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CERTIFIED MAIL - RETURN RECEIPT REQUESTED

October 23, 2006

David Gregory
Federal Project Director
Los Alamos Site Office, Department of Energy
528 35th Street, Mail Stop A316
Los Alamos, NM 87544

David McInroy
Remediation Services Deputy Project Director
Los Alamos National Laboratory
P.O. Box 1663, Mail Stop J591
Los Alamos, NM 87545

RE: RESPONSE TO JULY 28, 2006 UPDATE ON STATUS OF WELL R-25
LOS ALAMOS NATIONAL LABORATORY
EPA ID #NM0890010515
HWB-LANL-GW-MISC

Dear Messrs. Gregory and McInroy:

The New Mexico Environment Department (NMED) is in receipt of the United States Department of Energy (DOE) and Los Alamos National Security, LLC (collectively, the Permittees) document entitled *Update on Status of Groundwater Well R-25* dated July 28, 2006 and referenced by EP2006-0699. NMED has several concerns about the Permittees' approach, particularly with respect to nickel and chromium contamination.

1. Based on current information provided by the Permittees, the possibility of the presence of nickel and chromium in formation water intercepted by screens 1 and 2 of R-25 cannot be eliminated. Although the filtered sample data show continuous increases in nickel and chromium levels in water samples collected from screens 1 and 2 of R-25 (possibly indicating the corrosion of stainless steel well materials and the influence of residuals remaining from well construction), the results may be due to the presence of nickel and chromium in formation water. If nickel and chromium are present in groundwater, it would not be surprising to detect increasing concentrations of nickel and chromium over time after completion of the well, because of the decreasing effects of residual drilling fluids and bentonite surrounding screens 1 and 2 of well R-25. The presence of residual drilling fluids and bentonite typically causes redox reactions and adsorption of metals that likely result in detected concentrations of nickel and chromium in water samples that are less than the

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concentrations actually present in the groundwater (*Well Screen Analysis Report,* LA-UR-05-8615/ER2005-0841). The impact on water sample quality by these residuals is expected decrease over time, as explained in the *Well Screen Analysis Report.* Therefore, the continuous increases of nickel and chromium levels in water samples collected from screens 1 and 2 of well R-25 may indicate that the nickel and chromium concentrations observed in water samples are approaching equilibrium with the formation water.

Both chromium and nickel have been frequently detected at concentrations above the background values in alluvial surface sediment samples and surface water samples collected from Cañon de Valle (LANL, August, 2006, LA-UR-06-5510/ER2006-0288, *Investigation Report for Intermediate and Regional Groundwater, Consolidated Unit 16-021(c)-99*), and both metals were listed as constituents of concern in the *CMS Plan for Potential Release Site 16-021(c)* (LANL, September 1998, LA-UR-98-3918). A steam plant constructed in 1952 may have utilized chromate-bearing anti-scaling agents resulting in discharge of chromium into the environment; therefore, nickel and chromium are potential target contaminants in groundwater subject to further investigation. Until the Permittees provide convincing data that demonstrates the absence of these metals in groundwater, NMED considers any metals detected in groundwater samples at concentrations higher than background levels to be evidence of metals contamination in the groundwater at R-25.

2. Consideration of any well construction residual as a potential source contaminating water samples must be established on the basis of chemical composition of the material. To back up such an assertion, the Permittees must provide relevant data to show nickel or chromium as a constituent in particles remaining from well construction.

3. To evaluate stainless steel as a potential source of water samples, NMED conducted independent calculations simulating the same conditions described in Attachment 2 of your July 28, 2006 letter, using the PHREEQC Interactive 2.12.5 computer code, the newest version of PHREEQC code from the United State Geological Survey. Simulation results obtained by NMED are similar to that provided in Attachment 2. NMED's interpretation of the simulation results is that nickel contained in stainless steel under corrosive conditions is likely to dissolve into groundwater in the forms of $NiCO_3$, Ni^{2+} and $NiHCO_3^+$. However, the simulations do not yield evidence that rules out the possibility that nickel detected in water samples collected from screens 1 and 2 of well R-25 came from the formation water. Indeed, the geochemical model simulations using the PHREEQC code do not have the capacity to distinguish whether nickel comes from corrosion of stainless steel or from formation water that has been contaminated. Evidence, such as data from a field test, is required to demonstrate that nickel and chromium are not present in the formation water.

In addition, the PHREEQC code lacks information to support simulations of the behavior of chromium associated with stainless steel in groundwater under corrosive conditions.

4. The *Report on the Corrosion of Certain Alloys* (EPA, July 2001, EPA260-R-01-002) provides solid data to evaluate the corrosivity and leachability of chromium contained in metal alloys, including stainless steel 304. The EPA data were obtained from laboratory simulations of corrosion under various harsh environments, including an acidic condition, an oxidizing precipitation, a very low permeability soil, and a warm acidic soil. No hexavalent chromium or other chromium species were detected in the leachate from any of the five sample alloys tested (including stainless steel 304). The tested stainless steel alloys contain high levels of chromium ranging from 11% to 18% of the steel composition. The EPA results strongly indicate that chromium contained in stainless steel (including 304) is unlikely to leach out either in the hexavalent form or as other species, even if accelerated and intensive corrosion of the stainless steel has occurred.

5. To eliminate the possibility of nickel and chromium existing in the formation water intercepted by screens 1 and 2 of well R-25, the Permittees must perform a field test by pumping the two screens until fresh formation water is collected. Water samples should be collected for chemical analysis at different time intervals over the entire pumping period, starting from the beginning of pumping. Observations of a significant decrease in nickel and chromium concentrations in water samples collected when fresh formation water has been reached may indicate that nickel and chromium observed at the beginning of pumping originates from corrosion of stainless steel or residuals of well construction. If similar or increasing concentrations of nickel and chromium are observed in water samples collected throughout the pumping period, the possibility that groundwater has been contaminated by nickel and chromium must be considered. NMED believes that only field test data can provide adequate information to demonstrate that there is no groundwater contamination by nickel and chromium.

NMED generally agrees with the Permittees' preliminary proposal to isolate well R-25 screens 1 and 2 from other screens to minimize any potential cross-contamination of groundwater in underlying zones. NMED does not agree with the Permittees' conclusion that nickel and chromium previously detected in water samples are interferences from the corrosion of stainless steel or residual well construction materials remaining around the screens. Based on the concerns and uncertainties mentioned above, the Permittees must provide field test data to demonstrate that there is no nickel or chromium contamination in groundwater at regional well R-25. If the Permittees intend to conduct a field test, the Permittees must submit a work plan to NMED for review and approval no less than 60 days prior to conducting the test. Alternately, if the Permittees decide to plug screens 1 and 2 of well R-25, new single-screened wells must be installed in the vicinity of R-25 to monitor groundwater currently intercepted by screens 1 and 2 of well R-25. Because screen 3 of R-25 is damaged and not producing quality data, a work plan

for replacement of R-25 must also include a replacement well that intercepts the groundwater zone currently intercepted by R-25 screen 3.

The Permittees must address the concerns mentioned in this letter, before any conclusion regarding nickel and chromium concentrations in groundwater can be drawn. The alternative is to plug and abandon all or part of R-25 now, and replace it with single or dual screened wells that intercept the appropriate water-bearing intervals. Please contact either Dave Cobrain at (505) 428-2553 or Hai Shen at (505) 428-2539 if you have any questions or comments.

Sincerely,

James P. Bearzi
Chief
Hazardous Waste Bureau

JPB:hs

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file: Reading and [redacted]