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

**APPLICATION OF NEW MEXICO OIL CONSERVATION DIVISION TO REVOKE ORDER NO. R-21096, AS AMENDED, AND APDS FOR CAVEMAN #402H AND CAVEMAN 7 12 WCD #003H WELLS, EDDY COUNTY, NEW MEXICO**

**Case No. 22102**
**Order No. R-21888**

## ORDER

This matter came before the Director ("Director") of the New Mexico Oil Conservation Division ("Division" or "OCD") on the Amended Application for Order to Revoke Order No. R-21096, As Amended, and APDs for Caveman #402H and Caveman 7 12 WCD #003H Wells. The Division conducted a public hearing on September 9, 2021. The Director, having considered the testimony and evidence presented, and being otherwise fully advised in the matter, enters the following findings of fact, conclusions of law, and order:

## FINDINGS OF FACT

1. The Division gave notice of the hearing as required by 19.15 NMAC.
2. SPC Resources, LLC ("SPC") is an oil and gas production company doing business in New Mexico.
3. The Division presented the testimony of two witnesses, Jim Griswold, OCD Special Projects Manager for the Carlsbad Brine Well, and Michael Rucker, Senior Associate Engineer for Wood Environment & Infrastructure Solutions, Inc. The Division offered twenty-two exhibits.

4. SPC presented the testimony of one witness, Hanson Yates, President and Co-Managing Member of Santo Petroleum LLC and president of its affiliate, SPC. SPC offered eight exhibits.

**CAVEMAN PROJECT BACKGROUND**

5. SPC applied for Applications for Permit to Drill ("APDs") for the Caveman #402H well (formerly known as the Caveman 7 12 WCXY 2H well) and Caveman 7 12 WCD #003H well ("Caveman #003H well").

6. The Division approved SPC's APD for the Caveman #402H well (API 30-015-47629) on November 5, 2020.

7. The proposed surface hole location and vertical borehole for the Caveman #402H well is located approximately 7,200 feet from the Carlsbad Brine Well Cavity (the "Cavity").

8. The proposed lateral for the Caveman #402H well extends westward from the vertical borehole for approximately 10,500 feet at a depth of 8,797 feet beneath the surface.

9. The Division approved SPC's APD for the Caveman #003H well (API 30-015-47689) on November 17, 2020.

10. The proposed surface hole location and vertical borehole for the Caveman #003H well is located approximately 6,800 feet from the Cavity.

11. The proposed lateral for the Caveman #003H well extends westward from the vertical borehole for approximately 11,000 feet at a depth of 9,300 feet beneath the surface.

12. On August 6, 2019, SPC filed an application to pool all uncommitted interests in and produce hydrocarbons from the Wolfcamp formation underlying a spacing unit comprised of the W/2 and E/2 of Section 12, Township 22 South, Range 26 East, and

the W/2 and E/2 of Section 7, Township 22 South, Range 27 East, NMPM, Eddy County, New Mexico (the "Spacing Unit").

13. On February 12, 2020, the Division granted SPC's pooling application and issued Order No. R-21096.

14. On April 12, 2021, the Division issued Order No. R-21096-A, which updated the form of order, granted an extension of time to commence drilling until February 12, 2022, pooled additional interest owners, and affirmed the material provisions of the Order No. R-21096.

15. On May 17, 2021, the Division issued Order No. R-21096-B, which pooled additional interest owners and affirmed the material provisions of Order R-21096. Order No. R-21096, as amended by Order Nos. R-21096-A and R-21096-B, is hereinafter referred to as "Order R-21096".

**HISTORY OF THE CARLSBAD BRINE WELL REMEDIATION**

16. The Carlsbad Brine Well is an abandoned brine well situated beneath the town of Carlsbad, New Mexico. See NMSA 1978, §75-11-1(G)(2) (definition of "Carlsbad brine well").

17. The Cavity is the subsurface cavern formed as a result of mining salt from the Carlsbad Brine Well. The location of the Cavity is provided in the "Area Map" in the direct testimony of Jim Griswold.

18. The Cavity lies beneath substantial surface development, including the Carlsbad Irrigation District's main canal, a mobile home park, a church, two commercial operations, the intersection of US 285 and 62/180, and a groundwater aquifer.

19. The Carlsbad Brine Well began production in 1978, and continuously operated under various ownership until its closure in 2008. On May 9, 2010, the owner, I&W, Inc. of Artesia, filed for bankruptcy.

20. The Division estimates that more than six million barrels of brine were produced from the Carlsbad Brine Well during its operation and more than 220,000 cubic yards of salt were removed.

21. The Energy, Minerals and Natural Resources Department ("EMNRD") became aware of the potential for catastrophic collapses in brine wells generally, following the collapse of the Jim's Water Service and Loco Hills Water Disposal wells in July and November of 2008, respectively. In both instances, the depth to the salt formation was less than 500 feet and the estimated width of the caverns exceeded 300 feet.

22. EMNRD determined that the stability of underground caverns associated with brine wells is a function of depth, size, and the strength of rocks which form the cavern roof.

23. EMNRD determined in 2008 that the Carlsbad Brine Well shared significant characteristics (depth to salt and breadth of cavern) with the Jim's Water Service and Loco Hills Water Disposal wells that had previously collapsed, and that the Carlsbad Brine Well presented a significant risk of catastrophic collapse, and potential to materially impact critical infrastructure in the area.

24. Beginning in 2009, EMNRD began characterizing and monitoring the Carlsbad Brine Well. The efforts included installation of various monitors, creation of an alarm system, and coordinating with local agencies to develop emergency and contingency plans related to potential catastrophic collapse.

25. Beginning in 2013, EMNRD evaluated methodologies to stabilize the Cavity created by the brine well.

26. Beginning in 2018, EMNRD retained AMEC Environment & Infrastructure, Inc. (now Wood Environment & Infrastructure Solutions, Inc.) (collectively "Wood") to conduct in-situ backfill of the Cavity.

27. The purpose of ongoing in-situ backfill operations is to reduce the void space as much as possible, reducing the likelihood of future raveling of the roof structure causing either surface subsidence or the migration of pressurized brine into the immediately overlying groundwater aquifer.

28. The Cavity currently exists in a state of partial collapse. The roof structure over the void space appears to have partially but substantially collapsed between 2000 and 2010.

29. In 2019, backfill operations utilizing the EMNRD's selected grout method commenced as planned, stabilizing the southern extent of the Cavity.

30. In December of 2019, EMNRD became aware of the previously undetected void space within the northern extent of the Cavity, exceeding an additional 98,000 cubic yards. EMNRD switched from grout to sand backfill to address the increased void space in the northern portion of the Cavity.

31. After backfilling the Cavity with more than 100,000 cubic yards of sand, EMNRD determined that a significant percentage of the injected sand had settled into open spaces in the rubble pile on the floor of the Cavity created by prior roof rockfalls. Wood determined that the backfill operation would require an additional 60,000 cubic

yards of sand at a minimum. The project was temporarily suspended at that time due to a lack of available appropriations.

32. In August of 2020, Wood evaluated the risk currently posed by the partially filled void space. Wood determined that the remaining void in the Cavity still posed the risk of surface subsidence sufficient to damage US 285 and that, more likely, further damage to the roof of the cavity could permit pressurized brine to contaminate the overlying groundwater aquifer.

33. To date, the State of New Mexico, Eddy County, and the City of Carlsbad have invested nearly $58 million and expect to invest an additional approximately $24 million to stabilize the Cavity.

34. Remediation is currently projected for completion in Spring of 2022.

**DIVISION RESPONSE TO ACTIVITY NEAR THE CAVITY**

35. On or about April 14, 2021, the Division's Cavity remediation project manager (Jim Griswold) discovered that several wells were planned or had been drilled in proximity to the Cavity.

36. On June 17, 2021, SPC sent a letter to the Division stating its intent to commence drilling the Caveman #402H well in late June or early July 2021 and to complete the well in late September or early October 2021.

37. On June 30, 2021, the Division requested that SPC temporarily suspend its plan to drill and complete the Caveman #402H well for twelve (12) months to allow EMNRD to complete the project to stabilize the Cavity.

38. On July 1, 2021, SPC refused to temporarily suspend drilling and completing the Caveman #402H well.

39. On August 6, 2021, the Division requested that SPC temporarily suspend its plan to drill and complete the Caveman #003H well for twelve (12) months to allow EMNRD to complete the project to stabilize the Cavity.

40. On August 9, 2021, SPC refused to temporarily suspend drilling the Caveman #003H well.

**IMPACT OF SEISMICITY AND PRESSURE ON THE CAVITY**

41. On March 26, 2020, a Magnitude 5.0 seismic event occurred approximately 75 kilometers from the Carlsbad Brine Well.

42. Wood conducted sonar surveys of the Cavity in February and May of 2020. The surveys documented apparent changes in the void space occurring between the surveys.

43. The March 26, 2020 seismic event is likely to have caused significant roof fall or additional rubble pile settlement within the Cavity.

44. Seismic events have been detected at the Cavity and regional seismic activity is rapidly increasing.

45. Geological displacements caused by seismic activity can have a cumulative effect on the Cavity and EMNRD's ongoing efforts to stabilize it.

46. Drilling and completion activities have the potential to impact the stability of the un-remediated Cavity.

47. Lower magnitude seismic events which occur closer to an area of concern can cause similar "Ground Motion Particle Velocity" as would be caused by larger magnitude events occurring farther away from the area of concern. For instance, a Magnitude 3.0

event with a hypocenter distance of 3.3 kilometers will have an effect similar to a Magnitude 5.0 event occurring at a distance of 75 kilometers.

48. Seismic events can impact the structural integrity of the Cavity.

49. Operators conducted drilling and completion activities in proximity to the brine well in March and April of 2021.

50. The brine well experienced a change in annulus pressure at the Eugenie #1 well that appears to correlate to the drilling operations.

51. Changes in formation hydraulic pressures around the cavity due to imposed drilling fluid pressures can impact the structural integrity of the cavity and EMNRD's ability to successfully complete Cavity remediation.

52. The cumulative impact of seismic events, formation pressure changes, and pressure changes within the Cavity can impact the structural integrity of the Cavity.

53. Drilling and completion activities associated with oil and gas production within the acreage affected by Order R-21096 could impact the structural integrity of the cavity, posing a risk to surface development and the overlying groundwater aquifer.

## CONCLUSIONS OF LAW

54. Pursuant to NMSA 1978, § 70-2-6, the Division has jurisdiction over the parties and the subject matter herein.

55. The Division is authorized to make orders "to prevent crude petroleum oil, natural gas or water from escaping from strata in which it is found into other strata." NMSA 1978, § 70-2-12(B)(2).

56. The Division is authorized to make orders "to require wells to be drilled, operated and produced in such manner as to prevent injury to neighboring leases or properties." NMSA 1978, § 70-2-12(B)(7).

57. SPC's intent to drill and complete any well within the acreage affected by Order R-21096 poses a clear and immediate risk of harm to the stability of the Cavity and the successful completion of the ongoing Carlsbad Brine Well remediation project.

58. SPC's intent to drill and complete any well within the acreage affected by Order R-21096 poses a clear and immediate risk of harm to surface development and the groundwater aquifer overlying the Cavity.

59. Based on testimony and evidence presented, the Director finds that SPC's proposed activity, as well as any drilling or completion activities occurring within three miles of the Cavity, must be suspended until such time as the Division determines the remediation is completed and the Cavity sufficiently stabilized.

## ORDER

60. Order R-21096 is suspended until such time as the Director determines that drilling and/or completion activities may commence.

61. SPC's APDs for the Caveman #402H Well and the Caveman #003H Well are suspended, until such time as:

    a. The remediation of the Carlsbad Brine Well project is complete,

    b. The Cavity is considered stabilized, and

    c. The Director or her delegate has provided written confirmation to SPC that drilling and/or completion activities may commence, which confirmation shall be

provided 10 business days after the conditions in subparagraphs 61(a) and (b) above have been met.

62. SPC's APDs for Caveman #402H Well and the Caveman #003H Well are amended to include the following conditions, applicable to commencement of activity after stabilization of the Cavity:

a. The APD is suspended, until such time as:

i. The remediation of the Carlsbad Brine Well project is complete,

ii. The Cavity is considered stabilized, and

iii. The Director or her delegate has provided written confirmation to SPC that drilling and/or completion activities may commence, which confirmation shall be provided 10 business days after the conditions in subparagraphs 62(a)(i) and (ii) above have been met.

b. SPC shall provide notice to the Division of any drilling or completion activities at the Caveman #402H Well and the Caveman #003H Well either (i) 60 days prior to the start of such activities when possible, or (ii) if such activities are planned to start in less than 60 days, within 72 hours of scheduling drilling or completion activities. However, in all instances, the notice shall be provided at least 14 days prior to the start of any such activities.

c. The Division retains the right to require the cessation of any drilling or completion activities associated with the permits due to concerns about potential impacts to ongoing or completed remediation activities at the Carlsbad Brine Well,

i. If the Division orders cessation pursuant to this provision, the Division shall do so in a written communication (email is sufficient) simultaneously submitted to SPC that contains a high-level rationale for the Division's cessation order. The duration of the initial period for such cessation may be as follows:

    1. up to 45 days if SPC is more than 45 days from starting actual drilling or completion activities; or
    2. if SPC is within 45 days from starting actual drilling or completion activities, or is conducting actual drilling or completion activities, the initial period of cessation shall be limited to 72 hours (not including weekend or holiday time)
    3. whichever cessation period in subparagraphs 62(c)(i)(1) or (2) applies shall be referred to hereafter as the "Initial Period".

ii. If the Division's concerns, as summarized in its written communication , are not resolved to the Division's satisfaction in its sole discretion during the Initial Period (up to 45 days or 72 hours, whichever is applicable), the Division may extend any such cessation until the earlier of (i) 45 additional days or (ii) a hearing before the Division; provided, however, that no cessation shall be authorized for a cumulative period of more than 90 days without a Division hearing.

iii. During the Initial Period or any extension thereof, the Division and SPC shall discuss the Division's rationale for the cessation order and make a

good faith effort to determine whether SPC's current or planned operations can be carried out in a manner satisfactory to the Division.

63. Suspension of Order R-21096 and the APDs is effective as of the date of the Division's Emergency Order, July 2, 2021.

64. All deadlines associated with Order R-21096 and the APDs are tolled, effective July 2, 2021, until such time as the Director notifies SPC that drilling and/or completion activities may commence.

65. SPC may not commence any drilling or completion activities at any depth within the acreage affected by Order R-21096 until such time as the Director or her delegate notifies SPC that activities may commence. The Division will provide notice to SPC of the Division's determination that activities may commence at the same time it provides notice pursuant to paragraph 61.c.

66. The Division retains jurisdiction of this matter for the entry of such further orders as it may deem necessary.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

Date: 10/19/2021

ADRIENNE SANDOVAL
DIRECTOR
AES/bb