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Environmental Restoration Project
Standard Operating Procedure

for:

Waste Characterization

Los Alamos
NATIONAL LABORATORY

Los Alamos, New Mexico 87545

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Waste Characterization

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Waste Characterization

1.0 PURPOSE

This standard operating procedure (SOP) describes the development of a strategy for characterizing wastes generated during projects performed at the Los Alamos National Laboratory (the Laboratory) by the Environmental Restoration (ER) Project. Specifically, this document (1) identifies the steps involved in waste identification and characterization as delineated by Laboratory requirements, and (2) provides instructions for completing a Waste Characterization Strategy Form (WCSF), a task that is required prior to every project.

2.0 SCOPE

This SOP is a mandatory document and shall be implemented by all ER Project participants when preparing a WCSF for the ER Project (this shall be done prior to performing any activities that generate waste). These activities include, but are not limited to, site investigations, corrective actions, drilling projects, closures, and decommissioning activities.

This SOP shall be used in conjunction with current Laboratory Implementation Requirements (LIRs) and Laboratory Implementation Guidance (LIG) documents associated with waste characterization and management. This SOP shall also be used in conjunction with the Laboratory's current Waste Acceptance Criteria (WAC) document, found at http://swo.lanl.gov/FMU-64_Controlled_Documents/, and ER Project SOPs, located at http://erinternal.lanl.gov/home_links/Library_proc.shtml. These documents include

- ER-SOP-1.06, Management of Environmental Restoration Project Wastes
- LIG 404-00-02.0, Acceptable Knowledge Guidance
- LIG 404-00-03.0, Waste Profile Form Guidance
- LIG 404-00-04.0, Chemical Waste Disposal Request Guidance
- LIG 404-00-05.0, Preparing the Waste with No Disposal Path Approval Package
- LIR 404-00-02.3, General Waste Management Requirements
- LIR 404-00-03.1, Hazardous and Mixed Waste Requirements
- LIR 404-00-04.1, Managing Solid Waste
- LIR 404-00-05.2, Managing Radioactive Waste
- LIR 404-00-06.1, Managing Polychlorinated Biphenyls

- LANL Waste Acceptance Criteria document

Note: Subcontractors performing work under the ER Project's quality program shall follow this SOP for waste characterization or may use their own procedure(s) as long as the substitute meets the requirements prescribed by the ER Project Quality Management Plan, and is approved by the ER Project's Quality Program Project Leader (QPPL) before the commencement of the designated activities.

3.0 TRAINING

- 3.1 ER Project personnel using this SOP are trained by reading the procedure and all applicable LIRs, LIGs, ER Project SOPs, and the Laboratory's WAC (see list in section 2.0).
- 3.2 The training shall be documented at <http://erinternal.lanl.gov/Training/Trainingmain.shtml> in accordance with QP-2.2.
- 3.3 The **Field Team Leader** (FTL) shall monitor the proper implementation of this procedure and ensure that relevant team members have completed all applicable training assignments in accordance with QP-2.2.

4.0 DEFINITIONS

Note: A glossary of definitions is located on the ER Project internal home page <http://erinternal.lanl.gov/WritingGuide.shtml>.

The definitions below include the reference document from which they were derived.

- 4.1 *Acceptable knowledge (AK)* — Waste-stream characterization method that can be used to meet all or part of the waste analysis requirements for the waste media. This method may include documented process knowledge, supplemental waste analysis data, and/or facility records of analysis (LIR 404-00-03.1 and LIG 404-00-02.0).
- 4.2 *Acute hazardous waste* — Waste that has an Environmental Protection Agency (EPA) hazardous waste number [designated with an *H* in the hazard code column of Title 40, Code of Federal Regulations (40 CFR), Chapter 1, Part 261 (§261.31-33)].
- 4.3 *By-product material* — Radioactive material from producing or processing nuclear materials (ER-SOP-1.06).
- 4.4 *Characterization* — Determination of a waste's physical, chemical, and radiological characteristics with sufficient accuracy to permit proper

segregation, treatment, storage, and disposal according to the final treatment, storage, and disposal (TSD) facility's WAC (LIG 404-00-02.0).

- 4.5 Environmental media — Soil, rock, sediment, surface water, groundwater, and borehole cuttings and core that are displaced during a corrective action (ER-SOP-1.06).

Note: The *mixture* and *derived-from* rules do not apply to environmental media.

- 4.6 Hazardous waste — Solid waste that is not excluded from regulation as a hazardous waste and is a listed hazardous waste or a waste that exhibits any of those characteristics (ignitability, corrosivity, reactivity, or toxicity) (LIR 404-00-03.1).

- 4.7 Investigation-derived waste (IDW) — Solid or hazardous waste managed as a result of investigation/characterization corrective action activities (ER-SOP-1.06).

- 4.8 Less-than-90-day (<90 day) accumulation area — {40 CFR §262.34} A designated space for accumulating hazardous or mixed waste in containers or tanks; the waste may not remain in the accumulation area longer than 90 days (LIR 404-00-03.1).

- 4.9 Mixed waste — Waste containing both *hazardous* and *source, special nuclear, or by-product* materials subject to the Atomic Energy Act of 1954 (LIR 404-00-03.1).

- 4.10 Polychlorinated biphenyl (PCB) — Any chemical substance that is limited to the biphenyl molecule that has been chlorinated to varying degrees, or any combination of substances which contains such substance (ER-SOP-1.06).

- 4.11 PCB remediation waste — Waste containing PCBs as a result of a spill, release, or other unauthorized disposal, at the following concentrations:

- Materials disposed of prior to April 18, 1978, that are currently at concentrations greater than or equal to 50 ppm PCB, regardless of the concentration of the original spill;
- Materials that are currently at any volume or concentration where the original source was greater than or equal to 500 ppm PCB beginning on April 18, 1978, or greater than or equal to 50 ppm beginning on July 2, 1979; and
- Materials that are currently at any concentration if the PCBs are spilled or released from a source not authorized for use under 40 CFR, Chapter 1, Part 761 (ER-SOP-1.06).

Note: PCB remediation waste means soil, rags, and other debris generated as a result of any PCB spill cleanup, including but not limited to:

- Environmental media containing PCBs, such as soil and gravel, dredged materials (e.g., sediments), settled sediment fines, or aqueous decantate from sediment.
- Sewage sludge containing less than 50 ppm PCB and not in use according to 40 CFR §761.20(a)(4); PCB sewage sludge; commercial or industrial sludge contaminated as the result of a spill of PCBs, including sludges located in or removed from any pollution control device; or aqueous decantate from an industrial sludge.
- Buildings and other man-made structures (such as concrete floors, wood floors, or walls contaminated with leaking PCBs, or PCB-contaminated transformers), porous surfaces, and non-porous surfaces.

4.12 Recycled — A material that is used, reused, or reclaimed. Material is *reclaimed* if it is processed to recover usable products or if it is regenerated. A material is *used* or *reused* if it is either employed as an ingredient in a n industrial process to make a product or employed in a particular function or application as an effective substitute for a commercial product (LIR 404-00-03.1).

4.13 Satellite accumulation area — {40 CFR §262.34} A space designated for accumulating hazardous and mixed waste where the volume of hazardous waste may not exceed 55 gal. and where the volume of acutely hazardous waste may not exceed 1 quart (LIR 404-00-03.1).

4.14 Solid waste — Any garbage; refuse; sludge from a waste treatment plant, or air-pollution-control facility; and other discarded material including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations and from community activities (LIR 404-00-04.1).

4.15 Source material — Material containing any combination of uranium or thorium in any physical or chemical form or ores containing 0.05% or more uranium, thorium, or both (ER-SOP-1.06).

Note: *Source material* excludes special nuclear material.

4.16 Special nuclear material — Plutonium or uranium enriched to a higher-than-natural assay. Special nuclear material includes plutonium-239, uranium-238, uranium containing more than the natural abundance of uranium-235, or any material artificially enriched in one of these isotopes (ER-SOP-1.06).

4.17 Special waste —The following are types of solid waste that have unique handling, transportation, or disposal requirements to assure protection of the

environment as well as the public health, welfare, and safety (LIR 404-00-04.1).

Note: *Special waste* includes treated formerly characteristic hazardous waste, asbestos waste, ash, infectious waste, sludge, industrial solid waste, spill of a chemical substance or commercial product, dry chemicals that become characteristically hazardous waste when wetted, and petroleum-contaminated soils.

4.18 *Special waste storage area* — A designated space for accumulating New Mexico special waste of any volume; the waste may not remain in the accumulation area longer than 90 days (LIR 404-00-04.1).

4.19 *Waste generator*— An ER Project person, by site, whose act or process produces hazardous waste or whose act first causes a a hazardous waste to become subject to regulation.

Note: With regard to ER Project activities, the waste generator is usually the FTL in charge of the field project. This individual is also responsible for the characterization of all waste generated during a field project.

5.0 BACKGROUND AND PRECAUTIONS

5.1 This SOP shall be used in conjunction with all Laboratory-wide waste-management LIRs and LIG documents, for all wastes generated by the ER Project, with the following exceptions:

- Municipal refuse and routine office trash,
- Wastes managed by another Laboratory group under a Facility Tenant Agreement, or
- Wastes managed by the Laboratory's maintenance contractor.

5.2 Documentation and characterization requirements beyond those described in this procedure may exist for the Laboratory's TSD facilities or off-site TSD facilities. Refer to the appropriate on-site or off-site WAC document for specific requirements.

5.3 Either the waste generator or the Waste Management Coordinator shall verify the most recent documentation requirements and facility WAC prior to waste characterization.

5.4 Conflicting requirements between this document and other regulations or criteria shall be resolved by implementing the requirements that are driven by regulation.

6.0 RESPONSIBLE PERSONNEL

The following personnel are responsible for activities identified in this procedure.

- 6.1 FTL — The ER Project Team Leader who is responsible for the field project that will generate waste and who is a reviewer and signatory on completed WCSFs.
- 6.2 Waste Management Coordinator (WMC) — That person responsible for coordinating waste-management activities on behalf of waste generators, line managers, Facility Managers, Field Project Leaders, the Waste Management Groups, and other Laboratory organizations. The WMC prepares, or is involved in the preparation of, WCSFs and Waste Profile Forms (WPFs), and is responsible for the preparation of Chemical Waste Disposal Requests (CWDRs).
- 6.3 ER Waste Management Coordinator — That person responsible for ensuring that all ER Project WCSFs are complete, address all potential waste streams for the project, and address the regulatory and WAC requirements. This individual is a designated reviewer and signatory on WCSFs.
- 6.4 Waste Services representative — That individual designated by the Laboratory's Facility & Waste Operations-Solid Waste Operations (FWO-SWO) Waste Services to review WCSFs to ensure compliance with all applicable WAC requirements. This individual is a signatory on WCSFs.
- 6.5 Regulatory Compliance Focus Area representative — That individual designated to review and approve WCSFs to ensure regulatory compliance. This individual is a signatory on WCSFs.
- 6.6 Author
- 6.7 Document Control Coordinator

7.0 EQUIPMENT

No equipment is required for the implementation of this SOP; however, the WCSF is required in order to implement the procedure.

8.0 PROCEDURE

Note: ER Project personnel may produce paper copies of this procedure printed from the controlled-document electronic file located at http://erinternal.lanl.gov/home_links/Library_proc.shtml. However, it is each person's responsibility to ensure that they are trained to and utilize the current version of this procedure. The author may be contacted if text is unclear. The Document Control Coordinator may be contacted if the author cannot be located.

Note: Deviations from SOPs are made in accordance with QP-4.2, Standard Operating Procedure Development, and documented in accordance with QP-5.7, Notebook Documentation for Environmental Restoration Technical Activities.

- 8.1 Waste streams generated during ER projects must be identified and a waste-characterization strategy formulated.
- 8.2 Waste identification is achieved by
 - identifying the potential wastes to be generated by the proposed activity, and
 - reviewing those ER Project data and reports regarding the project site that identify wastes generated by previous activities, if any.
- 8.3 Formulating a waste-characterization strategy is achieved by determining if the existing data and/or documentation for the waste stream fulfills the requirements for AK as specified in LIG 404-00-02.0.
- 8.4 If the existing data and/or documentation does *not* fulfill the requirements, determine if the existing data and/or documentation provides *any* useful information for characterizing any portion of the waste stream.
 - 8.4.1 If so, develop a sampling strategy that will complete the characterization for the waste stream.
 - 8.4.2 If not, develop a strategy for sampling and analysis that will identify and quantify all potential constituents of concern in the waste stream.
- 8.5 Based on the existing knowledge of the site and the strategy developed for each waste stream, a preliminary waste-classification determination can be made. Classifications include, but are not limited to the following categories:
 - Radioactive (including low-level and mixed low-level)
 - RCRA
 - PCB
 - Special
 - Solid

Note: Waste may be classified as a combination of the above.

Note: Requirements and guidelines for the appropriate characterization and management of wastes are provided in LIRs, LIG documents, specific ER Project SOPs and the Laboratory's WAC document, as listed in section 2.0.

Note: Wastes with no disposal path should not be generated; however, if it is unavoidable, approval must be obtained. Guidance for this process is

contained in LIG 404-00-05.0, Preparing the Waste with No Disposal Path Approval Package.

Note: A determination of when contamination has been caused by listed hazardous waste can be made when listed constituents have been detected and there are no known processes to which one can attribute the contamination. Guidance for this determination is provided in EPA memorandum "Management of Remediation Waste Under RCRA," EPA530-F-98-026, October 1998. It is advised that the ER Project's Regulatory Compliance Focus Area be consulted when making these determinations.

Note: Media contaminated with a characteristic or listed hazardous waste can be considered to no longer contain hazardous waste when it can be demonstrated that either the media no longer exhibit the characteristic or that the levels of the hazardous constituents are below site-specific health-based levels. This "contained in" determination requires the approval of the New Mexico Environment Department. Guidance for this determination is provided in ER-SOP-1.06. The ER Project's Regulatory Compliance Focus Area should be consulted when making these determinations.

8.6 Once the waste streams have been identified and a preliminary classification has been determined, the WCSF can be prepared. The WMC for the field project shall complete the WCSF. The steps for completing the WCSF are outlined below.

Note: The WCSF must be completed and approved prior to the generation of any waste on an ER project.

8.6.1 Fill in the following information at the top of page 1 of the form:

- *Project title:* Usually the same title that was given to the remediation plan.
- *Operating unit #:* Enter the operating unit number.
- *PRS #:* Enter the potential release site number.
- *Activity type:* Describe the activity that is going to occur during this project (e.g., voluntary corrective action, interim measure, etc.).
- *Field Team Leader:* Insert the name of the FTL in charge of the project.
- *Waste Management Coordinator:* Insert the name of the WMC assigned to this specific project.
- *Completed by:* Insert the name of the author of the WCSF.
- *Date:* Insert the date on which this WCSF was completed.

8.6.2 Add text for the following items on page 1:

- *Description of activity:* Describe, in detail the activity(ies) that will occur.
- *Site history and description:* Give a brief history of the site and any previous investigations or remediation activities that may have occurred there. It is helpful to attach ER Project reports, or portions thereof, that describe this in further detail; be concise.

8.6.3 In the *Characterization strategy* section, identify each anticipated waste stream and describe the strategy for its characterization in one to two paragraphs. List each waste stream in numeric order and provide the following information in the text:

- The physical form of the waste.
- Identify the anticipated regulatory classification.
- Identify the characterization approach, i.e. either by acceptable knowledge, direct sampling of the waste, existing data, etc., or a combination of characterization approaches.
- For acceptable knowledge waste streams, identify the document(s) to be used in proving the acceptable knowledge, i.e. MSDS, previous sampling results, etc., and attach those documents to the WCSF.
- If a determination has been made that a waste stream no longer contains a hazardous constituent, attach the documentation supporting this effort.
- Identify the anticipated storage and disposal method.

8.6.4 Fill in the characterization table on page 2 of the form. For each waste stream identified in the characterization strategy section of page 1, enter a waste stream number and short description (e.g., Waste #1, Soils) in a column heading. Using the rest of the table, provide the information below:

- anticipated volume,
- proposed packaging of the waste,
- regulatory classification (check the box that applies)
- method of characterization (check the box that applies)
- analytical testing to be performed (check the boxes that apply)
- existing waste profile form number (if applicable to the waste)

8.6.5 Obtain all authorized signatures and dates **after** comments and changes have been made to the WCSF.

Note: The WPF for a waste stream can be prepared at any point as long as there is enough information to adequately characterize the waste. Attach copies of all AK and analytical documentation to the WPF (LIG 404-00-03.0).

Note: Once the wastes have been generated and prepared for shipment, a Chemical Waste Disposal Request can be submitted (LIG 404-00-04.0).

8.7 Ammending the WCSF

WCSFs can be ammended when an unanticipated waste or a correction to the approved form is necessary. This can be accomplished by completing Attachment B and obtaining the required signatures.

8.8 Perform Lessons Learned

During the performance of work, ER Project personnel shall identify, document, and submit lessons learned, as appropriate in accordance with QP-3.2, Lessons Learned, located at http://erinternal.lanl.gov/home_links/Library_proc.shtml.

9.0 REFERENCES

ER Project personnel using this procedure should become familiar with the contents of the following document to properly implement this SOP:

ER Project Quality Management Plan located at http://erinternal.lanl.gov/home_links/Library_proc.htm

The following documents are cited within this procedure:

20 NMAC 4.1, New Mexico Hazardous Waste Management Regulations

20 NMAC 9.1, New Mexico Solid Waste Regulations

DOE Order 435.1, Radioactive Waste Management

EPA memorandum "Management of Remediation Waste Under RCRA," EPA530-F-98-026, October 1998

ER-SOP-1.06, Management of Environmental Restoration Project Wastes

LANL Waste Acceptance Criteria document at http://swo.lanl.gov/FMU-64_Controlled_Documents/

LIG 404-00-02.0, Acceptable Knowledge Guidance

LIG 404-00-03.0, Waste Profile Form Guidance

LIG 404-00-04.0, Chemical Waste Disposal Request Guidance
LIG 404-00-05.0, Preparing the Waste with No Disposal Path Approval Package
LIR 404-00-02.3, General Waste Management Requirements
LIR 404-00-03.1, Hazardous and Mixed Waste Requirements
LIR 404-00-04.1, Managing Solid Waste
LIR 404-00-05.2, Managing Radioactive Waste
LIR 404-00-06.1, Managing Polychlorinated Biphenyls
QP-2.2, Personnel Orientation and Training
QP-3.2, Lessons Learned
QP-4.2, Standard Operating Procedure Development
QP-4.4, Record Transmittal to the Records Processing Facility
QP-5.7, Notebook Documentation for Environmental Restoration Activities
Title 40 of the Code of Federal Regulations, Parts 260 through 299 and 761

10.0 RECORDS

The **Waste Management Coordinator** is responsible for submitting the following records (processed in accordance with QP-4.4, Record Transmittal to the Records Processing Facility) to the Records Processing Facility.

- WCSFs, with all attachments, completed and signed by the appropriate individuals
- Amendments to WCSFs

11.0 ATTACHMENTS

Attachment A: WCSF (3 pages) located at
<http://erinternal.lanl.gov/Quality/user/forms.asp>

Attachment B: WCSF Amendment Form (1 page) located at
<http://erinternal.lanl.gov/Quality/user/forms.asp>

[Using a token card, click here to record "self-study" training to this procedure.](#)

If you do not possess a token card or encounter problems, contact the RRES-ECR training specialist.

Waste Characterization Strategy Form

For instructions regarding this form, see section 8 of SOP-1.10.

Project title	
Operating unit #	
PRS #	
Activity type	
Field Team Leader	
Waste Management Coordinator	
Completed by	
Date	

Description of Activity:

Site History and Description:

Characterization Strategy:

Waste #1:

Waste #2:

Waste #3:

Waste #4:

Waste Characterization Strategy Form (continued)

CHARACTERIZATION TABLE

WASTE DESCRIPTION	Waste # ___	Waste # ___	Waste # ___	Waste # ___
Volume				
Packaging				
Regulatory classification				
Solid				
RCRA				
TSCA				
New Mexico Special				
CHARACTERIZATION METHOD				
AK: Existing Data/Documentation				
AK: from Site Characterization				
Direct Sampling of Containerized Waste				
ANALYTICAL TESTING				
Volatile Organic Constituents EPA 8260-B				
Semivolatiles EPA 8270-C				
Organic Pesticides EPA 8081-A				
Organic Herbicides EPA 8151-A				
PCBs EPA 8082				
Total Metals EPA 6010-B				
Total Cyanide EPA 9012-A				
High Explosives Constituents EPA 8330				
Asbestos				
TPH EPA 8015				
TCLP Metals (EPA 1311/6010-B)				
TCLP Organics (EPA 1311/8260 & 1311/8270)				
TCLP Pest. & Herb. (EPA 1311/8081/1311/8151-A)				
Gross Alpha (alphacounting)				
Gross Beta (beta counting)				
Gross Gamma (gamma counting)				
Tritium (liquid scintillation)				
Gamma spectroscopy				
Isotopic plutonium (chem. separation/alpha spec.)				
Isotopic uranium (chem. separation/alpha spec.)				
Total uranium (6020 ICPMS)				
Strontium-90 (beta proportional counting)				
Americium-241 (chem. separation/alpha spec.)				
Waste Profile Form #				

Waste Characterization Strategy Form (continued)

SIGNATURES		DATE
Team Leader (Print name and then sign below.)		
Regulatory Compliance Focus Area representative (Print name and then sign below.)		
ER Waste Management Coordinator (Print name and then sign below.)		
Waste Services representative (Print name and then sign below.)		
ER-SOP-01.10, R1	Los Alamos Environmental Restoration Project	

Example

This form is available online via a link from the form title in Section 11.0.

**Amendment to the
Waste Characterization Strategy Form (WCSF)**

Page of

<p>INTRODUCTION (e.g., "This amendment addresses a waste stream that was not previously addressed in the original WCSF for this project. The waste stream, which is the subject of this amendment, is... This waste stream was not addressed because... Therefore, no strategy form was prepared to address the management and disposal of this waste stream.")</p>	
<p>BACKGROUND (Briefly describe the background of the project.)</p>	
<p>WASTE DESCRIPTION (e.g., "Industrial Soil") (Give a detailed description of the waste and how this waste was generated, discovered, etc.)</p>	
<p>CHARACTERIZATION, MANAGEMENT AND DISPOSAL (Give a detailed description of how the waste will be characterized and managed, and the anticipated method of disposal. Analytical results or AK documentation should be cited and attached to this amendment.)</p>	
<p>SIGNATURES (Print name and then sign.)</p>	
<p>Field Team Leader:</p>	
<p>Regulatory Compliance Focus Area representative:</p>	
<p>Waste Services representative:</p>	
<p>ER Project Waste Management Coordinator:</p>	
<p>ER-SOP-01.10, R1</p>	<p align="center">Los Alamos Environmental Restoration Project</p>