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## REGULATION OF BRINE DISCHARGES FOR PROTECTION OF GROUND WATER QUALITY IN NEW MEXICO

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Good morning everyone. My name is Karen Menetrey and I work for the Ground Water Quality Bureau of the New Mexico Environment Department and I have been working for the Bureau and Permitting Program for about 12 years. First I want to tell you about an interesting letter I ran across when I first started working for the department. The letter was written to a dairy man who had a dairy facility with an unlined lagoon that was probably leaking and getting into the ground water — a manure and water-filled lagoon. A letter dated 1983 from our department told him, “...well, Mr. [Dairyman], you stated that under

your facility the water is all brackish and so nobody is ever going to use that water and so it does not need to be protected. But Mr. [Dairyman] this water is protected under the regulations in the state and we do not know what is going to happen in the future. Someday somebody may need to use that brackish water...” At the time I thought, “Who is going to ever use that brackish water?” That letter shaped how I thought about my job from day one, that we need to protect all water in the state for future use. Little did I think that 12 years later I would be here at a conference talking about how we can use brackish

water. I don't know if any of you are also surprised at where we are right now.

Today I will talk about the permitting requirements for the disposal of concentrated water from the desalination process. In my presentation, this concentrated water is referred to as a brine discharge although in the program the title of my talk it indicates "concentrate discharge." I don't really know what the correct term is but I am going to call it "brine discharge." I will talk about the purpose of the Ground Water Quality Bureau and why we need to protect ground water quality, how we regulate the disposal of brine wastewater, and what is included in a discharge permit for different types of disposal.

The most feasible disposal methods we see are: Evaporation Lagoons, Class I Underground Injection Control Wells, and Class V Underground Injection Control Wells, although I will talk about a couple of other disposal methods too.

The Ground Water Quality Bureau protects ground water quality by regulating discharges that have the potential to cause ground water contamination. We regulate industrial, mining, domestic, and agricultural discharges and our authority comes from the New Mexico Water Quality Act and the Water Quality Control Commission regulations. The regulations are designed to protect all ground water in New Mexico that has a total dissolved solids concentration of 10,000 mg/L or less.

Scarcity of water is one of the biggest issues that faces New Mexico. About 90 percent of New Mexico's population is relying on ground water resources with 10 percent of the population using private wells and 80 percent using public water supply systems. *U.S. News and Water Online* reports that population growth in parts of New Mexico may outpace water supply by 2025.

The Ground Water Quality Bureau's role in regulating brine discharges is to issue ground water quality protection permits known as ground water Discharge Permits. With these permits we ensure compliance with a number of ground water quality standards and abatement of groundwater contamination. Compliance is ensured through inspections, sampling, and the permittee's submittal of monitoring reports.

A discharge permit has essentially four components: (1) an operational plan that includes construction and operating requirements designed to ensure that the facility is properly constructed so that it won't contaminate groundwater; (2) a monitoring

plan that sets a schedule for sampling, analysis, and submittal of monitoring reports about the brine discharge into the ground water; (3) a contingency plan that outlines measures to be taken in the event of a system failure or in the event of ground water contamination; and (4) and a closure plan that outlines measures to be taken when a discharge ceases so that waste is not left on site to contaminate ground water.

If someone were to submit a Discharge Permit Application for Disposal of Brine to an Evaporation Lagoon, we would want to see the operational requirements for a double synthetic liner with a leak detection system as seen in Figure 1.



Figure 1.

I am going to discuss disposal to an evaporative lagoon, to a deep Class I Well, and to a shallow Class V Disposal Well, which we think are the most viable options for disposal. However, we will not preclude someone from submitting an application for a different type of disposal method. For instance, I know research is planned for the Tularosa Facility regarding crop uptake. If someone can demonstrate that crops take up salts and brine, we would be able to consider a permit for land application for brine disposal. Also if a project were proposed to discharge to a city sewer system, we would not need to be involved; we would just need to ensure that the city sewer system could meet their requirements for effluent disposal. If they were able to have holding tanks on the site for the brine, we would not need to have a Discharge Permit Application.

The monitoring requirements associated with the evaporation lagoon would include flow metering, effluent sampling, ground water monitoring, routine

inspection of the leak detection system, and routine inspection of the liner and berms around the evaporation lagoon.

The contingency requirements for this type of permit would include liner repair or replacement if there is a problem with the liner, spill reporting and corrective action, and abatement of ground water contamination if it should occur.

The closure requirements would include: removing or plugging the conveyance system, perforating or removing the liner, filling the lagoon and grading for positive drainage, and two years of post-closure ground water monitoring.

The diagram on Figure 2 shows a Class I Well injection of hazardous and non-hazardous wastes into geological formations capable of confining the fluids. It shows a sector in the land surface where the well is extending through geologic layers beneath the drinking water aquifer that is pictured in blue. A Class I Well is generally a deep well designed so that the brine will stay there and be the final disposal location. Suitable areas for Class I Wells include the northwestern and eastern parts of New Mexico and perhaps in other parts of the state.

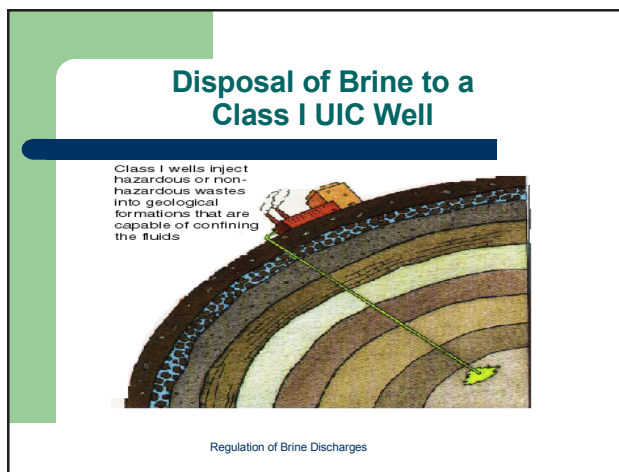


Figure 2.

The operational requirements for a Class I Injection Well include well-specific construction criteria to make sure that the well material and the aquifer are compatible with the brine being disposed. It includes a formation-specific injection pressure. Again, the idea of the Class I Well is that fluids are injected below the lower most drinking water aquifer and will stay there.

Monitoring requirements include: mechanical integrity testing, continuous pressure monitoring, continuous flow rate and volume metering, effluent

sampling, and ground water monitoring of the drinking water aquifer that overlay the injection zone.

Contingency requirements include reporting and corrective action if fracture propagation occurs from the injection zone and if fluid migration occurs and abatement of ground water contamination of the drinking water aquifer if that occurs.

Closure requirements include: financial assurance, which is posted up front when we issue a permit; plugging and abandoning the Class I Injection Well; removing or plugging the conveyance system to the well; and two years of post-closure ground water monitoring, if necessary.

Figure 3 shows a picture of brine disposal to a Class V UIC Well. Class V Wells are wells not included in Classes I-IV. It is a catch-all category that EPA devised. Non-hazardous fluids are injected into or above an underground source of drinking water. The diagram depicts a farm with an irrigation run-off well into a shallow drinking aquifer that is in blue. A Class V Well could be either a vertical well or a subsurface fluid injection system like a leach field or an underground piping system.

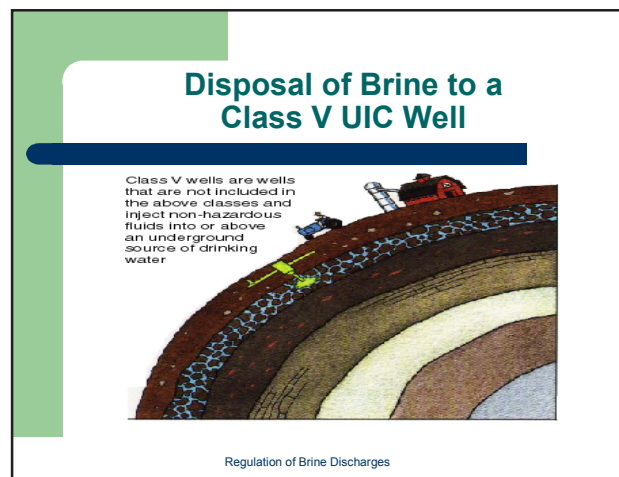


Figure 3.

For the Environment Department to consider a Class V Well for brine disposal from desalination wastewater, it would have to be injected into a formation that contains 10,000 mg/L or more total dissolved solids, which you might actually have if you are working on a desalination project. To use this disposal method, the permittee must demonstrate that ground water of higher quality would not be affected by the discharge. A detailed characterization of the hydrogeology would need to be done to determine if pockets of fresh water exist that might be affected if

you discharged into this poorer quality aquifer. Monitoring requirements for a Class V Disposal Well would include flow metering, effluent sampling, and ground water monitoring of any fresh water areas around the discharge. Contingency requirements call for spill reporting and corrective action and abatement of ground water contamination if it occurs. Closure requirements include removing the conveyance system, removal or backfill of the subsurface distribution system, grade for positive drainage, and two years of post-closure ground water monitoring if required in the permit.

The permitting process for the ground water discharge permit takes about 180 days. A public notice process can extend that permitting time if a public hearing is required. A public hearing is required if there is significant public interest. We appreciate it when folks call us in advance for a planning meeting.

Our Program Manager, George Shuman, can be reached at (505) 827-2900 (George.Shuman@nmenv.state.nm.us) if there are any projects folks are considering and they would like to talk about permitting. Our website is <http://nmenv.state.nm.us> and on the website are Discharge Permit Applications and other information about the Bureau.

*Question:* Karen, in the State of Florida, one of the things they do is to classify desalination by-product concentrate as water treatment by-product for the reason that they are trying to get around classification of the waste as industrial waste realizing that it has the same components that water has in it initially but it is a little more concentrated, maybe five times more concentrated. Would New Mexico consider, if we had more desalination operations going on in the state, modifying or opening a class of waste disposal for only desalination by-products?

*Answer:* We do not have that classification yet; we have not had to consider it. I am not sure it would make a difference in terms of permitting. We have adopted EPA's classification for injection wells but the regulations are not different depending on the different types of waste. Some restrictions on injections wells require you to meet drinking water standards but the example you give I do not think would be necessary in New Mexico - it would not affect permitting. Certainly we would consider it when we receive an application.