

**STATE OF NEW MEXICO
NEW MEXICO OIL CONSERVATION COMMISSION**

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

CASE NO. 25875

**DÍNE C.A.R.E., EARTHWORKS, SAN JUAN CITIZENS ALLIANCE,
SIERRA CLUB RIO GRANDE CHAPTER, TÓ NIZHÓNÍ ÁNÍ,
AND WESTERN ENVIRONMENTAL LAW CENTER'S
SUBMISSION OF FILING REBUTTAL TESTIMONY AND EXHIBITS**

Pursuant to 19.15.3.11.B NMAC and the Hearing Officer's Amended Prehearing Procedural Order in this matter, the Diné C.A.R.E., Earthworks, San Juan Citizens Alliance, Sierra Club Rio Grande Chapter, Tó Nizhóní Ání, and Western Environmental Law Center ("WELC") (collectively, "Conservation Groups") hereby file Rebuttal Testimony and Exhibits in this matter with the following information:

1. The person's name and its attorney's name: WELC represents all parties in the proceeding, identified above.
2. The names of all witnesses the person will call to testify: Conservation Groups will present:
 - a. Peter Morgan, J.D., Legal and Policy Director, Center for Asset Retirement and Accountability; and
 - b. Charles Harvey, PhD, Professor of Civil Engineering, Massachusetts Institute of Technology.
3. All witnesses' full rebuttal testimony, their qualifications including a description of their education and experience, and the approximate time to present a summary of the witness's rebuttal testimony: All witnesses' full rebuttal testimony and qualifications are set forth herein as follows:
 - a. Rebuttal testimony of Peter Morgan, J.D., is Conservation Groups' Exhibit 24 and

his resume is Conservation Groups' Exhibit 2; the approximate time for a summary of his testimony is 15 minutes.

- b. Rebuttal testimony of Charles Harvey, PhD, is Conservation Groups' Exhibit 25 and his resume is Conservation Groups' Exhibit 4; the approximate time for a summary of his testimony is 30 minutes.
4. Any proposed modifications to the proposed rule change with reasons for adopting the modifications: Conservation Groups' proposed modifications are set forth in their Exhibit 1 and their reasons for adopting the modifications are set forth in their exhibits, a list of which appears below, and in their Prehearing Statement, filed June 29, 2026.
 5. All exhibits the person plans to offer as rebuttal exhibits in the hearing: Conservation Groups' list of rebuttal exhibits is set forth below. The exhibits are attached and are uploaded to the shared WELC folder in this matter on the EMNRD CentreStack Platform. Conservation Groups provide a Bates stamp number for each exhibit to facilitate accessing the exhibits.

Exhibit No.	Exhibit	Bates Stamp No.
24	Rebuttal Testimony of Peter Morgan, J.D.	CG-464
25	Rebuttal Testimony of Charles Harvey, PhD	CG-470

Respectfully submitted,

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Certificate of Service

I certify that on July 13, 2026, I served a copy of this pleading to the following via email:

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EXHIBIT 24

**STATE OF NEW MEXICO
NEW MEXICO OIL CONSERVATION COMMISSION**

**IN THE MATTER OF PROPOSAL TO
ADOPT 19.15.41, 19.15.42, and
19.15.43 NMAC; STATEWIDE**

CASE NO. 25875

REBUTTAL TESTIMONY OF PETER MORGAN

Q: Please state your name.

A: Peter Morgan.

Q: Did you provide direct testimony in this matter?

A: Yes. My direct testimony is Conservation Group's Exhibit 3.

Q: Are your qualifications and background set forth in that testimony?

A: Yes, on Bates stamped pages CG-055-057 of Conservation Group's Prehearing Statement, and my resume is Applicants' Exhibit 2.

FINANCIAL ASSURANCE

Q: Oxy's witness recommends that the Commission adopt the financial test set forth in U.S. Environmental Protection Agency's ("EPA") hazardous waste regulations implementing the Resource Conservation and Recovery Act ("RCRA")¹ as the criteria for determining an operator's eligibility for self-insurance: Wallace Test. at ¶ 32 - 41 [Oxy Ex. 2] What is your response?

A: As an initial matter, and as set forth in my Direct Testimony, I strongly urge the Commission to not include self-insurance as an allowable form of financial assurance.

¹ Specifically, the tests Oxy proposes adopting from RCRA are located at 40 C.F.R. § 261.143(e)(1).

Eliminating the self-insurance option, including striking section 19.15.43.9.F(1)(f)(v) in its entirety, would obviate the need to consider Ms. Wallace's recommendation.

If the Commission were to allow self-insurance, it should adopt a financial fitness test much more stringent than the one proposed by Ms. Wallace. Ms. Wallace recommends that the Commission adopt the financial fitness test set forth in the implementing regulations for the Resource Conservation and Recovery Act ("RCRA") at 40 C.F.R. § 261.143(e)(1). Under this test, operators have two options for demonstrating financial fitness to qualify for self-insurance. The first test requires the owner or operator to demonstrate that it has:

- (A) Two of the following three ratios: A ratio of total liabilities to net worth less than 2.0; a ratio of the sum of net income plus depreciation, depletion, and amortization to total liabilities greater than 0.1; and a ratio of current assets to current liabilities greater than 1.5; and
- (B) Net working capital and tangible net worth each at least six times the sum of the current cost estimates and the current plugging and abandonment cost estimates; and
- (C) Tangible net worth of at least \$10 million; and
- (D) Assets located in the United States amounting to at least 90 percent of total assets or at least six times the sum of the current cost estimates and the current plugging and abandonment cost estimates.

The second test requires the owner or operator to demonstrate that it has:

- (A) A current rating for his most recent bond issuance of AAA, AA, A, or BBB as issued by Standard and Poor's or Aaa, Aa, A, or Baa as issued by Moody's; and
- (B) Tangible net worth at least six times the sum of the current cost estimates and the current plugging and abandonment cost estimates; and
- (C) Tangible net worth of at least \$10 million; and
- (D) Assets located in the United States amounting to at least 90 percent of total assets or at least six times the sum of the current cost estimates and the current plugging and abandonment cost estimates.

These RCRA tests are comparable to the self-insurance criteria provided under the Surface Mining Control and Reclamation Act (SMCRA) that failed to prevent or mitigate the bankruptcies of major coal miner operators, as discussed in my Direct Testimony. Those SMCRA criteria allowed an operator to self-bond if:

- (i) The applicant has a current rating for its most recent bond issuance of “A” or higher as issued by either Moody's Investor Service or Standard and Poor's Corporation;
- (ii) The applicant has a tangible net worth of at least \$10 million, a ratio of total liabilities to net worth of 2.5 times or less, and a ratio of current assets to current liabilities of 1.2 times or greater; or
- (iii) The applicant's fixed assets in the United States total at least \$20 million, and the applicant has a ratio of total liabilities to net worth of 2.5 times or less, and a ratio of current assets to current liabilities of 1.2 times or greater.²

Three of the largest coal mine operators in the United States were determined to meet these criteria and allowed to self-insure. When commodity prices fell, the three self-insured operators all filed for bankruptcy.³ The criteria had failed to predict or prevent those bankruptcies.

The lesson to be gleaned from the failure of self-insurance in the SMCRA context is *not* that there is some optimal ratio of assets or net worth to liabilities that can render self-insurance an acceptable form of financial assurance. The lesson is that the *entire premise* that a formula can predict an operator's future financial health is inherently flawed and likely to fail. This is particularly true where, as here, the financial assurance obligations will stretch over decades.

Q: Oxy's witness proposes removing the requirement to show adequate “net working capital” to qualify for self-insurance, as holding larger cash balances is inefficient, costly, and reduces opportunities for companies to grow: Wallace Test. at ¶¶ 37–40. What is your response?

A: If an operator does not maintain adequate net working capital, how will it be able to respond to and address “corrective action, injection well plugging, post-injection site care

² 30 C.F.R. § 800.23 (1988); *see also* Joshua C. Macey & Jackson Salovaara, *Bankruptcy as Bailout*, 71 STAN. L. REV. 879, 895 (2019).

³ Macey and Salovaara, *Bankruptcy as Bailout*, at 895–98.

(PISC), site closure, and emergency and remedial response” obligations?⁴ These are the functions for which financial assurances must be available for Class VI wells.

If a pipeline or well-head ruptures, or something else goes wrong at a project, immediate corrective action or response will be required. Operators who have adequate working capital on hand can deploy resources to address these issues. Or, if a third-party is required to act, operators with adequate working capital can reimburse those costs without imperiling the overall financial structure of the company.

In contrast, an operator with narrow margins, or who routinely prioritizes other outlays such as “shareholder returns”⁵, may not be able to satisfy its corrective action and well plugging obligations. An operator without adequate liquid resources available to meet its obligations may be forced into bankruptcy, where environmental and clean-up liabilities are typically given low priority. The bankruptcy of an operator that has been allowed to rely on self-insurance will pass significant costs on to the state and its taxpayers. For Class VI wells in New Mexico, these costs could range from \$10 million to \$75 million dollars for a single project.⁶

The economic literature on financial assurance recognizes that certain forms of financial assurance can “tie up a firm’s operating capital.”⁷ The solution, however, is not to eliminate

⁴ U.S. Environmental Protection Agency, “Federal Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO₂) Geologic Sequestration (GS) Wells,” 75 Fed. Reg. 77,230, 77,233 (December 10, 2010).

⁵ Wallace Testimony at ¶ 37.

⁶ Ben Shelton, Deputy Secretary, New Mexico Energy, Minerals and Natural Resources Department, Letter to Senator Jeff Steinborn, Chair, Radioactive and Hazardous Materials Committee, November 25, 2025 (providing a cost estimate of “\$10 million to \$75 million” for “expenses for well plugging, postinjection monitoring, potential emergency and remedial response, and site closure” for a typical New Mexico Class VI project). Letter available at: <https://www.nmlegis.gov/handouts/RHMC%20120825%20Item%203%20EMNRD%20Letter%20Class%20VI%20Carbon%20Sequestration.pdf>

⁷ David Gerard, The Law and Economics of Reclamation Bonds, Resources Policy 26 (4): 189–97 at p. 191, Oct. 2, 2000.

1 working capital requirements. The solution recommended by economists is to rely instead on
2 third party bonding. Economists recognize that “[o]ne way to mitigate the liquidity constraint is
3 by involving a third party, for instance, a surety. For a fee, a surety agrees to cover the amount of
4 the bond if the agent fails to fulfill its obligation, which also transfers a portion of the default risk
5 from the public to the surety provider.”⁸ To be sure, “[t]he use of a surety reduces, but does not
6 eliminate, liquidity constraints,” as the operator “must pay an annual premium, and the bond
7 amount is also a liability on the firm’s balance sheet that adversely affects the firm’s credit.”⁹

8 The goal, however, is not to reduce an operator’s liquidity constraints to zero. Instead, the
9 goal is to balance the constraints on the operator against the risk to the public posed by
10 inadequate financial assurance. If an operator truly wishes to minimize the amount of working
11 capital it maintains, as Ms. Wallace’s testimony suggests, surety bonding and other alternative
12 forms of financial assurance offer a solution that does not require the Commission to further
13 weaken the criteria for self-insurance.

14 This concludes my rebuttal testimony, which is accurate to the best of my knowledge.

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18 Peter Morgan

July 8, 2013

Date

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23 ⁸ *Id.*

24 ⁹ *Id.*

EXHIBIT 25

**STATE OF NEW MEXICO
NEW MEXICO OIL CONSERVATION COMMISSION**

**IN THE MATTER OF PROPOSAL TO
ADOPT 19.15.41, 19.15.42, and
19.15.43 NMAC; STATEWIDE**

CASE NO. 25875

REBUTTAL TESTIMONY OF DR. CHARLES HARVEY

Q: Please state your name.

A: Charles Harvey.

Q: Did you provide direct testimony in this matter?

A: Yes, my direct testimony is Conservation Groups' Exhibit 5.

Q: Are your qualifications and background set forth in that testimony?

A: Yes, on Bates stamped pages CG-090–CG-093 of Conservation Groups' Prehearing Statement, and my resume is Conservation Groups' Ex. 4.

SUMMARY OF OPINIONS

Oxy's proposed modifications, taken together, systematically relax the regulatory framework on which the safety of New Mexico's drinking water depends. For every proposed modification, a key justification is operator cost or convenience; for no proposed modification does Oxy's witness cite scientific evidence that the protections proposed by the Division are unnecessary. I oppose each modification. The catch-all "minor modification" category grants excessive discretion to a single official using terms that lack scientific or regulatory definition. Extending Area of Review ("AoR") reevaluations to five years is not justified given the \$85-per-ton federal subsidy operators receive and the documented pace at which subsurface conditions diverge from predictions. Reducing groundwater monitoring from a quarterly to an annual frequency is contradicted by the peer-reviewed literature and EPA's own statistical framework.

Eliminating spontaneous potential logging removes the only required method that directly measures formation fluid salinity, which is the property most relevant to locating underground sources of drinking water (“USDW”) and their boundaries. Replacing mandatory logging requirements with discretionary ones removes the regulatory floor that ensures every Class VI well is characterized to a consistent, publicly reviewable standard. Extending the emergency response plan review cycle from three to five years would make Class VI emergency planning less rigorous than requirements for Resource Conservation and Recovery Act (“RCRA”) hazardous waste sites. Finally, limiting injection cessation to a single well when evidence of USDW endangerment exists is inconsistent with the physics of pressure propagation in a shared injection zone and creates a perverse incentive to characterize endangerment as localized rather than shut down the project and fix the problem.

MINOR MODIFICATION OF PERMITS

Q: Dr. Harvey, Oxy’s witness recommends that the list of “minor modifications” not subject to formal permit revision procedures include “[n]on-material, non-substantive permit modifications that do not increase risk to USDWs” to prevent permitting delay: Wallace at ¶ 23 [Oxy Ex. 2]. What is your response?

A: The catch-all category proposed provides too much leeway to a single official without the benefit of formal and independent review. Every term in the proposed formulation (i.e., “non-material”, “non-substantive”, and “does not increase risk”) is subjective and not defined with scientific or regulatory rigor. Who determines materiality and by what standard? By what metric is risk to USDWs evaluated? These are the determinations that the formal permit revision process exists to make, with public participation and independent technical scrutiny of potential threats to public resources. Replacing that process with a unilateral judgement that a particular

1 change is sufficiently minor to bypass public review invites the very regulatory failures that a
2 strong protective framework should be designed to prevent.

3 Oxy's witness argues that the Director's ability to subject a Class VI permit to
4 modification, revocation, and reopening of public participation for any amendment to project
5 plans creates "significant uncertainty for project developers." This inverts the regulatory priority.
6 The purpose of Class VI permitting is to protect underground sources of drinking water, not to
7 minimize uncertainty for developers. Reservoir models are non-unique: many different sets of
8 assumptions can reproduce the same calibration data while predicting very different futures
9 (Oliver & Chen, 2011). To illustrate, Oxy's witness offers the following example: "[A]n owner
10 or operator may finalize agreements with third-party contractors to perform quality assurance
11 surveillance plans that result in slight changes to the plans without material change to the number
12 of samples taken and the constituents analyzed." (Wallace Test. at ¶ 20). Extending this example,
13 consider an original plan subject to public review which mandates monthly measurement and
14 reporting of pH, total dissolved solids (TDS), and trace metals from 10 spatially distributed
15 groundwater-monitoring wells (120 samples of three contamination indicators per year); then
16 consider a revised monitoring plan, agreed upon after contracting third-party companies, in
17 which twice-monthly samples of pH, specific conductivity, and temperature will be taken from a
18 subset of 5 monitoring wells chosen by the operator. The revised plan still takes 120 samples of
19 three indicators: does it constitute a material change? Who decides?

20 The RCRA framework was developed over decades to close loopholes in which post-hoc
21 threshold selection and discretionary judgments proved vulnerable to manipulation (EPA Unified
22 Guidance, 2009). If a modification genuinely does not affect risk to USDWs, the operator should
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1 have no difficulty demonstrating that through formal review. A modification that cannot survive
2 public scrutiny should not bypass it.

3 AREA OF REVIEW

4 **Q: Dr. Harvey, Oxy's witness recommends that New Mexico match the frequency of**
5 **AoR reevaluations to the five-year frequency of the federal rules, as the data collection and**
6 **simulations needed to reevaluate an AoR are time intensive: Wallace Test. at ¶ 26. What is**
7 **your response?**

8 A: Oxy's witness grounds this argument in cost and convenience. The Commission should
9 begin from a different premise: contamination of New Mexico's drinking water aquifers is
10 irreversible. Once metals mobilized by carbon dioxide ("CO₂") or displaced brine have entered a
11 USDW, the damage cannot be undone on any human timescale (Pabst v. Peoples Gas, 2022).
12 The precautionary principle demands that when the consequences of failure are irreversible, the
13 burden falls on the operator to demonstrate safety at frequent intervals; the burden should not fall
14 on the regulator to justify why oversight is necessary.

15 The claim that the proposed four-year reevaluation frequency is "prohibitively expensive"
16 (Wallace Test. at ¶ 26) does not hold up in context. Under Section 45Q of the Internal Revenue
17 Code, operators receive tax credits of \$85 per ton of CO₂ sequestered. For a project injecting one
18 million tons per year, that is \$85 million annually in federal tax credits. The cost of an AoR re-
19 evaluation even every year is a small fraction of this revenue stream. Claims about prohibitive
20 costs should be weighed against the substantial federal subsidies—tens of millions of dollars
21 annually—that these projects will receive.

22 The ADM Decatur project in Illinois provides an object lesson in why more frequent re-
23 evaluation is warranted. Within the first decade of operation, and after injecting only a few
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1 million tons, monitoring revealed that pre-injection models had failed to predict actual plume
2 behavior (Bukar et al., 2025) and monitoring wells built to Class VI specifications developed
3 corrosion failures within only a few years (EPA, 2024; Snider & Lefebvre, 2024). If
4 infrastructure damage and unexpected migration can and do occur within a few years at a well-
5 characterized site, a five-year reevaluation cycle is insufficient. The federal rules represent a
6 floor, not a ceiling, and New Mexico's geology, water resources, and the irreversibility of
7 potential harm all justify exceeding that floor.

8 **TESTING AND MONITORING**

9 **Q: Dr. Harvey, Oxy's witness recommends that groundwater monitoring be required**
10 **annually, rather than "quarterly," as she claims that quarterly monitoring is an "excessive**
11 **burden on owners and operators that does not provide additional protection to water**
12 **quality and the environment generally": Wallace Test. at ¶ 43. What is your response?**

13 A: The risk of permanent damage to New Mexico's limited and irreplaceable water
14 resources means that the bar for what constitutes an 'excessive burden' on operators standing to
15 profit from the use of New Mexico's subsurface must be exceedingly high.

16 Oxy's witness provides no scientific or statistical basis for her assertion regarding
17 sampling frequency. She does not cite a single study, dataset, or statistical analysis to support the
18 assertion that quarterly monitoring provides no additional protection over annual monitoring.
19 The peer-reviewed literature and the EPA itself say the opposite, unambiguously and repeatedly
20 (e.g., Barcelona et al., 1989; Zhou, 1996; US EPA, 2009; Papapetridis & Paleologos, 2012).
21 Basic statistical reasoning also contradicts Oxy's position.

22 Monitoring frequency is a fundamental component of monitoring design that determines
23 statistical power and how quickly changes in groundwater conditions can be detected. The
24

1 probability of detecting groundwater contamination consistently decreases as sampling
2 frequency decreases, and for most environments this relationship holds regardless of how many
3 monitoring wells are in the network (Papapetridis and Paleologos, 2012). Quarterly sampling
4 generates four data points per year; annual sampling generates one. With only one data point per
5 year, the ability to distinguish a real trend from natural variability is severely limited: by the time
6 a trend becomes detectable under annual monitoring, contamination may have spread beyond
7 any possibility of remediation.

8 The RCRA regulatory framework, which is far more mature than the Class VI program,
9 arrived at quarterly or more frequent sampling requirements over decades of operational
10 experience, precisely because less frequent monitoring proved inadequate to detect
11 contamination before it became impossible to remediate. Oxy's witness offers no explanation for
12 why the lessons of that experience should not apply to CO₂ storage, which Tsang et al. (2008)
13 conclude involves more complex hydrologic processes, stronger buoyancy effects, and larger
14 pressure footprints than the liquid waste injection that RCRA regulates.

15 **LOGGING, SAMPLING, AND TESTING**

16 **Q: Dr. Harvey, Oxy's witness supports the addition of gamma ray testing, but**
17 **encourages the Division to remove spontaneous potential as a logging method, as it**
18 **provides redundant information and can increase risks to well integrity: Wallace Test. at ¶**
19 **46. What is your response?**

20 **A:** Gamma ray, resistivity, spontaneous potential and caliper logging are four essential tools
21 that enable proper characterization of a wellbore ahead of surface casing installation. The two
22 changes proposed by Oxy's witness to 19.15.43.9.H(2)(a)(i) NMAC— the replacement of 'or'
23 with 'and' and the elimination of spontaneous potential as a logging requirement — both
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1 substantially and independently weaken the regulation's ability to protect drinking water. I will
2 explain the problems with each proposed change.

3 First, each of the logging tools listed are necessary for an operator to construct surface
4 casing that effectively protects USDW. For instance, gamma ray logging is the only logging
5 technology of the four identified in 19.15.43.9.H(2)(a)(i) NMAC that serves as a primary
6 indicator of the clay content of the formation: this is important because it identifies the confining
7 shale layers through which surface casing should be set. Spontaneous potential logging is the
8 only log of the listed four that directly responds to the contrast with formation fluid salinity
9 contrast without the need for independent porosity data; especially when combined with
10 resistivity logging, it is fundamentally important for identifying the location of the fresh-to-saline
11 water transition at the base of the USDW (i.e., through which the surface casing must extend)
12 and for ensuring identification of all aquifers that meet the USDW salinity classification. Caliper
13 logging characterizes the physical dimensions of the borehole itself, including enlarged zones
14 where cement may not achieve a competent seal, and as such is fundamentally important for
15 accurate cement volume calculations; furthermore, caliper data are used to apply borehole-size
16 corrections to other logs — most importantly the resistivity measurement — and to detect
17 washouts that compromise cement placement.

18 Second, the reasoning used to support Oxy's proposed elimination of spontaneous
19 potential raises significant concerns upon closer review. As described above, spontaneous
20 potential logging is the only listed method that directly responds to fluid salinity contrast.
21 Despite the assertion by Oxy's witness, gamma ray logging cannot fully replace spontaneous
22 potential logging because gamma ray responds to rock mineralogy, not the fluids in the rock.
23 Gamma ray logging can help operators determine whether a formation is shale or sandstone, but
24

1 it cannot determine whether the fluid in that formation is fresh or saline, and it cannot distinguish
2 a permeable zone from an impermeable one of the same lithology. Spontaneous potential, by
3 contrast, is the only log that provides a direct, continuous indication of formation permeability: a
4 spontaneous potential deflection develops only across permeable, fluid-conductive beds, so
5 spontaneous potential uniquely distinguishes permeable from impermeable zones of identical
6 lithology. This is among the properties most relevant to identifying zones capable of transmitting
7 fluids toward a USDW, and no other log in the list captures it. Fluid salinity and zone
8 permeability are the properties most directly relevant to identifying and protecting USDWs at the
9 surface casing interval. Furthermore, spontaneous potential is the simplest sensor of any
10 standard logging tool, consisting of a single electrode mounted on the wireline string: as such, it
11 does not come into contact with the borehole wall, poses minimal risk to well integrity, and is
12 one of the cheapest wireline logging techniques available. Critically, spontaneous potential is
13 recorded passively on the same wireline descent, and on the same tool string, as the resistivity
14 log that Oxy's witness proposes to retain. Because the tool is already in the open hole to acquire
15 resistivity, obtaining spontaneous potential requires no additional trip into the borehole and
16 therefore adds no incremental risk to well integrity. Oxy's position is internally inconsistent:
17 spontaneous potential cannot coherently be characterized as a threat to well integrity while the
18 resistivity log with which it is simultaneously acquired is retained.

19 The Commission should maintain a requirement for all tools, preserving “and” in the
20 regulatory language.

21 **Q: Oxy’s witness also recommends that the phrase “must include” preceding a list of**
22 **logs and tests be replaced by “may include,” as some of the listed testing methods are either**
23 **outdated or provide redundant information, and may increase well integrity risk without**
24

1 **providing corresponding benefit: Oxy Redline of 19.15.43 NMAC [Oxy Exhibit 1C]; see**
2 **Wallace Test. at ¶ 46 (emphasis added).¹ What is your response?**

3 A: Each of Oxy’s proposed changes to 19.15.43.9.H independently weakens the subsection:
4 together, they render the regulation unenforceable, making all logs and tests optional.

5 The listed logs and tests are neither interchangeable nor optional as part of a system of
6 robust USDW protection. Each method measures different physical properties of the formation
7 and contributes information that cannot be fully substituted by the others. As I discussed in the
8 context of spontaneous potential and gamma ray logging, two measurements can overlap
9 partially while still capturing distinct information that matters for evaluating containment
10 integrity and protecting USDWs. Oxy's witness asserts that some listed methods are outdated or
11 redundant, but she does not identify which methods beyond spontaneous potential. The
12 characterization of these methods as 'outdated' is also inaccurate. Gamma ray, resistivity,
13 spontaneous potential, and caliper logs constitute the foundational, industry-standard open-hole
14 logging suite run in essentially every well drilled today. Spontaneous potential in particular has
15 remained in continuous standard use for decades precisely because it provides unique, low-cost
16 information that newer tools have not displaced. This suite is the baseline to which more
17 specialized logs are added — not a set of methods that newer logs have replaced. Moreover, and
18 as discussed, spontaneous potential is neither redundant nor a risk to well integrity.

19 The mandatory logging suite in the proposed rule serves a structural function beyond its
20 technical content. Because the required logs are specified in the rule, they become part of the
21 permit application, which is subject to public notice and comment under the Class VI permitting
22

23 ¹ She correspondingly recommends that the “and” at the end of the list of logs and tests be replaced
24 by “or.” Wallace Test. at ¶ 47.

process. The public, independent scientists, and the regulator all review the same defined minimum standard. Replacing "must" with "may" would remove that floor. Under this weaker version of the regulation, the operator would propose whatever logging program it prefers, and the burden would shift: in such a case, instead of the operator justifying why an exception to a mandatory requirement is warranted at a specific site, the regulator and the public must identify what is missing and argue for its inclusion during comment, often without access to the site-specific data needed to make that argument. The federal rules do provide a mechanism at 40 CFR § 146.87(a)(5) by which an operator may seek Director approval for "alternative methods that provide equivalent or better information," but that is a Director-level determination, not a process that includes public participation or independent review. It is a useful safety valve for genuinely site-specific circumstances, but it is not a substitute for mandatory minimum requirements that are subject to public scrutiny at the permitting stage.

The Commission should retain the mandatory language proposed by the Division.

EMERGENCY AND REMEDIAL RESPONSE

Q: Dr. Harvey, Oxy's witness recommends that New Mexico decrease the frequency of review and amendment of the emergency and remedial response plan to match the five-year frequency of the federal rules: Wallace Test. at ¶ 51. What is your response?

A: The emergency and remedial response plan governs what happens when containment fails. Operational conditions relevant to this plan (e.g., injection rates, nearby drilling activity, monitoring results, community circumstances) change continuously. Extending the review cycle from three years to five means the plan may be based on conditions half a decade out of date at the moment it is needed most.

1 Rather than extending this interval, I would recommend that the plan be made publicly
2 available annually, disseminated across multiple public channels, and accompanied by public
3 hearings in the affected communities. The people whose drinking water is at risk have a right to
4 know what steps are being taken to protect it; they also have the right to raise concerns before a
5 crisis rather than after one. Annual public disclosure also creates a practical incentive for
6 operators to keep the plan current, because a plan that is visibly outdated in a public forum will
7 not survive scrutiny. Weakening the review period to five years would reduce oversight of the
8 single document that matters most when something goes wrong.

9 **Q: Oxy's witness recommends that in the case of evidence showing that the injected**
10 **CO₂ stream and associated pressure front may cause an endangerment to a USDW, the**
11 **owner and operator only be required to immediately cease injection in the impacted well:**
12 **Wallace Test. at ¶ 52. What is your response?**

13 A: This recommendation is divorced from the physics of how pressure propagates
14 underground. Injection wells within the same project are hydraulically connected: the pressure
15 field induced by one injection well influences and is influenced by those of the others. If
16 evidence of potential USDW endangerment exists at one well, then continued injection at any
17 well in the project means continued pressurization that endangers drinking water.

18 Aside from the scientific reasoning above, codifying Oxy's witness's recommendation
19 creates a perverse incentive to characterize potential endangerment as localized, allowing other
20 wells to continue to inject and generate profit. Requiring cessation of all injection at the project
21 until the operator has demonstrated that the source of potential endangerment has been identified
22 and remediated incentivizes the behavior that best protects New Mexico's water resources: rapid,
23 thorough, and holistic evaluation of threats to USDW and action to remediate them.

This concludes my rebuttal testimony, which is accurate to the best of my knowledge.

/s/ Charles Harvey

July 13, 2026

Charles Harvey

Date

List of References

- Barcelona, M., H. Wehrmann, M. Schock, M. Sievers, AND J. Karny. (1989). Sampling frequency for ground-water quality monitoring. U.S. Environmental Protection Agency, Washington, D.C., EPA/600/4-89/032.
<https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=2000TTSS.txt>
- Bukar, I., Bell, R., Muggeridge, A. H., & Krevor, S. (2025). Carbon Dioxide Migration Along Faults at the Illinois Basin—Decatur Project Revealed Using Time Shift Analysis of Seismic Monitoring Data. *Geophysical Research Letters*, 52(2), e2024GL110049. <https://doi.org/10.1029/2024GL110049>
- Oliver, D. S., & Chen, Y. (2011). Recent progress on reservoir history matching: A review. *Computational Geosciences*, 15(1), 185–221. <https://doi.org/10.1007/s10596-010-9194-2>
- Pabst v. The Peoples Gas Light and Coke Company et Al. (2022).
- Papapetridis, K., & Paleologos, E. K. (2012). Sampling Frequency of Groundwater Monitoring and Remediation Delay at Contaminated Sites. *Water Resources Management*, 26(9), 2673–2688. <https://doi.org/10.1007/s11269-012-0039-8>
- Tsang, C.-F., Birkholzer, J., & Rutqvist, J. (2008). A comparative review of hydrologic issues involved in geologic storage of CO₂ and injection disposal of liquid waste. *Environmental Geology*, 54(8), 1723–1737. <https://doi.org/10.1007/s00254-007-0949-6>
- U.S. Environmental Protection Agency. (2009). *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities: Unified Guidance* (EPA 530-R-09-007). U.S. EPA Office of Resource Conservation and Recovery.
- Zhou, Y. (1996). Sampling frequency for monitoring the actual state of groundwater systems. *Journal of Hydrology*, 180(1-4), 301-318. [https://doi.org/10.1016/0022-1694\(95\)02892-7](https://doi.org/10.1016/0022-1694(95)02892-7).