

**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. 15972
ORDER NO. R-14716**

**APPLICATION OF CHEVRON U.S.A., INC. FOR APPROVAL OF A
SALTWATER DISPOSAL WELL, LEA COUNTY, NEW MEXICO.**

ORDER OF THE DIVISION

BY THE DIVISION:

This case came on for hearing at 8:15 a.m. on February 8, 2018, at Santa Fe, New Mexico, before Examiner Phillip R. Goetze.

NOW, on this 7th day of June, 2018, the Division Director, having considered the testimony, 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 of the subject matter.

(2) Chevron U.S.A., Inc. (the "Applicant" or "Chevron") seeks an order granting authority to utilize its Maelstrom SWD Well No. 1 (API No. 30-025-Pending; the "Subject Well") with a surface location 2050 feet from the South line and 1793 feet from the East line (Unit J) in Section 15, Township 26 South, Range 32 East, NMPM, Lea County, as an Underground Injection Control (UIC) Class II well for disposal of produced water into the Silurian formations through an open-hole interval from approximately 17,400 feet to approximately 19,100 feet below surface.

(3) On December 5, 2017, Chevron submitted an administrative application (Application No. pMAM1733947142) to the Division for approval of the Subject well for disposal of produced water from its operating wells. Following the submittal and review of the application, the Division requested that Chevron seek approval of the application through hearing before an examiner due to the following concerns:

- (a) that notification using current Division Rule 19.15.26.8(B) NMAC for a radius of one-half mile from the surface location would not be sufficient to protect correlative rights;
- (b) that the current Area of Review for wells penetrating the disposal interval for a radius of one-half mile from the surface location of the proposed well was not sufficient to protect underground sources of drinking water (USDWs); and
- (c) that the proposed disposal activities for the predicted service life of the subject well did not consider the potential for induced-seismic events.

(4) Subsequently on December 20, 2017, the Applicant met with the Division and provided additional geologic and engineering data regarding the potential for induced seismic events to occur as a result of the disposal well activities. This presentation for the Division involved interpretations based on proprietary data. The Applicant later summarized these presentations without the inclusion of the proprietary data as evidence at hearing.

(5) Applicant appeared at the hearing through counsel and presented geologic and engineering evidence to the effect that:

- (a) the Applicant seeks to drill the Subject Well to an approximate total depth of 19,100 feet below surface. The injection will occur through an open borehole from approximately 17,400 feet to approximately 19,100 feet below surface;
- (b) the Subject Well will be constructed with the following four casing strings and liner system: 20-inch surface casing set at 800 feet; 16-inch intermediate casing set at 4540 feet; 13 $\frac{3}{8}$ -inch intermediate casing set at 12000 feet; 9 $\frac{5}{8}$ -inch intermediate casing set at 17410 feet; and a 7-inch liner set at a total depth of 17950 feet;
- (c) all four casings will have cement circulated to the surface while the liner will have cement circulated to the top of the liner;
- (d) the Subject well will inject fluids through a tapered tubing set consisting of plastic-lined, 4 $\frac{1}{2}$ -inch tubing within the liner and plastic-lined, 7-inch tubing above the liner. The tubing is attached to a packer set no shallower than 100 feet above the top of the open-hole interval;
- (e) the primary sources for disposal in the Subject Well will be produced water from Applicant's production wells within a four-mile radius of the Subject Well;

- (f) the analyses of produced water samples provided by Applicant showed the compatibility of the injection fluids with formation fluids in the proposed disposal interval;
- (g) the Applicant proposes a closed system operation with an average injection rate of 50,000 barrels of water per day (BWPD) using a maximum surface pressure of 3480 pounds per square inch (psi);
- (h) there are no disposal wells or production wells within a one-mile radius of the Subject Well that penetrate either the Devonian or Silurian formations;
- (i) the Applicant states that approximately 160 feet of Woodford Shale provides an upper confining layer for the proposed disposal interval while approximately 400 feet of Montoya formation along with remainder of the Simpson group provide a lower confining layer;
- (j) the proposed construction of the Subject Well will isolate and protect the two USDWs identified in the area, the Rustler formation and the Dockum group, from any disposal activities by the Subject Well;
- (k) based on the records of the New Mexico Office of the State Engineer, there are no fresh water wells within one mile of the Subject Well;
- (l) the use of a tapered tubing configuration will decrease friction loss and provide increased disposal efficiency, thereby offsetting the need for new deep disposal wells to be completed in the same Silurian interval;
- (m) the proposed well completion with the tapered tubing set with the available annular space of the 4½-inch tubing inside 7⅝-inch liner and with the annular space of the 7-inch tubing inside 9⅝-inch intermediate casing would be sufficient to allow the extraction of any lost tubing with standard fishing tools including overshot tools;
- (n) the estimated small increase in the reservoir pressure with the proposed injection rate of 50,000 BWPD should not impact the reservoir pressures for similar disposal operations in the same formation located within a mile of the Subject Well;

- (o) based on the application of an industry-recognized, risk assessment model (the *Fault Slip Potential* software tool; Stanford Center for Induced and Trigger Seismicity; 2017), additional analysis by Applicant's seismic group and the use of Applicant's proprietary 3-D seismic data, there was an extremely low or "*de minimis*" probability of any induced-seismic event occurring during the operational lifespan of injection activity for the Subject Well;
- (p) the estimated radius of maximum injection fluid migration following 30 years of disposal operation would be greater than 0.5 mile but less than one mile; and
- (q) as a result of the increased radius of fluid migration, the Applicant provided evidence of notification of this application to all "*affected persons*" within a one-mile radius of the Subject Well and with publication in a newspaper of general circulation in the county.

(6) No other party appeared at the hearing, or otherwise opposed the granting of this application.

The Division concludes as follows:

(7) The application has been duly filed under the provisions of Division Rule 19.15.26.8 NMAC.

(8) Applicant has presented satisfactory evidence that all requirements prescribed in Division Rule 19.15.26.8 NMAC have been met.

(9) There are no wells within the one-mile AOR for the Subject Well that penetrate the proposed injection interval.

(10) Division records indicate Chevron U.S.A., Inc. (OGRID 4323) as of the date of this order is in compliance with Division Rule 19.15.5.9 NMAC.

(11) The Division is responsible for the orderly development and production of hydrocarbon resources including the authority to regulate the disposition of produced water as described in NMSA 1978, Section 70-2-12(B)(15). It is obligated to prevent waste, to protect correlative rights, and to protect human health and the environment.

(12) The Division supports the use of Devonian and Silurian formations as suitable disposal intervals to lessen the potential impact upon production of hydrocarbon resources and associated correlative rights that occur in shallower Permian formations. The Division recognizes the necessity to increase the efficiency of these deeper disposal wells with their increased cost associated with the deeper disposal interval.

(13) Under Division Order No. R-14392 (Case No. 15654), the Division

determined that the increase in tubing size and the corresponding increase in injection rates necessitated additional information not previously incorporated into an administrative application for disposal wells with injection capacities greater than 25,000 BWPD. This included, but was not limited to, the following specific subjects:

- (a) the potential cumulative impacts to a common injection interval utilized by multiple disposal wells in close proximity;
- (b) the consideration that the area of review for penetrating wells based on a one-half mile radius from the disposal well's surface location was adequate;
- (c) the consideration that the notification of affected persons based on a one-half mile radius from the disposal well's surface location was protective of correlative rights;
- (d) addressing the induced-seismicity issue, especially with regards to the potential impacts of increased injection volumes into reservoirs with faulting and the determination of a lower confining layer to ensure injection fluids do not migrate out the permitted interval; and
- (e) the use of the larger diameter tubing in UIC Class II wells and the development of "best management practices" for all future applications with similar requests.

(14) The Applicant offered evidence or testimony to sufficiently respond to the items of concerns brought forth by the Division in its findings in Division Order No. R-14392. This included expanding the area of reviews for penetration wells and notification and conducting a risk assessment for the potential of induced seismicity related to the Subject Well's operation with a larger disposal rate.

(15) To avoid the drilling of additional disposal wells, protect correlative rights, and prevent waste while affording the Applicant the opportunity to fully utilize the disposal potential of the Subject Well in a manner that safeguards the public health and the environment, this application should be approved.

IT IS THEREFORE ORDERED THAT:

(1) Chevron U.S.A., Inc. (the "Operator" or "Chevron") is hereby authorized to utilize its Maelstrom SWD Well No. 1 (API No. 30-025-Pending; the "Subject well"), to be located 2050 feet from the South line and 1793 feet from the East line (Unit J) in Section 15, Township 26 South, Range 32 East, NMPM, Lea County, New Mexico, as a disposal well for UIC Class II fluids.

(2) Disposal shall be through open hole in the Silurian formation (or

equivalent of the Wristen Group) from approximately 17,400 feet to approximately 19,100 feet below surface. Injection is to be through a plastic-lined, tapered tubing set and a packer placed within 100 feet above the top of the permitted interval. This order shall approve the use of a tapered tubing set consisting of 4½-inch (OD) or smaller tubing placed within the 7-inch liner and 7-inch (OD) or smaller tubing placed in the 9⅝-inch intermediate casing above the 7-inch liner.

(3) The Operator shall take all steps necessary to ensure that the disposed water enters only the permitted disposal interval and is not permitted to escape to other formations or onto the surface. This order does not allow disposal into formations below the Silurian formations including the Montoya formation and the Ellenburger formation (lower Ordovician) or lost circulation intervals directly on top and obviously connected to these formations.

(4) The Operator shall complete a mudlog over the permitted disposal interval sufficient to demonstrate the hydrocarbon potential. The Operator shall notify the Division's District I office and the Bureau of Land Management of significant hydrocarbon shows that are observed during drilling. The Operator shall provide the District office and the Bureau of Land Management with copies of the log.

(5) Prior to commencing disposal, the operator shall submit mudlog and geophysical logs information to the Division's District geologist and Santa Fe bureau engineering office, showing evidence agreeable that only the permitted formation is open for disposal including a summary of depths (picks) for contacts of the formations which the Division shall use to amend this Order for a final description of the depth for the injection interval.

(6) As provided in testimony, the Operator shall circulate to surface the cement for all casings and to the top of liner for the 7-inch liner. The tie-in of the 7-inch liner with the 9⅝-inch casing shall be no less than 200 feet. The Operator shall run a cement bond log ("CBL" or equivalent) across the 7-inch liner from 500 feet above the liner to the bottom of the liner to demonstrate placement cement across the length of the liner and the cement bond with the tie-in with the 9⅝-inch casing. Copies of the CBL shall be provided to the Division's District I office and the Bureau of Land Management.

(7) After installation of tubing, the casing-tubing annulus shall be loaded with an inert fluid and equipped with a pressure gauge or an approved leak detection device in order to determine leakage in the casing, tubing, or packer. The casing shall be pressure tested from the surface to the packer setting depth to assure casing integrity.

(8) The well shall pass an initial mechanical integrity test ("MIT") prior to commencement of disposal and prior to resumption of disposal each time the disposal packer is unseated. All MIT procedures and schedules shall follow the requirements in Division Rule 19.15.26.11(A) NMAC.

(9) The wellhead injection pressure shall be limited to **no more than 3480**

psi. In addition, the Subject Well shall be equipped with a pressure limiting device in workable condition which shall, at all times, limit surface tubing pressure to the maximum allowable pressure for this well.

(10) The Director of the Division may authorize an increase in tubing pressure upon a proper showing by the Operator of said well that such higher pressure will not result in migration of the disposed fluid from the approved injection interval. Such proper showing shall be demonstrated by sufficient evidence including but not limited to an acceptable Step-Rate Test.

(11) The Operator shall notify the supervisor of the Division's District I office of the date and time of the installation of disposal equipment and of any MIT test so that the same may be inspected and witnessed. The Operator shall provide written notice of the date of commencement of disposal to the Division's District I office. The Operator shall submit monthly reports of the disposal operations on Division Form C-115, in accordance with Division Rules 19.15.26.13 NMAC and 19.15.7.24 NMAC.

(12) Without limitation on the duties of the Operator as provided in Division Rules 19.15.29 NMAC and 19.15.30 NMAC, 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 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.

(13) If the Subject Well fails a MIT or if there is evidence that the mechanical integrity of said well is impacting correlative rights, the public health, any underground sources of fresh water, or the environment, the Division Director shall require the well to be shut-in within 24 hours of discovery and the operator shall redirect all disposal waters to another facility. The operator shall take the necessary actions to address the impacts resulting from the mechanical integrity issues in accordance with Division Rule 19.15.26.10 NMAC, and the well shall be tested pursuant to Rule 19.15.26.11 NMAC prior to returning to injection.

(14) The Division further stipulates the following "best management practices" shall be included as conditions of the approved application:

- (a) The Subject Well shall be included in a Supervisory Control and Data Acquisition (SCADA) system for operation as an injection well.
- (b) The Operator shall first contact the Division's District I supervisor for approval of proposed remedial actions prior to initiating any recovery attempts should a failure of tubing occur with a loss of a tubing section within the Subject Well.

- (c) The Operator shall submit all well tests and performance reports to Division's District I (attached to a Form C-103) and made part of the well file for future availability.

(15) 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.

(16) The Division may revoke this injection permit after notice and hearing if the Operator is in violation of Division Rule 19.15.5.9 NMAC.

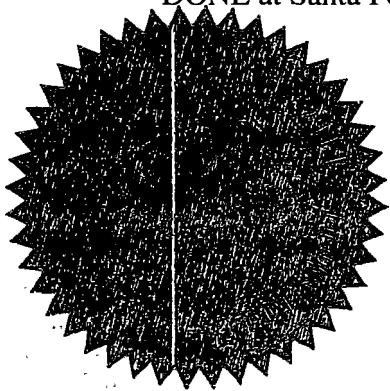
(17) The disposal authority granted herein shall terminate two years after the effective date of this order if the Operator has not commenced injection operations into the proposed well, provided however, the Division, upon written request, mailed by the Operator prior to the termination date, may grant an extension thereof for good cause.

(18) One year after disposal into the Subject Well has ceased, said well will be considered abandoned and the authority to dispose will terminate *ipso facto*.

(19) 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.

(20) 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 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.



SEAL

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

HEATHER RILEY
Director