Hydrochemical Profiles for Select White Rock Canyon Springs, Los Alamos, New Mexico

By

Michael R. Dug, Kris Gossen, Dave Edgar and Steve Yarwick
New Mexico Environment Department, DOE Oversight Bureau

ABSTRACT

Springs located along and near the White Rock Canyon reach of the Rio Grande are considered to be point of discharge from the upper unconfined portion of the regional aquifer beneath the Pajarito Plateau and the Los Alamos National Laboratory (LANL). General hydrochemical characteristics of these springs were determined with the intent of comparing the geohydrologic behavior of springs with the grouping based on the sodium and calcium bicarbonate type, calcium content, and dissolved solids. An overall comparison of the available data shows that additional hydrochemical signatures exist. As noted on Plate 1, certain springs can be grouped based on their sodium and/or calcium bicarbonate type and sulfate content (Figure 7). In general, the implications of these findings (Figures 1 – 6) are a variety of constituents and parameters show that:

1. Variations in the concentrations of the major cations, calcium, sodium and bicarbonate exist at the 4 Series Springs indicating a measurable influence in some portion of the recharge area, which is hydrologic in nature. Elevated concentrations are noted at the 4 Series Springs (Figure 2). The elevated perchlorate is noted at the 4 Series Springs (Figure 6). Reduced concentrations at the 4 Series Springs (Figure 6) indicate a measurable influence in some portion of the recharge area, which is hydrologic in nature. Elevated concentrations are noted at the 4 Series Springs (Figure 2). The elevated perchlorate is noted at the 4 Series Springs (Figure 6).

2. Dissolved perchlorate increases to the south (Figure 6). Anomalous tritium results (Blake, et al., 1984; NMED unpublished data) for the groundwater in the area suggests a recharge source from the central eastern portion of the Pajarito Plateau (lowdowns determined by the method used by Tarboton and Goff, 1988) (Figure 4).

3. Additional distinctions exist between the White Rock Canyon Springs, especially when comparing springs located on the west side versus the east side of the Rio Grande. Generally, springs on the east side have higher concentrations of calcium, sodium, sulfate, calcium bicarbonate, and dissolved solids. More recent analyses revealed differences between the White Rock Canyon Springs and the discovery of previously uncharacterized springs (Sims, et al., 1986; NMED unpublished data) for the groundwater that are consistent suggesting a recharge source from the central eastern portion of the Pajarito Plateau (downs determined by the method used by Tarboton and Goff, 1988) (Figure 4). These interpretations can be beneficial in assessing environmental impacts as well as water resource management concerns, e.g. long term water availability.

4. The importance and NMED perspective of this finding, although not a health concern, is more supportive evidence for a hypothesis that a deep groundwater pathway exists in the western and northeastern areas of the Rio Grande Valley. The hypothesis was supported when the state NMED (Blake, et al., 1984; NMED unpublished data) and State universities (Sims, et al., 1986; NMED unpublished data) observed similar trends during monitoring of these springs for quality and quantity on the Pajarito Plateau and within the Pajarito Plateau.