

MOV.19970402.0003

OCRWM
Waste Acceptance, Storage and Transportation Project



Spent Nuclear Fuel Verification Plan
Revision 0
(E00000000-00811-4600-00001)

March 1997

U.S. Department of Energy
Office of Civilian Radioactive Waste Management

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3-4-97

Date

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1. INTRODUCTION

Verification will be conducted on all waste (as defined below) that is accepted into the Civilian Radioactive Waste Management System (CRWMS). Verification will consist of collecting information concerning the type, quantity, and nature of the materials to be accepted, confirming that the information collected is complete, and documenting certain physical attributes of the material, including identity. Once collected and verified, the information will be used by the CRWMS to demonstrate that appropriate safeguards are in place.

This Verification Plan establishes the conceptual framework for the verification process. From this plan, detailed procedures will be developed to implement the verification process. Two factors will significantly impact the nature of the process. First, the information collected during verification will be used for Material Control and Accounting (MC&A) purposes, which is beyond the scope of the verification process outlined in the *Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste*¹ (10 CFR 961, the Standard Contract). Second, several Purchasers are currently investigating the feasibility of using dual purpose canisters for both storage of spent nuclear fuel at their sites and transportation of the spent nuclear fuel to a Federal facility at the time of acceptance. If these canisters are used, there is no intent to re-open the canisters prior to DOE's acceptance. These canisters might be used as early as 1997.

1.1 SCOPE

This plan presents the verification process the Department intends to use for purposes of the Standard Contract, and identifies areas where the requirements outlined in the Standard Contract must be slightly modified to allow for the implementation of the verification process described in this plan. These modifications may require amendment of the Standard Contract. These modifications will allow the Purchasers to use various types of sealed multi-element canisters within the framework of the verification process. This version of the Verification Plan is limited to a discussion of the process that will be implemented for commercial spent nuclear fuel, whether canistered or uncanistered prior to acceptance. The term "waste" throughout this document refers to spent nuclear fuel, as defined in the Standard Contract. The term "canistered fuel" refers to fuel that has been placed in a sealed, multi-assembly canister at a Purchaser's site with the intent of not re-opening the canister prior to its delivery to a Department of Energy (the Department or DOE) facility. Such a canister may be dual or multi-purpose.

This plan also identifies the specific information the Department intends to require for MC&A purposes. A determination of the system (electronic and/or conventional) that will be required to store and retrieve this information in order to accomplish item control and continuity of knowledge has not been made at this time.

1.2 DOCUMENT ORGANIZATION

This plan is organized into five sections, followed by references, a list of acronyms and a glossary. The main sections are: Introduction, Requirements, Data Validation, Physical Verification, and Procedures.

Section 2, Requirements, discusses the basis for the development of this plan and explains the need for providing guidance for implementation of the verification requirement in the Standard Contract. The specific requirements that the verification process must meet are discussed in detail.

Section 3, Data Validation, identifies the specific data that will be collected during the verification process and describes, conceptually, how the data will be validated. This information will serve as the basis for establishing "continuity of knowledge" of the special nuclear material (SNM) content of the waste, which is necessary to comply with MC&A requirements and must therefore be permanently retained.

Section 4, Physical Verification, confirms of the characteristics and identity of the waste being delivered through physical inspection, as opposed to the validation of information concerning the waste. The physical verification process is crucial to meeting the system goal of avoiding the necessity of re-opening sealed canisters for safeguards-related reasons once they have been sealed at a Purchaser's site. This verification will take place when a canister is sealed and when waste is accepted by the Office of Civilian Radioactive Waste Management (OCRWM).

Finally, Section 5 identifies the procedures that must be developed in order to implement the process discussed in this plan. Included in these detailed procedures will be a detailed checklist that will be used to ensure that all actions necessary to accomplish verification are completed.

2. REQUIREMENTS

Public Law 97-425, the "Nuclear Waste Policy Act of 1982" (NWPA), as amended by Public Law 100-203, the "Nuclear Waste Policy Amendments Act of 1987," establishes Federal responsibility for the disposal of spent nuclear fuel (SNF) and high-level radioactive waste (HLW). The NWPA also established OCRWM to carry out these functions of the Department. Under this authority, OCRWM promulgated the Standard Contract, which identifies, in general terms, the waste form data which must be provided to the Department upon delivery of SNF and transfer of title. These data requirements include, among other things, the data needed to verify the quantity and certain characteristics of the material to be accepted.

An analysis was conducted to identify all regulations applicable to the development of a Safeguards and Security program contained in the applicable and appropriate parts of Title 10 of the Code of Federal Regulations. The *Integrated Safeguards and Security Regulatory Analysis (ISSRA)*² documents the results of this analysis. This analysis served as a source of the requirements that pertain to verification.

The OCRWM Quality Assurance Requirements and Description (QARD) (DOE/RW/0333P) will be applied in a graded manner to the Verification Plan implementing procedures, as they are developed.

2.1 VERIFICATION REQUIREMENTS IN THE STANDARD CONTRACT

Article VI.B.2 of the Standard Contract requires that verification be performed on all SNF and/or HLW that is accepted into the CRWMS. Specifically, the article states,

During cask loading and prior to acceptance by the Department for transportation to the Department's facility, the SNF and/or HLW description of the shipping lot shall be subject to verification by the Department. To the extent the SNF and/or HLW is consistent with the description submitted and approved, in accordance with Appendices E and F, the Department agrees to accept such SNF and/or HLW for disposal when the Department has verified the SNF and/or HLW description, determined the material is properly loaded, packaged, marked, labeled and ready for transportation, and has taken custody, as evidenced in writing, of the material at the Purchaser's site, f.o.b. carrier. A properly executed off-site radioactive shipment record describing cask contents must be prepared by the Purchaser along with a signed certification which states: "This is to certify that the above-named materials are properly described, classified, packaged, marked and labeled and are in proper condition for transfer according to the applicable regulations of the U.S. Department of Transportation."

Appendix E, *General Specifications*, specifies the categories for classifying spent nuclear fuel for delivery and Appendix F, *Detailed Description of Purchaser's Fuel*, requires the Purchaser to describe, in detail, the specific fuel that will be delivered in a given allocation. While these two

forms are specifically referenced as the method of accomplishing verification, they may be replaced through appropriate modification of the Standard Contract with a more comprehensive set of forms, as discussed in Section 3.1.

This Verification Plan is written to implement the technical and regulatory requirements for verification, as well as to allow for the attainment of other Program goals, as discussed in Section 2.2.

2.2 OTHER VERIFICATION REQUIREMENTS

The CRWMS is being designed and implemented to meet all applicable Nuclear Regulatory Commission (NRC) regulations for the protection of SNF. The United States Department of State has also designated the CRWMS as eligible for International Atomic Energy Agency (IAEA) inspection. Having been designated as eligible for the imposition of international safeguards, the IAEA can now select the CRWMS facilities for inspection. If any CRWMS facility is selected by the IAEA for inspection, any resulting requirements would be codified in Title 10 Code of Federal Regulations Part 75 (10 CFR 75). This would obligate CRWMS facilities to comply with IAEA requirements for the safeguarding of SNM contained within SNF. Material considered to be SNM is defined in 10 CFR 70.

Since some of the elements of the CRWMS will be licensed by the NRC, the designs will be required to incorporate a Safeguards and Security (S&S) Program that complies with NRC S&S requirements. The *Civilian Radioactive Waste Management System Material Control and Accounting Plan*³ (CRWMS MC&A Plan) was developed to outline OCRWM's approach to meeting the S&S requirements.* This plan discusses the MC&A requirements for all elements of the waste management system. Examples of OCRWM's S&S responsibilities include collection of shipment information from Purchasers, data verification, and management of a central database. An Office of Waste Acceptance, Storage and Transportation (OWAST) MC&A Plan will also be developed. The information collected from the Purchasers must support the overall CRWMS MC&A Plan goal of establishing "continuity of knowledge" for the SNF and/or HLW entering the CRWMS. In order to establish this continuity of knowledge, some information will be required that was not anticipated in the Standard Contract. The additional information that would be requested is already known to the Purchasers and is being used by Purchasers in their reporting of other SNF information collected by other Federal Agencies (e.g., NRC, EIA). This Verification Plan includes the collection of this additional information, which would become the basic data for MC&A once the SNF and/or HLW is accepted.

*The MGDS MC&A Plan was developed to cover all aspects of MC&A within the CRWMS related to the delivery of canistered SNF. The MGDS MC&A Plan is currently under revision to include a discussion of the MC&A requirements for the delivery of uncanistered SNF. As part of this revision, the title will be changed to the *Civilian Radioactive Waste Management System Material Control and Accounting Plan* to more accurately reflect the applicability to all aspects of the CRWMS.

Verification of SNF, as such, is not explicitly referred to or required in NRC regulations. In general, the NRC relies on the licensee to produce and adhere to a performance-based MC&A plan. That is, the licensees develop and implement their own programs. The NRC then ensures that the licensee meets these commitments by independent record audits and facility inspections. CRWMS facilities (Interim Storage Facility (ISF) and/or Mined Geologic Disposal System (MGDS)) will be licensed by the NRC. While an interim storage facility is not currently being pursued as a component of the waste management system, there is the possibility that future plans may include such a facility. Even if an interim storage facility is not utilized, the NRC has informed OCRWM that the safeguards requirements for such a facility (which include MC&A) will be applied to the MGDS. To allow for this, the MC&A Plan commits to meeting the requirements of a storage facility contained in 10 CFR 72.72 through 72.78. These paragraphs detail the specific reporting and record-keeping for waste in storage. Among the requirements are "...the estimated quantity of radioactive material per item (including special nuclear material in spent fuel)...". In addition, NRC requires submission of the DOE/NRC Nuclear Material Transaction Report (Form 741) whenever SNM is transferred between item control areas, and the semi-annual submission of the DOE/NRC Material Balance Report (Form 742) thereafter.

While the NRC seeks to enforce licensee commitments to a performance-based MC&A Plan, the IAEA's goal is to prevent diversion of SNM by the Government. Unlike the NRC, the IAEA considers the Government itself (including the NRC) to be the potential adversary, or the party diverting SNM for non-peaceful purposes. Therefore, verification to the IAEA consists of those activities which permit the IAEA to independently confirm the State/operator declaration of the nature and quantity of the nuclear material. To assure the independence of its determinations, the IAEA may employ either its own methods and techniques (e.g., tamper-indicating devices, cameras, or measurements), or the IAEA may utilize State/operator methods and techniques that have been accorded prior IAEA approval and which can be "authenticated" by technical means. The requirements for IAEA safeguards are contained in the IAEA document, *Safeguards Criteria 1991-1995*⁴. The United States agreement to implement IAEA safeguards⁵ is codified in 10 CFR 75.

The purpose of the IAEA system is to enable the IAEA to determine that no material has been withdrawn from locations where its safeguards have been applied. The IAEA has used a variety of methods to provide these assurances in the past. For example, dual containment and surveillance (C/S) is provided to assure "continuity of knowledge". This C/S is provided by two functionally independent means, where the methods utilized do not have a common failure mode. A different level of performance is needed whenever material is prepared for introduction into a situation which the IAEA identifies as "difficult to access". This classification clearly applies to loaded sealed canisters (canistered fuel), since the individual spent fuel assemblies become difficult to access once they are sealed in a canister. Consideration of these IAEA requirements leads to the conclusion that before being placed into a sealed canister, individual assemblies may have to be item identified and item counted. Further, the IAEA may conduct non-destructive assay (NDA) testing to assure that the assemblies are as claimed and have not been replaced with other material.

The collection of data adequate to meet IAEA requirements on the identification and SNM content of the individual assemblies placed into each sealed canister is provided for in this Verification Plan.

This data has been collected by OCRWM and the Nuclear Material Management and Safeguard System for over thirteen years, and will continue to be collected as sealed canisters begin to be loaded. The use of specific NDA methods by the IAEA that are necessary for the IAEA to meet its requirements for difficult to access material at utility sites may require NRC licensing activities by the utility. As a result, the NRC has begun discussions with the IAEA regarding the implementation of these requirements⁶.

In developing this Verification Plan, the challenge was to establish a system which will meet IAEA requirements by requiring utilities to provide the necessary information as inexpensively and as non-intrusively as possible, and to do so under the NRC regulatory framework. OCRWM is implementing this Verification Plan through the Standard Contract and DOE/NRC Forms 741 and 742.

From the set of regulatory requirements discussed above, a set of specific objectives was developed for this Verification Plan. In order to meet the specific requirements of the Standard Contract and the overall goals related to development of an MC&A Plan, this Verification Plan establishes the conceptual basis for the development of procedures to verify the following:

- that the description of the SNF and/or HLW to be accepted by the Department is correct and consistent with Appendices E and F of the Standard Contract (as required by 10 CFR 961.11 Article VI.B.2 and 10 CFR 72.72-72.78)
- that the material is properly loaded, packaged, marked, labeled, and ready for transportation (as required by 10 CFR 961.11 Article VI.B.2)
- that the appropriate documents have been executed for the transfer of title (as required by 10 CFR 961.11 Article VI.B.2)
- that an off-site radioactive shipment record describing the cask contents has been properly submitted (as required by 10 CFR 961.11 Article VI.B.2 and 10 CFR 72.72-72.78)
- that all information required to establish continuity of knowledge for the SNF and/or HLW to be delivered, from the standpoint of OCRWM, has been collected (as required by the MGDS MC&A Plan).

3. DATA VALIDATION

Three separate components of verification will be accomplished during the waste acceptance process: data collection and validation, waste identification and item verification at time of delivery. This section of the Verification Plan will discuss the method that DOE plans to utilize to accomplish the first component, i.e., collection and validation of the data necessary for acceptance. Subsequent to collection, the data would be examined to ensure completeness, to avoid basic arithmetical errors in the submission process, and to document the consistency of the data. Section 4 discusses the process for verification of the waste identification and item identification at time of delivery.

3.1 SCOPE OF DATA COLLECTION AND VALIDATION

Data will be collected under the verification program for two distinct purposes. First, data will be collected to ensure that the characteristics of the waste to be accepted are documented. This is required for proper packaging, transportation, storage, and disposal. Second, data will be collected for purposes of MC&A requirements. While much of the data collected will serve both purposes, some unique data will be required for each purpose.

Data would be submitted describing the physical and radiological characteristics of the material to ensure that the accepted waste can be safely handled, transported, stored, and disposed of. Information must include either the radiological and thermal characteristics of the waste, or data which allows the characteristics to be calculated as needed. General physical information (length, weight, configuration, identification) will be needed to allow for adequate planning for receiving the shipment at the CRWMS facility in terms of the equipment and casks required. Unique information related to the waste, such as test history and known defects, should also be documented and retained in a record system.

A complete MC&A program requires that two different conditions be met, item control and continuity of knowledge. Item control is related to the unique identity of each waste item. The location and characteristics of all SNM accepted into the waste management system must be known at all times. The system must also allow for an inspector to locate a specific waste item at any time. This requirement will dictate that each item accepted (e.g. canistered fuel or bare spent fuel assembly) be uniquely labeled and that the identity and current location be recorded. The identifiers already on bare spent fuel assemblies should be sufficient for this purpose. Continuity of knowledge is related to the ability to document that the waste currently in the system has been monitored and documented subsequent to a set point of time agreed upon by the IAEA and the facility subject to inspection. For commercial SNF, this requirement will dictate that the history of the SNF be documented from the time it is transferred to the utility from the fabricator until it is finally placed in a repository for disposal.

Based on a review of the regulations applicable to spent nuclear fuel that were referenced earlier in Section 2, the MC&A Plan identifies ten general categories of information that must be collected in order for OCRWM to meet the requirements identified in Section 2. The ten categories are:

1. Type of waste
2. Form of waste
3. Physical description of waste
4. Physical description of canister, if appropriate
5. Isotopic composition of the waste prior to irradiation
6. Burnup
7. Date of discharge from the reactor
8. Quantity of special nuclear material
9. Description of any unusual incidents associated with the use or handling of the waste
10. The results of any measurements, tests, inspections, or observations associated with the waste.

From these general categories, a list of specific necessary information has been developed. In order to satisfy the above information needs, the following information will be collected once the specific waste to be delivered has been identified:

1. A unique identification number. For SNF, this will be the manufacturer's assigned identification number, while canisters will have a separate identification number. This identification number must be unique at least within the inventory of each individual reactor. In this way, this identification number can be combined with the Purchaser's reactor identification to form a completely unique number for purposes of item control.
2. Indication of type of waste. For the majority of waste accepted, this will be either Boiling Water Reactor or Pressurized Water Reactor SNF. There will be an "other" category to accommodate deliveries of non-light water reactor SNF or non-fuel-bearing components. A more complete description of the waste will be obtained through other items, as discussed below.
3. Drawing file reference. This will indicate the drawing that describes the waste to be delivered (e.g. Westinghouse 17x17). If no drawing for the specific waste to be delivered is available, the Purchaser will be asked to supply a drawing, and a new file will be created. The goal is to minimize the burden on utilities regarding the submission of assembly drawings, while at the same time ensuring that adequate drawings are available for all waste to be accepted. While duplicate drawings may inadvertently be collected, the intent is to collect only one drawing of each assembly

type and then reference this drawing for all deliveries of that type, regardless of whether the same utility is delivering the assembly. From the drawing, the active length of the fuel assembly, the cladding material, the overall assembly length, and the overall assembly weight can be determined.

4. Initial enrichment and uranium mass. The weight percent initial Uranium-235 (U-235) enrichment and total initial uranium mass must be reported to allow for the calculation of isotopic content as well as for criticality calculations.
5. Post irradiation isotopic content. Specifically, Thorium-232 (for thorium based fuel) and U-233 (for thorium based fuel), U-235, Plutonium-238 (Pu-238), Pu-239, Pu-240, and Pu-241 content (in weight percent concentrations) at the time that the SNF is permanently discharged from the reactor (final cycle end date) must be calculated and submitted, and each must be reported separately.
6. Post irradiation Uranium and Plutonium content. Total fissile Uranium and Plutonium content in grams must be calculated and submitted for each assembly as of the date of discharge. Pu-238 should be reported in tenths of a gram. This information must be collected to allow the Department to submit DOE/NRC Forms 741 and 742 after the Department becomes responsible for reporting to NRC on the SNM.
7. Final discharge burnup. The final discharge burnup of the SNF must be reported to allow for the calculation of isotopic contents.
8. Date of final discharge. This is the date that the fuel was last irradiated, which is necessary to perform decay calculations.
9. Description of any unusual incidents associated with the use or handling of the waste or any changes, whether intentional or accidental, to the fissile material content. This should include a discussion of anything that might affect the way that the waste is handled, packaged, transported, stored, or disposed of. Any removal of rods within the assembly must be described.
10. The results of any measurements, tests, inspections, or observations associated with the waste. This should not include the results of any testing that may be determined necessary for acceptance (such as burnup measurements), but should instead include any measurements, tests, inspections or observations that have been conducted by the Purchaser independent of these requirements.
11. Fabricator's/Receiver's Form 741. A copy of the DOE/NRC Form 741 that was generated when the fresh fuel was transferred to the utility from the fabricator, including any changes to the record made by the receiver, will be necessary to establish an initiation point for the continuity of knowledge regarding each assembly.

The above information is anticipated to be collected through the *Detailed Description of Purchaser's Waste* form developed by OCRWM. If it is determined to be appropriate, the current Appendix F form in the Standard Contract will be modified to include all of this information or replaced by the *Detailed Description of Purchaser's Waste* form. This information would be required prior to acceptance into the CRWMS.

A crucial aspect of the entire verification process will be the storage of this data once it is collected. Not only must the information be recorded, but the records themselves must be controlled, since they represent the records that will establish the basis for compliance with MC&A requirements. Appropriate controls must be imposed to protect the information, and the information must be accessible for the generation of necessary reports.

3.2 THE DATA VALIDATION PROCESS

Data validation will be initiated upon receipt of a *Detailed Description of Purchaser's Waste* form. The complete process for validating this information will be fully developed as the procedures for implementing this plan are written. At this time, the assumption is that validation will be accomplished by first confirming that all necessary information has been submitted for each waste item and then comparing the information submitted to a set of known bounding parameters which will be based upon the information previously submitted to OCRWM. If a data item is identified that falls outside of the bounding parameters, the Purchaser will be requested to confirm that the value as reported is correct. If the Purchaser confirms that the value is correct, the value will be retained.

This validation process assumes that all information is submitted under an NRC-approved Quality Assurance (QA) program. No information will be accepted which is not submitted under such a program. Because the NRC requires exhaustive confirmation of licensee calculations and records, requiring the information to be submitted to OCRWM under an NRC QA program will eliminate the need for OCRWM to perform any additional confirmation exercises.

4. PHYSICAL VERIFICATION

The part of the verification process described in Section 3, collection and validation of the data necessary for acceptance, will be initiated when the form describing the waste to be delivered is received. In addition to completion of the form, two other components of verification must be accomplished prior to acceptance: waste identification and item verification at time of delivery. While the collection and validation of data are administrative processes, these two components are considered to be physical aspects of verification, since they involve the verification of waste characteristics that which can be physically observed. These components are described in this section.

OCRWM has not yet identified any reason to conduct measurements for purposes of waste acceptance. Therefore, this plan does not include the requirement for any measurements. However, Purchasers should be aware of the circumstances* which may require waste measurements, even though OCRWM does plan to require them for waste to be accepted.

4.1 WASTE IDENTIFICATION

The first component of the physical verification program is verification of the identity of the individual items. For commercial SNF, this will consist of verifying the assembly number, which must be accomplished immediately prior to emplacement of the assembly into either a canister that will be sealed (i.e., welded closed with no intent of reopening) or a transportation cask.

Verification of the identification of the assembly will be accomplished by Purchasers under an NRC-approved QA procedure. It is assumed that this verification will be accomplished similar to methods which have been previously approved by the NRC that are currently in use at utility sites for the tracking of SNF location. For example, this verification may be accomplished by two individuals independently reading the number of the assembly, recording this number on paper, and

*The most likely measurement to be required is a burnup measurement, which may be necessary to account for burnup credit in the loading of canisters. Such measurements, if required, will be accomplished by the Purchasers, since they will be responsible for loading the canisters according to the Certificate of Compliance. Therefore, OCRWM does not plan to be involved in these measurements and will assume that all regulatory requirements regarding canister loading have been met when the waste is identified as ready for acceptance.

In addition, the IAEA may decide to conduct NDA analysis of the individual items prior to their placement in a sealed canister. This NDA would be conducted by the IAEA to assure that the SNM contents of the items have not been diverted. Because the material would be classified as "difficult-to-access," this assurance would be required at both the gross and partial defects level. A gross defect in the measured quantity is defined by the IAEA as a 100 percent difference between the measured amount of material and declared amount, while a partial defect is defined as a 50 percent difference between the measured and declared amount. If this NDA is done in advance of loading, dual containment/surveillance of the assemblies while in storage may be required to ensure that the items are not tampered with. This is not to imply that a decision on this requirement has been made or that OCRWM believes such measurements are necessary. However, Purchasers should be aware that the possibility exists that the IAEA will determine such measurements are necessary for purposes of establishing initial inventories of SNM. If such a determination is made, the IAEA will perform the measurements; OCRWM will not be involved with this procedure.

then comparing the two records. The verified information will be recorded on a form developed by OCRWM to establish a continuity-of-knowledge record for the waste. If sealed storage canisters are used, OCRWM intends for this information to be recorded at the time the canister is sealed. Completing the form at the time of canister sealing will maximize the probability that all required information is recorded in an acceptable level of detail. Placing waste in a sealed canister will also require the recording of the canister's unique identification number.

The loading of sealed canisters and/or transportation casks to be used at a facility will not normally be witnessed by an OCRWM representative. The Purchasers will be responsible for ensuring the accuracy and completeness of the loading data. For those loadings accomplished prior to the implementation of this plan, the Purchasers will be required to complete the records indicating the identity of the SNF in the sealed canister(s) and document that the information was gathered and reported using NRC-approved QA procedures. If this cannot be documented, the canister will have to be re-opened to verify the contents.

If sealed canisters are used, specific safeguards may be required in order to ensure that the contents are not tampered with. As discussed previously, if the IAEA determines that they will conduct safeguards activities at Purchaser sites, they may require NDA to be performed on any SNF placed in a sealed canister and dual, independent C/S systems once they are sealed. These additional requirements would be imposed by the NRC upon the specific site affected. The CRWMS does not plan to require sealed canisters to be opened for verification purposes if the above OCRWM verification process have been complied with.* While OCRWM cannot provide complete assurance that the IAEA or the NRC will not require sealed canisters to be opened, if such a demand is made and the above requirements are followed, OCRWM will investigate available options to insulate Purchasers from the impacts of re-opening. OCRWM believes that the probability is very low of either the NRC or IAEA requiring a sealed canister which has met these requirements to be opened for purposes of verification. Some sealed canisters may have to be opened for reasons other than verification, such as canister performance issues.

4.2 ITEM VERIFICATION AT TIME OF DELIVERY

The final component of verification will consist of verifying that the waste to be accepted by the CRWMS is properly loaded, packaged, marked, labeled, and ready for transportation, and that appropriate documents have been executed for the transfer of title. This verification would occur immediately before title is transferred.

This component of verification will include confirmation that the identity of the waste is as expected, whether non-canistered or canistered spent fuel is being delivered. Purchasers will identify the specific waste they intend to deliver on a *Detailed Description of Purchaser's Waste* form, described earlier. This form will be required for delivery of a canister in the same manner as it will be required for delivery of bare fuel. The specific waste offered for delivery will thus have

*OCRWM has been informed by the NRC Office of Arms Control and Non-Proliferation, International Safeguards Division, that if canisters are sealed prior to IAEA's decision regarding the implementation of international safeguards within the CRWMS, IAEA will not require such canisters to be opened for purposes of IAEA verification.

to match the waste identified in the form. As in the case of the verification process described for individual assembly identification, verification of either the identity of the non-canistered SNF placed in a transport cask or of a canister to be delivered will be accomplished by the Purchaser using a method currently approved by the NRC for item identification.

OCRWM will conduct any required inspection of the shipment and transport carrier required to ensure that the shipment meets all regulations and is ready for travel. Title will not be transferred, and thus the waste will not be transported offsite, until all documentation is in place to demonstrate that all regulations have been complied with.

5. PROCEDURES

This section identifies and briefly describes the procedures that would be developed in order to implement the process discussed in this plan. These procedures would be developed separately subsequent to the acceptance of this plan.

5.1 SNF DATA VALIDATION

The purpose of this procedure will be to define the process to be used to collect and store information regarding the waste to be delivered to ensure that the waste can be safely handled, transported, stored and disposed of. The information submitted by Purchasers will be examined to ensure completeness, arithmetical correctness, and consistency of data. If unexpected values are reported, they will be individually confirmed.

A critical part of the data validation procedures will be a description of the appropriate actions to be taken if unexpected information is identified. Although addressing every possible unexpected submission is not feasible, the procedures will identify generic actions to be taken to confirm that unexpected data was intended and not typographical in nature.

Once the data has been validated, the data must be entered into an MC&A database. The developed procedure will describe the necessary format and content of the forms to be used to input this data into the records database. Section 5.4, MC&A Data Collection and Processing, will describe the process by which this data is stored and protected.

5.2 SNF LOADING VERIFICATION AND CANISTER SURVEILLANCE

The procedure will describe the actions required to accomplish individual waste item identification verification, as well as the level of containment/surveillance that will be required. This procedure also will describe the activities required prior to loading SNF into any type of sealed canister. This includes canisters not intended to be re-opened even for purposes of disposal, including transportable storage casks for which disposal overpacks could be designed. In addition, this procedure will cover the activities required prior to loading dual-purpose casks/canisters which can be used for storage and transportation, but will be reopened at the repository. The procedure will describe the format that must be followed in documenting and submitting this information to OCRWM, since OCRWM personnel will not normally witness these activities.

Once the SNF loading verification has been completed at a Purchaser site, the verification data must be entered into the MC&A records database. This procedure will describe the format and content of the forms to be used to input verification data into the database. Section 5.4, MC&A Data Collection and Processing, will describe the process by which this verification input data is stored and protected in the records database.

5.3 ACCEPTANCE/SHIPMENT PHASE VERIFICATION

This procedure will describe the activities required to verify that material to be accepted by the CRWMS is properly loaded, packaged, marked, labeled, and ready for transportation, and that appropriate documents have been executed for the transfer of title. The procedure will address the acceptance of bare spent fuel as well as dual- or multi-purpose casks and canisters. The procedure will also identify the qualifications for the OCRWM personnel who are required to be present during SNF acceptance.

Procedures will be developed for documenting the identity of the waste being delivered, whether it is canistered or non-canistered. The individual identities of the waste items and the sealed canister, if used, must be documented prior to acceptance, via an approved NRC method of item identification.

There is a possibility that transportable canisters may be used in the future at Purchaser sites prior to the development of appropriate verification procedures by the Department. This procedure will specify the actions required to determine whether existing records for SNF in such transportable canisters are sufficient (from a verification standpoint) to allow the Department to accept the unopened canisters, or whether opening of the canisters prior to acceptance is required.

Once the acceptance/shipment phase verification has been completed at a Purchaser site, the verification data must be entered into the MC&A records database. This procedure will describe the format and content of the forms to be used to input verification data into the database. Procedure 5.4, MC&A Data Collection and Processing, will describe the process by which this verification input data is stored and protected in the records database.

5.4 MC&A DATA COLLECTION AND PROCESSING

This procedure will describe the process by which verification data is stored and protected in the MC&A records database. This procedure will describe how information from forms specified in the previously-described procedures is input into the records database, how access to the MC&A and other verification data is controlled, and how and to whom the verification data will be disseminated.

6. LIST OF ACRONYMS

CFR	Code of Federal Regulations
CRWMS	Civilian Radioactive Waste Management System
C/S	Containment and Surveillance
DOE	Department of Energy
f.o.b.	Freight On Board
HLW	High-Level Radioactive Waste
ICA	Item Control Area
IAEA	International Atomic Energy Agency
ISSRA	Integrated Safeguards and Security Requirements Analysis
MC&A	Material Control and Accounting
MGDS	Mined Geologic Disposal System
NDA	Non-destructive Assay
NRC	Nuclear Regulatory Commission
NWPA	Nuclear Waste Policy Act
OCRWM	Office of Civilian Radioactive Waste Management
Pu	Plutonium
QA	Quality Assurance
SNF	Spent Nuclear Fuel
SNM	Special Nuclear Material
S&S	Safeguards & Security
U	Uranium

7. GLOSSARY

Canistered Fuel: Spent nuclear fuel that is placed in a seal-welded canister prior to delivery. It is assumed that under normal circumstances, OCRWM will not physically observe unique identifiers of the fuel in the canister prior to acceptance.

Continuity of Knowledge: The ability to document the quantities and general characteristics of all SNM under one's control from a specified time to the present. Within the CRWMS, continuity of knowledge for commercial SNF will be established from the point when the fuel was delivered to the utility by the fabricator, using the fabricator's NRC/DOE Form 741 as the initiating document. Any alterations in the quantities or general characteristics of the SNM subsequent to this point will have to be documented in order to establish continuity of knowledge for the waste.

Difficult to Access: A designation given to certain storage applications by the IAEA. By applying this designation, the IAEA is stating that there is sufficient confidence in the continued presence of any SNM that periodic remeasurement of the SNM quantities is unnecessary, provided that dual containment/surveillance measures are maintained.

Dual-purpose Canister: refers to a sealed, metallic container maintaining multiple assemblies in a dry, inert environment and overpacked separately and uniquely for storage and transportation or storage and disposal.

Item: The fundamental unit for purposes of verification. Within the CRWMS, this is a spent fuel assembly; no tracking of individual items smaller than an assembly (i.e., fuel rods) will be accomplished.

Item Control: The ability to document that, subsequent to entering a safeguarded system, all items have been continually within one's control, with no opportunity for unauthorized access. To demonstrate this, all items must be able to be located within the system upon demand.

Item Control Area: A defined area with specific boundaries at a safeguarded facility over which no safeguarded item is allowed to pass without being accounted for and documented, and in which continuous control is exercised over the item.

Multi-purpose Canister: refers to a sealed, metallic container maintaining multiple assemblies in a dry, inert environment and overpacked separately and uniquely for various system elements of storage, transportation, and disposal.

Validation: The process whereby data submitted is checked for legibility, reproducibility, completeness, arithmetical correctness and consistency. It is meant to distinguish this process from verifying the data, which implies an auditing process. In the case of data validation, the data will be required to be submitted under an NRC-approved QA program, and thus verification will not be necessary. However, validation will be performed to ensure that the data is complete and to limit the possibility for typographical errors.

Verification: The process used to demonstrate that, for all SNM within the CRWMS, appropriate safeguards are in place and that the material is being handled and stored appropriately from a safeguards standpoint.

Waste: For this revision, this term refers exclusively to commercial SNF, as defined in 10 CFR 961.11.

8. REFERENCES

1. US Department of Energy, "Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste," *Code of Federal Regulations*, Title 10, Part 961.
2. Civilian Radioactive Waste Management System Management & Operating Contractor, *Integrated Safeguards and Security Regulatory Analysis*, March 8, 1996.
3. Civilian Radioactive Waste Management System Management & Operating Contractor, *Mined Geologic Disposal System Material Control and Accounting Program Plan*, Final Draft, June 30, 1994.
4. International Atomic Energy Agency, *1991-1995 Safeguards Criteria*, TS No. 3, 1994-04-15.
5. *The Text of the Agreement of 18 November 1977 Between the United States of America and The Agency for Application of Safeguards in the United States of America*, INFCIRC/288, December 1981.
6. *US/IAEA Discussion Paper on Application of IAEA Safeguards to Spent Fuel (SF) in Multi-Element Casks (MECs) in the US*, March 22, 1995, Vienna Austria.
7. US Department of Energy, Office of Civilian Radioactive Waste Management, *Quality Assurance Requirements and Descriptions*, (DOE/RW/0333P)

Appendix A

Provisions for DOE-Owned SNF

[To be determined]

Licensing Interactions Branch
Regulatory Affairs Division
Office of Technical Management

OTM: LJD-????

Enclosures (6):

1. *Memorandum of Agreement for Acceptance of Spent Nuclear Fuel and High-Level Radioactive Waste*, between the Assistant Secretary for Environmental Management (EM) U.S. Department of Energy (DOE), Washington, DC and the Director Office of Civilian Radioactive Waste Management (RW) U.S. DOE, Washington, DC, Revision 2, February 2007.
2. Cover Memorandum, *Transmittal of Revised Memorandum of Agreement for Acceptance of EM Spent Nuclear Fuel and High-Level Radioactive Waste*, January 10, 2007.
3. Cover Memorandum, *Approval of Attached Memorandum of Agreement (MOA) between EM and RW for Acceptance of Spent Nuclear Fuel (SNF) and High-level Radioactive Waste (HLW)*, February 14, 2007.
4. *Memorandum of Agreement for Acceptance of Naval Spent Nuclear Fuel* between the Director, Naval Nuclear Propulsion Program (NNPP), Department of the Navy, Arlington, VA and the Director, Office of Civilian Radioactive Waste Management (RW) U.S. Department of Energy (DOE), Washington, DC, Revision 1, April 11, 2000.
5. Cover Memorandum, *Memorandum of Agreement for Acceptance of Naval Spent Nuclear Fuel (MOA)*, June 7, 2000.
6. Correspondence from NRC (Reamer) to NNPP (Mowbray). *Naval Nuclear Propulsion Quality Assurance Program*, December 22, 1999.