

Lea County Water Study

This project is examining the occurrence and quality of water in the Dewey Lake and Santa Rosa Formations in Lea County, New Mexico. The Bureau of Land Management (BLM) has been concerned, based on its study of hydrologic and water well records compiled by the New Mexico Office of the State Engineer (OSE), that non-trivial groundwater resources could occur in the Dewey Lake and Santa Rosa formations, which places this resource at a greater depth than previously believed. Periodic testing and well sampling in these formations have shown an increase in chloride concentration in the useable water. Potential pathways for this increase could be the result of drilling oil and gas wells, or brine migration through fractures from the Rustler, Salado, or Castile formations. As more reliable water sources in the area become depleted (e.g. the Ogallala), the importance of maintaining the future viability of these waters increases. One suggestion for maintaining the future viability of these waters is to initiate special protective measures when drilling through these formations to deeper hydrocarbon reservoirs. However, much uncertainty exists with regards to this resource and thus more information is needed before any decisions can be made.

For this effort, the project is trying to identify the spatial distribution of water in these formations as well as the hydrologic connections (if any) between the two formations and other adjacent formations. The final objective is to gain enough understanding of the system to make prudent and reasonable decisions regarding protective measures for these formations. The main tasks of the project are as follows:

- Characterize the geologic and hydrogeologic settings. This has been accomplished through an extensive literature review and data collection effort that involved examining borehole logs, geostatistical analysis, and GIS.
- Model the groundwater flow system. A groundwater model has been completed using the Finite Element Heat and Mass (FEHM) model. The purpose of the model is to bound the recharge rates and volumetric flow rate through the aquifers.
- Perform geostatistical analysis and stochastic simulations with the FEHM model to identify locations suitable for drilling an exploratory well. Suitable locations will be vetted by BLM, who will make the final decision on where to drill.
- Drill an exploratory well and perform a series of aquifer tests. Data collected from the exploration well will be used to update the geostatistical representation and the FEHM model.
- Reanalyze the system with the updated data and form conclusions about the extent and quality of the water resource in the aquifers as well as the uncertainty associated with those conclusions.

The project is in its second of three years with the exploration well expected to be drilled later this summer. The conclusion of the project is expected to take another 6-9 months after the completion of the well tests and will consist of a final report detailing the data, analysis, modeling, and drilling activities as well as suggestions for future borehole locations and additional analysis.