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Date: April 26, 2001
Refer to: ER2001-0373

Mr. John Young, Corrective Action Project Leader
Permits Management Program
NMED – Hazardous Waste Bureau
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SUBJECT: ADDITIONAL INFORMATION REGARDING MATERIAL DISPOSAL AREA (MDA)-P PHASE II CONFIRMATION SAMPLING

Dear Mr. Young:

Per our discussions on January 31, 2001 and April 9, 2001, regarding Phase II confirmation sampling for the MDA-P Closure project, the need for additional information or clarification on four issues were identified. These issues include, sampling for volatile organic compounds (VOCs), sampling for perchlorate, specific locations of surface samples and deviations that may be required by difficult terrain, and characterization of the fracture regime. Each of these issues is addressed in detail below. The MDA-P Phase II Sampling and Analysis Plan (SAP), submitted to the New Mexico Environment Department (NMED) in August 1999, includes confirmation sampling for Technical Area (TA)-16 387 Burn Pad Closure and the Potential Release Site (PRS) 16-016(c)-99 Voluntary Corrective Action. These locations are implicitly included in further references to the MDA-P SAP.

Sampling for Volatiles

As Phase I waste removal activity at MDA-P has been completed, there is every indication that VOCs will not be encountered during Phase II sampling. Most of the areas below the East and West Lobes of MDA-P and the TA-16 387 Burn Pad have been scraped to bedrock. Confirmation samples will be collected in the tuff layers underlying the site according to the SAP. It is not practical to sample this hard rock for VOCs as volatilization would occur during drilling and crushing, and passive, or *in-situ* samplers do not yield reliable data. For these reasons, LANL proposes to deviate from the MDA-P SAP by eliminating this sample suite.

Sampling for Perchlorate

Based on our meeting on April 9, 2001, analysis for perchlorate will be added to a subset of the sampling locations at MDA-P. Fifty percent of the confirmation sampling locations will be sampled at two depths (0 to 12 inches and 24 to 36 inches) for perchlorate. This will allow a higher degree of certainty that nature and extent of

perchlorate will be determined if detected. The rationale for the confirmation sampling locations for MDA-P is discussed in detail below.

Rationale for Selecting Phase II Sampling Locations

Phase II confirmatory sampling activities at MDA-P will be conducted to evaluate whether concentrations of residual contamination are within acceptable limits. Sufficient analytical data will be collected to assess potential risks to human health, the environment, and ensure that the closure performance standards have been achieved. In accordance with the SAP, confirmation samples will be collected from four distinct areas: 87 sample locations within the Closure Unit; 50 sample locations within the PRS Cluster; 30 sample locations within the Exclusion Zone; and 12 sample locations within the Investigation Area. These sample counts do not include samples that will be collected for quality control. The ratio for these samples is 10:1. Each of these areas contain more grid cells than will actually be sampled, therefore, grid cells identified for "center of the cell" sampling are selected using the following staged approach.

First, grid cells with post-excavation field screening results that appear to exceed proposed limits for RDX (16 ppm, Region VI MSSL as proposed in SAP) (4.4 ppm is the residential standard) and barium (2,000 ppm, conservative value proposed in SAP since Region VI MSSL is 10,000 ppm) (5400 ppm is residential standard) are given highest priority within the Closure Unit and PRS clusters.

Second, remaining sample requirements are fulfilled by the assignment of sample locations that provide uniform distribution and representation of the area.

Third, the ongoing field survey of grid coordinates indicates that significant health and safety concerns are associated with sampling at locations with > 30% slope conditions. If the grid center identified for sampling exhibits dangerous slope conditions, individual sampling locations may need to be offset to a location within the same grid cell, or a cell in close proximity. A map identified as *Figure 2.1, MDA-P Phase II Confirmatory Sampling Locations* is attached. It is anticipated that cells be sampled in the Closure Unit and the PRS Cluster, several off-set locations may be required. Off-sets are required, will be documented in the Final Report.

Fourth, confirmation samples will also be collected from 24 to 36 inch depth interval at 10 percent of the sample locations. These locations are selected randomly within the Closure Unit, PRS Cluster, East and West Exclusions Zones, and East and West Investigation Areas to provide uniform distribution. These locations are identified in Figure 2.1 attached.

Fifth, sample locations within the Exclusion Zone and Investigation Area are selected randomly, allowing for accessibility and uniform distribution.

Fracture Regime Characterization

In addition to the confirmatory sampling program, a limited investigation of the fracture regime beneath MDA-P will be conducted. The objectives of this investigation are to: 1) define the depth profile of any potential residual barium and RDX contaminants in the

bedrock; 2) define the hydraulic characteristics of the bedrock fracture regime; 3) define the relationship between the bedrock fracture regime and the stream in Canon de Valle; and 4) define the regional groundwater setting of MDA-P. Surface and borehole investigations at MDA-P will be conducted. The regional water level data from monitoring wells R-25 and CdV-R-15-3 will be correlated with the site-specific data from MDA-P. This type of investigation has proven effective at other DOE facilities with fracture-dominated hydraulic systems in the vadose zone. The characterization program will consist of the following elements.

First, a surface map of the fractures exposed in the bedrock during the excavation of MDA-P will be compiled. The objective will be to identify the location and distribution of fractures exposed at the surface. Over 100 feet of vertical relief currently exists that will yield a three-dimensional view of the spacing, orientation, and aperture of fractures beneath MDA-P. The information will be compiled on the latest topographic map prepared after excavation and the surveyed grid will provide location markers for the field effort.

Second, four boreholes will be drilled within the landfill area to determine the vertical extent of contamination with depth, if any. Three boreholes will be located beneath the upper footprint of the landfill area at surface fractures with identified residual contamination of RDX and barium. The three grids with the greatest potential for these conditions are 374, 486, and 489 beneath the western, middle, and eastern parts of the landfill, respectively. All are located on the upper bench that provides the relatively flat topography necessary to place the drill rig. These boreholes will be sampled for continuous core to approximately 33 foot depth (elevation approx. 7416 feet msl). The target depth represents the top of the densely welded zone of the Bandelier Tuff beneath the landfill. The core will be field screened at 5-foot intervals or at any obvious fractures for RDX and barium. At least 3 analytical samples will be collected from each borehole for laboratory analysis of total TCLP metals, semi-volatile organics, and high explosives. One sample will be collected from the near surface and 2 samples from depth to demonstrate depth of contamination. After sufficient time for any vapors resulting from drilling have dissipated, a gas sample will be collected in each bore hole and analyzed for volatiles.

The fourth borehole in this group will be located at the toe of the former landfill along the line of grids 661 to 667. The objective will be to identify any residual contamination that may have accumulated downslope. The actual location will be determined from field conditions. This boring will be sampled for continuous core to approximately 25 foot depth (elevation approx. 7335 feet msl). The target depth represents the elevation of the stream in Canon de Valle. The core will be field screened at five-foot intervals for RDX and barium and at any obvious fractures. At least 3 analytical samples will be collected from each borehole for laboratory analysis of total TCLP metals, semivolatile organics, and high explosives. A gas sample will also be collected in this borehole as described above.

Third, two boreholes will be drilled adjacent to the landfill to determine the physical properties of the fracture regime. These boreholes will be located in or near grids 332, and 275 on the western and eastern margins of the landfill, respectively. These grids are believed to exhibit background concentrations of the contaminants at MDA-P and

possess the topography necessary to place the drill rig, and the elevation necessary to conduct the measurements. These boreholes will be sampled for continuous core to approximately 180 foot depth (elevation approx. 7270 feet msl). The target depth is approximately 60 feet below the Canon de Valle stream at the base of the landfill, and is within the moderately welded Unit 2 of the Bandelier Tuff.

After completion of drilling of the 2 deep boreholes, a suite of geophysical logs will be obtained including optical and acoustic imaging, natural gamma, neutron, caliper, resistivity, and a heat pulse flowmeter. The objectives are to define moisture and fracture zones within the rock; and, and then stress the system by the introduction of a false hydraulic head, i.e., pressure, and measure the response of the system. The heat pulse flowmeter in particular was designed to measure low-volume flows in fracture systems. Optical and acoustic imaging logs will provide physical and characteristic images of the boreholes with depth. The neutron and resistivity logs are designed to identify moist and dry zones. The boreholes will be located in adjacent areas to avoid the potential for driving contaminants with the water necessary to conduct the measurements.

Falling Head Hydraulic tests will be performed in the 2 deep and 4 shallow boreholes. These will provide direct measurements of the bulk permeability of the bedrock. Depending on the characteristics observed, water levels may or may not stabilize within the holes.

All of the boreholes will be filled with bentonite grout to the surface and the locations surveyed within the New Mexico State Plane coordinate system.

Upon completion of the field efforts the geophysical logs will be correlated with the core logs, e.g., identified fractures, and contaminant profiles to produce a three-dimensional, physical model of MDA-P. This conceptual model will consist of an envelope around and beneath MDA-P characterized by site-specific data. The model will be interpreted within regional groundwater context by correlation with existing monitoring wells R-25 and CdV-15-3. The regional water table is observed at elevation 6230 feet msl, over 1200 feet below MDA-P. The model will also be interpreted within surface water context by correlation with existing Canon de Valle studies.

Sincerely,

Julie A. Canepa, Program Manager
Environmental Restoration Project
Los Alamos National Laboratory

Sincerely,

Theodore J. Taylor, Project Manager
Department of Energy
Los Alamos Area Office

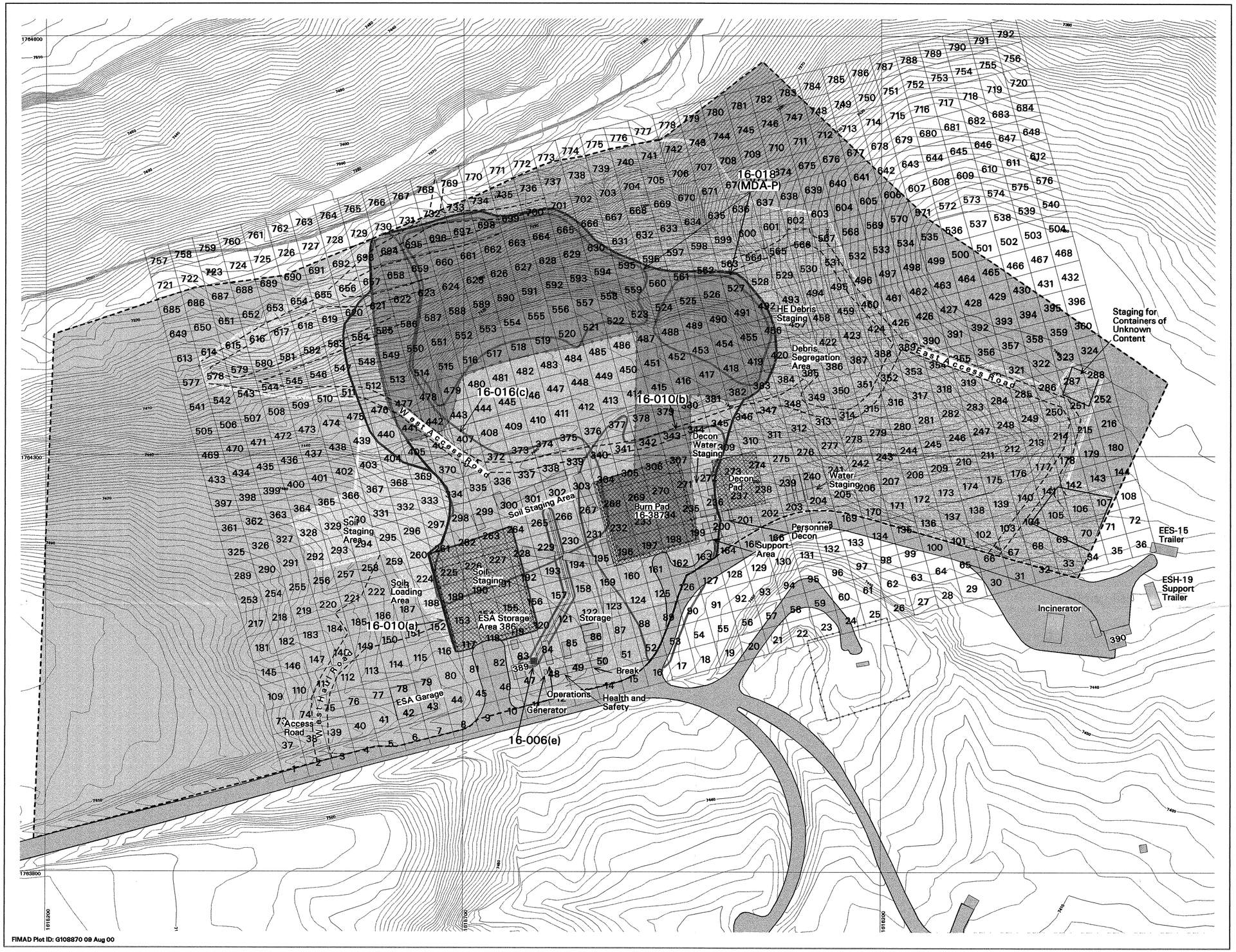
JC/TT/NR/ev

Enclosure: Figure 2.1 MDA-P Phase II Confirmatory Sampling Locations

Cy (w/enc.):
D. Hickmott, EES-6, MS M992
M. Kirsch, E/ER, MS M992
W. Neff, E/ET, MS M992
D. Neleigh, US EPA (2 copies)
N. Riebe, E/ET, MS M992
T. Taylor, LAAO, MS A316
H. Wheeler-Benson, E/ER, MS M992
L. Woodworth, LAAO, MS A316
J. Davis, NMED-SWQB
M. Leavitt, NMED-GWQB
J. Kieling, NMED-HWB
V. Maranville, NMED-HWB
J. Parker, NMED-DOE OB
S. Yanicak, NMED-DOE OB, MS J993
J. Young, NMED-HWB (2 copies)
E/ER File, MS M992
RPF, MS M707

Cy (w/o enc.):
K. Bostick, EES-10, MS M992
J. Canepa, E/ER, MS M992
B. Criswell, Weston, Inc., MS M992
D. McInroy, E/ER, MS M992
R. Romero, ESH-19, MS K490
J. Bearzi, NMED-HWB
R. Dinwiddie, NMED-HWB
J. Kieling, NMED-HWB

Figure 2.1. MDA-P Phase II Confirmatory Sampling Locations



FIMAD Plot ID: G108870 09 Aug 00

Boundary, TA
Contour, 2 foot
Contour, 10 foot
Fence
Former Sewer Line
Road, Dirt
Road, Paved
Culvert

MDA P Areas
Exlusion Zone
Investigation Area
PRS Cluster
Closure Units

PHASE II SAMPLES
Cells to be Sampled in the Closure Unit Strata (~87 samples)
Cells to be Sampled in the PRS Cluster Strata (~50 samples)
Western Exclusion Zone Strata (~10 samples)
Eastern Exclusion Zone Strata (~20 samples)
Western Extent Strata (~6 samples)
Eastern Extent Strata (~6 samples)

Pad
Structure
Former Septic Tank

6294-A

FACILITY for INFORMATION, MANAGEMENT, ANALYSIS and DISPLAY
EARTH & ENVIRONMENTAL SCIENCES DIVISION (EES-5)
LOS ALAMOS NATIONAL LABORATORY, Los Alamos, New Mexico

Produced by: Marcia Jones
Date: August 09, 2000
FIMAD Plot ID: G108870

N

State Plane Coordinate System, New Mexico Central Zone.
1983 North American Datum

Grid provides NM State Plane coordinates in feet.
Grid interval, in feet: 500
Feet per inch on map = 75
SCALE 1:900

0 23 46 69 92
METERS
0 75 150 225 300
FEET

Notice: The information on this map is provisional and the accuracy has not been confirmed. Feature locations are dependent on scale and symbology and should not be relied upon to establish legal claims. Basemap Sources: Boundary, structure, and utility data are from Los Alamos National Laboratory Engineering Division and Los Alamos County Utility and Engineering Departments. Contour data is from Los Alamos National Laboratory Environmental Restoration Program aerial survey, September 1991.

FIMAD Plot ID: G109387 22 Dec 00

Figure 2.1. MDA-P Phase II Confirmatory Sampling Locations

- Boundary, TA
- Contour, 2 foot
- Contour, 10 foot
- Fence
- Former Sewer Line
- Road, Dirt
- Road, Paved
- Culvert

MDA P Areas

- Exlusion Zone
- Investigation Area
- PRS Cluster
- Closure Units

PHASE II SAMPLES

- Cells to be Sampled in the Closure Unit Strata (~87 samples)
- Cells to be Sampled in the PRS Cluster Strata (~50 samples)
- Western Exclusion Zone Strata (~10 samples)
- Eastern Exclusion Zone Strata (~20 samples)
- Western Extent Strata (~6 samples)
- Eastern Extent Strata (~6 samples)

6294-B

- Pad
- Structure
- Former Septic Tank
- 24-36″ core + 0-12″ Interval or 0-6″ Interval
- 0-12″ 0-6″ Investigation Area Only (Western and Eastern Extent Strata)

N

State Plane Coordinate System, New Mexico Central Zone.
1983 North American Datum

Grid provides NM State Plane coordinates in feet.
Grid interval, in feet: 500
Feet per inch on map = 75

SCALE 1:900

0 23 46 69 92

METERS

0 75 150 225 300

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EES-5 GIS TEAM

Produced by: Marcia Jones

Date: December 22, 2000 GIS Plot ID: G109387