STATE OF NEW MEXICO
BEFORE THE WATER QUALITY CONTROL COMMISSION

IN THE MATTER TO AMEND 20.6.2.5000 NMAC

No. WQCC 14-15 (R)

FIRST AMENDED PETITION TO AMEND 20.6.2.5000 NMAC AND REQUEST FOR HEARING

Pursuant to the New Mexico Water Quality Act ("WQA"), NMSA 1978, §§76-6-1 to 76-6-17 (2009) and Section 301 of the *Guidelines for Water Quality Control Commission Hearings*, Navajo Refining Company, L.L.C. ("Navajo") petitions the Commission to adopt new rules authorizing Class I underground injection control wells for hazardous waste ("Class I hazardous waste injection wells") generated by oil refineries, 20.6.2.5300 NMAC to 20.6.2.5305 NMAC, hereinafter referred to as the Water Conservation Rule ("WCR"). The WCR would incorporate existing federal regulations, promulgated under the authority of the Safe Drinking Water Act ("SWDA") for Class I hazardous waste injection wells. Navajo's proposed Water Conservation Rule, attached as Attachment 1, would amend 20.6.2.5004 and add new text as 20.6.2.5300 through 20.6.2.5305.

This First Amended Petition ("Amended Petition") hereby amends the Petition to Amend 20.6.2.5000 NMAC that Navajo filed with the Water Quality Control Commission on November 5, 2014 ("Original Petition"). The Amended Petition limits the application of the WCR, specifically it limits it to oil refineries, the Original Petition otherwise remains unchanged.

I. Statement of Reasons for the Rule Change

Navajo operates an oil refinery in Artesia, New Mexico and generates a wastewater stream that, on a constituent basis, is very similar to produced water routinely disposed of in connection with the production of oil and gas. For the reasons stated in this petition, it desires to use an

injection well to dispose of process wastewaters that may be classified as hazardous due to concentration of constituents through water reuse. To do so, it seeks by this petition to authorize and to implement a hazardous waste injection well permitting regime that adopts federal requirements for such wells.

Authorizing Class I hazardous waste injection wells and adopting a permitting regime for those wells used by oil refineries will provide a number of benefits to both the State and to refineries and others in the oil and natural gas industry. These benefits include the following:

1. Water conservation: Allowing for permitting of Class I hazardous waste injection wells will promote water reuse and conservation by allowing for extraction and disposal of hazardous constituents in the waste streams generated by oil refineries.
2. Waste minimization: The WCR would promote waste minimization. Through water reuse, the final effluent stream that would be sent to a Class I hazardous waste injection well could be materially smaller than a full effluent stream that is typically disposed of now in underground injection control wells for non-hazardous wastes. Wastes generated by oil refineries would therefore be minimized.
3. Economic benefits: The WCR would provide a number of economic benefits to communities supporting refineries. Through reuse of water and reduction of fresh water usage in by oil refineries, more fresh water is available for use by the surrounding communities and businesses, including agriculture.
4. Preservation of disposal capacity: Because disposal capacity at existing oil refinery wells is finite, reducing effluent discharges to those wells preserves refining and disposal capacity. This capacity fosters oil and gas production by allowing for additional crude oil and recovered oil processing.

5. Improved oil and gas industry reliability: The WCR will also allow those in the oil and gas industry to improve reliability in their systems and production by allowing the refineries they depend upon to manage any unexpected generation of hazardous waste in the wastewater stream. Currently, refineries must treat wastewaters before disposal so that the waters are not hazardous. This treatment process can curtail crude oil throughput. Creating disposal capacity for hazardous wastewaters will allow refineries to maintain greater crude oil throughput, avoiding adverse financial consequences to their suppliers and the State.

II. Waste Management Practices of Oil Refineries in New Mexico

Oil refining companies must complete a number of processes in order to transform crude oil and recovered oil (i.e., oil recovered from oil-bearing residuals generated in the refining industry) into refined products. During these processes refineries use significant quantities of water and generates wastewater streams that can be recycled, especially if certain chemical constituents can be removed from these streams before reuse. Some of these chemical constituents could be considered hazardous waste if present in sufficient concentrations. Class I hazardous waste injection wells provide a demonstrated means for safely disposing of such wastes in deep geologic formations that are isolated from aquifers suitable for use as water supplies. The deep formations used for injection would be substantially below aquifers used for fresh drinking and agricultural/industrial water supplies and are separated from those supplies by numerous layers of impermeable rock formations. The WCR require that any injection of fluids by the well occur beneath the lowermost formation that contains 10,000 milligrams per liter or less of total dissolved solids ("TDS").

Since 2001, Class I hazardous waste injection wells have not been authorized in New Mexico, but elsewhere, under federal law, the United States Environmental Protection Agency ("EPA") allows disposal of hazardous waste by use of Class I hazardous waste injection wells. The federal regulations were promulgated in 1983 and have a demonstrated history of protection of human health and the environment. In 1984 New Mexico assumed primacy over the Safe Drinking Water Act program. After New Mexico assumed primacy the federal regulations changed to impose different requirement for Class I hazardous waste injection wells. New Mexico never amended its regulations to incorporate the changes made in the federal regulations. Therefore, the State's pre-2001 regulations did not impose different requirements for hazardous waste wells. In 2001, New Mexico eliminated the regulation allowing this practice because it had not been used and no such wells had been drilled.

The proposed amendment does not alter the responsibilities of the New Mexico Environment Department ("NMED") or the Oil Conservation Division ("OCD") for administering the programs currently delegated to the State by the EPA under the SDWA. Since the WCR only applies to oil refineries, the requirements of the WCR (adopting the federal EPA regulations) would be administered by OCD. OCD currently administers the Underground Injection Control well program for oil and gas related industries, including refineries, and is authorized to administer the permitting regime for Class I hazardous waste injection wells pursuant to the EPA's delegation to New Mexico under the SDWA.

As described fully below, Class I wells are a safe and economical way to dispose of wastewater. Federal regulations are comprehensive, imposing exacting requirements for the selection of the site, well construction standards, and the day-to-day operations to ensure that the USDW is safe and secure.

III. Background of Class I Injection Wells

Wastewater is an unavoidable byproduct of the manufacturing processes that create thousands of products we use every day. While industries continue to research and implement ways to reduce waste by recycling and improving the manufacturing processes, wastes are still generated and require disposal.

Class I underground injection wells represent a technically sound and safe disposal option for high-volume wastewaters. Class I underground injection wells present a low risk wastewater disposal option, as demonstrated by stringent design and operating requirements and a history of safe disposal that spans many decades.

(a) Regulatory Framework for UIC Wells

"Underground injection" refers to the placement of fluids, often wastewater, underground through a well bore. As the Environmental Protection Agency ("EPA") Regional Office for Region 6 found, "some waste fluids are generated in such volumes as to make treatment economically impractical. If properly constructed, and operated, injection wells are by far the best way to dispose of these waste fluids."[1] Not allowing underground injection wells "removes a safe, economically proven technology by which wastes can be effectively addressed."[2]

As part of the federal Safe Drinking Water Act ("SDWA") of 1974, a federal Underground Injection Control Program ("UIC Program") was established.[3] Since ground water is a major source of drinking water in the United States, the UIC Program requirements were designed to prevent ground water contamination. Most ground water used as drinking water today contains less than 3,000 milligrams per liter of total dissolved solids ("TDS"). The UIC

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[1] ENVIRONMENTAL PROTECTION AGENCY, *Frequently Asked Questions About the Underground Injection Control Program*, http://www.epa.gov/Region6/water/swp/uic/faq3.htm#banned.
[2] *Id.*
[3] 42 U.S.C. §300h.

Program protects waters with significantly higher mineral concentrations to ensure that all water with the potential to be treated and used as drinking water in the future is protected.

New Mexico, like other states and the federal government, has a reasonable objective to protect any underground source of drinking water ("USDW"). A USDW is defined by EPA as an "aquifer or its portion which supplies any public water system or contains a sufficient quantity of ground water to supply a public water system, and either currently supplies a public water system, or contains less than 10,000 milligrams per liter of [TDS] and is not an exempted aquifer."[4] In essence, a USDW is a collection of clean water large enough that it could potentially serve the public.

(b) Class I Wells

There are six classes of underground injection wells. These classes are based on the types of fluids injected; each well classification has technical standards for well design and construction, injection depth, and operating and monitoring techniques in order to ensure that wells that serve the same function are designed in a way to protect USDWs.

Class I wells, further classified as hazardous and non-hazardous wells, inject industrial or municipal wastewater far beneath the lowermost source of drinking water. Class I wells are used mainly by the following industries: petroleum refining, metal production, chemical production, pharmaceutical production, commercial waste disposal, food production, and municipal wastewater treatment.[5]

Class I wells inject wastewater into formations without suitable water to extract as a source of drinking water and that are located thousands of feet below the land surface. The geological formation into which the wastewater is injected, known as the injection zone, must be

[4] 40 C.F.R. § 144.3

[5] ENVIRONMENTAL PROTECTION AGENCY, *Industrial & Municipal Waste Disposal Wells (Class I),* http://water.epa.gov/type/groundwater/uic/wells_class1.cfm.

demonstrated to be sufficiently porous and permeable so that the wastewater can enter the rock formation without an excessive buildup of pressure. The injection zone is typically beneath a large, relatively non-permeable layer of rock, known as the confining zone, which along with the natural force of gravity, will hold injected fluids in place and restrict them from moving upward toward a USDW. A diagram depicting the general schematic of a Class I well is attached to this rulemaking petition as Attachment 2.

There are currently approximately 550 Class I injection wells in the United States. Approximately 121 of these wells (22%) are Class I hazardous waste injection wells.[6] Most Class I wells are located in EPA Region 6 (comprised of Arkansas, Louisiana, New Mexico, Oklahoma, Texas, and 66 Native American Tribes).[7] At least 21 states currently have Class I injection wells.[8] Texas has the greatest number of Class I wells, including hazardous waste wells, followed by Louisiana.[9] Florida and Kansas also have a large number of Class I wells.[10]

(c) Federal Regulations Regarding Class I Wells

Federal regulations strictly control the creation and maintenance of Class I wells. EPA requires that Class I wells be located in geologically stable areas that are free of fractures or faults through which injected fluids could travel to drinking water sources.[11] Well operators must also show that there are no wells or other artificial pathways between the injection zone and USDWs through which fluids can travel. The site-specific geologic properties of the subsurface around the well offer another safeguard against the movement of injected wastewaters to a USDW.

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[6] *Id.*
[7] ENVIRONMENTAL PROTECTION AGENCY, *EPA Region 6 (South Central),* http://water.epa.gov/type/groundwater/uic/wells_class1.cfm.
[8] EPA, CLASS I UNDERGROUND INJECTION CONTROL PROGRAM: STUDY OF THE RISKS ASSOCIATED WITH CLASS I UNDERGROUND INJECTION WELLS 3(March 2001).
[9] *Id.*
[10] *Id.*
[11] 40 CFR §146.62.

All Class I wells are designed and constructed to prevent the movement of injected wastewaters into USDWs. Their stringent, multi-layer construction[12] has many redundant safety features. One of these features is the well's casing, which prevents the borehole from caving in. The casing is made out of a corrosion-resistant material such as steel or fiberglass-reinforced plastic. It consists of an outer surface casing, that extends the entire depth of the well, and an inner "long string" casing that extends from the surface to or through the injection zone. The innermost layer of the well, the injection tubing, brings injected wastewater from the surface to the injection zone.

All of the materials that injection wells are made are made of are corrosion-resistant and compatible with the wastewater and the formation rocks and fluids into which they come in contact. A constant pressure is maintained in the space and is continuously monitored to verify the well's mechanical integrity and proper operational conditions.[13] Trained operators are responsible for day-to-day injection well operation, maintenance, monitoring, and testing.[14] In addition to monitoring the well operation, operators of hazardous waste wells are required to develop and follow a waste analysis plan for monitoring the physical and chemical properties of the injected wastewater.[15]

(d) Safety Factors and Safety Record

Because these Class I wells inject waste far below the deepest possible USDW, there is very little chance of any negative effect on potentially usable ground water. In fact, in its March 2001 Study of Class I wells the, EPA said that "the probability of loss of waste confinement due to Class I injection has been demonstrated to be low" and "existing Class I regulatory controls

[12] Wells typically consist of three or more concentric layers of pipe: surface casing, long string casing, and injection tubing. Class I hazardous wells must have 3 layers of casing. [40 CFR 146.65(c)].
[13] 40 CFR §146.67.
[14] 40 CFR§ 146.13(b).
[15] 40 CFR §146.68 (a).

are strong, adequately protective, and provide an extremely low-risk option in managing the wastewaters of concern."[16] In other words, the deep geologic formations that receive the waste ("the injection zone"), the related impermeable confining layers above the injection zone, and the many layers of protection required in the construction, operation, and monitoring of wells, provide many safeguards against upward fluid movement, effectively protect USDWs.

Class I injection wells that meet EPA's design and operating requirements are well studied and pose minimal risks. In 1998, scientists quantitatively estimated the risk of waste containment loss as a result of various sets of events associated with Class I hazardous waste wells.[17] According to the study, because of the redundant safety systems in a typical Class I well, loss of containment would requires a series of improbable events to occur in sequence. As a result, the calculated probability of containment loss resulting from each of the scenarios examined ranges from one-in-one-million to one-in-ten-quadrillion.[18]

In the field, the probability of Class I well failures, both non-hazardous and hazardous, has also been demonstrated to be very low. Many early Class I failures were a result of historic practices that are no longer permissible under the federal UIC regulations, such as improper well construction or improper well closure upon cessation of operations. Class I wells have redundant safety systems and several protective layers; an injection well would fail only when multiple systems fail in sequence without detection. In the unlikely event that a well would fail, the geology of the injection and confining zones serves as a final safety mechanism to prevent movement of wastewaters to USDWs. Injection well operators invest millions of dollars in the

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[16] EPA, CLASS I UNDERGROUND INJECTION CONTROL PROGRAM: STUDY OF THE RISKS ASSOCIATED WITH CLASS I UNDERGROUND INJECTION WELLS xiii (March 2001) (emphasis supplied).
[17] Rish, W.A., T. Ijaz, and T.F. Long, *A Probabilistic Risk Assessment of Class I Hazardous Waste Injection Wells,* 1998.
[18] *Id.*

permitting, construction, and operation of wells and even in the absence of UIC regulations would carefully monitor the integrity of the injection operation to safeguard their investments.

Failures of Class I wells are exceedingly rare and have generally not resulted in significant harm to the environment or fresh water supplies. Most failures of mechanical integrity are internal failures, detected by continuous pressure monitoring systems or integrity tests. Any wells that fail are shut down until they are repaired to the satisfaction of the regulatory agency. EPA's study of more than 500 Class I non-hazardous and hazardous wells showed that loss of mechanical integrity contributed to only 4 cases of significant wastewater migration (none of which affected a drinking water source) over several decades of operation.[19] This safety record can be attributed to the rigorous requirements for monitoring and for ensuring that the well materials are compatible with the wastewater injected.

(e) Monitoring Requirements

Finally, Class I injection wells are continuously monitored and controlled, usually with sophisticated computers and digital equipment, which provide real-time data and information to the well operator. Thousands of data points about the pumping pressure for fluid disposal, the pressure in the space between the injection tubing and the well casing (that shows there are no leaks in the well), and data on the fluid being disposed of, such as its temperature and flow rate, are monitored and recorded each day.[20]

Alarms are connected to sound if anything out of the ordinary happens, and if unusual pressures are sensed by the monitoring equipment, the well pump automatically shuts off.[21] Disposal in the well does not resume until the cause of the unusual event is investigated, and the

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[19] EPA, CLASS I UNDERGROUND INJECTION CONTROL PROGRAM: STUDY OF THE RISKS ASSOCIATED WITH CLASS I UNDERGROUND INJECTION WELLS 41 (March 2001).
[20] 40 CFR §146.67(a).
[21] 40 CFR §146.67(f).

people responsible for operating the well and the regulatory agencies both are sure that no environmental harm has been or will be done by well operations.[22]

The wells are also tested regularly, using special tools that are inserted into the well to record data about the well and surrounding rock formations. Regulators review all the data about the well operations, monitoring and testing frequently, and inspecting the well site to make sure everything is operating according to the requirements put in place to protect drinking water sources.

IV. Summary of Amendments

1. Navajo proposes the following change to 20.6.2.5004(A)(3) NMAC:

Delete the words "hazardous or" from the regulation. This would authorize the use of Class I hazardous waste injection wells.

2. Navajo proposes the addition of 20.6.2.5300

This new section sets forth the requirements for all Class I hazardous waste injection wells. It specifies that Class I hazardous waste injection wells are subject to the same permitting procedures as Class I non-hazardous waste injection wells. It limits Class I hazardous waste injection wells to use by oil refineries. Additionally, it incorporates by reference the subsequent sections (20.6.2.5301 NMAC through 20.2.6.5305 NMAC) that set forth specific requirements for Class I hazardous waste injection wells.

3. Navajo proposes the addition of 20.6.2.5301

This new section incorporates by reference the federal regulations that set forth the general requirements for Class I hazardous waste injection wells, 40 C.F.R. Section 144.14. This federal regulation sets forth specific notification, recordation, reporting and training requirements for operators of Class I hazardous waste injection wells.

[22] 40 CFR 146.67(h).

4. Navajo proposes the addition of 20.6.2.5302

This new section incorporates by reference 40 C.F.R. Sections 144.60 through 144.70, the federal regulations that set forth the requirements for financial responsibility for owners and operators of Class I hazardous waste injection wells. These regulations include financial assurance for plugging and abandonment.

5. Navajo proposes the addition of 20.6.2.5303

This new section incorporates by reference 40 C.F.R. 146.61 through 146.73, the federal regulations that set forth the specific requirements and conditions for Class I hazardous waste injection wells. These regulations include construction requirements, testing requirements, operating requirements, monitoring requirements, reporting requirements, closure requirements, and post-closure requirements for Class I hazardous waste injection wells.

6. Navajo proposes the addition of 20.6.2.5304

This new section incorporates by reference 40 C.F.R. Part 148, the federal regulations that set forth the requirements and restrictions on Class I hazardous waste injection wells, including the specific substances that are prohibited from being injected in Class I hazardous waste injection wells.

7. Navajo proposes the addition of 20.6.2.5305

This new section clarifies the terms, references, and definitions used in the federal regulations. These are clarified in order to vest authority into the relevant state agency that has been delegated primacy by the federal program.

V. Request for Hearing

Navajo requests that the Commission schedule a rulemaking hearing to consider the proposed Water Conservation Act. Navajo requests that the rulemaking hearing to be scheduled

to begin on April 14, 2015. This hearing date will allow the Commission to conduct the hearing in conjunction with the Commission's April 2015 meeting.

It is anticipated that the rulemaking hearing will take approximately one day or less.

Respectfully Submitted,

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