TA 16

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CERTIFIED MAIL – RETURN RECEIPT REQUESTED

November 29, 2006

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

David McInroy
Remediation Services Deputy Project Director
Los Alamos National Security, LLC
P.O. Box 1663, Mail Stop J591
Los Alamos, New Mexico 87545

RE: NOTICE OF APPROVAL WITH DIRECTION
INVESTIGATION REPORT FOR INTERMEDIATE AND REGIONAL GROUNDWATER, CONSOLIDATED UNIT 16-021(C)-99
EPA ID# NM0890010515
HWB-LANL-06-016

Dear Messrs. Gregory and McInroy:

The New Mexico Environment Department (NMED) is in receipt of the Department of Energy and Los Alamos National Security, LLC (collectively, the Permittees) document entitled *Investigation Report for Intermediate and Regional Groundwater, Consolidated Unit 16-021(c)-99* (Report) dated August 2006 and referenced by LA-UR-06-5510/ER2006-0288. The NMED has reviewed the Report and issues this approval that includes the following comments and direction to the Permittees. Direction and required actions follow the comments.

1. Executive Summary, Page iv

The presence of contaminants in intermediate zone groundwater samples obtained from well R-25 (e.g., trinitrotoluene), indicate more rapid downward intermediate groundwater flow rates than suggested (e.g., 750 feet below ground surface since discharges from the outfall began in 1951) by the Permittees' statement that "intermediate groundwater flow rates are likely to be limited by the low permeability tuff." Only 11 intermediate and regional wells are located in the more than 2400 acres of TA-16, TA-11, TA-28 and TA-37, which are in the general vicinity of 260 Outfall. Given that fracture flow may be a significant contaminant transport mechanism at the site, the available data simply do not support a firm conclusion that relatively slow downward groundwater flow rates in the intermediate groundwater exist in the subsurface at the site.

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Furthermore, rugged terrain and threatened and endangered species habitat limit access to crucial areas for monitoring.

2. Section 2.2, Current and Future Land Use Page 4

This section discusses the land use scenario for TA-16 as that of high explosives research, development and testing. Although this may be the current use of this area, the Order requires that groundwater be remediated to WQCC standards regardless of land use. NMED considers all groundwater beneath the Pajarito Plateau to be a potential source of municipal water supply and the protection of the groundwater resource remains of utmost concern to NMED.

3. Section 2.3.1(c) Results of Historical Investigations, Mesa Vadose Zone, Page 8

The second bullet suggests that contamination is concentrated directly beneath the source areas. Because contaminant inventories and transport pathways in fractured rock are poorly documented, and that the removal of the source area at the 260 Outfall has not resulted in a decrease in contaminant levels detected in spring discharges, consideration of the transport of contaminants through fractures and surges beds should be emphasized. The data also suggest that a large inventory of contaminants may still be present in the subsurface and contamination may extend beyond the zones beneath source areas, even though there are likely higher concentrations directly beneath source areas.

4. Section 2.3.2 Nature and Extent of Contamination, Page 9

The Permittees suggest that the major portion of the mesa-top contaminant inventory is located in the vicinity of the individual source areas. This conclusion is supported by tuff sample water content measurements which indicate that much of the vadose zone is "relatively dry." NMED does not agree with this assertion. First, the 260 Outfall was deactivated in 1996 and the shallow vadose zone has not received liquid discharges for 10 years. Concurrently, there were drought conditions during most of those years resulting in significantly decreased precipitation, possibly creating an anomaly from a "average" precipitation year . Second, unless the preferential flow paths that channel water both vertically and laterally were intercepted by borings during characterization activities, water content measurements are not a reliable indicator of the relative location and distribution of the contaminant inventory. The Permittees must not rely on this information in developing the conceptual model of the site for use in development of a remedy.

5. Section 3.0 Scope of Activities, Page 10

This section states that "to meet the objective of determining the nature and extent of chemicals in intermediate and regional groundwater, the investigation report combines groundwater sampling results from newly installed wells with data from other regional groundwater

monitoring wells..." The Permittees identify that data collected from the following wells were used to address the investigation objectives:

Regional Wells: CdV-R-15-3, CdV-R-37-2, R-18, R-19, R-25, R-26, and R-27
Intermediate Wells: CdV-16-1(i), CdV-16-2(i), CdV-16-2(i)r, and CdV-16-3(i)

While some of the wells listed may be useful in assessing the objectives of the investigation, all of the wells listed were drilled using fluids and/or developed using fluids. The Permittees document in the current version of the *Well Screen Analysis Report* (WSAR) dated November 15, 2005 (referenced by LA-UR-05-8615/ER2005-0841) that some of the wells yield "poor" to "fair" quality data. In addition, a well has not been installed in boring CdV-16-3(i). Therefore the data from the suspect wells and boring CdV-16-3(i) are not necessarily reliable for use in making the interpretations presented in the Report. In addition, the Permittees are revising the WSAR and the results of the individual well and well screen evaluations may therefore change.

6. Section 6.5.1 Comparison to Standards and Screening Levels and Identification of COPCs, Page 29

This section discusses factors used to determine whether to continue to consider individual chemicals of potential concern (COPCs) in the site assessments. One of the listed factors for eliminating a constituent for further consideration is the lack or low frequency of detection for COPCs detected in intermediate and regional groundwater. These factors should not be the only rationale used to identify COPCs. Following U.S. Environmental Protection Agency guidance, if a contaminant is detected in other media (e.g., sediment) or is suspected to have been used at the site, the Permittees must include the constituent in the current and future evaluations regardless of the frequency of detection. In addition, as the Permittees suggest, seasonal effects on the groundwater system may mobilize contaminants only under certain conditions, which indicates that it would be inappropriate to drop any constituent based on the frequency of detection. Also, as pointed out in other NMED correspondence to the Permittees, residual drilling and development fluids, poorly developed wells or well screens and precipitates from the initial reducing conditions resulting from the break down of residual drilling and development fluids or other well construction materials may mask contaminant detections or bias observed concentrations. There are also are documented construction problems with wells CdV-R-15-3 and R-25 which have rendered several important screened intervals unusable.

Another factor listed in the evaluation of COPCs is whether or not the chemical is naturally occurring. If the constituent is suspected to have been used at the site or has been detected in other occurrences of groundwater (i.e., alluvial or intermediate groundwater or spring discharges) or other environmental media (e.g., sediments, soils), the constituent must not be eliminated from consideration. Current and historic research, development and testing activities, conducted by

the Permittees, have resulted in the release of many constituents to the environment that also are naturally occurring.

Wells monitored as part of the 260 Outfall may also used to detect releases from other solid waste management units and areas of concern located at TA-16. Therefore, the Permittees must continue to test all groundwater samples for the presence of the following previously-detected constituents in accordance with the approved Interim Facility Wide Groundwater Monitoring Plan:

Arsenic has been detected in alluvial groundwater well 16-25279 located in Fishladder Canyon at a concentration of 8.8 ppb. The EPA maximum contaminant level (MCL) is 10 ppb. Arsenic is a COPC in the sediment and tuff in Fishladder Canyon.

Beryllium has been detected in one event at a concentration greater than the EPA MCL. Beryllium continues to be observed in groundwater samples collected from wells CdV 16-1(i), CdV-16 2(i)r, and R-25 Sources of beryllium releases may be from several locations at TA-16.

Chromium has been detected in alluvial groundwater and spring samples at concentrations greater than the New Mexico Water Quality Control Commission (WQCC) standard. Potential chromium sources exist at TA-16 including the cooling tower discharges from the former steam plant. Speciation of the chromium must be conducted to identify whether the chromium is in the trivalent or hexavalent form.

Iron has been detected in alluvial well 16-25279, located in Fishladder Canyon at a concentration (8900 ppb), which that exceeds the WQCC standard.

Manganese is a potential steel well screen degradation product as well as a constituent used in industrial processes that has been detected in alluvial groundwater, surface water, spring water, and sediments at 260 Outfall.

Nickel is a potential steel well screen degradation product as well as a constituent used in industrial processes that has been detected in the perched intermediate aquifer at R-25.

Thallium has been detected in the alluvial groundwater at 260 Outfall at concentrations greater than the MCL of 2μg/L and has been detected in several other monitoring wells at TA-16. Thallium is documented to have been used in industrial processes at TA-16.

Bis(2-ethylhexyl)phthalate has been detected at a concentration greater than the MCL (4.82μg/L) in well CdV-R-37 in 2002. Because plastic explosives were handled at TA-16, it is likely that this compound was a component of discharges from Building 260 or other TA-16 outfalls.

Chloromethane has been detected in alluvial groundwater downgradient from the 260 Outfall at a concentration of at 44 ppb that exceeds the EPA Region VI Tap Water Screening Level of 2.1 µg/L. Chloromethane also was detected in well 16-2(i) at a concentrations greater than the EPA Region VI Tap Water screening level.

2,4-Dimethylphenol and **2-Fluorophenol** also have been detected in groundwater at concentrations greater than the WQCC standard of 5µg/L for phenols.

7. Section 6.7 Estimation of RDX Subsurface Inventory, Page 33

The Permittees state: "[g]iven the substantial amount of surface water, groundwater, and vadose zone sampling that has been done, and the current monitoring well network, it is possible to make bounding estimates about where the RDX inventories reside." NMED does not necessarily agree with this conclusion. As previously stated, there is considerable uncertainty associated with the inventory estimations due to the relatively sparse monitoring well coverage and small volume of data collected to assess contaminant migration. Also, the questionable reliability of well sample data is demonstrated by the need for the well screen assessment project. Once the revised *Well Screen Assessment Report* is approved and the *Well Assessment Report* required by NMED in this approval letter has been reviewed and approved, NMED will determine the need for additional wells and/or replacement wells.

8. Section 7.0 Conclusions.

NMED does not agree with all the conclusions stated in this section and provides the following comments. A revision to the Report is not required and responses are not necessary.

In Section 7.3 Item 5s (page 38), the Permittees state that "groundwater flow occurs in fractures if sufficient hydraulic head is present to overcome the high matric potential." Although this is an obvious factor in groundwater flow and contaminant transport, saturation isn't necessarily needed to promote water movement in fractured media. Fluid flow can develop along preferential flow paths regardless of the degree of saturation and can be independent of matrix flow.

In the first bullet of Section 7.4 (page 38), the Permittees state that "direct remediation of the low-permeability intermediate zone is technically infeasible." This conclusion is premature. According to Section VIII.E of the Consent Order, the Permittees must seek an alternative abatement standard that demonstrates technical infeasibility to the New Mexico Water Quality Control Commission (WQCC) in accordance with WQCC Regulations 20.6.2.4103.E and F NMAC when groundwater contamination that includes WQCC constituents is involved. For other variance requests regarding clean up levels, the Permittees must provide the basis for their

impracticability determination. Demonstrations of impracticability must be submitted in written requests to NMED for approval in accordance with Section VIII.E of the Consent Order.

Due to the construction problems associated with well R-25, NMED is requiring the Permittees to conduct pumping tests (see October 23, 2006 letter from NMED to Permittees titled *Response to July 28, 2006 Update on Status of Well R-25*) on the top two screened intervals to evaluate the aquifer and the presence of the chromium and nickel detected in samples collected from these zones. During the pumping tests, samples must be collected periodically for geochemical analyses to assess changes in selected analyte concentrations, which will provide information pertaining to chromium, nickel and other geochemical markers in groundwater.

9. Required Actions:

As you are well aware, NMED and others have identified the potential of residual drilling fluids adversely affecting the quality and representativeness of groundwater data. Additionally, there are documented problems with well construction and whether well screens are located in hydrostratigraphic units most likely to detect contaminant releases. As a result NMED requires the following actions:

a) Four rounds of reliable groundwater monitoring data must be collected from wells requiring rehabilitation to demonstrate the effectiveness of rehabilitation activities and to support actions proposed in the upcoming CME due for submittal to NMED on May 31, 2007.

b) The Permittees must complete a comprehensive assessment of each well/well screen intersecting intermediate and regional groundwater at TA-16 prior to developing a Corrective Measures Evaluation (CME) for this site. The well assessment is required so that the final groundwater monitoring network at TA-16 may be optimized. It must incorporate the results of the *Well Screen Analysis Report* dated November 15, 2005 and address the comments listed in the September 18, 2006 letter from NMED to the Permittees entitled "Notice of Disapproval Well Screen Analysis Report" and the October 23, 2006 letter from NMED to the Permittees titled "Update on Status of Well R-25". The Permittees must also consider in the well assessment, concerns related to well construction (e.g., excessive filter pack lengths, misplaced screened intervals, seal integrity, and leaching of well materials), well location/coverage (spatially), hydrostratigraphic interval monitored, effects of fracture density and orientation and the influence of geologic structures (identified in Report Section 5.3.2) on groundwater flow and the screened intervals ability to detect releases from the 260 Outfall and other sources at TA-16.

c) The well assessment must also utilize historic and the most recent groundwater monitoring and water level information available. Rationale must be provided if the most recent data used in the well assessment is older than six months from the date of receipt of this approval, or if there are intervals of greater than six months in the Permittees' acquisition of data. In addition, the Permittees must include, in the comprehensive assessment, an evaluation of each of the wells identified in the Report to determine whether the wells are in the optimal locations both spatially and with regard to intersection of the most appropriate hydrostratigraphic units for use in detection or compliance monitoring.

d) The NMED requires the Permittees to leave borehole CdV-16-3(i) open until the wells located in the western Water Canyon Watershed have been evaluated. The Permittees must ensure that materials do not enter the boring from the ground surface. NMED will determine the future use or abandonment of the borehole based on the results of the TA-16 well assessment.

e) A report summarizing the results of the detailed well assessment that provides recommendations concerning well rehabilitation or replacement and a proposed schedule for such work must be submitted to NMED no later than April 30, 2007.

f) The Permittees must supply all core and cuttings sample analytical data, not previously reported to NMED, that were collected during drilling of the intermediate and regional wells drilled at TA-16 within 45 days of receipt of this approval. For example, the completion report for well CdV-16-1(i), dated May 7, 2004, indicates that these data will not be available until the Investigation Report for Cañon de Valle is submitted. According to the Consent Order deliverable schedule, the Investigation Report for Canon de Valle is not due until December 31, 2010. The NMED requires these data to evaluate the need for any additional characterization activities prior to the evaluation of the CME.

g) Until otherwise directed, the Permittees must sample the intermediate and regional wells identified in this report in accordance with the approved *Interim Facility Wide Ground Water Monitoring Plan*. If not already provided and where available, the Permittees also must supply video logs for each well proposed for monitoring in the Report.

Based on the results of the well assessment and any subsequent rehabilitation, NMED may require additional actions (e.g., completion of additional or replacement of existing intermediate and regional wells) to address any identified site characterization deficiencies or if a well and/or screened interval is incapable of producing representative samples.

Should you have any questions please call me at (505) 428-2512 or John Young at (505) 428-2538. Please note that the NMED Hazardous Waste Bureau is in the process of switching to a

new phone system. On or about December 7, 2006 the phone number for John Young will change from the current number, (505) 428-2538 to (505) 476-6038. The NMED Hazardous Waste Bureau's main number will be (505) 476-6000. My number will change to (505) 476-6016.

Sincerely,

James Bearzi
Chief
Hazardous Waste Bureau

JPB:jry

cc: D.Cobrain, NMED HWB
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File: Reading and LANL TA-16 (16-021(c))