

General

State of New Mexico
ENVIRONMENT DEPARTMENT

Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Telephone (505) 476-6000

Fax (505) 476-6030

www.nmenv.state.nm.us



BILL RICHARDSON
GOVERNOR



RON CURRY
SECRETARY

CINDY PADILLA
DEPUTY SECRETARY

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

April 27, 2007

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 A100
Los Alamos, NM 87545

**RE: DIRECTION TO REHABILITATE WELLS
PILOT WELL REHABILITATION STUDY SUMMARY REPORT
EPA ID #NM0890010515
HWB-LANL-GROUNDWATER 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 *Pilot Well Rehabilitation Study Summary Report* (hereafter, the Report) dated March 2007 and referenced by LA-UR-07-1640/EP2007-0102. NMED has reviewed the Report and hereby issues this direction to guide well rehabilitation in the future. NMED also requires specific for the three wells that have been rehabilitated in this pilot study, and for updating of the *Workplan for R-Well Rehabilitation and Replacement* (hereafter, the Workplan) dated June 2006 and referenced by LA-UR-06-3687/ER2006-0465.



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1. Actions for R-20, R-16 and R-12

- a) For R-20, The Permittees must install an active sampling system capable of purging a proper volume of water before collecting samples from screens 1 and 2 according to the requirements specified in NMED's April 5, 2007 *Well Evaluations for Intermediate and Regional Wells*.
- b) The Permittees must plug screen 3 of R-12, and install an active purging sampling system to collect water samples from screens 1 and 2. In addition, the Permittees must evaluate the feasibility and location for installation of a replacement well for screen 3 of R-12. The chromium plume in the regional groundwater poses a threat to municipal supply well PM-1. To monitor and assess any plume migration, effective groundwater monitoring at the location of screen 3 in R-12, and thus its immediate replacement, is urgent and critical. Therefore, the Permittees must develop an execution plan in the revised Workplan for implementing this requirement.
- c) Since the Westbay sampling system has been reinstalled at R-16, the Permittees must continue to monitor the quality of water samples for performance evaluation until two rounds of quarterly sampling events are accomplished from the three R-16 screens. The Permittees must submit the evaluation report to NMED within 60 days after the last evaluation sampling event is completed.

2. Updating of the Workplan for R-Well Rehabilitation and Replacement

- a) The Permittees used overpumping (i.e., pumping at a high flow rate over an extended period) as the only means to rehabilitate wells R-16 and R-12. The use of overpumping alone may not be a good practice for well redevelopment to achieve the rehabilitation objectives. Overpumping, by itself, has the disadvantage of making water flow only toward the screen. As a result, the smaller sand grains of the filter pack may be bridged in the screen or in the filter pack, limiting the effective removal of drilling residues. In addition, the bridges formed during overpumping may not be stable, and could settle by agitation during normal pump cycles, resulting in sand pumping. To overcome these drawbacks, overpumping is often used in conjunction with backwashing. Backwashing or surging is the reversal of water flow in a well, enabling dislodgment of sediments that may have become wedged or bridged around a screen. Overpumping when supplemented with backwashing or surging helps agitate the sediment, remove the finer fraction and drilling residues, and then rearrange the remaining particles in stable positions.

It has been documented that rehabilitation of a well is more likely to be successful when overpumping is used along with surging and jetting. Jetting, especially high-velocity hydraulic jetting, has been demonstrated as an effective method to

loosen fine-grained solids and drilling fluid residues from the formation and the filter pack. According to the Report, jetting and isolation pumping were successfully used to rehabilitate R-20. The Permittees must propose a comprehensive development approach that considers these factors in the revised Workplan to make greater efforts to rehabilitate wells. Specifically, the Permittees must include, at a minimum, overpumping, surging and jetting as a routine means to more effectively rehabilitate wells.

- b) The Permittees conclude that purging allows access and collection of representative groundwater samples at all three wells (R-12, R-16 and R-20) that have been rehabilitated in the Report (page vii). The Report also states that the final measure of rehabilitation success could only be determined at least six months after reinstallation of the non-purging Westbay sampling system. In terms of evaluating the Westbay sampling system, however, a much longer time may be needed to determine whether or not reliable data can be collected using this passive sampling system. Generally speaking, in order to assess the quality of water samples collected using a non-purging system, the waiting time to collect samples for evaluation purposes must be consistent with or longer than the intervals designed for actual sampling events that are used for monitoring purposes. This is because the rehabilitation operation will likely destroy the microbial ecology that had been established in the presence of residual drilling fluids. It is a time-consuming process for microbes to reestablish the ecology (such as the formation of biofilms and microbial consortia) to actively influence the quality of water samples. In other words, the impact of any remaining drilling residues on the quality of water samples may become evident more than six months later. Consequently, the reliability of data from the Westbay system may only be established in a time frame that may be much longer than is practical, given the time frames for remedy selections in the March 1, 2005 Order on Consent (the Order).

The wells that have been, and will be, selected for rehabilitation play an important role in determining remedy selections for sites, such as at TA-54 and the Consolidated Unit 16-021(c)-99. Remedy selections for these sites are either imminent or pending the availability of a reliable groundwater monitoring network in the surroundings. To achieve the objectives and meet the milestones in the Order, the Permittees must therefore consider, in the revised Workplan, installing active purging systems for sampling any wells that will be rehabilitated, given that the geochemical evaluation of the wells can demonstrate that purging would be sufficient to provide reliable data following the well rehabilitation. If any well has more than two screens, the Permittees must discuss with NMED which screens need to be sampled through installing purging sampling systems and which may be plugged and replaced.

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The Permittees must incorporate the above comments in the Workplan, and submit the revised plan to NMED for approval within 30 days of receipt of this letter. NMED commits to reviewing and responding to the updated Workplan within 10 business days of receipt. With this commitment, NMED expects that the Permittees will expedite the process to execute the Workplan based on the knowledge and experience obtained from the pilot study, such that the cleanup milestones in the Order can be achieved in a timely manner.

Should you have any questions or comments, please contact John Young at (505) 476-6038 or Hai Shen at (505) 476-6039.

Sincerely,



James P. Bearzi
Chief
Hazardous Waste Bureau

JPB:hs

cc: D. Cobrain, NMED HWB
J. Young, NMED HWB
H. Shen, NMED HWB
T. Skibitski, NMED DOE OB
S. Yanicak, NMED DOE OB, MS J993
B. Olson, NMED GWQB
L. King, EPA 6PD-N
M. Johansen, DOE LASO, MS A316
C. Mangeng, LANL, ENV, MS J591
N. Quintana, LANL ECR, MS M992
J. Dewart, LANL, ENV, MS M992
A. Simmons, LANL, ENV, MS M992

file: Reading and LANL General 2007 (Groundwater)