

**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. 12440  
ORDER NO. R-2749-A*

**APPLICATION OF SHAHARA OIL, L.L.C. FOR APPROVAL OF A TERTIARY  
RECOVERY PROJECT, TO QUALIFY THIS PROJECT FOR THE RECOVERED  
OIL TAX RATE PURSUANT TO THE "NEW MEXICO OIL RECOVERY ACT,"  
AND FOR TWO UNORTHODOX WELL LOCATIONS, EDDY COUNTY, NEW  
MEXICO.**

**ORDER OF THE DIVISION**

**BY THE DIVISION:**

This case came on for hearing at 8:15 a.m. on June 29, 2000, at Santa Fe, New Mexico, before Examiner Michael E. Stogner.

NOW, on this 8th day of September, 2000, the Division Director, having considered the record and the recommendations of the Examiner,

**FINDS THAT:**

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

(2) By Division Order No. R-2749, issued in Case No. 3083 on July 29, 1964, the Division authorized General American Oil Company of Texas ("General American") to institute a waterflood project on the Grayburg-Jackson Premier Sand Unit ("Premier Sand Waterflood Project") comprising the following 960.00 acres, more or less, of federal lands in Eddy County, New Mexico, by the injection of water into the Premier Sand of the Grayburg Jackson Pool:

(GENERAL AMERICAN - PREMIER SAND WATERFLOOD PROJECT)  
TOWNSHIP 17 SOUTH, RANGE 30 EAST, NMPM

Section 27: W/2, W/2 SE/4, SE/4 SE/4

Section 28: E/2 NE/4, SE/4

Section 33: N/2 NE/4  
Section 34: N/2 N/2  
Section 35: NW/4 NW/4.

(3) The "Unitized Formation" as defined within the Grayburg-Jackson Premier Sand Unit Agreement is that portion of the Grayburg Jackson Pool that extends from a depth of 3,230 feet to 3,243 feet as found on the Schlumberger Electric Log dated February 17, 1963, of the Pendragon Energy Partners, Inc. Grayburg Jackson Unit Tract 2 Well No. 8 (API No. 30-015-04342), formerly the General American Oil Company of Texas Maddren "B" Well No. 8, located 1980 feet from the South line and 660 feet from the West line (Unit L) of Section 26, Township 17 South, Range 30 East, NMPM, Eddy County, New Mexico.

(4) By Division Administrative Order WFX-363, dated December 31, 1971, General American was granted the authority to expand its Premier Sand Waterflood Project with two additional water injection wells.

(5) The applicant in this matter, Shahara Oil, L.L.C. ("Shahara"), seeks the following:

(a) to amend the injection authority under Division Order No. R-2749 and WFX-363 to authorize the injection of microorganisms and water into the Grayburg-Jackson Premier Sand Unit through the 14 wells described in the attached Exhibit "A";

(b) exceptions to Division Rules 104.B (1) and 104.F (1) for two wells within the Grayburg-Jackson Premier Sand Unit Area; and

(c) to qualify this tertiary recovery project for the recovered oil tax rate pursuant to the "New Mexico Enhanced Oil Recovery Act" ("EOR"), Sections 7-29A-1 through 7-29A-5, NMSA 1978.

(6) Shahara, as the operator of the Grayburg-Jackson Premier Sand Unit, intends to recover additional oil from the Premier Sand of the Grayburg Jackson Pool within the unit area by the injection into the 14 wells described on Exhibit "A" of this order of water with microorganisms.

(7) The proposed Grayburg Jackson PSU "MA" Well No. 7 is to be drilled along the western edge of the EOR Project Area at a location 1330 feet from the North line and 1310 feet from the East line (Unit H) of Section 28, Township 17 South, Range 30 East, NMPM, Eddy County, New Mexico. Further, the existing Grayburg Jackson PSU "MA" Well No. 2, located 2615 feet from the North line and 1295 feet from the East line (Unit H) of Section 28, a plugged and abandoned well to be re-entered and utilized as an injection well, is also located on the western edge of the EOR project area. Both well locations are unorthodox pursuant to Division Rules 104.B (1) and 104.F (1); however, the owners of the operating rights to the Premier Sand underlying the W/2 NE/4 of Section 28 adjacent to these two unorthodox locations are the same as in the Grayburg-Jackson Premier Sand Unit.

(8) Within the Grayburg-Jackson Premier Sand Unit Shahara intends to drill 11 new producing infill wells and one new injection well and re-enter, convert, or work over 10 currently existing well bores as injection wells.

(9) Shahara seeks to institute tertiary recovery operations within the Grayburg-Jackson Premier Sand Unit, which is the "EOR Project Area", by injecting microorganisms along with water as the carrier fluid to: (i) remove scale, which should result in better sweep efficiency; and (ii) serve as a surfactant, which should reduce residual oil saturation. As proposed by Shahara, the initial 450,000 barrels of water to be injected into this tertiary project will contain 2,800 gallons of these microorganisms. Thereafter normal waterflood operations are to be restored.

(10) Testimony presented by Shahara indicates that, as of December 1999, cumulative production from the Grayburg-Jackson Premier Sand Unit has been 2.3 million barrels of oil. The projected increase in recovery from the unit area is an additional 1,530,000 barrels of oil and 256,320 MCF of gas over the life of the project that is estimated to be 15 years. Approximately 1.17 million barrels of this increased recovery should be attributed to infill drilling and restored waterflood operations and 360,000 barrels to the microorganism treatment.

(11) The estimated initial cost to institute this tertiary recovery project is \$2,960,000.00.

(12) The proposed tertiary recovery operations should result in the recovery of otherwise unrecoverable oil thereby preventing waste, exhibits sound engineering practices, is in the best interest of conservation, and will not impair correlative rights.

(13) Subsequent to the hearing the applicant submitted the required Division Form C-108 and supplemental data on all wells (including plugged wells) that penetrate the zone of interest within the 2-mile "area-of-review" of the 14 injection wells within this project area. These data show that wells in the area are cased and plugged so as to protect fresh water and prevent fluid migration from the injection zone, and includes testimony indicating no evidence of open faults or any other hydrologic connection between the injection zone and the fresh water resources in the area has been discovered.

(14) The operator should take all steps necessary to ensure that the injected fluid enters and remains confined to the proposed injection interval and is not permitted to escape from the interval and migrate into other formations or onto the surface from injection, production or plugged and abandoned wells.

(15) Injection into each of the 14 wells described in Exhibit "A" should be accomplished through 2-3/8 inch internally plastic-lined tubing installed in a packer set no higher than 100 feet above the top of the uppermost perforation or open hole interval, whichever is applicable; the casing-tubing annulus in each well should be filled with an inert fluid and equipped with an approved gauge or leak detection device.

(16) Before commencing tertiary recovery operations, each of the 14 injection wells should be pressure tested throughout the interval from the surface down to the proposed packer-setting depth to ensure the mechanical integrity of each well bore.

(17) No evidence or testimony was presented concerning injection pressure into the proposed tertiary project; therefore, each injection well or pressurization system for each well should be initially equipped with a pressure control device or acceptable substitute that will limit the surface injection pressure at the wellhead to no more than 580 psi; however, the Division Director should have the authority to administratively authorize a pressure limitation in excess of the pressure limitation described above upon a showing by the operator that such higher pressure will not result in the fracturing of the injection formation or confining strata.

(18) The operator should give advance notification to the supervisor of the Division's Artesia District Office of the date and time of the installation of any new injection equipment and of the mechanical integrity pressure tests in order that the same may be witnessed.

(19) This application should be approved and the project should be governed by the provisions of Division Rules 701 through 708.

(20) The approved EOR Project Area should be re-designated the "*Shahara Premier Sand Unit EOR Project*" and is to comprise the 960.00 acres described in Finding Paragraph No. (2) above.

(21) Evidence presented by Shahara indicated that the proposed EOR Project Area meets all the criteria for certification by the Division as a qualified "Enhanced Oil Recovery Project" pursuant to the EOR Act.

(22) To be eligible for this EOR tax rate, prior to commencing tertiary recovery operations, the operator must request from the Division a Certificate of Qualification, which certificate will specify the proposed EOR Project Area described above.

(23) At such time as a positive production response occurs from the injection of water and microorganisms and within five years from the date of the Certificate of Qualification, the operator must apply to the Division for certification of positive production response, which application is to identify the area actually benefiting from enhanced recovery operations and identify the specific wells the operator believes are eligible for the EOR tax rate. The Division may review the application administratively or set it for hearing. Based upon evidence presented, the Division will certify to the Taxation and Revenue Department those lands and wells that are eligible for the EOR tax rate.

(24) The injection authority granted herein for any of the 14 individual injection wells described in Exhibit "A" should terminate one year after the effective date of this order if the operator has not commenced injection operations into the well; provided, however, the Division, upon written request by the operator, may grant an extension thereof for good cause shown.

(25) Since approval of this application serves to significantly change the injection pattern, profile, and substance of the General American's original Premier Sand Waterflood Project, this order should supersede the previous orders granting injection authority in the Grayburg-Jackson Premier Sand Unit (Division Order No. R-2749 and Administrative Order WFX-363).

**IT IS THEREFORE ORDERED THAT:**

(1) The applicant, Shahara Oil, L.L.C. ("Shahara"), is hereby authorized to institute tertiary recovery operations on its Grayburg-Jackson Premier Sand Unit by the injection of water and microorganisms into the unitized interval that is the Premier Sand of the Grayburg Jackson Pool through the 14 wells described in the attached Exhibit "A".

(2) The subject tertiary recovery project area ("EOR Project Area") shall henceforth be designated the "*Shahara Premier Sand Unit EOR Project*" and shall coincide with the boundary established for the Grayburg-Jackson Premier Sand Unit in Eddy County, New Mexico, comprising the following described 960.00 acres, more or less:

TOWNSHIP 17 SOUTH, RANGE 30 EAST, NMPM

Section 27: W/2, W/2 SE/4, SE/4 SE/4  
Section 28: E/2 NE/4, SE/4  
Section 33: N/2 NE/4  
Section 34: N/2 N/2  
Section 35: NW/4 NW/4.

(3) Shahara, as operator of the Grayburg-Jackson Premier Sand Unit, shall take all steps necessary to ensure that the injected fluid enters and remains confined to the unitized interval and is not permitted to escape to other formations or onto the surface from injection, production, or plugged and abandoned wells.

(4) Injection into each of the 14 injection wells shall be accomplished through 2-3/8 inch internally plastic-lined tubing installed in a packer set within approximately 100 feet of the uppermost injection perforation or open hole interval, whichever is applicable; the casing-tubing annulus in each well shall be filled with an inert fluid and equipped with an approved gauge or pressure leak detection device.

(5) The 14 injection wells herein authorized and/or the injection pressurization system shall be equipped with a pressure-limiting switch or other acceptable device that will limit the surface injection pressure at the wellhead to no more than 580 psi.

(6) Prior to the commencement of tertiary recovery operations, the casing in each of the 14 injection wells shall be pressure-tested throughout the interval from the surface down to the proposed packer setting depth to ensure the integrity of such casing in a manner that is satisfactory to the supervisor of the Division's Artesia District Office.

(7) The operator shall immediately notify the supervisor of the Division's Artesia District Office of the failure of the tubing, casing or packer in any of the EOR Project Area injection wells; the leakage of water, natural gas, or oil from or around any producing well within the EOR Project Area; or the leakage of water, natural gas, or oil from any plugged and abandoned well within the EOR Project Area. The operator shall take such steps as may be necessary to correct such failure or leakage.

(8) The Division Director has the authority to authorize an increase in the injection pressure limitation on any well upon a proper showing by the operator that such higher pressure will not result in the migration of the injected fluid from its respective interval or fracture the confining strata.

(9) The operator of the Shahara Premier Sand Unit EOR Project shall conduct injection operations in accordance with all applicable Division rules including Division Rules 701 through 708. Further, the Unit operator shall submit monthly progress reports in accordance with Rules 706 and 1115.

**IT IS FURTHER ORDERED THAT:**

(10) The Shahara Premier Sand Unit EOR Project is hereby certified as a qualified "Enhanced Oil Recovery Project" pursuant to the "Enhanced Oil Recovery ("EOR") Act," Sections 7-29A-1 through 7-29A-5, NMSA 1978 and shall comprise the 960.00 acres described above in Ordering Paragraph No. (2).

(11) To be eligible for the EOR tax rate, prior to commencing injection operations, the operator must request from the Division a Certificate of Qualification, which certificate will specify the proposed EOR Project Area described above.

(12) At such time as a positive production response occurs from the injection of water and microorganisms and within five years from the date of the Certificate of Qualification, the applicant must apply to the Division for certification of positive production response, which application shall identify the area actually benefiting from tertiary recovery operations. The Division may review the application administratively or set it for hearing. Based upon evidence presented, the Division will certify to the Taxation and Revenue Department those lands eligible for the EOR tax rate.

(13) The injection authority for any of the 14 injection wells described in Exhibit "A" shall terminate one year after the effective date of this order if the operator has not commenced injection operations into the well; provided, however, the Division, upon written request by the operator, may grant an extension thereof for good cause shown.

**IT IS FURTHER ORDERED THAT:**

(14) The following two wells, located at unorthodox locations along the west edge of the EOR Project Area, are hereby approved:

(a) the proposed Grayburg Jackson PSU "MA" Well No. 7 to be drilled along the western edge of the EOR Project Area at a location 1330 feet from the North line and 1310 feet from the East line (Unit H) of Section 28, Township 17 South, Range 30 East, NMPM, Eddy County, New Mexico; and

(b) the existing Grayburg Jackson PSU "MA" Well No. 2, located 2615 feet from the North line and 1295 feet from the East line (Unit H) of Section 28, Township 17 South, Range 30 East, NMPM, Eddy County, New Mexico.

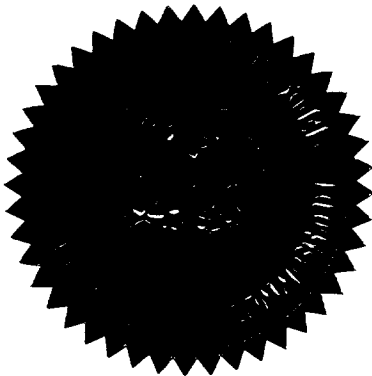
(15) This order shall supersede Division Order No. R-2749, issued in Case No. 3083 and dated July 29, 1964, and Division Administrative Order WFX-363, dated December 31, 1971.

(16) Jurisdiction of this case 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.

STATE OF NEW MEXICO  
OIL CONSERVATION DIVISION

  
LORI WROTENBERY  
Director



S E A L



**Exhibit "A"**  
**Case No. 12440**  
**Order No. R-2749-A**

*Shahara Oil, L.L.C.*  
*Microorganism/Water Injection Wells*  
*Shahara Premier Sand Unit EOR Project Area*  
*Sections 27, 28, 33, 34, and 35, Township 17 South, Range 30 East, NMPM, Premier Sand (Grayburg Jackson Pool), Eddy County, New Mexico.*

<b>Well Name and Number (Former Well Name and No.)</b>	<b>API Number</b>	<b>Footage Location (Unit)</b>	<b>Section</b>	<b>Injection Interval</b>	<b>Current Status</b>
Grayburg Jackson - PSU "AD" Well No. 12	30-015-30342	330' FN & WL (D)	27	3050' - 3200' (Perforations)	New Drill
Grayburg Jackson - WFU "FG" Well No. 1 (Federal "G" Well No. 1)	30-015-04445	330' FN & WL (D)	34	2947' - 3305' (Open hole)	Active Injector (Under the authority of R-2749)
Grayburg Jackson - WFU "ME" Well No. 1 (Maddren "E" Well No. 1)	30-015-04377	990' FSL & 1650' FEL (O)	28	3171' - 3196' (Open hole)	Active Injector (Under the authority of R-2749)
Grayburg Jackson - WFU "MB" Well No. 3 (Maddren "B" Well No. 3)	30-015-04358	990' FSL & 1650' FWL (N)	27	3169' - 3252' (Open hole)	Active Injector (Under the authority of WFX-363)
Maddren "B" Federal Well No. 1 (to be redesignated the Grayburg Jackson - PSU "MB" Well No. 1)	30-015-04359	990' FSL & 330' FWL (M)	27	2900' 3265" (Open hole)	Producing from the Fren-Seven Rivers Pool (to be converted)
Grayburg Jackson - WFU "MB" Well No. 5 (Maddren "B" Well No. 5)	30-015-01433	990' FSL & 2310' FEL (O) (resurveyed location is 978' FSL & 2323' FEL)	27	3142' - 3250' (Perforations)	P & A'ed Producing Well (to be re-entered and converted).
Grayburg Jackson - WFU "BB" Well No. 1 (Beeson "B" Well No. 1)	30-015-04443	330' FNL & 990' FEL (A)	33	3160' - 3280' (Open hole)	Producing Grayburg Jackson Well (Injection well from 1964 to 1974 under R-2749)
Grayburg Jackson WFU "FG" Well No. 2 (Federal "G" Well No. 2)	30-015-04446	330' FNL & 1650' FWL (C) (resurveyed location is 332' FNL & 1666' FWL)	34	3160' - 3268' (Perforations)	P&A'ed Water Injection Well (previously authorized by R-2749. Recently re-entered.)
Arnold "D" Federal Well No. 8 (to be redesignated the Grayburg Jackson PSU "AD" Well No. 8)	30-015-10611	330' FNL & 2140' FEL (B)	34	3241' - 3281' (Open hole)	Shut-in Seven Rivers Producing Well (to be converted.)
Grayburg Jackson WFU "AD" Well No. 9 (Arnold "D" Well No. 9)	30-015-10612	330' FNL & 640' FEL (A)	34	3260' 3300' (Open hole)	Active Unit Producing Well (to be converted.)
Grayburg Jackson WFU "AD" Well No. 1	30-015-04365	1980' FN & EL (F)	27	3050' - 3200' (Perforations)	P & A'ed Well (to be converted.)
Grayburg Jackson WFU "AD" Well No. 3 (Arnold "D" Well No. 3)	30-015-04366	660' FNL & 1980' FWL (C)	27	3072' - 3182' (Open hole)	Active Unit Producing Well (to be converted.)
Grayburg Jackson WFU "AD" Well No. 6 (Arnold "D" Well No. 6)	30-015-10463	2310' FNL - 330' FWL (E)	27	3087' - 3171' (Perforations/ Open hole)	Active Unit Producing Well (to be converted.)
Grayburg Jackson PSU "MA" Well No. 2 (Maddren "A" Well No. 2)	N/A	2615' FNL & 1295' FEL (H)	28	3010' - 3135' (Perforations/ Open hole)	P&A'ed Water Injection Well (previously authorized by R-2749. To be re-entered.)