WASTE VERIFICATION PROCESS

RWAP-09

1.0 PURPOSE

1.1 This instruction describes the National Nuclear Security Administration Nevada Field Office (NNSA/NFO) Radioactive Waste Acceptance Program (RWAP) waste verification program requirements for accepting Low-Level Waste (LLW) and Mixed Low-Level Waste (MLLW) for disposal at the Nevada National Security Site (NNSS).

1.2 The program establishes the process for on-site (NNSS) and/or off-site (generator facility) verification to confirm that LLW and MLLW waste meets established criteria in the *Nevada National Security Site Waste Acceptance Criteria* (NNSSWAC); and the *Mixed Waste Disposal Unit Waste Analysis Plan* (WAP).

2.0 SCOPE

2.1 The instruction applies to LLW and MLLW offered for disposal at the NNSS. The waste verification process addresses present and expected verification conditions identified in the NNSSWAC and WAP. MLLW scheduled for shipment or treatment from an approved waste-generator or a designated Treatment, Storage, and Disposal Facility (TSDF) ***will*** be subject to waste verification as described in this instruction. LLW ***will*** be verified at the discretion of the Waste Acceptance Review Panel (WARP).

3.0 RESPONSIBILITIES AND AUTHORITIES

3.1 The NNSA/NFO RWAP Manager has overall responsibility for the development, maintenance, and implementation of this instruction.

3.2 The verification program is implemented through a cooperative effort among various NNSS organizations. These include, but are not limited to, the Radioactive Waste Management Complex (RWMC) Operations, RWAP, Radiological Control, Industrial Safety, and Industrial Hygiene.

3.2.1 RWMC operations ***will*** provide support personnel and ensure that the Real-Time Radiography (RTR) facility is ready for container receipt, staging, verification, and equipment decontamination, if necessary.

3.2.2 Contracting Organization RWAP Manager (RM) ***will*** ensure that:

- employees receive required initial training, continuing training, and retraining as needed to perform assigned tasks;

- on-site verification activities at the NNSS are supported by RWMC support personnel and completed;
- off-site verification activities at the generator facility are scheduled and completed;
- issues/discrepancies noted during a verification activity are presented to the WARP;
- verification rates and results are entered and tracked in the M&O Low-Level Waste Information System (LWIS) database.
- verification records are maintained and controlled; and,
- each generator's performance is evaluated annually and more frequently if the generator's performance is less than adequate.

3.2.3 Contracting Organization Verification Representative (VR) ***will*** ensure that:

- verification activities are performed in accordance with the facility's applicable safety documentation, radiological work permits, RWMC procedures, and this procedure;
- waste is verified in accordance with the applicable screening method;
- verification results are documented;
- verification records are signed upon completion of verification;
- technical assistance in the interpretation of visual inspections and analytical results of samples collected are provided to RTR facility personnel, when required;
- the RWMC is informed of any issues that could affect compliance or safety; and,
- the RM is notified of any verification failures.

3.2.4 The WARP determines the initial physical and/or chemical screening frequency for each waste stream and documents when a waste is non-verifiable.

4.0 DEFINITIONS

4.1 **Chemical Screening -** process in which waste is examined for characteristics such as ignitability, corrosivity, and reactivity.

4.2 **Chemical Screening Record (CSR**) **–** record used to document the results of chemical screening of a waste stream.

4.3 **Container Verification Record (CVR**) **-** record used to document the results of physical verification of a waste stream.

4.4 **Off-Site Verification -** physical or chemical verification performed by RWAP personnel, which is conducted at the waste generator or designated TSDF before shipment of the waste.

4.5 **On-Site Verification –** physical verification performed by RWAP personnel at the NNSS by RTR.

4.6 **Physical Screening –** method of physically verifying the contents of a waste container by RTR or visual inspection of open waste containers.

4.7 **Reagent Logbook –** logbook maintained by RM that documents the source, concentration, date of receipt, lot number, and manufacturer or preparer of the reagents used for chemical screening.

4.8 **Real-Time Radiography –** examination technique using real-time X- ray images to inspect and verify the contents of an item or container.

4.9 **Verification -** process in which LLW and MLLW is physically and/or chemically examined to confirm the waste is compliant with the waste profile and NNSSWAC.

5.0 ACRONYMS

5.1	CAR	NNSA/NFO Corrective Action Request
5.2	CSR	Chemical Screening Record
5.3	CVR	Container Verification Record
5.4	LWIS	Low-Level Waste Information System
5.5	MLLW	Mixed Low-Level Waste
5.6	NNSS	Nevada National Security Site
5.7	NNSSWAC	Nevada National Security Site Waste Acceptance Criteria
5.8	RGD	Radiation-Generating Device
5.9	RM	Contracting Organization RWAP Manager
5.10	RTR	Real-Time-Radiography
5.11	RWAP	Radioactive Waste Acceptance Program

5.12	RWMC	Radioactive Waste Management Complex
5.13	TM	NNSA/NFO, RWAP Manager
5.14	TSDF	Treatment, Storage, and Disposal Facility
5.15	VR	Verification Representative
5.16	WARP	Waste Acceptance Review Panel
5.17	WSR	Waste Stream Recommendation

6.0 PROCEDURE

6.1 General Requirements for Waste Verification

6.1.1 Waste Verification is an RWAP inspection process to substantiate data supplied by a waste generator before LLW or MLLW is accepted for disposal at NNSS. Verification is achieved by performing RTR, visual inspection, and/or chemical screening on a designated percentage of LLW and MLLW waste prior to final acceptance at the RWMC.

6.1.2 The physical and chemical screening methods identified in this instruction ***will*** verify that waste received at the RWMC is consistent with the Waste Profile and supporting documentation. The methods have been selected based on the following:

- identification of prohibited wastes;
- confirm adherence to parameters important to management of waste; e.g., segregation, compatibility;
- methods ***must*** provide real-time or near-real-time results; and,
- results ***must*** conclusively indicate waste acceptance or rejection.

6.1.3 Selection of the specific verification method ***will*** be tailored to the operational parameters at the location where the verification ***will*** be performed (i.e., on-site or off-site).

6.1.4 The information gathered from verification activities may be utilized for safe and appropriate management of wastes.

6.1.5 Waste verification is conducted through a screening process that includes identifying the physical and chemical aspects of the waste. The results obtained ***will*** provide confidence that the waste verified is as expected, meets the acceptance criteria, and can be safely disposed at the RWMC.

6.1.6 Chemical screening techniques used in this instruction are adapted for field use and ***will*** provide real-time or near real-time results.

6.1.7 Due to operational limitations and facility requirements at the RWMC, waste containers ***will not*** be opened. Visual inspection and/or chemical screening of LLW or MLLW ***will*** be performed at the generator's site or designated TSDF.

6.1.8 The WARP, in accordance with RWAP-03, *Waste Generator Documentation Approval Process*, determines the initial physical and/or chemical screening method and frequency to be conducted on each MLLW waste stream offered for disposal. The verification frequency or reason a waste is not verifiable is documented on a Waste Stream Recommendation (WSR) and approved by the WARP.

6.1.9 Personnel Safety: The safety of employees conducting waste screening, testing, and container handling is a primary concern. Verification activities are performed within designated NNSS facilities and/or other field locations in accordance with this instruction and existing facility-specific safety documents. Active, controlled process facilities are those facilities that have current facility-specific safety documents and procedures, where access to and activities within the area are controlled. Operators and Health Physics Technicians assigned to the specific location are available, as needed, during verification activities.

6.1.10 Personnel Training: Personnel assigned responsibilities within this instruction ***shall*** complete required training in accordance with RWAP-04, *Training and Qualification of Personnel*. Additional training may be required to gain access to the site/facility where verification activities are performed.

6.2 Verification Process

6.2.1 The approved WSR identifies the method of verification (i.e., physical or chemical) and where it ***will*** be conducted. On-Site Verification is performed at the RWMC and involves RTR verification only. Off-Site Verification is performed at a generator's facility or designated TSDF and involves both physical and chemical verification.

NOTE: The RWMC now has the capability to RTR classified waste.

6.2.2 The RM ***will*** assign a Verification Representative (VR) to coordinate and conduct scheduled verification activities for the selected waste stream in accordance with Section 6.3 or Section 6.4, as applicable. The VR ***will*** utilize the methods described in Appendix 1, *Physical Screening* and/or Appendix 2, *Chemical Screening* when performing waste verification.

6.2.2.1 Waste containers completing the verification process are tagged as Pass, Hold, or Fail as follows:

- **Pass**: Containers pass the verification if no discrepancies or nonconformance issues are identified or if potential issues have been adequately resolved. The VR ***will*** document explanations of any issue, including justification for acceptance on the CVR. Tamper-resistant seal/devices may be used in lieu of a "Pass" tag. Containers subjected to RTR at the NNSS that pass verification are not required to be tagged as "Pass".

- **Hold**: Containers are placed on hold if the potential issue(s) can be resolved by obtaining additional information on waste content from the generator. The VR ***will*** document the reasoning and final determination for passing or failing a hold container on the CVR.

- **Fail**: Containers fail if verification results are inconsistent with the generator documentation and/or NNSSWAC requirements. The VR ***will*** document the reasoning and final determination for failing the container on the CVR.

6.2.3 When verification activities and/or container selection requirements cannot be completed as required for the WSR, the VR ***will*** record the reason and justification for not completing the verification on the CVR or CSR.

6.2.4 The RM and VR ***will*** notify the RWMC of the verification results and contact the waste generator to discuss issue(s) with the container(s)/shipment(s). Conformance issues identified during MLLW verification activities may be resolved by one or more of the following actions:

- generator supplies information that resolves the nonconforming issue;
- generator agrees to internally suspend the waste stream or the entire waste shipping program;
- generator issues a non-conformance report in accordance with their internal non-conformance program;
- schedule and conduct an RWAP audit or surveillance of the generator;
- increase the physical screening frequency required for the waste stream. If the screening frequency is changed, the RM ***will*** prepare a Waste Stream Recommendation form in accordance with RWAP-03, *Waste Generator Approval Process*;
- issue an RWAP Corrective Action Request in accordance with RWAP-07, *Corrective Action Requests;*
- ensure the issue is assessed during the next scheduled RWAP facility evaluation of the generator;
- generator arranges for return shipment of failed container and/or shipment.

6.3 On-Site LLW/MLLW Verification

6.3.1 On-site waste verification is performed by RWAP and RWMC Personnel. When performing on-site verification activities, the RWAP Personnel serve as the VR.

6.3.1.1 Upon receipt of designated waste streams at the RWMC, the VR ***will*** select waste containers that ***will*** undergo RTR verification.

6.3.1.2 Selected containers ***will*** be transferred to a designated area for processing at the RTR facility in accordance with facility procedures. The RWMC ***will*** maintain the balance of the shipment in a designated area until verification is completed and final determination is made on the status of the waste.

6.3.2 RTR, conducted in accordance with Appendix 1, *Physical Screening*, is the on-site waste verification physical screening method.

6.3.2.1 During RTR, the VR ***will*** verify the containers contents and record results on the CVR (Exhibit 1). The VR compares RTR data results to the approved waste profile and NNSSWAC requirements.

6.3.2.2 Upon completion of RTR, the VR ***will*** either inform RWMC personnel that the containers passed the RTR screening or tag the containers as Hold or Fail in accordance with paragraph 6.2.2.1. A container passes verification if no issues are identified. Containers that pass verification and are sent to the disposal cell are not required to be labeled with a Pass tag. A container may be placed on hold if additional information can be obtained to make a definitive decision to pass the container. A container fails RTR verification for any of the following reasons:

- Undocumented or improperly packaged waste;
- Discovery of prohibited articles;
- Image data not consistent with the applicable waste stream profile or shipment documentation; or,
- Void space greater than 10 percent for MLLW containers.

6.3.2.3 If one waste container in the original sample set fails, a second sample set of equal quantity is selected from the shipment for RTR. A second failure in either the first or the second sample set constitutes failure of the entire shipment.

6.3.2.3.1 If the second sample set passes the inspection, the single failed container is considered an anomaly and the remainder of the shipment passes verification and ***will*** be processed in accordance with 6.3.2.6.

6.3.2.4 Containers designated as Hold or Fail ***will*** have the respective Hold or Failed tag attached to the container by the VR when removed from the RTR vault. Hold and Failed waste containers ***will*** be placed in a controlled storage area until final disposition.

6.3.2.5 Hold and Failed containers and respective shipment ***will*** be dispositioned in accordance with Section 6.2.4. Disposition of Hold and Failed containers ***must*** be completed within **30 days** or arrangements made to return the waste to the generator within **90 days.**

6.3.2.6 If the generator can provide evidence to resolve the issue, the VR ***will*** document the issue and resolution on the CVR. The VR ***will*** remove any ***Hold*** or ***Failed*** tags and release the container(s) or shipment for disposal in accordance with RWMC procedures.

6.3.2.7 Containers that cannot be resolved by the above action(s) ***will*** be returned to the generator for additional screening to bring them into compliance.

The RM ***will*** document the issue on a CAR in accordance with RWAP-07, *Corrective Action Requests*.

6.3.2.7.1 The RM ***will*** determine if the conformance issue affects previously shipped waste. If yes, the subject waste stream may be suspended for shipping until satisfactory resolution and closure of the CAR.

6.3.2.7.2 The RM ***will*** notify the RWMC personnel (the LLW Supervisor and Area 5 RWMC Manager) that the container and/or shipment failed verification and ***must*** be returned to the generator. Hold and Failed RTR tags ***will*** remain on the container(s)/shipment while in storage at the RWMC.

6.3.2.8 The VR ***will*** notify the RM of the results of the RTR verification for the subject waste stream. Containers which “Pass” the verification process are released to the RWMC for disposal.

6.3.3 Failed Containers

6.3.3.1 The original generator ***will*** be responsible for the disposition of the rejected containers or shipments, including coordinating transportation and completing return manifests as required by Section 6.7 of the NNSSWAC.

6.3.3.2 Containers that fail RTR at the NNSS and are returned to the generator or designated TSDF for resolution ***must*** be re-verified.

6.3.3.3 The RM may request that a VR be present during the repackaging / correction effort at the designated facility. All conformance issues identified during the initial verification inspection ***must*** be dispositioned and accepted by the VR prior to release for shipment to the NNSS.

6.3.3.4 The VR ***will*** document the corrective actions and disposition on the CVR and CAR, if applicable.

6.3.3.5 Returned containers that are re-verified at the generators facility or TSDF in accordance with Section 6.4, ***will*** not need to be reverified at the NNSS.

6.3.4 The VR ***will*** provide the RM with the completed CVR upon completion of verification activities.

6.3.5 The RM, or designee, ***will*** sign and date the completed CVRs and have the results of the CVRs entered in the applicable fields in the M&O LWIS database.

6.4 Off-Site LLW/MLLW Verification

6.4.1 Off-site waste verification is performed at the generator's site or TSDF utilizing visual inspection and chemical screening, in accordance with Appendix 1, *Physical Screening*; and/or Appendix 2, *Chemical Screening*. WARP approves the verification method(s) on a WSR before the waste is authorized for shipment to the NNSS.

6.4.2 The RM ***will*** assign a VR to coordinate and conduct the off-site verification in accordance with an approved WSR. The WSR ***will*** identify the screening method and percentage of waste containers to be verified.

6.4.3 The VR ***will*** contact the waste generator to schedule and plan the verification activity. The off-site verification may also be conducted during a scheduled RWAP facility evaluation.

6.4.4 At the generators facility, the VR ***will*** select the container(s) to be verified.

6.4.4.1 The VR ***will*** physically verify containers, review supporting characterization data, and record the results on the CVR (Exhibit 1).

6.4.4.2 Under the direction of the VR, the generator ***will*** perform chemical screening on the physically verified waste containers if required for the WSR. Chemical screening results are documented on the CSR (Exhibit 2) by the VR and attached to the CVR.

6.4.5 Upon completion of the verification, the VR ***will*** status the container(s) as Pass, Hold, or Fail in accordance with 6.2.2.1. A container passes if no issues are identified and ***will*** be processes in accordance with 6.4.8. A container may be placed on hold if the generator can provide additional information that would allow the VR to make a definitive decision in changing the status. A container fails the verification for any of the following reasons:

- Undocumented or improperly packaged waste;
- Discovery of prohibited articles;
- Image data not consistent with the applicable waste stream profile or shipment documentation; or,
- Void space greater than 10 percent for MLLW containers.

6.4.5.1 If one waste container in the original sample set fails, a second sample set of equal quantity is selected for verification. A second failure in either the first or the second sample set constitutes failure of the entire shipment.

6.4.5.2 If the second sample set passes the inspection, the single failed container is considered an anomaly and the remainder of the shipment passes verification. All failed container(s) / shipment(s) are dispositioned in accordance with Section 6.4.6.

6.4.6 For MLLW waste containers that do not pass verification, the VR ***will*** discuss the conformance issue with the generator for resolution. The VR and/or generator ***will*** resolve the conformance issue by performing one or more of the following actions:

- generator supplies information that resolves the conformance issue;

- generator agrees to internally suspend the waste stream or the entire waste shipping program;

- generator issues a nonconformance report in accordance with their internal non-conformance program;

- schedules and conducts an RWAP audit/surveillance;

- increases the physical screening frequency required for the waste stream. If the screening frequency is changed, the RM ***will*** prepare a Waste Stream Recommendation in accordance with RWAP-03, *Waste Generator Approval Process;*

- ensures that the issue is assessed during the next scheduled RWAP facility evaluation at the generators facility.

6.4.7 If the generator can produce evidence to resolve the issue, the VR ***will*** document the issue resolution on the CVR/CSR, include justification for acceptance, and pass the container per paragraph 6.4.8.

6.4.7.1 If resolution of the conformance issue cannot be provided, the VR ***will*** document the issue on a CAR in accordance with RWAP-07, *Corrective Action Requests*.

6.4.7.2 The VR ***will*** determine if the conformance issue affects previously shipped waste. If yes, the subject waste stream may be suspended from shipping until satisfactory resolution and closure of the CAR.

6.4.8 The VR ***will*** notify the RM of the verification results for the subject waste stream. If the containers "Pass" the verification process, they are released for shipment.

6.4.8.1 The VR ***will*** apply at least one tamper-resistant seal/device to each container that "passed" verification. The type of seal or device ***must*** ensure that the container cannot be reopened unless the seal or device is broken and cannot be reattached. Tamper-resistant Seal/Devices ***must*** meet the following criteria:

- Placed by the VR prior to the container leaving his/her sight

- Uniquely identified and controlled (e.g., numbered, signed and dated, and documented on the CVR

- Easily differentiated from seals used for other purposes.

NOTE: The VR may utilize the generator's or TSDF's Tamper-resistant Seal/Devices as long as these devices meet the requirements identified above.

NOTE: If the final waste package is a stainless steel container that has been welded shut, where the weld completely seals the lid onto the container, a Tamper-resistant Seal/Device is not required.

6.4.9 The VR ***will*** complete the CVR and a CSR, if applicable.

6.4.10 The VR ***will*** provide the RM with the completed CVRs/CSRs upon completion of the verification activities.

6.4.11 The RM, or designee, ***will*** sign and date the completed CVRs/CVRs and have the results entered in the applicable fields in the M&O Low-Level Waste Inventory System (LWIS) database.

6.5 Quality Control Checks

6.5.1 The RM ***will*** ensure that applicable quality control (QC) checks are performed on the physical and chemical screening methods described in Appendix 1, *Physical Screening*; and Appendix 2, *Chemical Screening*. The QC checks ***will*** be performed to ensure that:

- the RTR unit is providing quality images; and,
- each new reagent lot is tested and QC checks have been completed on reagents in the test kit within one year, unless otherwise specified in Appendix 2.

6.5.2 The VR ***will*** document the results of the chemical screening QC checks in the Reagent Logbook. The VR ***will*** document any physical screening QC anomalies on the CVR for the waste container.

7.0 RECORDS

7.1 The following records are generated during implementation of this instruction and are considered quality records. RWAP personnel who generate records are responsible for ensuring that the content and information presented complies with the requirements stated in this instruction. Non-quality records generated by this instruction (e.g., computer disk) are maintained on file, as required.

The quality records consisting of the VHS video tapes and still photos generated via the Verification Program are processed and maintained in accordance the NNSS RWMC procedures.

The following records generated via the Verification Program are processed and maintained in accordance with RWAP-05, *Records Management*:

7.1.1 Container Verification Record (CVR)
7.1.2 Chemical Screening Record (CSR)
7.1.3 Reagent QC Logbook

8.0 REFERENCES

8.1 RWAP-P1, *Radioactive Waste Acceptance Program, Implementation Plan*

8.2 MWDU WAP, *Mixed Waste Disposal Unit Waste Analysis Plan*

8.3 RWAP-02, *Conduct of Waste Generator Facility Evaluations*

8.4 RWAP-03, *Waste Generator Documentation Approval Process*

8.5 RWAP-05, *Records Management*

8.6 RWAP-07, *Corrective Action Requests*

9.0 EXHIBITS

9.1 Exhibit 1 – Container Verification Record

9.2 Exhibit 2 – Chemical Screening Record

10.0 APPENDICES

10.1 Appendix 1 – Physical Screening Process

10.2 Appendix 2 - Chemical Screening Process

Exhibit 1
Container Verification Record
NNSS Verification Program
(Front)

VR Name: _____ **Date:** _____

VHS Tape#: _____

Shipment No.: _____ **Container ID#:** _____

Generator Facility: _____

Waste Profile/Rev.: _____

Container: **Type** _____ **Size** _____

Waste Type: ☐ **Low-Level Waste** ☐ **Mixed Low-Level Waste**

Verification Location: ☐ **On-Site at NNSS** ☐ **Off-Site at Generator/TSDF**

Verification Method(s):

☐ **RTR** ☐ **Visual Inspection** ☐ **Chemical Screening** ☐ **Attachments** _____

Notes: _____

_____

Container Status:

☐ **Container Passes:** (No Issues or Discrepancies) **Seal/TID #** _____

_____

_____

☐ **Container on Hold:** (Issues and/or Discrepancies)

_____

_____

☐ **Container Passes Re-Verification:** (Describe resolution completed) **Seal/TID #** _____

_____

_____

☐ **Container Fails Verification:** (Issues and/or Discrepancies)

_____

_____

Signed: _____ **Date:** _____
Verification Representative

Signed: _____ **Date:** _____
RWAP Manager

Exhibit 1
Container Verification Record
(Back)

Side A

Side B

Field Notes**:**

MLLW Chemical Screening Record
NNSS Verification Program

Container ID#: _____
Date: _____ **Generator Facility:**_____
VR: _____**Waste Profile/Rev.:** _____
Container: **Type** _____**Size** _____

Chemical Screening Activity	1 (A or U)	2 (A or U)	3 (A or U)	Notes:
pH Screen				
Peroxide Screen				
Oxidizer Screen				
Sulfide Screen				
Cyanide Screen				
Water Reactivity Screen				
Paint Filter Screen				
Pass				
Fail				
Hold				
Legend: Acceptable "**A**" Unacceptable "**U**"				

Issues:	**Resolution:**

Signed: _____ **Date** _____
Verification Representative
Signed: _____ **Date:** _____
RWAP Manager

Appendix 1
PHYSICAL SCREENING PROCESS

1.0 Physical Screening Methods

The following methods ***will*** be used to perform physical screening. The method and failure criteria for each method are summarized below, whereas the rationale for each method is summarized in the WAP.

1.1 Real-Time-Radiography (RTR)

1.1.1 For this method, the container is 100 percent-scanned (top to bottom and side to side) with an RTR system that is operated in accordance with written and approved procedures.

1.1.2 Quality Assurance (QA) measures including, but not limited to, "lines-pair gage" and/or "step-wedge" checks (or equivalent X-ray imaging quality indicators) ***will*** be utilized during equipment startup. For verification activities utilizing RTR Non-Destructive Examination, data is observed on a video monitor and captured on video tape or other video recording device.

1.1.3 RTR service providers ***will*** supply the following services:

- validation (via the technician) of quality assurance checks. All checks ***will*** be performed daily prior to RTR operation and logged accordingly;
- operation of equipment in conformance with host facility procedures;
- quality imagery of containers examined;
- SVHS (SuperVHS [video home system])-formatted tapes of real-time imagery;
- still photos as required at the discretion of the VR.

1.14 A container fails the RTR for any of the following reasons:

- Undocumented, or improperly packaged waste
- Discovery of prohibited articles or materials
- Discovery of material not consistent with the waste-stream profile or shipment documentation
- Void space greater than 10 percent for MLLW packages.

1.2 Visual Inspection

1.2.1 Visual inspection of the waste is performed to the extent necessary to determine that:

- waste contents matches the shipping documents and waste profile;
- no prohibited items are present, including but not limited to, pressurized containers or free liquids;

Appendix 1
PHYSICAL SCREENING PROCESS
continued

- container does not contain undocumented or improperly packaged waste;
- void space is less that 10 percent for MLLW.

1.2.2 Visual inspection requires that the container be opened and the contents removed as needed. Homogenous loose solids ***will*** be probed to determine the presence of material not identified on the shipping documentation or for improperly absorbed liquids. Visual observations are compared with the applicable waste profile and the container-specific information in the shipment documentation. Certain limitations or restrictions, such as As Low As Reasonably Achievable (ALARA) and/or safety considerations may prevent visual inspection. If restrictions or limitations prevent visual screening, review of images such as RTR tapes or video tapes of the treatment and/or packaging of the waste may be used to meet the visual inspection requirements. If the contents of the internal containment can be visually examined without opening, then the internal containment need not be opened.

1.2.3 For all containers, the internal contents ***will*** be examined to the extent possible considering ALARA and/or safety limitation or restrictions. Homogeneous loose solids are probed to determine the presence of materials not documented on the waste profile; examples include improperly absorbed liquids, and the presence of prohibited items. If safety and/or ALARA concerns prevent visual examination, the reasons for the deviation ***will*** be documented on the CVR.

1.2.4 If a compliance issue occurs during the inspection, further inspection of waste contents ***must*** be conducted to the extent necessary to determine whether the issue is an anomaly or not. In cases where safety and/or ALARA concerns prevent proper inspection, the reasons for the deviation ***will*** be documented in the verification record.

1.2.5 A container fails the visual inspection for any of the following reasons:

- Undocumented, or improperly packaged waste
- Discovery of prohibited articles or materials
- Discovery of material not consistent with the waste-stream profile or shipment documentation
- Void space greater than 10 percent for MLLW packages.

2.0 Physical Screening Quality Control

This section describes the QC measures used to ensure that sufficient data is obtained when performing physical screening, specifically RTR. Visual inspection that does not involve the use of instrumentation or chemical tests does not require a QC check.

Appendix 1
PHYSICAL SCREENING PROCESS
continued

2.1 RTR Quality Control Check

2.1.1 RWMC Operations will perform QC checks in accordance with applicable RWMC operating procedures for the RTR unit. At a minimum, the RTR Operator ***will*** view an Image Quality Indicator test container to verify RTR resolution prior to RTR of any waste. The results are documented in accordance with RWMC operating procedures for the RTR unit.

3.0 Physical Screening Exceptions

3.1 The generating facility is obligated to contact the RM to schedule verification activities. Exceptions to the requirements of this instruction ***must*** be approved by the RM.

3.1.1 Wastes that cannot be verified at the RWMC may be verified at the generator facility. Examples include large components, containers that cannot be opened, or ***will*** not fit into the RTR unit. Physical screening at the generator location consists of visual inspection of packaged waste, and/or observing the packaging of waste. If physical screening cannot be performed, review of evidence (e.g. picture that demonstrate compliance, RTR imagery) is an acceptable means of verification.

Appendix 2
CHEMICAL SCREENING PROCESS

1.0. Verification personnel perform chemical screening on the waste streams selected during the WARP process. The chemical screening tests are designed to indicate inconsistencies with generator documentation, as well as prohibited waste characteristics. Ignitable, Corrosive, and Reactive waste characteristics can be identified with the chemical screening process. Positive indicators during the chemical screening process would indicate these characteristics are present and result in a failure of the container. If the first set of test samples fails chemical screening, the VR ***will*** take additional samples to confirm the initial tests per paragraph 6.4.5 of the instruction.

2.0 Chemical screening ***will*** be performed prior to the waste being shipped to the NNSS. When screening is performed, at least one tamper-resistant seal/device is applied to containers deemed acceptable so that the container may not be reopened unless the seal/device is broken. Criteria for applying such seals/devices ***will*** be the same as that listed under Section 6.4 of the instruction.

3.0 Chemical screening conducted in accordance with this instruction does not meet RCRA protocol. Sampling methods, as described here, are for field screening purposes only; however, the sample ***must*** be representative and a matrix-specific method ***will*** be utilized when feasible. At all times, a best effort ***will*** be employed to obtain a representative sample. The potential for nonhomogenous waste matrices imposes several restrictions on the ability to obtain representative samples. Consequently, sampling for chemical screening ***will*** be performed on only those waste forms from which a representative sample can be obtained without employing destructive measures such as grinding or size reduction. The sampling method used in field screening activities ***will*** be documented on the CSR along with pertinent details associated with the verification activity.

3.1 The following types of homogenous wastes may be sampled:

- Soils
- Sludge
- Moist powders or granules
- Dry powders or granules
- Large-grained solids
- Solidified liquids
- Absorbents

3.2 Chemical Screening on other matrices may be conducted on a case-by-case basis if there is reason to believe that characterization information provided by the generator is incomplete or incorrect.

4.0 Chemical Screening Methods

4.1 Chemical screening is considered an additional verification element. Rationale for each method used is not detailed in this procedure, but is summarized in the WAP for the NNSS.

4.2 Selection and interpretation of chemical screening methods ***will*** be conducted by qualified Verification staff. Unless otherwise noted, tests are qualitative with the objective of providing reasonable assurance that the waste is generally consistent with the description in the shipping documentation. Items noted in parentheses indicate the HAZCAT system test material with the four digit product code for the reagent or test material. This information is provided for ease of use. Alternate reagents and products not supplied by HAZCAT may be utilized as long as the reagents successfully meet the chemical screening quality control requirements in Section 5.0 below and the results are documented in accordance with this procedure.

NOTE: Test tubes are identified for use in the chemical verification processes listed below. Glass test tubes may be substituted with any suitable glassware or plastic ware as determined by the Verification Representative.

4.2.1 Peroxide Screening

a. Wet a Peroxide Test Strip (Peroxide Test Paper 4047) with distilled water (Water Solubility Test, 2065)

b. Contact the wetted strip to a small sample of the waste, approximately 2 milligrams. A color change indicates a positive reaction.

c. The color change can be compared with information in the HAZCAT Chemical Identification System Users Manual, p.34, to determine an approximate organic peroxide concentration. A positive indicator during this test ***will*** indicate a suspect reactive characteristic waste.

4.2.2 Paint Filter Liquids Screening

a. To a standard paint filter, add 100 cm^3 or 100 grams of waste and allow the waste to settle for five minutes.

b. Any liquid passing through the filter signifies failure of the test.

4.2.3 pH Screening

a. Full-range pH paper is used for the initial screening.

b. In a test tube, mix a small amount of the solid sample with an equal weight of distilled water (Water Solubility Test, 2065)

c. and the liquid portion of the solution is tested.

d. Touch a pH test strip to the liquid portion of the solution. If the initial screen indicates a pH below 4 or above 10, a pH meter could be used, or a narrow-range pH paper. A positive indicator during this test would indicate a suspect corrosive characteristic waste.

4.2.4 Oxidizer Screening

a. Apply one drop of 3-normal hydrochloric acid (Acid Test, 2076) to a potassium iodide test paper (KI paper, 4045).

b. Touch the acidified test strip to the solid or liquid waste. A darkening of the paper is a positive indication. A positive indicator during this test would indicate a suspect ignitable characteristic waste.

4.2.5 Water Reactivity Screening

a. Place a small sample of the waste onto a watch glass or into a test tube.

b. Add a few drops of distilled water (Water SolubilityTest, 2065) to the sample.

c. Observe the solution for evidence of fuming, bubbling, spattering, or temperature change. These reactions are considered to be positive evidence that the waste is water reactive. A positive indicator during this test would indicate a suspect reactive characteristic waste.

4.2.6 Cyanide Screening

a. Place ½ inch of distilled water (Water Solubility Test, 2065) in a test tube.

b. Add approximately 2 milligrams of the sample to the test tube.

c. If the sample does not dissolve, stop here as it is not water soluble and the cyanide screen will not likely be effective since the screen is definitive for water-soluble inorganic cyanides only.

If the sample is water soluble, continue with the following tests to determine if cyanides are present:

d. Place ¼ inch of ferrous ammonium citrate (Cyanide Test 1, 2031) into a test tube.

e. Add a pinch of ferrous ammonium sulfate (Cyanide Test 2, 2032) to the test tube. The resulting solution should be a forest green color.

f. Place approximately 2 grams of the sample in a test tube. Add ¼ inch of the ferrous ammonium sulfate and ferrous ammonium citrate solution prepared in the previous step to the test tube containing the 2 grams of sample. Stopper the test tube and shake gently.

g. Remove the stopper and add 3-Normal hydrochloric acid (Acid Test, 2076) until a reaction is observed.

h. A dark blue precipitate indicates cyanides. A light blue precipitate indicates metallic cyanides; a blue-green liquid indicates very low levels of cyanides. A positive indicator during this test would indicate a suspect reactive characteristic waste.

4.2.7 Sulfide Screening

a. Add approximately 2 milligrams of sample to a watch glass or test tube.

b. Add 5 drops of 3-normal hydrochloric acid (Acid Test, 2076) to bring the pH down to near 2.0.

c. Place a sulfide test strip (4061) in the sample. If the paper turns brown or silvery black, the presence of sulfides in the sample is indicated. A positive indicator during this test would indicate a suspect reactive characteristic waste.

5.0 Chemical Screening Quality Control

5.1 This section describes the QC performed by the RM, or designee, to ensure that appropriate data is obtained when performing chemical screening methods identified in Section 4.0 above.

5.2 Therefore, the following QC checks ***will*** be performed on each new reagent lot and prior to use; the VR ***will*** verify that the following QC checks have been completed on reagents in the test kit within one year, unless otherwise specified in the QC check method.

5.2.1 pH Test Paper QC Check

The QC check for pH test paper is as follows:

a. Place a drop of concentrated hydrochloric acid (Metal Analysis Test 6, 2049) onto the test strip pH should be 0 ± 1.

b. Place a drop of vinegar (VAJRO 1) onto the test strip; pH should be 2 to 3 ± 1.

c. Place a drop of distilled water (Water Solubility Test, 2065) onto the test strip; pH should be 7 ± 1.

d. Place a drop of ammonium hydroxide (Metal Analysis Test 4, 2047) onto the test strip; pH should be 11 to 12 ± 1.

e. Place a drop of sodium hydroxide onto the test strip; pH should be 14 ± 1 [Note, you must create a concentrated solution by dissolving one sodium hydroxide crystal (Metal Analysis Test 5, 2048), in a few drops of distilled water (Water Solubility Test, 2065).

f. If the pH on three or more of the above tests is not as stated, replace the pH paper. If only one or two tests produce different results, check and test the reagents. The most important test is the distilled water test at a pH of 7 ± 1.

5.2.2 Hydrogen Peroxide Screening Test Paper QC Check

The QC check for the peroxide test paper is as follows:

a. Moisten a peroxide test paper (Peroxide Test, 4047) with distilled water (Water Solubility Test, 2065).

b. Add a couple drops of 3 percent hydrogen peroxide solution (Metal Analysis 8, 2051) to the moistened paper. The paper should turn blue. If negative, replace the paper or reject the lot.

c. Put ½ inch of distilled water in a test tube (Water SolubilityTest, 2065).

d. Add a drop of potassium dichromate solution (Alcohol Test 2, 2001) to the test tube.

e. Place the peroxide paper in the solution. The peroxide test paper should not turn blue. If it changes, reject the lot or replace the paper.

f. Add one drop of nitric acid (Metal Analysis 1, 2044) to the test paper. The paper should turn yellow. If negative, replace the paper or reject the lot.

5.2.3 Sulfide Screening Test Paper Quality Control Check

The QC check for the sulfide test paper is as follows:

a. Place two sodium sulfide flakes (Metal Analysis 7, 2050) in a disposable weigh boat or on a watch glass.

b. Add two drops of 3 Normal hydrochloric acid (Acid Test, 2076) to the flakes.

c. Add one to two drops of distilled water (Water SolubilityTest, 2065) to the sulfide test paper (4061).

d. Touch the sulfide test paper to the flakes. The paper should turn brown, black, or sometimes silver. If negative, replace the paper or reject the lot.

5.2.4 Cyanide Screening Reagent (Ferrous Ammonium Citrate) Quality Control Check

The ferrous ammonium citrate reagent is the most unstable reagent used for chemical screening. The ferrous ion will go to ferric on standing for even a short period of time. If the reagent is a thick opaque color or, if there are particles floating in the solution, the reagent should be replaced. The QC check for the cyanide test reagent is as follows:

a. Place ¼ inch of the ferrous ammonium citrate reagent (Cyanide Test 1, 2031) in a test tube.

b. Add a pinch of ferrous ammonium sulfate (Cyanide Test 2, 2032) to the test tube.

c. Add a drop of 1, 10-phenanthroline (Iron Test, 2040) to the test tube. The solution should turn blood red.

d. Place ¼ inch of the ferrous ammonium citrate reagent (Cyanide Test 1, 2031) in a test tube (Solution 1).

e. Add a pinch of ferrous ammonium sulfate (Cyanide Test 2, 2032) to the test tube.

f. Fill a test tube with distilled water (Water SolubilityTest, 2065).

g. Add a small amount of potassium ferrocyanide (Metal Analysis 3, 2046) to the test tube of distilled water (Solution 2).

h. Add a small amount of Solution 1 to Solution 2 (Solution 3).

i. Add a ¼ inch of 3 Normal hydrochloric acid (Acid Test, 2076) to the Solution 3. The solution should turn dark blue.

j. If either test is negative, replace the reagent or reject the lot.

5.2.5 Paint Filter Liquids Test Quality Control Check

The QC check for the paint filter test consists of inspecting the filter to ensure that it is in good condition and is not torn, clogged, or ripped. This check is performed prior to performing each test. If the filter is determined to be unacceptable, it ***will*** be replaced.

5.2.6 Water Reactivity Screening (Distilled Water) Quality Control Check

The QC check for the water reactivity test consists of adding one to two drops of the distilled water (Water Solubility Test, 2065) to pH paper. If the pH is not 7.0 ± 1, the distilled water ***will*** be replaced. This QC check may be performed as part of the pH QC check.

5.2.7 Oxidizer Screen Quality Control Check

a. Wet an oxidizer (Potassium Iodide or KI) test paper (4045) with 1 or 2 drops of hydrochloric acid (Acid Test, 2076).

b. Place a few drops of methanol (Alcohol Solubility Test, 2074) on the wetted paper. The paper should turn black. If the paper does not turn black, replace the paper.

c. As an alternative test, place a few drops of 3 percent hydrogen peroxide solution (Metal Analysis 8, 2051) on the strip. The paper should turn black. If the paper does not turn black, replace the paper.

6.0 Chemical Screening Exceptions

Chemical screening ***will not*** be performed on the following:

6.1 Waste subject to a technology-based treatment standard.

6.2 Hazardous debris.

6.3 Chemical-containing equipment removed from service (i.e., ballasts, batteries, etc.).

6.4 Mixed waste containing regulated asbestos.

6.5 Waste, environmental media, and/or debris from the cleanup of spills or a release of a single substance or commercial product or otherwise known material (e.g., material for which a Material Safety Data Sheet can be provided).

6.6 Confirmed noninfectious waste (e.g., xylene, acetone, ethyl alcohol, isopropyl alcohol) generated from laboratory tissue preparation, slide staining, or fixing processes.

6.7 Beryllium-contaminated waste.

6.8 Waste that may be subject to ALARA issues, site limitations, etc.