

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

**IN THE MATTER OF THE HEARING  
CALLED BY THE OIL CONSERVATION  
DIVISION FOR THE PURPOSE OF  
CONSIDERING THE:**

**APPLICATION OF CAMBRIAN MANAGEMENT, LTD. FOR APPROVAL OF A  
WATERFLOOD PROJECT AND TO QUALIFY THE PROJECT FOR THE  
RECOVERED OIL TAX RATE, CHAVES COUNTY, NEW MEXICO**

**CASE NO. 14068  
ORDER NO. R-12972**

**ORDER OF THE DIVISION**

**BY THE DIVISION:**

This case came on for hearing at 8:15 a.m. on January 24, 2008, at Santa Fe, New Mexico before Examiners David K. Brooks and Richard Ezeanyim and again on February 21, 2008, before Examiners David K. Brooks and William V. Jones.

NOW, on this 9<sup>th</sup> day of July, 2008, the Division Director, having considered the testimony, the record and the recommendations of the Examiners,

**FINDS THAT:**

(1) Due public notice has been given, and the Division has jurisdiction of this case and its subject matter.

(2) Cambrian Management, Ltd. ("Cambrian" or "applicant"), seeks approval to implement secondary recovery operations by injection of water into the San Andres formation within the Davis Federal Lease (United States Oil and Gas Lease NM0174830) containing 947.46 acres, more or less, of the following lands within Chaves County, New Mexico:

**Township 8 South, Range 33 East, NMPM**

Section 7:     Lots 3, 4, E/2 SW/4, and SE/4  
Section 18:    Lots 1-4, E/2, and E/2 W/2

(3) The waterflood project area would initially consist of one injection well bounded by 4 producing wells in a skewed, inverted 5-spot pattern. The following 5 wells would be located in a project area defined as 200 acres consisting of the W/2 NE/4,

E/2 NW/4, and the NE/4 SW/4 of Section 18.

30-005-20846	Davis "N" Well No. 4	Producer	Unit B
30-005-20527	Davis "N" Well No. 3	Producer	Unit C
<b>30-005-20228</b>	<b>Davis "N" Well No. 1</b>	<b>Injection</b>	<b>Unit F</b>
30-005-20848	Davis "N" Well No. 6	Producer	Unit G
30-005-20254	Davis "N" Well No. 2	Producer	Unit K

(4) Cambrian also seeks to qualify the proposed project as an "Enhanced Oil Recovery Project" pursuant to the "Enhanced Oil Recovery Act" (NMSA 1978 Sections 7-29A-1 through 7-29A-5, as amended).

(5) The proposed vertical extent of the waterflood is that productive interval underlying the Davis Federal Lease Area within the San Andres formation as presently completed in existing wells - extending from a minimum perforated depth of 4,240 feet to a maximum depth of 4,654 feet.

(6) The proposed Davis Federal Lease Waterflood is primarily contained within the Chaveroo-San Andres Pool (12049). Wells completed within this pool are governed by statewide rules for oil wells. The Davis Federal Lease and this proposed waterflood extends into the SE/4 of Section 18, which has not yet been included in the Chaveroo-San Andres Pool but is within one mile of the pool boundary.

(7) The Chaveroo-San Andres Pool was established July 1, 1965 by Order No. R-2923, initially covering the NE/4 of Section 32, Township 7 South, Range 33 East - about 3 miles north of the proposed waterflood. The pool now encompasses portions of five townships within Chaves and Roosevelt Counties. The pool was extended into the N/2 of Section 18 on February 1, 1976 by Order No. R-5143 and extended into the S/2 of Section 7 and the SW/4 of Section 18 on July 21, 1982 by Order No. R-7030.

(8) Division records indicate the Chaveroo-San Andres Pool already contains waterfloods approved by the Division including the following.

(a) The Jennifer Chaveroo San Andres Unit: The unit agreement and unit operating agreement were approved by Order No. R-9006 and the waterflood was approved by Order No. R-9007.

(b) The K-M Chaveroo-San Andres Unit: This unit was formed as a voluntary unit and was approved in Order No. R-8967; the waterflood was approved in Order No. R-8968.

(c) The Haley Chaveroo San Andres Unit: The unit agreement was approved by the Division in Order No. R-8750 and the waterflood was approved by Order No. R-8760.

(9) The Davis Federal Lease is one federal lease wholly owned by one party who has contracted Cambrian Management, Ltd. (OGRID 198688) to operate the

property. Cambrian is the operator of record with the Division of the wells located on this acreage.

(10) The applicant has notified all affected parties as defined in Division Rule 701B(2) of the intent to inject into the proposed injection well and has received no objections. The applicant testified that the surface of the injection wellsite located in Unit F is owned by the United States.

(11) No other parties appeared in this case or otherwise opposed this application.

(12) Cambrian appeared at the February 21<sup>st</sup> hearing and presented Exhibit No. 15, an affidavit of notice providing proof that affected parties were noticed of Cambrian's intention to apply for this Waterflood Project and to Qualify the Project for the Recovered Oil Tax Rate.

(13) Cambrian presented the following testimony from a professional engineer contracted to work on this project:

(a) The San Andres formation in this area dips to the Southeast. The producers furthest southeast in this lease make the most water. The proposed injection interval is continuous across the project area. The San Andres formation is relatively tight in this area; porosity averages about 6 percent.

(b) Cambrian wishes to begin the waterflood by converting one producer to injection in order to provide pressure support to four offsetting wells. The waterflood project area may be expanded in the future if response is seen and performance warrants the expansion.

(c) Wells in this lease were drilled in 1975 and produce from approximately 4400 feet. Initial reservoir pressure was 1340 psi, and current pressure is about 600 psi as indicated by fluid levels. Original oil in place ("OOIP") for the five wells in the initial project area is 2,588,000 barrels of 28 degree API crude oil. Primary production from solution gas drive has yielded approximately 257,000 barrels of oil or about 10 percent of OOIP.

(d) The estimated capital cost of additional facilities associated with this project is approximately 95,000 dollars, and the venture is expected to recover incremental production with an equivalent value of approximately 725,000 dollars.

(e) Cambrian is predicting secondary oil recovery resulting from this one injection well to be 57,000 barrels of oil or one-third of total primary recovery. Cambrian did look at other waterfloods within this pool as analogies for this project.

(f) Production from the existing wells is now extremely low, and the wells can be considered to be "stripper" wells. Without implementing secondary recovery, this lease will become uneconomic in about 3 years, but secondary recovery should extend the life to approximately year 2024.

(g) Injection rates of 600 barrels of water per day are needed to fill the void space and to waterflood this reservoir in the time frame needed to be profitable. Due to the low water production from this lease, additional "make-up" water will be needed.

(h) All wells within the ½ mile area of review are adequately cemented in order to isolate the injection to the intended injection interval. There are no faults or conduits which could transport injected waters out of the injection interval. There are no fresh water wells in this vicinity, but fresh water sands do exist near the surface. These fresh water sands will be protected from this injection operation, and fresh water will not be endangered.

The Division Director finds that:

(14) The proposed waterflood within the project area is feasible and should result in the recovery of additional oil and gas that would not otherwise be recovered.

(15) Cambrian has provided notice of its intent to convert the Davis "N" Well No. 1 to injection and has provided notice of the proposed lease waterflood to affected parties, and no objection has been received.

(16) The estimated additional costs of the proposed waterflood operations will not exceed the estimated value of the additional oil and gas recovered plus a reasonable profit.

(17) The proposed waterflood project will prevent waste, protect correlative rights, and should be approved and called the Davis Federal Lease Waterflood Project. The project should be governed by Division Rules No. 701 through 708.

(18) Cambrian should be approved to inject into the Davis "N" Well No. 1 as the project is first implemented. Provisions should be made for the operator of the Davis Federal Lease to apply administratively for additional or different injection wells as needed.

(19) An examination of all wellbores within ½ mile of the proposed injection well indicates that there is no Area of Review ("AOR") remedial cementing required prior to implementing this project.

(20) The proposed injection operation will not pose a threat to protectable underground sources of drinking water.

(21) The proposed injection well should be conditionally approved for

conversion and use as an injection well. Full approval should be granted only after Cambrian comes into full compliance with the Division Rule 40 provisions as it relates to inactive wells and financial assurance.

(22) It is necessary to complete and equip the injection well in a manner to ensure that the unitized interval receives injection support and to confine injection to only the unitized interval.

(23) The Division requires electric logs to be supplied to the district offices. Cambrian should ensure that all available electric logs run on wells within this lease including temperature surveys and cement bond logs are available on the Division's online imaging system. Logs not appearing on this system should be copied and provided to the Hobbs district office for scanning.

(24) Cambrian has offered evidence showing that the project area has been depleted and the proposed enhanced recovery technique should result in an increase in the amount of crude oil that may be ultimately recovered. Cambrian also showed that the application for secondary recovery will be economical and technically reasonable and has not been prematurely filed.

(25) The methods that Cambrian has proposed to utilize in its secondary recovery operations will prevent waste of oil and gas and with a reasonable probability increase the amount of hydrocarbons produced from the reservoir.

(26) Cambrian presented exhibits containing all the information required by Division rules to qualify this project under the Enhanced Oil Recovery Act.

(27) The evidence establishes that the secondary recovery project meets all the criteria for certification by the Division as a qualified "Enhanced Oil Recovery (EOR) Project" pursuant to the "Enhanced Oil Recovery Act" (NMSA 1978 Sections 7-29A-1 through 7-29A-5).

(28) To become eligible for the EOR credit, the operator should advise the Division of the date at which water injection commences into the project and should ask the Division to certify this project and the first injection date to the New Mexico Taxation and Revenue Department.

(29) Within 5 years of the first injection date and after the operator identifies a positive production response, the operator should apply to the Division, asking the Division to certify this positive production response to the New Mexico Taxation and Revenue Department. The EOR project area and/or the producing wells within this area eligible for the recovered oil tax rate may be contracted or expanded depending upon the evidence presented by the applicant in its demonstration of the occurrence of a positive production response.

(30) This application should be approved.

**IT IS THEREFORE ORDERED THAT:**

(1) Cambrian Management, Ltd. ("Cambrian") is hereby approved to implement secondary recovery operations in the San Andres formation from approximately 4,240 feet to 4,654 feet, within the Davis Federal Lease (United States Oil and Gas Lease NM0174830) consisting of the following lands in Chaves County, New Mexico, containing 947.46 acres, more or less:

**Township 8 South, Range 33 East, NMPM**

Section 7: Lots 3, 4, E/2 SW/4, and SE/4  
Section 18: Lots 1-4, E/2, and E/2 W/2

(2) Cambrian is granted approval to utilize the Davis "N" Well No. 1 (API No. 30-005-20228), located 1980 feet from the North and West lines of Section 18, Township 8 South, Range 33 East, NMPM, Chaves County, New Mexico, for injection of water through perforations from 4,261 feet to 4,477 feet within the San Andres formation for purposes of secondary recovery.

PRIOR TO BEGINNING INJECTION into this well, Cambrian shall provide to the Division proof of Cambrian's compliance with provisions of the Division's Rule 40, specifically concerning numbers of inactive wells and required financial assurance, and receive written reply from the Division acknowledging such compliance.

(3) The Division Director may administratively authorize additional injection wells within the lease as provided in Division Rule 701.F(3).

(4) The proposed Davis Federal Lease Waterflood Project is hereby approved and shall initially consist of one injection well and four producing wells, all contained in the 200 acres consisting of the W/2 NE/4, E/2 NW/4, and the NE/4 SW/4 of Section 18.

(5) The operator of the Davis Federal Lease shall be Cambrian Management, Ltd. (OGRID 198688).

(6) The operator shall ensure that all available electric logs run on wells within this lease including temperature surveys and cement bond logs are available on the Division's online imaging system. Logs not appearing on this system shall be copied and provided to the Hobbs district office for scanning.

(7) Cambrian shall take all steps necessary to ensure that the injected water enters only the permitted injection interval and is not permitted to escape to other formations or onto the surface from injection, production, or plugged and abandoned wells.

(8) Injection into this well shall be accomplished through plastic-lined tubing installed in a packer located within 100 feet of the uppermost injection perforation. The casing-tubing annulus shall be filled with an inert fluid, and a gauge or approved leak-

detection device shall be attached to the annulus in order to determine leakage in the casing, tubing, or packer.

(9) The injection well or pressurization system shall be equipped with a pressure control device or acceptable substitute that will limit the surface injection pressure to 852 psi.

(10) The Division Director may administratively authorize a pressure limitation in excess of the above upon a showing by the operator that such higher pressure will not result in the fracturing of the injection formation or confining strata or damage to the reservoir.

(11) The unit operator shall give 72 hours advance notice to the supervisor of the Division's Hobbs District Office of the date and time (i) injection equipment will be installed, and (ii) the mechanical integrity pressure test will be conducted on the approved injection well, so that these operations may be witnessed.

(12) The unit operator shall immediately notify the supervisor of the Division's Hobbs District office of any failure of the tubing, casing or packer in the injection well or the leakage of water, oil or gas from or around any nearby producing or plugged and abandoned well, and shall promptly take all steps necessary to correct such failure or leakage.

(13) The unit operator shall conduct injection operations in accordance with Division Rules No. 701 through 708, and shall submit monthly progress reports in accordance with Division Rules No. 706 and 1115.

(14) The injection authority granted herein for this well shall terminate one year after the date of this order if the unit operator has not commenced injection operations into the well; provided, however, the Division, upon written request postmarked or received prior to the one-year deadline, may grant an extension for good cause.

(15) The Davis Federal Lease Waterflood Project is hereby approved as an "Enhanced Oil Recovery Project" pursuant to the "Enhanced Oil Recovery Act" (NMSA 1978 Sections 7-29A-1 through 7-29A-5).

(16) To be eligible for the EOR tax rate, the unit operator shall advise the Division of the date on which water injection commences into the project area and shall request the Division certify the project and the date of first injection to the New Mexico Taxation and Revenue Department.

(17) At such time as a positive production response occurs, and within five years from the date the project was certified to the New Mexico Taxation and Revenue Department, the unit operator must apply to the Division for certification of a "positive production response." The Division may review the application administratively or set it for hearing. Based upon the evidence presented, the Division will certify to the New

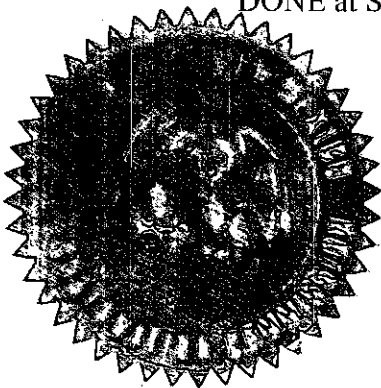
Mexico Taxation and Revenue Department those wells that are eligible for the EOR tax rate.

(18) This application for "positive production response" shall identify the area benefiting from enhanced oil recovery operations and the specific wells eligible for the EOR tax rate. The area and/or the producing wells eligible for the enhanced oil recovery (EOR) tax rate may be contracted or expanded based upon the evidence presented by the unit operator in its demonstration of a positive production response.

(19) This order does not relieve the operator of responsibility should its operations cause any damage or threat of damage to protectable fresh water, human health or the environment, nor does it relieve the operator of responsibility for complying with applicable Division rules or other federal, state or local laws or regulations.

(20) Jurisdiction of this case is retained for the entry of such further orders as the Division may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated



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STATE OF NEW MEXICO  
OIL CONSERVATION DIVISION

A handwritten signature in black ink, appearing to read "Mark E. Fesmire".

MARK E. FESMIRE, P.E.  
Director