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OAK RIDGE NATIONAL LABORATORY

LOCKHEED MARTIN

Oak Ridge National Laboratory Program Plan for Certification of Nonradioactive Hazardous Waste

MANAGED AND OPERATED BY
LOCKHEED MARTIN ENERGY RESEARCH CORPORATION
FOR THE UNITED STATES
DEPARTMENT OF ENERGY

ORNL/TM-13189

OAK RIDGE NATIONAL LABORATORY

PROGRAM PLAN

FOR

CERTIFICATION OF NONRADIOACTIVE

HAZARDOUS WASTE

May 1996

Prepared by the
ORNL No Radioactivity Added Committee

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ACRONYMS AND ABBREVIATIONS

AEC	Atomic Energy Commission
ASME	American Society of Mechanical Engineers
DOE	U. S. Department of Energy
L_D	detection limit
MDA	minimum detectable activity
NRC	U. S. Nuclear Regulatory Commission
OECD	Office of Environmental Compliance and Documentation
ORNL	Oak Ridge National Laboratory
PCB	polychlorinated biphenyl
PK	process knowledge
Program	Program for Certification of Nonradioactive Hazardous Waste
RadCon	Radiological Control
RCRA	Resource Conservation and Recovery Act
RMMA	Radioactive Materials Management Area
RPP	Radiological Protection Procedure

ACKNOWLEDGMENTS

This document was prepared by the ORNL No Radioactivity Added Committee:

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SUMMARY

This document describes Oak Ridge National Laboratory's (ORNL) Program for Certification of Nonradioactive Hazardous Waste (Program). The Program establishes the criteria that will be used by all ORNL divisions, offices, and programs for unrestricted release of hazardous waste to off-site commercial facilities. The certification process meets the requirements given in the *Performance Objective for Certification of Non-Radioactive Hazardous Waste*. The Program Plan has two main elements:

- Establishing Radioactive Materials Management Areas (RMMAs). At ORNL, RMMAs are (1) Contamination Areas, High Contamination Areas, and Airborne Radioactivity Areas, (2) Radiological Buffer Areas established for contamination control, and (3) areas posted to prevent loss of control of activated items.

- Certifying that hazardous waste originating in an RMMA is suitable for commercial treatment, storage, or disposal by process knowledge, surface contamination surveys, sampling and analysis, or a combination of these techniques. If process knowledge is insufficient, the hazardous waste must undergo sampling and analysis in addition to surface contamination surveys .

This Program will reduce the impact to current ORNL operations by using current radiological area boundaries and existing plans and procedures to the greatest extent possible. New or revised procedures will be developed as necessary to implement this Program.

1. INTRODUCTION

1.1 Purpose

This document describes Oak Ridge National Laboratory's (ORNL) Program for Certification of Nonradioactive Hazardous Waste (Program). The Program was established to ensure that ORNL will not ship any hazardous waste that contains DOE-added radioactivity to commercial treatment, storage, or disposal facilities not licensed to manage mixed waste.

1.2 Background

In May 1991, DOE's Office of Waste Management (EM-30) invoked a moratorium on shipments of hazardous waste from DOE sites to off-site, non-NRC permitted treatment, storage, and disposal facilities. Each DOE site was required to develop a program to ensure that (1) DOE activities added no measurable radioactivity, within statistical limits, to hazardous waste and (2) hazardous waste meets the DOE Order 5400.5 surface contamination guidelines. These requirements are described in the *Performance Objective for Certification of Non-Radioactive Hazardous Waste*. The Performance Objective was revised in February 1995 to incorporate allowable total residual surface contamination levels for transuranic materials based on guidelines in the Atomic Energy Commission (AEC) Regulatory Guide 1.86. To meet the requirements of the Performance Objective, ORNL established the Program for Certification of Nonradioactive Hazardous Waste. The Program's strategy is to first identify radioactive materials management areas (RMMAs) and then determine the radioactive status of the hazardous waste generated in these areas. In meeting this strategy, ORNL will use existing policies, criteria, procedures, and training methods to the greatest extent possible. New or revised procedures will be developed as necessary to implement this Program. This strategy, along with supporting activities such as training and quality assurance, is explained in this Program Plan.

2. FACILITY DESCRIPTION

ORNL is a multi-disciplinary research facility that began operation in 1943 as a part of the Manhattan Project. The original mission of the laboratory was to develop a prototype graphite reactor and reprocess the reactor fuel for plutonium recovery. After World War II, the primary functions of ORNL were nuclear fuel reprocessing research; radioisotope production and applications development; and nuclear reactor concept development, testing, and operation. More recently, the Laboratory has increased its role in biological, environmental, energy, and materials research. Because of these diverse activities and activities associated with environmental restoration and decontamination and decommissioning, a variety of radioactive, hazardous, and mixed wastes have been generated in varying amounts over time.

2.1 Radioactive and Mixed Waste Generation

Wastes identified as radioactive or mixed are managed by approved procedures and are outside the scope of this program.

2.2 Hazardous Waste Generation

Hazardous wastes are regulated under the Resource Conservation and Recovery Act (RCRA) and polychlorinated biphenyl (PCB) wastes are regulated under the Toxic Substances Control Act. Due to the diversity of activities at ORNL, all of the characteristically hazardous and many listed hazardous wastes appear on ORNL's RCRA Part A permit application. On-site treatment of hazardous waste is limited to acid neutralization for bulk non-nitrate acids and detonation of certain intrinsic wastes that cannot be shipped to, or accepted by, off-site vendors. The focus of hazardous waste management at ORNL is segregation, repackaging, and storage in preparation for shipment to permitted commercial facilities for treatment, storage, and disposal.

Before the Program, ORNL had no criteria to detect if DOE radioactivity had been added to the hazardous waste. However, this distinction has still been made by the Hazardous Waste Operations Group based on the characterization information provided with the hazardous waste data package submitted by the generating organization.

Hazardous waste and PCB waste are stored in four RCRA Part B permitted facilities. Bulk waste chemicals are stored in 55-gal drums in Building 7652, PCB wastes are stored in 55-gal drums in Building 7507, recyclable oils are stored in 55-gal drums in Building 7651, and small containers (less than 5 gal or 20 lb.) of laboratory chemicals and process chemical wastes are stored in Building 7653. Approximately 54,000 kg of hazardous waste and PCB waste have accumulated in storage since the moratorium was issued in May 1991.

3. RADIOACTIVE MATERIALS MANAGEMENT AREAS

ORNL's strategy for certifying that no radioactivity has been added to hazardous waste because of DOE operations begins with identifying RMMAs. At ORNL, RMMAs are those radiological areas within which the potential for radioactive contamination or activation of hazardous materials exists. In this document, the term "RMMA" may be used to describe the ORNL radiological areas that form the equivalent of Performance Objective RMMAs, as described in Subsect. 3.1.

3.1 Identification and Control of RMMAs

The Performance Objective defines an RMMA as an area in which the potential exists for contamination due to the presence of unencapsulated or unconfined radioactive material or an area exposed to beams or other sources of particles (neutrons, protons, etc.) capable of causing activation. The Performance Objective does not require an area to be defined as an RMMA if surface contamination levels do not exceed DOE Order 5400.5 and AEC Regulatory Guide 1.86 criteria for unrestricted release of materials, and if airborne radioactivity levels do not exceed DOE Radiological Control (RadCon) Manual criteria for posting Airborne Radioactivity Areas.

At ORNL, RMMAs are (1) Contamination Areas, High Contamination Areas, and Airborne Radioactivity Areas, (2) Radiological Buffer Areas established for contamination control, and (3) areas posted to prevent loss of control of activated items. Access to radiological areas is controlled by ORNL Radiological Protection Procedure RPP-330, *Administrative and Physical Access Controls*. The minimum requirements for unescorted entry into the areas listed above include radiation worker training and appropriate dosimetry. Work in any of the specific area types listed above except the Radiological Buffer Area requires an approved Radiation Work Permit.

ORNL's radiological protection procedures were rewritten in July 1995 to conform to the requirements of the RadCon Manual and 10 CFR 835. Posting requirements for Contamination Areas specified in these two documents differ from the unrestricted release criteria in DOE 5400.5 and Regulatory Guide 1.86 in two respects:

- the fixed plus removable ("total") limit for transuranics and selected other radionuclides prescribed by the RadCon Manual is higher than the Regulatory Guide 1.86 release criterion (500 dpm/100 cm^2 vs. 100 dpm/100 cm^2); and

- the RadCon Manual criterion for tritium and tritium-containing compounds is higher than the relevant criterion in DOE 5400.5 (10,000 dpm/100 cm^2 vs. 1,000 dpm/100 cm^2).

ORNL's radiological protection procedures were rewritten in May 1996 to agree with the unrestricted release limits in DOE 5400.5 and Regulatory Guide 1.86. The posting limits in ORNL Radiological Protection Procedure RPP-220, *Contamination Control*, have been revised to require posting of areas where: (1) transuranic (or unidentified alpha-emitting) contamination is detected at a total level of 100 dpm/100 cm^2, and (2) tritium or tritium-containing compounds are detected at a removable level of 1,000 dpm/100 cm^2. The current posting limits in RPP-220 are shown in Table 4.1. Since it has been common practice at ORNL to post conservatively, no new areas are expected to be posted because of these changes. Thus, the Performance Objective contamination levels for RMMAs are met by the radiological postings at ORNL.

The Performance Objective also requires that areas capable of activating waste be identified as RMMAs. ORNL Radiological Protection Procedure RPP-420, *Release and Transportation of Radioactive Material*, requires that material be treated as radioactive when it has been exposed to beams or other sources of particles capable of causing activation. Such materials must be shown to meet appropriate limits before their release as nonradioactive. Proper handling of material in areas where activation is possible, and the posting of those areas, has been discussed with Radiological Control Technicians and the affected Facility Managers. Facility Managers and Radiological Control Technicians must agree on which areas contain conditions that could activate items. A technical bulletin on induced radioactivity will be issued to help appropriate personnel decide which areas may have induced radioactivity in hazardous waste.

Table 4.1 Surface Radioactivity Values

NUCLIDE (See Note 1)	REMOVABLE (dpm/100 cm^2) (See Note 2)	TOTAL (fixed+removable) (dpm/100 cm^2) (See Note 3)
U-natural, U-235, U-238, and associated decay products	1,000 α	5,000 α
Transuranics, Ra-226, Ra-228, Th-228, Th-230, Pa-231, Ac-227, I-125, I-129	20	100 (See Note 4)
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	200	1,000
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above. Includes mixed fission products containing Sr-90	1,000 β-γ	5,000 β-γ
Tritium organic compounds, surfaces contaminated by HT, HTO and metal tritide aerosols	1,000	1,000

Notes:

1. The values in this table apply to radioactive contamination deposited on, but not incorporated into, the interior of the contaminated item. Where contamination by both alpha and beta-gamma emitting nuclides exists, the limits established for the alpha and beta-gamma emitting nuclides apply independently.

2. The amount of removable radioactive material per 100 cm^2 of surface area should be determined by smearing the area with dry filter or absorbent paper while applying moderate pressure and then assessing the amount of radioactive material on the smear with an appropriate instrument of known efficiency. For objects with a surface area less than 100 cm^2, the entire surface should be smeared, and the activity per unit area should be based on the actual surface area. Except for transuranics, Ra-228, Ac-227, Th-228, Th-230, Pa-231 and alpha emitters, it is not necessary to use smearing techniques to measure removable contamination levels if direct scan surveys indicate that the total residual contamination levels are below the values for removable contamination.

3. The levels may be averaged over 1 square meter provided the maximum activity in any area of 100 cm^2 is less than three times the values in Table 220-1.

4. There is currently no DOE Order or Federal Regulation providing guidance for the release of transuranic contaminated material and equipment to uncontrolled areas or the radiological posting of areas contaminated by transuranics. Until 10 CFR 834 is finalized, ORNL will adopt the guidance in Regulatory Guide 1.86 as directed by the DOE Site Office (R. O. Hultgren to M. W. Rosenthal, "Unrestricted Release Limits for Transuranic Contaminated Equipment and Property," June 8, 1992.) It is generally conceded that radiation survey instruments are incapable of detecting 100 dpm/100 cm^2 in the scanning mode. Monitoring of equipment potentially contaminated with transuranics will be done in the scanning mode for the maximum limit and then the scaling mode will be used in areas identified as suspect in the scanning mode to ensure that the average limit is not exceeded.

These areas are posted for radiological conditions with an insert similar to "CONTACT RADIATION PROTECTION BEFORE REMOVING ITEMS FROM THIS AREA" if the appropriate posting does not qualify as one of the specific RMMA-equivalent areas listed in Subsect. 3.1. Items to be removed from areas with this posting are evaluated by a Radiological Control Technician and either released as nonradioactive or handled as potentially radioactive. For example, a ladder and tools used by a worker in such an area when no beams were present could be released as nonradioactive. An item of unknown origin that may have been in the beam area would be potentially radioactive and could only be unconditionally released after having been shown to meet release criteria for surface and volume contamination.

3.2 Posting RMMAs

The posting of areas corresponding to RMMAs remains an important part of the ORNL radiological protection program. ORNL Radiological Protection Procedure RPP-230, *Radiological Posting*, specifies the radiological conditions requiring posting and describes the allowed posting formats. No separate RMMA postings will be required for RMMAs at ORNL since the RMMAs described in Subsect. 3.1 coincide with existing radiological areas. The lack of separate RMMAs makes special training of personnel, creating posting procedures, and administratively controlling areas as part of the RMMA program unnecessary.

3.3 Temporary RMMAs and Declassification of RMMAs

Abnormal conditions, such as a spill, may require an area that is normally nonradiological to be posted as a radiological area. Any area that would be posted as an RMMA by Performance Objective criteria would be posted at ORNL as a RMMA-qualified radiological area, as described above. When conditions are corrected and contaminated areas cleaned, the affected areas will be surveyed according to RPP-420, *Release and Transportation of Radioactive Material* to show that posting is no longer required. The release and declassification of radiological areas (i.e., RMMAs) are the same for areas set up in response to a spill and for normally contaminated areas that have been remediated. The survey and declassification sequence is an established and documented part of the existing ORNL radiological protection program.

4. DETERMINING THE RADIOACTIVE STATUS OF HAZARDOUS WASTE

The waste generating organization is responsible for determining and documenting the radioactive status of hazardous waste. This may be done by either process knowledge, surface contamination surveys, sampling and analysis, or a combination of these techniques. The method(s) used is dependent on the area where the waste originated, the waste type (solid or liquid), and potential radionuclides. The flow chart in Fig. 4.1 illustrates the process for determining that DOE activities have added no radioactivity to the waste.

4.1 Outside an RMMA

Hazardous waste generated and stored outside an RMMA can be certified by the generating organization as nonradioactive based on process knowledge. Process knowledge certifications will be made by individuals who are aware of the origin, use, and potential for exposure of the waste to contamination or activation sources. The generating organization documents the decision that no radioactivity was added by DOE activities on UCN-20116, *Process Knowledge (PK) Documentation.* This form requires waste generating organizations to document that a waste is or is not potentially radioactive and/or hazardous. This form is stored for a minimum of three years and is traceable to the waste item.

If the waste is characterized as nonradioactive by process knowledge, the generating organization certifies this decision by completing the required information on form UCN-2109F, *RCRA and/or TSCA Waste, Attachment C (*including the unique identification number assigned to the process knowledge form), signing the certification statement on UCN-2109F, and marking not applicable (N/A) for the health physics survey information and health physics signature on form UCN-2109, *Waste Item Description.*

By definition, all hazardous wastes originating outside an RMMA have no potential of becoming contaminated or activated. However, it has been common practice at ORNL to provide all materials being released offsite with a Radiological Control Release tag ("green tag").

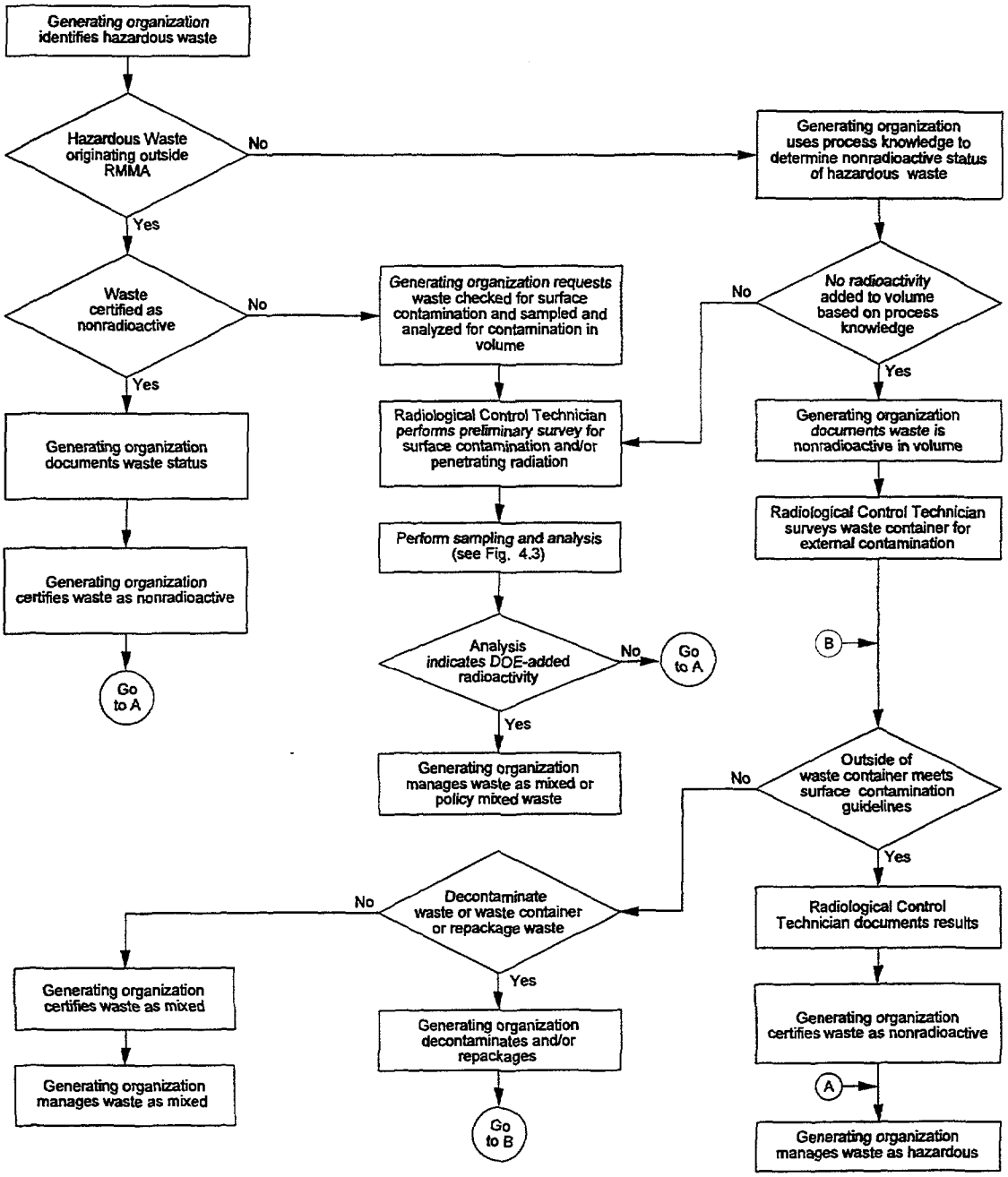

Figure 4.1 Determining the Radioactive Status of Hazardous Waste

The requirements for this survey are detailed in ORNL Radiological Protection Procedure RPP-420, *Release and Transportation of Radioactive Material*. This procedure allows items meeting the criteria on Form 420-2 in Fig. 4.2 or a waste management release form (e.g., UCN-20116) to be released from a Controlled Area without a radiological survey. In cases where the 420-2 or UCN-20116 form is used, a "green tag" will still be issued by the local Radiological Control Technician if required by the organization receiving the waste. The Radiological Control Technician will keep a copy of the form as a record of the transfer.

If process knowledge is insufficient to certify that the hazardous waste has no DOE-added radioactivity, the generating organization shall ensure the radioactive status of the hazardous waste is established by appropriate survey, sampling and analysis, or both.

ORIGINATOR/REQUESTER CERTIFICATION (RPP-420, Form 420-2)

I, _____, certify, "To the best of my knowledge, that as of _____:
(printed name) (date)

1) the equipment or material listed below has never been used or stored in Radiological Buffer, Contamination, High Contamination, or Airborne Radioactivity Areas),

2) the equipment or material listed below has never been exposed to activation-causing particle beams (neutron, proton, etc.).

3) I am knowledgeable enough of the history of these items to make the above determination."

_____ _____ _____
Signature Date Badge Number

Property Description	Property/Serial No.
_____	_____
_____	_____
_____	_____
_____	_____

Figure 4.2 Example of Originator/Requestor Certification Form

4.2 Inside an RMMA

Determining the radioactive status of hazardous waste generated inside an RMMA will be accomplished through the appropriate use of process knowledge, surface contamination surveys, sampling and analysis, or a combination of these techniques. Hazardous waste of unknown or uncertain history should be considered potentially radioactive. The accessible surfaces of all items being removed from an RMMA (except "not potentially radioactive" items leaving areas where activation could take place) must be checked by a Radiological Control Technician to assure that contamination levels are below those prescribed by the Performance Objective, or else those items must be appropriately handled as mixed waste.

4.2.1 Process Knowledge

The generating organization uses process knowledge initially to determine the radioactive content of hazardous waste generated or stored inside an RMMA. If the generating organization has sufficient process knowledge to characterize that the hazardous waste has not been contaminated in volume or activated by DOE activities, the generating organization documents the decision on UCN-20116, *Process Knowledge (PK) Documentation*. For example, if a sealed container of material was never opened while in an RMMA and was not exposed to a source of activation, the

waste-generating organization may certify by process knowledge that the hazardous waste contains no DOE-added radioactivity. If process knowledge is insufficient, then the hazardous waste must undergo additional surveying and/or sampling and analysis.

4.2.2 Surface Contamination Surveys

As shown in Fig. 4.1, a Radiological Control Technician surveys the accessible surfaces of the hazardous waste, hazardous waste container, or both before the waste is released to either a Controlled Area or off-site, whether or not process knowledge is sufficient to certify that the waste has not been contaminated in volume. If no surface contamination is found on the hazardous waste or the hazardous waste container above the unrestricted release criteria in RPP-220, the Radiological Control Technician records the results as prescribed in radiological protection procedures and documents the survey information in the space provided on the UCN-2109, *Waste Item Description*.

If surface contamination is found on the hazardous waste or hazardous waste container, the generating organization decides whether to decontaminate the waste or waste container or to repackage the waste. After repackaging or decontamination, the hazardous waste package is surveyed again. If the waste container meets the exterior surface contamination criteria and if the waste has not been contaminated in volume, the generating organization completes the required information on form UCN-2109F, RCRA and/or TSCA Waste, Attachment C (including the unique identification number assigned to the process knowledge form), and certifies the hazardous waste as nonradioactive by signing the certification statement on UCN-2109F.

If the generating organization cannot, or decides not to, decontaminate the hazardous waste or hazardous waste container or to repackage the waste, the generating organization characterizes the waste as mixed waste and documents it as such on UCN-2109G, *RCRA Mixed and/or TSCA Radioactive Waste, Attachment D*. In these cases, the waste must be over packed and the outermost waste container must meet the unrestricted release criteria in RPP-220 before the waste is transferred to a treatment, storage, or disposal facility.

4.2.3 Volume Contamination

If the waste cannot be certified as nonradioactive by process knowledge, the waste is considered potentially contaminated, and must be sampled and analyzed to decide if radioactivity has been added by DOE activities. The sampling and analysis must be done by individuals qualified by training and/or experience in developing sampling criteria and plans, determining the statistical basis for sample frequency, performing radioassay analyses, and interpreting radioassay results for DOE-added radioactivity.

4.2.3.1 Preliminary Survey

A Radiological Control Technician will do a preliminary survey for surface contamination and/or penetrating radiation on all hazardous waste inside an RMMA. This preliminary survey will also identify any waste that may have high levels of radiation and, therefore, require special handling during further sampling and analysis.

If the results of the preliminary survey show a radioactivity level above expected background of virgin material, the Radiological Control Technician can examine the survey results and waste container to decide if the radiation is emanating from within the waste (i.e., volume contamination), or is due to surface contamination on the waste container.

4.2.3.2 Sampling and Analysis

The generating organization requests the Office of Environmental Compliance and Documentation (OECD) to collect a representative sample of the hazardous waste. OECD, with help from the generating organization, will prepare a sampling and analysis plan. At a minimum the sampling and analysis plan will include the number of samples to be collected, sampling methodology, sampling procedures, type of analysis, cost, and any health and safety considerations. If standard sampling procedures are not applicable due to the nature of the waste, a specific method will be developed as part of the sampling and analysis plan. Any such deviation will be approved by the ORNL Environmental Coordinator. The sampling and analysis plan will be approved by OECD and the generating organization. Standard sampling methodologies for the Program will be documented in the *No Radioactivity Added Sampling and Analysis Procedures* that will be used for all sampling to ensure consistency and repeatability. All samples will be submitted to an approved analytical laboratory by OECD.

The analytical process for determining if DOE-added radioactivity has been added to the waste is outlined in Fig. 4.3. All samples will follow the same process until a point of decision can be reached with respect to the disposition of the hazardous waste. Initially samples are screened by gross alpha/beta counting. This screening tool is rapid, very sensitive, and less costly than other methods and may often provide sufficient detection capability for the hazardous or mixed waste decision. Gamma-spectroscopy, alpha-spectroscopy, or tritium analysis by liquid scintillation counting may be used when a more sensitive analysis of radioactive samples is required.

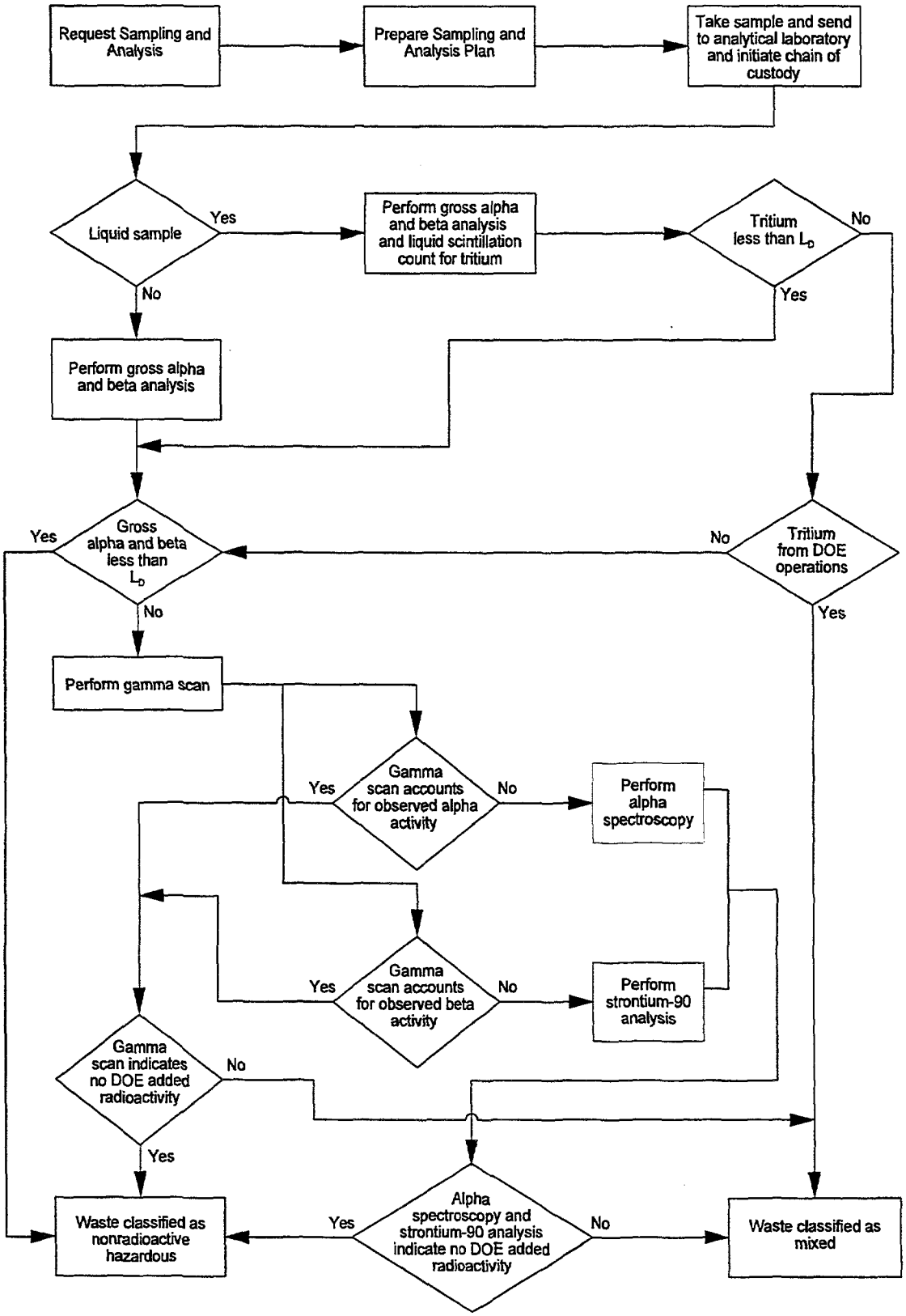

Figure 4.3 Sampling and Analysis for Certification of Nonradioactive Hazardous Waste

The analytical laboratory will report the analytical results along with the corresponding detection limits for each measurement to OECD. OECD personnel will ensure that the appropriate analytical methods were used, check for completeness, sample identification, sample media, and that the lab analyst has approved the data. The data will be evaluated as outlined in the *No Radioactivity Added Sampling and Analysis Procedures*. The results will be forwarded to the generating organization for determination of DOE-added radioactivity. The ORNL Environmental Coordinator will validate the decision before the certification of the waste by the generating organization.

Waste generating organizations who have the technical expertise and instrumentation to sample and/or analyze their own waste can request approval of their sampling and analytical procedures by the ORNL Environmental Coordinator. All procedures will be appropriate for the radionuclides and waste matrices to be analyzed.

4.2.3.3 Data Interpretation

The three steps used in determining whether radioactivity was added to the hazardous waste under evaluation are:

1) If the likelihood of surface contamination has been dismissed by measurements, is there a measurable net radiation flux much greater than expected background from the material? If so, treat the material as mixed waste. If the radiation flux is weak or nonexistent and the waste generating organization cannot certify the waste as nonradioactive by process knowledge, the generating organization will have the material sampled and analyzed.

2) If radioactivity is detected at or below the detection limit, L_D, the waste is nonradioactive hazardous.

3) If radioactivity is detected above the detection limit, L_D, either (a) the waste is mixed, or (b) if sufficient information exists indicating that the material is intrinsically radioactive (either by manufacture's specification or by comparison analysis) and that the radioactivity observed was not greater than the equivalent virgin material, the waste is nonradioactive hazardous.

The detection limit, L_D, was chosen as the statistical test for evaluating the analytical data. The background and efficiency of the instrument being used to measure a sample, along with the background and sample count times, determine the minimum detectable activity (MDA) of the measurement. However, the level of confidence desired in the result is an additional, hidden factor in the MDA. The usual confidence level adopted for measurements of radioactivity in samples is 95%, and that value will be used by ORNL. There are two components to the confidence level decision. A"false negative" result would allow the release of material as nonradioactive when it is in fact mildly radioactive. The probability of a false negative decreases dramatically for a sample with activity well above the detection limit, and a 5% probability of releasing a slightly contaminated sample is a generally accepted risk. Conversely, a "false positive" result would classify a sample as radioactive when it is in fact not radioactive. A false positive would lead to heroic measures as the generator attempts to characterize the radioactivity in a nonradioactive sample. Greater than a 5% probability of wasting resources on false positive samples is considered unacceptable by ORNL. If a 95% probability of avoiding each of the two errors (false negatives and false positives) is desired, L_D is the correct statistical value. Any other statistical methodology involves different assumptions concerning the confidence levels desired for the result.

5. SHIPPING REQUIREMENTS

Off-site shipment of hazardous waste is currently controlled by ORNL Waste Management Procedure WM-SWO-401.2, *Hazardous Waste Packaging and Offsite Shipping Procedure.* This procedure will be revised to include requirements for verifying the requirements of this Program.

Shipping requirements established under the Program will meet Department of Transportation regulations and waste acceptance criteria of receiving commercial facilities.

6. QUALITY ASSURANCE

The Performance Objective requires that formal documented procedures for waste management and waste characterization will be covered by quality assurance plans meeting the requirements of 10 CFR 830.120, DOE Order 5700.6C, and ASME NQA-1, as appropriate.

Quality assurance activities at ORNL are directed by Y/QD-15, Rev. 2, *Lockheed Martin Energy Systems Quality Program Description.* It requires all work to be performed to established technical standards and administrative controls using approved instructions, procedures, or other appropriate means. It also requires all personnel to be trained and qualified to do their assigned work.

Quality assurance activities at the division level are covered by:

- WMRAD-AD-110, *Quality Management Plan for the ORNL Site WMRAD* for waste management.
- MP-96-ORP-001, *ORP Management Plan* for radiological protection.
- ASO-QAP-0001, *Quality Assurance Plan for the Analytical Services Organization* for analytical services.

7. TRAINING

Training that is based on an analysis of the task to be done is provided for all personnel doing waste radioactivity determinations. As appropriate, periodic refresher training will be given. Training records will be maintained by the records retention requirements given in Sect. 8. Training covers the following areas:

7.1 General

All workers who handle hazardous materials or hazardous wastes will be offered training in the general requirements of the Program. All hazardous waste operations workers are trained according to 29 CFR 1910.120, *Hazardous Waste Operations and Emergency Response.*

7.2 Radioactive Status Determinations

Radiological Control Technicians, who conduct surface surveys to determine the radioactive status of wastes, are presently trained according to the requirements of the RadCon Manual.

Waste generators, waste certifiers, and other personnel who document the decision that a hazardous waste does or does not contain DOE-added radioactivity must be trained on the specific requirements of this procedure. Radiological Control Technicians are exempt from the training requirements of this procedure.

7.3 Periodic Retraining

Personnel will be retrained on the requirements of this procedure according to the frequency established by the designated training organization. Retraining will be incorporated in the hazardous waste generator training program.

8. RECORDS

All records generated in fulfillment of the Performance Objective will be managed according to DOE Order 1324.5B, *Records Management Program.* These records will be kept as quality assurance records until record retention requirements can be incorporated into DOE Order 1324.2A, *Records Disposition.*

Records that will be maintained include, but are not limited to, the following (or their approved equivalents):

1. The ORNL-designated waste management organization maintains UCN-20116, *Process Knowledge (PK) Documentation*, UCN-2109, *Waste Item Description*, and UCN-2109F, *RCRA and/or TSCA Waste, Attachment C.*

2. The waste generating organization maintains any documentation required to support process knowledge determinations.

3. OECD maintains sampling and analysis plans, chain of custody forms, completed log sheets (if applicable), analytical request forms, and analytical results.

4. The Office of Radiation Protection maintains radiological survey results.

5. The ORNL-designated analytical laboratory maintains records required by their approved quality assurance plan.

6. The ORNL-designated training organization(s) maintains their training records on this procedure.

Records will be maintained for a minimum of three years.

9. REFERENCES

1. *Performance Objective for Certification of Non-Radioactive Hazardous Waste*, DOE Office of Waste Management (EM-30), February 17, 1995.

2. J. R. Maher, DOE Office of Nuclear Safety (PE-222), memorandum to J. R. Beers, et al, *Unrestricted Release of Radioactivity Contaminated Personal Property*, March 15, 1984.

3. DOE *Radiological Control Manual*, DOE/EH-0256T.

4. DOE Order 5400.5, *Radiation Protection of the Public and the Environment.*

5. DOE Order 1324.5B, *Records Management Program.*

6. DOE Order 1324.2A, *Records Disposition.*

7. DOE Order 5700.6C, *Quality Assurance.*

8. 10 CFR 835, *Occupational Radiation Protection.*

9. 10 CFR 830.120, *Quality Assurance Requirements.*

10. 29 CFR 1910.120, *Hazardous Waste Operations and Emergency Response.*

11. ORNL Radiological Protection Procedure, RPP-220, *Contamination Control.*

12. ORNL Radiological Protection Procedure, RPP-230, *Radiological Posting.*

13. ORNL Radiological Protection Procedure, RPP-330, *Administrative and Physical Access Controls.*

14. ORNL Radiological Protection Procedure, RPP-420, *Release and Transportation of Radioactive Material.*

15. Waste Management and Remedial Action Division Procedure, WM-SWO-401.2, *Hazardous Waste Packaging and Offsite Shipping Procedure.*

16. Y/QD-15, Rev. 2, *Lockheed Martin Energy Systems Quality Program Description.*

17. American Society of Mechanical Engineers (ASME) NQA-1, *Quality Assurance Program Requirements for Nuclear Facilities.*

APPENDIX A

SITE PROCEDURES, PLANS, AND GUIDANCE DOCUMENTS

Radiological Protection Procedures and Guidance Documents

RPP-220, *Contamination Control*
RPP-230, *Radiological Posting*
RPP-330, *Administrative and Physical Access Controls*
RPP-420, *Release and Transportation of Radioactive Material*
RPP-560, *Radiological Instrumentation and Calibration*
RPP-700, *Radiological Records*

Sampling Procedures and Guidance Documents

SOP-ESP-003.110, *Liquid Sampling Procedures*
SOP-ESP-003.111, *Sampling of Soil and Sediment*
ESP-303-1, *Soil Sampling with a Spade and Scoop*
ESP-303-3, *Soil Sampling Using a Trier*
ESP-308-1, *Composite Procedures*
ESP-308-3, *Container Sampling: Drums and Tanks*
DOE/EH-0053, *Appendix E - Field Sampling Protocols and Guidance* (Guidance Document)
EPA/PB91-233650, *Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual* (Guidance Document)

Analytical Procedures and Guidance Documents

AC-MM-2 0038, *Operation and Calibration of the Tennelec LB5100 Proportional Counter*
AC-MM-2 00377, *Operation and Calibration of the Tennelec LB4000 Proportional Counter*
AC-MM-2 00379, *ND9900 Alpha and Gamma Data Acquisition and Processing System*

Waste Certification Procedures and Guidance Documents

EP-710, *Waste Certification Requirements for Energy Systems Waste Management Organization*
EPM-1.1, *Accumulation; Transportation; Manifesting; and Treatment, Storage, and Disposal of Hazardous or Low-Level Mixed Waste*
EPM-3.1, *Disposal of PCB (polychlorinated biphenyl) Oils*
EPM-3.2, *Oils (Non-PCB)*

Quality Assurance Plans and Guidance Documents

Y/QD-15, Rev. 2, *Lockheed Martin Energy Systems Quality Program Description*
WMRAD-AD-110, Rev. 1, *Quality Management Plan for the Oak Ridge National Laboratory Site Waste Management and Remedial Actions Division*
MP-96-ORP-001, *ORP Management Plan*
ASO-QAP-0001, *Quality Assurance Plan for the Analytical Services Organization*

Training Plans and Procedures

ESS-TQ-108, *Employee Training Records Management*
RPP-600, *Training and Qualifications for Radiological Control*

Records

DOE Order 1324.2A, *Records Disposition*
DOE Order 1324.5B, *Records Management Program*

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