

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:

CASE NO. 14353

APPLICATION OF CHI ENERGY, INC. FOR APPROVAL
OF A SECONDARY RECOVERY PROJECT AND TO QUALIFY THE
PROJECT FOR THE RECOVERED OIL TAX RATE, EDDY COUNTY, NEW
MEXICO.

CASE NO. 14354

APPLICATION OF CHI ENERGY, INC. FOR STATUTORY
UNITIZATION, EDDY COUNTY, NEW MEXICO.

ORDER NO. R-13262

ORDER OF THE DIVISION

BY THE DIVISION:

These cases came on for hearing at 8:15 a.m. on November 12, 2009, at Santa Fe, New Mexico, before Examiner Richard I. Ezeanyim.

NOW, on this 21st day of May, 2010, the Division Director, having considered the testimony, the record and the recommendations of the Examiner,

FINDS THAT:

(1) Due public notice has been given, and the Division has jurisdiction of these cases and their subject matter.

(2) Cases No. 14353 and 14354 were consolidated for hearing. Because the cases involve the same property and subject matter, a single order is being issued for both cases.

(3) In Case No. 14354, Chi Energy, Inc. ("Applicant") seeks statutory unitization, pursuant to NMSA 1978 Sections 70-7-1 through 70-7-21, as amended ("the Statutory Unitization Act"), of 560 acres, more or less, of federal lands for the purpose of instituting secondary recovery operations in the Brushy Canyon member of the Delaware formation, Benson-Delaware Pool (97083), to be called the **Benson Delaware Unit**, and

approval of the Unit Agreement and the Unit Operating Agreement, which were submitted as Applicant's Exhibits No. 2 and 3 in these cases.

(4) In Case No. 14353, Applicant seeks approval of a secondary recovery project involving the injection of water into the Brushy Canyon member of the Delaware formation within the Benson Delaware Unit Area through nine injection wells, to be drilled at the following locations, all in Township 19 South, Range 30 East, NMPM, in Eddy County, New Mexico:

Well Name	Surface Location	Bottom Hole Location
Munchkin #22W	900 FNL & 1980 FWL, C-12	930 FNL & 2620 FWL, C-12
Munchkin #21W		1050 FNL & 1150 FWL D-12
Munchkin #20W	1400 FNL & 400 FWL, D-12	1350 FNL & 20 FWL, D-12
Munchkin #19W	2300 FNL & 400 FEL, B-11	1300 FNL & 1000 FEL, A-11
Munchkin #18W		1500 FSL & 2200 FEL, J-1
Munchkin #17W		1700 FSL & 1500 FWL, K-1
Munchkin #16W		300 FSL & 1650 FEL, O-1
Munchkin #15W		300 FSL & 1550FWL, N-1
Munchkin #14W	330 FNL & 500 FWL, D-12	330 FNL & 330 FWL, D-12

(5) The proposed Unit Area consists of the following described lands:

TOWNSHIP 19 SOUTH, RANGE 30 EAST, NMPM

Section 1: NE/4 and S/2 of the SW/4,
and W/2 of the SE/4

Section 11: E/2 and SW/4 of the NE/4

Section 12: NW/4 and the N/2 of the SW/4

(6) The vertical extent of the proposed Unitized Formation is the stratigraphic equivalent of the interval within the Delaware formation from 4370 feet to 5300 feet below the surface, as shown by the Density Neutron Log for the Munchkin Federal Well No. 9 (**API No. 30-015-34293**), located 990 feet from the North line and 300 feet from the East line of Section 11, Township 19 South, Range 30 East, NMPM, Eddy County, New Mexico.

(7) All owners of interests within the proposed unit, and all affected persons in all spacing units within the area of review of each of the proposed injectors, were notified of these applications and of the hearing. No party appeared at the hearing to oppose these applications, or otherwise signified any opposition. The Oil Conservation Division appeared at the hearing through counsel and protested the application in Case No. 14353 because Chi Operating, Inc., the proposed operator of the Unit was out of compliance with Division Rule 5.9. The Division, however, has subsequently withdrawn its protest, signifying that Chi Operating, Inc. is now in compliance.

(8) Applicant appeared at the hearing through counsel and presented the following land testimony:

- (a) The proposed Unit Area consists entirely of federal lands, and working interest ownership is uniform throughout the Unit Area. The Unit Area is divided into seven tracts based on lease boundaries and differences in overriding royalty ownership.
- (b) There are 11 working interest owners in the Unit Area, one royalty owner, and eight overriding royalty owners. 100% of the working interest owners have executed ratifications of the Unit Agreement and Unit Operating Agreement. The United States Bureau of Land Management, as the representative of the only royalty owner, has issued preliminary approval of the Unit Agreement and Unit Operating Agreement. All but one of the owners of overriding royalty interests in the Unit Area have approved the Unit Agreement in writing. The owner of the only remaining, uncommitted overriding royalty interest has given verbal approval.
- (c) Applicant has requested that Chi Operating, Inc., an affiliate of Applicant, be designated operator of the Unit.

(9) Applicant presented the following geological testimony:

- (a) The Delaware formation underlying the Unit Area is made up of multiple sands, not all of which are productive. Applicant has identified three intervals that are generally productive of oil in the Unit Area.
- (b) The area that Applicant proposes to unitize is a well-defined structural high, with a strong dip to the east, and a fairly strong dip to the south and west. The structure is effectively closed by areas of reduced porosity. A cumulative isopach map of the three productive sand intervals, based on an 18% porosity cut-off, shows the Effective Pay Limit corresponding generally with the horizontal boundaries of the proposed Unit Area.
- (c) This is a tight oil reservoir that is trapping oil, and hence will be a good, tight feature to sweep by water injection.
- (d) The Unit Area has been defined by development. The Isopach Map shows that the entire unitized interval should contribute reserves to the Unit.
- (e) There are no faults connecting the proposed unitized interval to any fresh water zone.

(10) Applicant presented the following engineering testimony:

- (a) There are presently eight producing wells in the proposed Unit Area, producing a total of 515 barrels of oil per day, 615 mcf per day of natural gas, and 687 barrels per day of water. Cumulative production from the proposed Unit Area, at the end of June, 2009, was 1.268 million barrels of oil, 941 mmcf of natural gas, and 1.776 million barrels of water.
- (b) Applicant seeks Division approval to inject into the injection interval by means of nine new injection wells, which it proposes to drill, though it may produce some of these wells prior to commencing injection. The proposed injection wells are arranged as a modified five-spot to take advantage of the pinch-out to the northwest. Applicant may subsequently apply to convert some of the producing wells in the Unit Area to injection. Each of the two proposed injection wells will inject an average of 200 to 400 barrels of water per day.
- (c) The source of the injection water will be purchased, produced water from the Yates-Seven Rivers formation from Shackleford Oil Co. wells south of the Unit Area. These waters are compatible with the formation waters.
- (d) Initial injection pressures will not exceed 0.2 psig per foot of depth to the depth of the uppermost perforation in each injection well. If a higher injection pressure is required, a subsequent administrative application will be filed.
- (e) There are no fresh water sources within one mile of the proposed Unit Area. All plugged and abandoned wells within the half-mile area of review (AOR) of each proposed initial injection wells are properly plugged and abandoned, and no remedial work is required on these wells to enable safe operation of the project.
- (f) Applicant proposes to allocate production to the various tracts within the Unit Area on a straight acreage basis. Allocation in this manner, although unusual for secondary recovery projects, is fair and reasonable in this project because of the uniformity of working and royalty interest ownership, and because all owners of all interests have agreed to that allocation method, either in writing or verbally.
- (g) Unitized management of this pool is necessary to effectively implement and carry on the proposed secondary recovery operations.
- (h) The proposed secondary recovery operation is economically and technically feasible. Analogous secondary recovery projects in the Delaware in the same general area have been successful.
- (i) This pool is ripe for implementation of secondary recovery notwithstanding that there is significant remaining primary production.

This is a gas solution drive reservoir that has not reached the bubble point, and it is prudent to implement water injection before the reservoir reaches the bubble point.

- (j) The ultimate primary production from the proposed Unit Area is estimated to be approximately 3.553 million barrels of oil. Incremental recovery through secondary operations is forecast to be 4.62 million barrels of oil. The estimated total value of incremental revenue, discounted at a 40% rate of return will be approximately \$56.2 million.
- (k) The estimated total costs of operation of the proposed secondary recovery project are approximately \$11.5 million, and the project will be economic based on estimated costs and estimated incremental recovery.

The Division concludes as follows:

(11) The provisions of the proposed Unit Agreement and Unit Operating Agreement are fair, reasonable and equitable, contain satisfactory provisions with respect to all of the matters required by NMSA 1978 Section 70-7-7, as amended, and should be incorporated by reference into this order. The participation formula contained in the Unit Agreement allocates the produced and saved, unitized hydrocarbons to the separately owned tracts in the Unit Area on a fair, reasonable and equitable basis.

(12) This Order creating a unit comprising the Unit Area and providing for the unitization and unitized operation of the unit area upon the terms and conditions approved herein is necessary to protect and safeguard the respective rights and obligations of the working interest owners and the royalty interest owners in the Unit Area.

(13) Applicant has made a good faith effort to secure voluntary unitization of the Unitized Formation within the Unit Area.

(14) Chi Operating, Inc. (**OGRID No. 147179**), an operating affiliate of Applicant, should be designated as the operator of the unit.

(15) As of the hearing date, owners of all of the working interest had voluntarily committed to the unit verbally. This order should be made contingent upon final, written approval of the plan of unit operations by the owners of at least seventy-five percent of the production or proceeds thereof that will be credited to interests which are free of cost, including royalties, overriding royalties.

(16) Unitized management, operation and further development of the Unit Area is necessary to effectively carry on secondary recovery operations, to substantially increase the ultimate recovery of oil from the Unit Area. Unitization and implementation of secondary recovery operations by water injection in the Unit Area will benefit the

working interest and royalty interest owners within the proposed Unit Area, and will prevent waste and protect correlative rights of all parties.

(17) The proposed **Benson Delaware Unit** should be approved for statutory unitization.

(18) The applicant proposes to institute a secondary recovery project by water injection within the Benson Delaware Unit Area. The project area should comprise the entire area approved for statutory unitization as described in this Order. The Delaware reservoir within the Unit Area has not been depleted. However, it is prudent to commence water injection operations at this time to extend the life of the reservoir and to maximize the ultimate recovery of crude oil from this reservoir. This application for secondary recovery operations has not been prematurely filed either for economic or technical reasons.

(19) The proposed unitized method of secondary recovery operations within the Unit Area is feasible, and will result, with reasonable probability, in the recovery of substantially more oil from the unitized portion of the pool than would otherwise be recovered. The estimated additional costs of the proposed operations will not exceed the estimated value of the additional oil recovered plus a reasonable profit.

(20) An examination of all wellbores within one half-mile of each of the proposed nine injection wells indicates that all Area of Review ("AOR") wells are properly cased and cemented to prevent vertical migration of injected fluids. The proposed injection operation will not pose a threat to protectable underground sources of drinking water.

(21) The proposed secondary recovery project by water injection will prevent waste, protect correlative rights, should be called the **Benson Delaware Secondary Recovery Project**, and should be approved.

(22) The evidence establishes that the proposed 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].

(23) The certified project area should initially comprise the entire Unit Area.

(24) The project area within the Unit Area and/or the producing wells within such area eligible for the recovered oil tax rate may be contracted and reduced dependent upon the evidence presented by the Applicant in its demonstration of the occurrence of a positive production response.

IT IS THEREFORE ORDERED THAT:

(1) The application of Chi Energy, Inc. for the statutory unitization of 560 acres, more or less, in Eddy County, New Mexico, to be known as the Benson Delaware Unit, is hereby approved pursuant to the Statutory Unitization Act, NMSA 1978, Sections 70-7-1 through 70-7-21.

(2) The Benson Delaware Unit shall comprise the following described federal lands located in Eddy County, New Mexico:

TOWNSHIP 19 SOUTH, RANGE 30 EAST, NMPM

Section 1: NE/4 and S/2 of the SW/4,
and W/2 of the SE/4

Section 11: E/2 and SW/4 of the NE/4

Section 12: NW/4 and N/2 of the SW/4

(3) The Unitized Formation shall consist of the stratigraphic equivalent of the interval within the Delaware formation from 4370 feet to 5300 feet below the surface, as shown by the Density Neutron Log for the Munchkin Federal Well No. 9 (**API No. 30-015-34293**), located 990 feet from the North line and 300 feet from the East line of Section 11, Township 19 South, Range 30 East, NMPM, Eddy County, New Mexico.

(4) The persons owning the required statutory minimum percentage of the working interest have verbally ratified the Unit Agreement and the Unit Operating Agreement. However, this Order shall not be effective until the plan of unit operations provided herein has been approved in writing by the owners of at least seventy-five percent of the production or proceeds thereof that will be credited to interests which are free of cost [NMSA 1978, §70-7-8 (1975)], and the Division has made a finding in a supplemental order that the plan for unit operations has been so approved.

(5) The proposed UNIT AGREEMENT and the UNIT OPERATING AGREEMENT, admitted as EXHIBITS 2 and 3, respectively, at the hearing of these cases, are hereby incorporated into this Order by reference.

(6) Chi Operating, Inc. (**OGRID 4378**) is hereby designated the operator of the Benson Delaware Unit.

(7) The operator shall notify the Division in writing of its removal or the substitution of any other working interest owner within the Unit Area as operator.

(8) The unit established hereby shall terminate upon the plugging and abandonment of the last well in the Unit Area completed in the Unitized Formation.

IT IS FURTHER ORDERED THAT:

(9) Chi Operating, Inc. (Operator) is hereby authorized to institute secondary recovery operations within the Unit Area initially by the injection of water into the Unitized Formation of the Benson-Delaware Pool, in the interval from 4470 to 5200 feet below the surface, through the following nine wells to be located in Township 19 South, Range 30 East, NMPM, in Eddy County, New Mexico:

Well Name	Surface Location	* Bottom Hole Location
Munchkin #22W	900 FNL & 1980 FWL, C-12	930 FNL & 2620 FWL, C-12
Munchkin #21W		1050 FNL & 1150 FWL D-12
Munchkin #20W	1400 FNL & 400 FWL, D-12	1350 FNL & 20 FWL, D-12
Munchkin #19W	2300 FNL & 400 FEL, B-11	1300 FNL & 1000 FEL, A-11
Munchkin #18W		1500 FSL & 2200 FEL, J-1
Munchkin #17W		1700 FSL & 1500 FWL, K-1
Munchkin #16W		300 FSL & 1650 FEL, O-1
Munchkin #15W		300 FSL & 1550FWL, N-1
Munchkin #14W	330 FNL & 500 FWL, D-12	330 FNL & 330 FWL, D-12

(10) No fresh water shall be used as make-up water or otherwise injected pursuant to the injection authorization herein provided.

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

(12) Injection into each of the wells identified above shall be accomplished through 2 7/8 inch plastic lined or fiberglass lined tubing installed in a packer located within 100 feet of the uppermost injection perforations or casing shoe. 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.

(13) The injection wells or pressurization system shall be equipped with a pressure control device or acceptable substitute that will limit the surface injection pressure to no more than 860 pounds per square inch.

(14) 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.

(15) The Division Director may administratively authorize additional injection wells within the Unit Area as provided in Division Rule 19.15.26.8.A NMAC.

(16) Prior to commencement of injection operations, the casing in each well shall be pressure tested throughout the interval from the surface down to the proposed packer setting depth to assure the integrity of such casing. Mechanical integrity tests (MITs) shall be conducted at least once every five years thereafter.

(17) The Operator shall give at least 48 hours advance notice to the supervisor of the Division's Artesia District Office of the date and time (i) injection equipment will be installed, and (ii) the mechanical integrity pressure tests will be conducted on each proposed injection well, so that these operations may be witnessed.

(18) The Operator shall immediately notify the supervisor of the Division's Artesia District Office of any failure of the tubing, casing or packer in any of the injection wells, or the leakage of water, oil or gas from or around any producing or plugged and abandoned well within the project area, and shall promptly take all steps necessary to correct such failure or leakage.

(19) The Operator shall conduct injection operations in accordance with Division Rules No. 19.15.26.1 through 19.15.26.15 NMAC, and shall submit monthly progress reports in accordance with Division Rules No. 19.15.26.11.B, and 19.15.7.8.D.

(20) The injection authority granted herein for the injection wells shall terminate one year after the date of this order if the Operator has not commenced injection operations into at least one of the wells; provided, however, the Division, upon written request filed with the Division's Santa Fe Office prior to the termination date herein provided, may grant an extension for good cause. The injection authority shall also terminate *ipso facto*, one year after injection operations into all the wells have ceased.

(21) The secondary recovery project authorized by this order shall be known as the **Benson Delaware Secondary Recovery Project**.

(22) The injection authority granted under this order is **not** transferable except upon Division approval. The Division may require the operator to demonstrate mechanical integrity of each injection well that will be transferred prior to approving transfer of authority to inject.

(23) The Division may revoke this injection permit at any time after notice and hearing if the operator is in violation of Rule 19.15.5.9 NMAC.

(24) The Benson Delaware Secondary Recovery Project is hereby **certified** to the New Mexico Taxation and Revenue Department as an "Enhanced Oil Recovery Project" pursuant to the "Enhanced Oil Recovery Act" (NMSA 1978 Sections 7-29A-1 through 7-29A-5). The project area shall comprise the entire Benson Delaware Unit, described in Ordering Paragraph No. 2; provided the area and/or the producing wells eligible for the enhanced oil recovery (EOR) tax rate may be contracted and reduced based upon the evidence presented by the unit operator in its demonstration of a positive production response.

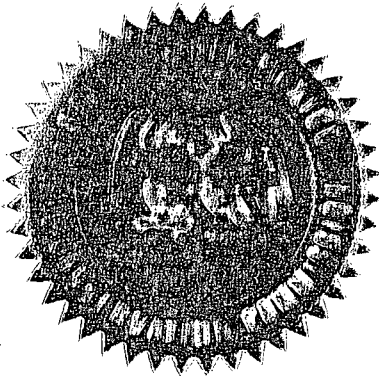
(25) At such time as a positive production response occurs, and within five years from the date the project was certified to the New Mexico Taxation and Revenue Department, the unit operator shall apply to the Division for certification of a positive production response. This application shall identify the area benefiting from enhanced oil recovery operations and the specific wells eligible for the EOR tax rate. 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.

(26) 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.

(27) Upon failure of the Operator to conduct operations (1) in such manner as will protect fresh water or (2) in a manner consistent with the requirements in this Order, the Division may, after notice and hearing, (or without notice and hearing in event of an emergency, subject to the provisions of NMSA 1978 Section 70-2-23), terminate the injection authority granted herein.

(28) Jurisdiction is hereby 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.



SEAL

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

A handwritten signature in dark ink, appearing to read "Mark E. Fesmire", written over a horizontal line.

MARK E. FESMIRE, P. E.
Acting Director