Santa Fe Water Fair and next steps

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As part of the New Mexico Small Business Assistance (NMSBA) program, Los Alamos National Laboratories (LANL), Sandia National Laboratories, the City of Santa Fe, Santa Fe County, and Good Water Company worked with the New Mexico Environment Department (NMED) to conduct a Water Fair to analyze water quality in private domestic wells in the greater Santa Fe area.

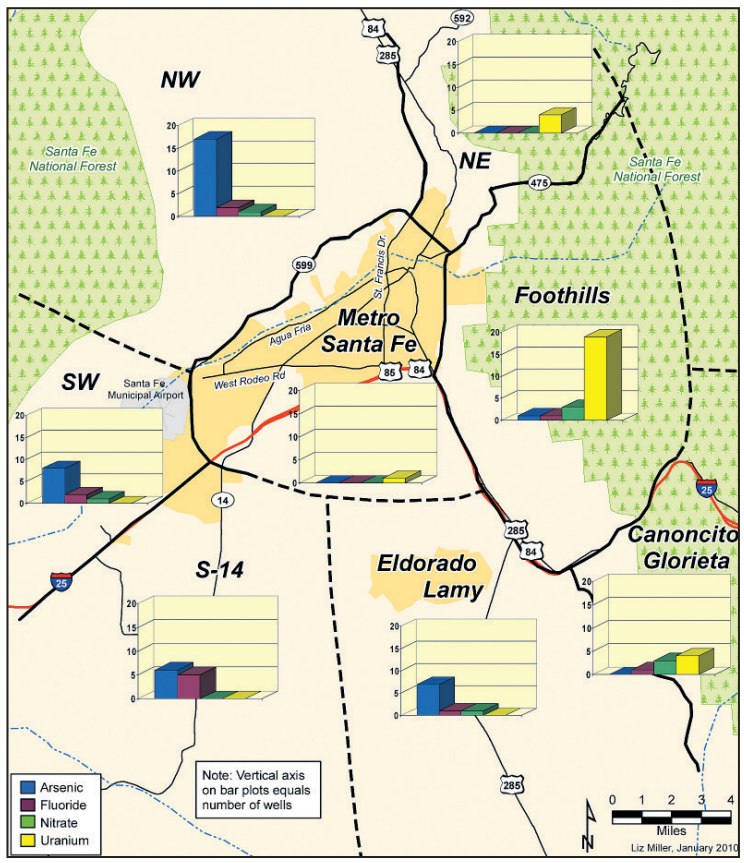
A total of 475 groundwater samples were collected in June and July, 2009, by teams from the participating organizations. The sampling and testing campaign was part of an NMSBA project to assist small businesses in identifying areas of mineralized groundwater within the Española Basin, evaluate proven and emerging contaminant removal technologies, and provide technical expertise in groundwater quality to New Mexico citizens.

Comprehensive analyses of 45 constituents were performed on all samples by LANL scientists Patrick Longmire, Benjamin Linhoff, and Michael Rearick of the Earth and Environmental Sciences Division. Thirty samples collected were also analyzed by the Scientific Laboratory Division of the N.M. Department of Public Health for radium-226 and -228. Test results were forwarded to the NMED, where environmental health manager Dennis McQuillan and staff collated the data, created spreadsheets for individual wells, and subdivided the testing area into eight easily recognizable field areas.

NMED sent the results and an interpretive letter to the well owners. In order to protect the confidentiality of the well data, which itself might influence real-estate transactions, only the NMED has the owner information for each well. The cover letter to participants also provided an explanation of the contaminants detected at concentrations that exceeded the EPA's maximum contaminant level or groundwater standards set by the New Mexico Water Quality Control Commission (WQCC).

One of the goals of this Water Fair is to work toward creating a series of contour maps of the constituents found in regional well water. These maps will be useful to people currently drinking from these wells in alerting them as to what contaminants (if any) may be present. Citizens who are investigating properties for sale can access these public-record maps and gain insight as to the contaminants found in nearby wells. Test results for selected parameters are available online at NMED.

The accompanying map shows the outline of the eight field areas and the occurrence of four constituents known to have potential implications for human health. Of the 475 wells sampled, 76 percent did not contain constituents at levels higher than EPA and WQCC limits; 19 percent contained one or more constituents at levels in excess of these limits; and 5 percent of all wells tested contained potentially hazardous concentrations of fluoride, nitrate, selenium, or barium.



The bar charts on the map summarize the number of private wells having concentrations of arsenic (As), fluoride (F), nitrate as nitrogen (NO3-N), and uranium (U) exceeding federal drinking water and NM groundwater standards, representing 91 of the 475 private wells tested. Arsenic, fluoride, and uranium are naturally occurring in this area, whereas nitrate concentrations above drinking water and groundwater standards are believed to be anthropogenic (manmade) contamination caused by seepage from domestic septic tanks.

Arsenic in groundwater, particularly in the western Santa Fe area, is believed to be derived from hydrothermal fluids reacting with volcanic rocks. Fluoride can be dissolved from soil and rocks when waters are low in calcium concentration. Naturally occurring uranium is a weathering product of granitic rocks found in the Sangre de Cristo Mountains and most of the local wells which tested high in uranium are adjacent to this mountain belt. Twenty five percent of the wells in the "Foothills" field area contained potentially high concentrations of uranium. Nitrate and fluoride migrate at the same rate of speed as that of groundwater flow, which can be on the order of several hundred feet per year. Arsenic and uranium react with rocks making up the aquifer and migrate at a slower rate than that of groundwater.

For additional information on the potential health risks of the constituents found in local wells, please refer to the websites of the Centers for Disease Control and Prevention (www.cdc.gov) and the Argonne National Laboratory (www.anl.gov).

With respect to WQCC limits set for aesthetic (taste, odor and color) considerations, 5 percent of all the wells tested contained excessive concentrations of sulfate, chloride and/or TDS (total dissolved solids) but not at concentrations posing potential hazards to human health. The interpretation of results to date has concentrated on constituents of potential health risk. Not summarized in the study to date are the concentrations of iron, manganese, and hardness (lime scale), which do not normally pose health hazards but are the treatment objectives of many water-purification systems because of their potentially damaging effects to plumbing infrastructure and fixtures.

All constituents identified in the 2009 Santa Fe Water Fair are treatable by proven technologies, including anion exchange, adsorption, reverse osmosis, and specialized media that remove both common forms of arsenic. As part of the NMSBA Program this year, we will run field trials of new media and technologies, touted as being capable both of removing the contaminants of interest while conserving precious water by reducing or eliminating backwashing.

On-site water testing is not usually adequate for purchasing water-purification equipment for domestic private wells. It is recommended that anyone purchasing a property with a well ask the seller to provide a comprehensive water test from an independent laboratory using EPA-approved testing methods. This recommendation for testing, which also applies to residents drinking water from private domestic wells, should also include testing for microbiological contamination. The cost of equipment to remediate both potential health risks (which are only detectable in laboratory testing) and aesthetic contaminants (such as iron, manganese, sulfate, hardness, etc.) can be substantial and should be considered in the decision-making process.

Thanks to all the well owners and the members of the sampling and technical teams who participated in the 2009 Santa Fe Water Fair. Reports to follow!

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