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To: Memo to the File, OU 1111, MS XXX
From: Bill Kopp, ESH-18
Date: June 23, 1998

SUBJECT: DOCUMENTATION FOR ADDITIONAL SAMPLING ACTIVITIES AT TA-6, FORMER STRUCTURE SITES, PRS AGGREGATE 8.

This memorandum documents additional sampling to augment data already available in order to support the completion of the Phase I RFI report. The currently approved sampling requirements for these PRSs is located in the August 1993RFI Work Plan for Operable Unit 1111, Chapter 5.

Site History

Aggregate 8, the former structure sites at TA-6, consists of a group of eighteen areas of concern (AOCs) and one potential release site (PRS), located along the Two-mile Mesa access road north of the current TA-22 operations area. The aggregate includes: 13 former magazine structures (AOCs C-6-001, C-6-008 to C-6018 and C-6-021); 4 former building structures (AOCs C-6-003, C-6-005, C-6-006, and C-6-020); 1 former boiler house (AOC C-6-007); and 1 septic tank (PRS 6-002). AOC C-6-001 is located north of the access road and east of building 06-06. All other former structure sites are located within a 16 acre area south of the access road (fig 1 map).

This area of TA-6 was used for early Manhattan Project detonator development and was active in the 1940's. The majority of the magazine and building structures south of the access road were decommissioned either by burning or removal in January of 1960. A brief summary of aggregate 8 operational information is presented in Table 1.

Phase I Data Summary

The phase I RFI at aggregate 8 generally included the collection of six samples at each AOC or PRS in the aggregate. These samples were collected at two intervals, the surface (0-0.5 ft), and at the soil /tuff interface(approx. 2-3 ft), from three locations at each former structure site. The sampling plan specified that each site would be sampled at one location within the footprint of the former structure and at two associated locations extending 5 ft from the outer boundary of the structure. The sampling locations outside of the structure footprint are generally oriented by local topography with samples located up and down gradient from each specific former structure location.

All sample locations were field screened as required by LANL SOPs ER-01.01R0, ER-10.06.R0 and ESH – 1-07-85R0 and ESH-1-07-84.R0 for HE, gross radioactivity, and organics, with all results negative or at background levels. All samples were submitted for TAL metals and HE fixed laboratory analysis. In addition, samples collected at PRS 06-002 were submitted for VOC analysis. A list of samples taken and analyses performed are presented in Appendix A.

Five inorganic chemicals, barium, copper, lead, zinc and cadmium were reported in RFI samples at levels which exceed background screening values and are considered COPCs at the aggregate. Mercury was reported in one sample at a level equal to the background screening value of 0.1 mg/kg at 0.1 (J) and twelve samples were reported as undetected (U) at levels slightly above the BV (range 0.11 - 0.13 mg/kg); however mercury is not considered a COPC at this site.

Table 1
Aggregate 8 Operational History

PRS number	Structure number	Structure type	Operations	Date removed	Possible Contaminants	Comments
6-002	TA-6-41	Septic Tank	PETN recrystalization; rest house	1965	PETN, solvents	Process line in place
C-6-001	TA-6-4	Magazine	Expl. storage	1972	HE	Removed
C-6-003	TA-6-11	Building	Control bldg; detonator loading	8/1955	HE	Removed to MDA-C
C-6-005	TA-6-13	Building	Detonator assembly, laboratory, storage	1/1960	HE, solvents	Removed by burning
C-6-006	TA-6-14	Building	Expl. pressing, storage	1/1960	HE	Removed by burning
C-6-007	TA-6-15	Boiler House	Steam generation	1/1960	HE	Removed by burning
C-6-008	TA-6-16	Magazine	Expl. processing	1/1960	PETN	Removed by burning
C-6-009	TA-6-17	Magazine	Shake testing	1/1960	HE	Removed by burning
C-6-010	TA-6-21	Magazine	Expl. storage	1/1960	HE	Removed by burning
C-6-011	TA-6-22	Magazine	Expl. processing	1/1960	HE	Removed by burning
C-6-012	TA-6-23	Magazine	Detonator storage	1/1960	HE	Removed by burning
C-6-013	TA-6-24	Magazine	Expl. storage	1/1960	PETN	Removed by burning
C-6-014	TA-6-25	Magazine	Expl. storage	1/1960	HE	Removed by burning
C-6-015	TA-6-27	Magazine	Expl. storage	1/1960	Tetryl	Removed by burning
C-6-016	TA-6-28	Magazine	Detonator storage	1/1960	HE	Destroyed
C-6-017	TA-6-29	Magazine	Expl. storage	1/1960	HE	Removed by burning
C-6-018	TA-6-30	Magazine	Expl. storage	1/1960	PETN	Removed by burning
C-6-020	TA-6-49	Building	Lavatory/Rest House	1/1960	None known	NFA criteria 3
C-6-021	TA-6-26	Magazine	Expl. storage	1/1960	HE	Removed by burning

Five organic chemicals, acetone, toluene, 2,4-dinitrotoluene, 2,6-dinitrotoluene, trinitrotoluene, and RDX were reported infrequently and at trace levels in site samples. Table 2 presents the maximum concentrations of contaminants above background screening values at TA-6, aggregate 8.

Table 2

Location ID	Analyte	Maximum Concentration (mg/kg)	Depth (inches)	BV (mg/kg)	SAL (mg/kg)	TRV (mg/kg)
06-8040	barium	776	34-37	295	5300	40 (bird)
06-8029	copper	1670	0-6	14.7	2800	50 (invert)
06-8011	lead	786	0-6	22.3	400	50 (plant)
06-8011	zinc	1260	0-6	48.8	23000	50 (plant)
06-8038	cadmium	3.0	36-39	0.4	38	3.0 (plant)
06-8047	mercury	0.13(U)	26-28	0.1	23	0.1 (invert)
06-8001	acetone	0.005(J)	36	NA	1400	1.5 (mouse)
06-8003	toluene	0.006	36	NA	520	14 (mouse)
06-8056	RDX	1.7(J)	36	NA	40	2.6 (mouse)
06-8051	TNT	2.3(J)	36	NA	15	0.8 (mouse)
06-8053	DNT	<0.36(J)	36	NA	0.65	0.2 (mouse)

Conceptual Model

Operations at TA-6, aggregate 8 primarily consisted of storage of HE in small (10 ft .x 10 ft.) magazine bunkers with some detonator development related HE processing, pressing and recrystalization also occurring. Detonator components require very small quantities of HE and the maximum amount of PETN released to PRS 6-002 is estimated at 0.03 lb. As a HE storage and detonator development area, the primary materials of concern are HE. It is assumed all HE was carefully handled during the site's operational period and there is little reason to believe that large amounts of HE were released to the environment. At the time the site was decommissioned it is assumed that any bulk HE was removed and low levels of residual HE associated with the structures was destroyed by burning or otherwise removed.

The conceptual release model for the magazines and buildings in aggregate 8 would therefore include:

- potential release of low levels of HE to the environment during operations due to mishandling or spillage;
- potential release of construction or site related inorganics as a result of the burning or demolition of structures.

These releases would be expected to have been concentrated in proximity to the former building structures as reflected in the RFI sampling plan. The flat local topography, as indicated by the low A.P. 4.5 run-off score of 3.6 to 8.8; and the relatively insoluble, immobile properties of HE and metals support the assumption that maximum residual contamination would persist in surface soils associated with previous structure sites. The potential does exist for both air and water borne migration of surface contamination as well as infiltration/percolation into subsurface soils.

The conceptual release model for the septic tank (PRS 6-002) includes the release of organic solvents (acetone, carbon tetrachloride) with small amounts of HE to the process sewer line, septic tank and outfall area. The potential exists for the release of these material to subsurface soils through leaks or breaks in the pipeline and tank as well as release of non-biodegraded material to the surface and subsurface soils at the outfall area.

Sampling Objectives

Objective 1. Additional RFI sampling is necessary to fill the PETN, HE and elemental data gaps.

Several data quality problems were identified through the focused validation of the Phase I RFI data. These include:

- failure to include confirmatory fixed-laboratory PETN analysis for site samples;
- poor quality HE data from one analytical laboratory associated with samples collected at AOCs C-06-018, C-06-020, and C-06-021;
- silver, antimony and cadmium detection limits greater than soil background screening values of 1.0, 0.83, and 0.4 mg/kg, respectively, in approximately two thirds of the site samples;
- poor quality Sb and Ag data from two of the analytical laboratories;
- several non-detected Hg values above background screening level (BV).

Objective 2. Additional sampling in the area of the septic tank outfall and drainage area is necessary to eliminate two characterization gaps.

Review of the site history and field reconnaissance also indicate two characterization deficiencies in the previous RFI sampling. Archival information indicates that the phase I work plan did not include instructions to characterize the actual septic tank outfall area for PRS 6-002 which has been determined to be located 100 feet east of the tank location. In addition, as a result of ecological scoping activities, it was concluded that a limited number of surface and subsurface soil samples should be collected in proximity to a surface drainage feature near AOC C-06-011. This is the only defined drainage feature in the area and sampling is recommended in order to evaluate the potential for water borne surface transport of contaminants away from the AOCs upgradient of this drainage.

Objective 3. Obtain tuff samples at selected locations so that vertical extent may be demonstrated if required.

The site conceptual model does not include migration of COPCs into underlying tuff at the site. However, Phase I data showed relatively high concentrations at depth in some locations (see Table 2). The septic system, PRS 06-002, discharged to the subsurface. Therefore it is prudent to collect a limited number of tuff samples to verify vertical extent.

Sampling Design

Sample Locations and Scheduled Analyses

The sample locations, depth intervals, and required analyses are summarized in Table 3. The data provided by this sampling effort will be used to fill the data gaps called out in the sampling objectives and to help bound vertical and horizontal extent of any COPCs. The rationale for each sampling location is briefly stated in Table 4.

Sampling and sample handling will be conducted in accordance with LANL ER SOPs. Field activities will be conducted in accordance with the approved site-specific Health and Safety plan (SSHASP).

Surface samples correspond to the 0-6" depth interval. Soil/tuff interface samples correspond to the 6" of unconsolidated material directly above the abrupt tuff boundary. The tuff samples correspond to an interval 18-24" below the abrupt soil/tuff boundary. Weathered tuff fragments may be included in soil/tuff interface samples. Inclusion of tuff in the soil/tuff samples is not expected to adversely affect data interpretation.

Samples scheduled for VOC analysis will be collected using 6" threaded sleeves. The sleeve from the appropriate depth will be removed from the casing and capped immediately to avoid possible loss of VOCs.

Fifteen-day analysis turn-around is requested for all samples.

Field Quality Control and Assessment

Quality control (QC) and quality assessment (QA) samples used in many soil sampling efforts include field blanks, trip blanks and field duplicate samples. However, no field QC or QA samples were selected for this resampling effort for the reasons provided below.

Field Blanks and Trip Blanks

Field blanks and trip blanks are designed to help protect data users from incorrectly concluding that a site is contaminated. Results from these blanks are an indicator of possible sample contamination occurring during field and laboratory operations. In the first TA-6 sampling effort, field blanks and trip blanks showed no contamination problems. At this site where contaminant concentrations are low or even less than detection limits, the potential for contamination is minimal. With a low potential for contamination, field and trip blanks are not necessary. Routine laboratory blanks will be evaluated to assess the possibility of laboratory contamination.

Field Duplicate Samples

When duplicate field samples exhibit analyte concentrations less than detection limits, the duplicate results are not useful because the control parameter related to those samples (relative percent difference) cannot be computed. Based on results from the first sampling effort, high explosives and VOCs are expected to be detected either at low frequencies or not at all in this resampling effort. It is unlikely that each sample of a field duplicate pair will contain enough HE compound or VOC to allow for computing a relative percent difference. Metals are generally being re-analyzed at this site to fill data gaps caused by prior laboratory data quality problems. These samples are essentially verification samples for the first sampling effort. Furthermore, the first sampling effort revealed that many metal concentrations were less than detection limits and/ or background screening levels. Consequently, no field duplicate samples are necessary.

Laboratory Communications

Several special requirements are placed on the service laboratories by this sampling and analysis plan. The special requirements are detailed in the "Special Sample Handling Instructions" and "Special Analytical Requirements" sections below. These requirements must be discussed with the service laboratory manager prior to shipment of any samples. Samples shall not be shipped without receiving an explicit agreement (in the form of a verbal, electronic or written acknowledgement) that all special requirements can be met.

The laboratory shall contact the appropriate LANL project member immediately if a problem arises in any phase of the sample analysis and reporting process so that possible corrective measures may be discussed and implemented. Any instructions to service laboratory managers or analysts must be approved by the SMO in order to maintain contract compliance.

LANL contacts and areas of responsibility are provided below.

Title	Name	Phone/Fax/Email	Responsibilities
Sample Management Office (SMO)	Joylene Valdez	505-665-9968 505-665-9972 joylenev@lanl.gov	Sample shipping; COC issues including lost or broken containers; Lost holding times, Analysis delays.