

# Geothermal Development Assessment

---

## *NSF Highlights – Track 1 Research*

### **Title**

Assessing the Sustainability of Geothermal Development Within the Truth or Consequences Hot-Springs District, New Mexico

### **Outcome**

With regard to the sustainability of the geothermal discharge, artesian flow has declined to the vanishing point in the remaining artesian well and water-table elevations have pervasively declined by one to two feet. According to the team's results, there is little doubt that unlimited pumping in the T or C area will result in lowered water levels and cooling of the system as Rio Grande water flows in to replace over-pumped geothermal water. It will be beneficial for the City to put a limit on pumping to a discharge of about 25%-50% of the natural discharge.



Geothermal component members Mark Person (center left) and Pete Lammers (far right) meet with Truth or Consequences city officials Steven Green (far left) and Juan Fuentes (center right)

### **Impact / Benefits**

One impact of the study is the possibility that the City will set up a monitoring program to collect continuous, or at least periodic, data on water levels, well discharges, and temperatures in selected wells at carefully selected locations. Locating or drilling at least one well near the source of geothermal upflow that can be used to monitor hydraulic head and temperature could provide unambiguous data, early warning of declines in the system, and enable analysis of its sensitivity to pumping of the alluvial aquifer. The establishment of a public venue (i.e. a website) to release information about the nature and state of the geothermal system was highly recommended by the team.

### **Explanation**

Between October 1, 2012 and Sept 30, 2013 NM Tech hydrology faculty and students, and personnel from the NM Bureau of Geology and Mineral Resources conducted a 1-year study to assess the subsurface flow patterns and the sustainability of the Truth or Consequences geothermal system. The team analyzed the change in water-table elevation from 1939 to 2013, but had difficulty defining the extent to which water levels in the alluvial aquifer have actually declined, due to lack of continuous records, a lack of continuity in the locations of wells, and that access to the immediate source of supply for geothermal water in Truth or Consequences has been reduced to one well. Still, the degree to which the City of T or C wishes to be conservative or expansive in setting limits on pumping is one that has to be made by entities with appropriate political accountability, and should obviously be made in consultation with potentially affected businesses, landowners, and other stakeholders. Lack of knowledge regarding the nature of the geothermal system, its current state, and the possible effects of future changes in exploitation has hindered discussion that might have been helpful to its management.

New Mexico is endowed with relatively high background heat flow and permeable, fractured bedrock. These conditions have given rise to numerous low temperature geothermal systems. Developing geothermal energy as a viable and sustainable resource in NM, however, will require a better understanding of the underlying natural hydrothermal systems and of the practical limitations and human technologies involved in its application. Hydrothermal energy exploration and utilization has the potential to become increasingly important to NM's energy future. Developing a fundamental understanding of the magnitude and sustainability of geothermal resources has direct implications for economic development as communities develop these resources for aquaculture, tourism and other possible uses.

*Source: Mark Person, New Mexico Tech; Natalie Willoughby, NM EPSCoR*

*Image provided by: Mark Person, New Mexico Tech*