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Buckman Wellfield and Its Relation to Groundwater Beneath Los Alamos National Laboratory

Velimir V. Vesselinov, Earth and Environmental Sciences, Los Alamos National Laboratory, vvv@lanl.gov

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Groundwater flow within the regional aquifer beneath LANL is generally eastward.

Understanding the hydrogeological characteristics of the potential hydraulic connection to the Buckman Well Field can be derived from existing information related to:

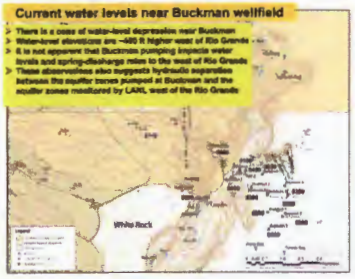
- **Water-level data (pre- and post- development, pumping drawdowns; spring-discharge rates)**
- **Basin geology and hydrostratigraphy**
- **Ground-surface subsidence**
- **Isotope data**

Pre-development water levels near Buckman

- Initial artesian conditions suggest limited hydraulic conductivity between the deep and shallow zones of the regional aquifer, i.e. existence of confining layers.
- Artesian conditions cause upward groundwater flow direction

Current water levels near Buckman wellfield

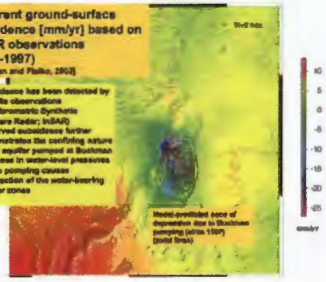
- There is a cone of water-level depression near Buckman
- Water-level elevations are ~400 ft higher west of Rio Grande
- It is not apparent that Buckman pumping impacts water levels and spring-discharge rates to the west of Rio Grande
- These observations also suggests hydraulic separation between the aquifer zones pumped at Buckman and the aquifer zones monitored by LANL west of the Rio Grande



Apparent ground-surface subsidence [mm/yr] based on InSAR observations (1993-1997)

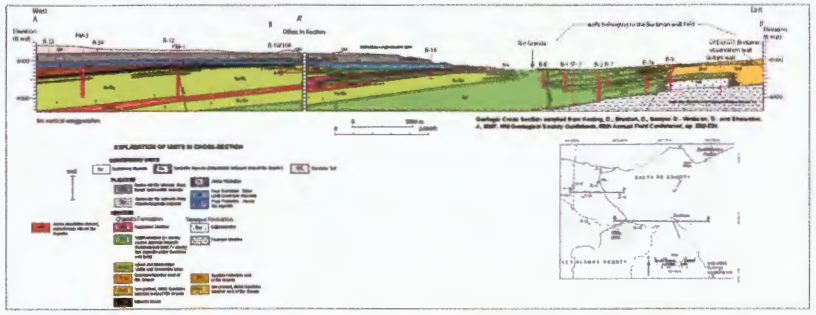
[Thomas and Fialko, 2003]

- Subsidence has been detected by satellite observations (Interferometric Synthetic Aperture Radar; InSAR)
- Observed subsidence further demonstrates the confining nature of the aquifer pumped at Buckman
- Decrease in water-level pressures due to pumping causes compaction of the water-bearing aquifer zones



Regional Hydrostratigraphy

- Hydrostratigraphy is expected to have a major control on the spatial propagation of the cone of depression caused by Buckman pumping
- Santa Fe group is highly stratified, and the layering is generally dipping to the West
- Faults in the Buckman area might be causing hydraulic compartmentalization by juxtaposing faces with contrasting hydrogeologic properties; for example, existing data suggest that SF-3 water levels are affected by B-1 but not by B-9 pumping
- Due to stratification of Santa Fe group, the cone of depression caused by pumping at Buckman is expected to be dipping to the West


West
A
East
Rio Grande
Geologic Cross Section compiled from Keating, G., Stockton, G., Gonzales, D., Vesselinov, V., and Wheatcraft, A., 2007, 2006 Geological Society Guidebook, 56th Annual Field Conference, pp. 232-236.
EXPLANATION OF UNITS IN CROSS-SECTION
Qal
Qbt 1
Qbt 2
Qbt 3
Qbt 4
Qbt 5
Qbt 6
Tsf
Tbf
Tbt
Tbc
Tbs
Tbv
Tpf
Tpt
Tpc
Tpb
Tpv
Tpl
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