Nevada Test Site Waste Acceptance Criteria

Prepared by the

U. S. Department of Energy
Nevada Operations Office
Waste Management Division

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Nevada Test Site Waste Acceptance Criteria

**NTSWAC (Rev. 3)
December, 2000**

Prepared by the

U. S. Department of Energy
Nevada Operations Office
Waste Management Division

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To the best of our knowledge, this document is correct and the process and criteria stated within meet the U.S. Department of Energy and appropriate federal regulation requirements.

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Table of Contents

Acronyms	vi
1.0 Radioactive Waste Management at the Nevada Test Site	1-1
1.1 Purpose and Scope	1-1
1.2 Policy	1-1
1.2.1 DOE/NV Policy	1-1
1.2.2 Process	1-2
1.2.3 Waste Type	1-2
1.2.4 Regulators and Stakeholders	1-2
1.3 Requirements	1-2
1.4 Responsibilities	1-3
1.4.1 Manager	1-3
1.4.2 Assistant Manager for Environmental Management (AMEM)	1-3
1.4.3 Director, Waste Management Division	1-3
1.4.4 Radioactive Waste Acceptance Program (RWAP) Personnel	1-3
1.4.5 Director, Safeguards and Security Division	1-3
2.0 Approval Process	2-1
2.1 Generator Document Requirements	2-1
2.1.1 Waste Profiles	2-1
2.1.2 Quality Assurance Plan	2-1
2.1.3 NTSWAC Implementation Crosswalk	2-2
2.1.4 Certification Personnel List	2-2
2.1.5 Document and Personnel Changes	2-2
2.2 RWAP Review	2-2
2.2.1 Facility Evaluations	2-2
2.2.1.1 Biennial Audit	2-3
2.2.1.2 Surveillance	2-3
2.2.1.3 Program Review (PR)	2-3
2.2.2 Waste Profiles	2-4
2.2.3 Split Sampling	2-4
2.3 Approval	2-5
2.4 Suspending Approval	2-5
2.5 Assistance and Technical Support	2-6
2.6 DOE/NV Policy	2-6
2.7 Options for Low-Volume Generators	2-6

3.0	Waste Criteria	3-1
3.1	General Waste Form Criteria	3-1
3.1.1	Transuranics	3-1
3.1.2	Radionuclide Content or Concentration	3-1
3.1.3	Greater-than-Class C Waste	3-1
3.1.4	Hazardous Waste	3-2
3.1.5	Free Liquids	3-2
3.1.6	Particulates	3-3
3.1.7	Gases	3-3
3.1.8	Stabilization	3-3
3.1.9	Etiologic Agents	3-3
3.1.10	Chelating Agents	3-4
3.1.11	Polychlorinated Biphenyls (PCBs)	3-4
3.1.12	Explosives	3-4
3.1.13	Pyrophorics	3-4
3.1.14	Sealed Sources	3-4
3.1.15	Low-Level Waste Containing Asbestos	3-5
3.1.16	Radioactive Animal Carcasses	3-6
3.1.17	Low-Level Beryllium Waste	3-6
3.2	Waste Package Criteria	3-7
3.2.1	Nuclear Criticality Safety	3-7
3.2.2	Closure	3-8
3.2.3	Strength	3-8
3.2.4	Handling	3-9
3.2.5	Size	3-9
3.2.6	Weight	3-10
3.2.7	Loading (Void Space)	3-10
3.2.8	Package Protection	3-10
3.2.9	Marking and Labeling	3-10
3.2.10	Bar Coding	3-10
3.3	Mixed Waste	3-11
3.3.1	Mixed Waste Generated Within the State of Nevada	3-11
3.3.1.1	Free liquids	3-11
3.3.1.2	Treatment	3-11
3.3.1.3	Incompatible Wastes	3-11
3.3.1.4	Marking and Labeling	3-11
3.3.1.5	Containers	3-11
3.3.2	Mixed Waste Generated Outside of the State of Nevada	3-11

Nevada Test Site Waste Acceptance Criteria - Revision 3		Uncontrolled
3.4	WAC Deviations	3-12
3.5	Shipping Arrangements	3-12
3.6	Shipping Documentation	3-15
4.0	Waste Characterization	4-1
4.1	Process Knowledge	4-1
4.2	Sampling and Analysis	4-2
4.2.1	Data Validation	4-3
5.0	Quality Assurance Requirements for Waste Certification Program	5-1
5.1	Program	5-1
5.2	Personnel Training and Qualification	5-2
5.3	Quality Improvement	5-2
5.4	Documents and Records	5-3
5.5	Work Processes	5-3
5.6	Design	5-4
5.7	Procurement	5-4
5.8	Inspection and Acceptance Testing	5-5
5.9	Management Assessment	5-6
5.10	Independent Assessment	5-6
6.0	Waste Transportation and Receipt Information	6-1
6.1	Waste Transportation	6-1
6.2	Waste Receipt and Records	6-1
6.3	Funding and Forecasting	6-2
6.4	Disposition of Noncompliant Conditions	6-2
6.5	Waste Refusal	6-2
Appendix A - Waste Generator Approval Process Flow Diagram		A-1
Appendix B - Nevada Test Site Waste Profile, Revision 3, 08/2000		B-1
Appendix C - Marking and Labeling		C-1
Appendix D - Package Storage and Disposal Request		D-1
Appendix E - Radiological Waste Characterization and Reporting Requirements		E-1
Appendix F - Glossary		F-1
References		Ref-1
Figure C-1: Bar Code Label Example		C-2
Figure C-2: Package Certification Label		C-3
Figure E-1: Radiological Characterization Flow Diagram		E-8

Acronyms

ACM	Asbestos-Containing material
ALARA	As Low as Reasonably Achievable
ALLW	Asbestiform Low-Level Waste
AMEM	Assistant Manager for Environmental Management
BN	Bechtel Nevada
Bq	Becquerels
CAP	Corrective Action Plan
CAR	Corrective Action Request
CFR	Code of Federal Regulations
Ci	Curie
CSE	Criticality Safety Evaluation
DOE	U.S. Department of Energy
DOE/NV	U.S. Department of Energy/Nevada Operations Office
DOT	U.S. Department of Transportation
DQO	Data Quality Objectives
EPA	U.S. Environmental Protection Agency
ETA	Estimated Time of Arrival
GTCC	Greater-Than-Class-C
HRI	Human Readable Interpretation
LDR	Land Disposal Restrictions
LLD	Lower Limit of Detection
LLW	Low-Level Waste
LVG	Low-Volume Generator
MC&A	Materials Control and Accountability
M&TE	Measuring and Test Equipment
MW	Mixed Waste
NIC	NTSWAC Implementation Crosswalk
NRC	Nuclear Regulatory Commission
NTS	Nevada Test Site
NTSWAC	Nevada Test Site Waste Acceptance Criteria

Acronyms (continued)

PCB	Polychlorinated Biphenyls
PCL	Package Certification Label
PK	Process Knowledge
PR	Program Review
PSDR	Package Storage and Disposal Request
QA	Quality Assurance
QAP	Quality Assurance Plan
RACM	Regulated Asbestos-Containing Material
RCRA	Resource Conservation and Recovery Act
RWAP	Radioactive Waste Acceptance Program
RWMS	Radioactive Waste Management Site
SOW	Statement of Work, Scope of Work
SSC	Structures, Systems, and Components
SW-846	EPA Document SW-846, "Test Methods for Evaluation Solid Waste, Physical/ Chemical Methods"
TCLP	Toxicity Characteristic Leaching Procedure
TRU	Transuranic
UHC	Underlying Hazardous Constituents
WAC	Waste Acceptance Criteria
WARP	Waste Acceptance Review Panel
WATS	Waste Generator Assistance and Technical Support
WCO	Waste Certification Official
WCPP	Waste Certification Program Plan
WMD	Waste Management Division
WP	Waste Profile

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1.0

Radioactive Waste Management at the Nevada Test Site

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1.0 Radioactive Waste Management at the Nevada Test Site

1.1 Purpose and Scope

This document establishes the U. S. Department of Energy, Nevada Operations Office (DOE/NV) waste acceptance criteria (WAC). The WAC provides the requirements, terms, and conditions under which the Nevada Test Site (NTS) will accept low-level radioactive and mixed waste for disposal. It includes requirements for the generator waste certification program, characterization, traceability, waste form, packaging, and transfer. The criteria apply to radioactive waste received at the Nevada Test Site (NTS) Area 3 and Area 5 Radioactive Waste Management Sites (RWMS) for storage or disposal. Storage referred to in this document is limited to Area 5 RWMS classified units. The glossary defines the terms "storage" and "classified waste" as they will be used in this document.

The DOE/NV and support contractors are available to assist you in understanding or interpreting this document. For assistance, please call DOE/NV Waste Management Division (WMD): phone (702) 295-3181, fax (702) 295-1153

1.2 Policy

1.2.1 DOE/NV Policy

The DOE/NV policy is to:

- ensure safe and compliant storage and disposal of radioactive waste;
- protect the environment and personnel from chemical and radiological hazards in accordance with Title 40 Code of Federal Regulations (CFR), the Resource Conservation and Recovery Act (RCRA); Title 10 CFR 835, "Occupational Radiation Protection"; DOE Order 435.1, "Radioactive Waste Management"; and state of Nevada and applicable U. S. Department of Transportation (DOT) regulations;
- ensure that present and future radiation exposures are kept as low as reasonably achievable (ALARA) and do not exceed the radiation protection standards established in Title 10 CFR 835, "Occupational Radiation Protection";

- ensure that Quality Assurance (QA) programs are established and implemented to fulfill the requirements of DOE Order 435.1, "Radioactive Waste Management"; Title 10 CFR 830.120, "Quality Assurance" and 414.1A, "Quality Assurance", current revisions; and
- be consistent with the current revision of all applicable federal, state, and local regulations.

1.2.2 Process

Waste will be accepted from generators approved by DOE/NV. The approval process is described in Section 2.0.

1.2.3 Waste Type

Low-Level Waste (LLW) and mixed waste (MW) will be accepted for disposal at the NTS. However, to verify the current acceptance status of waste types, please contact DOE/NV WMD.

1.2.4 Regulators and Stakeholders

DOE/NV will facilitate appropriate oversight by state agencies and support the involvement of the stakeholders. Where appropriate, to the extent possible, and in accordance with applicable DOE/NV authority, DOE/NV will provide regulatory agencies and stakeholders access to information related to Nevada Test Site Waste Acceptance Criteria (NTSWAC) activities, including waste characterization data, from all generators. Upon request by such parties, arrangements may be made to observe NTSWAC-related facility evaluations and participate in other activities such as NTSWAC revisions.

1.3 Requirements

Requirements are identified by "*shall*" or "*must*." The source of the requirement is identified by a superscript number which corresponds to the reference list. Statements not identified in this manner are provided as guidance. Section 2.0 requirements do not have corresponding references because the approval process is DOE/NV policy. Section 5.0 requirements are written in accordance with DOE Order 414.1A, "Quality Assurance"; Title 10 CFR 830.120, "Quality Assurance"; and DOE/NV Policy unless otherwise noted by superscript.

1.4 Responsibilities

The following offices and personnel have responsibilities for management and acceptance of radioactive waste at the NTS. The offices identified are within the DOE/NV, unless otherwise stated.

1.4.1 Manager

Responsibilities and authorities as assigned in DOE Order 435.1.

1.4.2 Assistant Manager for Environmental Management (AMEM)

Responsible for the DOE/NV Radioactive Waste Management Program according to DOE Manual NV M 435.1-1, "Radioactive Waste Management Manual". Provides approval to waste generators to dispose or store radioactive waste at the NTS and grants any deviations from the requirements of this document. Responsible for suspension of any generator. May delegate his/her responsibilities except for approval and suspension.

1.4.3 Director, Waste Management Division

Responsible for management of radioactive waste at the NTS. Responsible for radioactive waste management operation of the Areas 3 and 5 RWMSs in compliance with applicable DOE Orders and federal and state regulations.

1.4.4 Radioactive Waste Acceptance Program (RWAP) Personnel

Responsible for development, implementation, and maintenance of RWAP program documents (i.e., NTSWAC, instructions, checklists, etc.), and for providing guidance to generators shipping radioactive waste to the NTS.

1.4.5 Director, Safeguards and Security Division

Responsible for acceptance of documentation for shipments containing "classified waste", unclassified accountable, or special nuclear material. Coordinates acceptance of "classified waste" shipments at the NTS.

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2.0

Approval Process

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2.0 Approval Process

The following criteria describe the approval process used by DOE/NV to verify that waste generators have a program in place to ensure compliant waste is shipped to the NTS.

Official interactions between the generator and DOE/NV are initiated through the generator's DOE oversight office.

Corrective Action Requests (CARs) will be issued to generator sites when conditions adverse to quality are identified.

A flow diagram of the approval process is provided in Appendix A.

2.1 Generator Document Requirements

Generators should contact DOE/NV WMD and verify that the proposed waste type can be accepted at the NTS. The generator *shall* develop, implement, and maintain the documents listed below.

2.1.1 Waste Profiles

A Waste Profile (WP) *shall* be prepared and submitted to DOE/NV for each waste stream proposed for disposal. The WP summarizes the waste form and characterization data, and *shall* include a list of referenced procedures, citing the number and title. The WP instructions, numbering, and format that *must* be used is provided in Appendix B.

2.1.2 Quality Assurance Plan

A Quality Assurance Plan (QAP) *shall* be documented in accordance with Section 5.0 and submitted to DOE/NV.

After generator program approval a controlled copy of the QAP *shall* be submitted to the Bechtel Nevada (BN) RWAP Manager. Any subsequent revisions to the QAP *must* be submitted to the BN RWAP Manager.

2.1.3 NTSWAC Implementation Crosswalk

An NTSWAC Implementation Crosswalk (NIC) *shall* be prepared and submitted to DOE/NV. An electronic copy of the NIC is available from DOE/NV.

After generator program approval the NIC *shall* be reviewed and submitted to the BN RWAP Manager in accordance with Section 5.10.

Currently approved generators are not required to complete a NIC or provide their QAP if they have a controlled Waste Certification Program Plan (WCPP) on file with RWAP.

2.1.4 Certification Personnel List

A current list identifying the Waste Certification Official(s) (WCOs), alternate WCOs, and Package Certifier(s) *shall* be developed and submitted to DOE/NV. The list *shall* include the name and telephone number of each individual authorized to certify waste packages and shipments. This information is used by RWMS personnel to verify signatures on the Package Certification Labels (PCLs) and to assure that shipments are from authorized personnel. Any packages or shipments certified by unauthorized personnel *will not* be accepted by the RWMS.

2.1.5 Document and Personnel Changes

Generators *shall* notify DOE/NV in writing of any changes to the above documents and/or key personnel.

2.2 RWAP Review

DOE/NV's approval process for a generator's waste certification program and waste streams includes document reviews and on-site evaluations verifying program implementation. During these evaluations, CARs may be issued when conditions adverse to quality are identified by DOE/NV. CARs require the generator to document a root cause, corrective action, and action to preclude recurrence. Failure to respond to CARs could lead to delays in approval or result in suspension in accordance with Section 2.4.

2.2.1 Facility Evaluations

Facility evaluations (audits, surveillances, and program reviews) are scheduled and conducted by RWAP.

2.2.1.1 *Biennial Audit*

New generators **shall** submit the documents described in Section 2.1 to DOE/NV prior to scheduling their initial audit. Audits of approved generators are scheduled and conducted on a biennial basis.

Audits will verify by examination and evaluation of objective evidence that the documents contain the necessary elements and are adequately implemented. The audit scope will include an on-site evaluation of the characterization, quality assurance, and waste traceability program elements. Audits are both performance- and program-based.

2.2.1.2 *Surveillance*

A surveillance may be performed to verify the effectiveness of corrective actions, review a new waste stream, or evaluate specific program elements, to ensure continued compliance with the NTSWAC.

Surveillances may be performed at the discretion of DOE/NV.

2.2.1.3 *Program Review (PR)*

At DOE/NV discretion, a PR may replace an audit or Low-Volume Generator (LVG) surveillance which will include a documented evaluation of the generator's past performance. The substitution of a PR for an audit will be permitted only once in four years. PRs will not be conducted between biennial audits unless generator performance warrants an evaluation.

Prior to a PR, generators receive a "Generator Survey" from DOE/NV to complete and return with requested information (i.e., nonconformance reports, internal audit reports, etc.). The scope of the PR includes program changes, operational concerns, and internal assessments. The PR may result in DOE/NV conducting a surveillance, issuing CARs, or re-approving the generator.

2.2.2 Waste Profiles

Waste profiles are reviewed through the Waste Acceptance Review Panel (WARP) process. The WARP may require additional information from the generator, recommend a surveillance, or recommend DOE/NV approval or suspension of the waste stream.

For new generators, at least one profile *shall* be completed and submitted to DOE/NV for review prior to the initial audit.

Waste stream characterization activities *shall* be complete prior to the submittal of WPs to DOE/NV.

Once a generator has completed the initial audit and has received approval to ship from DOE/NV, WPs for new waste streams or changes to approved waste streams may be submitted to DOE/NV at any time.

Changes to approved WPs *shall* be submitted to DOE/NV. Depending on the significance of the change, the approval to ship may be temporarily suspended until the changes are reviewed and accepted.

Generators *shall* notify DOE/NV in writing when terminating an approved WP (project is complete, one-time-only waste stream has been shipped, etc.).

2.2.3 Split Sampling

The purpose of the split sampling program is to verify the results of waste analysis. DOE/NV may choose waste streams based on the annual volume, the potential for finding hazardous components, or the scope and complexity of the sampling process being performed. For mixed waste, DOE/NV may require split sampling prior to the waste stream being approved.

Samples will be collected by the generator's sampling team under the observation of an RWAP representative. DOE/NV may split a representative waste sample with the generator for independent analysis. Samples will be sent to the generator laboratory and to an independent laboratory chosen by DOE/NV. The samples will be analyzed by the same analytical methods. Results of the analyses from both laboratories will be compared by RWAP after data validation. Differences between the two sets of data may require further investigation.

2.3 Approval

RWAP personnel recommend to DOE/NV AMEM that approval be granted after the generator has demonstrated satisfactory implementation of the NTSWAC. The DOE/NV AMEM will provide written notice of approval, identifying the last facility evaluation number, current Waste Certification Program Plan (WCPP) or QAP and revision, and approved waste stream(s). Conditions affecting waste stream approval will be identified.

Approved waste generators *shall* ensure the following documents are maintained current within the DOE/NV RWAP while their approval to ship waste is in effect:

- List of Authorized Certification Personnel
- Latest approved WP/Revision (Active WPs Only)
- Controlled copy of the QAP
- NIC

2.4 Suspending Approval

DOE/NV may suspend approval if generator's waste or documents do not meet the NTSWAC requirements. Individual waste streams or the generator's entire program may be suspended. Reasons for suspension may include but are not limited to:

- Improper manifesting (e.g., incorrect activity reported),
- Repetitive programmatic deficiencies,
- Incorrect waste characterization,
- Waste container integrity deficiencies,
- Nuclear safety limits, and
- Facility evaluation results.

Suspension may be issued verbally by DOE/NV representatives, followed by official written notification.

2.5 Assistance and Technical Support

Generators may request assistance and technical support from the Waste Generator Assistance & Technical Support program (WATS). WATS provides assistance on waste issues, compliance, program development, and preliminary document reviews. For additional information on requesting WATS support, or to schedule a site visit, contact the DOE/NV RWAP Task Manager.

2.6 DOE/NV Policy

Because of changes in regulatory requirements, NTS policies, and changes instituted as a result of lessons learned, any aspect of the waste certification process may be subject to a full review to ensure its compliance with any changed requirements and effectiveness. This review may entail imposing additional requirements or reversing previous decisions. Unannounced facility evaluations may be performed at the discretion of DOE/NV.

2.7 Options for Low-Volume Generators

Generators may elect to become LVGs if the total volume of waste to be shipped to the NTS per fiscal year does not exceed 200 cubic meters (m^3) (7,063 cubic feet [ft^3]). LVG *must* comply with the NTSWAC with the following exceptions:

- The LVG status exempts the generator from the biennial audit described in Section 2.2.1.1.
- A surveillance of LVGs will be conducted triennially.

If an LVG determines that it would not be cost effective to establish a site-/project- specific program, DOE/NV encourages the LVG to team with a DOE/NV-approved generator to dispose of the waste. All arrangements between an LVG site and an approved generator should receive concurrence from the approved site's DOE oversight office, and DOE/NV.

3.0

Waste Criteria

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3.0 Waste Criteria

Waste accepted at the NTS **must** be radioactive and **shall** meet the waste form criteria outlined below.^{6,13} Generators **must** ensure waste is handled, stored, and shipped in accordance with applicable DOE, DOT, Environmental Protection Agency (EPA), state, and local regulations and requirements. Waste streams deviating from these requirements will be evaluated in accordance with Section 3.4, WAC Deviations.^{7,5}

3.1 General Waste Form Criteria

These waste form criteria are based on DOE radioactive waste management policies and practices.

3.1.1 Transuranics

The concentration of alpha-emitting transuranic nuclides with half-lives greater than 20 years **must not** exceed 100 nCi/g.^{6,8} The net weight of the waste (excluding the weight of the container and shielding) **must** be used to calculate the specific activity of the waste in each container.^{6,7} The following isotopes **shall**^{6,6} be considered when making the transuranic waste determination: ²³⁷Np, ²³⁸Pu, ²³⁹Pu, ²⁴⁰Pu, ²⁴²Pu, ²⁴⁴Pu, ²⁴¹Am, ^{242m}Am, ²⁴³Am, ²⁴³Cm, ²⁴⁵Cm, ²⁴⁶Cm, ²⁴⁷Cm, ²⁴⁸Cm, ²⁵⁰Cm, ²⁴⁷Bk, ²⁴⁹Cf, ²⁵¹Cf. Also see Appendix E for radionuclide reporting requirements.

3.1.2 Radionuclide Content or Concentration

Radionuclide concentration **must** be reported in accordance with Appendix E, "Radionuclide Characterization and Reporting Requirements."^{6,9/6.10/6.15} Radionuclide limits for disposal are listed in Table E- 1, "Radionuclide Action Levels for Waste Characterization and Reporting." Waste having radionuclide concentrations above these limits may be acceptable for disposal upon review by DOE/NV.

3.1.3 Greater-than-Class C Waste

Commercial waste designated as Greater-than-Class C (GTCC, as defined in Title 10 CFR 61.55), and DOE waste that, if commercially generated, would meet the GTCC definition, may be evaluated for disposal on a case-by-case basis depending on site-specific waste classification limits. This review may involve considering nonroutine disposal options (e.g., controlling depth of disposal, considering other waste forms and package integrity, limiting the other types of wastes disposed nearby) or the development of a specific radiological performance assessment.

3.1.4 Hazardous Waste

LLW offered for disposal **must not** exhibit characteristics of, or be listed as, hazardous waste as identified in Title 40 CFR, state of Nevada regulations, or state-of-generation hazardous waste regulations.^{3,4/5,6} State of Nevada regulations require that waste regulated as hazardous in the state of generation **must** be regulated as hazardous when brought into the state of Nevada.^{5,5}

The use of lead shielding in containers of LLW is an acceptable practice provided the shielding is necessary for radiation protection and not radioactively contaminated when introduced.^{7,13}

3.1.5 Free Liquids

Liquid waste and waste containing free liquids **must** be converted into a form that contains as little freestanding and noncorrosive liquid as is reasonably achievable.^{6,22} Liquid waste and waste containing free liquids should be processed to a solid form or packaged in sufficient sorbent for twice the volume of the liquid. The free liquid **must** not exceed 1 percent of the volume of the waste when the waste is in a disposal container; or 0.5 percent of the volume of the waste processed to a solidified form.^{1,1/6,22} Provisions for additional sorbent should be made when significant temperature and atmospheric differences exist between the generating site and the disposal site.

Waste **must** be evaluated to determine its potential to release liquid during handling, storage, and transportation.^{7,6} High moisture content waste is defined as waste that has the potential to release moisture from its final waste form in excess of the NTSWAC requirement. Generators **must** document the decisions made when characterizing and determining sorbents for high moisture content waste (see the Nevada Test Site Generator Work Group "Position Paper for High Moisture Content Waste" Revision 0, dated 11/3/1998, for use as guidance).^{7,5}

3.1.6 Particulates

Fine particulate wastes *shall* be immobilized so that the waste package contains no more than 1 weight percent of less-than-10-micrometer-diameter particles, or 15 weight percent of less-than-200-micrometer-diameter particles.^{7,6} Waste that is known to be in a fine particulate form or in a form that could mechanically or chemically be transformed to a particulate during handling and interim storage *must* be immobilized.^{7,6}

Secure packaging may be used in place of immobilization. Examples of acceptable packaging are overpacking (i.e., 55-gallon drum inside 85-gallon drum) and steel boxes. Drums and wooden boxes with sealed 6-mil (minimum) liners will also satisfy this requirement. Disposal containers with contents individually wrapped and sealed in plastic are also acceptable.

3.1.7 Gases

LLW gases *must* be packaged at a pressure that does not exceed 1.5 atmospheres at 20°C.^{6,25/7,6} Compressed gases as defined by Title 49 CFR *shall not* be accepted.^{4,8/6,25} Examples of compliance methods include puncturing aerosol cans and removing the valve mechanism from expended gas cylinders.

3.1.8 Stabilization

Where practical, waste *must* be treated to reduce volume and provide a more stable waste form.^{6,19} Wastes *must not* react with other wastes or the packaging during storage, shipping, handling, and disposal.^{6,17}

Structural stability can be accomplished by crushing, shredding, or placing a smaller piece inside an opening of a larger piece, such as nesting pipes

Chemical stability and compatibility *must* be demonstrated to ensure that no reactions occur and significant quantities of harmful gases, vapors, or liquids are not generated^{6,16/6,24} (specifically when different waste forms are combined in a single waste container).

3.1.9 Etiologic Agents

LLW containing pathogens, infectious wastes, or other etiologic agents as defined in Title 49 CFR *shall not* be accepted.^{1,3}

3.1.10 Chelating Agents

LLW packages containing chelating or complexing agents in amounts greater than 1 percent of the waste *shall not* be accepted unless stabilized or solidified.^{6.18/7.6}

3.1.11 Polychlorinated Biphenyls (PCBs)

PCB-contaminated LLW *shall not* be accepted for disposal unless the PCB concentration meets municipal solid waste disposal levels of ≤ 50 ppm.^{3.16/5.1} Refer to Title 40 CFR, state of Nevada, and state-of-generation regulations for PCB disposal requirements.

3.1.12 Explosives

Waste *must not* be readily capable of detonation or of explosive decomposition or reaction at normal pressures and temperatures, or of explosive reaction with water.^{6.23}

3.1.13 Pyrophorics

Waste *must not* be pyrophoric.^{6.26} Pyrophoric materials contained in the waste *shall be* treated, prepared, and packaged to be nonflammable.^{6.26} Pyrophoric materials that are blended in a hardened concrete matrix are considered to be treated to be nonflammable.

3.1.14 Sealed Sources

Sources containing transuranic nuclides *must* be individually evaluated against the transuranic criteria (Section 3.1.1), considering only the mass of the source and any component integral to the source.^{7.3}

Sealed sources that have an activity of less than 3.7 MBq (100 μ Ci) can be a component of waste streams such as contaminated trash. The total volume of the waste can be used for waste classification and for determination of the radionuclide concentration. Characterization of non-transuranic sources (i.e., less than 3.7 MBq (100 μ Ci)) on an individual source basis is not required, provided the characterization method used is adequate to ensure compliance with the radionuclide reporting criteria.

Sealed sources that have an activity of 3.7 MBq (100 μ Ci) or greater *shall* be segregated from other waste and profiled as a separate waste stream.^{7.3} These sealed sources *shall* be characterized on an individual basis using the volume or mass of the source to determine the radionuclide concentration.^{7.3} Sealed sources may be co-packaged with other waste streams provided Section 3.0 Waste Acceptance Criteria are met. See Appendix E for more information on the encapsulation of sealed sources.

3.1.15 Low-Level Waste Containing Asbestos

Asbestiform Low-Level Waste (ALLW) is defined as any LLW containing friable asbestos material; Category I nonfriable asbestos-containing material (ACM) that has become friable; Category I nonfriable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading; or Category II nonfriable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder. ALLW *must* be packaged, marked, and labeled in accordance with the requirements of Title 40 CFR, State of Nevada Solid Waste Disposal Site Permit (SW1300001, current revision), state-of-generation, and the NTS Management Plan for the Disposal of Low-Level Waste with Regulated Asbestos Waste, current revision.^{3.1/5.2} Packages containing ALLW *must* meet the applicable shipping requirements for the radioactive contents of the package.^{4.7} ALLW *must* be wetted with a water and surfactant mixture and packaged in a plastic bag which is not less than 6 mil in thickness, a combination of plastic bags which equal at least 6 mil in thickness, or a container which is lined with plastic.^{5.3}

If free liquid is present, sorbent *must* be added to ensure compliance with the free-liquids criteria.^{6.22} Sharp edges and corners in the package *must* be padded or protected to prevent damage to the plastic bag during handling, shipping, and disposal.^{7.6}

Each container used to dispose ALLW *must* bear a label that contains one of the following statements.^{5.4}

<p align="center">(1) CAUTION CONTAINS ASBESTOS FIBERS AVOID OPENING OR BREAKING CONTAINER BREATHING ASBESTOS IS HAZARDOUS TO YOUR HEALTH</p>	
<p>(2) CAUTION CONTAINS ASBESTOS FIBERS AVOID CREATING DUST MAY CAUSE SERIOUS BODILY HARM</p>	<p>(3) DANGER CONTAINS ASBESTOS FIBERS AVOID CREATING DUST CANCER AND LUNG DISEASE HAZARD</p>

ALLW **must** be segregated into a separate waste stream.^{7.9} Because of state notification requirements and disposal cell capacity, ALLW **must** be packaged separately from other waste streams.^{5.2/7.6} Call DOE/NV WMD at (702) 295-3181 for assistance and a copy of the current NTS Management Plan for the Disposal of Low-Level Waste with Regulated Asbestos Waste, which includes specific requirements for pre-shipment notifications.

3.1.16 Radioactive Animal Carcasses

Animal carcasses containing, or contained in, radioactive materials **shall** be packaged with the biological material layered with lime and placed in a metal container meeting applicable requirements.^{1.2/1.3} If the resultant waste matrix is capable of gas generation, the container **shall** be vented with a carbon composite High-Efficiency Particulate Air (HEPA) filtration device.^{1.2/7.6} DOE/NV may require analysis of the waste decomposition gases. Animal carcasses preserved with formaldehyde **shall not** be accepted for disposal.^{3.5}

3.1.17 Low-Level Beryllium Waste

For this section, beryllium is defined as elemental beryllium and any insoluble beryllium compound or alloy containing 0.1 percent beryllium or greater that may be released as an airborne particulate. Beryllium-containing waste, and beryllium-contaminated equipment **must** be packaged in sealed, impermeable bags (minimum 6 mil), containers, or enclosures to prevent the release of beryllium dust during handling and transportation.^{1.4} The bags, containers, and enclosures **must** be labeled with the following information^{1.5}:

“DANGER, CONTAMINATED WITH BERYLLIUM
DO NOT REMOVE DUST BY BLOWING OR SHAKING
CANCER AND LUNG DISEASE HAZARD”

3.2 Waste Package Criteria

Waste packages **must** meet applicable DOE Orders, Title 10 CFR, Title 40 CFR, and Title 49 CFR requirements such as: design, nuclear safety, radiation levels, activity limits, nuclear heating, and multiple hazards. Waste packages **must** be capable of withstanding the stresses associated with the loading, handling, stacking, and shipping of the package.^{4.5}

External contamination levels for waste packages and transport vehicles **must** meet the release limits specified in Title 10 CFR Part 835, Appendix D.^{7.14}

DOE/NV has adopted the following waste package criteria to assure that the NTS RWMSs are operated safely and efficiently.

3.2.1 Nuclear Criticality Safety

The quantity of fissionable (fissile) material in a waste package **shall** be limited so that an infinite array of such packages will remain subcritical.^{6.2} This quantity **shall** be determined on the basis of a specific Criticality Safety Evaluation (CSE).^{7.11} A CSE **shall** be performed for the following wastes:^{7.11}

- Waste packages having greater than 15 g of ²³⁵U and the ²³⁵U enrichment is equal to or greater than 0.90 percent by weight (Wt%). Any level of enriched uranium present in the waste **must** be identified and reported on the waste profile in Section E.^{7.6}
- Waste packages containing fissionable nuclides, other than enriched uranium nuclides, will be assessed on a case-by-case basis. Fissionable nuclides are listed in DOE Order 420.1, "Facility Safety," Table 4.3-1.

The CSE **shall** be performed in accordance with DOE Order 420.1, "Facility Safety," and applicable American National Standards Institute standards.^{7.11} DOE Standard STD-3007-93, Change Notice 1, "Guidelines for Preparing CSEs at Department of Energy Non-Reactor Nuclear Facilities," September 1998, is recommended as guidance for developing CSEs.

The CSE **shall** consider the actual materials in the waste and the accident condition where the waste would be flooded with water.^{6.1/7.11}

The infinite array of waste packages *must* remain subcritical given the following conditions:

- maximum reactivity of the fissionable material present is attained;
- the most reactive credible configuration consistent with the chemical and physical form of the material (e.g., lumped source, cylindrical, sphere, dispersed, etc.);
- moderation by water to the most reactive credible extent; and
- full reflection of the neutrons.

3.2.2 Closure

The package closure *must* be sturdy enough that it will not be breached under normal handling conditions.^{4,10}

3.2.3 Strength

The disposal package (packaging and contents) *must* be capable of supporting a uniformly distributed load of 16,477 kg/m³ (3,375 lbs/ft²).^{7,4} This is required to support other waste packages and earth cover without crushing during stacking and covering operations. Actual physical testing or design engineering calculations may be used to demonstrate this requirement. This section does not apply to bulk waste, waste packaged in steel drums, or cargo containers.

3.2.4 Handling

Handling procedures and ALARA documentation *must* be referenced on the WP for wastes requiring remote handling.^{7.6} The disposal site may request this documentation. Packages exceeding 2 mSv/hr (200 mR/hr) dose rate on contact are usually considered for remote handling.

Waste packages *must* be provided with cleats, offsets, rings, handles, permanently attached or removable skids, other auxiliary lifting devices to allow handling by means of forklifts, cranes, or similar handling equipment.^{7.6} Removable skids are preferred to assist in meeting NTS Performance Assessment objectives for reducing disposal cell subsidence. Lifting rings and other auxiliary lifting devices on the package are permissible, provided they are recessed, offset, or hinged in a manner that does not inhibit stacking the packages. The lifting devices *must* be designed with a 5:1 safety factor based on the ultimate strength of the material.^{7.1} All rigging devices that are not permanently attached to the waste package *must* have a current load test based on 125 percent of the safe working load.^{2.1/2.2} Permanently attached rigging devices *shall* have traceable certifications.^{7.6} They *must not* show any signs of corrosion, kinking, birdcaging, or other deterioration.^{7.6}

3.2.5 Size

Boxes measuring 1.2- x 1.2- x 2.1-m (4- x 4- x 7-ft) or 1.2- x 0.6- x 2.1-m (4- x 2- x 7-ft) (width x height x length, plus or minus ½ inch) or 208-liter (55-gallon) drums should be used. These sizes allow optimum stacking efficiency in disposal cells. Alternate packages (i.e., supersacks, burrito wraps) will be considered; however, RWMS operations personnel need to be consulted to ensure equipment compatibility.

Bulk waste generally exists in a form not suited to the conventional packaging requirements. Bulk LLW *must* meet the requirements of Title 49 CFR.^{4.11} Large items of bulk waste, such as machinery, may be considered for disposal unpackaged. For the transfer of unpackaged bulk material having external contamination, the contamination *must* be fixed, covered, or contained sufficiently for safe transfer.^{4.12}

Bulk waste shipping containers may be returned to the generator after decontamination. Decontamination and return of bulk waste shipping containers may incur additional operational costs for the generator.

3.2.6 Weight

In addition to the weight limits for specific packaging designs, packages *shall* not exceed 4,082 kg (9,000 lbs) per box and 544 kg (1,200 lbs) per drum.^{2,3} This weight limit does not apply to bulk waste.

3.2.7 Loading (Void Space)

Waste packages *must* be loaded to ensure that the interior volume is as efficiently and compactly loaded as practical to minimize void space.^{6,21} More than one waste stream may be packaged in a disposal container (see Appendices C and D). High-density loading will allow efficient RWMS space utilization and provide a more stable waste form that will reduce subsidence and enhance the long-term performance of the disposal site.

3.2.8 Package Protection

The following precautions ensure the integrity of the waste characterization and the certification processes.

Methods *must* be employed to ensure that the integrity of the in-process waste package is not compromised (i.e., prohibited items are not introduced into the waste package).^{7,5}

Once the waste package certification activities have been completed and the packages have been sealed, the packages *must* be stored in a secure, protected area to prevent deterioration and unauthorized intrusion.^{7,5} Tamper indicating devices, clips, or banding can be used to indicate that the package has not been opened.

3.2.9 Marking and Labeling

Each waste package *must* be marked and labeled according to Appendix C.^{4,2}

3.2.10 Bar Coding

The shipment and package numbers *must* be bar coded according to the standards in Appendix C.^{7,6}

3.3 Mixed Waste

MW offered for disposal **must** meet the applicable requirements of the NTSWAC, Title 40 CFR, state of Nevada, state-of-generation, package criteria and disposal site permit requirements for identification, treatment, and disposal.^{3.3/3.14/5.6}

3.3.1 Mixed Waste Generated Within the State of Nevada by DOE/NV Activities Only

3.3.1.1 Free liquids

MW **must** contain no free liquids.^{3.11} Any sorbents used in the waste **must** be non-biodegradable.^{3.13}

3.3.1.2 Treatment

MW accepted for disposal at the Mixed Waste Disposal Unit **must** meet applicable Title 40 CFR, "Land Disposal Restrictions."^{3.14}

3.3.1.3 Incompatible Wastes

Incompatible MW **must** be packaged in accordance with Title 40 CFR, "Special Requirements for Incompatible Wastes."^{3.12}

3.3.1.4 Marking and Labeling

MW packages of 416 liters (110 gallons) or less **must** be marked in accordance with Title 40 CFR.^{3.9} Marking and labeling of the waste packages **must** be for the hazardous and radioactive waste.^{3.7/3.8/4.3/4.4} Limited-quantity MW **must be** classified according to the requirements for hazardous components as defined by Title 49 CFR.^{4.5/4.9}

3.3.1.5 Containers

The requirements of Title 40 CFR, "Use and Management of Containers," and "Special Requirements for Containers," **must** be met.^{3.10/3.17/3.18}

3.3.2 Mixed Waste Generated Outside of the State of Nevada

(Reserved for future use) contact DOE/NV WMD for information.

3.4 WAC Deviations

Deviations from the NTSWAC that do not compromise the performance objectives for the disposal site or violate permit requirements may be accepted. The following information *must* be included with the WP: the NTSWAC requirement that cannot be met; the justification for not meeting the requirement; the duration of the deviation, if applicable; and the action plan to correct the deviation, if applicable^{6.20/6.27/7.5}

Example:

Requirement: NTSWAC, Revision 3, Section 3.2.3 Strength, requires that the disposal package must be capable of supporting a uniformly distributed load of 16,477 kg/m³ (3,375 lbs/ft²).

Justification: Two 4- x 4- x 7-ft metal boxes (#33248 and # 33798) do not meet the NTSWAC strength requirement. The boxes contain contaminated soil from a remediation project. Because of ALARA concerns, the generator seeks to avoid unnecessary exposure to personnel during repackaging by allowing the waste to remain in the boxes. The boxes will be identified by marking "Box Does Not Meet Strength Requirement" on the tops of each container. Shipping and handling procedures provide details about these containers. The WCO certification checklist will ensure the markings are applied and documented.

Duration: The duration of the deviation is one time only (boxes 33248 and 33798).

Corrective Action: None required.

3.5 Shipping Arrangements

After a generator secures written approval from the DOE/NV AMEM to send waste to an NTS RWMS, the generator should contact BN to arrange for transfer of the waste and accompanying records. BN will coordinate unclassified waste shipment transfers at NTS. "Classified waste", unclassified accountable, or special nuclear material shipments will be coordinated by DOE/NV Safeguards and Security Division.

3.5.1 To expedite waste receipt and handling at NTS, waste generators *shall*, at a minimum comply with the following:^{7.6}

- Prior to departure of a waste shipment to the NTS, the generator *shall* attach security seals to the shipping trailer's door latches or to each package if not enclosed in a trailer.^{7.6}

- When the shipment leaves the generator site, the generator *shall* enter the following pre-notification information on the BN HAZTRAK database.^{7.6} If the generator is unable to enter information on the BN HAZTRAK, pre-notification should be made by fax to BN (702) 295-6852. For “classified waste”, unclassified accountable, or special nuclear material shipments, generators should also contact DOE/NV Safeguards and Security Division (702) 295-0082. For all shipments, the following information *must* be provided:^{7.6}
 - Date and time shipment departed generator site
 - Estimated date and time of arrival (ETA) at NTS
 - Shipment number, shipper’s name, shipper’s contact number
 - Carrier, driver’s name (must be legible), driver’s license number and state
 - Trailer number, seal number(s), DOT “Proper Shipping Name(s)”
 - Number of packages, package type (boxes, drums, cargo containers, burrito wraps, etc.), and gross weight
 - Waste stream number and description of waste

The majority of the above information can be found on the “Bill of Lading.”

3.5.2 Consign unclassified waste shipments to:

Bechtel Nevada
For U.S. Department of Energy
Waste Management
Nevada Test Site - Zone 2
Mercury, NV 89023

Consign "classified waste", unclassified accountable, or special nuclear material waste shipments to:

U.S. Department of Energy
Attn: Security Specialist
DOE/NV Safeguards and Security Division
For Bechtel Nevada
Waste Management
Nevada Test Site - Zone 2
Mercury, NV 89023

Because unclassified and classified shipments are consigned differently, they should be shipped separately (i.e., on different trailers and have different shipment numbers and separate shipping papers). Under small-volume conditions, combined shipments can be arranged. Contact BN and DOE/NV Safeguards and Security Division for guidance.

- 3.5.3 If the shipment's ETA should change, the generator *shall* enter the changes on the BN HAZTRAK database at the earliest opportunity and provide the new ETA.^{7.6} Generators unable to update information on the BN HAZTRAK *shall* notify BN by phone.^{7.6} For "classified waste", unclassified accountable, or special nuclear material shipments, generators should contact DOE/NV Safeguards and Security Division.
- 3.5.4 The hours for receiving waste at the RWMS are from 0700 to 1530 hours, Monday through Thursday, except holidays. If a shipment arrives after 1530 hours, trailers (except classified loads) may be left at the parking area outside Gate 100 of the NTS after conferring with the NTS Duty Officer. Shipments may be subject to off-loading delays at any time due to NTS operational schedules.

3.6 Shipping Documentation

The following records are required:

3.6.1 For “classified waste”, unclassified accountable, or special nuclear material shipments, a “Nuclear Material Transaction Report” (DOE/Nuclear Regulatory Commission [NRC] Form 741) *shall be* completed for transfers of nuclear material between facilities having differing Reporting Identification Symbols and received by the DOE/NV Safeguards and Security Division and RWMS prior to shipment arrival.^{6.3} For additional information, call Safeguards and Security at (702) 295-0082 and RWMS at (702) 295-6811. The shipment may be refused if a Form 741 is not on file.

3.6.2 For materials regulated by DOT, complete shipping papers with shipper’s certification, as required by Title 49 CFR, *must* accompany each shipment.^{4.1}

A “Uniform Hazardous Waste Manifest” or equivalent state-of-generation manifest, accompanied by the appropriate documentation, *shall be* used when shipping MW.^{3.6/3.15} For on-site shipments of MW, an on-site Waste Manifest may be used.

3.6.3 The original completed and signed Package Storage and Disposal Request (PSDR) or the original of an equivalent, *shall* accompany each shipment.^{6.12/7.6} An electronic version of the PSDR *shall be* transferred to BN prior to shipment arrival (E-mail address: wmdata@nv.doe.gov).^{7.6} Shipments *will not* be accepted if a PSDR is not on file.

3.6.4 An appropriate Waste Certification Statement *shall be* signed by an authorized WCO or Alternate WCO (see next page).^{6.14/7.6}

Low-Level Waste Certification

I certify that containers:

(Container I.D. number(s))

do not contain hazardous waste as defined in Title 40 CFR 261 or _____ (state-of-generation) hazardous waste regulations:

- (1) according to the results of tests performed in accordance with the requirements as specified in Subpart C of Title 40 CFR 261: and/or
- (2) according to the supporting documentation provided to me about the materials and processes that produced this waste.

To the best of my knowledge, I believe the information I have submitted is true, accurate, and complete.

Generator Waste Certification Official (print name/ sign)

Date

Mixed Waste Certification for Land Disposal Restrictions:

I certify under penalty of law that I personally have examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste in containers:

(Container I.D. number(s))

complies with the treatment standards specified in Title 40 CFR 268, Subpart D, and all applicable prohibitions set forth in Title 40 CFR 268.32, RCRA Section 3004(D), or _____ (state-of-generation) hazardous waste regulations.

I believe that the information I submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting a false certification, including the possibility of a fine and imprisonment.

Generator Waste Certification Official (print name/sign)

Date

4.0

Waste Characterization

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4.0 Waste Characterization

Generators **must** characterize waste destined for disposal at NTS.^{6.9} When similar requirements are listed in separate regulations, the most stringent **shall** be met.^{7.5} Waste will not be accepted until the generator, through sampling and analysis, process knowledge (PK), or a combination of both demonstrates the waste to be LLW that meets the WAC requirements in Section 3.0. For waste characterized as MW, generators **must** demonstrate that the MW meets the applicable Title 40 CFR Land Disposal Restrictions (LDR) and WAC.^{3.14} Generators **shall** characterize waste with sufficient accuracy to permit proper segregation, treatment, storage, and disposal.^{6.9} The characterization methods and procedures employed by the generator **shall** ensure that the physical, chemical, and radiological characteristics of the waste are recorded and known during all stages of the waste management process.^{6.9} Characterization methods should undergo a peer review by personnel with appropriate expertise.

Waste **shall** be characterized prior to waste profile submittal.^{7.5} Generators **must** prepare and submit a WP for each waste stream (see Appendix B) which provides DOE/NV with a summary of waste characterization information.^{6.15/6.20/7.5} Generators **shall** provide waste characterization documentation that supports the WP (see Appendix E for radiological requirements) to DOE/NV for review during facility evaluations or upon DOE/NV request.^{6.9/6.20/7.5} Waste characterization documentation **shall** be traceable to the WP and disposal packages. Isotopic distributions and corresponding activity concentrations **shall** be traceable to the package.^{6.10/6.27} Traceability to a parcel level **shall** be required if characterization is being conducted at that level (e.g., individual sealed sources, bags, or components characterized on an individual basis, but packaged together).^{6.9/6.15/7.5}

Waste characterization may be conducted using PK, sampling and analysis, or a combination of both. The following sections provide specific information and requirements for these characterizations methods.

4.1 Process Knowledge

PK is a characterization technique that relies on the generator's knowledge of the physical, chemical, and radiological properties of the materials associated with the waste generation processes. It includes knowledge of the fate of those materials during and subsequent to the process, and the associated administrative controls.

PK sources include historic records, historic analytical data, system descriptions, plans and drawings, manufacturing specifications, mass balance documentation, literature searches, living memory, and procedures.

When PK consists of historic analytical data, generators **must** document the data limitations.^{7,10} Historical data should be routinely verified through controlled analytical methods such as verification sampling and analysis; however, if the data can successfully undergo a full validation, this verification may not be necessary.

When PK relies on living memory, the individual's knowledge **must** be documented and signed by both the interviewer and the interviewee.^{6,28} For telephone interviews, a statement outlining relevant information **must** be signed by the interviewer (and interviewee if possible).^{6,28}

PK can be used for waste characterization in lieu of sampling and analysis if the generator's PK is of sufficient detail to qualify as acceptable. Acceptable PK is PK that is based on detailed information on the waste obtained from existing waste analysis data, studies on similar waste generating process(es), or detailed information relative to the properties of the waste that are known due to site-specific and/or process-specific factors.

Generators should conduct a documented evaluation of compiled PK against criteria. The generator's evaluation should identify uncertainties, inconsistencies, limitations, and usefulness.

4.2 Sampling and Analysis

Generators **shall** obtain legally and scientifically defensible data that can be used to identify the physical, chemical, and radiological properties of the waste.^{3,2/7,7} When waste streams are characterized by sampling and analysis, the process **shall** be controlled and documented.^{6,28} Propagation of error throughout the sampling and analytical process **shall** be evaluated and considered when ascertaining usability of data for characterization of waste.^{6,9}

Sampling and Analysis Data Quality Objectives (DQOs) should meet EPA guidelines (see the seven-step process in EPA QA/G-4, "Guidance for the Data Quality Objectives Process," September 1994) or an equivalent national standard.

Generators **shall** demonstrate that controls are in place to trace each sample number to a specific package number. All sampling and analysis efforts, including verification and confirmatory sampling, should include screening analyses such as gamma spectroscopy, gross beta, and gross alpha.

DOE/NV may evaluate sampling and analysis documentation to ensure that: 1) samples will be representative of the waste inventory, 2) appropriate analytical procedures are used, and 3) sufficient quality controls have been established to allow measurement and documentation of data quality.

4.2.1 Data Validation

Data validation is a comprehensive analysis and review of analytical data conducted against a set of predetermined criteria and leading to the assignment of relative usability (i.e., completely usable, estimated value, unusable) for each analytical result. The validation criteria should be developed using the DQO process and depend upon the type(s) of data involved and the purpose for which the data are collected. Data **shall** be validated by technically qualified personnel who are independent of those performing the analyses.^{6.29/7/5}

A portion of all data, historical or current, **shall** be validated prior to use of the data for characterization purposes.^{3.2/7.7} Historical data that cannot be validated will be reviewed on a case by case basis. Validation reports **shall** cite the guidelines or procedures used to validate the data.^{6.28/7.5}

The complete validation report should be available to DOE/NV, if requested. Validation reports should include:

- Review and evaluation of the adequacy of the analytical methods used (taking into consideration expected contaminants, nuclide inventory, expected activity, decay mode, radiation energy, and any other relevant parameters).
- An evaluation as to whether the requirements of the Scope/Statement of Work (SOW) have been met (i.e., required detection limits, 90 percent confidence, acceptable error, standards for precision and accuracy).
- A data confidence statement and a determination of usability, including an evaluation as to whether the DQOs have been met. DQOs and the other criteria are generally presented in the SOW, applicable procedures, and/or the Sampling and Analysis Plan.

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5.0

Quality Assurance Requirements for Waste Certification Program

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5.0 Quality Assurance Requirements for Waste Certification Program

Section 5.0 requirements are written in accordance with DOE Order 414.1A, "Quality Assurance"; Title 10 CFR, 830.120, "Quality Assurance"; and DOE/NV Policy unless otherwise noted by superscript.

Generators **shall** develop, implement, and maintain a controlled QAP demonstrating compliance to the following requirements and the NTSWAC: (1) DOE Order 435.1, "Radioactive Waste Management"; (2) DOE Order 414.1A, "Quality Assurance"; and/or Title 10 CFR, 830.120, "Quality Assurance." Generators **shall** submit a controlled copy of their approved QAP and NIC to the BN RWAP Manager. An electronic copy of the NIC is available from DOE/NV.

The provided crosswalk **must** describe and/or reference each site's quality-affecting procedures, processes, or methods that demonstrate compliance with the NTSWAC. Examples of procedures, processes, or methods may include, but are not limited to:

- Plans and procedures from supporting organizations that satisfy the quality criteria in Section 5.0 of the NTSWAC.
- Waste characterization data.
- Documents demonstrating compliance to the waste criteria and packaging criteria in Section 3.0 of the NTSWAC.
- Documents assuring conformance to marking, labeling, electronic reporting, and forms requirements.

Currently approved generators are not required to complete a NIC or provide their QAP if they have a controlled WCPP on file with RWAP.

5.1 Program

Generators **must** develop an organizational chart specific to the waste management and support organizations. The organizational chart **must** depict the organizational structure, functional responsibilities, levels of authority, and interfaces necessary to manage the waste certification program. The chart **must** identify the organizations that generate, characterize, package, inspect, assess, ship, and perform support functions (i.e., procurement, document control, RCRA oversight, and training).

Each generator *shall* designate a WCO and alternate(s), if applicable, who are responsible for verifying implementation of the WCPP or QAP. The WCO *must* ensure that the waste certification processes, including waste, waste packages, supporting data, and waste shipments, comply with the requirements of the NTSWAC. The alternate WCO *must* report to the primary WCO for certification activities. The organizational structure *must* ensure the independence of the WCO, alternates(s), and package certifiers from the waste generator and allow for direct access to a management level having sufficient authority and organizational freedom, if necessary, to ensure compliance with the LLW program.

Generators may designate Package Certifiers responsible for signing the Package Certification Label (PCL); however, the Package Certifiers *must* report directly to the WCO for certification activities.

5.2 Personnel Training and Qualification

Personnel *shall* be trained and qualified to perform their assigned functions and tasks. The level and type of training *shall* be evaluated and documented. Training *shall* be commensurate with the importance of the task and the activities affecting compliance with the NTSWAC waste certification activities. Personnel *must* be provided training to ensure that job proficiency with established requirements is maintained. Methods and records *shall* be specified to ensure training of personnel is current and maintained.

5.3 Quality Improvement

Process controls to detect and prevent quality problems and verify conformance to specified requirements *must* be established and implemented. Performance of quality improvement processes *must* be documented.

Control of nonconforming components and processes *must* provide for the identification, documentation, evaluation, segregation (when practical), disposition, and notification to the affected organizations, including the WCO. Nonconforming components *must* be conspicuously labeled, tagged, or otherwise marked to ensure removal from the waste certification process and prevent inadvertent use.

The disposition of nonconforming components, services, and processes *must* be reviewed for technical justification and disposition by authorized personnel. When nonconforming conditions are identified that affect the quality of previously shipped waste, DOE/NV *must* be notified.

A process **shall** be established for the identification and timely correction of quality problems. The root cause, corrective action, action to prevent recurrence, and estimated completion date **must** be documented. The WCO and appropriate levels of management **must** be involved in the corrective action process and the corrective actions tracked until successful resolution can be demonstrated.

5.4 Documents and Records

Activities affecting the quality of the waste certification program **must** be prescribed and performed in accordance with written instructions, procedures, or drawings and available to those performing the work. A document control system **shall** be established to assure that these documents are prepared, reviewed, approved, controlled, and revised.

The records system **shall** be defined and implemented in accordance with written instructions, procedures, or other documentation.

Records documenting compliance with waste certification criteria **shall** be specified, prepared, reviewed, and signed by authorized personnel.

Records **shall** be compiled into a records management system that includes provisions for transmittal, distribution, retention, handling, correction, disposition, and retrievability. Completed records **must** be protected from damage, loss, and deterioration.

The generator **shall** maintain records for time periods equivalent to on-site records retention requirements, but not less than three years (or for time periods designated by other regulatory authorities).^{3,15}

5.5 Work Processes

Work **must** be planned and performed to established technical standards and administrative controls using approved instructions, procedures, or other appropriate means.

Processes important to waste certification activities **must** have controls or verification steps identified as part of operating procedures.

Controls **shall** be established to ensure that the traceability of waste from the point of generation through shipment is maintained. Waste characterization documentation **must** be traceable to the exact package in which waste was placed. Waste containers **must** be controlled through the life cycle of the component (e.g., receipt, handling, storage, packaging, and shipping) to prevent damage, loss, or deterioration.

Components used in the certification process such as waste containers, liners, sorbents, and solidifiers **shall** be controlled to ensure that only correct and acceptable items are used. Identification **must** be maintained on items or documents traceable to the items.

Measuring and Test Equipment (M&TE) used for process monitoring or data collection **must** be uniquely identified, controlled, and calibrated. Records of calibration **shall** be maintained, traceable to the equipment, and the equipment suitably marked to indicate calibration status. The M&TE marking **must** include a unique identification, date of calibration, calibration due date, and any limitations. Calibration equipment for M&TE **shall** be traceable to a nationally recognized standard or equivalent means to assure accuracy.

Testing and validation of computer programs and verification of data results from those programs (i.e., PSDR data, radioactivity calculations) **shall** be conducted and documented.

5.6 Design

Structures, Systems, and Components (SSCs) designed and/or constructed to ensure that waste will satisfy certification requirements **must** be designed using sound engineering/scientific principles and standards and performed in accordance with established design processes.

Design adequacy of SSCs **shall** be verified or validated by qualified personnel other than those who initiated the design. Verification and validation of SSC designs **must** be completed and approved prior to implementation of the design or design changes.

Design interfaces **shall** be identified and controlled. Waste generators **shall** document their review of product or process designs (e.g., waste containers, sorbents, waste treatment operations) when performed by others (e.g., suppliers or other generators) to ensure that they conform to established requirements and end-use application.

Design changes **shall** be approved commensurate with the same control measures that were applied to the original design.

5.7 Procurement

Components and services critical to the waste certification program **must** be procured under a controlled and documented system. Procurement documents **shall** identify applicable technical requirements such as drawings, specifications, codes, standards, regulations, tests, inspection and acceptance criteria, and certification records.

Procurement documents **shall** be reviewed and approved by authorized personnel to ensure that they contain appropriate references and technical requirements. Changes to procurement documents **must** receive the same degree of review and approval as the original documents.

Selection of suppliers providing components and services critical to the waste certification program **must** be evaluated and selected on the basis of specified criteria (e.g., waste packaging). The methods of evaluation (i.e., audits, surveillance, source inspection, receipt inspection) **shall** be established and provide adequate confidence that the selected supplier can meet the established requirements.

Suppliers of components (e.g., off-the-shelf sorbents) that are tested or verified by the purchasing organization for conformance to technical requirements may not need to be evaluated (audited), provided the testing demonstrates the procured component conforms to design requirements. Conformance testing **must** be documented.

A process to ensure approved suppliers continue to provide acceptable components and/or services **must** be established and implemented. Methods of evaluation **shall** be specified and documented.

5.8 Inspection and Acceptance Testing

Inspection and testing of components, services, and processes critical to the waste certification program **must** be conducted using established acceptance and performance criteria. Inspections **must** be performed by qualified personnel having no responsibility for the work activity being inspected.

Receipt inspections **must** be performed to verify conformance of components received to the procurement documents and design criteria.

In-process inspections, including waste container pre-use inspections and waste packaging activities, **shall** be conducted throughout the waste certification process.

Final inspections **shall** be conducted to verify conformance of the waste, containers, and waste certification process to the NTSWAC prior to shipment of the waste.

Records of inspection **shall** identify the type of inspection, component(s), services, or process inspected, date of inspection, inspector, inspection results, and action taken if nonconforming conditions are identified.

5.9 Management Assessment

Management of Waste Certification Programs should periodically assess their management processes to ensure conditions which could preclude the organization from achieving its objectives are identified and corrected. Management assessments *shall* be documented in a final report and issued to appropriate organizations, including the WCO for review.

5.10 Independent Assessment

The WCO *shall* perform an annual review of the NIC to ensure procedures, processes, and methods referenced in the NIC are current. Upon Completion of the review the WCO *shall* sign and submit a current NIC to the BN RWAP Manager.

Waste certification programs *must* be independently assessed (audit and surveillances) annually to verify compliance with applicable quality program requirements and to promote process improvement.

Surveillances may be accumulated and used in lieu of the annual audit provided they have been conducted within the same calendar year and encompass the entire waste certification program and supporting elements. When surveillances are used as the annual assessment, a final report *shall* be prepared and approved by a qualified Lead Auditor identifying the activities, conclusions, findings, and corrective actions initiated during each surveillance.

Audits and surveillances *shall* be planned, scheduled, and conducted in accordance with a documented and approved process. The WCO and/or supporting oversight organizations *shall* schedule and conduct periodic surveillances of activities critical to the waste certification program.

Personnel performing assessments *must* be qualified and knowledgeable in the areas being assessed. Assessment personnel *must* be independent of the assessed areas and have sufficient authority and freedom to effectively carry out the assessment activities.

Results of assessment activities (audits and surveillances) *must* be documented, approved, and reported to responsible management, including the WCO. Deficiencies identified during an assessment activity *shall* be tracked until acceptable resolution is achieved and verified.

6.0

Waste Transportation and Receipt Information

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6.0 Waste Transportation and Receipt Information

This section provides general guidelines that generators follow to expedite waste transportation and receipt.

6.1 Waste Transportation

“Classified waste” and unclassified waste shipments consigned to BN or to DOE/NV Safeguards and Security Division will be made in accordance with applicable DOE, DOT, EPA, state, and local hazardous waste regulations and requirements.

Generators are responsible for the evaluation of the motor carriers used for transporting radioactive waste. Motor carrier documentation (e.g., past carrier performance, prior evaluations, accident history, vehicle maintenance, etc.) should be reviewed to ensure that the carrier is in compliance with Title 49 CFR, state, and local transportation requirements. If carrier performance has been determined to violate federal, state, or local transportation safety regulations, a demonstration of corrective action may be required. Failure to initiate corrective action may result in waste refusal at the NTS.

DOE/NV *shall* be notified when 1) the motor carrier(s) is being evaluated; 2) the motor carrier route selection is being reviewed; 3) a motor carrier discrepancy, noncompliance, or inadequate performance has been identified; or 4) there is a transportation incident or emergency situation.^{7,6} This notification will keep DOE/NV personnel informed of generator transportation plans, activities, and issues. DOE/NV personnel will be able to use the information provided to inform stakeholders of transportation activities of radioactive LLW destined for the NTS. DOE/NV personnel may request to participate in the review of transportation-related information. DOE/NV may provide driver advisories to inform generators of local driving conditions (e.g., road construction, detours, safety issues). The generators will be responsible for providing carriers with driver advisories.

DOE/NV encourages approved LLW generators and their carriers to review route selections and consider transportation alternatives that avoid Hoover Dam and Las Vegas. Routes selected are required to minimize radiological risk. Information on accident rates, time in transit, population density, construction activities, and time of day *must* be considered when determining radiological risk.^{4,13}

6.2 Waste Receipt and Records

BN will be responsible for inspecting radioactive waste shipments upon arrival and maintaining shipment records for DOE/NV. BN RWMS does not take receipt of the waste until it has been unloaded, inspected, verified, and accepted by RWMS personnel.

6.3 Funding and Forecasting

For information regarding funding and forecasting requirements, contact DOE/NV WMD at (702) 295-3181.

6.4 Disposition of Noncompliant Conditions

NTS RWMS and RWAP personnel are responsible for identifying and documenting noncompliance issues (i.e., physical or documentation errors) discovered when conducting LLW receipt and disposal activities. Radioactive waste shipments received at the NTS that are not in compliance with requirements may be returned to the generator facility or require resolution from the generator.

DOE/NV *shall* be notified of waste shipment noncompliance issues.^{7.6} Appropriate action will be initiated based upon the level of the noncompliance and the established program requirements. Generators may be charged for costs incurred for noncompliant waste shipments.

6.5 Waste Refusal

BN personnel will be responsible for notifying the appropriate DOE/NV personnel regarding any refused radioactive waste shipments. Reasons for waste shipment refusal include but are not limited to failure to have:

- sufficient funding transferred to BN to cover the cost of handling disposal, or storage.
- a DOE/NRC Form 741 on file at the NTS prior to the shipment's arrival.
- a signed certification statement accompanying the shipment.

Appendix A

Waste Generator Approval Process Flow Diagram

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Appendix A - Waste Generator Approval Process Flow Diagram

The following diagram identifies key process steps. Operations and logistics may influence the order in which these activities are conducted. Technical support may be requested at any time by the generator (Section 2.5).

Appendix A - Waste Generator Approval Process Flow Diagram (continued)

Waste Profile Approval Process

Document and Personnel Changes

Appendix B

Nevada Test Site Waste Profile Revision 3, 08/2000

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Appendix B - Nevada Test Site Waste Profile, Revision 3, 12/2000

A. Generator Information

1. WCO _____ Phone _____ FAX _____
2. Technical Contact _____ Phone _____ FAX _____
3. DOE Contact _____ Phone _____ FAX _____
4. Facility Name _____
- Address _____
- City _____ State _____ Zip _____
5. EPA Identification Number _____

B. General Waste Stream Information

1. Waste Stream Identification Number _____
- Profile Revision Number _____ Profile Revision Date _____
2. Title of Waste Stream _____
3. Waste Category ☐ Low-Level ☐ Mixed Low-Level (Generated within Nevada only)
- ☐ "Classified Waste" ☐ 11(e)2 By-product Material (Small Quantities)
- ☐ CERCLA waste ☐ Asbestiform Low-Level Waste

Generating Process Description

- ☐ Yes ☐ No Process description continuation page attached?
- ☐ Yes ☐ No Flow diagram attached?

5. Estimated Rate of Generation ☐ One Time Only _____ m³
- ☐ Ongoing _____ m³/yr

6. Reasons for Submittal (specify one)

- ☐ New Waste Stream
- ☐ Modification to Waste Stream

7. ☐ Yes ☐ No Does this waste stream require a WAC deviation? Attach information.

C. Physical Properties

1. Waste Form Description ☐ Solid ☐ Solidified ☐ Encapsulated ☐ Sludge
- ☐ Powder/Dust ☐ Sealed Source ☐ Absorbed Liquid ☐ Other

2. List Waste Stream Components

Estimated Percent by :

- ☐ Volume ☐ Weight

- ☐ Yes ☐ No Component continuation page attached?

- Other**

Is the final waste form mixed waste? If yes, attach information which verifies LDR compliance.

E. Radiological Properties

1. Radiological characterization by (check all that apply)

☐ Process Knowledge☐ Sampling & Analysis☐ Materials Control & Accountability☐ Direct Measurement☐ Gross Radiation Measurement☐ Scaling Factors☐ Other _____

2. Reference documents that describe the radiological characterization process.

3. Reference documents that describe the method of determining package activity.

4. List reportable radionuclides as defined in the WAC.

Radionuclide	Activity Range (Bq/m ³)	Activity Representative of Final Waste Form (Bq/m ³)
_____	_____ to _____	_____
_____	_____ to _____	_____
_____	_____ to _____	_____
_____	_____ to _____	_____

Reportable Radionuclide continuation page attached?

☐ Yes☐ No☐ Yes☐ No

Attach chemical form of radionuclide list if known. Page attached?

6. ☐ Yes☐ No

Does the waste contain any alpha-emitting transuranic radionuclides with a half-life greater than 5 years (Pu-241 or Cm-242)? If yes, list below.

Transuranic Nuclides	Activity Range (nCi/g)	Activity Representative of Final Waste Form (nCi/g)
_____	_____ to _____	_____
_____	_____ to _____	_____
_____	_____ to _____	_____

☐ Yes☐ No

Transuranic nuclide continuation page attached?

7. List documents that describe process(es) that controls TRU determinations and ensures TRU waste is not shipped for disposal.

8. ☐ Yes☐ NoIs enriched uranium present? If yes, provide enrichment of ²³⁵U by weight percent ____ %. Provide maximum mass of ²³⁵U per package ____ g/package. Reference controlling documents.

F. Packaging Description

1. ☐ Yes ☐ No Does the container meet each of the package criteria as defined in the WAC?

List documentation that demonstrates WAC compliance.

2. Container types (s) _____

DOT Specification(s)/Descriptions(s) _____

3. a. Non-bulk container external dimensions (drums, boxes) _____

Does box meet 3,375 lb/ft² strength test?

☐ Yes

☐ No

Weight Range _____ kg to _____ kg

- b. Bulk package external dimensions (cargo containers, roll-offs) _____

Weight Range _____ kg to _____ kg

- c. Bulk shipment dimensions (supersack, burrito wraps, equipment) _____

Weight Range _____ kg to _____ kg

4. Estimated radiation dose rate of disposal package:

Surface _____ to _____ mSv/h

One meter _____ to _____ mSv/h

5. Reference special handling procedures and ALARA documentation, if appropriate.

G. Signature

To the best of my knowledge, the information in this document and attachments is true and accurate. Willful and deliberate omissions have not been made. All known and suspected hazardous materials have been disclosed.

Technical Contact Printed Name

Signature

Date

WCO's Printed Name

Signature

Date

Table B-1
Analytical Results

	Statistical Mean (mg/L)	Upper Confidence Level		Statistical Mean (mg/L)	Upper Confidence Level
TCLP Metals:			TCLP Semivolatiles:		
Arsenic			o-Cresol		
Barium			p-Cresol		
Cadmium			m-Cresol		
Chromium			Cresol		
Lead			Dinitrotoluene		
Mercury			Hexachlorobenzene		
Selenium			Hexachloro-1,3-butadiene		
Silver			Nitrobenzene		
TCLP Volatiles:			Pentachlorophenol		
Benzene			2,4,5-Trichlorophenol		
Carbon Tetrachloride			2,4,6-Trichlorophenol		
Chlorobenzene			Hexachloroethane		
Chloroform			TCLP Pesticides and Herbicides:		
1,4-Dichlorobenzene			Chlordane		
1,2-Dichloroethane			2,4 - D		
Methyl ethyl ketone			Endrin		
Pyridine			Heptachlor and Hydroxide		
Tetrachloroethelyne			Lindane		
Trichloroethylene			Methoxychlor		
Vinyl chloride			Toxaphene		
Dichloroethylene			2,4,5 - TP (Silvex)		

Instructions

Attach a list of all procedures cited with their numbers and titles. Citations within the Waste Profile should provide only the procedure number.

- A.1 Name, phone number, and fax number of the Waste Certification Official that certifies the waste.
- A.2 Name, phone number, and fax number of the technical contact. The technical contact should be an individual who understands the characteristics of the waste profiled.
- A.3 Name, phone number, and fax number of the DOE Field Office/Area Office/Operations Office representative for the facility.
- A.4 Facility name and complete address. If the waste is being shipped from a location other than the stated facility, include the address from which the waste is to be shipped.
- A.5 EPA identification number if shipping Mixed Waste.

- B.1 Waste stream number: unique two-part, 13-character alphanumeric code. First four characters are alphanumeric code for the facility found in Appendix C, page C-4. The second part is a generator determined nine-character alphanumeric code for the waste stream (e.g., LITN000000001, where LITN is the facility code for IT Corporation and 000000001 is the IT assigned waste stream code). Include the Profile revision number and date.
- B.2 Title of waste stream (e.g., laboratory trash, soil, sump sludge)
- B.3 Check all appropriate boxes for the waste category.
- B.4 Description of the process and/or information used as the basis for characterization. Shall include at a minimum: Waste characterization determination (RCRA-regulated; not regulated, transuranic); description of waste to include physical state, chemical and radiological composition, and a description of any treatment; origin or waste; method of characterization; process knowledge summary; and sampling and analysis summary.
 - Check "Yes" if additional pages are attached.
 - Check "Yes" if a process diagram is attached.
- B.5 Total amount of waste expected to be shipped under this waste profile. If the waste generation is ongoing, indicate rate of production during the fiscal year. DO NOT enter >, <, ≤, ≥ or a range (i.e., 30-50).
- B.6 Reason for profile submittal.
- B.7 Check "Yes" if the waste stream requires a WAC deviation (see Section 3.4).

- C.1 Check the appropriate box(es) for the description of the waste. If "Other," include waste form description.
- C.2 List waste stream components. Indicate the estimated percent of material in the waste stream (i.e., 50% PPE, 25% paper). The percentages must total 100 percent. DO NOT enter >, <, ≤, ≥ or a range (i.e., 30-50).
- C.3 If the waste form was treated to meet the NTSWAC, cite the procedure or process used to treat the waste. If a procedure was used to ensure compliance, cite the procedure number. "N/A" is acceptable.
- D.1 Check the appropriate box(es) for how the RCRA determination was made. Cite process or procedure used for RCRA hazardous/nonhazardous determination.
- D.2 Attach sample result summary to waste profile.
The table shall include the following information, as appropriate:
- the statistical mean of the sample results
 - the upper confidence interval (90 percent confidence interval calculation from SW-846, Chapter 9)
 - detection limits if sample results were non-detects
 - state-of-generation specific analytes
 - pre-and post-treatment tables for treated waste
- If one sample is used to confirm process knowledge, no upper confidence level is required to be reported. If process knowledge was used to reject the need for some sampling of analytes, "Not Analyzed" is acceptable for the table.
- D.3 Check the appropriate box. If Yes, identify the UHCs present in the waste as originally generated. See D.6 and D.7
- D.4 Check the appropriate box. If Yes, see D.6
- D.5 Check the appropriate box. If Yes, see D.6
- D.6 Check the appropriate box. List state-of-generation regulations.
- D.7 Check the appropriate box if the waste has been treated. If Yes, attach documentation that supports the treatment standard and final waste form conformance with the WAC.
- D.8 Check the appropriate box if the waste is MW. If Yes, attach documentation that verifies LDR compliance.
- E.1 Check the appropriate box(es) for how the radiological characteristics of the waste were determined. (See Appendix E - Scaling factors are ratios used to estimate the activity of a radionuclide from the known activity of another radionuclide).
- E.2 List documentation that describes how the radiological characterization was controlled.
- E.3 List documentation that describes how package activity determination was determined.
- E.4 List radionuclides as required by Appendix E, sections E.1 and E.2. Radionuclides that are not considered reportable may also be listed. DO NOT enter >, <, ≤, ≥ or a range (i.e., 30-50).
- E.5 Indicate whether a list detailing the chemical form of the radionuclides is attached.

-
- E.6 Check "Yes" box if the waste contains radionuclides defined in section E.1.A.2 (e.g., alpha-emitting transuranic radionuclide with a half-life greater than five years, ^{241}Pu , or ^{242}Cm) and list each nuclide meeting this definition by providing the lower limit, upper limit, and the representative (best estimate) activity concentration in units of nCi/g. DO NOT enter >, <, ≤, ≥ or a range (i.e., 30-50).
- E.7 List documents and processes that control TRU determinations and ensure TRU waste is not shipped for disposal.
- E.8 Check "Yes" box if waste contains enriched uranium. If Yes, provide the weight percent of enrichment and maximum mass of ^{235}U per package in grams. List documentation that demonstrates compliance with the nuclear criticality safety criteria (Section 3.2.1) and that controls the maximum mass of ^{235}U per package. DO NOT enter g/pkg as >, <, ≤, ≥ or a range (i.e., 30-50).
- F.1 Check "Yes" box if waste meets package criteria. List documentation that controls the package compliance.
- F.2 Specify type of containers and DOT specifications.
- F.3a State the external dimensions and weight of the standard shipping containers. If boxes are used, check the appropriate box for the strength requirement.
- F.3b State the external dimensions and weight of packaged bulk shipments.
- F.3c State the dimensions and weight of bulk shipments.
- F.4 State the estimated radiation dose rate at the package surface and at 1 meter.
- F.5 List any special handling procedures or ALARA documentation necessary for the waste.
- G. The Technical Representative and WCO must sign to certify that the information given on the profile is true and correct.

Appendix C

Marking and Labeling

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Appendix C - Marking and Labeling

C.1 Barcode

Barcodes (see Figure C-1) used on packages **must** meet the following standards.^{7.6}

- A. Code 39.
- B. Low- to medium density; low-density preferred.
- C. 1-inch high bar code.
- D. Human readable interpretation (HRI) ½ inch high, printed below the bar code.
- E. Spacing between bar code and HRI will be 1/10 of an inch.
- F. Minimum left and right margin (quiet zones) will be at least 1/25 inch.
- G. Bar codes and HRI will be stacked with a minimum separation of ½ inch and in the following order: shipment number, container number.
- H. A total of two bar code labels **must** be placed on each package near the top and on opposite sides.^{7.6} Drums **must** have a total of two bar code labels, one on top of the drum lid and one on the side near the top.^{7.6}
- I. A sample bar code **must** be submitted to Bechtel Nevada prior to the first shipment to ensure that the RWMS equipment can be used to read the bar code.^{7.6} BN will provide bar codes for low-volume generators (less than ten shipments per year) that do not have the equipment to print bar codes. Contact BN at least one month in advance to arrange for the bar codes.

Figure C-1: Bar Code Label Example

Note: Example not actual size.

C.2 Marking and Labeling

Packages **must** have the following markings and labels:^{6.14/7.6}

- A. Marking and labeling as required in Title 49 CFR; for additional Asbestos and Beryllium Labeling, see Sections 3.1.15 and 3.1.17.^{4.2}
- B. "Package Certification Label" (PCL) (see Figure C-2), signed by the Waste Certification Official or package certifier.^{6.14/7.6} If the waste is unpackaged bulk, a signed PCL **must** accompany the shipment papers.^{6.14/7.6} Low-volume generators can obtain these labels from BN.
- C. Shipment number in the following sequence: Two alpha character generator-site-designator codes assigned by DOE/NV/WMD (see Section C-3); one alpha character for type of waste (L for LLW, M for MW); two numerical characters for current fiscal year; three numerical characters for shipment sequence. This number **must** be on the bar code.^{7.6} Example: MDL99001 indicates a shipment from the Mound Facility of LLW in fiscal year 1999 and the first shipment.

- D. Package number **must** be six characters (alpha, numeric, or combination) with no duplication within the shipment.^{7.6} This number **must** be on the bar code.^{7.6}
- E. Package weight in units of kilograms and pounds **must** be included on the side of each waste package.^{2.3/7.6} This requirement can be met through the use of a label, additions to bar code labels, or by writing the weight on the side of the waste package.

Figure C-2: Package Certification Label

NV-211 August 1997	USDOE
PACKAGE CERTIFICATION LABEL	
This label certifies this container and its contents meet the requirements of DOE (49 CFR), EPA (40 CFR), and NTSWAC for transportation and disposal.	
DATE: _____	
CERTIFIED BY (print): _____	
CERTIFIED BY (signature): _____	
 Waste Certification Official ☐ Alternate Waste Certification Official ☐ Package Certifier ☐	
RWMS DESIGNATION (i.e., ONLO, ARIR): _____	

C.3 Generator Waste Stream and Shipment Codes

<u>GENERATOR</u>	<u>RWMS DESIGNATION</u>	<u>SITE DESIGNATOR</u>
Aberdeen Proving Ground	USAA	AP
Bechtel - NTS	LRYS	DP
Battelle Columbus	CEMP	BC
Earthline Technologies	ORMI	RM
Fernald	ONLO	WM
GA Technologies	BGAT	BG
Grand Junction	JMTC	GJ
IT Corp.	LITN	IT
Kansas City	ABXK	AS
LLNL	BCLA	LL
Lovelace Foundation	ALVI	LV
Mound	AMDM	MD
Oak Ridge	MMES	MM
Pantex	AMHP	PX
Rocketdyne	BNRC	BN
Rocky Flats	ARIR	RF
Sandia - Albuquerque	ASLA	SA
Sandia - California	ASLL	SL
Savannah River	SVRS	SR

Note: If generator site is not listed, develop designations and submit with first waste profiles. A database verification of uniqueness will be conducted by RWAP.

Appendix D

Package Storage and Disposal Request

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Appendix D - Package Storage and Disposal Request

D. Package Storage and Disposal Request, Revision 1

The activity of each nuclide in a waste package as documented on the Package Storage and Disposal Request (PSDR) *shall not* exceed the corresponding maximum radionuclide concentration specified on the waste profile.^{7.6} See Section 3.1.2 for reportable nuclides.

Shipment Number: _____ Prepared By: _____

Date: _____ Manifest No: _____

Package No. _____	Contact (mSv/h): _____	Completed Date: _____						
Container Code: _____	One Meter (mSv/h): _____	Operation Type: _____						
External Volume (m ³): _____	Gross Weight (kg): _____	Total Activity (Bq): _____						
Waste Volume (m ³): _____	Net Weight (kg): _____	Activity Date: _____						
Comment _____								
Waste Stream Profile	Form Code	Form Description	Treatment Code	Treatment Description	Rev. No.	Rev. Date	Nuclide	Qty (Bq)
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____

If you have any questions on completing this document, contact The BN Waste Management Department at (702) 295-6811. Data entered on the form *must* be legible. Hand-printing or typing of letters and numbers is preferred to handwriting. When using a decimal, it *must* be clearly defined. DO NOT USE COMMAS!

PSDR Instructions

- SHIPMENT NUMBER:** Consists of eight alphanumeric characters. Enter the shipment number in the following sequence: two-digit generator code assigned by WMD, L (low-level) or M (mixed), last two digits of the current fiscal year (Oct. 1 - Sept. 30), and the consecutive number of shipments from the generating facility. EXAMPLE: DPL90001 represents Decon Pad, low-level waste, fiscal year 1990, and the first shipment sent to WMD for fiscal year 1990. The shipment number *must* be eight characters in the above sequence.
- MANIFEST NUMBER:** Required only on mixed waste shipments; a five digit number.
- PACKAGE NUMBER:** Six unique characters for each container in the shipment.
- CONTACT:** Maximum radiation reading at the surface of the package in mSv/H: Written in scientific notation X.XXXE±00.
- COMPLETION DATE:** The date, in the formal DD/MMM/YYYY (e.g. 01/Jan/1992), that the last waste material was placed in the package.
- CONTAINER CODE:** Three digit number that identifies the type of container. If your container is not listed, contact the RWMS at (702) 295-6811.

<u>Code</u>	<u>Description</u>	<u>Length</u>	<u>Width</u>	<u>Height</u>	<u>External Volume</u>	
					<u>Cubic Feet</u>	<u>Cubic Meters</u>
100	Miscellaneous	N/A	N/A	N/A	N/A	N/A
101	30-gallon drum	N/A	N/A	N/A	4.99 - 6.99	0.113 - 0.170
102	55-gallon drum	N/A	N/A	N/A	7.99 - 9.99	0.226 - 0.283
124	85-gallon drum	N/A	N/A	N/A	12.99 - 14.99	0.368 - 0.424
125	110-gallon drum	N/A	N/A	N/A	18.99 - 20.99	0.537 - 0.594
*200	Half box	78" - 90"	42" - 56"	18" - 30"	34.125 - 87.5	0.9663 - 2.4777
*201	Wooden half box	78" - 90"	42" - 56"	18" - 30"	34.125 - 87.5	0.9663 - 2.4777
*210	Full box	78" - 90"	42" - 56"	42" - 56"	79.625 - 163.33	2.2547 - 4.6250
*211	Wooden full box	78" - 90"	42" - 56"	42" - 56"	79.625 - 163.33	2.2547 - 4.6250
*220	Cargo Container	234" - 246"	90" - 102"	90" - 102"	1,096.875 - 1,481.125	31.060 - 41.940
*230	Supersack	N/A	N/A	N/A	N/A	N/A
240	Burrito Wrap	N/A	N/A	N/A	N/A	N/A
250	Concrete Monolith	N/A	N/A	N/A	149.734 - 199.987	4.24 - 5.663

*External volumes reported for containers using these codes *must* be based on the containers' external dimensions. Volume should be within range specified.

- 1 METER:** Maximum radiation reading at 1 meter in mSv/h: Written in scientific notation X.XXXE±00.
- OPERATION TYPE:** B for burial, or R for storage.

EXTERNAL VOLUME:	Total volume displaced by the container in cubic meters. Refer to CONTAINER CODE. Written in scientific notation X.XXXE±00.	
GROSS WEIGHT:	Total weight of container including waste and solidification or absorbent media in kilograms. Written in scientific notation X.XXXE±00.	
TOTAL ACTIVITY:	Total Becquerels; <i>must</i> equal the sum of becquerels for each nuclide reported. Written in scientific notation X.XXXE±00.	
WASTE VOLUME:	Actual volume of waste material in package in cubic meters. Written in scientific notation X.XXXE±00.	
NET WEIGHT:	Total weight of waste and solidification or absorbent media, excluding container, in kilograms. Written in scientific notation X.XXXE±00.	
ACTIVITY DATE:	The date, in the formal DD/MMM/YYYY (e.g., 01/JAN/1992), that the activity of the package was determined.	
WASTE STREAM / OFFILE:	Waste Stream Identification or profile number. Thirteen alphanumeric characters. First four characters will be the RWMS designation. Next nine alphanumeric characters will be assigned by the generator. EXAMPLE: LRY5000000001 represents waste from the NTS.	
WASTE FORM CODES:	Enter the appropriate three digit number that categorizes the waste in the package.	
020 - Charcoal	028 - EPA Hazardous	036 - Sealed Source or Device
021 - Incinerator Ash	029 - Demolition Rubble	037 - Paint or Plating
022 - Soil	030 - Cation Exchange Media	038 - Evaporator Bottoms /Sludges /Concentrates
023 - Gas	031 - Anion Exchange Media	039 - Compactible Trash
024 - Oil	032 - Mixed Bed Ion Exchange Media	040 - Noncompactible Trash
025 - Aqueous Liquid	033 - Contaminated Equipment	041 - Animal Carcasses
026 - Filter Media	034 - Organic Liquid (except oil)	042 - Biological Material (except animal carcasses)
027 - Mechanical Filter	035 - Glassware or Labware	043 - Activated Material
		044 - Other (Describe)

WASTE TREATMENT CODES: Enter the appropriate three digit number that categorizes which waste treatment was used on the waste in the package.

Sorption

060 - SpeediDri
061 - Celetom
062 - Floor Dry/Superfine
063 - HiDri
064 - Safe T Sorb
065 - Safe N Dry
066 - Florco
067 - Florco X
068 - Solid A Sorb
069 - Chemsil 30

070 - Chemsil 50
071 - Chemsil 3030
072 - Dicaperl HP200
073 - Dicaperl HP500
074 - Zonolite Gd4
075 - Petroset
076 - Petroset
077 - Aquaset II
078 - Aquaset II
079 - Other (Describe)

Solidification

090 - Cement
091 - Concrete Encapsulation
092 - Bitumen
093 - Vinyl Toluene
094 - Vinyl Ester Styrene
095 - Other (Describe)
100 - No Sorption or Solidification

REVISION: Approved WP Revision number: profile revision *must* be a two digit number.

REVISION DATE: Approved WP Date: in the format DD/MMM/YYYY (e.g., 01/Jan/1992).

NUCLIDE: Valid nuclide description. Attach additional sheet to report more nuclides than space allows. Dash (-) format is required for identifying radionuclides (e.g., 137-Cs, 239-Pu).

QUANTITY: The quantity of the nuclide present in the container in Becquerels. The sum of each nuclide reported *must not* exceed the total activity reported for the total package. Written in scientific notation X.XXXE±00.

Appendix E

**Radiological Waste Characterization
and
Reporting Requirements**

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Appendix E - Radiological Waste Characterization and Reporting Requirements

E.1 Radionuclide Reporting

Reportable radionuclides *shall* be reported on the Waste Profile (WP) and Package Storage and Disposal Request (PSDR).^{6.10/7.5} The WP is applied at a waste stream level. The PSDR is applied at a waste package level. Any radionuclides reported on the PSDR *must* also be identified on the WP.^{7.5} (See Appendices B and D for examples of WP and PSDR.)

A. Reportable Radionuclides

Radionuclides known or reasonably expected to be present in a waste stream meeting any of the following criteria *shall* be reported.^{6.9/6.10/6.15}

1. The activity concentration in the final waste form exceeds 1 percent of the Action Level (Table E-1).^{6.15/7.9} These radionuclides should require rigorous waste characterization.
2. The radionuclide is an alpha-emitting transuranic radionuclide with a half-life greater than five years (²⁴¹Pu, or ²⁴²Cm). The waste mass *must* be determined as described in Section E.5.^{7.5} Transuranic waste radionuclides with concentrations that exceed 1 nCi/g require rigorous waste characterization methods.^{6.15}
3. The activity concentration in the final waste form exceeds 1 percent of the total activity concentration.^{6.15/7.9} The total activity concentration *shall* include the activity of all radionuclides except for those that are exempt from the reporting requirements as specified below.^{6.15/7.9} For these radionuclides and for those present at a level less than the detection limit of industry-accepted characterization methods, Process Knowledge (PK) should be sufficient for characterization.

Table E-1: Radionuclide Action Levels for Waste Characterization and Reporting

Nuclide	Action Level (Bq m ⁻³)	Nuclide	Action Level (Bq m ⁻³)
Unlisted nuclide with a $t_{1/2} < 5$ yr	No Limit	²²⁷ Ac	1.0×10^{12}
³ H	5.6×10^{15}	²²⁹ Th	4.1×10^9
¹⁴ C	2.3×10^8	²³⁰ Th	3.1×10^9
³⁶ Cl	1.1×10^{10}	²³² Th	8.1×10^8
⁵⁹ Ni	8.1×10^{12}	²³¹ Pa	1.4×10^9
⁶³ Ni (activated metal)	2.5×10^{14}	²³² U	9.3×10^9
⁶³ Ni	2.5×10^{13}	²³³ U	3.1×10^{10}
⁶⁰ Co	No Limit	²³⁴ U	3.7×10^{10}
⁹⁰ Sr	1.5×10^{12}	²³⁵ U	1.2×10^{10}
⁹³ Zr	1.4×10^{13}	²³⁶ U	1.2×10^{11}
⁹⁹ Tc	1.1×10^{11}	²³⁸ U	5.9×10^{10}
¹⁰⁷ Pd	1.3×10^{14}	²³⁷ Np	7.0×10^8
¹²⁶ Sn	5.9×10^8	²³⁶ Pu	2.3×10^{11}
¹²⁹ I	2.9×10^9	²³⁸ Pu	1.2×10^{11}
¹³³ Ba	No Limit	²³⁹ Pu	2.3×10^{10}
¹³⁵ Cs	2.8×10^{12}	²⁴⁰ Pu	2.3×10^{10}
¹³⁷ Cs	3.4×10^{11}	²⁴¹ Pu	5.2×10^{11}
¹⁵¹ Sm	1.2×10^{15}	²⁴² Pu	2.4×10^{10}
¹⁵² Eu	4.8×10^{13}	²⁴¹ Am	1.8×10^{10}
¹⁵⁴ Eu	1.2×10^{16}	²⁴³ Am	7.0×10^9
²¹⁰ Pb	1.3×10^{13}	²⁴² Cm	2.4×10^{13}
²⁰⁷ Bi	1.1×10^{11}	²⁴⁴ Cm	8.1×10^{12}
²²⁶ Ra	1.3×10^9	²⁴⁸ Cm	6.3×10^9
²²⁸ Ra	No Limit		

B. Exempt Radionuclides

Radionuclides meeting any of the following criteria are exempt from the reporting requirements:

1. Any radionuclide, as listed in Table E-2, that will reach a state of transient or secular equilibrium with a parent radionuclide within the operational period of the disposal site.

Table E-2: Exempt Radionuclides

The progeny radionuclides listed are exempt from reporting requirements, when a parent radio-nuclide is present.

^{90}Y , ^{93}Nb , $^{126\text{m}}\text{Sb}$, ^{126}Sb , $^{137\text{m}}\text{Ba}$
^{233}Pa , ^{225}Ra , ^{225}Ac , ^{221}Fr , ^{217}At , ^{213}Bi , ^{213}Po , ^{209}Tl , ^{209}Pb
^{239}Np , ^{231}Th , ^{227}Th , ^{223}Fr , ^{223}Ra , ^{219}Rn , ^{215}Po , ^{211}Pb , ^{211}Bi , ^{211}Po , ^{207}Tl
^{234}Th , $^{234\text{m}}\text{Pa}$, ^{234}Pa , ^{222}Rn , ^{218}Po , ^{214}Pb , ^{214}Bi , ^{214}Po , ^{210}Bi , ^{210}Po
^{238}U , $^{240\text{m}}\text{Np}$, ^{240}Np , ^{228}Ra , ^{228}Ac , ^{228}Th , ^{224}Ra , ^{220}Rn , ^{216}Po , ^{212}Pb , ^{212}Bi , ^{212}Po , ^{208}Tl

2. Any radionuclide occurring at activity concentrations not exceeding background ranges for the region in which it was generated and material of interest.

E.2 Waste Profile Instructions

The reported activity concentrations (profile Sections E.4 and E.6) **must** be representative of the final waste form after treatment or stabilization.^{7.5} Zero will not be accepted as the lower limit value. The lower limit **must** be set as the expected lower limit concentration or as the lower limit of detection (LLD) of the characterization method.^{7.5} If the lower limit is set by the LLD, list the lower limit value in parenthesis. Waste packages exceeding the upper limit will not be accepted for disposal without prior approval of a revised waste profile. The waste concentration may be less than the lower limit without prior approval.

E.3 Radiological Characterization Methods

Waste characterization methods are described below and are not intended to be all-inclusive. These methods can be used individually or in combination. The DOE/NV will use a graded approach in its acceptance of waste characterization methods. Generators are encouraged to develop innovative waste characterization plans designed for the specific conditions at their facilities.

The acceptability of a generator's waste characterization plan will be based on a determination that the level of effort is appropriate, given the potential of the waste stream to exceed the waste concentration action levels (*Table E-1*) and the physical limitations of the waste stream. Physical limitations may include waste matrices that cannot be representatively sampled because of unreasonable radiation exposure. Generators are expected to identify, based on knowledge of their processes and facility, those radionuclides with a reasonable probability of exceeding 1 percent of the waste concentration action level. Waste streams or waste packages reasonably expected to exceed 1 percent of the waste concentration action levels (*Table E-1*) will require the greatest level of characterization and verification.

A. Materials Controls and Accountability (MC&A)

MC&A records are data developed from a mass balance of material entering and exiting a process. MC&A data can be used to estimate the activity concentration of waste streams. This method is expected to be most useful for generators possessing limited numbers of nuclides, such as special nuclear materials, in known activity concentrations.

B. Gross Radiation Measurements

Scaling factors can be developed that relate gross radiation measurements to the activity concentration of a waste stream. Generators using gross radiation measurements *shall* ensure that measurements correlate with activity concentration on a consistent basis.^{7,8} Radionuclide distributions in the waste stream *shall* be initially determined and periodically verified through direct measurements or sampling and analysis.^{7,8} Generators *shall* document all methods used to develop scaling factors which relate gross radiation measurements to the activity concentration.^{7,8} When developing scaling factors, generators *must* consider the waste package and detector geometry, shielding and attenuation effects, and the energy spectra and decay schemes of radionuclides in the waste.^{7,8}

C. Direct Measurement of Specific Radionuclides

Direct measurement of radionuclides may include nondestructive analysis of waste packages. In using this method, individual radionuclides are measured.

D. Sampling and Analysis

Radiological characterization using sampling and analysis, including swipes taken for characterization, *shall* be controlled.

E. Process Knowledge

Process knowledge will often be sufficient for characterization of radionuclides not having action levels or occurring at concentrations less than 1 percent of the action level. This method involves determining the radionuclide content of the waste through knowledge and control of the source of the waste.

E.4 Encapsulation of Sealed Sources and Other Waste

The encapsulation of sealed sources can mitigate dispersion of waste and limit the impacts from direct and potential exposure pathways. The bounding conditions for the encapsulation of sealed sources are as follows:

- A. A minimum solidified volume or mass that precludes significant movement of the waste without the assistance of mechanical equipment.
- B. A maximum solidified volume or mass for encapsulation of a single discrete source will be 0.2 m³ or 500 kg (55-gallon drum).
- C. A maximum amount of gamma-emitting radioactivity or radioactive material generally acceptable for encapsulation is that which, if credit is taken for a 500-year decay period, would result in a dose rate of less than 0.2 μ Sv/hr (0.02 mrem/hr) on the surface of the encapsulating media. The maximum Cs-137/Ba-137m encapsulation in a single disposal container is 1.1 TBq (30 Ci).
- D. A maximum amount of any nontransuranic radionuclide that can be encapsulated in a single disposal container intended for shallow land disposal is that which, when averaged over the waste and the encapsulating media, does not exceed the maximum concentration limits for Class C waste, as defined in Tables 1 and 2 of Title 10 CFR 61.55.
- E. Sealed sources containing transuranic (TRU) radionuclides *shall* be evaluated against the NTSWAC TRU waste criteria individually, considering only the mass of the source itself (no packaging, extrinsic shielding, or other waste-diluting materials).^{7.3} Encapsulation and concentration averaging over the waste and encapsulating media cannot be used to meet the NTSWAC TRU criteria.

- F. In all cases, when a discrete source of radioactive solid waste is encapsulated, written procedures should be established to ensure that the radiation source(s) is reasonably centered within the encapsulating medium.

Encapsulated waste *must* be recognizable after the institutional control period of the disposal site so that inadvertent intrusion would be unlikely.^{7.3} This is accomplished by the waste maintaining its structural integrity under the expected disposal conditions. The NRC *Technical Position on Waste Form* provides guidance in using cementitious materials to solidify and stabilize LLW.

E.5 Determination of Waste Volume

Waste activity concentration *shall* be determined based on the volume of the final waste form as offered for disposal.^{6.11} Measurement or analysis of samples may be performed prior to final processing if the measured activity concentration can be related to the final activity concentration. The volume of the waste can usually be taken as the internal volume of the container if the radionuclides are reasonably homogeneously distributed throughout the waste and the waste fills at least 90 percent of the waste container. When these conditions are not met, for example when the package contains significant void space or contains irregularly shaped equipment or components, the volume *shall* be taken as the volume occupied by the waste in the container.^{6.11} The activity concentration of transuranic radionuclides in units of nCi/g *shall* be based on the mass of the contents of a single waste container, excluding the mass of the container and any shielding present.^{7.6}

E.6 Examples of Waste Characterization Documentation

- A. Process knowledge documentation:

Historical analytical data, literature searches, living memory, historic records, MC&A records, mass balance documentation, production specifications, certificates of traceability, plans and drawings, signed statements of living memory, system descriptions, work and operating procedures which generated waste, and Material Safety Data Sheets.

- B. Evaluation of PK and historical data.

- C. Independent review of program documents (may be in the form of a sign-off page within the approved document).

D. Reviewed and approved procedures:

Direct measurement and/or survey processes, surface area estimations (when surface area of waste material is utilized in radiological characterization calculations), and ratio/scaling factor information (approach to ratio/scaling factor development, application of ratios/scaling factors, justification for use of ratios/scaling factors, supporting calculations, operating procedures for assay equipment).

E. Evaluated Data, Validated Data, Sampling and Analysis Plan, Scope of Work, and Laboratory Acquisition Document.**E.7 Radiological Characterization Flow Diagram Overview**

Figure E-1, the radiological characterization flow diagram, illustrates the approach that should be used to obtain adequate radiological characterization. The approach allows for the utilization of generally accepted radiological characterization methodologies and documentation. Radiological characterization documentation requirements are outlined by markers (□) on the radiological characterization flow diagram.

Figure E-1: Radiological Characterization Flow Diagram

1 Documents Should Be Referenced
in the Waste Profile

Figure E-1: Continued

1 Documents Should Be Referenced
in the Waste Profile

NOTE: Historical analytical data used for characterization
should be verified through controlled analytical methods.

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Appendix F

Glossary

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Appendix F - Glossary

Certified Waste: Waste that has been confirmed to comply with disposal site Waste Acceptance Criteria (WAC) under an approved certification program.

Chelating Agents: Amine polycarboxylic acids (e.g., EDTA, DPTA), hydroxy-carboxylic acids, and polycarboxylic acids (e.g., citric acid, carboic acid, and gluconic acid).

“Classified Waste”: a term of art, defined for the purposes of the NTSWAC to mean: low-level radioactive material, including but not limited to, nuclear weapons components and assemblies designated by the United States Government, pursuant to Executive Order, Statue, or Regulation, that require protection against information or material disclosure for reasons of national security. Such materials include radioactive waste to which access has been limited for national security reasons and cannot be de-classified, and that must be managed in accordance with the applicable DOE Orders and DOD Directives.

Controlled Copy: An approved, uniquely numbered document regulated through controlled distribution.

Corrective Action: Measures taken to rectify conditions adverse to quality and, where necessary, to preclude repetition.

Disposal: The emplacement of Low-Level Waste (LLW) or Mixed Waste (MW) in a manner which is considered permanent in that routine recovery is not provided for.

Facility Evaluation: A documented review to evaluate a generator’s program to be in compliance with the WAC. Facility evaluations are conducted by Radioactive Waste Acceptance Program (RWAP) personnel in the form of an audit, surveillance, program reviews, or a combination of these.

Free Liquid: Liquids which readily separate from the solid portion of the waste including liquid that has been released during handling, storage, or transportation.

Generator: An individual, facility, corporation, government agency, or other institution that offers waste material for certification, treatment, storage, or disposal.

Hazardous Waste Component: Waste identified or listed in Title 40 Code of Federal Regulations (CFR) 261, or that otherwise meets the Resource Conservation and Recovery Act (RCRA) definition of hazardous, or waste identified by applicable state-of-generation hazardous waste regulations.

Incompatible Waste: Waste type that might react adversely with its containment materials or commingled waste as defined in Title 40 CFR 260.10.

Item: An all-inclusive term used in place of any of the following: assembly, component, equipment, material, part, structure, or system. The term "item" may also include technical data, documents, computer codes, or samples.

Land Disposal Restricted (LDR) Waste: Waste that is prohibited from land disposal in accordance with Title 40 CFR 268.

Low-Level Waste: Radioactive waste not classified as high-level waste, spent nuclear fuel, transuranic waste, uranium mill tailings, MW, or small quantities of 11e(2) by-product material as defined in Department of Energy (DOE) Order 435.1. Test specimens of fissionable material irradiated for research and development only, and not for the production of power or plutonium, may be classified as LLW, provided the concentrations of TRU is less than 100 nCi/g.

Mixed Waste: Waste containing both radioactive and hazardous components as defined by the Atomic Energy Act of 1954 (as amended) and the RCRA. MW must meet the LDRs as listed in Title 40 CFR 268.

Nonconformance: A deficiency in characteristic, documentation, or procedure that renders the quality of an item or activity unacceptable or indeterminate.

Package: The packaging, together with its contents; a container (usually a drum or box) of waste in final form for disposal, one or more of which may constitute a shipment.

Packaging: The assembly of components necessary to ensure compliance with Department of Transportation (DOT), Environmental Protection Agency (EPA), and DOE/NV requirements. It may consist of one or more receptacles, absorbent materials, radiation shielding, spacing structures, thermal insulation, and devices for cooling or absorbing mechanical shocks. The conveyance, tie-down system, and auxiliary equipment may sometimes be designated as part of the packaging.

Parcel: An individual component, item, or bag of waste, two or more of which may make up a package.

Pyrophoric Material: A material which, under normal conditions, is liable to cause fires through friction, retain heat from processing, or which can be ignited readily and, when ignited, burns so vigorously and persistently as to create serious transportation, handling, or disposal hazards.

Qualification: The characteristics or abilities gained through education, training, or experience, as measured against established requirements, such as standards or tests, that qualify an individual to perform a required function.

Qualified: Having complied with the specific requirements or precedent conditions.

Quality Assurance: All those planned and systematic actions necessary to provide adequate confidence that a structure, system, or component will perform satisfactorily in service.

Radioactive Waste: Solid, liquid, or gaseous material that contains radioactive nuclides regulated under the Atomic Energy Act of 1954 (as amended).

Radioactive Waste Management Site: Designated locations where radioactive waste handling, storage, or disposal operations are conducted.

Real-Time Radiography: X-ray unit used to examine waste packages.

Removable Contamination: Removable radioactive material on the package surface or shipping vehicle.

Stabilization: A technique that limits the solubility and mobility of waste constituents by bonding or chemical reaction with the stabilizing material.

Storage: For the purposes of the NTSWAC, storage refers to the long-term management of "classified waste".

Solidification: A technique that limits the solubility and mobility of waste constituents by immobilization through physical means.

Supplier: Any individual or organization who furnishes items or services in accordance with a procurement document. An all-inclusive term used in place of any of the following: vendor, seller, contractor, subcontractor, fabricator, consultant, and their subtier levels.

Tamper-Indicating Devices: Devices that may be used on containers and that, because of their uniqueness in design or structure, reveal violations of containment integrity.

Treatment: Any method, technique, or process designed to change the physical or chemical character of waste to render it less hazardous; safer to transport, store, or dispose; or reduced in volume. Five basic treatments are (a) volume reduction, (b) immobilization of radioactive/hazardous components, (c) change of composition, (d) removal of radioactive or hazardous components from the waste, and (e) solidification of liquids.

Uniform Hazardous Waste Manifest: The shipping document EPA Form 8700-22 originated and signed by the generator in accordance with the instructions included in the Appendix to Title 40 CFR 262.

Verification Sampling: A DOE/NV program that confirms the accuracy and precision of a generator's analytical data by obtaining split samples of the waste from the generator, and having them analyzed.

Waste Characterization: Determination of the physical, chemical, or radiological properties of waste.

Waste Stream: A waste or group of wastes from a process or a facility with similar physical, chemical, and radiological properties.

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References

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- 1.1 10 CFR 61.56(a)(2)
- 1.2 10 CFR 61.56(a)(5)
- 1.3 10 CFR 61.56(a)(8)
- 1.4 10 CFR 850.32(b)
- 1.5 10 CFR 850.38

Title 29 - Labor

- 2.1 29 CFR 1910.66(f)(4)(v)
- 2.2 29 CFR 1910.66(f)(4)(ix)
- 2.3 29 CFR 1910.178(0)(2)

Title 40 - Protection of Environment

- 3.1 40 CFR 61.140 - .157
- 3.2 40CFR260.11(a)
- 3.3 40 CFR 261
- 3.4 40 CFR 261.1(a)
- 3.5 40 CFR 261.33(a)
- 3.6 40 CFR 262.20(a)
- 3.7 40 CFR 262.31
- 3.8 40 CFR 262.32
- 3.9 40 CFR 262.32(b)
- 3.10 40 CFR 264.170 - .179
- 3.11 40 CFR 264.314(d)
- 3.12 40 CFR 265.177
- 3.13 40 CFR 265.314(f)
- 3.14 40 CFR 268
- 3.15 40 CFR 268.7(a)(1),(2), and (3)
- 3.16 40 CFR 761.60 - .79
- 3.17 40 CFR 264.315
- 3.18 40 CFR 265.315

Title 49 - Transportation

- 4.1 49 CFR 172.200 - .205
- 4.2 49 CFR 172 Subparts D (172.300 - .338) and E (172.400 - .450)
- 4.3 49 CFR 172.310
- 4.4 49 CFR 172.403
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- 4.6 49 CFR 173.2a(c)(5)
- 4.7 49 CFR 173.24

- 4.8 49 CFR 173.115(b)(3)
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- 4.11 49 CFR 173.427
- 4.12 49 CFR 173.427(a)(6)(ii)
- 4.13 49 CFR 397.101

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- 5.1 NAC 444.490 - .948
- 5.2 NAC 444.965 - .976
- 5.3 NAC 444.971(1)
- 5.4 NAC 444.971(2)
- 5.5 NAC 444.8565(2)(b)
- 5.6 NAC 444.8632

DOE Orders**DOE Order 420.1, "Facility Safety"**

- 6.1 420.1 4.3.2
- 6.2 420.1 4.3.3

DOE Order 474.1, "Control and Accountability of Nuclear Materials"**DOE Manual M 474.1-1 "Control and Accountability of Nuclear Materials"**

- 6.3 474.1-1 II. 5(a)(2)
- 6.4 Not Used

DOE Order 435.1, "Radioactive Waste Management"**DOE Manual M 435.1-1 "Radioactive Waste Management"**

- 6.5 435.1 4.b.
- 6.6 435.1-1 Attachment 2, 49
- 6.7 435.1-1 III. A
- 6.8 435.1-1 IV. A
- 6.9 435.1-1 IV. I
- 6.10 435.1-1 IV. I(2)
- 6.11 435.1-1 IV. I(2)(b)
- 6.12 435.1-1 IV. I(2)(d)
- 6.13 435.1-1 IV. G(1)
- 6.14 435.1-1 IV. J
- 6.15 435.1-1 IV. G(1)(a)
- 6.16 435.1-1 IV. G(1)(d)(4)
- 6.17 435.1-1 IV. G(1)(b)
- 6.18 435.1-1 IV. G(1)(c)
- 6.19 435.1-1 IV. O
- 6.20 435.1-1 IV. K
- 6.21 435.1-1 IV. G(1)(d)(1)

- 6.22 435.1-1 IV. G(1)(d)(2)
- 6.23 435.1-1 IV. G(1)(d)(3)
- 6.24 435.1-1 IV. G(1)(d)(4)
- 6.25 435.1-1 IV. G(1)(d)(5)
- 6.26 435.1-1 IV. G(1)(d)(3)
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DOE Order 414.1A, "Quality Assurance"

- 6.28 414.1A 4(b)(2)(a)
- 6.29 414.1A 4(b)(2)(d)

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- 7.1 DOE Hoisting & Rigging Manual, 8.3.1.a
- 7.2 Memo for the Record from Wendy A. Griffin, 7-10-1995, "Acceptance of the Lawrence Livermore National Laboratory, Livermore, California, Position Paper on Depleted Uranium Tailings." (Pyrophoric Position Paper)
- 7.3 "Position Paper on the Proper Characterization and Disposal of Sealed Radioactive Sources." Revision 2, October 1997
- 7.4 Memo 9109-35 to Carol A. Shelton from Steve Okosisi, 11-21-1995, "Request for Evaluation of NVO-325 Criteria to Ensure Safe and Compliant Radioactive Waste Disposal Operations."
- 7.5 DOE/NV RWAP
- 7.6 DOE/NV Operations
- 7.7 "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846, Chapter 1, Section 1.0, 12/1996
- 7.8 Low-Level Waste Licensing Branch, Technical Position on Radioactive Waste Classification, May 1983, Revision 0, Section C.1.c
- 7.9 DOE/NV Performance Assessment
- 7.10 USEPA "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Wastes" PB94-463603, OSWER 9938.4-03, April 1994; Section 1.5.2
- 7.11 "Criticality Safety Plan for Low-Level Waste Disposal at the Nevada Test Site, Bechtel Nevada, L-E10.317.LAA, current version.
- 7.12 "Position Paper for High Moisture Content Waste" revision 0, dated 11/3/1998
- 7.13 "Position on the Use of Lead Shielding for the Disposal of Low Level Radioactive Waste at the Nevada Test Site" current version.
- 7.14 DOE/NV letter from Carl P. Gertz, 8/19/1998, "Contamination Release Limits for Radioactive Waste Transport Vehicles."