STATE OF NEW MEXICO
ENVIRONMENTAL DEPARTMENT

WATER PROTECTION DIVISION

IN THE MATTER OF PROPOSED AMENDMENTS
TO THE DEPARTMENT'S

DRAFT RULES: *Ground and Surface Water Protection –*
Supplemental Requirements for Water Reuse (20.6.8 NMAC)

PROPOSED AMENDMENTS BY WILDEARTH GUARDIANS

These comments on New Mexico Environment Department's (NMED) draft rules for Ground and Surface Water Protection – Supplemental Requirements for Water Reuse (20.6.8 NMAC), as well as the attached proposed redline amendments, are submitted on behalf of WildEarth Guardians (Guardians).

I. Introduction

The Produced Water Act (PWA) (NMSA 1978, 70-13) and the Water Quality Act (WQA) (NMSA 1978, 74-6-4) require the Water Quality Control Commission (WQCC) to adopt regulations to be administered by NMED for protection of human health and the environment and "…for the discharge, handling, transport, storage, recycling or treatment for the disposition of treated produced water...". To this end, NMED has drafted requirements for "water reuse" that includes the potential reuse of the toxic waste byproduct of oil and gas extraction called "produced water."

Guardians suggests the following amendments to NMED's draft rule as a member of the New Mexico Produced Water Research Consortium (Consortium), serving on several committees including the Treatment and Technology Working Group, Risk and Toxicology Working Group, and Public Education and Outreach Working Group. Our Consortium work has revealed serious accountability concerns with regard to the handling, transport, storage, treatment, testing, monitoring, and potential reuse of this toxic waste outside of the oilfield related to how research has been managed within the Consortium in collaboration with NMED and the Oil Conservation Division. Our suggestions address critical gaps in oversight and

management of produced water experimentation that create public and environmental health risks.

Even though NMED's initial draft rule is predominantly prohibitive, the draft rule as written creates unnecessary risks to public and ecological health that can be eliminated by our suggested amendments. Guardians urges the department to correct these areas of deficiency in the draft rule:

1. Testing and Evaluation of Demonstration Projects
2. Transportation, Handling and Disposal of Treatment Products

II. Testing and Evaluation of Demonstration Projects

Currently, NMED's draft rule falls woefully short of setting scientifically-based, protective criteria for demonstration projects. Neglecting to secure standards for testing, evaluation, monitoring, and reporting within the letter of the law creates a vacuum of accountability. While the Consortium has outlined some standards for testing and evaluation of produced water treatment technologies, these standards are not required by or defensible under state law. Because of the highly toxic nature of produced water and the experimental nature of pilot demonstration projects, we advise NMED to add specifications to the Notice of Intent section C(2) of the draft rule, which currently reads:

> *Persons implementing demonstration projects shall submit to the department all research results, including lab analyses of all water contaminants in the untreated produced water and treated produced water, to assist the commission in developing standards and regulations that may allow for the broader use of treated produced water in a manner that prevents water pollution and protects human health and the environment.*

If demonstration projects are to sincerely "assist the commission in developing standards," then data submitted to the department must be scientifically sound. Data generated using faulty methodology or limited analytes is an unnecessary obstacle and waste of the department's time. NMED could rely on the Consortium to set data standards, but this presents several pitfalls: 1) the Consortium doesn't have legal authority to hold project managers

accountable; 2) the Consortium is not funded to operate in perpetuity; 3) the Consortium has made mistakes managing pilot projects and lacks thorough oversight.

By setting its own standards for research and analysis in regulation, the department prevents spending its limited resources on reviewing messy, incomplete, or indefensible data from demonstration projects and avoids potential pitfalls from depending on Consortium oversight. This has the added benefit of saving demonstration projects themselves time and resources by providing clear standards and goals. Specific criteria for this section can be borrowed directly from Consortium standards for pilot demonstration projects, such as:

> *Pilot Demonstration Test Plan must include detailed information on…Process Operation, Sample and Data Collection, Sample and Data Analysis QA/QC, 3rd party analysis and review, process energy and mass balance, photo documentation…expected operational schedule, waste generation and management, treated water quality monitoring and analysis, assessment of public health and environment impact and risk relative to NMED and Consortium water treatment guidelines, and operational reliability of the system.*[1]

Regarding the draft rule's reference to lab analysis for water contaminants in section C(2), NMED should include a list of desired analytes based on commonly known constituents of oil and gas wastewater. This list should serve as a minimum baseline that can be expanded upon in subsequent rulemakings. To generate a list of commonly known constituents, NMED can simply borrow what's been documented by the U.S. Environmental Protection Agency (EPA) and United States Geological Survey (USGS).

As the EPA has acknowledged, produced water contains "salts, metals, radioactive materials, dissolved organic compounds, and hydraulic fracturing [fracking] chemicals and their transformation products (the result of reactions of these chemicals in the subsurface)."[2] Produced water from shale formations "typically contains high levels of TDS (salinity) and associated ionic constituents (bromide, calcium, chloride, iron, potassium, manganese, and sodium)."[3]

Studies in the New Mexico portion of the Permian Basin have shown average salinity levels of more than 89,000 mg/L in produced water, some 2.5 times higher than the 35,000

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[1] New Mexico Produced Water Research Consortium, *Guidance on Produced Water Treatment Research, Development, and Pilot-Scale Demonstration Testing and Evaluation* (Nov. 2020) available online: https://nmpwrc.nmsu.edu/_assets/public_information/Pilot-Testing-Guide_November2020_6.10.20211.pdf

[2] EPA, Hydraulic Fracturing for Oil and" Gas: Impacts from the Hydraulic Fracturing Water Cycle on Drinking Water Resources in the United States, EPA-600-R-16-236Fa at 7-1 (Dec. 2016), available at: http://www.epa.gov/hfstudy

[3] *Id.* at 7-42

mg/L characteristic of seawater.[4] With such high salinity levels, researchers have concluded that the basin has a "Low" potential for treatment, as desalination technologies required to render produced water safe for most uses is likely to be cost-prohibitive.[5]

Further, "[p]roduced water can also contain toxic materials, including barium, cadmium, chromium, lead, mercury, nitrate, selenium, and BTEX," as well as acetone, ethylene glycol (anti-freeze), phthalates, polypropylene glycols, and dozens of other toxic chemicals.[6] Such toxics can have significant adverse impacts on human health including causing cancer[7] and disrupting the endocrine system.[8] Oil and gas companies also use per- and polyfluorinated substances (PFAS), "forever chemicals" that are very toxic at very small amounts.[9] PFAS are used in fracturing fluid mixtures that end up in produced water and other industry wastes.

Oil- and gas-bearing geologic formations also often contain naturally radioactive materials, which can be concentrated in fracking waste, such as produced water.[10] According to the EPA, radionuclides commonly found in produced water include "radium, radon, uranium, potassium and thorium,"[11] and produced water from shale formations in the Permian Basin has been shown to contain "significant levels of uranium."[12] The extraction, storage, transportation, recycling, and reuse of produced water thus poses a serious threat of widespread radioactive contamination. As the EPA has acknowledged, "[o]nce oil and gas have been extracted from the formation, workers and members of the public may be exposed to radionuclides that are brought to the surface."[13] As a British radiation biologist has stated, "All oil-field workers are radiation workers."[14] They just don't know it. "Tanks, filters, pumps, pipes, hoses, and trucks that [produced water] brine touches can all become contaminated, with the radium building up" and

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[4] Benko, K.L. & J.E. Drewes, Produced Water in the Western United States: Geographical Distribution, Occurrence, and Composition, 25 Envtl. Engineering Science No. 2, 239, 243 tbl.3 (2008)
[5] *Id.*
[6] EPA, *supra* note 2, at 7-4, 7-22 to -23.
[7] E.G. Elliott, Unconventional Oil and Gas Development and Risk of Childhood Leukemia: Assessing the Evidence, Science of the Total Environment 138 (2017)
[8] C.D. Kassotis et al., Endocrine-Disrupting Chemicals and Oil and Natural Gas Operations: Potential Environmental Contamination and Recommendations to Assess Complex Environmental Mixtures, 124 Environmental Health Perspectives 3, at 256 (Mar. 2016), available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4786988/pdf/ehp.1409535.pdf
[9] Physicians for Social Responsibility, "Fracking With 'Forever Chemicals' in New Mexico: Evidence Shows Oil and Gas Companies Have Used PFAS in New Mexico Wells; Water Risks Especially High for Groundwater-Dependent State," available at https://psr.org/wp-content/uploads/2023/04/fracking-with-forever-chemicals-in-new-mexico.pdf
[10] EPA Radiation Waste Material from Oil and Gas Drilling, https://www.epa.gov/radtown/radioactive-waste-material-oil-and-gas-drilling (last accessed Nov. 17, 2023)
[11] *Id*.
[12] EPA, *supra* note 2, at 7-20.
[13] EPA, *supra* note 10.
[14] J. Nobel, America's Radioactive Secret at 6, Rolling Stone (Jan. 21, 2020), available at: https://www.rollingstone.com/politics/politics-features/oil-gas-fracking-radioactive-investigation-937389/.

concentrating into a hardened and highly radioactive "scale."[15] Experts have attributed a slew of cancers among oil workers in Louisiana to on-the-job radiation exposure with 99 percent certainty.[16] Yet radioactive produced water is – even today – being piped and trucked across New Mexico, both inside and outside of the oil fields, without testing, without adequate protective equipment for exposed workers, and without an adequate regulatory scheme, free of loopholes and special exemptions, to protect against the public health and environmental threat.

Even more concerning, of more than a thousand chemicals found by scientists in produced water samples, only 14% have established toxicity values for risk assessment in the United States.[17] In other words, the toxicity of 86% of the chemicals found in produced water has never been studied.[18] Moreover, less than one-quarter of the nearly 1,200 chemicals identified in produced water can even be detected through standard analytical methods, a huge barrier to fully understanding the public health and environmental impacts of produced water reuse.[19] Because of this massive data gap, in 2019, EPA found that it lacked the data necessary to quantitatively evaluate "the potential risks associated with releases to the environment" of produced water."[20]

The Consortium cites USGS's "Common Produced Water Constituents and Concentrations" in its pilot demonstration project guidelines. These common constituents include barium, boron, bromide, HEM [n-hexane extractable material], MBAS [methylene blue active substances], radium 226 and 228, Strontium, TOC [total organic carbon], sulfate, TDS [total dissolved solids], and chloride (see Figure 3 below.)[21]

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[15] *Id.*
[16] *Id.* at 9-10
[17] C. Danforth et al., An Integrative Method for Identification and Prioritization of Constituents of Concern in Produced Water from Onshore Oil and Gas Extraction, Environment International 134, at 8 (2020)
[18] *Id.*
[19] *Id.* at 9. See also EPA, *supra* note 2, at 7-12 (explaining that studies have shown that "standard analytical methods are not adequate for detecting and quantifying the numerous organic chemicals, both naturally occurring and anthropogenic, that are now known to occur in produced water," and "advanced analytical techniques are needed to detect or quantify some analytes.")
[20] EPA, Management of Exploration, Development and Production Wastes: Factors Informing a Decision on the Need for Regulatory Action, at 5-29 (April 2019), available at: https://www.epa.gov/sites/production/files/2019-04/documents/management_of_exploration_development_and_production_wastes_4-23-19.pdf.
[21] Consortium, *supra* note 1.

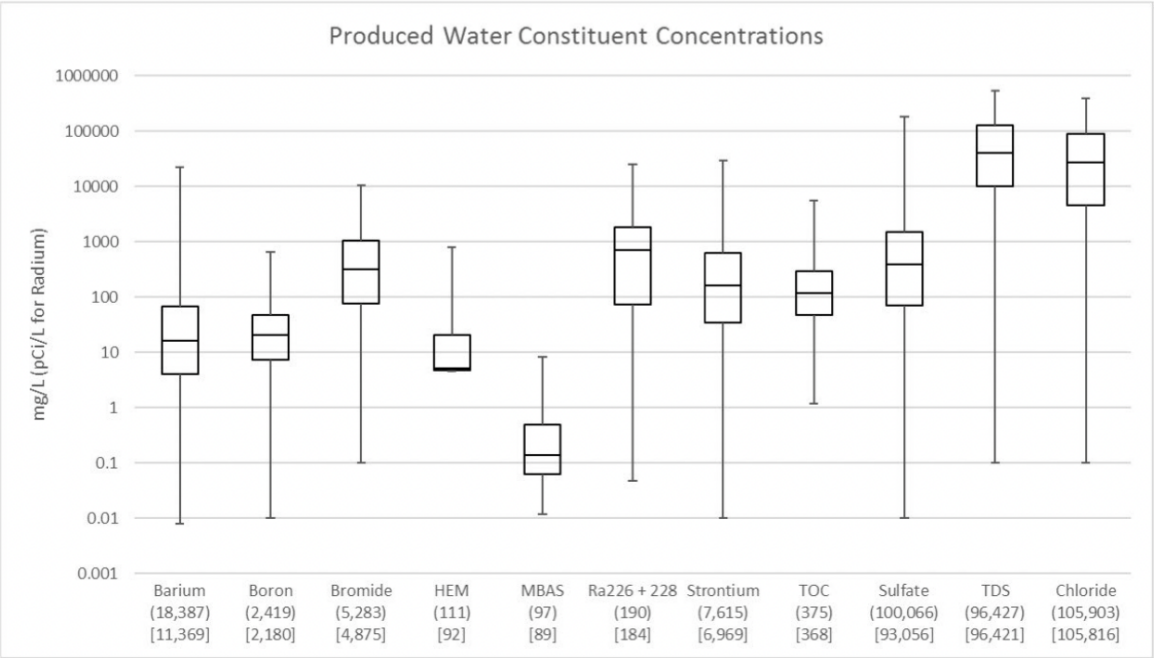

Figure 3. Example of Common Produced Water Constituents and Concentrations (USGS).

RECOMMENDATION: TESTING AND EVALUATION OF DEMONSTRATION PROJECTS

For the reasons stated above, Guardians suggests the department incorporate specificity into its Notice of Intent section C(2) and add a section C(3) that lists commonly known produced water contaminants for lab analysis. Suggested changes are shown here in red and included in our suggested redline amendments:

> *(2) Persons implementing demonstration projects shall submit to the department all research results, including lab analyses of all water contaminants in the untreated produced water and treated produced water, to assist the commission in developing standards and regulations that may allow for the broader use of treated produced water in a manner that prevents water pollution and protects human health and the environment. Submissions must include:*
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> *(a) detailed descriptions of operation processes,*
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> *(b) sample frequency and data collection methodology,*
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> *(c) sample and data analysis methodology,*

(d) QA/QC for all data collection and analysis,

(e) third party analysis and review,

(f) process energy and mass balance,

(g) photo documentation,

(h) expected operational schedule,

(i) types and volumes of waste generation and management,

(j) methods of treated water quality monitoring and analysis,

(k) assessments of public health and environment impact and risk.

(3) Lab analyses of untreated and treated produced water must include but need not be limited to:

(a) all known or disclosed chemical additives, including per- and polyfluorinated substances and their precursors

(b) acknowledgement of any unknown or undisclosed, trade secret, or proprietary additives

(c) arsenic

(d) barium

(e) boron

(f) bromide,

(g) BTEX compounds

(h) chloride

(i) HEM [n-hexane extractable material],

(j) MBAS [methylene blue active substances],

(k) nitrates

(l) radium 226 and 228,

(m) strontium

(n) sulfates

(o) TOC [total organic carbon],

(p) TDS [total dissolved solids],

(q) Uranium

III. Transportation, Handling and Disposal of Treatment Products

Spills and releases of oil and gas waste, including produced water, pose serious environmental and public health risks in New Mexico. It is imperative that NMED's water reuse

rules do not make an untenable situation worse. Specifically, New Mexicans deserve to know that any produced water being trucked across New Mexico for new demonstration projects is being handled safely and securely. The data shows that far too often that is not the case in the oil fields. In 2022, New Mexico's oil and gas industry reported an average of four spills of liquid contaminants *every day*, resulting in over 5.4 million gallons spilled.[22] The most common spilled material reported by industry was produced water, and the most common causes of these spills were "equipment failure" followed by "corrosion."[23]

Despite containing hazardous contaminants, oil and gas waste is generally exempt from hazardous waste law. And though it contains radioactive contaminants, oil and gas waste is not regulated like other radioactive industrial wastes, such as nuclear or medical waste. The industry enjoys other exemptions and loopholes as well, such as the Halliburton Loophole, which allows the industry to inject chemicals underground that would otherwise be regulated by the Safe Drinking Water Act.[24] Such exemptions do not, however, apply to produced water demonstration projects, as these projects are unrelated to the development or production of oil or gas. NMED should clarify that hazardous waste exemptions do not apply to the handling, transport, and disposal of produced water in demonstration projects.

The best intentions to prevent pollution do not stop produced water from spilling, whether by an oil and gas company or a produced water pilot project. In authorizing demonstration projects related to potential future use of produced water outside the oil and gas industry, NMED is creating new avenues for pollution due to unintended leaks and spills. Therefore, it's important that NMED incorporate language into the draft rule specific to the handling, transport, and disposal of produced water.

RECOMMENDATION: TRANSPORT, HANDLING & DISPOSAL OF TREATMENT PRODUCTS

NMED has the authority to require hazardous waste oversight of all byproducts from demonstration project treatment processes, including treated produced water, considering 1) oil and gas wastewater is known to contain hazardous materials, 2) pilot or demonstration projects are unrelated to the development or production of oil or gas and are therefore not exempt from

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[22] "Toxic oil and gas spills overwhelm NM regulatory agencies," WildEarth Guardians, March 2023. Available at: https://wildearthguardians.org/press-releases/toxic-oil-and-gas-spills-overwhelm-new-mexico-regulatory-agencies/

[23] *Id.*

[24] Underhill, et al., "Outcomes of the Halliburton Loophole: Chemicals regulated by the Safe Drinking Water Act in US fracking disclosures, 2014–2021," Environmental Pollution, Volume 322, 2023. Available at: https://www.sciencedirect.com/science/article/pii/S0269749122017663

hazardous waste law, and 3) treatment processes alter produced water chemistry and can introduce additional chemicals, including potentially hazardous materials.

Because of the toxic nature of produced water and the inherent risk of spills and releases from transportation and handling, all materials passed through or created by a demonstration project should be considered to be potentially hazardous until proven otherwise. Suggested language to adequately handle disposal of potentially hazardous, nonexempt materials, is offered in sections B(1)(i) and B(1)(j) of our proposed redline amendments:

> **(i) Persons disposing of treated produced water or any treatment byproduct created by a demonstration project shall provide NMED with third-party laboratory analysis of any and all potentially hazardous or radioactive contaminants prior to disposal. If lab analysis shows no hazardous or radioactive contamination, waste products may be either discharged to a produced water disposal well permitted pursuant to the oil conservation commission's regulations for oil and gas injection (19.15.26 NMAC), delivered to a surface waste management facility permitted pursuant to the oil conservation commission's regulations for oil and gas surface waste management facilities (19.15.36 NMAC), or disposed in a permanent pit permitted pursuant to the oil conservation commission's regulations for oil and gas pits, closed-loop systems, below-grade tanks and sumps (19.15.17 NMAC). If lab analysis shows the presence of hazardous or radioactive contaminants, waste products will be disposed of in accordance with applicable state and federal hazardous waste regulations. Components of demonstration projects are not oil and gas operations, and are therefore not exempt from state or federal hazardous waste regulations.**
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> **(j)** ~~(i)~~Persons disposing of the components of a demonstration project using untreated or treated produced water, as part of the final disposition must adhere to all local, state and federal regulations, as applicable**, including state and federal hazardous waste law. Components of demonstration projects are not oil and gas operations, and are therefore not exempt from state or federal hazardous waste regulations.**

The handling and transportation of all waste material from demonstration projects must be carefully documented. When lab analysis of demonstration projects wastes reveal hazardous

or radioactive contamination, waste must be transported using appropriate containment with clearly displayed hazard placards on transport vehicles and storage equipment.