

CHARACTERIZATION THROUGH DATA QUALITY OBJECTIVES AND CERTIFICATION OF REMOTE-HANDLED TRANSURANIC WASTE GENERATOR/STORAGE SITES FOR SHIPMENT TO THE WIPP

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ABSTRACT

The Waste Isolation Pilot Plant (WIPP) is operating to receive and dispose of contact-handled (CH) transuranic (TRU) waste. The Department of Energy (DOE) Carlsbad Field Office (CBFO) is seeking approval from the Environmental Protection Agency (EPA) and the New Mexico Environment Department (NMED) of the remote-handled (RH) TRU characterization plan to allow disposal of RH TRU waste in the WIPP repository. In addition, the DOE-CBFO has received approval from the Nuclear Regulatory Commission (NRC) to use two shipping casks for transporting RH TRU waste.

Each regulatory agency (i.e., EPA, NMED, and NRC) has different requirements that will have to be met through the use of information collected by characterizing the RH TRU waste. Therefore, the DOE-CBFO has developed a proposed characterization program for obtaining the RH TRU waste information necessary to demonstrate that the waste meets the applicable regulatory requirements. This process involved the development of a comprehensive set of Data Quality Objectives (DQOs) comprising the various regulatory requirements.

The DOE-CBFO has identified seven DQOs for use in the RH TRU waste characterization program. These DQOs are defense waste determination, TRU waste determination, RH TRU determination, activity determination, RCRA physical and chemical properties, prohibited item determination, and EPA physical and chemical properties. The selection of the DQOs were based on technical, legal and regulatory drivers that assure the health and safety of the workers, the public, to protect the environment, and to comply with the requirements of the regulatory agencies.

The DOE-CBFO also has the responsibility for the certification of generator/storage sites to ship RH TRU mixed waste to the WIPP for disposal. Currently, thirteen sites across the DOE-complex are generators of RH TRU waste or store the waste at their location for other

generators. Generator/storage site certification involves review and approval of site-specific programmatic documents that demonstrate compliance with the WIPP waste characterization and transportation requirements. Additionally, procedures must be developed to implement programmatic requirements and adequacy of those procedures determined. Finally, on-site audits evaluate the technical and administrative implementation and effectiveness of the operating procedures.

INTRODUCTION

The DOE-CBFO has submitted regulatory compliance documents to the EPA (1) and the NMED (2) to allow the management and disposal of RH TRU waste at the WIPP. In addition, the DOE has received a certificate of compliance from the NRC for transporting RH TRU waste in the RH 72-B shipping cask (3) and the 10-160B shipping cask (4). These documents contain the characterization and certification requirements that the generator/storage sites must meet in order to ship RH TRU waste to the WIPP.

The DOE presented a data quality objective (DQO) based program to the regulatory agencies based on the data necessary to ensure compliance with the regulatory requirements. The DQOs support decision-making and were developed around specific waste characterization objectives based on what must be known to safely and compliantly manage, store, and dispose of RH TRU waste at the WIPP.

Based on the DQOs, the DOE has proposed specific characterization methods for collecting the necessary data that must be implemented at the sites. The DQO process resulted in the development of seven DQOs. Each DQO is satisfied by collecting specific types of data for making the necessary regulatory decisions. The data that is collected to meet each DQO is different and will be satisfied by a site collecting the required data per a characterization program that is compliant with the regulatory requirements.

The DOE has proposed that the sites' compliance with the characterization program be evaluated and approved by the CBFO prior to RH TRU waste shipment. The DOE has developed a process for approving the sites' waste characterization and certification programs. This approval process is similar to the one that is currently being implemented in the CH TRU waste characterization program, although the characterization program requirements are different.

DATA QUALITY OBJECTIVES DEVELOPMENT

The RH TRU Waste Characterization Program was developed by identifying the DQOs that must be met in order to meet the regulatory requirements. Because the EPA and the NMED regulate disposal of RH TRU waste and the NRC and DOT regulate the transportation of it, the DQOs were developed to address the applicable requirements for each of the regulatory agencies.

The DQOs were developed around specific waste characterization objectives to support decision-making. These waste characterization objectives are measures of compliance with legal and regulatory requirements (i.e., the decision whether or not compliance is achieved). The DQOs

are supported by individual quality assurance objectives (QAOs) that are used to ensure that the quality and integrity of data collected is acceptable for making a regulatory decision.

The RH TRU Waste Characterization Program has defined the DQOs at the programmatic level, derived directly from a regulatory driver (see Figure 1) based on the EPA guidance (5). The QAOs have been defined at the implementation level and derived for methods used to collect data to satisfy the DQOs. The QAOs are also part of the Quality Assurance Program defined for the implementing organization; therefore, QAOs may be slightly different from site to site depending on the specific methods that a site will employ and the source of the waste specific data that a site will use. However, all sites must provide the information that satisfies the DQOs to ensure compliance with the regulatory drivers prior to RH TRU waste shipment and disposal.

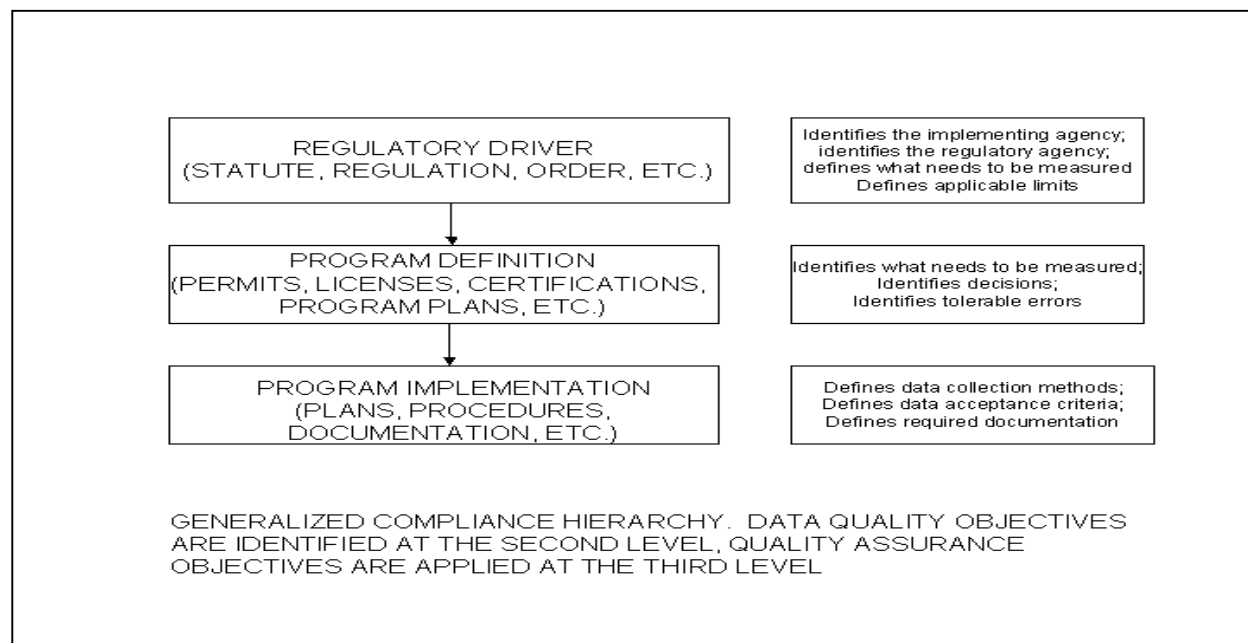


Figure 1 Generalized Document Hierarchy

The RH TRU Waste Characterization Program has developed seven DQOs that must be implemented at generator/storage sites. The individual DQOs are:

- Defense Waste Determination
- TRU Waste Determination
- RH TRU Waste Determination
- Activity Determination
- RCRA Physical and Chemical Property Determination
- Prohibited Item Determination
- EPA Physical and Chemical Property Determination

The first DQO is the defense waste determination. The WIPP Land Withdrawal Act (LWA) (6), as amended, requires that waste being disposed of at the WIPP be generated as part of defense-related activities. A generator site must collect information relative to the process and materials

that produced the waste in order to demonstrate compliance with this DQO. This DQO is qualitative and has no specified decision error tolerance on the information collected because the generator must make the decision based on the best available information.

The LWA (6) also requires that waste being disposed of at the WIPP be classified as TRU based on its activity concentration. Therefore, the second DQO is to make the TRU waste determination to ensure that the waste has an activity concentration equal to or greater than 100 nanocuries per gram). This DQO is met by collecting data relative to the TRU activity in the waste stream. Because, the threshold for the TRU waste definition is not established with an associated error or uncertainty, there may be uncertainties associated with the methods for obtaining the data needed.

Another LWA (6) related DQO is the RH TRU waste determination. This DQO requires that the waste be classified by dose rate to ensure that it is RH TRU waste. This is accomplished by collecting surface dose rate data for each container of waste to demonstrate that it has a surface dose rate equal to or greater than 200 mrem/hr and less than 1000 rem/hour. The threshold for the surface dose rate minimum and maximum limits for RH TRU waste are not established with an associated error or uncertainty; therefore, there may be uncertainties associated with the methods for obtaining the data needed.

The final LWA (6) related DQO is also related to the EPA certification of the WIPP (7). This DQO is for activity determination. The LWA requires that the total activity of the disposed RH TRU waste must be no more than 5.1 million curies and that each canister meet a 23 curie/liter limit. The EPA certification requires that the activity of isotopes important to the calculation of releases be tracked. These requirements are met by collecting data relative to the activity in the waste stream. The activity requirements for RH TRU waste are not specified with associated precision or accuracy statements; therefore, there may be uncertainties associated with the methods for obtaining the data needed.

The RCRA waste characterization requirements include knowing the physical and chemical properties of the waste; therefore, a DQO to identify this information has been established (2). Specifically, this DQO requires a generator site to determine the physical properties of the waste by assigning the Summary Category Group designation and to determine chemical properties of the waste by assigning the hazardous waste number. The DQO is met by collecting information relative to the process and materials that produced the waste and information about the specific items in the waste stream. This is a qualitative DQO with no specified decision error tolerance because the generator must make determinations of physical properties and hazardous waste number based on the best available information.

The EPA certification of the WIPP (7) and RCRA requirements (2) call for the collection of information that relates to prohibited items. The prohibited items in the waste are those items that could. The list of prohibited items for RH TRU waste is smaller than that for CH TRU waste and only prohibited residual liquids above 1% by volume and PCBs ≥ 50 ppm. This DQO is met by collecting information relative to the process and materials that produced the waste and the site policies that addressed the management of prohibited items. The limit on residual liquids has been specified with no associated error; therefore, any container that contains more than 1 percent residual liquids cannot be shipped to the WIPP. The limit on PCBs has also been

specified with no associated error; therefore, any container that contains 50 ppm or more PCBs cannot be shipped to the WIPP.

The EPA certification of the WIPP (7) requires that the physical form of the waste be known such that the waste form assumptions used for performance assessment modeling can be verified. The waste form assumptions are based on waste material parameters that categorize the various materials that could be present in the waste. The waste material parameter requirements include an upper limit on the amount of cellulosic, plastic, and rubber (CPR) in the waste and a lower limit on the amount of ferrous metals. Information must be collected relative to the process and materials that produced the waste to allow these waste material parameters to be estimated. This information allows the WIPP to keep track of material parameter weights and compare the quantity disposed to the limits established for the repository. As such, there are no decision-making tolerable errors identified, although the EPA requires that the uncertainty in the estimate be documented.

CERTIFICATION OF GENERATOR SITES

Remote-handled TRU generator/storage sites must also demonstrate the efficacy of their characterization programs. The CBFO has the responsibility for the certification of generator/storage sites to ship RH TRU mixed waste to the WIPP for disposal. Currently, thirteen sites across the DOE-complex are generators of RH TRU waste or store the waste at their location for other generators awaiting certification to ship to the WIPP. Certification of the generator/storage sites involves review and approval of specific programmatic documents that demonstrate compliance with the WIPP waste characterization and transportation requirements. Additionally, procedures must be developed to implement programmatic requirements and adequacy of those procedures determined. Finally, on-site audits evaluate the technical and administrative implementation and effectiveness of the operating procedures.

The certification process ensures that all characterization, shipping, and disposal requirements are met before a site ships defense RH TRU waste to the WIPP for disposal. The CBFO certification gives the sites authority to certify that waste containers, contents, and payload assemblies for the RH 72B and the CNS 10-160B shipping casks are acceptable for shipment to and disposal at the WIPP.

The CBFO certifies each generator/storage site to perform the required operations leading to first, certification that individual waste streams are characterized in accordance with the requirements of the WIPP Hazardous Waste Facility Permit (HWFP) proposed attachments R and appendices R1 through R3 (called the “draft RH TRU Waste Analysis Plan” [RH WAP]) (2), and that all individual containers fall within *RH Waste Acceptance Criteria for the Waste Isolation Pilot Plant* (WIPP RH WAC) limits (8) Second, certification that TRU waste packaging and loading operations for shipping the waste in an RH 72B are conducted in accordance with the WIPP RH WAC (8) and the *RH 72-B Safety Analysis Report for Packaging* (9). Alternatively, certification that TRU waste packaging and loading operations for shipping the waste in a CNS 10-160B are conducted in accordance with the WIPP RH WAC (8) and *CNS 10-160B Safety Analysis Report for Packaging* (10). And finally, certification that a quality assurance program is in place that meets American Society of Mechanical Engineers (ASME)

Nuclear Quality Assurance (NQA) and other DOE and regulatory QA requirements as interpreted by the CBFO QAPD (11).

Under the proposed regulatory submittals, CBFO must grant RH-TRU waste certification authority and transportation certification authority to the generator sites. The process ensures that all characterization, transportation, and disposal requirements are met before a site ships defense RH-TRU and TRU-mixed waste to the WIPP for disposal.

The CBFO determines a site's readiness to perform waste characterization, certification, packaging, and transportation activities by:

- Reviewing and approving the site-specific plans that implement the CBFO requirements
- Reviewing for adequacy the site-specific operating procedures that implement the site-specific plans. Performing on-site audits to evaluate the technical and administrative implementation and effectiveness of the operating procedures.

When a site's waste characterization, packaging, and certification program plans and operating procedures meet all applicable program requirements, the CBFO manager grants the site waste certification authority and transportation certification authority. Sites will be required to review their program documents and procedures at least annually, or when CBFO requirements are revised, and revise documents or procedures as necessary.

CBFO Actions

The CBFO reviews and approves site-specific TRU waste programs. The CBFO assembles a team of auditors and technical specialists to review site plans and operating procedures for adequacy and conduct on-site audits of waste characterization, certification, and transportation program implementation. The audit team examines site documents related to TRU waste management and observes quality-affecting TRU waste management activities at the site. The audit process verifies that the site's plans and procedures adequately implement the CBFO requirements, that the site is performing work and processes according to its procedures.

On-site certification audits are held after the CBFO has approved site-specific program plans, operating procedures have been reviewed for adequacy, site personnel have been trained, the site has performed an internal assessment and declared readiness, and procedures have been implemented for at least 30 days. During the on-site audit, any program requirement deficiencies or discrepancies between the operating procedures and actual practice are documented in corrective action reports (CARs) or as conditions corrected during the audit. The results of the audit are documented in an audit report.

Generator/Storage Site Actions

To receive certification authority the site must demonstrate how each of the applicable program requirements is met. This is accomplished, in part, by developing the required site plans and operating procedures and by training personnel to perform the required waste and transportation certification operations in accordance with the site's approved procedures.

Each generator/storage site should start their program development as soon as practical to allow time to resolve problems and to accommodate program changes. The process that should be used is described below:

Access CBFO documents - The CBFO has several requirements documents and other compliance, instructional, and guidance documents. The requirements documents necessary to prepare RH TRU waste for disposal at the WIPP are the RH WAP (2), the RH WAC (8), the RH TRU Waste Characterization Program Implementation Plan (WCPIP) (1), the RH-72-B TRAMPAC (9) and the 10-160B TRAMPAC (10), and the QAPD (11). All CBFO documents are posted on the WIPP Internet home page for use by the sites in preparing their characterization, certification, and transportation programs.

Prepare waste certification plan (WCP) and receive CBFO approval - The RH WAC (8) and the RH TRU WCPIP (1) require each site to prepare a WCP. The WCP and associated QA plan may be combined or submitted as separate documents, which are reviewed and approved by the DOE field element and the CBFO.

Prepare certification QA plan and receive CBFO approval - The QAPD (11) requires that each site write a certification QA plan. The QA plan should be combined with the WCP or submitted separately. The DOE field element and the CBFO review and approve the QA plan.

Prepare QAPjP and receive CBFO approval - The RH WAP (2) and QAPD (11) require that each generator/storage site prepare a TRU waste characterization QAPjP. The DOE field element and the CBFO review and approve the QAPjP.

Prepare procedures matrices - The QAPD (11) requires that each site prepare a QAPD procedures matrix. It is approved by the site project manager (SPM) and reviewed during the CBFO review performed as part of the certification audit. Each site should also prepare RH WAP, RH WAC, RH TRU WCPIP, and RH-TRAMPAC or 10-160B TRAMPAC compliance matrices and submit them to the CBFO.

Prepare graded approach procedure and receive CBFO approval - The QAPD (11) requires that each site prepare a graded approach procedure that is reviewed and approved by the DOE field element and the CBFO.

Prepare documents for shipments in the 72-B cask; Prepare site-specific RH-TRAMPAC, RH-TRAMPAC QA plan, and packaging QA plan - The RH WAC (8) and RH-TRAMPAC (9) require that the site write a site-specific RH-TRAMPAC and RH-TRAMPAC QA plan (payload control requirements). In addition, the sites must include a plan that meets the RH 72-B SARP packaging QA requirements (packaging usage requirements) contained in section 9.0 of the RH 72-B SARP. Both the DOE field element and the CBFO approve the site-specific RH-TRAMPAC, RH-TRAMPAC QA plan, and packaging QA plan.

For shipments in the 10-160B cask (if applicable)- Prepare site-specific 10-160B TRAMPAC, 10-160B TRAMPAC QA plan and packaging QA plan. Both the DOE field element and the

CBFO approve the site-specific 10-160B TRAMPAC, 10-160B TRAMPAC QA plan, and packaging QA plan.

Prepare characterization and transportation operating procedures - Once the site TRU waste certification and transportation certification programs have been planned and documented in the site-specific WCP, QAPjP, RH-TRAMPAC, and RH-TRAMPAC QA plan, and packaging QA plan, (as applicable to usage of the 72-B or 10-160B casks) the site prepares and approves the appropriate operating procedures. To the extent practical, the site uses existing procedures, making modifications as needed to qualify them for use in the program. These procedures are approved by the SPM and are reviewed for adequacy by the CBFO as part of the certification audit process.

Train and qualify certification, sampling, analysis, and transportation certification personnel - The site selects personnel who meet the qualification and experience requirements for the duties to be performed. The site then provides training and qualifies the personnel to the site-specific operating procedures. Specific training requirements are identified in the RH WAP (2), RH WCPIP (1), RH WAC (8), and QAPD (11). Training is performed and documented as indicated by site-specific training plans and procedures.

Submit required program information – Each site must submit a letter to CBFO stating that they will accept any returned waste shipment originating at the site that is rejected upon arrival at the WIPP facility. Each site must also submit a letter to CBFO that lists by name and title the site-specific TRU program officials. This letter should include the DOE field element representative, the SPM, the site project QA officer (SPQAO), the waste certification official (WCO), the transportation certification official (TCO) and one alternate for each of these positions.

Receive WIPP Waste Information System (WWIS) orientation and access approval – The CBFO provides the generator/storage sites with WWIS client software, a WWIS user's manual, and orientation on the operation of the WWIS. To verify that the WWIS is operational, the WIPP management and operating (M&O) contractor assists site programmers with development of WWIS-acceptable data structure, setup, and acceptance testing.

Implement procedures - The site characterizes waste on a waste stream basis. The waste characterization data are reviewed, verified, and validated using operating procedures.

Perform internal assessment - The site finds and corrects deficiencies in the procedures during the internal assessment. A 30-day implementation period is required before a CBFO audit. If time restraints imposed by CBFO cause the internal assessment to occur during the 30-day implementation period, procedures can be revised and resubmitted without the 30-day clock restarting.

Declare readiness – The site formally notifies the CBFO that they are ready for a certification audit. If applicable, the CBFO then notifies the NMED and the EPA of the proposed audit date and scope. The CBFO then schedules the audit for the next available date on the audit schedule.

Receive final audit report - Certification audits performed by the CBFO include review for adequacy of site-specific plans and operating procedures, followed by on-site review of the

implementation and effectiveness of all waste characterization, certification, packaging, and transportation activities. The CBFO issues an audit report to the site that summarizes the determinations made during the audit. The CBFO also issues a final audit report to the NMED after all CARs are closed. The final audit report to NMED details only the RH WAP-related findings. NMED must approve this report prior to any waste shipment. After the CBFO has performed a successful audit, sites must notify the CBFO within 5 days of RH WAP-related document changes. The CBFO must approve program changes and major document changes prior to implementation. In conjunction with site audits, CBFO has implemented a program to maintain a continuous adequacy determination for each site.

Receive waste and transportation certification authority - The CBFO will receive notification from the EPA and the NMED of approval for each site. Site certification authority (waste and transportation) is granted by letter from the CBFO manager after all CARs affecting quality are closed.

Enter data into WWIS - The site inputs individual waste container data to the WWIS characterization module and transmits it to the WIPP.

Receive Waste Stream Profile Form (WSPF) approval and certify waste containers - The WSPF for each waste stream to be disposed of at the WIPP is prepared by the SPM and submitted to and approved by the CBFO prior to shipment. The WCO certifies each waste container as meeting the waste acceptance criteria of the RH WAC. Following WSPF approval the sites may then enter data into the certification and shipping modules of the WWIS.

Assemble payload; obtain approval to ship; release shipment - Individual waste containers are selected for assembly into 72B or 10-160B payload assemblies that meet the site-specific RH-TRAMPAC or 10-160B TRAMPAC requirements (as applicable). The site TCO certifies that the assembled payload meets the criteria of the site-specific RH-TRAMPAC or 10-160B AMPAC, obtains payload approval before loading, transmits the transportation certification data to the WIPP M&O contractor using the WWIS, and requests approval to release the shipment to the WIPP. The WIPP M&O contractor verifies the certification data and notifies the site of approval to release the shipment to the WIPP. The site releases the certified payload and the shipment is made.

CBFO performs annual certification audit and recertifies site - The CBFO conducts annual audits of the site activities to ensure continued acceptable performance.

Continue program activities - The generator/storage site continues to characterize and certify waste containers; assemble, load, and certify 72B and 10-160B payload assemblies; obtain the WIPP M&O contractor approval to ship; and release further shipments.

SUMMARY

The DOE has presented a DQO based RH TRU waste characterization program to the regulatory agencies in their recently submitted regulatory documents. This RH TRU waste characterization program is based on the data necessary to ensure compliance with the regulatory requirements. The proposed DQOs support decision-making and were developed around specific waste

characterization objectives. These waste characterization objectives were based on what must be known to safely and compliantly manage, store, and dispose of RH TRU waste at the WIPP.

In these submittals, the DOE has also proposed that the sites' compliance with the characterization program be evaluated and approved by the CBFO prior to RH TRU waste shipment. In order to facilitate the site certification process, the DOE has developed a process for approving the sites' waste characterization and certification programs that is similar to the one currently used in the CH TRU waste program.

REFERENCES

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