STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

APPLICATION OF EOG RESOURCES, INC. FOR A GAS CAPTURE PILOT PROJECT INVOLVING THE OCCASIONAL INJECTION OF PRODUCED GAS INTO THE BONE SPRING FORMATION, LEA COUNTY, NEW MEXICO

CASE NO. 20965
ORDER NO. R-21061

ORDER OF THE DIVISION

This case came on for hearing at 8:15 a.m. on December 12, 2019, in Santa Fe, New Mexico, before Examiner Dylan Rose-Coss..

NOW, on this 31st day of January, 2020, the Division Director, having considered the testimony, the record, and the recommendations of the Examiner,

FINDS THAT

(1) Due notice has been given, and the OCD has jurisdiction of this case and the subject matter.

(2) EOG Resources, Inc. ("EOG") seeks approval of a gas capture pilot project ("Project") involving the intermittent injection of produced gas into the Bone Spring formation (Red Hills; Upper Bone Spring Shale Pool, Pool Code 97900) within the following 160 acres, more or less, located in Lea County, New Mexico:

Township 25 South, Range 33 East, NMPM
Section 23: E/2 W/2

(3) The Project involves the injection of excess gas volume from EOG's gathering system into an existing producing gas well for temporary storage. The excess gas volume is the result of the interruption of pipeline service by a third-party gas processing facility that is contracted to take the produced gas from EOG's gathering system.

(4) The Project will inject the excess gas volume into EOG's Caballo 23 Federal Well No. 2H (API No. 30-025-40051) ("Well"), a horizontal well with a surface location of 50 feet from the North line and 2200 feet from the West line and a bottom-hole location of 4911 feet from the North line and 2221 feet from the West line of Section 23, Township 25 South, Range 33 East, NMPM, Lea County, New Mexico. The

Well is currently producing from the Bone Spring formation within a standard horizontal well spacing unit comprised of the W/2 of Section 23.

(5) EOG will intermittently inject the produced gas through the Well into the upper Bone Springs formation, which is sometimes referred to as the Avalon Shale, or the Leonard Shale, at a total vertical depth ("TVD") of approximately 9,418 to 9,457 feet along the perforated portion of the wellbore at a surface injection pressure not to exceed 3,500 pounds per square inch ("psi").

(6) EOG appeared through counsel and presented testimony and exhibits that support the following findings of fact:

(a) The goal of the Project is to divert produced gas resulting from the interruption of the gathering system and temporarily store this produced gas in an active production well.

(b) The Project will have the beneficial effect of storing produced gas that normally would be flared, which prevents waste and protects correlative rights, public health, and the environment.

(c) The Well and associated gathering system are located approximately twenty (20) miles west of Jal, New Mexico.

(d) The Project area is encompassed by a 320-acre horizontal spacing unit in which EOG is the sole mineral interest owner.

(e) EOG's reservoir characterization for the Upper Bone Spring Shale injection interval included a cross section and formation isopach. The characterization demonstrates that the formation is a siliceous mudstone with low permeability that will prohibit migration of the produced gas away from the wellbore and facilitate greater recovery of the produced gas. Additionally, the injection interval is bounded above and below by impermeable limestone formations that will prohibit the produced gas from migrating out of the Upper Bone Spring Shale.

(f) EOG's reservoir model demonstrates that produced gas will not migrate from the formation, interfere with other wells, or affect underground sources of drinking water ("USDWs").

(g) The Project will not cause a negative effect on ultimate well recovery or any remaining hydrocarbon resources in the injection interval.

(h) EOG will inject the produced gas through the Well to a TVD of 9,456 feet with a maximum allowable surface pressure ("MASP") of 3,500 psi.

(i) The well diagram depicts the casing, cementing, and perforation details of the Well.

(j) The Well is constructed with 5½-inch, 20 pound, P-110 production casing with a burst pressure rating equal to 12,640 psi.

(k) The casing burst pressure is greater than 120% of the MASP plus the hydrostatic pressure from a full column of reservoir fluid.

(l) The MASP will not exceed 90% of the horizon's propagation pressure minus the expected bottom hole hydrostatic pressure generated by a fluid column consisting of the injected gas.

(m) EOG performed a mechanical integrity test ("MIT") and completed a cement bond log ("CBL") for the Well on November 24, 2019.

(n) The MIT confirmed that the Well's casing is capable of a load which is at least 116 percent of **the MASP, which demonstrates mechanical integrity.**

(o) The CBL indicated that there is adequate cement coverage throughout the entire vertical length of the Well that will seal strata and provide sufficient tie-back between casing intervals.

(p) To determine the area of review ("AOR") for the Well, EOG used the horizontal segment of the Well as the center line and the endpoints based on the surface and bottom-hole locations to delineate the one-half mile radius.

(q) Within the AOR, EOG identified forty-five (45) producing wells and three (3) plugged wells that penetrate the injection interval, all of which are properly cased and cemented to prevent lateral and vertical migration of the produced gas.

(r) The source of the produced gas is the Bone Spring, Wolfcamp and Atoka formations.

(s) The produced gas will be delivered to the Well by a localized gas lift compressor station, and if necessary, an additional compressor station installed on site.

(t) The analysis of the gas sample collected from the Well indicates that the produced **gas does not contain appreciable volumes of corrosive gas such as H_2S or CO_2 that may damage the casing.**

(u) The produced gas will be injected through the tubing and the open annular space between the tubing and the production casing and will not require the use of a packer.

(v) EOG will install equipment on the Well to **prevent the surface pressure from exceeding the MASP.**

(w) The Project will **be conducted remotely through an existing Supervisory Control and Data Acquisition ("SCADA") system, including the collection of all relevant data for safe operations, such as production flow rate, injection gas flow rate, and surface pressure.**

(x) **EOG will prepare a response plan to address any environmental or engineering emergency that may occur during the Project.**

(y) **During the Project, EOG will submit a Form C-115 each month that identifies the production volumes, injection volumes, pressures and days of operation.**

(z) **Following the completion of the Project, EOG will submit a report compiling the data collected by the SCADA system, including injection rates, injection volumes, injection durations, maximum surface pressure during injection, production rates, gas recovery rates, and delta pressures for adjacent wells during injection.**

(aa) EOG provided proper notice to affected persons, including the surface landowner, and published notice in a newspaper with general circulation in the county where the Project is located.

(bb) Prior to the hearing, EOG presented the Project to representatives of the Bureau of Land Management and the New Mexico State Land Office.

(7) Marathon Oil Permian, LLC and BTA Oil Producers, LLC appeared at the hearing, but did not oppose the application. No other party appeared at the hearing or opposed the application.

(8) After the hearing and during the OCD's technical review of the Application, EOG submitted the calculations used to develop the MASP.

CONCLUSIONS OF LAW

(9) EOG has the technical capability, existing and planned infrastructure, and contingent plans to successfully implement the Project.

(10) The geologic and reservoir evidence demonstrates with reasonable probability that the injection interval can accommodate the produced gas, and that the produced gas will be contained within the injection interval.

(11) The Well is properly cased and cemented to protect USDWs within the Project area.

(12) The MASP of 3,500 psi will not degrade the mechanical integrity of the Well or cause fracturing in the injection interval or confining layers.

(13) Additional monitoring requirements are required to ensure that the Well complies with the MASP.

(14) The active and plugged wells located within the AOR are adequately cased and cemented such that they will not become a conduit for the escape of produced gas from the injection interval, and accordingly, no well within the AOR requires remedial work prior to implementing the Project.

(15) The Project will not, in reasonable probability, cause waste or harm correlative rights, public health, or the environment.

ORDER

(1) EOG is authorized to conduct the Project as described in Findings ¶¶ 1-6.

(2) EOG (OGRID 7377) is designated as the operator of the Project.

(3) EOG shall inject produced gas into the Well only from the Bone Spring, Wolfcamp, and Atoka formations.

(4) EOG shall inject produced gas that has a composition consistent with the gas sample analysis referenced in Finding ¶ 6(t).

(5) EOG shall deliver the produced gas to the Well through the existing gathering system, provided however that EOG may modify the gathering system to achieve the MASP of 3500 psi.

(6) EOG shall equip the Well with a pressure control device that limits the MASP to 3,500 psi.

(7) Following termination of the Project, EOG shall inspect and conduct a mechanical integrity test on the vertical portion of the Well in accordance with 19.15.16 NMAC.

(8) EOG shall monitor the Well with a SCADA system during the Project, **collect all relevant data for safe operations as specified in Fact** ¶ 6(z), and maintain the data for inspection at the request of OCD.

(9) EOG shall equip the Well to continuously monitor the pressure in the annulus between the 5½-inch and 8⅝-inch casings.

(10) EOG shall immediately notify the OCD's District I office supervisor and the Engineering Bureau if it detects an increase in the pressure in the annulus between the 5½-inch and 8⅝-inch casings.

(11) EOG shall conduct a test to determine if a fluid column of liquid occurs during a period of injection with high rate, volume, and pressure. The test shall include the following steps: (a) allow the Well to produce down the flowline until the standard production pressure has been reached within the annulus; (b) shut-in the Well for one (1) hour; and (c) take a fluid level reading by a commonly accepted method such as an echo meter. EOG may conduct additional tests using different methodology at its discretion. At least ten (10) business days prior to conducting the test, EOG shall submit the proposed test conditions and protocol for OCD's approval.

(12) EOG shall prepare and submit to the OCD's District I office supervisor and Engineering Bureau a plan specifying the procedures to address any environmental or engineering emergency during the Project. EOG shall provide written notice to the OCD's District I office supervisor and Engineering Bureau at least forty-eight (48) hours prior to commencing the injection of produced gas into the Well.

(13) EOG shall immediately notify the OCD's District I office supervisor and the Engineering Bureau in Santa Fe if the tubing or casing of the Well fails, or water, oil, or other fluid leaks from or around the Well or any well located within the AOR.

(14) If the tubing or casing of the Well fails, or water, oil, or other fluid leaks from or around the Well or any well located within the AOR, EOG shall take all steps as may be timely and necessary, or as otherwise directed by OCD, to correct such failure or leakage.

(15) The Project additionally shall comply with 19.15.26.9 & 10 NMAC.

(16) EOG shall submit monthly reports for the Project on Form C-115 in accordance with 19.15.26.13 NMAC. If OCD determines that Form C-115 is not appropriate to report the produced gas for the Project, EOG shall submit monthly reports for the produced gas for the Project on Form C-103.

(17) EOG shall provide written notice to the OCD's District I office supervisor and Engineering Bureau in Santa Fe upon termination of the Project.

(18) No later than ninety (90) days following termination of the Project, EOG shall file a report describing the operation and its findings and recommendations, including the information required by Findings ¶¶ 6(w) and (z), and Order ¶ 11.

(19) The authority granted by this Order shall terminate one year after the date of signature by the OCD Director, provided however that the OCD Director, upon the Engineering Bureau's recommendation or a written request from EOG for good cause shown, may extend the authority granted by this Order.

(20) EOG shall take all steps necessary to ensure that the produced gas enters only the injection interval and does not escape or infiltrate other formations or USDWs or onto the surface through other wells in the AOR.

(21) Notwithstanding the authority granted by this Order, EOG shall be responsible if the Project causes any harm or damage or threat of harm or damage to protectable fresh water, public health, or the environment.

(22)) Notwithstanding the authority granted by this Order, EOG shall be responsible for complying with all applicable OCD rules and any other state, federal, or local law or regulation.

(23) If OCD determines that EOG has failed to comply with this Order, OCD may, after notice and hearing, or without notice and hearing pursuant to NMSA 1978 §§ 70-2-23 or 70-2-31, take any action or impose any sanction authorized by the Oil and Gas Act or OCD rules.

(24) 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

ADRIENNE SANDOVAL
Director