Letter from Robert H. Gilkeson on July 27, 2009 to DOE Headquarters staff Vince Adams and Frank Marcinowski

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Vince and Frank

The March 30, 2009 review by the EPA Kerr Lab of the LANL *Well Screen Analysis Report-Revision 2* is in the attachment. The Kerr Lab also provided written reviews of the two earlier versions of the WSAR and found that all three versions are not credible because of the relatively high degree of uncertainty in the results reported in the WSAR (see page 1 of the EPA report).

The high degree of uncertainty is because the WSAR reports are only a study of the chemistry of the water samples produced from the impacted wells and the water chemistry is not diagnostic of the ability of the wells to produce reliable and representative water samples. The Kerr Lab reviewed the LANL WSAR reports because of presentations that I made beginning in 2004 to the Northern New Mexico Citizen's Advisory Board (CAB). My presentations advised the CAB that the assessment scheme in the LANL WSAR reports was not credible.

The LANL *Well Screen Analysis Report* (WSAR) was a response to the request from the U.S. Department of Energy (DOE) for LANL to provide an in-depth analysis of all screens in the monitoring wells constructed under the LANL Hydrogeologic Workplan. The pertinent excerpt from page 1 of the LANL WSAR-Revision 1 is pasted below:

> "Concerns about the reliability or representativeness of the groundwater quality data obtained from these wells [NOTE: "these wells" refers to 43 LANL monitoring wells with 95 individual screens] stem from the potential for residual drilling fluids and additives to mask the present and future detection of contaminants, as discussed in [the LANL] characterization well geochemistry reports (listed in section 7.3) and by Gilkeson (Gilkeson 2004, 088728). LANL responded to the concerns raised by Gilkeson by presenting hydrogeological and geochemical data collected at selected wells (LANL 2004, 088420). The U.S. Department of Energy (DOE) then requested LANL to provide an in-depth analysis of all screens in wells constructed under the "Hydrogeologic Workplan" that were completed within intermediate perched zones or in the regional aquifer. The U.S. Environmental Protection Agency (EPA) reviewed the criteria selected by the Laboratory for its approach to evaluating the representativeness of water quality data (EPA 2005, 090545)."

NOTE: Unfortunately, the original WSAR report and the two revisions all fail to provide the in-depth analysis requested by the DOE. The WSAR reports also fail to inform the reader that the EPA produced a set of reports with

findings that the assessment scheme in the WSAR reports was not credible because the study only of water quality data could not determine that any of the impacted screens had cleaned up from the new mineralogy introduced by the bentonite clay drilling muds and/or organic drilling fluids and –foams. The LANL scientists, the DOE Site Office and the New Mexico Environment Department have not paid attention to the accurate criticism by the EPA, the National Academy of Sciences (NAS), and in the many reports by Robert H. Gilkeson.

The NAS Final Report also presented findings that the study of only water quality data was not adequate to determine the impacted wells produced reliable and representative water samples for the detection of LANL contaminants. The finding in the NAS Final Report that the assessment scheme in the WSAR is not statistically valid is pasted below:

> **"Findings and Recommendations on Monitoring and Data Quality**
> **General Findings**
> Any monitoring activity faces a conundrum: If little or no contamination is found, does it mean that there is in fact little or no contamination, or that the monitoring itself is flawed? During this study the committee was presented a good deal of information suggesting that most or all wells into the regional aquifer at LANL (R-wells) are flawed for the purpose of monitoring. The committee did not disagree, but rather found a lack of basic scientific knowledge [in the LANL WSAR reports] that could help ensure future success. Evidence about the conditions prevalent around the screens in the compromised wells is indirect—relying on plausible but unproven chemical interactions, general literature data, analyses of surrogates, and apparent trends in sampling data that may not be statistically valid" (p.60).

NOTE: I am the person who provided the NAS committee with information that most or all of the LANL monitoring wells are flawed for the purpose of monitoring.

The position of LANL that the monitoring wells could not be installed without the use of the drilling muds and organic additives was also a mistake. In 1997, I recommended for LANL to use dual rotary casing advance drilling methods that would prevent bentonite clay muds and organic additives from invading the screened intervals in the monitoring wells. These appropriate drilling methods were not used because the New Mexico Environment Department (NMED) approved of the use of drilling methods that invaded the well screens with the bentonite clay muds and the organic additives.

However, my persistence over the years that LANL needed to use dual rotary casing advance drilling methods was finally successful in 2007 – after a period of 12 years and I estimate a misspending of more than $250 million. I presented a paper to the March 14, 2007 meeting of the Northern New Mexico Citizen's Advisory Board (CAB) that described the imperative need for LANL to stop allowing drilling muds and organic additives to invade the screened intervals in

the monitoring wells. My presentation described the proper application of dual rotary casing advance drilling methods and the mistakes that LANL had made in the past in the attempt to use casing advance methods.

It is very important to understand that the claim by the LANL scientists and the DOE Site Office that casing advance drilling was too risky was because of mistakes in the drilling methodology and not of the casing advance drilling method. In fact, there is very little risk with the dual rotary casing advance drilling methods when the proper equipment for drill casings and underreamer drills are used. LANL made a mistake in 1999 to purchase drill casings with over-sized connectors (i.e., "knuckles") at a spacing of each 10 to 20 feet along the strings of retractable casing. The knuckles were the feature that made the casing advance drilling too risky. I informed LANL in 1999 that the over-sized connectors would cause the drill casings to become stuck in the boreholes and that the over-sized connectors were not necessary but LANL did not listen. Instead, LANL claimed that the casing advance drilling methods were too risky and therefore, it was necessary to use drilling methods that invaded the well screens with the bentonite clay muds and the organic additives that have well known properties to mask the detection of many of the LANL contaminants.

My presentation to the CAB on March 14, 2007 convinced the members of the CAB to recommend for LANL to use casing advance drilling methods with smooth outside wall drill casings for the pair of LANL R-35 monitoring wells. The duall rotary casing advance drilling methods were successful in installing the two wells. Only air and water were used as drilling fluids when drilling was into the regional aquifer. Because of my persistent efforts, LANL now routinely uses the proper application of casing advance drilling methods for the installation of the monitoring wells in the regional aquifer. An example of the success of the casing advance drilling methods for installing monitoring wells in the regional aquifer is the excerpt pasted below from the LANL Well R-43 Completion Report:

> "Dual-rotary air-drilling techniques and a Foremost DR-24HD drill rig were used to drill the R-43 borehole. Dual-rotary drilling has the advantage of simultaneously advancing and casing the borehole. Two sizes of **flush-welded** [emphasis added] mild carbon-steel casing (16-in. and 12-in.) were used to complete the R-43 borehole. The 16-in. casing was used for drilling from ground surface to the top of the Cerros del Rio basalt. The 12-in. casing was utilized when unstable conditions were encountered after open-hole drilling in the lower Puye Formation. . . Dual-rotary drilling methods with 12-in. casing continued to TD in Santa Fe Group sediments. . . No additives other than municipal water were used for drilling within the regional aquifer" (p. 3).

NOTE: The 12-in. flush-welded casing was drilled from a depth of 418 feet to the total depth (TD) of 1006 feet below ground surface, a depth of 100 feet into the

regional aquifer and a drilling distance of 588 feet. Drilling this distance with the LANL drill casing that was loaded with “knuckles” would have been very risky.

I will answer any question about this email or about the findings in the EPA Kerr Lab report at our conference call on this coming Thursday.

Sincerely

Bob Gilkeso