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Preliminary Identification of Interfaces for Certification and Transfer of TRU Waste to WIPP

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PRELIMINARY IDENTIFICATION OF INTERFACES FOR CERTIFICATION AND TRANSFER OF TRU WASTE TO WIPP

by

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ABSTRACT

This study complements the national program to certify that newly generated and stored, unclassified defense transuranic (TRU) wastes meet the Waste Isolation Pilot Plant (WIPP) Waste Acceptance Criteria. The objectives of this study were to identify (1) the existing organizational structure at each of the major waste-generating and shipping sites and (2) the necessary interfaces between the waste shippers and WIPP.

The interface investigations considered existing waste management organizations at the shipping sites and the proposed WIPP organization. An effort was made to identify the potential waste-certifying authorities and the lines of communication within these organizations. The long-range goal of this effort is to develop practicable interfaces between waste shippers and WIPP to enable the continued generation, interim storage, and eventual shipment of certified TRU wastes to WIPP. Some specific needs identified in this study include:

- organizational responsibility for certification procedures and quality assurance (QA) programs;
- simple QA procedures; and
- specification and standardization of reporting forms and procedures, waste containers, and container labeling, color coding, and code location.

I. INTRODUCTION

The Transuranic (TRU) Waste Management Program is developing plans for the certification and shipment of unclassified defense TRU wastes to the Waste Isolation Pilot Plant (WIPP). A general set of requirements for these wastes to be shipped to WIPP was defined in a May 1980 report[1] by the Steering Committee on TRU Waste Acceptance Criteria for WIPP. This report, sometimes referred to as the WIPP-WAC, details WIPP Waste Acceptance Criteria and discusses their technical bases. Minor changes to this document were proposed,[2] and these are included in a formal revision[3] to the WIPP Waste Acceptance Criteria.

The WIPP Waste Acceptance Criteria issued in May 1980 emphasized criteria for the waste forms and the shipping containers for both contact-handled and remote-handled, unclassified defense TRU wastes. However, these TRU wastes are generated and stored in a variety of forms and storage modes at several sites in the US. Therefore, it is necessary to develop a general plan for the certification of these wastes that can be made site-specific in its implementation. The Los Alamos National Laboratory Safeguards Systems Group was requested by the Transuranic Waste Systems Office (TWSO), as part of the overall certification effort, to identify (1) the existing organizational structure at each of the waste-generating and shipping sites, and (2) the necessary interfaces between the waste shippers and WIPP.

Members of the Los Alamos Safeguards Systems Group met with the major TRU-waste generators and

shippers and reviewed all relevant documentation. The remaining minor producers of TRU waste will be contacted during the continuation of this investigation in FY 1982. The investigation of the interfaces between TRU-waste generators and WIPP considered existing waste management organizational structures at shipping sites and the proposed organization for WIPP, including their potential waste-certifying authorities and their lines of communication. The long-range goal of this effort is to develop practicable interfaces between waste shippers and WIPP to enable the continued generation, interim storage, and eventual shipment of certified TRU wastes to WIPP when it becomes operational. It is important to note that the organizational descriptions and the conclusions and recommendations in this report were written in August and September of 1981; hence, they reflect the status of the TRU-waste certification program up to that time.

II. WASTE SHIPPING ORGANIZATIONS

Collectively, several organizations participating in the US defense program have generated large quantities of contact-handled and lesser amounts of remote-handled TRU waste. The major producers of defense TRU waste are the Rocky Flats Plant (RFP), the contractors on the Hanford Reservation, the Savannah River Plant (SRP), the Mound Facility, and the Los Alamos National Laboratory. Smaller producers include the Argonne National Laboratory (ANL), the Oak Ridge National Laboratory (ORNL), the Lawrence Livermore National Laboratory, Battelle Columbus Laboratories (BCL), the Bettis Atomic Power Laboratory, and the Idaho National Engineering Laboratory (INEL). Most of the readily recoverable TRU waste is in storage at INEL and at Hanford,[4] and most of the inventory at INEL is from RFP.

When WIPP becomes operational (scheduled for 1989), all TRU-waste generators are expected to ship their certified contact-handled TRU waste directly to WIPP. Remote-handled TRU waste also will be accepted at WIPP after they are certified.

All shipments of TRU waste to WIPP must comply with the regulations of the US Department of Transportation (DOT), the US Nuclear Regulatory Commission (NRC), and the individual states.[4] The specific regulations are intended to ensure safety through standards established for packaging, handling, and shipping radioactive materials. In addition to DOT, NRC, and any state regulations, all TRU waste shipped to WIPP must first be certified that it meets the WIPP Waste Acceptance Criteria.

III. WIPP ORGANIZATION FOR ACCEPTING WASTE

The US Department of Energy (DOE) is the owner/applicant of WIPP, and Westinghouse is the potential contractor responsible to DOE for its operation. The proposed WIPP operating-contractor organization is shown in Fig. 1. It includes a general manager who will have overall responsibility for the operation, maintenance, and modification of WIPP, and several subordinate managers. The waste management manager will be responsible for planning, scheduling, and conducting waste-handling operations in an efficient and economical manner that ensures safe plant operation. He will also be responsible for selecting the waste-handling processes, which include waste receipt, inspection, repackaging when required, and underground emplacement. Additionally, his responsibilities will include integrating the overall plant operation process flow according to established criteria and in compliance with all applicable health and safety regulations.[5]

Waste acceptance is scheduled to take place in the receiving and inspection area of the waste-handling building, where the packages will be surveyed and inspected for contamination or damage. The shipping papers will be checked first to verify that the train or truck was scheduled for WIPP. The data packages and other certification documentation will be examined before admission to the waste-handling building. Waste shipments that meet certification requirements when dispatched, but are found in noncompliance at receipt, will be

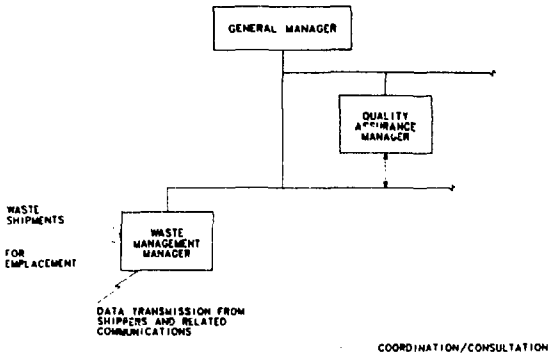

Fig. 1. Typical WIPP operating-contractor organization. (Adapted from Ref. 5.)

segregated until the appropriate action can be determined. Scheduling waste receipt is not anticipated to be a problem because adequate buffer storage capacity is planned for WIPP. Any scheduling problems probably will be related to the transportation link between the shipper and WIPP.

IV. WIPP REQUIREMENTS FOR ACCEPTING WASTE

The WIPP Waste Acceptance Criteria for unclassified TRU wastes resulting from national defense activities were developed to ensure that all waste transportation and WIPP operations take place safely.[1,3] These criteria are not specifications but limits within which waste generators and shippers may develop their own procedures for the preparation of waste for shipment to WIPP. The WIPP Waste Acceptance Criteria were updated by WIPP personnel to include pertinent comments suggested by the State of New Mexico Environmental Evaluation Group, the DOE Albuquerque Operations Office, and the Certification Requirements Working Group. These criteria are summarized in Appendix A.

TWSO prepared preliminary interpretations[6] of the criteria in March 1981 for review by generators and shippers. As a follow-up to the comments received, TWSO prepared another document[2] in July 1981 outlining compliance requirements necessary for certification of newly generated, contact-handled TRU waste, which was revised by the Certification Requirement Working Group. Further revisions of this document were issued for review. The final version of the compliance requirements was issued as a WIPP-DOE series document.[7] Similar compliance requirements for stored, contact-handled TRU waste will be developed in FY 1982.

The revisions to the WIPP Waste Acceptance Criteria, as detailed in Refs. 3 and 7, make it possible for the waste generators and shippers to develop their own site-specific procedures for certifying that each of their waste packages meets the criteria. Therefore, no exceptions to the criteria will be made by the WIPP operator. However, the special needs of nonconforming and toxic waste packages will have to be addressed individually.

A. Waste Certification

Waste shipping organizations are required to provide the WIPP operator with a data package that certifies that each waste package in the shipment meets the WIPP Waste Acceptance Criteria. Also, the waste shippers must maintain auditable waste documentation systems that include descriptions of the methods used for certification of their TRU waste, including the associated quality assurance (QA) programs.[1,3,7] The WIPP operator must be satisfied that the shipping-site certification procedures are valid. Therefore, a QA system auditable by DOE must be developed by each site to meet its specific needs. The audit authority within DOE has not been identified. Furthermore, the actual waste acceptance procedures and the QA program at WIPP must also be auditable.[5] The DOE-WIPP Project Office is responsible for surveillance, monitoring, auditing, review, and approval of all QA functions performed by the major project participants during the site evaluation, design, and construction phases of WIPP.[5,8] The responsibility for QA at WIPP during the operational phase will rest with the WIPP operator.

B. Nonconforming Waste Packages

Waste packages that are certified when they are shipped, but are found to be in noncompliance upon receipt at WIPP, are considered nonconforming items. The receipt of nonconforming items should be infrequent, and they will be treated on site to make them safe for emplacement, or returned to the

shipper under the appropriate DOT, NRC, and state regulations.

C. Data Package Transmission

It has been proposed that all information regarding waste shipments should be transmitted electronically to the WIPP central computer. This information, in addition to the required data packages, will include notification of the intent to ship and the mode of transportation. Any documentation or scheduling problems will be handled individually.

The VAX-type central computer will be part of the WIPP general computer system. It will have interactive and batch-processing capabilities and the ability to communicate off site with other computers. With properly designed hardware, software, peripheral equipment, and operating system, this computer should be able to handle easily the transmission of data packages.[9] Bechtel Incorporated, Nuclear Fuel Operations, the architectural-engineering firm for WIPP, is responsible for the design of the computer system. A systematic approach to establishing data transmission procedures should take into account the requirements of the shipper and WIPP.

V. STRUCTURE OF WASTE-SITE OPERATIONS

The FY 1981 task of the Los Alamos Safeguards Systems Group included initial contacts and discussions with the waste generating sites, storage sites, and Westinghouse-WIPP. This effort started in April 1981 when we met with personnel from TWSO, BCL, Pacific Northwest Laboratories, and the Nuclear Quality Assurance Program Office (NQAPO). NQAPO provided guidance on QA aspects of the certification effort. This guidance was further discussed between Los Alamos Safeguards Systems and Los Alamos Quality Assurance personnel. These meetings provided the QA framework and background for the discussions with waste generating and storage site operators and Westinghouse-WIPP. The following narrative pertains to our discussions with the waste generators and shippers. The WIPP operator was discussed in Sec. III and IV.

Our initial visits were to Westinghouse-WIPP, EG&G Idaho, Inc., and RFP. These contacts were followed by visits to ORNL, Mound Facility, ANL, Rockwell Hanford Operations (RHO), Los Alamos National Laboratory, and SRP. BCL and Bettis Atomic Power Laboratory were contacted by telephone. BCL's small volume of TRU waste is from decontamination and decommissioning operations and will be shipped to INEL. Bettis ships their small volume of TRU waste to INEL and will be contacted again in FY 1982.

For a complete list of the individuals contacted, see Appendix B. The following discussion of individual site operations is presented in the order that the sites were visited.

A. INEL

Figure 2 shows the waste management organization of EG&G Idaho, Inc. Waste Operations is responsible for accepting TRU waste for storage and eventual shipment to WIPP. Waste Programs is responsible for the design and development of waste certification procedures and for technology development. The DOE Idaho Operations Office has been directed to design a Stored Waste Retrieval Facility (SWRF) and a SWRF integrated with a TRU-Waste Treatment Facility (TWTF). The SWRF and the TWTF are in the conceptual design stages, and this effort will continue through FY 1982. Certification of TRU wastes destined for WIPP will take

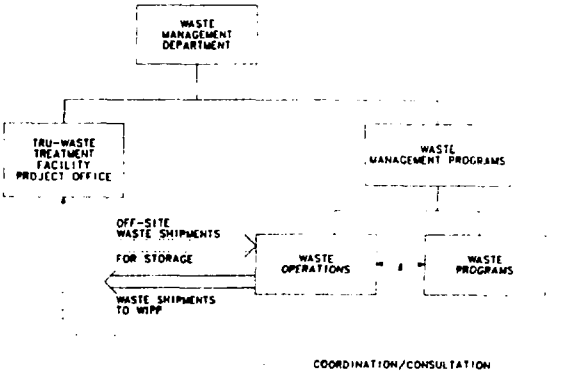

Fig. 2. Waste management organizational structure at INEL.

place in the SWRF. If waste needs to be processed to become certifiable, the plans are to use the TWTF.

Waste shipped to INEL for storage must meet acceptance criteria established by EG&G Idaho, Inc.[10] In some cases, these acceptance criteria are more stringent than those for WIPP. EG&G Idaho will start receiving certified waste from off site in FY 1982 for placement in certified storage. This certified waste will require further verifications before shipment to WIPP.

EG&G Idaho plans to start work in FY 1982 on stored waste certification procedures. Decisions by DOE on the funding of processing facilities at INEL will have an impact on certification of stored wastes and possibly on certification of wastes shipped to INEL that cannot be certified by the shipper.

The certifying authority for stored wastes at INEL will be housed in the SWRF; however, this authority has not been identified because the organizational structure is just now being developed. Currently, the certification activities are managed by the Waste Program Branch. EG&G Idaho plans to meet with Westinghouse-WIPP personnel early in FY 1982 to discuss certification procedures.

EG&G Idaho, Inc. operates six waste information systems for DOE. Three of these systems are national in scope, and three are applicable to INEL only. The systems that are applicable to the national TRU program are the Solid Waste Information Management System (SWIMS),[11] the Waste Management Information System (WMIS), and the Transuranic Contaminated Waste Container Information System (TCWCIS).

The SWIMS is a DOE-wide, central, automated information-management system that uses a master data base for describing the TRU and low-level wastes generated, disposed, or stored at DOE facilities to facilitate the management of solid-radioactive-waste management by DOE. All SWIMS data are separated into eight nuclide categories that include both contact-handled and remote-handled TRU wastes. The data are summary in nature and include such parameters as volume, weight, curies, nuclides, waste types, and waste treatment. This information is published annually and data are furnished to the Integrated Data Base. (The Integrated Data Base is a DOE-supported system operated by ORNL and used for standardized radioactive-waste management and spent-fuel inventory data.[12,13])

The WMIS is an INEL data base that describes each shipment of solid waste for disposal or storage at the Radioactive Waste Management Complex (RWMC). The data include type, volume and number of containers, nuclide content, shipment weight, and storage/disposal location. This system provides information on inventory, generation data, etc.

The TCWCIS describes each container of TRU waste placed in RWMC storage since late 1971. Consequently, ~78% of the retrievable storage containers at INEL are described by this system. Specific data on each container include waste generator, container identification number, date packaged, waste combustibility and compactibility, content code, weight, dose rate, element weights, and shipment number.

B. RFP

The general structure of the RFP organizations related to waste management and certification is presented in Fig. 3. Rockwell International has set up a Waste Acceptance Criteria Development Team to investigate and solve problems that might prevent or delay certification of some TRU waste forms. The team comprises RFP personnel from

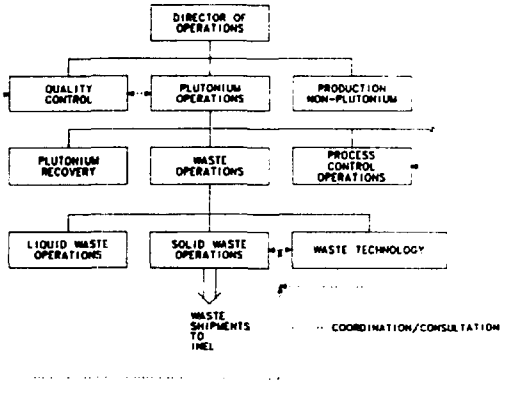

Fig. 3. Waste management and related organizational structure at RFP.

on-site laboratories, R&D, TWSO, Quality Control, and Waste Operations. The main problem requiring resolution at RFP concerns the immobilization of wastes that might produce respirable fines during handling. Waste Operations will be responsible for developing RFP's certification procedures for certifying their TRU waste. The waste generators will be responsible for following their operating procedures. RFP has a good quality control (QC) program that interfaces with Plutonium Operations, Waste Technology, and Solid Waste Operations. Existing QC procedures are under review to determine the modifications necessary to make them applicable to certification.

Liquid waste streams will be handled, as much as possible, by process control. If the process and inputs can be controlled, then the output can be certified without much difficulty. Visual inspection can play an important role in certifying steady-state processes. Line-generated wastes could present some problems, but coordination among Quality Control, Plutonium Operations, and Waste Technology should lessen their impact on certification. The Quality Control Office is instituting a statistical sampling program for line-generated and non-line-generated waste. A product audit will be conducted on finished waste ready for shipment. A container QC program that has been in existence for 5 yrs will provide valuable knowledge for using QC in the certification effort.

Several data processing systems are in use at RFP. The Waste Management Information System[14] (WMIS)* is a computerized data collection system used primarily to maintain data on waste containers shipped to INEL and to provide summary reporting, including the quarterly SWIMS report. Much of the data processed by the WMIS is also required in the data packages necessary for certification. Modification of the WMIS output could provide certification data. In addition to the WMIS, an updated nuclear materials accountability system is being set up to gather data on shipments. Bills of lading and other related materials are prepared for shipments. Monthly reports are prepared and shipped to INEL through the Secure Automatic Communications Network (SACNET), a DOE secure system based in Germantown, Maryland.[15]

It is felt that some waste could be certified early in FY 1982 if decisions are made on container color coding, and if the requirements for data packages and immobilization are specified. Other minor problems may also slow the certification of newly generated waste. When these decisions are made, certification of newly generated wastes should be possible at RFP. Existing procedures will help simplify certification so that some waste can be certified by the end of FY 1982.

C. ORNL

Figure 4 shows the waste management structure at ORNL. ORNL waste management personnel have discussed the need for certification in FY 1982 with the on-site waste generators, and plans for meeting the WIPP Waste Acceptance Criteria will be developed in FY 1982. At present no internal waste certification is conducted, but the generators fill out forms that are checked periodically. A new Los Alamos assay system, soon to be delivered to ORNL, will provide an efficient monitoring system for TRU-waste drums.

The waste management organization has a good QA program that includes many of the items in the WIPP Waste Acceptance Criteria. However, TRU-waste drums are never opened, and the only documentation provided by generators is a statement about whether

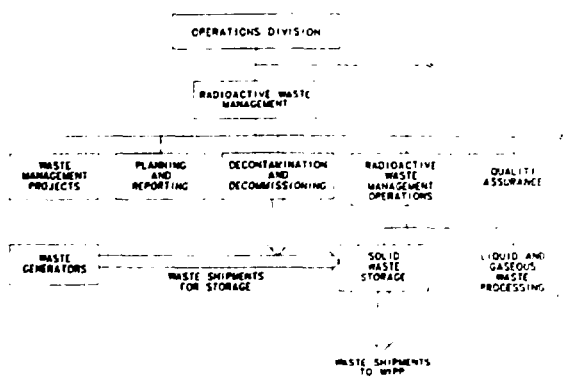

Fig. 4. Waste management organizational structure at ORNL.

*Both RFP and INEL have systems that use the acronym WMIS; however, they are different systems.

the drum TRU-waste concentration exceeds 10 nCi/g. Thus, the generators are the certifying authorities now, but the shipper will have the ultimate responsibility when waste is shipped to WIPP. No internal certifying authority has been identified; however, data packages will be transmitted by the operations personnel.

ORNL has funded a FY 1982 study, similar to that at RFP, to investigate certification issues. They have made initial contacts with RFP personnel, and they anticipate that nearly all of FY 1982 will be required to develop plans and procedures. It will be difficult for ORNL to certify waste in FY 1982 except, perhaps, for a small quantity late in the year. ORNL personnel would prefer to let RFP personnel develop their certification procedures first.

D. Mound Facility

The Monsanto Research Corporation (Mound Facility) structure related to TRU-waste certification is shown in Fig. 5. Nearly all TRU waste produced at the Mound Facility is from decontamination and decommissioning operations. The bulk of this waste will be shipped to INEL before 1989. Thereafter, a small amount of TRU waste will continue to be generated from normal operations. Mound's major problem is the need to use boxes larger than those approved for WIPP. After the decontamination and decommissioning operations are terminated, container size will not be a problem.

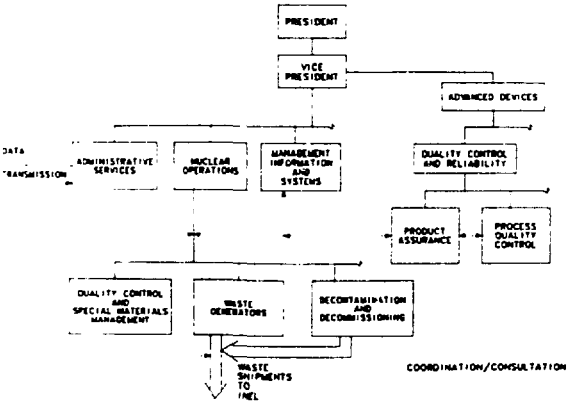

Fig. 5. Waste management and related organizational structure at the Mound Facility.

The problem of oversize boxes will require continued negotiation with FG&G Idaho regarding acceptance and processing of this waste.

Mound employees are developing plans for the certification of newly generated waste and for appropriate QA procedures. A task force similar to that in existence at RFP has been formed to develop plans for certifying waste and for identifying the funding necessary to implement these plans. Certification of some newly generated waste can occur late in FY 1982 if an external organization is available to approve their certification procedures and QA program. If a responsible organization is not available, Mound personnel are planning to request the Westinghouse-WIPP organization to review their procedures.

Three groups will be involved in certification at Mound: (1) the generating organization, (2) Quality Assurance, and (3) Administrative Services. The Quality Assurance office resides in the Quality Control and Reliability organization. The QA function has been mostly involved in container studies and in auditing TRU-waste-generating processes. The certification task force is investigating the compliance requirements and developing plans for a certification procedure that satisfies the requirements. Their concerns include immobilization, gas generation, and size reduction. Administrative Services is responsible for the packaging and subsequent transportation of waste to INEL. They will probably also be responsible for the transportation of waste to WIPP. If any newly generated waste is certified in FY 1982, it will probably consist of sludge that is cemented in 55-gal drums. No internal certifying authority has been identified for the shipment of newly generated waste.

The Mound Facility has three data systems that are integrated through the use of one of them, the Waste Accountability, Shipping, and Packaging (WASP) System.[16,17] All accountable nuclear material on site is managed by the Serial Number Recognition Accountability (SENRAC) System,[17] which is a real-time accountability system. Shipments and receipts of nuclear material are processed through a computerized transfer system, the Automated-741 System, furnished by the DOE Albuquerque Operations Office.[17,18] The WASP System

stores packaging data and inspection results for each waste unit and prepares all necessary documents at the time of waste shipment to INEL. On-line interfaces enable rapid tranfer of information between the WASP System and SENRAC, and the Automated-741 System. This is necessary because shipping documents produced by the Automated-741 System, in addition to the shipping reports generated by the WASP System, are required for each shipment of waste material. (All sites shipping waste must use DOE/NRC Form 741, Nuclear Material Transaction Report.[19,20] It is mentioned here because of its use with the WASP System.) The TWSO has provided Mound with FY 1982 funds to modify the WASP System to include all additional information that is necessary for certification but not already provided. Additional plans call for investigating the possible modification of the WASP System for other sites. Mound personnel plan to form a committee early in FY 1982, composed of different site representatives, to investigate different site needs and the feasibility of adapting the WASP System to these sites.

E. ANL

Figure 6 shows the structure related to waste management and certification at ANL. All TRU waste at ANL is produced in laboratories or as a result of decontamination and decommissioning activities. The on-site waste generators are responsible for the contents of their own waste packages. Decontamination and decommissioning wastes and other TRU wastes are typically placed in wooden boxes or in 55-gal steel drums and then in M-3 (4' X 5' X 6') steel bins. Primary waste containers are counted on a segmented scanner by the Special Materials Division to determine fissile-materials content.

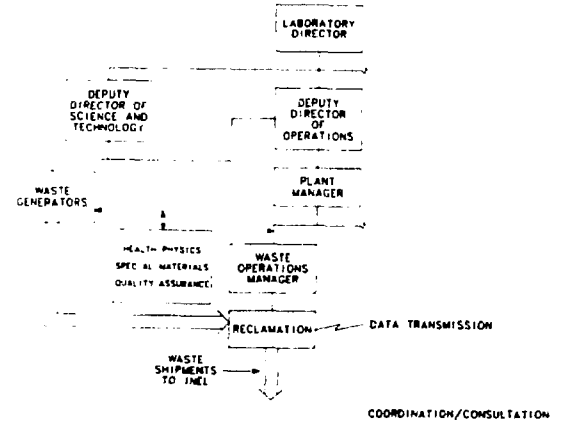

Fig. 6. Waste management and related organizational structure at ANL.

A well developed internal QA program is used to aid in internal certification. Essentially, visual inspections are used to check waste packages, and administrative procedures are used to control waste packaging. As with many other organizations, immobilization of waste is a concern at ANL. The Waste Operations Manager will be responsible for modifying the QA program and developing the procedures necessary for certification. The Reclamation supervisor, who is responsible for the handling and disposal of solid TRU waste and liquid waste, and for decontamination and decommissioning operations, will be the certifying authority at ANL.

Possibly all ANL waste can be certified in FY 1982 except for absorbed liquids. Absorbed-liquid problems are mainly related to the more restrictive EG&G Idaho acceptance criteria than to the WIPP Waste Acceptance Criteria. Decisions defining appropriate immobilization methods would be beneficial at an early date.

ANL is now handling all data collection and reporting requirements manually.

F. RHO

Solid wastes produced by the myriad facilities on the Hanford Reservation are stored on the 200 Area Plateau, which is managed by RHO. In addition to waste produced on site, TRU waste has been, and will continue to be, received from off-site generators. For example, classified TRU waste produced at RFP is shipped to Hanford. Many organizations ship waste, including nondefense waste, to Hanford. Once on the reservation, the nondefense waste is not segregated from defense waste.

Figure 7 shows the structure of organizations related to waste management and certification. All the internal waste generators and lines of authority and communication are not shown in Fig. 7

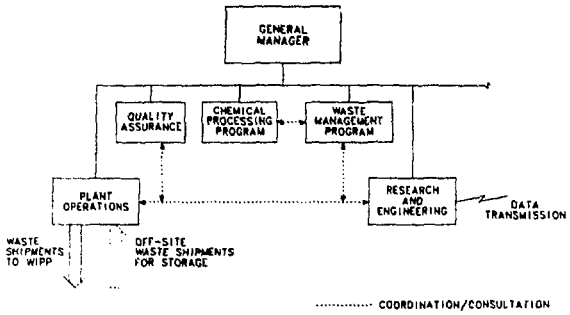

Fig. 7. Waste management and related organizational structure at RHO.

because the structure of RHO is too complex. The major organizations within RHO involved in the receipt and storage of waste are Research and Engineering, the Waste Management Program Office, and Plant Operations. The QC, QA, and audit functions are under Quality Assurance. Data transmission to WIPP will be handled by Research and Engineering, which is the official records organization.

Certification may be a difficult task at RHO because of the multitude of on-site and off-site waste generators. The off-site wastes are easier to certify because they must meet DOT and NRC regulations for transportation.

RFP is funding RHO to write certification procedures in FY 1982. An objective of RHO is to begin certifying TRU waste by the end of FY 1982. This will include QA and QC procedures. A QA manual entitled "Hanford Radioactive Solid Waste Packaging, Storage and Disposal Requirements" (RHO-MA-222), now under revision, will provide the basis for their QA requirements for certification. Certification will be required of the waste generator; however, overall site certification, which will likely reside in Research and Engineering, probably can only ensure that the generator followed procedures to meet the WIPP Waste Acceptance Criteria. RHO will devote 2 man-yr to certification in FY 1982.

Many of RHO's concerns are similar to those of other site operators. Organic liquids can probably be detoxified and stabilized; however, toxic elements such as cadmium, beryllium, mercury, and lead must be addressed individually. In addition, ~50% of the wastes contain nitrates and may require processing to meet the pyrophoric materials criterion. Finally, most boxes used to store TRU waste at Hanford exceed the size requirements of the WIPP Waste Acceptance Criteria.

Several studies will be initiated by RHO in FY 1982 that will affect their future certification and disposal activities. One study will address the feasibility of a Waste Reprocessing and Packaging (WRAP) facility. Another study will investigate the use of a vibratory finisher to remove TRU contamination from large metal items, such as gloveboxes and hoods. This, if effective and economical, would convert the large metal items to low-level waste suitable for shallow land burial and a TRU-waste effluent stream with a much reduced volume. RHO personnel cite a need for sorting, size-reduction, incineration, immobilization, and assay facilities as a minimum to achieve waste certification before shipment to WIPP. Decontamination and compaction processes will be recommended if economically justified.

Data processing at RHO is conducted on a new minicomputer that is linked to a DOE computer system operated by Boeing Computer Services and housed in the Federal Building in Richland, Washington. Together they generate data, some of which are later transmitted over SACNET to the SWIMS in Idaho Falls. RHO personnel do not use SWIMS or the Integrated Data Base. Instead, they use their own data base system to keep track of waste and to generate various reports, including the quarterly reports. It is felt that the new computer system will allow RHO personnel to track individual waste containers through packaging and disposition.

G. Los Alamos

Figure 8 shows the waste management and related organizational structure at Los Alamos. Most of the TRU waste is generated by on-site operations, although small quantities are received at ~5-yr intervals from the Lovelace Biomedical and Environmental Research Institute, Inc. On-site generators package most wastes in 55-gal drums and fiberglass-reinforced polyester (FRP) coated plywood boxes that are purchased from RFP. Visual inspection of containers for damage is the only

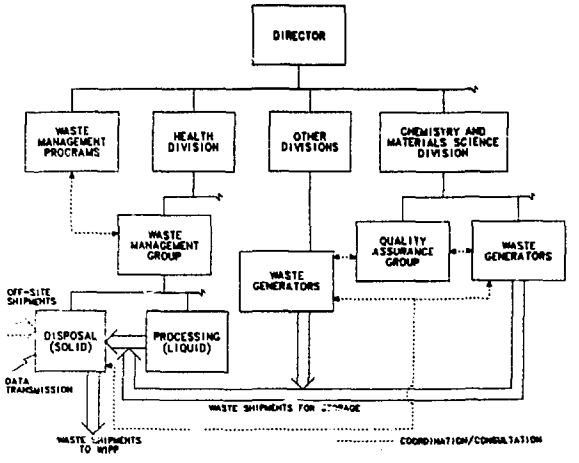

Fig. 8. Waste management and related organizational structure at Los Alamos.

new-container QC activity performed because of the effective QA program conducted by Rockwell International. Before waste packages are stored at the Los Alamos disposal site, they are visually inspected to ensure proper packaging by the waste generator. Shipping papers are reviewed by at least two Waste Management (Disposal) personnel before packages are stored at the retrievable-storage facility. Los Alamos Waste Management personnel are familiar with the generators' operations and use this knowledge to make consistency checks in their review of the package documentation.

Waste generators are responsible for both the contents and condition of their waste packages. The Waste Management Group has developed waste acceptance procedures that detail what must be done before a waste package can be stored. The intent of the procedures is not only to promote safe operations but also to define corrective actions. Each generator is required to have formal procedures, which are reviewed and approved annually by Waste Management personnel. Los Alamos Waste Management has no formal QA procedures. They could, however, be developed in consultation with the Los Alamos Quality Assurance Group, with little additional effort.

The TRU wastes that have been at Los Alamos the longest time present more problems because some of them are too large or heavy, in the wrong form, or the contents of the packages are not well characterized. Special considerations must be addressed individually.

Approximately 125 oversize boxes are in storage at Los Alamos. This will not present a problem for shipment to WIPP because a size-reduction facility is under construction and should be operational by 1983. Most oversize boxes will be retrieved and processed in the size-reduction facility so that acceptable standard boxes can be used. Some newly generated waste may not meet the WIPP Waste Acceptance Criteria; contaminated soils and residues may need to be immobilized to meet the immobilization criterion related to respirable fines. Clarification is necessary on what needs to be immobilized, and acceptable immobilization methods need to be identified.

Los Alamos Waste Management personnel are initiating a study with the largest TRU-waste generator at Los Alamos to identify, in simple chemical terms, the composition of existing waste categories and, if necessary, to modify their categorization scheme. This will help to identify immobilization needs and to improve the effectiveness of the existing records system. A certifying authority for waste shipment to WIPP has not been identified, but it will probably rest with the waste shipper (Disposal). The general plan will call for the generator to conduct all procedures necessary for certification and for Waste Management personnel to provide an oversight function of the generators' activities.

Newly generated waste placed in storage as certified waste will be shipped to WIPP first, followed by existing stored waste after it is certified. Newly generated waste stored as certified waste will be verified by visual inspection and other semi-quantitative methods before shipment to WIPP.

The Waste Management Group handles the waste management records using a minicomputer. Data are available in easily retrievable form for every container stored since 1971. Data necessary for SWIMS reports also are handled with this system. The Waste Management Group (Disposal) can transmit data packages to WIPP from the existing data files.

Los Alamos should have little trouble certifying some wastes by the end of FY 1982. However, a full certification program will require formal procedures that are approved at top management levels at Los Alamos and by the responsible external authority yet to be designated. Moreover, it is estimated that one additional waste management employee will be necessary to help implement a certification program.

H. SRP

Figure 9 shows the waste management and related organizational structure of SRP and the Savannah River Laboratory, which are managed by the Atomic Energy Division of E. I. duPont de Nemours and Company. The responsibility for accepting on-site, certified TRU waste for storage and eventual shipment to WIPP will probably rest with Waste Management Operations. SRP is planning certification studies in FY 1982; however, no certifying authorities have been identified yet within SRP. Currently, only the generators are participating in certification-like activities, much the same as for other organizations we have contacted. If some certification does take place, it will probably consist only of an authority's certifying that the generators are following procedures that will allow their waste to meet the WIPP Waste Acceptance Criteria.

SRP has a well established QA group, whose capabilities are being investigated relative to the certification of TRU waste. SRP personnel

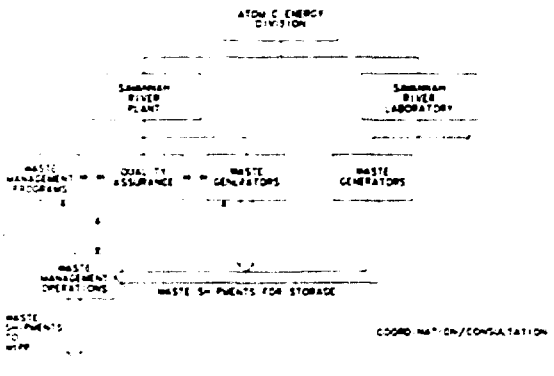

Fig. 9. Waste management and related organizational structure at SRP.

suggest that the WIPP operator should define the necessary level of QA.

SRP and DOE Savannah River Operations Office personnel believe that one organization should be responsible for approving certification procedures. They think it should be either WIPP personnel or the DOE organization responsible for the operation of WIPP. If more than one organization is approving procedures, there will be a lack of consistency. (DOE is now preparing guidance on procedures to be used, and this will be published in the near future.)

SRP is planning to retrieve its stored waste; however, this is not recognized in WIPP documentation regarding transfer of retrieved waste to WIPP. SRP personnel feel that retrieval of their waste should have a high priority because their site has a more humid environment than that of INEL, which exacerbates the concern over radionuclide migration. SRP personnel further believe that the WIPP Environmental Impact Statement (EIS) and the WIPP Waste Acceptance Criteria address only the waste management problems at INEL and RFP. Although RFP has a larger volume of waste, SRP's TRU waste has the largest curie content. Hence, SRP recommends that the WIPP EIS be amended or supplemented to address the specific problems associated with their ^{239}Pu.

Other concerns at SRP are related to gas generation, combustibility, and packaging requirements. Savannah River personnel would like to have approved containers specified. Single or double containment on the TRU Package Transporter (TRUPACT) is also a concern, and they have contacted the Transportation Technology Center of the Sandia National Laboratories, Albuquerque, to resolve this concern. Because of their waste types, SRP thinks the TRUPACTs should have double containment.

Currently, SRP has two parallel efforts for long-term TRU-waste management. One is to incinerate the TRU waste, combine it with high-level waste, and then immobilize it for long-term disposition on site or for future shipment to a repository. The alternative is to ship the waste to WIPP in accordance with the WIPP Waste Acceptance Criteria. The direction finally chosen will affect the level of effort needed for certification.

I. BCL

BCL's major source of contact-handled TRU waste has been their Plutonium Laboratory. This facility has been shut down since the end of 1977 and decontamination and decommissioning operations are nearing completion. All TRU wastes generated from research and development programs and from the decontamination and decommissioning operations have been shipped to INEL for retrievable storage. It is estimated that during the final decontamination and decommissioning phase of this facility, an additional 15 drums and possibly 4 bins of TRU waste might be produced. After completion of these activities, it is estimated that a combined generation rate of $<75\ ft^3/yr$ of contact-handled TRU waste will be produced from the BCL Radiochemistry Laboratory and from a small, three-glovebox laboratory facility that is planned.

The above information was collected by a telephone conversation and a letter from BCL. No site visit was made.

VI. CONCLUSIONS AND RECOMMENDATIONS

The WIPP Waste Acceptance Criteria were developed primarily to ensure safe waste transport to and operations at WIPP. Clarification of the WIPP Waste Acceptance Criteria has received considerable attention, and the findings of a DOE contractors' Certification Requirements Working Group was published as a WIPP-DOE series document.[7] Our interactions with the majority of TRU-waste generators and shippers lead us to conclude that there is a recognition of the need to reorient local waste management activities to meet the requirements of WIPP. Specific areas that need attention are summarized in the following sections.

A. Certification Authority

The major problem we identified is the absence of an organization responsible for approving certification, QA, and transportation procedures. Currently, no waste generators or shippers have been formally charged by DOE either to certify their wastes or to develop waste certification and QA procedures that would ensure conformance with the WIPP Waste Acceptance Criteria. A formal request for certification should be made immediately by DOE Headquarters, and an authority responsible for approving site-specific certification programs should be identified. Personnel at most sites suggest that a central organization should be responsible to avoid possible inconsistencies. Furthermore, an arbitrator of disputes between the waste shippers and WIPP needs to be identified.

Most of the contractors have well developed QA programs. The DOE-WIPP Project Office may be required to approve the level of QA procedures or may serve only in an advisory or consultation role. It would be beneficial to have a meeting of all the contractor and WIPP personnel to discuss different aspects of the level of QA that will be necessary for the certification program. This meeting should be scheduled after the responsible DOE organization(s) is identified. The QA procedures should be simple to minimize the operators' efforts to certify their waste. The QA program that the shippers submit to DOE should state how they will meet the requirements, their related organizational structures and levels of authority, and their data collection procedures. A separate QA authority could guide the waste management personnel (shipper) in developing procedures for a QC program. Ideally, waste management personnel would be in contact with generators, when necessary, to provide guidance and assistance.

B. Waste Certification Training

We recommend that RFP waste management personnel, in consultation with TWSO, provide seminars on the procedures that are presently being developed at RFP to make their newly generated TRU waste conform to the WIPP certification requirements. Invited attendees should include the people who are developing and implementing QA/QC and certification procedures. If necessary, a separate 1-day seminar could be conducted, through TWSO, for management personnel. Through this exchange of ideas the shippers probably would be able to certify newly generated TRU waste sooner and with less expense than if they each try to develop procedures independently.

C. Waste Packaging

Two of the major concerns of TRU-waste generators and shippers have been (1) the waste forms acceptable at WIPP and (2) the container for shipping to WIPP. TWSO should provide input to waste generators and shippers concerning the experiences of DOE-supported waste-form development activities. Some specific suggestions to all generators and shippers at an early date are desirable. Much of the concern regarding containers is justified because the contractors have waste-handling equipment that would be expensive to replace if they were required to use containers not matched to their equipment. However, exemptions might be considered for small waste generators having containers smaller than those specified by the compliance requirements. Otherwise, the contents of the containers could, perhaps, be processed at INEL. Small waste operations using larger than approved containers should be exempted from the EG&G Idaho acceptance criteria so that the waste can be processed at INEL. The financial implications of these waste packaging concerns can be enormous, and the ability of the waste generators to produce certified waste in FY 1982 depends on funding availability.

D. Waste Documentation

Standardization of forms and reporting procedures should be addressed immediately. Different contractors have different data collection, reporting, and processing systems, often primarily designed for accountability or nuclear materials control. It would be beneficial to develop a standardized reporting procedure for future waste generation. One way to accommodate the old records-keeping methods would be to change the old records on an as-can basis after the new procedures are implemented.

E. Standard Labels

Standardization of container labeling, color coding, and code location should be addressed immediately.

F. Data Processing

Every contractor has his own approach to computer systems for collecting, collating, processing, and transmitting data. In addition to the Mound computerized records system discussed in Sec. V, there are several other systems or partial systems. ORNL has the Integrated Data Base, RFP has the WMIS, RHO has a waste management system, and EG&G Idaho has a separate WMIS and the SWIMS. EG&G Idaho plans to dedicate a computer to their waste operations using NOMAD[21] for data base handling. In addition, they plan to use this computer system to generate the data for SWIMS. RFP and RHO are using SACNET to transmit data to INEL.

TWSO has provided funding in FY 1981 and has budgeted FY 1982 funding for the Mound Facility to modify its waste management computer system to include additional features necessary for a totally automated records system to support certification activities. Future plans call for the adaptation of this system to other sites, where appropriate. Modification of the computer system at Mound will not be completed in FY 1982, and installation at another site probably would require $\geq$2 yrs. Mound personnel plan to form a committee in early FY 1982 to discuss their system with all site operators.

Although the Mound system may not be easily adapted to some sites, Mound's plan to meet with other site personnel in early FY 1982 is desirable. This committee should include a representative from Westinghouse-WIPP and from Bechtel. Before additional funding is appropriated for the development of any or several computer systems, the problem should be thoroughly studied, possibly within 6 months. It may be that no single system will be feasible, with each site having its own hardware and software needs. However, the output from these site-specific systems should be in a single, standard form and should be easily transmitted to WIPP.

G. Additional Concerns

Examples of additional concerns include gas generation and combustible waste. For gas generation, if a vent is required for waste containers,

the vent could be plugged to meet DOT requirements for shipment, and then unplugged after receipt at WIPP. For combustible waste, INEL plans to ship them to WIPP unless incineration or some other volume-reduction method is more cost effective. The concern with centralized vs decentralized (on-site) incineration or processing facilities is an economic concern, and early policy decisions are necessary. Continuing efforts to assess objectively the concerns of all the program participants under the auspices of TWSO should facilitate the development of practicable interfaces between TRU-waste shippers and WIPP.

ACKNOWLEDGMENTS

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APPENDIX A

A SUMMARY OF WIPP WASTE ACCEPTANCE CRITERIA[a]

Criteria	Contact-Handled (CH) Waste	Remote-Handled (RH) Waste
1. Gas generation	• Shall not exceed 10 mol/m^3 of storage-room volume/yr or • The organic content may not exceed: (a) 220 kg/m^3 (14 lb/ft^3) in 210-L drums (b) 100 kg/m^3 (6 lb/ft^3) in other containers	Not specified
2. Combustibility	Noncombustible containers must be used for combustible waste	Same as CH
3. Immobilization	• Powders, ashes, and similar particulate materials shall be immobilized if the waste matrix contains >1 wt% of particles <10-μ diam or >15 wt% of particles <200-μ diam	Same as CH
4. Prohibited materials at WIPP	• Sludges • Free liquids • Explosives • Compressed gases	Same as CH
5. Pyrophoric materials (nonradioactive)	• All forms must be rendered safe • Pyrophoric radionuclides should be ≤1 wt% of waste	Same as CH
6. Toxic and corrosive materials	• Toxics must be identified and approved; corrosives must be rendered noncorrosive	Same as CH
7. Containers and overpacks	• Shall be noncombustible and meet the requirements of 49CFR173.398(b) for Type A packaging • Damaged containers shall be overpacked • Design life of the containers shall be at least 15 yrs after emplacement, including labeling and color coding • All containers need prior approval by WIPP	Same as CH. Same as CH Same as CH
8. Waste package	• Containers must have cleats, offsets, chines, or skids for handling by fork trucks, cranes, etc.	Must have axial lifting pintle for remote handling. Other auxiliary devices are not permissible
9. Waste package weight	• Max. 11 300 kg (25 000 lbs)	Max 3200 kg (7000 lbs)
10. Waste package size	• May not exceed 3.7x2.4x2.5 m in overall LxWxH dimensions (12x8x8.5 ft)	Shall be cylinders of 0.6 m (2 ft) in diam with a maximum length of 3.1 m (10 ft) including the pintle

Criteria	Contact-Handled (CH) Waste	Waste
11. Surface dose	• Max: 200 mrem/hr (2 mSv/hr) at any point. Color coding required when >10 mrem/h, ≤200 mrem/h	Max: 100 rem/hr (1 Sv/hr) (internal shielding may be used)
12. Surface contamination	• ≤50 pCi/100 cm^2 (1.9 Bq/100 cm^2) for α- • ≤450 pCi/100 cm^2 (16.7 Bq/100 cm^2) for β-, γ-	Same as CH
13. Thermal power	• >3.5 W/m^3 (0.1 W/ft^3) must be recorded in data package	Thermal power shall not exceed 300 W per package
14. Nuclear criticality	• Fissile-isotope content is limited to: ≤200 g/55 gal (0.21 m^3) or larger drums ≤100 g/30 gal (0.11 m^3) drum ≤500 g/DOT 6M container ≤350 g/4x4x7ft (1.2x1.2x2.1 m) FRP DOT 7A box ≤5 g in any ft^3 (0.028 m^3) in other boxes	≤5 g/ft^3 (0.028 m^3) All others will be reviewed on an individual basis
15. Certification	• Generation and shipping sites must provide a data package certifying that each waste package meets the WIPP-WAC	Same as CH
16. Waste-documentation system	• Shipping sites must maintain auditable documentation • Documentation system must include: (a) Description of methods of certification (b) Quality assurance and safety requirements	Same as CH
17. Labeling	• All federal labeling requirements must be met • In addition, each waste package must have a label that will uniquely identify it. Information will include: (a) Standardized package identification number (b) Weight in kilograms	Same as CH Labeling must use 2" or larger characters for remote handling and distant viewing
18. Color coding	• WIPP operator will prescribe the code • The code must be designed to identify: (a) Surface dose rate (b) Combustible contents (if >25 vol%) (c) Toxic material content	Not specified
19. Data-package transmittal	• Data package shall be transmitted to WIPP before shipping waste package	Same as CH

Criteria	Contact-Handled (CH) Waste	Waste
20. Data package (contents of...)	• Package ID number • Certification statement • Waste-generation site • Date of packaging • Radiation levels • Weight • Container type • Physical description of waste • Assay information • Nonradioactive hazardous materials • Weight of organics • Thermal power (if >0.1 W/ft^3) • Date of shipment • Carrier identification • Other significant information (if any)	Same as CH

[a]This appendix was adapted from US DOE report WIPP-DOE-069, Rev. 1.

APPENDIX B

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[a]Telephone conversation.