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

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

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

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

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

EMPIRE
PETROLEUM CORPORATION EST. 1983

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Direct Testimony and Exhibits

August 26, 2024

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SELF-AFFIRMED STATEMENT OF GALEN DILLEWYN

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

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

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

EXHIBIT F

subsequent data was provided for analysis. In the case of Wells EMSU-142 and EMSU-614 a pulsed neutron tool was run before the analysis was completed and therefore the saturations take into account the more recent data. The pulsed neutron is a tool that can obtain data after the well has had pipe run on it and is cased off.

NUTECH utilizes an eight-step process for analysis as indicated in **Exhibit F-1**. This is known in the industry as our NULOOK analysis. The NULOOK process is designed to remove analyst bias from the analysis process and let the wireline data tell the story of the subsurface.

NUTECH utilized core data available in the area, including core results from the EMSU-679 and R.R. Bell #4 obtained by Chevron. See **Exhibit F-2**.

Step 1 is to validate the data. As with any data provided not all data is of the same quality. Some of the wireline tools are run over decades and the quality of the tools is different, some boreholes are more rugous than others providing issues for the tools that require borehole contact for proper measurement. Also, different tools by different vendors are slightly different and are subject to calibration. NUTECH utilizes downhole calibrations to verify correct tool measurement and consistent tool readings.

Step 2 calculates the volume of shale utilizing multiple indicators such as resistivity, gamma ray, spontaneous potential, and neutron-density difference.

Step 3 is where the irreducible water in the porosity is calculated.

Step 4 using the irreducible porosity from Step 3 the amount of clay can be determined.

Step 5 calculates the lithology in a volumetric basis. A variety of methods depending on the input data available are used. The primary method is the photoelectric effect (PE) curve. If mudlogs are available with descriptions that will also be utilized in a qualitative manner.

Step 6 is where the effective porosity is determined. This result is the same as core measured porosity. Once this is determined the water saturation is also calculated. A modified Simandoux equation is used for water saturation. See **Exhibit F-3**.

Step 7 has permeability calculated. In this instance a Timur Coates free fluid permeability equation is utilized. See **Exhibit F-4**.

Step 8 is the ranking of pay using predetermined thresholds. Every log analyzed has the flag cutoffs and any other parameters used in the analysis listed in the log header.

An example NULOOK interpretation is shown in **Exhibit F-5**. The various curves are described below.

Track 1 – Correlation: This is the original log data and includes SP, Gamma Ray, and Caliper. GR which wraps is shaded with consecutively darker shading with each wrap.

Track 2 – Reservoir Quality Flags:

- A yellow flag appears when the thresholds for Vclay, free fluid, and Kmin are met.
- A dark-cyan flag appears when the free water is less than the set threshold for free water production.
- A black flag appears when the volume of hydrocarbon exceeds a set percentage of effective porosity.
- A green flag appears when the permeability exceeds a Kfair threshold.
- A red flag appears when the permeability exceeds a Kgood threshold.

Note: The permeability threshold values are determined by area, based on client information and experience. A light-cyan flag appears on the right of the track when free water exceeds the set threshold. For intervals where Shale Vision processing is utilized, a purple flag is displayed.

Track 3 – Depth & Miscellaneous: Pay Rating the quality of a zone from 1 to 3. The flags in Track 2 determine the Risk Rating for the identified zones. Three flags are required for a # 3 rated zone. Four flags indicate a # 2 rating. Five flags indicate a # 1 rated zone. **Numbers rated 1 are always recommended for completion**. Zones rated 2 have lesser permeability and/or possible water production, and should be considered for completion. Zones rated 3 have low permeability and/or, are water producing, and are not usually recommended. An interval with fair permeability but low hydrocarbon volume is also rated 3. If perforations are available, they are displayed in this track. In addition, the SHALE FLAG (purple bar) is placed on this track indicating an unconventional zone with Shale Vision Analysis. Lastly, any completion information (such as PERF or DST) present is flagged accordingly.

Track 4 – Miscellaneous: Line Tension, Caliper Flag, TOC and CORTOC are presented in this track.

Track 5 – Lithology**:** PHIE, BVI, BVW as well as Volumetric Carbonate (Lime, Dolomite, Anhydrite), Quartz (Sand, Silica), Heavy (Unconventional), and Clay (Computed & Core Volumes)

Track 6 – Resistivity: Resistivity data provided by the customer (Shallow, Medium, Deep)

Track 7 – Porosity/PE: All porosity data (neutron, density, and sonic) provided by the customer. PE is presented in this track when available. If curves are normalized or edited they are present. Porosity may be presented on a Limestone Matrix or Sandstone Matrix dependent on formation type and preference.

Track 8 – Supplemental Data: MicroLog curves, density correction and Mud Log data when available.

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

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

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

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

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

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

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

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

Track 16 – Fracture Track: Fracture Density Flags.

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

Track 18 – Fracture Track: Cumulative Fracture Height.

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

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

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

Date: 8/20/24

Galen Dillewyn
VP Business Development
NUTECH Energy Alliance

Galen P. Dillewyn

4106 Pine Breeze Dr, Kingwood, Texas 77345
Telephone: (713) 857-0856
E-Mail: gdillewyn@hotmail.com

EDUCATION

Texas Tech University, Lubbock, TX
Bachelor of Science in Chemical Engineering (2000)

PROFESSIONAL EXPERIENCE

NuTech Energy Alliance

VP Business Development **2017-Present**

- Created the commercial IRAD SaaS platform and handled customer support along with technical testing and verification
- The technical liaison between clients and consultants to ensure accuracy and completeness of projects
- Review all analysis that is completed internally for final approval
- Validate models and change regional understanding as data dictates
- Technically deliver all work to clients and review and answer technical questions regarding the solutions
- Validate all solutions prior to client review for completions, log analysis, and geological modeling
- Train new employees on analysis and quality control issues
- Presentations include:
  - NAPE Business Summit 2024 – AI and the role in Subsurface Analysis
  - URTeC AAPG 2024 – New Tools for Subsurface Exploration
  - SPWLA National Convention 2024 – Relative Permeability using Production Data
  - SPE – University of Houston 2024 -
  - AAPG 2024 – Lithium and Bromine Potential in Oil and Gas
  - SPWLA San Antonio Chapter 2023 – Relative Permeability and the effects on Heavy Oil Plays
  - URTeC AAPG 2023 – Utilizing Old Well Log Data for New Plays
  - SPE – University of Houston 2023 – Petrophysics and the Role in Exploration
  - Texas Christian University 2018 – The "New Austin Chalk" play
  - AAPG 2016 – Making Money with Mature Fields
  - SIPES 2016 – The Austin Chalk – Unconventional Target?

Houston Sales Manager **2014-2017**

- Lead a team of 5 account managers

Area Account Manager **2009-2014**

- Responsible for providing petrophysical interpretation, hydraulic fracture design, reservoir modeling, and core analysis products to clients
- Represent NuTech in San Antonio, Corpus Christi, Austin, College Station, Dallas, and Houston
- Validate internal analysis against production and core data
- Advise clients on completion methodology and feasibility
- Verify log data

Schlumberger Technology Corporation **2000 - 2009**

Dedicated Sales Account Engineer, Houston TX **2008-2009**

- Completed all failure analysis and data reviews with ExxonMobil asset teams in US Production and Exploration

Operations Manager, Abilene, TX **2006-2008**

- Responsible for Technical Accuracy of all data gathered by all employees
- Awarded the North American Service Quality Award in 2008
- Analyze logs and teach field engineers petrophysics and tool theory

General Field Engineer, Houston, TX **2001-2005**

- Performed evaluation, inspection, and completion services for oil and gas well evaluation in the Gulf of Mexico which include petrophysical analysis, completion decisions, and reservoir feasibility for clients that included but not limited to: BP, Shell, El Paso, Houston Exploration, Chevron.
    - Required to ensure tool operation and correct readings
    - Tool failure analysis included working with the SLB formation standards at the University of Houston

Field Engineer, Laurel, MS **2000-2001**
Junior Field Engineer, Belle WV **2000**

PROFESSIONAL ASSOCIATIONS & TRAINING

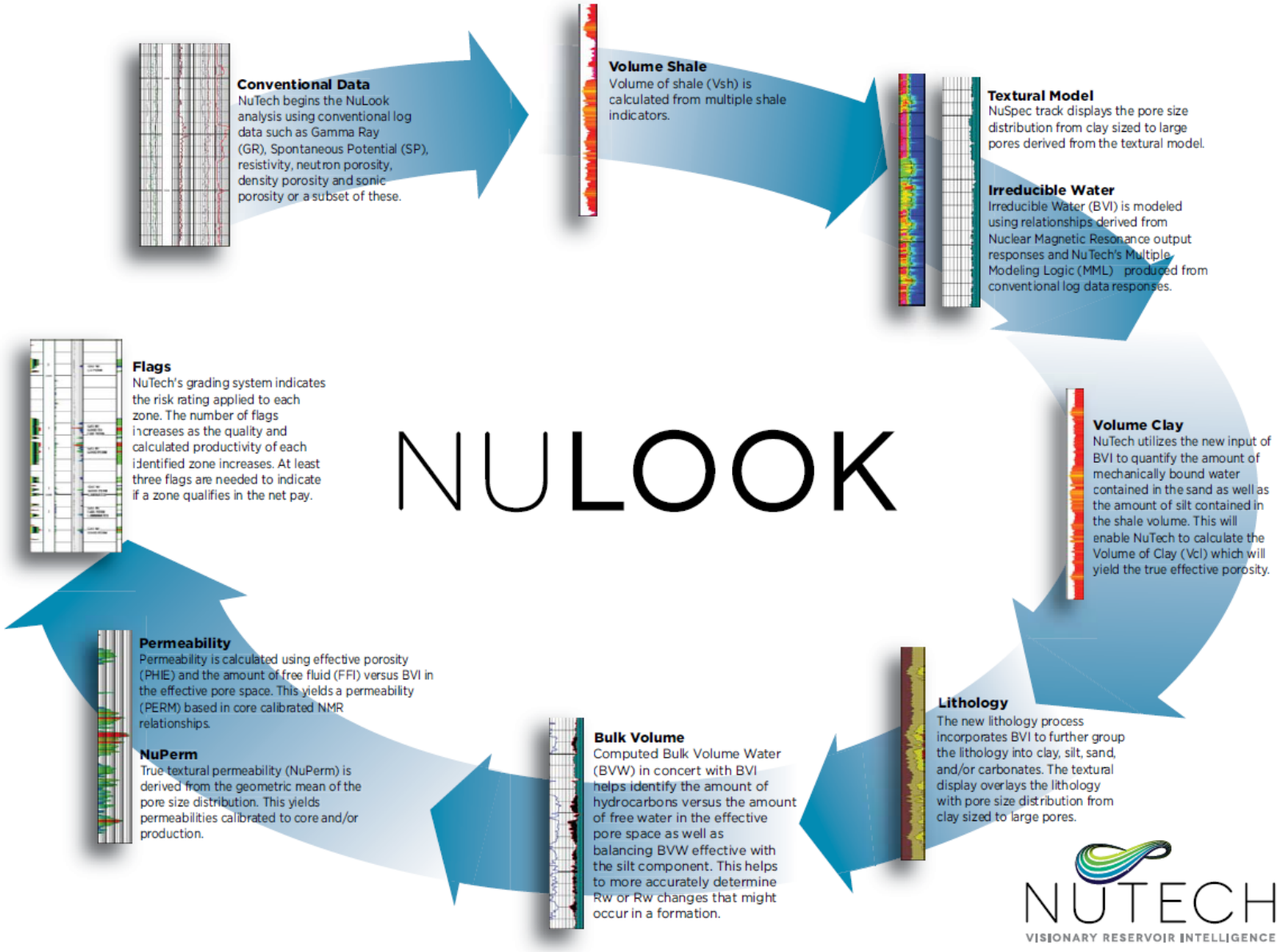
- Houston Geological Society
- SPE
- SPWLA
- Basic Geology
- Advanced Petrophysics
- Hydraulic Fracturing
- Reservoir Modelling
- Imaging and down hole sonic applications
- Production Logging and interpretation
- Perforation and Optimization

Table F-1

Wellname	API	Field	Top Depth	Bottom Depth	Input Curves
AGU #408	30025372860000	ARROWHEAD	3500.0	4537.0	CALI, DRHO, DTC, GR, PE, LLD, LLS, MSFL, RHOB, TENS
ESMU #713	30025373210000	EUNICE MONUMENT	3182.0	4182.0	CALI, DCAL, DRHO, GR, GRC, PE, LLD, LLS, RHOB, TENS
EMSU #673	30025373200000	EUNICE MONUMENT	3324.0	4324.0	CALI, DCAL, DRHO, GR, GRC, PE, LLD, LLS, MSFL, RHOB, TENS
EMSU #660	30025373190000	EUNICE MONUMENT	3386.0	4386.0	CALI, DCAL, DRHO, GR, GRC, PE, LLD, LLS, RHOB, TENS
EMSU #577	30025373180000	EUNICE MONUMENT	3210.0	4210.0	CALI, DCAL, DRHO, GR, GRC, PE, LLD, LLS, RHOB, TENS
EMSU #658	30025372800000	EUNICE MONUMENT	3315.0	4315.0	CALI, DRHO, GR, PE, LLD, LLS, RHOB, TENS
RYNO SWD #1	30025439010000	JESS BURNER	3685.0	5847.0	DEPT, GR, CALI, MSFL, LLS, LLD, DT, PE, DRHO, DPHI, NPHI, DEPTH, CALI, DRHO, DT, GR, NPHI, PE, DPHI, LLD, LLS, MSFL
EMSU #746	30025373560000	EUNICE MONUMENT SOUTH	3630.0	5368.0	DEPT, PE, GRD, NPOR_LS, CALD, DCOR, RHOB, TENS, LLD, LLS, MGUARD, DEPTH, CALD, DCOR, GRD, LLD, LLS, MGUARD, NPOR_LS, PE, RHOB, TENS
EMSU #628	30025372790000	EUNICE MONUMNET; GRAYBURG-ANDRES	3635.0	4546.0	DEPT, PE, GRD, CALD, DCOR, NPOR_LS, RHOB, TENS, MGUARD, LLS, LLD, DEPTH, CALD, GRD, LLD, LLS, MGUARD, NPOR_LS, RHOB, PE, TENS, DCOR
RYNO SWD #1	30025439010000	JESS BURNER	3685.0	5847.0	DEPT, GR, CALI, MSFL, LLS, LLD, DT, PE, DRHO, DPHI, NPHI, DEPTH, CALI, DRHO, DT, GR, NPHI, PE, DPHI, LLD, LLS, MSFL
EMSU #746	30025373560000	EUNICE MONUMENT SOUTH	3630.0	5368.0	DEPT, PE, GRD, NPOR_LS, CALD, DCOR, RHOB, TENS, LLD, LLS, MGUARD, DEPTH, CALD, DCOR, GRD, LLD, LLS, MGUARD, NPOR_LS, PE, RHOB, TENS
EMSU #628	30025372790000	EUNICE MONUMNET; GRAYBURG-ANDRES	3635.0	4546.0	DEPT, PE, GRD, CALD, DCOR, NPOR_LS, RHOB, TENS, MGUARD, LLS, LLD, DEPTH, CALD, GRD, LLD, LLS, MGUARD, NPOR_LS, RHOB, PE, TENS, DCOR
Eunice Monument South Unit 614	30025354530000	EUNICE MONUMENT; GRAYBURG-SAN ANDRES	2980.0	3992.0	DEPT, BSAL, CCLD, CIRF, CIRF_FIL, CIRN, CIRN_FIL, CRFI, CRNI, DCAL, ED, FBAC, GR, GTEM, INFD, IRAT, IRAT_FIL, MWFD, ND, RSCF_RST, RSCN_RST, SBNA_FIL, SFFD, SFND, SIGM, STIT, TENS, TPHI, TSCF, TSCN, WINR_RST, WTEP, WPRE, DEPTH, DPHZ, DT, HCAL, HDRA, HLLD, HLLS, RXOZ, TNPH
Eunice Monument South Unit 142	30025044280001	Eunice Monument; Grayburg-San Andres	2900.0	4040.0	DEPT, CCLC, INFD_FIL, BSAL, SIBF, RSCF, MARC, RSCN, CIRN_FIL, SIGM, TSCN_FIL, CIRF_FIL, TSCF_FIL, IRAT_FIL, TENS, TPHI, GR, WINR, CCLD, WPRE, WTEP

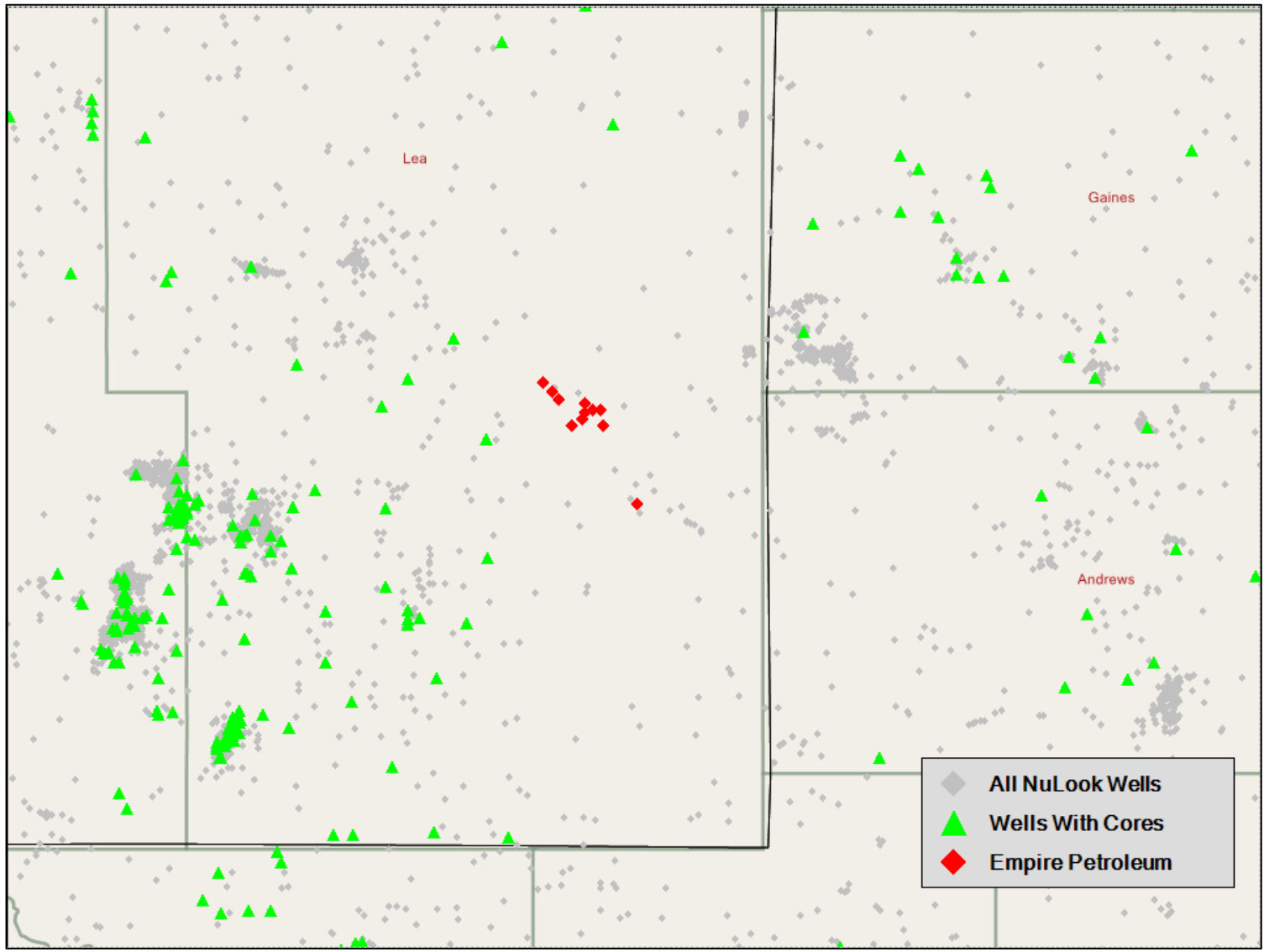
Input data for analysis

Exhibit F-1



NULOOK Process

Exhibit F-2



NUTECH wells analyzed, wells with core, and location of Empire Petroleum's analyzed wells

Exhibit F-3

$$SW \cong \left\{ \left(\frac{a.Rw}{\phi^m} \right) \left(\frac{1}{Rt} - \frac{Vsh}{Rsh} \cdot SW_{\text{guess}} \right) \right\}^{(1/n)}$$

Modified Simandoux equation

Exhibit F-4

$$K = \left(\frac{C \; x \; \phi^{2W}}{W^4 \, x \, (R_w / R_{tirr})} \right)^2$$

Timur Coates Free Fluid Permeability Equation

Exhibit F-5

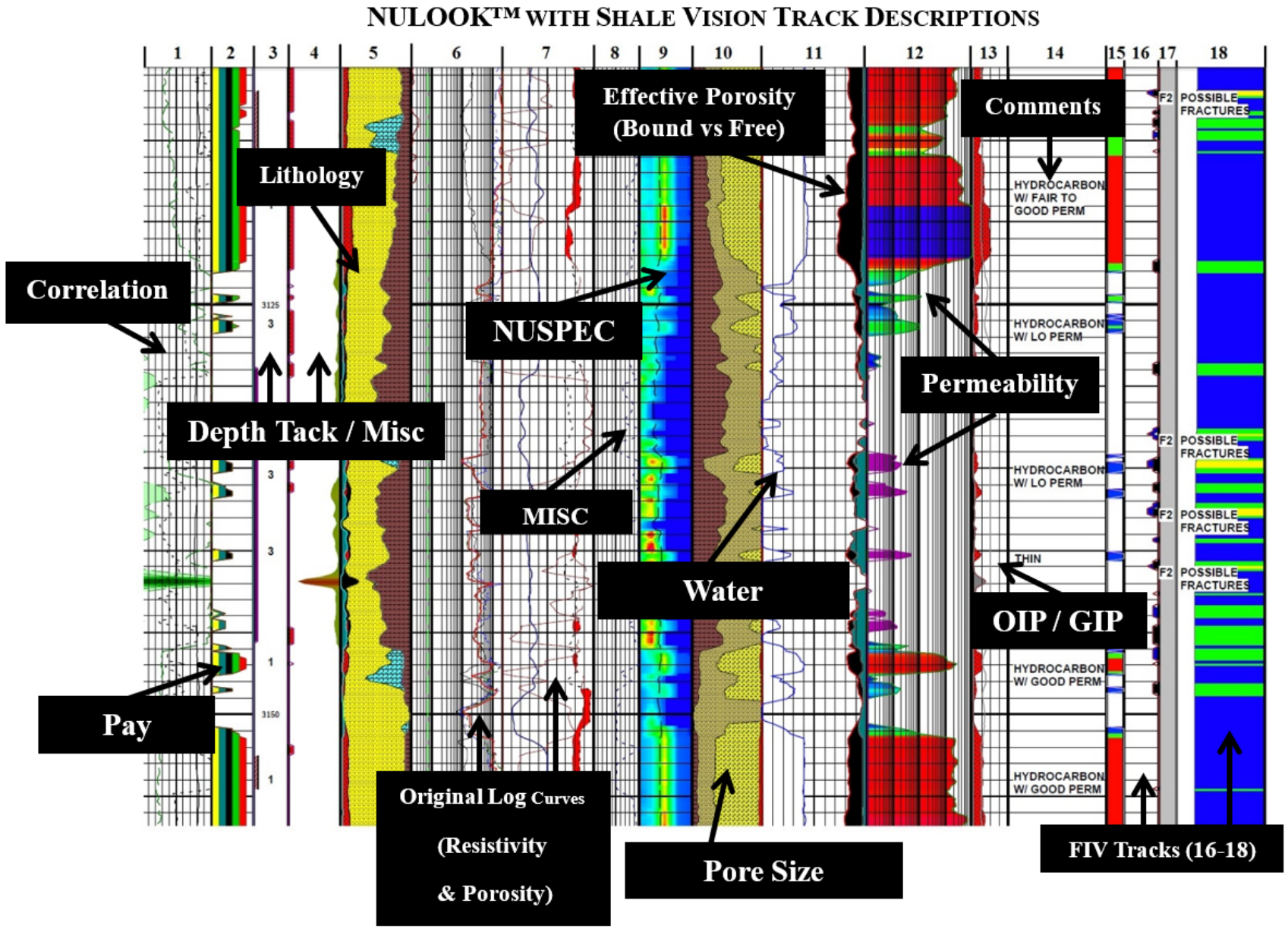
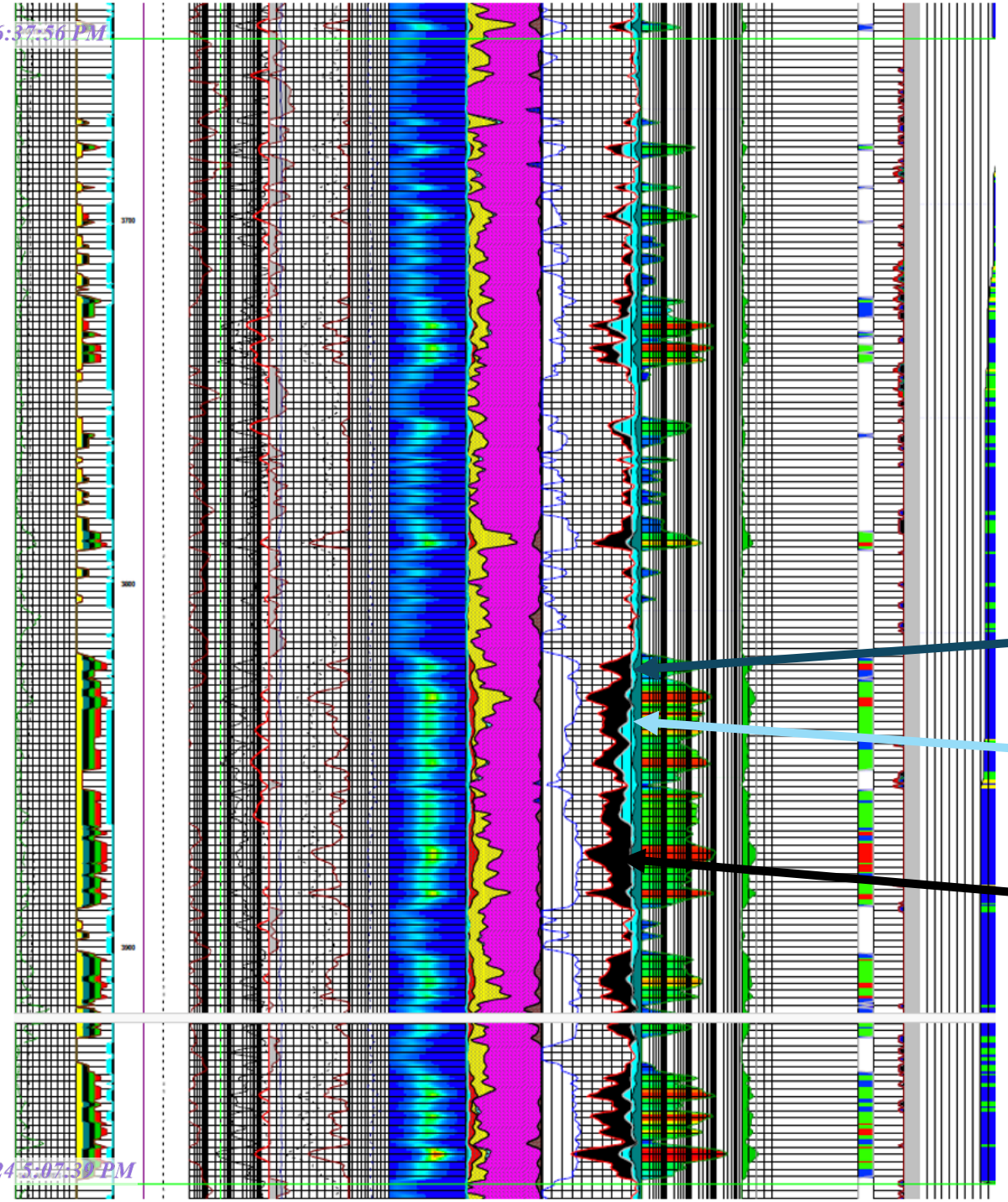

NULOOK™ WITH SHALE VISION TRACK DESCRIPTIONS
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
Effective Porosity (Bound vs Free)
Comments
Lithology
Correlation
NUSPEC
Permeability
Depth Tack / Misc
MISC
Water
OIP / GIP
Pay
Original Log Curves (Resistivity & Porosity)
Pore Size
FIV Tracks (16-18)
HYDROCARBON W/ FAIR TO GOOD PERM
HYDROCARBON W/ LO PERM
HYDROCARBON W/ LO PERM
THIN
HYDROCARBON W/ GOOD PERM
HYDROCARBON W/ GOOD PERM
F2 POSSIBLE FRACTURES
F2 POSSIBLE FRACTURES
F2 POSSIBLE FRACTURES
F2 POSSIBLE FRACTURES
3125
3
3
3
1
3150
1

Exhibit F-6



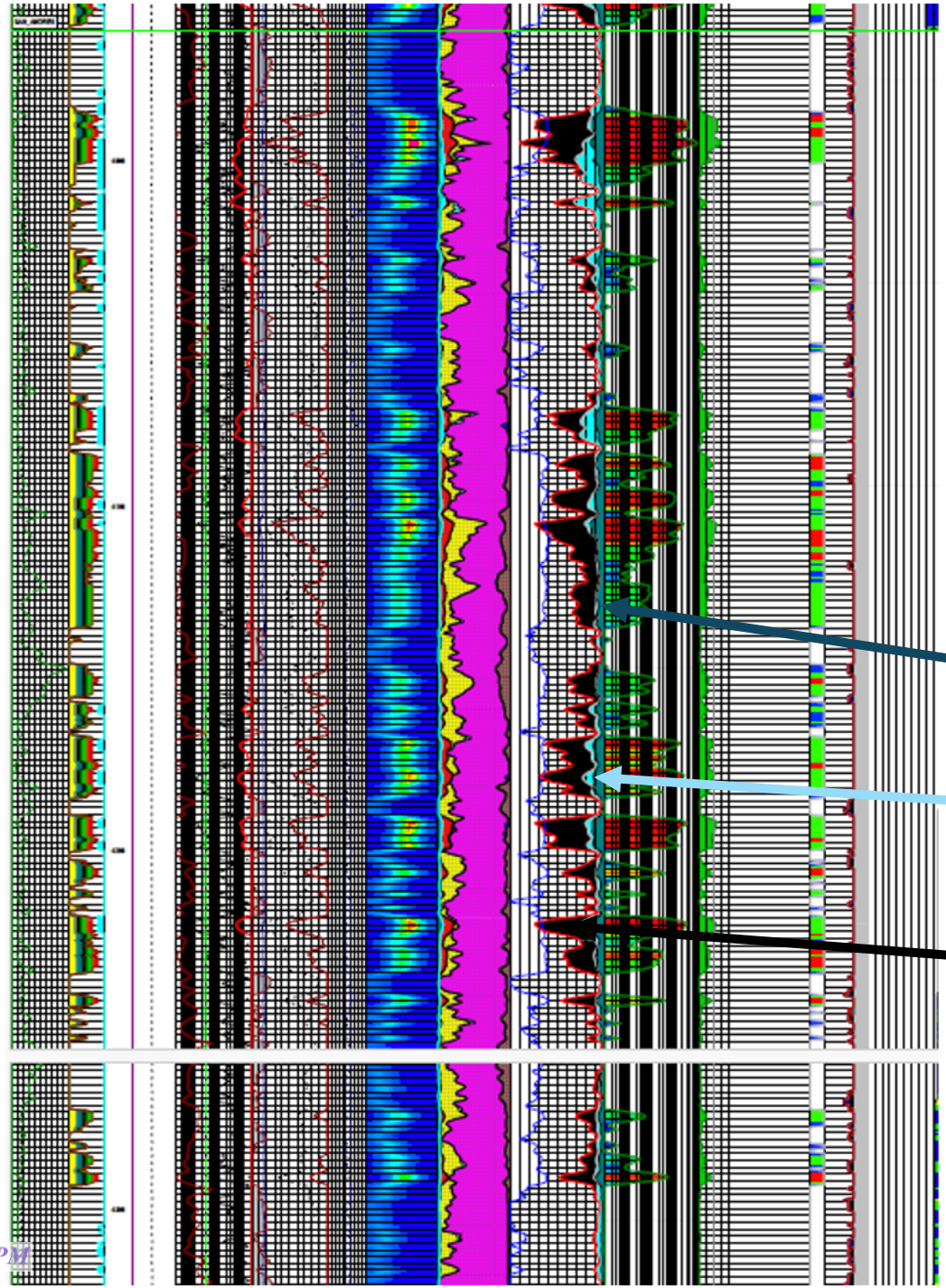
EMSU-673 Grayburg Section

Bound Water

Moveable Water

Oil

Exhibit F-7



EMSU-673 San Andres Section

Bound Water

Moveable Water

Oil

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

SELF-AFFIRMED STATEMENT OF JOSEPH A. McSHANE

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

2. I obtained a Bachelor of Science degree in Geology from Stephen F. Austin State University in August 2001. Since August 2001, I have worked as a petroleum geologist for multiple companies including Chesapeake Energy, Petrohawk Energy, Halcon Resources, Ajax Resources and now Empire Petroleum focused on the characterization, management and development of conventional and unconventional oil and gas assets across multiple geologic basins including the Central Basin Platform and Northwest Shelf in the Permian Basin. In addition to three years of post-graduate work at Stephen F. Austin State University starting in 2005, I have overseen drilling programs, developed pilot proposals for new secondary/tertiary floods, characterized residual oil zones within the San Andres formation across the Permian Basin, and assisted in modeling of carbonate ramp systems. A substantial portion of my work responsibility

EXHIBIT G

involves field level geologic characterization, mapping and well log interpretation in addition to well and development planning. A copy of my resume is attached.

3. In the present case, I performed a geologic review and study of the unitized interval at the Eunice Monument South Unit ("EMSU") consisting of the Grayburg and San Andres.

4. As a part of my study on this matter, I have prepared the following exhibits:

- **Geologic Overview of the EMSU**
- **Cross-sections including the proposed Goodnight SWD wells and active wells showing Empire's unitized interval**
- **Top of Grayburg and San Andres structure maps**
- **A representative sampling of seven wells across the EMSU analyzed by Nutech indicating the presence of hydrocarbons within the San Andres reservoir**
- **Confirmation of EMSU 200H Well being completed in the Grayburg**
- **Cross-section detailing lateral variability within Grayburg and San Andres**

A. Geologic Overview of the Grayburg and San Andres

5. The Grayburg formation underlying the EMSU is a mixed carbonate-siliciclastic composite sequence, with porous to non-porous ramp dolostones and interbedded less porous dolomitic sandstones. The Grayburg was deposited in a distally steepened carbonate ramp setting containing inner ramp, ramp crest shoal, and middle ramp facies. The San Andres was deposited in an open marine setting as part of a carbonate ramp setting as well and consists of middle ramp and ramp crest facies. The San Andres also has evidence of subaerial exposure with collapse breccias infilling solution enhanced karst features. The trap at EMSU is structural and stratigraphic in nature with an anticlinal closure on the west, north and south and then stratigraphic to the east where the porous dolograinstones are sealed up-dip by the inner ramp back shoal facies. In essence, the dip angle of the Grayburg and San Andres increases to 3-5 degrees on the west side of the EMSU creating the down-dip limit of the reservoir and up-dip on the eastern side the porosity degrades as a function of the depositional system.

B. Unitized Interval at EMSU

6. **Exhibit G-1(a-c)** consists of a map displaying the EMSU with a Subsea San Andres structure map. The map depicts all wells that penetrate the San Andres formation, Goodnight's active SWD wells and proposed SWDs, and the location of two cross-sections. The two cross-sections detail the unitized interval that was defined in the Commission's order approving the EMSU, which stated: "The Unitized Interval shall include the formations from a lower limit defined by the base of the San Andres formation to an upper limit defined by the top of the Grayburg formation or a -100 foot subsea datum, whichever is higher." The first cross-section depicts Empire's wells within the unit completed in the Grayburg-San Andres reservoir alongside Goodnight's active SWD wells and demonstrates that their perforated interval lies within Empire's

unitized formation. The second cross-section details the same unitized interval with the pending SWD applications displayed on the NW-SE line through EMSU.

C. Subsea Structure maps for Grayburg and San Andres Reservoirs

7. **Exhibit G-2(a) and (b)** is a Grayburg Subsea Structure Map made from the top of Empire's unitized interval. The contour interval is 100' with the producing oil-water-contact (POWC) FWL marked at -350'. The map shows a NW-SE strike with dip to the SW. There are no major faults present in the Grayburg section at EMSU. The geologic setting of EMSU is key in characterizing the stratigraphic framework and corresponding structure. The western edge of EMSU experiences a much steeper dip at around 3-4° compared to ≤2° on the eastern edge of the unit. Deep-seated structures moved during the Laramide orogenic event, causing deformation and leading to the current asymmetric anticline.

8. The San Andres Subsea Structure Map is made from the base of Grayburg/top San Andres exposure surface that is characteristic of the top G9 (Sequence Stratigraphic top of San Andres) regionally. The contour interval is 100' with the lowest known oil from core marked at -750' for reference. The map shows a strike similar to the Grayburg at NW-SE with a SW dip.

D. Log Analysis by Nutech Showcasing Hydrocarbon Presence in San Andres

9. **Exhibit G-3(a-j)** identifies wells across the entire Eunice Monument South Unit that were chosen for detailed open hole ("OH") log analysis to evaluate the presence of hydrocarbons in the San Andres reservoir. This exhibit contains a base map detailing the location of the 7 analyzed wells, 4 of which were recently evaluated using 2005 vintage OH triple combo logs. All 7 of the wells, EMSU 628, 660, 713, 746, 673, 658, and Ryno 1 SWD wells, indicate the presence of hydrocarbons in the San Andres reservoir. The analysis uses a standard Simandoux equation approach with an m & n that fits with San Andres intervals across the Permian. For all of the Nutech logs analyzed; the far left track contains Gamma Ray and Caliper; Track 2 contains an array of Reservoir Quality Pay Flags using a range of different parameters including the free fluid flag, free hydrocarbon flag, low water flag, fair permeability flag, good permeability flag, resistivity mineral flag, permeability mineral flag, gas mineral flag, and porosity mineral flag; Track 3 is Depth; Track 4 contains Resistivity; Track 5 contains Neutron, Sonic and Density Porosity; Track 6 contains Density Correction; Track 7 contains Clay Volume Indicator; Track 8 contains the Lithology Track; Track 9 contains Bulk Volume Water, Bulk Volume Irreducible, Water Saturation and Effective Porosity; Track 10 is calculated Permeability; Track 11 contains calculated Oil in Place per 640 acre section ("OIP/sec") and Track 12 contains an estimation of fracture density.

10. The EMSU 658 well covers approximately 400' of the San Andres formation and has multiple packages of pay identified and estimated OIP of 60.9 MMBO/640-acre section. The EMSU 673 well had a Triple Combo (TCOM) OH log run in 2005 covering approximately 400' of the San Andres reservoir with 75-100' of hydrocarbons present and an estimated OIP of 61.1MMBO/sec. The next well in the exhibit is EMSU 713 which had an TCOM OH log run in

2005 covering approximately200'of the San Andres reservoir. From the log analysis we can see approximately 40' of hydrocarbons present and an estimated OIP of 13.6MMBO/sec. The next well, EMSU 660 had a TCOM OH log from 2005 that was analyzed over approximately 400' of the San Andres reservoir and shows ~170' of hydrocarbons present with an estimated OIP of 98.1 MMBO/sec. The next well, EMSU 746 had a TCOM OH log run in 2005 that covers the entire unitized interval and all approximately 1000' of the San Andres. The analysis shows over 200' of hydrocarbons with an OIP of 174.5 MMBO/sec. Moving to the next well, the Ryno 1, one of Goodnight's SWD wells that is currently disposing water into the San Andres, part of Empire's unitized formation that again shows presence of hydrocarbons in the log analysis. This well is near the down-dip most portion of EMSU and has approximately 150' of pay identified with an estimated OIP of 91.5 MMBO/sec. The final well in the exhibit is the EMSU 628 which again had a modern TCOM OH log from 2005 that was analyzed over greater than 500' of the San Andres reservoir. The Simandoux calculation indicates greater than 250' of hydrocarbons present within the San Andres with an estimated OIP of 89.4 MMBO/sec.

E. Proof of Residual Oil Zone within the San Andres Reservoir

11. **Exhibit G-4** contains a mudlog that was run on EMSU 660 during drilling that indicates the presence of hydrocarbons. The description across 150' of the San Andres shows good to dull yellow fluorescence with regions of good cut and strong gas shows. The characteristics present in this mudlog align well with other San Andres residual oil zones actively being CO_2 flooded across the Permian Basin, including the Hobbs Unit to the northeast of EMSU. It is typical for mudlogs and well logs within the San Andres Residual Oil Zone to show hydrocarbon presence, but then drill stem tests (DSTs) and production will test 100% water. This occurs because during the Late Cretaceous, there was a regional uplift to the west, causing hydrodynamic flushing with meteoric waters low in salinity, high in sulfate that resulted in the San Andres being left in an imbibition state at residual oil saturations that can only be moved utilizing tertiary recovery methods.

F. Geochemical Evidence of a Residual Oil Zone in the San Andres

12. **Exhibit G-5** is a geochemical analysis from EMSU 679 where the ratio of immobile to mobile oil is calculated utilizing the saturates versus aromatic compounds present and then a percentage aromatics versus depth plot is shown. Literature states that a Residual Oil Zone will characteristically contain a lower percentage of aromatic compounds due to the hydrodynamic flushing of meteoric waters in the Late Cretaceous[1].

G. EMSU 200H Landing Zone

13. **Exhibit G-6** is cross-section displaying the EMSU 200H and associated landing zone accompanied by a location map. There is also a directional well view showing that the horizontal did indeed land in the Grayburg reservoir. Therefore, no production can be allocated to the San Andres. This is important, as an incorrect statement was made in the previous hearing for

[1] Aleidan, "Residual-Oil Zone: Paleo-Oil Characterization and Fundamental Analysis", SPE Res Eval & Eng, 20(02), (2016), Paper Number: SPE-179545-PA.

the Piazza well that we had in fact produced oil on primary from the EMSU 200H, but it is a producing Grayburg well.

H. Geologic Barrier between Grayburg and San Andres Reservoirs

14. **Exhibit G-7(a, b)** contains two different cross-sections that look at the Grayburg and San Andres reservoir sections across the EMSU. The cross-sections show the Grayburg-San Andres reservoir section. The blue highlighting shows a dolostone package capped by collapse breccia features just beneath the unconformity surface and Premier Sandstone within the Grayburg. The highlighting is included to show that while not ubiquitous across all of the EMSU, reservoir quality rock with greater than 10% porosity exists just below the Grayburg with varying thicknesses of tight anhydrite layers at the top of San Andres. Near the crest of the structure this reservoir rock is commonly capped by collapse breccias containing fractures that act as fluid conduits. Included in this cross-section is a core description from the EMSU 679 well detailing the collapse breccia features right at the top San Andres near the unconformity, which are known to contain fractures of varying heights and occurrence. There has been extensive work done both in outcrop and in core that shows the presence of dissolution features and fractures near the top San Andres. Also, during the Laramide orogenic event the basinal structural blocks were still shifting and adjusting causing a double-humped asymmetric anticline to form resulting in flexures and fractures. The fractures happen throughout the field but are more prevalent near the crest of the structure where historically the large plumes of San Andres water were seen. The crest of the structure is where Goodnight's current proposed salt-water disposal wells are planned, increasing the risk of contaminating Empire's San Andres residual oil zone and communicating with our Grayburg operations.

I. Conclusions and Recommendations

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

16. The attached Exhibits were either prepared by me or under my supervision or were compiled from company business records.

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

Joseph A. McShane

Date: 8-21-24

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 andgeomechanical 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 Three Forks 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 mmcfd 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 contaminates.
- 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 contaminates.
- 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 theColumbia 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 EXPIERENCE

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

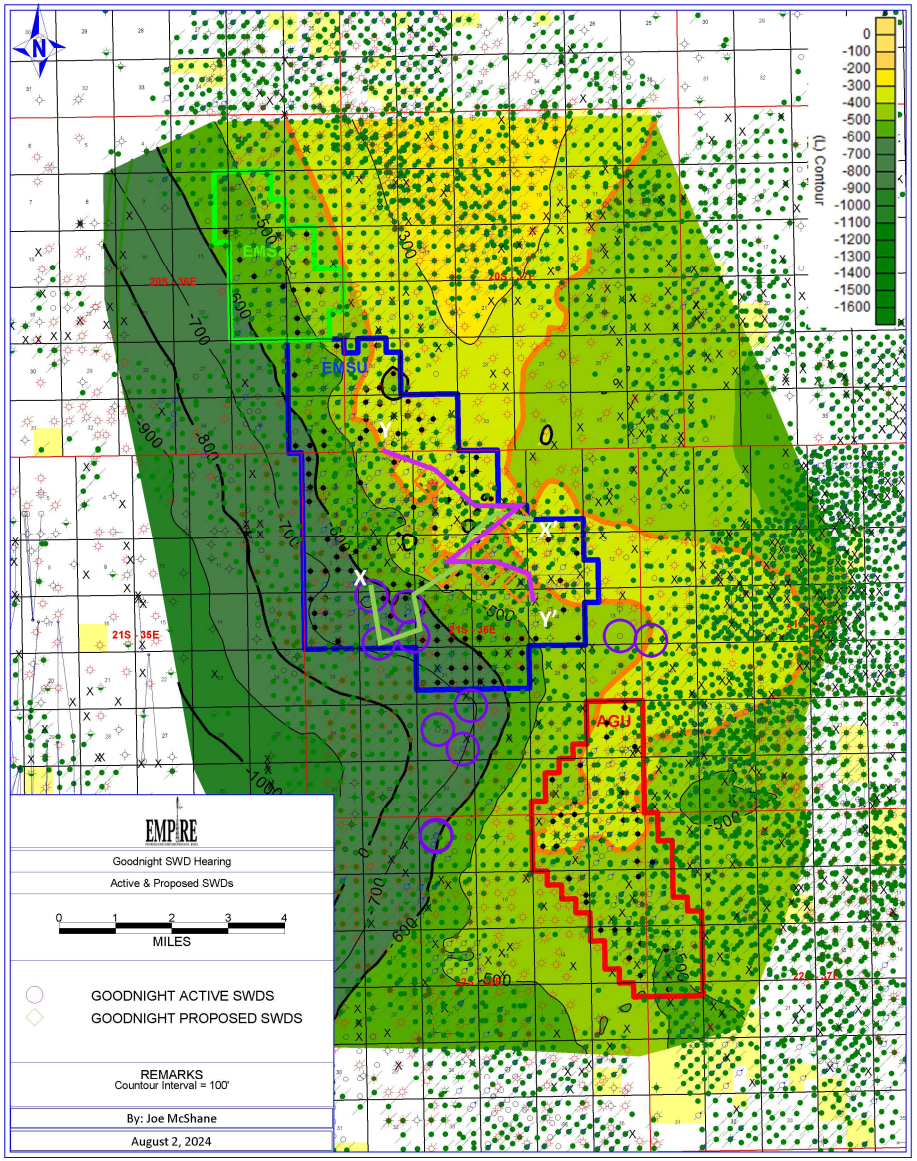
ADDITIONAL TRAINING / EDUCATION

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

Exhibit G-1(a)

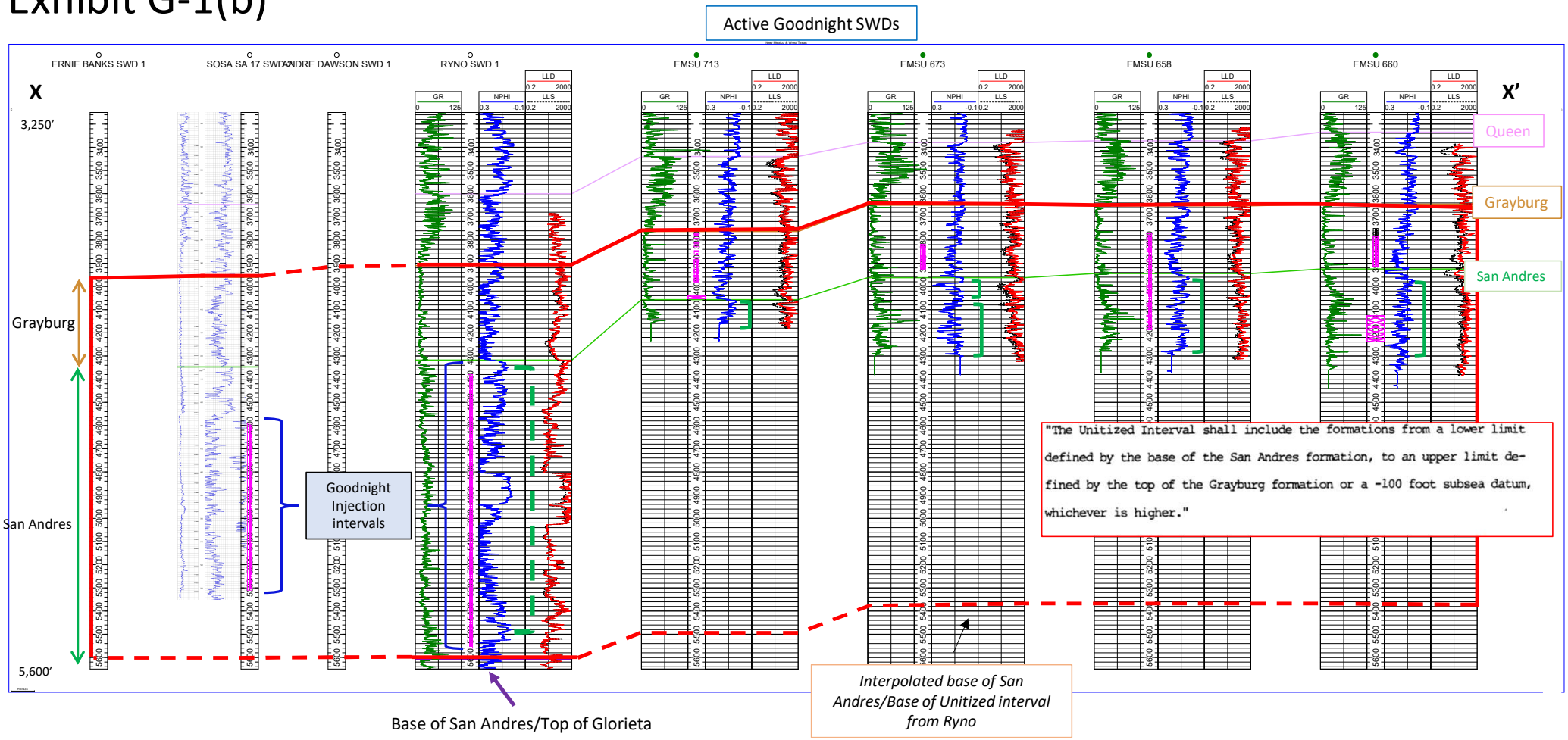
Top San Andres Structure displaying all wells in surrounding area around Eunice & Goodnights Active SWD wells and current pending applications



KEY POINTS

- There is a structural closure in the San Andres interval in the EMSU
- The disposal of water at high rates damages the reservoir and inhibits proper development of our **Unitized Interval**
- Oil in core shows that there is oil down to -750' ss at the EMSU

Exhibit G-1(b)



Perfs

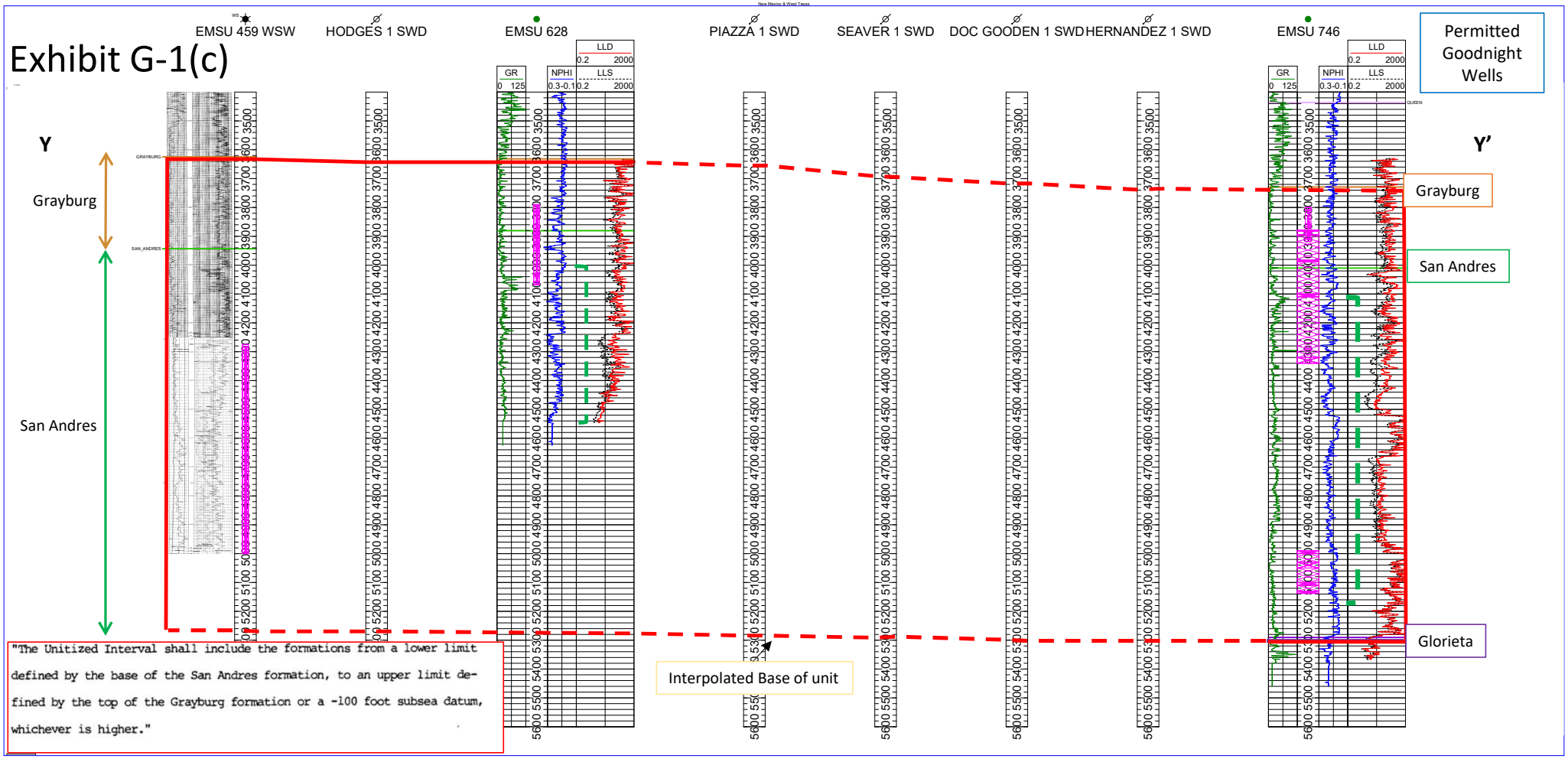
Unitized interval

Oil Saturated Residual Oil Zone

KEY POINTS

- Per the approved unitized agreement with the NMOCD our unit interval consists of the Grayburg and San Andres in their entirety
- There is oil saturation present across all of the EMSU, with some wells being tested and having produced oil from the San Andres
- The disposal of water into the San Andres therefore is damaging Empire's hydrocarbon reserves and violating their correlative rights

Exhibit G-1(c)



Unitized interval

Oil Saturated Residual Oil Zone

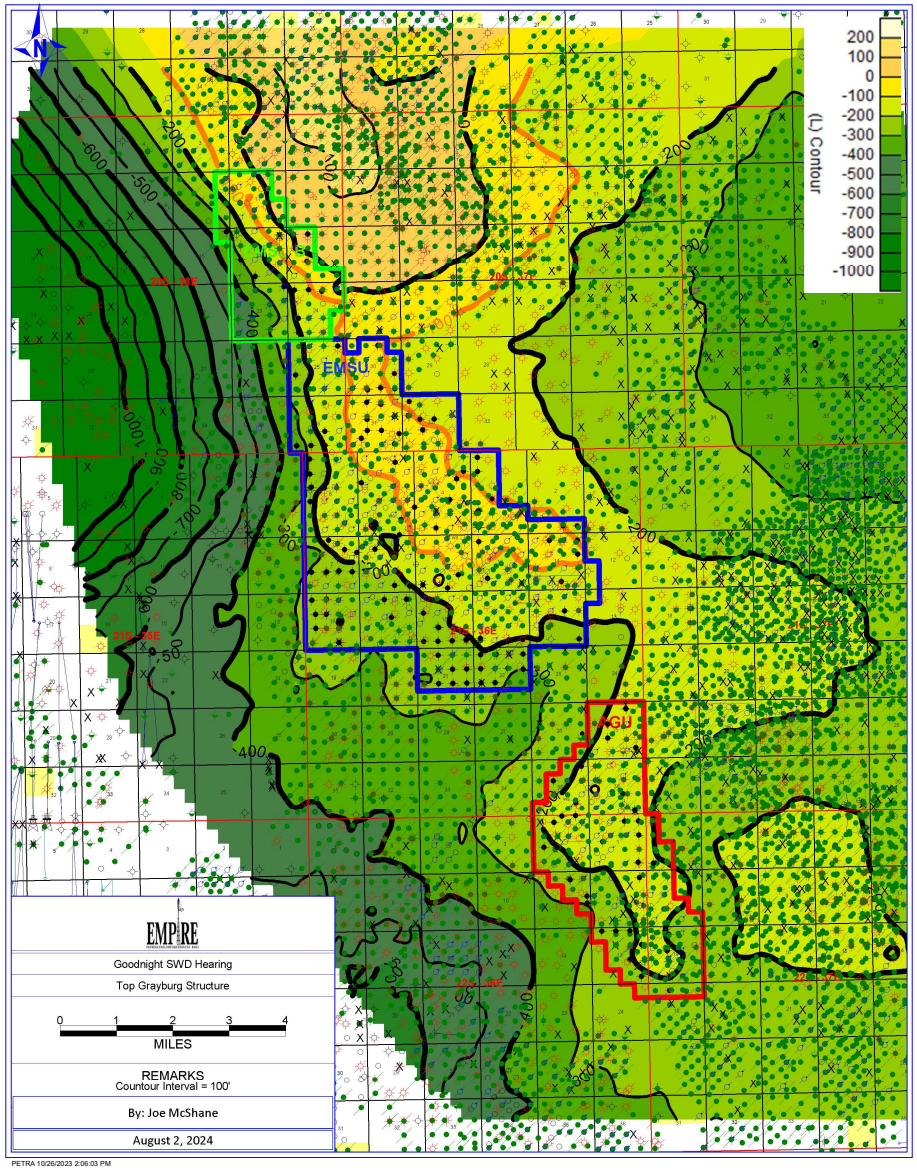
Perfs

KEY POINTS

- Per the approved unitized agreement with the NMOCD our unit interval consists of the Grayburg and San Andres in their entirety
- There is oil saturation present across all of the EMSU, with some wells being tested and having produced oil from the San Andres
- The disposal of water into the San Andres therefore is damaging Empire's hydrocarbon reserves and violating their correlative rights

Exhibit G-2(a)

Top Grayburg Structure

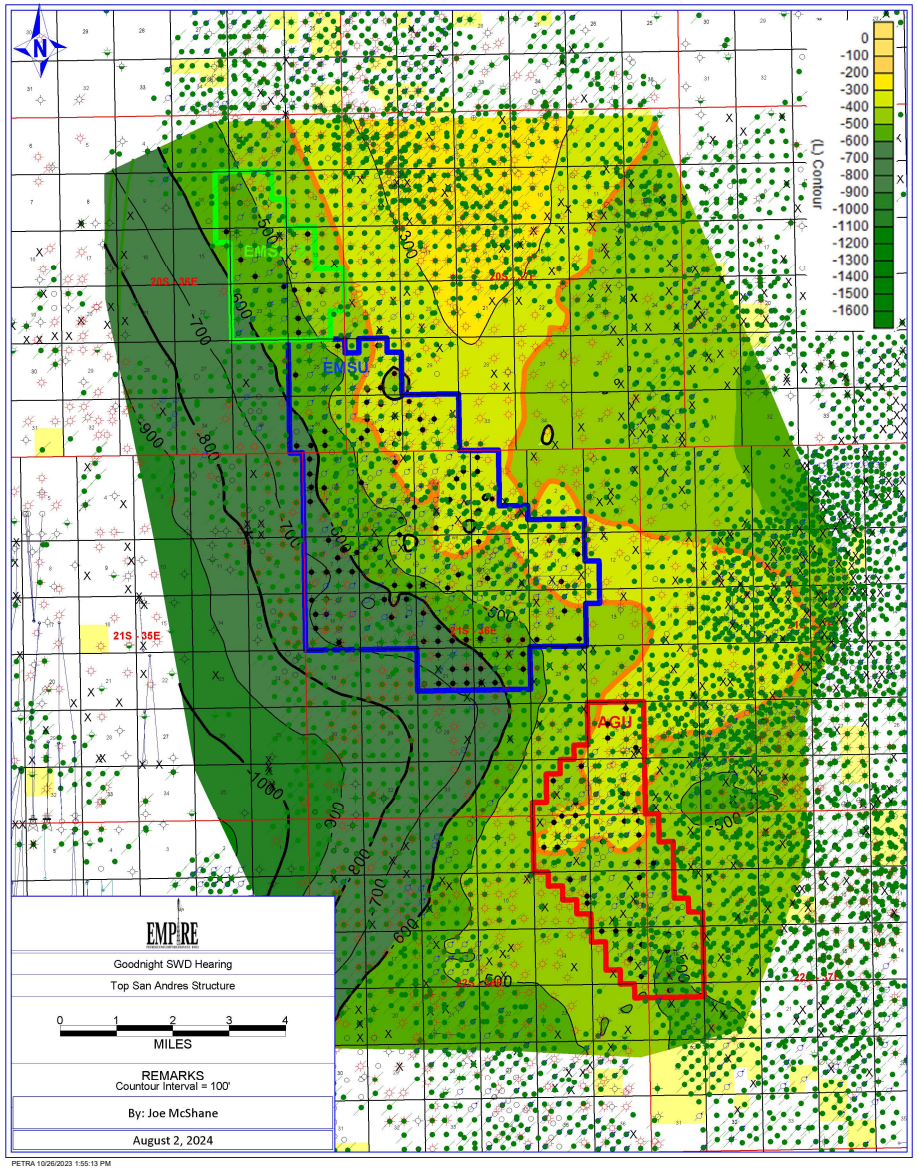


KEY POINTS

- There is a structural closure in the Grayburg interval in the EMSU
- The disposal of water at high rates into the San Andres damages existing waterflood operations in the Grayburg
- No third-party disposal should be allowed inside of the unitized interval as it damages oil and gas production

Exhibit G-2(b)

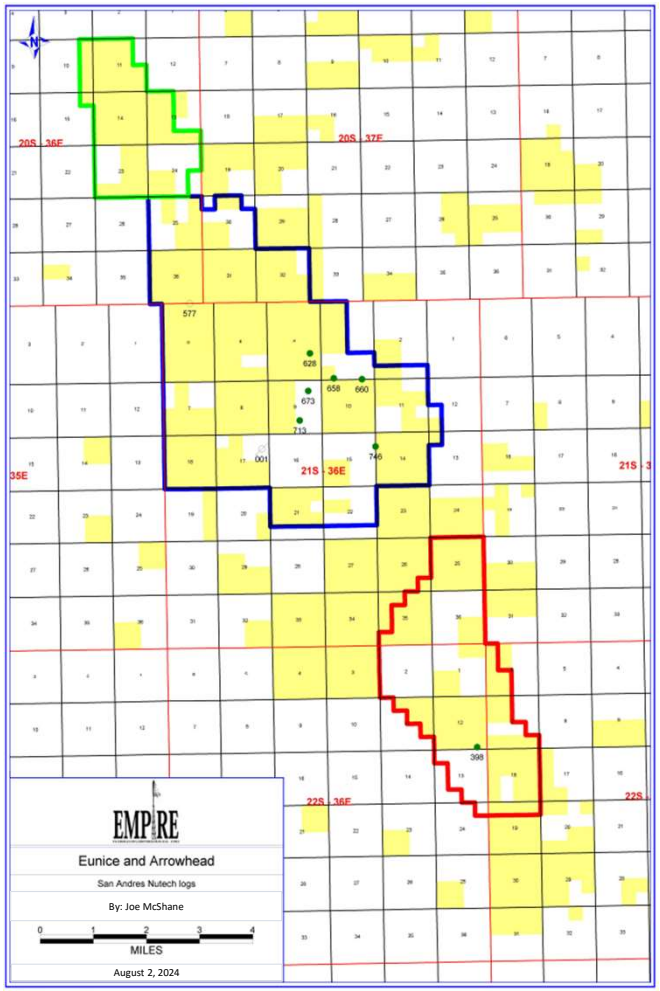
Top San Andres Structure



KEY POINTS

- There is a structural closure in the San Andres interval in the EMSU
- The disposal of water at high rates damages the reservoir and inhibits proper development of our **Unitized Interval**
- Oil in core shows that there is oil down to -750' ss at the EMSU

Exhibit G-3(a) - Nutech log analysis – 7 wells covering the San Andres



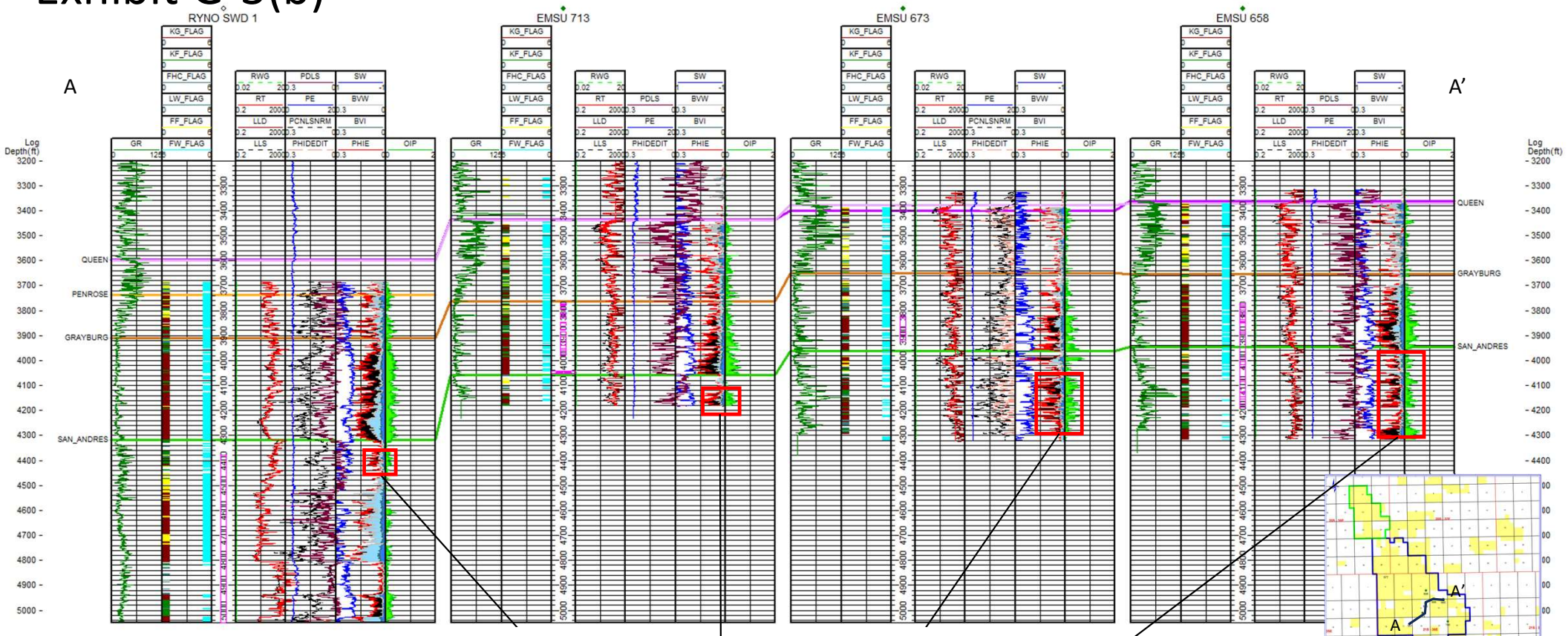
- There were 9 legacy interpreted logs done by Nutech and of those 7 covered some portion of the San Andres reservoir within the Eunice Monument South Unit

- 4 of these were performed recently on 2005 vintage OH logs to evaluate the San Andres for hydrocarbons

KEY POINTS

- One of these wells was Goodnight's Ryno SWD Well
  - According to Nutech's analysis the OIP/section for the Ryno SWD is **91.5 MMBO/sec**
- The wells are aerially distributed across the EMSU representing both down-dip and up-dip reservoir and prove hydrocarbon presence throughout the structure of the EMSU
- On average the wells cover greater than 200 feet of the San Andres reservoir with two (Ryno SWD and EMSU 746) covering over 1000 ft.
- Oil in place volumes were calculated on a per 640 section basis and range from 13 MMBO/sec to 174.5 MMBO/sec

Exhibit G-3(b)

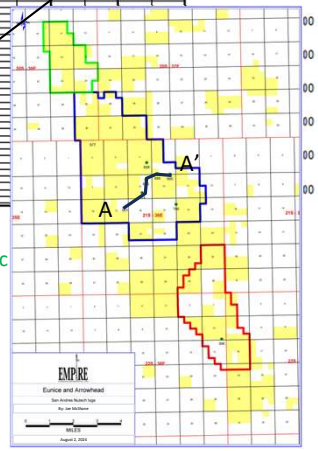


Ryno SWD 1
OIP: 91.5 MMBO/sec
*HydroPorFt: 24

EMSU 713
OIP: 13.6 MMBO/sec
*HydroPorFt: 3.6

EMSU 673
OIP: 61.1 MMBO/sec
*HydroPorFt: 16

EMSU 658
OIP: 60.9 MMBO/sec
*HydroPorFt: 15.9

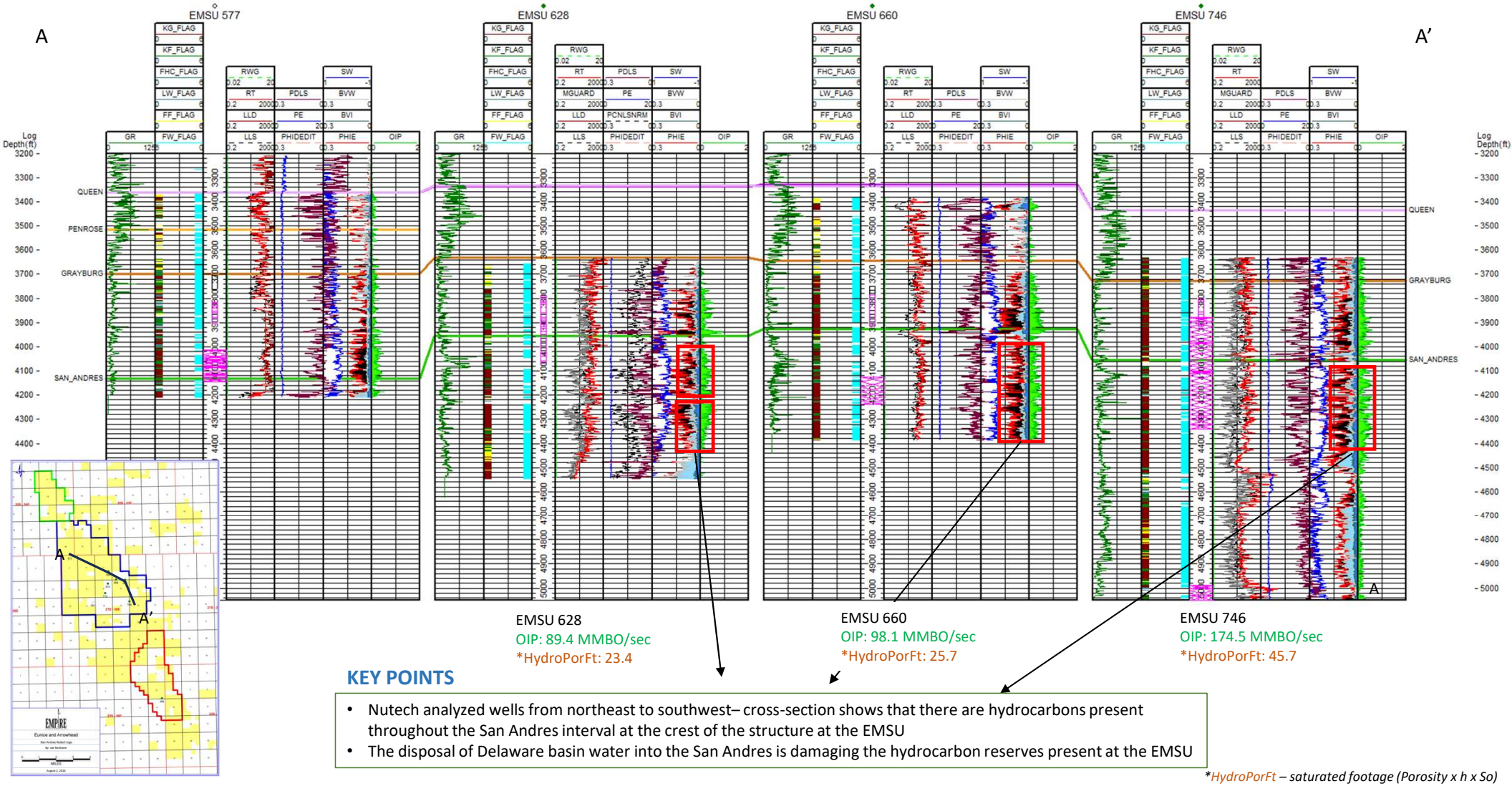


KEY POINTS

- Nutech analyzed wells from west to east – cross-section shows that there are hydrocarbons present throughout the San Andres interval from the down-dip most western edge to the up-dip most eastern edge of the EMSU
- The disposal of Delaware basin water into the San Andres is damaging the hydrocarbon reserves present at the EMSU

**HydroPorFt* – *saturated footage (Porosity x h x So)*

Exhibit G-3(c)

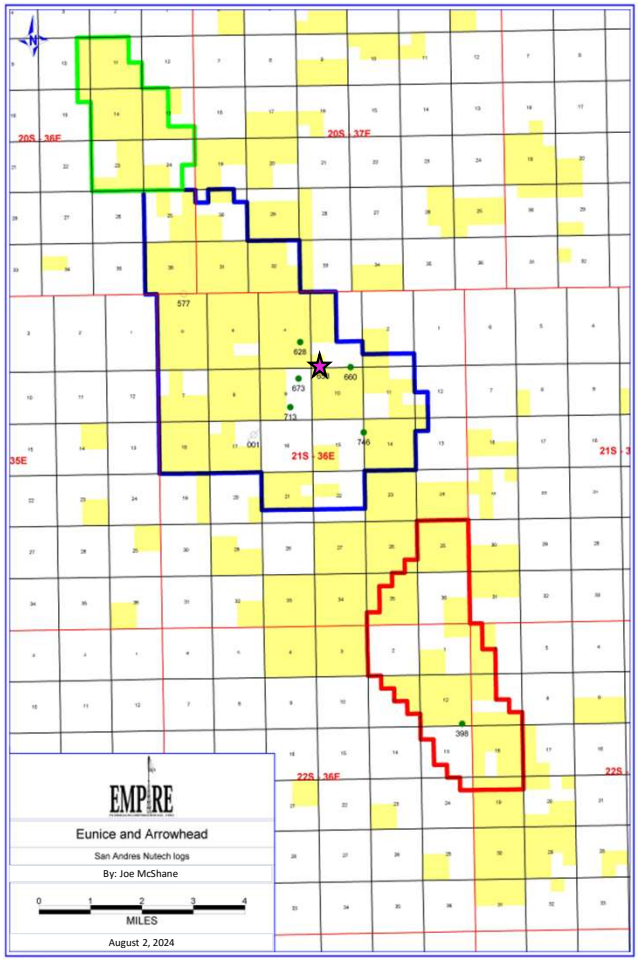


KEY POINTS

- Nutech analyzed wells from northeast to southwest– cross-section shows that there are hydrocarbons present throughout the San Andres interval at the crest of the structure at the EMSU
- The disposal of Delaware basin water into the San Andres is damaging the hydrocarbon reserves present at the EMSU

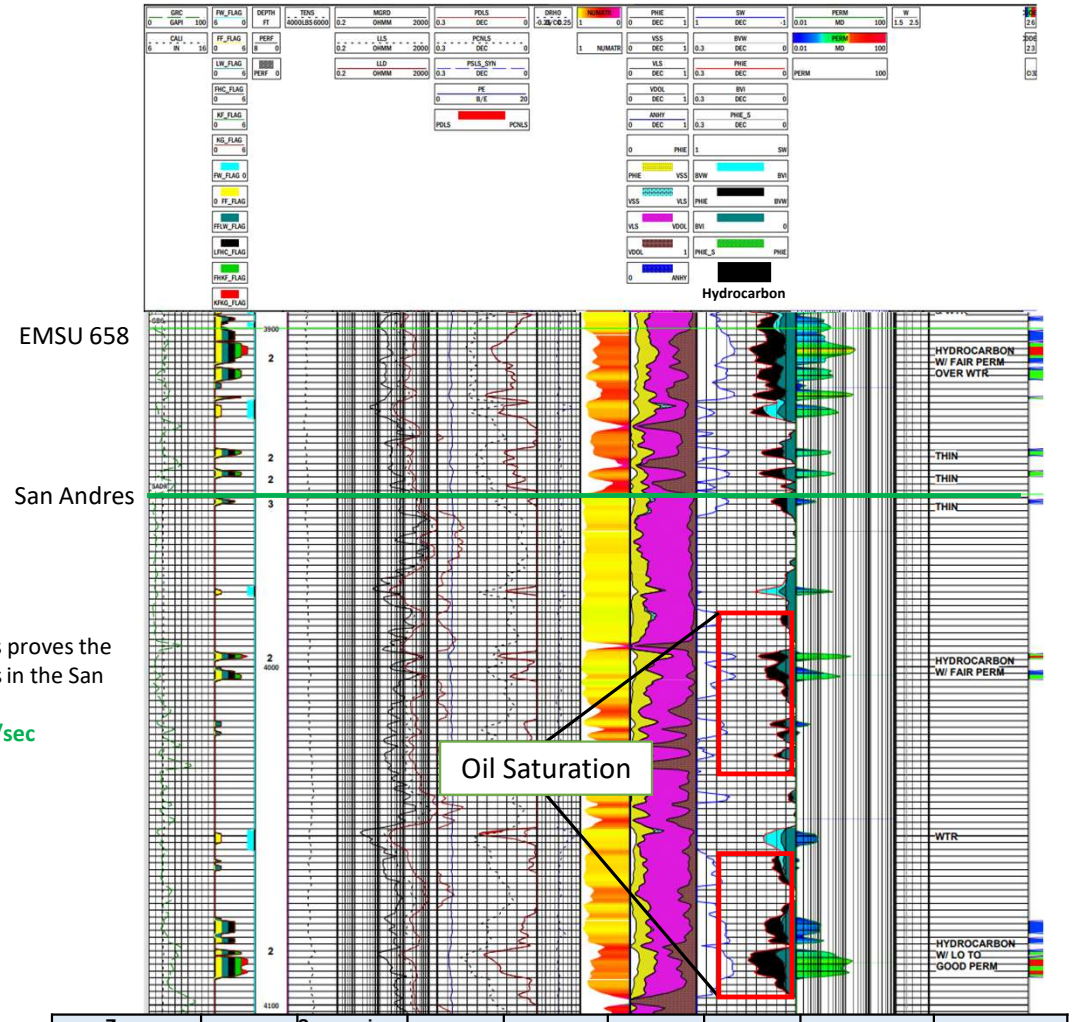
**HydroPorFt* – *saturated footage (Porosity x h x So)*

Nutech analysis of San Andres EMSU
Exhibit G-3(d)



KEY POINTS

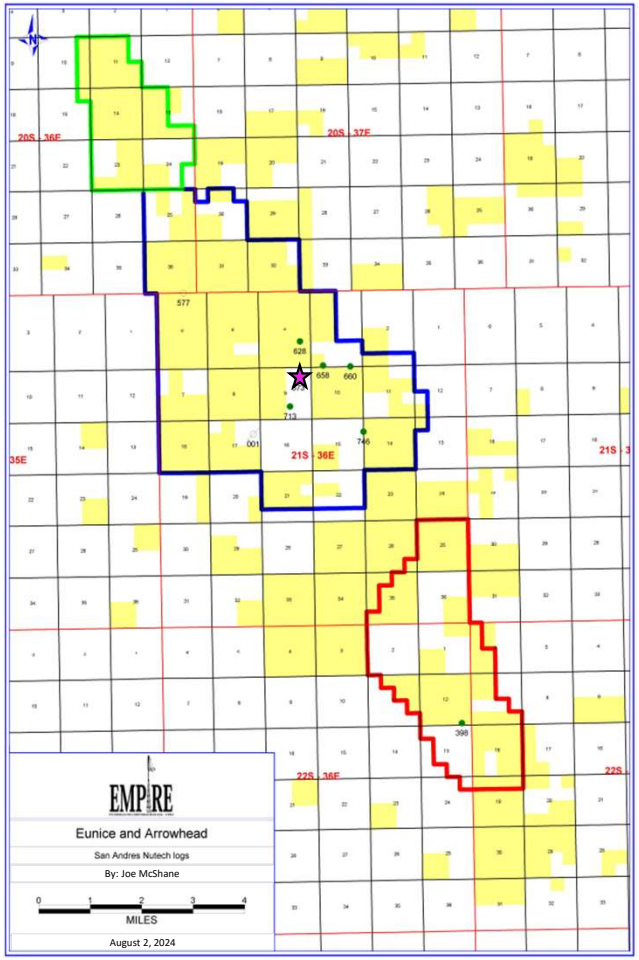
- The petrophysical analysis proves the presence of hydrocarbons in the San Andres interval
- **EMSU 658 – 60.9 MMBO/sec**



Zone		Summaries						
DEPTH	GROSSFT	PAYFT	PHIE	SW	NUPERM	HydPorFT	NUPERMFT	OIP
FT			DEC	DEC	MD	POR-FT	MD-FT	MMBO/sec
-----	-----	-----	-----	-----	-----	-----	-----	-----
SAN_ANDRES	371	208	0.072	0.505	1.121	15.947	415.965	60.906
-----	-----	-----	-----	-----	-----	-----	-----	-----
	TOT	TOT	AVGX	AVGX	AVGX	CUM	CUM	CUM

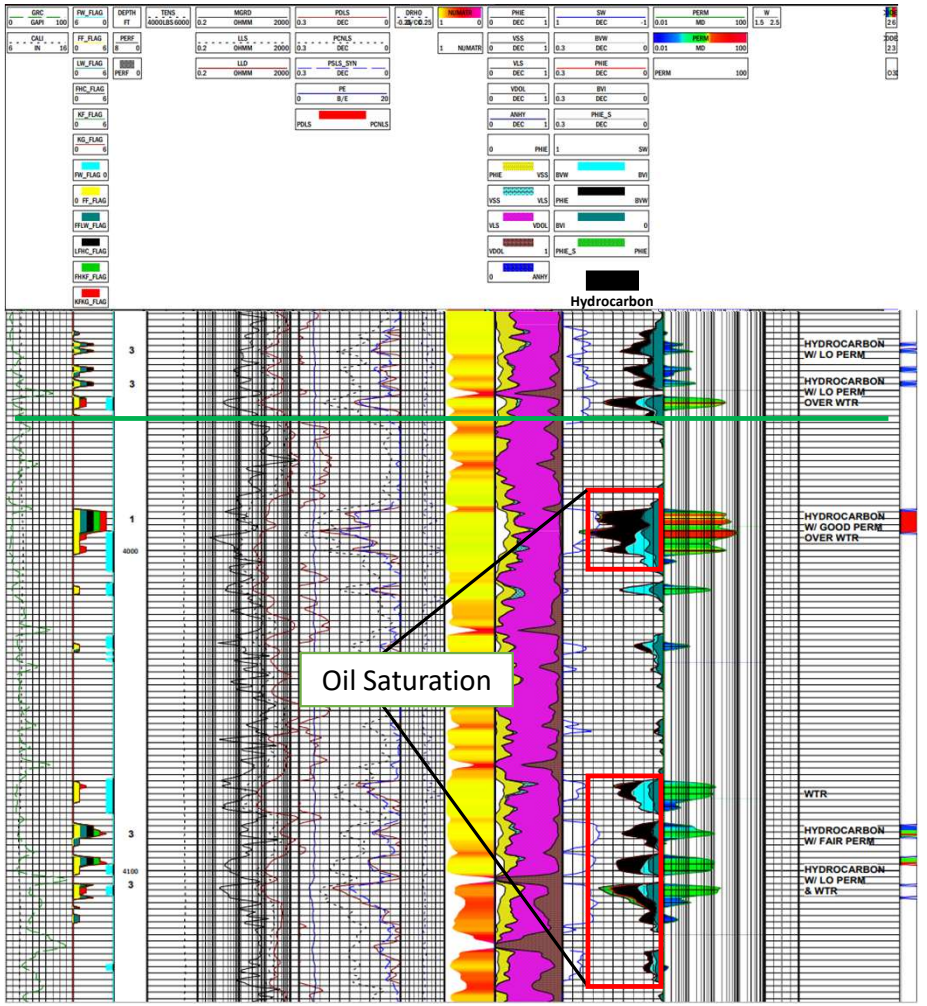
Nutech analysis of San Andres EMSU

Exhibit G-3(e)



EMSU 673

San Andres



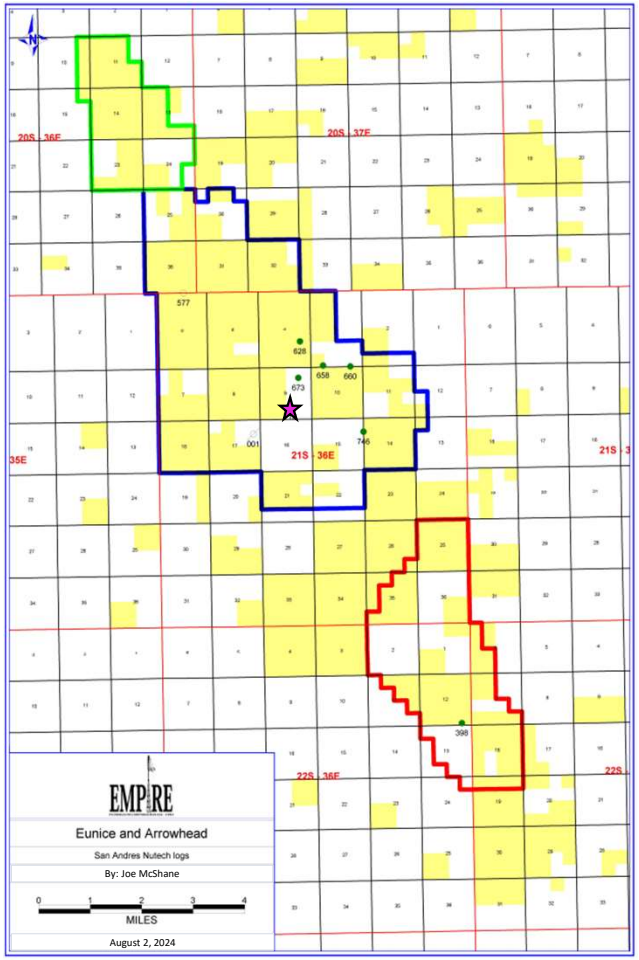
KEY POINTS

- The petrophysical analysis proves the presence of hydrocarbons in the San Andres interval
- **EMSU 673 – 61.1 MMBO/sec**

Zone		Summaries						
DEPTH	GROSSFT	PAYFT	PHIE	SW	NUPERM	HydPorFT	NUPERMFT	OIP
FT			DEC	DEC	MD	POR-FT	MD-FT	MMBO/sec
SAN_ANDRES	362	174	0.074	0.546	2.666	15.996	964.938	61.098
	TOT	TOT	AVGX	AVGX	AVGX	CUM	CUM	CUM

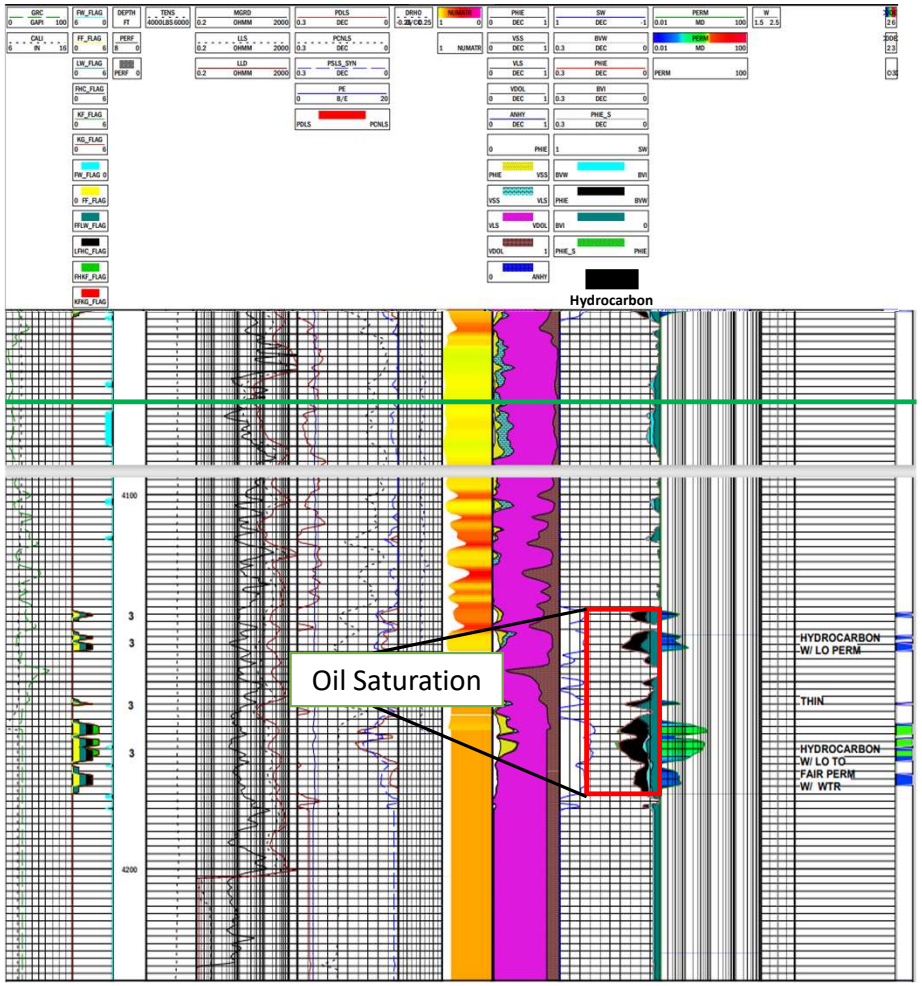
Nutech analysis of San Andres EMSU

Exhibit G-3(f)



EMSU 713

San Andres



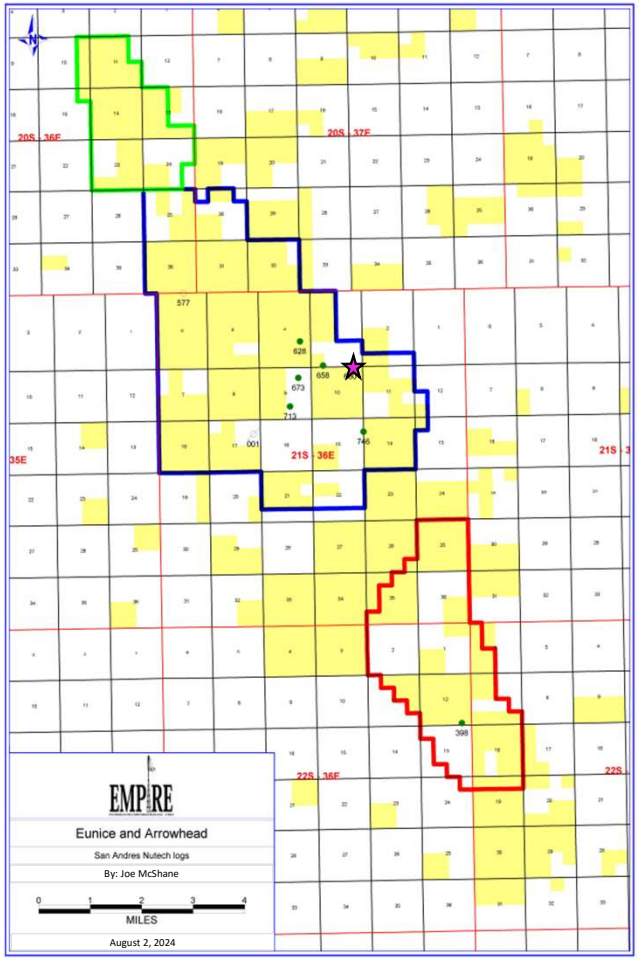
KEY POINTS

- The petrophysical analysis proves the presence of hydrocarbons in the San Andres interval
- **EMSU 713 – 13.7 MMBO/sec**

Zone		Summaries						
DEPTH	GROSSFT	PAYFT	PHIE	SW	NUPERM	HydPorFT	NUPERMFT	OIP
FT			DEC	DEC	MD	POR-FT	MD-FT	MMBO/sec
SAN_ANDRES	125	45	0.057	0.665	0.451	3.575	56.403	13.653
	TOT	TOT	AVGX	AVGX	AVGX	CUM	CUM	CUM

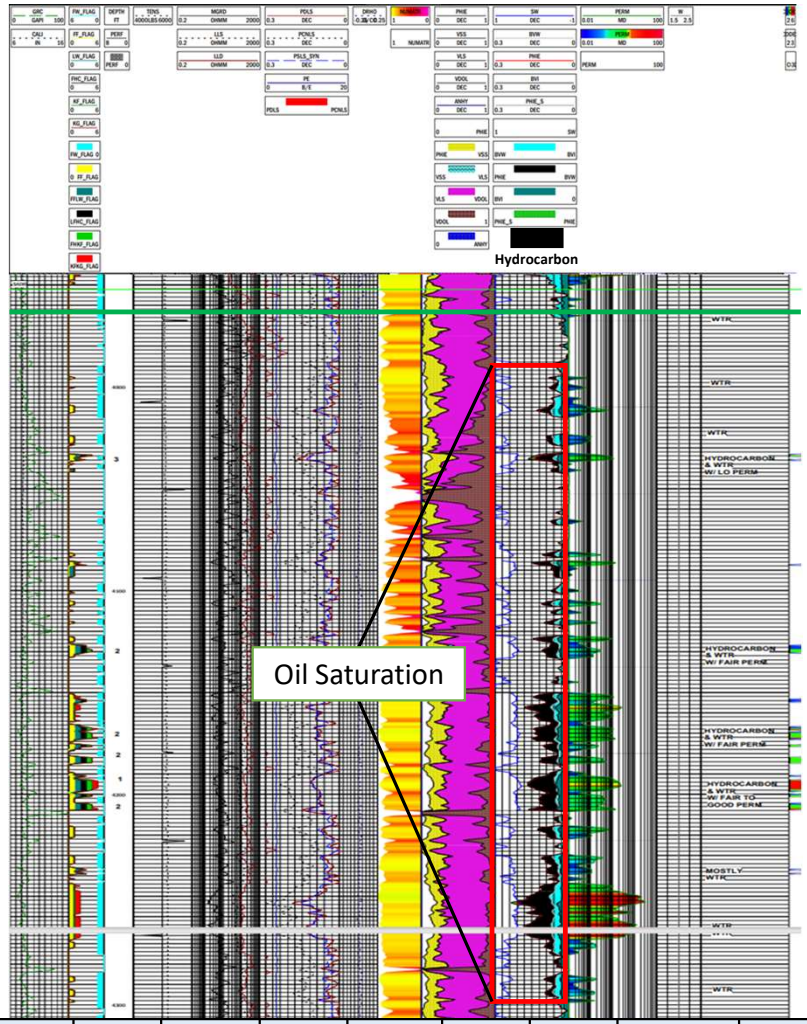
Nutech analysis of San Andres EMSU

Exhibit G-3(g)



EMSU 660

San Andres



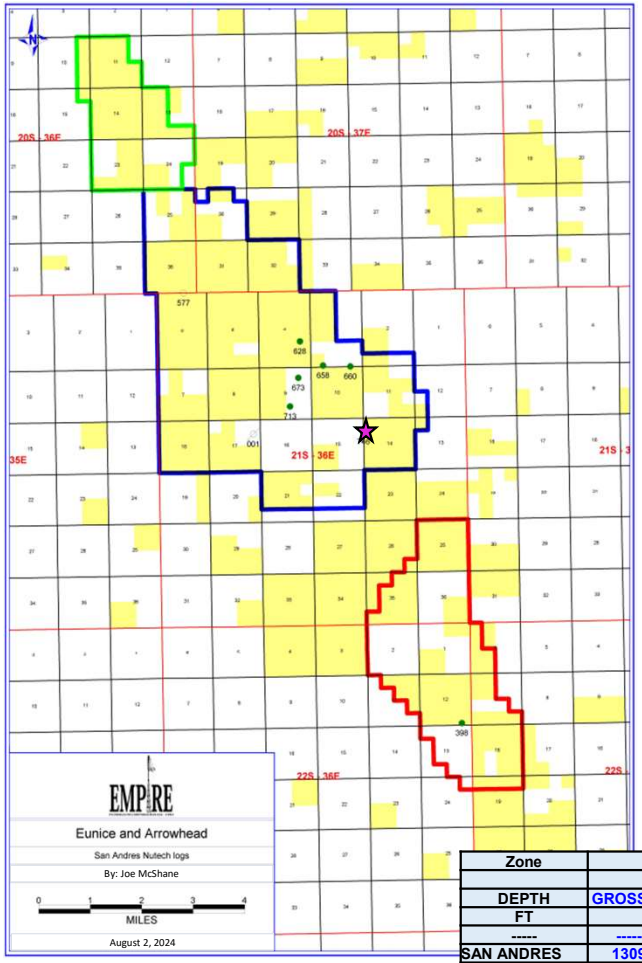
KEY POINTS

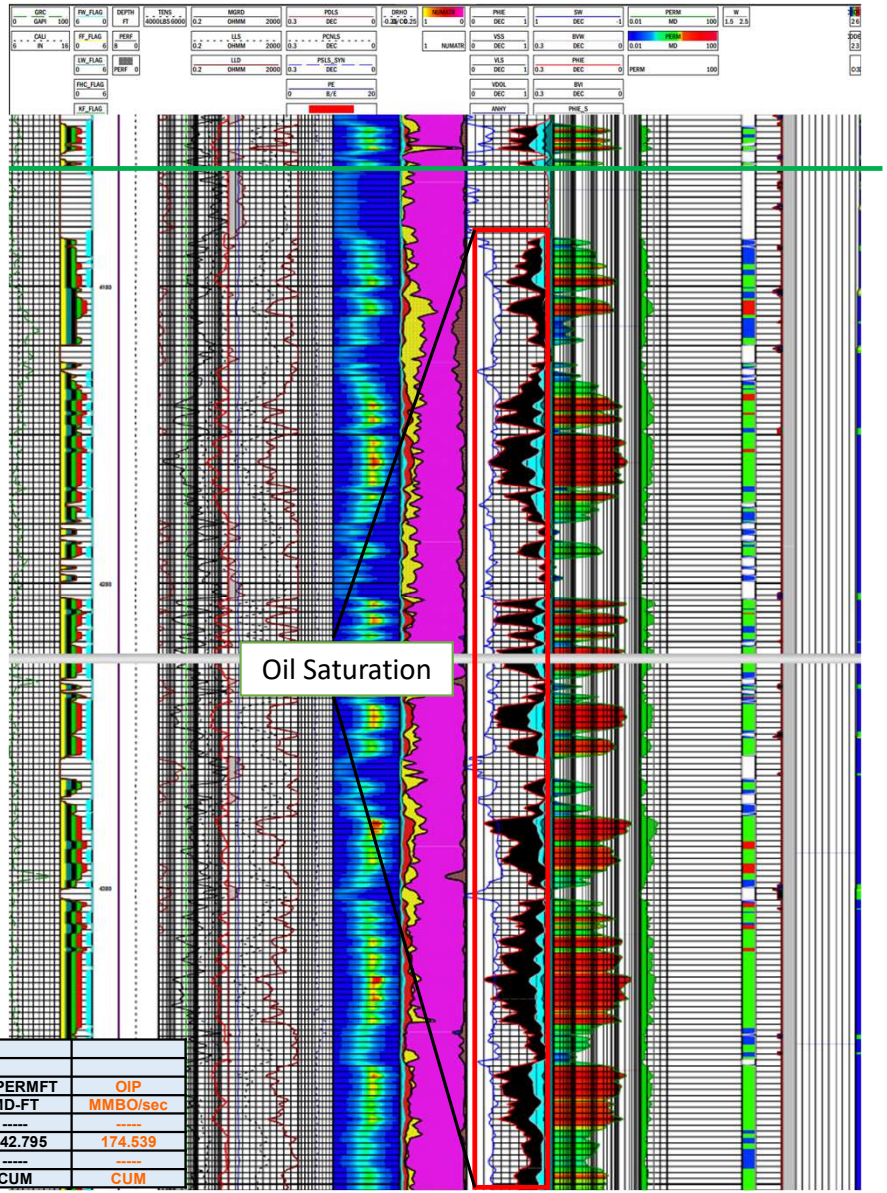
- The petrophysical analysis proves the presence of hydrocarbons in the San Andres interval
- **EMSU 660 – 98.2 MMBO/sec**

Zone		Summaries						
DEPTH	GROSSFT	PAYFT	PHIE	SW	NUPERM	HydPorFT	NUPERMFT	OIP
FT			DEC	DEC	MD	POR-FT	MD-FT	MMBO/sec
-----	-----	-----	-----	-----	-----	-----	-----	-----
SAN_ANDRES	431	338	0.096	0.431	1.846	25.704	795.636	98.175
-----	-----	-----	-----	-----	-----	-----	-----	-----
	TOT	TOT	AVGX	AVGX	AVGX	CUM	CUM	CUM

Nutech analysis of San Andres EMSU

Exhibit G-3(h)





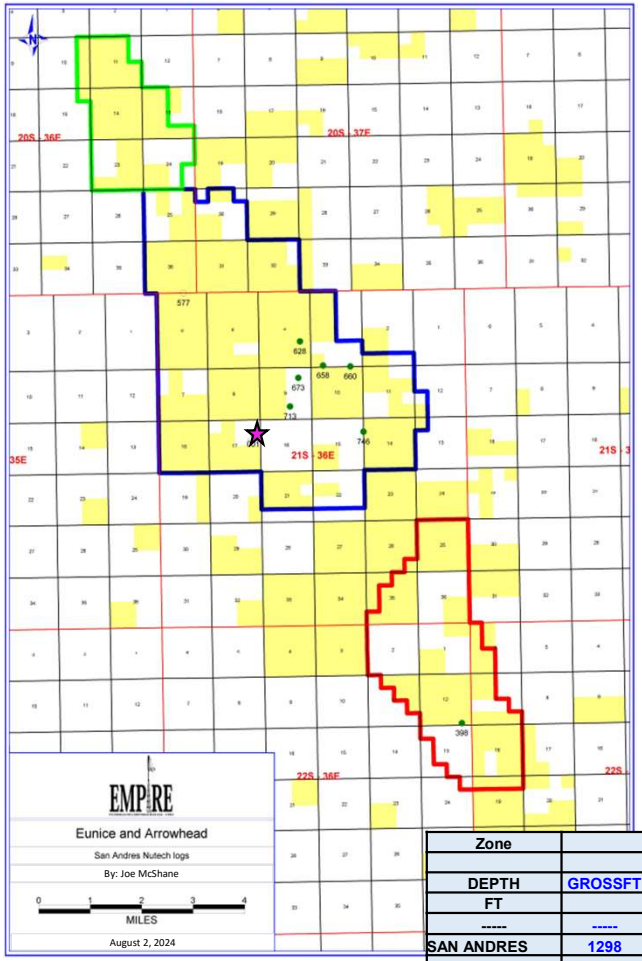
KEY POINTS

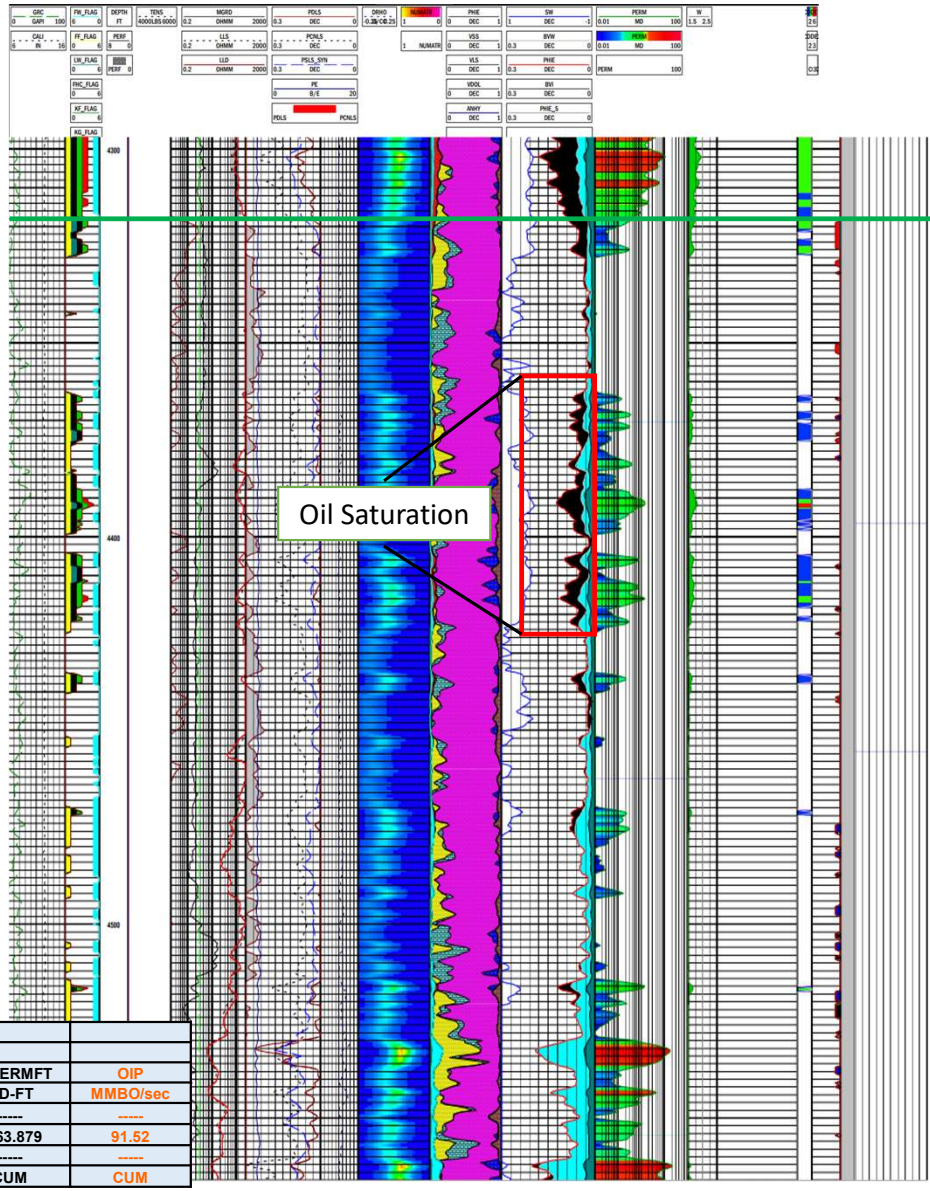
- The petrophysical analysis proves the presence of hydrocarbons in the San Andres interval
- **EMSU 746 – 174.5 MMBO/sec**

Zone		Summaries						
DEPTH	GROSSFT	PAYFT	PHIE	SW	NUPERM	HydPorFT	NUPERMFT	OIP
FT			DEC	DEC	MD	POR-FT	MD-FT	MMBO/sec
-----	-----	-----	-----	-----	-----	-----	-----	-----
SAN ANDRES	1309	530	0.086	0.639	2.095	45.7	2742.795	174.539
-----	-----	-----	-----	-----	-----	-----	-----	-----
	TOT	TOT	AVGX	AVGX	AVGX	CUM	CUM	CUM

Nutech analysis of San Andres EMSU

Exhibit G-3(i)





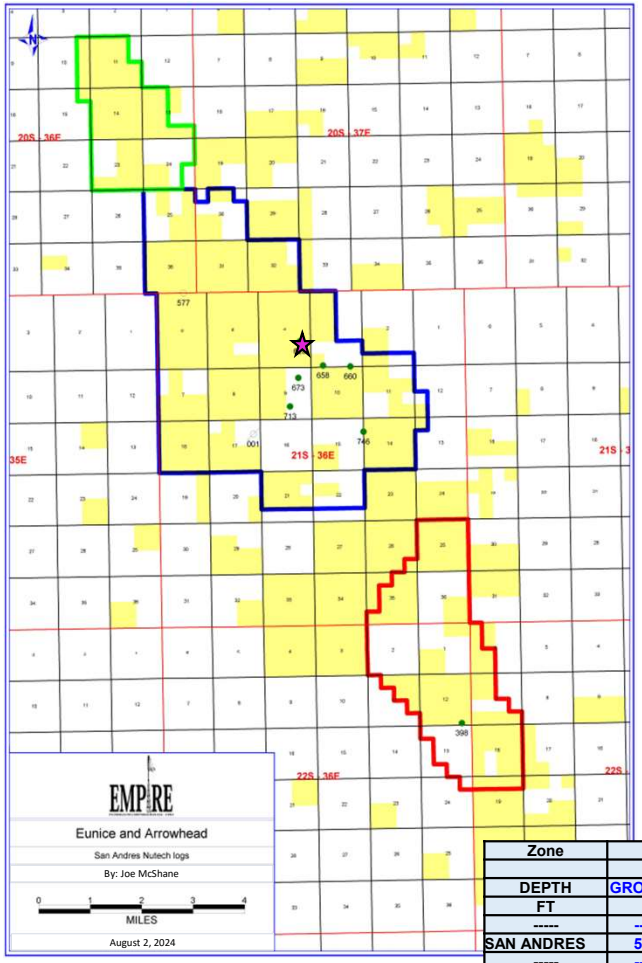
KEY POINTS

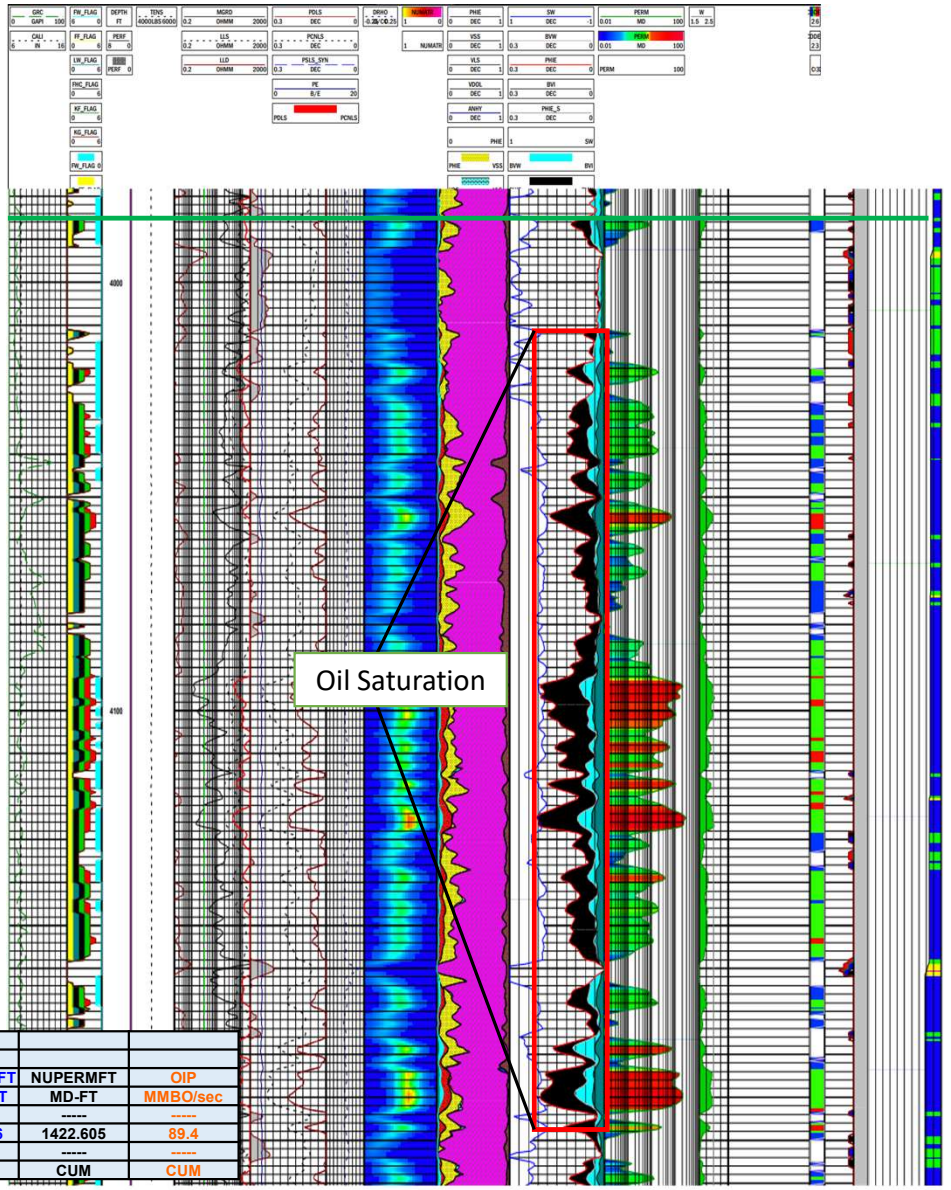
- The petrophysical analysis proves the presence of hydrocarbons in the San Andres interval
- **Ryno SWD – 91.5 MMBO/sec**

Zone		Summaries						
DEPTH	GROSSFT	PAYFT	PHIE	SW	NUPERM	HydPorFT	NUPERMFT	OIP
FT			DEC	DEC	MD	POR-FT	MD-FT	MMBO/sec
-----	-----	-----	-----	-----	-----	-----	-----	-----
SAN ANDRES	1298	191	0.090	0.780	1.808	24.029	2763.879	91.52
-----	-----	-----	-----	-----	-----	-----	-----	-----
	TOT	TOT	AVGX	AVGX	AVGX	CUM	CUM	CUM

Nutech analysis of San Andres EMSU

Exhibit G-3(j)





KEY POINTS

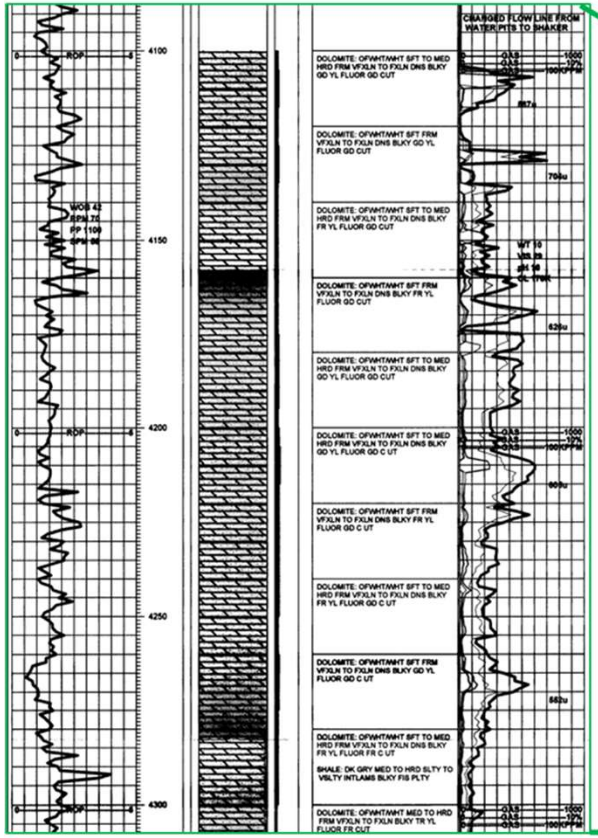
- The petrophysical analysis proves the presence of hydrocarbons in the San Andres interval
- **EMSU 628 – 89.4 MMBO/sec**

Zone		Summaries						
DEPTH	GROSSFT	PAYFT	PHIE	SW	NUPERM	HydPorFT	NUPERMFT	OIP
FT			DEC	DEC	MD	POR-FT	MD-FT	MMBO/sec
SAN ANDRES	562	283	0.095	0.604	2.531	23.406	1422.605	89.4
	TOT	TOT	AVGX	AVGX	AVGX	CUM	CUM	CUM

Exhibit G-4 –Proof of Residual Oil Zone within the San Andres Reservoir

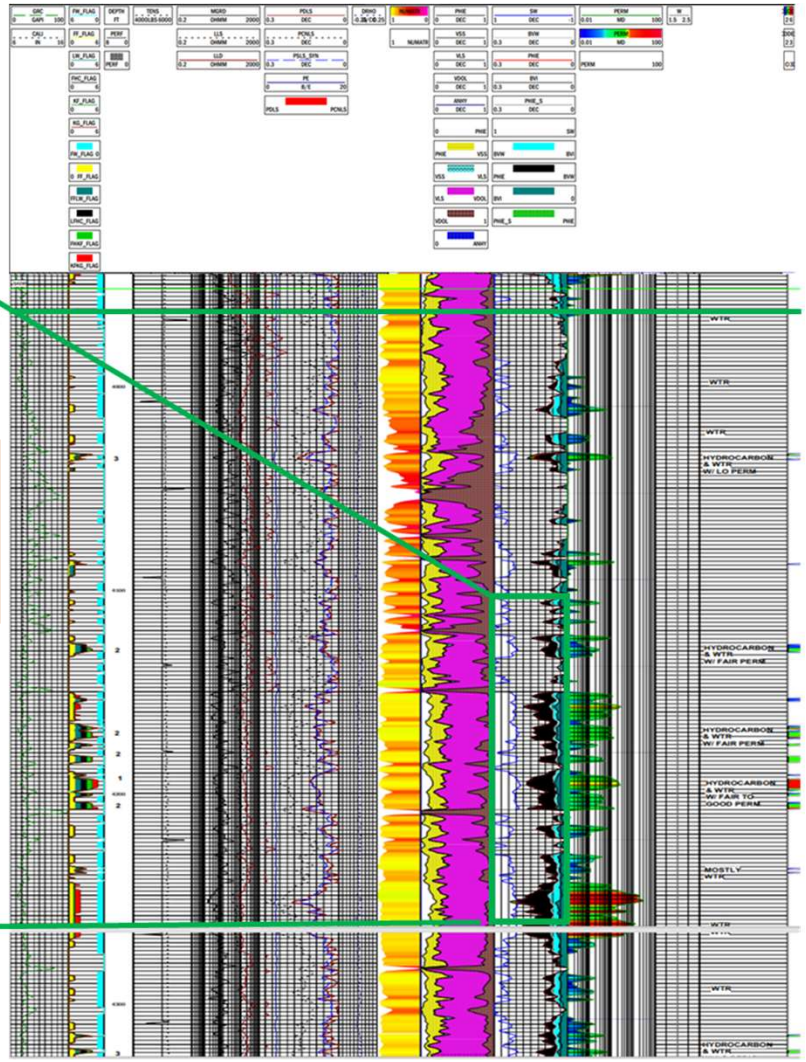
KEY POINTS

- Multiple mudlogs were run at the EMSU all showing indications of a Residual Oil Zone in the San Andres
- As an example, the EMSU 660 has a 200’ interval of yellow fluorescence with good cut within the San Andres interval



EMSU 660

San Andres

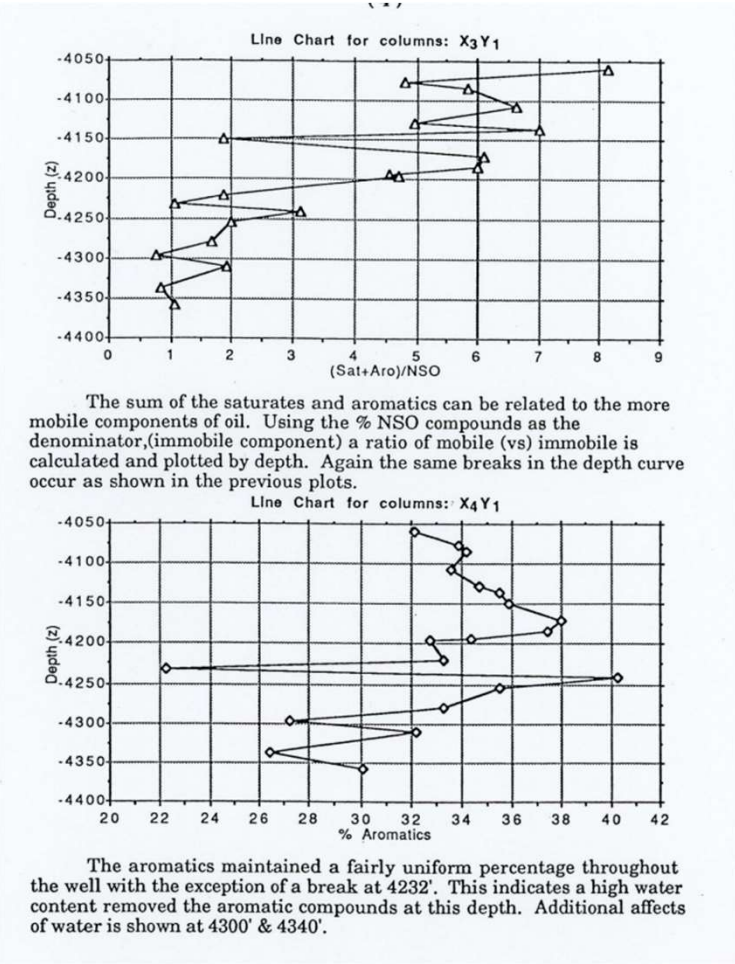


“This will result in the “Dull” as opposed to “Bright” fluorescence. This is, however, still an indicator of the presence of an ROZ.” [2]

[2]Trentham, Robert C., Melzer, Stephen, Vance, David B., Kuuskraa, Vello, Petrusak, Robin. “Idenitfying and developing technology for enabling small producers to puruse the residul oil zone(ROZ) fairways in the Permian Basin San Andres.” RPSEA, University of Texas, 2015.

Exhibit G-5 - Geochemical Evidence of a Residual Oil Zone in the San Andres

"A Fourier transform ion cyclotron resonance (FT-ICR) study, which zoomed into the heavier components, revealed that paleo oil has less aromaticity than MPZ oil and lacks aromatic sulfur and disulfur compounds, a negligible amount of nitrogen compounds, and no resin-type components." [1]



The sum of the saturates and aromatics can be related to the more mobile components of oil. Using the % NSO compounds as the denominator,(immobile component) a ratio of mobile (vs) immobile is calculated and plotted by depth. Again the same breaks in the depth curve occur as shown in the previous plots.

The aromatics maintained a fairly uniform percentage throughout the well with the exception of a break at 4232'. This indicates a high water content removed the aromatic compounds at this depth. Additional affects of water is shown at 4300' & 4340'.

KEY POINTS

- The core study done on the EMSU 679 indicates the presence of a residual oil zone in the San Andres
- Aromatic compounds decrease as a result of Mother Nature's waterflood
- Mobile vs Immobile profile shows oil in the core down to -720'

[1] Aleidan, Ahmed , Kwak, Hyung , Muller, Hendrik , and Xianmin Zhou. "Residual-Oil Zone: Paleo-Oil Characterization and Fundamental Analysis." *SPE Res Eval & Eng* 20 (2017): 260–268. doi: https://doi.org/10.2118/179545-PA

Exhibit G-6 – EMSU 200H Landing Zone

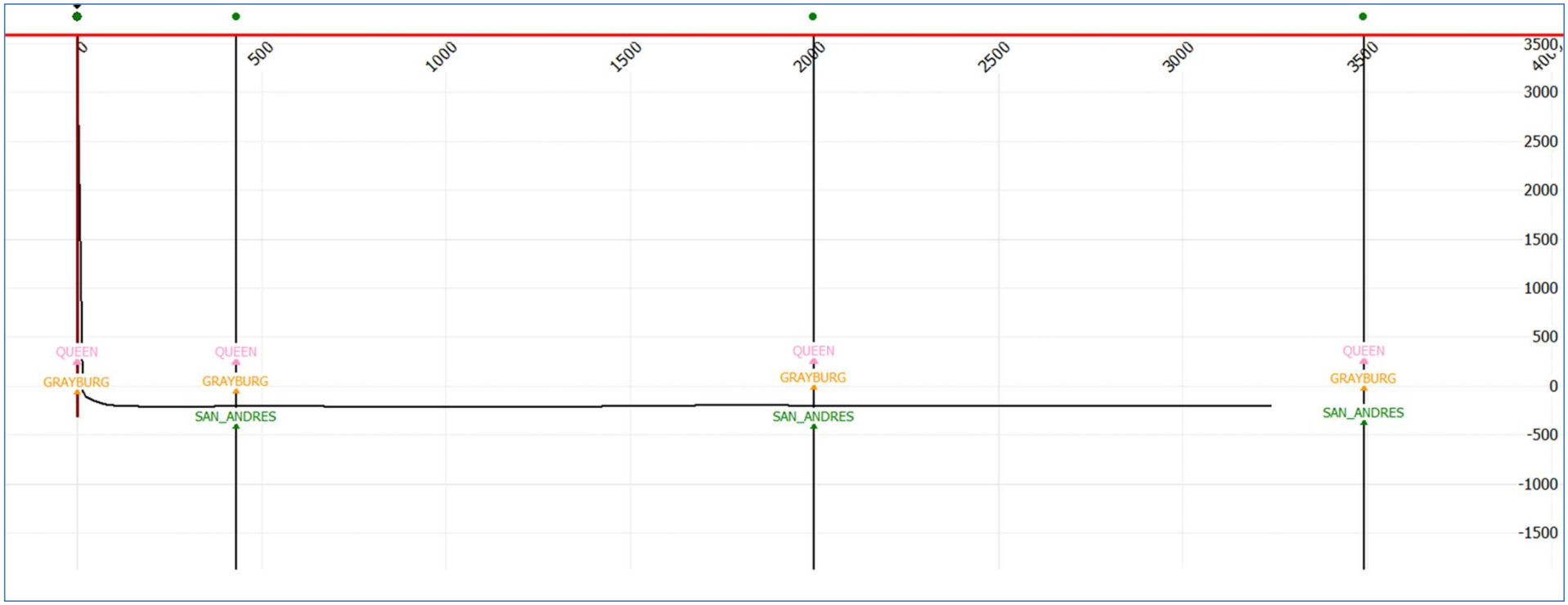


Exhibit G-7(a)

KEY POINTS

- Due to lateral facies changes across the EMSU, there is not a consistent barrier between the San Andres and Grayburg reservoirs
- There are proven examples of communication throughout the field
- Basal blocks moved post deposition causing fractures to form creating pathways for fluid communication

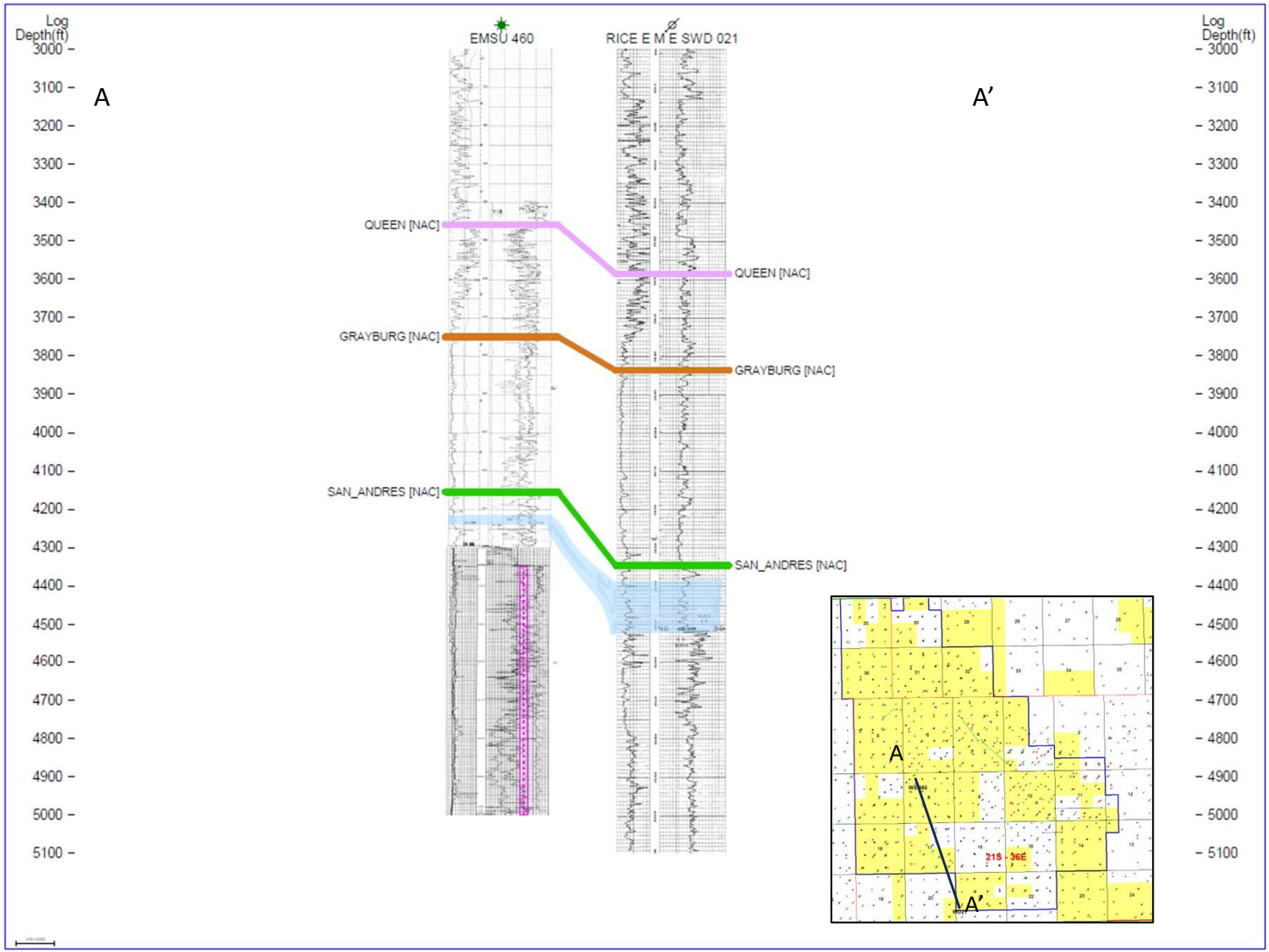
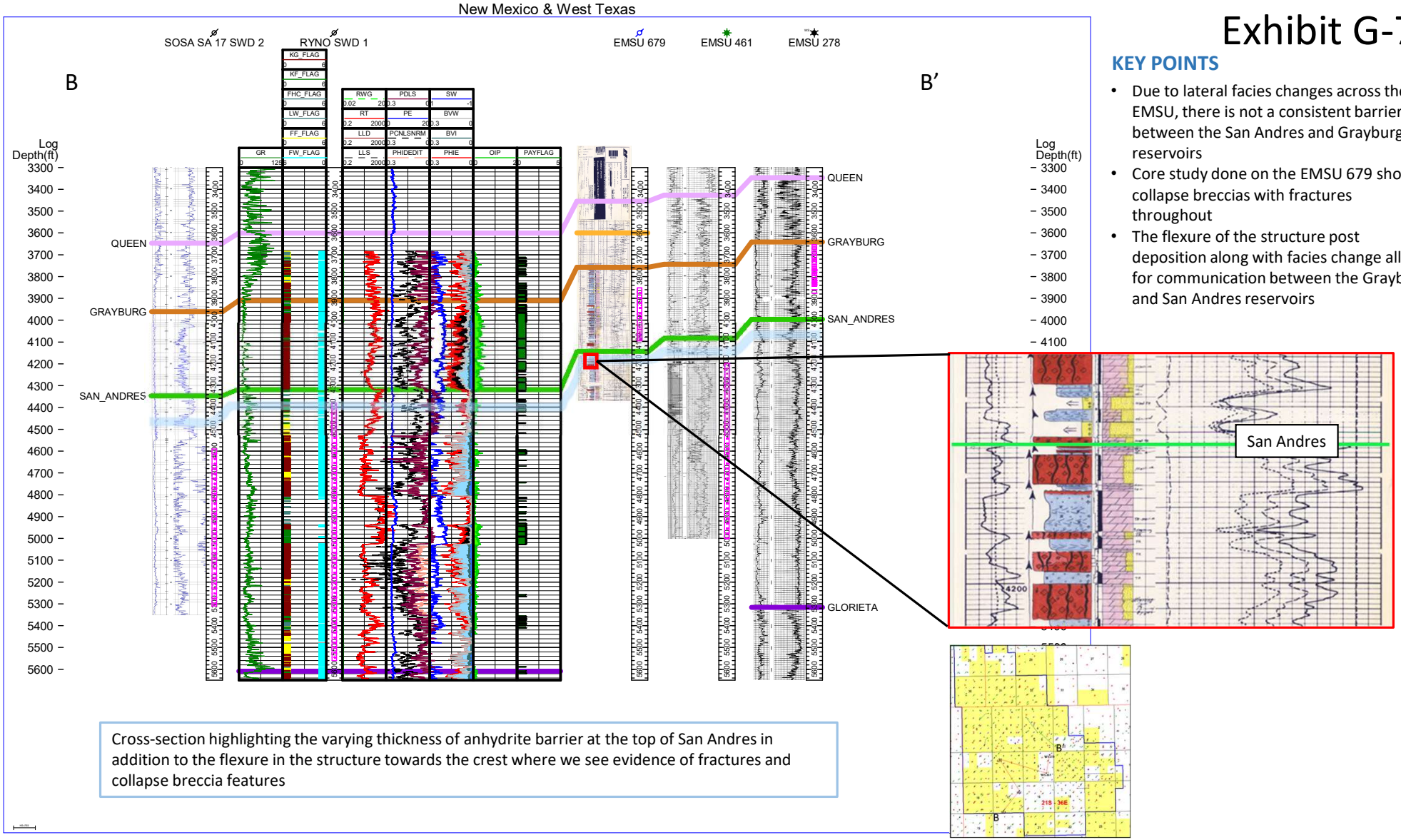


Exhibit G-7(b)

KEY POINTS

- Due to lateral facies changes across the EMSU, there is not a consistent barrier between the San Andres and Grayburg reservoirs
- Core study done on the EMSU 679 shows collapse breccias with fractures throughout
- The flexure of the structure post deposition along with facies change allows for communication between the Grayburg and San Andres reservoirs



Cross-section highlighting the varying thickness of anhydrite barrier at the top of San Andres in addition to the flexure in the structure towards the crest where we see evidence of fractures and collapse breccia features

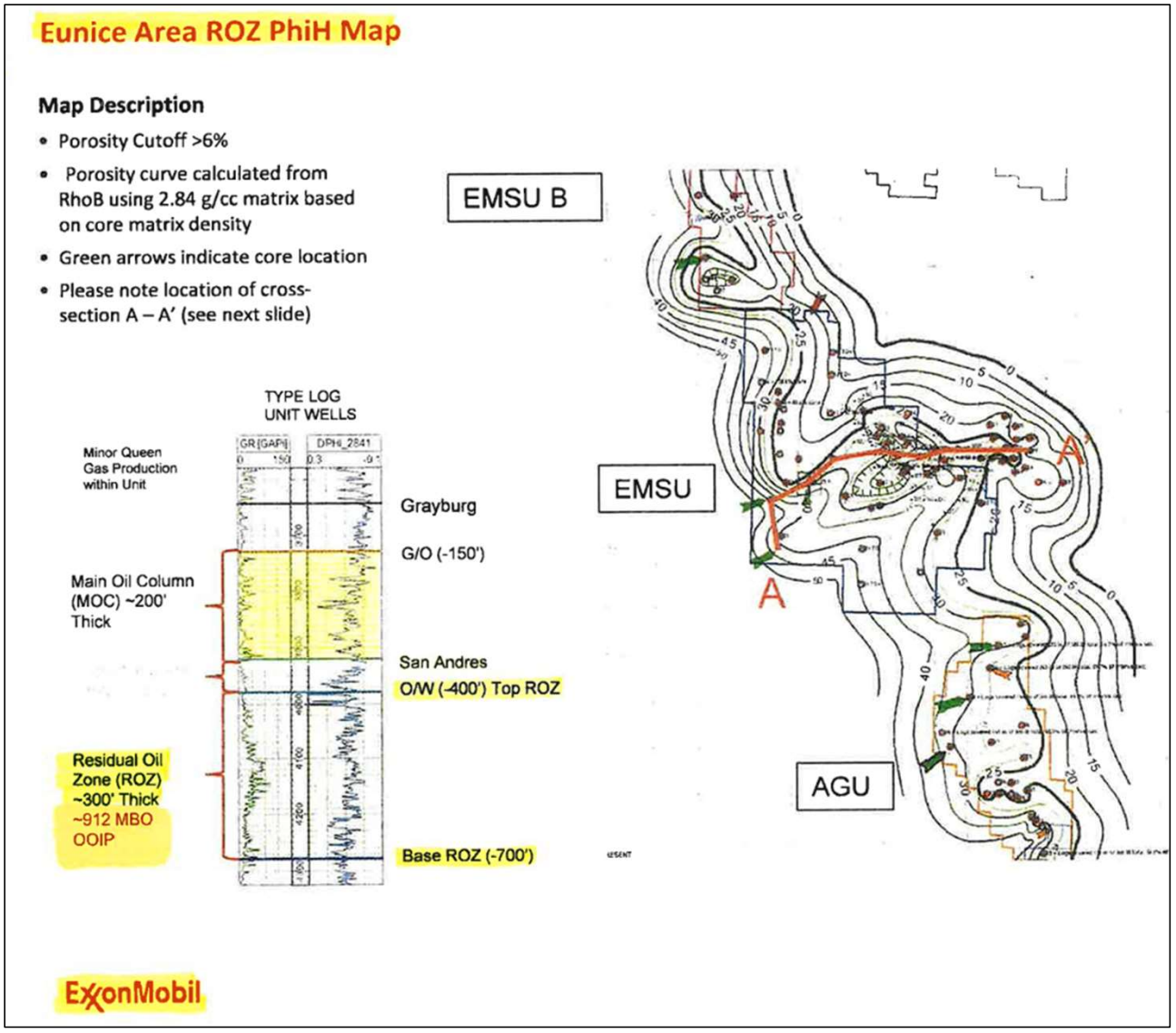


Exhibit G-8

KEY POINTS

- In ExxonMobil's 2021 sales package for EMSU, EMSU-B, and AGU, they mention the ROZ on 5 of 7 pages, with their estimates of original oil-in-place at 912 MMBO.
- Protecting this oil resource is critical to the future of EMSU, EMSU-B, and AGU and should be protected by the unitization agreement between State, Federal, and Private mineral owners.
- It will take more than 40 years to develop and produce this oil resource, therefore Empire should no be forced into hasty decisions as a result of a trespassing SWD company.
- Core, well log, and some production tests (particularly AGU) confirm that the oil is there and CO_2-EOR can recover substantial reserves.

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

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

SELF-AFFIRMED STATEMENT OF FRANK J. MAREK

My name is Frank J. Marek. I am a registered professional engineer in Texas, and currently Senior Vice President of William M. Cobb & Associates, in Dallas Texas. I obtained a bachelor's degree in Petroleum Engineering in 1977 from Texas A&M University. I have held leadership positions in industry organizations including the Society of Petroleum Engineers (SPE) and the Society of Petroleum Evaluation Engineers (SPEE).

I have been involved with numerous carbonate waterfloods in the Permian Basin since the early 1980's. This includes projects in Lea and Eddy Counties, New Mexico. I also have significant experience with CO2 tertiary oil recovery projects in the area.

My first experience with the EMSU was with a study my firm prepared in August, 1987. This was a study of the waterflood potential of the EMSU on the current, at the time, 80-acre well spacing. I was also involved in an April, 1988 follow up study which investigated the potential for infill drilling to 40 acre spacing and waterflooding on 80 acre 5-spot patterns.

EXHIBIT H

I have been asked to express my opinions regarding saltwater disposal (SWD) operations within the San Andres interval at the Eunice Monument South Unit (EMSU), located in Lea County, New Mexico. The EMSU is a secondary oil recovery project (waterflood) formed in 1984. The unitized interval at EMSU is defined as follows:

> "The unitized interval shall include the formations from a lower limit defined by the base of the San Andres formation to an upper limit defined by the top of the Grayburg formation or at -100 foot subsea datum, whichever is higher."

This captures the entire Grayburg and San Andres interval.

Exhibits H-1 through H-3 present cross sections showing well logs for the Goodnight Ryno SWD #1 well, EMSU #679, EMSU #660, and the R. R. Bell #4 well. The NuTech processed log for the Ryno SWD #1 well shows oil saturation throughout the entire San Andres interval, top to base. The deepest measurement on this log shows an oil saturation of 40% at a depth of -2142 feet SSD. Current perforations are shown on all of the well logs. Clearly, water is being disposed of (injected) into the unitized San Andres interval. Although water injection into the Ryno SWD #1 well is structurally deeper than producing perforations in the Grayburg wells, water is being injected into a documented residual oil zone (ROZ). This is further supported by conventional core data in well EMSU-679. This core shows an oil saturation of 16.2% at a measured depth of 4357 feet, or -761 feet SSD. The ROZ clearly exists down to a datum of -761 feet SSD, and likely deeper, based on the Ryno SWD #1 Nutech log. Following is a summary of data points relating to the depth of the ROZ at the EMSU:

-728 feet SSD > top injection perf in the Ryno SWD #1 well

-761 feet SSD > deepest core point on EMSU-669, 16.2% oil

-2013 feet SSD > deepest injection perf in the Ryno SWD #1 well

-2142 feet SSD > Ryno SWD #1 deepest penetration, 40% oil from Nutech log

The Ryno SWD #1 well is clearly injecting into a well documented ROZ. The high water disposal rates will likely cause higher pressures in the ROZ, and higher potential for hydraulic fracturing and vertical communication, all of which will be detrimental to future ROZ operations. These same factors may also have a negative impact on current field operations in the traditional Grayburg/San Andres producing zones.

As a final note, in my 47 years of experience, I have never seen an instance where a waterflood unit owner allowed an outside party to dispose of water into the unitized interval. I certainly believe that such water disposal should not be allowed at the EMSU.

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

Sincerely,

WILLIAM M. COBB & ASSOCIATES, INC.
Texas Registered Engineering Firm F-84

Frank J. Marek, P.E.
Senior Vice President

8/13/2024
Date

ATTACHMENT

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 CO_2 reserve evaluation and economic analysis, waterflood and CO_2 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 CO_2 project for the West Texas property which included CO_2 supply alternatives, CO_2 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

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

- 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.

- 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

E X H I B I T S

H-1 through H-3

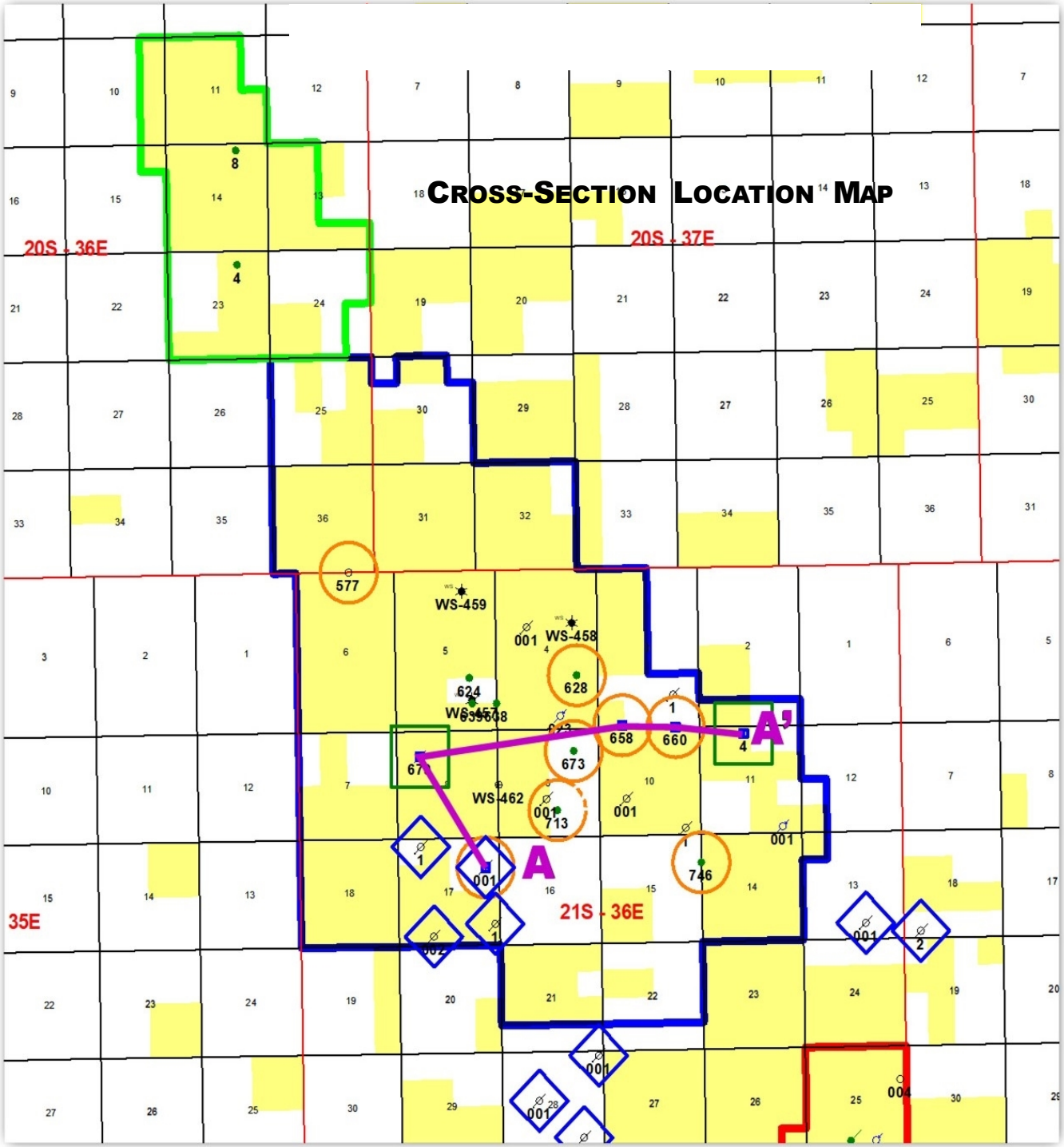

CROSS-SECTION LOCATION MAP
20S - 36E
20S - 37E
21S - 36E
35E
A
A'
WS-459
WS-458
WS-462
577
628
624
658
660
673
713
746
001
002
004

Exhibit H-1

Structural Cross-Section

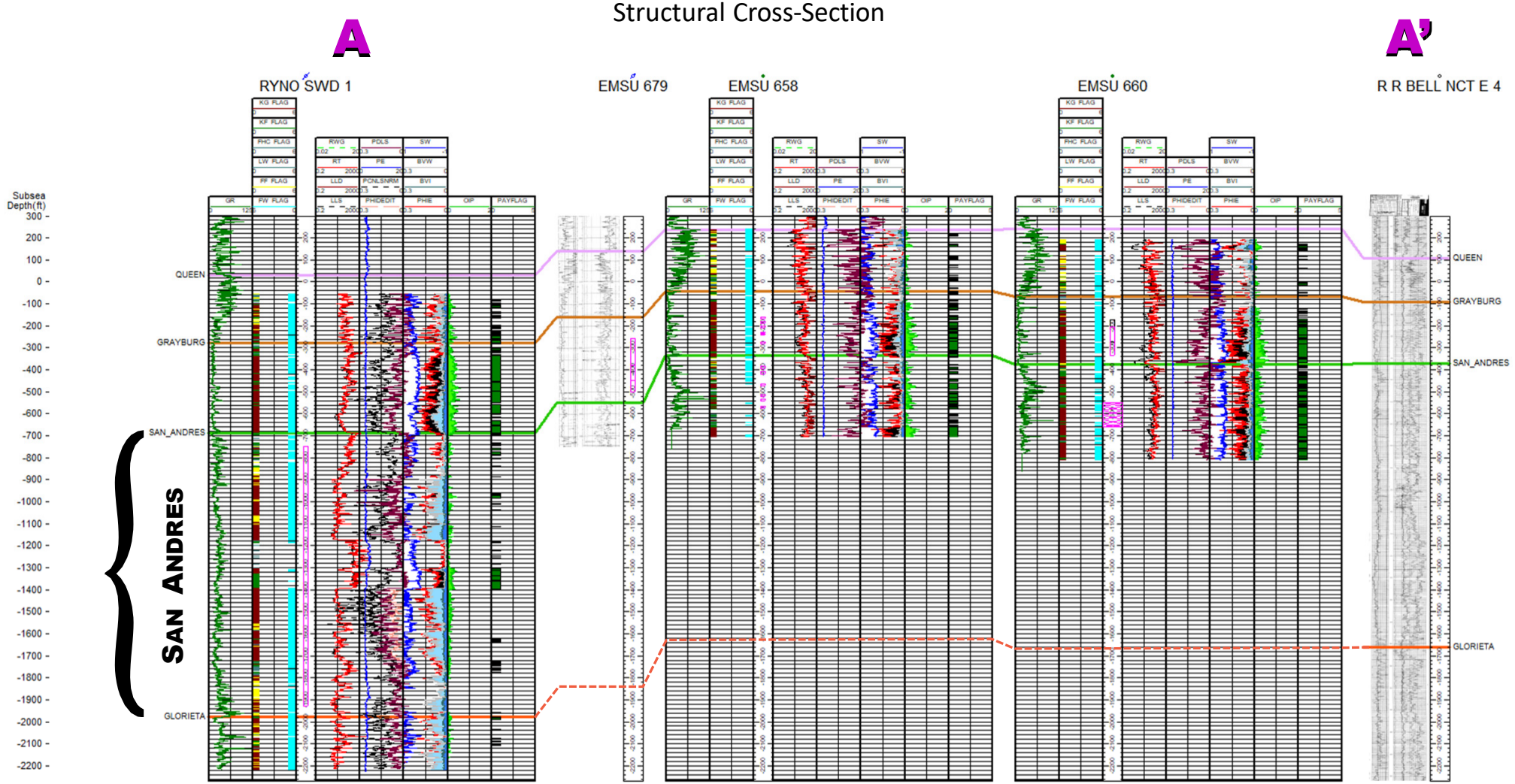


Exhibit H-2

Stratigraphic Cross-Section

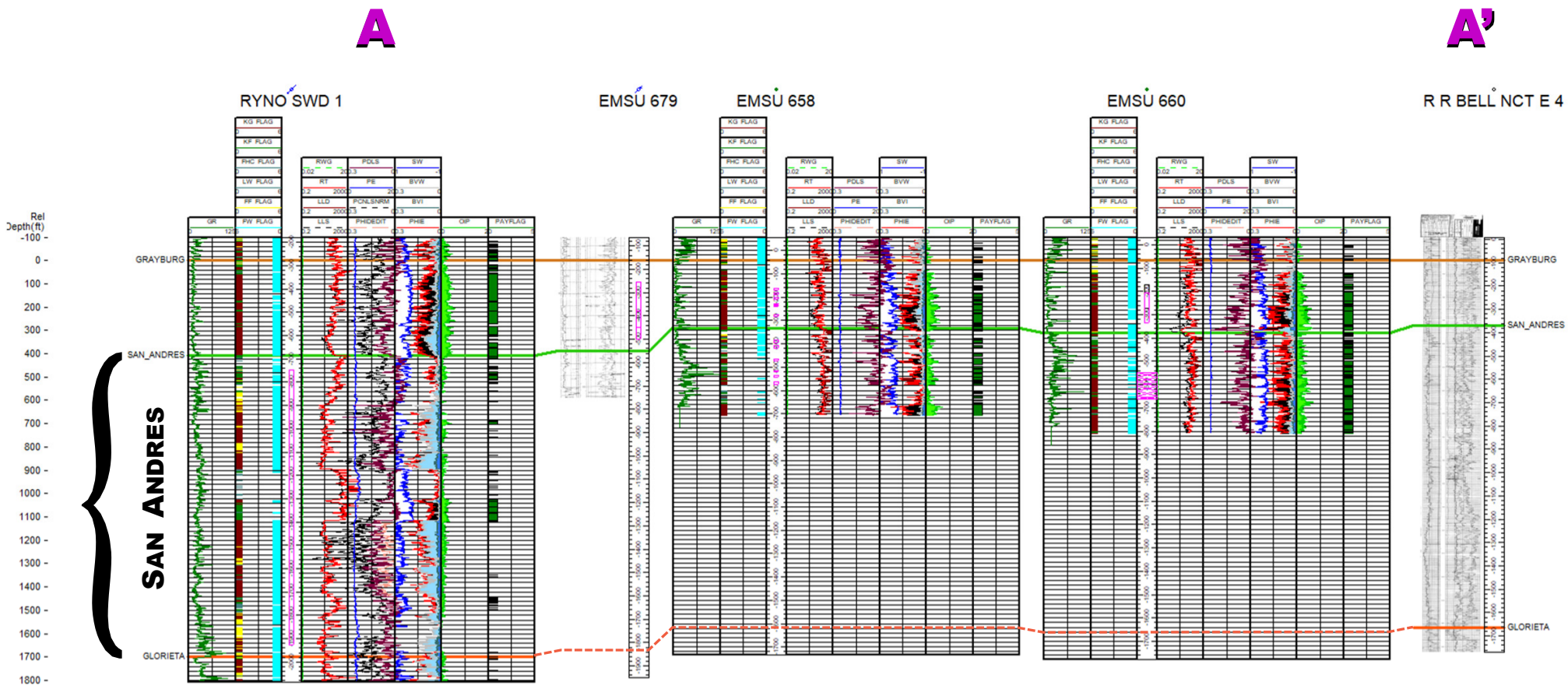


Exhibit H-3

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**

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

SELF-AFFIRMED STATEMENT OF WILLIAM WEST

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

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

EXHIBIT I

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

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

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

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

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

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

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

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

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

corresponding 18.5% drop in San Andres reservoir pressure prior to water injection in 1986. No withdrawals from the San Andres in the immediate vicinity of EMSU had been made at that time, with water supply well production from the San Andres starting later on, therefore the only plausible reason behind this substantial drop in San Andres pressure is communication with the Grayburg. The water influx from the San Andres resulted in an increase in the EMSU water production in the central portions of the field from wells where water production should not have occurred due to their high structural position. Chevron indicated that San Andres water carried sulfate ions into the Grayburg interval, and mixed with barium ions from the Grayburg water, thus resulting in barium sulfate scale formation prior to the waterflood. The only way to account for this mixing is through communication between the San Andres and Grayburg.

- **EMSU-660 pumped 3 barrels oil and 1057 barrels water on January 10, 2006 from the San Andres interval with top perforation at 4126 feet and bottom perforation at 4239 feet. This demonstrates the San Andres is oil bearing and productive. A CO_2 flood will enhance this production and is a viable production method.**

- **Disposal into the San Andres portion of Empire's unitized interval using the five proposed salt water disposal (SWD) wells will reach Empire's San Andres water supply well (EMSU-459), which is less than 4000 feet away. This introduction of off lease high salinity water (with chemicals from Delaware Basin fracture treatments) will result in increased corrosion and scaling in the facilities and wells as it is processed and reinjected into the Grayburg wellbores.**

- **There is communication between the Grayburg and San Andres intervals through natural fractures and breaches, which allows San Andres water to enter the Grayburg interval. This influx of San Andres water has been documented by water production maps of wells prior to unitization, increased sulfur content of the EMSU produced water, and the pressure drop in the San Andres interval, which occurred before water supply well production.**

- **Corrosive disposal water into the San Andres will travel long distances over a 1, 5, 10, and 20 year period, thus allowing corrosive disposal saltwater to enter the Grayburg interval through natural fractures and breaches between the two intervals. This corrosive water will then be produced by Empire's oil wells. This disposal will not only increase failure rates in wells and facilities but will also prematurely water out Empire's wells.**

- **The San Andres reservoir portion of the unit contains a Residual Oil Zone (ROZ) that is confirmed by core (oil down to -762' in EMSU-679) and log analysis of numerous EMSU wells, as well as the adjoining North Monument Grayburg San Andres Unit (NMGSAU), which is connected to EMSU-B and had high oil saturations to the bottom of the core (-700' subsea) in NMGSAU #22 (also referred to #522). By CO_2 flooding this San Andres ROZ interval, it is estimated that 270 million barrels of this residual oil can be recovered, in addition to an estimated 300 million barrels of tertiary oil recovered from the Grayburg.**

- **Disposal of off lease high salinity and corrosive water by Goodnight into the EMSU unitized interval will negatively impact current waterflood and future CO_2 flood oil recovery. The added volume of water into the unitized interval will pressure up the San Andres reservoir and require Empire to produce the water and inject it into the Grayburg as CO_2 is injected. This will require the drilling of additional Grayburg water injectors and require more CO_2 due to operating the CO_2 flood at a higher pressure than necessary. Empire will need to displace an estimated 1.0 to 1.5 billion barrels of disposal water and then reinject it, thus increasing operating costs for reinjection of the produced water.**

- **Goodnight has disposed of approximately 49 million barrels of water into the unitized interval of the San Andres reservoir inside the EMSU boundary as of June 1, 2024 using 4 wells. This disposal has forced an additional 49 million barrels of water to move through the reservoir, therefore impacting 610 acres inside EMSU. After one additional year, the volume will increase to approximately 116 million barrels and the impacted area will grow to 1128 acres. This volume was determined based on 40,000 BWPD each for the Andre Dawson SWD #1 and Ernie Banks SWD #1, and does not include any disposal from the five (5) application wells which are assumed to start disposal June 1, 2025 in the analysis. If the 5 application wells inside EMSU are allowed to be drilled and dispose of 40,000 BWPD each starting June 1, 2025, the total disposal from all 9 wells inside EMSU will be 571 million barrels by June 1, 2029, with an additional 571 million barrels displaced by this volume. This disposal and displacement volume will impact 6620 acres and impair Empire's ability to produce the underlying reserves, thereby violating correlative rights.**

- **Goodnight has leased 40-acre tracts in Sections 3, 4, 9, and 10 of Township 21, Range 36 (Lea County) for saltwater disposal. Information contained in the Surface Use and Salt Water Disposal Agreement Exhibit B indicates that Goodnight has assigned five acres to each disposal well. If similar acreage is leased for each of the existing SWD wells, Goodnight has exceeded the 5-acre area on each well, with Sosa impacting 302 acres, Ryno 181 acres, Andre Dawson 72 acres, and Ernie Banks 55 acres. Based upon estimated 49 million barrels water disposal since disposal began, these wells have already impacted 610 acres and the water is trespassing upon State and Federal lands. The disposal volume displaces an equivalent volume of water (49 million barrels) outward away from the well, therefore this impacted area is based upon 98 million barrels. Disposal of water into these wells <u>must</u> be terminated.**

- **Regarding the Andre Dawson SWD #1, Goodnight produced information that shows it has operated the well at rates in excess of the 25,000 BWPD (permitted volume) for 60 days out of 165 operable days since the well became active on January 18, 2023 and data was reported on September 19, 2023. Goodnight disposed of more than 40,000 BWPD on four separate days, with the highest daily disposal rate being 41,937 BWPD on April 1, 2023. No water disposal volumes have been reported on NMOCD's website on the Andre Dawson SWD #1 or Ernie Banks SWD #1 since they became active in 2023 so 40,000 BWPD rate is assumed in our calculations after the data provided by the 2023 subpoena.**

- **The Ryno SWD #1 (30-025-43901 previously Snyder SWD #1) was a Devonian saltwater disposal well from September 2019 through September 2021, when it was**

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

A. Discussion of Exhibits

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

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

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

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

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

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

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

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

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

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

13. **Exhibit I-13** is the 2005-2006 XTO well completion report for EMSU-660, which demonstrates that the San Andres made water during swabbing operations but made 3 BO and 1057 BW when it was produced using ESP (Electric Submersible Pump). This shows that oil can be produced from the San Andres but requires CO_2 flooding to mobilize large quantities of the residual oil.

14. **Exhibit I-14** shows the location of Trinity CO_2 pipeline that runs south from Hobbs CO_2 project to within 7.5 miles east of EMSU. This pipeline can be used to transport natural (subsurface CO_2 resources) or anthropogenic (industrial emissions) CO_2 supplies to be used for the CO_2 flood. With 45-Q tax credits paying $60/ton ($3.11/MCF) for CO_2-EOR sequestered CO_2, parties interested in obtaining this tax credit for 12 years will have a location to inject the anthropogenic CO_2 they capture. The disposal of 250,000 BWPD occupies the space of 588 MMCF (30,500 tons) CO_2 at 2000 psi, 100 degrees F, a volume which would receive $1.83 million in 45-Q tax credits daily ($668 million yearly) if EMSU is used as a CO_2-EOR sequestration site and receives the $60/ton. By allowing Goodnight to pressure up the San Andres to above 2500 psi, any injection of CO_2 will require that the water be pumped out and injected into another zone to avoid over pressurizing the San Andres reservoir. **These two factors alone, which impact CO_2-EOR economics, indicate that the damage already done by the disposal of 137 million barrels of water by Goodnight is significant and will accelerate exponentially with time.**

15. **Exhibit I-15** shows the impacted areas of saltwater disposal into the San Andres as of June 1, 2024. These exhibits were prepared using the assumption that all new drilled wells would start disposal June 1, 2025 at a rate of 40,000 BWPD per well therefore have no impact until after June 1, 2025. Since disposal rates have not been posted on the Andre Dawson and Ernie Banks SWD wells since September 19, 2023 when subpoena data was received, we assume 40,000 BWPD disposal rate for these two wells. The average May 2024 disposal rates were used for the other active SWD wells. The impacted areas are calculated assuming cumulative disposal volume plus an equivalent volume of water which is displaced by the disposal volume. In reality, the disposal volume impacts a much larger area because the water displaced by the volume displaces an additional equivalent volume and the pressure builds up over large distances.

The San Andres has a net-to-gross interval of approximately 50% (portion of interval which can accept water) so we use half of the perforated interval for each well in the calculation of impacted area. The San Andres has an estimated average porosity of 10%, initial connate water saturation of 30%, and residual oil saturation of 30%. The disposal water goes through the San Andres interval and pushes the San Andres water through the openings in the rock, but does not move the oil because it is residual to water. This residual oil reduces the volume of rock which can be filled up with disposal water, and therefore the saltwater disposal impacts a larger area with each barrel pumped. The area impacted is based upon the water disposal volume plus an equivalent volume of water which is displaced by the disposal water. This water disposal and displacement volume moves through the San Andres and comes in contact with the natural fractures which penetrate the Grayburg interval, thus resulting in water influx into the Grayburg.

16. **Exhibit I-16(a)** shows the impacted area for Ernie Banks SWD #1. It is assumed that a 5-acre surface lease was assigned to this well like those used for the 5 new application wells. Not only has it exceeded the volume contained beneath this 5-acres but it has also impacted 55

acres and is trespassing upon Federal lands. Disposal volumes or pressures are not available on the NMOCD website since Goodnight began disposal May 16, 2023. This well is disposing of water in the unitized interval and should have its permit revoked and the well shut-in immediately.

17. **Exhibit I-16(b)** shows the impacted area for Ryno SWD #1. It is assumed that a 5-acre surface lease was assigned to this well like those used for the 5 new application wells. Not only has it exceeded the volume contained beneath this 5-acres but it has also impacted 181 acres and is trespassing upon State and Federal lands. This well is disposing of water in the unitized interval and should have its permit revoked and the well shut-in immediately.

18. **Exhibit I-16(c)** shows the impacted area for Andre Dawson SWD #1. It is assumed that a 5-acre surface lease was assigned to this well like those used for the 5 new application wells. Not only has the injected water exceeded the volume contained beneath this 5-acres but it has also impacted 72 acres and is trespassing upon Federal lands. Disposal volumes or pressures are not available on the NMOCD website since Goodnight began disposal January 18, 2023. Information received from Goodnight via subpoena indicates that they exceeded their 25,000 BWPD permitted rate on 60 days out of 165 days produced from January 18, 2023 to September 19, 2023, with disposal over 40,000 BWPD during 4 days. This well is disposing of water in the unitized interval and should have its permit revoked and the well shut-in immediately.

19. **Exhibit I-16(d)** shows the impacted area for Sosa SA 17 SWD #2. It is assumed that a 5-acre surface lease was assigned to this well like those used for the 5 new application wells. Not only has it exceeded the volume contained beneath this 5-acres but it has also impacted 302 acres and is trespassing upon Federal and Private lands. This well is disposing of water in the unitized interval and should have its permit revoked and the well shut-in immediately.

20. **Exhibit I-16(e)** shows the impacted area for all four active SWD wells operated by Goodnight within the EMSU. These wells have impacted a total of 610 acres as of June 1, 2024. These wells are disposing of water in the unitized interval and have trespassed upon State, Federal, and Private lands. The disposal permits should revoked and the wells shut-in immediately.

21. **Exhibit I-17** shows the impacted area for all four active SWD wells and one active SWD well outside EMSU (Yaz 28 SWD #1) which will be trespassing inside EMSU by June 1, 2025 if allowed to continue disposal. Yaz 28 SWD #1 (~1550' off EMSU boundary line) has impacted 155 acres (1468' radius) and is injecting 18,125 BWPD as of June 1, 2024. All 5 of these wells have raised San Andres reservoir pressure to approximately 1557 psi which is above the 1527 psi original reservoir shown in **Exhibit I-4.** These wells should be shut-in immediately to prevent over pressuring the San Andres and increasing water influx into the Grayburg, thus impacting Empire's ability to perform CO_2-EOR in the San Andres and maximizing oil recovery from the Grayburg by waterflood and CO_2-EOR.

22. **Exhibit I-18** shows the EMSU portion of the monthly operating report sent to NMOCD and the State Land Office. A 13.4% oil production decline over the past 9 months is abnormally high. Empire believes some of this decline is caused by Goodnight water disposal inside EMSU. Water disposal inside EMSU should not be allowed.

23. **Exhibit I-19** shows the impacted area as of June 1, 2025 (1 year forecast). It is assumed that the 5 application wells do not start disposal until June 1, 2025 so no damage is shown for those wells. By June 1, 2025, a total of 1312 acres will have been impacted by disposal into the San Andres.

24. **Exhibit I-20** shows the impacted area as of June 1, 2029 (5 year forecast). The 5 application wells will have impacted 684 acres each over their 4 year injection period at a rate of 40,000 BWPD. A total of 6920 acres will have been impacted if disposal is allowed to continue.

25. **Exhibit I-21** shows the impacted area as of June 1, 2034 (10 year forecast). The 5 application wells will have impacted 1540 acres each and total impacted area for the 10 SWD wells will be 13,930 acres which is 98% of EMSU assigned acreage.

26. **Exhibit I-22** shows the impacted area as of June 1, 2044 (20 year forecast). The 5 application wells will have impacted 3251 acres each and total impacted area for the 10 SWD wells will be 27,950 acres which is close to twice the size of EMSU.

27. **Exhibit I-23** shows that at a disposal rate of 40,000 barrels of water per day, Goodnight will exceed the storage volume of the 5-acre tract assigned to each well in 13 days. Since disposal water will push water that is already in the reservoir, it is not just the volume of water which is disposed of which determines impacted area but the disposal volume plus an equivalent volume of water which is moved by the water disposal. Disposal of water into the assigned 5-acre tracts at 40,000 BWPD will impact the San Andres interval of other surface and mineral owners after only 13 days, trespassing upon Federal and State lands.

28. **Exhibit I-24** shows the location of the four wells which cored the San Andres formation in the Eunice Monument field. All 4 wells cored oil and the 3 wells where core reports are available show oil saturations down to -762' subsea in EMSU-679 (elevation 3596'), -700' subsea at the base of the core in NMGSAU #22/522 (elevation 3699') and -453' subsea at the base of the core in RR Bell #4 (elevation 3550'). The presence of oil in these 4 cores clearly demonstrate that there is a large residual oil zone in the San Andres which can be CO_2 flooded to recover significant volumes of oil.

29. **Exhibit I-25** shows the cored oil saturation versus subsea depth for the NMGSAU #22 (also referred to as #522) located 4 miles north of EMSU-B. The well was drilled by Amerada Hess during 1992 over the northern portion of the Eunice Monument field. The entire 454' cored section of the San Andres contained oil down to -700' subsea (base of the core), with highest measured value of 70.2% and average of 30%. This core confirms there is a residual oil zone over Eunice Monument field.

30. **Exhibit I-26** shows an oil, water, CO_2 recycle, and CO_2 injection forecast assuming we develop 72 40-acre patterns for Phase 1 of the San Andres ROZ CO_2-EOR project. It assumes CO_2 is injected continuously into each pattern at a rate of 3000 MCFPD with no water injection, therefore the water production declines and the CO_2 recycle volume increases. Depending upon whether natural or anthropogenic CO_2 supplies are used for the project, the design will be adjusted accordingly. The 3000 MCFPD CO_2 equates to 1200 BWPD so if the WAG option is utilized,

3000 MCFPD would be injected for 1-2 months into each pattern and then 1200 BWPD for 1-2 months, thus providing a 1:1 WAG ratio. This will reduce the amount of CO_2 purchase and the amount of produced CO_2 which will have to be compressed and reinjected.

31. **Exhibit I-27** shows preliminary economics for Phase 1 (72 patterns) of the San Andres ROZ CO_2-EOR development. The project will generate $3.2 billion in total oil revenue with $0.5 billion paid in royalties to the State, Federal Government, and Private royalty owners. An additional $129 million will be paid for State and Local Government taxes. There are more than 72 additional patterns at EMSU, approximately 32 patterns at EMSU-B, and 64 patterns at AGU which will be developed during Phases 2 and 3 of the San Andres ROZ development.

32. **Exhibit I-28** shows an oil, water, CO_2 recycle, and CO_2 injection forecast assuming we develop 250 (40-acre) patterns across the San Andres ROZ interval using continuous CO_2 injection. Production peaks at over 21,500 BOPD by January 2043 and 1.7 TCF (Trillion Cubic Feet) or 88.6 million metric tonnes of CO_2 is sequestered in the reservoir.

33. **Exhibit I-29** shows preliminary economics for Phases 1-3 (250 patterns) development of the San Andres ROZ interval. The project will generate $12.8 billion in total oil revenue with $1.9 billion paid in royalties to the State, Federal Government, and Private royalty owners. An additional $554 million will be paid for State and Local Government taxes. The project after capital expenditures of $1.2 billion and CO_2 purchases of $1.7 billion, has a Net Present Value (10% discount rate) of $586 million. The economics are for the San Andres ROZ only and does not consider the CO_2-EOR which can be applied to the Grayburg.

34. **Exhibit I-30** shows the impact of allowing Goodnight to increase the San Andres reservoir pressure by continued water disposal. The CO_2-EOR flood could be operated at 1500 psi and would require 7729 MMCF CO_2 to displace the total fluid volume in one 40-acre pattern. By raising the reservoir pressure to 2000 psi it will require an additional 13.1% CO_2 to displace same pore volume, and if pressure is raised to 3000 psi, an additional 24.8% CO_2 will have to be purchased. This impacts CO_2 project economics. If the pressure of 3000 psi is reached prior to the CO_2 flood start-up, it is likely that the produced San Andres water will have to be injected into another reservoir (i.e. Grayburg) to prevent over pressurization and/or fracturing of the San Andres. This will require that additional Grayburg wells be drilled and will impact project economics.

B. Evidence of Communication Between San Andres and Grayburg

35. As demonstrated by the following data, there is communication between the San Andres and Grayburg intervals.

- Sulfate (SO_4) rich San Andres water (approximately 2800 mg/L) was produced by Grayburg oil wells prior to water injection as documented by Chevron paper (Reference 1). The Grayburg water had low sulfate concentration prior to this influx of San Andres water.

- The April, 1983 Technical Committee Report[1] shows that in 1981 there were plumes of water production from the San Andres in the central portions of the field, in up-dip areas of the reservoir where water production would not be expected.

- Openhole pressure measurement taken in the EMSU-211 on April 8, 1986 prior to water production from the San Andres shows a drop in San Andres reservoir pressure of 282 psi (18.5%) since discovery in 1929, another clear indication that communication with the Grayburg is occurring.

36. San Andres water was produced by unit wells completed in the Grayburg interval prior to unitization. This became apparent to Chevron when the sulfur content of the produced water increased and barium sulfate scale began to form. In Chevron's 1996 NACE paper "Utilization of Geological Mapping Techniques to Track Scaling Tendencies in the Eunice Monument South Unit Waterflood, Lea County, New Mexico," [1] Chevron stated "that during the time of primary production prior to unitization and initiating the waterflood in the Eunice Monument field, barium sulfate scale deposition was experienced in a number of producing wells due to sulfate waters from the San Andres mixing with the barium contained in the Grayburg water. Although the drilling was confined to the Penrose and the Grayburg formations, apparently some San Andres water was finding its way into the wellbores producing from the Grayburg and resulted in a barium sulfate scale, barite, deposition problem." With the Grayburg water having low levels of sulfate prior to the waterflood, and the Goat Seep Aquifer containing no sulfate, the water had to originate from the San Andres. After water injection began in November, 1986, the San Andres water was used as make-up water for the waterflood and the sulfur content of the Grayburg water continued to increase.

37. Production data presented in the "Proposed Eunice Monument South Unit" Technical Committee Report [2] of April, 1983, prior to the waterflood, shows that the central parts of the field had high water production. **Exhibits I-5 and I-6** show the cumulative water production from wells in the EMSU prior to the start of water injection in 1986. The highest water producer, which was later designated as EMSU-239 (API #30-025-04468), produced around 1,000 BWPD in 1981 and was converted to a water injector after unitization. This well and the nearby EMSU-262H (30-025-04454) are located in the central portions of the field and surrounded by low water producers. The location of these high water producers indicate that water from the San Andres was entering through natural fractures or some other breach in the barrier caused by stresses in the rock during deposition. The EMSU-262-H was a vertical well when this high water production occurred, and the well was later sidetracked as a horizontal well in 2012.

38. The area where the highest water production occurred is near the location where Goodnight proposes to drill five new SWD wells. The Ernie Banks SWD #1 is also disposing of water very close to the EMSU-368 well, which had apparent high water influx from the San Andres prior to unitization. Goodnight's disposal of water into the San Andres unitized interval is causing, and will continue to cause, irreparable damage to Empire's wells, facilities, and reserves.

39. The San Andres and Grayburg original reservoir pressure was approximately 1450 psi at -250 subsea depth (approximately 3814 feet measured depth in EMSU-211) when discovered in 1927. Prior to water injection in April, 1986, the San Andres pressure had dropped from

approximately 1,533 psi to 1,245 psi based on the EMSU-211 openhole pressure measurements. Although the pressure drop in the Grayburg interval was much larger than the pressure drop in the San Andres due to production of 121 million barrels of oil, the lower San Andres pressure indicates that the Grayburg and San Andres intervals are in communication.

C. Estimated Area of Exposure of SWD High Salinity Water

40. **Exhibits I-17 thru I-23** were generated to show the radius of exposure of the Goodnight SWD wells over time if the existing wells are allowed to continue their disposal at current rates and the five application wells plus the Andre Dawson and Ernie Banks are allowed to dispose at 40,000 BWPD, and their current impact on production. By year ten 12,912 acres are invaded by disposal and displacement saltwater by 10 SWD wells. This area expands to 25,913 acres by year 20.

41. Section 17 of Township 21S, Range 36E has the four active SWD wells that are disposing of saltwater inside the EMSU. **Exhibit I-16(e)** shows that the water injected from all 4 wells has already trespassed onto State, Federal, and Private lands. The SWD damage has extended well past the 5-acre surface acreage assigned to each well. Since water disposal is impacting Empire's unitized Grayburg / San Andres interval, it must be stopped.

42. Since the barrier between the Grayburg and San Andres is not continuous over all parts of the field, as shown by the sulfur increase, water production increase in the central portions of the field, and drop in San Andres reservoir pressure, the high salinity disposal water will move over large distances and find a natural fracture or breach in the barrier and begin interfering with EMSU production. The location of the five proposed SWD wells are near the area where the greatest water production from the San Andres. The high water production in these areas prior to the waterflood indicates that the Grayburg and San Andres intervals are in communication in the area of these wells, therefore the applications for these SWD wells should be denied.

43. As of June 1, 2024, Goodnight has disposed of 67 million barrels of water into the San Andres interval using the 5 active SWD wells shown on **Exhibit I-16 (e)**. The invasion areas shown in the exhibits represent fluid movement radially away from the wellbore due to water disposal volume plus an equivalent volume of San Andres water which is displaced by the disposal. The pressure response caused by the saltwater disposal will occur over a much larger distance and this pressure will force San Andres water into the natural fractures and breaches in the barrier with the Grayburg. It is indicated by bottomhole pressure measurement taken in January 2024 in EMSU-459 water supply well (1557 psi at 4076 feet measured depth in the wellbore) that the San Andres pressure is already above the original reservoir pressure and will continue to increase with additional disposal. The disposal of high salinity corrosive fluids will prematurely water out our producing wells and cause corrosion in the wells and facilities. **Disposal of saltwater into the San Andres impairs Empire's correlative rights and unit operations, and results in waste of oil and gas.**

D. SWD Impact Upon Waterflood and CO_2 Flood Performance

44. Empire has previously identified communication between the Grayburg and San Andres intervals. The entry of high salinity corrosive water into Empire's water supply wells and water injection system will result in production of corrosive water and impact waterflood performance both from an oil reserve recovery standpoint and also financially, as Empire would need to address the contaminated water in its injection and production operations. Based on 40,000 BWPD disposed into the new wells and the Andre Dawson and Ernie Banks SWD wells, the June 2025 disposal rate will be 344,000 BWPD (125,560,000 barrels per year) in these wells. This saltwater disposal will impair Empire's ability to implement a CO_2 flood. To perform a successful CO_2 flood, the injection of CO_2 and water must be monitored closely and adjustments made based upon design. Goodnight's SWD wells cannot dispose of water when an active CO_2 flood is being performed. To prevent further damage caused by these wells, they should be shut-in immediately.

45. It is estimated that 1.0 to 1.5 billion barrels of water will be produced by Empire as it injects CO_2 for enhanced oil recovery. Goodnight's disposal of water into the unitized interval will increase the reservoir pressure and make it more difficult for Empire to inject this produced water back into the reservoir. The disposal will increase Empire's capital and operating costs.

E. Goodnight has violated at least one of its existing permits.

46. Goodnight has requested that the OCD increase the maximum disposal rate of the Andre Dawson SWD #1 from 25,000 BWPD to 40,000 BWPD. Goodnight has leased 40-acre tracts in Sections 3, 4, 9, and 10 of Township 21, Range 36 (Lea County) for saltwater disposal on the new applications. Information contained in the Surface Use and Salt Water Disposal Agreement Exhibit B indicates that they have assigned five acres to each disposal well. Based upon estimated 7.3 million barrels water disposal since January 2023 into the Andre Dawson SWD #1, Goodnight has already impacted 72 acres with its water disposal and will impact 217 acres by June 2025 if they are allowed to dispose at the 40,000 BWPD rate. Goodnight's documentation on the Andre Dawson SWD #1 shows it has disposed at rates exceeding 25,000 BWPD for 60 days out of 165 days since the well started injecting on January 18, 2023 and last data available September 19, 2023. Goodnight disposed of more than 40,000 BWPD on four separate days, with highest daily disposal rate of 41,937 BWPD. This injection, in conjunction with the injection proposed for the five wells at issue here, is cumulative and will impair Empire's ability to utilize enhanced oil recovery techniques. This impairment will result in waste and violate Empire's correlative rights.

F. CO_2 Flood of San Andres ROZ interval

47. The San Andres ROZ interval offers an excellent opportunity for CO_2-EOR due to its large oil column and good reservoir properties. It is anticipated that 3000 MCFPD (156 metric tonnes per day) of CO_2 can be injected into each 40-acre pattern and will recover approximately 500,000 barrels oil over a 20-year period. Given that there are more than 250 40-acre patterns available over EMSU, EMSU-B, and AGU, this indicates that over 125 million barrels oil recovery is possible in the San Andres alone. Empire has discussed CO_2 purchase from two suppliers of natural CO_2 and one future supplier of anthropogenic CO_2. The rate at which the patterns will be developed will depend upon the timing for CO_2 supplies and which type of CO_2 source is used will impact whether continuous CO_2 injection or WAG is utilized. **Exhibit I-26** shows an oil,

water, CO_2 recycle, and CO_2 injection forecast for development of only 72 40-acre patterns beginning Jan-2027 and ending June-2032 using a continuous (100%) CO_2 injection process, where no water is injected. This project would allow for over 471 BCF (25 million metric tonnes) of CO_2 to be sequestered and would generate $44 million in 45-Q tax credits over the 12-year period currently allowed by law. **Exhibit I-27** shows preliminary economics for Phase 1 which would develop 72 40-acre patterns (4-1/2 640-acre sections). Total oil sales of close to $2.7 billion is generated and $129 million in taxes is paid to the State and Local Governments based on $75 per barrel of oil escalated 1% annually. Economics have not been optimized by applying WAG (Water-Alternating-Gas) injection process which will reduce the CO_2 purchase and CO_2 recycle cost by injecting water and reducing CO_2 production, nor the impact of developing additional patterns using the same Central Facility infrastructure. It is assumed that 75% of the wells will be new drills, with the remainder deepenings of existing Grayburg wells. Once oil production declines in the San Andres interval, these wellbores can be used for Grayburg CO_2 flood or both zones commingled to reduce Grayburg development cost.

Exhibits I-28 and I-29 show the production profile and preliminary economics for development of 250 (40-acre) patterns in the San Andres ROZ. A peak production rate of over 21,500 BOPD occurs in January-2043 and a total of 141 million barrels of CO_2-EOR oil is recovered over the 40 year life. Oil price is escalated 1% annually from $75 per barrel 2025 price.

G. Discussion of Reference Papers

48. Reference 1 is entitled "Utilization of Geologic Mapping Techniques to Track Scaling Tendencies in the Eunice Monument South Unit Waterflood, Lea County, New Mexico." This paper, which was presented by Chevron as Paper #181 at the Corrosion 96 NACE International Annual Conference and Exposition in Denver, demonstrates there is communication between the San Andres and Grayburg. On Page 181/2, Chevron states: "During the time of primary production prior to unitization and initiating the waterflood in the Eunice Monument field, barium sulfate scale deposition was experienced in a number of producing wells. Although the drilling was confined to the Penrose and Grayburg formations, apparently some San Andres water was finding its way into the wellbore of these wells and resulted in barium sulfate scale, barite, deposition problem." Because the Goat Seep Aquifer to the west does not contain sulfate and the Grayburg produced water which had low levels of sulfate, the water had to originate from the San Andres.

49. Reference 2 is the Technical Committee Report entitled "Proposed Eunice Monument South from April 1983," which was prepared prior to the Unit being formed. Page 4 defines the unitized interval and states: "The unitized interval shall include the formations from a lower limit defined by the base of the San Andres formation, to an upper limit defined by the top of the Grayburg formation or a -100 foot subsea datum, whichever is higher." This report also states on Page 22 that "after analyzing individual well production records it is obvious that the water production is not evenly distributed throughout the field. For example, in 1980, only 19% of the active wells produced more than 50 barrels of water per day for a total of 75% of all water produced." Figures 11 and 12 in the report show that some wells are experiencing high water production while surrounding wells are not. Based on Empire's analysis, this phenomena is due to communication of the San Andres and Grayburg intervals.

H. Conclusions

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

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

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

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

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

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

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

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

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

Signed by:
William West
71DD2BEB6978464...

William West

Senior Vice President Operations

EMPIRE PETROLEUM CORPORATION

Date: 8/22/2024

References

1.) L. N. Strickland, D. W. Beaty, A. B. Carpenter; "Utilization of Geological Mapping Techniques to Track Scaling Tendencies in the Eunice Monument South Unit Waterflood, Lea County, New Mexico" Paper 181 presented at Corrosion 96 – The NACE International Annual Conference and Exposition March 24-29, 1996 Denver, Colorado

2.) Technical Committee Report – April 1983 – "Proposed Eunice Monument South Unit, Lea County, New Mexico" prepared by Chevron

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

WILLIAM WEST

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

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

WILLIAM WEST

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

- 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

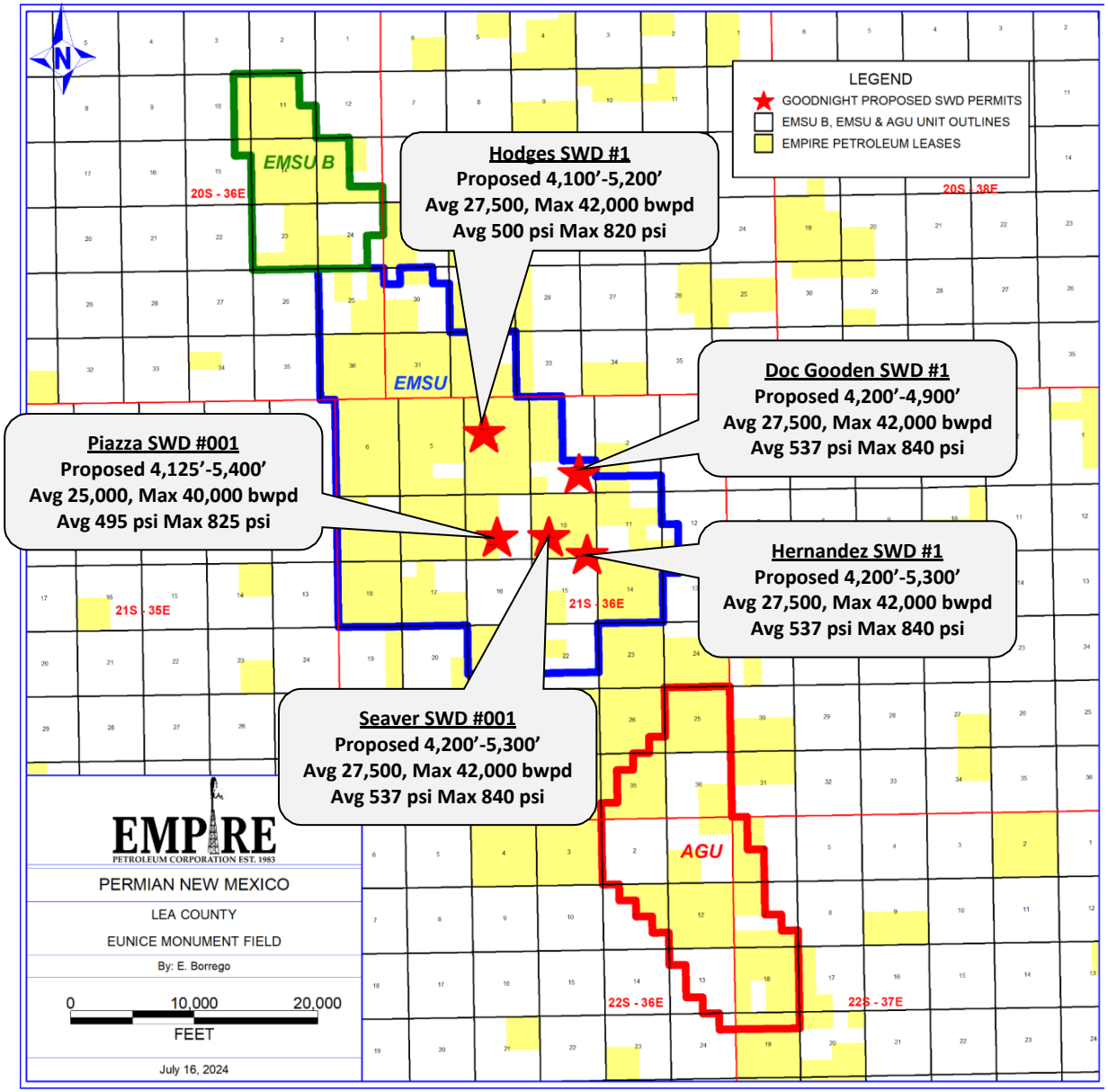
EDUCATION

PROFESSIONAL ENGINEER 2009-Present
Petroleum Engineering – WY ID #12599

MARIETTA COLLEGE May 1999
Bachelor of Science, Petroleum Engineering

GOODNIGHT MIDSTREAM PERMIAN, LLC
SWD APPLICATIONS

Exhibit 1-1

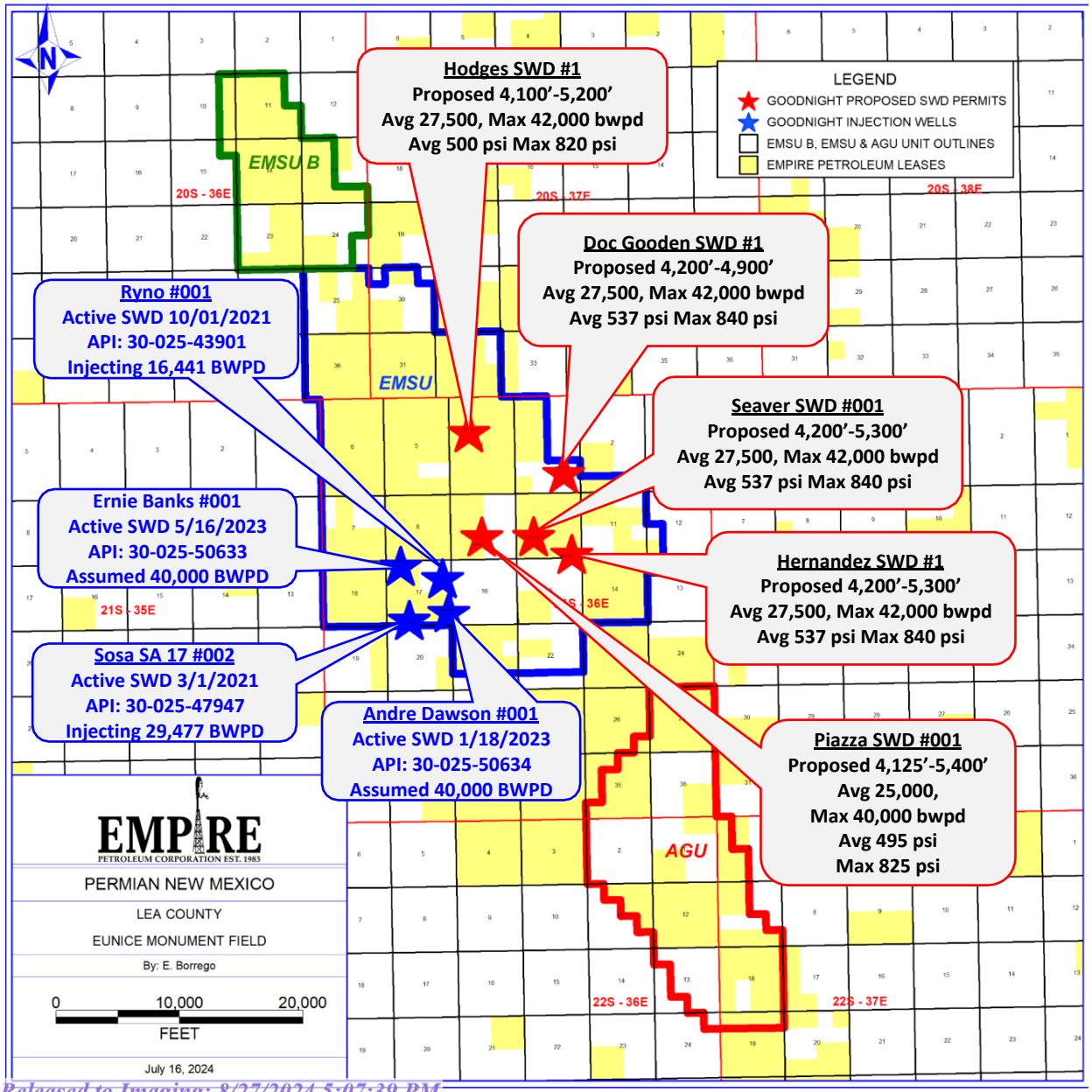


KEY POINTS

- No third-party injection wells should be allowed inside a unitized oil and gas field
- The 5 proposed wells will increase water influx into the Grayburg interval and negatively impact Empire's oil and gas production
- Disposal into the San Andres unitized interval will not allow CO_2 injectors to be utilized to recover residual oil
- The Delaware Basin disposal water is not compatible with existing produced water, damaging oil recovery
- Excess water production and injection increases lease operating costs
- Excess water causes direct plugging & abandonment liabilities that must be assumed by those authorizing this destructive activity and the parties injecting the water.

GOODNIGHT MIDSTREAM PERMIAN, LLC
ACTIVE SWD WELLS & APPLICATIONS INSIDE EMSU

Exhibit 1-2



KEY POINTS

- Goodnight water disposal inside the EMSU must be immediately stopped:

1. Disposal of saltwater into the San Andres impairs Empire's correlative rights and unit operations, resulting in waste of oil and gas reserves.

2. Existing permits must be revoked to prevent further damage to Empire's oil and gas reserves

3. No increases on disposal rate volumes should be considered

4. The Andre Dawson #1 and Ernie Banks #1 have been exceeding their permitted disposal rate

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

Exhibit F-3

KEY POINTS

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

REPEAT FORMATION TEST (RFT) PRESSURE DATA

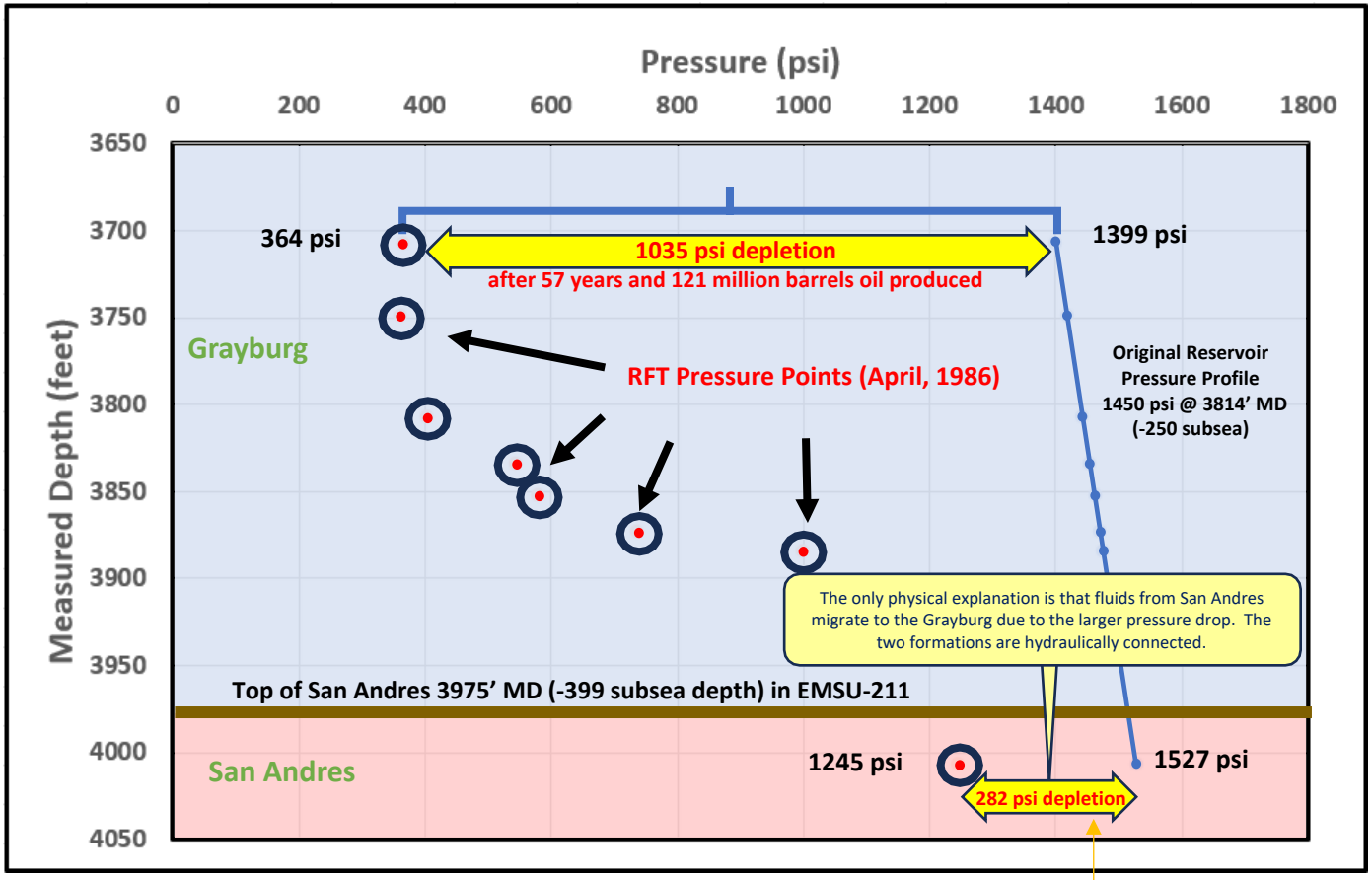
		API:	WELL NAME:	DATE TAKEN:	
	ELEV = 3576'	30-025-29615	EMSU #211 RFT	4/8/1986	
DEPTH: (FEET)	SUBSEA ELEVATION (FEET)	ORIGINAL RESERVOIR PRESSURE (PSI)	APRIL 8, 1986 SHUT IN PRESSURE (PSI)	PRESSURE DEPLETION (PSI)	PRESSURE DEPLETION (PERCENT)
3707	-131	1399	364	1035	74.0%
3749	-173	1417	360	1057	74.6%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

Original reservoir pressure was 1450 psi @-250' subsea. Assumes 0.43 psi/foot gradient during original conditions

Top of San Andres at 3975' MD (-399' subsea)

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

Exhibit I-4



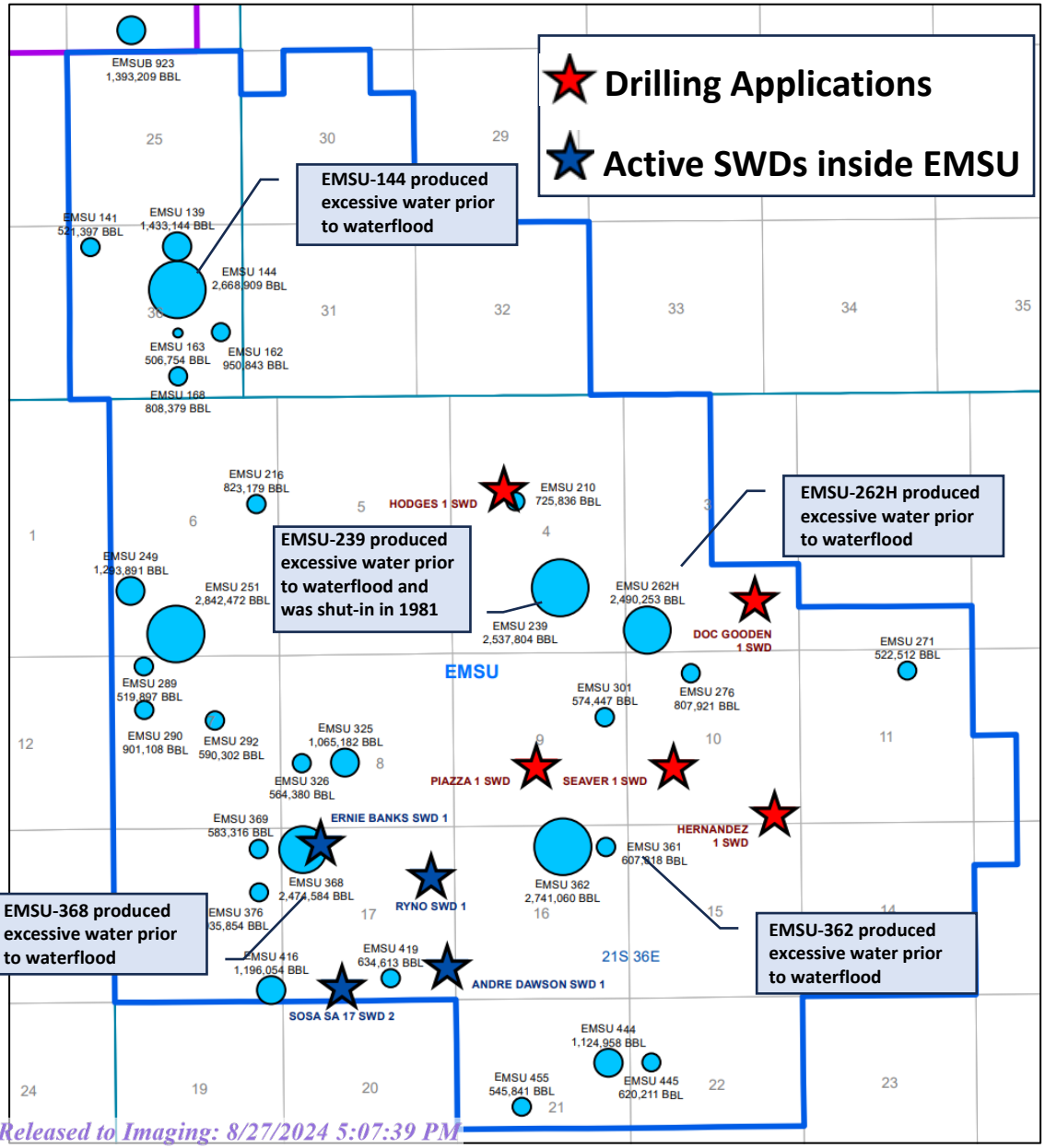
Elevation for EMSU-211 is 3576' above sea level

KEY POINTS

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

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

Exhibit I-5



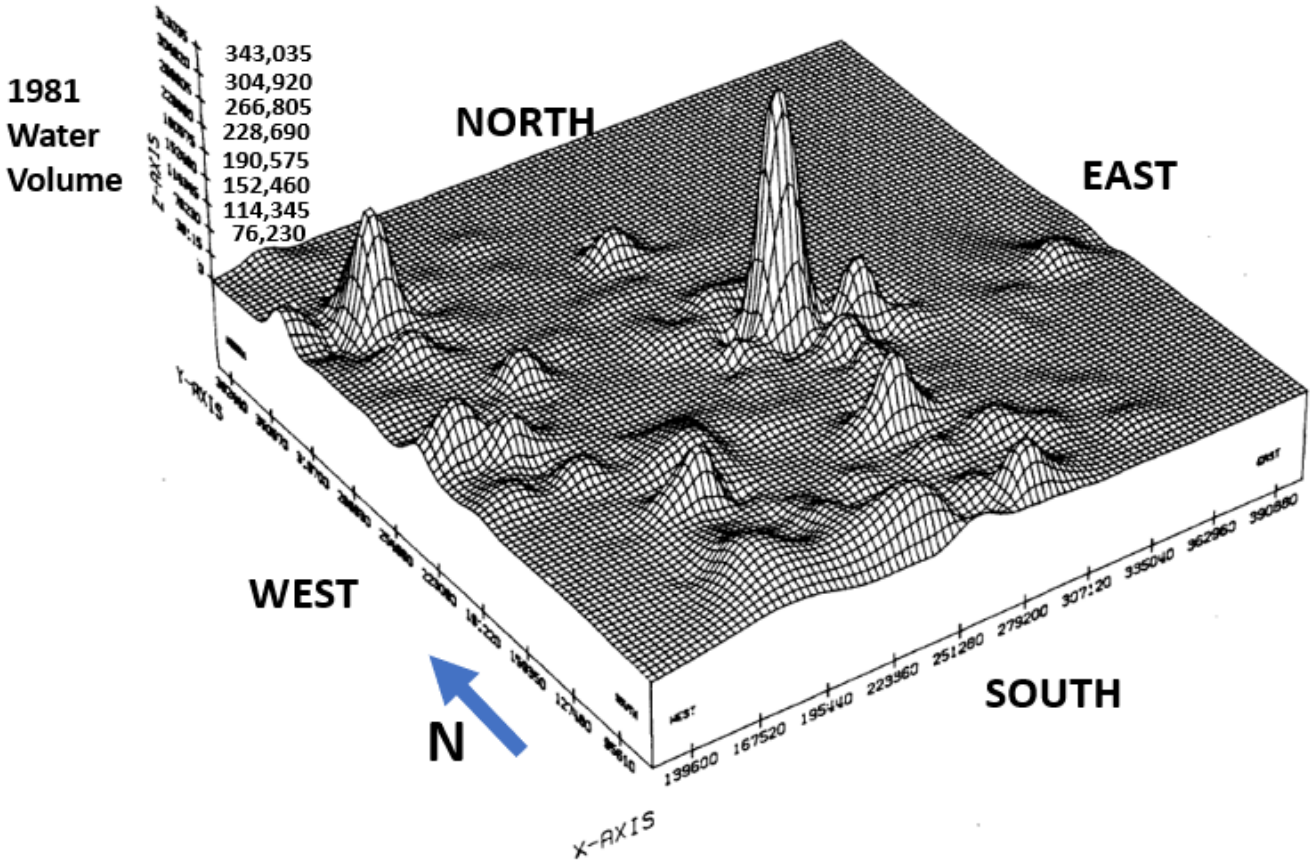
KEY POINTS

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

Exhibit 16

Proposed Eunice Monument South Unit
Technical Committee Report
April 1983

1981 water production volumes contained in the Technical Committee Report indicate that natural fractures or breaches in the barrier exist in the central, updip portions of the reservoir and there is communication between the Grayburg & San Andres. EMSU-262 and EMSU-362 in the central portions of the field demonstrate this by their plumes of water. Further evidence of communication was obtained by sulfur rich water being produced.



KEY POINTS

- High water production seen on some interior wells during 1981 indicated that the San Andres is communicating with the Grayburg formation.
- NMOCD recognized Grayburg & San Andres as one oil producing zone.
- The state must prevent false or misleading applications ever being proposed inside a unit.
- No wells within 2 miles of unit boundary should be allowed.
- No disposal 1,000 feet above or below any productive zone should be allowed.
- Depending on the volumes, disposal volumes within 2-5 miles must be approved by all unit holders.

Exhibit I-7

Indication of Communication Between San Andres & Grayburg

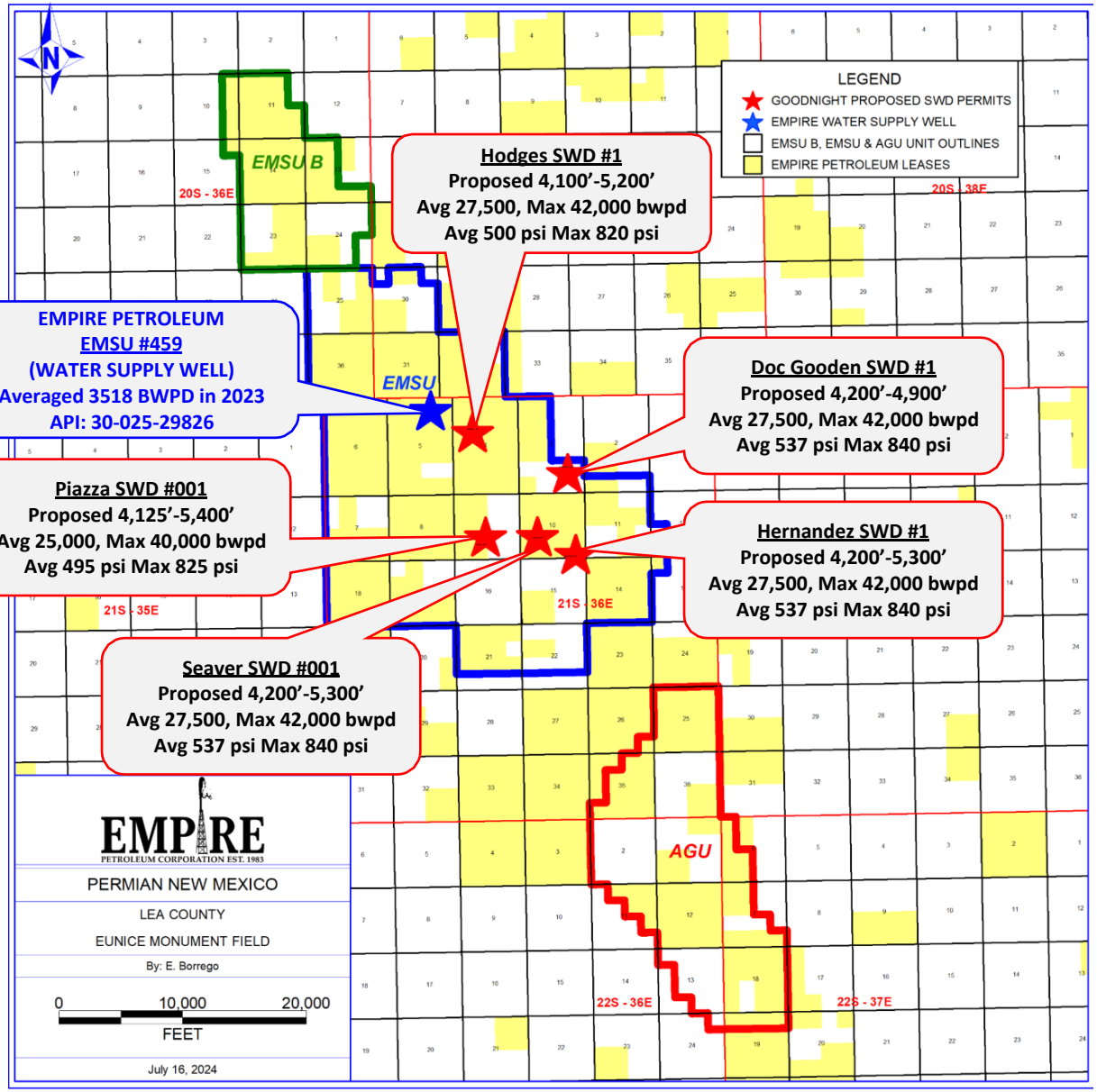
- **1996 Chevron paper "Utilization of Geological Mapping Techniques to Track Scaling Tendencies in the Eunice Monument South Unit Waterflood, Lea County, New Mexico"**

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

KEY POINTS

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

GOODNIGHT MIDSTREAM PERMIAN, LLC - SWD DISPOSAL WILL CONTAMINATE EMPIRE'S SAN ANDRES WATER SUPPLY WELL

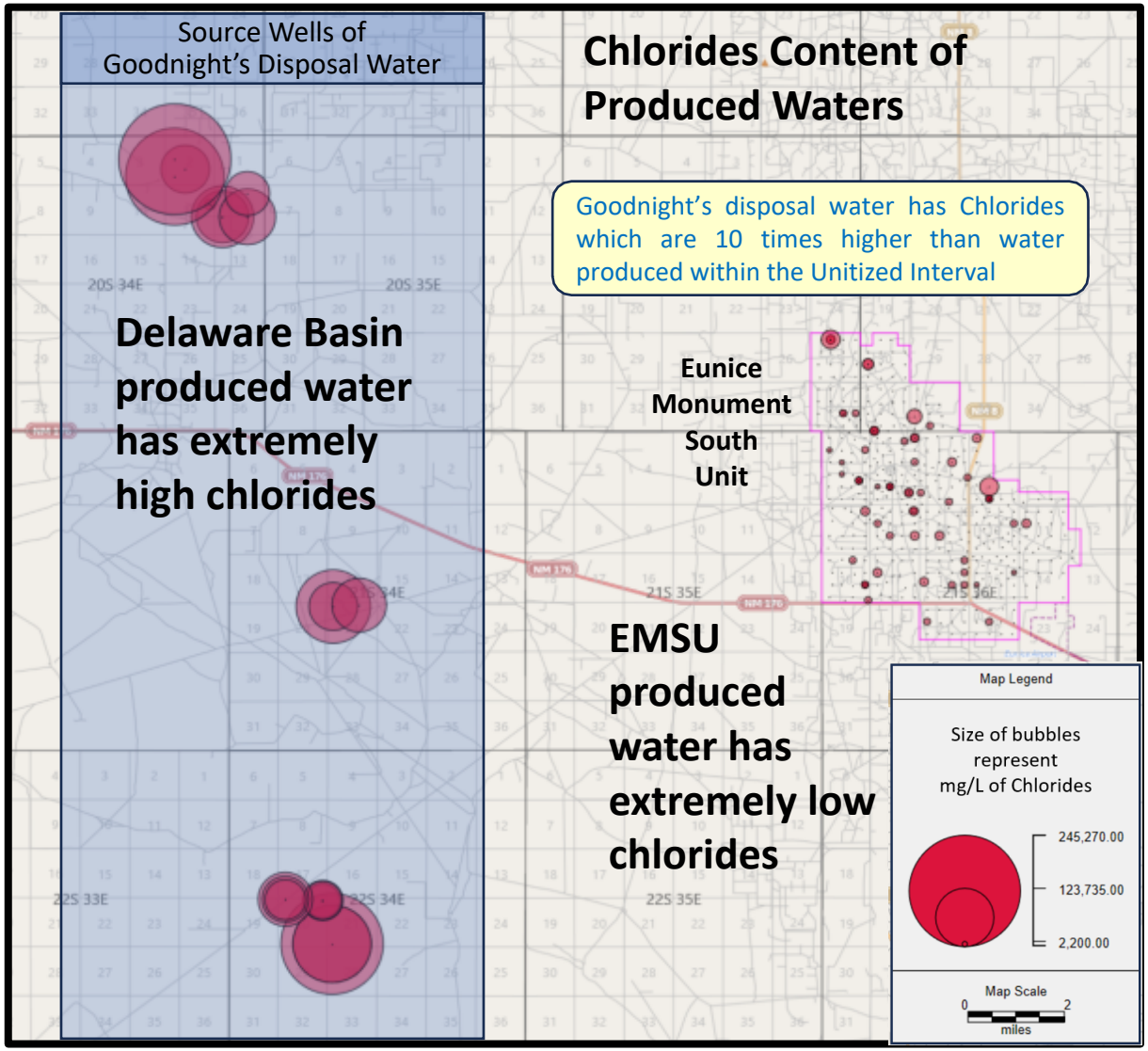


KEY POINTS

- Empire currently operates one San Andres water supply well (EMSU-459) at EMSU near the proposed SWD wells.
- The high salinity disposal water will be produced by this water supply well and will contaminate the Grayburg interval as it is re-injected into the reservoir.
- The chemistry and salinity of Goodnight's disposal water is not compatible with the EMSU water composition.

Exhibit I-9

Contrast of Chlorides content for Goodnight's SWD versus native water within the Unitized Interval.
Data for Goodnight's disposal water was supplied by Goodnight as part of Case No. 22626.
(Piazza SWD #1 application)



KEY POINTS

- The chlorides of the disposal water is much higher than the produced water at EMSU.
- Proves a non-compatible saltwater disposal well should not be allowed.
- A 3rd party operated SWD well should not be allowed to dispose of water in a unitized interval.
- Disposal of off-site water damages the CO2 oil recovery by increasing operating costs and occupying space where CO2 will be injected.
- Damages the existing waterflood oil recovery

Exhibit 1-10

Water Analysis Data for Goodnight's disposal water.
It was supplied by Goodnight as part of Case No. 22626.
(Piazza SWD #1 application)

API	Well Name	Formation	Total Dissolved Solids (TDS), mg/L	Chloride (Cl), mg/L	Sulfate (SO4), mg/L	Bicarnonate (HCO3), mg/L
3002540626	GAUCHO 21 FEDERAL-002H	DELAWARE-BRUSHY CANYON		169,000	341	37
3002540626	GAUCHO 21 FEDERAL-002H	DELAWARE-BRUSHY CANYON		224,384	210	366
3002540626	GAUCHO 21 FEDERAL-002H	DELAWARE-BRUSHY CANYON	266,468	167,562		366
3002541564	GAUCHO UNIT-012H	BONE SPRING 2ND SAND		68,000	97	427
3002541564	GAUCHO UNIT-012H	BONE SPRING 2ND SAND	109,808	66,985	1,030	281
3002541565	GAUCHO UNIT-013H	BONE SPRING 2ND SAND		77,000	1,600	305
3002541565	GAUCHO UNIT-013H	BONE SPRING 2ND SAND	139,905	85,081	740	293
3002541571	GAUCHO UNIT-014H	BONE SPRING 2ND SAND		82,000	624	220
3002541566	GAUCHO UNIT-015H	BONE SPRING 2ND SAND	158,147	96,378	710	232
3002541566	GAUCHO UNIT-015H	BONE SPRING 2ND SAND	184,420	115,274	765	268
3002503587	H L VINSON-1	WOLFCAMP	67,277	66,400	690	187
3002503123	LEA 4O1 STATE-2	WOLFCAMP	60,950	33,568	3,049	1,087
3002502424	LEA UNIT-004H	BONE SPRING	29,436	16,720	1,142	634
3002502429	LEA UNIT-005	BONE SPRING	121,800			
3002502429	LEA UNIT-005	BONE SPRING	202,606	118,100	992	5,196
3002502427	LEA UNIT-1	BONE SPRING	15,429			
3002502427	LEA UNIT-1	BONE SPRING	180,701	108,300	670	1,016
3002502427	LEA UNIT-1	DELAWARE	214,787	132,700	1,816	208
3002502431	LEA UNIT-8	BONE SPRING	147,229	89,640	1,038	108
3002531696	MOBIL LEA STATE-001	DELAWARE	152,064	102,148	691	404
3002532105	MOBIL LEA STATE-003	DELAWARE	296,822	215,237	294	143
3002532466	MOBIL LEA STATE-005	DELAWARE	340,838	245,270	147	229
3002540986	MONK 21 STATE COM-001H	BONE SPRING 2ND SAND		103,000	439	207
3002540986	MONK 21 STATE COM-001H	BONE SPRING 2ND SAND	261,089	160,264	425	122
3002542193	MONK 21 STATE-004H	BONE SPRING 2ND SAND	184,233	112,775	425	488
3002503659	PHILLIPS STATE-1	WOLFCAMP	78,885	47,400	875	354
3002503743	STATE CA-1	WOLFCAMP	167,968	102,800	623	61

This table shows the water chemistry of the waters which Goodnight collects and disposes into EMSU.

KEY POINTS

- Delaware Basin water chemistry is much different than EMSU produced water, with high chlorides increasing corrosion rates and sulfate/bicarbonates increasing scaling tendencies
- This table provided by Goodnight shows chlorides as high as 245,270 mg/L

Exhibit 1-11

Historical Water Analysis Data for Eunice Monument South Unit Unitized Interval (Page 1 of 2)

API	Well Name	Formation	Total Dissolved Solids (TDS), mg/L	Chloride (Cl), mg/L	Sulfate (SO4), mg/L	Bicarbonate (HCO3), mg/L
3002508706	EMSU-221	GRAYBURG/SAN ANDRES	5,482	2,200		1,494
3002504657	EMSU-218	GRAYBURG/SAN ANDRES	6,069	2,320		1,800
3002504456	EMSU-263	GRAYBURG/SAN ANDRES	7,637	3,018	108	1,918
3002504522	EMSU-192	GRAYBURG/SAN ANDRES	7,842	3,144	132	1,937
3002504456	EMSU-263	GRAYBURG/SAN ANDRES	7,866	3,365	54	1,739
3002506321	EMSU-175	GRAYBURG/SAN ANDRES	8,220	4,080	24	1,151
3002504498	EMSU-245	GRAYBURG/SAN ANDRES	8,259	3,020	142	1,296
3002504456	EMSU-263	GRAYBURG/SAN ANDRES	8,317	3,121	34	2,384
3002504504	EMSU-212	GRAYBURG/SAN ANDRES	8,418	3,867	51	1,260
3002504641	EMSU-388	GRAYBURG/SAN ANDRES	8,809	3,632	1,342	677
3002504456	EMSU-263	GRAYBURG/SAN ANDRES	8,816	3,261	109	2,493
3002504653	EMSU-400	GRAYBURG/SAN ANDRES	8,822	2,980	610	2,197
3002504513	EMSU-184	GRAYBURG/SAN ANDRES	9,090	4,000	192	1,828
3002504678	EMSU-409	GRAYBURG/SAN ANDRES	9,161	4,249	416	1,361
3002504670	EMSU-416	GRAYBURG/SAN ANDRES	9,303	5,218	382	264
3002504753	EMSU-446	GRAYBURG/SAN ANDRES	10,200	4,754	456	1,709
3002504456	EMSU-263	GRAYBURG/SAN ANDRES	10,291	4,800	175	1,728
3002504420	EMSU-163	GRAYBURG/SAN ANDRES	10,800	5,200	179	1,810
3002504497	EMSU-244	GRAYBURG/SAN ANDRES	10,815	5,199	529	1,290
3002504678	EMSU-409	GRAYBURG/SAN ANDRES	10,944	4,990	554	1,586
3002504665	EMSU-402	GRAYBURG/SAN ANDRES	10,996	5,856	150	1,184
3002530511	EMSU-620	GRAYBURG/SAN ANDRES	11,100	5,174	599	1,460
3002504497	EMSU-244	GRAYBURG/SAN ANDRES	11,165	5,067	624	1,590
3002504532	EMSU-195	GRAYBURG/SAN ANDRES	11,208	5,412		1,791
3002504684	EMSU-370	GRAYBURG/SAN ANDRES	11,598	6,380	18	1,380
3002504420	EMSU-163	GRAYBURG/SAN ANDRES	11,700	5,900	134	1,730
3002504597	EMSU-305	GRAYBURG/SAN ANDRES	11,739	4,975	181	2,412
3002530511	EMSU-620	GRAYBURG/SAN ANDRES	12,124	5,482	608	1,856
3002504456	EMSU-263	GRAYBURG/SAN ANDRES	12,160	4,814	135	3,095
3002504497	EMSU-244	GRAYBURG/SAN ANDRES	12,315	5,695	640	1,686
3002521902	EMSU-282	GRAYBURG/SAN ANDRES	13,209	6,316	1,070	1,173
3002504463	EMSU-260	GRAYBURG/SAN ANDRES	13,534	6,520	1,174	1,097
3002530511	EMSU-620	GRAYBURG/SAN ANDRES	13,745	6,544	1,058	1,313
3002504497	EMSU-244	GRAYBURG/SAN ANDRES	13,862	5,971	902	1,856
3002504419	EMSU-162	GRAYBURG/SAN ANDRES	13,871	6,780	417	1,751

This table shows the water chemistry of the waters which Empire produces at EMSU.

KEY POINTS

- The water chemistry of produced water at EMSU indicates low chlorides which allows Empire to treat the water at lower costs than would occur if Delaware Basin water enters the production stream.

Exhibit 1-12

Historical Water Analysis Data for Eunice Monument South Unit Unitized Interval (Page 2 of 2)

API	Well Name	Formation	Total Dissolved Solids (TDS), mg/L	Chloride (Cl), mg/L	Sulfate (SO4), mg/L	Bicarbonate (HCO3), mg/L
3002504656	EMSU-384	GRAYBURG/SAN ANDRES	14,072	6,220	42	2,107
3002504678	EMSU-409	GRAYBURG/SAN ANDRES	14,156	6,186	983	1,721
3002504456	EMSU-263	GRAYBURG/SAN ANDRES	14,492	8,037	38	1,734
3002531409	EMSU-639	GRAYBURG/SAN ANDRES	14,661	7,176	1,250	1,056
3002530511	EMSU-620	GRAYBURG/SAN ANDRES	15,151	6,306	1,051	2,105
3002531409	EMSU-639	GRAYBURG/SAN ANDRES	15,677	8,807	305	884
3002504464	EMSU-231	GRAYBURG/SAN ANDRES	15,797	6,393	2,020	1,889
3002534824	EMSU-575	GRAYBURG/SAN ANDRES	15,797	8,338	1,137	880
3002504667	EMSU-401	GRAYBURG/SAN ANDRES	15,882	7,519	367	1,976
3002531426	EMSU-638	GRAYBURG/SAN ANDRES	15,965	7,860	1,452	1,001
3002504562	EMSU-294	GRAYBURG/SAN ANDRES	16,408	8,357	1,410	847
3002504556	EMSU-325	GRAYBURG/SAN ANDRES	17,262	8,018	590	2,306
3002504737	EMSU-441	GRAYBURG/SAN ANDRES	17,562	8,748	106	1,952
3002521902	EMSU-282	GRAYBURG/SAN ANDRES	17,899	9,016	1,192	1,378
3002534824	EMSU-575	GRAYBURG/SAN ANDRES	17,934	9,432	1,389	934
3002529826	EMSU-459	GRAYBURG/SAN ANDRES	18,031	8,711	2,463	525
3002504321	EMSU-104	GRAYBURG/SAN ANDRES	18,200	10,000	558	1,070
3002534824	EMSU-575	GRAYBURG/SAN ANDRES	18,385	9,523	1,462	931
3002504540	EMSU-286	GRAYBURG/SAN ANDRES	18,408	10,604	290	898
3002504555	EMSU-323	GRAYBURG/SAN ANDRES	18,542	9,402	650	1,513
3002504321	EMSU-104	GRAYBURG/SAN ANDRES	18,800	10,100	512	1,410
3002504570	EMSU-321	GRAYBURG/SAN ANDRES	19,590	10,162	677	1,342
3002504688	EMSU-404	GRAYBURG/SAN ANDRES	20,286	10,900	231	1,818
3002504473	EMSU-209	GRAYBURG/SAN ANDRES	20,770	10,623	917	1,415
3002504447	EMSU-179	GRAYBURG/SAN ANDRES	22,277	12,064	169	1,279
3002504513	EMSU-184	GRAYBURG/SAN ANDRES	22,897	11,905	1,130	1,171
3002504655	EMSU-361	GRAYBURG/SAN ANDRES	23,547	8,304	512	2,050
3002504604	EMSU-306	GRAYBURG/SAN ANDRES	24,581	12,363	354	835
3002529396	EMSU-117	GRAYBURG/SAN ANDRES	24,857	13,881	1,522	743
3002529396	EMSU-117	GRAYBURG/SAN ANDRES	25,848	14,249	1,579	865
3002504689	EMSU-377	GRAYBURG/SAN ANDRES	26,813	11,901	529	1,781
3002506207	EMSU-157	GRAYBURG/SAN ANDRES	42,129	24,973	475	806
3002504320	EMSU-107	GRAYBURG/SAN ANDRES	46,200	27,000	401	1,920
3002504458	EMSU-236	GRAYBURG/SAN ANDRES	59,126	32,804	4,357	18

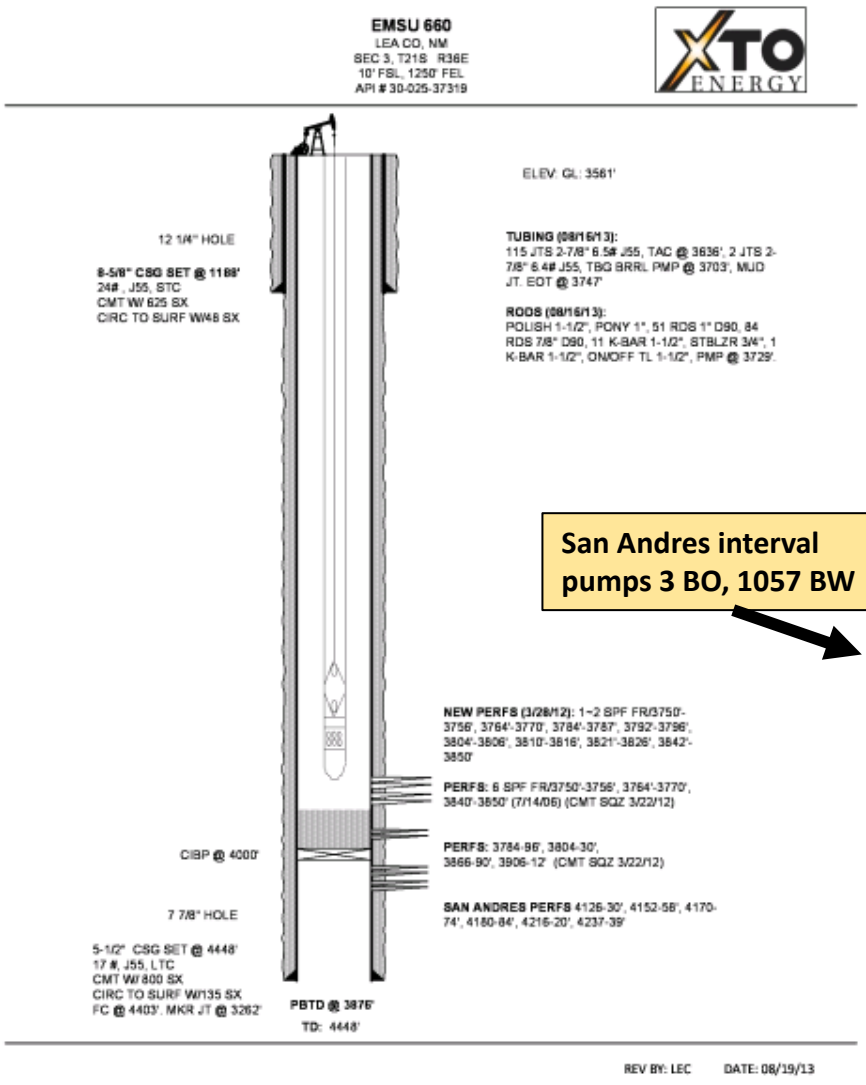
This table shows the water chemistry of the waters which Empire produces at EMSU.

KEY POINTS

- The water chemistry of produced water at EMSU indicates low chlorides which allows Empire to treat the water at lower costs than would occur if Delaware Basin water enters the production stream.

Exhibit 1-13

EUNICE MONUMENT SO. UNIT #660
WELLBORE DIAGRAM



San Andres interval pumps 3 BO, 1057 BW

DATA

LOCATION: 10' FSL & 1250' FEL, SEC 3, T21S & R36E
COUNTY/STATE: LEA, NM
FIELD: EUNICE MONUMENT
FORMATION: SAN ANDRES
SPUD DATE: 10/19/05 **COMPLETION DATE:** 3/10/06
API #: 30-025-37319
STATUS: ESP
IIP: 11 BPD, 5 MCFD, 158 BW

WELL HISTORY

COMPLETION DATA:

12/06/05: PERF THE FOLLOWING INTERVALS: 4237' - 4239', 4216' -4220', 4180' - 4184', 4170' - 4174', 4152' - 4158' & 4126' - 4130'. PPI ACID RESULTS: 4237' - 4239'. SPOTTED 2 BBLS OF ACID TO END OF TBG. PERFS BROKE AT 800#. 4,216' - 4,220', PMPD IN 3-1/2 BBLS OF ACID W/5 BW. PRESS UP ON PERFS TO 800#. PERFS COMMUNICATED W/LOWER SET. 4,180' - 4,184', PMPD 7 BBLS OF ACID . PERFS BROKE AT 800#. 4,170' - 4,174', PMPD IN 7 BBLS OF ACID. PERFS BROKE AT 800#. 4,152' - 4,158', PMPD IN 1.5 BBLS OF ACID IN 2 HRS. PRESS UP ON PERFS TO 1,500 PSIG. PERFS NEVER DID BREAK. 4,126' - 4,130', PMPD IN 7 BBLS OF ACID . PERFS BROKE @ 800#. FLUSHED ACID TO BTM W/25 BW. SWBD 545 BBLS WTR IN 2 DAYS, BFL 1300 FFS, EFL 1100 FFS. SWBD PERFS FR 4216 TO 4239'. BFL @ 1300' FFS. MADE 6 SWB RUNS. REC 25 BW. SWB RUN #3 SHOWED SOME GAS. EFL 1,300' FFS. SWB PERFS FR 4180' TO 4184'. BFL @ 1000' FFS. MADE 5 SWAB RUNS. REC 41 BW. SHOWED SOME GAS. EFL 1,600 FFS. SWB PERFS FR 4170' TO 4174'. BFL @ 1,100 FFS. MADE 5 RUNS. REC 39 BW. SHOWED SOME GAS. EFL @ 1600 FFS. SWB PERFS FR 4152' TO 4158'. BFL @ 900 FFS. MADE 5 RUNS. REC 20 BW. SHOWED NO GAS & SWBD DRY ON LAST RUN. SWAB PERFS FR 4126' TO 4130'. BFL @ 1,200 FFS. MADE 4 RUNS. REC 19 BW. EFL 1,300 FFS. SHOWED SOME GAS.

01/10/06: IN 24 HRS, WELL PMPD 3 BO, 1057 BW & 190 MCF. RUNNING 75 HZ. FAP 60'.

02/28/06: PERF THE FOLLOWING INTERVALS : 3906' - 3912', 3866' -3890', 3804' - 3830', & 3784' - 3796'. PMPD 250 GALS ACID INTO EACH SET OF PERFS. ISIP VAC. SWBD PERFS: 3,784' TO 3912'. SWBD DRY. REC 61 BW & 1 BO. RUN 2" INSERT PUMP. PI @3934'

03/01/06: A. PERFS: 3,866' - 3,912'. SPOTTED 500 GALS OF 15% NEFE HCL ACID. A. 3784' - 3830' @ 1 BPM @ 722 PSIG W/ 500 GALS OF 15% NEFE HCL ACID.

03/02/06: RIH W/7K COMPOSITE PLUG. SET PLUG @ 4,000'. RIH W/2 7/8" TBG, PMP & RODS.

03/07/06: LUFKIN SET AN AMERICAN 912-365-168 PMPG UNIT. RUNNING @ 7.5 SPM

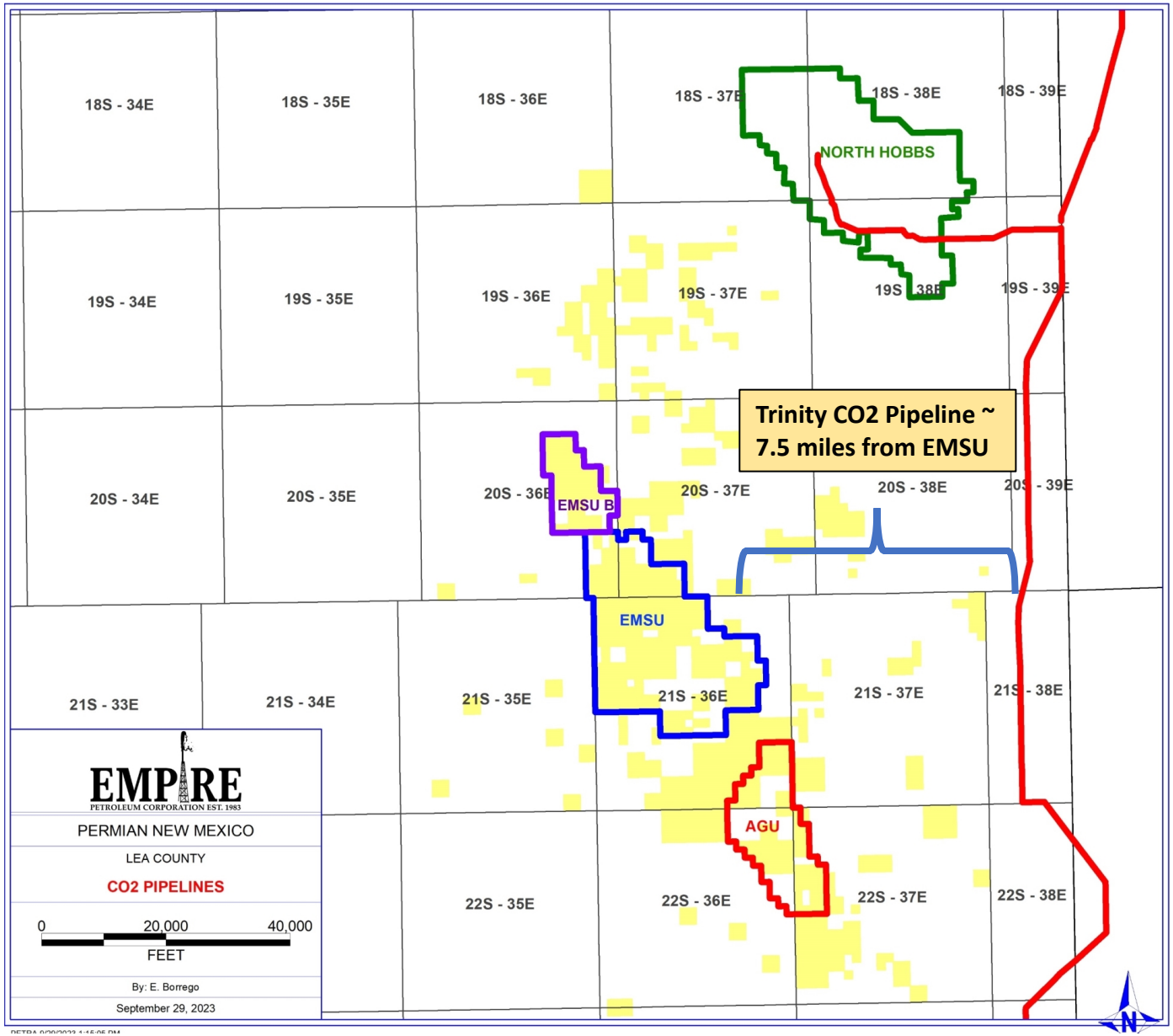
03/09/06: IN 24 HRS, WELL PMPD 11 BO, 158 BW & 5 MCF. RUNNING 50% ON TIMER. FAP 0'.

07/11/06: SONIC HAMMER WASHED PERFS FR/3784'-3912' W/180 BBLS 8.6# BRINE WHILE CIRC TO REV PIT. CIRC. SONIC HAMMERED PERFS W/3000 GALS 20% NEFE HCL (APPROX 20 BBLS PER STD). FLUSHED ACID TO BTM W/9 BW. DROPPED BALL TO SHIFT SLEEVE IN TOOL. AVG BPM 4.6. AVG IN PRESS 1630 PSIG. SITP 5" 0 PSIG (VAC). SWBD. BFL @ 2600' FS. MADE 62 RUNS, REC 222 BW W/TRACE OIL & SOME GAS & 3.5 BO. EFL @ 3100' FS. PERF W/6 SPF @ 60 DEG PHASING FR/3840'-3850', 3764'-3700', 3750'-3756'. TREATED EACH SET OF PERFS W/500 GALS 20% HCL. PERFS COMMUNICATED INSTALY W/LWR SET OF PERFS BELOW. SIPT 5" 0 PSIG (VAC). AIR 0.4 BPM, MAX PRESS 1500 PSIG, MIN PRESS 0 PSIG, AVG PRESS 700 PSIG. SWBD. BFL @ 1800' FS. MADE 53 RUNS IN 307 HRS. SHOWED SME GAS W/EACH RUN. EFL @ 2100' FS. RIH W/5-1/2" RBP & PKR ON EOT. LOADED W/6 DRUMS T-249 & 5 GALS DP-61 MIXZED W/72 BBLS FW. PMPD 26 BBLS OF PILL MIXTURE INTO PERFS FR/3866'-3912'. MIXED W/5 GALS RN-

KEY POINTS

- Further proof of oil in the San Andres
- Oil saturation seen on core and logs justified San Andres tests on at least 6 wells in EMSU

Exhibit 1-14



KEY POINTS

- CO_2 is proven in the region with Hobbs Field currently being CO_2 flooded ~10 miles from EMSU
- CO_2 infrastructure is in close proximity to EMSU and there are natural and anthropogenic CO_2 sources available to conduct the flood
- Disposal of saltwater into San Andres impacts Empires ability to do a successful CO_2 flood due to increased CO_2 purchase (greater pressure increases CO_2 volume factor) and greater water handling requirements (all water must be reinjected).
- This damage by saltwater disposal could impact the recovery of 250 – 600+ million barrels of oil for the Royalty Owners, State and the Federal Government

Goodnight San Andres SWD Wells Impacted Areas
Current (June 1, 2024) Impact and Impact after 1, 5, 10, and 20 years

Exhibit 1-15

						Assumes SWD starts June 1, 2025 for Application Wells				
			San Andres Net-to-Gross	50%						
			Porosity	10%						
			Swi	30%		Current Cum Volume + Added Equivalent Volume (ACRES Affected)				
			So	30%		1-Jun-24	1-Jun-25	1-Jun-29	1-Jun-34	1-Jun-44
#	API #	Inside or Outside EMSU	Well	1-Jun-24 Cumulative Volume Barrels	Current SWD Rate BWPD	Current Impacted Area Acres	1 year in future Impacted Area Acres	5 years in future Impacted Area Acres	10 years in future Impacted Area Acres	20 years in future Impacted Area Acres
1		Inside	Hodges	-	40,000	-	-	684	1,540	3,251
2		Inside	Doc Gooden	-	40,000	-	-	684	1,540	3,251
3		Inside	Piazza	-	40,000	-	-	684	1,540	3,251
4		Inside	Seaver	-	40,000	-	-	684	1,540	3,251
5		Inside	Hernandez	-	40,000	-	-	684	1,540	3,251
6	30-025-50634	Inside	Andre Dawson	7,297,067	40,000	72	217	794	1,516	2,961
7	30-025-50633	Inside	Ernie Banks	5,516,807	40,000	55	199	777	1,499	2,943
8	30-025-43901	Inside	Ryno	16,607,459	16,441	181	247	509	837	1,492
9	30-025-47947	Inside	Sosa SA 17	19,930,696	29,477	302	465	1,118	1,934	3,565
10	30-025-46382	Outside	Yaz 28	17,714,270	18,125	155	184	300	445	735
			TOTAL	67,066,299	344,043	766	1,312	6,920	13,930	27,950
			Inside EMSU - 4 wells	49,352,029	125,918	610	1,128	3,198	5,786	10,962
			Inside EMSU - 9 wells	49,352,029	325,918	610	1,128	6,620	13,485	27,215
			Outside EMSU	17,714,270	18,125	155	184	300	445	735

KEY POINTS

- Goodnight has disposed of approximately 67,066,299 barrels of water into wells inside and near EMSU as of June 1, 2024. Since this disposal volume displaces an equivalent volume of water in the San Andres interval while being injected, the impacted area is based upon 134,132,598 barrels (2 times), indicating 766 acres has been impacted.

- Yaz-28 slightly outside EMSU is included because its water injection volume plus displaced volume will trespass inside EMSU boundary by June 1, 2025 if allowed to continue disposal.

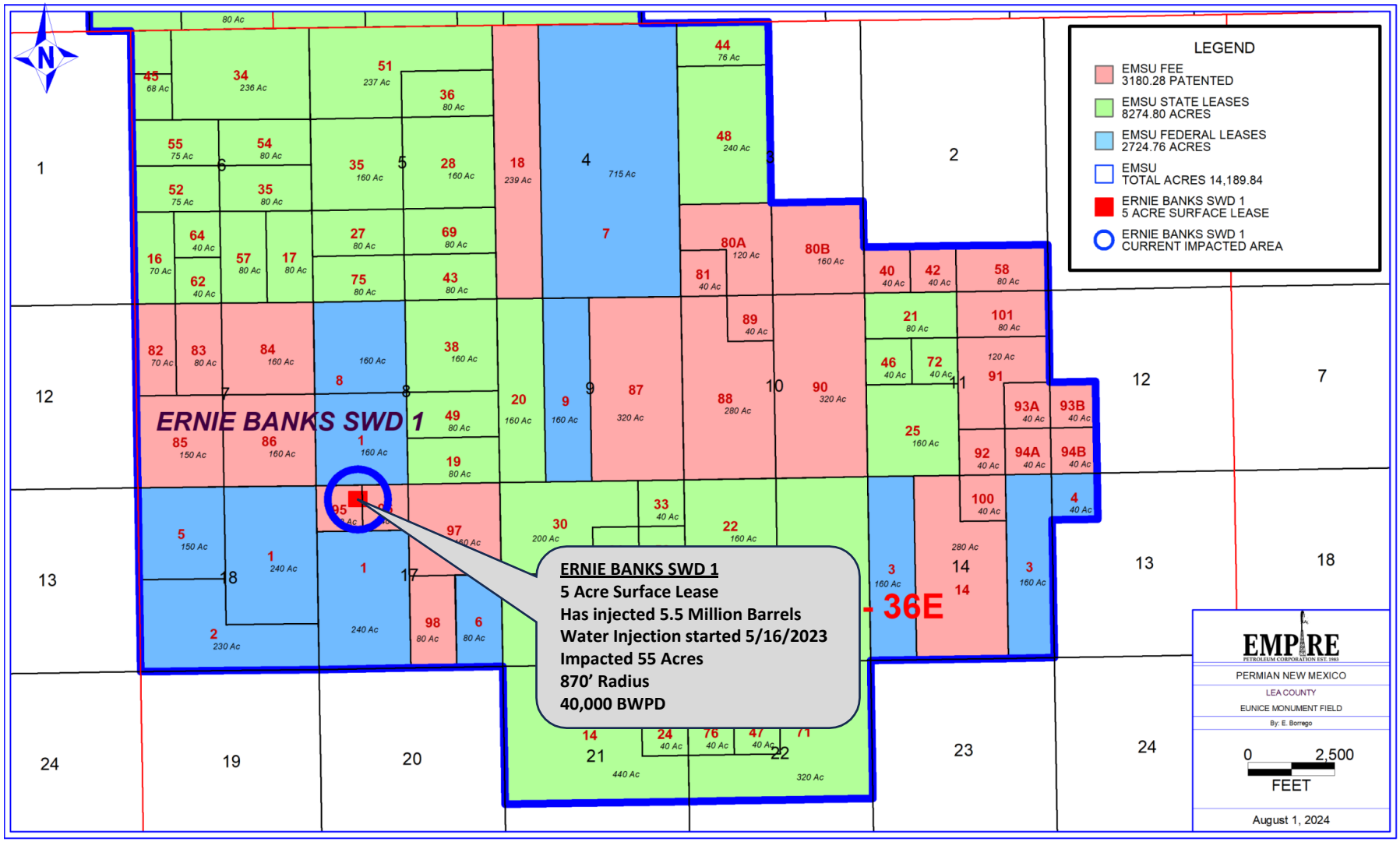
- Impacted areas after 1, 5, 10, and 20 years are calculated and it is seen that after 10 years water disposal, 13,930 acres will have been impacted. This is 98% of the EMSU total 14,189.84 acres.

- After 20 years the impacted area grows to 27,950 acres which is close to twice the size of EMSU.

GOODNIGHT MIDSTREAM PERMIAN, LLC

ERNIE BANKS SWD 1

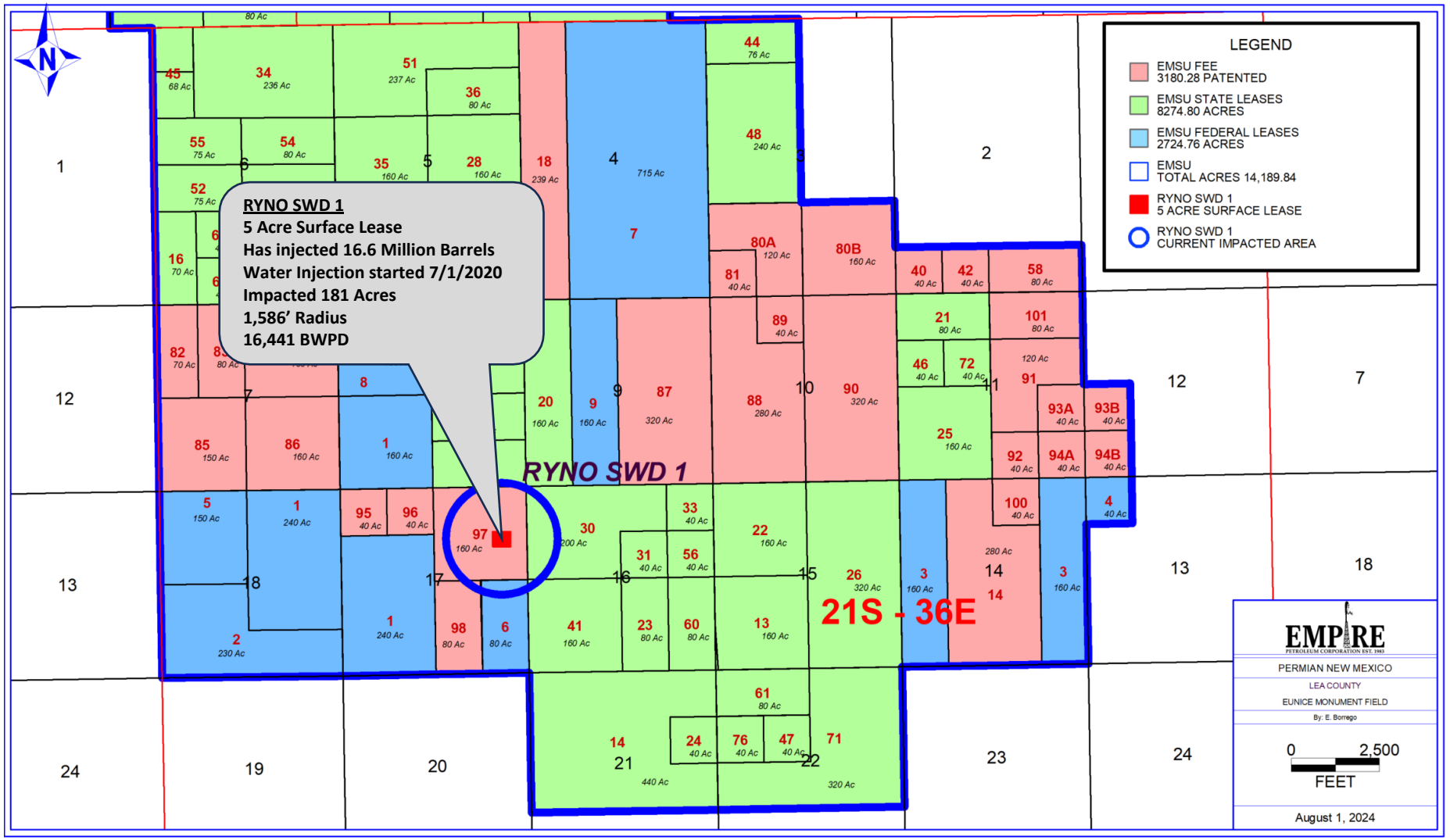
Exhibit I-16 (a)



GOODNIGHT MIDSTREAM PERMIAN, LLC

RYNO SWD 1

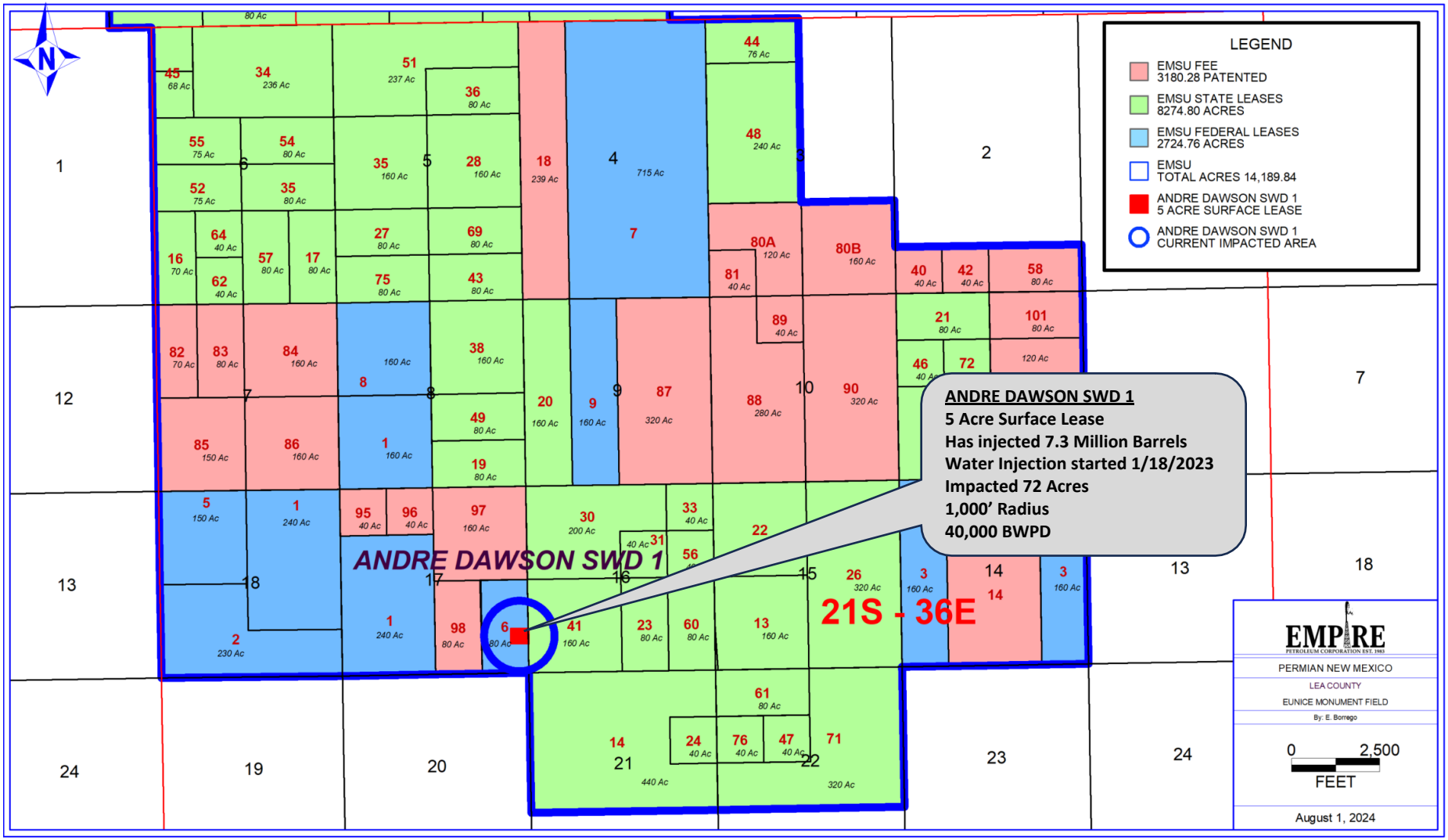
Exhibit I- 18 (b)



GOODNIGHT MIDSTREAM PERMIAN, LLC

ANDRE DAWSON SWD 1

Exhibit I- 18 (c)



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GOODNIGHT MIDSTREAM PERMIAN, LLC

SOSA SA 17 SWD 2

Exhibit I-16 (d)

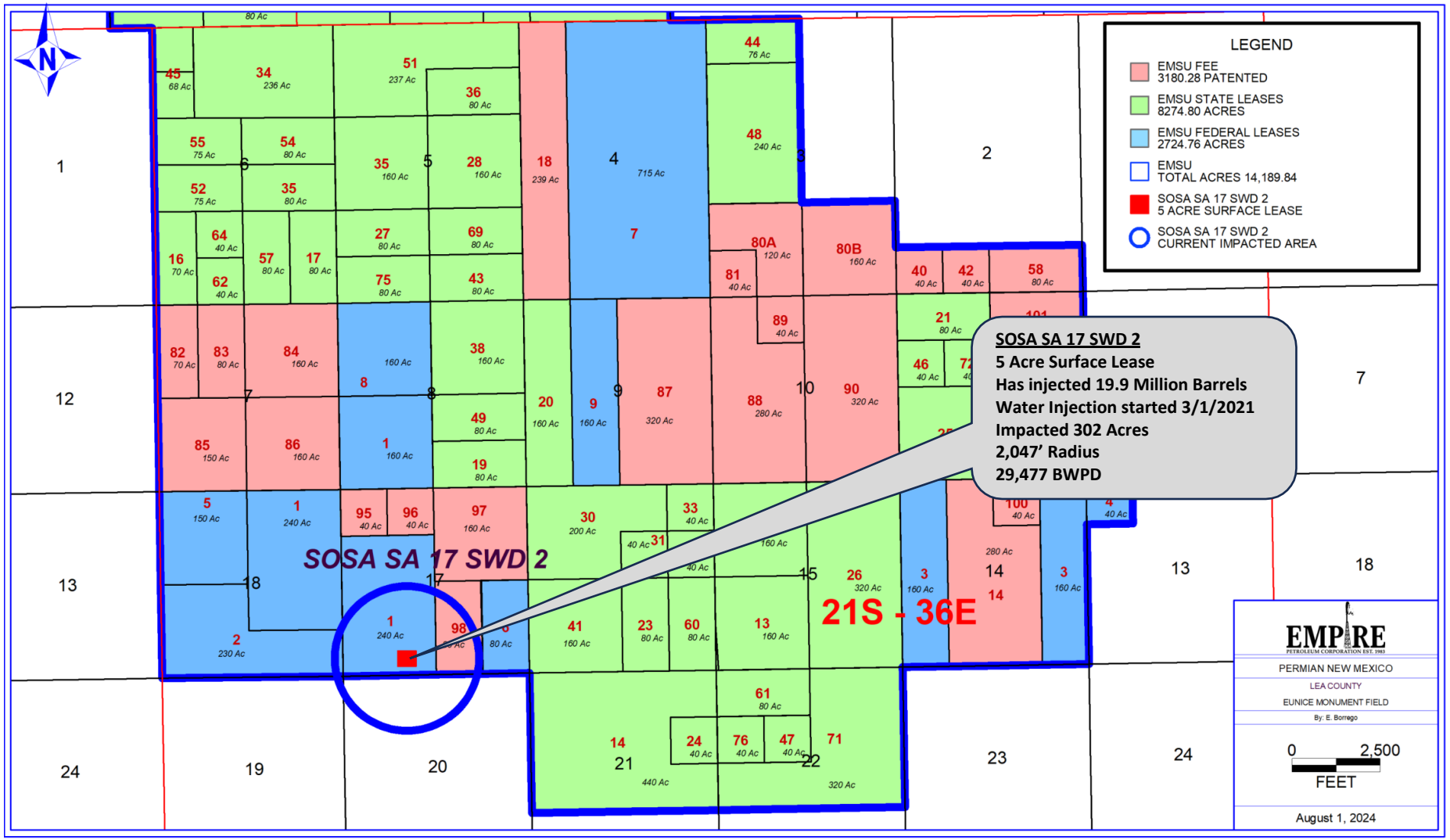
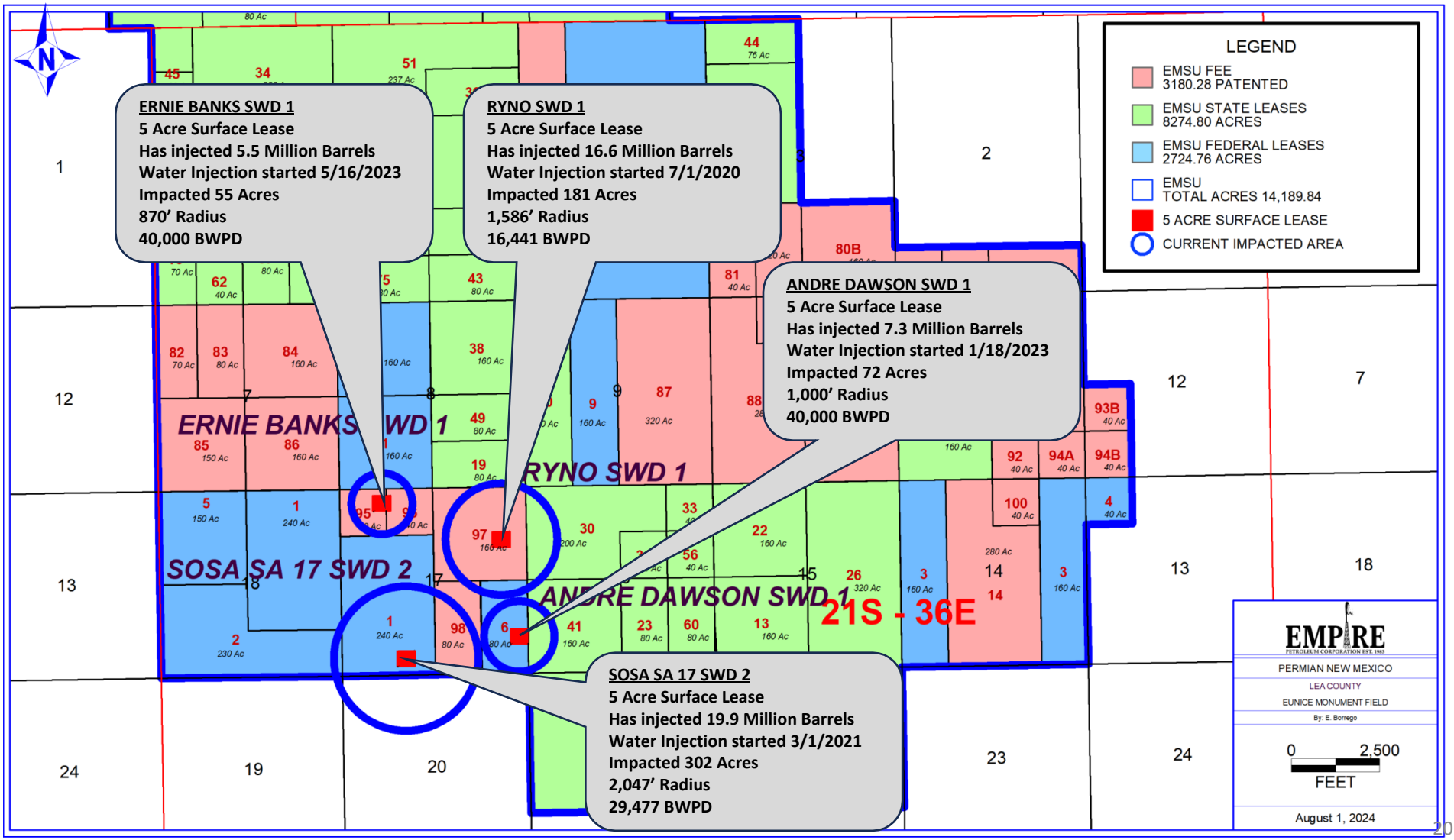


Exhibit I-18 (e)

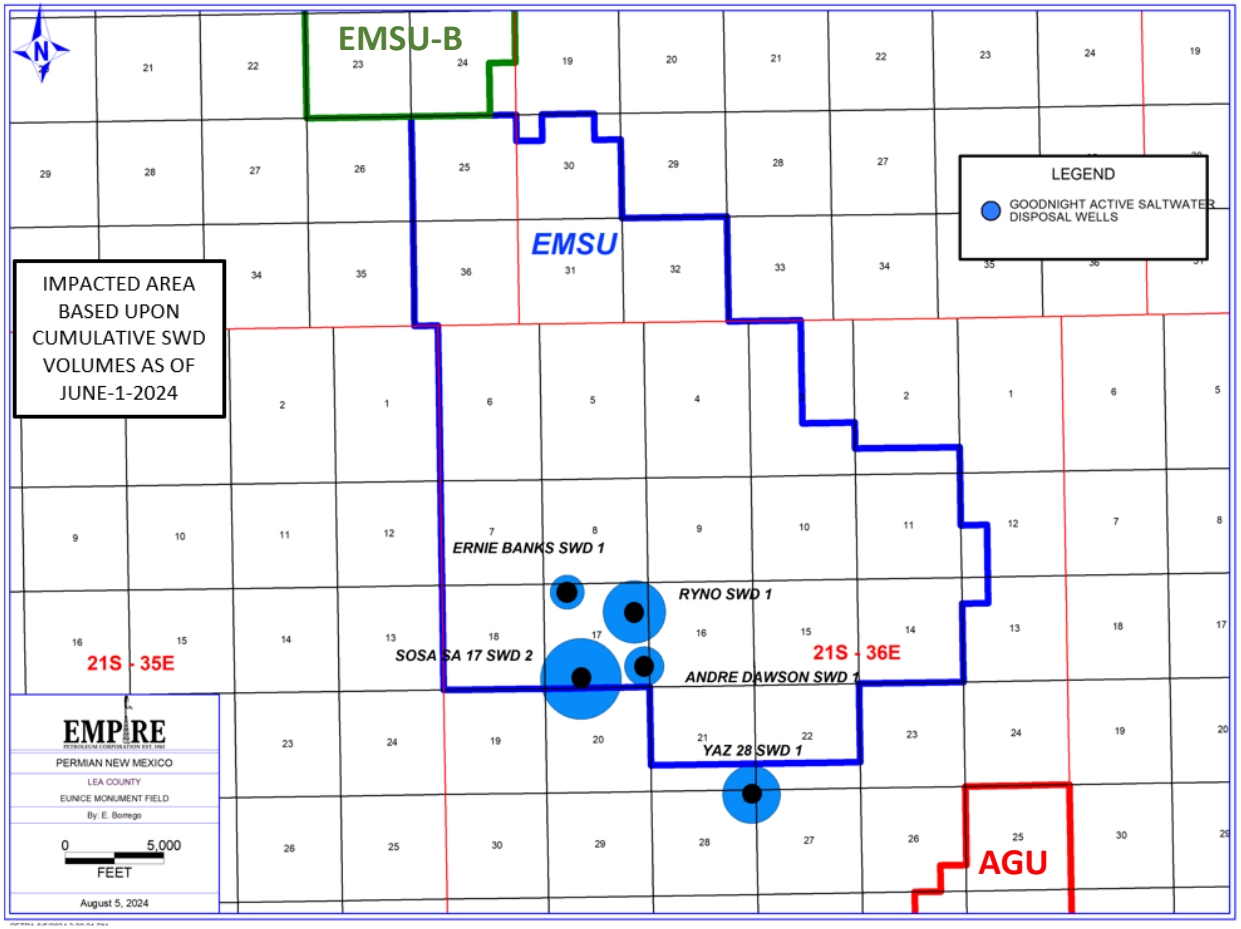
GOODNIGHT MIDSTREAM PERMIAN, LLC



GOODNIGHT MIDSTREAM PERMIAN, LLC

CURRENT ESTIMATED SWD EXPOSURE AREAS BASED UPON DISPOSAL VOLUME (JUNE 1, 2024)

Exhibit 1-17



KEY POINTS

- To determine the damage already caused by Goodnight saltwater disposal, we look at impacted areas around the 4 active SWD wells inside EMSU and 1 well outside EMSU which will trespass upon EMSU this year
- These wells have disposed of 67 million barrels saltwater, impacted a total of 766 acres and have raised San Andres reservoir pressure above original conditions.
- The Sosa SWD has impacted 302 acres, Ryno 181 acres, Yaz 28 155 acres, Andre Dawson 72 acres, and Ernie Banks 55 acres as of June 1, 2024.
- Disposal from all SWD wells is negatively impacting Grayburg oil production due to uncontrolled water influx from the San Andres.
- The increased San Andres reservoir pressure will also make it more costly to perform a CO_2 flood across the ROZ interval.

Exhibit I-18

EMSU Has Seen Steep Decline in Oil Production over Past 9 Months

EMSU Waterflood Report (Daily Volumes)

	Oil Produced (BBLS/DAY)	Water Produced (BBLS/DAY)	Gas Produced (MCF/DAY)	Water Injected (BBLS/DAY)
Nov-2023	835	68,698	516	71,349
Dec-2023	806	69,382	462	70,354
Jan-2024	823	69,313	434	69,630
Feb-2024	814	75,034	458	73,501
Mar-2024	828	73,201	483	68,635
Apr-2024	819	70,849	480	71,398
May-2024	752	65,702	317	66,155
Jun-2024	777	71,882	503	69,267
Jul-2024	723	70,285	508	67,559

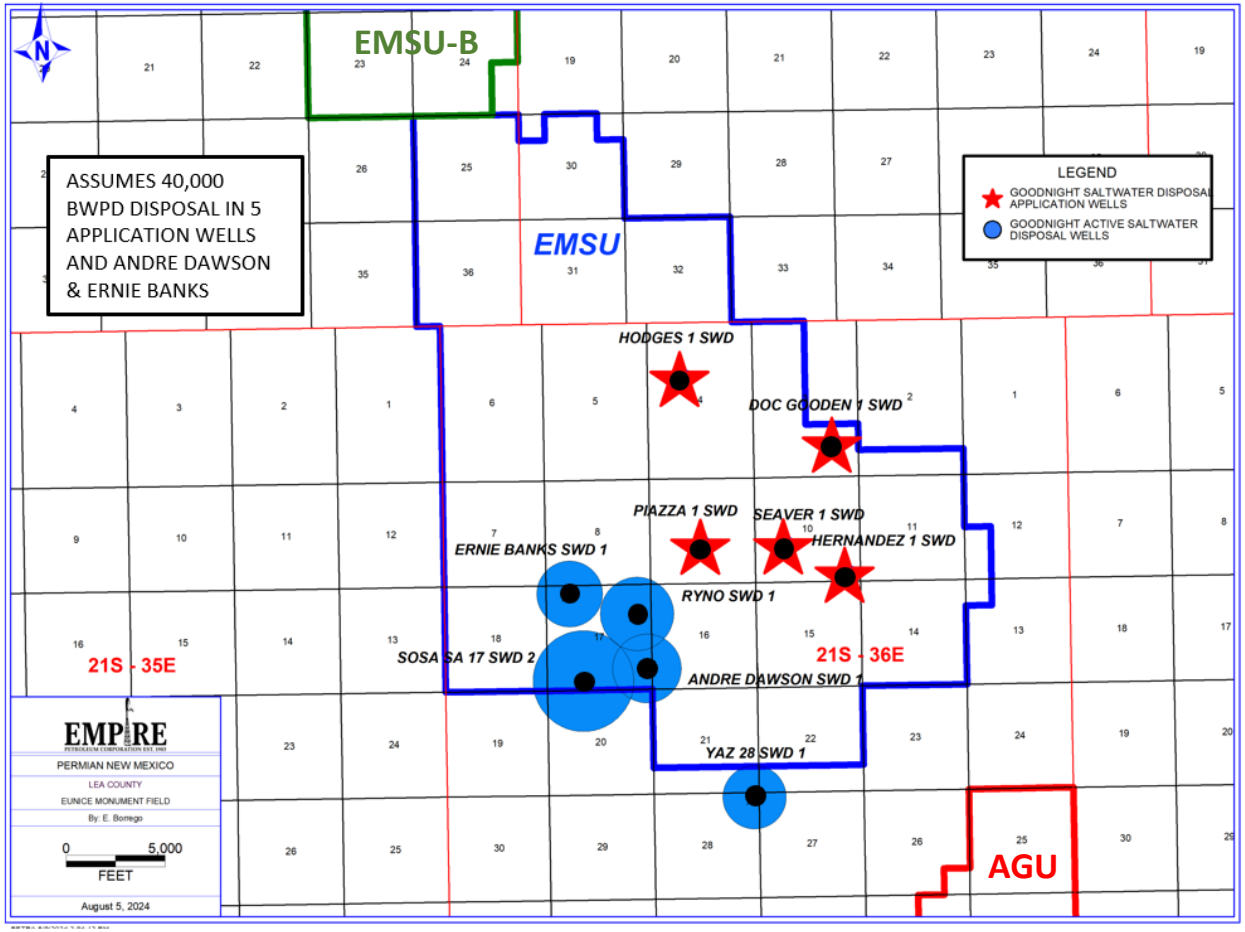
Field reported (unallocated) volumes

KEY POINTS

- EMSU portion of monthly report sent to NMOCD and State
- 13.4% decline in EMSU production (850 BOPD to 723 BOPD) over the past 9 months is abnormally high.
- Empire believes some of this decline is caused by Goodnight water disposal inside EMSU.
- Oil production will continue to be impacted as more volume is injected.
- Water disposal inside the unit should not be allowed.

GOODNIGHT MIDSTREAM PERMIAN, LLC

ESTIMATED SWD EXPOSURE AREA AFTER 1 ADDITIONAL YEAR OF DISPOSAL (JUNE 1, 2025)



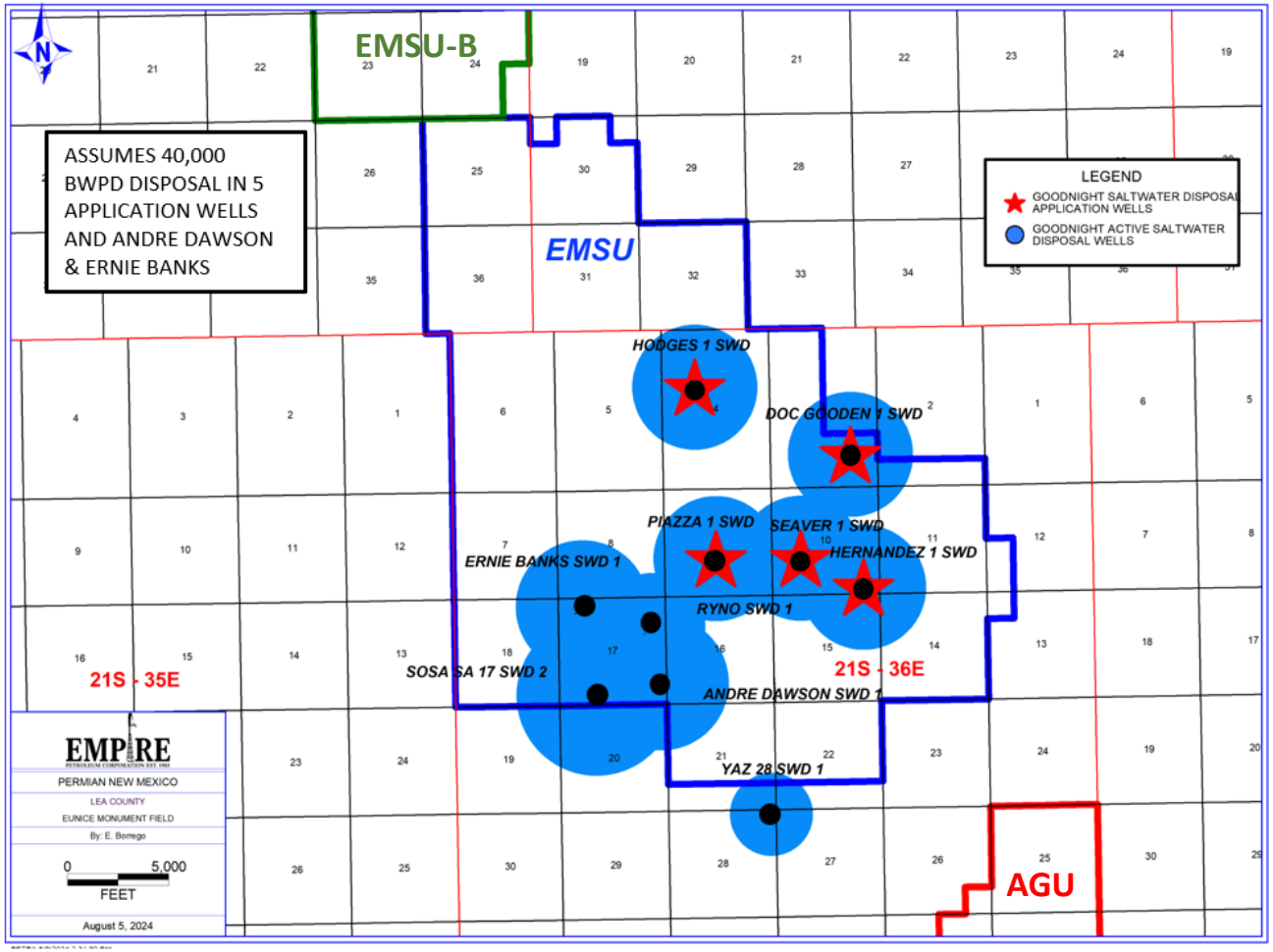
KEY POINTS

- To understand the impact Goodnight has had upon our operations, we calculate the area impacted by their past water disposal and what it will be like after 1, 5, 10, and 20 additional years of disposal.
- By June 1, 2025 the Sosa will have impacted 465 acres, Ryno 247 acres, Andre Dawson 217 acres, Ernie Banks 199 acres, and Yaz-28 184 acres.
- All four wells inside EMSU will be trespassing on other State and Federal lands outside Section 17 and Yaz-28 will be trespassing onto EMSU by this time.
- The assumption is that the 5 application wells will begin disposal on June 1, 2025 so no impact is shown for these wells on this date.
- Each well inside EMSU is assigned only 5 acres surface lease so the disposal will begin pushing water outside the assigned lease in 13 days and result in trespass upon State and Federal lands.

GOODNIGHT MIDSTREAM PERMIAN, LLC

ESTIMATED SWD EXPOSURE AREA AFTER 5 ADDITIONAL YEARS OF DISPOSAL (JUNE 1, 2029)

Exhibit 1-20

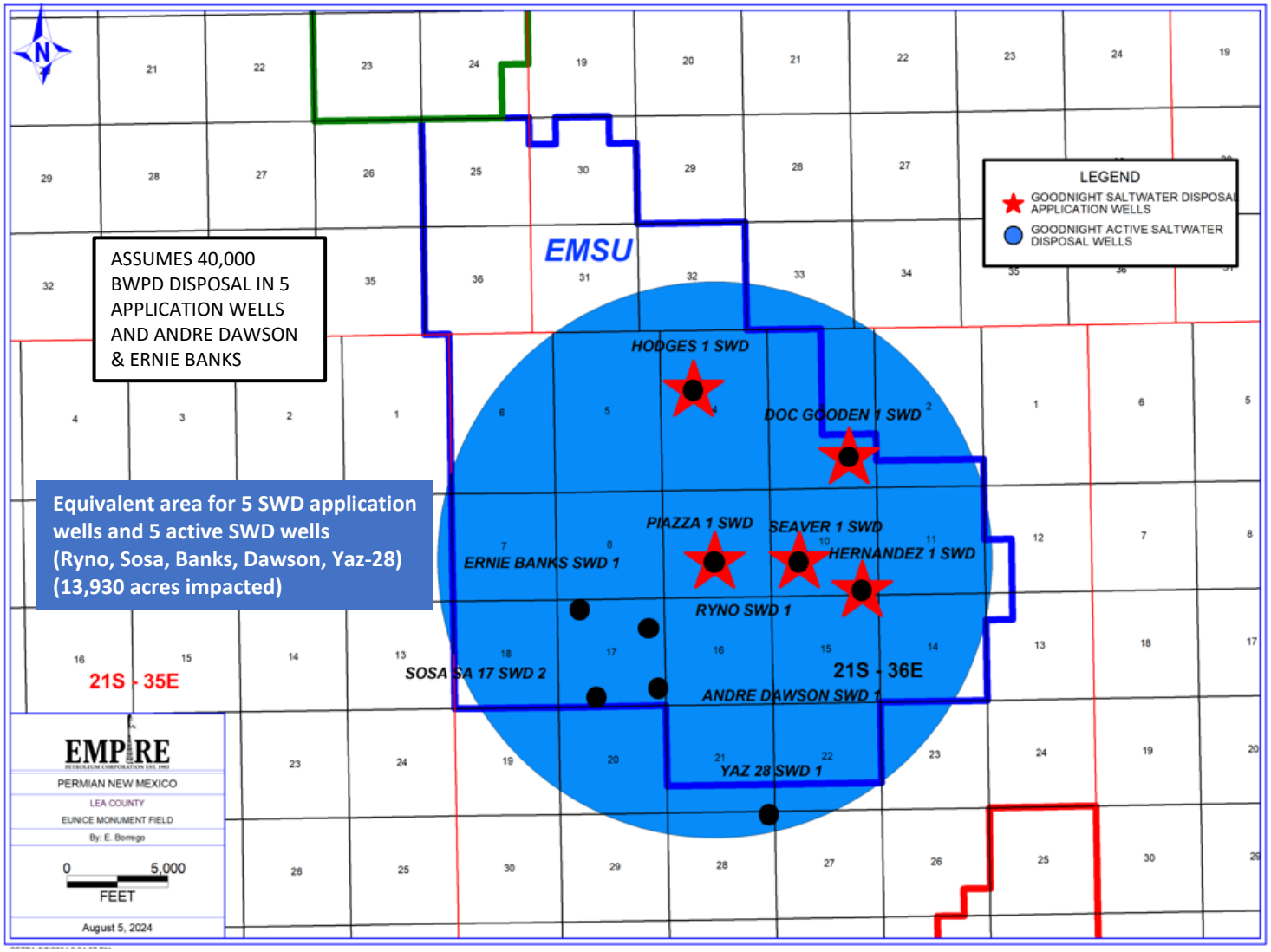


KEY POINTS

- By June 1, 2029, water disposal rate from Goodnight's 10 SWD wells inside and near EMSU will be 344,000 BWPD.
- The 5 new wells (200,000 BWPD) will have disposed of 58.4 million barrels each over the 4-year period since start-up June-1-2025, and will have impacted 684 acres each.
- The other 4 disposal wells inside EMSU will have impacted a total of 3198 acres with total disposal rate of 126,000 BWPD.
- Yaz-28 SWD #1 (18,000 BWPD) impacted area will have grown to 300 acres, with further trespass inside EMSU.
- Total impacted area will be 6920 acres.

GOODNIGHT MIDSTREAM PERMIAN, LLC

ESTIMATED SWD EXPOSURE AREA AFTER 10 ADDITIONAL YEARS OF DISPOSAL (JUNE 1, 2034)

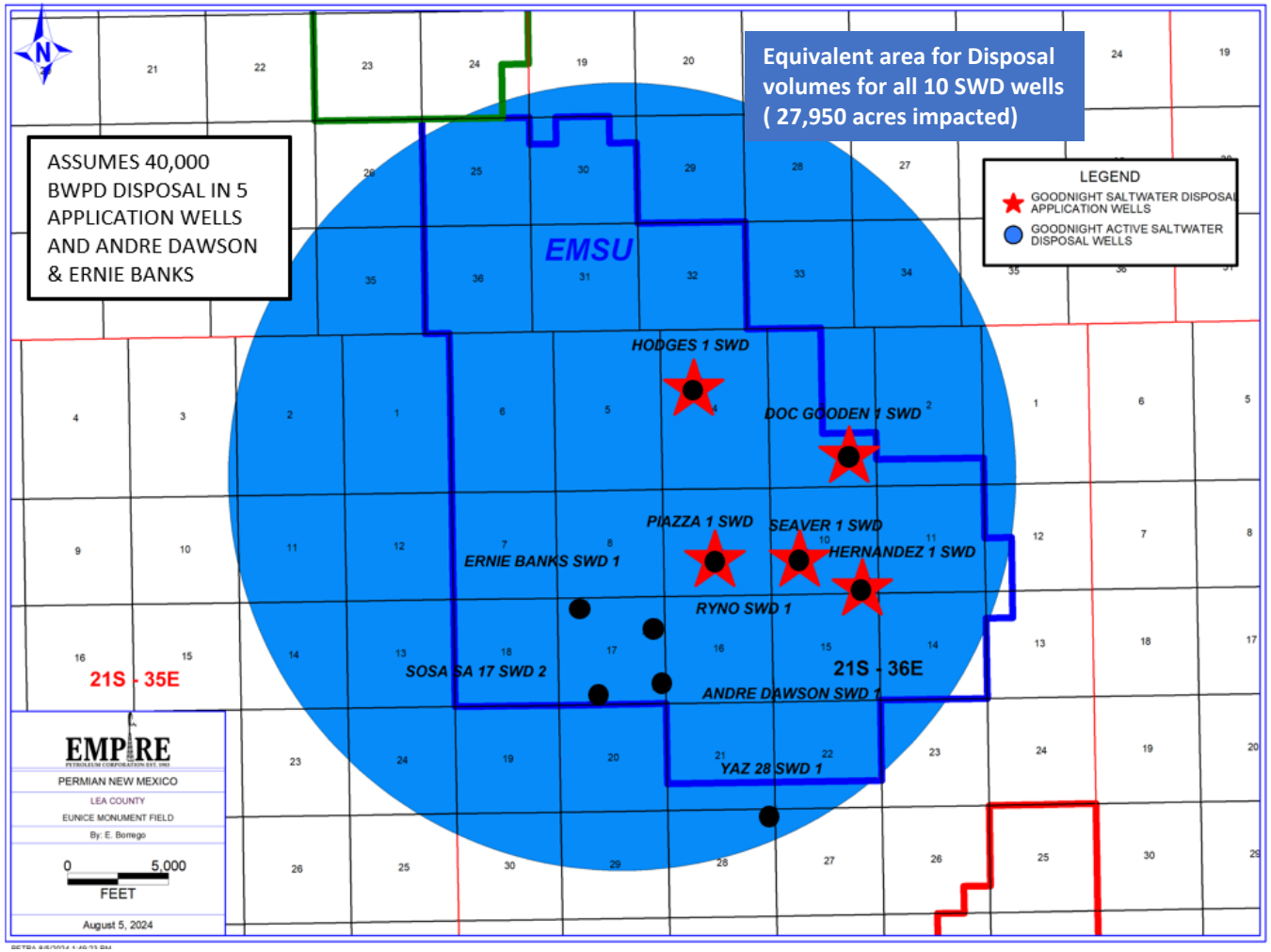


KEY POINTS

- By June 1, 2034, the total area impacted will have grown to 13,930 acres which is 98% the size of EMSU.
- A total of 1.15 billion barrels of saltwater will have been disposed of inside the EMSU and another 38 million by Yaz-28.
- This total of 1.15 billion barrels of saltwater displaces another 1.15 billion barrels within the San Andres, with some portion finding flowpaths through natural fractures into the Grayburg

GOODNIGHT MIDSTREAM PERMIAN, LLC

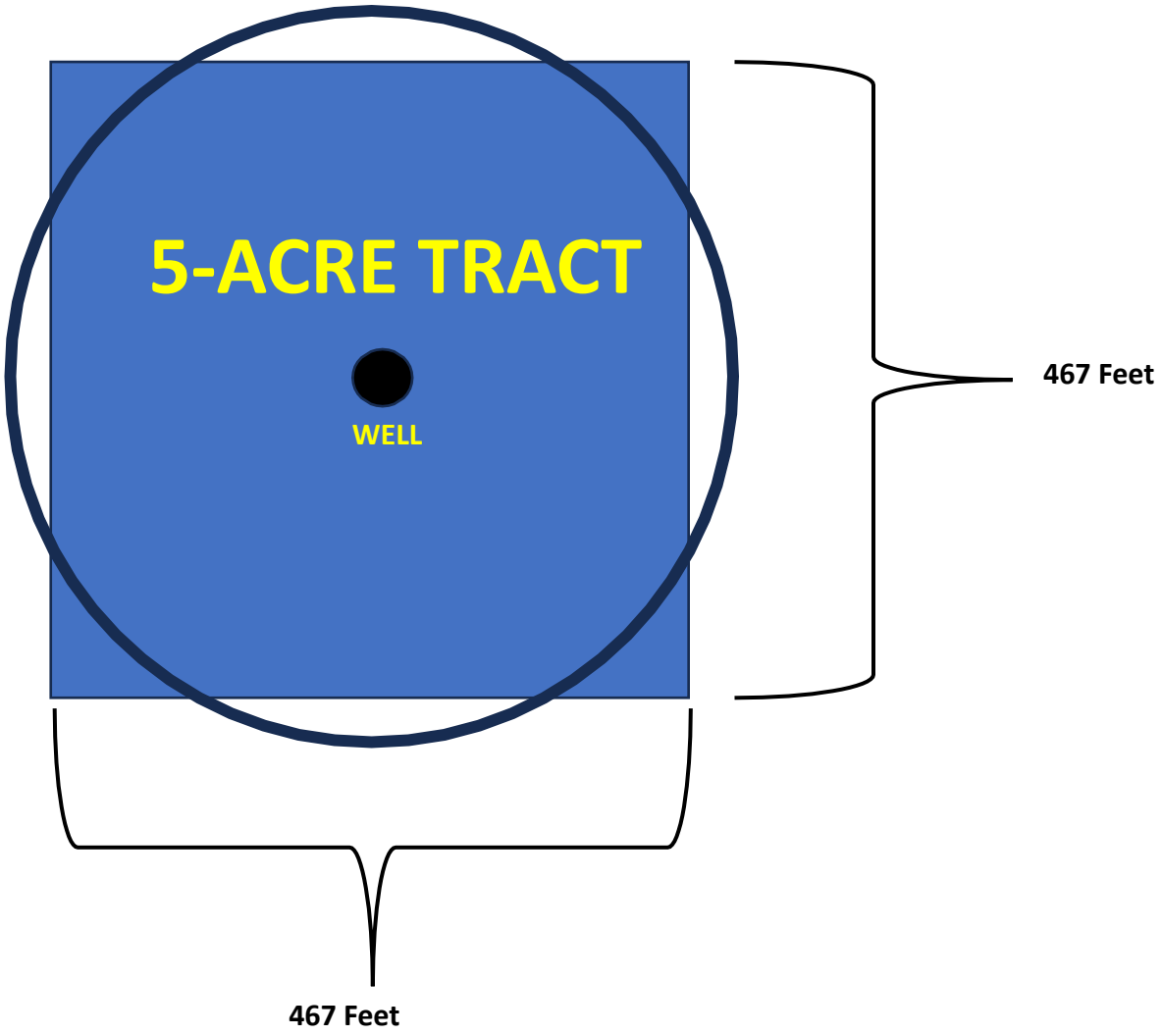
ESTIMATED SWD EXPOSURE AREA AFTER 20 ADDITIONAL YEARS OF DISPOSAL (JUNE 1, 2044)



KEY POINTS

- After 20 years of disposal the area impacted by the 10 SWD wells is 27,950 acres, 97% more than the size of EMSU = 14,189.84 acres)
- A total of 2.37 billion barrels of saltwater will have been disposed of and 2.37 billion barrels displaced by the disposal water, thus contacting the natural fractures and allowing the influx of water into the Grayburg at rates as high as 50,000 BWPD.
- All primary, secondary and tertiary oil recovery has been overwhelmingly damaged by SWD operations and will get worse if allowed to continue.

WATER DISPOSAL OF 40,000 BWPD WILL IMPACT THE 5-ACRE TRACT ASSIGNED TO EACH WELL IN 13 DAYS

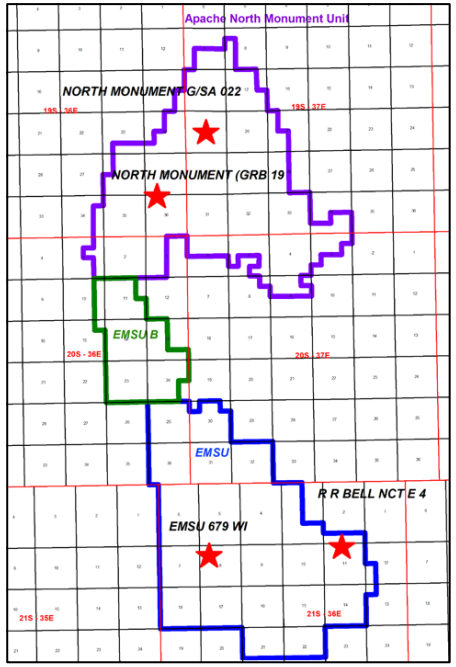


KEY POINTS

- Storage capacity of 5-acre tract is 1,008,540 barrels.
- From the start of water disposal, water in the San Andres will be pushed off the 5-acre tract, trespassing on other properties.
- After 13 days the volume of water injected and displaced will move beneath Federal lands.
- Water will be pushed off the lease and begin impacting the San Andres porous hydrocarbon interval of other land and mineral owners, rights which should be protected.
- The pressure exerted downhole will impact a much larger area and will force San Andres water into the Grayburg interval where Empire must handle the water production volumes.
- Bottomline, water disposal cannot be allowed in a hydrocarbon bearing reservoir.

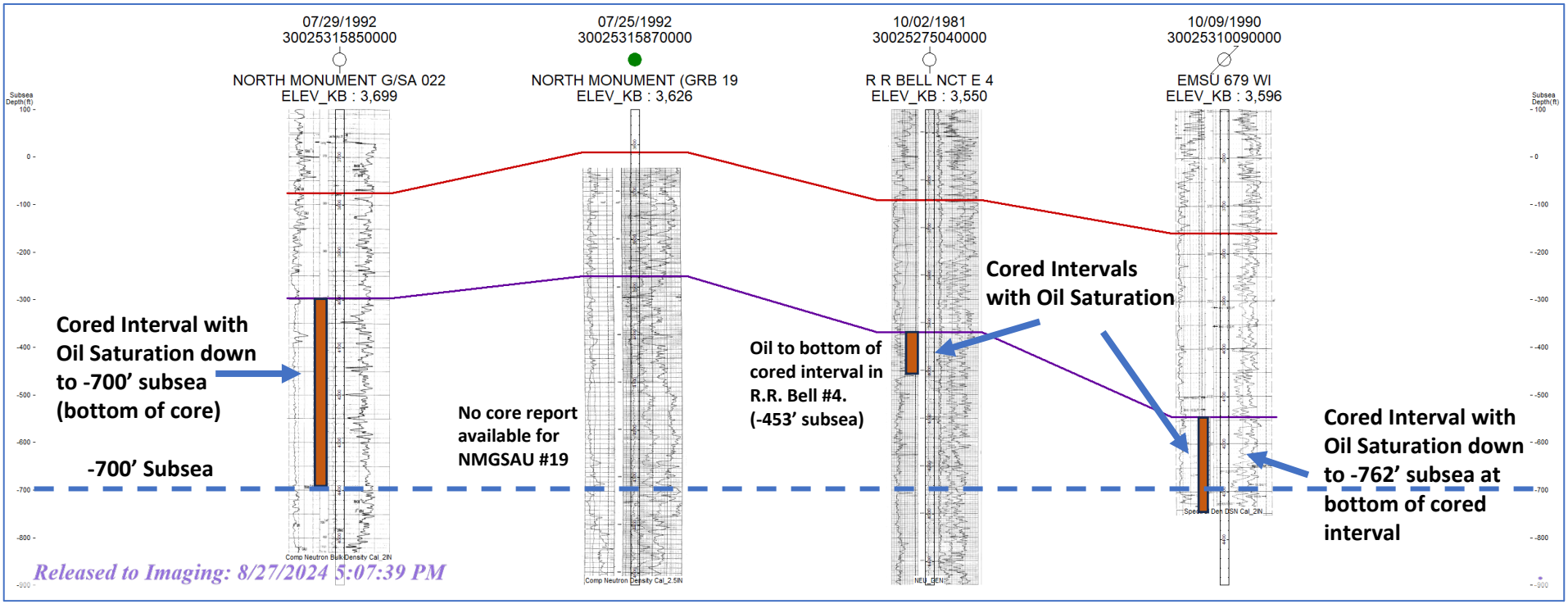
Exhibit I-24

SAN ANDRES CORE FROM 4 WELLS AT EUNICE MONUMENT OIL FIELD CONFIRMS RESIDUAL OIL ZONE (ROZ), WITH OIL DOWN TO -762’ SUBSEA IN EMSU-679

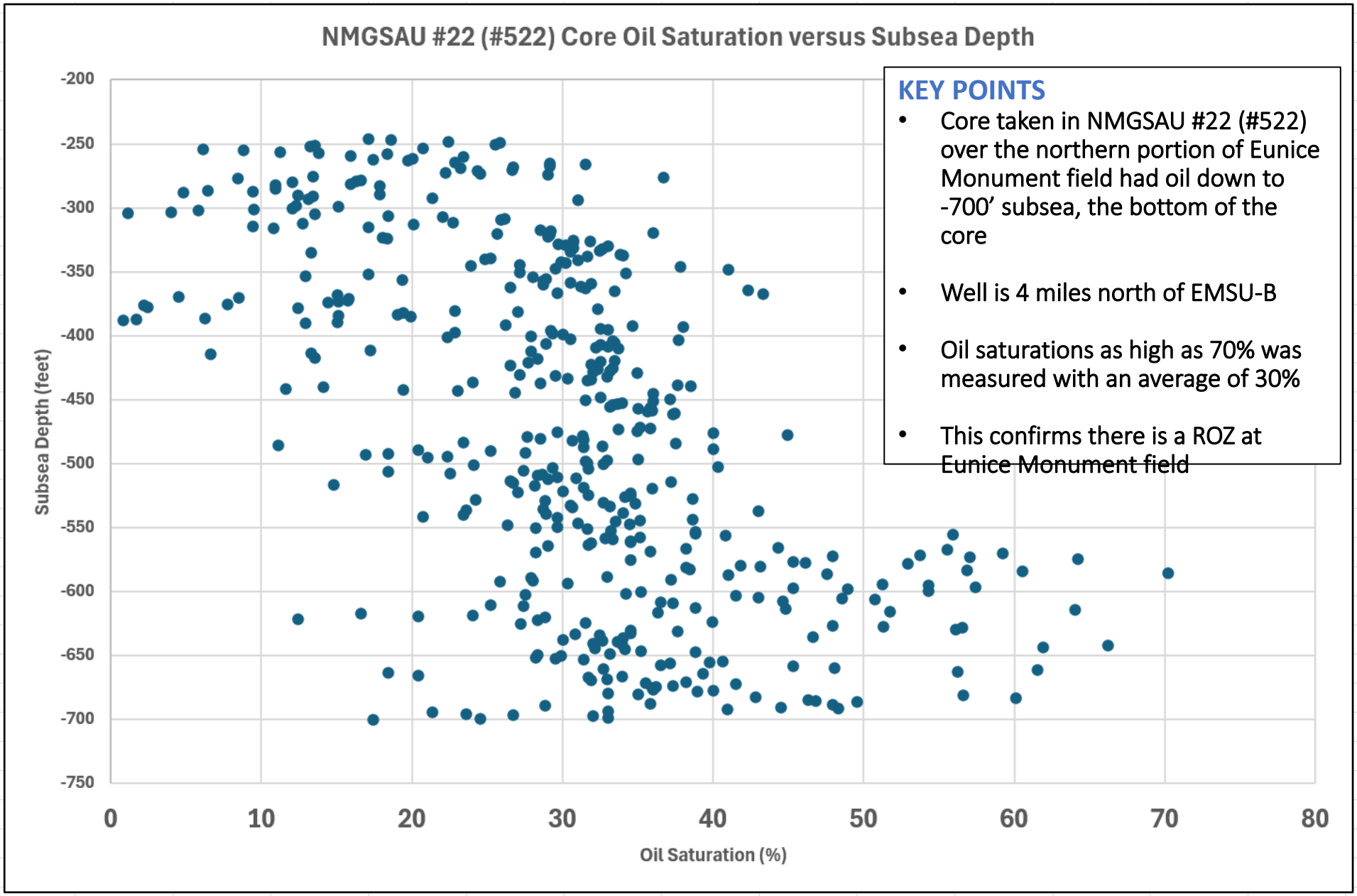


KEY POINTS

- Core acquired in 4 wells across Eunice Monument field showed oil in the San Andres with oil saturations as high as 70%
- EMSU #679 and NMGSAU #22 (#522) had oil down to -762’ subsea
- R.R. Bell #4 had oil to bottom of the core at -453’ subsea
- Core report not available for NMGSAU #19 (#1419) but is indicated to have oil in #522 report

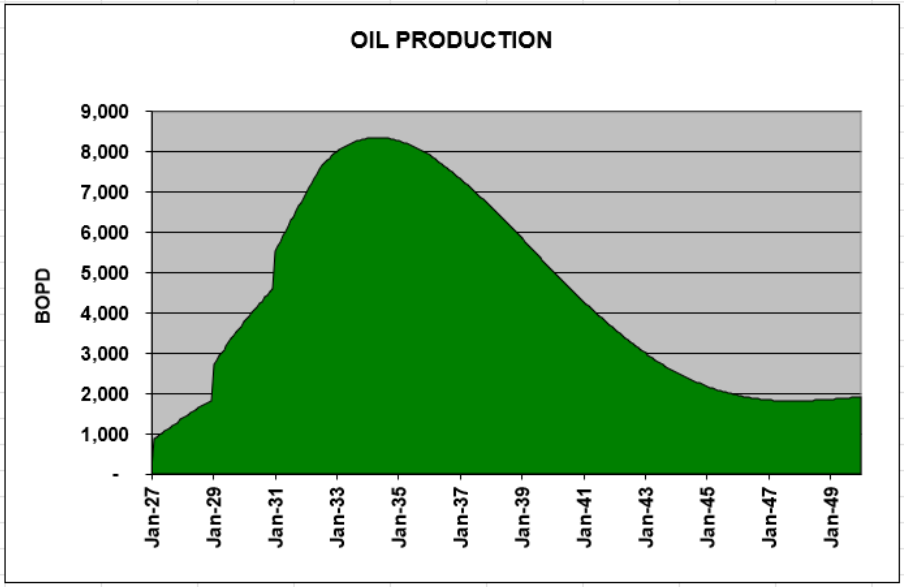


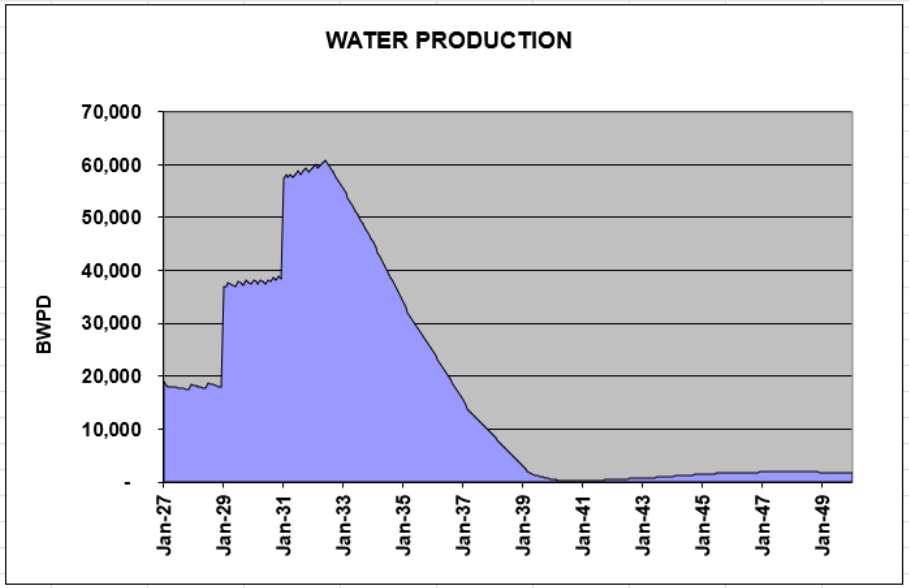
North Monument Grayburg San Andres Well #22 (or #522)

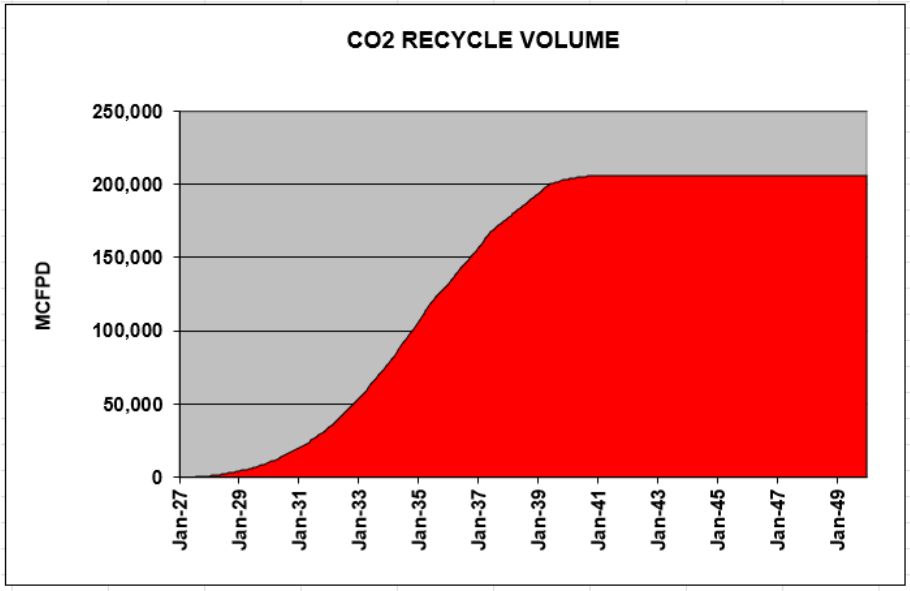


CO_2-EOR Forecast for Development of 72 40-acre Patterns (Continuous CO_2 Injection, No WAG)

Exhibit I-26







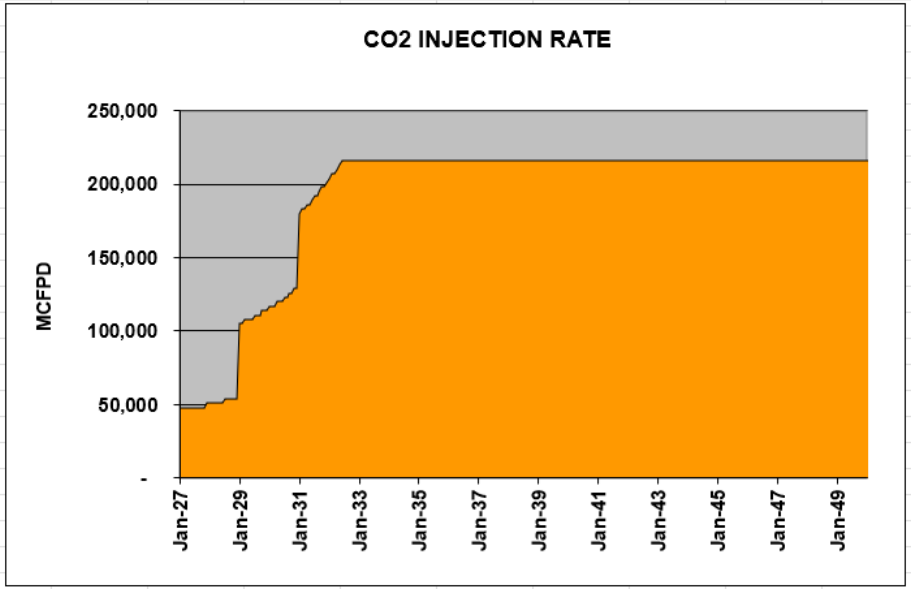


Exhibit I-27

CO_2-EOR Economic Evaluation for Development of 72 40-acre Patterns (Continuous CO_2 Injection, No WAG) Oil Price Escalated 1% Annually

EMSU
EMPIRE PETROLEUM CORPORATION — PROBABLE RESERVES 1/1/2025

YEAR	100% OIL (MBBL)	GROSS OIL (MBBL)	NET OIL (MBBL)	OIL PRICE ($/BBL)	TOTAL NET SALES (M$)	GROSS CO2 PROD (MMCF)	GROSS CO2 PURCHASED (MMCF)	TAXES (M$)	CO2 REC COST (M$)	CO2 PURCH COST (M$)	NON-CO2 LOE (M$)	OPERATING CASHFLOW (M$)	TOTAL GWI OPEX (M$)	NET CAPITAL (M$)	CASH FLOW BTAX (M$)	CUMULATIVE CASH FLOW (M$)	CUM PV DISC BTAX (M$)
2025	-	-	-	$ 75.0	$ -	-	-	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2026	-	-	-	$ 76.0	$ -	-	-	$ -	$ -	$ -	$ -	$ -	$ -	$ 182,500	$ (182,500)	$ (182,500)	$ (158,862)
2027	374	374	318	$ 76.9	$ 24,472	63	17,539	$ 612	$ 9	$ 17,550	$ 3,071	$ 3,229	$ 20,631	$ 7,500	$ (4,271)	$ (186,771)	$ (162,381)
2028	592	592	503	$ 77.7	$ 39,098	817	18,335	$ 977	$ 123	$ 18,397	$ 4,162	$ 15,439	$ 22,681	$ 75,000	$ (59,561)	$ (246,332)	$ (205,073)
2029	1,176	1,176	1,000	$ 78.4	$ 78,412	2,369	37,668	$ 1,960	$ 355	$ 37,697	$ 7,080	$ 31,319	$ 45,133	$ 15,000	$ 16,319	$ (230,013)	$ (194,658)
2030	1,529	1,529	1,300	$ 79.2	$ 102,967	5,221	39,376	$ 2,574	$ 783	$ 39,402	$ 8,845	$ 51,363	$ 49,030	$ 47,500	$ 3,863	$ (226,150)	$ (192,770)
2031	2,267	2,267	1,927	$ 80.0	$ 154,161	9,425	59,979	$ 3,854	$ 1,414	$ 60,018	$ 12,533	$ 76,343	$ 73,964	$ 22,500	$ 53,843	$ (172,307)	$ (164,741)
2032	2,760	2,760	2,346	$ 80.8	$ 189,625	15,505	62,106	$ 4,741	$ 2,326	$ 62,315	$ 15,002	$ 105,241	$ 79,644	$ -	$ 105,241	$ (67,066)	$ (114,757)
2033	2,988	2,988	2,540	$ 81.6	$ 207,296	23,516	55,280	$ 7,960	$ 3,527	$ 55,296	$ 16,140	$ 124,373	$ 74,963	$ -	$ 124,373	$ 57,307	$ (61,206)
2034	3,040	3,040	2,584	$ 82.4	$ 213,044	33,076	45,721	$ 12,037	$ 4,961	$ 45,730	$ 16,402	$ 133,914	$ 67,093	$ -	$ 133,914	$ 191,221	$ (9,016)
2035	2,965	2,965	2,520	$ 83.3	$ 209,826	43,476	35,321	$ 11,855	$ 6,521	$ 35,325	$ 16,024	$ 140,100	$ 57,870	$ -	$ 140,100	$ 331,321	$ 40,432
2036	2,802	2,802	2,382	$ 84.1	$ 200,319	52,346	26,451	$ 11,318	$ 7,852	$ 26,555	$ 15,212	$ 139,382	$ 49,619	$ -	$ 139,382	$ 470,703	$ 84,983
2037	2,559	2,559	2,176	$ 84.9	$ 184,793	61,041	17,756	$ 10,441	$ 9,156	$ 17,756	$ 13,997	$ 133,443	$ 40,910	$ -	$ 133,443	$ 604,146	$ 123,601
2038	2,286	2,286	1,943	$ 85.8	$ 166,703	67,416	11,381	$ 9,419	$ 10,112	$ 11,381	$ 12,630	$ 123,160	$ 34,124	$ -	$ 123,160	$ 727,306	$ 155,872
2039	1,997	1,997	1,697	$ 86.7	$ 147,071	72,830	5,967	$ 8,309	$ 10,924	$ 5,968	$ 11,184	$ 110,685	$ 28,077	$ -	$ 110,685	$ 837,991	$ 182,133
2040	1,716	1,716	1,459	$ 87.5	$ 127,651	74,793	4,004	$ 7,212	$ 11,219	$ 4,053	$ 9,779	$ 95,388	$ 25,051	$ -	$ 95,388	$ 933,379	$ 202,629
2041	1,444	1,444	1,227	$ 88.4	$ 108,511	75,062	3,735	$ 6,131	$ 11,259	$ 3,743	$ 8,421	$ 78,958	$ 23,423	$ -	$ 78,958	$ 1,012,336	$ 217,989
2042	1,208	1,208	1,027	$ 89.3	$ 91,706	75,062	3,735	$ 5,181	$ 11,259	$ 3,743	$ 7,242	$ 64,281	$ 22,244	$ -	$ 64,281	$ 1,076,618	$ 229,309
2043	1,012	1,012	860	$ 90.2	$ 77,582	75,062	3,735	$ 4,383	$ 11,259	$ 3,743	$ 6,260	$ 51,936	$ 21,262	$ -	$ 51,936	$ 1,128,554	$ 237,588
2044	863	863	733	$ 91.1	$ 66,796	75,062	3,735	$ 3,774	$ 11,259	$ 3,784	$ 5,513	$ 42,466	$ 20,557	$ -	$ 42,466	$ 1,171,020	$ 243,716
2045	754	754	641	$ 92.0	$ 58,975	75,062	3,735	$ 3,332	$ 11,259	$ 3,743	$ 4,970	$ 35,670	$ 19,972	$ -	$ 35,670	$ 1,206,690	$ 248,373
2046	691	691	588	$ 92.9	$ 54,623	75,062	3,735	$ 3,086	$ 11,259	$ 3,743	$ 4,657	$ 31,877	$ 19,659	$ -	$ 31,877	$ 1,238,567	$ 252,138
2047	667	667	567	$ 93.9	$ 53,187	75,062	3,735	$ 3,005	$ 11,259	$ 3,743	$ 4,533	$ 30,647	$ 19,535	$ -	$ 30,647	$ 1,269,215	$ 255,413
2048	672	672	571	$ 94.8	$ 54,148	75,062	3,735	$ 3,059	$ 11,259	$ 3,784	$ 4,559	$ 31,486	$ 19,602	$ -	$ 31,486	$ 1,300,700	$ 258,457
2049	689	689	586	$ 95.8	$ 56,082	75,062	3,735	$ 3,169	$ 11,259	$ 3,743	$ 4,644	$ 33,267	$ 19,647	$ -	$ 33,267	$ 1,333,967	$ 261,368
2050	231	231	196	$ 96.4	$ 18,928	25,021	1,245	$ 1,069	$ 3,753	$ 1,179	$ 1,555	$ 11,371	$ 6,487	$ -	$ 11,371	$ 1,345,338	$ 262,300
TOTAL	37,283	37,283	31,690		2,685,977	1,162,474	471,739	129,461	$ 174,371	$ 472,392	$ 214,414	$ 1,695,338	$ 861,178	$ 350,000	$ 1,345,338		

DISCOUNT FACTOR	10.0				
GWI	100.00	NPV-10 (M$)	$ 262,300	DEVELOPMENT COST ($/BO)	$ 11.04
NRI	85.00				
				LIFTING COST ($/BO)	$ 27.17
				NON-CO2 LIFTING COST ($/BO)	$ 6.77

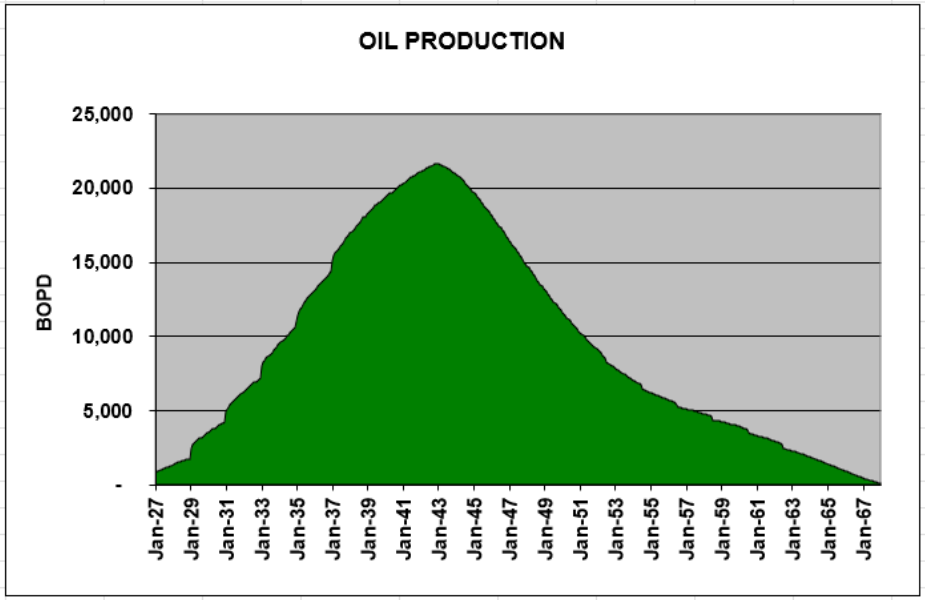
GROSS UTILIZATION (MCF/BO)	43.83
NET UTILIZATION (MCF/BO)	12.65

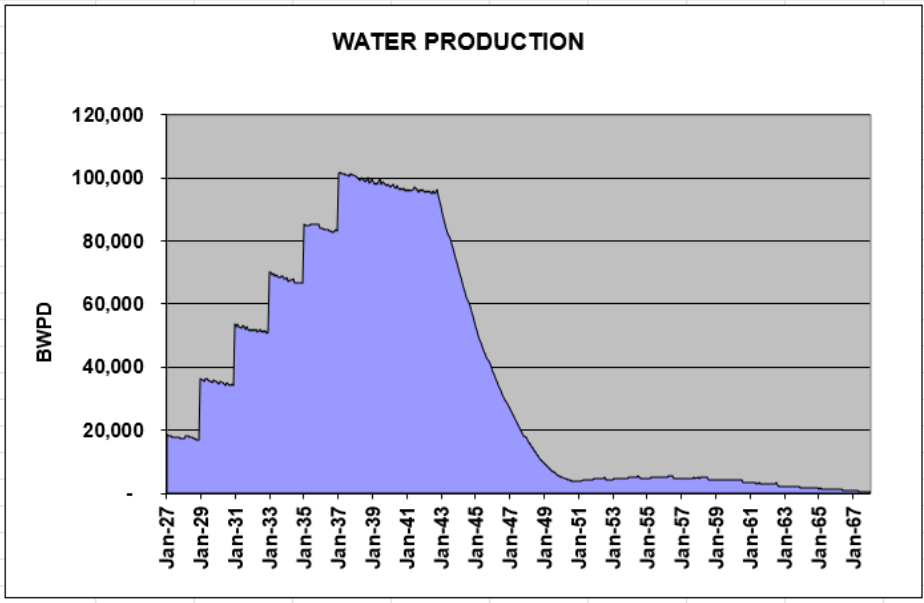
Gross CO_2 Utilization is Total CO_2 Injected per Barrel of Oil Recovered

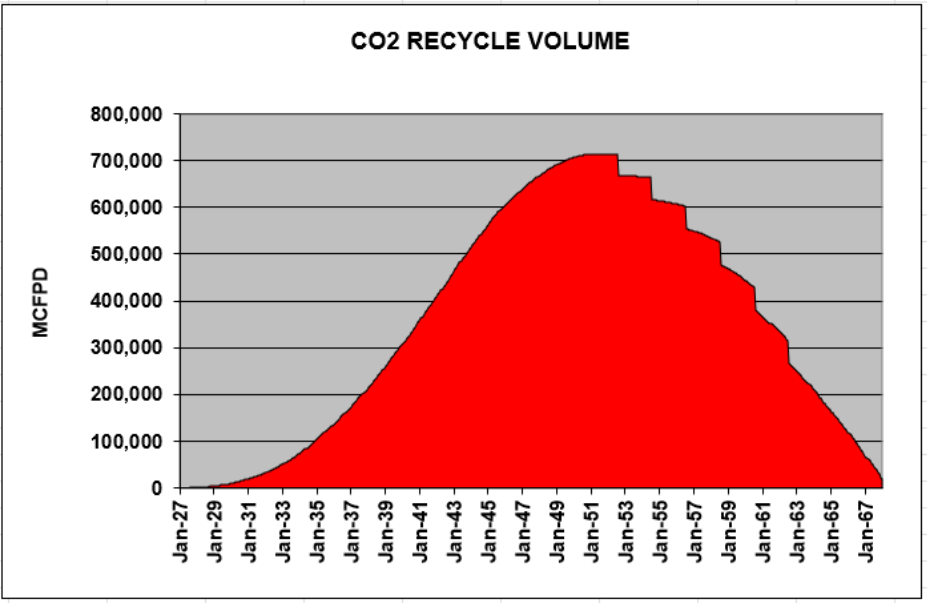
Net CO_2 Utilization is CO_2 Purchased (Sequestered) per Barrel of Oil Recovered

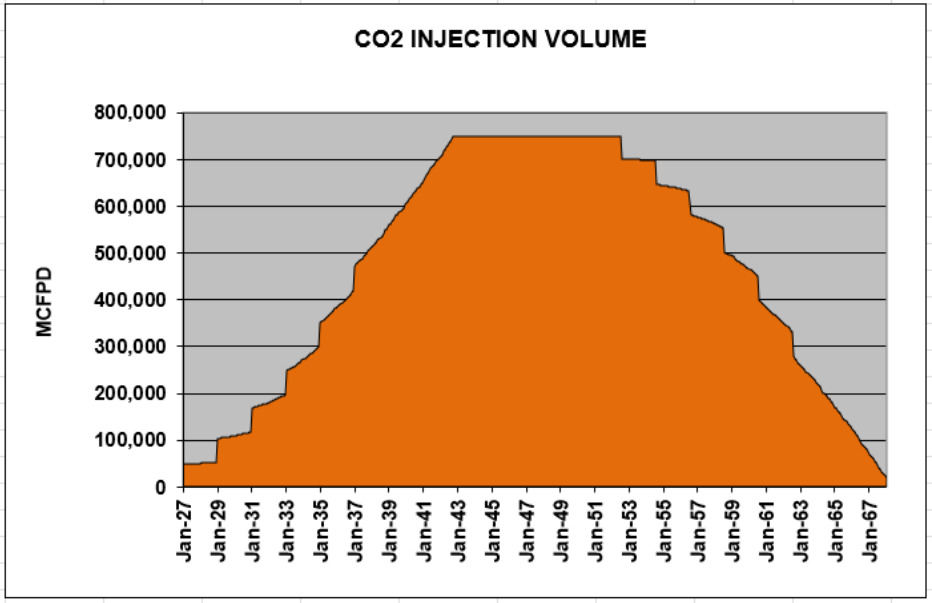
CO_2 EOR Economic Evaluation for 250 (40-acre) Patterns (Continuous CO_2 Injection, No WAG)

Exhibit I-28









CO_2 EOR Economic Evaluation for 250 (40-acre) Patterns (Continuous CO_2 Injection, No WAG) – Oil Price Escalated 1% Annually

Exhibit I-29

EMSU + EMSU-B + AGU

EMPIRE PETROLEUM CORPORATION **PROBABLE RESERVES 1/1/2025**

YEAR	100% OIL (MBBL)	GROSS OIL (MBBL)	NET OIL (MBBL)	OIL PRICE ($/BBL)	TOTAL NET SALES (M$)	GROSS CO2 PROD (MMCF)	GROSS CO2 PURCHASED (MMCF)	TAXES (M$)	CO2 REC COST (M$)	CO2 PURCH COST (M$)	NON-CO2 LOE (M$)	OPERATING CASHFLOW (M$)	TOTAL GWI OPEX (M$)	NET CAPITAL (M$)	CASH FLOW BTAX (M$)	CUMULATIVE CASH FLOW (M$)	CUM PV DISC BTAX (M$)
2025	-	-	-	$ 75.0	$ -	-	-	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2026	-	-	-	$ 76.0	$ -	-	-	$ -	$ -	$ -	$ -	$ -	$ -	$ 166,375	$ (166,375)	$ (166,375)	$ (142,924)
2027	390	390	332	$ 76.9	$ 25,519	63	17,448	$ 638	$ 9	$ 17,457	$ 7,952	$ (538)	$ 25,418	$ 4,125	$ (4,663)	$ (171,038)	$ (146,622)
2028	578	578	491	$ 77.7	$ 38,124	814	17,699	$ 953	$ 122	$ 17,755	$ 8,888	$ 10,406	$ 26,765	$ 61,875	$ (51,469)	$ (222,507)	$ (182,898)
2029	1,125	1,125	956	$ 78.4	$ 75,024	2,336	35,968	$ 1,876	$ 350	$ 35,990	$ 11,626	$ 25,181	$ 47,967	$ 8,250	$ 16,931	$ (205,576)	$ (172,152)
2030	1,429	1,429	1,215	$ 79.2	$ 96,229	5,084	35,956	$ 2,406	$ 763	$ 35,981	$ 13,145	$ 43,934	$ 49,889	$ 184,250	$ (140,316)	$ (345,891)	$ (253,042)
2031	2,080	2,080	1,768	$ 80.0	$ 141,465	9,051	54,242	$ 3,537	$ 1,358	$ 54,275	$ 19,400	$ 62,896	$ 75,032	$ 20,625	$ 42,271	$ (303,621)	$ (230,828)
2032	2,477	2,477	2,105	$ 80.8	$ 170,157	14,681	54,266	$ 4,254	$ 2,202	$ 54,451	$ 21,385	$ 87,864	$ 78,039	$ 82,500	$ 5,364	$ (298,256)	$ (228,194)
2033	3,202	3,202	2,721	$ 81.6	$ 222,155	22,033	72,450	$ 5,554	$ 3,305	$ 72,489	$ 28,009	$ 112,798	$ 103,803	$ 37,125	$ 75,673	$ (222,583)	$ (195,640)
2034	3,675	3,675	3,124	$ 82.4	$ 257,558	31,709	72,351	$ 6,439	$ 4,756	$ 72,399	$ 30,376	$ 143,588	$ 107,531	$ 202,125	$ (58,537)	$ (281,120)	$ (218,058)
2035	4,495	4,495	3,821	$ 83.3	$ 318,166	43,494	90,479	$ 7,954	$ 6,524	$ 90,537	$ 34,474	$ 178,677	$ 131,535	$ 30,250	$ 148,427	$ (132,694)	$ (165,797)
2036	5,031	5,031	4,277	$ 84.1	$ 359,697	55,803	90,482	$ 8,992	$ 8,370	$ 90,809	$ 37,156	$ 214,369	$ 136,336	$ 210,375	$ 3,994	$ (128,700)	$ (164,254)
2037	5,872	5,872	4,991	$ 85.0	$ 423,997	70,255	108,862	$ 15,234	$ 10,538	$ 108,929	$ 41,358	$ 247,938	$ 160,825	$ 31,625	$ 216,313	$ 87,613	$ (101,726)
2038	6,417	6,417	5,454	$ 85.8	$ 468,024	85,403	109,035	$ 26,443	$ 12,810	$ 109,110	$ 44,084	$ 275,576	$ 166,005	$ 45,375	$ 230,201	$ 317,814	$ (41,467)
2039	6,877	6,877	5,845	$ 86.7	$ 506,594	102,815	109,134	$ 28,623	$ 15,422	$ 109,213	$ 46,384	$ 306,952	$ 171,019	$ 33,000	$ 273,952	$ 591,766	$ 23,394
2040	7,256	7,256	6,168	$ 87.5	$ 539,928	120,328	108,857	$ 30,506	$ 18,049	$ 109,276	$ 48,282	$ 333,814	$ 175,608	$ 41,250	$ 292,564	$ 884,331	$ 86,106
2041	7,558	7,558	6,424	$ 88.4	$ 568,029	139,422	108,916	$ 32,094	$ 20,913	$ 108,998	$ 49,791	$ 356,233	$ 179,702	$ 41,250	$ 314,983	$ 1,199,314	$ 147,257
2042	7,818	7,818	6,645	$ 89.3	$ 593,453	158,068	108,783	$ 33,530	$ 23,710	$ 108,865	$ 51,090	$ 376,258	$ 183,665	$ 12,375	$ 363,883	$ 1,563,197	$ 211,126
2043	7,785	7,785	6,617	$ 90.2	$ 596,848	177,716	95,884	$ 33,722	$ 26,657	$ 95,915	$ 50,925	$ 389,629	$ 173,497	$ -	$ 389,629	$ 1,952,826	$ 273,124
2044	7,453	7,453	6,335	$ 91.1	$ 577,135	195,735	77,865	$ 32,608	$ 29,360	$ 78,200	$ 49,266	$ 387,701	$ 156,826	$ -	$ 387,701	$ 2,340,527	$ 328,990
2045	6,929	6,929	5,890	$ 92.0	$ 541,970	212,967	60,633	$ 30,621	$ 31,945	$ 60,654	$ 46,647	$ 372,102	$ 139,247	$ -	$ 372,102	$ 2,712,629	$ 377,532
2046	6,341	6,341	5,390	$ 92.9	$ 500,954	226,614	46,986	$ 28,304	$ 33,992	$ 47,007	$ 43,707	$ 347,943	$ 124,706	$ -	$ 347,943	$ 3,060,572	$ 418,629
2047	5,721	5,721	4,863	$ 93.9	$ 456,480	238,282	35,318	$ 25,791	$ 35,742	$ 35,337	$ 40,605	$ 319,004	$ 111,685	$ -	$ 319,004	$ 3,379,576	$ 452,741
2048	5,123	5,123	4,355	$ 94.8	$ 412,888	247,813	25,787	$ 23,328	$ 37,172	$ 25,985	$ 37,617	$ 288,786	$ 100,774	$ -	$ 288,786	$ 3,668,361	$ 480,701
2049	4,532	4,532	3,853	$ 95.8	$ 368,943	255,020	18,580	$ 20,845	$ 38,253	$ 18,600	$ 34,662	$ 256,582	$ 91,516	$ -	$ 256,582	$ 3,924,944	$ 503,188
2050	4,008	4,008	3,407	$ 96.7	$ 329,529	259,350	14,250	$ 18,618	$ 38,902	$ 14,274	$ 32,040	$ 225,694	$ 85,216	$ -	$ 225,694	$ 4,150,638	$ 521,095
2051	3,539	3,539	3,008	$ 97.7	$ 293,857	260,620	12,980	$ 16,603	$ 39,093	$ 13,008	$ 29,693	$ 195,460	$ 81,794	$ -	$ 195,460	$ 4,346,099	$ 535,135
2052	3,093	3,093	2,629	$ 98.7	$ 259,384	253,682	12,622	$ 14,655	$ 38,052	$ 12,784	$ 27,463	$ 166,430	$ 78,299	$ -	$ 166,430	$ 4,512,528	$ 545,960
2053	2,723	2,723	2,315	$ 99.7	$ 230,693	243,604	12,120	$ 13,034	$ 36,541	$ 12,147	$ 25,615	$ 143,356	$ 74,302	$ -	$ 143,356	$ 4,655,884	$ 554,397
2054	2,413	2,413	2,051	$ 100.7	$ 206,483	235,351	11,710	$ 11,666	$ 35,303	$ 11,727	$ 24,065	$ 123,723	$ 71,094	$ -	$ 123,723	$ 4,779,607	$ 560,989
2055	2,180	2,180	1,853	$ 101.7	$ 188,424	223,188	11,105	$ 10,646	$ 33,478	$ 11,128	$ 22,900	$ 110,273	$ 67,506	$ -	$ 110,273	$ 4,889,880	$ 566,305
2056	1,979	1,979	1,682	$ 102.7	$ 172,721	212,850	10,590	$ 9,759	$ 31,927	$ 10,725	$ 21,893	$ 98,417	$ 64,545	$ -	$ 98,417	$ 4,988,297	$ 570,602
2057	1,814	1,814	1,542	$ 103.7	$ 159,964	198,341	9,868	$ 9,038	$ 29,751	$ 9,888	$ 21,070	$ 90,217	$ 60,710	$ -	$ 90,217	$ 5,078,513	$ 574,165
2058	1,648	1,648	1,401	$ 104.8	$ 146,812	184,962	9,203	$ 8,295	$ 27,744	$ 9,211	$ 20,242	$ 81,320	$ 57,197	$ -	$ 81,320	$ 5,159,833	$ 577,073
2059	1,501	1,501	1,276	$ 105.8	$ 135,011	167,152	8,317	$ 7,628	$ 25,073	$ 8,330	$ 19,504	$ 74,476	$ 52,907	$ -	$ 74,476	$ 5,234,309	$ 579,484
2060	1,327	1,327	1,128	$ 106.9	$ 120,537	149,864	7,456	$ 6,810	$ 22,480	$ 7,547	$ 18,634	$ 65,066	$ 48,660	$ -	$ 65,066	$ 5,299,375	$ 581,392
2061	1,153	1,153	980	$ 108.0	$ 105,803	128,231	6,380	$ 5,978	$ 19,235	$ 6,390	$ 17,764	$ 56,437	$ 43,389	$ -	$ 56,437	$ 5,355,812	$ 582,889
2062	952	952	809	$ 109.0	$ 88,217	108,336	5,390	$ 4,984	$ 16,250	$ 5,387	$ 16,759	$ 44,836	$ 38,397	$ -	$ 44,836	$ 5,400,648	$ 583,968
2063	767	767	652	$ 110.1	$ 71,789	84,184	4,189	$ 4,056	$ 12,628	$ 4,191	$ 15,834	$ 35,080	$ 32,653	$ -	$ 35,080	$ 5,435,729	$ 584,731
2064	607	607	516	$ 111.2	$ 57,416	68,546	3,410	$ 3,244	$ 10,282	$ 3,451	$ 15,036	$ 25,403	$ 28,769	$ -	$ 25,403	$ 5,461,131	$ 585,232
2065	433	433	368	$ 112.3	$ 41,343	51,953	2,585	$ 2,336	$ 7,793	$ 2,582	$ 14,165	$ 14,467	$ 24,540	$ -	$ 14,467	$ 5,475,599	$ 585,491
2066	256	256	218	$ 113.4	$ 24,704	34,838	1,733	$ 1,396	$ 5,226	$ 1,729	$ 12,781	$ 3,573	$ 19,736	$ -	$ 3,573	$ 5,479,171	$ 585,550
2067	100	100	85	$ 114.5	$ 9,693	16,680	830	$ 548	$ 2,502	$ 824	$ 4,698	$ 1,122	$ 8,024	$ -	$ 1,122	$ 5,480,293	$ 585,566
2068	5	5	4	$ 115.3	$ 494	1,564	78	$ 28	$ 235	$ 43	$ 325	$ (137)	$ 603	$ -	$ (137)	$ 5,480,157	$ 585,565
TOTAL	140,662	140,662	119,563		10,902,210	5,298,805	1,700,795	553,574	$ 794,821	$ 1,703,599	$ 1,157,309	$ 6,692,907	$ 3,655,729	$1,212,750	$ 5,480,157		

DISCOUNT FACTOR 10.0
GWI 100.00
NRI 85.00

NPV-10 (M$) $ 585,565

DEVELOPMENT COST ($/BO) $ 10.14
LIFTING COST ($/BO) $ 30.58
NON-CO2 LIFTING COST ($/BO) $ 9.68

GROSS UTILIZATION (MCF/BO) 49.76
NET UTILIZATION (MCF/BO) 12.09

Exhibit I-30

Impact of Increased Pressure on CO_2-EOR Design & Economics

KEY POINTS

- Raising San Andres reservoir pressure will result in more CO_2 purchase required to do the CO_2 flood.
- If CO_2 flood is conducted at 1500 psi, each pattern will require 7729 MMCF CO_2 to displace 1 HCPV
- If pressure is raised to 3000 psi, each pattern will require 9643 MMCF CO_2, a 25% increase.
- The higher pressure will also require that produced water be injected into another zone (i.e. Grayburg) to prevent over pressurization of San Andres and potential fracturing

Temperature	Pressure	Density	Compressibility	Viscosity		Factor	Factor	Factor	40-acre pattern =		3,723,600	RB
F	PSIA	LB/CF	FACTOR	cp	PHASE	CF/SCF	res bbl/Mcf	Mcf/res bbl				
100	1000	12.468	0.58769	0.019227	D	0.009305	1.657719	0.603				
100	1100	15.864	0.50808	0.021228	D	0.007313	1.302873	0.768				
100	1200	22.968	0.38283	0.02682	D	0.005051	0.899886	1.111				
100	1300	36.109	0.26381	0.042661	D	0.003213	0.572414	1.747		CO2 Volume Required		
100	1400	40.549	0.25299	0.050034	D	0.002861	0.509727	1.962				
100	**1500**	42.902	0.25619	0.054498	D	0.002704	**0.481763**	2.076		**7,729**	**MMCF**	
100	1600	44.535	0.26325	0.057864	D	0.002605	0.464099	2.155				
100	1700	45.802	0.27197	0.060647	D	0.002533	0.451268	2.216				
100	1800	46.845	0.28155	0.063062	D	0.002477	0.441210	2.266				
100	1900	47.737	0.29164	0.065222	D	0.00243	0.432968	2.310				
100	**2000**	48.519	0.30204	0.067191	D	0.002391	**0.425988**	2.347		**8,741**	**MMCF**	**13.1%**
100	2100	49.217	0.31265	0.069014	D	0.002357	0.419954	2.381				
100	2200	49.848	0.32339	0.070718	D	0.002327	0.414635	2.412				
100	2300	50.426	0.33422	0.072326	D	0.002301	0.409890	2.440				
100	2400	50.958	0.3451	0.073851	D	0.002277	0.405598	2.465				
100	**2500**	51.454	0.35602	0.075308	D	0.002255	**0.401695**	2.489		**9,270**	**MMCF**	**19.9%**
100	2600	51.917	0.36696	0.076705	D	0.002235	0.398114	2.512				
100	2700	52.352	0.3779	0.078049	D	0.002216	0.394799	2.533				
100	2800	52.763	0.38885	0.079348	D	0.002199	0.391730	2.553				
100	2900	53.153	0.39978	0.080606	D	0.002183	0.388853	2.572				
100	**3000**	53.523	0.4107	0.081828	D	0.002168	**0.386159**	2.590		**9,643**	**MMCF**	**24.8%**
100	3100	53.877	0.42161	0.083017	D	0.002153	0.383629	2.607				
100	3200	54.215	0.4325	0.084176	D	0.00214	0.381240	2.623				
100	3300	54.539	0.44336	0.085309	D	0.002127	0.378970	2.639				
100	3400	54.85	0.4542	0.086416	D	0.002115	0.376817	2.654				
100	3500	55.15	0.46502	0.087501	D	0.002104	0.374771	2.668				