

Concerned Citizens for Nuclear Safety (CCNS) and Robert H. Gilkeson, Registered Geologist, provide the following comments to the National Academies of Science, "Plans and Practices for Groundwater Protection at the Los Alamos National Laboratory," June 2007 prepublication copy.

## 1. **Introduction - A Brief History.**

From 1998 through 2006, 42 characterization wells were drilled under the Hydrogeologic Workplan for Los Alamos National Laboratory (LANL) to characterize the hydrogeologic setting beneath the Pajarito Plateau, as required by the New Mexico Environment Department (NMED). Of the 42 wells, 7 were completed in perched intermediate zones, 25 have screens in the regional aquifer, and the remaining 10 have screens in both perched intermediate zones and the regional aquifer. Scientific concerns were raised about the reliability and representativeness of the groundwater quality data obtained from these wells because the LANL scientists used mud-rotary drilling methods which allowed organic drilling fluids and foams and/or bentonite clay muds to invade all of the screened intervals. These organic additives and muds have known properties to mask present and future radionuclides and toxic and hazardous contaminants. In the spring of 2004, Robert H. Gilkeson raised these issues through written reports and presentations to the Northern New Mexico Citizens' Advisory Board (CAB) and Concerned Citizens for Nuclear Safety (CCNS).

The Gilkeson reports were a major reason that the Department of Energy (DOE) requested a study by the National Academies of Science (NAS) about plans and practices for groundwater protection at LANL.

Mr. Gilkeson also brought the problems with the LANL characterization wells to the attention of the DOE Office of Inspector General (IG). In September 2005, the DOE IG wrote a report entitled *Characterization Wells at Los Alamos National Laboratory* that described the failure of DOE/LANL to meet the requirements of the Resource Conservation and Recovery Act (RCRA) and DOE Order 450.1 to install monitoring wells that produce reliable and representative water samples for the detection of LANL contaminants. From the DOE IG Report:

However, LANL did not adhere to specific constraints established in the RCRA guidance when using muds and other drilling fluids, and, as a result, LANL could not assure that certain residual drilling fluids were fully removed; and muds and other drilling fluids that remained in certain wells after construction created a chemical environment that could mask the presence of radionuclide contamination and compromise the reliability of groundwater contamination data. DOE/IG-0703, September 2005.  
<http://www.ig.energy.gov/documents/CalendarYear2005/ig-0703.pdf>

In response to the DOE IG report, the DOE required LANL to provide an in-depth analysis of all screens in the intermediate perched zones and in the regional aquifer

wells constructed under the Hydrogeologic Workplan. To the present time, the LANL scientists have not performed the required in-depth analysis.

The CAB requested a review of the issues raised in the Gilkeson reports by the Environmental Protection Agency (EPA). The two EPA reports presented the following findings:

- 1). the properties of the new mineralogy formed by the organic drilling fluids and the bentonite clay muds prevent the LANL characterization wells from producing reliable and representative water samples,
- 2). the statistical scheme used by the LANL scientists in the *Well Screen Analysis Report* (WSAR) is not valid to identify that the LANL characterization wells produce reliable and representative water quality data,
- 3). the LANL background water quality data are not suitable for the assessment that the characterization wells produce valid water samples, and
- 4). there is a need for an in-depth study of each screened interval for all of the factors that are important for the detection of contamination now and in the future.

Ford, R., S.D. Acree, and R.R. Ross. 2006, Ford, R., and S.D. Acree. 2006.

The EPA scientists explained their position during a telephone conference call, which was summarized in the notes of a LANL scientist:

EPA also thought that iron minerals [formed by the organic drilling fluids] would not return to predrilling conditions in the foreseeable future. EPA pointed out that equilibrium testing of aquifer minerals is reported in the literature but that there is no quantifiable measure of success and that multiple lines of evidence would need to be used to demonstrate representativeness. EPA further expressed the opinion that it would be difficult to determine when and whether the impacted screens would return to predrilling conditions. EPA expressed the opinion that LANL would never be able to get representative samples from the impacted wells, but could only make choices and tradeoffs based on specific contaminants at various locations. Dewart, November 8, 2005.

In January 2006, the NAS study began and ran for a period of 18 months. Gilkeson, the CAB and CCNS made presentations and provided written materials to the NAS committee. In June 2007, the NAS committee issued a prepublication copy – subject to editorial correction.

A general finding in the NAS report is that:

Many if not all of the wells drilled into the regional aquifer under the Hydrogeologic Workplan appear to be compromised in their ability to produce water samples that are representative of ambient groundwater for the purpose of monitoring. NAS prepublication copy, p. 79.

In addition, the NAS committee found that the geochemical criteria used in the LANL *Well Screen Analysis Report* were not valid for the assessment that the discrete screens in the characterization wells produced reliable and representative water samples for the detection of the LANL contaminants.

The NAS committee recommended for LANL/DOE to use drilling methods that do not invade the screened intervals with any drilling additives other than air or water.

The NAS committee described the need to purge a large volume of water from the LANL characterization wells before samples are collected for the analytical suite. Presently, LANL does not purge any water from 70% of the screened intervals before collection of samples.

The NAS committee brought attention to the need to install additional characterization and monitoring wells into the regional aquifer:

- 1). on the property of the Pueblo de San Ildefonso,
- 2). in the southern region of the LANL site, and
- 3). immediately downgradient of the LANL disposal sites located atop dry mesas.

For the dry mesas, the committee expressed a concern for the large volumes of buried waste that can pose a long-term threat to the regional groundwater and for near-term contamination of groundwater because of fast travel of vapor phase contamination. Presently, LANL does not have any characterization or monitoring wells into the regional aquifer located immediately at the large waste disposal sites atop dry mesa.

During the press conference on the release of the prepublication copy, Dr. Larry Lake, Chairman of the NAS committee, expressed the belief that the LANL characterization wells do not produce water quality data to support risk assessment.

All of these matters brought us to make the following general and specific comments about the prepublication copy of the NAS report entitled *Plans and Practices for Groundwater Protection at the Los Alamos National Laboratory*. We cover the following topics:

1. Introduction – A Brief History.
2. An Important Finding of the NAS Committee is that LANL/DOE have Failed to Install a Reliable Network of Monitoring Wells in the Regional Aquifer.
3. The NAS Prepublication Copy Misrepresents Casing Advance Drilling.
4. The NAS Committee Approval of the LANL Interim Groundwater Monitoring Plan is a Mistake that Must Be Corrected in the NAS Final Report.
5. The NAS Committee Approval of the LANL Scheme for Monitoring and Data Quality is a Mistake that Must Be Corrected in the NAS final report.
6. The Impracticable Rehabilitation of the LANL Characterization Wells.

7. The NAS Prepublication Copy Misrepresents the LANL Knowledge of Background Groundwater Chemistry.
8. The Misinformation about Regulatory Requirements in the NAS Report Prepublication Copy.
9. The Presentation of Spurious Groundwater Contaminant Data in the NAS Report.
10. Public Comment is Necessary for the LANL Plans and Reports and for the NAS Final Report.
11. Other General and Specific Comments.