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Waste Analysis Plan for the Waste Receiving and Processing Facility

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GLOSSARY

1		
2		
3		
4	ALARA	as low as reasonably achievable
5	AWMP	alternative waste management plan
6		
7	CAP	corrective action plan
8	CFR	Code of Federal Regulations
9		
10	DOE-RL	U.S. Department of Energy, Richland Operations Office
11		
12	Ecology	Washington State Department of Ecology
13	EPA	U.S. Environmental Protection Agency
14		
15	GEA	gamma energy analysis
16		
17	IPAN	imaging passive/active neutron
18		
19	LDR	land disposal restriction
20		
21	MSDS	material safety data sheet
22		
23	NDA	nondestructive assay
24	NDE	nondestructive examination
25		
26	PCB	polychlorinated biphenyl
27	PES	performance evaluation system
28	pH	negative logarithm of the hydrogen-ion concentration
29	PNNL	Pacific Northwest National Laboratory
30	PPE	personal protective equipment
31		
32	QA/QC	quality assurance and quality control
33		
34	RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
35		
36	SWITS	solid waste information tracking system
37		
38	TRU	transuranic
39	TSD	treatment, storage, and/or disposal
40		
41	WAC	Washington Administrative Code
42	WAP	waste analysis plan
43	WRAP	Waste Receiving and Processing Facility

METRIC CONVERSION CHART

The following conversion chart is provided to the reader as a tool to aid in conversion.

Into metric units

Out of metric units

If you know	Multiply by	To get	If you know	Multiply by	To get
Length			Length		
inches	25.40	millimeters	millimeters	0.0393	inches
inches	2.54	centimeters	centimeters	0.393	inches
feet	0.3048	meters	meters	3.2808	feet
yards	0.914	meters	meters	1.09	yards
miles	1.609	kilometers	kilometers	0.62	miles
Area			Area		
square inches	6.4516	square centimeters	square centimeters	0.155	square inches
square feet	0.092	square meters	square meters	10.7639	square feet
square yards	0.836	square meters	square meters	1.20	square yards
square miles	2.59	square kilometers	square kilometers	0.39	square miles
acres	0.404	hectares	hectares	2.471	acres
Mass (weight)			Mass (weight)		
ounces	28.35	grams	grams	0.0352	ounces
pounds	0.453	kilograms	kilograms	2.2046	pounds
short ton	0.907	metric ton	metric ton	1.10	short ton
Volume			Volume		
fluid ounces	29.57	milliliters	milliliters	0.03	fluid ounces
quarts	0.95	liters	liters	1.057	quarts
gallons	3.79	liters	liters	0.26	gallons
cubic feet	0.03	cubic meters	cubic meters	35.3147	cubic feet
cubic yards	0.76	cubic meters	cubic meters	1.308	cubic yards
Temperature			Temperature		
Fahrenheit	subtract 32 then multiply by 5/9ths	Celsius	Celsius	multiply by 9/5ths, then add 32	Fahrenheit

Source: *Engineering Unit Conversions*, M. R. Lindeburg, PE., Second Ed., 1990, Professional Publications, Inc., Belmont, California.

1.0 UNIT DESCRIPTION

The purpose of this waste analysis plan (WAP) is to document the waste acceptance process, sampling methodologies, analytical techniques, and overall processes that are undertaken for dangerous, mixed, and radioactive waste accepted for confirmation, nondestructive examination (NDE) and nondestructive assay (NDA), repackaging, certification, and/or storage at the Waste Receiving and Processing Facility (WRAP). Mixed and/or radioactive waste is treated at WRAP. WRAP is located in the 200 West Area of the Hanford Facility, Richland, Washington (Figures 1-1 and 1-2). Because dangerous waste does not include source, special nuclear, and by-product material components of mixed waste, radionuclides are not within the scope of this documentation. The information on radionuclides is provided only for general knowledge.

This document has been revised to meet the interim status waste analysis plan requirements of Washington Administrative Code (WAC) 173-303-300(5). When the final status permit is issued, permit conditions will be incorporated and the document will be revised.

1.1 DESCRIPTION OF UNIT PROCESSES AND ACTIVITIES

WRAP (2336-W Building) is a nonland-based unit used for the treatment and storage of waste subject to the *Dangerous Waste Regulations*, WAC 173-303. WRAP has a waste shipping and receiving area; NDE and NDA area; process area having enclosures¹ for opening, screening and sorting the contents of waste containers; restricted waste management enclosures for waste sampling, screening, and treatment; and process support, sample management, and administrative areas (Figure 1-3 through 1-6).

WRAP is designed for opening, sorting, sampling, and screening to characterize retrieved² waste; and to verify the characterization of newly generated³ containers of transuranic, low-level, and mixed waste. Limited treatment of mixed waste is provided in the process area enclosures, including deactivation (neutralization, cementing, absorption, and controlled reaction with water), stabilization (cementing, absorption, and encapsulation), and amalgamation; volume reduction of waste (i.e., supercompaction); and repackaging of waste.

Waste entering WRAP initially is segregated into low-level and transuranic waste types. This segregation is based either on prior knowledge of the waste or on information obtained by performing NDA. Waste generator information on the physical nature of the waste also might be verified by NDE and/or the chemical nature of the waste might be verified through screening or laboratory analysis. Boxed waste is brought into WRAP for NDE and/or NDA and is not transferred to the process area. Waste in metal drums brought into WRAP is examined by NDA or NDE or sent directly to the process area if sufficient information already exists for the waste. Waste intended for processing or additional verification within WRAP is transferred to the process area. Low-level waste is taken to the low-level process gloveboxes and transuranic waste is taken to the transuranic process gloveboxes. The waste is

¹ The enclosures in the process area are referred to as containment enclosures and are commonly called gloveboxes and could be referred to as such in this document.

² Retrieved waste is defined as waste that has unknown, suspect, or limited characterization contents and has been retrieved from the Hanford Facility (e.g., Low-Level Burial Grounds or from other locations). All retrieved waste, after being characterized, is newly generated waste.

³ Newly generated waste is defined as waste that has been certified as to content by a generator.

sorted in these gloveboxes into compliant and noncompliant⁴ fractions. Compliant waste is waste that can be disposed without further treatment or repackaging. Field screening and sampling might be conducted within the gloveboxes to perform verification or to establish if a particular item is compliant. Noncompliant items are transferred to the low-level or transuranic restricted waste management gloveboxes. Additional field screening or sampling could occur in these gloveboxes to complete verification or assist in completion of characterization of the waste. Noncompliant waste material also could be treated in the restricted waste management gloveboxes to meet land disposal restriction (LDR), 40 Code of Federal Regulations (CFR) 268 or other requirements. If sampling is necessary to verify treatment requirements, this will be conducted in the restricted waste management gloveboxes. Compliant waste, treated waste, and waste awaiting future treatment are transferred out of WRAP. Waste is examined using NDE before leaving WRAP if additional quality assurance (QA) verification is required. NDA is performed on waste exiting WRAP if the waste was sorted or combined such that a new radionuclide inventory must be determined for the waste container.

Additional description can be found in Chapter 2.0 of the *Hanford Facility Dangerous Waste Permit Application, Waste Receiving and Processing Facility* (DOE/RL-91-16).

1.1.1 How Waste is Accepted, Moved, Processed, and Managed

The following sections and the flowchart on page F2-1 describe the process for waste acceptance and the different types of information and knowledge reviewed/required during the acceptance process. The process for management of waste is described in Chapter 4.0 of the WRAP dangerous waste permit application documentation (DOE/RL-91-16).

1.1.1.1 Narrative Process Descriptions

The onsite generating units, offsite generators, and treatment, storage, and/or disposal (TSD) units transferring waste to WRAP hereafter are referred to as the 'generator' unless otherwise denoted in this WAP.

Waste that does not meet LDR requirements, as specified in 40 CFR 268 and WAC 173-303-140, is stored in WRAP until the waste is processed for repackaging or further treatment. Unless excepted or otherwise discussed in Section 2.1.3 of this WAP, the WRAP operating record contains information necessary to meet LDR requirements (Sections 2.1.3.2 and 7.4). Containerized waste that is not fully characterized or is awaiting analytical results can be stored in WRAP (DOE/RL-91-16). The Hanford Facility is required to test certain mixed waste depending on the type of treatment standard to ensure that the waste or treatment residuals are in compliance with applicable LDR requirements (Section 2.1.3.2 and 4.5). Such testing is performed according to the frequency specified in this WAP.

1.1.1.2 Waste Acceptance Process

WRAP waste acceptance process consists of following activities:

- Waste Stream Approval. The generator provides information concerning each waste stream on a waste profile sheet. The waste stream information is reviewed against the WRAP waste acceptance

⁴ Noncompliant waste refers to materials that cannot be accepted for transportation or disposal without further processing and does not refer to noncompliance with WAC 173-303.

criteria. However, waste that previously was accepted at a Waste Management Project operated TSD unit does not require the development or redevelopment of a waste profile and is exempt from the waste stream approval function. If the waste stream information is sufficient and meets the applicable acceptance criteria, the waste stream is approved⁵. In addition, the initial verification frequency for the waste is determined in accordance with the requirements found in the performance evaluation program (PES) (Section 1.1.1.3). For a more complete description of the waste stream approval process, refer to Section 2.1.1.

- Waste Shipment Approval. The generator provides specific data for each waste. The container data are reviewed against the waste profile sheet data and the WRAP acceptance criteria before being approved for shipment. In addition, the WRAP operating organization, hereafter referred to the 'WRAP operating organization or its representative', determines if any of the containers require verification based on the verification frequency as determined by PES. For a more complete description of the waste shipment approval process, refer to Section 2.1.2.
- Verification. Verification activities include container receipt inspection and also could include physical screening, and/or chemical screening. All containers received at WRAP are receipt inspected before acceptance and a percentage of waste containers are selected for physical and/or chemical screening during the waste shipment approval process. These containers can be inspected visually, verified by NDE, or sampled for field or laboratory analysis to confirm that the waste matches the waste profile and container data information supplied by the generator. Any discrepancies between the verification results and the waste profile sheet must be resolved before final acceptance at WRAP in accordance with the conformance issue resolution process found in Section 1.1.1.3.3.

1.1.1.2.1 Types of Acceptable Knowledge

When collecting documentation on a waste stream or container, the WRAP operating organization or representative must determine if the information provided by the generator is acceptable knowledge. Acceptable knowledge requirements are met using any one or a combination of the following types of data:

- Mass balance from a controlled process that has a specified input for a specified output
- Material safety data sheets (MSDSs) on unused chemical products
- Test data from a surrogate sample
- Analytical data on the waste or a waste from a similar process.

In addition, acceptable knowledge requirements can be met using a combination of analytical data or screening results and one or more of the following:

- Interview information
- Logbooks
- Procurement records
- Qualified analytical data
- Radiation work package
- Procedures and/or methods
- Process flow charts

⁵ Approved waste profiles will be retained in the Operating Record and will be made available to the regulators upon request.

- 1 • Inventory sheets
- 2 • Vendor information
- 3 • Mass balance from an uncontrolled process (e.g., spill cleanup)
- 4 • Mass balance from a process with variable inputs and outputs (e.g., washing/cleaning methods).

5
6 | If the information is sufficient to quantify constituents of regulatory concern and determine waste
7 characteristics as required by the regulations and WRAP acceptance criteria, the information is
8 considered acceptable knowledge. The WRAP acceptance criteria is defined as the requirements found
9 | in this WAP and the associated Part A, Form 3 (DOE/RL-91-16, Chapter 1.0).

10 11 **1.1.1.3 Description of Performance Evaluation System**

12 | The Performance Evaluation System (PES) determines the initial physical screening frequency of each
13 generator waste stream. PES provides a periodic status of an individual generator's performance for
14 waste received. Also, PES provides a mechanism for determining corrective actions, resolving waste
15 acceptance issues, and physical screening frequency adjustments when a problem has been discovered.

16 17 **1.1.1.3.1 Initial Physical Screening Frequency Determination**

18 The initial physical screening frequency is determined based on the following process.

- 19
20 • WRAP operating organization reviews the generator waste profile information to determine the
21 relative potential for misdesignation or inappropriate segregation based on all relevant information,
22 including any previous experience with the generator. Based on this review, WRAP operating
23 organization identifies any concerns associated with the following criteria:
24
25 – documented waste management program
26 – waste stream characterization information
27 – potential for inappropriate segregation.
28
29 • Based on the identification of concerns during the review, the WRAP operating organization
30 establishes the initial physical screening frequency for the new generator's waste stream based on the
31 following criteria:
32
33 – Initial physical screening frequency of, at a minimum, 20 percent: No concerns identified
34 – Initial physical screening frequency of, at a minimum, 50 percent: Concern(s) identified in one
35 criterion
36 – Initial physical screening frequency of 100 percent: Concerns identified in two or more criteria
37

38 **1.1.1.3.2 Monthly Performance Evaluation**

39 A performance evaluation is used to trend a generator's performance and is used to raise the generator's
40 overall group of streams physical screening frequency based on the type of issue. The evaluation should
41 be objective and should consider the conformance issues documented during the Preshipment Review
42 and Verification functions. The WRAP operating organization will: (1) perform monthly evaluations
43 based on deficiencies and conformance issues identified, (2) evaluate unsatisfactory performance for
44 corrective actions, and (3) adjust physical screening rates accordingly.
45

1.1.1.3.3 Conformance Issue Resolution

Conformance issues identified during verification could result in a waste container that does not meet WRAP waste acceptance criteria. If a possible conformance issue is identified, the following actions are taken to resolve the issue.

- WRAP operating organization compiles all information concerning the possible conformance issue(s).
- The generator is notified and requested to supply additional knowledge to assist in the resolution of the concern(s). If the generator supplies information that alleviates the concern(s) identified, no further action is required.
- Upon determination that a conformance issue has been identified, the WRAP operating organization personnel and the generator discuss the conformance issue and identify the appropriate course of action to resolve the container/shipment in question, i.e., pick another sample set, return the container/shipment, divert the container/shipment to another TSD unit that can accept the container/shipment and resolve the issue, or the generator resolves the issue at the TSD unit. If the conformance issue(s) results in the failure of a shipment, the physical screening frequency for all streams that could exhibit a similar issue(s) from the generator are adjusted to 100 percent until the issue(s) adequately can be addressed.
- On resolution of the initial conformance issue, WRAP operating organization requests the generator to provide a corrective action plan (CAP) that clearly states the reason for the failure and describes the actions to be completed to prevent re-occurrence. The generator could request a reduction in verification of additional streams that the generator believes are unaffected. This request must be accompanied by a justification that identifies why this stream(s) would not exhibit the same conformance issue.
- WRAP operating organization reviews the CAP and stream justification for adequacy. If the stream justification is adequate, WRAP operating organization could provide an alternative frequency as denoted in Section 1.1.1.3.2.

1.1.1.3.4 Process for Reducing the Physical Screening Frequency

Screening rate frequencies and changes to those frequencies could be applied to a specific waste stream, to a specific contractor, or to a specific offsite generator based on the circumstances surrounding the conformance issue. After the initial screening frequency for a given waste stream has been established or increased, the physical screening frequency can be reduced in accordance with the following process.

The physical screening frequency will be reduced in three steps. Reduction for all steps is based on the ability to demonstrate that five containers from the waste stream in question pass verification. In addition, reduction to the minimum frequency requires that the WRAP operating organization documents an acceptable evaluation of the corrective action plan. At no time will the physical screening frequency be reduced below 5 percent for waste generated onsite or below 10 percent for offsite generators.

- Step 1. Reduce frequency by a maximum of 66 percent after five containers from the waste stream in question pass verification.
- Step 2. Reduce frequency established in Step 1 by a maximum of 50 percent or to the minimum allowable, whichever results in a greater frequency after five containers from the waste stream in question pass verification.

- Step 3. Reduce frequency to the minimum allowable after five containers from the waste stream in question pass verification. The WRAP operating organization documents an acceptable evaluation of the corrective action plan.

1.1.2 Process Flow Diagram

Refer to Figure 2-1 for the WRAP waste analysis plan flowchart and Section 1.1 for a description of waste processing.

1.1.3 Operating Conditions

The following conditions and constraints apply to waste accepted at WRAP. Only waste contained in 208- and 322-liter metal drums can be received for management in the process area. The waste container weight must be known and proper handling procedures imposed to ensure safe operations. The waste container radiation dose must be known and procedures must ensure that personnel exposure is kept as low as is reasonably achievable (ALARA). The quantity of fissile material within the waste must be determined and must be low enough to prevent a criticality hazard. Liquid waste is allowed when packaged in compatible inner containers, surrounded with a sufficient quantity of sorbent to sorb the total liquid quantity of the waste package. Residual liquid is allowed when sorbent is placed in the bottom of the outer container or is dispersed among the waste in sufficient quantity to sorb the total residual-liquid content of the waste package. Containers of waste that cause pressurization must be vented. Radionuclide and dangerous waste constituent inventories in waste containers must be kept low enough to ensure that personnel emergency exposure limits are not exceeded.

The Part A, Form 3, permit application for WRAP identifies dangerous waste numbers, quantities and design capacity (DOE/RL-91-16, Chapter 1.0).

Dangerous and/or mixed waste with waste numbers not identified on the WRAP Part A, Form 3, will not be managed at WRAP. Additionally, waste for which WRAP is unable to obtain the information required by WAC 173-303-300 will not be managed in WRAP.

1.2 IDENTIFICATION AND CLASSIFICATION OF WASTE

Waste is accepted for treatment (mixed waste) and/or storage (mixed and dangerous) in WRAP except for the following waste types:

- Bulk liquid waste
- Explosive waste
- Shock sensitive waste
- Class IV oxidizer waste
- Infectious waste.

Refer to DOE/RL-91-16, Chapter 4.0 for precautions that are taken when ignitable, reactive, or incompatible waste is stored.

WRAP manages the following waste types:

- 1 • Labpack liquids
- 2 • Solids/debris
- 3 • Sludges/soils.

4
5 These waste types could be classified as transuranic, low-level, mixed, and/or dangerous. Unless
6 otherwise prohibited by this WAP, the waste could exhibit the characteristics of ignitable, toxic,
7 corrosive, and/or reactive. In addition to the waste received at WRAP for verification or processing,
8 WRAP generates mixed and dangerous waste. This waste material consists of items such as personal
9 protective equipment (PPE), rags, and spent equipment contaminated with dangerous cleaning agents,
10 lubricants, paints, or other dangerous materials. Process knowledge, field screening, or sampling and
11 analysis are used as appropriate to characterize these waste materials. Field screening and sampling are
12 in accordance with this WAP and occur at the point of waste generation or at the location where the
13 waste materials are stored.
14
15

1 |
2
3
4
5

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H98030043.273

Figure 1-1. 200 West Area Site Plan.

H98030043.3R2

Figure 1-2. Waste Receiving and Processing Facility Location.

2336-W Building

South Elevation

North Elevation

Note: To convert feet to meters, multiply by 0.3048.
To convert inches to centimeters, multiply by 2.54.

39305096.3

Figure 1-3. Waste Receiving and Processing Facility--2336-W Building (North and South Sections).

Waste Receiving and Processing Facility 2336-W Building

H98030043.5R2

Figure 1-4. Waste Receiving and Processing Facility--2336-W Building (West and East Sections).

H98030043.1

Figure 1-5. Waste Receiving and Processing Facility--2336-W Building Floor Plan.

Plan-Upper Level
(not to scale)

39305096.1R1

Figure 1-6. Waste Receiving and Processing Facility--2336-W Building Upper Level Plan.

2.0 CONFIRMATION PROCESS

The confirmation process includes completing appropriate pre-shipment reviews and verification steps and/or parameters

2.1 PRE-SHIPMENT REVIEW

Pre-shipment review takes place before waste can be scheduled for transfer or shipment to WRAP. The review focuses on whether the waste stream is defined accurately, meets the WRAP waste acceptance criteria, and the LDR status is determined correctly. Only waste determined to be acceptable for treatment and/or storage is scheduled. This determination is based on the information provided by the generator. Except for waste transfers among Waste Management Project operated TSD units, the pre-shipment review consists of the waste stream approval and waste shipment approval process. Previously accepted waste that is transferred from one Waste Management Project operated TSD unit to another does not require the development or approval of a profile. The following sections discuss the pre-shipment review process. The information obtained from the generator during the pre-shipment review, at a minimum, includes all information necessary to safely treat and/or store the waste. The pre-shipment review ensures the waste has been characterized and the data provided qualify as 'acceptable knowledge' (Section 2.1.3).

2.1.1 Waste Stream Approval Process

The waste stream approval process consists of reviewing stream information supplied on a waste stream profile and attached analysis. At a minimum, the profile requests the following information:

- Generator information (e.g., name, address, point-of-contact, phone number)
- Waste stream name
- Waste generating process description
- Radiological knowledge (e.g., classification, reportable radionuclides, characterization method)
- Chemical characterization information (e.g., characterization method(s), chemicals present, concentration ranges)
- Designation information
- LDR information including identification of underlying hazardous constituents if applicable
- Waste type information (e.g., physical state, absorbents used, inert materials, stabilizing agents used)
- Packaging information (e.g., container type, maximum weight, size)
- Attachments could consist of container drawings, process flow information, analytical data, etc.

In some cases, such as variable waste streams, the profile information could be general in nature. In

these cases, more detailed information will be gathered during the waste shipment approval process. This information is reviewed against the WRAP waste acceptance criteria to ensure the waste is acceptable for receipt. If discrepancies are found during this review, additional information is requested that could include analytical data or a sample to be analyzed. If the waste cannot be received, the WRAP operating organization will pursue acceptance of the waste at an alternative TSD unit or request the generator to pursue acceptance at an offsite facility.

On determination that the waste is acceptable, the WRAP operating organization assigns the profile to a waste management path and establishes a waste verification frequency based on the requirements found in Sections 1.1.1.3 and 2.2.2.2.

2.1.2 Waste Shipment Approval Process

For each waste transfer or shipment that is a candidate for treatment and/or storage, the generator provides the following information:

- Container identification number
- Profile number (except for waste transfers of previously accepted waste)
- Waste description
- Generator information (e.g., name, address, point-of-contact, telephone number)
- Container information (e.g., type, size, weight)
- Waste numbers
- Extremely hazardous waste or dangerous waste
- Dose rate information
- Reportable radionuclides and quantities
- Waste composition
- Packaging materials and quantities

The pertinent information is entered into Solid Waste Information Tracking System (SWITS). Figure 2-1 is the waste acceptance process.

Where potential nonconformances exist in the information provided, (i.e., waste characteristics do not match the waste profile information/WRAP waste acceptance criteria, or additional constituents are expected to be present that do not appear on the documentation), the generator is contacted by the WRAP operating organization for resolution. Refer to Section 6.0 for discussion on repeat and review frequency.

For each container, a technical review, physical screening determination, and chemical screening determination are performed as follows.

- **Technical review.** The individual container data are compared to the waste profile data to ensure the waste to be shipped to WRAP is as described by the waste profile. Every transfer or shipment is reviewed to ensure the waste meets the WRAP waste acceptance criteria.

Based on waste identification information provided, the waste designation is reviewed to ensure consistency with waste designations per WAC 173-303-070, as well as for technical accuracy to ensure the waste meets the waste acceptance criteria.

If the transfer or shipment information is found to be acceptable, the WRAP operating organization determines if any of the waste containers will be physically or chemically screened.

- **Physical screening determination.** Containers are chosen based on the methodology described in this section. The first criterion is based on whether pre-shipment review activities (document and characterization review) identify areas of potential concern. The second criterion is reviewing the current physical screening percentage ensuring that the minimum physical screening confirmation rates and stream criteria required by this WAP are met.

The number of containers initially selected for physical screening constitutes a sample set.

Individual containers within a shipment are selected based on a review of the contents listed in the associated shipment documentation.

Containers are selected at random unless variability within the stream is noted. In this case containers representing different variations are selected (e.g., wood debris vs metallic debris).

- **Chemical screening determination.** Individual containers within a shipment are selected based on a review of the contents listed in the associated shipment documentation. Containers are selected at random unless variability within the stream is noted. In this case, containers representing different variations are selected (e.g., used oil, spent solvent).

Upon determining whether the shipment will be verified, the shipment is scheduled.

2.1.3 Acceptable Knowledge Requirements

The WRAP operating organization ensures that all information used to make waste management decisions will be based on adequate characterization data, as described in the following sections. The WRAP operating organization evaluates the data to ensure that the data are adequate acceptable knowledge for management of the waste.

2.1.3.1 General Acceptable Knowledge Requirements

Adequate acceptable knowledge includes (1) general waste knowledge requirements, (2) LDR waste knowledge requirements, and/or (3) waste knowledge exceptions.

- (1) **General Waste Knowledge Requirements.** At a minimum, the generator supplies enough information for the waste to be treated and/or stored at WRAP. The minimum level of acceptable knowledge consists of designation data where the constituents causing a waste number to be assigned are quantified, and data that address any WRAP operational parameters necessary for proper management of the waste.

Where the available information does not qualify as acceptable knowledge or is not sufficient to characterize a waste for management, the sampling and testing methods outlined in WAC 173-303-110 must be used to determine whether a waste designates as toxic characteristic, corrosive, and/or contains free liquids.

If a generator's process knowledge indicates that constituents, which if present in the waste might cause the waste to be regulated, are input to a process but not expected to be in the waste, sampling

and analysis must be performed to ensure the constituents are not present above regulatory limits in the waste. This requirement can be met through chemical screening as long as the constituents of concern can be measured by the screening method. This sampling and analysis is required only for initial characterization of the waste stream.

- (2) **LDR Waste Knowledge.** Waste might be stored in WRAP while awaiting analytical results for LDR requirements. The WRAP operating record contains all information required to document that the appropriate treatment standards have been met or will be met after the waste is treated unless otherwise excepted in this section.

For the purposes of this WAP, a representative sample is required to demonstrate compliance with a concentration-based treatment standard (refer to Section 4.5). Corroborative testing for the sample could be accomplished in the following manner.

- Generators could use onsite laboratories or other laboratories to certify that the waste meets LDR requirements. For waste that does not meet LDR requirements, the generator must supply information on the treatment methods necessary to meet LDR requirements and in accordance with WAC 173-303-380(1)(j),-(k),-(n), and -(o).
- The WRAP operating organization uses these analytical data to ensure that the applicable requirements found in 40 CFR 268.7 and WAC 173-303-140(4) are met.

- (3) **Waste Knowledge Exceptions.** In some situations, full characterization of waste for cradle-to-grave management is not possible or feasible before receipt at WRAP for storage. For storage purposes, waste analysis requirements could be met through application of partial acceptable knowledge when such knowledge provides sufficient information to ensure that waste will be stored properly. Acceptable knowledge could be used to accommodate storage at WRAP for the following.

- Waste previously disposed before the effective date of the regulation that has been or will be retrieved for storage at WRAP, and for which adequate information has been obtained to ensure proper storage at WRAP.
- Waste placed in storage before the effective date of this waste analysis plan for which adequate information has been obtained to ensure proper storage at WRAP.
- Newly-generated waste for which adequate information has been obtained to ensure proper storage at WRAP.

For situations in which acceptable knowledge has been used to accommodate storage, such information will be supplemented as necessary before treatment and/or disposal of the waste.

2.1.3.2 Methodology to Ensure Compliance with Land Disposal Restrictions Requirements

All generators are subject to LDR requirements and are required to submit all information notifications and certifications described in WAC 173-303-380(1)(j)(k)(n) or (o). Mixed waste not meeting the treatment standards, but meeting the WRAP waste acceptance criteria, can be stored at WRAP (refer to Chapter 1.0, Section 1.1.1.1). The following are general requirements for offsite notifications or onsite information and supporting documentation.

- 1 • The waste is subject to LDR and the generator has treated the waste. The generator supplies the
2 appropriate LDR certification information (40 CFR 268).
- 3
- 4 • The waste is subject to LDR and the generator has determined that the waste meets theas generated.
5 The generator develops the certification based on process knowledge, and/or analytical data, and
6 supplies the appropriate LDR certification information necessary to demonstrate compliance with the
7 LDR treatment standards of 40 CFR 268 and WAC 173-303-140. State-only LDRs do not require
8 this type of certification.
- 9
- 10 • The waste is subject to LDR and requires further treatment to meet applicable treatment standard.
- 11
- 12 – The generator supplies additional information concerning the waste and details any treatment
13 necessary to meet applicable treatment standards.
- 14
- 15 – If waste is treated to meet state-only or federal LDRs at WRAP, the WRAP operating organization
16 prepares information necessary to meet WAC 173-303-380(1)(k) (refer to Section 7.4).
- 17
- 18 When demonstrating that a concentration based treatment standard has been met a representative sample
19 of the waste must be submitted for analysis. This sample could be taken by the WRAP operating
20 organization or the generator, and is required to comply with the treatment standards contained in
21 40 CFR 268.40 and 268.48.
- 22
- 23

24 2.2 VERIFICATION

25 Verification is an assessment performed by the WRAP operating organization to substantiate that the
26 waste received at WRAP is the same as represented by the analysis supplied by the generator for the
27 pre-shipment review. Verification is performed on waste received by WRAP. Verification includes
28 container receipt inspection, physical screening, and chemical screening. Waste is not accepted by
29 WRAP for treatment and/or storage until required elements of verification have been completed,
30 including evaluation of any data obtained from verification activities.

31
32 All discrepancies identified during the verification process are resolved in accordance with
33 Section 1.1.1.3.3.

36 2.2.1 Container Receipt Inspection

37 The container receipt inspection is a mandatory element of the confirmation process. Therefore,
38 100 percent of the transfers/shipments are inspected for damage and to ensure the waste containers are
39 those indicated on the documentation. This activity is a mechanism for identifying any document
40 discrepancies or damaged containers before acceptance. The container receipt inspection is performed
41 by the WRAP operating organization at WRAP or at another onsite location. The WRAP operating
42 organization will ensure that the shipment: (1) is received in good condition, (2) is the waste indicated on
43 the manifest or shipping papers, (3) has not been opened improperly after physical and/or chemical
44 screening was performed, and (4) is complete.

2.2.2 Physical Screening Process

Physical screening is considered an additional verification element. This section describes the requirement pertaining to methods, frequency, and exceptions concerning the use of physical screening as a verification activity. Physical screening could be performed before the waste is shipped to WRAP. When screening is performed at a location not within the Waste Management Project (e.g., Central Waste Complex, T Plant Complex, Low-Level Burial Grounds), unique tamper resistant seals are applied to each container examined. Selection and interpretation of the appropriate physical screening method(s) are conducted by personnel who are qualified as described in the training plan. Each physical screening method is performed by qualified personnel.

2.2.2.1 Physical Screening Methods

Each of the following physical screening methods, listed in order of preference, complies with the requirement to verify a waste. If a method other than 1 or 2 is used, the reasoning behind the method chosen must be documented in the operating record (refer to Section 3.1 for the criteria for choosing a physical screening method).

1. Visual inspection (opening the container)
2. NDE
3. NDA
4. Dose rate profile.

Refer to Section 2.2.5 for quality control pertaining to physical screening.

2.2.2.2 Physical Screening Frequency

The minimum physical screening frequency is 5 percent for onsite generating units, applied per waste stream⁶ per subcontractor per year. For offsite generators, the minimum physical screening frequency is 10 percent per waste stream per generator per year. The WRAP operating organization adjusts the physical screening frequency for generators based on objective performance criteria (refer to Section 1.1.1.3.1).

In the event that one of the containers in the original sample set fails, a second sample set of equal size, or a minimum of three additional containers, is selected from the shipment. First and second sample sets are selected using the rationale described in the pre-shipment review section (Section 2.1). A second failure in either the first or the second sample set constitutes failure of the shipment. If the second sample set passes the inspection the single failed container is considered an anomaly and the remainder of the shipment passes verification. All failed containers and shipments are dispositioned via the PES, as described in Section 1.1.1.3.

When physical screening is performed at a location not within the Waste Management Project, tamper-resistant seals are applied to each outer container examined.

⁶ The term waste stream as referred to in the context of physical screening frequencies refers to general waste groupings for treatment/disposal and should not be equated to the waste streams referred to in the waste profile discussion.

2.2.2.3 Physical Screening Exceptions

The following exceptions to the physical screening process outlined previously have been developed.

- Shielded, classified, TRU retrieved waste and remote-handled mixed waste are not required to be physically screened; however, the WRAP operating organization must perform a more rigorous documentation review and obtain the raw data used to characterize the waste (<1 percent of current waste receipts). For classified waste, it is necessary to have an appropriate U.S. Department of Energy security clearance and a need to know the information as defined by the classifying organization or agency.
- Waste that physically cannot be screened at WRAP or associated screening facility must be physically screened at the generator location (e.g., large components, containers that can not be opened, are greater than 20 mrem per hour, contain greater than 10 nanocuries per gram of transuranic radionuclides, or will not fit into the NDE unit). If no location can be found to perform the physical screening, no screening is required.
- Waste that is packaged by the WRAP operating organization is considered to have met the physical screening requirements denoted in this WAP [e.g., WRAP operating organization packaged waste that is transferred to Waste Management Project managed TSD units]. On closure of the container, tamper-resistant seals must be applied to ensure the integrity of the contents.

2.2.3 Chemical Screening Process

Chemical screening is considered an additional verification element. This section describes methods, frequency, and exceptions for chemical screening. Chemical screening could be performed by the WRAP operating organization before the waste is shipped to WRAP. After chemical screening is done, tamper-resistant seals are applied over the container opening on each outer container screened. The requirements described for tamper-resistant seals used for physical screening apply for chemical screening, as well.

Selection and interpretation of the appropriate chemical screening method(s) are conducted by personnel who are qualified as described in the training plan. Each chemical screening method is performed by qualified personnel. Unless otherwise noted, tests are qualitative, not quantitative. The objective of chemical screening is to obtain reasonable assurance that the waste received by the TSD unit is consistent with the description of the waste on the waste profile and to provide information that will be used to safely manage the waste at the TSD unit. The following tests are selected depending on the waste matrix and the applicability of the method. A minimum of three listed screening tests, including pH screening, are conducted on each sample. If less than five of the following methods are selected, the rationale is recorded by the qualified analyst.

The following tests are conducted on all samples collected for chemical screening:

- pH
- Peroxide
- Oxidizer
- Water reactivity.

Additionally, the following screening tests could be performed as needed:

- HOC (chlor-n-oil/water/soil)
- Ignitability/headspace screening for volatile compounds
- Sulfide
- Cyanide
- Paint Filter Liquids Test.

Refer to Section 2.2.5.2 for quality control pertaining to chemical screening.

2.2.3.1 Chemical Screening Frequency

At a minimum, 10 percent of the mixed waste containers verified by physical screening (Section 2.2.2.2) must be screened chemically. Although grab samples are acceptable, the WRAP operating organization obtains a representative sample.

Small containers of waste (labpacks), not otherwise identified in the exceptions, packaged in accordance with 40 CFR 264.316, 40 CFR 265.316, and WAC 173-303-161 are screened chemically in accordance with waste stream's chemical screening frequency as determined by PES (Section 1.1.1.3). Inner containers are segregated by physical appearance. At least one container from each group (or three containers if all are similar) are screened chemically.

2.2.3.2 Chemical Screening Exceptions

There are cases in which chemical screening is not required. The exceptions are as follows:

- Small containers of waste in overpacked containers (labpacks) packaged in accordance with WAC 173-303-161 and not prohibited under LDR specified in WAC 173-303-140
- Waste exempted from the physical screening requirements (Section 2.2.2.3) is exempted from chemical screening
- Commercial chemical products in the original product container(s) (e.g., off-specification, outdated, or unused products)
- Chemical containing equipment removed from service, (e.g., ballasts, batteries)
- Waste containing asbestos
- Waste, environmental media, and/or debris from the cleanup of spills or release of single substance or commercial product or otherwise known material (e.g., material for which an MSDS can be provided)
- Confirmed noninfectious waste (e.g., xylene, acetone, ethyl alcohol, isopropyl alcohol) generated from laboratory tissue preparation, slide staining, or fixing processes
- Hazardous debris as defined in WAC 173-303-040
- Other special cases could be exempted on a case-by-case basis with prior approval by Ecology.

2.2.4 Sampling for Confirmation Screening

Sampling is performed in accordance with WAC 173-303-110(2). A representative sample is obtained for chemical screening. The chemical screening methods described in Section 3.0 do not require any sample preservation methods because the screening tests are performed at the time and location of sampling, or as soon as possible thereafter. During the interim period, the samples are stored in a manner that maintains chain of custody and protects the sample composition.

The equipment requirements in Table 4-1 apply to sampling for chemical screening. In addition, the following sampling equipment could be used in sampling for chemical screening: (1) for liquids and slurries – dip, tank, bomb, and bailer samplers, as well as tube-type samplers (e.g., thin-walled Shelby tubes, split spoons, probes, pipettes); and (2) for sludges and solids – tube-type samplers (as previously mentioned) and augers; for small containers, a spoon may be used in place of a scoop.

2.2.5 Quality Assurance and Quality Control for Confirmation Process

The following QA and quality control (QC) elements are used by the WRAP operating organization to ensure confirmation activities provide sufficient data to provide an indication that waste received is as described in the shipping documentation.

2.2.5.1 Physical Screening Quality Control

This section describes the QC used by the WRAP operating organization to ensure that quality data are obtained when performing physical screening methods identified in Section 2.2.2, except visual inspection. Visual inspection does not consist of the use of instrumentation or chemical tests. Therefore, QC for visual inspection depends on appropriate training for the individual(s) performing the test. For the remaining physical screening tools (NDE, NDA, and dose rate profile), QC for these methods will be incorporated in accordance with manufacturer's instructions or site-specific protocols. If any results are questionable, those affected containers must be re-evaluated and handled appropriately.

2.2.5.2 Chemical Screening Quality Control

This section describes the QC used by the WRAP operating organization to ensure that appropriate data are obtained when performing chemical screening methods identified in Section 2.2.3.

The following applies for all chemical screening parameters.

- Each lot will be evaluated to determine that the lot is useable. Unstable reagents will be accounted for when determining the usability of the lot.
- For each lot, the source, concentration, date of receipt, lot number, and manufacturer/preparer (as applicable) will be maintained in a logbook.
- For individual chemical screening parameters, QC checks will be performed in accordance with manufacturer's instructions or site-specific protocols.

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----- Data Input to PES or from PES
----- Documentation Process

Figure 2-1. Waste Acceptance Process.

3.0 SELECTING WASTE ANALYSIS PARAMETERS

Physical and chemical screening parameters for verification must be chosen from those in Sections 3.1 and 3.2. Other sampling and analysis parameters are addressed in Section 3.3.

3.1 PHYSICAL SCREENING PARAMETERS

The following methods are approved for use in performing physical screening. These methods are listed in order of preference. If a method other than 1 or 2 is used, the reasoning behind the method selection will be documented.

(1) Visual inspection (preferred method for physical screening):

Rationale. This method meets the requirement to ensure consistency between waste containers and the accompanying shipment documentation.

Method: The container is opened and the contents are removed as needed for visual examination. Homogenous loose solids are probed to determine the presence of material not documented on the shipping documentation, or for improperly absorbed liquids. Visual observations are compared with the applicable profile information and the container specific information in the shipment documentation.

Failure criteria: A container fails the inspection for any of the following reasons;

(a) undocumented or improperly packaged waste; (b) discovery of prohibited articles or materials listed in Section 1.2; (c) discovery of material not consistent with the applicable waste stream profile; and (d) variability greater than 25 percent by volume in listed constituents (e.g., paper, plastic, cloth, metal).

(2) NDE:

Rationale. This method meets the requirement to ensure consistency between waste containers and the accompanying shipment documentation. This method also is subject to the QA checks listed in Section 2.2.5.1. Containers that are not easily amenable to visual inspection due to physical or radiological content, or facility availability, can be safely and economically examined.

Method: The container is scanned with a NDE system. Data are observed on a video monitor and captured on video tape. Personnel experienced with the interpretation of NDE imagery record their observations. These observations are compared to the contents listed on the shipping documentation.

Failure criteria: A container fails the inspection for any of the following reasons;

(a) undocumented or improperly packaged waste ; (b) discovery of prohibited articles listed in Section 1.2; (c) image data not consistent with the applicable waste stream profile; and (d) variability greater than 25 percent by volume in listed constituents (e.g., paper, plastic, cloth, metal).

(3) NDA:

Rationale. This method is available for obtaining data that can be compared with accompanying shipping documentation for consistency on containers that cannot be opened for visual inspection, and cannot be examined by NDE (e.g., high container dose rate, shielding.) The reason for selection of this method is documented.

Method. Radioactive waste is assayed in one or both of two different assay systems. The assay systems include gamma energy analysis (GEA) and imaging passive/active neutron (IPAN). Gamma emitting radionuclides are detected in the GEA assay system. This instrument determines the type and quantity of radionuclides based on their gamma energy spectrum. The IPAN uses passive and active neutron detection to determine the presence of fissionable radionuclides. Passive detection results are equated with Pu-240 and active detection results are equated with Pu-239. The curie amount of low energy gamma emitting radionuclides, other fissile and non-fissile alpha emitting radionuclides, and beta emitting radionuclides are calculated from the GEA and IPAN data and the generator supplied radionuclide information. Radionuclide ratios are calculated by dividing the activity of each radionuclide reported by the activity of the most prominent radionuclide.

Failure criteria. A container fails the assay if the difference between the reported radionuclide ratios and the measured ratios and the reported and measured curie amounts exceed 50 percent. The failure criteria are adjusted based on the density of the waste and the amount of fissionable material present.

(4) Dose rate profile:

Rationale. This method is used to obtain data that can be compared for consistency with the shipment documentation for a container. This method is used only when the previous three methods cannot be performed for technological or ALARA reasons (e.g., container size, weight, shielding, dose rate). The reason for selection of this method is documented.

Method. A portable dose rate meter is used to determine the contact dose rate at six evenly distributed points on the exterior of the waste package. The six readings obtained are recorded and averaged. The average reading is compared with the container contact dose rate recorded on the shipment documentation.

Failure criteria. If the average dose rate observed during the dose rate profile examination differs from that recorded on the shipping documentation by more than 100 percent, the container fails.

3.2 CHEMICAL SCREENING PARAMETERS

The following methods are approved for use in performing chemical screening.

(1) Ignitability and/or headspace volatile organic compound screening

Rationale: To determine the potential ignitability and the presence or absence of volatile organic compounds in waste, and to ensure personnel adequately are protected. This method is used when containers are opened for inspection. This method can be applied to any matrix:

1
2 **Method:** A sample of the headspace gases in a container is analyzed by one or more of the
3 following types of portable instrumentation: organic vapor monitor, colorimetric gas sampling
4 tubes, or a lower explosive level meter.
5

6 **Tolerance:** High organic vapor readings in matrices not documented as having volatile organic
7 content constitutes failure.
8

9 (2) Peroxide screening:
10

11 **Rationale:** To determine the presence of organic peroxides in solvent wastes, to alert personnel
12 to potential hazards, to ensure safe segregation and storage of incompatible wastes, and to confirm
13 consistency with the shipping documentation. The test is sensitive to low parts per million ranges.
14

15 **Method:** A peroxide test strip is dampened with a pipet sample of liquid waste. Solids are tested
16 by first wetting the test strip with water and contacting a small sample of the waste. A blue color
17 change indicates a positive reaction. The color change can be compared with a chart on the
18 packaging to determine an approximate organic peroxide concentration.
19

20 **Tolerance:** Peroxide concentrations greater than 20 parts per million in liquid waste constituents
21 that are known organic peroxide formers not documented as having been stabilized constitutes
22 failure.
23

24 (3) Paint filter liquids test:
25

26 **Rationale:** To verify the presence or absence of free liquid in solid or semisolid material.
27

28 **Method:** To a standard paint filter, 100 cubic centimeters or 100 grams of waste are added and
29 allowed to settle for 5 minutes. Any liquid passing through the filter signifies failure of the test.
30

31 **Tolerance:** Failure of the test in waste matrices not documented as having free liquids constitutes
32 failure of the container. Small quantities of condensate trapped in inner plastic liner folds are
33 acceptable.
34

35 (4) pH screen:
36

37 **Rationale:** To identify the pH and corrosive nature of an aqueous or solid waste, to ensure safe
38 segregation and storage of incompatible waste, and to confirm consistency with the shipping
39 documentation.
40

41 **Method:** Full range pH paper is used for the initial screening. If the initial screen indicates a pH
42 below 4 or above 10, a pH meter could be used, or a narrow range pH paper. Solids are mixed
43 with an equal weight of water and the liquid portion of the solution is tested.
44

45 **Tolerance:** pH paper for this test has a sensitivity of +/-1.0 pH units. If the pH of a matrix
46 appears to exceed regulatory limits (<2.0 or >12.5) in waste not documented as being regulated
47 for this property, the container fails the test.
48

1 (5) Oxidizer screen:

2
3 **Rationale:** To determine if a waste exhibits oxidizing properties to ensure safe segregation and
4 storage of incompatible waste, and to confirm consistency with the shipping documentation. This
5 test can be applied to waste liquids, solids, and semisolids.

6
7 **Method:** Acidified potassium iodide (KI) test paper is applied to solid or liquid waste. A
8 darkening of the paper is a positive indication.

9
10 **Tolerance:** This method is very sensitive to oxidizing properties. A positive indication in a waste
11 that can not be explained by documented constituents constitutes failure.

12
13 (6) Water reactivity screen:

14
15 **Rationale:** To determine if the waste has the potential to vigorously react with water, form gases,
16 or other reaction products. This information is used to ensure safe segregation and storage of
17 incompatible waste, and to confirm consistency with the shipping documentation.

18
19 **Method:** Water is added to a sample of solid or liquid waste. The solution is observed for
20 evidence of fuming, bubbling, spattering, or temperature change. These reactions are considered
21 to be positive evidence that the waste is water reactive.

22
23 **Tolerance:** A positive indication in a waste that cannot be explained by documented constituents
24 constitutes a failure.

25
26 (7) Cyanide screen:

27
28 **Rationale:** To indicate if waste could release hydrogen cyanide upon acidification near pH 2.
29 This information is used to ensure safe segregation and storage of incompatible waste, and to
30 confirm consistency with the shipping documentation.

31
32 **Method:** To a test tube or watch dish containing approximately 2 milligrams of sample, an equal
33 amount of freshly prepared ferrous ammonium citrate is added. 3 Normal hydrochloric acid is
34 used to reduce the pH of the solution to near 2.0. A deep blue color indicates the presence of
35 cyanide.

36
37 **Tolerance:** A positive indication in a waste that can not be explained by documented constituents
38 constitutes a failure.

39
40 (8) Sulfide screen:

41
42 **Rationale:** To indicate if the waste could release hydrogen sulfide upon acidification near pH 2.
43 This information is used to ensure safe segregation and storage of incompatible wastes, and to
44 confirm consistency with the shipping documentation.

45
46 **Method:** Approximately 2 milligrams of sample is added to a watch dish or test tube and enough
47 3 Normal hydrochloric acid is added to bring the pH down to near 2.0. A sulfide test strip is
48 placed in the solution. If the paper turns brown or silvery black, the presence of sulfides in the
49 sample is indicated.

1 **Tolerance:** A positive indication in a waste that can not be explained by documented constituents
2 constitutes a failure.

3
4 (9) HOC screen:

5
6 **Rationale:** To indicate whether PCBs or other chlorinated solvents are present in the waste. This
7 information is used to ensure safe segregation and storage of incompatible waste, to confirm
8 consistency with the shipping documentation, and to determine if the waste needs to be managed
9 in accordance with the regulations prescribed in the *Toxic Substance Control Act of 1976*.

10
11 **Methods:** Field organic chlorine tests appropriate to the matrix, such as those offered by the
12 Dexsil Corporation (e.g. Chlor-N-Oil, Chlor-N-Soil) are used. These screening tests are available
13 with several detection limits. At a minimum, the 50 parts per million test is performed on oily
14 matrices.

15
16 **Tolerance:** A positive indication of chlorinated organics in a waste not documented as having
17 chlorinated organic content constitutes failure.

18
19
20 **3.3 OTHER ANALYSIS PARAMETERS**

21 Parameters needed to meet other waste characterization needs for waste stored and/or treated at WRAP
22 are identified in Appendix A.

1
2
3
4
5

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4.0 SELECTING SAMPLING PROCEDURES

Specific sampling procedures and techniques depend on both the nature of the material and the type of packaging. This section describes the sampling methodology used to obtain representative samples.

4.1 SAMPLING STRATEGIES

Table 4-1 contains waste forms and sample equipment used to sample referenced waste. Sampling of these waste forms is performed in accordance with Table 4-1.

4.2 SAMPLING METHODS

The appropriate personnel are responsible for arranging all sampling and laboratory support for sample analysis. Samples are processed at one of several laboratories qualified to perform analysis of waste samples (refer to Section 5.0). Sampling methods are those described in WAC 173-303 110(2).

The basic sampling sequence is as follows:

- Obtain a unique sample number and complete the sample tag before sampling
- Obtain a precleaned sampler and sample bottles
- Attach sample label to sample bottles
- For sampling liquid waste, a sampler or pipet will be used to sample for two phase liquids. Homogeneous liquids in small containers will be poured into a sample bottle
- For sampling solid waste, use a scoop, trier, or hand auger to obtain a sample of the waste. For large containers of waste, composite several augers or scoops to ensure samples are representative
- Fill sample containers in the following sequence: volatile organics, semivolatile organics, metals, ignitability, pH (corrosivity)
- For solid waste, wipe the exterior surfaces of the sample bottles with a dry rag
- Place samples in an appropriate receptacle for transfer to the laboratory
- Complete the chain-of-custody forms
- Seal and mark the receptacle in accordance with WAC 173-303-071(3)(1)
- Transfer receptacle to the analytical laboratory as appropriate to meet sample holding times
- Properly clean and decontaminate nondisposable sampling equipment or package for return to central sampling equipment decontamination area according to onsite requirements.

4.3 SELECTING SAMPLING EQUIPMENT

Sampling equipment selection is detailed in Table 4-1. Sampling equipment needed to sample waste is maintained and decontaminated as necessary by the WRAP operating organization.

4.4 SAMPLE PRESERVATION

Sample preservation follows SW-846 protocol or other approved sample preservation method for waste in accordance with 62 FR 62079.

4.5 ESTABLISHING QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES FOR SAMPLING

The sampling team ensures all samples are labeled with a unique identifier.

Sample collectors prepare a permanent log of sampling activities. Log entries include as appropriate: date of collection, time of collection, location, batch number, sample number, tank number, copy of the chain-of-custody form, sampling methodology, container description, waste matrix (liquid), description of generating process (e.g., decontamination activities), number and volume of samples, field observations, field measurements (e.g., pH, percent lower explosive limit), laboratory destination and laboratory number, and signature. These log entries are made by the appropriate personnel⁷ while the sampling is performed. The logs are permanent records of the TSD unit and must be retained in the Operating Record. If sampling is conducted in a posted radiological zone, the logbook entries could be made by a person who is outside the zone or by the sampler immediately after the sampling is completed. The sampling logs described are kept in accordance with standard industrial data recording practices.

A chain-of-custody record accompanies samples at all times. The record contains a unique sample number for each sample, date and time of collection, sample type, sample location, methods of transfer, and signatures (or electronic equivalent, e.g., signature password) of the collector and all subsequent custodians.

During all sampling activities, strict compliance with applicable industrial hygiene and safety standards is mandatory. If samplers accidentally contact waste material and sampling personnel, decontamination of sampling personnel is performed immediately. Transportation of samples is performed in accordance with all applicable Hanford Site and U.S. Department of Transportation requirements.

The following QA/QC elements are used by the WRAP operating organization to ensure sampling activities for designation purposes result in acceptable laboratory data:

- Representative sampling methods as defined by WAC 173-303-110(2), 40 CFR 261 Appendix I, and/or SW-846 Chapter 9
- Appropriate sample containers and equipment
- Samples numbered

⁷ The term 'appropriate personnel' is defined as the sampler or a person directed by the sampler.

- 1 • Traceable labeling system
- 2
- 3 • Field QA/QC samples (applicable sampling and analysis plan)
- 4
- 5 • Equipment calibration (current as appropriate)
- 6
- 7 • Chain of custody.

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Table 4-1. Waste Receiving and Processing Facility Chemical Screening Sampling Equipment.

Waste form	Reference in SW-846	
	Waste type	Equipment*
Liquids	Free-flowing liquids and slurries	COLIWASA, SW-846, Chapter 9, glass thief or pipet
Solidified liquids	Sludges	Trier, SW-846, Chapter 9, scoops and shovels
Sludges	Sludges	Trier, SW-846, Chapter 9, scoops and shovels
Soils	Sand or packed powders and granules	Auger, SW-846, Chapter 9, scoops and shovels
Absorbents	Large-grained solids	Large trier, SW-846, Chapter 9, scoops and shovels
Wet absorbents	Moist powders or granules	Trier, SW-846, Chapter 9, scoops and shovels
Process solids and salts	Moist powders or granules	Trier, SW-846, Chapter 9, scoops and shovels
	Dry powders or granules	Thief, SW-846, Chapter 9, scoops and shovels
	Sand or packed powders and granules	Auger, SW-846, Chapter 9, scoops and shovels
	Large-grained solids	Large trier, SW-846, Chapter 9, scoops and shovels
	Moist powders or granules	Trier, SW-846, Chapter 9, scoops and shovels
Ion exchange resins	Dry powders or granules	Thief, SW-846, Chapter 9, scoops and shovels
	Sand or packed powders and granules	Auger, SW-846, Chapter 9, scoops and shovels

COLIWASA = composite liquid waste sampler.

* other ASTM approved equipment could be used to collect samples.

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5.0 SELECTING A LABORATORY, LABORATORY TESTING, AND ANALYTICAL METHODS

QC will be applied in implementing both sampling and analytical techniques. Specific performance standards for QA and QC methods for individual sampling and analysis activities are dynamic and are revised as warranted to reflect technological advances in available, appropriate techniques. These performance standards are described in policies maintained and used at WRAP and are available for review by regulators upon request.

These sampling and analytical quality practices help ensure that the data obtained are precise and accurate for the waste stream being sampled. The analytical results are used by operations management to decide whether or not to accept a particular waste and, on acceptance, to determine the appropriate method of treatment, storage, and/or disposal. Results also are important to ensure that the waste is managed properly and that incompatible waste is not combined inadvertently. Just as these results are important, so is the quality of these results.

5.1 SAMPLING PROGRAM

Sampling procedures for WRAP operations are described in Section 2.2.4. The selection of sample collection devices depends on the type of sample, the sample container, the sampling location, and the nature and distribution of regulated constituents in the waste. In general, the methodologies used correspond to those referenced by 40 CFR Part 261, Appendix I. The selection and use of the sample collection device are supervised or performed by a person who is thoroughly familiar with sampling protocols.

Sampling equipment are constructed of materials that are nonreactive with the waste being sampled. Materials such as glass, PVC plastic, aluminum, or stainless steel could be used. Care is taken in the selection and use of the sample collection device to prevent contamination of the sample and to ensure compatibility with waste being sampled. Individual container samples that are related and compatible could be composited before analysis.

5.2 ANALYTICAL PROGRAM

A program of analytical QC practices and procedures has been developed on the Hanford Facility to ensure that precision and accuracy are maintained throughout the laboratories. Good laboratory practices that encompass sampling, sample handling, housekeeping, and safety are maintained at onsite laboratories.

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6.0 SELECTING WASTE RE-EVALUATION FREQUENCIES

The re-evaluation (repeat and review) frequency to review profile information is yearly, or more often if the waste generation process changes.

WRAP re-evaluates a waste profile if:

- A generator notifies WRAP operating organization that the generating process has changed
- Inspection or analysis indicates that the waste received at WRAP does not match the profile and/or shipping documentation.

When a waste profile is re-evaluated, the WRAP operating organization could request the generator to do one of the following:

- Verify the current waste profile is accurate
- Supply a new waste profile
- Submit a sample for parameter analysis.

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7.0 SPECIAL PROCEDURAL REQUIREMENTS

This section discusses any special process requirements for receiving mixed waste at WRAP.

7.1 PROCEDURES FOR RECEIVING WASTE GENERATED ONSITE

In general, mixed waste received from onsite generator units is managed the same as waste received from offsite generators. Differences include, but not limited to, the following: (1) physical and chemical screening frequencies for verification (minimum percentages of 5% for waste from onsite generator units and 10% for waste from offsite generators (note that chemical screening frequency is depends on the physical screening frequency), (2) shipping documentation (Uniform Hazardous Waste Manifests are used for waste from offsite generators and waste tracking forms are used for waste from onsite generator units), and (3) LDR documentation requirements (notification for waste from offsite generators and the information contained in the notice for waste from onsite generator units).

7.2 PROCEDURES FOR RECEIVING WASTE GENERATED OFFSITE

Waste received from offsite is handled in the same manner as mixed waste received from onsite except as denoted in Section 7.1.

7.3 PROCEDURES FOR IGNITABLE, REACTIVE, AND INCOMPATIBLE WASTE

WRAP accepts ignitable, reactive, or incompatible waste (refer to Section 1.2). The following precautions are taken before ignitable, reactive, or incompatible waste is accepted at WRAP.

- Pre-shipment review and/or chemical screening identifies whether the waste is ignitable, reactive, or incompatible.
- WRAP waste acceptance criteria identifies storage requirements for ignitable, reactive, and incompatible waste, ensuring the waste is stored in a safe manner.

The types of prohibited waste not accepted at WRAP are listed in Section 1.2.

7.4 PROVISIONS FOR COMPLYING WITH FEDERAL AND STATE LAND DISPOSAL RESTRICTION REQUIREMENTS

State-only and federal LDR requirements restrict the land disposal of certain types of waste subject to *Resource Conservation and Recovery Act (RCRA) of 1976* and the *Hazardous Waste Management Act*. Waste managed on the Hanford Facility falls within the purview of these LDRs per 40 CFR 268 and WAC 173-303-140. Waste constituents that are subject to LDRs are identified in 40 CFR 268.40 and referenced by WAC 173-303-140. Waste must meet certain treatment standards, as specified in 40 CFR 268.40 and WAC 173-303-140, if the waste is to be land disposed.

Generators (as defined in the regulation) determine if LDRs apply to the waste based on knowledge or testing [40 CFR 268.7(a)]. Each waste is analyzed for those LDR constituents contained in the listed and

characteristic waste numbers identified by the generator, if the generator's knowledge is not sufficient to make a determination. If the LDR waste does not meet the applicable treatment standards, the generator (Section 1.1.1.1) provides with each shipment of waste information stating so, in accordance with WAC 173-303-380(1)(j),-(k),-(l),-(m),-(n) or -(o). If the waste meets the standards, the generator must send a certification that the waste meets the treatment standards.

7.4.1 Waste Treatment

Retrieved and newly generated waste is treated to meet LDR as specified in 40 CFR 268.40 and WAC 173-303-140 with the exception of transuranic mixed waste. Transuranic mixed waste is treated to the applicable standards required by Waste Isolation Pilot Plant or other generator requirements. WRAP potentially can pretreat certain waste before shipment to a permitted offsite facility that could perform full treatment of the specific waste to meet full LDR. Waste requiring treatment other than what WRAP can provide is repackaged, labeled, and transferred to a TSD unit for storage pending identification or development of an appropriate treatment.

LDR requirements apply to all mixed waste except a small class of state-only waste. When evaluating the treatability of certain characteristic waste, consideration must be given to any additional underlying hazardous constituents that might be found in the waste. The treatment standards, for the most part, are concentration-based. If the constituent concentrations for the waste fall below those specified in 40 CFR 268.40 and/or 268.48 for underlying hazardous constituents and in WAC 173-303-140, the waste can be land disposed without being treated. If the concentrations exceed these limits, the waste must be treated before disposal.

Specific treatments performed in WRAP include deactivation, encapsulation, stabilization, and amalgamation.

Deactivation is used to remove the hazardous characteristics of the waste due to its ignitability (D001), corrosivity (D002), solid corrosive acid (WSC2), and/or reactivity (D003). Treatment techniques include, but are not limited to, neutralization, cementing, absorption, controlled reaction with water, and macroencapsulation.

- Neutralization is the primary method of treatment for corrosive waste that has a pH ≤ 2 and/or ≥ 12.5 . Examples of bases that could be used as neutralizing agents include sodium hydroxide, calcium hydroxide, or calcium carbonate. Examples of acids that could be used to neutralize bases are hydrochloric acid and sulfuric acid.
- Absorption is the primary method of treatment for ignitable waste, which include waste that is liquid and has a low total organic carbon content (<10 percent). Absorbent material that could be used includes polyacrylates, polypropylene, polymer type, superabsorbent polymer, cellulose, or other absorbent materials meeting various disposal requirements.
- Cementing or grouting is the primary method of treatment for ignitables consisting of metal fines or other corrosive materials. These types of waste are deactivated by mixing and binding it with an inert cementitious material.
- Controlled reaction with water is the primary method of treatment for reactive materials such as sodium metal. This process will deactivate the material and allow for further disposition.

- Macroencapsulation with polyethylene plastic containers is the primary treatment for debris. For elemental lead, macroencapsulation is performed in accordance with Table 1 of 40 CFR 268.42.

Stabilization methods used at WRAP include cementing or grouting, sealing, and absorption.

Particulates and/or liquid waste containing hazardous constituents could be cemented or grouted in WRAP to meet either RCRA LDR, Waste Isolation Pilot Plant waste acceptance criteria, and/or the disposal criteria of future TSD units. These types of waste are stabilized by mixing and binding the waste with an inert material. The inert material generally used is Portland cement. When dealing with some waste streams such as sludges that might contain an inconsistent or excess liquid content, absorbent could be added to the waste to provide a drier matrix to allow identification of the proper combination of ingredients to ensure a successful stabilization effort.

Amalgamation of liquid elemental mercury (D009) is achieved using inorganic reagents such as copper, zinc, nickel, gold, and sulfur. The resultant matrix is a nonliquid, solid, or semi-solid visually inspected to verify compliance.

Treatment of state-only extremely hazardous waste (WT01, WP01, and WP03) will be performed in accordance with RCW 70.105.050(2) and/or WAC 173-303-140(4)(a) as applicable.

Waste managed in WRAP is treated to meet either concentration-based treatment standards or technology-based standards. When dealing with underlying dangerous constituents or mixtures, both standards could apply, requiring a treatment train for ultimate compliance to LDR. In most cases, stabilization treatment will be at the end of the treatment train. In some instances, as with the cementing process, treatability studies could be performed to ensure that when the waste is treated, LDR requirements are met.

Grab samples are collected on each batch of concentration-based treated waste to ensure that the treatment process was successful. Methods used to ensure compliance include visual inspection, pH, and toxicity characteristic leaching procedure. For specified technologies, the WRAP operating record will contain information to demonstrate the treatment process was well designed and well operated.

7.4.2 Sampling and Analytical Methods

If waste is sampled and analyzed to demonstrate that a federal LDR has been met, only U.S. Environmental Protection Agency methods are used. Waste is analyzed using the methods outlined in 40 CFR 268.40 and WAC 173-303-140(4)(b) or any other reliable method allowed by regulations.

Samples of waste are transferred to the sample management area for packaging and transferred to an onsite laboratory or shipped offsite to a laboratory for analysis. Samples are collected and analyzed in accordance with SW-846 or any other method allowed by regulations. Storage is provided for waste containers while waiting for laboratory analysis results.

7.4.3 Land Disposal Restriction Certification of Treatment

When LDR treatment has been completed and analytical results (if applicable per 40 CFR 268.40 and WAC 173-303-140) have verified the LDR treatment is successful, certification of the LDR treatment is required. The certification statement is prepared by the WRAP operating organization in accordance with 40 CFR 268.7. A copy of the certification is placed in the Operating Record.

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2 | When a LDR waste does not meet the applicable treatment standards set forth in 40 CFR 268.40 and
3 | WAC 173-303-140, or exceeds the application prohibition levels set forth in 40 CFR 268.32 or
4 | Section 3004(d) of RCRA, this information is placed in the WRAP operating record, in accordance with
5 | WAC 173-303-380(1)(k),-(n),-(o).

8.0 RECORDKEEPING

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2 Recordkeeping requirements that are applicable to this WAP are described in Chapter 12.0, Table 12-1,
3 *Hanford Facility Dangerous Waste Permit Application, General Information Portion* (DOE/RL-91-28)
4 and within this WAP.

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9.0 REFERENCES

- DOE/RL-91-16, *Hanford Facility Dangerous Waste Permit Application, Waste Receiving and Processing Facility*, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- DOE/RL-91-28, *Hanford Facility Dangerous Waste Permit Application, General Information Portion*, U.S. Department of Energy, Richland Operations Office, Richland, Washington, revised periodically.
- EPA SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, Third Edition, as amended, U.S. Environmental Protection Agency, Washington, D.C.
- EPA-600/4-7-020, *Methods for Chemical Analysis of Water and Wastes*, U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio.
- 62 FR 62079, *Mixed Waste Testing Guidance*, November 20, 1997.

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APPENDIX A

**ANALYTICAL PARAMETERS, METHODS, AND RATIONALE FOR WASTE RECEIVED AT
WASTE RECEIVING AND PROCESSING FACILITY**

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Analytical Parameters, Methods, and Rationale for Waste Received at
Waste Receiving and Processing Facility.

Parameter	Analytical method ^a	Media type	Rationale for selection of waste acceptance parameters	Rationale for analysis
General chemistry				
Flashpoint	1010/1020	Liquid	To provide documentation for safe storage conditions	To determine regulatory status as D001 waste, to provide proper waste designation and applicability of LDR requirements
pH	9040	Liquid, sludge	To indicate the degree of corrosivity for safe handling; to provide for proper waste designation; and to identify waste that might compromise container integrity	To determine regulatory status as D002 waste, to provide proper waste designation, applicability of LDR requirements and state-only requirements.
	9045c	Solid		
Hydroxide	9040	Liquid	To provide documentation for safe treatment and storage conditions; and to comply with WRAP waste acceptance criteria.	To provide proper waste designation and applicability of LDR requirements.
Water reactivity	Field method	Liquid, sludge	To determine whether the waste has a potential to violently react with water to form gases or generate heat; to provide documentation for safe treatment and/or storage conditions for waste designation; and to comply with WRAP waste acceptance criteria.	To provide proper waste designation; safe storage and management.
Free liquids	9095A	Liquid, sludge, solid	To determine applicability of LDRs and for characterization of appropriate treatment	To determine appropriate state-only LDR status of the waste.

Analytical Parameters, Methods, and Rationale for Waste Received at
Waste Receiving and Processing Facility.

Parameter	Analytical method ^a	Media type	Rationale for selection of waste acceptance parameters	Rationale for analysis
Cyanide	9010B/9012A	Liquid, sludge, solid	For safe storage; for proper waste designation; applicability of LDR; and characterization of appropriate treatment	To provide proper waste designation and applicability of LDR requirements.
Sulfide	9030B	Liquid, sludge, solid	For safe storage; for proper waste designation; applicability of LDR; and characterization of appropriate treatment	To provide proper waste designation and applicability of LDR requirements.
Organic analyses				
PCBs	8081A/8082	Liquid, sludge, solid	To determine proper waste designation for management of waste in accordance with the <i>Toxic Substance Control Act of 1976 (TSCA)</i> and WAC 173-303.	To provide proper waste designation and to meet TSCA and LDR requirements.
Total organic carbon	9060	Liquid, sludge, solid	To determine applicability of LDR and applicability to state-only requirements.	To provide proper waste designation and applicability to state-only requirements, to meet LDR requirements, and comply with WRAP waste acceptance criteria.
Total organic halides	9020B/9021/9022	Liquid, sludge	To determine proper waste designation and applicability to state-only requirements.	To provide proper waste designation and applicability to state-only requirements.
Persistent constituents	9075/9076/9077/ 9211/9212/9214/ 9250/9251/9253			
Total suspended solids	160.2b	Liquid, sludge	To determine applicability of LDR and status as a wastewater	To provide applicability of LDR and status as a wastewater.

Analytical Parameters, Methods, and Rationale for Waste Received at
Waste Receiving and Processing Facility.

Parameter	Analytical method ^a	Media type	Rationale for selection of waste acceptance parameters	Rationale for analysis
Volatile organic compounds	1311/8260B	Liquid, sludge, solid	To determine proper waste designation, applicability of LDRs, and characterization of appropriate treatment.	To provide proper waste designation, regulatory status, and applicability of LDR requirements.
Semivolatile organic compounds	1311/8270A	Liquid, sludge, solid	To determine proper waste designation, applicability of LDRs, and characterization of appropriate treatment.	To provide proper waste designation, regulatory status, and applicability of LDR requirements.
Chlorinated herbicides	8151A	Liquid	Not applicable	To provide proper waste designation and applicability to state-only requirements.
Inorganic analyses				
Arsenic	1311/6010B	Liquid, sludge, solid	To provide for proper waste designation, applicability of LDRs, and for characterization of appropriate treatment.	To determine proper waste designation, regulatory status as a toxic characteristic waste, and applicability of LDR requirements.
Barium	1311/6010B	Liquid, sludge, solid	To provide for proper waste designation, applicability of LDRs, and for characterization of appropriate treatment.	To determine proper waste designation, regulatory status as a toxic characteristic waste, and applicability of LDR requirements.
Cadmium	1311/6010B	Liquid, sludge, solid	To provide for proper waste designation, applicability of LDRs, and for characterization of appropriate treatment.	To determine proper waste designation, regulatory status as a toxic characteristic waste, and applicability of LDR requirements.

Analytical Parameters, Methods, and Rationale for Waste Received at
Waste Receiving and Processing Facility.

Parameter	Analytical method ^a	Media type	Rationale for selection of waste acceptance parameters	Rationale for analysis
Chromium	1311/6010B	Liquid, sludge, solid	To provide for proper waste designation, applicability of LDRs, and for characterization of appropriate treatment.	To determine proper waste designation, regulatory status as a toxic characteristic waste, and applicability of LDR requirements.
Lead	1311/6010	Liquid, sludge, solid	To provide for proper waste designation, applicability of LDRs, and for characterization of appropriate treatment.	To determine proper waste designation, regulatory status as a toxic characteristic waste, and applicability of LDR requirements.
Mercury	1311/7470	Liquid, sludge, solid	To provide for proper waste designation, applicability of LDRs, and for characterization of appropriate treatment.	To determine proper waste designation, regulatory status as a toxic characteristic waste, and applicability of LDR requirements.
Silver	1311/6010	Liquid, sludge, solid	To provide for proper waste designation, applicability of LDRs, and for characterization of appropriate treatment.	To determine proper waste designation, regulatory status as a toxic characteristic waste, and applicability of LDR requirements.
Selenium	1311/6010	Liquid, sludge, solid	To provide for proper waste designation, applicability of LDRs, and for characterization of appropriate treatment.	To determine proper waste designation, regulatory status as a toxic characteristic waste, and applicability of LDR requirements.
Nickel	6010	Liquid, sludge, solid	To determine applicability of LDRs, and for characterization of appropriate treatment.	To meet LDR requirements.

^a EPA SW-846, unless otherwise noted.

^b EPA-600/4-7-020, unless otherwise noted.

LDR = land disposal restriction.

PCB = polychlorinated biphenyls.

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