

**STATE OF NEW MEXICO
NEW MEXICO OIL CONSERVATION DIVISION**

**APPLICATION OF OIL CONSERVATION DIVISION
TO ADOPT 19.15.41, 19.15.42, AND 19.15.43 NMAC**

No. 25875

**DIRECT TECHNICAL TESTIMONY OF DR. SAI WANG
ON BEHALF OF THE OIL CONSERVATION DIVISION**

JUNE 29, 2026

INTRODUCTION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. Sai Wang, 801 Leroy Place, Socorro, NM 87801.

Q. ON WHOSE BEHALF ARE YOU SUBMITTING DIRECT TESTIMONY?

A. The New Mexico Oil Conservation Division.

Q. BY WHOM ARE YOU EMPLOYED AND WHAT IS YOUR POSITION?

A. I am currently employed by the New Mexico Institute of Mining and Technology as an Assistant Professor in the Department of Petroleum and Natural Gas Engineering, a Section Head/Research Engineer in the Petroleum Recovery Research Center, and a Dean's Developing Scholar.

Q. PLEASE SUMMARIZE YOUR EDUCATION EXPERIENCE.

A. I have a Ph.D. in Petroleum Engineering from the University of North Dakota, a M.S. in Petroleum Engineering from the New Mexico Institute of Mining and Technology, and a B.S. in Applied Chemistry from Hainan University.

PURPOSE OF TESTIMONY

Q. WHAT ARE THE AREAS THAT YOU ARE GOING TO BE ADDRESSING?

A. My testimony addresses Class VI well log requirements and Class VI well plugging requirements, found generally at proposed rule sections 19.15.43.7 and 19.15.43.9.

CLASS VI WELL LOG REQUIREMENTS

**Q. WHAT ARE WELL LOGS IN THE CONTEXT OF A CLASS VI PROGRAM?
WHAT TYPE OF WELL LOGS ARE USED?**

A. Well logs are measurements taken in the well during drilling and construction. In the context of a Class VI program, they are used to help confirm the depth, thickness, lithology, porosity, permeability, and formation-fluid salinity of the relevant geologic formations. The required logs include resistivity, spontaneous potential, gamma ray, porosity, and fracture finder logs. Additional logs may also be required by the UIC Program Director based on the site geology.

Q. HOW ARE WELL LOGS USED TO CHARACTERIZE THE INJECTION ZONE AND CONFINING ZONE? HOW DO WELL LOGS ASSIST IN EVALUATING FORMATION PROPERTIES SUCH AS POROSITY, PERMEABILITY, AND FLUID CONTENT?

A. Well logs are used to tie wellbore data to the geologic model of the site.¹ Gamma ray logs help correlate formations and identify shale or clay-rich intervals. Spontaneous potential logs can help correlate formations, identify permeable beds, and provide qualitative information related to formation-fluid resistivity. Resistivity logs, together with formation-fluid samples and other testing data, help evaluate formation-fluid salinity. Porosity logs, such as density, neutron, and sonic logs, are used to estimate formation porosity. Permeability is typically estimated indirectly from log-derived porosity, lithology, and related petrophysical relationships, and then checked or calibrated against core analysis and formation testing.

For the injection zone, that data helps evaluate whether the interval has sufficient thickness, porosity, and flow capacity to receive the CO₂ stream. For the confining zone, the logs help

¹ See generally OCD Exhibit 3 at section 19.15.43.9.C.1.c.iii; 19.15.43.9.C.3.a-b; and 19.15.43.9.H.2

confirm thickness, lithology, and possible features such as fractures, borehole anomalies, or other intervals that may require further review. The log interpretation is compared with core data, formation-fluid samples, and pressure testing before the zone characterization is finalized.

Q. WHY IS THAT INFORMATION IMPORTANT FOR CLASS VI OPERATIONS?

A. That information is important because Class VI operations depend on knowing whether the injection zone can receive the planned CO₂ and whether the confining zone can keep the CO₂ and displaced fluids contained. The same information is also used to support the operating plan, the area of review model, and the monitoring program. Without reliable data on those formation properties, the regulator cannot evaluate whether injection can proceed in a way that protects underground sources of drinking water.

Q. WHAT TYPES OF TESTING ARE REQUIRED PRIOR TO OPERATION OF A CLASS VI WELL?

A. Before a Class VI well can begin operation, the owner or operator must complete the required logging, sampling, and formation testing. That includes well logging, core sampling and core analysis, formation-fluid sampling, measurement of downhole conditions, determination of fracture pressure, and hydrogeologic testing, such as a pressure fall-off test and a pump test or injectivity test.²

Q. WHAT ROLE DO WELL LOGS PLAY IN CONFIRMING MECHANICAL INTEGRITY? WHY IS MECHANICAL INTEGRITY TESTING IMPORTANT?

A. Well logs support mechanical integrity review by providing information on the well and the formations around it, including whether the relevant zones have been properly

² *Id.* at 19.15.43.9.H.2

identified and whether additional logs, such as casing inspection logs, are needed.³ They are not the only mechanical integrity tests. Under the Class VI proposed rule, mechanical integrity is also checked through monitoring and tests that show there is no significant leakage inside the tubing, casing, or packer, and no significant fluid movement outside the casing. Mechanical integrity testing is important because it helps confirm that the well is operating as intended and gives early warning if there may be a loss of containment that could endanger underground sources of drinking water.

Q. HOW DO WELL LOG REQUIREMENTS SUPPORT LONG-TERM CONTAINMENT OF THE CARBON DIOXIDE STREAM?

A. Well log requirements support long-term containment by helping confirm that the injection zone and confining zone have been properly identified and characterized. The logs provide data on depth, thickness, lithology, porosity, permeability, and formation-fluid salinity. That information helps evaluate whether the injection zone can receive the CO₂ and whether the confining zone can act as a barrier to fluid movement over time. Well log data also supports the broader site characterization used for the area of review, operating limits, and monitoring plans.

Q. HOW DOES THE PROGRAM USE WELL LOG INFORMATION THROUGHOUT THE LIFE OF THE PROJECT?

A. The program uses well log information first to confirm the basic subsurface interpretation before injection begins, including the injection zone, confining zone, formation thickness, lithology, porosity, permeability, and formation-fluid salinity.⁴ After that, the information remains part of the project record. It supports the area of review, the operating plan, and

³ *Id.* at 19.15.43.9.H.1.d (i)-(iv)

⁴ *Id.* at 19.15.43.9.C.1.c.iii; 19.15.43.9.C.3.a-b; 19.15.43.9.H.2

the testing and monitoring plan, and it provides a baseline for comparing later monitoring and operational data. If later data shows that the original understanding of the site needs to be updated, the well logs help the regulator evaluate those changes.

CLASS VI WELL PLUGGING REQUIREMENTS

Q. WHAT IS WELL PLUGGING, IN GENERAL TERMS?

A. Well plugging, in general, means closing and sealing a well so that the wellbore does not become a pathway for fluid movement. In the Class VI context, that is important after CO₂ injection because the well must not allow CO₂ or displaced formation fluids to move out of the injection zone or toward underground sources of drinking water. The proposed rule follows the federal rules and requires plugging to be done under an approved plugging plan, using specified plugs and materials that are compatible with the CO₂ stream.⁵

Q. HOW DO THE PROPOSED RULES REGULATE PLUGGING OF CLASS VI WELLS?

A. The proposed rules will regulate plugging through permit requirements, technical standards, and regulatory review.⁶ Operators must submit a plugging plan describing the materials, procedures, and placement methods that will be used to close the well. The plan is reviewed to ensure protection of underground sources of drinking water and long-term containment of the carbon dioxide stream. Plugging activities must be documented and completed in accordance with approved requirements.

Q. WHAT TYPES OF MATERIALS OR METHODS ARE USED TO ENSURE EFFECTIVE WELL PLUGGING?

⁵ *Id.* at 19.15.43.7.Q

⁶ *Id.* at 19.15.43.9.M

A. Effective well plugging generally relies on cement and, where appropriate, mechanical barriers such as bridge plugs or packers. These materials are used to seal the injection interval and other critical zones so that the well does not become a pathway for carbon dioxide, formation fluids, or pressure migration. Plugging materials and methods are selected based on well construction, site conditions, and long-term containment objectives.⁷

Q. HOW WOULD THE DIVISION EVALUATE WHETHER A WELL HAS BEEN PROPERLY PLUGGED?

A. Under the proposed rules, the Division will evaluate plugging by reviewing plugging records, materials used, placement procedures, and any required testing or verification information.⁸ The review confirms that plugging activities were completed in accordance with permit requirements and that critical intervals have been properly sealed. If necessary, the Division may require additional information or corrective measures before determining that plugging requirements have been satisfied.⁹

Q. HOW DO WELL PLUGGING REQUIREMENTS HELP PREVENT FLUID MIGRATION?

A. Well plugging requirements help prevent fluid migration by establishing permanent barriers within the wellbore after injection operations have ceased. Properly placed plugs isolate geologic formations and eliminate potential pathways for carbon dioxide, formation fluids, or pressure movement. This helps protect underground sources of drinking water and supports long-term containment of the carbon dioxide stream.

⁷ *Id.*

⁸ *Id.*

⁹ *Id.*

Q. HOW DO THE REQUIREMENTS SUPPORT LONG-TERM CONTAINMENT OF THE CARBON DIOXIDE STREAM?

A. Well plugging requirements under the proposed rules support long-term containment by helping ensure that the well does not become a pathway for fluid migration after injection has ended. Properly installed plugs maintain isolation between the injection zone, confining zones, and overlying formations. This helps preserve the integrity of the storage system and reduce the risk of future leakage.

Q. WHY IS IT IMPORTANT TO ISOLATE THE INJECTION ZONE FROM UNDERGROUND SOURCES OF DRINKING WATER?

A. It is important to isolate the injection zone from underground sources of drinking water because the primary purpose of the Class VI program is to protect those resources. Effective isolation helps ensure that carbon dioxide, displaced formation fluids, and pressure changes remain within the intended storage system. Without that separation, fluids could potentially migrate into formations containing usable groundwater.

Q. IN YOUR OPINION, DO THE PROPOSED RULES' WELL PLUGGING REQUIREMENTS REFLECT THE FEDERAL CLASS VI FRAMEWORK AND REQUIREMENTS?

A. Yes. In my opinion, New Mexico's proposed well plugging requirements are consistent with the objectives and requirements of the federal Class VI program and rules. They address long-term well integrity, prevention of fluid migration, protection of underground

sources of drinking water, and long-term containment of the carbon dioxide stream. Based on my review, the proposed requirements are consistent with the federal framework.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.

/s/ Sai Wang
Sai Wang