

**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 DEVON ENERGY PRODUCTION COMPANY, L P TO
REVOKE THE INJECTION AUTHORITY GRANTED BY ADMINISTRATIVE
ORDER SWD 640, LEA COUNTY, NEW MEXICO**

**CASE NO 15397
ORDER NO R 14120 A**

ORDER OF THE DIVISION

BY THE DIVISION

This case came on for hearing at 8 15 a m on December 3 2015 at Santa Fe New Mexico, before Examiners Phillip R Goetze and Michael McMillan and on March 29 2016, before Examiner Phillip R Goetze

NOW, on this 12th day of April 2017 the Division Director having considered the testimony, the record and the recommendations of Examiner Goetze

FINDS THAT

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

(2) Devon Energy Production Company L P ('Applicant or Devon), made application on September 29 2015 seeking an order revoking the injection authority granted to OXY USA Inc (Respondent or OXY) under Administrative Order SWD-640 Devon stated that the injection operation of the disposal well, Diamond 34 State Well No 1 had impacted the drilling operation for the North Thistle 34 State Com Well No 1H (API 30-025-42465, the North Thistle well) a horizontal well with a surface location 330 feet from the South line and 435 feet from the West line (Unit M) and a bottom hole location 280 feet from the North line and 430 feet from the West line (Unit D) all in Section 34 Township 22 South Range 33 East Lea County New Mexico

(3) By Corrected Administrative Order No SWD 640 dated September 4 1996, the Oil Conservation Division (Division) authorized Pogo Producing Company to utilize its Diamond 34 State Well No 1 (API No 30 025 33387 the subject well) located

990 feet from the South line and 1650 feet from the West line (Unit N) of Section 34, Township 22 South Range 33 East, Lea County New Mexico for disposal of oil-field produced water into the Bell Canyon and upper Cherry Canyon formations through perforations from approximately 5100 feet to 6516 feet below surface OXY became operator of this disposal well on March 1, 2008

(4) On October 15 2015 OXY entered an appearance in the case

(5) On November 10 2015 the Director signed a *Subpoena Duces Tecum* at the request of Devon for documents and information regarding the subject disposal well

(6) On November 18 2015 OXY filed a *Motion to Dismiss Application and Quash Subpoena or in the Alternative for a Continuance*

(7) On November 23 2015 Devon filed a *Response to OXY USA Inc s Motion to Dismiss and Quash Subpoena*

(8) At Division hearing on December 3 2015 Examiner Goetze conducted a pretrial conference between counsel for the Applicant and the Respondent regarding the possibility for the subject disposal well to be shut in and the scope of information to be provided under the *Subpoena Duces Tecum*

(9) On December 4 2015 the Director signed a second *Subpoena Duces Tecum* at the request of OXY for documents and information regarding Devon s North Thistle well

(10) On December 17 2015 Devon filed a *Response to Subpoena Duces Tecum and Motion to Partially Quash Subpoena*

(11) Subsequently on December 21 2015 the Director signed a third *Subpoena Duces Tecum* at the request of Devon for additional documents regarding OXY s drilling activities in the vicinity of the subject disposal well

(12) On December 30 2015 OXY filed a *Response to Devon s Motion to Partially Quash Subpoena*

(13) On February 1 2016 the Director issued Division Order No R 14120 a Confidentiality Order that established the criteria to be used by the Division to assess and to distribute the subpoena evidence classified by either party as Confidential Material or Confidential Information

(14) On February 9 2016, OXY filed a *Motion to Continue* due to the delays in the information exchange required by the three *Subpoena Duces Tecums*

(15) On February 11 2016 Devon provided a response to OXY's *Motion to Continue* that included a *Motion to Shut In* the subject disposal well

(16) On February 16, 2016, the Director signed a fourth *Subpoena Duces Tecum* at the request of Devon for additional documents regarding tests and data for the subject disposal well obtained after the initial *Subpoena Duces Tecum* issued on November 10 2015

(17) Additionally, on February 16, 2016 OXY filed *OXY s Opposition to Motion to Shut In OXY s Disposal Well* in response to Devon s motion on February 11th

(18) On February 19 2016 Devon filed a *Motion to Compel Production* for specific correspondence involving the subject disposal well and a *Reply Regarding Its Motion to Shut In OXY s Well*

(19) On February 22 2016 OXY filed *OXY s Response to Motion to Compel Production*

(20) Lastly, Devon filed on February 28, 2016 with OXY s consent an *Unopposed Motion for a Continuance* which established a hearing date of March 29 2016

(21) At hearing on March 29 2016 no additional parties appeared in opposition to the application

Applicant appeared at the hearing through counsel and presented the following evidence and testimony

(22) Applicant seeks to revoke the injection authority of the subject well for injection of produced water through perforations from 5100 feet to 6516 feet below surface. The subject well commenced disposal in the Bell Canyon and upper Cherry Canyon formations of the Delaware Mountain group on September 15 1999

(23) The subject well was constructed with the following three casing strings: 10¾ inch surface casing set at 823 feet, 7⅝ inch intermediate casing set at 4830 feet, and 4½-inch production casing set at 6613 feet. The current active perforations in the production casing were from 5335 feet to 5748 feet below surface. The lower perforations used for disposal were abandoned and sealed off with a cast iron bridge plug set at 5930 feet below surface. Injection occurred through 2⅜-inch plastic lined tubing with the injection packer set at 5314 feet below surface.

(24) The subject well has cement circulated to surface for both the surface casing and 7⅝-inch intermediate casing strings. The 4½-inch production casing was originally described with an estimated top of cement at 5200 feet, but the cement top was later verified with a cement bond log as being 5165 feet below surface (Respondent's interpretation). Therefore, the top of cement for the production casing does not overlap the shoe of the 7⅝-inch intermediate casing feet and does not seal the upper contact of the Delaware Mountain group.

(25) For the period between 2002 and 2015, Applicant stated that the monthly injection rates ranged between 69 694 barrels of water (BW) and 15 484 BW while the most current monthly rate was 26 629 BW

(26) Applicant described the occurrence of a high-pressure water flow at 1820 feet below surface encountered during the drilling of Applicant's North Thistle well. The initial kick occurred on September 3, 2015, while drilling the borehole for the 9½ inch intermediate casing. This depth placed the water flow within the Salado formation, a thick sequence of interbedded salt and anhydrite units that are vulnerable to dissolution. Applicant suspended the drilling operation and reported a shut in pipe pressure of 585 pounds per square inch (psi) after encountering the water flow.

(27) Using pressure information from both the North Thistle well and the subject well, Applicant presented testimony based on hydrostatic balance in static conditions that both wells were in communication at the depth where the water flow was encountered.

(28) Applicant requested that OXY suspend injection operation at the subject well after the encounter with the water flow at the North Thistle well. Applicant testified that when OXY suspended injection operations at the subject well on September 7, 2015, there was a corresponding decrease of pressure and volume of the water flow at the North Thistle well.

(29) Applicant continued with drilling operations at the North Thistle well commencing on September 7, 2015 and finishing on September 11, 2015. The final mud weight used for drilling the borehole was 15.3 pounds per gallon (ppg) and the Applicant required several attempts to run the intermediate casing to the final setting depth. The intermediate casing was cemented to surface with the assistance of an external casing packer on September 11, 2015.

(30) Applicant compiled a study of well completions for the six townships surrounding the North Thistle well. Applicant stated that shallow water flows and associated pressure hazards did not exist in this area prior to 1996 and have only occurred following the commencement of injection in the subject well.

(31) Applicant stated that lack of a proper cement seal at the top of the Bell Canyon formation provided for decoupling of the wellbore within the salt section, compromised the mechanical integrity of the subject well, and allowed the vertical migration of injected disposal fluids. This vertical migration provided the opportunity for dissolution of the salt section, resulting in the creation of a horizontal pathway that appeared as the water flow at the North Thistle well.

(32) Applicant emphasized that the pressures reported in OXY's e-mail exchanges exceeded the approved maximum surface injection pressure approved in the administrative order and that the recent reduction of injection volumes following work on the subject well indicated problems with the well's integrity.

Respondent appeared at the hearing through counsel and presented the following evidence and testimony

(33) Respondent noted that the injection fluids of the subject well contained hydrogen sulfide yet Applicant did not identify any signs of hydrogen sulfide in the initial kick of the water flow that impacted the North Thistle well

(34) Respondent provided evidence that the subject well was in compliance with Division rules having successfully completed the five-year mechanical integrity test for the annular space of the tubing-production casing

(35) Respondent provided historical summary Bradenhead tests for the subject well that did not show any measurable pressures for the annulus of the intermediate casing and the production casing

(36) Respondent provided differing testimony regarding the chronology of Applicant observations associated with the shut in of the subject well Respondent stated the subject well was shut in on September 8, 2015, approximately between 12 00 P M and 1 00 P M This suspension of injection occurred approximately 24 hours after Applicant reported a significant decrease in the water flow pressure at the North Thistle well

(37) Respondent presented findings of recent injection surveys (temperature and radioactive tracer tests) conducted on the subject well

- (a) the combined results of various temperature surveys were representative of lithology changes as correlated with geophysical logs and do not indicate any temperature deviation characteristic of vertical migration of injection fluid as claimed by Devon in their testimony
- (b) the tracer surveys found no indications of channeling (upward migration) above the approved injection zone and into the annulus of the production casing and
- (c) an injection survey with an approximate injection rate of 1000 barrels of water per day showed 95 percent of injection fluids entering the perforations from 5520 feet to 5542 feet below surface and an additional four percent entering the perforations below 5550 feet

(38) Respondent identified impermeable zones in the Bell Canyon formation located below the top of cement for the 7⁵/₈-inch intermediate casing of the subject well Respondent contended that these zones along with the upper cement seal of the intermediate casing provided a confining layer for the injection interval that would prevent any upward migration of injection fluids

The Division concludes as follows

(39) Applicant submitted evidence that identified issues concerning the operation of the subject well which Applicant claimed produced the shallow high pressure water flow encountered while drilling of the North Thistle well

(40) Respondent provided injection surveys and additional testing of the subject well that demonstrated mechanical integrity of the casing and cement and showed no indications of vertical migration of injection fluids

(41) Applicant could not provide any subsequent evidence to support their claim of mechanical integrity issues with the subject well that would counter Respondent's test findings

(42) Respondent's use of pressures for testing (such as injection surveys) and for well maintenance (such as acid treatments of the well bore) that temporarily exceed the maximum surface injection pressure found in the administrative order was consistent with the Division's practice for the temporary use of higher pressures for specific projects, but not for continuous operation of the disposal well

(43) There was no evidence presented by either party that the operation of the subject well by OXY has impacted either correlative rights or underground sources of drinking water

(44) The application to revoke the injection authority of the subject well should be denied

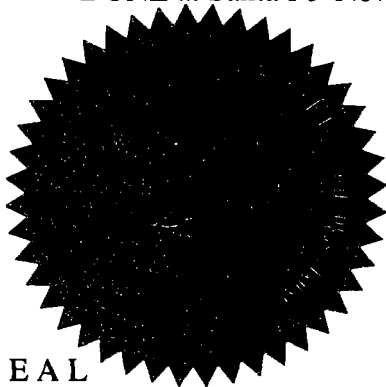
IT IS THEREFORE ORDERED THAT

(1) The application by Devon Energy Production Company LP to revoke the injection authority under Corrected Administrative Order No SWD-640 for the Diamond 34 State Well No 1 (API No 30-025 33387) located 990 feet from the South line and 1650 feet from the West line (Unit N) of Section 34 Township 22 South Range 33 East Lea County New Mexico is hereby denied

(2) Compliance with this order does not relieve the operator OXY USA Inc 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

(3) 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 upon failure to comply of which the Division may after notice and hearing or prior to notice and hearing in event of an emergency, terminate the disposal authority granted herein

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



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STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

A handwritten signature in cursive script, reading "David R. Catanach".

DAVID R. CATANACH
Director