bone Springs Exploration & Development

- Contributed to new play development
- Exploration and mapping of potential new prospects in South Texas, West Texas, East Texas Basin, and Ark-La-Tex region
- Worked with a team to map and model various characteristics of the Southern Eagle Ford Shale trend, and Delaware Basin
- Provided leasing & acquisition recommendations for all property submittals
- Worked to carryout master development plan of over 100,000 ac. with Land/ Drilling/ Reservoir counterparts
- Supervise data trades with numerous companies ranging from small independents to majors
- Drilled 47 wells with ~5,000' laterals; drilled to ~19,500' MD

Petrohawk Energy Corporation/ BHP Billiton, Houston, TX

Geologist, 2010 – 2011

Eagle Ford Shale Development

- Contributed to new play development which now has 18 operating rigs, over 105 operated producing wells, >457 Bcfd And 19 Mmbc proved reserves and over 7.3 TCF 406 Mmbc risked resource potential
- Worked on team to map various characteristics of the northeastern Eagle Ford Shale trend
- Provided leasing & acquisition recommendations for all property submittals in the northeastern Eagle Ford Shale play
- Coordinated master development plan of over 150 operated units with Land/ Drilling/ Reservoir counterparts
- Worked closely with Reservoir team to analyze decline curves, develop type wells, and continually review inventory of wells including evaluations of behind pipe potential and to help maximize reserves and production potential.
- Completion reviews of wells analyzing effectiveness of completion techniques.
- Negotiated data trades with numerous companies ranging from small independents to majors
- Steering experience drilling 67 wells with ~5,000' laterals; drilled to ~19,500' MD

Chesapeake Energy Corporation, Oklahoma City, OK

Geologist, 2007 – 2010

Haynesville Shale Exploration & Development

- Contributed to new play development which now has 40 operating rigs, over 150 operated producing wells, >450 mmcf/d gross production and over 30 TCF unrisked reserves
- Worked on discovery team to map various characteristics of the Haynesville Shale trend
- Provided leasing & acquisition recommendations for all Texas property submittals in the Haynesville play
- Coordinated master development plan of over 100 operated units with Land/ Drilling/ Reservoir counterparts
- Negotiated data trades with numerous companies ranging from small independents to majors
- Steering experience drilling 55 wells with ~4,500' laterals; drilled to ~16,000' MD

James Lime Exploration

- Performed study along with other team geologist to determine potential to extend existing vertically developed trends utilizing horizontal drilling methods
- Applied well data to map reservoir characteristics in areas that were previously sub-economic using vertical drilling method
- Presented opportunities to management in several areas along the Late Mesozoic trends

Cotton Valley, Bossier & Cretaceous Travis Peak Development

- Oversaw a 4 rig drilling program with approximately \$125 MM annual budget
- Performed multidisciplinary field wide study to optimize production through improvement of completion procedures
- Proposed, planned, and drilled 64 vertical Cotton Valley, Bossier & Travis Peak wells
- Mapped and recommended strategic extension opportunities to existing acreage positions

- Member of acquisition team; reviewed and provided recommendations on over 25 sales packages

Enerquest, Plano, TX**Geologist 2005 – 2007**

- Responsible for review of logs, including petrophysical calculations and analysis
- Map structural components and depositional components of Lower Cretaceous Travis Peak Formation, in Shelby County, TX

Stephen F. Austin State University, Nacogdoches, TX**Undergraduate Teaching Assistant, 2005 – 2007**

- Designed lab exercises with a group of Masters Students also working in the geology department
- Responsible for grading lab and test material, while providing positive feedback and advice to the students
- Provided professor with recommendations for changes to lab content at conclusion of the semester

IRCLM Lp., Houston, TX**Geologist, 2003 – 2005**

- Conducted site investigations to determine site geology, geotechnical properties of the soils, and determine the presence or absence of contaminants.
- Supervised site remediation and closures, as well as assisted in project management and cost tracking.

Weston Solutions, Houston, TX**Geoscientist, 2001 – 2003**

- Conducted site investigations to determine site geology, geotechnical properties of the soils, and determine the presence or absence of contaminants.
- Supervised site remediations and closures, as well as assisted in project management and cost tracking.
- Managed emergency response teams for oil spills, chemical releases, and various other responses including the Columbia space shuttle recovery.
- Clients included state, and federal agencies, as well as multiple industrial companies.

EDUCATION

Post Graduate Masters work in Geology (2005 - 2008), Stephen F Austin State University, Nacogdoches Texas, Department of Geology

Bachelor of Science in Geology (August 2001), Stephen F Austin State University, Nacogdoches Texas, Department of Geology

PROFESSIONAL AFFILIATIONS

American Association of Professional Geologists (2000 – Present)

Student Chapter Committee – Vice Chair Member (2007 – present)

Education Committee Member (2007 – 2010)

Houston Geological Society (2010 - Present)

East Texas Geological Society (2007- 2010)

Shreveport Geological Society (2007- 2010)

SOFTWARE EXPERIENCE

GeoDirect, StarSteer, SES, Petra, Landmark GeoGraphics Suite, Petrel, Kingdom SMT, Terra View, Techlog, Aries, PDWIN, SmartSection, Microsoft Office Suite, Adobe Illustrator, Spotfire, ArcGIS, HNAV

References available upon request

Citizenship: United States of America

ADDITIONAL TRAINING / EDUCATION

Unconventional Resources- Shale, Coal bed methane	Chesapeake	2009
Modern Carbonate Seminar – Turks and Caicos	Jeff Dravis	2009
Carbonate Core Seminar and Lab	Jeff Dravis	2009
Reservoir Sedimentology & Stratigraphy of Continental Clastic Systems, M027a	Nautilus	2008

Basic Reservoir Engineering	Petroskills	2008
Advanced Well Log Interpretation	Petroskills	2008
Core and Core Analysis	Petroskills	2008
Sequence Stratigraphy: An Applied Workshop	Petroskills	2008
Geogrphix Seisvision	Landmark	2008
Geogrphix Prizm Log Analysis	Landmark	2007
Geogrphix Interpretative Mapping	Landmark	2007
Applied Subsurface Geologic Mapping	SCA	2007

WILLIAM WEST

3510 Triple Crown Dr • Richmond, TX 77406 • 307.272.4624 • williamjwest@msn.com

OVERVIEW

As a proven leader, William brings a wealth of knowledge and a proven track record of success, driven by his dedication and experience in operations engineering. His commitment to collaboration and continuous improvement has resulted in significant advancements in the companies he has served.

EXPERIENCE

EMPIRE PETROLEUM CORPORATION, The Woodlands, TX

Senior Vice President of Operations

Jun 2023 – Present

- Oversee the strategic and day to day direction of Divisional Logistics, Transport, Sales, Financial and Field Operations
- Responsible for P&L, including department budget and cost control
- Carries out supervisory responsibly in accordance with the organizations policies and applicable laws
- Ensure that the operation's division is managed in the safest, most efficient, and cost-effective method possible
- Ensures safety is at the forefront of all actions and decisions and DOT Compliance standards are administered, monitored, and enforced
- Collaborate with managers and staff members to formulate and implement policies, procedures, goals, and objectives
- Understanding of all operating and financial systems current and future for the company and how to maximize use and return from each
- Strategically manage the network and identify key initiatives to drive year over year total cost improvements, using lean logistics principles and tools
- Assessment of equipment needs and completion of capital requests/business case to support oversight of employee-based driver pool management
- Lead operations management including oversight of maintenance operations, capital requirements, planning and administration, safety and cost management
- Remain current on industry trends and provide strategic recommendations to executive management that keep Empire on the "cutting edge"

TREADSTONE ENERGY PARTNERS LLC I, II, & III, Houston, TX

Vice President of Operations

Feb 2014 – Jun 2023

TEP III (Dec 2021-Present)

- Provide support for acquisition activities
 - *TEP II (Sept 2015 - Dec 2021)*
- Managed operations for 45,400 net acres in Milam, Burleson and Robertson Counties (165+ wells)
- Designed, operated, and managed increase of SWD system from 3,000 BWPD to 115,000 BWPD by adding 5 new SWD wells, facilities and pipelines
- Expanded electrical grid from 20 MW capacity to 80 MW capacity by expanding trunklines and a \$3MM substation upgrade
- Field production from 600 BOPD to 11,000+ BOPD through successful infield drilling program and facility upgrades
- Legacy production up from 600 BOPD to 1100+ BOPD at sale 6 years later due to diligent production and artificial lift operations

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TEP I (Feb 2014 - Sept 2015)

- Managed operations for 12,000 net acres in Fort Trinidad
- Field production from 3000 BOPD to 10,000+ BOPD in 7 months through drilling and facility upgrades
- Managed completion, facilities and production activities for 3 rig program
- Installed 2 SWD facilities and expanded SWD infrastructure
- Managed operations for 5500 net acres in Alabama Ferry field in Leon County (80 BOPD, 24 wells including water flood pilot program)

SHERIDIAN PRODUCTION COMPANY, Houston, TX

Exploration Engineer

Feb 2013 – Feb 2014

- Provide asset management and petroleum engineering support for Permian Basin properties in the Central Basin Platform
- Managed waterflood assets in: Grayburg, San Anders, Clearfork, and Tubb reservoirs
- Exploited reserves through conformance & recompletion work
- Recompletion and short radius lateral work in the Wolfcamp & Bone Springs reservoirs
- Installed and managed an openhole horizontal waterflood in the Powder River Basin

EXARO ENERGY II & III LLC, Houston, TX

Petroleum Engineer

March 2010 – Feb 2013

- Provide asset management and petroleum engineering support for South TX properties
- Designed LP gathering and fluid handling system capable of handling 30 MMCFD and 15 MBFPD at 6 psi
- Provided onsite supervision for all stimulation including coil controlled stimulation
- In 10 months increased field production from 1.9 MMCFD to 25 MMCFD
- Before start of drilling program dropped lifting cost from \$1.25/mcf to \$0.60/mcf
- Provided support in divesture of South TX properties
- Worked non-operated joint venture with Encana under Exaro III on WY Jonah properties

CONTRACT CONSULTING, Cody, WY

Completions Engineer

Nov 2009 – March 2010

- Contracted to Newfield Exploration in the Williston Basin
- Provide onsite supervision, operational and engineering support for multi-stage completion of Bakken & Three Forks wells and associated production facilities

Production Engineer

May 2009 – Nov 2009

- Contracted to Marathon Oil Company in the Big Horn and Oregon Basin Fields
- Responsible for field gas wells, horizontal Darwin Oil wells, field fracturing, drilling disposal wells and stimulation treatments
- Covered for workover foreman, prepared and implemented workover program

LEGEND NATURAL GAS I, II, & III, Katy, TX

Operations Manager

May 2006 – May 2009

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- Supervise 11 company field employees (2 Field Foreman, 1 Construction Foreman, 1 Completion Foreman and 7 Lease Operators)
- Design & installation for a new venture pipeline infrastructure and compression facilities for ongoing 100 well development program; ultimate design for 1000+ wells
- Managed operating expenses and expenditures including over \$110 MM of capital in 2008 and resulting in \$130 MM of net revenue

Production Engineer

March 2004 – May 2006

- Directed five company employees and contract employees for natural gas production operations in south Texas; more than 200 wells and production in excess of 30 MMCFD
- Designed facilities & pipelines for 16 well exploration programs with production of 30 MMCFD
- Increased mature field's oil production from 50 BOPD to 250 BOPD with design and implementation of new water handling facilities; increase water disposal capabilities from 5,000 BWPD to 25,000 BWPD

VERNON E. FAULCONER INC., Breaux Bridge, LA

Production Engineer/Area Manager

July 2000 – March 2004

- Responsible for natural gas operation for over 100+ wells in 5 states exceeding 10 MMCFD
- Areas of work: TX, LA, MS, AR, OK, KS, WY and NM
- Provided onsite supervision for facility installations, workover and operational troubleshooting
- Managed daily operations, troubleshooting, and maintenance of 28 company owned compressors (over 3500HP) and an active purchase and rebuild program

MARATHON OIL COMPANY, Lafayette LA

Production Engineer & Reservoir Engineer, Gulf of Mexico

May 1999 – June 2000

- Prepared workover, recompletion, and sidetrack AFE packages
- Finished reservoir evaluation of a mature GOM field and proposed future projects

EDUCATION

PROFESSIONAL ENGINEER

2009-Present

Petroleum Engineering – WY ID #12599

MARIETTA COLLEGE

May 1999

Bachelor of Science, Petroleum Engineering

Curriculum Vitae

James L Buchwalter
President, Gemini Solutions, Inc.
702 Morton Street
Richmond Tx
281-238-5252

Education

May 1979	B.S., Chemical Engineering	Ohio State University
May 1981	M.S., Chemical Engineering	Ohio State University
May 1994	PhD, Chemical Engineering	Rice University

Industry Experience

1998 – Present	President. Gemini Solutions Inc.
1986-1998	Reservoir simulation engineer, Texaco Houston offices
1981-1986	Reservoir engineer, Texaco Harvey district office

Significant Professional Achievements and Areas of Specialization

- Expertise in reservoir simulation studies
- Expertise in developing reservoir simulation interfaces/calculation engine
- Expertise in managing software development and consulting studies
- Contributing author for the applied reservoir engineering book “Practical Enhanced Reservoir Engineering” published by PennWell and used by both universities and industry personnel.
- Instructor for industry reservoir simulation schools taught over the past 40 years
- Publications in compositional simulation, rapid engineering workflows using downhole gauge data, dual porosity/fracture reservoir applications, WCD workflows, optimizing tight asset evaluation workflows, and rapid simulation workflows

Prior to founding Gemini Solutions Inc. I was employed as a reservoir engineer in the Texaco Harvey district from 1981 to 1986. In 1986 I moved to Houston and was selected to attend Texaco’s 9-month advanced engineering/geology program where I built a CO2 flood simulation model for Texaco’s Paradis field.

Following the conclusion of the 9-month training program I joined Texaco’s Engineering Technical Services Group in 1987 where I co-developed Texaco’s in-house simulator that was used by more than 400 Texaco engineers globally. From 1987 to my departure in 1998 I traveled the globe and completed more than 70 simulation studies in the US and worldwide. International studies included reservoirs in Russia, the North Sea, the Middle East, Sakhalin, Columbia, Kazakhstan, Malaysia, Indonesia, Nigeria, Myanmar, and Vietnam.

I co-founded Gemini Solutions Inc (GSI) in 1998. Over the past 26 years I have managed software development, written codes for GSI software, sold licenses, and completed and/or assisted clients in more than 1000 studies globally.



Gemini Solutions Inc (GSI) was selected as the simulation provider to the US Federal MMS agency (Minerals Management Service) in 2004. Following the BP Macondo spill, I was chosen by MMS to study the Macondo spill. I delivered a report detailing Macondo spill rates for different possible wellbore restrictions.

GSI clients include the US Federal Bureau of Safety and Environmental Enforcement (BSEE). BSEE uses GSI technology for verifying wellbore integrity and calculating maximum blowout discharge rates. All wells drilled since 2010 in offshore federal waters including the Gulf of Mexico, California, and Alaska have a GSI model constructed by BSEE engineers to meet government safety requirements.

Curriculum Vitae

ROBERT C. TRENTAM
Professor of Practice in Geosciences
University of Texas Permian Basin
(432) 552-2249, trentam_r@utpb.edu

Education

January 1970	B.S., Geology	City College of New York
June 1976	M.A., Geology	City College of New York
August 1981	D.G.S., Geology	University of Texas El Paso

Academic Experience (recent)

September 2023 – Present Professor of Practice, Geosciences Department, UTPB.
 September 2019–August 2023 Senior Lecturer & Research Associate, Geosciences Dept, UTPB.
 April 2001- Aug 2019 Director of CEED, Senior Lecturer in Geology at UTPB.

Continue to work with industry and faculty to develop research in state-of-the-art Enhanced Oil Recovery and Carbon Capture and Storage. Teach part of Industry classes: CO2 Flooding School, Young Professional Field Trip, Carbon Capture, Utilization, and Storage (CCUS) classes.

Revised and taught Graduate Courses in Advanced Subsurface Methods, and Petroleum Geology. Developed and taught Arid Lands Hydrology, and Exploration and Production Logging. Added to the curriculum and taught Undergraduate Courses in Geology of the Permian Basin, Sample Description, Core Description, Sequence Stratigraphy, and Sedimentary Rocks for Engineers. Revised and taught Sedimentary Rocks for Geologist included adding Lab.

CEED director duties included coordinating with local industry and governmental entities to study oil and gas and alternative energy issues and promote economic development and diversification.

January - April 2001 Adjunct Lecturer, Geosciences, UTPB.

Industry Experience

August 1992 – April 2001	Consulting Geologist, DBA Muskoka Consultants.	Midland, TX
July 1985 - July 1992	Senior Geologist, Chevron, U.S.A.	Midland, TX
February 1980 - June 1985	Project Geologist, Gulf Oil Co.	Midland & Odessa, TX

Significant Professional Achievements and Areas of Specialization

- Expertise in Carbon Capture Utilization & Storage
- Expertise in Residual Oil Zones.
- Expertise in CO2 Enhanced Oil Recovery.
- Instructor at numerous Petroleum Industry CO2 Flooding schools, including international schools.
- Instructor at numerous CO2 Carbon Capture Storage and Utilization schools.
- Board Member, Annual CO2 Flooding Conference 2001 - Present.

Department of Energy grant - Carbon Utilization and Storage Partnership (CUSP) of the Western United States, Awarded October 2019, Principal Investigator, Robert Balch PRRC, New Mexico Tech. Drs. R.



Trentham & M. Henderson are Subcontractors. UTPB has received, from the original grant, and subsequent modifications, an awarded of ~\$450,000 for 3 years.

Principal Investigator or Investigator for several completed Department of Energy/Research Partnership to Secure Energy for America Residual Oil Zone CO2 related projects. Including:

- Department of Energy, DE_FOA_0000080. Recovery Act: Regional Sequestration Technology Training **“Carbon Capture and Storage in the Permian Basin, A Regional Technology Transfer and Training Program.”** Co-PI’s: Petroleum Technology Transfer Council, American Association of Petroleum Geologists, Applied Petroleum Technology Academy. Total Funding Requested: \$994,998.00 UTPB/CEED as Subcontractor: \$84,270, for 3 years. Period of Performance: November 1, 2009 – September 30, 2013.
- The Research Partnership to Secure Energy for America (RPSEA) Number: RFP2008SP001. Application to Improved Oil Recovery for Small Producers. **“Commercial Exploitation and the Origin of Residual Oil Zones: Developing a Case History in the Permian Basin of New Mexico and W. TX”.** Co-PI’s Robert C. Trentham, Steve Melzer. Funds Requested: \$961,934.00. RPSEA Share: \$630,934.00. Industry Match: \$331,000.00. Period of Performance: April 01, 2009 – March 31, 2011.
- Department of Energy DE_FOA_0000032. Recovery Act: **“A Modular Curriculum for Training University Students in Industry Standard CO2 Sequestration and Enhanced Oil Recovery Methodologies”.** Co-PI’s: Dr Emily Stoudt, Dr Robert Trentham, Funds Requested \$ 296,000.00, for 3 years. Period of Performance: Dec 1, 2009 - May 31, 2013.
- The Research Partnership to Secure Energy for America (RPSEA). Application to Improved Oil Recovery for Small Producers. **“Identifying and Developing Technologies for Enabling Small Producers to Pursue the Residual Oil Zones (ROZ) Fairways in the Permian Basin, San Andres”.** Co-PI’s Robert C. Trentham, Steve Melzer .Funds Requested: \$1,243,369.98, RPSEA Share \$859,269.98. Industry Cost Share \$ 374,100.00. Period of Performance: May 1, 2011 – December 21, 2015. RPSEA 10123.17.FINAL
- National Energy Technology Laboratory. Number: Unconventional Fossil Energy Funding Opportunity. **“Using Next Generation CO2 EOR Technologies to Optimize the Residual Oil Zone CO2 Flood at Goldsmith Landreth Unit, Ector County, Texas”** PI: Robert Trentham. DOE Funds Requested: \$1,198,547.00, Industry Match \$654,563.00. Period of Performance: Feb 23, 2011 - June 30, 2015. DE FOA 0000312.
- Member Permian Basin FutureGen Task Force 2005-2008.
- Manager and Principal Investigator. Department of Energy, Class II Shallow Shelf Carbonate Study, Foster-South Cowden (Grayburg and San Andres) Field, Ector Co., TX. 1994 - 2000.
- Industry Highlights:
 - Exploration Pathfinder, Chevron with exploration experience in Permian, Palo Duro, Dalhart, and Hardeman Basins of West Texas and SE New Mexico.
 - Discovered Wolf Flat Field in Pennsylvanian (Cisco) carbonates, Motley Co., TX, and W. A. Estes (Holt) Field and Monahans, N.W. (San Angelo) Field, Ward Co., TX.
 - Reservoir Geologist at Sand Hills (San Andres, Tubb, Ellenburger) Crane Co., TX; Wagon Wheel (Canyon & Cisco) and North Ward Estes (Yates & Queen) Ward Co., TX. Project

- Core and reservoir studies of numerous Upper Permian Reservoirs:
 - Leamex Field, Lea Co., NM, for Phillips Petroleum.
 - McCamey Field, Upton Co., TX, for Burlington Resources.
 - East Cowden Field Field, Ector Co., TX, for Conoco.
 - Fuhrman Mascho Field, Andrews Co., TX, for Conoco.
 - Sand Hills Field, Crane Co., TX, for Burlington Resources.
 - Outcrop study of the Apache Mountains, Culberson Co. TX. Studying outcrop analogs to producing Permian Basin fields. 1998 – 2003.
 - Local expertise in Karsted Reservoirs (Ellenburger, Pennsylvanian, and Permian).

Awards

- **The 2023 Grover E. Murray Memorial Distinguished Educator Award. From the American Association of Petroleum Geologists.** A 40,000 member professional association. 1-2 Awards given a year.
- ***Energy and Technology Award***, by The Permian Basin Petroleum Pioneers along with Steve Melzer, received October, 2019.
- The ***A. I. Levorsen Memorial Award*** recognizes the best paper presented at each AAPG Section meeting, “*with particular emphasis on creative thinking toward new ideas in exploration*”. Southwest Section, American Association Petroleum Geologists, May 2017.
- ***Volunteer of the Year Award***, by Permian Basin Section SEPM, 2014-2015.
- ***Distinguished Educator Award*** by the Southwest Section, American Association of Petroleum Geologists, April 8, 2013. Given “*in recognition of distinguished and outstanding contributions to geological education with respect to petroleum geology in the Southwest Section area.*”
- ***Top Speaker, “General Geology of the Southwest”***, Southwest Section, American Association of Petroleum Geologists, Ruidoso, 2011.
- ***Best Paper***, West Texas Geological Society Fall Symposium 2008
- ***Honorary Life Member***, Permian Basin Section S. E. P. M, 2008.
- ***Honorary Life Member***, West Texas Geological Society, 2008.
- ***Dedicated Service Award***, West Texas Geological Society, 2004-2005.

Professional Societies Membership

American Association of Petroleum Geologists (AAPG),
 Society of Sedimentary Geology (SEPM),
 West Texas Geol. Society (WTGS) – Past President & Honorary Life Member,
 Permian Basin Section-SEPM – Past President & Honorary Life Member
 Geological Society of America (GSA).

Professional Society/Organization Activities

Annual CO2 Flooding Conference, Board Member, 2001 to Present.
 Applied Petroleum Technology Academy (APTA), Board Member, 2002 to Present.
 PBS-SEPM Young Professional & Intern Field Trip Co-Leader 2011-Present
 Midland Energy Library, Past-President (2004 -2008), Board Member 1997 - Present

Recent UTPB Classes

Current - Spring 2024

GEOL 3212 Sedimentary Rocks for Engineers
GEOL 6346 Petroleum Geology of the Permian Basin**
GEOL 4346 Petroleum Geology of the Permian Basin**
GEOL 4101 Sample Description**
GEOL 6170 Sample Description**
GEOL 6399 Master's Thesis
 * Stacked Classes
 **Stacked Classes

Fall 2023

GEOL 4317 Geology of the Permian Basin*
GEOL 6317 Geology of the Permian Basin*
GEOL 1301 Physical Geology
GEOL 6399 Master's Thesis
 * Stacked Classes
 **Stacked Classes

Spring 2023

GEOL 3212 Sedimentary Rocks for Engineers
GEOL 3304 Igneous & Metamorphic Petrology
GEOL 4102 Core Description

Fall 2022

GEOL 4349 Well Logging*
GEOL 6349 Exploration & Production Logging*
GEOL 6357 Volcanology
 * Stacked Classes

Spring 2022

GEOL 3212 Sedimentary Rocks for Engineers
GEOL 6347 Subsurface Methods*
GEOL 4389 Subsurface Mapping*
GEOL 4101 Sample Description**
GEOL 6101 Sample Description**
 * Stacked Classes

Stacked Classes**Fall 2021**GEOL 4317 Geology of the Permian BasinGEOL 6317 Geology of the Permian Basin***GEOL 6346 Petroleum Geology of the Permian Basin****GEOL 4389 Petroleum Geology of the Permian Basin****GEOL 6399 Master's Thesis*** Stacked Classes****Stacked Classes**Spring 2021*

GEOL 3212 Sedimentary Rocks for Engineers

GEOL 3304 Igneous & Metamorphic Petrology

GEOL 4102 Core Description

GEOL 6102 Core Description

GEOL 6699 Master's Thesis

Publications:

A total of over 90 publications and numerous oral presentations on CO2 EOR, Residual Oil Zones, & Carbon Capture Utilization & Storage associated with Permian Basin reservoirs, including Queen, Grayburg and San Andres (Guadalupian), Pennsylvanian and Ellenburger (lower Ordovician). Additional studies of uranium in volcanics and volcanoclastics and feldspar geochemistry.

Recent Conference Presentations and Schools

Melzer, L.S., Wackowski, R., Trentham, R.C. CO2 EOR School for Hilcorp, Presented by Applied Petroleum Technology Academy(APTA), Houston, TX, May, 2024.

Lindsay, R. F., R. C. Trentham, West Texas Geological Society 100 Year Anniversary: A Core Workshop of Early Permian Basin Field Discoveries. Presented at the Southwest Section American Association Petroleum Geologists, Abilene, TX, April 2024.

Lindsay, R. F., R. C. Trentham, West Texas Geological Society 100 Year Anniversary: A Core Workshop of Early Permian Basin Field Discoveries. Presented at the West Texas Geological Society 2023 Fall (WTGS) Symposium, Midland, TX. September, 2023.

Trentham, R. C., CCUS: Emerging Professionals and Workforce Development. Invited panel chaired by Denise Hills, with John Grimmer, Paiden Pruett, Conn Wetherington, Priyank Jaiswal, at American Association of Petroleum Geologists Annual Convention.

Verma, Sumit,* , Esra Yalçın Yılmaz, Laura Ortiz Sanguino , Justin Yandell, Miles A. Henderson, Robert C. Trentham, 2023, Seismic attribute and well-log analysis for channel characterization in the upper San Andres and Grayburg formations of the Midland Basin, Texas, Energy Geosciences <https://doi.org/10.1016/j.engeos.2023.100188>

Trentham, Robert C., Cory Hoffman, Robert Campbell, Chris Fling, presented each year: June 2023. Previously presented June 2008, June 2010 - June, 2015, 2017 -2019, *PBS-SEPM Summer Intern and New Hire Field Trip, Guadalupe Mountains, Texas and New Mexico*. Field Guide and References, 1 volume.

Trentham, R.C. 2023, CCUS, A View From The Oil Patch. Abilene Geological Society. April, 22, 2023.

Kalina, M.T., Trentham, R.C., and Henderson, M.A. (2022). Evaluation of cementing phases in the Cherry Canyon Formation of the Delaware Mountain Group, Ford Geraldine Field, Texas. Geological Society of America Abstracts with Programs. Vol 54, No. 5, <https://doi.org/10.1130/abs/2022AM-380656>

Henderson, M.A., Lindsay, R.F., and Trentham, R.C. (2022). Treating carbon sequestration in heterogeneous reservoirs as a water alternating gas (WAG) CO₂ enhanced oil recovery flood. Geological Society of America Abstracts with Programs. Vol 54, No. 5, <https://doi.org/10.1130/abs/2022AM-382814>

Henderson, M.A., Brain, E.M, and Trentham, R.C. (2022). Reservoir properties of the Lower San Andres Formation on the Northwest Shelf of the Permian Basin. Geological Society of America Abstracts with Programs. Vol 54, No. 5, <https://doi.org/10.1130/abs/2022AM-383632>

Trentham, R. C., Tracy, D. 2022, TMBR-Sharp/Staley #2-22 Ligon St: An Example of lower Cherry Canyon Age Tectonism. Trentham, Robert C., Presented at the West Texas Geological Society 2022 Fall (WTGS) Symposium, Midland, TX.

Aminu, Abdulmutallib, A., Zobaa, Mohamed, K., Trentham, Robert C., 2022, Visual Kerogen Analysis of the Woodford Formation in the Superior #1 Richburg well, Delaware Basin. Poster Presented at the American Association of Petroleum Geologists, Southwest Section, Midland, TX.

Kalina, M., Trentham, R.C., and Henderson, M.A. (2022). Evaluation of cementing phases in the Cherry Canyon Formation, of the Delaware Mountain Group, Ford Geraldine Field, Texas. Southwest AAPG Convention, Midland, TX.

Fuller, M., Trentham, R.C., and Henderson, M.A. (2022). Understanding the Geochemistry of the Limestone-Dolostone Transition in the Residual Oil Zone in the lower Permian San Andres Formation, Permian Basin, Texas. Southwest AAPG Convention, Midland, TX.

Brain, E.M., Trentham, R.C., and Henderson, M.A. (2022). Reservoir Characterization of the Lower San Andres Residual Oil Zone for Utilization and Storage of Carbon Dioxide in Cochran and Yoakum Counties, Texas. Southwest AAPG Convention, Midland, TX.

Trentham, R.C., Brain, E.M., Kalina, M., Fuller, M., and Henderson, M.A. (2022). The Carbon Utilization and Storage Project of the Western USA: A View from the Oil Patch. Southwest AAPG Convention, Midland, TX.

Trentham, R.C. and Henderson M.A. (2022). The Carbon Utilization and Storage Partnership of the Western USA: A view from the oil patch. Geological Society of America Abstracts with Programs. Vol 54. No. 1. <https://doi.org/10.1130/abs/2022SC-374287>

Brain, E.M, Trentham, R.C., and Henderson, M.A. (2022). Reservoir characterization of the Lower San Andres residual oil zone for utilization and storage of carbon dioxide in Cochran and Yoakum Counties, Texas. Geological Society of America Abstracts with Programs. Vol. 54, No. 1. <https://doi.org/10.1130/abs/2022SC-374225>

Kalina, M.T., Trentham, R.C., and Henderson M.A. (2022). Evaluation of cementing phases in the Cherry Canyon Formation of the Delaware Mountain Group, Ford Geraldine Field, Texas. Geological Society of America Abstracts with Programs. Vol. 54, No. 1. <https://doi.org/10.1130/abs/2022SC-373990>

Fuller, M.J., Trentham, R.C., and Henderson, M.A. (2022). Petrographic and geochemical evaluation of the limestone-dolostone transition beneath the residual oil zone of the Lower Permian San Andres Formation, Ector County, Texas. Geological Society of America Abstracts with Programs. Vol. 54, No. 1. <https://doi.org/10.1130/abs/2022SC-374266>

Henderson, M.A., Fuller, M.J.*, and Trentham, R.C. (2021). Petrography and geochemistry of the limestone-dolostone transition in the residual oil zone of the early Permian San Andres Formation, Permian Basin, Texas. Geological Society of America, Abstracts with Programs, Vol. 53 (6). <https://doi.org/10.1130/abs/2021AM-369364>

Szypulki, J.*, Trentham, R.C., Henderson, M.A., and Verma, S. (2021). The effect of deep early Paleozoic faulting on Permian-aged strata with seismic attribute analysis in Ector County, Texas. Geological Society of America, Abstracts with Programs, Vol 53 (6). <https://doi.org/10.1130/abs/2021AM-368033>

Trentham, R. C., Miles A. Henderson 2021, Assessing Collapse Risk in Evaporite Sinkhole-prone Areas Using Commonly Available Oil Field Data in the Area of the Winks Sinks, Winkler County, Texas, *in* Evaporite Karst in the Greater Permian Evaporite Basin (GPEB) of Texas, New Mexico, Oklahoma, Kansas, and Colorado. K. S. Johnson, L. Land, and D. D. Decker; Editors, Oklahoma Geological Survey, Circular 113, p. 111 - 123.

Trentham, R. C., L. S. Melzer, M. A. Henderson, 2021, Stacked Greenfield & Brownfield Residual Oil Zones. North Ward Estes area, Western Margin of the Central Basin Platform, Permian Basin, Texas. Presented at the West Texas Geological Society Fall (WTGS) Symposium.

Brain, E, M.A. Henderson, R.C. Trentham, 2021, Facies of the Hudson #601 H Core, Cochran County, Poster presented at the West Texas Geological Society Fall (WTGS) Symposium.

Trentham, R.C., 2021, Kinder Morgan (Legado Resources) A CO2 Flood Front Caught in the Act, #203 RW GLSAU, San Andres Fm., Ector County, TX. Core presented at the West Texas Geological Society Fall (WTGS) Symposium post Symposium Core Workshop.

Brain, E., R. C. Trentham, 2021, Mammoth Exploration #601-H Hudson, San Andres Fm., Sable Field, Cochran Co., TX. Core presented at the West Texas Geological Society Fall (WTGS) Symposium post Symposium Core Workshop.

Lindsay, R.F., R.C. Trentham, L.S. Melzer, 2021 San Andres Residual Oil Zone (ROZ) Core Workshop. PBS-SEPM pub #21-54, vol. 1, 29 pages.

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Johnson, J.M., Trentham, R.C., and Henderson, M.A. (2020). Investigating the nature of the limestone-dolostone transition in the early Permian San Andres Formation, Goldsmith Landreth Field, Ector County, Texas. Geological Society of America, Abstracts with Programs, 52 (6). <https://doi.org/10.1130/abs/2020AM-359649>

Trentham, Robert C., 2020, *Carbon Utilization from the Permian Basin Perspective*. SEG Post Convention Workshop – CO2 Geophysical Monitoring: Achievements, Challenges and the Road Ahead (Virtual).

Trentham, Robert C., 2020 *A View of Carbon Utilization from the Oil Patch*. Unconventional Resources: Shale Gas & CBM Exploration & Exploitation, Virtual International Workshop.

Trentham, Robert C., 2019, *Tectonic History Considerations and Flow Fields*. Presented at the 2019 New Insights on Transmissive Faults/Fractures from the ROZ Studies and Horizontal Well Revolution Short Course, 25th Annual CO2 Conference, Midland.

Trentham, Robert C., L. Stephen Melzer, and David Vance, 2019, *Whose Fault Is It?* Presented at the West Texas Geological Society Fall (WTGS) Symposium, Midland Texas.

Trentham, Robert C., and L. Stephen Melzer, 2019, *A “Cookbook” Approach to Evaluating Residual Oil Zones completed by Horizontal Depressuring of the Upper San Andres (DUROZ)*, American Association of Petroleum Geologists - Southwest Section Annual Meeting, Dallas, TX. AAPG Search and Discovery #51570.

Trentham, Robert C., 2018, *The Importance of a Well Developed Profile in the Horizontal San Andres Play in Yoakum Co., TX*. Presented at the West Texas Geological Society Fall (WTGS) Symposium, Midland.

Trentham, Robert C., Cory Hoffman, Robert Campbell, Chris Fling, 2018, *PBS-SEPM Summer Intern and New Hire Field Trip, Guadalupe Mountains, Texas and New Mexico*. Field Guide and References, 2 volumes.

Trentham, Robert C., 2018, *ROZs: Science and Fairways - An Update*. American Association of Petroleum Geologists - Southwest Section Annual Meeting, El Paso, TX. AAPG Search and Discovery #70353.

Trentham, Robert C., 2017, *Greenfield ROZ: Science and Fairways*. Presented at the 23rd Annual CO2 ROZ Conference, Midland, TX.

Trentham, Robert C., 2017, *Upper Leonardian on the Central Basin Platform, ROZs to Max Floods*. September 2017, presented at the West Texas Geological Society Fall (WTGS) Symposium, Midland, TX.

Melzer, L. Stephen, and Bob Trentham (Presenter), 2017, *ROZs in the Permian Basin: Exploiting via Horizontals and EOR*. presented at the International Association of Drilling Contractors (IADC) Shale Energy Workshop, Midland, TX.

Trentham, Robert C., Emily Stoudt, Robert Campbell, Chris Fling, presented each year: 2008, 2010 - June, 1215, 2017, *PBS-SEPM Summer Intern and New Hire Field Trip, Guadalupe Mountains, Texas and New Mexico*. Field Guide and References, 2 volumes.

Trentham, Robert C., 2017, *The Relationship Between the San Andres Regional Setting and Residual Oil Zones (ROZs) in the Permian Basin*. American Association of Petroleum Geologists - Southwest Section Annual Meeting, Midland, TX. AAPG Search and Discovery #51400.

Bennett, Craig E. (presenter), Benjamin W. Cleveland, and Dr. Robert C. Trentham, 2017, *The Victorio Peak, Cutoff, and Cherry Canyon Formations in the Apache Mountains: After Fifty Years, A New Look.*, American Association of Petroleum Geologists - Southwest Section Annual Meeting.

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Melzer, L. Steve, and Robert Trentham, David Vance, 2017, *San Andres: the New Frontier, Horizontals, Residual Oil, and Core Workshop*. Day-long Seminar and Core Workshop for PBS-SEPM.

Trentham, Robert, C., 2016, *Residual Oil Zones (ROZ's) - From Science to Commercial Exploitation*. 22nd Annual CO2 ROZ Conference, Midland, TX.

Trentham, Robert C., 2016, *The I-20 corridor: A Historical and Core Based Look at the San Andres, and SADR ROZ's, Across the Central Basin Platform*. West Texas Geological Society Fall (WTGS) Symposium, Midland, TX.

Trentham, Robert C., 2016, *A Residual Oil Zone (ROZ) History Lesson, ROZ Terminology, Geology, Mapping and Resource*. Society of Petroleum Engineers Liquids-Rich Basins Conference-North America, Midland TX.

Trentham, Robert C., 2016, *A "Cookbook" Approach to Exploring for, and Evaluating, Residual Oil Zones in the San Andres Formation of the Permian Basin*. American Association of Petroleum Geologists - Southwest Section Annual Meeting, Abilene, TX. AAPG Search and Discovery #51259.

Afuape, Olakemi, and Robert C. Trentham *Depositional Lithofacies and Diagenetic Overprints of Pennsylvanian Lower Cisco Shelf Margin Carbonates, Wolf Flat Field, Motley County, Texas, USA*, American Association of Petroleum Geologists - Southwest Section Annual Meeting, Abilene, TX. AAPG Search and Discovery #20352 (2016).

Trentham, Robert, C., 2011, "Residual Oil Zones (ROZ's) and the Long Term Future of the Permian Basin (and Elsewhere)", SPE Permian Basin Study Group of Gulf Coast Section.

Harouaka, A., B. Trentham and S. Melzer (2013). Long overlooked residual oil zones (ROZ's) are brought to the limelight. *SPE Unconventional Resources Conference Canada*, Society of Petroleum Engineers.

A series of presentations made as part of the 2016-2021 CO₂ Flooding School held August each in Midland, TX:

“A Quick Look at Residual Oil Zones”;

“Key Elements of Reservoir Geology”;

“Flow Units and Reservoir Compartmentalization”;

“Cycles, Stratigraphy, and the Geologic Reasons Why CO₂ Floods Fail”;

“Geophysical and Geochemical Techniques for Monitoring CO₂ Floods”;

“The Science of ROZs”; and

“The Permian Basin and an Update on Current ROZ RPSEA & Field CO₂ Project Results”

Part of the faculty of the PBS-SEPM “Intern and New-Hire Field Trip” a 4 day interactive training for summer hire and young professional Geologists, Engineers and Land Personnel. Team taught with Geologists, Engineers and Land Personnel. 2008 – 2019.

Military

1970 – 1976, New York Army National Guard. 101st Armored Cavalry, 42nd Division. Highest rank - Second Lieutenant. Assistant Squadron Training Officer and Platoon Leader. In part, responsible for scheduling and presenting unit classroom training. Platoon Leader of 32 man platoon.

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing was served on the following by electronic mail on July 8, 2024.

/s/ Sharon T. Shaheen

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Attorneys for Pilot Water Solutions SWD, LLC

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

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

COMM. CASE NO. 24123

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

DIV. CASE NOS. 23614-23617

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

DIV. CASE NO. 23775

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

**DIV. CASE NOS. 24018-24020,
24025**

SUBPOENA

To: Thomas E. Tomastik
c/o Holland & Hart LLP
Attn: Michael H. Feldewert
Adam G. Rankin
Nathan R. Jurgensen
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Santa Fe, NM 87504
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nrjurgensen@hollandhart.com
pmvance@hollandhart.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: Hinkle Shanor LLP, 218 Montezuma Ave., Santa Fe, New Mexico, 87501

Date: August 6, 2024 Time: 9:00 a.m.

to testify at the taking of a deposition regarding the topics attributed to you in Goodnight Midstream Permian, LLC’s July 8, 2024, Witness Disclosure (the “Goodnight Witness Disclosure”). The deposition will be recorded by a certified court reporter and videotaped. This deposition testimony may be used at hearing for any and all purposes permitted by the New Mexico Oil Conservation Commission.

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):

1. Any documents you reviewed or relied upon to develop your opinions on the subject matter set forth in the Goodnight Witness Disclosure; and
2. Any reports or analyses prepared by you, or at your direction, regarding your opinions on the subject matter set forth in the Goodnight Witness Disclosure

to produce these documents at the offices of Hinkle Shanor LLP, 218 Montezuma Ave., Santa Fe, New Mexico, 87501, contemporaneous with the taking of your deposition.

This subpoena is issued on application of Empire New Mexico, LLC, through its attorneys of record.

Dated this ___ day of July 2024.

NEW MEXICO OIL CONSERVATION COMMISSION

BY: _____

Date: _____

Exhibit 4

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

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

COMM. CASE NO. 24123

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DIV. CASE NO. 23775

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

**DIV. CASE NOS. 24018-24020,
24025**

SUBPOENA

To: William J. Knights
c/o Holland & Hart LLP
Attn: Michael H. Feldewert
Adam G. Rankin
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agrankin@hollandhart.com
nrjurgensen@hollandhart.com
pmvance@hollandhart.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: Hinkle Shanor LLP, 218 Montezuma Ave., Santa Fe, New Mexico, 87501

Date: August 6, 2024 Time: 1:00 p.m.

to testify at the taking of a deposition regarding the topics attributed to you in Goodnight Midstream Permian, LLC’s July 8, 2024, Witness Disclosure (the “Goodnight Witness Disclosure”). The deposition will be recorded by a certified court reporter and videotaped. This deposition testimony may be used at hearing 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):

1. Any documents you reviewed or relied upon to develop your opinions on the subject matter set forth in the Goodnight Witness Disclosure; and
2. Any reports or analyses prepared by you, or at your direction, regarding your opinions on the subject matter set forth in the Goodnight Witness Disclosure

to produce these documents at the offices of Hinkle Shanor LLP, 218 Montezuma Ave., Santa Fe, New Mexico, 87501, contemporaneous with the taking of your deposition.

This subpoena is issued on application of Empire New Mexico, LLC, through its attorneys of record.

Dated this ___ day of July, 2024.

NEW MEXICO OIL CONSERVATION COMMISSION

BY: _____

Date: _____

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

**IN RE: APPLICATION OF GOODNIGHT
MIDSTREAM PERMIAN LLC FOR APPROVAL
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LEA COUNTY, NEW MEXICO.**

COMM. CASE NO. 24123

**APPLICATIONS OF GOODNIGHT
MIDSTREAM PERMIAN LLC FOR APPROVAL
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DIV. CASE NOS. 23614-23617

**APPLICATION OF GOODNIGHT
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DIV. CASE NO. 23775

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

**DIV. CASE NOS. 24018-24020,
24025**

SUBPOENA

To: Dr. James A. Davidson
c/o Holland & Hart LLP
Attn: Michael H. Feldewert
Adam G. Rankin
Nathan R. Jurgensen
Paula M. Vance
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nrjurgensen@hollandhart.com
pmvance@hollandhart.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: Hinkle Shanor LLP, 218 Montezuma Ave., Santa Fe, New Mexico, 87501

Date: August 7, 2024 Time: 9:00 a.m.

to testify at the taking of a deposition regarding the topics attributed to you in Goodnight Midstream Permian, LLC’s July 8, 2024, Witness Disclosure (the “Goodnight Witness Disclosure”). The deposition will be recorded by a certified court reporter and videotaped. This deposition testimony may be used at hearing for any and all purposes permitted by the New Mexico Oil Conservation Commission.

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):

1. Any documents you reviewed or relied upon to develop your opinions on the subject matter set forth in the Goodnight Witness Disclosure; and
2. Any reports or analyses prepared by you, or at your direction, regarding your opinions on the subject matter set forth in the Goodnight Witness Disclosure

to produce these documents at the offices of Hinkle Shanor LLP, 218 Montezuma Ave., Santa Fe, New Mexico, 87501, contemporaneous with the taking of your deposition.

This subpoena is issued on application of Empire New Mexico, LLC, through its attorneys of record.

Dated this ____ day of July 2024.

NEW MEXICO OIL CONSERVATION COMMISSION

BY: _____

Date: _____

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

**IN RE: APPLICATION OF GOODNIGHT
MIDSTREAM PERMIAN LLC FOR APPROVAL
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LEA COUNTY, NEW MEXICO.**

COMM. CASE NO. 24123

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

DIV. CASE NOS. 23614-23617

**APPLICATION OF GOODNIGHT
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DIV. CASE NO. 23775

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

**DIV. CASE NOS. 24018-24020,
24025**

SUBPOENA

To: John McBeath
c/o Holland & Hart LLP
Attn: Michael H. Feldewert
Adam G. Rankin
Nathan R. Jurgensen
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Post Office Box 2208
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mfeldewert@hollandhart.com
agrarkin@hollandhart.com
nrjurgensen@hollandhart.com
pmvance@hollandhart.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: Hinkle Shanor LLP, 218 Montezuma Ave., Santa Fe, New Mexico, 87501

Date: August 7, 2024 Time: 1:00 p.m.

to testify at the taking of a deposition regarding the topics attributed to you in Goodnight Midstream Permian, LLC’s July 8, 2024, Witness Disclosure (the “Goodnight Witness Disclosure”). The deposition will be recorded by a certified court reporter and videotaped. This deposition testimony may be used at hearing for any and all purposes permitted by the New Mexico Oil Conservation Commission.

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 you reviewed or relied upon to develop your opinions on the subject matter set forth in the Goodnight Witness Disclosure; and

2. Any reports or analyses prepared by you, or at your direction, regarding your opinions on the subject matter set forth in the Goodnight Witness Disclosure

to produce these documents at the offices of Hinkle Shanor LLP, 218 Montezuma Ave., Santa Fe, New Mexico, 87501, contemporaneous with the taking of your deposition.

This subpoena is issued on application of Empire New Mexico, LLC, through its attorneys of record.

Dated this ___ day of July 2024.

NEW MEXICO OIL CONSERVATION COMMISSION

BY: _____

Date: _____

Exhibit 7

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

IN RE: APPLICATION OF GOODNIGHT
MIDSTREAM PERMIAN LLC FOR APPROVAL
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LEA COUNTY, NEW MEXICO.

COMM. CASE NO. 24123

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LEA COUNTY, NEW MEXICO.

DIV. CASE NO. 23775

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

DIV. CASE NOS. 24018-24020

SUBPOENA

To: Dr. Larry Lake
c/o Holland & Hart LLP
Attn: Michael H. Feldewert
Adam G. Rankin
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mfeldewert@hollandhart.com
agrarkin@hollandhart.com
nrjurgensen@hollandhart.com
pmvance@hollandhart.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: Hinkle Shanor LLP, 218 Montezuma Ave., Santa Fe, New Mexico, 87501

Date: August 8, 2024 Time: 9:00 a.m.

to testify at the taking of a deposition regarding the topics attributed to you in Goodnight Midstream Permian, LLC’s July 8, 2024, Witness Disclosure (the “Goodnight Witness Disclosure”). The deposition will be recorded by a certified court reporter and videotaped. This deposition testimony may be used at hearing for any and all purposes permitted by the New Mexico Oil Conservation Commission.

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):

1. Any documents you reviewed or relied upon to develop your opinions on the subject matter set forth in the Goodnight Witness Disclosure; and
2. Any reports or analyses prepared by you, or at your direction, regarding your opinions on the subject matter set forth in the Goodnight Witness Disclosure

to produce these documents at the offices of Hinkle Shanor LLP, 218 Montezuma Ave., Santa Fe, New Mexico, 87501, contemporaneous with the taking of your deposition.

This subpoena is issued on application of Empire New Mexico, LLC, through its attorneys of record.

Dated this ___ day of July, 2024.

NEW MEXICO OIL CONSERVATION COMMISSION

BY: _____

Date: _____

Exhibit 8

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

IN RE: APPLICATION OF GOODNIGHT
MIDSTREAM PERMIAN LLC FOR APPROVAL
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COMM. CASE NO. 24123

APPLICATIONS OF GOODNIGHT
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DIV. CASE NO. 23775

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

DIV. CASE NOS. 24018-24020, 24025

TO: Goodnight Midstream Permian, LLC
c/o Adam Rankin
Holland & Hart LLP
P.O. Box 2208
Santa Fe, NM 87504-2208

YOU ARE HEREBY COMMANDED pursuant to NMSA 1978, §70-2-8 and Rule 19.15.4.16.A NMAC to produce the following documents, including communications, within thirty (30) days of the service of this subpoena to all counsel of record in this matter:

1. Executed copies of all surface use agreements or other agreements by and between Goodnight Midstream Permian LLC, or its affiliates, (“Goodnight”) and surface owners within the Eunice Monument South Unit (“EMSU”).
2. Copies of all agreements by and between Goodnight, or its affiliates, and other persons purporting to have ownership in the San Andres formation within the EMSU.
3. Daily water injection volumes and wellhead pressures for all wells operated by Goodnight within the EMSU.

4. The entire well file for each well operated by Goodnight within the EMSU, including all documents, communications, and electronic data relating to each well, such as but not limited to the gross and net acres leased for each individual SWD Well, the mineral owner under each surface lease, any analysis or provisions relating to volumes of water that can be disposed into each individual SWD Well, the volumes of water required to fill the space leased in each SWD Well and the time required to fill the entire space leased.
5. All documents, including communications, provided to, reviewed by, or received from Nathan Alleman in relation to his testimony in these matters.
6. All documents, including communications, provided to, reviewed by, or received from Preston McGuire in relation to his testimony in these matters.
7. All documents, including communications, provided to, reviewed by, or received from Thomas E. Tomastik in relation to his testimony in these matters.
8. All documents, including communications, provided to, reviewed by, or received from William J. Knight in relation to his testimony in these matters.
9. All documents, including communications, provided to, reviewed by, or received from Dr. James A. Davidson in relation to his testimony in these matters.
10. All documents, including communications, provided to, reviewed by, or received from John McBeath in relation to his testimony in these matters.
11. All documents, including communications, provided to, reviewed by, or received from Dr. Larry Lake in relation to his testimony in these matters.

This subpoena is issued on application of Empire New Mexico, LLC through its attorneys, Ernest L. Padilla, Padilla Law Firm, P.A., Dana Hardy, Hinkle Shanor, LLP. and Sharon T. Shaheen, Montgomery & Andrews, P.A.

Dated this _____ day of _____, 2024.

NEW MEXICO OIL CONSERVATION COMMISSION

BY: _____

Date: _____