NMED's Approach to Aquifer Storage and Recovery—Water Quality Issues

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I promise to keep my presentation relatively short this morning. I only prepared for 15 minutes, which I assumed was reflective of the interest level for a talk on regulations. This is really a breeze-through of where the Environment Department (NMED) is at with respect to aquifer storage and recovery, or aquifer recharge as we like to call it. It is intended for a fairly general audience so if I bore you, I apologize.

We are going to talk about the benefits of ASR, the water quality regulations as they pertain to it in New Mexico, and how NMED sees ASR proceeding. I will concentrate the most time on development in New Mexico. So let's talk about the benefits of ASR.

I hope everybody understands when I use the term ASR I am talking about aquifer storage and recovery, which is a technology that has been emergent for a number of years now, offering tremendous benefits for the replenishment of aquifers and for the storage of available surplus water. The ability to store surplus supplies in an aquifer for later recovery has a tremendous benefit in the West, potentially taking advantage of wet water supplies when water is actually there and banking it so that it is available in times when we need it. The source waters could come from a number of places including: surface water supplies (treated or untreated), potable water, or industrial wastewaters. The source may be reclaimed domestic wastewater, which is where I think a lot of the interest is. Reclaimed wastewater is a source in New Mexico that is being used increasingly for irrigation and other reuse applications in what NMED refers to as "above ground reuse." Aquifer storage and recovery using reclaimed wastewater has not yet started New Mexico, but we certainly anticipate it over the next few years.

The large storage capacity of aquifers is a great advantage and why people are interested in ASR. With such a tremendous ability to eliminate evaporative losses, this really represents a new management tool we haven't had before. From the quality standpoint, there is a significant advantage in having an environmental barrier in place to mitigate direct effects and provide additional

treatment and dilution. In ASR, the aquifer storage element represents this environmental barrier. It is becoming increasingly clear that under most circumstances, allowing recharged water to reside in the aquifer for extended periods offers water quality benefits. The overall benefit is most profound when considering unregulated contaminants (microconstituents) that are typical of reclaimed wastewater.

Let's talk about some of the downsides of ASR. There is an element to ASR that can be fairly energy-intensive. Particularly if you are pumping large quantities of water underground, the cost can be considerable compared to the alternatives (lakes and more traditional storage methods). It is not suitable for all formations and we can't do this everywhere. The formation must be well matched to storage and recovery of the water. There are many aquifers in New Mexico that are suitable and others that are not. There is at least the potential for leeching of contaminants as recharge water moves into areas that have not been previously saturated. This problem has been encountered at ASR projects in other states, although leaching often seems to be a relatively short-term effect, as one might expect. From a regulatory standpoint, a short-term leaching effect is a little confounding because the rules are written in such a way that you can't cause an exceedance of a standard. A leeching effect might be short-term and cause only a very localized problem. NMED has had to wrestle with devising effective regulatory strategies to deal with leaching effects that don't create a unnecessary barrier to ASR but that ensure that a system is protective of groundwater quality overall.

The technology used for ASR ranges from the simplest infiltration system, (you could view a septic tank leachfield system as a form of aquifer recharge) to complex multiple direct injection well systems. Simple infiltration systems that rely upon vadose zone treatment are going to play a large role in ASR in New Mexico, but there are also some fairly exotic approaches such as direct injection wells that introduce recharge water into the saturated zone. When using reclaiming domestic wastewater as the source, a very high level of treatment becomes necessary and this naturally increases the complications. NMED does expect that vadose zone treatment will be an element of infiltrative ASR projects here, but how to characterize the vadose zone treatment has not yet been established.

When the NMED Ground Water Quality Bureau (GWQB) issues a permit for a discharge that represents disposal, the standards in groundwater that must be protected are the standards set forth in 20.6.2.3103 NMAC. However, discharge permits issued for ASR projects will have to meet a higher standard of protection. This will involve protection to both the standards set forth in 20.6.2.3103 and to the state primary drinking water standards. The regulatory basis for this stems from the Underground Injection Control section in the Water Quality Control Commission Regulations (Section 20.6.2.5000 NMAC). GWQB is also focused on the control of pathogens for a variety of source waters and is concerned that the level of emergent (unregulated) contaminants at least be monitored.

Our current projects in development include:

- ABCWUA Bear Canyon Demonstration (operational)
- ABCWUA Large Scale Aquifer Recharge
- Rio Rancho Direct Injection
- Rio Rancho Mariposa Infiltration
- Rancho Viejo Development (SF County)

The Rio Rancho Direct Injection project features include a pilot project using potable water; the ultimate source water will be highly treated reclaimed wastewater; ongoing permitting with be with OSE, NMED, and EPA; and advanced water treatment methods will be explored (Fig. 1).

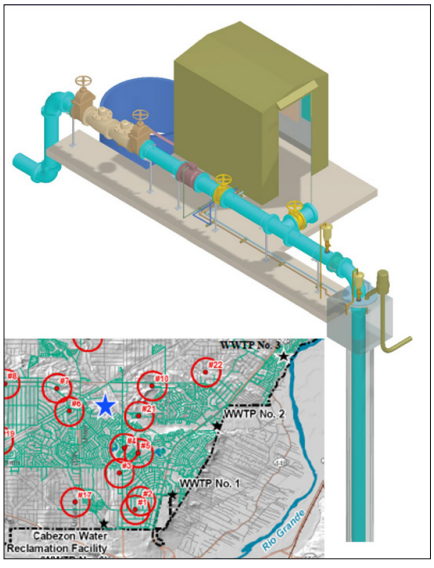

Figure 1. Rio Rancho Direct Injection

The Mariposa WRF Recharge System (Fig. 2) will use a reclaimed wastewater source and will include vadose zone treatment.

Thank you.

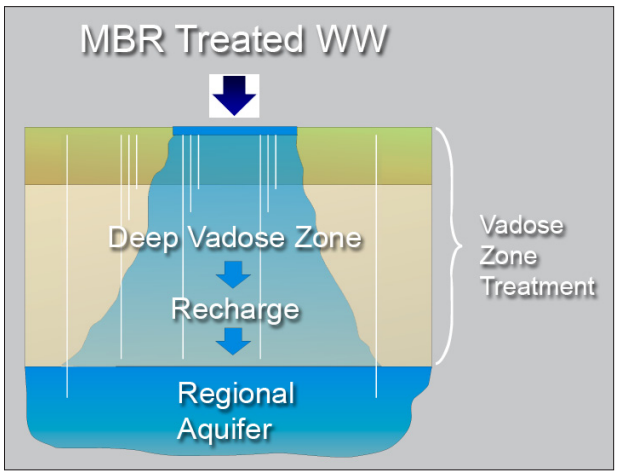

Figure 2. Mariposa WRF Recharge System