

**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 CONOCOPHILLIPS FOR AMENDMENT OF DIVISION
ORDER NO. R-2403, AS AMENDED, TO INCREASE THE AUTHORIZED
INJECTION PRESSURE IN ITS MCA UNIT AREA, LEA COUNTY, NEW
MEXICO.**

**CASE NO. 14421
ORDER NO. R-2403-B**

ORDER OF THE DIVISION

BY THE DIVISION:

This case came on for hearing at 8:15 a.m. on March 4 and April 1, 2010, at Santa Fe, New Mexico, before Examiners William V. Jones and David K. Brooks.

NOW, on this 8th day of June, 2010, 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 of the subject matter.

(2) The Applicant, ConocoPhillips, seeks to establish an authorized surface injection pressure for water of 2150 psi within its previously approved secondary recovery project within the MCA Unit Area, Lea County, New Mexico.

(3) Pursuant to the Maljamar Cooperative Repressuring Agreement, approved by Oil Conservation Commission Order No. 485 in Case No. 36, dated November 14, 1942, pressure maintenance operations through cooperative gas injection by various operators began in the Maljamar Cooperative Area. The original gas injection area was expanded and pilot waterflood project operations were initiated over a twenty year period pursuant to various Oil Conservation Commission orders such as Orders No. 595, R-841, and R-1075.

(4) On October 30, 1979 in Order No. R-6157, the Oil Conservation Division approved the creation of the "Maljamar CO2 Injection Project", subsequently expanded by Order PMX-153 and clarified as to allowed injection fluids in Order No. R-6157-A.

(5) On September 24, 1962, the Maljamar Cooperative Agreement project area was unitized for waterflood operations and Continental Oil Company was named unit operator.

(6) By Order No. R-2403, issued on December 31, 1962, the Division granted the application of Continental Oil Company for, among other things, (a) approval of a Supplemental Cooperative Agreement ("Supplement 5") unitizing oil and gas by agreement within certain leases and (b) adoption of the initial Plan of Operation for expansion of the pressure maintenance program by gas and water injection in the Cooperative Area.

(7) The Maljamar Cooperative Agreement Area ("MCA Unit") heretofore approved by the Oil Conservation Commission for pressure maintenance of the Grayburg-San Andres formations includes the following Federal, State and Fee acreage in Lea County, New Mexico:

TOWNSHIP 17 SOUTH, RANGE 32 EAST, N.M.P.M.

Sections 14 to 23: All
Sections 25 to 35: All

TOWNSHIP 17 SOUTH, RANGE 33 EAST, N.M.P.M.

Section 30: W/2

(8) The MCA Unit Operator, from time to time, has received authorization to expand this project by adding injection wells as provided in Supplement 5 and on receipt of Division approval as required by Order No. R-2403.

(9) Orders approving additional injection wells in the project area have limited initial maximum injection pressures to approximately 775 psi. These orders have provided that increases in injection pressures may be authorized by the Division Director "upon a proper showing by the operator that higher pressure will not result in migration of the injected fluid from the permitted injection interval or harmful formation fracturing".

(10) ConocoPhillips presented geological and engineering evidence as follows:

- a. The unitized interval in the MCA Unit is comprised of portions of the Grayburg-San Andres formation, Maljamar-Grayburg-San Andres Pool, which is a well defined reservoir into which water has been injected for enhanced recovery operations for over 65 years. The injection interval is approximately 1278 feet thick. Tight zones in the Queen formation, above

the unitized interval and low porosity zones in the San Andres below this interval assure that injected fluids do not migrate out of zone.

- b. ConocoPhillips is currently injecting in 28 wells in the MCA Unit and plans to add additional injection wells within the southeastern portion of the waterflood in the configuration of 10 acre well density, line drive patterns.
- c. Some producers in this MCA Unit are shut in because of high water production and no place to dispose of the water. Higher injection pressures would enable this water to be re-injected.
- d. New wells to be converted will have adequate casing and cement to prevent migration of injection fluids out of the intended injection interval.
- e. ConocoPhillips indicated no current problems with vertical movement of fluids within the MCA Unit and stated some older wells had been repaired with liners. The older wells have had internal fiberglass liners installed and cemented in order to best confine injection fluid to the intended water flooding interval.
- f. Current injection wells are located throughout the MCA Unit and each was originally either not limited in pressure (for the older wells) or authorized to inject at a surface pressure of 775 psi (0.2psi per foot of depth to the top of the injection interval) and subsequently each has been authorized to inject at a surface pressure of 2150 psi which was approved by the Division.
- g. ConocoPhillips presented step-rate tests on three wells (#223, #273, and #301) as well as initial shut in pressure (ISIP) data from stimulation treatments showing that the most likely formation parting pressure is above 2150 psi.
- h. Approval of a surface injection pressure of 2150 psi for all new injection wells in the MCA Unit will result in operational and administrative efficiencies for ConocoPhillips.

(11) No person other than ConocoPhillips appeared at the hearing, and except for the comments noted below, no person indicated any objection to the application.

(12) This waterflood is one of several older projects in Lea County with some occurrences of water flows while drilling new wells and consequentially with required annual bradenhead surveys. Many of the older wells were drilled in the 1940's and therefore have old casing and cement and are open hole completions stimulated with nitro-glycerin.

(13) The United States Bureau of Land Management ("BLM") filed a statement in email format prior to this hearing listing concerns such as the waterflows and the effects the increased pressure limit would have on older wells with open hole completions.

(14) The case was heard on March 4, 2010, and then continued to permit ConocoPhillips to meet with BLM representatives to discuss its questions and concerns.

(15) ConocoPhillips testified at the April 1 hearing that it had met with the BLM and reviewed its application and recent step-rate tests. ConocoPhillips stated the BLM now supported its request for a maximum surface injection pressure in the MCA Unit of 2150 psi. The BLM did not appear at either hearing and did not send any subsequent letter after the meeting with ConocoPhillips.

(16) As the BLM had mentioned the possible need for periodic tracer surveys, ConocoPhillips presented recent tracer surveys run immediately after the initial completions of two wells to be used for injection in the MCA Unit. The completion fluids on each well had been tagged with radioactive material. These surveys demonstrated that the fracturing or stimulation fluids remained in the intended treatment intervals and did not migrate out of zone during the treatments.

(17) ConocoPhillips emphasized that all new injection wells will be drilled with production casing run to total depth and cement circulated to surface and will therefore competently isolate the injection interval from adjacent formations.

(18) A surface injection pressure of 2150 psi for all "new" injection wells in the MCA Unit will result in operational efficiencies for ConocoPhillips, and will not cause migration of injection fluids out of zone, will otherwise be in the best interest of conservation, the prevention of waste and the protection of correlative rights.

(19) Increased pressures should be limited in older wellbores if these are not repaired with liners or squeezed to supplement older cement jobs. If any conduits exist to allow vertical movement of injected waters it would be the old wellbores, some of which were drilled and abandoned decades ago. Away from these wells, there is a natural barrier to vertical movement of injected waters within the MCA Unit. There is no evidence of faulting in this area and logs presented at the hearings indicate higher stress rocks exist above and below the Grayburg-San Andres porosity intervals.

(20) Division records indicate there are approximately 29 injection wells and total injection per year is approximately 2 million barrels of water. There are approximately 205 producing wells and total water production per year is approximately 3 million barrels of water. Apparently ConocoPhillips intends to drill and convert additional injection wells in order to increase waterflood efficiency and to reverse the decline in reservoir pressure. The additional injection pressure is needed to serve the same purpose.

(21) Division permitting records indicate that injection pressure limits were imposed on MCA Unit wells permitted for injection after 1978. Injection wells permitted before this time period were not limited in pressure and are still not limited in pressure. The operator of the MCA Unit quickly asked for more than the 0.2 psi per foot injection gradient and supported these requests with results of Step Rate Tests run on wells #256 (tested 6/20/79) and wells #202 and #350 (both tested 12/11/89). Other evidence used to support these requests for increased pressure was breakdown pressures and ISIP's experienced during stimulation treatments. With the three Step Rate Tests presented in this application, the Division has evidence of a total of only 6 wells tested with injection Step Rate Tests within the life of the MCA Unit.

(22) The Division has granted 2150 psi for maximum surface injection pressure in previous years and indeed all current injection wells (see Exhibit "A" to this order) either are limited to 2150 psi or not limited at all. Approval of this application would be consistent with prior approvals and is supported by the evidence.

(23) ConocoPhillips testified that currently Well No. 380 is being used to inject gas that was contaminated with injected CO₂ from the old tertiary recovery project. Other wells may be used for this in the future. The maximum injection pressure while injecting CO₂ or a mixture of gases and water was addressed in 1992 with a permit from the Division and that permit is available in the files of administrative orders PMX-153 or IPI-375.

(24) The application of ConocoPhillips to authorize an increase in the maximum allowable surface injection pressure to **2150 psi for "new" wells** in its Maljamar Cooperative Agreement Unit, Lea County, New Mexico should be approved subject to the following conditions:

- a. Wells listed on the attached Exhibit "A" should be considered as "existing" injection wells. The maximum allowable surface injection pressure on these existing wells should be as granted on previously approved permits. Any well NOT listed in the attached Exhibit "A", if converted to injection, should be considered to be a "new" injection well.
- b. The maximum allowable surface injection pressure while injecting water into any "new" injection well within the MCA Unit, should be set at **2150 psi**; provided said well is equipped with cemented casing extending through the Grayburg San Andres waterflood interval.
- c. To prevent possible damage to older wells converted to injection, any "new" injection well any portion of which consists of an open hole or uncemented completion should be limited to a maximum allowable surface pressure of 800 psi, which is approximately equivalent to a gradient of 0.2 psi per foot of depth, until such well is itself step-rate-tested and administratively permitted for increased pressures.

- d. The Division director should be allowed to administratively approve increases to the permitted maximum surface injection pressure on any "new" or "existing" injection well within the MCA Unit after proper demonstration that such well is adequately cased and fracturing of the formation will not occur at the revised pressure.
- e. Any injection well permitted for and primarily used for injection of Carbon Dioxide or Carbon Dioxide contaminated gases, should be limited in maximum surface injection pressure, while injecting these gases, as per the Director's letter dated August 5, 1992. (See administrative Order IPI-375)

IT IS THEREFORE ORDERED THAT:

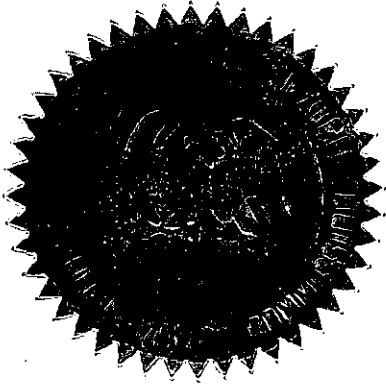
(1) The application of ConocoPhillips to authorize an increase in the maximum allowable surface injection pressure **to 2150 psi for "new" wells** in its Maljamar Cooperative Agreement Unit, Lea County, New Mexico is hereby approved subject to the following conditions:

- a. Wells listed on the attached Exhibit "A" shall be considered as "existing" injection wells. The maximum allowable surface injection pressure on these existing wells shall be as granted on previously approved permits. Any well NOT listed in the attached Exhibit "A", if converted to injection, shall be considered to be a "new" injection well.
- b. The maximum allowable surface injection pressure while injecting water into any "new" injection well within the MCA Unit, shall be set at **2150 psi**; provided said well is equipped with cemented casing extending throughout the Grayburg-San Andres waterflood interval.
- c. Any "new" injection well any portion of which consists of an openhole or uncemented completion shall be limited to a maximum allowable surface pressure of 800 psi, until such well is itself Step-Rate-Tested and administratively permitted for increased pressures.
- d. The Division director shall be authorized to administratively approve increases to the permitted maximum surface injection pressure on any "new" or "existing" injection well within the MCA Unit after proper demonstration that such well is adequately cased and fracturing of the formation will not occur at the revised pressure. Any application for an increase in this pressure limit shall be accompanied by results from a new Step Rate Test run on any one well as subject to the application or, in the case of multiple cased and cemented wells, new Step Rate Tests run on representative wells.

- e. Any injection well permitted for and primarily used for injection of Carbon Dioxide or Carbon Dioxide contaminated gases, shall be limited in maximum surface injection pressure, while injecting these gases, as per the Director's letter dated August 5, 1992 (See administrative Order IPI-375).

(2) 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.



SEAL

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

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

MARK E. FESMIRE, P.E.
Acting Director

Exhibit "A" R-2403-B, Case No. 14421
MCA Unit "Existing" Injection Wells

30-025-	MCA Unit	Unit Letter	Sec	Psi Limit	Inj Permit	Plimit Water PSI
00610	067	L	21			
00627	074	J	22			
00639	084	P	22			
08063	094	P	20	Yes	PMX-153	2150
00759	109	D	29	Yes	PMX-153	2150
00767	111	B	29	Yes	PMX-153	2150
00715	121	B	27	Yes	PMX-153	2150
00705	123	D	26			
00678	127	D	25			
00682	131	B	25			
00685	137	H	25			
00681	139	F	25			
00697	141	H	26			
00714	145	H	27	Yes	PMX-153	2150
00740	150	H	28	Yes	PMX-153	2150
00736	152	F	28	Yes	PMX-153	2150
00753	154	H	29	Yes	PMX-153	2150
00755	169	L	29	Yes	PMX-153	2150
00764	171	J	29	Yes	PMX-153	2150
00728	180	L	27	Yes	PMX-153	2150
00718	184	J	27	Yes	PMX-153	2150
00701	189	J	26			
00763	211	P	29			
00800	223	B	33	Yes	PMX-153	2150
23730	273	L	26	Yes	PMX-153	2150
24226	301	J	28	Yes	PMX-153	2150
08051	331	D	20			
30337	380	B	28	Yes	See Permit Letter	Dated 8/5/92
31100	386	F	29	Yes	PMX-164-A	2150