Waste Characterization Strategy Form

Project Title:	TA 57-007 Fenton Hill
Activity Type:	Risk Based Soil Removal
Project Manager:	Todd Haagenstad
Waste Generator:	Victor Garde
Waste Management Coordinator:	Ron DeSotel
Completed by:	Ron DeSotel
Date:	September 11, 2014

Description of Activity:

The waste-generating activities addressed in this Waste Characterization Strategy Form (WCSF) consist of removal of soil contaminated with arsenic above residential screening levels and nature and extent sampling. Soil removal activities will consist of manual removal of soil.

The following waste streams are expected to be generated during reconfiguration:

- Contact Waste
- Petroleum Contaminated Soils (PCS) (potential)
- Municipal Solid Waste (MSW)
- Soil

All waste will be managed in accordance with P-409, *Waste Management*; EP-SOP-10021 R.1, *Characterization and Management of Environmental Program Waste*; P-930-1, *LANL Waste Acceptance Criteria*; P-930-2, *Waste Certification Program*, and approved work plans.

A trained and qualified Field Waste Management Technician (FWMT), Waste Sampling Personnel (SP), and Hazardous Materials Packaging and Transportation (HMPT) personnel will be assigned to perform the duties outlined in EP-SOP-10021 R.1, and Exhibit F of the LANL Contract.

This WCSF will be implemented before any waste generating activity is undertaken. An amendment to this WCSF will be prepared and submitted for review and approval if any of the waste streams change in description or characterization approach, or unanticipated waste streams are generated. The generation of no path forward wastes must be approved by the Department of Energy (DOE) prior to generation of the waste.

Relevant Site History and Description:

AOC 57-007 is a leach field located at Fenton Hill, the site of former geothermal energy experiments. The leach field served a trailer used as an analytical chemistry laboratory and was located approximately 20 ft southeast of the trailer. The open-bottom leach field was about 8 ft to 10 ft deep, constructed with cinder blocks and filled with gravel. Chemists working in the trailer used a special drain that was connected to a plastic-lined, 55-gal. drum to dispose of chemicals that could not be disposed of through the wastewater system (AOC 57-006). Wastewater from other activities in the trailer drained to the leach field. Potential contaminants at AOC 57-007 are inorganic and organic chemicals. An AK Review Form, 57-006 & 57-007 has been prepared an approved for this area.

Scope of Work:

SUBCONTRACTOR shall perform work as prescribed in the Investigation Work Plan for Technical Area 57 Aggregate Area (Fenton Hill), LA-UR-12-20545, April 2012, EP2012-0093 subsequently referred to as the Work Plan that is included in Exhibit D, Appendix D-1, and as prescribed in additional scope via modifications to Exhibit D scope of work and technical specifications. Additional scope includes:

- Collect additional extent samples to define lateral extent for arsenic associated with sample location 57-4011.
- Removal of arsenic-contaminated surface soil at two locations that exceeds the 3.9 milligram per kilogram (mg/kg) residential soil screening level (SSL)

CHARACTERIZATION STRATEGY

The characterization strategy for investigation derived waste (IDW) generated during soil removal will be based on direct sampling of the containerized waste, and may also include source term/process identification performed to identify whether listed hazardous waste may be present (i.e., due diligence review).

The selection of waste containers will be based on U.S. Department of Transportation requirements, waste types, and estimated volumes of waste to be generated. Immediately following containerization, each waste container will be individually labeled with a unique container identification number and with information regarding waste classification, contents, and date generated. A waste determination must be made within 45 days of the generation of the waste. A Waste Acceptance Criteria (WAC) waste exception form (WEF) can be used if the generator does not meet the 45 day deadline.

A copy of either the ENV-CP approved due diligence/AK Review or the NMED contained-in approval letter must accompany all waste profiles prepared for the subject waste(s).

Waste # 1 - Contact Waste: This waste stream is comprised of solid waste generated during soil removal and sampling activities that has come into contact with contaminated environmental media and equipment. This includes, but is not limited to: personal protective equipment (PPE) (e.g., gloves); plastic sheeting (e.g., tarps, liners); plastic and glass sample bottles; disposable sampling supplies (e.g., filters, tubing, plastic bags); and dry decontamination wastes, such as paper items. It is estimated that less than 1 yd^3 of contact waste may be generated.

Anticipated Regulatory Status: Industrial (non-hazardous/non-radiological).

Characterization Approach: Contact Waste will be characterized using the AK of the environmental media (i.e., soil) with which it came into contact.

Storage and Disposal Method: Contact waste will be containerized at the point of generation and initially managed as non-hazardous/non-radiological waste pending review of analytical data to determine final waste characterization. . If the contact waste is determined to be non-hazardous/nonradioactive and approval is granted by ENV-RCRA, it may be recycled and reused via the Material Recycling Facility (MRF). Otherwise, the contact waste will be disposed of at an appropriate waste disposal facility based upon the final regulatory classification of the waste.

Waste # 2 – Petroleum Contaminated Soils (PCS): This waste stream is comprised of soils contaminated due to the accidental release of commercial products such as hydraulic fluid, motor oil, unleaded gasoline, or diesel fuel (e.g., from the rupture of hydraulic or fuel hoses, or spills during maintenance, etc.). It may also include adsorbent padding, paper towels, spill pillows or other adsorbent material used to contain the released material and added to the containerized PCS waste for storage and disposal. It is estimated that less than 1 yd^3 of this waste stream will be generated.

Anticipated Regulatory Status: New Mexico Special Waste (NMSW)

Characterization Approach: PCS may be characterized based upon the AK of the product spilled and the media with which it came into contact and/or using the analytical results obtained from direct sampling. AK may only be used if the product spilled is known (an MSDS specifying composition is available) and the spill is on clean fill (non-hazardous/non-radioactive). Direct sampling may be performed in place (same day as spill/containerization) or from the containerized waste within 10 days of generation. Samples will be collected in one of the following two ways:

1. For spills containerized in large containers (i.e., 55-gallon drums) and/or deep spills being sampling in place the samples will be collected in accordance with LANL SOP-06-10, *Hand Auger and Thin-Wall Tube Sampler.*

2. For spills containerized in small containers and/or shallow spills being sampled in place the samples will be collected in accordance with SOP-06.09, Spade and Scoop Method for Collection of Soil Samples.

The analysis of the samples will be dependent on where the spill occurred as follows:

- If the spill occurred on clean soil, other constituents may be analyzed as necessary to meet the WAC of the disposal facility.

- If the spill occurs on soils with known hazardous contaminants or soils with no available/reliable AK documentation the samples will be analyzed, at minimum, for VOCs, SVOCs, TPH, DRO/GRO, PCBs, total cyanides, nitrates/nitrites, perchlorates and total metals based on the below characterization table. TCLP analysis may also be performed for TAL metals if the analytical results for the total metals divided by 20 indicate contaminants that exceed regulatory thresholds. If radiological contamination is a possibility the samples must also be analyzed for radionuclides (by alpha and gamma spectroscopy); isotopic uranium, isotopic plutonium, americium-241, tritium, and strontium-90.

All samples will be submitted with a 21-day turnaround time for analysis so that a waste determination can be made within 30 days of generation. The "initial" date or date of generation for NMSW is the date the container is completely full or the date in which no additional NMSW will be added to the container. The "final" date (or the date starting the 90 day NMSW clock) is the date that the validated analytical data is received by the WMC and/or a waste determination has been made using AK.

Sampling personnel must record sampling information in accordance with EP-ERSS-SOP-5058 and EP-ERSS-SOP-5181. The field notebook or sample collection sheet must be used to document sample collection activities (e.g., equipment and sampling methods used, number and location of samples, etc.). Sampling personnel must also record field conditions, problems encountered, local sources of contamination (e.g., operating generators or vehicles), the personnel involved, equipment and supplies used, waste generated, and field observations.

Storage and Disposal Method: PCS will be containerized at the point of generation on the same day that the spill occurred. If AK for the site indicates that the soil will not be contaminated with radioactive or hazardous materials, the PCS will be managed as NMSW pending review of AK and/or analytical results to determine final waste characterization. If AK for the site indicates that the soil could be contaminated with radioactive or hazardous materials the PCS will be stored in a clearly marked and constructed waste accumulation area appropriate to the anticipated waste type. Waste accumulation area postings, regulated storage duration, and inspection requirements will be based upon the waste classification.

Waste # 3 – Municipal Solid Waste (MSW): This waste stream is comprised of non-contact trash, including, but not limited to, paper, cardboard, wood, plastic, food, and beverage containers. It is estimated that less than 1 yd^3 of MSW will be generated.

Anticipated Regulatory Status: MSW

Characterization Approach: MSW will be characterized based on AK of the waste materials (including MSDSs) and methods of generation.

Storage and Disposal Method: MSW will be segregated from all other waste streams. It is anticipated that the wastes will be stored in plastic trash bags or other appropriate containers and transferred/disposed of at the County of Los Alamos Solid Waste Transfer Station or other authorized off-site solid waste facility.

Waste # 4 – Soil: This waste stream is comprised of soil contaminated with arsenic above Risk Based Screening Levels (Residential). It is estimated that less than 10 yd^3 of soil will be generated.

Anticipated Regulatory Status: Industrial (non-hazardous/non-radiological)

Characterization Approach: SUBCONTRACTOR shall excavate and remove soil/tuff from two separate areas at and around locations 57-4011 and 57-4020. At location 57-4011, soil shall be removed to a depth of 2 ft bgs and a radius of 2 ft surrounding location 57-4011. At location 57-4020, soil shall be removed to a depth of 2.5 ft bgs with a radius of 2ft surrounding location 57-4020. Soil will be removed using manual methods. The soil will be characterized by direct sampling of the containerized soil. Soil will be sampled within 10 days of generation and submitted for analysis with a 21 day turnaround time. Soil from a single SWMU may be combined into a single container before sampling. If container sizes are small, a representative sample may be collected from more than one container (e.g., one sample for every 20 yd^3 generated from a single SWMU). A hand auger or thin-wall tube sampler will be used in accordance with LANL SOP-06.1 0, *Hand Auger and Thin-Wall Tube Sampler,* to collect waste material from each container, auguring from the surface to the bottom of the waste in a sufficient number of locations to obtain a representative sample. Soil will be analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), radionuclides, nitrates/nitrites, perchlorates, total cyanides, PCB's and toxicity characteristic (TCLP) metals based on the below characterization table. If process knowledge, odors, or staining indicate the cuttings may be contaminated with petroleum products, the materials will be analyzed for total petroleum hydrocarbons (TPH [DRO/GRO]). Other constituents may be analyzed as necessary to meet the WAC for a receiving facility.

Storage and Disposal Method: Soil will be containerized at the point of generation in DOT approved containers appropriate for the quantity of waste generated and managed as industrial (non-hazardous/non-radiological) pending analytical results to determine final waste characterization. Note: Due to the nature of this project, soil may have to be stored at a centrally located staging area, on LANL property, as opposed to the point of generation. SUBCONTRACTOR shall be responsible for providing waste containers, packaging, on-site management (including transfer of waste containers to a LANL approved staging/storage area), off-site profile(s), transportation and disposal of all waste generated.

TABLE 1- CHARACTERIZATION TABLE

NOTE: Multiple sampling may be required to ensure WAC requirements are met.

Waste Description	Waste # 1 Contact Waste	Waste #2 Petroleum Contaminated Soils (PCS)	Waste #3 Municipal Solid Waste (MSW)	Waste #4 Soil
Estimated Volume				
Packaging				
Regulatory classification:				
Radioactive Waste		X		
Reusable Material				
Municipal Solid Waste (MSW)			X	
Waste destined for LANL's SWWS or RLWTF [1]				
Hazardous Waste		X		
Mixed (hazardous and radioactive) Waste		X		
Toxic Substances Control Act (TSCA)		X		
New Mexico Special Waste		X		
Industrial Waste	X	X		X
Characterization Method				
Acceptable knowledge (AK): Existing Data/Documentation	X	X	X	
AK: Site Characterization		X		
Direct Sampling of Waste		X (As needed)		X
Analytical Testing				
Volatile Organic Compounds (EPA 8260-B)		X (As needed)		X
Semivolatile Organic Compounds (EPA 8270-C)		X (As needed)		X
Organic Pesticides (EPA 8081-A)				
Organic Herbicides (EPA 8151-A)				
PCBs (EPA 8082)		X (As needed)		X
Total Metals (EPA 6010-B/7471-A)				
Total Cyanide (EPA 9012-A) [2]		X (As needed)		X
Nitrates/Nitrites (EPA 300.09)		X (As needed)		X
Dioxins/Furans (EPA 1613B)				
Oil/Grease (EPA 1665)				
Fluoride, Chlorine, Sulfate (EPA 300)				
TTO (EPA 8260-B and EPA 8270-C) [3]				
Total Suspended & Dissolved Solids (TSS) and Total Dissolved Solids (TDS) (EPA 160.1 and 160.2)				
Chemical Oxygen Demand (COD) (EPA 410.4)				
pH (EPA 904c)				
Microtox or Biological Oxygen Demand (BOD) [4]				
Perchlorates (EPA 6850)		X (As needed)		X
High Explosives Constituents (EPA 8330/8321-A)				
Asbestos				
BTEX (EPA-8021b)				
Total petroleum hydrocarbon (TPH)-GRO (EPA 8015-M) TPH-DRO (EPA 8015-M)		X		
Toxicity characteristic leaching procedure (TCLP) Metals (EPA 1311/6010-B)		X (As needed)		X
TCLP Organics (EPA 1311/8260-B & 1311/8270-C)				
TCLP Pest. & Herb. (EPA 1311/8081-A/1311/8151-A)				
Radium 226 & 228 (EPA 9320)		X		X
Gross Alpha (alpha counting) (EPA 900)				
Gross Beta (beta counting) (EPA 900)				
Tritium (liquid scintillation) (EPA 906.0)		X (As needed)		X
Gamma spectroscopy (EPA 901.1)		X (As needed)		X
Isotopic plutonium (Chem. Separation/alpha spec.) (HASL-300)		X (As needed)		X
Isotopic uranium (Chem. Separation/alpha spec.) (HASL-300)		X (As needed)		X
Total uranium (EPA 6020)		X (As needed)		X
Strontium-90 (EPA 905)		X (As needed)		X
Americium-241 (Chem. Separation/alpha spec.) (HASL-300)		X (As needed)		X
Isotopic Thorium		X (As needed)		X
Waste Profile Form #	TBD	TBD	TBD	

1 In addition to other analytes needed to characterize the waste (e.g., VOC, SVOC, total metals), analyze for TSS, TDS, Oil and Grease, gross alpha gross beta, tritium, and pH for liquids destined for the LANL SWWS. For wastes destined for the RLWTF additional constituents include TTO, TSS, COD, pH, total nitrates/nitrites, and gross alpha, gross beta (not including tritium), and gross gamma or the sum of individual alpha-, beta-, and gamma-emitting nuclides.
2 Filtered metals and filtered Cyanide are required for land application, with the exception of mercury (hg).
3 TTO is the total of volatile organic and semi-volatile organic compound contaminants. Request methods EPA 8260-B (VOCs) and EPA 8270-C (SVOCs).
4 If Microtox analysis is not available, request BOD.

Notes:

If data are insufficient to make a definitive regulatory classification at the time of WCSF completion, more than one box on the characterization table may be checked, along with an explanation in the text section. The final regulatory classification will be reflected on the waste profile form. The table identifies the suite of analyses required based on site knowledge, information needed by the anticipated receiving facility, or for land application, if applicable.

Section 1.2 of the TCLP method 1311 states "If a total analysis of the waste demonstrates that individual analytes are not present in the waste, or that they are present but at such low concentrations that the appropriate regulatory levels could not possibly be exceeded, the TCLP need not be run." The methodology for using total waste analyses determination for the 40 TC constituents in soil is as follows:

Liquids – Wastes containing less than 0.5% filterable solids do not require extraction and therefore by filtering the waste and measuring the total constituent level of the filtrate and comparing those levels to regulatory levels is appropriate.

Solids – Constituent concentrations from the extraction fluid of wastes that are 100% physical solids are divided by 20 (reflecting the 20 to 1 ratio of TCLP extraction) and then compared to the regulatory levels. If the theoretical levels do not equal or exceed the regulatory levels, the TCLP need not be run. If the levels do equal or exceed the regulatory levels, the generator may either declare the waste hazardous or run TCLP analyses.

Additional Analytical Information:

Standard analytical turnaround time is anticipated to be 30 calendar days. In the event a waste is suspected to be hazardous, the total waste volume exceeds 55 gallons (e.g., purge water, decontamination fluids, and contact waste), and a <90-day Accumulation Area is required, then an expedited analytical turnaround time will be needed to meet the 90-day time limit. Environmental Stewardship sample support will be notified if an expedited analysis is necessary. Utah-certified analytical laboratory data is recommended to meet the MLLW WAC for waste streams that are suspected to be hazardous and low-level radioactive.

References:

- 40 CFR 261.24, 40 *Code of Federal Regulations* Part 261, Identification and Listing of Hazardous Waste, Subpart C, Section 24, Toxicity Characteristic.
- EP-DIR-SOP-10021 R.1, *Characterization and Management of Environmental Programs Waste*
- EP-ERSS-SOP-5056, *Sample Containers and Preservation*
- EP-ERSS-SOP-5058, *Handling, Packaging, and Transporting Field Samples*
- EP-ERSS-SOP-5181, *Notebook and Logbook Documentation for Environmental Directorate Technical and Field Activities*
- P-409, *Waste Management*
- P930-1, *LANL Waste Acceptance Criteria*
- SOP-06.09, *Spade and Scoop Method for the Collection of Soil Samples*
- SOP-06-10, *Hand Auger and Thin-Wall Tube Sampler*
- WES-EDA-QP-219, *Sample Control and Field Documentation*

Waste Characterization Strategy Form

Signatures	Date
Project Manager: Todd Haagenstad	9/11/14
Waste Generator: Victor Garde	9/15/14
Waste Management Coordinator: Ron DeSotel	9-11-14
ENV-CP Representative: John Valdez TA-57 Fenton Hill WCSF	9/18/14
Waste Acceptance Representative: Andy Elicio	09/17/2014
Waste Certification Program Representative (only if radioactive wastes will be generated) N/A	N/A

	Los Alamos National Laboratory EP

AK REVIEW FORM or DUE DILIGENCE REPORT

Remediation; Soil Sampling; and Borehole Sampling

PRS ID No.: 57-006 & 57-007	**Technical Area: 57**
Watershed:	
Scope of Work:	Sampling to define nature and extent of potential contamination.

PRS Description

AOC 57-006 is the former location of a plastic-lined, 55-gal. drum that was buried in the ground beneath a trailer at TA-57, Fenton Hill, that served as an analytical chemistry laboratory. Fenton Hill is the site of former geothermal energy experiments. Chemicals that could not be disposed of through the wastewater system were poured into a special drain, which was connected to the 55-gal. drum. When the drum was full, its contents were transported to LANL for disposal. In 1994, the drum was removed.

AOC 57-007 is a leach field located at Fenton Hill, the site of former geothermal energy experiments. The leach field served a trailer used as an analytical chemistry laboratory and was located approximately 20 ft southeast of the trailer. The open-bottom leach field was about 8 ft to 10 ft deep, constructed with cinder blocks and filled with gravel. Chemists working in the trailer used a special drain that was connected to a plastic-lined, 55-gal. drum to dispose of chemicals that could not be disposed of through the wastewater system (AOC 57-006). Wastewater from other activities in the trailer drained to the leach field. Potential contaminants at AOC 57-007 are inorganic and organic chemicals.

The following excerpt is taken from the RFI Report (which encompassed other AOCs in addition to 57-006 and 57-007):

This report describes the results of surface and shallow subsurface soil sampling at potential release sites (PRSs) 57-001(b), 57-001(c), 57-002, 57-004(a), 57-006, and 57-007 at Technical Area (TA 57 (former Operable Unit {OU} 1154), known as the Fenton Hill facility. From the early 1970s until the early 1990s, the Laboratory carried out geothermal recovery experiments at this facility; these PRSs which include circulation ponds, an outfall, a sludge disposal pit, and discharge areas for an on-site analytical chemical trailer, received fluids and other materials associated with geothermal experiments. The objective of this Phase I investigation was to confirm the presence or infer the absence of Resource Conservation and Recovery Act (RCRA) hazardous constituents at these PRSs.

During the summer of 1994, surface and shallow subsurface soil samples were collected from nine locations. All the samples were analyzed for metals. In addition, those samples collected from PRSs at which drilling materials and geothermal circulations fluids had been used were analyzed for semivolatile organic compounds; and those samples collected from the discharge areas for the analytical chemistry trailer were analyzed for volatile organic compounds. Because no RCRA hazardous constituents were found at levels above screening action levels (SALS) in samples collected from PRSs 57-001(b) (pond portion only), 57-001(c), 57-004(a), 57-006, or 57-007, we are recommending NFA (No Further Action) for the pond portion of th PRS 57-001(b) and the other four PRSs.

Listed Status

There is no documented evidence that 57-006 and 57-007 are contaminated with F-, K-, P-, or U-listed waste. If potentially listed organics typical of asphalt are detected, the source may be considered to be asphalt, if applicable, which is not a listed source.

Potential Contaminant Sources	Listed
Asphalt/concrete parking lot run-off (e.g., MEK, Methylene Chloride, Toluene, etc.)	No
Plastics used in waste storage and/or sampling equipment (i.e., Bis(2-ethylhexyl)phthalate)	No

Review Summary and Waste Management Instructions

Guidance provided by EPA's Management of Remediation Waste Under RCRA (EPA 530-F-98-026), Determination of When Contamination is Caused by Listed Hazardous Waste states:

> "Where a facility owner/operator makes a good faith effort to determine if a material is a listed hazardous waste but cannot make such a determination because documentation regarding a source of contamination, contaminant, or waste is unavailable or inconclusive, EPA has stated that one may assume the source, contaminant or waste is not listed hazardous waste and therefore, provided the material in question does not exhibit a characteristic of hazardous waste, RCRA requirements do not apply."

There are no records of U- and/or P-listed spills that would require wastes from 14-001 (a,b,c,d,e) to be listed. F-listed sources are associated with specific processes and operations. There is no documented evidence that any of the following processes/operations have occurred at the Laboratory:

- Production and manufacturing of tr6-, tetra- or pentachlorophenol, or tetra-, penta- or hexachlorobenzene (F020, F021, F022, F023, F027, F028)
- Aliphatic hydrocarbon production (F024, F025)
- Wood preserving (F032, F034, F035)
- Petroleum refining (F037, F038)

These F-listings are not applicable to waste from 57-006 and 57-007.

Most K-listed sources are industrial in nature and not typical of Laboratory operations. The Laboratory generates only small amounts of K-listed wastes, primarily spent carbon from high explosives processing that is disposed off-site. The documented amounts of K-listed wastes generated at LANL are not sufficient to have impacted activities at 57-006 and 57-007.

The IDW from the aggregate site may be managed as non-hazardous. Refer to the WCSF for detailed waste management instructions.

Documents Reviewed

Document Title	Date	ER ID No.
LA-UR-96-1062; ERID-053801, RFI Report for TA-57: PRSs 57-001(b,c), 57-002, 57-004(a), 57-006, 57-007 [SAP 57-001(b)]	April, 1996	53801
PRS Database :http://wesweb.lanl.gov/PRS/PRSMain.asp	July 2010	NA

Review/Approval

ADEP Representative:	**Date:** 6-30-14
ENV-CP Environmental Professional	**Date:** 6/30/14