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STATE OF NEW MEXICO
BEFORE THE WATER QUALITY CONTROL COMMISSION

IN THE MATTER OF PROPOSED NEW RULE 20.6.8 NMAC – *Ground and Surface Water Protection - Supplemental Requirements For Water Reuse* **No. WQCC 23-84(R)**

NEW MEXICO ENVIRONMENT DEPARTMENT, WATER PROTECTION DIVISION,

Petitioner.

AMIGOS BRAVOS AND SIERRA CLUB'S NOTICE OF FILING COMPLETE SET OF EXHIBITS

Amigos Bravos and Sierra Club give notice of filing a complete set of their exhibits admitted in this proceeding, which includes their direct and rebuttal exhibits and exhibits introduced and admitted during the hearing. Included as well are their final proposed amendments to the New Mexico Environment Department's (NMED) proposed rule at 20.6.8 NMAC, which are AB-SC Exhibit 1 *Final*, which is a redline/strikeout of proposed amendments to NMED's last proposed rule (NMED Exhibit 175), and AB-SC Exhibit 2 *Final,* which is a clean copy of their proposed amendments. Below is a list of all exhibits, along with the PDF page citation to facilitate locating the exhibits, attached.

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Respectfully submitted,

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Certificate of Service

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AB-SC EXHIBIT 1 *FINAL*

AMIGOS BRAVOS AND SIERRA CLUB'S *FINAL* PROPOSED AMENDMENTS TO NMED'S REVISED PROPOSED RULE (NMED EXHIBIT 175)
December 6, 2024

TITLE 20 ENVIRONMENTAL PROTECTION
CHAPTER 6 WATER QUALITY
PART 8 GROUND AND SURFACE WATER PROTECTION – SUPPLEMENTAL REQUIREMENTS FOR WATER REUSE

Amigos Bravos and Sierra Club recommend deleting all definitions of terms not used in the rule, including terms only used in other definitions. Defined terms not used in the rule are highlighted.

20.6.8.1 ISSUING AGENCY: Water Quality Control Commission.
[20.6.8.1 NMAC - N, mm-dd-yy]

20.6.8.2 SCOPE: This rule applies to ~~A~~all persons subject ~~to regulation implemented through the department pursuant~~ to the Water Quality Act, Sections 74-6-1 through 74-6-17 ~~et. seq,~~ NMSA 1978 and specifically to persons intending to reuse wastewater and their operations.
[20.6.7.2 NMAC - N, mm-dd-yy]

20.6.8.3 STATUTORY AUTHORITY: Standards and regulations are adopted by the commission under the authority of the Water Quality Act, Sections 74-6-1 through 74-6-17 NMSA 1978, and the Produced Water Act, Subsection B of Section 70-13-3 and Subsection D of Section 70-13-4 NMSA 1978.
[20.6.8.3 NMAC - N, mm/dd/yy]

20.6.8.4 DURATION: Permanent.
[20.6.8.4 NMAC - N, mm-dd-yy]

20.6.8.5 EFFECTIVE DATE: Month Day, Year, unless a later date is cited at the end of a section.
[20.6.8.5 NMAC - N, mm-dd-yy]

20.6.8.6 OBJECTIVE: The objective of 20.6.8 NMAC is to supplement the general requirements of 20.6.2.1200 through 20.6.2.2201 NMAC and 20.6.4.8 through 20.6.4.900 NMAC, and the general groundwater permitting requirements of 20.6.2.3000 through 20.6.2.3114 NMAC to control the discharges of water contaminants specific to water reuse.
[20.6.8.6 NMAC - N, mm-dd-yy]

20.6.8.7 DEFINITIONS: The following terms as used in this ~~p~~Part shall have the following meanings. ~~:~~ ~~t~~Terms defined in the Water Quality Act, but not defined in this ~~p~~Part, shall ~~will~~ have the meaning given in the act.

A. Terms beginning with numerals or the letter "A," and abbreviations for units.

(1) ~~**"Agricultural application"** means the application of reuse water for cultivating the soil and growing crops or irrigating pasture for livestock grazing. Agricultural application includes the use of water in connection with the operation or maintenance of feedlots or animal feeding operations ("AFOs"), but not those activities defined as livestock application.~~

(2) "Application" means a final disposition of a treated wastewater for reuse. Applications include~~, but are not limited to~~ industrial, agricultural, direct potable, indirect potable, recreational turf, rangeland, or ecological restoration water reuse. ~~Applications may have effluent criteria to protect ground water, surface water, and aquatic health.~~

B. Terms beginning with the letter "B".

(1) "Bench-scale project" means a project or study conducted in a laboratory.

C. Terms beginning with the letter "C".

(1) ~~**"Commercial application"** means the application of reuse water in connection with any activity that provides, or offers to provide, goods or services for incidental use, such as but not limited to car washes, laundry facilities, window washing, chemical mixing, where public access is not restricted or limited.~~

D. Terms beginning with the letter "D".

(1) "Demonstration project" means a bench-scale or pilot project, as defined in this Part.

(2) "Department" means the New Mexico environment department.

(3) ~~**"Direct potable application"** means the application of reclaimed wastewater for drinking water purposes through delivery directly to a drinking water plant or a drinking water distribution system without an environmental buffer. Additional treatment, monitoring, or an engineered buffer would be used in place of an environmental buffer to provide equivalent protection of public health and response time if the purified water does not meet specifications~~.

(4) **"Discharge permit"** as defined in 20.6.2 NMAC.

(5) ~~**"Discharge plan"** as defined in 20.6.2 NMAC.~~

(6) ~~**"Discharge site"** as defined in 20.6.2 NMAC.~~

(7) **"Disposal"** as defined in 20.6.2 NMAC.

(8) **"Domestic wastewater"** means untreated wastewater containing human excreta and water-carried waste from typical residential plumbing fixtures and activities, including but not limited to, wastes from toilets, sinks, bath fixtures, clothes or dishwashing machines and floor drains.

E. Terms beginning with the letter "E".

(1) ~~**"Environmental buffer"** means any ground water, streams, lakes, or impoundments used for reuse water storage or conveyance purposes related to an indirect potable application.~~

F. Terms beginning with the letter "F".

(1) **"Feasibility study"** means a study conducted by a person to determine if a new or modified domestic wastewater treatment technology will be technically, economically, or financially viable for use in a ~~direct or indirect~~ potable application.

(2) ~~**"Flood irrigation application** means land application of reuse water by ditches, furrows, pipelines, low flow emitters, and other non-sprinkler methods.~~

(3) ~~**"Flowback water"** means the fluid returned after the hydraulic fracturing process is completed, where the internal pressure of the rock formation causes fluid to return to the surface through the wellbore. Flowback water is a component of produced water.~~

(4) ~~**"Food crop application"** means application of reuse water to domestic plants which are produced for the purpose of or may be used in whole or in part for, consumption by people or livestock, including, but not limited to nursery, root, seedstock to be used for the production of food crops.~~

(5) ~~**"Formation water"** means water that occurs naturally within the pores of rock.~~

G. Terms beginning with the letter "G".

(1) **"Ground water"** as defined in 20.6.2 NMAC.

H. Terms beginning with the letter "H".

(1) **"Hydraulic fracturing"** means a technique that fractures a rock formation by pumping large quantities of fluids at high pressure down a borehole and into a target rock formation, which ~~that~~ stimulates the flow of natural gas or oil, increasing the volumes that can be recovered. ~~Fractures are created by pumping large quantities of fluids at high pressure down a wellbore and into the target rock formation. Hydraulic fracturing fluid, also referred to as fracking fluid, commonly consists of water, proppant, and chemical additives that open and enlarge fractures that can extend several hundred feet away from the wellbore. This technique is generally used in unconventional oil and gas production.~~

I. Terms beginning with the letter "I".

(1) ~~**"Indirect potable application"** means the application of reclaimed wastewater for drinking water purposes with an intermediary environmental or constructed buffer.~~

(2) ~~**"Industrial application"** means the application of reuse water in any activity that is used in connection with industrial processes, such as alternative energy, hydrogen production, cooling water, process/boiler feeds, utility power plants, chemical plants, and metal working facilities where at a minimum, public access is restricted or limited.~~

(3) ~~**"Industrial project"** means a reuse water project that does not discharge and that is used in connection with industrial processes, such as alternative energy, hydrogen production, cooling water, process/boiler feeds, utility power plants, chemical plants, and metal working facilities where at a minimum, public access is restricted or limited.~~

(4) ~~**"Injection"** as defined in 20.6.2 NMAC~~

(5) ~~**"Irrigation application"** means application of reuse water to land areas to foster plant growth.~~

J. Terms beginning with the letter "J". [RESERVED]

K. Terms beginning with the letter "K". [RESERVED]

L. Terms beginning with the letter "L".

(1) ~~**"Land application"** means the application of reuse water to the ground surface in which no other application has been assessed and to which the application or run-off does directly or indirectly enter a surface or ground water of the state.~~

(2) **"Livestock application"** means the application of reuse water for the consumption of water for the care and feeding of domestic animals such as cattle or horses. Livestock application does not include the use of water in connection with the operation or maintenance of feedlots or agricultural application of water.

M. Terms beginning with the letter "M". [RESERVED]

N. Terms beginning with the letter "N".

(1) **"National Pollutant Discharge Elimination System"** means the federal program for issuing, modifying, revoking, and reissuing, terminating, monitoring, and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of the federal Clean Water Act. The NPDES program is administered by the United States Environmental Protection Agency (EPA) in the State of New Mexico.

(2) **"NTU"** means nephelometric turbidity units, measured by a nephelometer.

(3) **"NPDES permit"** means a national pollutant discharge elimination permit which is an authorization, license, or equivalent control document issued by the authorized permitting entity to implement the requirements of the federal program as identified in 40 C.F.R. Sections 122, 123, and 124.

O. Terms beginning with the letter "O". [RESERVED]

P. Terms beginning with the letter "P".

(1) **"Person"** as defined in 20.6.2 NMAC.

(2) **"Pilot project"** means a representative engineering scale model or prototype system that is beyond the bench-scale and tested in a non-laboratory environment. A pilot project represents an increase in the technological scale than otherwise achievable in a laboratory and often involves larger quantities of materials over longer periods of time.

(3) **"Potable"** means water that is suitable for human consumption that meets state drinking water standards at 20.7.10 NMAC.

(4) **"Potable application"** means the delivery to a drinking water plant or a drinking water distribution system of reuse water that has been purified to remove all contaminants.

(4) **"Pretreatment"** means the reduction, elimination, or alteration of pollutants in wastewater prior to or in lieu of discharging into a publicly owned treatment works (POTW) or other wastewater treatment facility. The reduction or alteration may be obtained by physical, chemical, or biological processes, process changes, or by other means. Appropriate pretreatment technology includes control equipment, such as equalization tanks or facilities, for protection against volumetric or pollutant surges or load variations that might interfere with or otherwise be incompatible with the treatment facility.

(5) **"Produced water"** means a fluid or (wastewater) that is an incidental byproduct from drilling for or the production of oil and gas, and includes formation water, flowback water, and any chemicals added downhole during drilling, production, or maintenance processes during the life cycle of an oil or gas well. Produced water includes known and unknown water pollutants.

Q. Terms beginning with the letter "Q". [RESERVED]

R. Terms beginning with the letter "R".

(1) **"Reclaimed wastewater"** means domestic wastewater that has been treated to the specified levels for the defined applications and complies with other applicable local, state, or federal regulations.

(2) **"Recycled produced water"** means produced water that is reconditioned by a recycling facility permitted or registered with the oil conservation division of the energy, minerals, and natural resources department, and is reused within the oil and gas industry for the exploration, drilling, production, treatment or refinement of oil and gas.

(3) **"Restoration application"** or **"ecological application"** means the use of water for the implementation of ecological or environmental restoration activities permitted under applicable state and federal regulations.

(4) **"Reuse water"** means a treated wastewater originating from domestic, industrial, or produced water sources, that has undergone a level of treatment appropriate for an application such as agriculture, irrigation, potable water supplies, aquifer recharge, industrial processes, or environmental restoration. Reuse water has a water quality, based on application, determined to be protective of the environment and human health. For purposes of this Part, reuse is categorized by the source of the water. (e.g., "domestic reuse" is wastewater originated from domestic sources following appropriate treatment that may be used for various applications such as irrigation).

S. Terms beginning with the letter "S".

(1) **"State"** means the state of New Mexico.

(2) **"Surface water"** means a "surface water(s) of the state" as defined in 20.6.4 NMAC.

T. Terms beginning with the letter "T".

(1) **"Transference"** means the distribution, temporary storage, or disposal of reuse water.

(2) "Treated produced water" means produced water that is reconditioned by mechanical or chemical processes into a reusable form.

(3) ~~"Treated wastewater"~~ ~~means wastewater that has undergone treatment.~~

(4) "Treatment" means a process in which wastewater has been reconditioned by biological, mechanical, or chemical processes to remove or eliminate contaminants, creating an effluent that can be returned to the water cycle either through discharge, transfer, storage, disposal, ~~transference,~~ or reuse.

U. Terms beginning with the letter "U".

(1) ~~"Untreated produced water"~~ ~~means produced water that has not undergone treatment.~~

(2) ~~"Untreated wastewater"~~ ~~means wastewater that has not undergone treatment.~~

V. Terms beginning with the letter "V". [RESERVED]

W. Terms beginning with the letter "W".

(1) "Water contaminant" means any substance that, if discharged or spilled, could alter the physical, chemical, biological or radiological qualities of water. "Water contaminant" does not mean source, special nuclear or by-product material as defined by the Atomic Energy Act of 1954, but may include all other radioactive materials, including ~~but not limited to~~ radium. ~~and accelerator-produced isotopes.~~

(2) "Water pollutant" as defined in 20.6.4 NMAC. ~~means a water contaminant in such quantity and of such duration as may with reasonable probability injure human health, animal or plant life or property, or to unreasonably interfere with the public welfare or the use of property.~~

(3) "Water pollution" as defined in 20.6.2 NMAC.

(4) "Wastewater" means water or other fluids associated directly with sewerage systems, industrial processes, or produced water that is disposed of, or undergoes treatment for discharge, transference, or reuse. Wastewater in this Part does not include dairy "wastewater", ~~,~~ as defined in 20.6.6 NMAC.

X. Terms beginning with the letters "X" through "Z". [RESERVED]

[20.6.8.7 NMAC – N, mm-dd-yy]

20.6.8.8 – 20.6.8.99 [RESERVED]

[20.6.8.8-20.6.8.99 NMAC – N, mm-dd-yy]

20.6.8.100 GENERAL PROVISIONS: Unless otherwise required by this Part, all persons are subject to the state's Ground and Surface Water Protection Regulations at ~~(~~20.6.2 NMAC~~)~~. ~~This includes, but is not limited to, regulations relating to spills, notices of intent, permitting, fees, penalties, compliance orders, and abatement.~~

[20.6.8.100 NMAC – N, mm-dd-yy]

20.6.8.101 UNAUTHORIZED APPLICATIONS OF REUSE WATER: The department shall not approve a discharge permit or a discharge permit modification that includes the discharge to ground or surface water of reuse water for potable applications.

20.6.8.101 – 20.6.8.199 [RESERVED]

[20.6.8.101-20.6.8.199 NMAC – N, mm-dd-yy]

20.6.8.200 DOMESTIC WASTEWATER REUSE: [RESERVED]

[20.6.8.200 NMAC – N, mm-dd-yy]

20.6.8.201 ~~DIRECT AND INDIRECT~~ POTABLE APPLICATIONS FOR DOMESTIC WASTEWATER:

A. Unauthorized applications. The department shall not approve a discharge permit or a discharge permit modification that includes the discharge of domestic wastewater ~~reuse water~~ for ~~direct or indirect~~ potable applications except for those authorized applications identified in Subsection B of 20.6.8.201 NMAC.

B. Authorized applications.

(1) Feasibility studies: Persons proposing to conduct a feasibility study for ~~direct or indirect~~ potable applications for domestic wastewater shall: ~~;~~

(a) Comply with all applicable permitting requirements in 20.6.2 and 20.6.4 NMAC.

(b) Ensure there is no connection between a potable water system and the water being studied and no cross connections exist between feasibility study-water and a community's potable water supply.

(c) Ensure that all ~~direct and indirect~~ potable reuse feasibility studies are conducted in a manner that does not interfere with ongoing operations at the wastewater and drinking water facilities.

(d) Obtain approval from the department~~,~~ through ~~either~~ a discharge permit or from the U.S. environmental protection agency through a national pollutant discharge elimination system permit pursuant to section 402 of the Clean Water Act ~~NPDES permit~~ and comply with all conditions therein.
[20.6.8.201 – N, mm-dd-yy]

20.6.8.202-299 [RESERVED]
[20.6.8.202-20.6.8.299 NMAC – N, mm-dd-yy]

20.6.8.300 INDUSTRIAL WASTEWATER REUSE: [RESERVED]
[20.6.8.300 NMAC – N, mm-dd-yy]

20.6.8.301-399 [RESERVED]
[20.6.8.301-20.6.8.399 NMAC – N, mm-dd-yy]

20.6.8.400 PRODUCED WATER REUSE: As provided in the Water Quality Act, Subsection P of Section 74-6-4 NMSA 1978, and the Produced Water Act, Subsection B of Section 70-13-3 NMSA 1978, the following provisions apply to the discharge of produced water for activities unrelated to the exploration, drilling, production, treatment, or refinement of oil or gas.

A. General requirements.

(1) Untreated produced water discharge to surface water: No person shall cause or allow untreated produced water to discharge so that it may move directly or indirectly to a surface water. The department shall deny certification of any federal permit proposing to discharge untreated produced water to a surface water.

(2) Treated produced water discharge to surface water: No person shall cause or allow treated produced water to discharge so that it may move directly or indirectly to a surface water. The department shall deny certification of any federal permit proposing to discharge treated produced water to a surface water.

(3) Untreated produced water discharge to ground water: No person shall cause or allow untreated produced water to discharge so that it may move directly or indirectly into ground water. The department shall not issue a discharge permit or a discharge permit modification that includes the discharge of untreated produced water.

(4) Treated produced water discharge to ground water: No person shall cause or allow treated produced water to discharge so that it may move directly or indirectly into ground water. The department shall not issue a discharge permit or a discharge permit modification that includes the discharge of treated produced water. ~~without development and adoption of standards specific to treated produced water (Subsection D of 20.6.8.400 NMAC). Demonstration projects or industrial projects submitted to the department through the notice of intent process in Subsection C of 20.6.8.400 NMAC are authorized to operate, following the determination of no discharge permit required issued by the department.~~

B. Authorized uses. Demonstration projects ~~or industrial projects~~, determined by the department not to require a discharge permit because the demonstration project ~~or industrial project~~ will not discharge in a manner that may directly or indirectly affect ground or surface water, are subject to the following requirements:

(1) Persons intending to conduct a demonstration project ~~or industrial project~~ shall secure and comply with all applicable federal, state, and local statutes, permits, and certifications, including the Produced Water Act, Sections 70-13-1 through 70-13-5~~, et. seq~~ NMSA 1978, and including payment of department fees and satisfying department financial assurance requirements.

(2) The demonstration project ~~or industrial project~~ shall be designed to provide information specific to untreated produced water quality, treatment technologies, treated produced water quality, treatment volumes, and toxicity studies for potential produced water reuse applications.

(3) In accordance with 20.6.2.1201 NMAC, any person intending to use produced water for approved purposes, unrelated to the production of oil and gas, shall submit to the ground water quality bureau of the department a produced water notice of intent prior to use.

(4) Demonstration projects ~~or industrial projects~~ shall not commence until the department has made a determination of no permit required on the notice of intent.

(5) Persons transporting, storing, treating, or utilizing untreated or treated produced water shall have written procedures at the locations where the demonstration project ~~or industrial project~~ is physically located to prevent releases onto the ground, directly or indirectly into ground or surface water.

(6) All untreated and treated produced water shall be handled, transported, and stored in

accordance with all other applicable local, state, and federal regulations.

(7) Any release of untreated or treated produced water is subject to the notifications and corrective actions in 20.6.2.1203 NMAC except releases under the authority of the oil conservation commission pursuant to the provisions of the Oil and Gas Act, ~~NMSA 1978,~~ Section 70-2-12 NMSA 1978, and other laws conferring power on the oil conservation commission and the oil conservation division of the energy, minerals, and natural resources department to prevent or abate water pollution.

(8) Persons disposing of untreated or treated produced water, as part of the final disposition following a demonstration project ~~or industrial project~~, shall use one of the following methods in accordance with the relative permit: discharge to a produced water disposal well permitted pursuant to the oil conservation commission's regulations for oil and gas injection at 19.15.26 NMAC, delivery to a surface waste management facility permitted pursuant to the oil conservation commission's regulations for oil and gas surface waste management facilities at ~~(~~19.15.36 NMAC~~)~~, or disposal 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 at 19.15.17 NMAC. The department may consider alternative disposal options on a case-by-case basis.

(9) Persons disposing of the components of a demonstration project ~~or industrial project~~ using untreated or treated produced water, as part of the final disposition must adhere to all local, state, and federal regulations, as applicable.

C. Notice of intent.

(1) Any person intending to use produced water for an authorized use under Subsection B of 20.6.8.400 NMAC shall submit to the ground water quality bureau of the department a produced water notice of intent prior to use.

(a) Notices shall be on a form provided by the department and shall include the following information:

(i) the name and address of the person intending to conduct the demonstration project ~~or industrial project~~;

(ii) the location of the intended demonstration project ~~or industrial project~~;

(iii) the concentration of water contaminants in the untreated produced water used in the demonstration project or industrial project;

(iv) the quantity of produced water used in the produced water used in the demonstration project or industrial project;

(iv) the demonstration project ~~or industrial project~~ research plan and objectives;

(vi) documentation that the demonstration project ~~or industrial project~~ design is consistent with the approved uses in Subsection B of 20.6.8.400 NMAC;

(vii) the storage, secondary containment and spill prevention methods that will be used to prevent accidental discharges;

(viii) a plan to transport in and transport out any untreated produced water or treated produced water in a safe manner, in accordance with state and federal regulations;

(vii) plans for safe handling and proper disposal of produced water and any materials that come into contact with untreated produced water or treated produced water, including soils, plant material, treatment equipment, and containment area materials;

(ix) the health and safety considerations that minimize the risk of human exposure to produced water via any exposure pathway; ~~and~~

(x) financial assurance in place to cover the cost of cleanup and remediation in the event of failure during operation and closure of the demonstration project ~~or industrial project.~~; and

(xi) documentation that all property owners adjacent to the property or properties on which the demonstration project ~~or industrial project~~ will be located receive actual notice of the application for a notice of intent and how to obtain additional information regarding the project.

(b) The department, at its discretion, may request additional information.

(c) Based on the information provided in the notice of intent, the department shall make a determination if the demonstration project ~~or industrial project~~ meets the requirements in this section. If the demonstration project ~~or industrial project~~ does not meet the requirements in this section, the person shall not implement the demonstration project ~~or industrial project~~ as proposed.

(2) Persons implementing demonstration projects ~~or industrial projects~~ pursuant to Subsection B of 20.6.8.400 NMAC 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 department in developing standards and assist the commission in promulgation of regulations for the use of treated produced water in a manner that prevents water pollution and protects human health and the environment.

(3) The department shall publish on its website all applications for produced water notices of intent, supplemental information provided by the applicant at the department's request, all written procedures and plans required by Paragraphs B and C of this Section, and the department's determination.

20.6.8.401-20.6.8.899 [RESERVED]

[20.6.8.401-20.6.8.899 NMAC – N, mm-dd-yy]

20.6.8.900 REFERENCES: [RESERVED]

[20.6.8.900 NMAC – N, mm-dd-yy]

AB-SC EXHIBIT 2 *FINAL*

AMIGOS BRAVOS AND SIERRA CLUB'S *FINAL* PROPOSED AMENDMENTS TO NMED'S REVISED PROPOSED RULE (NMED EXHIBIT 175)
December 6, 2024

TITLE 20 ENVIRONMENTAL PROTECTION
CHAPTER 6 WATER QUALITY
PART 8 GROUND AND SURFACE WATER PROTECTION – SUPPLEMENTAL REQUIREMENTS FOR WATER REUSE

20.6.8.1 ISSUING AGENCY: Water Quality Control Commission.
[20.6.8.1 NMAC - N, mm-dd-yy]

20.6.8.2 SCOPE: This rule applies to all persons subject to the Water Quality Act, Sections 74-6-1 through 74-6-17 NMSA 1978 and specifically to persons intending to reuse wastewater and their operations.
[20.6.7.2 NMAC - N, mm-dd-yy]

20.6.8.3 STATUTORY AUTHORITY: Standards and regulations are adopted by the commission under the authority of the Water Quality Act, Sections 74-6-1 through 74-6-17 NMSA 1978, and the Produced Water Act, Subsection B of Section 70-13-3 and Subsection D of Section 70-13-4 NMSA 1978.
[20.6.8.3 NMAC - N, mm/dd/yy]

20.6.8.4 DURATION: Permanent.
[20.6.8.4 NMAC - N, mm-dd-yy]

20.6.8.5 EFFECTIVE DATE: Month Day, Year, unless a later date is cited at the end of a section.
[20.6.8.5 NMAC - N, mm-dd-yy]

20.6.8.6 OBJECTIVE: The objective of 20.6.8 NMAC is to supplement the general requirements of 20.6.2.1200 through 20.6.2.2201 NMAC and 20.6.4.8 through 20.6.4.900 NMAC, and the general groundwater permitting requirements of 20.6.2.3000 through 20.6.2.3114 NMAC to control the discharges of water contaminants specific to water reuse.
[20.6.8.6 NMAC - N, mm-dd-yy]

20.6.8.7 DEFINITIONS: The following terms as used in this Part shall have the following meanings. Terms defined in the Water Quality Act, but not defined in this Part, shall have the meaning given in the act.

A. Terms beginning with numerals or the letter "A," and abbreviations for units.

(1) "Application" means a final disposition of a treated wastewater for reuse. Applications include industrial, agricultural, direct potable, indirect potable, recreational turf, rangeland, or ecological restoration water reuse.

B. Terms beginning with the letter "B".

(1) "Bench-scale project" means a project or study conducted in a laboratory.

C. Terms beginning with the letter "C". [RESERVED]

D. Terms beginning with the letter "D".

(1) "Demonstration project" means a bench-scale or pilot project, as defined in this Part.

(2) "Department" means the New Mexico environment department.

(3) "Discharge permit" as defined in 20.6.2 NMAC.

(4) "Disposal" as defined in 20.6.2 NMAC.

(5) "Domestic wastewater" means untreated wastewater containing human excreta and water-carried waste from typical residential plumbing fixtures and activities, including wastes from toilets, sinks, bath fixtures, clothes or dishwashing machines and floor drains.

E. Terms beginning with the letter "E". [RESERVED]

F. Terms beginning with the letter "F".

(1) "Feasibility study" means a study conducted by a person to determine if a new or modified domestic wastewater treatment technology will be technically, economically, or financially viable for use in a potable application.

G. Terms beginning with the letter "G".

(1) "Ground water" as defined in 20.6.2 NMAC.

H. Terms beginning with the letter "H".

(1) "Hydraulic fracturing" means a technique that fractures a rock formation by pumping fluids at high pressure down a borehole and into a target rock formation, which stimulates the flow of natural gas or oil, increasing the volumes that can be recovered.

I. Terms beginning with the letter "I". [RESERVED]

J. Terms beginning with the letter "J". [RESERVED]

K. Terms beginning with the letter "K". [RESERVED]

L. Terms beginning with the letter "L". [RESERVED]

M. Terms beginning with the letter "M". [RESERVED]

N. Terms beginning with the letter "N". [RESERVED]

O. Terms beginning with the letter "O". [RESERVED]

P. Terms beginning with the letter "P".

(1) "Person" as defined in 20.6.2 NMAC.

(2) "Pilot project" means a representative engineering scale model or prototype system that is beyond the bench-scale and tested in a non-laboratory environment. A pilot project represents an increase in the technological scale than otherwise achievable in a laboratory and often involves larger quantities of materials over longer periods of time.

(3) "Potable" means water that is suitable for human consumption that meets state drinking water standards at 20.7.10 NMAC.

(4) "Potable application" means the delivery to a drinking water plant or a drinking water distribution system of reuse water that has been purified to remove all contaminants.

(5) "Produced water" means a fluid or wastewater that is an incidental byproduct from drilling for or the production of oil and gas, and includes formation water, flowback water, and any chemicals added downhole during drilling, production, or maintenance processes during the life cycle of an oil or gas well. Produced water includes known and unknown water pollutants.

Q. Terms beginning with the letter "Q". [RESERVED]

R. Terms beginning with the letter "R".

(1) "Reclaimed wastewater" means domestic wastewater that has been treated to the specified levels for the defined applications and complies with other applicable local, state, or federal regulations.

(2) "Reuse water" means a treated wastewater originating from domestic, industrial, or produced water sources that has undergone a level of treatment appropriate for an application such as agriculture, irrigation, potable water supplies, aquifer recharge, industrial processes, or environmental restoration. Reuse water has a water quality, based on application, determined to be protective of the environment and human health. For purposes of this Part, reuse is categorized by the source of the water.

S. Terms beginning with the letter "S".

(1) "State" means the state of New Mexico.

(2) "Surface water" means a "surface water(s) of the state" as defined in 20.6.4 NMAC.

T. Terms beginning with the letter "T".

(1) "Treated produced water" means produced water that is reconditioned by mechanical or chemical processes into a reusable form.

(2) "Treatment" means a process in which wastewater has been reconditioned by biological, mechanical, or chemical processes to remove or eliminate contaminants, creating an effluent that can be returned to the water cycle either through discharge, transfer, storage, disposal, or reuse.

U. Terms beginning with the letter "U".

V. Terms beginning with the letter "V". [RESERVED]

W. Terms beginning with the letter "W".

(1) "Water contaminant" means any substance that, if discharged or spilled, could alter the physical, chemical, biological or radiological qualities of water. "Water contaminant" does not mean source, special nuclear or by-product material as defined by the Atomic Energy Act of 1954, but may include all other radioactive materials, including radium.

(2) "Water pollutant" as defined in 20.6.4 NMAC.

(3) "Water pollution" as defined in 20.6.2 NMAC.

(4) "Wastewater" means water or other fluids associated directly with sewerage systems, industrial processes, or produced water that is disposed of, or undergoes treatment for discharge, transfer, storage, disposal, or reuse. Wastewater in this Part does not include dairy "wastewater" as defined in 20.6.6 NMAC.

X. Terms beginning with the letters "X" through "Z". [RESERVED]

[20.6.8.7 NMAC – N, mm-dd-yy]

20.6.8.8 – 20.6.8.99 [RESERVED]
[20.6.8.8-20.6.8.99 NMAC – N, mm-dd-yy]

20.6.8.100 GENERAL PROVISIONS: Unless otherwise required by this Part, all persons are subject to the state's Ground and Surface Water Protection Regulations at 20.6.2 NMAC. [20.6.8.100 NMAC – N, mm-dd-yy]

20.6.8.101 UNAUTHORIZED APPLICATIONS OF REUSE WATER: The department shall not approve a discharge permit or a discharge permit modification that includes the discharge to ground or surface water of reuse water for potable applications.

20.6.8.101 – 20.6.8.199 [RESERVED]
[20.6.8.101-20.6.8.199 NMAC – N, mm-dd-yy]

20.6.8.200 DOMESTIC WASTEWATER REUSE: [RESERVED]
[20.6.8.200 NMAC – N, mm-dd-yy]

20.6.8.201 POTABLE APPLICATIONS FOR DOMESTIC WASTEWATER:

A. Unauthorized applications. The department shall not approve a discharge permit or a discharge permit modification that includes the discharge of domestic wastewater for potable applications except for those authorized applications identified in Subsection B of 20.6.8.201 NMAC.

B. Authorized applications.

(1) Feasibility studies: Persons proposing to conduct a feasibility study for potable applications for domestic wastewater shall:

(a) Comply with all applicable permitting requirements in 20.6.2 and 20.6.4 NMAC.

(b) Ensure there is no connection between a potable water system and the water being studied and no cross connections exist between feasibility study-water and a community's potable water supply.

(c) Ensure that all potable reuse feasibility studies are conducted in a manner that does not interfere with ongoing operations at the wastewater and drinking water facilities.

(d) Obtain approval from the department through a discharge permit or from the U.S. environmental protection agency through a national pollutant discharge elimination system permit pursuant to section 402 of the Clean Water Act and comply with all conditions therein.

[20.6.8.201 – N, mm-dd-yy]

20.6.8.202-299 [RESERVED]
[20.6.8.202-20.6.8.299 NMAC – N, mm-dd-yy]

20.6.8.300 INDUSTRIAL WASTEWATER REUSE: [RESERVED]
[20.6.8.300 NMAC – N, mm-dd-yy]

20.6.8.301-399 [RESERVED]
[20.6.8.301-20.6.8.399 NMAC – N, mm-dd-yy]

20.6.8.400 PRODUCED WATER REUSE: As provided in the Water Quality Act, Subsection P of Section 74-6-4 NMSA 1978, and the Produced Water Act, Subsection B of Section 70-13-3 NMSA 1978, the following provisions apply to the discharge of produced water for activities unrelated to the exploration, drilling, production, treatment, or refinement of oil or gas.

A. General requirements.

(1) Untreated produced water discharge to surface water: No person shall cause or allow untreated produced water to discharge so that it may move directly or indirectly to a surface water. The department shall deny certification of any federal permit proposing to discharge untreated produced water to a surface water.

(2) Treated produced water discharge to surface water: No person shall cause or allow treated produced water to discharge so that it may move directly or indirectly to a surface water. The department shall deny certification of any federal permit proposing to discharge treated produced water to a surface water.

(3) Untreated produced water discharge to ground water: No person shall cause or allow untreated produced water to discharge so that it may move directly or indirectly into ground water. The department shall not issue a discharge permit or a discharge permit modification that includes the discharge of untreated produced water.

(4) Treated produced water discharge to ground water: No person shall cause or allow treated produced water to discharge so that it may move directly or indirectly into ground water. The department shall not issue a discharge permit or a discharge permit modification that includes the discharge of treated produced water.

B. Authorized uses. Demonstration projects, determined by the department not to require a discharge permit because the demonstration project will not discharge in a manner that may directly or indirectly affect ground or surface water, are subject to the following requirements:

(1) Persons intending to conduct a demonstration project shall secure and comply with all applicable federal, state, and local statutes, permits, and certifications, including the Produced Water Act, Sections 70-13-1 through 70-13-5 NMSA 1978, and including payment of department fees and satisfying department financial assurance requirements.

(2) The demonstration project shall be designed to provide information specific to untreated produced water quality, treatment technologies, treated produced water quality, treatment volumes, and toxicity studies for potential produced water reuse applications.

(3) In accordance with 20.6.2.1201 NMAC, any person intending to use produced water for approved purposes, unrelated to the production of oil and gas, shall submit to the ground water quality bureau of the department a produced water notice of intent prior to use.

(4) Demonstration projects shall not commence until the department has made a determination of no permit required on the notice of intent.

(5) Persons transporting, storing, treating, or utilizing untreated or treated produced water shall have written procedures at the locations where the demonstration project is physically located to prevent releases onto the ground, directly or indirectly into ground or surface water.

(6) All untreated and treated produced water shall be handled, transported, and stored in accordance with all other applicable local, state, and federal regulations.

(7) Any release of untreated or treated produced water is subject to the notifications and corrective actions in 20.6.2.1203 NMAC except releases under the authority of the oil conservation commission pursuant to the provisions of the Oil and Gas Act, Section 70-2-12 NMSA 1978, and other laws conferring power on the oil conservation commission and the oil conservation division of the energy, minerals, and natural resources department to prevent or abate water pollution.

(8) Persons disposing of untreated or treated produced water, as part of the final disposition following a demonstration project, shall use one of the following methods in accordance with the relative permit: discharge to a produced water disposal well permitted pursuant to the oil conservation commission's regulations for oil and gas injection at 19.15.26 NMAC, delivery to a surface waste management facility permitted pursuant to the oil conservation commission's regulations for oil and gas surface waste management facilities at 19.15.36 NMAC, or disposal 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 at 19.15.17 NMAC. The department may consider alternative disposal options on a case-by-case basis.

(9) 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.

C. Notice of intent.

(1) Any person intending to use produced water for an authorized use under Subsection B of 20.6.8.400 NMAC shall submit to the ground water quality bureau of the department a produced water notice of intent prior to use.

(a) Notices shall be on a form provided by the department and shall include the following information:

(i) the name and address of the person intending to conduct the demonstration project;

(ii) the location of the intended demonstration project;

(iii) the concentration of water contaminants in the untreated produced water used in the demonstration project or industrial project;

(iv) the quantity of produced water used in the produced water used in the demonstration project or industrial project;

(iv) the demonstration project research plan and objectives;

(v) documentation that the demonstration project design is consistent with the approved uses in Subsection B of 20.6.8.400 NMAC;

(vii) the storage, secondary containment and spill prevention methods that will be used to prevent accidental discharges;

(viii) a plan to transport in and transport out any untreated produced water or treated produced water in a safe manner, in accordance with state and federal regulations;

(ix) plans for safe handling and proper disposal of produced water and any materials that come into contact with untreated produced water or treated produced water, including soils, plant material, treatment equipment, and containment area materials;

(x) the health and safety considerations that minimize the risk of human exposure to produced water via any exposure pathway;

(xi) financial assurance in place to cover the cost of cleanup and remediation in the event of failure during operation and closure of the demonstration project; and

(xii) documentation that all property owners adjacent to the property or properties on which the demonstration project will be located receive actual notice of the application for a notice of intent and how to obtain additional information regarding the project.

(b) The department, at its discretion, may request additional information.

(c) Based on the information provided in the notice of intent, the department shall make a determination if the demonstration project meets the requirements in this section. If the demonstration project does not meet the requirements in this section, the person shall not implement the demonstration project as proposed.

(2) Persons implementing demonstration projects pursuant to Subsection B of 20.6.8.400 NMAC 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 department in developing standards and assist the commission in promulgation of regulations for the use of treated produced water in a manner that prevents water pollution and protects human health and the environment.

(3) The department shall publish on its website all applications for produced water notices of intent, supplemental information provided by the applicant at the department's request, all written procedures and plans required by Paragraphs B and C of this Section, and the department's determination.

20.6.8.401-20.6.8.899 [RESERVED]
[20.6.8.401-20.6.8.899 NMAC – N, mm-dd-yy]

20.6.8.900 REFERENCES: [RESERVED]
[20.6.8.900 NMAC – N, mm-dd-yy]

AB-SC EXHIBIT 3

DR. CHRISTOPHER LEWIS SENIOR TECHNICAL CONSULTANT

Overview

Dr. Christopher Lewis, Senior Technical Consultant at Industrial Economics, Incorporated (IEc), specializes in the assessment of environmental harms from releases of hazardous substances and oil. He has over 17 years of experience assisting clients with science-based analysis and decision-making in the context of natural resource damage assessment (NRDA), economic and policy analysis, risk assessment, and ecosystem services valuation. Dr. Lewis also has extensive experience in the design and implementation of field and laboratory work, including design, planning, and logistics for environmental sampling operations, as well as analysis and interpretation of environmental monitoring data, environmental modeling, and restoration planning. For the past decade, Dr. Lewis has also served as a Governor-appointed Director on the State of Colorado Cherry Creek Basin Water Quality Authority, including in leadership roles, and is a member of the professional Society of Environmental Toxicology and Chemistry (SETAC). Dr. Lewis lives and works in Denver, CO.

Education

Doctor of Science in Environmental Health, concentrating in Environmental Science and Engineering, Harvard University School of Public Health.

Master of Science in Environmental Health, concentrating in Environmental Science and Engineering, Harvard University School of Public Health.

Bachelor of Arts in Biology with minor in Spanish, Middlebury College.

While attending Harvard as a doctoral student, Dr. Lewis also served on the disciplinary committee and assisted in the teaching of a course on Water Pollution. His dissertation was titled "Assessment of Spatial and Temporal Variability of Heavy Metal Speciation in Aquatic Environments."

Project Experience

For the **U.S. DEPARTMENT OF ENERGY**, since 2010, Dr. Lewis has served as the Lead Environmental Scientist on the assessment of natural resource damages stemming from releases of hazardous substances and oil from historical U.S. Department of Energy operations at the Los Alamos National Laboratory (LANL). In this role, Dr. Lewis supports the Trustee Council, consisting of the Department of Energy, the State of New Mexico, the U.S. Forest Service, Santa Clara Pueblo, Jemez Pueblo, Pueblo de San Ildefonso, and Cochiti Pueblo. Current efforts are focused on evaluation and use of existing site data and information for assessing injuries to natural resources including soil, surface water, sediment, air, groundwater, and biota. Dr. Lewis previously led efforts to compile and review information on historical site operations and contamination of environmental media with hazardous substances, including metals, explosives, and radionuclides, and drafted the

Preassessment Screen and Damage Assessment Plan documents designed to guide future assessment activities at the site.

For the **STATE OF NEW MEXICO, OFFICE OF THE NATURAL RESOURCES TRUSTEE,** led the development of the first Gold King Mine (Bonita Peak Mining District) Restoration Plan, which outlined environmental restoration projects funded through approximately $1 million in settlement funds. As part of this effort, Dr. Lewis helped identify stakeholders, establish restoration criteria, solicit restoration project proposals, evaluate proposed projects, and plan and present at public meetings.

For the **STATE OF NEW MEXICO, OFFICE OF THE NATURAL RESOURCES TRUSTEE AND NAVAJO NATION,** assisted with the assessment of damages stemming from releases of hazardous substances, including metals, from the Bonita Peak Mining District in Colorado. This included the assessment of injuries from the short-term acid mine drainage release from the Gold King Mine Spill into the Animas River. Efforts included case management and strategy, review of site risk assessment documents produced by the U.S. Environmental Protection Agency, and drafting of NRDA case documents, including technical evaluations related to the fate and transport of metals and injuries to downstream aquatic natural resources. Efforts culminated in numerous monetary settlements with responsible parties.

For the **U.S. DEPARTMENT OF JUSTICE**, and the **U.S. DEPARTMENT OF THE INTERIOR FISH AND WILDLIFE SERVICE**, is serving as an expert witness and consultant on the natural resource damage assessment and restoration of the Sauget Industrial Corridor in Illinois. This has included overseeing efforts related to evaluations of injury and identification of approaches for establishing baseline, as well as planning and managing environmental field sampling programs focused on aquatic habitats and impacts of hazardous substances on avian resources.

For the **STATE OF COLORADO OFFICE OF THE ATTORNEY GENERAL,** developed damages estimates associated with natural resource injuries stemming from a petroleum tanker rollover and spill into Fountain Creek. This included documentation and quantification of injuries to aquatic resources, consideration of restoration options, and assisting the State with settlement discussions with the responsible parties.

For the **U.S. ENVIRONMENTAL PROTECTION AGENCY, OFFICE OF WATER AND OFFICE OF RESEARCH AND DEVELOPMENT**, managed the implementation of functionality related to reporting of environmental justice impacts into the BenSPLASH model for evaluating the economic benefits of ambient water quality improvements.

For the **U.S. DEPARTMENT OF ENERGY**, provided decision support related to the natural resource damage assessment and restoration process being conducted at the Hanford Reservation. This included preparation of technical analyses and white papers to assist the Trustees prioritize assessment activities and navigate technical uncertainties. It also included support on a detailed pilot assessment of remedial-based injuries within the 100-BC area that incorporated factors including baseline habitat quality and condition as well as revegetation efforts.

For the **U.S. DEPARTMENT OF THE INTERIOR FISH AND WILDLIFE SERVICE**, assisted in the assessment of damages related to legacy hazardous substance contamination and numerous petroleum spills in Duck and Otter Creeks, in the Maumee River Watershed in northeastern Ohio. This included technical analyses and reporting, case development, restoration project evaluation and scaling, and case strategy and settlement discussion support.

For the **U.S. DEPARTMENT OF THE INTERIOR NATIONAL PARK SERVICE**, is leading the implementation of the Anacostia River NRDA, in the District of Columbia. Dr. Lewis previously led the development of the Natural Resource Damage Assessment Plan for the River.

For the **WORLD BANK, ENVIRONMENT, NATURAL RESOURCES AND BLUE ECONOMY GLOBAL PRACTICE**, provided logistics and analysis support to the Government of Peru in the wake of the Pampilla Oil Spill. Efforts included documenting the economic impacts of the spill on the regional tourism and fisheries sectors, developing and delivering guidance related to disaster response capacity building, and planning and leading expert workshops on oil spill response planning.

For the **U.S. DEPARTMENT OF THE INTERIOR FISH AND WILDLIFE SERVICE**, assisted state and Federal Trustees in the assessment of damages related to the Houston Ship Channel Texas City Y Oil Spill, as well as restoration planning for avian and shoreline restoration. Assistance included shoreline and avian injury determination and quantification, data management, data quality assurance and quality control, data evaluation, case strategy and technical support, and restoration scaling and alternatives assessment.

For the **CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY, OFFICE OF ENVIRONMENTAL HEALTH HAZARD ASSESSMENT**, managed the seafood safety sampling program for the Pipeline P00547 Orange County, California Huntington Beach Oil Spill. This included planning and oversight for commercial and recreational fishing species sampling and analysis for petroleum contamination for human health risk assessment purposes. Results were used to justify reopening of the commercial and recreational fisheries in the wake of the oil spill.

For the **STATE OF ARKANSAS GAME AND FISH COMMISSION**, assisted in the assessment of damages related to the Mayflower Oil Spill in Dawson Cove in Lake Conway. This effort has included the evaluation of existing data and information on resource injury and the preliminary evaluation of potential restoration projects and estimation of damages, as well as the provision of guidance related to case strategy and management.

For the **NATIONAL ACADEMIES OF SCIENCE, NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM**, assisted in the development of a framework for the evaluation of out-of-kind stormwater mitigation techniques for state departments of transportation. This focused on generating guidance for the evaluation of ecosystem service co-benefits such as human health, recreational, and carbon sequestration benefits, as well as the development of case studies and information and decision support resources.

For the **GOVERNMENT OF THE U.S. VIRGIN ISLANDS,** oversaw and assisted in the planning of a baseline ecological evaluation of the estuarine environment at the St. Croix South Shore Industrial Complex. This included development of the Sampling and Analysis and Quality Assurance and Control Plan.

For the **NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION**, served as the Technical Work Group Lead for the Deepwater Benthic Communities Technical Work Group for the MS Canyon 252 Deepwater Horizon Oil Spill. Efforts included organization, budgeting, and planning of offshore cruises for environmental sampling, work group facilitation, and the provision of technical, strategic, and case support. As part of this effort, Dr. Lewis drafted the Benthos Chapter of the Programmatic Damage Assessment Restoration Plan.

For the **U.S. DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE**, conducted a resource equivalency analysis to scale restoration required to compensate for avian wildlife killed as a result of the Suncor petroleum spill into a wetland and Sand Creek, in Denver, CO. This process included working with U.S. Fish and Wildlife personnel to develop life history parameters for affected avian species and identifying and scaling appropriate restoration options. Dr. Lewis also assisted in settlement negotiations and subsequently assisted the **STATE OF COLORADO OFFICE OF THE ATTORNEY GENERAL** with post-settlement filings associated with the case.

For the **U.S. DEPARTMENT OF THE INTERIOR**, assisted the **BUREAU OF LAND MANAGEMENT** and the **FISH AND WILDLIFE SERVICE** to assess damages for a petroleum spill into West Creek, near Grand Junction, CO. As part of this effort, Dr. Lewis conducted a habitat equivalency analysis for natural resource injuries resulting from the spill and assisted in settlement negotiations with the responsible party.

For the **U.S. DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE**, assisted with damages assessment efforts related to a petroleum spill in the Upper Missouri River in the Bakken region of North Dakota. Dr. Lewis also provided support on the oil spill response effort for this spill.

For the **NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION**, participated in damage assessment efforts related to the Enbridge Pipeline Oil Spill in the Kalamazoo River. Efforts included drafting assessment work plans and assisting in the drafting of Shoreline Cleanup Assessment Team (SCAT) forms for use in the context of the damages assessment.

For the **U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF OCEAN ENERGY MANAGEMENT**, assisted in the development of restoration cost estimates for ecological injuries caused by oil spills resulting from offshore oil and gas development as part of the development of the Offshore Economic Cost Model.

For **HEALTH CANADA, AIR HEALTH EFFECTS DIVISION OF THE WATER, AIR, AND CLIMATE CHANGE BUREAU**, assisted in the conduct of literature reviews focusing on quantifying the economic benefits of health improvements associated with reductions in air pollution-related asthma prevalence and incidence, and reduced indoor mold exposure.

For the **STATE OF NEW JERSEY, OFFICE OF THE ATTORNEY GENERAL**, assisted in the evaluation and quantification of natural resource injuries to groundwater at numerous contaminated sites. These evaluations supported the development of expert reports and damage claims in litigation against potentially responsible parties.

For the **STATE OF MISSOURI, DEPARTMENT OF NATURAL RESOURCES**, assisted the State in the development of several groundwater damages claims. Dr. Lewis previously collected and synthesized information on groundwater resources, contaminated groundwater sites, baseline groundwater quality, and damage assessment approaches used in other states to develop a technical approach to pursuing groundwater claims in Missouri.

For the **STATE OF ILLINOIS, OFFICE OF THE ATTORNEY GENERAL**, quantified anticipated changes in water quality in the Chicago Area Waterway System (CAWS) attributable to potential changes in the regulatory use designations of river reaches.

For the **STATE OF DELAWARE, DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL**, assisted in the modeling of changes in water quality caused by estimated changes in the extent of wetlands over time.

For the **U.S. ENVIRONMENTAL PROTECTION AGENCY, OFFICE OF SUPERFUND REMEDIATION AND TECHNOLOGY INNOVATION AND THE OFFICE OF SOLID WASTE AND EMERGENCY RESPONSE**, provided a range of risk assessment support, including assessment of inhalation risks associated with exposures to volatile organic contaminants (VOCs) stemming from domestic water use. This effort included a review of analytical approaches and the equations and parameters used in those approaches for estimating inhalation risk.

For the **U.S. ENVIRONMENTAL PROTECTION AGENCY, OFFICE OF SUPERFUND REMEDIATION AND TECHNOLOGY INNOVATION**, contributed to an evaluation of a draft guidance document on clean-up strategies for soils at Superfund sites. This draft guidance document provides information about alternative approaches for identifying contaminated soil for removal (area-averaging versus not-to-exceed thresholds).

For the **ENVIRONMENTAL DEPARTMENTS OF THE STATES OF MISSOURI, KANSAS, AND OKLAHOMA**, assessed damages stemming from ecological injury to surface water and groundwater stemming from heavy metal contamination attributable to mine waste as part of the ASARCO bankruptcy. This effort also included assistance with the preparation of expert reports.

For the **ST. REGIS MOHAWK TRIBE, ENVIRONMENT DIVISION**, provided technical support in the context of the St. Lawrence River NRDA. This included development of a series of data reports and a fact sheet describing the results various environmental analyses. The reports required review and critical evaluation of data quality, statistical analysis of contaminant concentration trends, and comparison of results with those from other, relevant datasets. The fact sheet summarized one of these reports and presented results from a community-wide study into PCB concentrations in garden soils.

For the **U.S. ENVIRONMENTAL PROTECTION AGENCY, OFFICE OF POLLUTION PREVENTION AND TOXICS**, evaluated and mathematically modeled the U.S. and global elemental mercury markets. Dr. Lewis also assisted in compiling the results of this analysis to support a stakeholder panel for managing domestic stocks of commodity-grade mercury and helped to prepare responses to inquiries by the Committee on Energy and Commerce of the U.S. House of Representatives. Dr. Lewis then assisted in the preparation of a Report to the U.S. Congress on the "Potential Export of Mercury Compounds from the United States for Conversion to Elemental Mercury," as required by the 2008 Mercury Export Ban Act.

Select Peer-reviewed Publications

Georgian, S.E., Kramer, K., Saunders, M., Shedd, W., Roberts, H., Lewis, C., Fisher, C. and E. Cordes. 2020. Habitat suitability modeling to predict the spatial distribution of cold-water coral communities affected by the Deepwater Horizon oil spill. Journal of Biogeography 2020;00:1-12. DOI: 10.1111/jbi.13844.

Lewis, C.G. and R.W. Ricker. 2019. Chapter 21--Overview of Ecological Impacts of Deep Spills: Deepwater Horizon in Deep Oil Spills Facts, Fate, and Effects. Murawski, S.A., Ainsworth, C.H., Gilbert, S., Hollander, D.J., Paris, C.B., Schluter, M. and D.L. Wetzel., Eds. Springer Nature, Switzerland. 611 p.

Reuscher, M.G., Baguley, J.G., Conrad-Forrest, N., Cooksey, C., Hyland, J.L., Lewis, C., Montagna, P.A., Ricker, R.W., Rohal, M., and T. Washburn. 2017. Temporal patterns of Deepwater Horizon

impacts on the benthic infauna of the northern Gulf of Mexico continental slope. PLoS ONE 12(6): e0179923. https://doi.org/10.1371/journal.pone.0179923.

Balthis, W., Hyland, J., Cooksey, C., Montagna, P., Baguley, J., Ricker, R., and C. Lewis. 2017. Sediment Quality Benchmarks for Assessing Oil-Related Impacts to the Deep-Sea Benthos. Integrated Environmental Assessment and Management doi:10.1002/ieam.1898

Stout, S.A., Rouhani, S., Liu, B., Oehrig, J., Ricker, R.W., Baker, G, and C. Lewis. 2017. Assessing the footprint and volume of oil deposited in deep-sea sediments following the Deepwater Horizon oil spill. Marine Pollution Bulletin 114: 327-342.

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AB-SC EXHIBIT 4

STATE OF NEW MEXICO
BEFORE THE WATER QUALITY CONTROL COMMISSION

IN THE MATTER OF PROPOSED NEW
RULE 20.6.8 NMAC – *Ground and Surface Water Protection - Supplemental Requirements For Water Reuse* No. WQCC 23 – 84 (R)

NEW MEXICO ENVIRONMENT DEPARTMENT,
WATER PROTECTION DIVISION,

Petitioner.

DIRECT TESTIMONY OF CHRISTOPHER LEWIS, Sc.D.

Q: Please state your name.

A: My name is Christopher Lewis.

Q: Where are you currently employed and what is your position?

A: I am a Senior Technical Consultant with Industrial Economics, Incorporated (IEc). IEc is a consultancy founded in 1981 and headquartered in Cambridge, Massachusetts. IEc employs a wide range of professional consulting staff with expertise in the natural sciences, policy, and economics. Most of our work is conducted on behalf of federal, state, and tribal entities. I have been employed with IEc since 2006, and I live and work in Denver, Colorado. As a Senior Technical Consultant, I assist clients on matters related to natural resource damage assessment, economic and policy analysis, risk assessment, ecosystem services, and scientific data collection, management, and interpretation.

Q: What is your educational background?

A: I have a Bachelor of Arts in Biology with a minor in Spanish from Middlebury College and both a Master of Science and a Doctorate of Science in Environmental Health, both concentrating in Environmental Science and Engineering, from the Harvard University School of Public Health. My dissertation at Harvard focused on aquatic chemistry and the chemical

speciation of metals in the environment relevant to their bioavailability.

Q: Can you briefly describe your work background and the work you have undertaken in New Mexico?

A: After earning my undergraduate degree, but prior to and during graduate school I worked for several years in applied occupational and environmental health epidemiological research as a research assistant. This included a mix of laboratory, desk-based research, and field-based applied aquatic science and survey-based research. I then attended graduate school for a period of five years. After graduate school I joined my current firm, IEc, where I have worked for the past 17 years. Over that time, I have worked on numerous consulting projects throughout the U.S. and to a limited degree, internationally. This has included work for U.S. federal, state, and tribal clients, including the U.S. Environmental Protection Agency (US EPA), the U.S. Department of Interior Fish and Wildlife Service, the U.S. National Oceanic and Atmospheric Administration, the U.S. Department of Energy, the U.S. Bureau of Ocean Energy Management, and numerous state and tribal environmental agencies and offices of Attorneys General.

My work has ranged from providing policy analysis and decision-making support to litigation support and from applied field work to desk-based research and modeling, typically at the intersection of environmental science, policy, and economics. For example, my work for US EPA has included providing policy analysis, managing peer reviews, developing literature reviews, and developing guidance documents. This included, for example, helping US EPA to develop guidance related to soil cleanup approaches at Superfund sites, as well as the assessment of human health risks associated with polychlorinated biphenyls (PCBs). I have also done a significant amount of work in the context of assessing harms from hazardous substance and petroleum releases. This has included applied field work such as planning and executing field

studies to assess the impacts of PCBs on songbirds, managing a large-scale coastal seafood sampling effort to assess the risks of consuming seafood in the wake of an oil spill, and supporting the assessment of impacts of hazardous substances and oil on large freshwater systems. For example, I have worked on natural resource damages assessments of the Buffalo River, Anacostia River, Onondaga Lake in New York State, Animas River, Mississippi River, Missouri River, Lake Conway in Arkansas, and Kalamazoo River. I have also worked on small petroleum spills in numerous freshwater creek systems, for example, in Colorado, the Bakken in North Dakota, and Massachusetts, as well as a number of cases in watersheds affected by mining. Finally, I have also worked on numerous damage assessments related to injuries to groundwater resources, including in New Jersey, New York, Missouri, and the Tri-State Mining District in Kansas, Missouri, and Oklahoma.

In the State of New Mexico, since 2010, I have served as Lead Environmental Scientist for the U.S. Department of Energy on the natural resource damage assessment for releases of hazardous substances and oil from historic operations at Los Alamos National Laboratory. I have also worked on behalf of the State of New Mexico, through the Office of the Natural Resources Trustee, to develop restoration projects related to the 2015 Gold King Mine spill, and for the Office of the Natural Resources Trustee and the Navajo Nation to assess damages from the Gold King Mine spill, which included assistance in the review and provision of comments on site-specific risk assessment documents.

Q: Is an accurate copy of your curriculum vitae attached as AB/SC Exhibit 3?

A: Yes.

Q: Dr. Lewis, can you please summarize the opinions you will provide in your testimony?

A: I will provide opinions regarding the environmental risks associated with the discharge of produced water to surface water and groundwater, as well as the inability to characterize the risks of unknown contaminants in produced water or known contaminants lacking hazard information.[1] My opinions are offered in support of a regulatory prohibition on the discharge of untreated or treated produced water to surface water or ground water. Based on the hazards and potential risks associated with ambient discharge of untreated or treated produced water, the technologies available for treating produced water, and the lack of information on the precise constituents that are in produced water and on the human health and ecological toxicity of many constituents of produced water, in my opinion, a prohibition on discharge of treated and untreated produced water to ground and surface water is prudent and warranted in order to protect human health and the environment.

Q: Dr. Lewis, what is environmental risk assessment?

A: Environmental risk assessment is an analytical process to characterize the nature and magnitude of the potential adverse effects of hazards on human health or the environment. A hazard is a physical, chemical, or biological stressor, such as heat, the element mercury, or a virus. Risk assessment typically involves four steps: hazard identification, dose-response evaluation, exposure assessment, and risk characterization. Hazard identification and dose-response evaluation together constitute the identification and assessment of the toxicity of a given stressor. Exposure assessment is an evaluation of the extent to which the stressor comes into contact with the human or ecological receptor. Risk characterization is a contextualization of the three previous analytical steps that culminates in a conclusion about risk. Putting these steps

[1] I define "known" substances as identified via a Chemical Abstracts Service registry number, which is a unique identifier for chemical substances.

together in risk assessment results in an overall evaluation of the likelihood of adverse effects given the known hazards of the stressor and the extent to which the human or ecological receptor is, or is potentially, exposed to it.

Hazards may be established in a variety of ways, including through laboratory-based toxicity testing, epidemiological studies, and toxicological screening assays. Hazards may also be classified in several different ways, including based on the kinds of adverse effects they cause. For example, a chemical may be considered hazardous based on its ability to cause physical irritation. Or a chemical can be considered carcinogenic if it has the propensity to cause cancer, or a reproductive hazard if it can interfere with reproduction. Whether a hazard poses a risk to human health or the environment, however, is ultimately dependent upon the dose-response relationship and the exposure. For example, a stressor may only pose a risk when inhaled, but not when it comes into contact with the skin. Or a given stressor can be considered acutely toxic or chronically toxic, depending on the duration of exposure required to elicit a given adverse effect.

In environmental risk assessment, we typically think about risk being based on the concentration of a stressor in the environment, dose-response information about how increasing concentrations cause increasing adverse effects, and the extent to which a given human or ecological receptor comes into contact, or might be expected to come into contact, with relevant concentrations in the environment.

Q: Please describe your work experience, with particular attention to your work related to environmental risk assessment.

A: As part of my graduate school experience, I received formal training in environmental risk assessment. This included courses such as risk assessment, regulatory toxicology, and

environmental risk management, as well as courses on properties of environmental contaminants and epidemiology, which are relevant to understanding the environmental hazards and risks posed by stressors. Prior to graduate school, as I noted previously, I worked as a research assistant on occupational and environmental health studies. As a consultant at IEc, I have worked for the US EPA to conduct research and develop internal memoranda related to risk assessment as well as risk assessment guidance documents, and I have managed peer reviews of regulatory risk assessments conducted by US EPA. I have also worked for Health Canada to conduct literature reviews related to the risks of environmental stressors. Finally, as part of my work for clients on natural resource damage assessment matters, I regularly review and rely on information generated as part of environmental risk assessments. And as noted above, this has included reviewing and providing comment on site-specific human and ecological risk assessments.

Q: Dr. Lewis, to prepare your testimony, what sources did you review?

A: I reviewed a variety of peer reviewed journal articles as well as government reports related to produced water, including the known and unknown constituents in produced water, the toxicity of known constituents of produced water, studies of the effects of releasing produced water in the environment, and produced water treatment technologies and regulatory regimes. A list of sources I reviewed is set forth at the end of my testimony.

Q: Dr. Lewis, what is produced water?

A: Produced water is a liquid byproduct from the drilling or production of oil and gas. It is defined in federal regulations as: "the fluid brought up from the hydrocarbon-bearing strata during the extraction of oil and gas, and includes, where present, formation water, injection water, and any chemicals added downhole or during the oil/water separation process." 40 C.F.R.

§ 435.33(a)(2)(v). I will also note that the proposed regulation includes a specific definition for produced water. The definition in the proposed regulation is "a fluid (wastewater) that is an incidental byproduct from drilling for or the production of oil and gas, and includes formation water, flowback water, and any chemicals added downhole during drilling, production, or maintenance processes during the life cycle of an oil or gas well. Produced water includes known and unknown water pollutants." (NMED 2024)

Q: What constituents are found in produced water?

A: Produced water typically contains saline water, as well as natural and man-made hydrocarbons, drilling fluids, and constituents originating from the rocks from which petroleum is extracted (Alley et al. 2011). The salinity of produced water can vary from less than one percent up to greater than 30 percent, or roughly 10 times as salty as the ocean (Neff et al. 2011). A specific study of produced water from five locations in the Permian Basin in New Mexico found salinity ranged from about 10 to 20 percent (Jiang et al. 2022a). Drilling fluids are primarily clay-based but can contain a variety of known and proprietary additives. Drilling fluids can also refer to hydraulic fracturing fluids. Constituents from the environment can include hydrocarbons, salts, metals, and radionuclides.

Q: Please describe the human and ecological health hazards and risks associated with contamination that may be present in untreated produced water.

A: Many of the constituents found in untreated produced water are known hazards; for example, common constituents include arsenic, barium, bromide, mercury, as well as benzene, toluene, ethylbenzene, and xylenes (BTEX). These constituents have the potential to cause carcinogenic, developmental, reproductive, and other adverse effects in humans and other biological organisms (Wollin et al. 2020). In addition, even though one might not think about

salts as being particularly hazardous, the documented concentrations of salts alone in raw produced waters are high enough to be toxic to freshwater organisms (Folkerts et al. 2020). This means that raw produced water discharged into a freshwater stream or lake poses a risk of harming aquatic ecosystems.

However, in addition to these prevalent chemicals, produced water can contain hundreds of other constituents. For some of these constituents, hazard information is lacking. A recent literature review documented more than 1,000 individual known chemical constituents (Danforth et al. 2020). A follow-up presentation reviewing additional data sources suggests more than 2,800 unique compounds may be present in produced water (Thimons et al. 2023). In addition, there are many constituents that are proprietary, so their basic chemical structure is unknown to the public, let alone their potential toxicity. A 2015 study by US EPA identified 692 unique ingredients in hydraulic fracturing fluids, 11 percent of which were designated as confidential business information (US EPA 2015). It is also possible that new chemicals are created during the drilling or operation of oil and gas wells through chemical transformation of known and unknown constituents in produced water (Jiang et al. 2022b, Wollin et al. 2020, Hoelzer et al. 2016).

Academic and government studies have shown that concentrations of known chemical constituents in process water can vary greatly (Danforth et al. 2020, US EPA 2020, Folkerts et al. 2020). I already discussed previously the variability of salt concentrations in produced water, but concentrations of other constituents besides salts can vary considerably as well. For example, barium and strontium concentrations in produced water based on data from the U.S. Geological Survey (USGS) National Produced Waters Geochemical Database ranged from less than 10 micrograms per liter (µg/L) to more than 10 grams per liter (g/L). Similarly, radium activities

ranged from less than 0.1 picocuries per liter (pCi/L) to greater than 10,000 pCi/L (US EPA 2020). The study from five locations in the Permian Basin I mentioned above showed radium activities in a slightly narrower range from less than 1 pCi/L to greater than 1,000 pCi/L (Jiang et al. 2022a).

So, assessing the environmental risks associated with produced water is very difficult because there is no single standard makeup of produced water. The very nature of its highly variable constituents means that produced water from one well may pose a significantly different risk than produced water from another well. Nevertheless, researchers have aimed to tackle this question.

Investigations of the composition of produced water indicate that metal concentrations can be orders of magnitude above US EPA acute and chronic criteria for the protection of aquatic life, and that pH can range from 3.4 to 10.1, which is well outside the range of natural freshwaters (Folkerts et al. 2020). Those metals concentrations and extreme pH values would be expected to cause toxicity to biological organisms living in freshwater systems. Another recent meta-analysis by Danforth et al. (2020) of the literature on chemical constituents of produced water found maximum concentrations observed in produced water were 0.035 milligrams per liter (mg/L) for benzo(a)pyrene, 860 mg/L for benzene, and 16,800 mg/L for toluene (Danforth et al. 2020). For reference, ambient freshwater quality criteria for the protection of aquatic life developed by the US EPA for benzene and toluene are 5.3 mg/L and 17.5 mg/L, respectively (US EPA 1980a, 1980b). The federal maximum contaminant levels (MCLs) for drinking water for these three chemicals are 0.0002, 0.005, and 1 mg/L, respectively (US EPA 2024). These thresholds are multiple orders of magnitude lower than the observed concentrations. Both benzene and benzo(a)pyrene are carcinogenic (ATSDR 1995, 2007) and their maximum

contaminant level goals are both zero (US EPA 2024). Since there is no threshold for effects of carcinogenic compounds, this means that any exposure to these constituents would be expected to increase one's risk of developing cancer.

The Danforth et al. (2020) meta-analysis I mentioned previously is one of the most recent and comprehensive evaluations of the relative toxicity of the chemical constituents of produced water available. That study ultimately found that of the 1,198 chemicals identified in the literature as present in produced water, only 167 had corresponding toxicity information suitable for risk assessment available. Of those 167, a list of 23 chemicals was highlighted as being of particular toxicological concern, based on their maximum observed concentrations in produced water and toxicological information on lower bound effects thresholds. Those thresholds came from laboratory- and field-based ecological toxicity studies as well as toxicological screening assays. The authors also identified 36 chemicals as occurring on US EPA's Priority Pollutant List (Danforth et al. 2020). This means that out of only the small fraction of produced water constituents about which we know something of their potential hazards and concentrations, dozens would be expected to pose a risk to human or environmental receptors if those receptors were exposed to produced water.

Researchers have also published studies of the direct toxicity of produced water constituents or of produced water itself to ecological receptors. For example, a review by Folkerts et al. (2020) first identified specific adverse toxicological effects to aquatic organisms caused by individual produced water constituents including salts, metals, and organics such as polycyclic aromatic hydrocarbons at concentrations observed in produced waters. The authors then synthesized studies of the toxicity of produced water tested directly on aquatic organisms or of the toxicity of laboratory-generated "reconstituted" produced water containing mixtures of

some of the known constituents of produced water. Observed toxicological responses included immunological, endocrine, metabolic, developmental, and mortality responses in aquatic organisms (Folkerts et al. 2020). Finally, a recent study of Permian Basin produced water taken from near Carlsbad, New Mexico, which was funded by the New Mexico Water Resources Research Institute, showed that even diluted and treated produced water induced toxicity in three toxicity screening assays. The authors of that study highlighted that salinity was the primary driver of toxicity but that organic constituents may play a role in the observed toxicity, and raised the possibility that produced water constituents may cause synergistic toxicity (Hu et al. 2022). So, based on these studies, we know that specific known constituents in produced water, as well as raw produced water itself, may pose a risk to human health and the environment.

Q: What technologies are being used to treat produced water?

A: Different technologies are effective at removing different contaminants from water. For example, chemicals can be added to water to react with contaminants and cause them to precipitate out of solution, bioreactors can address high levels of organic carbon, carbon filtration can be used to filter out hydrophobic organic contaminants, and irradiation with ultraviolet light can be used to remove bacteria.

Given the wide variety of contaminants in produced water, multiple treatment technologies have been documented to address different needs. Treatment technologies generally can be organized based on the classes of contaminants they are meant to target. For example, hydrocyclones, oil-water separators, floatation, and coagulation and flocculation have been used to remove suspended particles and oil droplets; adsorption and cation and anion exchange membranes have been used to remove metals; and activated sludge, advanced oxidation, and ozonation have been used to address organic contaminants (Amakiri et al. 2022, Igunnu and

Chen 2014).

Although many of the traditional approaches can remove upwards of 80, 90, or even 95 percent of oil, grease, suspended solids and metals, the reality is that most approaches are not 100 percent effective at removing even targeted contaminants, may not address non-targeted contaminants, and are subject to failure. One particular problem is the complete removal of aromatic compounds such as BTEX, which may not be completely removed in industrial water treatment settings (Amakiri et al. 2022, Igunnu and Chen 2014). To ensure removal of the various constituents that may be present in produced water, a more thorough and complete understanding of what constituents are included in produced water needs to be developed so treatment techniques targeting the specific contaminants may be employed. Further, multiple treatments in series may be necessary, and treatment train effluents should be tested to confirm removal.

Q: How effective are these technologies in treating produced water to meet water quality standards, such as drinking water standards or surface and ground water standards?

A: Under limited circumstances, dischargers have demonstrated success with treating produced water to meet specific permit requirements, for example, in Pennsylvania, Colorado, and Wyoming (Jiang et al. 2022b). However, I don't believe these few specific examples demonstrate that treatment of all types of produced water in a typical industrial setting would result in effluents that meet ground or surface water quality standards in New Mexico (20.6.2 *et seq.* and 20.6.4 NMAC *et seq.*, respectively). For example, where discharge has been permitted, it has been limited to produced water from conventional oil and gas or coalbed methane wells

(Jiang et al. 2022b) where hydraulic fracturing fluids have not been used.[2] There are also documented cases of contaminants in effluents from wastewater treatment plants treating produced water exceeding MCLs and ambient water quality criteria (Ferrar et al. 2013) and causing mutagenicity in screening assays (McLaughlin et al. 2020). As I stated previously, treatment trains would be needed in most cases to effectively address the variable contaminants that may be present in produced water (Amakiri et al. 2022, Igunnu and Chen 2014) and treatment trains should be designed to address the specific suite of contaminants present in the produced water. Comprehensive testing of produced water to ascertain specifically what constituents are present and what chemicals persist in the effluent should be an integral part of any demonstration projects assessing the efficacy of produced water treatment.

Q: Please describe the human and ecological health hazards and risks associated with contamination that may be present in treated produced water.

A: The same types of risks I discussed previously about untreated produced water are relevant to treated produced water. Treatment only reduces the concentrations of produced water constituents. It therefore may reduce the level of risk, but it does not necessarily eliminate it.

Lingering risk stems from two key factors. First, we know that treatment does not equate to complete removal of a contaminant from a wastewater stream. This is particularly problematic from a risk perspective for hazards such as carcinogens that do not have a safe level of exposure. But it is also relevant to non-carcinogenic compounds because they may accumulate in the environment downstream of wastewater treatment facilities or may not be removed to below levels of concern. Second, as I stated previously, treatment trains must be designed to address the

[2] By contrast, "unconventional" wells generally refers to hydraulically fractured or "fracked" wells.

specific suite of contaminants that are present, and even then, some contamination may still pass through the treatment process. Since we do not know the full suite of contaminants that may be present in produced water, is it possible, if not likely, that unknown hazards may be passing through treatment facilities. Residual contamination from a given treatment train will ultimately be dictated by the specific treatment technologies used and the characteristics of the contaminants (e.g., size, polarity, solubility, resistance to breakdown).

This challenge—that water treatment is not 100 percent effective, particularly against non-target compounds—is not unique to the petroleum industry. It was most strikingly shown by two USGS studies published in the early 2000s, which first documented numerous pharmaceuticals and personal care products in U.S. streams and led to widespread public health concern regarding the persistence of these chemicals in drinking water (Kolpin et al. 2002, Stackelberg et al. 2004). The first study by Kolpin et al. (2002) documented potentially hazardous substances in streams throughout the U.S. This was followed by a study that documented that a wide variety of contaminants were found to pass through the treatment train in a drinking water facility (Stackelberg et al. 2004). These two studies, together, were revealing in the field of environmental health specifically because they demonstrated that measurable quantities of known hazards were passing through our wastewater and drinking water treatment facilities.

I have similar concerns about substances expected to be in produced water in New Mexico. For example, radium is a known contaminant in produced water from the Permian Basin in New Mexico (Thakur et al. 2022). Studies of stream sediments in Pennsylvania near centralized waste treatment facilities demonstrated that, even with treatment, managed wastewater from oil and gas facilities led to increased radium at the facility outfalls and

downstream of the outfalls relative to upstream (Lauer et al. 2018, Van Sice et al. 2018).

Contaminants that pass through wastewater treatment facilities therefore may still pose a risk to any exposed human or ecological receptors that come into contact with the wastewater treatment facility discharges. If wastewater-receiving streams or aquifers are hydrologically connected to or used themselves as a source of drinking water, any contaminants that subsequently pass through the drinking water treatment process may then pose a risk to the public consuming that water. Although the magnitude of that risk is dependent on the actual dose and route of exposure, as I discussed previously, given the uncertainties in the makeup of produced water and its treatment, I think it is unlikely to go to zero.

Therefore, to the extent that produced water is effectively treated and the hazardous constituents removed, or their concentrations substantially reduced, the risks posed by the known constituents in treated water would undoubtedly be reduced. However, they may not be fully eliminated.

Q: Please describe the uncertainty associated with human and ecological health risks associated with unknown constituents that may be present in treated and untreated produced water or with known constituents but for which information on their potential human and ecological toxicity is lacking.

A: Risk characterization is the final step in risk assessment. Most of what I have discussed so far relates to the characterizable risks associated with untreated and treated produced water. The first three steps of risk assessment—hazard identification, dose-response evaluation, and exposure assessment—all are predicated on existing scientific studies into the nature, toxicity, and behavior of specific, known stressors. However, the US EPA's Risk Characterization Handbook states that, "Risk characterization is not only about science—it is also about making

clear that science doesn't tell us certain things and that policy choices must be made" (US EPA 2000, p. 11). I, therefore, would be remiss if I neglected to mention uncharacterizable risks. Two considerable sources of uncertainty, when it comes to the risks of produced water, stem from (1) unknown constituents and (2) the lack of toxicological information available for many of the known constituents.

Of the 1,198 chemicals identified as being present in produced water based on the literature reviewed by Danforth et al. (2020), only 290, or 24 percent, can be identified using standard analytical methods. Further, most of these constituents have not been evaluated to determine whether they are hazardous or not: 56 percent of the known chemical constituents in produced water had no corresponding dose-response data available, and, as stated previously, only 167 constituents, or 14 percent, had known toxicity data suitable for risk assessment available (Danforth et al. 2020). Another study reviewed the available toxicity information for chemicals in produced water and hydraulic fracturing fluids, which may be a contaminant in produced water. Yost et al. (2016) found that 62 percent of the 134 chemicals reported as being present in produced water and only eight percent of the 1,072 chemicals reported in hydraulic fracturing fluids had chronic oral reference values. Oral slope factors, which describe the carcinogenicity of a chemical, were almost universally unavailable (Yost et al. 2016). Without information on whether a contaminant is present in produced water, or without information about whether a contaminant is a hazard, one cannot assess risk at all.

Q: Are you familiar with the rule at 20.6.8 NMAC, relating to the discharge and reuse of produced water, proposed by the New Mexico Environment Department (NMED) in this proceeding as set forth in its First Amended Petition?

A: Yes, I have reviewed NMED's First Amended Petition and the proposed rule.

Q: What is your understanding of NMED's proposal regarding discharge of treated and untreated produced water to state waters?

A: NMED proposes to prohibit discharge of treated and untreated produced water to surface and ground water in the state at 20.6.8.400.A NMAC. NMED could not permit or otherwise authorize such a discharge.

At 20.6.8.400.B and C NMAC, NMED proposes to authorize "demonstration projects or industrial projects" that "will not discharge in a manner that may directly or indirectly affect ground or surface water". Any person who wants to engage in such a project must submit a "notice of intent" to NMED, providing certain information and meeting certain conditions to carry out the project.

Q: Dr. Lewis, have you reviewed other states' regulatory requirements for the handling and discharge of produced water?

A: I reviewed readily available literature on the regulatory environments for produced water in individual states as they relate to the handling and discharge of produced water to surface and ground water. Jiang et al. (2022b) reviewed state policies in major oil- and gas-producing regions for the New Mexico Produced Water Research Consortium and determined that most produced water is disposed of through underground injection and only one to two percent of produced water is reused outside of the oil and gas industry nationwide. Further, such reuse appears to be concentrated in only several states. Wyoming was the state with the highest proportion of produced water reused outside of the oil and gas industry, at 37 percent in the year 2017; however, the authors noted that most of that water was from coalbed methane wells, which tend to generate produced water with lower salinity and higher quality than other types of wells. Only a limited number of states have permitted the discharge of treated produced water or untreated

produced water meeting permit-specific water quality requirements, but to varying and limited degrees. For example, most of the states that allow discharge to surface water exclude produced waters from unconventional oil and gas wells (Jiang et al. 2022b).

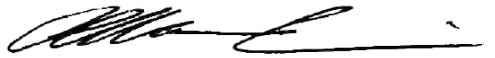
Q: Is a prohibition on the discharge of produced water to surface and ground water consistent with other states' requirements?

A: To my knowledge, yes; principally because the few states that allow for discharge to surface or ground water only do so very sparingly and appear to pose significant restrictions on such practices—for example, excluding discharge of produced water from unconventional oil and gas development to surface or ground water, requiring dischargers to obtain permits, and requiring effluents meet certain testing and water quality criteria—suggesting regulators in those states are also aware of the environmental and human health risks associated with produced water and are similarly taking steps to minimize those risks.

Q: Based on the human and ecological health risks of treated and untreated produced water and current technologies for treating produced water, do you support a prohibition against the discharge of treated and untreated produced water to surface and ground water?

A: Based on my understanding of the hazards and potential risks associated with ambient discharge of untreated or treated produced water, the technologies available for treating produced water, and the basic lack of information on the precise constituents that are in produced water and on the human health and ecological toxicity of many constituents of produced water, in my opinion, a prohibition on discharge of treated and untreated produced water to ground and surface water is prudent and warranted in order to protect human health and the environment.

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



Christopher Lewis, D.Sc.

April 9, 2024

Date

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AB-SC EXHIBIT 5

CHARLES de SAILLAN

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Santa Fe, New Mexico 87506
(505) 819-9058 (Mobile)

EXPERIENCE

July 2022 to present — **NEW MEXICO COALITION FOR CLEAN AFFORDABLE ENERGY**
Santa Fe, New Mexico

Attorney
Represented coalition of clean energy organizations in rulemaking proceedings before the N.M. Environmental Improvement Board on motor vehicle zero-emission standards (Advanced Clean Cars II, Advanced Clean Trucks, NOx Omnibus) and emission standards for electric generating facilities; represented coalition in administrative proceedings before the N.M. Public Regulation Commission on approval of public utility transportation electrification plans, grid modernization projects, triennial energy efficiency plans, battery storage projects, and rate cases involving time-of-use rates.

June 2018 to June 2022 — **NEW MEXICO ENVIRONMENTAL LAW CENTER**
Santa Fe, New Mexico

Staff Attorney
Represented environmental organizations in State rulemaking proceedings on adoption of California motor vehicle emission standards (Advanced Clean Cars I), air emission standards for oil and gas production facilities, and revision of surface water standards (triennial review); represented community organizations and State legislators in action against the U.S. Air Force seeking injunctive relief for cleanup of bulk fuel spill at Kirtland Air Force Base; represented community organizations and acequia association in action against U.S. Environmental Protection Agency challenging 2020 rulemaking on "waters of the United States" under the Clean Water Act; represented ranching and ecotourism businesses and environmental organizations in opposing permits for the Copper Flat Mine under the N.M. Water Quality Act, the N.M. Mining Act, and the N.M. Water Code, including several administrative hearings and appeals; drafted and promoted legislation on various environmental issues including citizen suits under environmental laws, State regulatory authority, and the scope of groundwater protection; member of the Governor's Methane Advisory Panel that made recommendations on regulation of methane emissions from oil and gas production; represented conservation organization in advocating for funding for electric school buses under the Volkswagen settlement.

January 2014 to May 2018 — **NEW MEXICO INTERSTATE STREAM COMMISSION**
Legal Bureau
Santa Fe, New Mexico

Attorney
Represented the Commission in administrative and civil litigation and advised the Commission on matters involving compliance with interstate river compacts, transfer of water rights, and protection of endangered aquatic and riparian species; drafted and negotiated funding agreements to implement the Taos Pueblo Indian water rights settlement; oversaw implementation of the N.M. Strategic Water Reserve and drafted regulations; co-authored a preliminary report on the effects of climate change on water resources in the Pecos River Basin.

December 1999 to December 2013 — **NEW MEXICO ENVIRONMENT DEPARTMENT**
Office of General Counsel
Santa Fe, New Mexico

Assistant General Counsel
Represented the Department in enforcement and permitting actions under State environmental laws: served as lead Department counsel in administrative adjudicatory hearings on the hazardous waste permit for Los Alamos National Laboratory under the N.M. Hazardous Waste Act, and the groundwater discharge permits for the Molycorp, Chino, and Tyrone mines under the N.M. Water Quality Act; briefed and argued the Tyrone appeal before the N.M. Court of Appeals; briefed and argued the State designation of outstanding national resource waters before the N.M. Supreme Court; prepared, litigated, and negotiated imminent endangerment orders for comprehensive investigation and clean up of pollution at Los Alamos National Laboratory, Sandia National Laboratories, and Giant Bloomfield Refinery under the Hazardous Waste Act; handled the bankruptcy litigation in *Mark IV Indus. v. New Mexico* (S.D.N.Y.), successfully arguing that the State's injunctive action for cleanup of groundwater pollution at an industrial site was not discharged in bankruptcy; prepared and litigated more than 25 administrative compliance orders and civil complaints for violations of the N.M. Air Quality Control Act, N.M. Water Quality Act, N.M. Hazardous Waste Act, and N.M. Radiation Protection Act; negotiated and prepared administrative or judicial settlements in most of these cases.

September 1993 to September 1999 — **NEW MEXICO OFFICE OF THE ATTORNEY GENERAL**
Environmental Enforcement Division
Santa Fe, New Mexico

Assistant Attorney General
Headed a National Association of Attorneys General workgroup on Superfund reauthorization including preparation of extensive comments on proposed amendments in the 103rd, 104th, and 105th Congresses, and presentation of testimony in U.S. Senate and House committee hearings on five occasions; helped start a new State program for bringing natural resource damage claims under CERCLA and the Oil Pollution Act; negotiated several settlements for such claims; represented the State in *New Mexico v. Sparton Technology* (D.N.M.) seeking injunctive relief under RCRA to abate an imminent endangerment from groundwater contamination; represented the State in enforcement actions under the N.M. Water Quality Act; negotiated compliance agreements with the U.S. Department of Energy under the Federal Facility Compliance Act for disposal of stored radioactive waste; prepared and filed *amicus curiae* briefs in several significant federal appellate cases.

August 1991 to September 1993 — **UNITED STATES DEPARTMENT OF JUSTICE**
Environmental Enforcement Section
Washington, D.C.

Special Trial Attorney
Conducted the litigation in *United States v. Butte Water Co.* (D. Mont.) seeking injunctive relief and civil penalties under the Safe Drinking Water Act, including discovery, summary judgment motions, and garnishment of company assets; negotiated a partial settlement for the construction of filtration plants and other injunctive relief totaling $14 million, and a final settlement for a $900,000 civil penalty. The settlement

imposed the largest penalty ever obtained under the public water supply provisions of the Safe Drinking Water Act.

September 1985 to September 1993

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Enforcement
Washington, D.C.

Senior Attorney
Handled all aspects of environmental enforcement litigation under CERCLA, RCRA, the Clean Water Act, and the Safe Drinking Water Act, including pleadings, motions, written discovery, depositions, witness preparation, and trial of several significant cases; negotiated more than 30 settlements under these statutes, including a CERCLA prospective purchaser agreement and a CERCLA "*de minimis*" settlement involving 177 parties and $11 million; helped prepare the *Exxon Valdez* (D. Alaska) case for litigation; worked with Congressional staff on the 1986 CERCLA reauthorization and drafted proposed amendments; helped develop national enforcement policy under CERCLA, RCRA, and the Safe Drinking Water Act; recognized as a national expert on CERCLA liability, the public water system provisions of the Safe Drinking Water Act, petroleum and used oil issues, and the litigation of imminent endangerment cases.

March to October 1984

MASSACHUSETTS EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
Boston, Massachusetts

Assistant General Counsel
Represented the Executive Office on the Special Legislative Commission on Liability for Releases of Hazardous Material and Oil established to report on the adequacy of the legal system in compensating victims of hazardous waste exposure and to recommend legislative reform; worked on the subcommittee that drafted the Commission's Interim Report; helped draft and coordinated the promulgation of amendments to the state "Bottle Deposit Law" regulations and represented the Office in hearings on those amendments.

PUBLICATIONS

United States Court Upholds Regulation of Greenhouse Gas Emissions, 22 EUROPEAN ENERGY & ENVIRONMENTAL LAW REVIEW 116 (2013) (Netherlands).

The Disposal of Spent Nuclear Fuel in the United States and Europe: A Persistent Environmental Problem, 34 HARVARD ENVIRONMENTAL LAW REVIEW 461 (2010).

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United States Supreme Court Rules EPA Must Take Action on Greenhouse Gas Emissions: Massachusetts v. EPA, 47 NATURAL RESOURCES JOURNAL 793 (2007).

Superfund Reauthorization: A More Modest Proposal, 27 ENVIRONMENTAL LAW REPORTER (ELI) 10201 (May 1997).

CERCLA Liability for Pre-Enactment Disposal Activities: Nothing Has Changed, NATIONAL ENVIRONMENTAL ENFORCEMENT JOURNAL, Oct. 1996, at 3.

In Praise of Superfund, ENVIRONMENT, Oct. 1993, at 42.

Acid Rain, Canada, and the United States: Enforcing the International Pollution Provision of the Clean Air Act, 1 BOSTON UNIVERSITY INTERNATIONAL LAW JOURNAL 151 (1982).

AWARDS

New Mexico Environment Department and EPA, State-EPA Strategic Partnership Award, Molycorp Mine Remediation, 2003.

U.S. Department of Justice, Environment and Natural Resources Division, Certificate of Commendation, 1997.

EPA Bronze Medal for Commendable Service: *United States v. Butte Water Co.*, 1994.

U.S. Department of Justice, Environment and Natural Resources Division, Certificate of Commendation, 1991.

EPA Bronze Medal for Commendable Service: *United States v. Sanders Lead Co., et al.*, 1991.

EPA Bronze Medal for Commendable Service: *United States v. Hardage, et al.*, 1990.

ADMISSIONS & PROFESSIONAL ACTIVITIES

Admitted: U.S. Supreme Court; U.S. Courts of Appeals for the Fourth, Ninth, Tenth, Eleventh, and D.C. Circuits; U.S. District Court for the District of New Mexico; Supreme Court of New Mexico; Supreme Judicial Court of Massachusetts (inactive).

Member American Bar Association, Section on Environment, Energy, and Resources; New Mexico Bar Association, Section on Natural Resources, Energy, and Environmental Law.

Board member and past Board President, Conservation Voters New Mexico; Secretary, Conservation Voters New Mexico Education Fund.

Served on N.M. Governor-Elect Michelle Lujan Grisham's Transition Team for the Environment Department (2018).

EDUCATION

KATHOLIEKE UNIVERSITEIT
Leuven, Belgium
Degree: LL.M. *magna cum laude*, July 2009
Master in Environmental and Energy Law
Internship at ClientEarth, Brussels, Belgium, April-May 2009

BOSTON UNIVERSITY SCHOOL OF LAW
Boston, Massachusetts
Degree: J.D., May 1982
Associate Editor, *Boston University International Law Journal*

BOSTON UNIVERSITY COLLEGE OF LIBERAL ARTS
Boston, Massachusetts
Degree: B.A. *cum laude* with Distinction, May 1979
Major: Political Science
Senior Distinction research project identified as one of the year's two best projects: "Law, Politics, and the Supreme Court: *United States v. Nixon.*"

HOBBIES & INTERESTS

Bicycling, skiing, hiking and backpacking, photography, scuba diving, woodworking, world travel.

References and writing sample available on request.

AB-SC EXHIBIT 6

STATE OF NEW MEXICO
BEFORE THE WATER QUALITY CONTROL COMMISSION

IN THE MATTER OF PROPOSED NEW
RULE 20.6.8 NMAC – *Ground and Surface Water Protection - Supplemental Requirements For Water Reuse* No. WQCC 23-84(R)

NEW MEXICO ENVIRONMENT DEPARTMENT,
WATER PROTECTION DIVISION,

Petitioner.

DIRECT TESTIMONY OF CHARLES DE SAILLAN

Introduction

Q: Please state your name.

A: Charles de Saillan.

Q: What is your current employment?

A: I am an environmental lawyer. I currently work full-time, under a contract, for Coalition for Clean Affordable Energy. But I am also working for a number of other clients, as I am in this proceeding.

Q: What is your educational background?

A: I have a Bachelor of Arts degree with distinction in political science, *cum laude*, from Boston University College of Liberal Arts in Boston, Massachusetts. I have a *Juris Doctor* from Boston University School of Law. And I have an *LL.M.*, or Master of Laws, degree in environmental and energy law, *magna cum laude*, from Katholieke Universiteit (sometimes called the University of Leuven) in Leuven, Belgium.

Q: Would you please briefly describe your work background, with particular attention to your work reviewing and drafting regulations and legislation, and your experience before New Mexico state administrative agencies in rulemakings?

A: I have been practicing environmental law for 40 years. After law school, I worked briefly for the Massachusetts Executive Office of Environmental Affairs in Boston. I then worked for about eight years at the United States Environmental Protection Agency (EPA), in the Office of Enforcement, in Washington, D.C. And I also worked in the Environmental Enforcement Section at the United States Department of Justice. In 1993, I moved to New Mexico and worked in the Environment Division at the New Mexico Office of the Attorney General (now the New Mexico Department of Justice). Then I worked for 14 years at the New Mexico Environment Department in the Office of General Counsel. Starting in 2014, I worked for four and a half years at the New Mexico Interstate Stream Commission (ISC). I then worked for four years at the New Mexico Environmental Law Center, a non-profit, public interest law firm. I started working for Coalition for Clean Affordable Energy almost two years ago. CCAE is also a non-profit organization.

I have worked on the drafting of regulations and legislation throughout my legal career. For example, while at EPA, although I was in the enforcement office, I was a member of several work groups that drafted some of the federal hazardous waste regulations under RCRA.[1]

At the New Mexico Office of the Attorney General, I worked on amendments to the State Mining Act regulations, and I testified before the Mining Commission. I also led a National Association of Attorneys General workgroup on Superfund[2] reauthorization. We drafted comprehensive amendments to the Superfund statute, and I testified before congressional committees five times.

While at the Department, I worked with the Surface Water Quality Bureau in drafting

[1] The Resource Conservation and Recovery Act, 42 U.S.C. §§ 6901 to 6992k.

[2] The Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9601 to 9675.

regulations for state certification of federal permits, which this Commission adopted.[3] At the ISC, I drafted amendments to the regulations on the Strategic Water Reserve.[4] Those amendments stalled at the time, but I have recently been asked to resurrect them.

While I was at the Environmental Law Center, I worked on several administrative proceedings for the adoption of regulations: the methane waste rules before the Oil Conservation Commission,[5] in which I testified; the hazardous waste fee regulations before the Environmental Improvement Board (EIB);[6] the 2021 Triennial Review of State surface water standards before this Commission;[7] the ozone precursor rule before the EIB[8]; and the advanced clean cars I rule before the EIB and the Albuquerque-Bernalillo County Air Quality Control Board.[9] I also drafted and testified in support of a half-dozen bills before the New Mexico Legislature, including proposed amendments to the Water Quality Act, the Air Quality Control Act, the Hazardous Waste Act, the Mining Act, and the Oil and Gas Act. And I drafted comments on several proposed federal rules, most notably the proposed lead and copper rule[10] under the Safe

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[3] 20.6.2.2001, 20.6.2.2002, 20.6.2.2003 NMAC.

[4] 19.25.14 NMAC. The Strategic Water Reserve is a program established by legislation in 2005. NMSA 72-14-3.3 (2007). It is administered by the Interstate Stream Commission. It allows the ISC to acquire water rights and set them aside to assist with compliance with interstate stream compacts, and to assist with protection of threatened and endangered species. It should not be confused with the Strategic Water *Supply*, a different program recently proposed by the Administration.

[5] 19.15.27 NMAC.

[6] 20.4.2 NMAC.

[7] 20.6.4 NMAC.

[8] 20.2.50 NMAC.

[9] 20.11.104 NMAC (superseded).

[10] 84 Fed. Reg. 61684 (Nov. 13, 2019).

Drinking Water Act, and the 2019 proposed rule[11] and 2021 proposed rule[12] to amend the definition of "waters of the United States" under the Clean Water Act. I represented several organizations, including Amigos Bravos and the New Mexico Acequia Association, in challenging the 2020 (final) definition in federal district court.[13]

More recently, I represented Coalition for Clean Affordable Energy in the advanced clean cars II, advanced clean trucks, and nitrogen oxides omnibus rules,[14] which the EIB and the Albuquerque-Bernalillo County board adopted in November 2023. Currently, on behalf of CCAE, I am rewriting the Public Regulation Commission (PRC) procedural rules.[15] I am also drafting amendments to several other PRC rules to address emissions of greenhouse gases.

Q: Is AB-SC Exhibit 5 an accurate copy of your resume?

A: Yes. AB-SC Exhibit 5 is my resumé. It is accurate and up-to-date.

Summary of Testimony and References

Q: On whose behalf are you presenting testimony today?

A: I am testifying on behalf of Amigos Bravos and the Sierra Club. I should mention that I am not testifying on behalf of Coalition for Clean Affordable Energy, which is not a party in this proceeding.

Q: Have you reviewed any documents in preparing the testimony you will be giving today?

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[11] 84 Fed. Reg. 4154 (Feb. 14, 2019).

[12] 86 Fed. Reg. 69372 (Dec. 7, 2021).

[13] *N.M. Cattle Growers' Ass'n v. U.S. Envtl. Prot. Agency*, No. 1:19–CV–00988–RB–SCY (D.N.M. Complaint in Intervention filed June 30, 2020).

[14] 20.2.91 NMAC.

[15] 1.2.2 NMAC.

A: Yes, I have. I reviewed the initial Petition and Statement of Reasons that the Department filed with the Water Quality Control Commission (Commission) on December 27, 2023, including the proposed new Part 8 of Title 20, Chapter 6, New Mexico Administrative Code. I also reviewed the First Amended Petition and Statement of Reasons that the Department filed with the Commission on March 20, 2024, including the proposed new Part 8.

Q: Can you please summarize the testimony and opinions you will give in your testimony?

A: Yes. I will provide testimony and opinions on the rule that the Department is proposing at 20.6.8 NMAC in its First Amended Petition. I have reviewed the proposed rule from a legal drafting perspective, and recommend a number of revisions. Specifically, I will cover four general areas:

First, several of the provisions of the proposed rule lack clarity – they are vague or ambiguous, and sometimes both. For example, I think it needs to be made crystal clear that produced water must not be reused for any sort of potable application – that is, used for drinking water – under any circumstances. I believe that should be more clearly stated in the proposed rule. While this clarification is most prominent, several other provisions of the proposed rule need clarification. Other provisions of the rule serve no regulatory purpose and are unnecessary. I recommend changes to the proposed rule to address these issues.

Second, the Department has proposed more than 20 definitions that are unnecessary and therefore should not be included in the proposed rule. Many of these definitions are not used anywhere in the proposed rule; others are used only in other definitions. It is poor drafting practice – and nonsensical – to define terms not used in a rule. The proposed rule also includes several other proposed definitions that are unnecessary because they are circular, redundant, or

merely state the obvious. I recommend deleting all unnecessary definitions.

Third, in a few places I recommend revisions to correct substantive errors in the proposed rule.

Fourth, I recommend several non-substantive revisions to address formatting of citations, cross-references, and numbering.

In sum, my recommendations are intended to make the proposed rule clearer, easier to interpret and enforce, and consistent with accepted style and formatting practice. My goal is to make a better rule. My recommended revisions are provided in a "redline" version of proposed 20.6.8 NMAC in AB-SC Exhibit 1 and in a "clean" version of proposed 20.6.8 NMAC in AB-SC Exhibit 2.[16]

Q: Are there any New Mexico rules that govern the drafting of state rules?

A: Yes, section 1.24.10 NMAC, issued by the New Mexico State Records Center and Archives, governs the format and style of State rules and applies to rules issued by all State agencies, including the Commission. 1.24.10.1 to 1.24.10.26 NMAC. Section 1.24.10.12.A NMAC, governing style, provides that, "Style shall be guided by relevant portions of the current edition of the legislative drafting manual of the New Mexico legislature published by the New Mexico legislative council service." Therefore, the Commission should look to the *Legislative Drafting Manual* prepared by Legislative Council Service (LCS) for guidance on style in drafting 20.6.8 NMAC. A copy of relevant portions of the current *Legislative Drafting Manual* is AB-SC Exhibit 7.

Q: In addition to your own knowledge and expertise developed over your practice of

[16] The redline version in AB-SC Exhibit 1 does not change the subsection numbers in the definition section at 20.6.8.7 NMAC; those subsection numbers are changed in the clean version in AB-SC Exhibit 2.

law for four decades, did you consult any treatises, books, or articles to prepare your testimony?

A: Yes, I did. I consulted a number of references on legislative and rule drafting. In general, guidance for drafting legislation applies to drafting rules. My references are listed at the end of my testimony. The guidance I consulted comports with my understanding of good rule and legislative drafting.

Guidance on Use of Definitions in Rule

Q: What is the basis of your recommendation not to include unnecessary definitions in 20.6.8 NMAC?

A: Good legal drafting should be clear and concise, and not contain unnecessary words. There is no point in defining terms that are not used in a rule or other legal document. The authorities on legal writing that I consulted support my view. For example, according to Mr. Dickerson, "The first thing to remember about definitions in legal instruments is that they should be used only when necessary." Dickerson, p. 137. The LCS *Legislative Drafting Manual* says: "Use definitions sparingly." LCS, p. 4. There are good reasons for not encumbering a rule with definitions that are not used in the rule.

First, defining unused terms is simply unnecessary. It needlessly makes the rule longer and more complex. If anything, we should be trying to make New Mexico's rules shorter and simpler.

Second, definition of unused terms lacks meaningful context. It is difficult, if not impossible, to assess and analyze the proposed definitions for accuracy, applicability, and completeness without any regulatory context. This principle applies with special force to technical terms, such as many of those in the proposed rule. Without regulatory context, parties

like Amigos Bravos and Sierra Club cannot evaluate the definitional wording or make recommendations for revisions on an informed basis. Likewise, the Commission cannot adopt those definitions on an informed basis.

Third, defining unused terms makes the proposed rule very confusing. With no regulatory context or purpose for many of the definitions, it is difficult to follow the proposed rule, to grasp what the defined terms mean, or to understand why the defined terms are in the rule in the first place. As the U.S. General Services Administration states, defining terms that are not used "can be very confusing for users." US GSA.

The confusion is exacerbated in the proposed rule by the large number of definitions of unused terms. Although the proposed rule is relatively short at six pages, it includes 52 defined terms. Of those 52 defined terms, approximately 15 are not used in the proposed rule. Moreover, approximately eight of the definitions are used only in other definitions, which creates a needlessly complex and convoluted structure. If one or two definitions of unused terms can make the rule confusing, more than 20 such definitions make the rule utterly baffling. For example, needlessly inserting definitions for terms like "agricultural application," "irrigation application," and "food crop irrigation" into this rule, which governs reuse of produced water, gives the impression that produced water can be land applied for agricultural, irrigation, and food crop uses. However, the proposed rule allows no such uses.

Finally, definition of unused terms is an indication of poor drafting. Many people reading the rule – if it were to be adopted as currently written – would reasonably conclude that substantial material had been deleted from the rule in the rulemaking process, but that the drafters had neglected to remove the corresponding definitions. That would not reflect well on the Department, or the Commission.

The Department's rationale for including definitions of unused terms in the proposed rule, as I understand it, is not persuasive. Department staff have indicated that the Department intends to use these terms in future rulemakings. But that is not a satisfactory reason for including the definitions in today's proposed rulemaking. Although the Department may intend to define these terms now for the future, agency priorities change over time. The presumed future rules might never be developed, or they might ultimately be adopted in a form that is very different from what the Department now anticipates. But assuming future rules are developed and proposed, the definitions can and obviously should be added in that rulemaking, when the terms are actually used, their context is clear, and an informed analysis of their content is possible.

Indeed, the Commission confronted a very similar issue in the most recent Triennial Review of surface water standards.[17] The Department had proposed definitions for two terms – "baseflow" and "effluent dominated" – that were not used in the rules to be amended, 20.6.4 NMAC.[18] Amigos Bravos, a party in that proceeding, objected to inclusion of those two definitions, in part, because the terms were not used in 20.6.4 NMAC and therefore "served no regulatory purpose."[19] During deliberations, the Commission agreed, and voted unanimously

[17] WQCC No. 20-51 (R).

[18] *See* N.M. Env't Dep't, Notice of Amended Petition 2-3, *In re: Proposed Amendments to Standards for Interstate and Intrastate Surface Waters, 20.6.4.NMAC*, WQCC No. 20-51 (R) (filed Mar. 12, 2021), *available at* https://www.env.nm.gov/water-quality-control-commission/wp-content/uploads/sites/27/2020/08/2021-03-12-OPF-WQCC-20-51-R-NMED-Notice-of-Amended-Petition-finalpj.pdf.

[19] *See* Amigos Bravos, Notice of Intent to Present Direct Testimony 11, *In re: Proposed Amendments to Standards for Interstate and Intrastate Surface Waters, 20.6.4.NMAC*, WQCC No. 20-51 (R) (filed May 3, 2021), *available at* https://www.env.nm.gov/water-quality-control-commission/wp-content/uploads/sites/27/2020/08/2021-05-03-WQCC-20-51R-Amigos-Bravos-Notice-of-Intent-Direct-Testimony-pj.pdf.

against including the two definitions in rule because they were not used elsewhere in 20.6.4 NMAC.[20] A copy of the cited pages of the transcript of the Commission's deliberations is AB-SC Exhibit 8.

A few of the statements that commissioners made during the deliberations are worth highlighting. During discussion on the definition for "baseflow," Commissioner Dominguez queried whether it is "good practice for us to start branching out and defining things or placing things within definitions that are not actually utilized within the NMAC?"[21] Commissioner Certain stated, "I think I have to agree with Commissioner Dominguez. My contracts analyst, who I've worked with for 13 years would have my head if she – if she knew I was supporting putting a definition in a rule when the word doesn't even exist in the rule."[22] During the deliberations on the definition for "effluent dominated," Commissioner Certain reiterated that he "oppose[d] including this definition in the surface water quality standards because the term 'effluent dominated' is not used anywhere else outside of potentially the definition section of this rule."[23] Commissioner McWilliams opposed including the definition for the same reasons as Commissioner Certain.[24] Chair Stringer concluded that, "for consistency sake, given how we ruled earlier, I think it's appropriate that we do not adopt a definition into the standards that is not actually used in the standards."[25] I believe that the Commission made the correct decision by not

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[20] Mar. 1, 2022 Transcript of Deliberations 27:1 to 31:25 (Commission deliberations on "baseflow"), 47:1 to 49:15 (Commission deliberations on "effluent dominated"), *In re: Proposed Amendments to Standards for Interstate and Intrastate Surface Waters, 20.6.4.NMAC*, WQCC No. 20-51 (R).

[21] *Id.* at 27:15-18.

[22] *Id.* at 28:5-9.

[23] *Id.* at 47:10-13.

[24] *Id.* at 47:22-23.

[25] *Id.* at 47:25 to 48:3.

including in the amended rule definitions of terms that are not used in the rule.

In proposing deletion of certain definitions and revision of others, I relied upon a number of generally accepted principles for drafting rules and statutes, including several I have already mentioned. Here is a partial list of those principles:

1. **Do not define terms not used in the rule.** LCS, pp. 53, 55, 56; US GSA.

2. **Use definitions only when necessary.** LCS, p. 4; Temple-Smith, p. 325; Dickerson, pp. 137, 148. "Definition for its own sake has no place in legal instruments." *Id.* at 148. "Unnecessary or superfluous definitions cloud meaning." Temple-Smith, p. 207.

3. **Do not define words that are being used in their normal dictionary meaning.** LCS, p. 53; Kuney, p. 93; Dickerson, p. 145; Temple-Smith, pp. 207, 325-26; US GSA; OFR. Terms in a legal document are assumed to have their ordinary dictionary meaning unless the drafter stipulates otherwise. Temple-Smith, p. 325.

4. **Do not define terms in a way that is contrary to their ordinary meaning.** Kuney, p. 93; Martineau, pp. 70-71; Temple-Smith, pp. 333-34; OFR. A definition that "departs too far from the ordinary meaning of a term . . . strains the reader's willing to accept" the definition. Temple-Smith, p. 334.

5. **Use a definition only when the meaning of the word is important.** Martineau, p. 70.

6. **Do not put substantive law in a definition.** LCS, p. 53; Kuney, p. 93; Martineau, p. 71; Temple-Smith, p. 333; Dickerson, pp. 151-52; US GSA; OFR. Substantive provisions belong in separate, substantive provisions of law. Dickerson, pp. 151-52.

7. **Do not define terms solely to use them in another definition.** LCS, pp. 53, 55.

8. **Do not include the word defined in the definition.** Martineau, p. 71.

9. **Use a definition only if it is used more than once in the relevant section of the rule or statute.** Martineau, p. 70; Dickerson, p. 150; OFR; *accord* Temple-Smith, p. 330.

<u>Amigos Bravos and Sierra Club's Proposed Amendments to 20.6.8 NMAC</u>

Q: Mr. de Saillan, would you please walk the Commission through your proposed language and formatting changes to 20.6.8 NMAC?

A: Yes, I will start at the beginning of the proposed rule, 20.6.8 NMAC, describe my recommendations with revisions shown in redline, and discuss the rationale for the changes I

propose.

20.6.8.2 SCOPE: This rule applies to all ~~All~~ persons subject to the Water Quality Act, ~~NMSA 1978,~~ Sections 74-6-1 through 74-6-17 NMSA 1978, and specifically to persons intending to reuse wastewater in their operations.

The first phrase, "This rule applies to," completes the first sentence. The revised citation is a rather minor formatting change to 20.6.8.2 NMAC. The LCS *Legislative Drafting Manual*, which as discussed is to be used as guidance for State rules, requires New Mexico statutes to be cited to the applicable section or subsection, followed by the year of compilation in the New Mexico Statutes Annotated or NMSA (with no comma in between), *e.g.*, Section 74-6-1 NMSA 1978. LCS, pp. 26, 184, & *in passim.* While various Commission regulations have varying formats for the NMSA, recently amended Commission rules use this format consistently. *E.g.,* 20.6.4 NMAC. So do other recently promulgated rules the Department has proposed. *E.g.,* 20.2.50 NMAC (ozone precursor rule). I recommend using this format throughout the rule, and specifically at 20.6.8.2, 20.6.8.3, 20.6.8.400, and 20.6.8.400.B(1)(a) and (g). I make this formatting recommendation at other places in the proposed rule, but I do not repeat the explanation. Finally, in the last line of this provision the word "and" should probably be "in."

20.6.8.3 STATUTORY AUTHORITY: Standards and regulations are adopted by the commission under the authority of the Water Quality Act, ~~NMSA 1978,~~ Sections 74-6-1 through 74-6-17 NMSA 1978, and the Produced Water Act, ~~NMSA 1978,~~ Subsection B of Section 70-13-3 and Subsection D of Section 70-13-4 NMSA 1978.

The revised citation format is consistent with the guidance from the *Legislative Drafting Manual*, as discussed above for 20.6.8.2 NMAC.

20.6.8.7 DEFINITIONS: The following terms as used in this ~~p~~Part shall have the following meanings.~~:~~ ~~t~~Terms defined in the Water Quality Act, but not defined in this ~~p~~Part, shall ~~will~~ have the meaning given in the act.

When specific parts, sections, subsections, and the like in the rule at hand are referred to

in the rule, they are capitalized; therefore "Part" is capitalized here. Capitalization of these terms used in this context is consistent with other provisions in 20.6.8 NMAC. *E.g.,* 20.6.8.D(1), 20.6.8.R(4) NMAC. Dividing the sentence into two sentences is clearer, and using the term "shall" instead of "will" is consistent with usage in the rest of the rule.

I propose to delete or revise the following definitions. Terms in 20.6.8.7 NMAC that are defined but not used in the rule, or that are used only in other definitions, are highlighted, as in AB-SC Exhibit 1.

20.6.8.7 DEFINITIONS

~~**A(1) "Agricultural application"** means the application of reuse water for cultivating the soil and growing crops or irrigating pasture for livestock grazing. Agricultural application includes the use of water in connection with the operation or maintenance of feedlots or animal feeding operations ("AFOs"), but not those activities defined as livestock application.~~

The term "agricultural application" is not used in the proposed rule. It should be deleted. If the Commission retains this definition, it should delete the acronym in parentheses, ("AFOs"), because the acronym is not used elsewhere in the proposed rule.

A(2) "Application" means a final disposition of a treated wastewater for reuse. Applications include~~, but are not limited to~~ industrial, agricultural, direct potable, indirect potable, recreational turf, rangeland, or ecological restoration water reuse. ~~Applications may have effluent criteria to protect ground water, surface water, and aquatic health.~~

The qualifier "but are not limited to" is not necessary because the term "include" or "includes" is not limiting. In the last few years, the Legislative Council Service has been deleting the words "but not limited to" where it appears after the word "including" (or similar wording) in new laws and amended laws. *See* LCS, p. 187. The last sentence is not definitional, but is regulatory, and therefore should not be in a definition. Also, the last sentence – applications "may have effluent criteria" – is indeterminate such that it is meaningless.

~~**C(1) "Commercial application"** means the application of reuse water in connection with any activity that provides, or offers to provide, goods or services for incidental use, such as but not limited to car washes, laundry facilities, window washing, chemical mixing, where public access is not restricted or limited.~~

The term "commercial application" is not used in the proposed rule. It should be deleted.

~~**D(3) "Direct potable application"** means the delivery of purified water to a drinking water plant or a drinking water distribution system without an environmental buffer. Additional treatment, monitoring, or an engineered buffer would be used in place of an environmental buffer to provide equivalent protection of public health and response time if the purified water does not meet specifications.~~

Replace with:

P(4) "Potable application" means the delivery to a drinking water plant or a drinking water distribution system of reuse water that has been purified to remove all contaminants.

The Department's proposed definition for "direct potable application" is problematic in several respects. It needs to be revised.

First, there does not seem to be a meaningful or useful distinction between "direct" and "indirect potable application" in the context in which they are used, *i.e.,* in feasibility studies for domestic wastewater in 20.6.8.201 NMAC. The two definitions distinguish between water delivered without an "environmental buffer" but perhaps with "additional treatment, monitoring, or an engineered buffer" (direct potable application) and reclaimed wastewater delivered with "an intermediary environmental or constructed buffer." The water entering the water system must be purified, regardless whether the water is applied directly or indirectly, or whether there is an environmental buffer, an engineered buffer, or no buffer at all. The term "buffer," moreover, while partially defined in the proposed definition of "environmental buffer," 20.6.8.7.E(1) NMAC, remains quite vague. It is also not clear what an "engineered buffer" or a

"constructed buffer" is because the terms are not defined. Thus, I propose replacing the definitions of "direct potable application" and "indirect potable application" with one definition of "potable application," which would be moved to 20.6.8.7.P NMAC, and I propose using the term "potable application" wherever the terms "direct" and "indirect potable application" occur. I also propose deleting the references to buffers. I therefore propose a new definition for "potable application."

Second, the Department proposes defining "direct potable application" as delivering "purified" water to a drinking water plant or distribution system. The word "purified" is not defined, and its meaning is unclear. The dictionary definition of "purify" means "to make pure" such as "to clear from material defilement or imperfection."[26] Accordingly, I propose clarifying the word "purified" by adding the phrase "to remove all contaminants." That phrase is consistent with the dictionary definition, and uses terminology from the water quality rules.

Third, the "water" that is to be "purified," I believe, is reclaimed wastewater, referred to in the Department's proposed definition for "indirect potable application." That point needs clarification, as I have suggested.

Fourth, the last sentence in the Department's proposed definition of "direct potable application" is not a definition at all. It is – or appears to be – a substantive regulatory requirement, albeit a vague one. It should not be used in a definition. *See* LCS, p. 53; Kuney, p. 93; Martineau, p. 71; Temple-Smith, p. 333; Dickerson, p. 15-52; US GSA; OFR. Moreover, the last sentence of the proposed definition is also vague and difficult to understand. It is not clear what is meant by "equivalent protection of public health." Presumably, it means the water must be "purified," but that is already stated in the first sentence, so the last sentence is at best

[26] MERIAM WEBSTER'S COLLEGIATE DICTIONARY 1010 (11th ed. 2004).

redundant, at worst confusing. The term "response time" in the context of a "potable application" is also unclear and particularly puzzling. And it is not clear what is meant by "purified water" not meeting "specifications." If the "purified water does not meet specifications," it has not been "purified" in the first place. For all these reasons, I recommend deleting the last sentence of the definition.

The definition of "direct potable application" is very unclear and laden with confusing terms. It would be most difficult if not impossible to interpret, apply, and enforce. The definition should be revised, following my recommendations, to be clear and concise.

~~**D(5) "Discharge plan"** as defined in 20.6.2 NMAC.~~[27]

The term "discharge plan" is not used in the proposed rule. Throughout the proposed rule, the Department most often uses the term "discharge permit," and correctly so, not "discharge plan." For example, proposed 20.6.8.201.A NMAC states that the Department shall not "approve a discharge permit or a discharge permit modification". "Discharge permit" is defined in 20.6.8.7.D(4) NMAC as "in 20.6.2 NMAC," which in turn defines "discharge permit" as "a discharge plan approved by the department." 20.6.2.7.D(3) NMAC. As these terms are generally used, the applicant submits a discharge plan, and the Department then approves and issues a discharge permit. The term "discharge permit" is thus the more accurate and appropriate term as it is used in the proposed rule, preferable to "discharge plan."

In the proposed rule, the Department also uses the anomalous term "discharge permit plan." Proposed 20.6.8.400.A(3) NMAC states, "The department shall not approve a discharge permit plan or a discharge permit plan modification that includes the discharge of untreated

[27] Section 20.6.2.7.D(6) NMAC defines "discharge plan" as "a description of any operational, monitoring, contingency, and closure requirements and conditions for any discharge of effluent or leachate which may move directly or indirectly into ground water."

produced water." The Department proposes the same sentence in 20.6.8.400.A(4) NMAC, which applies to treated produced water. The term "discharge permit plan" is not used in the Water Quality Act and, to my knowledge, it is not used anywhere in the Commission's regulations.

I recommend that the term "discharge permit" should be used consistently throughout the proposed rule. The definition of "discharge plan" in proposed 20.6.2.7.D(5) NMAC should be deleted. And the third term, "discharge permit plan," used in the proposed rule at 20.6.8.400.A(3) and (4) NMAC, should be replaced with "discharge permit."

~~**D(6) "Discharge site"** as defined in 20.6.2 NMAC.~~

This term "discharge site" is not used in the proposed rule. It should be deleted.

~~**E(1) "Environmental buffer"** means any ground water, streams, lakes, or impoundments used for reuse water storage or conveyance purposes related to an indirect potable application.~~

The term "environmental buffer" is not used in the proposed rule, except in the definition of "direct potable application" at 20.6.8.7.D(1) NMAC. Terms are usually not defined solely for use in another definition. *See* LCS, pp. 53, 55.

As alluded to previously, the significance of the term "environmental buffer" is unclear. The word "buffer" suggests that an "environmental buffer" would serve to help protect the water system from contaminants, but the definition does not indicate that is the case. Moreover, since water delivered to a drinking water system must be "purified," the significance of a buffer is puzzling. Another similarly enigmatic term that is used in the proposed rule, but which is not defined, is "engineered buffer." These terms are confusing and, so far as I can tell, unnecessary.

I recommend deleting the terms "environmental buffer" and "engineered buffer" from the proposed rule. This deletion would also render the distinction between "direct potable

application" and "indirect potable application" meaningless. As I stated earlier I recommend that the definitions of "direct potable application" and "indirect potable application" be replaced with a single term, "potable application."

> **F(1) "Feasibility study"** means a study conducted by a person to determine if a new or modified domestic wastewater treatment technology will be technically, economically, or financially viable for use in a ~~direct or indirect~~ potable application.

I recommend using "potable application" instead of "direct or indirect potable application" for the reasons I explained previously in the discussion of "direct potable application" at 20.6.8.7.D(3) NMAC.

> ~~**F(2) "Flood irrigation application** means land application of reuse water by ditches, furrows, pipelines, low flow emitters, and other non-sprinkler methods.~~

This term "flood irrigation application" is not used in the proposed rule. It should be deleted.

> ~~**F(3) "Flowback water"** means the fluid returned after the hydraulic fracturing process is completed, where the internal pressure of the rock formation causes fluid to return to the surface through the wellbore. Flowback water is a component of produced water.~~

The term "flowback water" is not used in the proposed rule, except in the definition of "produced water" at 20.6.8.7.P(5) NMAC. Terms are usually not defined solely for use in another definition. *See* LCS, pp. 53, 55. Moreover, the precise meaning of this term is unimportant to the definition of "produced water" and to the overall proposed rule. The definition is therefore not necessary and should be deleted. *See* Martineau, p. 70.

> ~~**F(4) "Food crop application"** means application of reuse water to domestic plants which are produced for the purpose of or may be used in whole or in part for, consumption by people or livestock, including, but not limited to nursery, root, seedstock to be used for the production of food crops.~~

The term "food crop application" is not used in the proposed rule. It should be deleted.

~~**F(5) "Formation water"** means water that occurs naturally within the pores of rock.~~

The term "formation water" is not used in the proposed rule, except in the definition of "produced water" at 20.6.8.7.P(5) NMAC. Again, terms normally should not be defined solely for use in another definition. *See* LCS, pp. 53, 55. Moreover, the precise meaning of this term is unimportant to the definition of "produced water" and to the overall proposed rule. The definition is therefore not necessary and should be deleted. *See* Martineau, p. 70.

H(1) "Hydraulic fracturing" means a technique that fractures a rock formation by pumping large quantities of fluids at high pressure down a wellbore and into the target rock formation, which ~~that~~ stimulates the flow of natural gas or oil, increasing the volumes that can be recovered. ~~Fractures are created. Hydraulic fracturing fluid, also referred to as fracking fluid, commonly consists of water, proppant, and chemical additives that open and enlarge fractures that can extend several hundred feet away from the wellbore. This technique is generally used in unconventional oil and gas production.~~

The definition of "hydraulic fracturing is awkwardly worded. The last two sentences are unnecessary to the definition.[28] I recommend rewording the definition and deleting the last two sentences.

~~**I(1) "Indirect potable application"** means the application of water for drinking water purposes with an intermediary environmental or constructed buffer.~~

As I explained previously, the distinction between "direct potable application" and "indirect potable application" turns on the existence or nonexistence of a "buffer" – an

[28] It is well understood that the fractures created through use of hydraulic fracturing in horizontal drilling can extend much longer than "several hundred feet away from the wellbore," but can extend thousands of feet. That explanatory reference should be deleted as inaccurate. Indeed, in the Permian Basin, horizontal wells with 3-mile-long laterals are becoming routine. Stephen Rassenfoss, The Trend in Drilling Horizontal Wells Is Longer, Faster, Cheaper, JPT, https://jpt.spe.org/the-trend-in-drilling-horizontal-wells-is-longer-faster-cheaper, retrieved April 11, 2024.

"environmental buffer" an "engineered buffer," or a "constructed buffer." The distinction is elusive. Any potable application, whether buffered or not, must be "purified," that is, all contaminants must be removed. Moreover, this definition uses the term "constructed buffer," whereas the proposed definition of "direct potable application" uses the term "engineered buffer." 20.6.8.7.D(3) NMAC. Presumably, these terms have the same meaning, but neither term is defined, and the varying terminology compounds the lack of clarity. Again, I suggest eliminating the distinction between "direct" and "indirect potable application," as I do not believe this is a meaningful distinction. A definition of "potable application" should suffice. And I suggest deleting the references to buffers – "environmental buffers," "engineered buffers," and "constructed buffers" – as the terms are confusing, vague, and serve no real purpose in the proposed rule.

~~**I(2) "Industrial application"** means the application of reuse water in any activity that is used in connection with industrial processes, such as alternative energy, hydrogen production, cooling water, process/boiler feeds, utility power plants, chemical plants, and metal working facilities where at a minimum, public access is restricted or limited.~~

The term "industrial application" is not used in the proposed rule. It should be deleted.

I(3) "Industrial project" means a reuse water project that does not discharge to ground or surface water and that is used in connection with industrial processes, such as alternative energy, hydrogen production, cooling water, process/boiler feeds, utility power plants, chemical plants, and metal working facilities where ~~at a minimum,~~ public access is restricted or limited.

I recommend clarifying the "discharge" referred to in the definition of "industrial project" is a discharge "to ground or surface water" since "discharge" is not a defined term. The qualifier "at a minimum" serves no relevant purpose in the definition or the rule. There is no explanation of other requirements that would apply. I recommend removing the qualifier.

~~**I(4) "Injection"** as defined in 20.6.2 NMAC~~

The only time the word "injection" is used in the proposed rule is in 20.6.8.400.B(1)(h)

NMAC. That provision specifies several options for the disposal of produced water from a demonstration project or an industrial project, one of which is "discharge to a produced water disposal well permitted pursuant to the oil conservation commission's regulations for oil and gas *injection* at 19.15.26 NMAC." 20.6.8.400.B(1)(h) NMAC (emphasis added). Thus, 20.6.8.400.B(1)(h) NMAC effectively "defines" or explains the term "injection" in place. It does so by referencing specific Oil Conservation Commission rules, not the more general definition at 20.6.2.7.I(2) NMAC A formal definition, referencing the water quality rules at 20.6.2 NMAC – or, more precisely, 20.6.2.7.I(2) – is both unnecessary and confusing. I recommend that the definition of "injection" be deleted.

~~**I(5) "Irrigation application"** means application of reuse water to land areas to foster plant growth.~~

The term "irrigation application" is not used in the proposed rule. It should be deleted.

~~**L(1) "Land application"** means the application of reuse water to the ground surface in which no other application has been assessed and to which the application or run-off does directly or indirectly enter a surface or ground water of the state.~~

The term "land application "is not used in the proposed rule. It should be deleted.

~~**L(2) "Livestock application"** means the application of reuse water for the consumption of water for the care and feeding of domestic animals such as cattle or horses. Livestock application does not include the use of water in connection with the operation or maintenance of feedlots or agricultural application of water.~~

The term "livestock application" is not used in the proposed rule. It should be deleted.

~~**N(1) "National Pollutant Discharge Elimination System"** means the federal program for issuing, modifying, revoking, and reissuing, terminating, monitoring, and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of the federal Clean Water Act. The NPDES program is administered by the United States Environmental Protection Agency (EPA) in the State of New Mexico.~~

The proposed definition of "National Pollutant Elimination System" is unnecessarily long

and complex. Moreover, the term "National Pollutant Discharge Elimination System" is used only in the proposed definition of "NPDES permit" at 20.6.8.7.N.3 NMAC. A term generally should not be defined if it is used only in another definition. *See* LCS, pp. 53, 55.

Because the second term, "NPDES permit," is used only once in the proposed rule, at 20.6.8.201.B(1)(d) NMAC, the better drafting approach is simply to define or explain the term in place. *See* Martineau, p. 70; Dickerson, p. 150; US GSA. I suggest that 20.6.8.201.B(1)(d) NMAC be rewritten to provide that a discharger obtain approval for a feasibility study from the Department for a discharge permit or "from the U.S. Environmental Protection Agency through a national pollutant discharge elimination system permit pursuant to section 402 of the Clean Water Act." This phrasing, fewer than 25 words, adequately and concisely substitutes for the cumbersome definitions of "National Pollutant Discharge Elimination System" and "NPDES permit." Indeed, NPDES permits are referred to with some frequency in both 20.6.2 and 20.6.4 NMAC, but are not defined. *E.g.,* 20.6.2.2001, 20.6.2.2003, 20.6.2.3105.F, 20.6.2.4105.C, 20.6.4.12.G, 20.6.4.13.F(5), 20.6.4.16, 20.6.4.126, 20.6.4.319.C NMAC. The meaning of NPDES permits in those two parts is clear and unambiguous, and neither the Department nor the Commission has ever seen a need to define the term.

~~**N(2) "NTU"** means nephelometric turbidity units, measured by a nephelometer.~~

The term "NTU" is not used in the proposed rule. It should be deleted.

~~**N(3) "NPDES permit"** means a national pollutant discharge elimination permit which is an authorization, license, or equivalent control document issued by the authorized permitting entity to implement the requirements of the federal program as identified in 40 C.F.R. Sections 122, 123, and 124.~~

I discussed my recommendation to delete "NPDES permit" as a defined term previously in the context of the term "National Pollutant Elimination Discharge System" at 20.6.8.7.N(1)

NMAC.

P(3) "Potable" means ~~describes~~ water that meets state water quality standards at 20.7.10 NMAC and is otherwise suitable for human consumption.

It is unclear why the Department proposes to use the word "describes" instead of "means" to introduce the definition of "potable." The word "means" is used for all the other definitions in the proposed rule. To be consistent and to avoid any confusion, the word "means" should be used. Moreover, water that is "suitable for human consumption" must, at a minimum, meet applicable drinking water standards. I therefore recommend adding that clarification.

P(4) "Potable application" means the delivery to a drinking water plant or a drinking water distribution system of reclaimed wastewater that has been purified to remove all contaminants.

I recommend adding a definition for "potable application" instead of using the definitions of "direct or indirect potable application" for the reasons above in the discussion of "direct potable application" at 20.6.8.7.D(3) NMAC.

~~**P(4) "Pretreatment"** means the reduction, elimination, or alteration of pollutants in wastewater prior to or in lieu of discharging into a publicly owned treatment works (POTW) or other wastewater treatment facility. The reduction or alteration may be obtained by physical, chemical, or biological processes, process changes, or by other means. Appropriate pretreatment technology includes control equipment, such as equalization tanks or facilities, for protection against volumetric or pollutant surges or load variations that might interfere with or otherwise be incompatible with the treatment facility.~~

The term "pretreatment" at 20.6.8.7.P(4) NMAC is used only in the definition of "National Pollutant Elimination System." Again, terms should usually not be defined if they are used only in another definition. LCS, pp. 53, 55. Further, the term is not important or relevant in the context of the proposed rule, and the proposed definition is unnecessarily complicated. I therefore recommend that it be deleted.

P(5) "Produced water" means a fluid ~~(wastewater)~~ that is an incidental byproduct from drilling for or the production of oil and gas, and includes

formation water, flowback water, and any chemicals added downhole during drilling, production, or maintenance processes during the life cycle of an oil or gas well. Produced water includes known and unknown water pollutants.

The proposed definition of "produced water" includes a parenthetical, "(wastewater)," inserted after the word "fluid," which may create some confusion. I suggest simply using the word "fluid," which is consistent with the definition in the Water Quality Act: "a fluid that is an incidental byproduct from drilling or the production of oil and gas." NMSA 1978, § 74-6-2(S) (2019).[29]

~~**R(2) "Recycled produced water"** means produced water that is reconditioned by a recycling facility permitted or registered with the oil conservation division of the energy, minerals, and natural resources department, and is reused within the oil and gas industry for the exploration, drilling, production, treatment or refinement of oil and gas.~~[30]

The term "recycled produced water" is not used in the proposed rule. It should be deleted.

~~**R(3) "Restoration application"** or **"ecological application"** means the use of water for the implementation of ecological or environmental restoration activities permitted under applicable state and federal regulations.~~

The terms "restoration application" and "ecological application" are not used in the proposed rule. The definition should thus be deleted. Aside from that, the rule should not use two terms with the same definition.

R(4) "Reuse water" means a treated wastewater originating from domestic, industrial, or produced water sources that has undergone a level of treatment appropriate for an application such as agriculture, irrigation, potable water supplies, aquifer recharge, industrial processes, or environmental restoration. Reuse water has a water quality, based on application, determined to be protective of the environment and human health. For purposes of this Part,

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[29] The Produced Water Act contains an identical definition. NMSA 1978, § 70-13-2(B).

[30] Note that the Produced Water Act defines "recycled produced water" as "produced water that is reconditioned by a recycling facility permitted or registered with the oil conservation division of the energy, minerals, and natural resources department." NMSA 1978, § 70-13-2(C).

reuse is categorized by the source of the water. ~~(e.g., "domestic reuse" is wastewater originated from domestic sources following appropriate treatment that may be used for various applications such as irrigation).~~

The parenthetical at the end of the definition refers to terms and concepts not used in the proposed rule. I suggest deleting it.

~~**T(1) "Transference"** means the distribution, temporary storage, or disposal of reuse water.~~

The term "transference" is only used in the definitions of "treatment" at 20.6.8.7.T(4) NMAC and "wastewater" at 20.6.8.7.W(4) NMAC. A term, generally should not be defined if it is used only in another definition. *See* LCS, pp. 53, 55. Rather, the phrase "distribution, temporary storage, or disposal" should be incorporated into the definitions of "treatment" and "wastewater."

Additionally, the definition of "transference" is confusing because it is defined contrary to its common meaning, which is not good drafting practice. *See* Kuney, p. 93; Martineau, pp. 70-71; Temple-Smith, pp. 333-34. "Transference" means "an act, process, or instance of transferring: conveyance, transfer."[31] However, the Department proposes that "transference" take on contrary meanings -- of "temporary storage" and "disposal."

~~**T(3) "Treated wastewater"** means wastewater that has undergone treatment.~~

The term "treated wastewater" is only used in the definitions of "application" at 20.6.8.7.T(2) NMAC and "reuse water" at 20.6.8.7.R(4) NMAC. Again, a term should not be defined if it is used only in another definition. LCS, pp. 53, 55. Moreover, the definition is circular: treated wastewater means wastewater that has been treated. It is a tautology that provides no useful information. It should be deleted.

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[31] Error! Hyperlink reference not valid. MERIAM WEBSTER'S COLLEGIATE DICTIONARY 1328 (11th ed. 2004).

T(4) "Treatment" means a process in which wastewater has been reconditioned by biological, mechanical, or chemical processes to remove or eliminate contaminants, creating an effluent that can be returned to the water cycle either through discharge, transfer, temporary storage, disposal, ~~transference,~~ or reuse.

As I explained previously, in discussing the proposed definition of "transference" at 20.6.8.7.T(1) NMAC, the words "transfer, temporary storage, [and] disposal" should be substituted for the word "transference in the definition of "treatment." I also recommend using the word "transfer" instead of "transference" as it is clearer and simpler.

~~**U(1) "Untreated produced water"** means produced water that has not undergone treatment.~~

A definition of "untreated produced water" is unnecessary for much the same reasons a definition of "treated wastewater" is unnecessary. It is circular, tautological, and provides no useful information. It should be deleted.

~~**U(2) "Untreated wastewater"** means wastewater that has not undergone treatment.~~

The term "untreated wastewater" is only used in the definitions of "domestic wastewater" at 20.6.8.7.D(8) NMAC. A term should not be defined if it is used only in another definition. *See* LCS, pp. 53, 55. Moreover, as with the proposed definitions of "treated wastewater" and "untreated produced water," the definition of "untreated wastewater" is circular, tautological, and provides no useful information. It should be deleted.

W(1) "Water contaminant" means any substance that, if discharged or spilled, could alter the physical, chemical, biological or radiological qualities of water. "Water contaminant" does not mean source, special nuclear or by-product material as defined by the Atomic Energy Act of 1954, but may include all other radioactive materials, including ~~but not limited to~~ radium ~~and accelerator-produced isotopes~~.

There is some confusion in the definition of "water contaminant." Both the Water Quality Act and 20.6.2.7 NMAC define "water contaminant" as:

> . . . any substance that, if discharged or spilled, could alter the physical, chemical, biological or radiological qualities of water. "Water contaminant" does not mean source, special nuclear or by-product material as defined by the Atomic Energy Act of 1954 . . . .

NMSA 1978, § 74-6-2(B); 20.6.2.7.W(3) NMAC. The definition in 20.6.4.7 NMAC adds the phrase "but may include all other radioactive materials, including but not limited to radium and accelerator-produced isotopes." 20.6.4.7.W(2) NMAC. The Department proposes using that same definition, from 20.6.4 NMAC, in 20.6.8 NMAC. However, both the existing definition of "water contaminant" at 20.6.4.7.W(2) NMAC, and the Department's proposed definition at 20.6.8.7.W(1) NMAC, incorrectly refer to "accelerator produced isotopes" as subject to state regulation. In the Energy Policy Act of 2005, Congress amended the definition of "byproduct material" in the Atomic Energy Act of 1954 to include "any material that has been made radioactive by use of a particle accelerator."[32] Consequently, accelerator-produced isotopes are now regulated under the Atomic Energy Act, and state regulation is pre-empted. To address this problem, the Commission could adopt the definition of "water contaminant" as the Department has proposed it in 20.6.8.7.W(1) NMAC, but delete the words "and accelerator produced isotopes." Or the Commission could adopt the definition of "water contaminant" in 20.6.2.7 NMAC, which is accurate, but does not expressly state that "all other radioactive materials" including "radium" are subject to state regulation.

As discussed earlier, the qualifier "but not limited to" is not necessary.

> **W(2) "Water pollutant"** as defined in 20.6.4.7 NMAC. ~~means a water contaminant in such quantity and of such duration as may with reasonable probability injure human health, animal or plant life or property, or to unreasonably interfere with the public welfare or the use of property.~~

The term "water pollutant" is defined at 20.6.4.7.W(3) NMAC as the Department

[32] 42 U.S.C. § 2014(e)(3)(B) (2024).

proposes here. When defining terms in proposed 20.6.8 NMAC that are already used in Commission regulations, the Department's practice is to refer to that existing definition. This is acceptable practice and ensures consistency within Commission regulations. Therefore, I recommend for consistency with the rest of 20.6.8 NMAC that the definition of "water pollutant" also refer back to the existing definition at 20.6.4 NMAC.

> **W(4) "Wastewater"** means water or other fluids associated directly with sewerage systems, industrial processes, or produced water that is disposed of, or undergoes treatment for discharge, transference, or reuse. Wastewater in this Part does not include dairy "wastewater" as defined in 20.6.6 NMAC.

The defined term in 20.6.6.7.B(29) NMAC is "wastewater," not "dairy wastewater." The term should be placed in quotation marks to accurately identify the cross-reference.

> **20.6.8.100 GENERAL PROVISIONS:** Unless otherwise required by this Part, all persons are subject to the state's Ground and Surface Water Protection Regulations at ~~(~~20.6.2 NMAC~~)~~. ~~This includes, but is not limited to, regulations relating to spills, notices of intent, permitting, fees, penalties, compliance orders, and abatement.~~

There is no need to refer to specific topic areas in 20.6.2 NMAC, which includes more topic areas than identified. This superfluous sentence should be deleted, and so should the unnecessary parentheses.

> **20.6.8.101 UNAUTHORIZED APPLICATIONS OF PRODUCED WATER:** The department shall not approve a discharge permit or a discharge permit modification that includes the discharge to ground or surface water of produced water for potable applications.

Although the proposed rule clearly states that produced water may not be discharged so that it might move directly or indirectly into groundwater or surface water, 20.6.8.400.A NMAC, the proposed rule is not as clear that produced water may not be used in potable applications, although that appears to be the Department's intent. I therefore recommend adding a new section 101 to 20.6.8 NMAC to make that prohibition clear.

20.6.8.201 ~~DIRECT AND INDIRECT~~ POTABLE APPLICATIONS FOR DOMESTIC WASTEWATER:

A. Unauthorized applications. The department shall not approve a discharge permit or a discharge permit modification that includes the discharge of reuse water for ~~direct or indirect~~ potable applications except for those authorized applications identified in Subsection B of 20.6.8.201 NMAC.

B. Authorized applications.

(1) Feasibility studies: Persons proposing to conduct a feasibility study for ~~direct or indirect~~ potable applications for domestic wastewater shall:~~;~~

(a) Comply with all applicable permitting requirements in 20.6.2 and 20.6.4 NMAC.

(b) Ensure there is no connection between a potable water system and the water being studied and no cross connections exist between feasibility study-water and a community's potable water supply.

(c) Ensure that all ~~direct and indirect~~ potable reuse feasibility studies are conducted in a manner that does not interfere with ongoing operations at the wastewater and drinking water facilities.

(d) Obtain approval from the department~~,~~ through ~~either~~ a discharge permit or from the U.S. environmental protection agency through a national pollutant discharge elimination system permit pursuant to section 402 of the Clean Water Act ~~NPDES permit~~ and comply with all conditions therein.

I recommend four changes to proposed 20.6.8.201 NMAC. First, I recommend revising the provision to clarify that it only authorizes feasibility studies using domestic wastewater, and that it does not authorize feasibility studies using produced water. This limitation is not clear as 20.6.8.201 NMAC is currently written. I recommend adding the words of "domestic wastewater" to the title of the section and in 20.6.8.B(1) NMAC. Second, consistent with my previous recommendation, I recommend using the term "potable applications" and deleing the terms "direct" and "indirect potable applications." Third, I recommend adding a phrase to define in place "NPDES permit," for the reasons I discussed previously for the definition of "National Pollutant Discharge Elimination System" at 20.6.8.7.N(1) NMAC. Fourth, this provision, as proposed, reads that the Department approves NPDES permits. But the Department does not approve NPDES permits, at least not until New Mexico receives delegation of the NPDES

permit program. Until that happens, EPA issues NPDES permits in New Mexico and the Department certifies compliance of those permits with State and federal water quality standards. *See* 20.6.2.2001, 20.6.2.2002 NMAC.

> **20.6.8.400 PRODUCED WATER REUSE:** As provided in the Water Quality Act, Subsection P of Section 74-6-4 NMSA 1978, and the Produced Water ~~Oil and Gas~~ Act, ~~NMSA 1978,~~ Subsection B of Section 70-13-3 NMSA 1978, the following provisions apply to the discharge of produced water for activities unrelated to the exploration, drilling, production, treatment, or refinement of oil or gas.

Both the Water Quality Act and the Produced Water Act define the extent of the Commission's authority with respect to produced water as "unrelated to the exploration, drilling, production, treatment, or refinement of oil and gas." I recommend adding a citation to the Water Quality Act and revising the citation to the Oil and Gas Act to correctly cite the Produced Water Act.[33]

> **20.6.8.400.A(3) Untreated produced water discharge to ground water:** No person shall cause or allow untreated produced water to discharge so that it may move directly or indirectly into ground water. The department shall not approve a discharge permit ~~plan~~ or a discharge permit ~~plan~~ modification that includes the discharge of untreated produced water.

I recommend deleting the word "plan" in this paragraph for the reasons I explained in my previous discussion of the proposed definition of "discharge plan" at 20.6.8.2.D(5) NMAC.

> **20.6.8.400.A(4) Treated produced water discharge to ground water:** No person shall cause or allow treated produced water to discharge so that it may move directly or indirectly into ground water. The department shall not approve a discharge permit ~~plan~~ or a discharge permit ~~plan~~ modification that includes the discharge of treated produced water. ~~without development and adoption of standards specific to treated produced water (Subsection D of 20.6.8.400 NMAC). Demonstration projects or industrial projects submitted to the department through the notice of intent process in Subsection C of 20.6.8.400 NMAC are authorized to operate, following the determination of no discharge permit required issued by~~

[33] *See* NMSA 1978, § 70-13-1 (2019) ("Sections 1 through 5 [70-13-1 to 70-13-5 NMSA 1978] of this act may be cited as the 'Produced Water Act'.").

~~the department.~~

I recommend deleting the last phrase of the second sentence of proposed 20.6.8.400.A(4) NMAC. While 20.6.8.400.A(4) NMAC would generally prohibit the Department from issuing a ground water discharge permit for treated produced water, this phrase would allow the Department to do so upon "the development and adoption of standards specific to treated produced water." This provision is problematic for a number of reasons. Most importantly, it is entirely speculative. It is possible that the Department might at some point develop standards governing treated produced water and that the Commission might adopt such standards, but it is by no means certain. No such standards have yet been developed, proposed, or adopted. Moreover, because this provision references standards that do not exist – and may never exist – it is likely to create confusion if it is included in a final rule. And the provision is completely unnecessary; it is surplusage that adds to the length and complexity of the proposed rule while serving no regulatory purpose.

I also recommend deleting the last sentence of proposed 20.6.8.400.A(4) NMAC. This sentence simply reaffirms that demonstration projects and industrial projects approved through the notice of intent process in 20.6.8.400.C NMAC are authorized. As such, the sentence is redundant and unnecessary. Subsections B and C of 20.6.8.400 NMAC are clear, specific, and detailed as to the requirements that demonstration and industrial projects must meet. Such projects may not discharge to ground or surface water. 20.6.8.400.B(1) NMAC. Applicants must provide detailed information ranging from the water quality of the produced water to how the produced water will be transported, stored, treated, and disposed of. *Id.* The applicant must file a notice of intent with the Department detailing how the produced water will be handled, how spills will be prevented, and the financial assurance in place to cover the cost of any

cleanup. 20.6.8.400.C NMAC.

For all these reasons, I recommend that this superfluous language in 20.6.8.400.A(4) NMAC should be deleted.

In addition, I recommend deleting the word "plan" in this paragraph for the reasons set forth in the discussion of deleting the definition for "discharge plan" at 20.6.8.2.D(5) NMAC.

20.6.8.400.B Authorized applications.
20.6.8.400.C Notice of intent.

I have a few minor suggestions for proposed 20.6.8.400.B and C NMAC. I recommend that the word "demonstration" in "demonstration projects" not be capitalized, as it is throughout that subsection. And I make noted formatting changes to citation of NMSA at 20.6.8.400.B.(1)(a) and (g) NMAC, along with a deletion of parentheses at 20.6.8.400.B.(1)(h) NMAC.

20.6.8.400.C(1)(a) Notice of intent.

(1) Any person intending to use produced water for an authorized application under Subsection B of 20.6.8.400 NMAC shall submit to the ground water quality bureau of the department a produced water notice of intent prior to use.

(a) Notices shall be on a form provided by the department and shall include the following information:

(i) the name and address of the person intending to conduct the demonstration project or industrial project;

(ii) the location of the intended ~~D~~demonstration project or industrial project;

(iii) an estimate of the concentration of water contaminants in the produced water used in the demonstration project or industrial project;

(iv) the quantity of produced water used in the produced water used in the demonstration project or industrial project;

(iii) the ~~D~~demonstration project or industrial project research plan and objectives;

(iv) documentation that the ~~D~~demonstration project or industrial project design is consistent with the approved applications in Subsection B of 20.6.8.400 NMAC;

(v) the storage, secondary containment and spill prevention methods that will be used to prevent accidental discharges;

(vi) a plan to transport in and transport out any untreated produced water or treated produced water in a safe manner, in accordance with state and federal regulations;

(vii) plans for safe handling and proper disposal of produced water and any materials that come into contact with untreated produced water or treated produced water, including soils, plant material, treatment equipment, and containment area materials;

(viii) the health and safety considerations that minimize the risk of human exposure to produced water via any exposure pathway; and

(ix) financial assurance in place to cover the cost of cleanup and remediation in the event of failure during operation and closure of the ~~D~~demonstration project or industrial project.

I recommend making a clarification to proposed 20.6.8.400.C(1)(a) NMAC, which lists the requirements for a notice of intent for demonstration and industrial projects. Under proposed 20.6.8.400.B(1)(c) NMAC, persons wanting to conduct a demonstration or industrial project must submit a notice of intent to the Department "[i]n accordance with 20.6.2.1201 NMAC . . . ." Thus, as I understand it, the person would need to provide all information required in 20.6.2.2101 NMAC, including both the concentration of contaminants and the quantity of water in the potential discharge. 20.6.2.2101.C(4), (5) NMAC. Because those two pieces of information are not listed as required in proposed 20.6.8.400.C(1)(a) NMAC, but the other information required in 20.6.2.2101.C NMAC is, it is not clear whether concentration and quantity are required to be submitted to the Department. Yet the concentration and the quantity are critically important information. I therefore recommend adding these two pieces of information to clarify they must be submitted in a notice of intent to use produced water for an authorized application.

~~**D. Effluent quality. [RESERVED]**~~

I recommend deleting the "reserved" subsection at proposed 20.6.8.400.D. Reserved sections are used in the proposed rule to designate section numbers where there will likely be

future amendments creating new sections, especially new interstitial sections needing a "placeholder." In this case, it is uncertain whether the Department will propose "effluent quality" standards or other "standards specific to treated produced water," as suggested in proposed 20.6.8.400.A(4) NMAC. Moreover, the proposed "reserved" provision is subsection D, the final subsection of section 20.6.8.400 NMAC. There is no need for an interstitial placeholder. I recommend deletion of the "reserved" subsection entitled "effluent quality."

I declare under penalty of perjury that the foregoing testimony is true and correct.

Charles de Saillan — April 15, 2024

Charles de Saillan — Date

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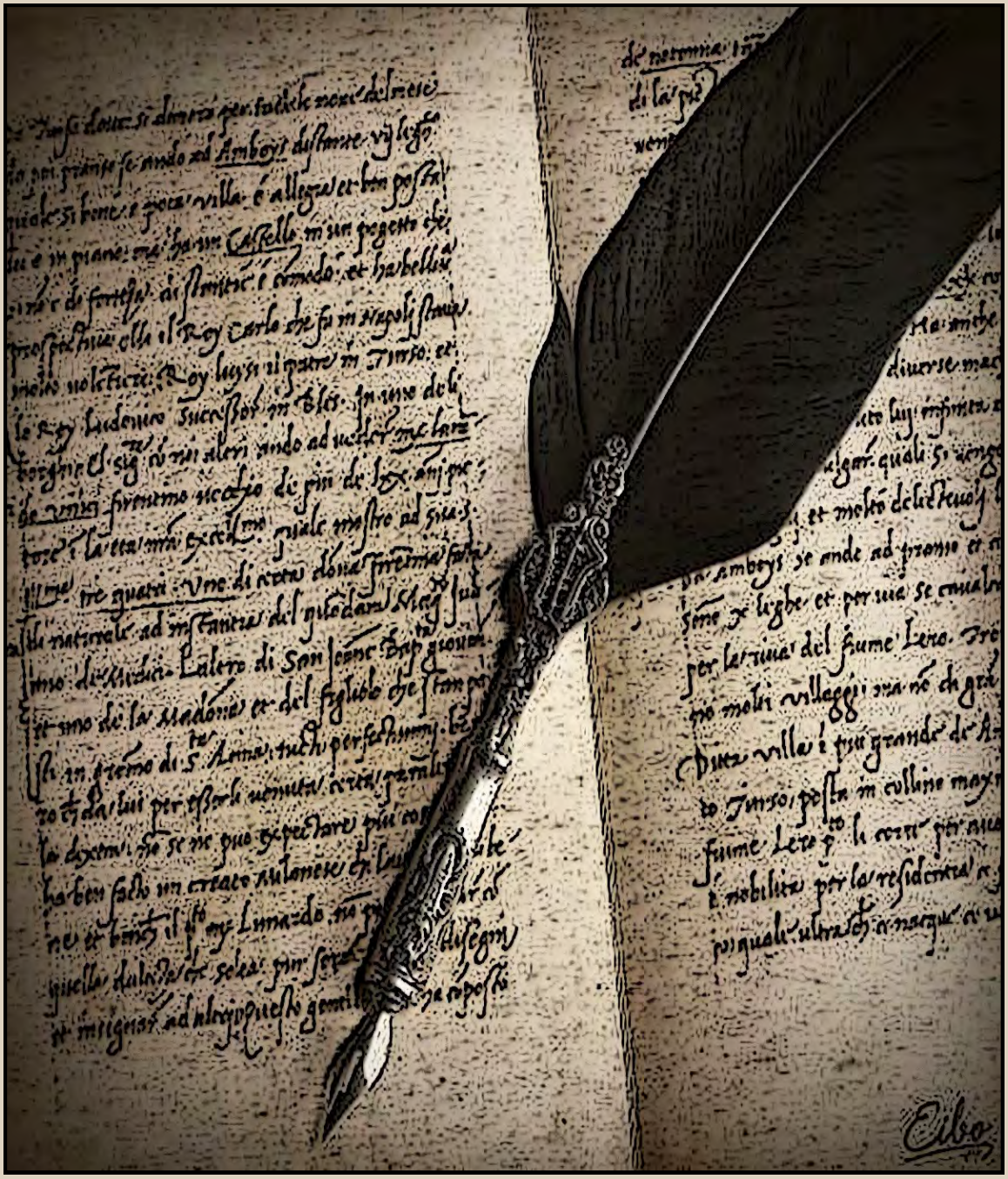
AB-SC EXHIBIT 7

LEGISLATIVE DRAFTING MANUAL



AB/SC Ex. 7

Legislative Drafting Manual

Legislative Council Service

September 22, 2015

AB/SC Ex. 7

Legislative Drafting Manual

Legislative Council Service

411 State Capitol

Santa Fe, New Mexico 87501

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Legislative Drafting Manual

Legislative Council Service

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Be consistent in the arrangement of comparable provisions. Arrange provisions in the same way as provisions are arranged in sections of the bill containing similar material.

Avoid gender-based language. Use gender-neutral terms when possible, such as "worker" for "workman" or "drafter" for "draftsman". Avoid gender-based pronouns by omitting them, rewriting the sentence or repeating the noun.

Use definitions sparingly. Other than administrative terms, which are defined for ease of use, a word should be defined only if the drafter is actually adding to or subtracting from the ordinary dictionary meaning of the word, since it is superfluous to enact into law the common dictionary meaning. In constructing a definition, the drafter is cautioned against straying from the path of logical thought. Perhaps a deviation from such logic produced this definition of a new building: "any building pulled or burnt down to or within ten feet from the surface of the adjoining ground". Another example in New Mexico law defined a motor boat as "any vessel propelled, or designed to be propelled, by sail".

Take care when drafting powers and duties. A duty could be incomplete without some form of sanction. To require an act without the sanction could undercut the effectiveness of the law. Penalties should be sufficient but not excessive, and they should bear some relevance to the degree of the offense. Ensure that penalties do not duplicate or conflict with other penalties.

Write general provisions to apply in most cases. Most requests are for general legislation. It is not possible to anticipate all exceptions or to preempt all legal arguments. The drafter is urged to resist the temptation to write an answer to every possible imagined argument against the bill; it makes for tortured writing and unreadable legislation.

Consider separation of powers. The drafter who puts administrative detail in a bill may create a separation of powers problem. The New Mexico Supreme Court has ruled that the New Mexico Legislature cannot impinge on the executive management function. Thus, the drafter should avoid micromanagement in legislation. Usually, the goal of legislation is to require a state agency or an entity to dot its "I"s and cross its "T"s, not how to draw the dot and

Drafters are reminded that **amendment by reference is prohibited by the Constitution of New Mexico**. The New Mexico Supreme Court has ruled that only procedural law may be adopted by reference. This rule is not always as clear-cut as drafters would like; distinguishing between substantive and procedural provisions may be difficult in certain cases.

Drafters are also reminded that the purpose of bill drafts is to clearly inform members of the legislature, and the public, what changes to the law are proposed. Drafters should endeavor to limit the reader's need to research other statutes, or even other pages of the bill, to understand the provisions of a given section. For example, a drafter should define a term in the section in which it is used or in the definition section of the short title act to which it applies, instead of sending the reader to another act or chapter to find the defined term's meaning. (An exception to this practice would be the use of references to federal citations and defined terms.)

Cross-Reference Citations

In a cross-reference or internal citation in the text of a bill, use the Comp number without any history (being Laws). Review the following example.

Example: Citation to Comp Number — No "Being Laws"

". . .pursuant to the provisions of Section 45-6-4 NMSA 1978"

When citing an entire chapter or article of the NMSA 1978, the following form is correct:

Example: Citation to Chapter and Article

"… pursuant to Chapter 5, Article 23 NMSA 1978"

If citing to the section level, the cite is:

Example: Citation to Section

"… pursuant to Section 5-23-56 NMSA 1978"

When citing to a subdivision of a compiled section, the following example should be followed.

Example: Citation to Subdivision of a Compiled Section

"… pursuant to Subsection A of Section 5-23-56 NMSA 1978"

act" or "Sections 1 through 8 of this act" must be converted to the actual Comp numbers in order to include the new section.

For example, to add a new section to the Per Diem and Mileage Act, it is also necessary to amend the short title section to make sure that the reference will include the new section. There are two acceptable ways to change a short title. Review the following examples. The first example is preferred where possible because it is a broader reference, which alleviates the need for future amendment, and it does not require the assignment of a Comp number to the new section. Its use, of course, depends on how the short title act fits in the Comp.

Example: Short Title Conversion — All-Inclusive Reference — Preferred

```
15      SECTION 1.  Section 10-8-1 NMSA 1978 (being Laws 1963,
16 Chapter 31, Section 1, as amended) is amended to read:
17      "10-8-1.  SHORT TITLE.--[~~Sections 10-8-1 through 10-8-8~~]
18 Chapter 10, Article 8 NMSA 1978 may be cited as the "Per Diem
19 and Mileage Act"."
```

Example: Short Title Conversion — Specific Reference — Narrow

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15      SECTION 1.  Section 10-8-1 NMSA 1978 (being Laws 1963,
16 Chapter 31, Section 1, as amended) is amended to read:
17      "10-8-1.  SHORT TITLE.--Sections 10-8-1 through [~~10-8-8~~]
18 10-8-9 NMSA 1978 may be cited as the "Per Diem and Mileage
19 Act"."
```

Short Title and Application of Definitions

Once a section is made part of a short title act, the definitions of the act apply to that section. Conversely, an act's definitions do not apply to sections of law outside the confines of that act.

Definition Sections

A definition section should be drafted when certain terms used in an act need to be defined or when it is desirable to substitute a single word for a long phrase that will be used many times. If a term is used in only one section, it may be defined in that section. The following guidelines should be used when drafting definitions.

Do not define words that are being used in their normal dictionary meaning. Unnecessary or superfluous definitions cloud meaning.

Do not put substantive law in a definition section. The problems caused by having substantive law in the definition section are both immediate and long lasting. The most obvious problem with legislating in the definition section is that no one will think to look for it there. This can cause unnecessary problems with amendments, as well as enforcement of the law.

List defined terms alphabetically. When creating a definition section, the drafter should resist the temptation to list definitions hierarchically; the drafter will find that, more often than not, other people will not agree with or even understand such a schema. Drafters are encouraged to maintain the alphabetical order of existing definition sections even when adding definitions by amendment. However, they must be sensitive to highly litigious areas of law, heavily amended definition sections and overly cross-

Definition Drafting Key Points

- ♦ Do not define words that are being used in their normal dictionary meaning.
- ♦ **Do not put substantive law** in a definition section.
- ♦ List defined terms alphabetically.
- ♦ Enclose defined terms in quotation marks.
- ♦ Place each definition in its own subdivision.
- ♦ Use the verb "means" and "includes" in the singular.
- ♦ If the definition is restrictive, use the word "means".
- ♦ If the definition is extensive, use the word "includes".
- ♦ Do not use "but is not limited to".
- ♦ Do not define "act" or "federal act".
- ♦ Do not define acronyms or abbreviations.
- ♦ Define administrative terms.
- ♦ Do not define terms that are not used in the bill.
- ♦ Do not define terms solely to use them in another definition.

referenced acts to ensure that they are not causing more harm than good when opting to reorder an existing definition section.

Enclose defined terms in quotation marks. Whatever is within the quotation marks must be the **precise** term that will be used in the bill. A different grammatical form of the defined term is allowed if the sentence structure requires, but if the precise term is not used predominantly, the drafter needs to rewrite the term.

Place each defined term in its own subdivision. Usually, each defined term occupies its own subdivision, that is subsection or paragraph, in a single definition section, but there are rare exceptions. Extensive codifications may have individual sections for each definition or series of definitions, particularly when a single definition section is several pages long and is frequently amended. The Motor Vehicle Code, which has close to 150 defined terms, has 21 definition sections, based on alphabetical order, to make it easier to change or add definitions.

Use the verb "means" and "includes" in the singular. Whether the defined word is singular, plural or collective, the verb "means" or "includes" always remains singular.

If the definition is restrictive, use the word "means"; if the definition is extensive, use the word "includes". If it is necessary to exclude a meaning from an extensive definition, add the phrase "but does not include".

Do not define "act" or "federal act". It is not acceptable drafting style to define "act" or "federal act" to avoid using a long short title.

Do not define acronyms or abbreviations. It is not acceptable drafting style to define acronyms or use other abbreviations in the law, except for "a.m.", "p.m." and "NMSA" and, in certain sections, "DWI".

Define administrative terms. For example, define "department", "division", "board", "commission", "fund" and similar terms. Beware of defining a word that crosses governmental

lines. For example, defining "agency" to mean both a state agency and a municipal agency can cause untold — and unnecessary — problems in future amendments. Similarly, the drafter must ensure that a definition of "agency" does not inadvertently encompass legislative or judicial agencies if the scope of the term is intended to include executive agencies only; such an oversight can create separation of powers issues.

Do not define terms that are not used in the bill. This sometimes occurs when a drafter defines terms in the beginning of the drafting process that the drafter believes will be used in the act, but are not actually used in the completed bill draft or are subsequently removed from the bill. The drafter must remember to remove such terms from the definition section.

Do not define terms solely to use them in another definition. A defined term may be used in another definition; this is particularly prevalent with administrative terms. Do not use circular definitions.

Context of Defined Terms

The definition section does not need to state that the definitions "control unless the context requires otherwise"; that is understood.

Rules of Statutory Construction

The drafter must be familiar with the definition of "person" in the Uniform Statute and Rule Construction Act. "Person" will need to be defined in the bill if the drafter wants a definition other than that in the statutory construction act. Unlike the old statutory construction act, the new law is not permissive. The usual definitions of "person" include both natural (individuals) and artificial (corporate) persons; therefore, the drafter should not try to distinguish individuals from entities in the text. This is one of the best examples of the admonition against using synonyms in the law. There may be rare occasions when there is a legitimate reason to differentiate between person and individual, but the drafter would have to change the normal definition of person to accommodate the differentiation. Every drafter should be familiar with all of the terms defined in the Uniform Statute and Rule Construction Act.

Example: Definition Section

```
      SECTION 3.  [NEW MATERIAL] DEFINITIONS.--As used in the
Fish Act:
          A.  "department" means the department of game and
fish;
          B.  "fingerling" means a fish shorter than six inches
in length;
          C.  "fish" includes both game fish and nongame fish,
but does not include carp;
          D.  "fund" means the fish replenishment loan fund;
          E.  "hatchery" means a fish farm licensed by the
department and the federal department of the interior; and
          F.  "poaching" means the taking of fingerlings from a
lake or stream in the state by someone other than a department
representative.
```

Like the title of the bill, it is a matter of personal preference whether the definition section is drafted first or last. Perhaps the easiest way is to write the common or known definitions first, then leave the section open to revise, add or delete defined terms as the bill is drafted.

If a bill draft is conformed before introduction, the drafter should check to see if the revisions have necessitated the removal of a definition because it is no longer used or if the material added by revision requires a new defined term. The same is true of a bill that is amended after introduction. An amendment to strike an existing defined term or insert a new defined term may be necessary.

"Herein", "Hereinbefore", "Hereinafter", "Above" and "Below"

Words and phrases such as "herein", "hereinbefore", "hereinafter", "above", "below", "the preceding section", "the following section" and the like will lose meaning even quicker than "this act". Absent a direct order from the requester, there is no instance when these words are acceptable in bill drafting.

"Including, But Not Limited To"

There is no need to write "including but is not limited to"; the word "including" implies an incomplete listing. Put another way, "including" or "includes" includes the concept of "not limited to".

Commonly Misused Words

There are a number of words that are commonly misused.

Examples: Misused Words

"Utilize" means to use something in a new and different way; most times, "use" is the correct word.

"Presently" means future; "at present" or "currently" means now.

"Insure" means insurance; "ensure" means to make certain.

The phrase "ex officio" indicates only that a person holds one office by virtue of holding another office. A law saying that "the governor is ex-officio president of the state board of finance" is unnecessary and simply means that any person holding the office of governor automatically becomes president of the State Board of Finance.

The phrase does not restrict any powers or duties of an officer while serving in the officer's ex-officio capacity; in particular, the phrase has nothing to do with the ability to vote. The drafter must specify that the ex-officio member cannot vote if that is the intent. Often, the phrase is not needed, because it is a given that the person serves ex officio — if the *governor* is president of the State Board of Finance, it is obvious that the *person* changes with who holds the office of governor.

British Spelling

Avoid the use of British spelling. "Canceled", "traveler" and the like should be spelled with one "l". "Judgement" should be spelled "judgment" without the middle "e".

Use quotation marks on new sections that are being assigned Comp numbers or new sections that are being inserted in an existing short title act or a chapter or article of the NMSA 1978. **That is, use quotation marks on sections if the lead-in ends with a colon.**

Example: New Material Lead-In and Quotation Marks

```
21        SECTION 23.  A new section of the Drafting Act is enacted
22  to read:
23        "[NEW MATERIAL] QUOTATION MARKS--WHEN USED.--
```

Use quotation marks when defining or referring to a term in a definition section or other section if there is no definition section.

Example: Defined Term and Quotation Marks

```
1             D.  "shopper" means all persons who shop within the
2   exterior boundaries of the state, but "shopper" does not
    include residents of the state who shop by catalogue;
```

Use quotation marks in first stating the short title of an act or the name of a department, board, commission, program, position, fund or other thing created by an act.

Examples: Creations and Quotation Marks

```
13        SECTION 1.  [NEW MATERIAL] SHORT TITLE.--This act may be
14  cited as the "Good Examples Act".
```

```
 7        SECTION 10.  [NEW MATERIAL] PROBATE CODE COMMITTEE
 8  CREATED.--The "Probate Code committee" is created as a joint
 9  interim committee of the legislature.
```

```
 7        SECTION 11.  [NEW MATERIAL] INSURANCE PUBLICATIONS
 8  REVOLVING FUND CREATED.--The "insurance publications revolving
 9  fund" is created in the state treasury.
```

AB-SC EXHIBIT 8

STATE OF NEW MEXICO
WATER QUALITY CONTROL COMMISSION

No. WQCC 20-51(R)

In the Matter of:

PROPOSED AMENDMENTS TO
STANDARDS FOR INTERSTATE AND
INTRASTATE SURFACE WATERS,
20.6.4 NMAC

TRANSCRIPT OF PROCEEDINGS

BE IT REMEMBERED that on the 1st day of March, 2022, this matter, Triennial Review, came on for Deliberations and Decision at the New Mexico State Capitol, 490 Old Santa Fe Trail, Room 322, before STEPHANIE STRINGER, Chairperson for the Water Quality Control Commission, commencing at the hour of 9:00 a.m.

REPORTED BY:

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A P P E A R A N C E S

For the Water Quality Control Commission:

STEPHANIE STRINGER, Chairperson
GABRIEL WADE, Vice-Chairperson
KEITH CANDELARIA, Commissioner
DAVID CERTAIN, Commissioner
LARRY DOMINGUEZ, Commissioner
KRISTA McWILLIAMS, Commissioner
KIRK PATTEN, Commissioner
KELSEY M. RADER, Commissioner
DAVID M. SYPHER, Commissioner
BRUCE THOMSON, Commissioner (via WebEx)
EDWARD VIGIL, Commissioner

For the Commission:

ROBERT SANCHEZ, Commission Counsel
Office of the Attorney General

PAMELA JONES, Commission Administrator
MADAI CORRAL, Commission Administrator

Okay. The next item is including the definition of "baseflow." Any comments or deliberations on this proposed definition?

Commissioner Dominguez?

COMMISSIONER DOMINGUEZ: Madam Chair, more of a question, and I'm going to pose it to the Commission again. This term was proposed and as it was pointed out by some of the parties, the definition that's being proposed is not actually used within this particular NMAC.

When you go to the state record center's guidelines on developing NMAC's, definitions are stipulated for words that are used within a rule. So my question for the Commission, although I know there gets to be overlap with NMAC's the Environment Department and this Commission oversees, my question is, is it a good practice for us to start branching out and defining things or placing things within definitions that are not actually utilized within the NMAC?

So it's more of a question comment that we're -- we're somewhat butting heads with state rule center's policy on NMAC development.

(Phone ringing.)

COMMISSIONER DOMINGUEZ: Sorry.

CHAIRPERSON STRINGER: Did that conclude your comment?

COMMISSIONER DOMINGUEZ: Yes.

CHAIRPERSON STRINGER: Thank you, Commissioner.

Commissioner Certain?

COMMISSIONER CERTAIN: Madam Chair, I -- in this instance, I think I have to agree with Commissioner Dominguez. My contracts analyst, who I've worked with for 13 years would have my head if she -- if she knew I was supporting putting a definition in a rule when the word doesn't even exist in the rule. We're being technical here. I'm just not sure the Environment Department made a good enough case for how adding the definition will help -- will help with implementation of the water quality standard. Maybe we needed to go into more detail about that, but I just -- I just can't get past putting this definition in when it doesn't really help clarify water quality standards.

CHAIRPERSON STRINGER: Thank you, Commissioner Certain.

Any other comments?

I looked into this matter as well, and I do agree that technically speaking, including a definition that is not used in the regulations is somewhat problematic. I think it brings clarity to the application of how we determine compliance with water quality standards, but that doesn't necessarily mean it's appropriate to include

in the regulations.

I think there are other alternatives to incorporate it into the water quality management plan, continuing planning process. As well as, as NMED noted, they've incorporated the definition into the document that describes how it's applied. So I -- I agree that technically speaking this is not the appropriate place for it; although, again, I want to comment that it would bring clarity and consistency to how the term is used across the broad spectrum of implementing the water quality standards.

With that, do I have a motion?

COMMISSIONER SYPHER: I don't know who -- Madam Chair, I don't know who I'm actually asking this question of, but is there a place that would be a much better placement of this in a definition section or appendix?

CHAIRPERSON STRINGER: Commissioner, so the proposal is to incorporate it into the definitions of the water quality standard. I might be misunderstanding your question.

COMMISSIONER SYPHER: Yes. With no reference to this section it's intended to effect? Is that -- do I understand that correctly?

I mean, there's no place to refer to this specifically.

CHAIRPERSON STRINGER: Correct. It is not used anywhere else in the water quality standards.

COMMISSIONER SYPHER: Okay. Thank you.

CHAIRPERSON STRINGER: Thank you.

COMMISSIONER THOMSON: Madam Chair, this is Commissioner Thomson.

CHAIRPERSON STRINGER: Yes, Commissioner Thomson.

COMMISSIONER THOMSON: I agree with you, that I think this would be much more appropriate in the water quality management plan or the CPP. And so, therefore, I would make a motion that we do not include the definition of baseflow into the water quality standards.

VICE-CHAIR WADE: Commissioner and Madam Chair, I would second that motion, and only modify it to the extent that the numbering does get affected later because of this proposal. So I would second that we reject this, as well as the renumbering within the section.

CHAIRPERSON STRINGER: Okay. So that's a modified motion. Do I have a second for the revised motion?

COMMISSIONER DOMINGUEZ: Second.

CHAIRPERSON STRINGER: Okay.

Pam, shall we have a roll-call vote, please.

ADMINISTRATOR JONES: Uh-huh. Commissioner Candelaria?

COMMISSIONER CANDELARIA: Yes.
ADMINISTRATOR JONES: Commissioner Certain?
COMMISSIONER CERTAIN: Yes.
ADMINISTRATOR JONES: Commissioner Dominguez?
COMMISSIONER DOMINGUEZ: Yes.
ADMINISTRATOR JONES: Commissioner McWilliams?
COMMISSIONER McWILLIAMS: Yes.
ADMINISTRATOR JONES: Commissioner Mody?
Commissioner Musharrafieh?
Commissioner Patten?
COMMISSIONER PATTEN: Yes.
ADMINISTRATOR JONES: Commissioner Rader?
COMMISSIONER RADER: Yes.
ADMINISTRATOR JONES: Commissioner Sypher?
COMMISSIONER SYPHER: Yes.
ADMINISTRATOR JONES: Commissioner Thomson?
COMMISSIONER THOMSON: Yes.
ADMINISTRATOR JONES: Commissioner Timmons?
Commissioner Vigil?
COMMISSIONER VIGIL: Yes.
ADMINISTRATOR JONES: Vice-Chair Wade?
VICE-CHAIR WADE: Yes.
ADMINISTRATOR JONES: Chair Stringer?
CHAIRPERSON STRINGER: Yes.
ADMINISTRATOR JONES: The motion passes.

threats to our water quality, such as climate change, and we need to make sure we're very clear in that purpose and the standards. Thank you.

Okay. The next item up for consideration is 20.6.4.7 (E) NMAC, effluent dominated. And it's adopting the definition of effluent dominated. (E) 2, I should say. Open the floor for deliberations.

Commissioner Certain?

COMMISSIONER CERTAIN: Thank you, Madam Chair. I oppose including this definition in the surface water quality standards because the term "effluent dominated" is not used anywhere else outside of potentially the definition section of this rule. Further, there was concern by other parties, including Amigos Bravos, that including this definition could somehow lead to lesser protections.

I think there are a variety of reasons for not including this definition, and I oppose it. Thank you.

CHAIRPERSON STRINGER: Thank you, Commissioner Certain.

Commissioner McWilliams?

COMMISSIONER McWILLIAMS: I also opposes this definition for the same reasons.

CHAIRPERSON STRINGER: Thank you.

I think for consistency sake, given how we ruled

earlier, I think it's appropriate that we do not adopt a definition into the standards that is not actually used in the standards. And I open the floor for a motion on this item.

COMMISSIONER CERTAIN: Madam Chair, I move to reject including the definition for effluent dominated in the rule.

VICE-CHAIR WADE: Madam Chair, I would second that motion.

CHAIRPERSON STRINGER: Thank you.

Pam, roll-call vote, please.

ADMINISTRATOR JONES: Yes. Commissioner Candelaria, how do you vote?

COMMISSIONER CANDELARIA: Yes.

ADMINISTRATOR JONES: Commissioner Certain?

COMMISSIONER CERTAIN: Yes.

ADMINISTRATOR JONES: Commissioner Dominguez?

COMMISSIONER DOMINGUEZ: Yes.

ADMINISTRATOR JONES: Commissioner McWilliams?

COMMISSIONER McWILLIAMS: Yes.

ADMINISTRATOR JONES: Commissioner Mody?

Commissioner Musharrafieh?

Commissioner Patten?

COMMISSIONER PATTEN: Yes.

ADMINISTRATOR JONES: Commissioner Rader?

COMMISSIONER RADER: Yes.
ADMINISTRATOR JONES: Commissioner Sypher?
COMMISSIONER SYPHER: Yes.
ADMINISTRATOR JONES: Commissioner Thomson?
COMMISSIONER THOMSON: Yes.
ADMINISTRATOR JONES: Commissioner Timmons?
Commissioner Vigil?
COMMISSIONER VIGIL: Yes.
ADMINISTRATOR JONES: Vice-Chair Wade?
VICE-CHAIR WADE: Yes.
ADMINISTRATOR JONES: Chair Stringer?
CHAIRPERSON STRINGER: Yes.
ADMINISTRATOR JONES: Madam Chair, the motion passes.
CHAIRPERSON STRINGER: Thank you.

Okay. The next item up for consideration is incorporating the definition of emerging contaminants. This one is somewhat related to an item further -- further in the text of the standards, and so I think we can proceed with having the discussion on the definition, but it is related to the other item, so this one is a little bit harder to manage, but we'll proceed with deliberating the definition first, and see how it intersects with the other proposal. So I open the floor for deliberation.

Commissioner Dominguez?

AB-SC EXHIBIT 9

STATE OF NEW MEXICO
BEFORE THE WATER QUALITY CONTROL COMMISSION

IN THE MATTER OF PROPOSED NEW
RULE 20.6.8 NMAC – *Ground and Surface Water Protection - Supplemental Requirements For Water Reuse* No. WQCC 23-84 (R)

NEW MEXICO ENVIRONMENT DEPARTMENT,
WATER PROTECTION DIVISION,

Petitioner.

REBUTTAL TESTIMONY OF CHRISTOPHER LEWIS, D.Sc.

Q: Please state your name.

A: My name is Christopher Lewis.

Q: Dr. Lewis, you submitted direct testimony on behalf of Amigos Bravos and Sierra Club in this proceeding?

A: Correct. I supplied testimony in support of a prohibition against discharge of treated and untreated produced water to ground and surface waters in New Mexico.

Q: **Would you please summarize the opinions you will provide in this rebuttal testimony?**

A: I provide rebuttal statements in response to the direct testimonies of Robert Balch, Rick McCurdy, and Michael Hightower. I believe these individuals' testimonies each disregard the potential human and environmental health risks associated with produced waters, particularly those associated with unknown constituents in produced waters, and the individuals make statements related to the safety of produced water that are not supported by the literature on the human and environmental risks associated with produced water. Further, I think some of these individuals' testimonies overstate the anticipated effectiveness of treatment technologies, particularly at industrial scales.

Q: Dr. Lewis, to prepare your rebuttal testimony, what sources did you review?

A: I reviewed the direct testimony from John D'Antonio, Robert Balch, and Rick McCurdy, witnesses for the New Mexico Oil and Gas Association (NMOGA); Michael Hightower; and Lei Hu, from the New Mexico Environment Department (NMED). I also reviewed a journal article referenced in Mr. Hightower's supplemental materials by Jiang et al. (2022). In a number of instances in my rebuttal testimony I reference literature I cited originally in my direct testimony. I also reference two additional resources by the U.S. Environmental Protection Agency (US EPA). A list of the references I cited is provided below, at the end of this rebuttal testimony.

Rebuttal to Balch Testimony

Q: Beginning with the testimony from Dr. Balch, his testimony is:

> **Q: TO YOUR KNOWLEDGE, CAN TREATMENT OF PRODUCED WATER RESULT IN SATISFACTION OF WATER QUALITY STANDARDS?**
>
> **A: Based on our laboratory results and published data, treated produced water via a thermal distillation process can satisfy US EPA water quality standards. The remaining task is to identify if there are other constituents in produced water that should be addressed by water quality standards. These could be addressed by NM regulatory designated tests.**

(NMOGA NOI Ex. 3, Balch Test., NMOGA_000042, ll. 1-6). What is your assessment of his opinion that produced water can be treated to water quality standards promulgated by the US EPA?

A: I will first note that I do not have access to, nor have I reviewed, Dr. Balch's laboratory results, nor does Dr. Balch cite to any publicly available literature, so I cannot speak to what those results do or do not show. That said, my assessment is that Dr. Balch understands that there are constituents in produced water that are harmful to human health or the environment, or should otherwise be regulated, and that he believes that there is at least one treatment technology

that works to reduce concentrations of those constituents below existing US EPA water quality criteria. Discussion of the variability of produced water constituent concentrations and how that might affect treatment is notably absent in Dr. Balch's response to this question, and therefore his answer does not sufficiently address whether treatment of produced water will satisfy water quality standards.

I note as well that Dr. Balch refers only to federal water quality standards and does not address whether he believes New Mexico ground water standards at 20.6.2 NMAC or surface water quality standards at 20.6.4 NMAC can be met.

Q: What is your assessment of Dr. Balch's opinion that the remaining task is to identify if there are other constituents in produced water that "should be addressed by water quality standards"?

A: Dr. Balch acknowledges that produced water may contain constituents that are not addressed by existing water quality standards, implying that more research and work is needed before produced water, untreated or treated, can be discharged to surface or ground water. Dr. Balch also suggests that New Mexico should therefore develop additional water quality standards for these constituents.

Q: What is your assessment of Dr. Balch's opinion that other constituents in produced water, not addressed by US EPA, could be satisfactorily addressed by "NM regulatory designated tests."

A: I do not know what New Mexico regulatory designated tests Dr. Balch is referring to, and he does not identify any such tests. But it seems he is suggesting that NMED could designate an analytical method or methods to measure whether a given constituent meets a theoretical, to-be-determined water quality criterion. The problem with this is that without knowing what

constituents are in produced water and/or whether a given constituent is a hazard, neither US EPA nor NMED can develop a water quality criterion. As I noted in my direct testimony, of the 1,198 chemicals identified as being potentially present in produced water based on the literature reviewed by Danforth et al. (2020), only 24 percent can be identified using standard analytical methods and 56 percent had no corresponding dose-response data available, and even fewer—14 percent—had known toxicity data suitable for risk assessment available (Danforth et al. 2020). So, regulators would have multiple steps to undertake before they could develop water quality criteria for many produced water constituents, let alone designate an analytical method or methods.

NMED witness, Dr. Lie Hu, whose dissertation for her Ph.D. in Environmental Engineering focused on produced water treatment and toxicity assessment, provided detailed testimony on the characteristics of produced water and the range of potential treatment technologies (NMED NOI Ex. 5, Hu Test., p. 2, ll. 18-20; p. 9, l. 15 – p. 29, l. 13). She concluded that:

> To date, there is still a lack of robust data concerning the characterization of raw and treated PW, treatment methodologies, effluent quality, and the management of treatment waste streams. Given the variability and unknowns, the Department has determined that allowing the discharge of treated or untreated produced water into the environment is premature and cannot currently be done in a way that complies with the Water Quality Act.

(*Id.* at p. 30, ll. 11-15). There is no indication based on the testimony from Dr. Hu that there are New Mexico "regulatory designated tests" that can identify water contaminants in treated produced water sufficient to satisfy current New Mexico water quality standards, let alone identify water contaminants for standards that are not yet promulgated.

Q: Dr. Balch further testifies:

> **Q: IN YOUR OPINION, IS THERE A VALID BASIS FOR PROHIBITING THE DISCHARGE OF PRODUCED WATER AS PROPOSED IN 20.6.8.400 NMAC?**
>
> **A. No. The composition of produced water varies significantly depending on location and formation geological conditions. There should be a water quality standard to define the specific produced water characteristics prohibited from discharge, but not ALL produced water should be automatically excluded, particularly if it has been cleaned to EPA and NM standards.**

(Balch Test., NMOGA_000045, ll. 4-10). What is your assessment of his opinion that there "should be a water quality standard" for specific characteristics of produced water, but that there should not be a prohibition against discharge of all produced water to ground and surface water?

A: Dr. Balch suggests that standards can and should be developed to address produced water "characteristics", and that as long as those "characteristics" are sufficiently removed through treatment, produced water should be presumed to be safe to discharge. This statement ignores a key factor the New Mexico Water Quality Control Commission (Commission) is required to consider when making regulations: "the character and degree of injury to or interference with health, welfare, environment, and property." NMSA 1978, § 74-6-4(E)(1) (cited in NMED 2024, p. 6). I agree that in an ideal world NMED would be able to identify all of the hazards associated with produced water and regulate those hazards, but that ideal does not accurately reflect what we know and don't know about the constituents in produced water.

What we do know, as I detailed in my direct testimony, is that (1) there are many known and unknown constituents in produced water, (2) toxicity information and standard analytical testing methods for these constituents are lacking, and (3) treating produced water for a subset of constituents will not remove all potential contaminants because different treatment technologies

target different constituents and are not 100 percent effective. Therefore, the potential degree of injury or interference with health, welfare, environment, and property from discharge of produced water to surface water or groundwater is uncertain.

Taking Dr. Balch's opinion at face value, he is suggesting that the Commission should ignore existing data gaps related to the potential toxicity of produced water constituents and take it on faith that some produced water might be clean enough to discharge, either naturally or after treatment for the subset of constituents with existing US EPA water quality criteria. Were the Commission to do this, I do not believe such an action would be protective of human health or the environment.

Q: What is your assessment of Dr. Balch's statement that, "technically, any water can be cleaned to existing or future water quality standards."? (Balch Test., NMOGA_000045, ll. 17-18).

A: In a theoretical abstraction, appropriate water quality standards and tests, as well as treatment methods, could be developed in the future. However, Dr. Balch's statement ignores practical realities related to our understanding of produced water constituents and available treatment technologies in industrial settings related to produced water. Dr. Balch, himself, states in his testimony that work conducted by the "two most active institutions on produced water research" have been working on "emerging" and "pilot-validated" technologies for the treatment of produced water, that he is only aware of three pilot projects, and that he is not aware of any field demonstration projects having been conducted to-date (Balch Test., NMOGA_000041, ll. 8-14).

Rebuttal to McCurdy Testimony

Q: Dr. Lewis, in his testimony, Mr. McCurdy discusses three examples in which he says produced water has been safely discharged to ground or surface water. Those examples are:

- **In Wyoming, where treated produced water from coalbed methane wells, which he acknowledges "is relatively low in total dissolved solids and fairly easy to treat" has been used for agriculture and a water source for livestock and wildlife;**
- **In Arkansas, in which treated produced water was discharged pursuant to a National Pollutant Discharge Elimination Permit to the White River;[1] and**
- **In Pennsylvania, where treated produced water was discharged to the Susquehanna River.**

(NMOGA Ex. 4, McCurdy Test., NMOGA_000047-48). Based in part on these examples, Mr. McCurdy opines that discharge of treated produced water to surface water and the ground has been shown "that it can be done safely." (*Id.* NMOGA_000050). What is your assessment of that opinion?

A: I will start by saying that I am not aware of any publicly available information on the evaluation of human or environmental risks associated with these three examples that might underpin Mr. McCurdy's statements related to safety. Further, Mr. McCurdy does not provide citations to any such studies. I also do not believe that examples of cases of discharge where produced water has been treated to meet permit requirements, has been allowed by another state regulatory agency, or has simply been done before demonstrate that treatment of produced water in a typical industrial setting would be considered safe. In contrast to this anecdotal evidence, I cited to several peer-reviewed studies in my direct testimony that raise significant safety

[1] Mr. McCurdy states that the discharge was discontinued because of a "severe depression in natural gas prices in the 2010s" caused the operator to end treatment. (NMOGA NOI Ex. 4, McCurdy Test., NMOGA_000048).

concerns associated with even permitted discharges of treated produced water. In addition, a 2018 US EPA study specifically evaluating centralized waste treatment facilities treating oil and gas extraction wastes highlighted that treatment efficacy and the human and environmental risks associated with discharge of treated produced water are uncertain (US EPA 2018). The authors of that US EPA study noted that:

> O&G [Oil and gas] wastewaters contain a variety of chemicals, from sources such as HF [hydraulic fracturing] fluid additives, well stimulation and well maintenance activities. In addition, the source formation can contribute various constituents. The chemical concentrations in O&G wastewater…particularly for HF fluids, have not been widely characterized in publicly available literature. Subsequently, researchers have not studied the impacts of these varied chemicals on CWT [centralized waste treatment] treatment abilities or the efficacy of CWT facilities treating those chemicals. Because the HF fluid chemicals in effluent are generally not documented, many constituents have not been tested, and therefore impacts from those chemicals to human health and aquatic life are unknown. (US EPA 2018, p. 9-36).

The report went on to note:

> Additionally, very few of the studies we evaluated here investigated the distance to which impacts extend downstream from CWT outfalls…it is clear that pollutant concentrations decrease as distance from outfall increases and the effluent mixes with the receiving waters. However, more research is needed to better characterize the distance and magnitude of impacts downstream. (US EPA 2018, p. 9-37).

Therefore, I do not find Mr. McCurdy's claims of safety, using three case studies, to be credible.

Rebuttal to Hightower Testimony

Q: Dr. Lewis, Michael Hightower opined that NMED's proposed prohibition on the discharge of treated produced water to "supplement surface or ground water supplies and to limit land applications" "disregards federal regulations and EPA initiatives on produced water . . . and the current scientific data on the safety of treated produced water reuse." (Hightower NOI, Test., p. 2). What is your assessment of that opinion?

A: I disagree with Mr. Hightower's opinion related to federal regulations and US EPA initiatives. Mr. Hightower neither cites to any federal regulations nor discusses in detail any EPA initiatives in his direct testimony to support this statement, and while his supplementary materials in his Exhibit 1 discuss existing federal regulations and US EPA's 2019 National Water Reuse Action Plan (WRAP), they make no mention of how NMED's proposed regulations are inconsistent with them. Further, although the US EPA has undertaken studies related to the potential treatment and reuse of produced water, I am not aware of any specific recommendations on the part of US EPA related to how states should or should not regulate produced water. In fact, US EPA's report titled "Summary of Input on Oil and Gas Extraction Wastewater Management Practices Under the Clean Water Act", which was released after the WRAP, shows that US EPA has not reached any decisions regarding treating produced water as a waste or a resource and acknowledges there is substantial disagreement and concern among stakeholders (US EPA 2020).

With regard to Mr. Hightower's assertions related to the current scientific data on the safety of produced water reuse, I also disagree. As Mr. McCurdy does in his direct testimony, Mr. Hightower provides examples of three case studies and highlights that produced waters have been discharged previously in Pennsylvania, California, and Colorado, which he claims "overwhelmingly" show that produced water can be used safely. The fact that produced waters have been discharged before in other states does not demonstrate that discharge of produced water, either untreated or treated, in a typical industrial setting would be considered safe.

I will note further that the first two studies appear to relate to the use of treated produced water for agricultural purposes. Since Mr. Hightower does not provide any references in his direct testimony to these studies, I was unable to review them and therefore have no opinion on

them. However, since they do not appear to focus on the discharge of produced water to surface or ground water, it is also possible, if not likely, that they do not address potential risks to (and through) surface water and ground water.

Mr. Hightower claims that the third project, described as a pilot project to "supplement water supplies for the Pecos River", "showed that treated produced water was of a better quality than the Pecos River." (Hightower NOI, Test., p. 2). Mr. Hightower does not discuss at all how "better quality" was defined, but supplemental materials provided by Mr. Hightower describe data from a study by Jiang et al. (2022). This study, titled "Characterization of produced water and surrounding surface water in the Permian Basin, the United States", published in the Journal of Hazardous Materials, is NMED Exhibit 140. One of its co-authors is Dr. Pei Xu from the Department of Civil Engineering at New Mexico State University, who is also a co-author on Mr. Hightower's Exhibit 1. Dr. Pei Xu is listed in that exhibit as the Research Director for the New Mexico Produced Water Research Consortium (Hightower NOI, Ex. 1).[2]

The supplemental materials and the Jiang et al. (2022) study describe results from an analysis of 46 produced water samples from five locations and 10 Pecos River samples from one location. A total of 309 analytes were analyzed for in these samples, 91 of which were detected in the produced water samples and 67 of which were detected in the Pecos River samples. Notably, there was not consistent overlap between the compounds identified in the produced water and the river. For example, the authors noted that only six organic compounds were detected in the Pecos River water, whereas 28 organic compounds were detected in the produced water samples (Jiang et al. 2022).

[2] Dr. Pei Xu is also listed as the Associate Director of the New Mexico Produced Water Research Consortium on its website (see: https://nmpwrc.nmsu.edu/leadership-team/leadership-team.html).

The authors of the study also specifically note that "One of the barriers to use treated PW as an alternative water source is the lack of comprehensive chemical characterization of PW quality" (Scanlon et al. 2020b, as cited in Jiang et al. 2022, p. 2). Although the goal of the study is to further the goal of characterization, and it is a clear step forward along that path, both the supplemental materials and the Jiang et al. (2022) paper discuss the measurement of tentatively identified compounds (TICs). Jiang et al. (2022) describe a TIC as a compound that "can be detected by the analysis method, but its identity cannot be confirmed without further investigation" (Jiang et al. 2022, p. 7). The authors then go on to say, "To improve hazard and risk assessment, and reduce concern for reuse of treated PW [produced water], an effort should be made to identify compounds of concern within this unresolved fraction" (US EPA 2020, as cited in Jiang et al. 2022, p. 7).

Mr. Hightower's supplemental materials do not address the human or environmental health risks of these compounds other than to say that the concentration of TICs in the produced water samples they tested were 100 times lower than the concentrations of common organic constituents. However, these common organic constituents, including diesel and gasoline range organics, were present at concentrations ranging from 12 milligrams per liter (mg/L) up to 130 mg/L. TICs were found at concentrations ranging from 280 to 1,000 micrograms per liter (µg/L). The document then claims without evidence that since treatment technologies can decrease contaminant levels (broadly) by orders of magnitude, then TICs would similarly be reduced in concentration.

As with the direct testimony provided by Dr. Balch, the implication of this text is that NMED and the Commission need not worry about unknown contaminants in produced water. I believe that such statements are not rooted in scientific fact or any assessment of the actual or

potential risks associated with exposures to produced water constituents. In fact, there are any number of constituents that can be highly toxic at low concentrations. As a case in point, Jiang et al. (2022) also measured concentrations of 34 per- and polyfluorinated substances (PFAS) compounds in one produced water sample and one Pecos River water sample. While the actual results were equivocal—PFAS compounds were found in the produced water sample, the river water sample, and the blank, suggesting potential contamination—the authors' choice to do this analysis speaks volumes (Jiang et al. 2022). PFAS have only in recent years been the subject of dozens of lawsuits and settlements, are now ubiquitous in the environment, and have recently been the subject of US EPA regulations that have been controversial due to the magnitude of potential societal costs associated with their cleanup. Furthermore, there are thousands of PFAS compounds, only a small fraction of which have approved analytical methods for their detection, and the US EPA has only managed to regulate a small subset of them (US EPA 2024). In fact, US EPA's moves to regulate PFAS were justified using public health and environmental protection concerns raised by the Governor of New Mexico.[3] The immense data gaps on PFAS that persist and plague society are precisely the same data gaps that exist for the vast majority of constituents in produced water—a lack of ability to characterize and reliably measure them and a dearth of data on their toxicity.

Q: Mr. Hightower opines that,

> **Our studies and studies by other states clearly show that pre-treatment, treatment, and post-treatment polishing technologies can be used within a treatment-train approach to effectively and safely treat produced water to meet the current water quality discharge numerical and narrative criteria for applications identified in NMAC 20.6.4.900.**

(Hightower NOI, Test., p. 2). What is your assessment of that opinion?

[3] See Federal Register Vol. 87, No. 171, Tuesday, September 6, 2022, Proposed Rules, p. 54431.

A: Treating water safely and treating water so that it is safe are two different things. Treating produced water to meet current, existing water quality criteria is not the same thing as removing all of the potentially known and unknown hazardous substances. As I stated in my direct testimony, the fact that toxicity information, let alone water quality criteria, do not exist for a significant portion of the compounds identified in produced water means that the potential risks to human health and the environment posed by discharged produced water are unknown.

With regard to Mr. Hightower's statements about the efficacy of treatment technologies, Mr. Hightower again does not cite directly to any specific publicly available studies. So, although I have reviewed some publicly available literature from researchers from the New Mexico Produced Water Consortium, I cannot opine on the specific scientific merits of any of the studies referred to in Mr. Hightower's direct testimony or supplementary materials related to treatment technologies. However, even presuming Mr. Hightower's assertion were true, that multiple treatment trains may successfully reduce produced water constituent concentrations sufficiently to meet New Mexico water quality criteria, Mr. Hightower makes no claims regarding his studies' ability to show that treatment results in concentrations that would meet ground water standards or address constituents for which standards have not been promulgated. Further, the supplementary materials note that the desalination systems conducted at industrial scales they investigated generate effluents that "do carry over some constituents like ammonia, organics, and other constituents that can still be toxic at low concentrations." (Hightower NOI, Ex. 1, p. 23). The discussion then goes on to state clearly that "the Consortium has worked closely with NMSU to conduct **laboratory-scale** treated produced water post-treatment analysis, or polishing step analysis to find approaches to remove any harmful trace constituents in the treated produced water. These include **bench and column tests** of adsorbents like zeolites and

activated carbon, aquatic testing and Microtox testing of removal approaches, green house studies of plant uptake and bioaccumulation in greenhouses, and human cell line testing to assess human impacts." (*Id.;* emphasis added). Therefore, while the New Mexico Produced Water Consortium is clearly conducting valuable and insightful research, I do not believe that their work demonstrates that produced water can be treated in typical industrial settings to a sufficient extent to be protective of human health and the environment when discharged to surface or groundwater.

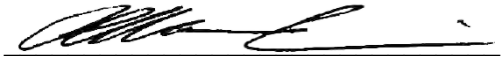
Q: Mr. Hightower states that,

> **It is the best interests of New Mexico to reject (Revised) Proposed New Rule 20.6.8. and either accept the original Proposed New Rule 20.6.8, or simply require that all non-traditional waters - including produced water, be treated to meet the identified numerical and associated narrative discharge standards noted in NMAC 20.6.4.900 for the application required, and add a requirement for WET [whole effluent toxicity] testing of the treated water.**

(Hightower NOI, Test., p. 2). What is your assessment of that opinion?

A: I disagree with this statement. As I have detailed previously in this rebuttal testimony and my direct testimony, treating produced water to meet only existing regulations ignores the potential human and environmental health risks associated with known and unknown produced water constituents. While adding a WET test requirement would provide some additional information about the potential aggregate toxicity of constituents in a given produced water to aquatic life, a WET test alone would not address important human and environmental health factors such as potential harm to humans exposed to the discharged water or the accumulation of contaminants in the environment downstream of the discharge location over time.

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



Christopher Lewis, D.Sc.

May 5, 2024

Date

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AB-SC EXHIBIT 10

STATE OF NEW MEXICO
BEFORE THE WATER QUALITY CONTROL COMMISSION

IN THE MATTER OF PROPOSED NEW
RULE 20.6.8 NMAC – *Ground and Surface Water Protection - Supplemental Requirements For Water Reuse* No. WQCC 23-84(R)

NEW MEXICO ENVIRONMENT DEPARTMENT,
WATER PROTECTION DIVISION,

Petitioner.

REBUTTAL TESTIMONY OF CHARLES DE SAILLAN

Q: Please state your name.

A: Charles de Saillan.

Q: Mr. de Saillan, you submitted direct testimony on behalf of Amigos Bravos and Sierra Club in this proceeding?

A: Yes, I did. I provided written direct testimony in support of proposed revisions to clarify, streamline, and improve the New Mexico Environment Department's (Department) proposed rule from a legal drafting perspective. My direct testimony is AB-SC Exhibit 6.

Q: To prepare this rebuttal testimony, what materials did you review?

A: I reviewed the notices of intent and the testimony and most of the exhibits submitted by the parties to this proceeding. Except I did not review all of the exhibits submitted by the Environment Department. I focused, in particular, on the direct testimony of each of the five Department witnesses, and the direct testimony of each of the three witnesses for the New Mexico Oil and Gas Association (NMOGA).

Q: What testimony will you respond to in rebuttal?

A: In this testimony, I will respond to the Department's testimony supporting definitions for "applications" of reuse water and other terms not otherwise used in 20.6.8 NMAC, its testimony

supporting the definitions of "direct potable application" and "indirect potable application," and its lack of any testimony or evidentiary support for including "industrial projects" as an authorized use. I will respond to testimony from New Energy Economy's witness, Norman Gaume, on the lack of public notice requirements for produced water "notice of intent" proceedings. And, I will respond to several proposed amendments from the New Mexico Oil and Gas Association. I will begin with the Department's testimony.

I. REBUTTAL TO THE DEPARTMENT'S TESTIMONY

A. DEPARTMENT'S PROPOSED DEFINITIONS

Q: Have you prepared any rebuttal to the Department's proposed definitions?

A: Yes, I have. I have several comments in response to the Department's testimony on the definitions in the proposed rule. As in my direct testimony, my recommendations are to delete unnecessary and superfluous definitions in the proposed rule.

Most prominently, the Department proposes defining several terms to distinguish among the various "applications" for reuse water. These terms are:

1. "Agricultural application" at 20.6.8.7.A(1) NMAC,
2. "Commercial application" at 20.6.8.7.C(1) NMAC,
3. "Flood irrigation application" at 20.6.8.7.F(2) NMAC,
4. "Food crop application" at 20.6.8.7.F(4) NMAC,
5. "Industrial application" at 20.6.8.7.I(2) NMAC,
6. "Irrigation application" at 20.6.8.7.I(5) NMAC,
7. "Land application" at 20.6.8.7.L(1) NMAC,
8. "Livestock application" at 20.6.8.7.L(2) NMAC, and
9. "Restoration application" or "ecological application" at 20.6.8.7.R(2) NMAC.

But none of these terms are actually used in the proposed rule. As I explain in my direct

testimony, a term simply should not be defined in a rule if it is not used in that rule.[1]

The Department attempts to justify these proposed definitions through the testimony of Jennifer Fullam, who states that they "will provide definitions for language that Discharge Permits can begin referencing in a consistent manner."[2] Further, Ms. Fullam states, "[t]his will reduce complexity and confusion for permittees and provide consistency in regulatory oversight."[3] But Ms. Fullam does not explain how this will work. She does not indicate – and nothing else in the Department's evidence suggests – that any existing discharge permits contain any of the terms the Department seeks to define. Nor does she explain how any of these terms have been applied inconsistently, have created confusion, or are otherwise in need of definition. Moreover, definitions in the proposed rule, if it is adopted, will define terms in the rule and only in the rule; they will not define or redefine terms in existing permits. The permits contain their own sets of definitions. Even assuming that some existing discharge permits contain a provision generally incorporating all the definitions in the groundwater regulations, any such incorporation would include only those definitions that were in the regulations at the time the permit was issued, not definitions adopted later. The Department's justification for these definitions does not hold up to scrutiny.

If terms need to be defined for purposes of consistent interpretation and implementation of a discharge permit, they should be defined in the permit itself. If any of the existing permits are deficient, the Department can amend them as they come up for renewal. The Department

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[1] Direct Testimony of Charles de Saillan pp. 7-11 (Apr. 15, 2024) (AB-SC Exhibit 6); *see* N.M. Legis. Council Servs. *Legislative Drafting Manual* pp. 53, 55, 56 (2015) (hereinafter *Legis. Drafting Manual*).

[2] Direct Technical Testimony of Jennifer Fullam p. 13 (Apr. 15, 2024) (NMED Exhibit 2).

[3] *Id.*

needs to follow the amendment process established in the regulations; it cannot amend the permits wholesale through a rulemaking. Alternatively, the Department could issue a policy or guidance document explaining precisely how the Department will interpret, implement, and enforce discharge permits for water reuse. Such a document would be much more informative to permittees, future applicants, and interested members of the public than cryptic definitions in a rulemaking.

Thus, the Department's justification for including these "application" definitions in the proposed rule, even though they are not used anywhere in the proposed rule, is deficient. I recommend, as I did in my direct testimony, that each of these nine definitions be deleted.

The Department proposes and attempts to justify several other definitions that should be deleted. In his direct testimony, the Department's witness Jason Herman lists several proposed definitions of terms that he states are "utilized throughout the rule."[4] But three of these terms are used only once or twice in other definitions: "transference," "treated wastewater," and "untreated wastewater." As I explain in my direct testimony, a term generally should not be defined if it is used only in another definition.[5] The term should be explained in the first definition, so the reader is not forced to consult several definitions to discern the meaning of one word. And there are additional reasons why definitions of these three terms are not necessary, as explained in my direct testimony.[6] I recommend that the definitions of these terms be deleted.

Further, another term that Mr. Herman describes as used throughout the proposed rule, "discharge plan," is not used in the proposed rule at all. Again, a term should not be defined if it

[4] Direct Technical Testimony of Jason Herman p. 1 (Apr. 15, 2024) (NMED Exhibit 3).

[5] De Saillan Test. p. 11 (AB-SC Exhibit 6); *see Legis. Drafting Manual* pp. 53, 55.

[6] De Saillan Test. pp. 25, 26 (AB-SC Exhibit 6).

is not used.

The Department offers a justification for defining this unused term, but it is very hard to follow. According to Mr. Herman, "The [D]epartment uses the terms Discharge Permit and Discharge Plan interchangeably in 20.6.2 NMAC, Ground Water Quality Discharge Permits, and in implementation of this proposed supplemental regulation."[7] But that statement is not correct. The terms "discharge permit" and "discharge plan" are not used interchangeably in the groundwater regulations. They have different meanings, as I note in my direct testimony,[8] and as is reflected in their respective definitions in the regulations.[9]

Mr. Herman goes on to state that if the proposed definition is not adopted, "there is potential for confusion to exist in implementation of 20.6.8 NMAC with implications for permitting requirements, monitoring requirements, permit approvals, and public hearing procedures." He then lists several provisions of the regulations that correctly use the term "discharge plan."[10] But he does not explain how such confusion would occur. It seems, perhaps, the Department believes that unless the term "discharge plan" is defined in the proposed rule, certain provisions of the groundwater regulations (that use the term "discharge plan") would somehow be found inapplicable to discharge permits for wastewater reuse. Such a conclusion would be unfounded. It is true the proposed rule reiterates that a groundwater discharge permit must be obtained for reuses of wastewater. But, obviously, it is not necessary to reproduce all of the NMAC provisions governing discharge permits in the proposed rule. Those provisions necessarily apply to all groundwater discharge permits. Likewise, it is not necessary to

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[7] Herman Test. p. 6 (NMED Exhibit 3).

[8] De Saillan Test. at 16 (AB-SC Exhibit 6).

[9] *Compare* 20.6.2.7.D(3) NMAC *with* 20.6.2.7.D(6) NMAC.

[10] Herman Test. p. 6 (NMED Exhibit 3).

reproduce all of the definitions that cover groundwater discharge permits in the proposed rule, especially definitions of terms such as "discharge plan" that do not appear in the proposed rule. Deleting the definition of "discharge plan," as I recommend, will not create confusion. To the contrary, it will reduce confusion by avoiding an unnecessary definition of an unused term.

B. Department's Proposed Distinction Between Direct and Indirect Potable Applications

Q: Have you prepared any rebuttal to the Department's proposed distinction between "direct potable application" and "indirect potable application"?

A: Yes, I have. The Department proposes using the terms "direct potable application" and "indirect potable application." As I explained in my direct testimony, the distinction is meaningless under the proposed rule and should be discarded. I recommend using one term – "potable application" – instead of two.[11] The Department's evidence confirms my recommendation.

In his direct testimony, Mr. Herman explains the meaning of these two terms in the proposed rule.[12] He also explains the meaning of the term "environmental buffer," the concept that distinguishes a direct from an indirect "potable application."[13] But he does not explain why the distinction is a meaningful one, or what the significance of an "environmental buffer" might be under the proposed rule. In support of the Department's proposed distinction, Mr. Herman cites three documents that discuss water reuse, each of which the Department submits as an exhibit:

[11] De Saillan Test. pp. 14-16 (AB-SC Ex. 6).

[12] Herman Test. pp. 18, 21-22 (NMED Ex. 3).

[13] *Id.* at 20.

1. R. Rodes Trussel et al., WateReuse Research Foundation, *Potable Reuse: State of Science Report and Treatment Equivalency Criteria for Treatment Trains* (2013) (NMED Exhibit 84).
2. Caroline E. Scruggs & Catherine M. Heyne, *Extending Traditional Water Supplies with Nontraditional Solutions to Water Scarcity* (2021) (NMED Exhibit 85).
3. AQUAREC, ed., *Handbook on Feasibility Studies for Water Reuse Systems* (Feb. 2006) (NMED Exhibit 86).

The Feasibility Studies Handbook, a European publication, mentions direct and indirect potable uses, but does not discuss the terms in any detail, or explain the differences between the two.[14] Both the Scruggs and Heyne article[15] and the WateReuse Foundation report[16] explain the distinction in greater detail. But neither document sheds any light on why the distinction might be meaningful in the proposed rule. Indeed, the WateReuse Foundation report favorably discusses a report of a committee of the National Research Council[17] that concludes, as I do, that the distinction is not a meaningful one. The WateReuse report is worth quoting at length on this point:

> Potable reuse (PR) is becoming increasingly important as a water supply alternative throughout the United States (U.S.) and the world due to a combination of increased demand and uncertain supply. At the present time, all operating PR projects in the U.S. utilize an environmental buffer between the advanced water treatment (AWT) train and the ultimate consumer. These environmental buffers, which are typically underground aquifers or surface water storage reservoirs, provide additional contaminant mitigation and agency response time. In the past, such projects have been characterized as indirect potable reuse

[14] AQUAREC, ed., *Handbook on Feasibility Studies for Water Reuse Systems* pp. 27, 61 (Feb. 2006) (NMED Exhibit 86).

[15] Caroline E. Scruggs & Catherine M. Heyne, *Extending Traditional Water Supplies with Nontraditional Solutions to Water Scarcity* p. 3, WILEY (2021) (NMED Exhibit 85).

[16] R. Rodes Trussel et al., WateReuse Research Found., *Potable Reuse: State of Science Report and Treatment Equivalency Criteria for Treatment Trains* pp. 2, 13, 124 (2013) (NMED Exhibit 84).

[17] Nat'l Research Council, *Water Reuse: Potential for Expanding the Nation's Water Supply through Reuse of Municipal Wastewater* (2012). The National Research Council is the research arm of the National Academies of Sciences, Engineering, and Medicine.

> (IPR) to contrast them with direct potable reuse (DPR) projects that eliminate the environmental buffer and provide water directly to the user. The recent National Research Council (NRC) Committee stated that it cannot be demonstrated that such "natural" barriers provide public health protection that is not also available by other engineered processes. The Committee went on to conclude that the potable reuse of highly treated recycled water without an environmental buffer is worthy of consideration with the proviso that adequate protection is engineered into the system. *In essence, the Committee recommended that the industry dispense with the terms "direct" and "indirect" and just refer to projects as either potable reuse or nonpotable reuse, commenting that the distinction between indirect and direct potable reuse is not scientifically meaningful to the quality of the final product*.[18]

Elsewhere, the WateReuse report similarly states:

> In the past, such projects have been characterized as indirect potable reuse (IPR) to contrast them with direct potable reuse (DPR) projects that eliminate the environmental buffer and provide water directly to the user. The recent National Research Council (NRC) Committee stated that it cannot be demonstrated that such "natural" barriers provide public health protection that is not also available by other engineered processes. The Committee went on to conclude that the potable reuse of highly treated recycled water without an environmental buffer is worthy of consideration if adequate protection can be engineered into the system. *In essence, the Committee recommended that the industry dispense with the terms "direct" and "indirect" and just refer to projects as either potable reuse or nonpotable reuse*.[19]

I continue to recommend – apparently in accord with the National Research Council – that the proposed rule's distinction between direct and indirect potable applications be discarded. Instead, a single definition of "potable applications" should be used.

C. DEPARTMENT'S PROPOSED "NOTICE OF INTENT" PROCESS

Q: Have you prepared any rebuttal to the Department's proposed procedure for persons proposing a demonstration project or an industrial project to submit a notice of intent?

A: Yes. The Department proposes that a demonstration project or industrial project reusing

[18] WateReuse Found. p. xix (emphasis added) (footnote omitted).

[19] *Id.* at 124 (emphasis added).

produced water is authorized if the Department determines that the project will not result in a discharge of produced water to groundwater or surface water. In addition, the person seeking to conduct the project must submit to the Department a "produced water notice of intent" describing the project. Under the proposed rule, a demonstration project or an industrial project must meet several requirements to be authorized. The Department's witness, Mr. Herman, describes these proposed requirements in his written testimony.[20]

New Energy Economy's witness, Norman Gaume, also discusses these proposed requirements. He is quite critical of the proposed requirements for the potential reuse of produced water, and he makes a number of valid points. For example, proposed section 20.6.8.400.B(1)(e) would require that:

> Persons transporting, storing, treating, or utilizing untreated or treated produced water shall have written procedures at the locations where the Demonstration project or industrial project is physically located to prevent releases onto the ground, directly of indirectly into ground or surface water.[21]

However, as Mr. Gaume correctly points out, the provision does not require the "written procedures" to be made public.[22]

I agree with Mr. Gaume's point, and I note that none of the documents related to the notice of intent are required to be made public. The Department, however, currently publishes all notices of intent for "pilot projects" for produced water on its New Mexico Produced Water website.[23] This is a good practice, and it should be continued. The public has a keen interest in produced water and its use in New Mexico. I therefore recommend that section 20.6.8.400.C of

[20] Herman Test. pp. 27-30 (NMED Exhibit 3).

[21] 20.6.8.400.B(1)(e) NMAC (proposed) (NMED Exhibit 1).

[22] Direct Testimony of Norman Gaume, P.E. pp. 42-43 (Apr. 15, 2024) (NEE Exhibit NEE-A).

[23] *See* https://www.env.nm.gov/new-mexico-produced-water/pilot-projects/.

the proposed rule be revised to require applications for notices of intent, additional information requested by the Department, the Department's determination on the notice of intent, and all written procedures and plans required under section 20.6.8.400.B and C to be published on the Department's website. I recommend the following new provision:

> **20.6.8.400.C(3)** The department shall publish on its website all applications for produced water notices of intent, supplemental information provided by the applicant at the department's request, all written procedures and plans required pursuant to Paragraphs B and C of this Section, and the department's determination.

This proposed revision would address Mr. Gaume's concern regarding the lack of public notice of the "written procedures" that demonstration projects and industrial projects must have in place to prevent discharges to ground and surface waters. It would also inform the public of the entire produced water "notice of intent" process by all individual applicants.

D. DEPARTMENT'S PROPOSED PROHIBITIONS

Q: Have you prepared any rebuttal to the Department's proposed prohibitions on the discharge of treated and untreated produced water?

A: Yes. The Department proposes to prohibit discharge of untreated produced water to surface water; treated produced water to surface water; untreated produced water to groundwater; and treated produced water to groundwater.[24]

Each paragraph of the proposed prohibition would clearly and directly prohibit the discharge of produced water. Each paragraph would also prohibit the Department from certifying a federal permit that allows the discharge of produced water. But there is, inexplicably, a potential exception in the fourth paragraph of the proposed prohibition, the prohibition against the discharge of treated produced water into groundwater. In that paragraph,

[24] 20.6.8.400.A NMAC (proposed) (NMED Exhibit 1).

the Department proposes an additional phrase that would seem to allow such discharges if the Commission has adopted standards for the discharge of treated produced water. The Department also proposes an additional sentence in the fourth paragraph, which states that demonstration projects and industrial projects that follow the "notice of intent process" are authorized if the Department has determined that no discharge permit is necessary. Thus, the proposed fourth paragraph of the prohibition would state:

> **20.6.8.400.A(4) Treated produced water discharge to ground water:** No person shall cause or allow treated produced water to discharge so that it may move directly or indirectly into ground water. The department shall not approve a discharge permit plan or a discharge permit plan modification that includes the discharge of treated produced water *without development and adoption of standards specific to treated produced water (Subsection D of 20.6.8.400 NMAC). Demonstration projects or industrial projects submitted to the department through the notice of intent process in Subsection C of 20.6.8.400 NMAC are authorized to operate, following the determination of no discharge permit required issued by the department*.[25]

In my direct testimony, I recommend deleting the phrase that would allow the discharge of produced water if standards have been adopted.[26] The phrase is entirely speculative, as no such standards have been adopted or proposed or developed, and it is quite likely that such standards will not be adopted in the foreseeable future. The phrase is also unnecessary. Moreover, it is unclear why the Department proposes to include this phrase in the fourth paragraph (prohibiting the discharge of treated produced water into groundwater) but not in the second paragraph (prohibiting the discharge of treated produced water into surface water). The Department does not provide any justification for including this phrase in the prohibition. I continue to recommend that it be deleted.

[25] 20.6.8.400.A(4) NMAC (proposed) (emphasis added) (NMED Exhibit 1).

[26] De Saillan Test. p. 31 (AB-SC Exhibit 6).

In my direct testimony, I also recommend deleting the last sentence, which would provide that "demonstration projects" and "industrial projects" are authorized to operate if they have been submitted to the Department through a "notice of intent," and the Department has determined that no discharge permit is required.[27] The sentence is superfluous and unnecessary. It is also unclear why the Department proposes to include this sentence in the fourth paragraph of the prohibitions and not the other three paragraphs. The Department offers scant support for this sentence. Mr. Herman states simply that "This section also contains the authorizing language in the draft rule which identifies Demonstration Projects as the only possible pathway for untreated and treated produced water outside of the oil and gas industry."[28] But that is clear from subsections B and C of section 20.6.8.400 NMAC. I continue to recommend that this sentence, too, be deleted.

E. DEPARTMENT'S PROPOSED "INDUSTRIAL PROJECTS"

Q: Have you prepared any rebuttal to the Department's proposed provisions authorizing "industrial projects"?

A: Yes. The Department proposes to include "industrial projects" as an authorized reuse of produced water under section 20.6.8.400.A and B of the proposed rule. However, none of the Department's five witnesses provide any support for this proposal. Mr. Herman provides testimony in support of including "demonstration projects" as an authorized use under section 20.6.8.400.B of the proposed rule.[29] He also provides testimony in support of the notice of intent requirements for demonstration projects in section 20.6.8.400.C of the proposed rule.[30] But he

[27] *Id.* at 31-32.

[28] Herman Test. p. 27 (NMED Exhibit 3).

[29] *Id.* at 27-30.

[30] *Id.* at 30-34.

does not provide any testimony in support of industrial projects, nor do any of the other Department witnesses or any of the other parties' witnesses.

Under the Water Quality Act, Commission actions such as promulgation of rules must be supported by "substantial evidence in the record."[31] Without any evidence in the record, the Commission has no basis to include "industrial projects" as an authorized use of produced water under the rule. I therefore recommend that the term "industrial project" be deleted where it appears in section 20.6.8.400.B and C of the proposed rule. I further recommend deleting the definition of "industrial project" at 20.6.8.7.I(3) of the proposed rule, as the term would no longer be used in the body of the proposed rule.

Q: Are your recommendations to include public notice of applications for notices of intent and related documents and deletion of "industrial projects" reflected in AB-SC Exhibit 1 Revised and AB-SC Exhibit 2 Revised?

A: Yes. In AB-SC Exhibit 1 Revised, Amigos Bravos and Sierra Club have revised their proposed changes to the Department's proposed rule. AB-SC Exhibit 2 Revised is a revised clean copy of the Amigos Bravos and Sierra Club proposal. The revised exhibits reflect those revisions.

II. REBUTTAL TO NMOGA'S PROPOSED AMENDMENTS

A. NMOGA'S PROPOSED REVISION TO DEFINITION OF "DEMONSTRATION PROJECT"

Q: Have you prepared any rebuttal to NMOGA's proposed revisions to the definition of "demonstration project" in the proposed rule?

[31] NMSA 1978, § 74-6-7(B)(2); *see Regents of Univ. of Cal. v. N.M. Water Quality Control Comm'n*, 2004-NMCA-073, ¶ 29 (substantial evidence must support Commission adoption of water quality standards).

A: Yes. The New Mexico Oil and Gas Association, or NMOGA, proposes to delete "bench-scale" projects from the definition of "demonstration projects."[32] If the Commission adopts this revision, bench-scale projects involving produced water would not be subject to the "notice of intent" process in section 20.6.8.400.B and C of the proposed rule, which is applicable to demonstration projects. This would be a substantive revision to the proposed rule, but NMOGA provides no testimony to support it. I recommend that the Commission decline to adopt this proposed revision because there is no evidence in the record to support it.[33]

B. NMOGA'S PROPOSED REVISION TO DEFINITION OF "INDIRECT POTABLE APPLICATION"

Q: Have you prepared any rebuttal to NMOGA's proposed revisions to the definition of "indirect potable application" in the proposed rule?

A: Yes. NMOGA proposes to revise the definition of "indirect potable application" so that it would apply to "reuse water" but not to "reclaimed wastewater."[34] This proposed revision is highly problematic for at least two reasons.

First, the revision would allow produced water to be used for potable applications. Under the Department's proposed rule, "reclaimed wastewater" refers only to domestic wastewater,[35] while "reuse water" refers to domestic, industrial, and produced water sources.[36] Thus, the definition of "indirect potable application" would expressly include produced water.

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[32] NMOGA Exhibit 1 (corrected).

[33] *See* NMSA 1978, § 74-6-7(B)(2); *Regents of Univ. of Cal. v. N.M. Water Quality Control Comm'n*, 2004-NMCA-073, ¶ 29.

[34] NMOGA Exhibit 1 (corrected).

[35] *See* 20.6.8.7.R(1) NMAC (proposed).

[36] *See* 20.6.8.7.R(4) NMAC (proposed).

Second, the revision would allow "feasibility studies," which are limited to domestic wastewater under the Department's proposed rule,[37] to be conducted on industrial wastewater and produced water. Yet industrial wastewaters and produced water are much more variable and much more likely to have a larger number of contaminants, a higher concentration of contaminants, and more toxic contaminants than domestic wastewater. Unlike produced water and most industrial wastewaters, as the Department's witnesses observed, domestic wastewater has "been evaluated over many decades to determine attainable water quality[,] and characterization of this subcategory is well understood."[38]

NMOGA's proposal would be a substantive revision to the proposed rule that has potentially serious implications for public health. NMOGA, however, provides no testimony or other evidence to support this revision. I recommend that the Commission reject this proposed revision, as there is no evidence in the record to support it.[39]

Q: Do you have any further recommendations in response to NMOGA's proposal to expand the scope of the term "indirect potable application"?

A: Yes. In response to NMOGA's proposal to expand the scope of the term "indirect potable application" to include produced water and industrial wastewater, Amigos Bravos and Sierra Club propose to revise an amendment they offered and I supported in my direct testimony. In my direct testimony, I recommended the Department's prohibition on the use of produced

[37] *See* 20.6.8.201.B NMAC (proposed).

[38] Fullam Test. p. 27 (NMED Exhibit 2); *see also* Direct Technical Testimony of Lei Hu p. 30 (Apr. 15, 2024) (NMED Exhibit 5).

[39] *See* NMSA 1978, § 74-6-7(B)(2); *Regents of Univ. of Cal. v. N.M. Water Quality Control Comm'n*, 2004-NMCA-073, ¶ 29.

water in potable applications be clarified. In section 20.6.8.201.A of the proposed rule, the Department proposes:

> **A. Unauthorized applications.** The department shall not approve a discharge permit or a discharge permit modification that includes the discharge of reuse water for direct or indirect potable applications except for those authorized applications identified in Subsection B of 20.6.8.201 NMAC.

This provision would prohibit approval of a discharge permit for potable applications for "reuse water." Reuse water, as I discussed previously, includes domestic wastewater, industrial wastewater, and produced water.[40]

In my direct testimony, I recommended adding a new section 101 to the proposed rule to make the prohibition on reuse of produced water for potable applications entirely clear.[41] In light of NMOGA's proposal to expand the scope of potable applications, I propose a small revision to my initial proposal. The new section 101 should read (new material in italics):

> **20.6.8.101 UNAUTHORIZED APPLICATIONS OF *REUSE* WATER:** The department shall not approve a discharge permit or a discharge permit modification that includes the discharge to ground or surface water of *reuse* water for potable applications.

Thus, the prohibition would apply to all three types of wastewaters to be regulated under the proposed rule, domestic wastewater, industrial wastewater, and produced water. The revised prohibition is consistent with the Department's prohibition in section 20.6.8.201.A of the proposed rule, although it is placed more appropriately under section 100 (General Provisions), rather than under section 200 (Domestic Water Reuse).

Section 20.6.8.201.A of the proposed rule should also be revised to apply only to

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[40] *See* 20.6.8.7.R(4) NMAC (proposed).

[41] De Saillan Test. p. 28 (AB-SC Exhibit 6).

domestic wastewaters:

20.6.8.201 ~~DIRECT AND INDIRECT~~ POTABLE APPLICATIONS FOR DOMESTIC WASTEWATER:

A. Unauthorized applications. The department shall not approve a discharge permit or a discharge permit modification that includes the discharge of domestic wastewater ~~reuse water~~ for ~~direct or indirect~~ potable applications except for those authorized applications identified in Subsection B of 20.6.8.201 NMAC.

Q: Is your recommendation to include the two revisions you just discussed reflected in AB-SC Exhibit 1 Revised and AB-SC Exhibit 2 Revised?

A: Yes, it is.

Q: Does this conclude your rebuttal testimony?

A: Yes.

I declare under penalty of perjury that the foregoing testimony is true and correct.

Charles de Saillan

May 6, 2024
Date

AB-SC EXHIBIT 11

EDF
ENVIRONMENTAL DEFENSE FUND
Finding the ways that work

December 9, 2020 Transmitted via email: jennifer.fullam@state.nm.us

Ms. Jennifer Fullam,
Water Quality Standards Coordinator
Surface Water Quality Bureau
New Mexico Environment Department
PO Box 5469
Santa Fe, NM 87502-5469

Re: Public Comment on NMED's proposed amendments to the State's Standards for Interstate and Intrastate Surface Waters, 20.6.4 New Mexico Administrative Code (NMAC).

Ms. Fullam:

The Environmental Defense Fund (EDF) appreciates the opportunity to submit comments regarding the New Mexico Environment Department's (NMED's) Surface Water Quality Bureau (SWQB) Triennial Review (TR) of New Mexico's Standards for Interstate and Intrastate Surface Waters (20.6.4 NMAC). EDF is an international organization with over 2,000,000 members and activists worldwide, with more than 18,000 residing in New Mexico, many of whom care deeply about the potential health and environmental impacts of oil and gas development.

New Mexico's surface water quality standards (WQS), codified at 20.6.4 NMAC, define water quality goals by designating uses for rivers, streams, lakes and other surface waters; setting criteria to protect those uses; and establishing antidegradation provisions to preserve water quality. These WQS, after an opportunity for public review and comment, are adopted by the Water Quality Control Commission (WQCC), then approved by the United States Environmental Protection Agency (US EPA) under the authority of the federal Clean Water Act (CWA). They are then available for use by NMED in permitting discharges to surface waters, assessing whether its surface waters are impaired, and establishing restoration goals.

In its effort to implement House Bill 546, New Mexico will need to carefully assess whether these standards adequately address the potential pollutants in oil and gas produced waters, given that the bill contemplates the treatment and release of this wastewater in ways that may impact surface waters of the state. NMED itself has rightfully acknowledged this duty, sharing

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with the public that the Produced Water Act presents the agency with a research question to assess "what changes are needed to our state water quality standards to protect water resources and human health?"[1]

EDF recognizes the knowledge, time and resource challenges at play in revisiting and improving regulatory programs and standards in order to appropriately address the complexities of produced water. With this in mind, we can appreciate the potential reasons why NMED has chosen not to include or address produced water chemicals in its November 2020 draft proposed amendments to 20.6.4 NMAC. Nevertheless, EDF—as we did in informal commentary during the public involvement stage—would like to respectfully emphasize again the importance of beginning to address these constituents in the near-term by utilizing currently available information and eventually building on those initial efforts as science and technology allows.

EDF acknowledges that NMED will not be able to consider and develop individual standards for all of the many compounds in produced water at any one time, including during this TR, due to time and research constraints. However, EDF remains concerned that the current standards are not adequate to protect surface water quality or human health and the environment from permitted discharges of treated produced water should they occur in the future. Timely action to begin addressing gaps in existing standards is vital to ensure the proper baseline regulatory protections are in place *prior to* considering actual permitting programs. Given the time needed to modify standards and the research requirements necessary to gather supporting data and develop necessary analytical tools, an effort to consider new or modified standards to address produced water constituents should be launched as soon as reasonably practicable, if not within this TR.

Furthermore, a phased approach to comprehensively address produced water constituents makes sense, focusing first on improvements to the NMED water quality standards that can be made with existing knowledge and tools and next on improvements that prove necessary following research advancements. Research conducted by EDF has shown that there are known chemicals in produced waters that have existing surface water quality standards, or enough toxicity information to begin considering development of human health and/or aquatic life water quality criteria that could be incorporated into the New Mexico water quality standards in the near-term. Although criteria and standards based solely on this existing body of knowledge would only be a first step, action on these constituents presents a practical "phase one" effort toward developing a baseline (such as for initial pilot projects) that could then be supplemented and strengthened by ongoing research identified by the Produced Water Research Consortium toward the development of more substantial pilot testing conditions or broader permit conditions if the scientific research supports that outcome. This 'process of continuous improvement' approach to the establishment of guidelines or standards applicable to the reuse or discharge of treated produced water is vital to advance protection of the health and safety of New Mexico's surface waters and its citizens as NMED contemplates various pathways for implementing HB546.

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[1] NMED Public engagement meeting presentation: Produced Water Management in New Mexico (Nov. 14, 2019), https://www.env.nm.gov/new-mexico-produced-water/wp-content/uploads/sites/16/2019/11/Produced-Water-Public-Meeting-Presentation_ENGLISH_FINAL-191114.pdf

To summarize, EDF strongly believes that an initial phase of near-term action, either during this TR or outside of the review but before the next TR, should be taken on as many as possible chemicals potentially found in New Mexico produced water that:

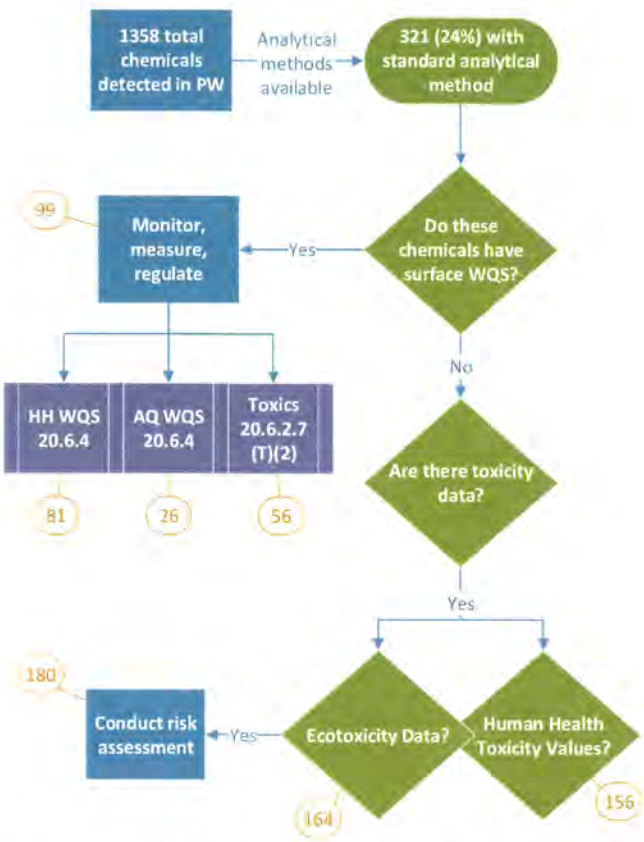
(i) have a standard, approved analytical method currently available;

(ii) are not covered by existing numeric standards; and

(iii) have the toxicity values that are necessary to assess risk and consider regulatory modification.

EDF has initiated an effort to elucidate the produced water chemicals that may meet this initial threshold. Through an extensive literature review, EDF has identified approximately 1,360 chemicals that can be found in produced water nationally and therefore have the potential to be found in New Mexico produced waters. An estimated 88 of those already have New Mexico surface water quality standards that could be immediately applied in a potential pilot testing or preliminary permitting program. Of the remainder, about 180 chemicals—which are not already considered under NMAC 20.6.2.7(T)(2), as discussed below—have an approved standard method associated with them, and toxicity values that could be used to conduct human health or aquatic life risk assessments that are the prelude to developing water quality criteria to adopt into a WQS. In other words, EDF estimates that at least 180 potential produced water chemicals have the type of tools and data necessary to begin a process of considering associated water quality criteria and standard updates *today*.

In addition to considering water quality numeric criteria improvements, there are other aspects of the holistic standards that deserve consideration in addressing produced water. For example, there are important protections related to "toxic pollutants," as defined in NMAC 20.6.2.7(T)(2) to include a list of 104 chemicals; of those, 56 have been identified in produced water and are potentially present in New Mexico produced water. While 45 of the 56 defined toxic pollutants found in produced water already have numeric surface water standards in New Mexico, there are 11 additional toxic pollutants that should be considered for a numeric standard. Importantly, toxic pollutants are also associated with a narrative requirement in the Surface Water General Criteria, which states "[e]xcept as provided in 20.6.4.16 NMAC, surface waters of the state shall be free of toxic pollutants from other than natural causes in amounts, concentrations or combinations that affect the propagation of fish or that are toxic to humans, livestock or other animals, fish or other aquatic organisms, wildlife using aquatic environments for habitation or aquatic organisms for food, or that will or can reasonably be expected to bioaccumulate in tissues of fish, shellfish and other aquatic organisms to levels that will impair the health of aquatic organisms or wildlife or result in unacceptable tastes, odors or health risks to human consumers of aquatic organisms" (see NMAC Section 20.6.4.12(F)(1)). This narrative standard could be translated into numerical limits for toxics identified in produced water where pilot or other eventual permits are issued for the potential discharge of treated produced water to surface water bodies.



Initial comparison of chemicals identified in produced water (as reported nationally in the literature) to NM surface water quality standards, toxic pollutants, and available ecotoxicity and human health data. Chemicals, citations, and associated data are reported in the attachment to this letter. This represents ongoing work by EDF and partners that is expected to be presented in future peer-reviewed publications. Preliminary outputs are current as of November 2020.

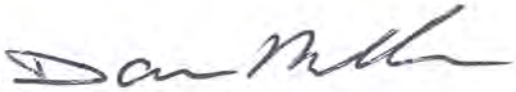
EDF strongly encourages, at a minimum and as part of the 2020 TR or another near-term action prior to the next TR, that NMED conduct an assessment of the New Mexico surface water quality standards in relation to what is already known regarding the chemical character and toxicity of produced water. Based on that assessment, NMED should identify the suite of surface water quality standards already in place that may be utilized to address produced water in the nearer term, alongside the gaps that exist in coverage for the remaining potential chemicals. NMED should also identify and consider opportunities for an adaptive management approach to future actions on new standards as data and analytical tools allow – as represented by the EDF analysis here showcasing constituents with data currently available to conduct risk assessments toward the establishment of new criteria.

Finally, it is important to emphasize that even such an effort only scratches the surface of changes that would need to be in place before considering a move to implement any treatment and discharge of produced water into surface waters of the state. Pointedly, 76% of the potential chemicals in produced water were removed from EDF's analysis altogether simply because a standard analytical method does not exist for their detection and quantification in the regulatory context. This fact underscores why the recommendations for near-term action included here do not obviate the need for additional research but rather emphasize the importance of that research, while highlighting opportunities to—at a minimum—use available tools and

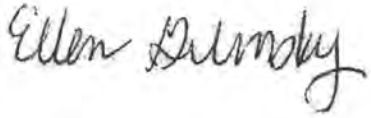
information to inform pilot studies, assess risk, and begin to strengthen regulatory programs in advance of real-world permitting scenarios.

Sincerely,

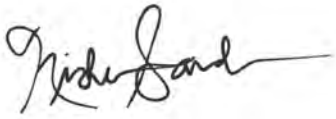
Cloelle Danforth, Ph.D.
Scientist
Environmental Defense Fund



Dan Mueller, P.E.
Senior Manager
Environmental Defense Fund



Ellen Gilinsky, Ph.D.
Consultant to EDF



Nichole Saunders
Senior Attorney
Environmental Defense Fund

Attachment

cc (via email);
Rebecca Roose, Rebecca.Roose@state.nm.us
Shelly Lemon, Shelly.Lemon@state.nm.us

NM surface water quality standards, toxic pollutants, and available ecotoxicity and human health data and produced water chemicals

Produced water chemicals identified in literature with standard analytical method (Part 136, SW-846, or NEMI)
Chemical constituents identified in produced water as reported in the literature (181 peer-reviewed and grey; citations available upon request)
Toxicity value and ecotoxicity data sourced from Chemistry Dashboard database of toxicity values (ToxValDB, https://comptox.epa.gov/dashboard/)

Total		Counts				
279		81	26	56	250	255
Descriptor		HH WQS (20.6.4)	AQ WQS (20.6.4)	Toxics (20.6.2.7, T2)	Toxicity Values	Ecotoxicity Data
CAS	Name					
309-00-2	Aldrin	✓	✓	✓	✓	✓
60-57-1	Dieldrin	✓	✓	✓	✓	✓
72-20-8	Endrin	✓	✓	✓	✓	✓
76-44-8	Heptachlor	✓	✓	✓	✓	✓
58-89-9	Lindane	✓	✓	✓	✓	✓
12672-29-6	Aroclor 1248	✓	✓		✓	✓
7440-38-2	Arsenic	✓	✓		✓	✓
7440-43-9	Cadmium	✓	✓		✓	✓
7440-50-8	Copper	✓	✓		✓	✓
57-12-5	Cyanide	✓	✓		✓	✓
959-98-8	Endosulfan I	✓	✓		✓	✓
33213-65-9	Endosulfan II	✓	✓		✓	✓
1024-57-3	Heptachlor epoxide B	✓	✓		✓	✓
7439-92-1	Lead	✓	✓		✓	✓
7439-97-6	Mercury	✓	✓		✓	✓
7440-02-0	Nickel	✓	✓		✓	✓
72-55-9	p,p'-DDE	✓	✓		✓	✓
7782-49-2	Selenium	✓	✓		✓	✓
7440-66-6	Zinc	✓	✓		✓	✓
7429-90-5	Aluminum		✓		✓	✓
7782-50-5	Chlorine		✓		✓	✓
16065-83-1	Chromium (III)		✓		✓	
18540-29-9	Chromium (VI) ion		✓		✓	✓
7439-96-5	Manganese		✓		✓	✓
7439-98-7	Molybdenum		✓		✓	✓
7440-22-4	Silver		✓		✓	✓
156-60-5	(E)-1,2-Dichloroethylene	✓		✓	✓	✓
79-34-5	1,1,2,2-Tetrachloroethane	✓		✓	✓	✓
120-82-1	1,2,4-Trichlorobenzene	✓		✓	✓	✓
95-50-1	1,2-Dichlorobenzene	✓		✓	✓	✓
107-06-2	1,2-Dichloroethane	✓		✓	✓	✓
122-66-7	1,2-Diphenylhydrazine	✓		✓	✓	✓
106-46-7	1,4-Dichlorobenzene	✓		✓	✓	✓
120-83-2	2,4-Dichlorophenol	✓		✓	✓	✓
107-13-1	Acrylonitrile	✓		✓	✓	✓
319-84-6	alpha-1,2,3,4,5,6-Hexachlorocyclohexane	✓		✓	✓	✓
120-12-7	Anthracene	✓		✓	✓	✓
71-43-2	Benzene	✓		✓	✓	✓
92-87-5	Benzidine	✓		✓	✓	✓
50-32-8	Benzo(a)pyrene	✓		✓	✓	✓
205-99-2	Benzo(b)fluoranthene	✓		✓	✓	✓
207-08-9	Benzo(k)fluoranthene	✓		✓	✓	✓
319-85-7	beta-Hexachlorocyclohexane	✓		✓	✓	✓
111-44-4	bis(2-Chloroethyl) ether	✓		✓	✓	✓
117-81-7	bis(2-Ethylhexyl) phthalate	✓		✓	✓	✓
75-27-4	Bromodichloromethane	✓		✓	✓	
75-25-2	Bromoform	✓		✓	✓	✓
108-90-7	Chlorobenzene	✓		✓	✓	✓
67-66-3	Chloroform	✓		✓	✓	✓
84-74-2	Dibutyl phthalate	✓		✓	✓	✓
75-09-2	Dichloromethane	✓		✓	✓	✓
84-66-2	Diethyl phthalate	✓		✓	✓	✓
131-11-3	Dimethyl phthalate	✓		✓	✓	✓
100-41-4	Ethylbenzene	✓		✓	✓	✓
206-44-0	Fluoranthene	✓		✓	✓	✓
86-73-7	Fluorene	✓		✓	✓	✓
118-74-1	Hexachlorobenzene	✓		✓	✓	✓
78-59-1	Isophorone	✓		✓	✓	✓
74-83-9	Methyl bromide	✓		✓	✓	✓
98-95-3	Nitrobenzene	✓		✓	✓	✓
86-30-6	N-Nitrosodiphenylamine	✓		✓	✓	✓
108-95-2	Phenol	✓		✓	✓	✓
129-00-0	Pyrene	✓		✓	✓	✓
127-18-4	Tetrachloroethylene	✓		✓	✓	✓
108-88-3	Toluene	✓		✓	✓	✓
79-01-6	Trichloroethylene	✓		✓	✓	✓
541-73-1	1,3-Dichlorobenzene	✓			✓	✓
105-67-9	2,4-Dimethylphenol	✓			✓	✓
83-32-9	Acenaphthene	✓			✓	✓
12587-46-1	Alpha particle	✓				
7440-36-0	Antimony	✓			✓	✓
7440-39-3	Barium	✓			✓	✓
56-55-3	Benz(a)anthracene	✓			✓	✓
85-68-7	Benzyl butyl phthalate	✓			✓	✓
7440-41-7	Beryllium	✓			✓	✓
124-48-1	Chlorodibromomethane	✓			✓	✓
7440-47-3	Chromium	✓			✓	✓
218-01-9	Chrysene	✓			✓	✓
53-70-3	Dibenz(a,h)anthracene	✓			✓	
1031-07-8	Endosulfan sulfate	✓			✓	✓
7421-93-4	Endrin aldehyde	✓				
193-39-5	Indeno(1,2,3-cd)pyrene	✓			✓	✓
14797-55-8	Nitrate	✓			✓	✓
13982-63-3	Radium-226	✓				

NM surface water quality standards, toxic pollutants, and available ecotoxicity and human health data and produced water chemicals

Produced water chemicals identified in literature with standard analytical method (Part 136, SW-846, or NEMI)
Chemical constituents identified in produced water as reported in the literature (181 peer-reviewed and grey; citations available upon request)
Toxicity value and ecotoxicity data sourced from Chemistry Dashboard database of toxicity values (ToxValDB, https://comptox.epa.gov/dashboard/)

Total		Counts				
279		81	26	56	250	255
	Descriptor	HH WQS (20.6.4)	AQ WQS (20.6.4)	Toxics (20.6.2.7, T2)	Toxicity Values	Ecotoxicity Data
CAS	Name					
15262-20-1	Radium-228	✓				
10098-97-2	Strontium-90	✓				
7440-28-0	Thallium	✓			✓	✓
7440-61-1	Uranium	✓			✓	✓
75-34-3	1,1-Dichloroethane			✓	✓	✓
123-91-1	1,4-Dioxane			✓	✓	✓
90-12-0	1-methylnaphthalene			✓	✓	✓
91-57-6	2-Methylnaphthalene			✓	✓	✓
74-87-3	Chloromethane			✓	✓	✓
108-38-3	m-xylene			✓	✓	✓
91-20-3	Naphthalene			✓	✓	✓
95-47-6	o-Xylene			✓	✓	✓
85-01-8	Phenanthrene			✓	✓	✓
106-42-3	p-xylene			✓	✓	✓
100-42-5	Styrene			✓	✓	✓
87-61-6	1,2,3-Trichlorobenzene				✓	✓
526-73-8	1,2,3-trimethylbenzene				✓	
95-63-6	1,2,4-Trimethylbenzene				✓	✓
84-69-5	1,2-Benzenedicarboxylic acid, bis(2-methylpropyl) ester					✓
573-98-8	1,2-dimethylnaphthalene					✓
57-55-6	1,2-Propylene glycol				✓	✓
108-67-8	1,3,5-Trimethylbenzene				✓	✓
106-51-4	1,4-Benzoquinone				✓	✓
2245-38-7	1,6,7-Trimethylnaphthalene					✓
575-43-9	1,6-dimethylnaphthalene					✓
71-36-3	1-Butanol				✓	✓
611-14-3	1-Ethyl-2-methylbenzene				✓	
832-69-9	1-Methyl phenanthrene					✓
2381-21-7	1-Methylpyrene					✓
90-15-3	1-Naphthol				✓	✓
71-23-8	1-Propanol				✓	✓
829-26-5	2,3,6-Trimethylnaphthalene					✓
118-79-6	2,4,6-Tribromophenol				✓	✓
95-87-4	2,5-dimethylphenol					✓
581-42-0	2,6-dimethylnaphthalene					✓
576-26-1	2,6-dimethylphenol				✓	✓
111-76-2	2-Butoxyethanol				✓	✓
110-75-8	2-Chloroethyl vinyl ether				✓	✓
104-76-7	2-Ethyl-1-hexanol				✓	✓
591-78-6	2-Hexanone				✓	✓
149-30-4	2-Mercaptobenzothiazole				✓	✓
109-06-8	2-Methylpyridine				✓	✓
88-74-4	2-Nitroaniline				✓	✓
122-99-6	2-Phenoxyethanol				✓	✓
95-65-8	3,4-dimethylphenol				✓	✓
108-68-9	3,5-dimethylphenol					✓
140-66-9	4-(1,1,3,3-tetramethylbutyl)-Phenol					✓
7005-72-3	4-Chlorodiphenyl ether				✓	✓
622-96-8	4-Ethyltoluene				✓	
108-10-1	4-Methyl-2-pentanone				✓	✓
100-01-6	4-Nitroaniline				✓	✓
56-57-5	4-Nitroquinoline-1-oxide					✓
57-97-6	7,12-Dimethylbenz(a)anthracene				✓	✓
208-96-8	Acenaphthylene				✓	✓
75-07-0	Acetaldehyde				✓	✓
64-19-7	Acetic acid				✓	✓
67-64-1	Acetone				✓	✓
98-86-2	Acetophenone				✓	✓
79-06-1	Acrylamide				✓	✓
7664-41-7	Ammonia				✓	✓
14798-03-9	Ammonium					✓
62-53-3	Aniline				✓	✓
100-52-7	Benzaldehyde				✓	✓
191-24-2	Benzo(g,h,i)perylene				✓	✓
205-82-3	Benzo(j)fluoranthene				✓	
65-85-0	Benzoic Acid				✓	✓
119-61-9	Benzophenone				✓	✓
95-16-9	Benzothiazole				✓	✓
100-51-6	Benzyl alcohol				✓	✓
100-44-7	Benzyl Chloride				✓	✓
92-52-4	Biphenyl				✓	✓
7440-69-9	Bismuth				✓	✓
80-05-7	Bisphenol A				✓	✓
7440-42-8	Boron				✓	✓
123-86-4	Butyl acetate				✓	✓
104-51-8	Butylbenzene				✓	
58-08-2	Caffeine					✓
7440-70-2	Calcium				✓	
471-34-1	Calcium Carbonate				✓	✓
105-60-2	Caprolactam				✓	✓
7440-44-0	Carbon				✓	✓
124-38-9	Carbon Dioxide				✓	✓
75-15-0	Carbon disulfide				✓	✓
7440-45-1	Cerium				✓	✓

NM surface water quality standards, toxic pollutants, and available ecotoxicity and human health data and produced water chemicals

Produced water chemicals identified in literature with standard analytical method (Part 136, SW-846, or NEMI)
Chemical constituents identified in produced water as reported in the literature (181 peer-reviewed and grey; citations available upon request)
Toxicity value and ecotoxicity data sourced from Chemistry Dashboard database of toxicity values (ToxValDB, https://comptox.epa.gov/dashboard/)

Total		Counts				
279		81	26	56	250	255
	Descriptor	HH WQS (20.6.4)	AQ WQS (20.6.4)	Toxics (20.6.2.7, T2)	Toxicity Values	Ecotoxicity Data
CAS	Name					
7440-46-2	Cesium				✓	✓
16887-00-6	Chloride				✓	✓
7440-48-4	Cobalt				✓	✓
98-82-8	Cumene				✓	✓
110-82-7	Cyclohexane				✓	✓
108-94-1	Cyclohexanone				✓	✓
108-91-8	Cyclohexylamine				✓	✓
556-67-2	Cyclotetrasiloxane, octamethyl-				✓	✓
112-31-2	Decanal				✓	
124-18-5	Decane				✓	✓
134-62-3	DEET				✓	✓
319-86-8	Delta-Hexachlorocyclohexane					✓
132-64-9	Dibenzofuran				✓	✓
132-65-0	Dibenzothiophene				✓	✓
3252-43-5	Dibromoacetonitrile					✓
117-84-0	Di-n-octyl phthalate				✓	✓
122-39-4	Diphenylamine				✓	✓
298-04-4	Disulfoton				✓	✓
5989-27-5	D-Limonene				✓	✓
629-97-0	Docosane					✓
112-40-3	Dodecane				✓	
64-17-5	Ethanol				✓	✓
141-78-6	Ethyl Acetate				✓	✓
62-50-0	Ethyl methanesulfonate				✓	✓
107-21-1	Ethylene glycol				✓	✓
16984-48-8	Fluoride				✓	✓
50-00-0	Formaldehyde				✓	✓
68334-30-5	Fuels, diesel				✓	
7440-55-3	Gallium				✓	✓
7440-56-4	Germanium				✓	✓
7440-57-5	Gold				✓	✓
7440-58-6	Hafnium				✓	✓
142-82-5	Heptane				✓	✓
544-76-3	Hexadecane				✓	✓
66-25-1	Hexanal				✓	✓
142-62-1	Hexanoic acid				✓	✓
7647-01-0	Hydrochloric acid				✓	✓
7783-06-4	Hydrogen sulfide				✓	✓
7440-74-6	Indium				✓	✓
7553-56-2	Iodine				✓	✓
7439-89-6	Iron				✓	✓
67-63-0	Isopropanol				✓	✓
119-65-3	Isoquinoline					✓
8008-20-6	Kerosine				✓	
7439-91-0	Lanthanum				✓	✓
7439-93-2	Lithium				✓	✓
7439-95-4	Magnesium				✓	✓
108-39-4	m-Cresol				✓	✓
74-82-8	Methane				✓	
67-56-1	Methanol				✓	✓
78-93-3	Methyl Ethyl Ketone				✓	✓
80-62-6	Methyl methacrylate				✓	✓
66-27-3	Methyl methanesulfonate				✓	✓
108-87-2	Methylcyclohexane				✓	✓
68-12-2	N,N-Dimethylformamide				✓	✓
110-54-3	n-Hexane				✓	✓
14797-65-0	Nitrite				✓	✓
7727-37-9	Nitrogen				✓	✓
10595-95-6	N-Nitroso-N-methylethylamine				✓	
95-48-7	o-Cresol				✓	✓
630-02-4	Octacosane				✓	✓
593-45-3	Octadecane				✓	
7440-04-2	Osmium				✓	✓
7440-05-3	Palladium				✓	✓
106-44-5	p-Cresol				✓	✓
99-87-6	p-Cymene				✓	✓
307-55-1	Perfluorododecanoic acid					✓
198-55-0	Perylene					✓
7723-14-0	Phosphorus				✓	✓
85-44-9	Phthalic anhydride				✓	✓
7440-06-4	Platinum				✓	✓
25322-68-3	Polyethylene glycol				✓	✓
25322-69-4	polypropylene glycol				✓	✓
7440-09-7	Potassium				✓	✓
50-24-8	Prednisolone					✓
107-19-7	Propargyl alcohol				✓	✓
79-09-4	Propionic acid				✓	✓
103-65-1	Propylbenzene				✓	✓
110-86-1	Pyridine				✓	✓
91-22-5	Quinoline				✓	✓
7440-15-5	Rhenium					✓
7440-16-6	Rhodium				✓	✓
7440-17-7	Rubidium				✓	✓
7440-18-8	Ruthenium				✓	✓

NM surface water quality standards, toxic pollutants, and available ecotoxicity and human health data and produced water chemicals

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Total		Counts				
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Descriptor		HH WQS (20.6.4)	AQ WQS (20.6.4)	Toxics (20.6.2.7, T2)	Toxicity Values	Ecotoxicity Data
CAS	Name					
7440-20-2	Scandium				✓	✓
135-98-8	sec-Butylbenzene				✓	
7631-86-9	Silica				✓	✓
7440-21-3	Silicon				✓	✓
7440-23-5	Sodium				✓	✓
7440-24-6	Strontium				✓	✓
14808-79-8	Sulfate				✓	✓
18496-25-8	Sulfide					✓
7704-34-9	Sulfur				✓	✓
7446-09-5	Sulfur dioxide				✓	
7440-25-7	Tantalum				✓	✓
13494-80-9	Tellurium				✓	✓
75-65-0	tert-Butyl alcohol				✓	✓
98-06-6	tert-Butylbenzene				✓	✓
629-59-4	Tetradecane				✓	
7440-29-1	Thorium				✓	✓
7440-31-5	Tin				✓	✓
7440-32-6	Titanium				✓	✓
126-73-8	Tributyl phosphate				✓	✓
25167-82-2	Trichlorophenol					✓
115-86-6	Triphenyl phosphate				✓	✓
78-51-3	Tris(2-butoxyethyl) phosphate				✓	✓
115-96-8	Tris(2-chloroethyl) phosphate				✓	✓
7440-33-7	Tungsten				✓	✓
7440-62-2	Vanadium				✓	✓
7440-65-5	Yttrium				✓	✓
7440-67-7	Zirconium				✓	✓

AB-SC EXHIBIT 12

Defined Terms in 20.6.8 NMAC Proposed for Deletion by Amigos Bravos and Sierra Club

	Term	Used in the Body of the Rule?	Used in Another Definition?
1	**Agricultural application**	No	Yes (livestock application, reusue)
2	**Commercial application**	No	No
3	**Discharge plan**	No	No
4	**Discharge site**	No	No
5	**Environmental buffer**	No	Yes (direct potable application)
6	**Flood irrigation application**	No	No
7	**Flowback water**	No	Yes (produced water)
8	**Food crop application**	No	No
9	**Formation water**	No	Yes (produced water)
10	**Industrial application**	No	No
11	**Injection**	No	No
12	**Irrigation application**	No	Yes (reuse)
13	**Land application**	No	Yes (flood irrigation application)
14	**Livestock application**	No	Yes (agricultural application)
15	**National Pollutant Elimination Sys**	No	Yes (NPDES)
16	**NTU**	No	No
17	**Pretreatment**	No	Yes (National Pollutant Elimination System)
18	**Recycled produced water**	No	No
19	**Restoration application**	No	No
20	**Ecological application**	No	No
21	**Transference**	No	Yes (treatment)
22	**Treated wastewater**	No	Yes (application, reuse water)
23	**Untreated wastewater**	No	Yes (domestic wastewater)

AB-SC EXHIBIT 13

GUIDANCE ON PRODUCED WATER TREATMENT RESEARCH, DEVELOPMENT, AND DEMONSTRATION TESTING AND EVALUATION

NEW MEXICO PRODUCED WATER RESEARCH CONSORTIUM
NEW MEXICO STATE UNIVERSITY

NM STATE NEW MEXICO PRODUCED WATER RESEARCH CONSORTIUM

MAY 2022

PREFACE

This guidance document was prepared by the New Mexico Produced Water Research Consortium (Consortium) to support of the New Mexico Environment Department by providing a framework to be used by the Consortium to conduct project planning, testing, and evaluation efforts of pilot or field-scale produced water treatment technologies for fit-for-purpose applications outside the oil and gas sector. The guidance is based on other pilot-testing and evaluation programs conducted by organizations such as the Environmental Protection Agency, the Department of Energy, and federal agencies comprising the Federal Remediation Technologies Roundtable to assess the operational cost and performance of water and waste treatment technologies and their ability to meet state and federal standards for public and environmental protection and health and safety.

The framework provides step-by-step guidance to technology developers on how the Consortium will:

- identify technologies for early-level research and development and laboratory and bench-scale testing and performance analysis; and
- for more mature technologies, establish pilot-scale demonstration testing and analysis efforts that would include;
    - project planning and approval requirements,
    - demonstration testing and monitoring requirements,
    - collection of technology operational cost and performance data, and
    - evaluation of human environmental risk and toxicology to verify the safety of the effectiveness of the treatment technology application.

Federal environmental technology evaluation programs that have utilized detailed pilot-scale, field demonstration testing and cost and performance evaluation approaches, have been able to successfully facilitate the understanding of the operational performance of innovative technologies in large-scale, real-world applications, and help improve technology acceptance and commercialization. The efforts and approach provided in this document utilizes approaches used successfully for bench and pilot-testing and cost and performance evaluation by several federal agencies including the Departments of Energy and Defense, and the Environmental Protection Agency.

CONTENTS

Figures

3. Executive Summary:

(One or two paragraphs)

4. Proposed Reuse Application of Treated Water: (following statement required)

For the purposes of this test, there will be no discharge of the produced water. The distillate will be collected in a holding tank for sampling before being blended back with the concentrated brine for reinjection into the SWD.

5. Similar or related permits/notification needed with other agencies, or nearby properties:

(What is the nearby property, is it owned by the same company, or another operator. They should be contacted and know of the project.)

6. Pilot-System Process and Design:

(Two to three paragraphs of your treatment process and what you will do. Discuss general throughput and expected performance, etc. Include a simple treatment process flow sheet.)

7. Project Goals and Objectives: (Summary of objectives and KPI's similar to below)

The pilot project is expected to operate for up 'x' weeks, treating up to 'y' bbls/day of produced water of a water quality compatible with reuse for 'z' (i.e. agricultural irrigation). It is expected the concentrate and distillate will have the following beginning and final qualities.

Parameter	Feed Water	Brine	Clean Distillate
TDS, mg/L	a	b	c
pH	e	f	g
Water Volume	h bbls/day	i bbls/day	j bbls/day
Ammonia, mg/L	x	y	z

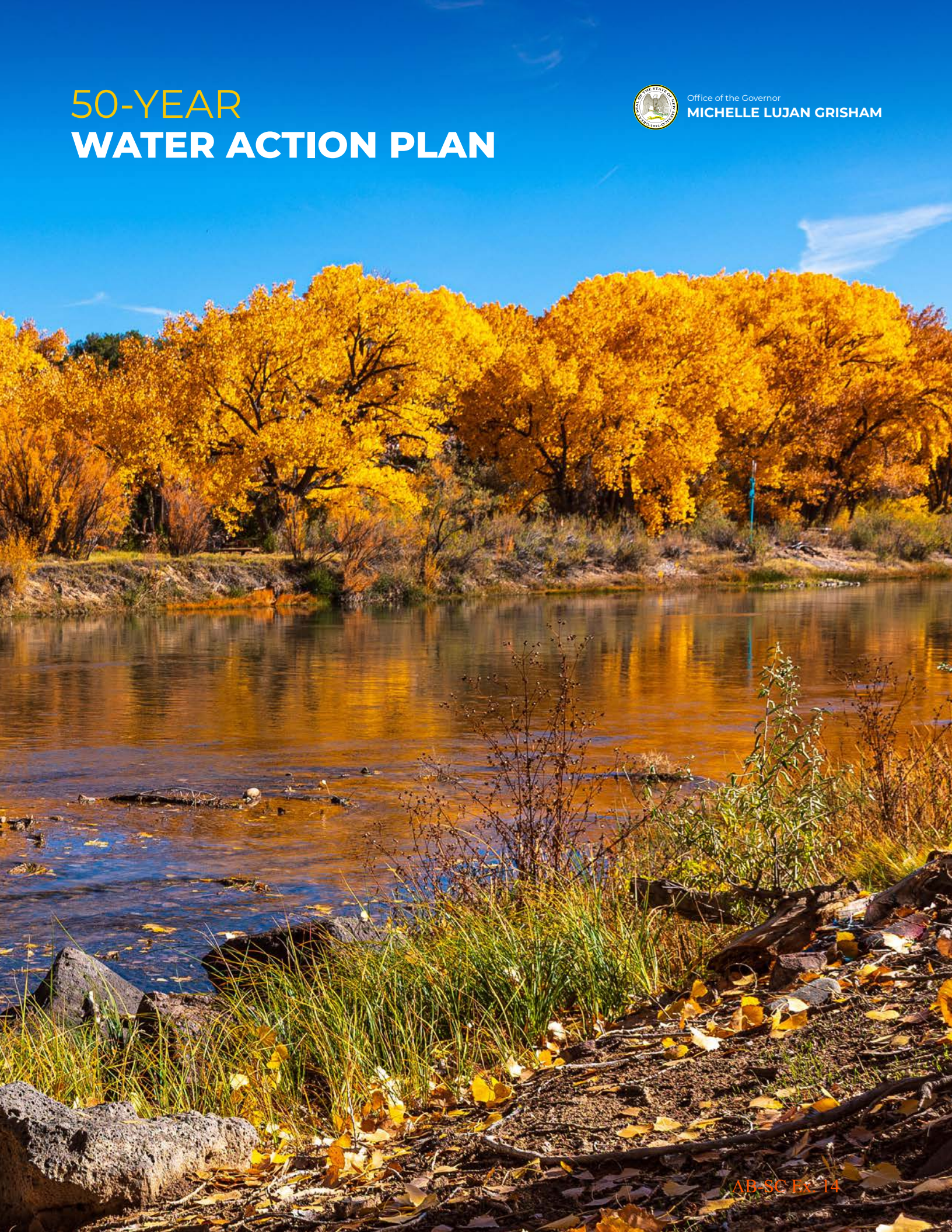
Additionally, …… (i.e. Solids and ammonia recovery will be evaluated for economic reuse of those recovered minerals). The following Key Performance Indicators (KPI's) will be evaluated to assess system and process cost effectiveness and overall performance:

Operational throughput - x bbls/hr
Operational efficiency - x average hrs/day
Downtime - x average hrs/wk
Meet water quality target - x % of time
Max. water quality variation - x average % above target level
Energy use/cost per bbl treated - x kwh/bbl, x btu/bbl, and $x/bbl
Treatment vs pre and post treatment costs of operation - y in %
Distillate and concentrate recovery - average bbls/bbls treated
Mineral recovery - x tons per day per bbls treated
(Additional KPI's as required)

AB-SC EXHIBIT 14

50-YEAR
WATER ACTION PLAN

Office of the Governor
MICHELLE LUJAN GRISHAM



Office of the Governor
MICHELLE LUJAN GRISHAM

MESSAGE FROM THE GOVERNOR

There are few places in the world where water holds such profound significance as here in New Mexico. The original inhabitants of the southwest have recognized the life-sustaining import of water for thousands of years. Today, it also holds immeasurable cultural, agricultural, ecological, economic, and recreational value. The effects of climate change now threaten this precious resource. By the time a Class of 2024 high school graduate reaches retirement age, New Mexico will have 25% less water than we do today in our already over-stressed communities, farms, and wilderness areas.

The science is clear: Precipitation will be more variable and extreme. Snowpack, runoff, and aquifer recharge will decline, stressing surface water and groundwater supplies. Higher temperatures and greater aridity will dry landscapes, leading to more extreme wildfires and increased erosion.

We cannot wait to act – and we are not.

We have the time, resources, and technology to secure a strong water future. We will draw upon New Mexico's rich heritage of forward-thinking water management. We will build on the vital work of the 2022 New Mexico Water Policy and Infrastructure Task Force and harness expertise from water stewards across our diverse state, as well as from some of the finest research institutions in the world, including New Mexico universities and national laboratories. We will continue to use science, innovation, and cultural history as our reliable guides to navigate these water challenges while fostering greater economic opportunities and resilience for future generations of New Mexicans.

By following the path laid out in this plan, we not only ensure that New Mexicans have clean water now and into the future, but also that an advanced clean energy economy can continue to thrive, farmers and ranchers continue to grow the food that sustains us, and our rivers remain swift and clear.

Using the knowledge gained over countless generations and the cutting edge innovation of today, we are rising to meet this moment.

Sincerely,

Michelle Lujan Grisham

Gov. Michelle Lujan Grisham

WATER IN NEW MEXICO

TODAY AND IN THE FUTURE

WATER SUPPLY:
New Mexico relies on surface water and groundwater

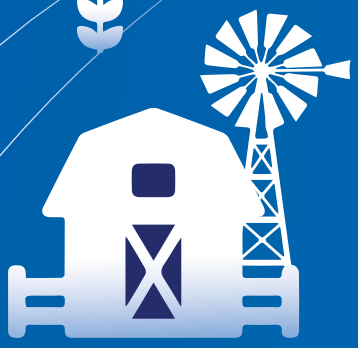
Over **170** lakes and reservoirs

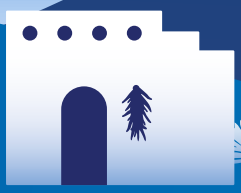
Over **1 million** acres of wetlands

WATER USE:
New Mexicans use a total of approximately three million acre-feet of surface and groundwater per year

Nearly **200,000** miles of rivers and streams

Over **30** groundwater basins and aquifer systems





There are nearly **25,000** commercial farms and ranches in New Mexico

On average New Mexico residents use **81 gallons** per person per day in and around the home

Approximately 60% is used indoors.

CURRENT WATER USE:

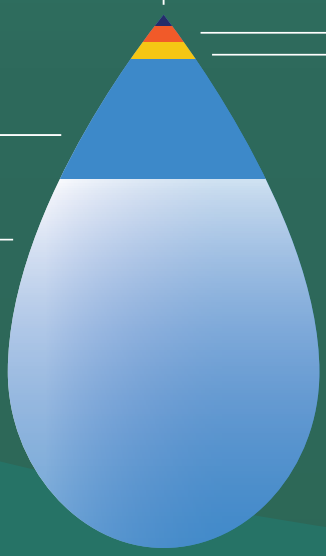
20% Municipal & domestic

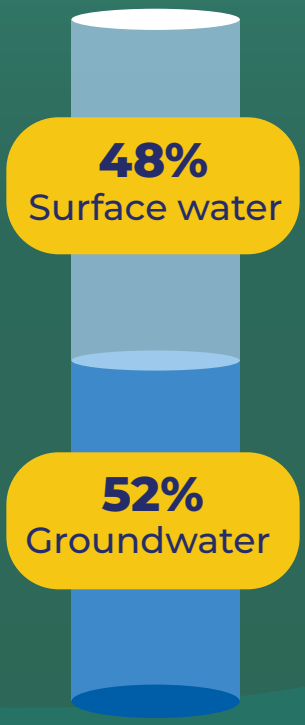
75% Supports agricultural production (including livestock) & evaporation

1% Power generation

2% Commercial

2% Industrial





HOW MUCH IS AN ACRE-FOOT?

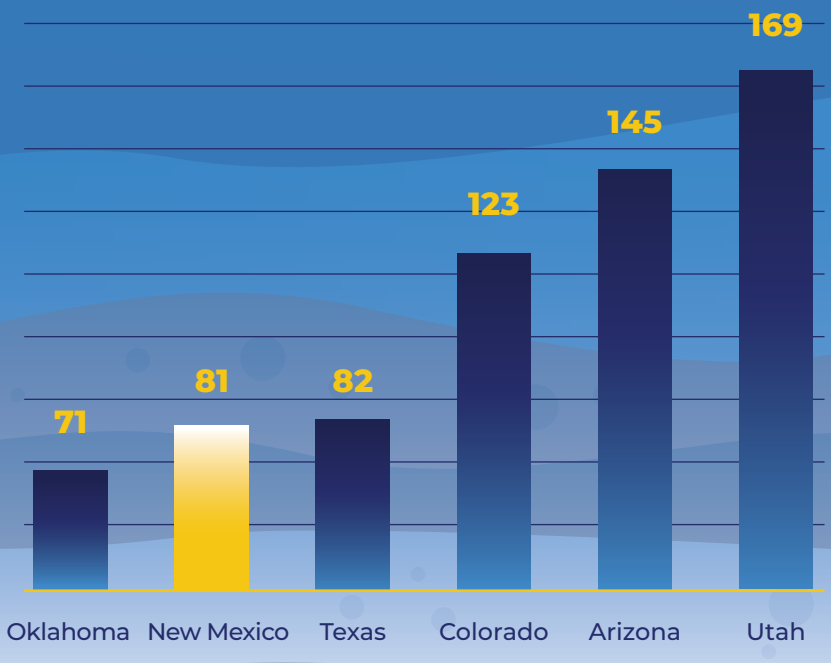
Over 16,000 showers

The water needed to produce ¼ acre of green chile plants

Enough to support three four-person households per year

COMPARISON WITH OTHER STATES

Total domestic per capita use (gallons/day)



NEW MEXICO'S WATER FUTURE:

Scientists predict over the next 50 years...

New Mexico will have approximately 25% less water available in rivers and aquifers

- New Mexico will be hotter and drier
- Historical weather patterns, including precipitation, will change significantly
- There will be more significant weather events, such as fires, flooding and drought

Without action, New Mexico will not have enough water to meet our needs

Within the next 50 years New Mexico will have a shortage of **750,000 acre feet of water**

Conservation, protection of existing water resources and development of new water resources will be required to meet this shortfall

WHAT WE ARE DOING TO INCREASE WATER SECURITY:

50-Year Water Action Plan.

The Water Plan actions will help address the reality of a reduced supply in the future.

Water Conservation

EST. IMPACT: 660,000 AF PER YEAR

- **A1** Develop a public education campaign
- **A2** Incentivise agricultural water conservation
- **A3** Reduce leaks in drinking water infrastructure and increase municipal conservation
- **A4** Improve water storage and delivery systems

New Water Supplies

EST. IMPACT: 150,000 AF PER YEAR

- **B1** Establish a $500M strategic water supply to spur investments in desalination and wastewater treatment
- **B2** Adopt policies to expand potable and nonpotable water reuse
- **B3** Improve groundwater mapping and monitoring

Water and Watershed Protection

- **C1** Cleanup contaminated groundwater sites
- **C2** Protect surface water by controlling pollution through a discharge permitting program
- **C3** Modernize wastewater treatment plants and stormwater infrastructure
- **C4** Protect and restore watersheds

OUR ACTION PLAN TO SECURE NEW MEXICO'S WATER FUTURE

As New Mexicans face increasing water scarcity and emerging threats to our existing resources, we will meet our goal of providing sustainable clean water to communities through the combination of:

- Strategic investments of federal and state funding
- Broad deployment of advanced technology
- Collaboration with community members and leaders across all levels of government
- Utilization of cultural and traditional knowledge of our tribal and acequia communities; and
- Modern policy approaches tailored for 21st century water resource management

TO SECURE NEW MEXICO'S WATER SUPPLY FOR THE NEXT 50 YEARS AND BEYOND, WE WILL PRIORITIZE ACTIONS FOR WATER CONSERVATION, NEW WATER SUPPLIES and WATER AND WATERSHED PROTECTION.

Our efforts will require sustained investments and contributions from everyone to expand upon the effective water programs that currently serve our State, Nations, Tribes and Pueblos, and rural communities. Some of the ongoing efforts that complement the priority actions highlighted in this Plan include:

- Advancing Indian water rights settlements to build on the strong progress made in recent years to negotiate and implement agreements that resolve outstanding claims and secure water supplies for more communities
- Robust regional water planning to implement the Water Security Planning Act of 2023
- Implementing the Land of Enchantment Legacy Fund
- Continued funding and reforms for the Water Trust Board
- Improving opportunities for communities to leverage capital outlay funding to complete water projects
- Advancing regionalization approaches that increase critical capacity for managing drinking water and wastewater systems, including through the Regional Water System Resiliency Act of 2023
- Implementing the New Mexico Water Data Act of 2019; and
- Broader investments in local capacity building and the water workforce

We will also continue our high priority collaborative efforts with federal, Tribal and local partners to complete major drinking water supply projects that transform water security for communities, including the Navajo Gallup Water Supply Project and the Eastern New Mexico Water Utility Authority project. For more information about the many water programs and initiatives that informed this 50-Year Water Action Plan, see the List of Related Resources and the list of the Governor's Water Resilience Initiatives at the end of this document.

A WATER CONSERVATION

New Mexico's water conservation traditions have been shaped over the centuries by our Pueblos, Tribes, acequias, rural areas, and cities and we rely on those communities to continue to develop innovative ways to conserve water. It is essential that we take actions together to preserve and protect the unique traditions we have here in the State while we build a platform for future generations through additional water conservation measures tailored to the changing climate.

As we face diminished surface water and groundwater supplies in the coming decades, we can work together to prioritize actions that translate to decreased water use – even as we grow our communities and advance new industries, such as clean energy production and manufacturing and diversified crops. New Mexico's farmers and ranchers produce products that are an essential element of the State's food supply and the economy that forms the lifeblood of many of our rural communities. And, as the largest water users throughout the State, agricultural producers understand the need to conserve and protect the State's water resources in order to sustain a vibrant agricultural sector for generations to come. As drought and other effects of climate change impact food production in the Southwestern U.S., having a secure, locally produced food supply will be increasingly critical for New Mexico's future.

Over the coming decades, through implementation of the actions below and other parallel efforts, New Mexicans will conserve water through broader education on water issues and actions we take can do at home and work to preserve our most precious resource, as well as through adoption of new irrigation technologies and tools for sustainable agriculture and upgraded municipal water infrastructure. We will leverage unprecedented levels of federal funding, available through 2026 and beyond through the Bipartisan Infrastructure Law, the Inflation Reduction Act, the Farm Bill and other programs, for everything from fixing leaks in community drinking water distribution lines to upgrading dams, reservoirs and conveyance systems to ensure secure supplies with decreased water loss. In the first two years of BIL funding, New Mexico has already received over $800 million from federal agencies for water infrastructure investments, and we are just getting started.

New Mexicans have a strong track record of residential water conservation, as evidenced by trends in some of our largest cities; however, we know that we will need to continue to employ water conservation and education to enhance these positive trends as our communities grow and freshwater supplies decline.

Actions

Action A1

Develop and implement New Mexico's Water Education Template ("WET"), a statewide water education campaign, to inform all New Mexicans about the source of their water, what is at stake due to reduced supplies in future years, and how each individual can do their part to conserve.

Immediate Next Steps:

In 2024 and 2025 develop the statewide water education campaign for the general public and public schools, in conjunction with a statewide survey to establish baseline data related to the public's understanding of water issues and personal actions to conserve water. In addition, continue to implement the Water Security Planning Act of 2023 to support rural and municipal efforts to increase water education and conservation through expanded water recycling, limitations on outdoor water use, and greater adoption of water efficient fixtures.

Return on Investment:

By 2040, decrease water consumption in rural and municipal communities by 10% through the combination of water education, water planning, and local incentives for water conservation at homes and businesses.

Action A2

Develop tools and policy incentives to expand water conservation and resilience in the agricultural sector through initiatives that increase producers' voluntary adoption of high-efficiency irrigation technology (e.g., soil moisture sensors, remote controlled equipment, and application of satellite-based evapotranspiration data) and drought resilient, low water-demand crops.

Immediate Next Steps:

In 2024, expand outreach to farmers, agricultural businesses, and irrigation districts on all available state and federal funding to support costs associated with water conservation practices, including the State's Healthy Soil Program and federal Farm Bill programs for efficient irrigation systems, voluntary crop conversion, and conservation practices. In 2025, continue to advocate for greater federal investments in water conservation research and development and establish State fiscal incentives, such as an economic development incentive program, and other programs developed in coordination with agricultural producers, including acequias, to make adoption of water conservation practices more affordable for New Mexico farmers. Starting in 2025, use regional water planning to identify programs and projects for state funding that will increase agricultural resilience and preserve landscape health while decreasing depletions on a basin-wide scale.

Return on Investment:

By supporting producers to adapt farming and ranching to a future with less freshwater, decrease water use in the agricultural sector statewide by 10% by 2035 and 20% by 2050 while maintaining economic viability and protecting ecosystem services that benefit from crop irrigation.

Action A3

Build and repair resilient public drinking water infrastructure to address water loss, thereby ensuring a greater volume of water is conserved and that safe and affordable drinking water is available in all communities. Today, some drinking water systems in New Mexico are losing 40-70% of all treated drinking water due to breaks and leaks throughout aging infrastructure, such as underground distribution pipes. Many of these problems stem from chronic underinvestment in the infrastructure and water workforce that communities rely upon for clean drinking water.

Immediate Next Steps:

In 2024, deploy innovative technology and remote sensing techniques to complete a statewide inventory of water loss across 1,000+ public water systems in New Mexico, including analysis of planned and active infrastructure projects, in order to quantify the extent of water loss and inform further investments in water conservation through federal and state funding.

Return on Investment:

Return on Investment: Decrease statewide water loss from public drinking water infrastructure by 25% by 2040 through routine and targeted projects to repair and replace failing and leaking pipes, pumps, hydrants and other facility components, saving municipalities and ratepayers millions of dollars while saving water.

Action A4

Prioritize water management infrastructure improvements (e.g., dams and reservoirs) and operational efficiencies to meet future demands by developing agreements for flexible management options, continuing progress on completion of Indian Water Rights Settlements, repairing aging infrastructure (e.g., in tribal and acequia communities) and addressing critically important dam safety improvements, while ensuring that environmental flows and compliance will be part of our solutions. Seek and apply federal resources and funding to assist in the completion of many urgent infrastructure projects.

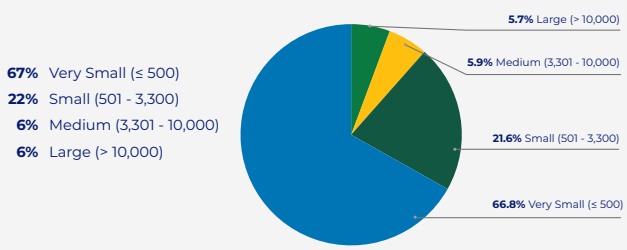
Immediate Next Steps:

Work with partners in 2024 and 2025 to repair and modernize existing infrastructure to improve water use efficiency savings, utilize naturally distributed storage where appropriate, and maximize operational flexibilities and surface water and groundwater storage opportunities to protect up to three-million-acre-feet of water per year for existing and future uses. In addition, establish tools and data to calculate a baseline for system-wide efficiency and to measure future change. In 2025, allocate dedicated state funding to accelerate projects that address infrastructure priorities, including over 70 deficient dams.

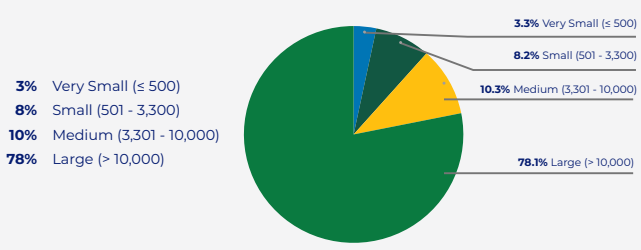
Return on Investment:

By 2040, improve system-wide efficiency by 20% and develop additional infrastructure to meet future water supply needs for our communities.

Community Water System in NM - By system size



Community Water System in NM - By population served



B NEW WATER SUPPLY

With projections of 25% less water available in 50 years, we must develop new sources of water while we conserve and protect our freshwater resources. Technological advances continue to make water treatment safer and more economically viable. This includes safely tapping and treating ancient underground reserves of brackish water to remove salt and other naturally occurring constituents, as well as the treatment of wastewater from industrial processes to remove harmful pollutants so the treated water may be used to offset demand for freshwater.

New Mexico will become the first state in the country to establish a State Strategic Water Supply through a program that offers advanced market commitments to mitigate market risks through State commitments to purchase treated water from selected projects to build new desalination plants and produced water treatment plants in New Mexico. Depending on the quality of the treated water and associated regulatory standards, the State would be able to use or sell the auxiliary water for a range of specified purposes, for example, recharge a depleted freshwater aquifer with desalinated brackish water or use treated wastewater to develop

and store renewable energy. In other words, among other benefits, we will better meet the water demands of our clean energy transition without reducing the availability of freshwater for human consumption, growing crops and raising livestock, and cultural and ecological purposes.

Our policy innovations will spur huge capital investments in new water treatment infrastructure and help to accelerate ongoing research and development for inland desalination and produced water treatment and reuse. In addition, the priority actions below demonstrate our commitment to ensuring each new investment in new sources of water is grounded in strong science and data and subject to regulatory frameworks that protect public health and foster accountability. As we expand utilization of a wider range of water resources and continue to conserve, it is important to closely monitor existing groundwater supplies. Building a dedicated water resource monitoring network will help New Mexico track the impacts of our water management decisions, thereby better informing state, tribal and local water managers for decades to come.

Actions

Action B1 Establish the State Strategic Water Supply with $500 million reserved during 2024 and 2025 for New Mexico to apply toward purchases of water that can be used for everything from community water supply to building our clean energy economy. The State's program for "advanced market commitments" will reduce risk for private companies looking to build desalination and produced water treatment facilities to convert brackish groundwater and oil and gas sector wastewater to valuable resources. These nonrenewable additional sources of water will greatly bolster water security by addressing near and long-term future water supply needs without increasing demand on the State's diminishing freshwater resources.

Immediate Next Steps:

In 2024, create the program framework and guidelines, and launch concept paper competition for advanced market commitments for desalination and wastewater treatment/reuse. In 2024 and 2025, secure $500 million in program funding through revenues from severance taxes collected on oil, gas, and other natural resource extraction.

Return on Investment:

By 2028, 100,000-acre-feet of new water is available for State use and resale for clean energy production, storage and manufacturing and for other zero-discharge industrial processes. By 2035, 50,000-acre-feet of treated brackish water is available and/or applied to active projects to recharge freshwater aquifers and otherwise augment the supply of freshwater for communities, farms, aquatic ecosystems, and interstate compact compliance.

Action B2 Develop and implement comprehensive water reuse rules for potable and non-potable reuse of treated wastewater, including, but not limited to, continued implementation of the Produced Water Act, which was enacted in 2019 to spur greater reuse of produced water, by developing rigorous science-based standards and permitting requirements to protect the environment and public health.

Immediate Next Steps:

By 2024 adopt preliminary water reuse rules to create a consistent and science-based regulatory program for treatment and reuse of produced water outside of the oil and gas sector. By 2026, adopt necessary revised and sector-specific water reuse rules pursuant to the Water Quality Act, the Produced Water Act and the Environmental Improvement Act to establish clear regulatory pathways for potable (direct and indirect) and fit-for-purpose non-potable reuse of all relevant sources of wastewater, including from domestic/municipal and industrial sectors.

Return on Investment:

The necessary regulatory frameworks are in place by 2026 to maximize utilization of the new water supplies identified in Action B1 above.

A 25 million gallon per day brackish water treatment plant could produce up to 27,900 acre-feet of potable water a year. For comparison, this would cover approximately 70% of the annual consumptive water use in the Albuquerque area, which is roughly 40,000 acre-feet.

Action B3

Fully fund and implement the Aquifer Mapping and Monitoring Program at the New Mexico Bureau of Geology and Mineral Resources and establish an integrated statewide groundwater monitoring network to support ongoing water management decisions, including development of desalination treatment plants and aquifer recharge projects. This action also directly supports action B1 above by expanding opportunities for the proper siting of water treatment plants and characterization of brackish water aquifers. In order to better understand our complex aquifers and track changes in some regions, we will need to drill wells to explore and delineate the aquifers. These wells can then be used for dedicated, long-term monitoring to track the impacts of our water use and conservation efforts.

Immediate Next Steps:

In 2024 and subsequent years, fully fund the Bureau of Geology and Mineral Resources' request for recurring funding (i.e., an increase of $1.25 million) and any requested nonrecurring program funding. Utilize federal infrastructure funding to help cover costs to drill wells and build an improved groundwater monitoring network.

Return on Investment:

By 2037, after 12 years fully-funded, the Program has added 100 new dedicated monitoring wells to the statewide network and characterized all major and minor aquifers in the State – freshwater and brackish water – with major aquifers characterized by 2032.

C WATER AND WATERSHED PROTECTION

New Mexicans enjoy iconic rivers and aquatic playgrounds at our many beautiful lakes and reservoirs. Yet, many of our precious surface waterbodies, forested watersheds, and groundwater resources are polluted or at risk of degradation due to human activity, natural disasters, extreme weather, and other threats. As we face realities of diminishing freshwater supplies in the coming decades, we are reminded that every drop counts. That means we have a responsibility to keep healthy water from becoming polluted while we double-down on efforts to clean up contaminated groundwater and impaired rivers and lakes in all corners of the State.

The priority actions set forth in this section highlight four key areas of increased focus that will ensure we are working toward access to clean

water for all our communities and prevent certain sources of freshwater from becoming polluted or degraded sacrifice zones. Future generations of New Mexicans and our vibrant agricultural and outdoor recreation sectors depend on New Mexico to protect and restore water quality. As drought intensifies and new water pollutants emerge, we must simultaneously cleanup legacy waste and put strong programs in place to protect healthy watersheds and pristine aquifers through pollution prevention, forestland restoration, and fixing aging infrastructure.

Actions

Action C1

Cleanup contaminated groundwater across 15 Superfund sites, hundreds of legacy uranium mining and milling sites, federal facilities (such as Los Alamos National Lab and military institutions), hundreds of petroleum storage tank releases, and up to 200 other pollutant plumes scattered across rural and urban communities where groundwater fails to meet State water quality standards.

Immediate Next Steps:

In 2024, in partnership with the New Mexico Water Data Initiative and the state uranium mining reclamation programs, develop a dashboard of all known contaminated groundwater sites, including the status and estimated cost of cleanup for each site. In 2025, fund and launch a State program to pay for remediation of groundwater contamination at over 100 neglected sites that have no responsible party and that do not rank for the federal Superfund program.

Return on Investment:

By 2035, average federal and private sector investments in legacy uranium cleanup in New Mexico are 500% of 2023 levels; 30 non-uranium groundwater contamination sites are remediated, of which at least 50% are located in underserved or disadvantaged communities; there are zero active petroleum storage tank sites with human health risk; and all active Superfund sites are on schedule with an approved and funded remediation plan.

Action C2

Develop and implement a State surface water discharge permitting program to protect watersheds and reduce the amount of pollution entering New Mexico's rivers, lakes, streams and wetlands. New Mexico is one of three states that is not authorized by the federal government to administer the Clean Water Act discharge permitting program. Instead, New Mexico businesses and utilities rely on the U.S. Environmental Protection Agency out of Dallas, TX to write and enforce these permits. In addition, given that the majority of New Mexico's surface waters are not protected from pollution under current federal law, a state program would ensure protection of all waters of the State and the communities and ecosystems that rely on them.

Immediate Next Steps:

In 2024, fund the New Mexico Environment Department's five-year plan to build the surface water discharge permitting program. In 2025, enact legislation to remove any statutory barriers to full program development and assumption of federal program authorization.

Return on Investment:

By 2030, NMED is implementing a State permitting program for all types of regulated discharges. By 2040, 20% fewer surface water impairments are caused by point source pollution.

Action C3 Fix or replace aging municipal wastewater treatment plants and build modern stormwater infrastructure to prevent surface and groundwater pollution and address emerging contaminants, while saving communities money in the long run and protecting public health. In addition to controlling pollution and protecting water quality, these infrastructure investments will make communities more resilient to the impacts of climate change and decrease risks of loss of life and property destruction from flooding. Improved wastewater and stormwater infrastructure will also increase groundwater recharge during heavy precipitation events and create greater opportunities for water reuse.

Immediate Next Steps:

In 2024 and 2025, develop a list of community wastewater treatment facilities in need of repair or replacement to protect water quality and work with local communities to develop tailored capacity and funding strategies to plan, design and construct projects. In addition, continue state, regional and local efforts to support adoption of regionalization approaches that mitigate local capacity shortfalls to operate and maintain wastewater systems.

Return on Investment:

By 2040, the pollution control compliance rate at municipal wastewater treatment plants is 95%. By 2045, major stormwater management and flood prevention projects, including those that utilize green infrastructure practices, are complete or substantially underway in all cities, towns and villages.

Action C4 Accelerate watershed restoration projects to reduce risk of catastrophic wildfires, flooding, and large-scale erosion to protect critical surface water sources. The record-breaking wildfire season of 2022 made clear the devastating impacts that wildfire can have on municipal water supply and irrigation water sources and infrastructure. New Mexico will utilize the abundant federal and new State conservation funding to invest in wildfire-risk reduction in critical water source areas across the State, including mechanical thinning, responsible prescribed burning, and reforestation. The 2020 Forest Action Plan provides detailed steps to reduce the risk of high-intensity wildfires in forested watersheds that supply the bulk of our State's surface water supplies.

Immediate Next Steps:

In 2024 and 2025, continue implementation of the 2020 Forest Action Plan to accelerate the pace and scale of water source protection projects. Secure additional federal funding for New Mexico projects and utilize Good Neighbor and other cooperative agreements with the U.S. Forest Service and Department of the Interior agencies to manage wildfire risk on federal lands across New Mexico. Use the Land of Enchantment Legacy Fund and other State appropriations to increase conservation work on private, Tribal, and public lands. Continue investment in the New Mexico Reforestation Center to expand post-fire reforestation and mitigate the risk of permanent forest loss posed by climate change.

Return on Investment:

By 2035, New Mexico collectively restores and reduces wildfire risk on 300,000 acres annually per year in critical watersheds and water source areas, including 140,000 acres per year of treatments on State and private lands. New Mexico's capacity to reforest burned areas increased from 300,000 seedlings per year to 5 million.

Through implementation of the 11 priority actions in this 50-Year Water Plan, future generations of New Mexicans will enjoy clean water, healthy watersheds, more reliable groundwater supplies, and vibrant local economies. We must continue to make bold State investments in water programs and infrastructure, even as we each do our part to protect and conserve our most precious resource.

Governor Michelle Lujan Grisham Administration's Water Resilience Initiatives (2019-2023)

Over the past five years, the State has made great progress in tackling New Mexico's water challenges.

Ongoing and completed priority work since 2019 includes:

- ✓ Climate Change Task Force and Executive Order 2019-003
- ✓ Expanded state agency capacity, including NMED Climate Change Bureau, EMNRD Climate Change Bureau, NMISC Acequia Bureau, NMOSE Pueblos, Tribes, and Nations Bureau
- ✓ New Mexico Produced Water Research Consortium
- ✓ NMOSE/NMISC Tribal Water Working Group
- ✓ Produced Water Act (2019)
- ✓ Water Data Act (2019)
- ✓ New Mexico 2020 Forest Action Plan
- ✓ NMBGMR Leap Ahead Report (2022)
- ✓ New Mexico Water Policy and Infrastructure Task Force (2022)
- ✓ Land of Enchantment Legacy Fund (2023) Water Security Planning Act (2023)
- ✓ Regional Water System Resiliency Act (2023)
- ✓ Forest Conservation Act Amendments (2023)
- ✓ Hermits Peak-Calf Canyon Fire Recovery Funds (2023)
- ✓ Funding and workplan for State Surface Water Permitting Program
- ✓ Litigation against U.S. Department of Defense for groundwater contamination in Curry and Otero Counties
- ✓ Remediation of groundwater contamination Kirtland Air Force Base, Los Alamos National Laboratory, and other federal facilities
- ✓ Settlement of all Gold King Mine claims with total of $50 million for water projects and other cost recovery

LIST OF RELATED RESOURCES

NM Water Policy and Infrastructure Task Force Report.
bit.ly/NM50WAP_Utton

Climate Change in New Mexico Over the Next 50 Years: Impacts on Water Resources (Leap Ahead Report).
bit.ly/NM50WAP_Leap

Recommendations from Tribal Water Working Group.
bit.ly/NM50YAP_TribalWaterReport

Recommendations from the Acequia Water Planning Working Group.
bit.ly/NM50WAP_Acequia

Water Security Planning Act.
bit.ly/NM50WAP_WSPAct

New Mexico Water Use by Categories.
bit.ly/NM50WAP_WaterByCat

NM Aquifer Mapping Program.
bit.ly/NM50WAP_Mapping

EPA Drinking Water Infrastructure Needs Assessment.
bit.ly/NM50WAP_EPA

New Mexico 2020 Forest Action Plan at
https://www.emnrd.nm.gov/sfd/forest-action-plan/


GREAT SEAL OF THE STATE OF NEW MEXICO · 1912 ·

AB-SC EXHIBIT 15 *REV*

PRODUCED WATER BENEFICIAL REUSE
FRAMEWORK FOR PILOT STUDY AUTHORIZATION

Railroad Commission of Texas
Oil and Gas Division
Technical Permitting Section
Environmental Permits and Support Unit

January 8, 2024

INTRODUCTION

Produced water means the water (brine) brought up from the subsurface during the extraction of oil and gas, and can include formation water, hydraulic fracturing fluid flowback, and any chemicals added downhole or during the drilling, completion, and or/water separation processes.

Produced water has the potential to have a significant positive impact on the State's limited water resources. Produced water may contain amounts of minerals, organic compounds, and other substances that make it unsuitable as a water supply source for most human, agricultural, environmental, or industrial uses. However, water treatment technology exists to treat produced water so that the treated fluid may become available for many uses. A number of U.S. states currently allow for treated produced water to be land applied or surface discharged under applicable permits, but significant potential health and safety, practical, logistical, and economic challenges warrant additional investigation in the State of Texas. The oil and gas industry currently recycles some treated and untreated produced water through normal oil and gas operations, such as to provide makeup water for hydraulic fracture stimulation and completion fluids. However, the use of treated produced water outside of downhole and oil and gas industrial scenarios has, for the most part, not been explored.

In response to the potential for treated produced water to have a significant and positive impact on water resources in Texas, the Legislature created the Texas Produced Water Consortium to organize stakeholders and to facilitate the safe development of treated produced water as a potential water resource. The Railroad Commission of Texas (RRC) is the agency charged with regulating the oil and gas industry, and the Legislature has directed RRC to encourage recycling of produced water for beneficial purposes.

Operators are now proposing pilot studies to explore the health and safety, practical, logistical, and economic challenges to implementation of various produced water treatment technologies. This document describes RRC staff's approach for evaluating applications and granting authority for operators to conduct pilot studies in which produced water is treated and made available for beneficial reuses outside of regular oil and gas operations, and it provides a template for an application for such a pilot study. This approach is based on existing statutes and rules, as well as RRC's mission, which is to serve Texas by our stewardship of natural

resources and the environment, our concern for personal and community safety, and our support of enhanced development and economic vitality for the benefit of Texans.

AUTHORITY

The RRC's general recycling authority can be found in Natural Resources Code §122 (relating to Treatment and Recycling for Beneficial Use of Fluid Oil and Gas Waste), which states the RRC shall adopt rules that encourage fluid oil and gas waste recycling for beneficial purposes. The RRC has promulgated rules in 16 Texas Administrative Code (TAC) §3.8 (relating to Water Protection) that provide for three categories of recycling: prohibited, authorized, and permitted (16 TAC §3.8(d)(7)(A), (B), and (C), respectively). In addition, 16 TAC Chapter 4 contains rules for commercial recycling of oil and gas waste. The permitted recycling provisions in 16 TAC §3.8(d)(7)(C) provide the framework that RRC staff will employ to authorize pilot studies for the recycling of produced water:

> *(C) Permitted recycling.*
>
> *(i) Treated fluid may be reused in any manner, other than the manner authorized by subparagraph (B) of this paragraph[1], pursuant to a permit issued by the director on a case-by-case basis, taking into account the source of the fluids, the anticipated constituents of concern, the volume of fluids, the location, and the proposed reuse of the treated fluids. Fluid that meets the requirements of a permit issued under this clause is a recyclable product.*

Any activity that may be authorized by the RRC is also constrained by specific statutory and regulatory obligations. Notably, pursuant to 16 TAC §3.8(b), no person conducting activities subject to regulation by the RRC may cause or allow pollution of surface or subsurface water in the state. Pollution of surface of subsurface water in the state is defined in 16 TAC §3.8(a)(28) as the alteration of the physical, thermal, chemical, or biological quality of, or the contamination of, any surface or subsurface water in the state that renders the water harmful, detrimental, or injurious to humans, animal life, vegetation, or property, or to public health, safety, or welfare, or impairs the usefulness or the public enjoyment of the water for any lawful or reasonable purpose.

[1] The "*authorized*" recycling referenced in subparagraph (B) states that: (1) no permit is required if treated fluid is recycled for use as makeup water for a hydraulic fracturing fluid treatment(s), or as another type of oilfield fluid to be used in the wellbore of an oil, gas, geothermal, or service well; (2) treated fluid may be reused in any other manner, other than discharge to waters of the state, without a permit from the Commission, provided the reuse occurs pursuant to a permit issued by another state or federal agency; and (3) if treatment of the fluid results in distilled water, no permit is required to use the resulting distilled water in any manner other than discharge to waters of the state. Note that the term "distilled water" is defined in 16 TAC §3.8(a)(47) as "*water that has been purified by being heated to a vapor form and then condensed into another container as liquid water that is essentially free of all solutes*." The rule authorizes the use of distilled water from a treatment process for any purpose; however, RRC reserves the right to require an operator to conduct sampling and analysis to determine and demonstrate that the definition of distilled water is satisfied.

Produced water recycling thus far has mostly been confined to uses related to downhole oil and gas exploration and production activities. Pursuant to 16 TAC §3.8(d)(7)(B)(ii), a permit is not required if the treated fluid is to be used in a wellbore. There is interest from policymakers and operators in expanding acceptable re-use scenarios beyond oil and gas (downhole) uses, notably for irrigation of non-food crops, non-specific pasture irrigation, or other similar uses. Because these are novel uses for treated produced water, special care and concern is warranted in determining whether to authorize a particular recycling activity.

PILOT STUDIES

A pilot study is the focused and attentive execution of an activity that is performed on a limited scale to evaluate the efficacy of the activity and whether the activity can be successfully implemented on a larger scale, and to use the learnings of the study to inform various aspects of the activity, including health and safety, practical, logistical, and economic considerations.

Pilot studies also provide significant value as a means of informing regulatory policy and requirements. That is, the results of pilot studies will be used to shape the future regulatory program in a manner that is protective of the RRC's regulatory obligations as stated in statute, rule, and its mission.

An application for a pilot study for produced water recycling will be considered by RRC staff on a case-by-case basis. RRC staff will consider information from the five categories identified in 16 TAC §3.8(d)(7)(C)(i), which include the source of the fluids, the anticipated constituents of concern, the volume of fluids, the location, and the proposed reuse of the treated fluids.

RRC Pilot Study Program Goals

RRC staff has constructed this pilot study framework for the purpose of developing a program for the safe and economical recycling of produced water. This will be examined through multiple pilot studies that generate information to further industry and society's knowledge and understanding of produced water recycling benefits and risks. RRC staff established the following pilot study program goals:

1. To establish the public's trust that treated produced water can be reused in certain activities that are safe and protective of human health and the environment.

2. To provide an efficient regulatory program for operators to assess the effectiveness of water treatment technologies.

3. To provide an efficient and effective regulatory program to assess the suitability of applying treated produced water to specific beneficial purposes.

RRC Pilot Study Objectives

Individual pilot studies will assess the efficacy of specific treatment technologies and reuse scenarios. From the RRC perspective, the objectives of each produced water recycling pilot study should include:

1. Obtain administrative documentation of the pilot study.
2. Characterize the source fluids.
3. Describe the treatment technology.
4. Characterize the treated fluids and their consistency in quality (i.e., levels of constituents other than H2O).
5. Identify the constituents of concern.
6. Describe the reuse scenario.
7. Describe the water treatment methodologies (ie., modalities) and how they will directly affect the reuse scenario (i.e., water constituents' accumulation into soil, crop absorption, other).
8. Identify constraints associated with the proposed reuse activity.

Pilot Study Considerations

Administrative Considerations

Authorization for a treated produced water pilot study will only be issued to an organization with an active Organization Report (Form P-5) and the necessary financial assurance required by 16 TAC §3.78.

RRC staff will limit the duration of pilot study permits to one year. In addition, the RRC authorization may include limits on the volume of produced water that is treated and the methods and means by which the treated fluid is reused.

The duration of a pilot study may be extended, provided the activity is in good standing with its authorization requirements. An operator should request an extension 60 days prior to the expiration of the current authorization.

Pilot studies cannot be performed as commercial endeavors without considering the financial security requirements of 16 TAC §3.78 and the Oil & Gas Division's notice requirements for commercial facility applications.

The treated water generated through a produced water pilot study must applied to the specific beneficial purpose(s) described in the authorization or be disposed of in accordance with RRC rules.

Authorization for a treated produced water pilot study will include reporting requirements that will include quarterly and final reports.

Fluid Source Considerations

Produced water is not defined in statute or rule. However, the definition of fluid oil and gas waste in Natural Resources Code §122.001(2) includes "produced water" and other fluids:

> *"Fluid oil and gas waste" means waste containing salt or other mineralized substances, brine, hydraulic fracturing fluid, flowback water, produced water, or other fluid that arises out of or is incidental to the drilling for or production of oil or gas.*

The definition of oil and gas waste in Natural Resources Code §91.1101 includes "salt water" and other fluids.

In federal regulations, produced water is defined in 40 §CFR 435.11(bb):

> *Produced water means the water (brine) brought up from the hydrocarbon-bearing strata during the extraction of oil and gas, and can include formation water, injection water, and any chemicals added downhole or during the oil/water separation process.*

A general discriminator for the definition of produced water for the purpose of this document and program would be the aspect of the fluid having been "produced" through an oil and gas well, even if the fluid was first introduced into the subsurface by the well.

At this point, however, there are some oil and gas wastes that are liquid in form that should not be considered in pilot studies of produced water. These include contact stormwater, liquids

from washout pits, and possibly other liquid oil and gas wastes that were not produced through the normal drilling, completion, or operation of an oil or gas well.

Constituents of Concern and Proposed Reuse Scenario Considerations

Recent compilation studies by the Groundwater Protection Council, the Texas Produced Water Consortium, the U.S. Environmental Protection Agency, and the U.S. Bureau of Reclamation have identified many chemical constituents that may be present in produced water. Generally, produced water may contain[2]:

- Mineral salts including cations and anions dissolved in water (often expressed as salinity, conductivity, or total dissolved solids [TDS])
- Organic compounds including volatile and semi-volatile organics, hydrocarbons, organic acids, waxes, and oils,
- Inorganic metals and other inorganic constituents including compounds such as sulfate and ammonia,
- Naturally occurring radioactive material (NORM) that leached into the produced water from some formations or precipitated due to water mixing,
- Chemical additives to improve drilling and production operations, and
- Transformational byproducts that can form from the interaction between added chemicals and formation water.

The Texas Produced Water Consortium cited a large database of more than 17,000 produced water samples that showed the following range of some inorganic constituents:[3]

[2] Produced Water Report: Regulations, Current Practices, and Research Needs. Groundwater Protection Council, 2019. Accessed on April 12, 2023. https://www.gwpc.org/sites/gwpc/uploads/documents/Research/Produced_Water_Full_Report___Digital_Use.pdf
[3] Beneficial Use of Produced Water in Texas: Challenges, Opportunities and the Path Forward. Texas Produced Water Consortium Report to the Texas Legislature 2022. https://www.depts.ttu.edu/research/tx-water-consortium/downloads/22-TXPWC-Report-Texas-Legislature.pdf. Accessed on April 12, 2023.

Table 7: Assumed chemical composition of produced water for treatment based on 17,000+ samples from the Midland and Delaware basins (* Na was adjusted slightly where necessary to achieve electroneutrality).

	Concentration (mg/L)			
Species	Seawater	25th Percentile	50th Percentile	75th Percentile
Calcium (Ca)	408	1,723	2,728	3,794
Magnesium (Mg)	1,298	299	464	640
Sodium (Na)*	10,768	34,417	43,336	49,458
Potassium (K)	396	359	501	643
Barium (Ba)	-	1	2	3
Strontium (Sr)	-	293	506	691
Iron (Fe)	-	17	36	68
Manganese (Mn)	-	0.6	1.1	1.9
Total cations	12,870	37,122	47,592	55,325
Sulfate (SO_4)	2702	282	421	690
Chloride (Cl)	19364	57,012	73,586	84,843
Bromide (Br)	67	401	549	674
Phosphate (PO_4)	-	32	48	66
Boron (B)	-	40	49	61
Silica (SiO_2)	5	10	13	17
Bicarbonate (HCO_3)	146	256	366	525
Carbon Dioxide (CO_2)	9.19	110	220	374
Total anions	22,284	58,033	75,035	86,880
Total TDS	35,154	95,155	122,627	142,204
Alkalinity (as mg/L $CaCO_3$)	120	210	300	431

[33] Xu, P.; Hightower, M., Characterization of Produced Water and Surrounding Surface Water in the Permian Basin. In *Produced Water Society Seminar* 2022, Houston TX, 2022.

The U.S. EPA's study of hydraulic fracturing[4] compiled extensive documentation of chemical constituents found in produced water from throughout the United States. All three of these studies noted a significant degree of variation in the chemical constituents of produced water. Produced water contains chemical constituents that are native to the producing formation and may contain chemical constituents that were introduced during oil and gas exploration and production activities.

The release of treated or untreated produced water is a regulatory concern to the RRC; high salt content could be immediately harmful to plant life and soil health, and lower concentrations of various constituents could present adverse effects over time. The thresholds for concern are not certain at this time because of the complexity and diversity of produced water, but also because regulators and the industry have not quantified the potential harm that

[4] Hydraulic Fracturing for Oil and Gas: Impacts from the Hydraulic Fracturing Water Cycle on Drinking Water Resources in the United States. U.S. EPA. EPA-600-R-16-236Fa. December 2016. www.epa.gov/hfstudy. Accessed on April 12, 2023.

may come through human or environmental exposure to the constituents of concern in treated or untreated produced water. Generally, however, a regulatory concern will arise if the chemical constituents of produced water may:

- Cause pollution of surface or subsurface water,
- Harm natural resources or the environment,
- Harm personal and community safety, or
- Harm the economic vitality of Texas.

For the purposes of a pilot study, the analysis of produced water will be considered to assess the potential long-term risks posed by the activity and to monitor the soil conditions in the application area.

As described below, RRC staff have established three appendices (A, B, and C) that identify the primary analytical considerations for pilot studies. An applicant may propose a variance from the requirements in the appendices with justification, subject to RRC staff approval. The actionable analytical requirements will be specified in the letter of authorization or permit issued by RRC staff.

Sampling and Analysis Protocol No. 1

Appendix A contains the details of Sampling and Analysis Protocol No. 1. The RRC will require detailed analysis of untreated and treated produced water for the purpose of supporting academic or consortium-supported assessment of the risks associated with the recycling of produced water for beneficial purposes. This analysis will be comprehensive and will include the sampling and analysis schedule contained in Appendix A, which will be included as a requirement of the pilot study authorization.

The outcome of academic or consortium-supported risk assessment will inform RRC's future produced water recycling program. Namely, to meet the RRC's goal of establishing the public's trust that treated produced water can be reused in activities that are safe and protective of human health and the environment. But the results of the Protocol No. 1 analyses will not be actionable by the RRC for the purposes of pilot study operations. That is, RRC does not anticipate the need to revoke or alter an authorization based on these analytical results, although the RRC may decline to renew or extend an existing pilot study authorization.

Sampling and Analysis Protocol No. 2

Appendix B contains the details of Sampling and Analysis Protocol No. 2. The RRC anticipates that most pilot studies requiring RRC authorization will include some aspect of the treated produced water being applied to the ground surface for irrigation of pastureland or a specific agricultural crop.[5] Therefore, a two-element (treated water and soil) sampling program will be required to assess the treated produced water and its impact on the soil environment. This analysis will generally be consistent with RRC's current land application program—soil and treated produced water samples for selected analytes to assess soil health and constituent accumulation. However, consistent with the practice of the New Mexico Produced Water Research Consortium, RRC will adopt the recommendations of the U.S. Bureau of Reclamation[6] with some modification (Appendix C).

Importantly, the specific requirements of Protocol No. 2 may be further modified case-by-case based on the specific beneficial reuse scenario(s) planned by the applicant.

For soil sampling, the evaluation area should be subdivided into six equal-area plots, three of which will be application plots and three of which will be control or blank plots. An application plot is a plot of land on which treated produced water will be applied and soil samples will be collected. A control or blank plot is a plot of land on which treated produced water will not be applied, but soil samples will be collected. For example, purposes, the following guidelines will discuss using a 1-acre plot for a pilot study. It is anticipated that each operated produced water treatment pilot will be assessed as unique knowing that some aspects of each pilot conducted may vary from one study to another.

Soil sampling will generally follow the guidelines found below.

For each 1-acre plot,

- The 1-acre plot is to be subdivided geometrically into four quadrants (see Figure 1).
  - Within each quadrant there will be 1 soil sample collected from each depth zone as defined below.
    - One soil sample must be collected from Zone 1 (0-12 inches depth) from the center of the quadrant.
    - One soil sample must be collected from Zone 2 (12-24 inches depth) from the center of the quadrant.

[5] RRC does not have the jurisdiction to authorize the discharge of treated produced water to surface water or for aquifer recharge. Such authorization may be obtained from the Texas Commission on Environmental Quality.
[6] Oil and Gas Produced Water Management and Beneficial Use in the Western United States. U.S. Department of the Interior, Bureau of Reclamation. September 2011. Table 9, Constituent limits for irrigation water (adapted from Rowe and Abdel-Magid, 1995)

  - One soil sample must be collected from Zone 3 (24-36 inches depth) from the center of the quadrant.
- The four soil samples collected for each depth zone will be composited into one single combined soil sample representing the entire 1-acre plot at each prescribed depth.
- Three combined soil samples will be submitted for lab testing for each 1-acre plot.

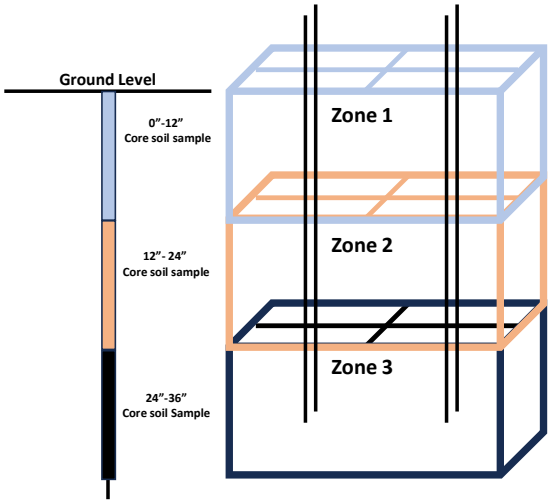


Figure 1

Location and Fluid Volume Considerations

Generally, the application must demonstrate the operator's ability to manage the volume of produced water being treated, and the ground surface must be sufficiently capable of receiving the treated produced water without deleterious effects. The following will be general requirements of the authorization:

- The location must be suitable for the activity (no surface water features, not in a flood plain, and not in a wetlands or sensitive environment.)

- The topography should be flat or gently sloped.

- The soil type must be suitable for the proposed reuse scenario, including liquid volume and rate loading.

- The amount of water to be applied must be specified in terms of both total aggregate volume and application rate (volume / day).

- Plans for measuring and reporting rain fall amounts, and how those additional water volumes will be incorporated into the maximum application volumes will be required. Any diluent or addition of water from any source will add an obligation to the operator to ensure that new water source is tested and assessed for composition much the same as if it were a raw water source to be treated.

- Application by irrigation must be controlled and by sprinkler or drip system.

- The applied liquid must infiltrate into the soil horizon.

- The applied liquid must not accumulate on the surface (pool).

- The applied liquid must not runoff or cause erosion.

- The applied fluid must not contact groundwater or surface water.

- Applied fluids must be contained within the designated application area. Berms or other containment features may be required.

- An assessment of the occurrence and quality of groundwater is recommended and may be required.

- The facility must have adequate storage for the volume of produced water to be managed.

- The facility must have a contingency plan for the storage or disposal of treated fluid in the event application of the treated fluid is not authorized (i.e., during rainfall events, when the ground is frozen) or if a process or quality control requirement prevents fluid from being applied to the ground surface.

PILOT STUDY APPLICATION

Pre-application meetings with RRC staff are encouraged.

Applicant/Operator Information

Provide the following information for the applicant/operator:

- Organization (Operator/P-5) information
    - Operator name

    - Operator number
- Project Contact Information (must be an employee of the operator organization)
    - Project Contact Name
    - Title
    - Address
    - Phone number(s)
    - email address
- The application must include the following signed and dated certification statement: "I certify that I am authorized to make this application, that this application was prepared by me or under my supervision and direction, and that the data and facts stated herein are true, correct, and complete to the best of my knowledge."

Project Description

Provide a brief project description for the purpose of providing an introduction/orientation to the project details contained in subsequent parts of the application.

Project Location

- Surface owner information
    - Identity of surface owner
    - Provide proof of surface owner consent (this information must establish that the surface owner is aware of the activities to be performed on the property and the potential risks associated with those activities.)
    - Provide the surface lease/use agreement.
- Notice.
    - The applicant shall comply with the notice provisions of 16 TAC §3.8(d)(6)(C), as if the produced water recycling project utilizes a pit.
    - The applicant shall demonstrate that notice has been provided.
- Property Description
    - Provide a map to the project location with directions sufficient for RRC staff to find the pilot project location.
    - Describe the size and features of the pilot project property, including:
        - Tract size
        - Size of treatment area
        - Size of evaluation/application/reuse area
        - Topography
        - Property boundaries
        - Surface water and drainage features
        - The project may not be located in a wetlands (use the U.S. Fish and Wildlife Service's National Wetlands Inventory Wetlands Mapper

available at https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/, or provide a site-specific assessment and determination).
- The project may not be located in a floodplain (use the Federal Emergency Management Agency National Flood Hazard Layer available at https://www.fema.gov/flood-maps/national-flood-hazard-layer, or provide a site-specific assessment and determination.)

Fluid Sources

- Describe the fluid sources that will be used, whether from specific operators, fields, etc..
- Describe the known and anticipated chemical constituents and concentrations of the produced water to be treated. Include available analytical results.
    - Identify constituents of concern
    - Quantify constituents of concern

Treatment Area

- Provide a diagram of the treatment process equipment layout, including receiving, treating, and storing equipment or pits.
    - The use of a pit will require filing Form H-11, Application for Permit to Use or Maintain a Pit, which is available at https://www.rrc.texas.gov/oil-and-gas/oil-and-gas-forms/
- Describe the treatment process.
    - The description should be of sufficient detail to categorize the treatment processes and identify the role of individual process units. RRC does not intend to infringe on proprietary information but does need a general understanding of the processes for categorization.
    - Describe the intended treatment rates.
    - Describe the treatment goals and quality control.
    - Describe how concentrated brines and other waste will be managed.

Evaluation/Application/Reuse Area

For this framework, RRC staff anticipates that pilot studies will include the land application of treated fluid, including irrigation. If another method of reuse is proposed, the elements of this part of the application shall be adjusted accordingly.

- Describe the proposed evaluation/application/reuse scenario.
- Describe the soil horizon and soil characteristics of the evaluation/application/reuse area.
    - Site-specific soil characterization is preferred and should include the following:

        - Soil classification
        - Geotechnical soils analysis, if available
        - Geochemical soils analysis, including baseline soils analysis (see Appendix B)
    - USDA soil surveys may be accessed at the U.S. Department of Agriculture Natural Resources Conservation Service https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx
- Describe the subsurface
    - Geology to 40 feet
    - Hydrogeology, including depth to groundwater and the direction of flow.
    - Identify water wells within one-half mile of the evaluation/application/reuse area using resources from the Texas Water Development Board (Water Well Report Viewer available at https://www.tceq.texas.gov/gis/waterwellview.html, and Groundwater Data Viewer available at https://www3.twdb.texas.gov/apps/WaterDataInteractive/GroundwaterDataViewer/?map=sdr.)
- Describe the methods of treated produced water application.
    - Volume and rate
    - Equipment used to apply treated fluid (the equipment capacity must be sufficient to accommodate the treatment and application rates.
- Describe how treated fluid will be confined to the evaluation/application/reuse area.
    - Berms may be necessary to prevent runoff and run-on.
    - If the applicant asserts berms are not necessary, the applicant shall provide a plan for monitoring the evaluation/application/reuse area and for sampling soils beyond the application areas that may be subject to runoff.

Operations Plan

The application shall address how the applicant/operator will manage the following:

- Site security.
- Spills.
- Quality control issues, such as treated fluid not meeting the treatment goals or requirements for land application of treated fluid.
- Other operational issues that may occur; and
- Closure of the pilot study facilities.

PILOT STUDY AUTHORIZATION CONDITIONS

Authorization for a pilot study to treat produced water and make treated water available for beneficial reuse outside of regular oil and gas operations shall include conditions consistent

with RRC's other waste management permitting programs. The specific conditions listed below may change based on case-by-case information or as the pilot project program develops.

General Conditions

- The authority granted by this permit is effective <start date> and will expire on <end date>.
- This permit may be considered for administrative renewal upon review by the RRC. Any request for renewal should be received at least 60 days prior to the permit expiration date.
- This permit is nontransferable without the written consent of the RRC. A written request for permit transfer must be filed with Technical Permitting in Austin at least 60 days before the transfer takes place.
- Unless otherwise required by the conditions of this permit, the construction, use, and maintenance of the facility must be in accordance with the information represented in the permit application and attachments thereto.
- Any deviation from this permit must be approved by amendment from Technical Permitting in Austin before implementation.
- This permit does not authorize the discharge of any oil and gas waste.
- A sign must be posted at the entrance to the recycling pilot study facility. The sign must be readily visible and show the operator's name, facility name, and permit number in letters and numerals at least three (3) inches in height.

Authorized Waste

- This permit authorizes the treatment and recycling of produced water only. No other oil and gas wastes may be treated and applied to the designated application/reuse areas.

Recycling and Reuse Scenario

- A condition that describes the application area.
- Treated fluid may not be applied to the ground surface if the concentration of any of the constituents exceeds the analytical limitations in Appendix C.
- The treated fluid must be applied to the land area in such a manner that it will not pool or migrate off the application area or enter any water courses or drainage ways, including any drainage ditch, dry creek, flowing creek, or any other body of surface water.
- To prevent any standing or pooled rainwater, or other liquid, in the application area, treated fluid will not be applied during periods of rainfall or when the ground surface is frozen.

- Any standing or pooled rainwater, or other liquid, in the application area or within the perimeter must be removed within 72 hours and disposed of in an authorized manner.
- The maximum daily wastewater application rate for the application area must not exceed a total of <volume> barrels per day (BPD).
- The wastewater must be applied using <methodology in application>.
- If any part of the land application area becomes saturated, all treated fluid application must cease until it has had time to dry.

Monitoring and Analysis

- All chemical laboratory analyses required to be performed in accordance with this permit must be performed using appropriate Environmental Protection Agency (EPA) methods or Standard Methods by an independent, National Environmental Laboratory Accreditation Program (NELAP) certified laboratory neither owned nor operated by the permittee. Any sample collected for laboratory analysis must be collected and preserved in a manner appropriate for that analytical method as specified by 40 CFR, Part 136.
- The sampling and analysis program shall include any necessary field and laboratory quality control and quality assurance activities, samples, documentation, analysis, and review.
- Untreated produced water shall be sampled and analyzed for the parameters and constituents listed in Appendix A at the start of any land application activities and every 90 days thereafter.
- Treated produced water shall be sampled and analyzed for the parameters and constituents listed in Appendix A at the start of any land application activities and every 90 days thereafter.
- Treated produced water shall be sampled and analyzed for the parameters and constituents listed in Appendix B Table 1 at the start of any land application activities, every 30 days thereafter, and at the end of land treatment activities.
- Treated produced water shall be sampled and analyzed for the parameters and constituents listed in Appendix B Table 1 at the start of any land application activities, every 30 days thereafter, and at the end of land treatment activities.
- Soil samples shall be collected for analysis before land application activities commence, every 30 days thereafter, at the end of land application activities, and 90 days after the end of land application activities.
    - Based on the results of the initial baseline soil sampling and analysis results, RRC staff will establish analyte-specific concentration limits for the soil.
    - It is recommended that the soil sampling and analysis necessary to establish these soil concentration limits be completed during the pilot study application phase.
    - The permit will prohibit the application of produced water once the soil concentration limits have been reached.

- Soil samples will be analyzed according to Appendix B Table 2.
- Soil samples shall be collected as follows:
    - One soil sample must be collected from Zone 1 (0 to 12 inches depth) for each equidimensional, 1-acre area of the plot.
    - One soil sample must be collected from Zone 2 (12 to 24 inches depth) for each equidimensional, 1-acre area of the plot.
    - One soil sample must be collected from Zone 3 (24 to 36 inches depth) for each equidimensional, 1-acre area of the plot.
    - A minimum of four composite soil samples must be collected from 1-acre area of each plot each zone.
    - One composite soil sample should consist of at least four (4) discrete samples collected from the same plot and zone and homogenized.

Reporting

- The permittee shall report the date treatment activities begin to the Technical Permitting Section in Austin.
- The permittee shall report the date application activities ceased to the Technical Permitting Section in Austin.
- A final report shall be submitted 120 days after land treatment activities ceased containing any additional treatment, application, sampling, and analysis activities that have occurred since the most recent 90-day report, and the final soil samples collected for analysis 90 days after the end of application.
- The permittee shall submit a report to the Technical Permitting Section in Austin for each 90-day period the pilot program is in operation. Operation begins when treatment begins. Reports are due 30 days after the end of the 90-day period.
- The report shall include a description and tabulations of pilot study activities during the reporting period, including volume of produced water treated, volume of treated produced water applied to the reuse scenario, and volume of waste generated.
- The report shall include a summary of fluid and soil sampling activities that occurred during the reporting period.
- The report shall include a tabular summary of fluid and soil sampling results received during the reporting period.
- Laboratory analytical reports and the corresponding chain of custody shall be included for all chemical analyses performed.

APPENDIX A: SAMPLING AND ANALYSIS PROTOCOL NO. 1, ANALYSIS OF UNTREATED AND TREATED PRODUCED WATER TO SUPPORT A RISK ASSESSMENT

The following sampling and analysis of untreated and treated produced water will be required at the start of any land application activities and every 90 days thereafter. The sampling and analysis program shall include any necessary laboratory field and laboratory quality control and quality assurance activities, documentation, analysis, and review.

Protocol 1			
Category	**Subcategory**	**Analyte**	**Method**
Anions		Bromide	EPA 300.0/300.1; SW-846 9056A
Anions		Chloride	EPA 300.0/300.1; SW-846 9056A
Anions		Fluoride	EPA 300.0/300.1; SW-846 9056A
Anions		Nitrogen, nitrate	EPA 300.0/300.1; SW-846 9056A
Anions		Nitrogen, nitrite	EPA 300.0/300.1; SW-846 9056A
Anions		Phosphate	EPA 300.0/300.1; SW-846 9056A
Anions		Sulfate	EPA 300.0/300.1; SW-846 9056A
General		Alkalinity, total and bicarbonate	SM 2320B
General		Asbestos	EPA 100.1, 100.2
General		Chemical Oxygen Demand	SM 5220C, D, ASTM D1252B, EPA 410.X
General		Cyanide, total	EPA-NERL 335.4
General		Dissolved Oxygen	EPA-NERL 360.1
General		Electrical Conductivity	SM 2510B
General		Hardness (total or dissolved)	EPA-NERL 130.1
General		Surfactants - methylene blue active substances	SM 5540C
General		Nitrogen, ammonia	EPA 350.2
General		Oxidation Reduction Potential	USGS-OWQ NFM 6.5
General		pH	ASTM D6569
General		Specific Gravity	USGS-NWQL I-1312

Protocol 1			
Category	**Subcategory**	**Analyte**	**Method**
General		Sulfide	EPA-NERL 376.1
General		Total Dissolved Solids	SM 2540C
General		Total Organic Carbon	EPA 415.1
General		Total Suspended Solids	SM 2540B
General		Turbidity	EPA-NERL 180.1
Metals		30 Metals	SW-846 6010 or 6020
Metals		Mercury	SW-846 7470
Organics	Semi-Volatile Organic Compounds (SVOC)		SW-846 8270
Organics	SVOC - Agent Breakdown Products		EPA Method 538
Organics	SVOC - Carbonyl Compounds		SW-846 8315
Organics	SVOC - Dioxins		EPA 1613B
Organics	SVOC - Explosives		SW-846 8095
Organics	SVOC - Organic Acids		SW-846 8015
Organics	SVOC - PAH		SW-846 8015
Organics	SVOC - Pesticides/Herbicides		SW-846 8081
Organics	SVOC - PFAS	PFOS, PFOA, PFHxS	EPA 537.1
Organics	SVOC - Polychlorinated biphenyls (PCBs)	Aroclors	SW-846 8082
Organics	SVOC - Polychlorinated biphenyls (PCBs)	World Health Organization list of congeners	EPA 1668a
Organics	TPH	Diesel Range Organics (DRO) [C10-C28]	SW-846 8015D
Organics	TPH	Gasoline Range Organics (GRO) [C6-C10]	SW-846 8015D
Organics	TPH	Oil Range Organics (ORO) (C28-40)	SW-846 8015D

Protocol 1			
Category	**Subcategory**	**Analyte**	**Method**
Organics	Volatile Organic Compounds (VOC)		SW-846 8260
Organics		Oil and Grease	EPA-EAD 1664
Organics		Total Organic Halides (TOX)	SW-846 9020
Radionuclides		Gross Alpha/Beta	EPA 900.0/9310; EPA 600/00-02
Radionuclides		Radium 226, pCi/L	EPA 903.1
Radionuclides		Radium-228	EPA 904.0 - radium; SW-846 9320; Gamma Spec EPA 901.1

APPENDIX B: SAMPLING AND ANALYSIS PROTOCOL NO. 2, ANALYSIS OF TREATED PRODUCED WATER AND SOIL TO SUPPORT APPLICATION MONITORING

The following sampling and analysis of treated produced water will be required at the start of any land application activities, every 30 days thereafter, and at the end of the application period. Sampling and analysis shall include any necessary field and laboratory quality control and quality assurance activities, documentation, analysis, and review.

TABLE 1
Protocol 2 – Treated Produced Water

Category	Analyte	Method
Anions	Chloride	EPA 300.0/300.1; SW-846 9056A
Anions	Fluoride	EPA 300.0/300.1; SW-846 9056A
Anions	Nitrogen, nitrate	EPA 300.0/300.1; SW-846 9056A
Anions	Nitrogen, nitrite	EPA 300.0/300.1; SW-846 9056A
Anions	Phosphate	EPA 300.0/300.1; SW-846 9056A
Anions	Sulfate	EPA 300.0/300.1; SW-846 9056A
General	Alkalinity	SM 2320B
General	Conductivity, electrical	SM 2510B
General	Hardness	EPA-NERL 130.1
General	Nitrogen, ammonia	EPA 350.2
General	pH	ASTM D6569
General	Sodium Adsorption Ratio (SAR)	Calculated
General	Temperature	EPA-NERL 170.1
General	Total Dissolved Solids	SM 2540C
General	Turbidity	EPA-NERL 180.1
Metals	Aluminum	SW-846 6010 or 6020
Metals	Arsenic	SW-846 6010 or 6020
Metals	Beryllium	SW-846 6010 or 6020
Metals	Boron	SW-846 6010 or 6020

TABLE 1 **Protocol 2 – Treated Produced Water**		
Category	**Analyte**	**Method**
Metals	Cadmium	SW-846 6010 or 6020
Metals	Calcium (for SAR)	SW-846 6010 or 6020
Metals	Chromium	SW-846 6010 or 6020
Metals	Cobalt	SW-846 6010 or 6020
Metals	Copper	SW-846 6010 or 6020
Metals	Iron	SW-846 6010 or 6020
Metals	Lead	SW-846 6010 or 6020
Metals	Lithium	SW-846 6010 or 6020
Metals	Magnesium (for SAR)	SW-846 6010 or 6020
Metals	Manganese	SW-846 6010 or 6020
Metals	Molybdenum	SW-846 6010 or 6020
Metals	Nickel	SW-846 6010 or 6020
Metals	Phosphorus	SW-846 6010 or 6020
Metals	Potassium	SW-846 6010 or 6020
Metals	Selenium	SW-846 6010 or 6020
Metals	Sodium (for SAR)	SW-846 6010 or 6020
Metals	Total Metals	SW-846 6010 or 6020
Metals	Vanadium	SW-846 6010 or 6020
Metals	Zinc	SW-846 6010 or 6020
Organic	Total Oil and Grease	EPA-EAD 1664
Organic	Total Organic Carbon	EPA-NERL 415.1
Organic	Total Petroleum Hydrocarbons	SW-846 8015D
Radionuclides	Gross Alpha/Beta	EPA 900.0/9310; EPA 600/00-02
Radionuclides	Radium 226, pCi/L	EPA 903.1
Radionuclides	Radium-228	EPA 904.0 - radium; SW-846 9320; Gamma Spec EPA 901.1

The following sampling and analysis of soil will be required at the start of any land application activities, every 30 days thereafter, and at the end of the application period. Sampling and analysis shall include any necessary field and laboratory quality control and quality assurance activities, documentation, analysis, and review.

TABLE 2 **Protocol 2 - Soil**		
Category	**Analyte**	**Method**
Anions	Chloride	EPA 300.0/300.1; SW-846 9056A
Anions	Fluoride	EPA 300.0/300.1; SW-846 9056A
Anions	Nitrogen, nitrate	EPA 300.0/300.1; SW-846 9056A
Anions	Phosphate	EPA 300.0/300.1; SW-846 9056A
Anions	Sulfate	EPA 300.0/300.1; SW-846 9056A
General	Alkalinity	SM 2320B
General	Conductivity, electrical	SM 2510B
General	Nitrogen, ammonia	EPA 350.2
General	pH	ASTM D6569
General	Sodium Adsorption Ratio	Calculated
Metals	Aluminum	SW-846 6010 or 6020
Metals	Arsenic	SW-846 6010 or 6020
Metals	Beryllium	SW-846 6010 or 6020
Metals	Boron	SW-846 6010 or 6020
Metals	Cadmium	SW-846 6010 or 6020
Metals	Calcium (for SAR)	SW-846 6010 or 6020
Metals	Chromium	SW-846 6010 or 6020
Metals	Cobalt	SW-846 6010 or 6020
Metals	Copper	SW-846 6010 or 6020
Metals	Iron	SW-846 6010 or 6020
Metals	Lead	SW-846 6010 or 6020
Metals	Lithium	SW-846 6010 or 6020
Metals	Magnesium (for SAR)	SW-846 6010 or 6020
Metals	Manganese	SW-846 6010 or 6020
Metals	Molybdenum	SW-846 6010 or 6020
Metals	Nickel	SW-846 6010 or 6020
Metals	Phosphorus	SW-846 6010 or 6020
Metals	Potassium	SW-846 6010 or 6020
Metals	Selenium	SW-846 6010 or 6020
Metals	Sodium (for SAR)	SW-846 6010 or 6020
Metals	Total Metals	SW-846 6010 or 6020

TABLE 2 **Protocol 2 - Soil**		
Category	**Analyte**	**Method**
Metals	Vanadium	SW-846 6010 or 6020
Metals	Zinc	SW-846 6010 or 6020
Organic	Total Oil and Grease	EPA-EAD 1664
Organic	Total Organic Carbon	EPA-NERL 415.1
Organic	Total Petroleum Hydrocarbons	SW-846 8015D
Radionuclides	Gross Alpha/Beta	EPA 900.0/9310; EPA 600/00-02
Radionuclides	Radium 226, pCi/L	EPA 903.1
Radionuclides	Radium-228	EPA 904.0 - radium; SW-846 9320; Gamma Spec EPA 901.1

APPENDIX C: APPLICATION LIMITS FOR TREATED PRODUCED WATER APPLIED TO SOIL

Category	Parameter	Method	Upper Limit or Range	Units
Anions	Chloride	EPA 300.0/300.1; SW-846 9056A	100	mg/L
Anions	Fluoride	EPA 300.0/300.1; SW-846 9056A	1	mg/L
Anions	Nitrogen, nitrate	EPA 300.0/300.1; SW-846 9056A	45	mg/L
Anions	Nitrogen, nitrite	EPA 300.0/300.1; SW-846 9056A	10	mg/L
General	Alkalinity	SM 2320B	100	mg/L
General	Conductivity, electrical	SM 2510B	1500	µmho/cm
General	Hardness	EPA-NERL 130.1	150	mg/L
General	Nitrogen, ammonia	EPA 350.2	30	mg/L
General	pH	ASTM D6569	6.5-8.4	std. units
General	Sodium Adsorption Ratio	Calculated	4	meq/L
General	Temperature	EPA-NERL 170.1	20-30	°C
General	Total Dissolved Solids	SM 2540C	1000	mg/L
General	Turbidity	EPA-NERL 180.1	30	NTU
Metals	Aluminum	SW-846 6010 or 6020	5	mg/L
Metals	Arsenic	SW-846 6010 or 6020	0.1	mg/L
Metals	Beryllium	SW-846 6010 or 6020	0.1	mg/L
Metals	Boron	SW-846 6010 or 6020	0.75	mg/L
Metals	Cadmium	SW-846 6010 or 6020	0.01	mg/L
Metals	Chromium	SW-846 6010 or 6020	0.1	mg/L
Metals	Cobalt	SW-846 6010 or 6020	0.05	mg/L
Metals	Copper	SW-846 6010 or 6020	0.2	mg/L
Metals	Iron	SW-846 6010 or 6020	5	mg/L
Metals	Lead	SW-846 6010 or 6020	5	mg/L
Metals	Lithium	SW-846 6010 or 6020	2.5	mg/L
Metals	Manganese	SW-846 6010 or 6020	0.2	mg/L
Metals	Molybdenum	SW-846 6010 or 6020	0.01	mg/L
Metals	Nickel	SW-846 6010 or 6020	0.2	mg/L
Metals	Phosphorus	SW-846 6010 or 6020	5	mg/L
Metals	Selenium	SW-846 6010 or 6020	0.02	mg/L
Metals	Sodium (for SAR)	SW-846 6010 or 6020	100	mg/L
Metals	Total Metals	SW-846 6010 or 6020	10	mg/L
Metals	Vanadium	SW-846 6010 or 6020	0.1	mg/L

Category	Parameter	Method	Upper Limit or Range	Units
Metals	Zinc	SW-846 6010 or 6020	2	mg/L
Organic	Total Oil and Grease	EPA-EAD 1664	35	mg/L
Organic	Total Organic Carbon	EPA-NERL 415.1	10	mg/L
Organic	Total Petroleum Hydrocarbons	SW-846 8015D	10	mg/L
Radionuclides	Gross Alpha/Beta	EPA 900.0/9310; EPA 600/00-02	15	pCi/L
Radionuclides	Radium 226, pCi/L	EPA 903.1	30	pCi/L
Radionuclides	Radium-228	EPA 904.0 - radium; SW-846 9320; Gamma Spec EPA 901.1	30	pCi/L

AB-SC EXHIBIT 16

HOUSE BILL 23-1242

BY REPRESENTATIVE(S) Boesenecker and Joseph, Amabile, Bacon, Brown, deGruy Kennedy, Dickson, Froelich, Gonzales-Gutierrez, Hamrick, Kipp, Lindsay, Lindstedt, McCormick, Michaelson Jenet, Sirota, Story, Valdez, Velasco, Weissman, Bird, Herod, Jodeh, Mabrey;
also SENATOR(S) Cutter and Priola, Jaquez Lewis.

CONCERNING WATER USED IN OIL AND GAS OPERATIONS, AND, IN CONNECTION THEREWITH, MAKING AN APPROPRIATION.

Be it enacted by the General Assembly of the State of Colorado:

SECTION 1. Legislative declaration. (1) The general assembly finds and determines that:

(a) Since the year 2000, Colorado has experienced a drought that, according to the Colorado state university's Colorado water institute, is the most severe drought in the southwestern United States since the year 800;

(b) The drought has affected every part of Colorado, and agricultural operations throughout the state have been negatively impacted due to reduced water supply for irrigation;

Capital letters or bold & italic numbers indicate new material added to existing law; dashes through words or numbers indicate deletions from existing law and such material is not part of the act.

(c) In the years 2020 and 2021, the historically dry conditions led to the four most destructive wildfires in recorded state history; and

(d) Compared to twentieth century levels, the flow of the Colorado river has declined twenty percent since the year 2000.

(2) The general assembly further finds and determines that:

(a) One way to conserve water is by increasing the recycling of produced water in oil and gas operations;

(b) To reduce the use of fresh water and increase the recycling of produced water in oil and gas operations, the Colorado oil and gas conservation commission, referred to in this section as the "commission", should ensure that it collects robust data regarding the existing use, recycling, and disposal of water in oil and gas operations;

(c) New rules adopted by the commission will also assist in the reduction of fresh water use and concomitant increase in produced water recycling; and

(d) A produced water consortium, consisting of individuals with expertise in produced water, environmental impacts, environmental justice concerns, and community perspectives, would be helpful for sorting through the issues related to water use in oil and gas operations, with the primary goal of the consortium being to reduce the use of fresh water and increase the recycling of produced water in oil and gas operations.

(3) Therefore, the general assembly declares that:

(a) The collection of oil and gas operations' water use data is intended to assist stakeholders, the commission, and the public to determine the best solutions for reducing the use of fresh water and increasing the recycling of produced water in oil and gas operations;

(b) The commission should adopt new rules to require a rapid and substantial reduction of the use of fresh water and the increase in the recycling of produced water in oil and gas operations; and

(c) To assist the commission and the public, a produced water

consortium should be appointed and should proceed in a collaborative manner, with efforts to achieve consensus among consortium members whenever possible. The consortium is intended to be an informational resource for the commission and the public and is not intended to be a party participant in any commission rule-making proceedings.

SECTION 2. In Colorado Revised Statutes, **add** 34-60-134 and 34-60-135 as follows:

34-60-134. Reporting of water used in oil and gas operations - cumulative reporting - definitions - rules - repeal. (1) **Definitions.** AS USED IN THIS SECTION AND IN SECTION 34-60-135, UNLESS THE CONTEXT OTHERWISE REQUIRES:

(a) "CONSORTIUM" MEANS THE COLORADO PRODUCED WATER CONSORTIUM CREATED IN SECTION 34-60-135 (2)(a).

(b) "DISPROPORTIONATELY IMPACTED COMMUNITY" HAS THE MEANING SET FORTH IN SECTION 24-4-109 (2)(b)(II).

(c) (I) "PRODUCED WATER" MEANS WATER, INCLUDING THE WATER'S MINERAL AND CHEMICAL COMPONENTS, IN OR INTRODUCED TO A GEOLOGICAL FORMATION, THAT IS COPRODUCED WITH OIL OR NATURAL GAS.

(II) "PRODUCED WATER" INCLUDES FLOWBACK WATER, EXCLUDING PROPPANTS RETURNED TO THE SURFACE.

(d) "RECYCLED OR REUSED PRODUCED WATER" MEANS PRODUCED WATER THAT IS RECONDITIONED INTO A REUSABLE FORM OR THAT IS REUSED WITHOUT RECONDITIONING.

(2) **Well reporting - rules.** BEGINNING SEPTEMBER 1, 2023, OPERATORS SHALL REPORT TO THE COMMISSION ON A MONTHLY BASIS, IN A MANNER THAT PROVIDES FOR CONCURRENT REPORTING WITH REQUIRED PRODUCTION REPORTING, FOR EACH OIL AND GAS WELL:

(a) THE VOLUME, EXPRESSED IN BARRELS, OF ALL FRESH WATER USED DOWNHOLE;

(b) THE VOLUME, EXPRESSED IN BARRELS, OF ALL RECYCLED OR

REUSED PRODUCED WATER USED DOWNHOLE;

(c) THE VOLUME, EXPRESSED IN BARRELS, OF ALL PRODUCED WATER THAT IS PRODUCED FROM THE WELL AND THE VOLUME, EXPRESSED IN BARRELS, OF THE PRODUCED WATER REMOVED FROM THE OIL AND GAS LOCATION FOR DISPOSAL, INCLUDING:

(I) THE DISPOSAL METHOD, AS DEFINED BY THE COMMISSION BY RULE; AND

(II) THE DISPOSAL LOCATION, INCLUDING FACILITY IDENTIFICATION, IF APPLICABLE; AND

(d) THE VOLUME, EXPRESSED IN BARRELS, OF ALL PRODUCED WATER THAT IS PRODUCED FROM THE WELL AND:

(I) RECYCLED OR REUSED IN ANOTHER WELL AT THE SAME OIL AND GAS LOCATION; AND

(II) REMOVED FROM THE OIL AND GAS LOCATION FOR RECYCLING OR REUSE IN OIL AND GAS OPERATIONS AT A DIFFERENT OIL AND GAS LOCATION, INCLUDING FOR USE BY ANOTHER OPERATOR.

(3) **Oil and gas location reporting - rules.** (a) BEGINNING JANUARY 1, 2024, AN OPERATOR SHALL REPORT TO THE COMMISSION, ON A QUARTERLY BASIS, FOR EACH OIL AND GAS LOCATION AT WHICH THE OPERATOR CONDUCTED OIL AND GAS OPERATIONS IN THE PREVIOUS REPORTING PERIOD:

(I) THE VOLUME, EXPRESSED IN BARRELS, AND WHETHER THE FRESH WATER WAS ACQUIRED FROM INDUSTRIAL, COMMERCIAL, MUNICIPAL, OR AGRICULTURAL WATER SOURCES FOR USE IN OIL AND GAS OPERATIONS AT THE OIL AND GAS LOCATION;

(II) THE VOLUME, EXPRESSED IN BARRELS, AND SOURCE OF ALL RECYCLED OR REUSED WATER USED IN OIL AND GAS OPERATIONS AT THE OIL AND GAS LOCATION;

(III) THE VOLUME, EXPRESSED IN BARRELS, OF ALL PRODUCED WATER DISPOSED OF FROM THE OIL AND GAS LOCATION, INCLUDING:

(A) THE DISPOSAL METHOD, AS DEFINED BY THE COMMISSION BY RULE; AND

(B) THE DISPOSAL LOCATION, INCLUDING FACILITY IDENTIFICATION, IF APPLICABLE;

(IV) THE VOLUME, EXPRESSED IN BARRELS, OF ALL PRODUCED WATER THAT IS REMOVED FROM THE OIL AND GAS LOCATION FOR RECYCLING OR REUSE IN OIL AND GAS OPERATIONS, INCLUDING BY ANOTHER OIL AND GAS OPERATOR; AND

(V) THE TOTAL VOLUME, EXPRESSED IN BARRELS, OF ALL WATER PRODUCED FROM ALL WELLS AT THE OIL AND GAS LOCATION IN EACH MONTH OF THE REPORTING PERIOD.

(b) AN OPERATOR SHALL:

(I) FILE THE REPORT REQUIRED UNDER SUBSECTION (3)(a) OF THIS SECTION NO LATER THAN FORTY-FIVE DAYS AFTER THE END OF THE PREVIOUS CALENDAR QUARTER; AND

(II) INCLUDE IN EACH REPORT FILED PURSUANT TO SUBSECTION (3)(a) OF THIS SECTION THE TOTAL AMOUNTS OF ALL FRESH WATER, PRODUCED WATER, AND RECYCLED OR REUSED PRODUCED WATER MANAGED AT THE OIL AND GAS LOCATION FOR ANY PURPOSE. INFORMATION REPORTED UNDER THIS SUBSECTION (3)(b)(II) DOES NOT INCLUDE STORM WATER.

(4) **Scope of report - operational lifetime of a well.** AN OPERATOR'S PRODUCED WATER REPORTS DESCRIBED IN SUBSECTIONS (2) AND (3) OF THIS SECTION MUST DESCRIBE ALL WATER PRODUCED OR USED THROUGHOUT THE OPERATIONAL LIFETIME OF A WELL, BEGINNING WITH SITE CONSTRUCTION, DRILLING, COMPLETION, STIMULATION AND PRODUCTION OPERATIONS, ASSOCIATED PLUGGING AND ABANDONMENT, FACILITY DECOMMISSIONING, REMEDIATION, AND RECLAMATION.

(5) **Rules.** (a) FOR THE PURPOSE OF COLLECTING THE DATA REQUIRED BY SUBSECTIONS (2) AND (3) OF THIS SECTION, THE COMMISSION MAY ADOPT RULES AUTHORIZING OPERATORS TO INCLUDE INFORMATION IN THEIR REPORTS THAT IS NOT OTHERWISE REPORTED PURSUANT TO EXISTING COMMISSION RULES.

(b) THE COMMISSION SHALL NOT ADOPT A RULE DESIGNATING THE DATA REQUIRED PURSUANT TO SUBSECTION (5)(a) OF THIS SECTION AS CONFIDENTIAL INFORMATION THAT AN OPERATOR MAY REDACT WHEN REPORTING THE INFORMATION TO THE COMMISSION.

(c) (I) ON OR BEFORE DECEMBER 31, 2024, THE COMMISSION SHALL ADOPT RULES TO REQUIRE A STATEWIDE REDUCTION IN FRESH WATER USAGE, AND A CORRESPONDING INCREASE IN USAGE OF RECYCLED OR REUSED PRODUCED WATER, AT OIL AND GAS LOCATIONS. THE RULES MUST NOT APPLY TO ACTIVITIES OCCURRING WITHIN THE EXTERIOR BOUNDARIES OF AN INDIAN RESERVATION LOCATED WITHIN THE STATE.

(II) IN ADOPTING RULES PURSUANT TO SUBSECTION (5)(c)(I) OF THIS SECTION, THE COMMISSION SHALL CONSIDER:

(A) THE DATA IN REPORTS FILED WITH THE COMMISSION PURSUANT TO SUBSECTIONS (2) AND (3) OF THIS SECTION; AND

(B) RECOMMENDATIONS THAT THE CONSORTIUM DEVELOPS.

(d) THE RULES ADOPTED PURSUANT TO THIS SUBSECTION (5) MUST INCLUDE:

(I) REQUIREMENTS FOR NEW OIL AND GAS DEVELOPMENT PLANS AND SUBSTANTIAL MODIFICATIONS TO PREVIOUSLY APPROVED PERMITS TO INCLUDE A PLAN SPECIFYING THE METHODS AND LOCATIONS FOR TREATMENT OF THE PRODUCED WATER, QUANTIFYING RECYCLED OR REUSED PRODUCED WATER USED IN PLACE OF FRESH WATER, DESCRIBING EMISSION CONTROLS ASSOCIATED WITH PRODUCED WATER TREATMENT, AND INCLUDING ANY OTHER REQUIREMENTS THE COMMISSION DETERMINES ARE NECESSARY FOR IMPLEMENTATION OF THIS SECTION;

(II) A PROHIBITION AGAINST PLACEMENT OF A NEW CENTRALIZED PRODUCED WATER STORAGE OR TREATMENT FACILITY IN A DISPROPORTIONATELY IMPACTED COMMUNITY;

(III) A REQUIREMENT THAT AN OPERATOR QUANTIFY AND REPORT, FOR EACH OIL AND GAS LOCATION, THE VEHICLE MILES TRAVELED IN RELATION TO FRESH WATER AND PRODUCED WATER MANAGEMENT, INCLUDING VEHICLE MILES TRAVELED FOR THE RECYCLING AND REUSE OF

PRODUCED WATER.

(e) THE RULES ADOPTED PURSUANT TO SUBSECTION (5)(c) OF THIS SECTION:

(I) MUST:

(A) REQUIRE FOR EACH OIL AND GAS PRODUCTION BASIN AN ITERATIVE AND CONSISTENT INCREASE IN THE USE OF RECYCLED OR REUSED PRODUCED WATER WITHOUT INCREASING EMISSIONS ASSOCIATED WITH OIL AND GAS OPERATIONS; AND

(B) ESTABLISH, BASED ON RECOMMENDATIONS OF THE CONSORTIUM, AN ITERATIVE AND CONSISTENT SCHEDULE OF DATES THAT WILL SIGNIFICANTLY INCREASE THE USAGE OF RECYCLED OR REUSED PRODUCED WATER AND DECREASE THE AMOUNT OF FRESH WATER UTILIZED IN OIL AND GAS OPERATIONS IN THE STATE, WHILE ENSURING THE PROTECTION OF PUBLIC HEALTH, SAFETY, AND WELFARE; THE ENVIRONMENT; AND WILDLIFE RESOURCES. THE CONSORTIUM SHALL REVIEW THE DATES ANNUALLY TO ENSURE THAT THE DATES CONTINUE TO REPRESENT SIGNIFICANT ADVANCEMENT OF THE GOALS OF THIS SECTION, TAKING INTO CONSIDERATION POPULATION DYNAMICS, IMPROVEMENTS IN TECHNOLOGY, RESEARCH, BEST MANAGEMENT PRACTICES, AND INFRASTRUCTURE DEVELOPMENT AROUND PRODUCED WATER.

(II) MAY INCLUDE OIL-AND-GAS-BASIN-SPECIFIC BENCHMARKS TO COMPLY WITH THE REQUIREMENTS ESTABLISHED BY RULE PURSUANT TO SUBSECTION (5)(e)(I) OF THIS SECTION.

(6) **Cumulative impacts reporting.** THE COMMISSION SHALL INCLUDE IN ITS ANNUAL REPORTING ON CUMULATIVE IMPACTS OF OIL AND GAS OPERATIONS IN THE STATE INFORMATION REPORTED PURSUANT TO THIS SECTION.

(7) (a) ON OR BEFORE APRIL 1, 2025, THE COMMISSION SHALL SUBMIT A REPORT TO THE HOUSE OF REPRESENTATIVES ENERGY AND ENVIRONMENT COMMITTEE AND THE SENATE TRANSPORTATION AND ENERGY COMMITTEE, OR THEIR SUCCESSOR COMMITTEES, SUMMARIZING THE REPORTS DEVELOPED PURSUANT TO THIS SECTION.

(b) THIS SUBSECTION (7) IS REPEALED, EFFECTIVE JULY 1, 2025.

34-60-135. Colorado produced water consortium - created - membership - recommendations - definitions - review of functions - repeal. (1) (a) AS USED IN THIS SECTION, UNLESS THE CONTEXT OTHERWISE REQUIRES:

(I) "BENEFICIAL USE" HAS THE MEANING SET FORTH IN SECTION 37-92-103 (4).

(II) "DEPARTMENT" MEANS THE DEPARTMENT OF NATURAL RESOURCES.

(III) "EXECUTIVE DIRECTOR" MEANS THE EXECUTIVE DIRECTOR OF THE DEPARTMENT.

(IV) "GOVERNING BODY" MEANS THE GOVERNING BODY OF THE CONSORTIUM APPOINTED PURSUANT TO SUBSECTION (3)(a) OF THIS SECTION TO APPOINT MEMBERS OF THE CONSORTIUM.

(V) "LOCAL GOVERNMENT" MEANS A STATUTORY OR HOME RULE CITY, CITY AND COUNTY, OR COUNTY.

(VI) "NONTRIBUTARY GROUNDWATER" HAS THE MEANING SET FORTH IN SECTION 37-90-103 (10.5).

(VII) "STATE INSTITUTION OF HIGHER EDUCATION" HAS THE MEANING SET FORTH IN SECTION 23-18-102 (10).

(VIII) "WATER RIGHT" HAS THE MEANING SET FORTH IN SECTION 37-92-103 (12).

(b) DEFINITIONS IN SECTION 34-60-134 (1) APPLY TO TERMS AS THEY ARE USED IN THIS SECTION.

(2) (a) THERE IS CREATED IN THE DEPARTMENT THE COLORADO PRODUCED WATER CONSORTIUM TO MAKE RECOMMENDATIONS THAT ARE PROTECTIVE OF PUBLIC HEALTH, SAFETY, AND WELFARE; THE ENVIRONMENT; AND WILDLIFE WITH REGARD TO:

(I) AN INFORMED PATH FOR THE RECYCLING AND REUSE OF PRODUCED WATER WITHIN, AND POTENTIALLY OUTSIDE OF, OIL AND GAS OPERATIONS IN THE STATE; AND

(II) MEASURES TO ADDRESS BARRIERS ASSOCIATED WITH THE UTILIZATION OF PRODUCED WATER.

(b) THE CONSORTIUM HAS NO ROLE WITHIN THE EXTERIOR BOUNDARIES OF AN INDIAN RESERVATION LOCATED WITHIN THE STATE.

(c) THE PRIMARY GOAL OF THE CONSORTIUM IS TO HELP REDUCE THE CONSUMPTION OF FRESH WATER WITHIN OIL AND GAS OPERATIONS. THE CONSORTIUM SHALL BRING TOGETHER THE FOLLOWING GROUPS TO COLLABORATE ON WORKING TOWARD THAT GOAL:

(I) STATE AND FEDERAL AGENCIES;

(II) RESEARCH INSTITUTIONS;

(III) STATE INSTITUTIONS OF HIGHER EDUCATION;

(IV) AFFECTED AND INTERESTED NONGOVERNMENTAL ORGANIZATIONS;

(V) LOCAL GOVERNMENTS;

(VI) AFFECTED INDUSTRIES;

(VII) ENVIRONMENTAL JUSTICE ORGANIZATIONS;

(VIII) DISPROPORTIONATELY IMPACTED COMMUNITY MEMBERS; AND

(IX) OTHER INTERESTED PARTIES.

(3) (a) (I) EXCEPT AS PROVIDED IN SUBSECTION (3)(a)(IV) OF THIS SECTION, A GOVERNING BODY OF THE CONSORTIUM SHALL MAKE APPOINTMENTS TO THE CONSORTIUM IN ACCORDANCE WITH THIS SUBSECTION (3). THE MEMBERS OF THE GOVERNING BODY ALSO SERVE AS MEMBERS OF THE CONSORTIUM.

(II) THE EXECUTIVE DIRECTOR OR THE EXECUTIVE DIRECTOR'S DESIGNEE SHALL APPOINT THE FOLLOWING THREE INDIVIDUALS TO SERVE AS THE GOVERNING BODY AND MEMBERS OF THE CONSORTIUM:

(A) ONE REPRESENTATIVE OF THE COMMISSION;

(B) ONE REPRESENTATIVE OF THE DIVISION OF WATER RESOURCES IN THE DEPARTMENT; AND

(C) ONE REPRESENTATIVE FROM THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT.

(III) THE GOVERNING BODY SHALL APPOINT THE FOLLOWING TWENTY-TWO MEMBERS OF THE CONSORTIUM:

(A) FOUR REPRESENTATIVES FROM A STATE OR FEDERAL AGENCY, OTHER THAN A COMMISSIONER OF THE COMMISSION, ASSOCIATED WITH THE REGULATION OF PRODUCED WATER, INCLUDING AT LEAST ONE MEMBER FROM THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT. A STAFF PERSON FOR THE COMMISSION MAY BE APPOINTED PURSUANT TO THIS SUBSECTION (3)(a)(III)(A).

(B) FOUR REPRESENTATIVES FROM RESEARCH INSTITUTIONS OR STATE INSTITUTIONS OF HIGHER EDUCATION WITH EXPERIENCE IN PRODUCED WATER;

(C) FOUR REPRESENTATIVES FROM ENVIRONMENTAL NONGOVERNMENTAL ORGANIZATIONS THAT ENGAGE IN WORK AND ADVOCATE FOR POLICIES RELATED TO PRODUCED WATER;

(D) FOUR REPRESENTATIVES FROM THE OIL AND GAS INDUSTRY, WITH ONE MEMBER APPOINTED FROM EACH OF THE FOLLOWING BASINS: THE DENVER-JULESBURG OIL AND GAS BASIN; THE PICEANCE OIL AND GAS BASIN; THE SAN JUAN OIL AND GAS BASIN; AND THE RATON OIL AND GAS BASIN;

(E) TWO REPRESENTATIVES WHO SERVE ON A GOVERNING BODY OF A LOCAL GOVERNMENT, WHO SHALL BE APPOINTED WITH CONSIDERATION OF THE NEED FOR GEOGRAPHIC REPRESENTATION OF AREAS OF THE STATE THAT HAVE CURRENT OR ANTICIPATED RECYCLED OR REUSED PRODUCED WATER; AND

(F) FOUR REPRESENTATIVES WITH EXPERTISE AND EXPERIENCE IN PRODUCED WATER.

(IV) THE PRESIDENT OF THE SENATE AND THE SPEAKER OF THE HOUSE OF REPRESENTATIVES SHALL APPOINT SIX MEMBERS OF THE CONSORTIUM AS FOLLOWS:

(A) THREE MEMBERS, EACH FROM A NONGOVERNMENTAL ORGANIZATION IN THE STATE THAT WORKS ON AND ADVOCATES FOR POLICIES RELATED TO ENVIRONMENTAL JUSTICE AND CONSERVATION, TWO OF WHOM ARE APPOINTED BY THE PRESIDENT OF THE SENATE AND ONE OF WHOM IS APPOINTED BY THE SPEAKER OF THE HOUSE OF REPRESENTATIVES; AND

(B) THREE MEMBERS, EACH OF WHOM MUST BE FROM A NONGOVERNMENTAL ORGANIZATION IN THE STATE THAT WORKS WITH AND ADVOCATES FOR DISPROPORTIONATELY IMPACTED COMMUNITIES AND COMMUNITIES OF COLOR OR MUST RESIDE IN A DISPROPORTIONATELY IMPACTED COMMUNITY, ONE OF WHOM IS APPOINTED BY THE PRESIDENT OF THE SENATE AND TWO OF WHOM ARE APPOINTED BY THE SPEAKER OF THE HOUSE OF REPRESENTATIVES.

(b) ANY VACANCY IN MEMBERSHIP OF THE CONSORTIUM SHALL BE FILLED AS SOON AS PRACTICABLE IN ACCORDANCE WITH THE APPOINTMENT PROCESS SET FORTH IN SUBSECTION (3)(a)(III) OR (3)(a)(IV) OF THIS SECTION.

(c) THE GOVERNING BODY SHALL CALL THE FIRST MEETING OF THE CONSORTIUM, AT WHICH MEETING THE MEMBERS OF THE CONSORTIUM SHALL ELECT A MEMBER TO SERVE AS CHAIR OF THE CONSORTIUM. THE CHAIR OF THE CONSORTIUM SERVES FOR TWO YEARS, AND THE MEMBERS OF THE CONSORTIUM ELECT A NEW CHAIR AS NEEDED.

(d) (I) MEMBERS SHALL BE REIMBURSED FOR ACTUAL AND NECESSARY EXPENSES INCURRED WHILE PERFORMING OFFICIAL DUTIES, TOGETHER WITH MILEAGE, AT THE RATE AT WHICH MEMBERS OF THE GENERAL ASSEMBLY ARE REIMBURSED PURSUANT TO SECTION 2-2-317. ALL CONSORTIUM MEMBERS ARE ENTITLED TO RECEIVE FIFTY DOLLARS FOR EACH MEETING ATTENDED DURING THE 2023-24 STATE FISCAL YEAR; EXCEPT THAT MEMBERS WHO ARE APPOINTED UNDER SUBSECTION (3)(a)(IV)(B) OF THIS

SECTION AND RESIDE IN A DISPROPORTIONATELY IMPACTED COMMUNITY ARE ELIGIBLE TO RECEIVE AN ADDITIONAL ONE HUNDRED FIFTY DOLLARS FOR EACH MEETING ATTENDED DURING THE 2023-24 STATE FISCAL YEAR.

(II) A MEMBER OF THE CONSORTIUM WHO, AS PART OF THE MEMBER'S TYPICALLY ASSIGNED, REGULAR JOB DUTIES, RECEIVES PROFESSIONAL COMPENSATION FOR THE MEMBER'S PARTICIPATION IN A CONSORTIUM MEETING IS NOT ELIGIBLE FOR THE ADDITIONAL PER DIEM FOR REPRESENTATIVES OF A DISPROPORTIONATELY IMPACTED COMMUNITY PURSUANT TO SUBSECTION (3)(d)(I) OF THIS SECTION.

(III) THE DIRECTOR OF THE CONSORTIUM HIRED PURSUANT TO SUBSECTION (3)(e) OF THIS SECTION SHALL ANNUALLY ADJUST THE PER DIEM AMOUNTS SET FORTH IN SUBSECTION (3)(d)(I) OF THIS SECTION BASED ON THE ANNUAL PERCENTAGE CHANGE IN THE UNITED STATES DEPARTMENT OF LABOR'S BUREAU OF LABOR STATISTICS CONSUMER PRICE INDEX FOR DENVER-AURORA-LAKEWOOD FOR ALL ITEMS PAID BY ALL URBAN CONSUMERS, OR ITS SUCCESSOR INDEX.

(IV) THE DIRECTOR OF THE CONSORTIUM SHALL DETERMINE THE FORM AND MANNER BY WHICH A CONSORTIUM MEMBER MAY REQUEST EXPENSE REIMBURSEMENT, MILEAGE REIMBURSEMENT, OR A PER DIEM ALLOWANCE.

(e) THE EXECUTIVE DIRECTOR SHALL HIRE A DIRECTOR AND A DIRECTOR OF RESEARCH TO ASSIST THE CONSORTIUM AS FOLLOWS:

(I) THE DIRECTOR OF THE CONSORTIUM SHALL PROVIDE ADMINISTRATIVE SUPPORT; COORDINATE MEETINGS AND MEMBERSHIP; WRITE GRANTS; PREPARE THE CONSORTIUM BUDGET; CONTRACT FOR ANALYSES AND STUDIES; AND INTERACT WITH AND REPORT TO AGENCIES AND THE GENERAL ASSEMBLY REGARDING POLICIES, RULE-MAKING PROCEEDINGS, AND LEGISLATION REGARDING REUSE, RECYCLING, AND BENEFICIAL USE OF PRODUCED WATER;

(II) THE DIRECTOR OF RESEARCH FOR THE CONSORTIUM SHALL MANAGE ACADEMIC ANALYSES, RESEARCH, PILOT PROJECTS, AND CASE STUDIES FOR THE CONSORTIUM.

(4) THE CONSORTIUM SHALL:

(a) PROVIDE RECOMMENDATIONS TO STATE AGENCIES AND THE GENERAL ASSEMBLY AS FOLLOWS:

(I) ON OR BEFORE MAY 1, 2024, HOW STATE AND FEDERAL AGENCIES CAN BETTER COORDINATE REGULATORY POLICIES RELATED TO PRODUCED WATER;

(II) ON OR BEFORE SEPTEMBER 1, 2024, TOPICS RELATED TO PRODUCED WATER;

(III) ON OR BEFORE NOVEMBER 1, 2024, ANY LEGISLATION OR AGENCY RULES NEEDED TO REMOVE BARRIERS TO THE SAFE RECYCLING AND REUSE OF PRODUCED WATER IN THE STATE, TAKING INTO CONSIDERATION:

(A) ENVIRONMENTAL JUSTICE ISSUES;

(B) ANY LEGAL ISSUES THAT MAY AFFECT THE RECYCLING AND REUSE OF PRODUCED WATER;

(C) TESTING STANDARDS AND PROCEDURES FOR TREATMENT OF PRODUCED WATER FOR BOTH CONVENTIONAL AND NONCONVENTIONAL OIL AND GAS EXPLORATION AND DEVELOPMENT;

(D) RESEARCH GAPS ASSOCIATED WITH THE TREATMENT OF PRODUCED WATER, INCLUDING GAPS IN ADDRESSING EMISSIONS FROM PRODUCED WATER TREATMENT AND STORAGE AND ANY OTHER DEFICIENCIES IN THE TREATMENT OF PRODUCED WATER;

(E) WATER SHARING AGREEMENTS; AND

(F) INFRASTRUCTURE AND STORAGE FOR PRODUCED WATER REUSE AND RECYCLING, SPECIFICALLY ADDRESSING NEW OR EXISTING PITS;

(IV) ON OR BEFORE DECEMBER 1, 2024, SHORT- AND LONG-TERM PRODUCED WATER REUSE AND RECYCLING GOALS FOR THE STATE AND CONTEMPORANEOUS DECREASES IN FRESH WATER USE;

(b) PARTICIPATE IN RELEVANT STATE AGENCY RULE-MAKING PROCEEDINGS REGARDING PRODUCED WATER; EXCEPT THAT THE CONSORTIUM SHALL NOT PARTICIPATE AS A PARTY IN ANY RULE-MAKING

PROCEEDING;

(c) ON OR BEFORE MARCH 1, 2024, DEVELOP GUIDANCE DOCUMENTS AND CASE STUDIES TO PROMOTE BEST PRACTICES FOR IN-FIELD RECYCLING AND REUSE OF PRODUCED WATER THROUGHOUT THE STATE;

(d) ON OR BEFORE JULY 1, 2024, BASED ON DATA REPORTED UNDER SECTION 34-60-134, ANALYZE AND REPORT ON CURRENT PRODUCED WATER INFRASTRUCTURE, STORAGE, AND TREATMENT FACILITIES WITHIN THE DIFFERENT OIL AND GAS PRODUCTION BASINS IN THE STATE, WITH SPECIFIC EMPHASIS ON OPPORTUNITIES WITHIN THE DENVER-JULESBURG OIL AND GAS PRODUCTION BASIN;

(e) ON OR BEFORE AUGUST 1, 2024, ANALYZE AND REPORT ON THE VOLUME OF PRODUCED WATER PRODUCED IN THE DIFFERENT OIL AND GAS PRODUCTION BASINS AVAILABLE FOR REUSE AND RECYCLING IN COMPARISON TO THE TOTAL VOLUME OF WATER NECESSARY FOR COMPLETION ACTIVITIES IN NEW OIL AND GAS OPERATIONS;

(f) ON OR BEFORE SEPTEMBER 1, 2024, ANALYZE AND REPORT ON THE INFRASTRUCTURE, STORAGE, AND TECHNOLOGY NECESSARY TO ACHIEVE DIFFERENT LEVELS OF RECYCLING AND REUSE OF PRODUCED WATER IN OIL AND GAS PRODUCTION BASINS THROUGHOUT THE STATE, WITH SPECIFIC EMPHASIS ON OPPORTUNITIES WITHIN THE DENVER-JULESBURG OIL AND GAS PRODUCTION BASIN;

(g) ON OR BEFORE JULY 1, 2025, EVALUATE ANALYTICAL AND TOXICOLOGICAL METHODS EMPLOYED DURING PRODUCED WATER TREATMENT AND ASSESS TOOLS USED TO EVALUATE PRODUCED WATER AND ITS POTENTIAL FOR USE OUTSIDE THE OIL FIELD; AND

(h) ON OR BEFORE APRIL 1, 2024, IN THE 2024 LEGISLATIVE SESSION AND ANNUALLY THEREAFTER, AND NOTWITHSTANDING SECTION 24-1-136 (11)(a)(I), THROUGH THE DIRECTOR OF THE CONSORTIUM, UPDATE THE HOUSE OF REPRESENTATIVES ENERGY AND ENVIRONMENT COMMITTEE AND THE SENATE TRANSPORTATION AND ENERGY COMMITTEE, OR THEIR SUCCESSOR COMMITTEES, ON THE CONSORTIUM'S WORK PURSUANT TO THIS SECTION.

(5) (a) ON OR BEFORE JULY 1, 2023, THE GOVERNING BODY AND

MEMBERSHIP OF THE CONSORTIUM SHALL BE APPOINTED PURSUANT TO SUBSECTION (3) OF THIS SECTION.

(b) THE CONSORTIUM SHALL MEET ON A MONTHLY BASIS DURING THE CONSORTIUM'S FIRST YEAR AND ON A QUARTERLY BASIS IN SUBSEQUENT YEARS, OR MORE OFTEN IF NEEDED AS DETERMINED BY THE CHAIR OF THE CONSORTIUM.

(6) (a) REPORTS AND ANALYSES THAT THE CONSORTIUM PROVIDES TO BOTH STATE AGENCIES AND THE GENERAL ASSEMBLY MUST BE INCLUSIVE OF ALL OF THE OPINIONS OF MEMBERS OF THE CONSORTIUM ON THE REPORTED TOPICS.

(b) NOTWITHSTANDING SECTION 24-1-136 (11)(a)(I), THE EXECUTIVE DIRECTOR OR THE EXECUTIVE DIRECTOR'S DESIGNEE SHALL INCLUDE IN THE ANNUAL "SMART ACT" DEPARTMENTAL PRESENTATION, MADE TO A JOINT COMMITTEE OF THE GENERAL ASSEMBLY, PURSUANT TO SECTION 2-7-203 (2) A SUMMARY OF THE CONSORTIUM'S WORK, INCLUDING THE CONSORTIUM'S RECOMMENDATIONS MADE TO THE COMMISSION AND REPORTS PREPARED PURSUANT TO THIS SECTION.

(7) THIS SECTION IS REPEALED, EFFECTIVE SEPTEMBER 1, 2030. BEFORE THE REPEAL, THIS SECTION IS SCHEDULED FOR REVIEW IN ACCORDANCE WITH SECTION 24-34-104.

SECTION 3. In Colorado Revised Statutes, 24-34-104, **add** (31)(a)(X) as follows:

24-34-104. General assembly review of regulatory agencies and functions for repeal, continuation, or reestablishment - legislative declaration - repeal. (31) (a) The following agencies, functions, or both, are scheduled for repeal on September 1, 2030:

(X) THE COLORADO PRODUCED WATER CONSORTIUM CREATED IN SECTION 34-60-135 (2)(a).

SECTION 4. Appropriation. (1) For the 2023-24 state fiscal year, $464,512 is appropriated to the department of natural resources for use by the Colorado oil and gas conservation commission. This appropriation is from the oil and gas conservation and environmental response fund created

in section 34-60-122 (5)(a), C.R.S., and is based on an assumption that the commission will require an additional 4.0 FTE. To implement this act, the commission may use this appropriation for program costs.

(2) For the 2023-24 state fiscal year, $30,169 is appropriated to the department of public health and environment for use by the water quality control division. This appropriation is from the perfluoroalkyl and polyfluoroalkyl substances cash fund created in section 8-20-206.5 (7)(a), C.R.S., and is based on an assumption that the division will require an additional 0.3 FTE. To implement this act, the division may use this appropriation for personal services related to the drinking water program.

SECTION 5. Safety clause. The general assembly hereby finds,

determines, and declares that this act is necessary for the immediate preservation of the public peace, health, or safety.

Julie McCluskie
SPEAKER OF THE HOUSE
OF REPRESENTATIVES

Steve Fenberg
PRESIDENT OF
THE SENATE

Robin Jones
CHIEF CLERK OF THE HOUSE
OF REPRESENTATIVES

Cindi L. Markwell
SECRETARY OF
THE SENATE

APPROVED June 7, 2023 at 3:11 pm
(Date and Time)

Jared S. Polis
GOVERNOR OF THE STATE OF COLORADO

AB-SC EXHIBIT 17

Tannis Fox

From: GenCounsel Office <gencounsel@nmsu.edu>
Sent: Thursday, July 25, 2024 10:35 AM
To: Tannis Fox
Cc: Scott Field
Subject: RE: Fox IPRA 24-0131
Attachments: 2024 Memberships.xlsx; NMPWRC Memberships_7.24.24.xlsx

Good Morning, Ms. Fox:

On Wednesday, July 24, 2024, NMSU received your question regarding previous records sent in response to your May 28, 2024 IPRA Request.

The original (attached) spreadsheet was up to date as June 12, 2024, the date we sent it to you.

Also attached is the most current membership list, as of July 24, 2024. This even includes groups that have yet to pay the membership fee. We're giving them some time to get their payments in.

As stated previously, we are still waiting for confirmation on one more potential set of records from the employee who was out of the office. We will respond further on or before **Wednesday, July 31, 2024**. Thank you for your patience as we work to process your request.

Patrick Scott Field, Associate General Counsel, is responsible for the responses in this IPRA request. He can be reached at 575-646-2446, psfield@nmsu.edu.

Sincerely,

University General Counsel
New Mexico State University
P. O. Box 30001 MSC 3UGC
Las Cruces, NM 88003-8001
Office: (575) 646-2446
Fax: (575) 646-3012
gencounsel@nmsu.edu

NM STATE UNIVERSITY
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From: Tannis Fox <fox@westernlaw.org>
Date: Wednesday, July 24, 2024 at 2:18 PM
To: GenCounsel Office <gencounsel@nmsu.edu>
Cc: Patricia Sullivan <patsulli@nmsu.edu>, NMPWRC <nmpwrc@nmsu.edu>
Subject: RE: Fox IPRA 24-0131

Hi. I have one question about the response to date, and that is, is the attached spreadsheet (that I received from you) the most complete and up to date list of members of the New Mexico Produced Water Research Consortium? It doesn't seem complete.

Thank you very much!
Tannis

Tannis Fox | Senior Attorney | *she/ella*
Western Environmental Law Center
409 East Palace Avenue, Suite 2 | Santa Fe, New Mexico 87501
505.629.0732 | fox@westernlaw.org
www.westernlaw.org | *Defending the West*

From: GenCounsel Office <gencounsel@nmsu.edu>
Sent: Friday, July 19, 2024 3:37 PM
To: Tannis Fox <fox@westernlaw.org>
Cc: Patricia Sullivan <patsulli@nmsu.edu>; NMPWRC <nmpwrc@nmsu.edu>; Knight, Andrew, ENV <Andrew.Knight@env.nm.gov>; environment.records@env.nm.gov
Subject: RE: Fox IPRA 24-0131

Good Afternoon, Ms. Fox:

On Tuesday, May 28, 2024, NMSU received your request to inspect:

> " . . . the following public records relating to the New Mexico Produced Water Research Consortium ("NMPWRC") on behalf of Western Environmental Law Center, Amigos Bravos, and Sierra Club:
> 1. The December 23, 2022 NMPWRC External Review ("External Review") and any and all documents related to the External Review including all interview notes from the External Review Team and all draft External Reviews.
> 2. Any and all responses to the External Review from the NMPWRC, NMPWRC Leadership, and/or New Mexico State University, including any draft responses.
> 3. The following documents referred to on page 3 of the November 18, 2022 Memorandum of Understanding between the New Mexico Environment Department and Regents of New Mexico State University ("MOU"):
>
> Document Management and Information Protection Plan,
> Consortium Communication, Outreach, and Education Plan,
> Guidance on Produced Water Sampling Procedure,
> Guidance on Produced Water Treatment Research, Development, and Pilot-Scale Testing and Evaluation, and
> All Annual Program Plans since January 1, 2022.
>
> 4. The current Governance Guide referred to on pages 2-3 of the MOU.
> 5. The current Research Plan referred to on page 3 of the MOU.
> 6. All project summaries referred to on page 3 of the MOU for each NMPWRC project
> 7. The NMPWRC fiscal year 2023-24 and fiscal year 2024-25 budgets.
> 8. Any and all lists of NMPWRC members.
> 9. Any contract between Mike Hightower and New Mexico State University.
> 10. Any and all documents evidencing payments to Mike Hightower from NMSU related to work for the NMPWRC, including any payments representing salary to Mr. Hightower, any payments for work performed by

Mr. Hightower pursuant to contract, and any reimbursements for expenses for work on behalf of the NMPWRC expended by Mr. Hightower. "

We are still waiting for confirmation on one more potential set of records from the employee who was out of the office. We will respond further on or before **Wednesday, July 31, 2024**. Thank you for your patience as we work to process your request. Below is the same SharePoint site that we used before, but let us know right away if you are unable to access the files.

Fox IPRA 24-0131

Pursuant to *The Inspection of Public Records Act*, a records custodian may charge reasonable fees for copying public records. New Mexico State University will provide the first 20 pages at no charge and charges $0.25 per printed page thereafter. Payment in advance may be required. If documents are requested electronically, a fee will be assessed for the actual cost of downloading, copying and/or transmitting of records including personnel time involved.

Sincerely,

University General Counsel
New Mexico State University
P. O. Box 30001 MSC 3UGC
Las Cruces, NM 88003-8001
Office: (575) 646-2446
Fax: (575) 646-3012
gencounsel@nmsu.edu

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From: GenCounsel Office <gencounsel@nmsu.edu>
Sent: Friday, July 12, 2024 3:08 PM
To: Tannis Fox <fox@westernlaw.org>
Cc: Patricia Sullivan <patsulli@nmsu.edu>; NMPWRC <nmpwrc@nmsu.edu>; Knight, Andrew, ENV <Andrew.Knight@env.nm.gov>; environment.records@env.nm.gov
Subject: RE: Fox IPRA 24-0131

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Consortium Communication, Outreach, and Education Plan,
Guidance on Produced Water Sampling Procedure,
Guidance on Produced Water Treatment Research, Development, and Pilot-Scale Testing and Evaluation, and
All Annual Program Plans since January 1, 2022.

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5. The current Research Plan referred to on page 3 of the MOU.
6. All project summaries referred to on page 3 of the MOU for each NMPWRC project
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With this email, we are providing a third set of records responsive to your request. We are waiting for confirmation on one more potential set of records from the employee who is out of the office. We will respond further on or before **Friday, July 19, 2024**. Thank you for your patience as we work to process your request. Below is the same SharePoint site that we used before, but let us know right away if you are unable to access the files.

Fox IPRA 24-0131

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Sincerely,

University General Counsel
New Mexico State University
P. O. Box 30001 MSC 3UGC
Las Cruces, NM 88003-8001
Office: (575) 646-2446
Fax: (575) 646-3012
gencounsel@nmsu.edu

NM STATE UNIVERSITY
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From: GenCounsel Office <gencounsel@nmsu.edu>
Sent: Friday, June 28, 2024 1:57 PM
To: Tannis Fox <fox@westernlaw.org>
Cc: Patricia Sullivan <patsulli@nmsu.edu>; NMPWRC <nmpwrc@nmsu.edu>; Knight, Andrew, ENV

<Andrew.Knight@env.nm.gov>; environment.records@env.nm.gov
Subject: RE: Fox IPRA 24-0131

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With this email, we are providing a second set of records responsive to your request. We are checking for additional responsive records from one other possible source who has been, and is currently, out of the office. We will respond further on or before **Friday, July 12, 2024**. Thank you for your patience as we work to process your request. Below is the same SharePoint site that we used before, but let us know right away if you are unable to access the files.

Fox IPRA 24-0131

Pursuant to *The Inspection of Public Records Act*, a records custodian may charge reasonable fees for copying public records. New Mexico State University will provide the first 20 pages at no charge and charges $0.25 per printed page thereafter. Payment in advance may be required. If documents are requested electronically, a fee will be assessed for the actual cost of downloading, copying and/or transmitting of records including personnel time involved.

Sincerely,

University General Counsel
New Mexico State University
P. O. Box 30001 MSC 3UGC
Las Cruces, NM 88003-8001
Office: (575) 646-2446

Fax: (575) 646-3012
gencounsel@nmsu.edu

NM STATE UNIVERSITY
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From: Tannis Fox <fox@westernlaw.org>
Sent: Friday, June 14, 2024 1:43 PM
To: GenCounsel Office <gencounsel@nmsu.edu>
Cc: Patricia Sullivan <patsulli@nmsu.edu>; NMPWRC <nmpwrc@nmsu.edu>; Knight, Andrew, ENV <Andrew.Knight@env.nm.gov>; environment.records@env.nm.gov
Subject: RE: Fox IPRA 24-0131

Hello. Thank you for the response. I apologize for not responding earlier! I was able to open the file. Thank you. I look forward to the remaining documents June 28.

Thank you again for your responsiveness.

Tannis

Tannis Fox | Senior Attorney | *she/ella*
Western Environmental Law Center
409 East Palace Avenue, Suite 2 | Santa Fe, New Mexico 87501
505.629.0732 | fox@westernlaw.org
www.westernlaw.org | *Defending the West*

From: GenCounsel Office <gencounsel@nmsu.edu>
Sent: Wednesday, June 12, 2024 10:29 AM
To: Tannis Fox <fox@westernlaw.org>
Cc: Patricia Sullivan <patsulli@nmsu.edu>; NMPWRC <nmpwrc@nmsu.edu>; Knight, Andrew, ENV <Andrew.Knight@env.nm.gov>; environment.records@env.nm.gov
Subject: RE: Fox IPRA 24-0131

Good Morning, Ms. Fox:

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> 2. Any and all responses to the External Review from the NMPWRC, NMPWRC Leadership, and/or New Mexico State University, including any draft responses.

3. The following documents referred to on page 3 of the November 18, 2022 Memorandum of Understanding between the New Mexico Environment Department and Regents of New Mexico State University ("MOU"):
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   Guidance on Produced Water Sampling Procedure,
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Below is a SharePoint link to partial records that are responsive to your request. Let us know right away if you are unable to access the files.

Fox IPRA 24-0131

We will need additional time to process any additional records. **We respond further no later than Wednesday, June 28, 2024**

Pursuant to *The Inspection of Public Records Act*, a records custodian may charge reasonable fees for copying public records. New Mexico State University will provide the first 20 pages at no charge and charges $0.25 per printed page thereafter. Payment in advance may be required. If documents are requested electronically, a fee will be assessed for the actual cost of downloading, copying and/or transmitting of records including personnel time involved.

Sincerely,

University General Counsel
New Mexico State University
P. O. Box 30001 MSC 3UGC
Las Cruces, NM 88003-8001
Office: (575) 646-2446
Fax: (575) 646-3012
gencounsel@nmsu.edu

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From: GenCounsel Office <gencounsel@nmsu.edu>
Sent: Wednesday, May 29, 2024 4:14 PM

To: Tannis Fox <fox@westernlaw.org>
Cc: Patricia Sullivan <patsulli@nmsu.edu>; NMPWRC <nmpwrc@nmsu.edu>; Knight, Andrew, ENV <Andrew.Knight@env.nm.gov>; environment.records@env.nm.gov
Subject: RE: Fox IPRA 24-0131

Good Afternoon, Ms. Fox:

On Tuesday, May 28, 2024, NMSU received your request to inspect:

> " . . . the following public records relating to the New Mexico Produced Water Research Consortium ("NMPWRC") on behalf of Western Environmental Law Center, Amigos Bravos, and Sierra Club:
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After reviewing your request, we will need additional time to search for, collect and process any responsive records. **We will have a response for you no later than Wednesday, June 12, 2024**

Pursuant to *The Inspection of Public Records Act*, a records custodian may charge reasonable fees for copying public records. New Mexico State University will provide the first 20 pages at no charge and charges $0.25 per printed page thereafter. Payment in advance may be required. If documents are requested electronically, a fee will be assessed for the actual cost of downloading, copying and/or transmitting of records including personnel time involved.

Sincerely,

University General Counsel
New Mexico State University
P. O. Box 30001 MSC 3UGC
Las Cruces, NM 88003-8001
Office: (575) 646-2446
Fax: (575) 646-3012
gencounsel@nmsu.edu

NM STATE UNIVERSITY

From: Tannis Fox <fox@westernlaw.org>
Sent: Tuesday, May 28, 2024 4:43 PM
To: GenCounsel Office <gencounsel@nmsu.edu>; environment.records@env.nm.gov
Cc: Patricia Sullivan <patsulli@nmsu.edu>; NMPWRC <nmpwrc@nmsu.edu>; Knight, Andrew, ENV <Andrew.Knight@env.nm.gov>
Subject: IPRA request for public records related to New Mexico Produced Water Research Consortium

Dear Records Custodians for New Mexico State University and New Mexico Environment Department:

Please find enclosed a public records request to your agencies for records related to the New Mexico Produced Water Research Consortium.

Please let me know if you have any questions related to the request.

Thank you for your prompt attention to this request.

Sincerely,

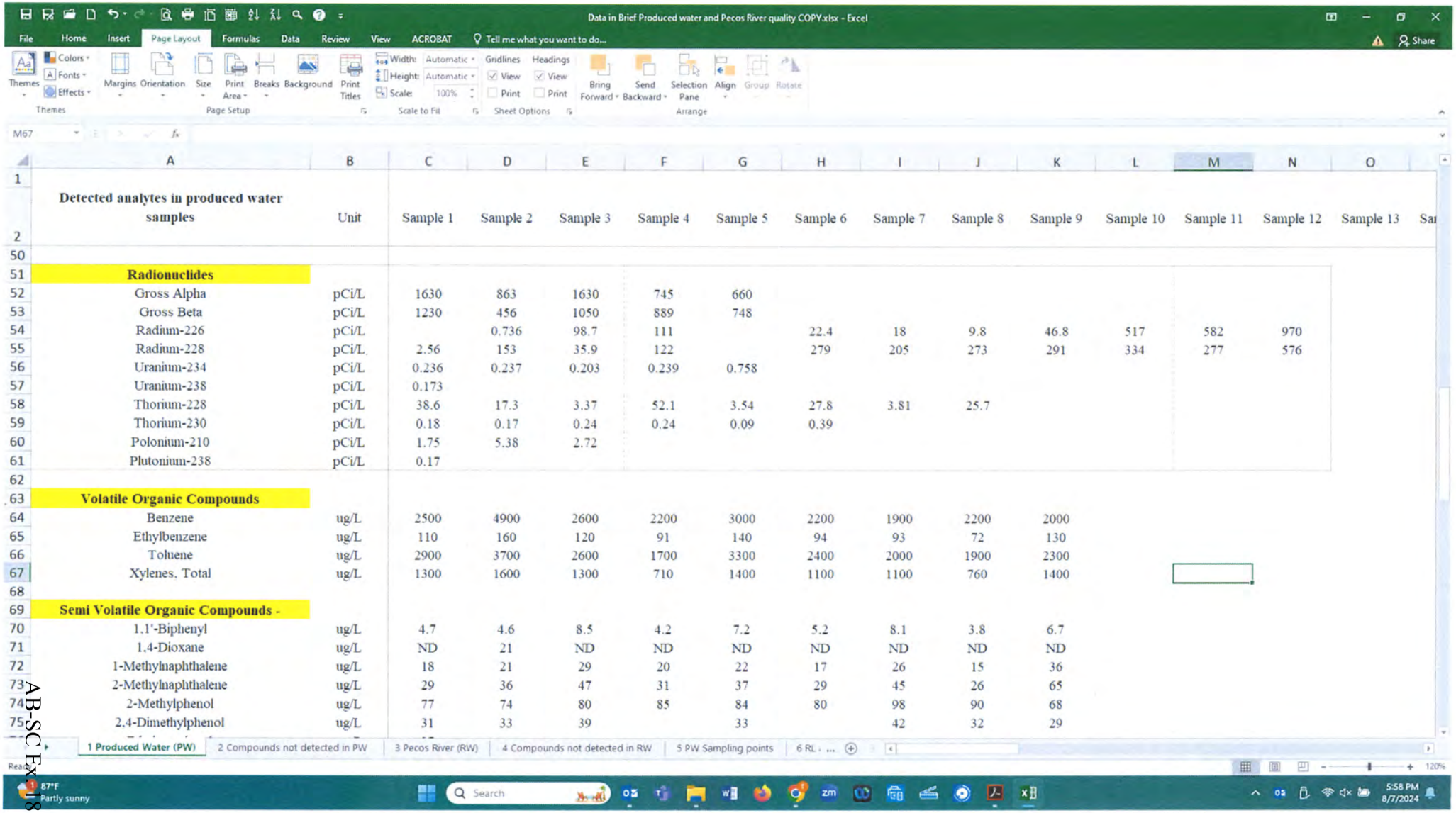
Tannis Fox | Senior Attorney | *she/ella*
Western Environmental Law Center
409 East Palace Avenue, Suite 2 | Santa Fe, New Mexico 87501
505.629.0732 | fox@westernlaw.org
www.westernlaw.org | *Defending the West*

Company	Affiliation
Strong Box Water Solutions	Industry-500
SolMem	Industry-500
CEHMM	NGO-450
Ground Water Protection Council	NGO-450
Circle Verde Water	Industry-500
Winkler Services	Industry-500
Produced Water Society	Industry-500
Coterra Energy	Industry-500
Aris Water	Industry-500
WaterBridge Stateline	Industry-500
Texas Pacific Water Resources	Industry-500
OXY USA (Occidental Petroleum)	Industry-500
Intrepid Potash	Industry-500
Apateq	Industry-500
Dugan Production Corp	Industry-500
New Horizons Foundation	NGO-450
Tetra Technologies	Industry-500
Tallgrass Water	Industry-500
Sandhills Area Research Association	NGO-450
Sierra Club	NGO-450
HF Sinclair Navajo Refining	Industry-500
NMDA	Gov't-0
Anthony Water & Sanitation District	Gov't-0
Devon Energy Ventures	Industry-500
Stephen Hightower	Industry-500
Select Water Solutions	Industry-500
Mustang Extreme	Industry-500
Environmental Defense Fund	NGO-450
NGL Water Solutions Permian	Industry-500
Chevron	Sponsorship
ExxonMobile	Sponsorship
Opus 2G USS Group	Industry-500
Conoco Phillips	Industry-500
Raptor Recovery	Industry-500
WildEarth Guardians	NGO-450

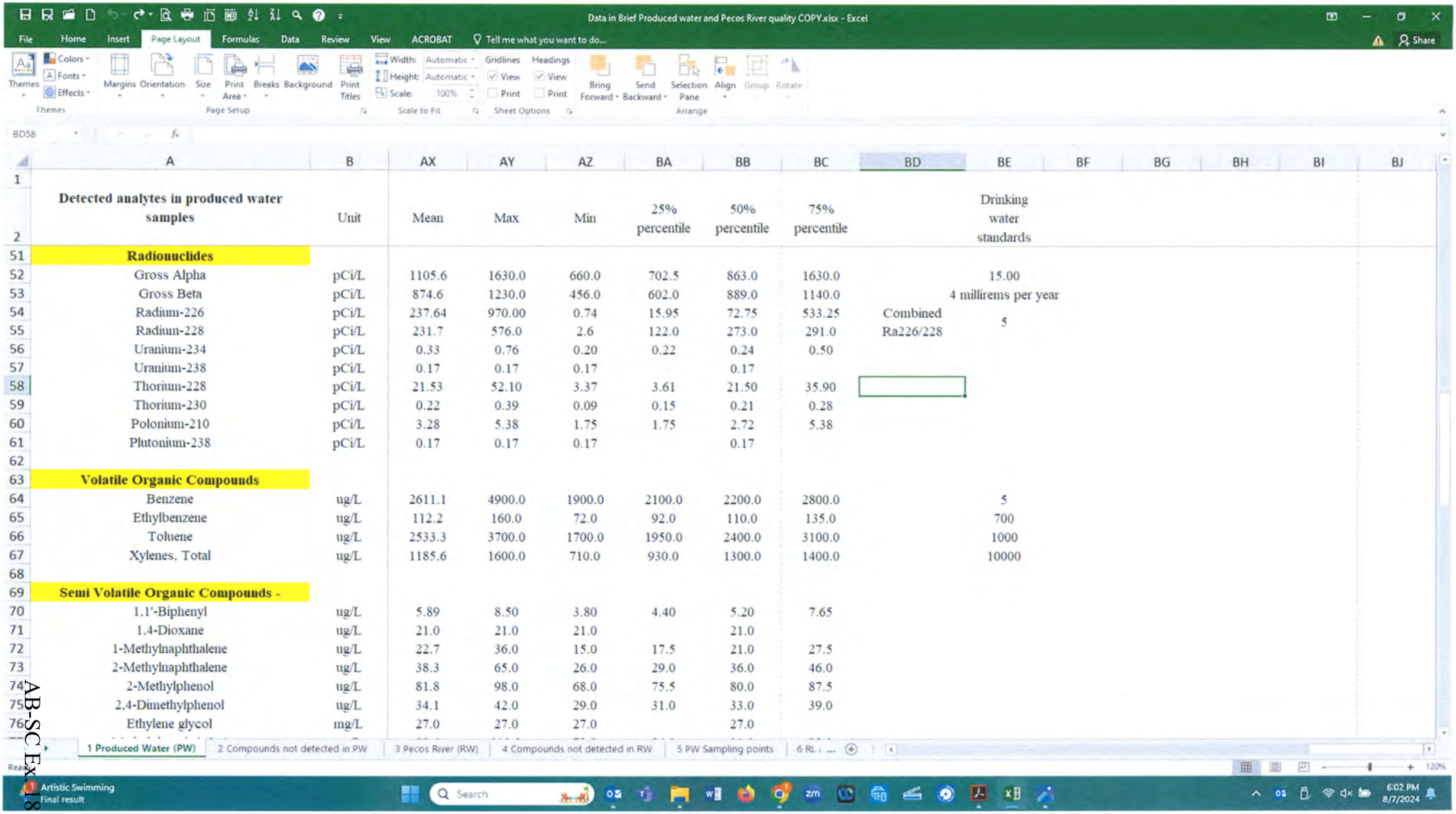
Company	Affiliation
NMDA	Gov't-0
CEHMM	NGO-450
Ground Water Protection Council	NGO-450
Produced Water Society	Industry-500
Strong Box Water Solutions	Industry-500
SolMem	Industry-500
Circle Verde Water	Industry-500
Winkler Services	Industry-500
Coterra Energy	Industry-500
WaterBridge Stateline	Industry-500
Tallgrass Water	Industry-500
OXY USA (Occidental Petroleum)	Industry-500
Intrepid Potash	Industry-500
Apateq	Industry-500
Aris Water Solutions	Industry-500
Devon Energy Ventures	Industry-500
Dugan Production Corp	Industry-500
Environmental Defense Fund	NGO-450
HF Sinclair Navajo Refining	Industry-500
Mustang Extreme	Industry-500
N/A	Industry-500
Select Water Solutions	Industry-500
New Horizons Foundation	NGO-450
NGL Water Solutions Permian	Industry-500
Sandhills Area Research Association	NGO-450
Chevron	Industry-500
Sierra Club	NGO-450
Envitrace LLC	Industry-500
Exxon Mobile	Industry-500
Raptor Recovery	Industry-500
TETRA Technologies	Industry-500
WildEarth Guardians	NGO-450

AB-SC EXHIBIT 18 *REV*

Detected analytes in produced water samples	Unit	Sampling Point 2											
		Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6	Sample 7	Sample 8	Sample 9	Sample 10	Sample 11	Sample 12
Inorganics													
Aluminum	mg/L										0.7259	0.6023	3.945
Arsenic	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.62	1.67	1.72
Barium	mg/L	4.3	3.9	2.3	1.7	3	2.4	3	3.2	2.7	2.03	2.05	1.75
Beryllium	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0069	ND	ND
Bismuth	mg/L												
Boron	mg/L										50.29	50.98	52
Cadmium	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	0.04	0.81	0.73	0.63
Calcium	mg/L	5600	5500	5800	7400	6800	5200	5100	5800	4900	6102	6830	7757
Chromium	ug/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.57	2.19	1.31
Cobalt	ug/L										7.68	7.84	7.47
Copper	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ferrous Iron	mg/L	6.7	4.3	3	0.57	0.88							
Iron	mg/L	20	20	12	13	28	14	13	15	16	11	22.8	22.6
Lithium	mg/L	25	24	21	18	28	21	20	22	21	21.86	26.92	17.02
Magnesium	mg/L										907.8	1024	1075
Manganese	ug/L										98	134	83
Molybdenum	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.1009	0.1191	
Potassium	mg/L	660	640	730	750	950	670	690	670	680	735.5	862.5	1012
Selenium	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Silica	mg/L										126.7	195.4	104.7
Sodium	mg/L	34000	35000	38000	40000	37000	38000	37000	38000	35000	36520	43990	42880
Strontium	mg/L	970	980	810	700	770	840	860	910	860	835.9	900.2	611.4
Thallium	mg/L												
Thorium	mg/L										0.035	0.054	0.054
Uranium	mg/L										0.19	0.22	0.5
Vanadium	ug/L										82.98	94.51	61.39
Zinc	mg/L												
Sulfate	mg/L	620	690	510	480	540	ND	ND	580	380	436.5	637	747
Phosphorus	mg/L			8.9	6.2	2.6		36		6.6	2.1	1.7	9
Nitrite as N	mg/L	ND	ND	ND	ND	ND	ND	ND	16				
Iodide	mg/L	77	86	90	94	94							
Chloride	mg/L	75000	72000	79800	85000	66000	76000	83000	87000	71000	86971.5	103565	91241
Bromide	mg/L	580	760	600	700	550			500	570	631	935.5	959.5
Ammonia	mg/L	400	410	750	500	320	330	490	360	330			
Wet Chemistry, Other													
Alkalinity	mg/L	150	140	130	150	120	120	140	120	100	126	180	118
Chemical Oxygen Demand	mg/L	1400	1400	1900	3100	1400	930	1100	1400	2000			
Cyanide, Total	mg/L	0.0076											
Methylene Blue Active Substances	mg/L	0.96	0.047	1.2	2.1		1.7	0.92	0.97	0.92			
pH	SU	6.9	6.9	6.9	6.6	7.4					6.6	6.8	6.2
Total Dissolved Solids	mg/L	120000	120000	119000	130000	110000	120000	140000	134200	112450	119805	129675	124445
Total Organic Carbon	mg/L	61	14	19	100	2.4	15	28	16	39	57.05	90.00	191.6
Total Suspended Solids	mg/L	380	370	400	120	430	85	790	500	320	120	210	390
Turbidity	NTU	23	200	110	49	200							
Charge Balance		-8.6%	-5.6%	-6.8%	-6.0%	2.9%	-5.2%	-10.7%	-11.0%	-5.6%	-10.4%	-3.5%	-4.5%
Mass Balance		2.1%	3.6%	6.0%	3.9%	2.5%	0.6%	9.6%	0.5%	0.9%	10.7%	11.2%	5.3%
Radionuclides													
Gross Alpha	pCi/L	1630	863	1630	745	660							
Gross Beta	pCi/L	1230	456	1050	889	748							
Radium-226	pCi/L		0.736	98.7	111		22.4	18	9.8	46.8	517	582	970
Radium-228	pCi/L	2.56	153	35.9	122		279	205	273	291	334	277	576



Detected analytes in produced water samples	Unit	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6	Sample 7	Sample 8	Sample 9	Sample 10	Sample 11	Sample 12	Sample 13	Sa
Radionuclides															
Gross Alpha	pCi/L	1630	863	1630	745	660									
Gross Beta	pCi/L	1230	456	1050	889	748									
Radium-226	pCi/L		0.736	98.7	111		22.4	18	9.8	46.8	517	582	970		
Radium-228	pCi/L	2.56	153	35.9	122		279	205	273	291	334	277	576		
Uranium-234	pCi/L	0.236	0.237	0.203	0.239	0.758									
Uranium-238	pCi/L	0.173													
Thorium-228	pCi/L	38.6	17.3	3.37	52.1	3.54	27.8	3.81	25.7						
Thorium-230	pCi/L	0.18	0.17	0.24	0.24	0.09	0.39								
Polonium-210	pCi/L	1.75	5.38	2.72											
Plutonium-238	pCi/L	0.17													
Volatile Organic Compounds															
Benzene	ug/L	2500	4900	2600	2200	3000	2200	1900	2200	2000					
Ethylbenzene	ug/L	110	160	120	91	140	94	93	72	130					
Toluene	ug/L	2900	3700	2600	1700	3300	2400	2000	1900	2300					
Xylenes, Total	ug/L	1300	1600	1300	710	1400	1100	1100	760	1400					
Semi Volatile Organic Compounds -															
1,1'-Biphenyl	ug/L	4.7	4.6	8.5	4.2	7.2	5.2	8.1	3.8	6.7					
1,4-Dioxane	ug/L	ND	21	ND	ND	ND	ND	ND	ND	ND					
1-Methylnaphthalene	ug/L	18	21	29	20	22	17	26	15	36					
2-Methylnaphthalene	ug/L	29	36	47	31	37	29	45	26	65					
2-Methylphenol	ug/L	77	74	80	85	84	80	98	90	68					
2,4-Dimethylphenol	ug/L	31	33	39		33		42	32	29					



	A	B	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ
1															
2	**Detected analytes in produced water samples**	Unit	Mean	Max	Min	25% percentile	50% percentile	75% percentile		Drinking water standards					
51	**Radionuclides**														
52	Gross Alpha	pCi/L	1105.6	1630.0	660.0	702.5	863.0	1630.0		15.00					
53	Gross Beta	pCi/L	874.6	1230.0	456.0	602.0	889.0	1140.0		4 millirems per year					
54	Radium-226	pCi/L	237.64	970.00	0.74	15.95	72.75	533.25	Combined						
55	Radium-228	pCi/L	231.7	576.0	2.6	122.0	273.0	291.0	Ra226/228	5					
56	Uranium-234	pCi/L	0.33	0.76	0.20	0.22	0.24	0.50							
57	Uranium-238	pCi/L	0.17	0.17	0.17		0.17								
58	Thorium-228	pCi/L	21.53	52.10	3.37	3.61	21.50	35.90							
59	Thorium-230	pCi/L	0.22	0.39	0.09	0.15	0.21	0.28							
60	Polonium-210	pCi/L	3.28	5.38	1.75	1.75	2.72	5.38							
61	Plutonium-238	pCi/L	0.17	0.17	0.17		0.17								
62															
63	**Volatile Organic Compounds**														
64	Benzene	ug/L	2611.1	4900.0	1900.0	2100.0	2200.0	2800.0		5					
65	Ethylbenzene	ug/L	112.2	160.0	72.0	92.0	110.0	135.0		700					
66	Toluene	ug/L	2533.3	3700.0	1700.0	1950.0	2400.0	3100.0		1000					
67	Xylenes, Total	ug/L	1185.6	1600.0	710.0	930.0	1300.0	1400.0		10000					
68															
69	**Semi Volatile Organic Compounds -**														
70	1,1'-Biphenyl	ug/L	5.89	8.50	3.80	4.40	5.20	7.65							
71	1,4-Dioxane	ug/L	21.0	21.0	21.0		21.0								
72	1-Methylnaphthalene	ug/L	22.7	36.0	15.0	17.5	21.0	27.5							
73	2-Methylnaphthalene	ug/L	38.3	65.0	26.0	29.0	36.0	46.0							
74	2-Methylphenol	ug/L	81.8	98.0	68.0	75.5	80.0	87.5							
75	2,4-Dimethylphenol	ug/L	34.1	42.0	29.0	31.0	33.0	39.0							
76	Ethylene glycol	mg/L	27.0	27.0	27.0		27.0								