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LIST OF TERMS

AS	Analytical Services
BOWC	Building Operations Waste Control
CP	Cutie Pie (Instrument)
DOT	U.S. Department of Transportation
GEA	Gamma Energy Analysis
HMC	Hazardous Material Control
LLW	Low-Level Waste
LO	Laboratory Operating (Procedure)
MW	Mixed Waste
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
SARP	Safety Analysis Report for Packaging
SDAR	Storage/Disposal Approval Record
TSD	Treatment, Storage, Disposal Unit
WHC	Westinghouse Hanford Company
WSCF	Waste Sampling and Characterization Facility

1.0 INTRODUCTION

1.1 PURPOSE

The Waste Characterization Plan for the Waste Sampling and Characterization Facility (WSCF) complex describes the organization and methodology for characterization of all waste streams that are transferred from the WSCF Laboratory Complex to the Hanford Site 200 Areas Storage and Disposal Facilities. The plan is a supporting document to WHC-SD-CP-PLN-025, *Low-Level Waste Certification Plan for the Waste Sampling and Characterization Facility* (Morrison 1994).

1.2 SCOPE

The Waste Characterization Plan applies only to waste that is generated in, or is the responsibility of, the WSCF Laboratory Complex. The scope of the plan is derived from the requirements found in the latest revisions of the following documents: WHC-EP-0063, *Hanford Site Solid Waste Acceptance Criteria*, current revision; Washington State Administrative Code, WAC-173-303; Title 40 of the Code of Federal Regulations (40 CFR); and WHC-CM-7-5, *Environmental Compliance Manual*.

NOTE: Waste generated at the WSCF complex typically originates from analytical or radiological procedures. Process knowledge is derived from these operations and should be considered an accurate description of WSCF generated waste. Sample contribution is accounted for in the laboratory waste designation process and unused or excess samples are returned to the originator for disposal.

2.0 PROCEDURES AND PROCESSES COMMON TO ALL WASTE STREAMS

2.1 PREPARATION OF WASTE MANAGEMENT DOCUMENTS

All low-level waste (LLW) certification procedures and quality assurance instructions shall be prepared according to guidelines established in WHC-CM-4-2, *Quality Assurance Manual*, QI 5.1, "Preparation of Quality Assurance Documents." Laboratory operating (LO) procedures shall be prepared according to WHC-CM-5-4, *Laboratory Administration*, Section 5.1, "Laboratory Procedures Instructions," or WHC-CM-5-5, *Operations - General Administration*.

Only trained and approved personnel shall prepare Hazardous Waste Manifests, Radioactive Shipment Records, Waste Storage/Disposal Requests, or other documents associated with LLW handling.

2.2 INSPECTIONS

All hazardous, radioactive and/or mixed wastes (MW) shall be accumulated or stored in satellite areas or less-than-90-day waste storage areas. These waste management areas shall be managed in accordance with LO-100-466, *Manage*

Satellite Accumulation Areas, 90-Day Accumulation Areas, and the Treatment, Storage, Disposal (TSD) Units (WHC 1994), and inspected weekly in accordance with LO-040-402, Inspection Plan for 90 day accumulation areas and Satellite Accumulation Areas in the WSCF Complex (WHC 1994).

Additional inspections, self-assessments and quality oversight functions are delineated in WHC-SD-CP-PLN-025, *Low-Level Waste Certification Plan for the WSCF Laboratory Complex*, and WHC-SD-CP-QAPP-015, *Quality Assurance Program Plan for Low-Level Waste at the WSCF Laboratory Complex* (Morrison 1994).

3.0 INDIVIDUAL WASTE STREAMS

3.1 LOW-LEVEL COMPACTIBLE WASTE

3.1.1 Description

This waste stream consists of compactible waste from laboratory areas including laboratory office paper waste, used surgeon's gloves, paper towels, tissues, rubber matting, and other assorted compactible wastes. Laboratory Operating Procedure LO-100-454, *Collect, Package and Ship Low-Level Compactible Waste* (WHC 1994), controls all phases of compactible waste handling to ensure the waste package meets the criteria established in WHC-EP-0063, current revision.

3.1.2 Radioactive Material Content Methodology

The radioactive material content of compactible waste shall be determined using dose rate readings from a Cutie Pie (CP) or equivalent instrument and the method described in Section 4.0 of this plan.

3.1.3 Physical/Chemical Characterization Methodology

Physical characterization of compactible waste shall be accomplished by using waste segregation, analytical results and/or process knowledge. Waste inventory sheets shall be used for drums containing compactible waste. When the compactible waste is transferred from a drum to an approved transfer box, a waste inventory sheet shall be filled out for the box.

Disposal of State (WAC)- or Resource Conservation and Recovery Act of 1976 (RCRA)-regulated materials is not permitted in the compactible waste stream and is strictly forbidden by administrative procedures; therefore, regulated chemical characterization of the compactible waste is unnecessary. Waste generated within the laboratory hoods may be considered mixed waste and is addressed in the following section.

3.1.4 Waste Segregation Methodology

Compactible waste shall be collected in drums inside the laboratory room. A waste inventory sheet shall be completed as the drum is filled. Compactible waste generated within the hoods, because of potential exposure to RCRA-regulated listed wastes, shall be managed as MW and collected separately.

3.1.5 Waste Handling, Packaging and Shipping Operations

In general, compactible waste containers shall be moved by Building Operations Waste Control during the day shift. (If necessary, shift operations shall move waste containers on weekends and off-shifts; packaging will be performed by qualified individuals only). The dose rate shall be measured and recorded on the waste inventory sheet, and the bag shall then be removed from the waste drum and double bagged. Full bags shall be transferred to a reusable transport box. When full, boxes shall be transported to 100-N, as part of the 100-N Compaction Program, or any other method for compaction of the contents. Future plans for the WSCF Laboratory Complex include installation of an on-site compactor or use of a commercial compactor.

Storage/Disposal Approval Record (SDAR) and WHC-EP-0063-4 or current revision instructions apply to packaging. All applicable U.S. Department of Transportation (DOT) regulations and requirements for shipping radioactive materials shall be followed when shipping compactible waste.

3.2 LOW-LEVEL NON-COMPACTIBLE WASTE

3.2.1 Description

The waste stream consists of non-compactible laboratory waste collected in DOT-approved containers or appropriate burial boxes.

Major constituents consist of small glass vials with hard plastic caps, metal planchets, glass reagent bottles, wood, steel, tools and other assorted non-compactible waste. LO-100-451, *Segregation of Laboratory Hood Wastes* (WHC 1994), and LO-100-172, *Package and Load Radioactive Low-Level Waste in a Plywood Burial Box* (WHC 1993), or LO-100-453, *Package Low-Level and Mixed Solid Laboratory Waste in a 55 Gallon Drum* (WHC 1994), control all phases of non-compactible waste handling to ensure the waste packages meet the criteria established in WHC-EP-0063.

3.2.2 Radioactive Material Content Methodology

The radioactive material content of non-compactible waste shall be determined using dose rate readings from a CP or equivalent instrument and the method described in Section 4.0 of this plan.

3.2.3 Physical/Chemical Characterization Methodology

Physical characterization of non-compactible waste shall be accomplished using waste segregation, analytical results and/or process knowledge. Waste

inventory sheets shall be used for containers containing multiple-component waste, and process knowledge shall be used for containers containing single-component waste.

Disposal of State- or RCRA-regulated materials in the non-compactible waste stream is strictly forbidden by administrative procedures as addressed in Section 3.1.3; therefore, regulated chemical characterization of non-compactible waste is unnecessary.

3.2.4 Waste Segregation Methodology

Noncompactible laboratory waste shall be segregated and collected in DOT-approved containers or in approved burial boxes, according to the type of waste stream. The major waste streams requiring segregation are metal, glass, plastic, and miscellaneous wastes. The hood waste streams that produce the above wastes shall be segregated and collected in hoods using cardboard cartons (also known as the ice cream carton). The full cardboard cartons shall be transferred to DOT-approved 55-gal drums. Miscellaneous noncompactible laboratory waste shall be collected in 55-gal drums or in approved burial boxes; a waste inventory sheet shall be used to identify waste contents.

3.2.5 Waste Handling, Packaging and Shipping Operations

Building Operations Waste Control (BOWC) shall package and ship all non-compactible waste in accordance with SDAR instructions. *Safety Analysis Report for Packaging*, WHC-SD-RE-SAP-024 (O'Brien 1983), shall be followed when shipping non-compactible waste in 55-gal drums.

3.3 ORGANIC LIQUID MIXED WASTE

3.3.1 Description

This waste stream is generated at the WSCF Laboratory during radiochemical separation procedures. Organic liquid MW shall be collected in glass bottles, inside laboratory hoods where the separation process occurs, and transferred to satellite areas (room N24, N29) for placement in shipping containers. Once accumulation reaches the 55 gallon limit or lesser quantity appropriate for labpacking, the containers will be moved to the less than 90 day storage unit prior to shipment to Central Waste Complex storage modules. LO-100-155, *Collect and Package Liquid Organic Wastes* (WHC 1993), controls all phases of organic liquid mixed waste handling to ensure the waste package meets the criteria established in WHC-EP-0063.

3.3.2 Radioactive Material Content Methodology

The radioactive material content of organic liquid MW shall be determined based on sample results and the percent radioactive profile, and measured

using total activity, gamma energy analysis (GEA), alpha/beta methods, and other appropriate analytical methods as necessary.

3.3.3 Physical/Chemical Characterization Methodology

Physical characterization is based entirely on process knowledge. Chemical characterization is based primarily on process knowledge, and in certain cases, on additional laboratory analysis. Waste from processes that generate a single waste stream shall be characterized by process knowledge; waste from processes that generate multiple waste streams in a single container shall be documented using a waste container inventory sheet listing the container contents.

3.3.4 Waste Segregation Methodology

The organic MW shall be segregated at the point of generation inside the hood by separating the organic and aqueous phases. The aqueous waste shall be collected in slurp bottles and disposed of according to LO-110-428, *Use and Change Out of Trap Bottles and Wall Traps* (WHC 1994), and the organic phase shall be disposed of in compliance with LO-100-155, *Collect and Package Liquid Organic Waste* (WHC 1993). Hoods that generate a single waste stream shall be collected in pre-labeled containers; the labels shall identify the waste's major constituents. Hoods that collect multiple waste streams in a single container shall require a waste inventory sheet to document contents. Incompatible chemicals are packaged by hazard class and shipped appropriately.

3.3.5 Waste Handling, Packaging and Shipping Operations

BOWC shall package and ship all liquid organic MW. Waste shall be lab-packed according to DOT specification packaging surrounded by an approved absorbent. An SDAR shall be requested and followed with each shipment of liquid organic mixed waste. The Safety Analysis Report for Packaging (SARP), WHC-SD-RE-SAP-024 (O'Brien 1983), shall be followed when shipping liquid organic mixed waste in DOT-approved 55-gallon drums.

3.4 AEROSOL CANS

3.4.1 Description

This waste stream consists of discarded aerosol cans from the WSCF Laboratory and other facility buildings. Aerosol cans that are from a radiological-controlled zone and that receive an unconditional radiological release shall be managed as non-radioactive waste. Those cans that cannot be released shall be disposed of as LLW or MW.

Most aerosol cans are properly emptied before becoming waste; however, some aerosol cans that are partially or completely full are identified as waste. Regardless of whether the can is full or empty, LO-100-175, *Disposal of Empty Aerosol Cans* (WHC 1994), controls all phases of aerosol can waste

handling to ensure the waste package meets the criteria established in WHC-EP-0063 (current revision).

3.4.2 Radioactive Material Contamination Methodology

The radioactive material contamination of an aerosol can that cannot be unconditionally released shall be measured by either GEA analysis of a smear sample or by direct GEA. The radioactive isotopic characterization shall then be determined using the method described in Section 4.0 of this plan.

3.4.3 Physical/Chemical Characterization Methodology

Physical and chemical characteristics shall be determined from the Material Safety Data Sheets of the discarded aerosol products.

3.4.4 Waste Segregation Methodology

Waste aerosol containers collected inside a radiological-controlled zone that receive an unconditional radiological release shall be managed as nonradioactive. Those cans that cannot be released shall be disposed of as LLW or MW. Aerosol cans collected outside a radiological-controlled zone shall be managed as non-radioactive.

3.4.5 Waste Handling, Packaging and Shipping Operations

BOWC shall package and ship all waste aerosol containers. An SDAR shall be requested and followed for packaging and disposal of aerosol container waste. A SARP, WHC-SD-RE-SAP-024 (O'Brien 1983), shall be followed when shipping waste aerosol containers in 55-gallon drums.

3.5 SOLID MIXED WASTE

3.5.1 Description

This radioactive waste stream consists of paper, rags, vials, pipettes, gloves, cleanup materials, and other miscellaneous wastes that are contaminated with a regulated chemical. Solid mixed wastes are generated during routine maintenance, process, and laboratory tasks. LO-100-451, *Segregation of Laboratory Hood Wastes* (WHC 1994), controls all phases of waste handling to ensure the waste package meets the criteria established in WHC-EP-0063 (current revision).

3.5.2 Radioactive Material Contamination Methodology

The radioactive material content of solid mixed waste shall be determined using dose rate readings from a CP or equivalent instrument and the method described in Section 4.0 of this plan.

3.5.3 Physical/Chemical Characterization Methodology

Physical characterization of the solid mixed waste shall be accomplished by waste segregation and process knowledge. Waste inventory sheets shall be used for drums that collect solid mixed waste.

Chemical characterization of the solid mixed waste shall be accomplished through specific process knowledge regarding the chemicals used in the analytical procedures generating the waste and waste designation information supplied by the customer.

3.5.4 Waste Segregation Methodology

Solid mixed waste shall be segregated, using cardboard cartons, and collected in hoods. Waste container inventory sheets shall be used as the cartons are filled and as the drums collecting solid mixed waste are filled.

3.5.5 Waste Handling, Packaging and Shipping Operations

BOWC shall package and ship all solid mixed waste in accordance with SDAR instructions. A SARP, WHC-SD-RE-SAP-024 (O'Brien 1983), shall be followed when shipping solid mixed waste containers in DOT-approved 55-gal drums.

3.6 METHODOLOGY FOR INFREQUENT OR UNFORSEEN WASTE CERTIFICATION

This section presents the methodology for certification of any waste that has not been identified in the previous sections or that is a result of activities outside normal laboratory operations. This waste stream includes laboratory and process equipment, chemicals, and assorted waste that is collected from a radiological-controlled zone and that cannot be unconditionally released. This material shall be disposed of as LLW or MW.

The chemical content of these wastes shall be determined as described in Section 3.7 of this plan. The radioactive material content shall be determined using dose rate readings from a CP or MicroR Meter instrument and the method described in Section 4.0 of this plan. Other methodologies shall be developed to characterize infrequent or unforeseen waste on an as-needed basis. These methodologies shall be in accordance with requirements found in: WHC-EP-0063 (current revision); Washington State Administrative Code, WAC-173-303; Title 40 of the Code of Federal Regulations (40 CFR); and WHC-CM-7-5, *Environmental Compliance Manual*.

Cyanide waste, D003 reactive, is not accepted by the Central Waste Complex. Concentrations of cyanide in waste at WSCF are in the low part per million range and do not meet the minimum criteria for designation under WAC 173-303-090 (7)(v) as a D003 waste.

3.7 CHEMICAL AND PHYSICAL CONSTITUENT CHARACTERIZATION

Chemical constituent characterization shall be accomplished using process knowledge, analytical results, and sampling. Mixed waste streams shall be subject to chemical constituent characterization, only if analytical results from random sampling disagree with process knowledge. This is, after all, a laboratory environment, used for defining unknown chemicals while using a specific list of chemical reagents to determine constituents. Examples of mixed waste streams are liquid organics, contaminated solid chemicals, and contaminated articles. Radionuclide characterization of these wastes shall be determined using the method described in Section 4.0 of this plan.

Physical constituent characterization shall be controlled by waste inventory sheets that list the contents of the containers.

4.0 RADIONUCLIDE CHARACTERIZATION METHODOLOGY

4.1 SOLID WASTE

The isotopic analysis performed at WSCF during routine analytical tasks, along with knowledge obtained from the standards used shall provide a radionuclide distribution profile for the laboratory waste. This radionuclide distribution profile identifies the radionuclides, by percentage, applied to the solid LLW generated at the WSCF Laboratory Complex. The radionuclide profile shall be revised annually by averaging all the previous year's analytical data from the WSCF waste sample analysis. This annual revision provides an update in the scaling factors used as part of the computer modeling described in Section 4.1.2. The methodology and calculations for this radionuclide profile shall be managed by Analytical Services (AS) Environmental Services. Please note that the computer modeling for solid waste and spent chemical reagent is utilized after analytical results of the waste as described in Section 4.1.2.

4.1.1 Nuclides Analyzed in WSCF Waste Samples

The following nuclides are suspected to be present in the waste contained in the WSCF waste system. These nuclides are those isotopes believed to be historically present on the Hanford Site as a result of reactor and fuels processing. The isotopes listed do not include those decayed beyond analytical limits because the producing facilities have been shutdown for a time period long enough for decay to occur. A portion of the following list includes those isotopes present as a result of standards or other calibration activity generated within the laboratory as a required routine operation. Included with this list is the analytical method used for detection of these specific isotopes.

	Nuclide	Analysis Method
	³ H	Liquid Scintillation Counting
*	¹⁴ C	Liquid Scintillation Counting
	⁶⁰ Co	Gamma Energy Analysis
*	⁹⁰ Sr	Total Beta Counting
	⁹⁴ Nb	Gamma Energy Analysis
*	⁹⁹ Tc	Liquid Scintillation Counting
*	¹²⁹ I	Gamma Energy Analysis
	¹³⁷ Cs	Gamma Energy Analysis
*	¹⁴⁷ Pm	Liquid Scintillation Counting
	¹⁵² Eu	Gamma Energy Analysis
	total U	Phosphorescence
	²³⁷ Np	Total Alpha Counting / Alpha Energy Analysis
	²³⁸ Pu	Total Alpha Counting / Alpha Energy Analysis
	^{239/40} Pu	Total Alpha Counting / Alpha Energy Analysis
	²⁴¹ Am	Total Alpha Counting / Alpha Energy Analysis
	²⁴⁴ Cm	Total Alpha Counting / Alpha Energy Analysis
	²⁴⁴ Pu	Total Alpha Counting / Alpha Energy Analysis

Note: * Indicated nuclides are analyzed after chemical separation.

4.1.1.1 Uranium Scaling Factors. As described in Section 4.1.1 above, total uranium content is determined through phosphorescence analysis. However, determination of uranium isotopic distribution requires difficult mass spectroscopy. As a result, a scaling factor method shall be used that relates the mass of uranium present to uranium isotopic distribution. This uranium scaling method was developed by Carol C. Pitkoff of Tank Farms. The documentation supporting this method shall be maintained by AS Environmental Services.

4.1.2 Dose Rate Conversion (Computer Modeling)

Analytical results are used to obtain the dose rate for organic liquid waste and solid expired reagents. For other wastes (that is, solid compactible waste, solid noncompactible waste, hot cell waste) analytical analysis is not practical, therefore dose rate conversion factoring methods must be utilized. When analytical analysis is not practical, a six-point survey of the waste package shall be taken using hand-held proportional counting instrumentation (either CP or MicroR Meter). Those isotopes that cannot be measured directly by GEA shall be scaled against gamma emitters known to be present in the waste streams. The results of this six-point survey shall be converted into an activity-to-dose-rate conversion factor by utilizing the ISOSHIELD computer model.

The dose rate calculated by ISOSHIELD shall then be multiplied by the radioisotope characterization determined in Section 4.1 to determine the curie contribution of each radioactive isotope. This multiplication is performed by using the ISOCALC computer model for compactible and noncompactible solid waste, ORGCALC computer model for organic liquid waste, and SOLIDCALC for expired reagents.

These computer models described above calculate total curies, curie contribution of each radionuclide, waste category determination, limited quantity determination, packaging requirements, reportable quantity determination, total grams of fissile material and transuranic determination.

4.2 LIQUID WASTE

Liquid waste is generated within the laboratory hoods during the performance of laboratory analytical procedures. Radionuclide characterization of this liquid waste shall be accomplished by using process knowledge and sample analysis. Through process control and segregation of liquid waste within the laboratory hoods, it is known which radionuclides are most likely to be present as a result of the analytical procedure that has been performed. This process knowledge shall dictate the appropriate sample analysis to be performed on the waste. Where process knowledge is lacking, total alpha counting, GEA, and when appropriate, total beta counting, shall be performed on the liquid.

The data obtained from the sample analysis described above shall be entered into ORGCALC, a version of the ISOCALC computer model discussed in Section 4.1.3. The ORGCALC computer model calculates total curies, curie contribution of each radionuclide, waste category determination, limited quantity determination, packaging requirements, reportable quantity determination, total grams of fissile material, and transuranic determination.

5.0 REFERENCES

- 40 CFR, "Protection of Environment," *Code of Federal Regulations*, as amended.
- WHC, 1994, *Inspection Plan for <90 day Temporary Storage Areas, and Satellite Accumulation Areas in the 222-S Complex*, LO-040-402, Laboratory Operating Procedure, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1993, *Collect and Package Liquid Organic Wastes*, LO-100-155, Laboratory Operating Procedure, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1993, *Package and Load Radioactive Low Level Waste in a Plywood Burial Box*, LO-100-172, Laboratory Operating Procedure Laboratory Operating Procedure, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1994, *Disposal of Empty Aerosol Cans*, LO-100-175, Laboratory Operating Procedure, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1994, *Segregation of Laboratory Hood Wastes*, LO-100-451, Laboratory Operating Procedure, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1994, *Package Low-Level and Mixed Solid Laboratory Waste in a 55 Gallon Drum*, LO-100-453, Laboratory Operating Procedure, Westinghouse Hanford Company, Richland, Washington.

- WHC, 1994, *Collect, Package and Ship Low-Level Compactible Waste*, LO-100-454, Laboratory Operating Procedure, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1994, *Manage Satellite Accumulation Areas, 90-Day Accumulation Areas, and the Treatment Storage, Disposal (TSD) Units*, LO-100-466, Laboratory Operating Procedure, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1994, *Use and Change Out Trap Bottles and Wall Traps*, LO-110-428, Laboratory Operating Procedure, Westinghouse Hanford Company, Richland, Washington.
- Resource Conservation and Recovery Act of 1976*, as amended, Public Law 94-580, 90 Statute 2795, 42 USC 6901, et seq.
- WAC 173-303, "Dangerous Waste Regulations," *Washington Administrative Code*, as amended.
- WHC-CM-4-2, *Quality Assurance Manual*, Westinghouse Hanford Company, Richland, Washington.
- WHC-CM-5-5, *Operations-General Administration*, Westinghouse Hanford Company, Richland, Washington.
- WHC-CM-7-5, *Environmental Compliance Manual*, Westinghouse Hanford Company, Richland, Washington.
- Morrison, J. A., 1994, *Low-Level Waste Certification Plan for the WSCF Laboratory Complex*, WHC-SD-CP-PLN-025, Westinghouse Hanford Company, Richland, Washington.
- Morrison, J. A., 1994, *Quality Assurance Program Plan for Low-Level Waste at the WSCF Laboratory Complex*, WHC-SD-CP-QAPP-015, Westinghouse Hanford Company, Richland, Washington.
- O'Brien, J. H., 1983, *Safety Analysis Report for Packaging*, WHC-SD-RE-SAP-024, Westinghouse Hanford Company, Richland, Washington.
- Stickney, R. G., 1988, *Hanford Site Solid Waste Acceptance Criteria*, WHC-EP-0063 and 0063-4, Westinghouse Hanford Company, Richland, Washington.

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