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*HEARINGS SECTION*

# RAILROAD COMMISSION OF TEXAS

## OFFICE OF GENERAL COUNSEL

OIL AND GAS DOCKET NO. 8A-0261663

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THE APPLICATION OF OCCIDENTAL PERMIAN LTD. FOR A PERMIT TO INJECT FLUID INTO A RESERVOIR PRODUCTIVE OF OIL OR GAS PURSUANT TO STATEWIDE RULE 46, ANTON-IRISH CLEARFORK UNIT LEASE, WELL NOS. 9W, 106W, 111W, 149W, 174W, 179, 181W, 185W, 186W & 205, ANTON-IRISH FIELD, HALE, LAMB AND LUBBOCK COUNTIES, TEXAS

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HEARD BY: Andres J. Trevino, P.E., Technical Examiner  
Mark J. Helmueller, Hearings Examiner

**APPEARANCES:**

John Soule  
Jesse Taitano

Ronald T. Welfelmeyer, P.E.

**REPRESENTING:**

Occidental Permian Ltd.

Pioneer Exploration, LLC

**EXAMINERS' REPORT AND PROPOSAL FOR DECISION**

**PROCEDURAL HISTORY**

Application Filed:	October 6, 2008
Request for Hearing:	March 30, 2009
Notice of Hearing:	April 30, 2009
Date of Hearing:	June 16, 2009
Proposal For Decision Issued:	May 21, 2010

**STATEMENT OF THE CASE**

Occidental Permian Ltd. ("Oxy") requests to amend the existing permit conditions for ten existing injection wells on its Anton-Irish Clearfork Unit in the Anton-Irish Field in Hale, Lamb and Lubbock Counties, Texas. Oxy seeks approval of expanded injection intervals, increased maximum injection pressures and volumes, and the addition of CO<sub>2</sub> to the authorized injection fluids. These amendments are intended to make these ten injection permits consistent with the injection permits for the majority of Oxy's 168 existing

injection wells on the Unit and to expand the CO<sub>2</sub> flood.

This application is protested by Pioneer Exploration, LLC ("Pioneer"), an offsetting operator to the Anton-Irish Clearfork Unit. Pioneer believes that amending Oxy's injection authority, for the ten injection wells for which amended authority is sought, may lead to increased pressures, increased maintenance costs and increased production of CO<sub>2</sub> in its wells. Oxy offered to remove Well No. 205 from the list of wells seeking CO<sub>2</sub> injection authority if Pioneer would withdraw its protest. Pioneer did not accept the offer or withdraw its protest. Oxy will not consider denial of the CO<sub>2</sub> gas as an injection fluid in Well No. 205 as an adverse decision.

### DISCUSSION OF THE EVIDENCE

#### Applicant's Evidence

Oxy requests authority to expand its fluid injection authority on the Anton-Irish Clearfork Unit in the Anton-Irish Field under Project Number F-1724. Oxy currently has authority for approximately 168 injection wells on the Anton-Irish Clearfork Unit. In this application, Oxy requests authority to amend the injection parameters for each of the ten subject injection wells. The ten injection wells are currently permitted for the injection of saltwater and freshwater only. Two of the ten are also permitted for the injection of hydrocarbon gas. For eight of the ten wells Oxy seeks to expand the injection interval to be consistent with the unitized interval of the project. For all ten injection wells, Oxy seeks an increase in the maximum injected volume to be consistent with most other injection permits on the Unit. For two of the ten injection wells, Oxy seeks to increase the maximum authorized pressure consistent with most other injection permits on the Unit. Oxy requests a maximum injection volume of 5,000 BWPD and 10,000 MCF of CO<sub>2</sub> per well with a maximum surface injection pressure of 2,600 psig for liquids and 3,200 psig for gas injection. The amended injection authority is sought to facilitate Oxy's existing and expanding miscible CO<sub>2</sub> flood on the Unit. All of the requested amended authority is consistent with existing injection authority for a vast majority of injection wells on the Unit.

The Texas Commission on Environmental Quality recommends that usable quality ground water be protected to a depth between 250 feet to 300 feet depending on well location within the Unit. The proposed injection interval is the Clearfork Dolomite found between 5,200 and 6,500 feet.

All of the ten wells (Nos. 9W, 106W, 111W, 149W, 174W, 179, 181W, 185W, 186W and 205) are currently authorized to inject saltwater and freshwater into the Anton-Irish Field. The wells are drilled to a total depth of approximately 6,000 feet to 6,500 feet. Each well has approximately 295 feet of 10<sup>3</sup>/<sub>8</sub>"-13<sup>5</sup>/<sub>8</sub>" casing cemented to surface. Each well has approximately 1,600 feet of 8<sup>5</sup>/<sub>8</sub>" intermediate casing cemented to surface and 4<sup>1</sup>/<sub>2</sub>" or 5<sup>1</sup>/<sub>2</sub>" longstring casing set to an average depth of 5,900 feet, with top of cement behind the longstring averaging 4,331 feet in each well. This cementing of longstring complies with Commission requirements of a least 400 feet of cement behind the longstring above the

injection interval. Injection will be through tubing set on a packer at approximately 5,200 feet in each well. There have been no technical issues identified by the Technical Permitting staff of the Commission.

There are 75 wellbores, all operated by Oxy, within a ¼ mile radius of the proposed injections wells. Many of the wells are either producing wells, injection wells or shut-in wells all in the Anton-Irish Field. The remaining wells have been plugged and abandoned in accordance with Commission standards.

For the injected water, Oxy uses produced salt water from the Anton-Irish Clearfork Unit. Additionally, Oxy used fresh water from the Ogallala aquifer at a depth of approximately 140 feet. The CO<sub>2</sub> is provided by the Bravo Dome Source Field in Harding and Union Counties, New Mexico.

The Unit is an existing enhanced recovery project in the Anton-Irish Field, involving injection of both water and CO<sub>2</sub>. First production in the field occurred in 1940. A waterflood was initiated in 1969. CO<sub>2</sub> injection began in 1997. Oxy currently operates 203 active producers and 168 injection wells on the Unit. Response to the injection of both water and CO<sub>2</sub> has been positive resulting in the drilling of additional wells on the unit. Enhanced recovery and the additional wells have resulted in the recovery of significant volumes of oil that otherwise would not have been produced. The Unit produces daily approximately 7,000 barrels of oil (approximately 35 BOPD per producing well) and 74,500 barrels of water. Oxy currently injects 81,500 BWPD and 70,000 MCFGPD through its 168 injection wells. Oxy estimates it will recover an additional 45,000 BO by implementing the requested amended injection authority.

Seven of the ten wells are located on the east side of the Unit and are more than four miles from Pioneer's Butler lease. Well Nos. 105W and 111W are approximately ¾ of a mile from the Butler lease and Well No. 205 is located within a ½ mile of the Butler Lease. There is a line of producing wells along the edge of Oxy's Unit, in between the nearest Oxy injection well and wells on the Butler lease. These producing wells serve to capture any fluids as they approach the edge of the Unit. The wells on the Butler lease are on the edge of the productive limits of the Anton-Irish reservoir. There are no injection wells on the Butler lease and Pioneer does not actively participate in either the CO<sub>2</sub> or waterflood. Production data on the Butler wells provided by Oxy shows a steady decline of oil production followed by a flattening of the curve then followed by a slight increase in production then a second decline in production. The water production data shows as water production began to increase, oil production on the Butler lease began to increase. These production patterns were suggested as evidence that the water/CO<sub>2</sub> flood has benefitted oil production on the Butler lease.

Notice of the subject application was published in *The Lubbock Avalanche-Journal*, a newspaper of general circulation in Hale, Lamb and Lubbock Counties, on July 1, 2008. A copy of the application was filed on October 3, 2008 with the Hale, Lamb and Lubbock County Clerks' Offices. On October 3, 2008, a copy of the application was sent to the

surface owners of all tracts on which injection wells are proposed and to all operators within ½ mile of each of the proposed wells.

Oxy has an active P-5 on file with the Commission, with \$250,000 financial assurance. There are no pending enforcement actions against Occidental Permian Ltd.

### **Protestant's Evidence**

Pioneer is the operator of the Butler lease which offsets the Anton-Irish Clearfork Unit to the north. There are three producing wells on Pioneer's Butler lease. The wells were drilled in the mid to late 70's. Commission records show Pioneer acquired the wells from the Banam Corporation in 2003. Well Nos. 1 & 2 generally produce 7 to 10 BOPD each with a total of 300 BWPD or 5% oil cut. Well No. 3 is shut in due to high wellhead pressure of 800 psig. Because Pioneer does not actively participate in the CO<sub>2</sub> flood it does not capture the CO<sub>2</sub> and re-inject it into the formation. Pioneer is currently venting all gas in an effort to keep the pressures down. The gas is not marketable as it contains up to 80% CO<sub>2</sub>. The high wellhead pressure prevents Pioneer from injecting corrosion inhibitors down the casing in Well No. 3.

Pioneer believes the operation of Oxy's Anton-Irish Clearfork Unit has caused its wells on the Butler lease to suffer corrosion damage, increased maintenance and operating costs with little benefit from the water and CO<sub>2</sub> flood. Pioneer is afraid that any increases in pressures or CO<sub>2</sub> injection will cause its wells to suffer additional pressure increases at the wellheads. Pioneer's witness testified that the wells' surface equipment has suffered from corrosion problems which have led to fluid leaks. Pioneer acknowledged that the corrosion problems were a result of saltwater production and not CO<sub>2</sub> production.

### **EXAMINERS' OPINION**

The examiners recommend approval of the application for nine of the ten injection wells on the Anton-Irish Clearfork Unit. It is recommended that an injection authority for No. 205 be denied as to inclusion of CO<sub>2</sub> as an injected fluid. Denial of authority to inject CO<sub>2</sub> in Well No. 205 will minimize any potential effect on Pioneer's offset lease. The well will receive an expanded injection interval consistent with the unitized interval, increased gas and liquid pressures and volumes.

All ten wells are completed in a manner which will protect usable quality water resources and confine injected fluids to the proposed injection interval. There are no wellbores within a ¼ mile radius of any proposed injection well which would provide a conduit to allow injected fluids to migrate out the injection interval.

The existing water and CO<sub>2</sub> flood in the Anton-Irish Clearfork Unit has produced significant quantities of secondary and tertiary oil that would otherwise not be recovered. The ten well expansion of the CO<sub>2</sub> flood comprises an additional 7% expansion of the existing CO<sub>2</sub> flood. The majority of subject injection wells would not effect wells on

Pioneer's Butler lease. Seven of the ten wells are over four miles from the Butler wells. Only Well No. 205 is within ½ mile from the Butler wells. In an effort to minimize CO<sub>2</sub> from crossing into the Butler lease, there is a line of injection wells that Oxy uses to create a saltwater barrier between CO<sub>2</sub> injection wells and the Butler wells. Oxy also operates a series of producing oil wells along the edge of its Unit's lease boundary to capture oil, CO<sub>2</sub> and saltwater before reaching the Butler wells. These measures are taken to minimize any CO<sub>2</sub> from reaching the Butler lease. Production data demonstrates the Butler wells have benefitted significantly from Oxy's secondary and tertiary recovery operations.

The Butler wells were drilled in the mid to late 1970's after waterflood operations were begun in 1969. Pioneer acquired the wells in 2003 after CO<sub>2</sub> flooding was initiated in 1997. Any effects caused by the Oxy's secondary and tertiary recovery operations were likely existing when Pioneer acquired the wells in 2003. Oxy is taking measures to reduce any detrimental effects on Pioneer. Pioneer's problems on their Butler lease are at least partially due to Pioneer's refusal to actively participate in the secondary and tertiary recovery operations on the Anton-Irish Clearfork Unit. The static gas in the Butler No. 3 is not being removed from the well and re-injected back into the formation. Pioneer's 800 psig pressure on their Butler No.3 is due in part to the well not being actively produced and allowing CO<sub>2</sub> which exists as a liquid under reservoir conditions to expand within the wellbore. Oxy's wells located deep in the Unit operate with a wellhead pressure of approximately 250 psig when they are being produced. Oxy's wells which operate within the Unit do not appear to suffer from similar corrosion problems.

The examiners believe that use of the ten wells for CO<sub>2</sub> (with the exception of Well No. 205) and water injection on the Anton-Irish Clearfork Unit will result in the recovery of additional oil which would otherwise not be recovered. The estimated additional recovery of oil surrounding the ten wells is 45,000 BO.

### FINDINGS OF FACT

1. Notice of this hearing was given to all persons entitled to notice at least ten (10) days prior to the hearing. Notice of the application was published in the *The Lubbock Avalanche-Journal*, a newspaper of general circulation in Hale, Lamb and Lubbock Counties, on July 1, 2008. A copy of the application was filed on July 1, 2008 with the Hale, Lamb and Lubbock County Clerk's Office. On July 1, 2008, a copy of the application was sent to the surface owners of all tracts on which injection wells are proposed and to all operators within ½ mile each of the proposed wells.
2. The ten injection wells are currently authorized under Fluid Injection Project No. F-1724 to inject salt and fresh water. Two of the wells are authorized to inject hydrocarbon gas.
3. The Anton-Irish Clearfork Unit's Fluid Injection Project No. F-1724 is transitioning from a secondary recovery project to a tertiary recovery project. Of the 168 injection wells authorized for fluid injection, 138 are authorized for CO<sub>2</sub> injection.

4. The ten wells will be completed in a manner which will protect usable quality water.
  - a. The Texas Commission on Environmental Quality recommends protection of useable quality water resources to a depth between 250 to 300 feet the area of these wells.
  - b. Each well has approximately 295 feet of 10<sup>3</sup>/<sub>8</sub>"-13<sup>5</sup>/<sub>8</sub>" casing cemented to surface.
  - c. Each well has approximately 1,600 feet of 8<sup>5</sup>/<sub>8</sub> intermediate casing cemented to surface.
  - d. Each well has either 4<sup>1</sup>/<sub>2</sub>" or 5<sup>1</sup>/<sub>2</sub>" longstring casing set to an average depth of 5,900 feet, with top of cement behind the longstring averaging 4,331 feet in each well.
  - e. The wells typically have open hole sections below the longstrings down to a depth of 6,300 feet.
5. The ten wells recommended for approval will have injection fluids confined to the injection interval.
  - a. The top of cement behind the longstring averaging 4,331 feet in each well.
  - b. The proposed disposal interval is the Clearfork Dolomite found between 5,200 and 6,500 feet.
  - c. The proposed injection in each well will be through tubing set on a packer no higher than 100 feet above the injection interval in each well.
6. The proposed expansion of the CO<sub>2</sub> flood project is expected to result in the recovery of approximately 45,000 barrels of additional oil from the Anton-Irish Clearfork Unit.
  - a. There are currently approximately 203 producing wells and 168 injection wells on the Anton-Irish Clearfork Unit. These wells produce 7,050 BOPD, 74,500 BWPD and inject 81,500 BWPD and 70 MMCFPD of CO<sub>2</sub>.
  - b. Secondary and tertiary recovery operations have been on going on the Anton-Irish Clearfork Unit since 1969 and have been successful.
  - c. The proposed expansion of the CO<sub>2</sub> flood by Oxy will introduce miscible CO<sub>2</sub> into areas not yet flooded with CO<sub>2</sub> should result in

tertiary recovery of oil in the areas to be flooded with CO<sub>2</sub>.

7. Pioneer's Butler wells were drilled in the mid to late 1970's after waterflood operations were begun in the Anton-Irish Clearfork Unit in 1969. Pioneer acquired the wells in 2003 after CO<sub>2</sub> flooding was initiated in 1997.
8. Oxy operates its wells adjacent to Pioneer's Butler wells in a manner to reduce fluid migration from the Unit to the Butler lease.
  - a. The nearest injection wells to the Butler lease will only inject saltwater.
  - b. The line of producing wells on the edge of the Anton-Irish Clearfork Unit boundary will help minimize the migration of fluids from the Unit to the Butler lease.
9. Pioneer's shut-in wellhead pressure on Well No. 3 on the Butler lease is 800 psig while Oxy's producing wellhead pressure is 250 psig.
10. Oxy's wells on the Unit are exposed to similar fluids as Pioneer's Butler wells without similar corrosion problems.
11. There is no evidence that use of the proposed injection wells will harm any oil, gas or geothermal resources. The ongoing water and CO<sub>2</sub> flood have been occurring in parts of the field for over 40 years with no evidence of damage.
12. The proposed CO<sub>2</sub> and waterflood expansion project and use of the ten wells as injection wells is in the public interest as it will result in the recovery of additional oil.
13. Occidental Permian Ltd. has an active P-5 on file with the Commission, with \$250,000 financial assurance.

#### **CONCLUSIONS OF LAW**

1. Proper notice was issued in accordance with the applicable statutory and regulatory requirements.
2. All things have occurred to give the Railroad Commission jurisdiction to consider this matter.
3. The use or installation of the proposed injection wells is in the public interest as it will likely result in the recovery of additional oil from the Anton-Irish Clearfork Unit in the Anton-Irish Field.
4. The use or installation of the proposed injection wells will not endanger or injure any oil, gas, or other mineral formation.

5. With proper safeguards, as provided by terms and conditions in the attached final order which are incorporated herein by reference, both ground and surface fresh water can be adequately protected from pollution.
6. Occidental Permian Ltd. has made a satisfactory showing of financial responsibility to the extent required by Section 27.073 of the Texas Water Code.
7. Occidental Permian Ltd. has met its burden of proof and satisfied the requirements of Chapter 27.051 of the Texas Water Code and the Railroad Commission's Statewide Rule 46.

**EXAMINERS' RECOMMENDATION**

Based on the above findings and conclusions, the examiners recommend that the application be approved for ten wells as set out in the attached Final Order.

Respectfully submitted,



Andres J. Trevino, P.E.  
Technical Examiner



Mark J. Helmueller  
Hearings Examiner