

**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:**

**APPLICATION OF LEGACY RESERVES OPERATING, LP TO INSTITUTE A
TERTIARY RECOVERY PROJECT FOR THE DRICKEY QUEEN SAND UNIT,
AND TO QUALIFY THE PROJECT FOR THE RECOVERED OIL TAX RATE,
CHAVES COUNTY, NEW MEXICO**

**CASE NO. 15255
ORDER NO. R-1477-B**

ORDER OF THE DIVISION

BY THE DIVISION:

This case came on for hearing at 8:15 a.m. on January 8, 2015, at Santa Fe, New Mexico before Examiner Michael McMillan and again on March 19, 2015 before Examiner Phillip R. Goetze.

NOW, on this 17th day of April, 2015, the Division Director, having considered the testimony, the record and the recommendations of Examiner McMillan,

FINDS THAT:

- (1) Due public notice has been given, and the Division has jurisdiction of this case and its subject matter.
- (2) Legacy Reserves Operating, LP ("Legacy" or "Applicant"), seeks approval of a tertiary (Water and CO2 injection) recovery project within its Drickey Queen Sand Unit and to qualify the expanded project for the Enhanced Oil Tax Rate.
- (3) The case was heard on January 8, 2015. Legacy appeared again on March 19, 2015 to present additional evidence including proof of the notice requirements.
- (4) The applicant notified the other working interest owners within the Drickey Queen Sand Unit and all parties affected by the proposed injection wells and received no objections. No other parties appeared in this case or otherwise opposed this application.
- (5) The Division approved the Drickey Queen Sand Unit Agreement first in

1959 and again in September of 2011 by Order No. R-1477-A in Case No. 14675. A land description of this Unit as it was last amended February 25, 2011 is included in that Order No. R-1477-A.

(6) In addition, Order No. R-1477-A consolidated all previously approved secondary recovery projects within the current boundaries of this Unit into one secondary recovery, water injection project. The previous approval orders for injection wells not currently plugged within this Unit are listed in the Exhibit A attached to this Order and within those approvals are details for each injection well such as perforation depths and pressure limits.

(7) Legacy Reserves Operating, LP (OGRID 240974) is the operator of this unit and is in compliance with Division Rule 19.15.5.9 NMAC and therefore eligible for approval of injection permits.

(8) Legacy appeared at the hearing through counsel and presented exhibits and testimony indicating the following:

(a) Currently there are 31 injection wells and 28 producing wells spaced on 40-acre (optimal) well density. Legacy plans to create 80-acre, 5-spot patterns for secondary and tertiary recovery.

(b) Legacy intends to drill additional production and injection wells and convert other producers to injection. Surface pipe will be set within the Rustler anhydrite and then production casing through the Queen formation.

(c) Below-ground fresh water sands will be protected by this proposed casing design, and in the casing and cement already installed on existing wells.

(d) Wells will be produced using a CO₂ gas artificial lift. Two and three eighths (2-3/8" OD) tubing will be used in both production and injection wells. Fresh water will be used from time to time to remove salt in the wells.

(e) This reservoir rock within the Queen formation is bounded vertically, top and bottom, by higher stress, low permeability rocks. The top of the Queen formation is monoclinial, dips gently at a rate of roughly 25 feet per mile to the southeast, and contains gas up dip to the west and water down dip to the east. There is no evidence of faulting within the Unit boundaries.

(f) The Rock Queen Unit located to the north is under CO₂ injection and is the primary analogy for this project. Results indicate secondary and tertiary reserves exist in this Drickey Queen Sand Unit. Recovery under primary, solution gas drive has been approximately 10 percent of original oil in place ("OOIP"). The results under secondary recovery (waterflooding) are expected to be an additional 28 percent of OOIP. Results after tertiary recovery (injection of CO₂) are expected to be yet another 10 percent of OOIP.

(g) Legacy expects to pressure up this reservoir using water injection and then inject CO2 under miscible conditions.

(h) Legacy is asking for a maximum surface injection pressure while injecting water of 800 psi and while injecting gas of 1200 psi. The evidence for these pressures was presented and accepted by the Division in Order No. R-1541-B in Case No. 14505.

(i) The one-half mile area of review ("AOR") around the proposed injection wells has 104 total wells, 41 of which are plugged and abandoned.

(j) The Area of Review contains one poorly plugged well. The Trigg Federal Well No. 14 (API No. 30-005-00983) located 2310 feet from the South line and 1650 feet from the East line, Unit letter J of Section 4, Township 14 South, Range 31 East, NMPM, was plugged after its casing parted; by pumping cement down the bradenhead and the casing. The 5-1/2 inch casing had parted just above the Rustler anhydrite, which is itself above the Salado salt formation. This well is approximately 2300 feet from the nearest injection well and is located where another injection well should be. Legacy proposed the production Well No. 806 as a pressure sink keeping the reservoir pressure low at the Well No. 14 location.

(k) Legacy supplied the required C-108 data on all 20 of the proposed CO2 injection wells. The C-108 individual details for the wells being proposed for only water injection had been submitted in previous administrative applications or hearing cases.

The Division concludes as follows:

(9) Legacy's proposal to use the Well No. 806 as a pressure sink is reasonable and has been used in other waterfloods to keep reservoir pressure low near poorly plugged wells.

(10) The proposal to add CO2 injection to the existing waterflood within the Drickey Queen Sand Unit is feasible and should result in the recovery of additional oil and gas that would not otherwise be recovered.

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

(12) The proposed project will prevent waste, protect correlative rights, and should be approved and named the Drickey Queen Sand Unit CO2 Tertiary Recovery Project. The area to be affected by these operations (the project area) should consist of the entire Drickey Queen Sand Unit area.

(13) Legacy should be approved to inject water and/or CO2 and produced gas as specified on Exhibit A to this Order into the proposed wells at depths within the Queen

formation specified in its application. Provisions should be made for the operator of the Unit to apply administratively for additional or alternative CO2 and water injection wells as needed.

(14) Legacy has proposed to take the produced gas from production wells within this project and to inject that produced gas back into injection wells within this same project without first fractionating the gas stream of component parts such as CO2. This is what is being done in the offsetting Rock Queen Unit and in other tertiary recovery projects within New Mexico. Legacy's operation to recycle produced gas is necessary and essential to profitability.

(15) Approval for this project should also include a requirement to work with District personnel as to frequency of MIT testing and providing charts of annulus and tubing pressures and rates obtained from the automation system. In addition, the H2S contingency plan should be in place prior to commencing CO2 injection.

(16) Legacy presented the information required by Division rules to qualify this project under the Enhanced Oil Recovery Act.

(17) The evidence establishes that the 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). The certified project area should consist of the entire Drickey Queen Sand Unit area.

(18) 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.

IT IS THEREFORE ORDERED THAT:

(1) Legacy Reserves Operating, LP ("Operator" with OGRID 240974) is hereby authorized to implement a tertiary (water and CO2 injection) recovery project within the Drickey Queen Sand Unit ("DQSU") by injection into the unitized portion of the Queen formation, Caprock-Queen Pool (Pool Code 8559).

(2) For tertiary recovery purposes, Operator is permitted to inject into 45 injection wells all shown on Exhibit A attached to this Order. Operator is permitted to inject CO2 (or water alternated with CO2) and re-inject produced gases into 20 wells detailed in Exhibit A. Operator is permitted to inject only water into 25 wells listed on Exhibit A – details of which are stipulated in other, previously issued orders.

(3) Notwithstanding the perforation or open hole intervals shown on Exhibit A and on previously issued Orders, Operator is permitted to inject water, CO2, or produced gases depending on the well, into the "Unitized Formation" as defined in the Unit Agreement. The agreement identifies the Unitized Formation as "*....the producing*

sand of the Cities Service Oil Company Government B-7, located in the SW/4 NW/4, Section 10-14S-31E, Chaves County, New Mexico, the top of which is found at a depth of 1374 feet above sea level." Within this limitation, future modifications to the injection interval of any of these 45 injection wells shall be authorized after submittal of intended changes on sundry forms and permission of the District office of the Division.

(4) Unless modified in writing by the Division Director, the Drickey Queen Sand Unit Well No. 806 (API No. 30-005-00979) or a replacement production well shall be maintained in active producing status in order to provide a pressure sink for the poorly plugged Trigg Federal Well No. 14 (API No. 30-005-00983). Failure to maintain this pressure sink shall result in immediate suspension of injection into immediately surrounding wells.

(5) The Drickey Queen Sand Unit (CO2) Tertiary Recovery Project is hereby approved and shall be wholly contained within the Unitized Formation and within the horizontal extent of the Drickey Queen Sand Unit.

(6) Prior to commencing CO2 injection or re-injection of produced gas in any well in this project, the operator shall have an approved H2S contingency plan for the project area.

(7) Each injection well shall be hooked up to a Supervisory Control and Data Acquisition (SCADA) system and be equipped so the wellhead will prevent out flow automatically upon physical damage to that wellhead or any flow line leading from that wellhead.

(8) The Division Director may administratively authorize alternative or additional injection wells within this Unit as provided in 19.15.26.8 NMAC.

(9) The operator shall take all steps necessary to ensure that the injected fluids enter only the permitted injection intervals and are not permitted to escape to other formations or onto the surface from injection, production, or abandoned wells.

(10) Injection into any approved injection well within this project shall be accomplished through lined tubing installed in a tubing-casing packer located less than 100 feet of the uppermost injection interval. 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 detect any leakage in the casing, tubing, or packer.

(11) The injection well or pressurization system shall be equipped with a pressure control device or acceptable substitute that will limit the maximum surface injection pressure to 800 psi while injecting water or 1200 psi while injecting CO2 or produced gases.

(12) The Division Director may administratively authorize a pressure limitation in excess of the above, upon a showing supported by approved Step Rate Tests (using

ONLY water) that such higher pressure will not result in the fracturing of the injection formation or confining strata or damage to the reservoir.

(13) As per Division Rule 19.15.26.11A NMAC, the operator shall test any injection well on this project for mechanical integrity ("MIT") prior to commencing injection into that well and prior to resuming injection each time the packer is unseated. All MIT testing procedures and schedules shall follow the requirements in Division Rule 19.15.26.11A. NMAC or with added provisions as may be required by the district office of the Division, such as more frequent MITs or access to data from the operator's SCADA system. The Division Director retains the right to require at any time wireline verification of completion and packer setting depths in any injection well.

(14) The operator shall provide notice, 72 hours in advance, to the supervisor of the Division's district office of the date and time of the installation of injection equipment and of any mechanical integrity test so that the same may be inspected and witnessed.

(15) The operator shall provide written notice of the date of commencement of injection to the Division's district office. In accordance with Division rules, the operator shall submit monthly reports of the disposal operations on Division Form C-115.

(16) Without limitation on the duties of the operator as provided in Division rules, or otherwise, the operator shall immediately notify the Division's district office of any failure of the tubing, casing or packer in the well, or of any leakage or release of water, oil or gas from or around any produced or plugged and abandoned well in the area, and shall take such measures as may be timely and necessary to correct such failure or leakage.

(17) The Drickey Queen Sand Unit CO2 Tertiary 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).

(18) The area to be affected by the enhanced oil recovery project shall consist of the area within the Drickey Queen Sand Unit. 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) 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." 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.

(20) 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.

(21) 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 any injection well that will be transferred prior to approving transfer of authority to inject.

(22) The Division may revoke any injection permit after notice and hearing if the operator is in violation of 19.15.5.9 NMAC.

(23) The injection authority granted herein shall terminate two years after the effective date of this order if the operator has not commenced injection operations into at least one of the permitted injection wells, provided however, the Division, upon written request, mailed by the operator prior to the termination date, may grant an extension thereof for good cause.

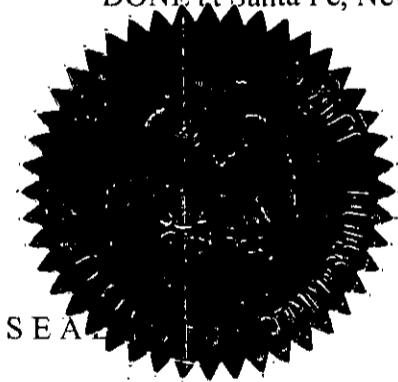
(24) One year after all injection of any fluid into the Drickey Queen Sand Unit has ceased (or last reported), the Division shall consider the project abandoned, and the authority to inject will terminate *ipso facto*. The Division, upon written request mailed by the operator prior to that termination date, may grant an extension thereof for good cause.

(25) Compliance with this order does not relieve the operator of the obligation to comply with other applicable federal, state or local laws or rules, or to exercise due care for the protection of fresh water, public health and safety and the environment.

(26) This Order is binding on all current and future operators of this Unit.

(27) Jurisdiction is retained by the Division for the entry of such further orders as may be necessary for the prevention of waste and/or protection of correlative rights or upon failure of the operator to conduct operations (1) to protect fresh or protectable waters or (2) consistent with the requirements in this order, whereupon the Division may, after notice and hearing (or without prior notice and hearing in case of emergency), terminate the injection authority granted herein.

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



STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

DAVID R. CATANACH
Director

EXHIBIT A															
LEGACY RESERVES OPERATING, L.P.															
DRICKEY QUEEN SAND UNIT CO2 TERTIARY RECOVERY PROJECT															
DRICKEY QUEEN SAND UNIT PERMIT HISTORY FOR INJECTION WELLS															
API	WELL	##	Unit	Sec	TSP	RGE	Injection	Permit	Injection	Status	Case No. 15255		Top Feet	Bottom Feet	Comp Type
							Permit	Num	Permit		BEFORE	AFTER			
							Type		R_OrderNo						
30-005-21132	DQSU	144	B	35	13.0S	31E	Hearing	---->	Case 15255	Oil	CO2	3026	3056	Perfs	
30-005-NA	DQSU	301	F	35	13.0S	31E	Hearing	---->	Case 15255	New	CO2	3036	3052	Perfs	
30-005-NA	DQSU	302	L	35	13.0S	31E	Hearing	---->	Case 15255	New	CO2	3049	3065	Perfs	
30-005-NA	DQSU	304	J	35	13.0S	31E	Hearing	---->	Case 15255	New	CO2	3063	3079	Perfs	
30-005-NA	DQSU	307	N	35	13.0S	31E	Hearing	---->	Case 15255	New	CO2	3053	3069	Perfs	
30-005-NA	DQSU	310	J	34	13.0S	31E	Hearing	---->	Case 15255	New	CO2	3040	3056	Perfs	
30-005-NA	DQSU	312	P	34	13.0S	31E	Hearing	---->	Case 15255	New	CO2	3051	3067	Perfs	
30-005-NA	DQSU	314	D	2	14.0S	31E	Hearing	---->	Case 15255	New	CO2	3067	3083	Perfs	
30-005-NA	DQSU	315	F	3	14.0S	31E	Hearing	---->	Case 15255	New	CO2	3044	3060	Perfs	
30-005-NA	DQSU	316	L	3	14.0S	31E	Hearing	---->	Case 15255	New	CO2	2881	2897	Perfs	
30-005-NA	DQSU	317	J	3	14.0S	31E	Hearing	---->	Case 15255	New	CO2	3045	3061	Perfs	
30-005-NA	DQSU	319	P	3	14.0S	31E	Hearing	---->	Case 15255	New	CO2	3037	3053	Perfs	
30-005-00967	DQSU	502	H	3	14.0S	31E	Hearing	---->	Case 15255	P&A	CO2	3042	3073	Oil	
30-005-29196	DQSU	701	N	34	13.0S	31E	Hearing	---->	Case 15255	Oil	CO2	3038	3052	Perfs	
30-005-00923	DQSU	2	B	35	13.0S	31E	WFX	100		WIW	CO2	3038	3080	OH	
30-005-00926	DQSU	5	H	35	13.0S	31E	WFX	167	R-1128	WIW	CO2	3051	3069	OH	
30-005-00900	DQSU	9	N	34	13.0S	31E	WFX	79		WIW	CO2	3045	3060	Perfs	
30-005-00973	DQSU	16	B	3	14.0S	31E	WFX	23		WIW	CO2	3048	3063	Perfs	
30-005-00977	DQSU	18	D	3	14.0S	31E	WFX	34		WIW	CO2	2922	2936	Perfs	
30-005-00968	DQSU	24N	N	3	14.0S	31E	Hearing	---->	R-1128	WIW	CO2	3033	3090	Oil	
30-005-00925	DQSU	1	A	35	13.0S	31E	WFX	868	R-1128	WIW	WIW				
30-005-00924	DQSU	4	G	35	13.0S	31E	WFX	868	R-1128	WIW	WIW				
30-005-00902	DQSU	7	L	34	13.0S	31E	WFX	86		WIW	WIW				
30-005-00901	DQSU	8	M	34	13.0S	31E	WFX	894		WIW	WIW				
30-005-00971	DQSU	17	C	3	14.0S	31E	WFX	894		WIW	WIW				
30-005-00963	DQSU	25	O	3	14.0S	31E	WFX	894		WIW	WIW				
30-005-01024	DQSU	26	A	10	14.0S	31E	WFX	894		WIW	WIW				
30-005-01026	DQSU	27	B	10	14.0S	31E	Hearing	---->	R-1128	WIW	WIW				
30-005-01029	DQSU	29	D	10	14.0S	31E	WFX	16	R-1128-B	WIW	WIW				
30-005-01022	DQSU	31	F	10	14.0S	31E	WFX	23		WIW	WIW				
30-005-01023	DQSU	32	G	10	14.0S	31E	WFX	894		WIW	WIW				
30-005-01025	DQSU	33	H	10	14.0S	31E	WFX	23/675		WIW	WIW				
30-005-01030	DQSU	34	J	10	14.0S	31E	WFX	23		WIW	WIW				
30-005-01036	DQSU	36	L	10	14.0S	31E	WFX	79		WIW	WIW				
30-005-01037	DQSU	38	N	10	14.0S	31E	WFX	79		WIW	WIW				
30-005-01070	DQSU	40	B	16	14.0S	31E	WFX	128	R-2448	SI	WIW				
30-005-01064	DQSU	46	F	15	14.0S	31E	WFX	128		SI	WIW				
30-005-01127	DQSU	53	H	22	14.0S	31E	Hearing	---->	R-2780	SI	WIW				
30-005-21156	DQSU	54	P	15	14.0S	31E	WFX	746	R-1128/API-144	WIW	WIW				
30-005-21157	DQSU	55	M	15	14.0S	31E	WFX	746	R-1128/API-144	WIW	WIW				
30-005-21153	DQSU	56	D	15	14.0S	31E	WFX	746	R-1128/API-144	WIW	WIW				
30-005-21154	DQSU	57	A	15	14.0S	31E	WFX	746	R-1128/API-144	WIW	WIW				
30-005-00978	DQSU	805	P	4	14.0S	31E	WFX	18	R-1456/12912	TA	WIW				
30-005-01013	DQSU	812	B	9	14.0S	31E	WFX	33	R-1456/12912	SI	WIW				
30-005-00985	DQSU	816	B	4	14.0S	31E	WFX	49	R-1456/12912	TA	WIW				