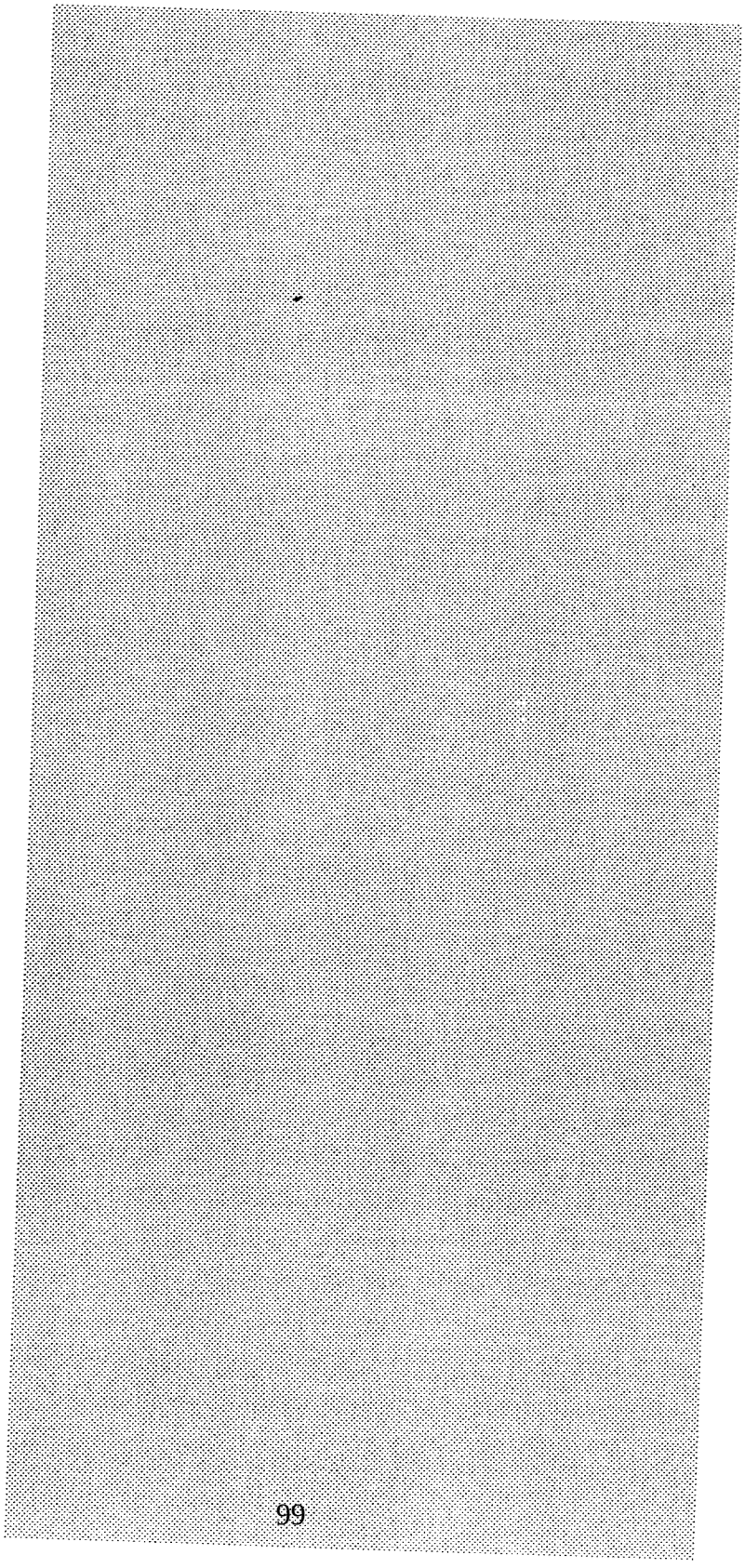
Peer Review Criteria, Findings, and Recommendations of the Review Panel



PEER REVIEW CRITERIA AND FINDINGS

The findings of the RP with respect to the review criteria are as follows:

Criterion 1

Is the draft *RCRA Class 3 Permit Modification* (DOE 2001a) optimized in format and content to facilitate the regulatory review and approval process?

Finding of the RP

The draft *RCRA Class 3 Permit Modification* (DOE 2001a) is optimized in a format to facilitate the regulatory review and approval process. Throughout the document the text has been modified to show the new information added, and there are strike-outs to show the information deleted. The Overview section includes tables showing the regulatory references and their corresponding location in the document. In addition, Table 2 lists all of the sections of the document that have been modified. However, the draft *RCRA Class 3 Permit Modification* (DOE 2001a) is lacking some information that would facilitate the regulatory review and approval process as described in the Findings to several of the Criteria.

Criterion 2

Are the parameters—for which RH-TRU waste will be analyzed—appropriate, and the rationale for the selection of these parameters adequately justified in the draft *Request for RCRA Class 3 Permit Modification* (DOE 2001a)?

Finding of the RP

The draft *Request for RCRA Class 3 Permit Modification* (DOE 2001a) lists the appropriate parameters and attempts to justify the selection of these parameters in the "ITEM 2" section of the document. This section includes the characterization approach, characterization methods, and data reporting and validation requirements. Table 2-1 attempts to justify all of the modifications of CH-TRU parameters to account for RH-TRU. Table 2-2 addresses the differences for Data Quality Objectives (DQOs). Table 2-3 addresses the differences for the Acceptable Knowledge (AK) criteria. Table 2-4 addresses the differences for Radiography, and Table 2-5 addresses the differences for Visual Examination. However, some of the information is presented only as background information and is not referenced in the permit.

Criterion 3

Is the acceptability of relying on AK as the sole analysis tool to meet characterization requirements chosen in the draft *Request for RCRA Class 3 Permit Modification* (DOE 2001a) consistent with relevant regulations as interpreted jointly by the U.S. Environmental Protection Agency (EPA) and the U.S. Nuclear Regulatory Commission (USNRC) (1997)?

Finding of the RP

In many cases, reliance on AK as the analysis tool to meet the waste characterization requirements listed in the draft *Request for RCRA Class 3 Permit Modification* (DOE 2001a) as the sole analysis tool can be consistent with the relevant regulations as interpreted by the EPA and the USNRC. There may be cases where AK is not sufficient to meet the regulatory requirements. The WIPP has proposed additional characterization methodologies in a hierarchy of methods to allow for the characterization of all wastes accepted at the WIPP that will meet the DQOs. There will be cases where AK alone is sufficient, but this will be determined on a case-by-case basis depending on the nature of the AK available.

Criterion 4

Is AK alone sufficient to meet the DQOs?

Finding of the RP

In many cases, AK alone will be sufficient to meet the DQOs. Whether or not it is sufficient will be dependent on the nature of the waste and the source and completeness of the data that constitute the AK. For example, AK for waste generated from a chemical conversion process may consist of: 1) material balance and operating data; 2) historical records of the analyses of samples of the waste; and 3) inventory and custody records. Such AK should be sufficient to meet the DQOs. The AK for a drum of scrapped equipment and other waste (not specified) from a decommissioning activity may not provide sufficient information to meet the DQOs.

Criterion 5

Does the draft *Request for RCRA Class 3 Permit Modification* (DOE 2001a) make a clear distinction between characterization activities using AK versus

supplementary; confirmatory; or verification activities involving physical and other measurements?

Finding of the RP

The draft *Request for RCRA Class 3 Permit Modification* (DOE 2001a) makes a distinction between characterization activities using AK versus supplementary, confirmatory, or verification activities involving physical and other measurements. Detailed records exist at the generating sites on many waste forms that will require disposal. Depending on process knowledge and other information sources, AK can be used successfully to fully characterize wastes to meet WIPP acceptance criteria. In some cases the existing information may be insufficient to meet the characterization requirements. When this occurs, supplementary information must be developed by other means. In the draft *Request for RCRA Class 3 Permit Modification* (DOE 2001a), several characterization methods—including AK, Radiography, and Visual Examination—are described, as well as their intended use in characterization activities. However, in the draft *Request for RCRA Class 3 Permit Modification* (DOE 2001a), figures such as R-2 do not provide for the use of other characterization methods should AK be insufficient.

Criterion 6

Is the application of the Performance-Based Measurement System approach consistent with the relevant EPA guidance on performance-based measurement systems?

Finding of the RP

The application of the Performance-Based Measurement System approach meets the EPA's guidance on performance-based measurement systems. The performance-based approach is designed to produce the desired results which eliminate characterization processes that do not produce information used to meet performance requirements. The DOE chose a performance-based approach to meet EPA's guidelines for RH-TRU waste. The characterization objectives for EPA requirements cover metals; residual liquids; cellulosic; plastics and rubber; total radioactivity; and surface dose rate. Baseline calculations for CH-TRU were used for comparisons to determine the relative effects of bounding assumptions regarding characterization data. The performance factors are specified in 40 CFR 191 (EPA 1993) and 40 CFR 194 (EPA 1996a). Section 40 CFR 194.24 (c)(3) of EPA

regulations allows AK and requires the QA standards—as specified in 40 CFR 194.22—to be applied to the process. Furthermore, 40 CFR 194.24 (c)(4) requires a system of controls and packaging of waste components to confirm that the total amount of each waste component falls within the performance limits. It appears that the EPA expects the performance assessment of an RH-TRU package to include uncertainty estimates, and that the actual diverse RH waste steams radionuclide contents be below the estimates.

Criterion 7

Does the draft *Request for RCRA Class 3 Permit Modification* (DOE 2001a) present an RH-TRU waste characterization program that is consistent with the recommendations of the National Research Council?

Finding of the RP

The draft *Request for RCRA Class 3 Permit Modification* (DOE 2001a) presents an RH-TRU waste characterization program that is not consistent in all cases with the recommendations of the National Research Council. The draft *Request for RCRA Class 3 Permit Modification* (DOE 2001a) still includes characterization requirements which the National Research Council criticized as being self-imposed and overly conservative. The draft request presents evolutionary steps regarding characterization as site programs evolve.

Criterion 8

Does the *Waste Analysis Plan* (WAP) included in the draft *Request for RCRA Class 3 Permit Modification* (DOE 2001a) meet the requirements for characterizing hazardous waste?

Finding of the RP

The WAP included in the draft *Request for RCRA Class 3 Permit Modification* (DOE 2001a) broadly meets the requirements for characterizing hazardous waste. The RH-TRU waste analysis plan has been prepared for the management, storage, and disposal activities at the WIPP facility, to meet the requirements of the New Mexico Administrative Code (NMED 1997) that incorporates the EPA's 40 CFR 264.13 regulations. However, the WAP, as presented, is not sufficiently detailed and clear on the information that each waste-generating site must supply to the

WIPP—particularly with respect to AK (see also Findings 1 and 2). Guidance concerning the characterization of mixed, hazardous, and radioactive waste has been incorporated into the preparation of the RH WAP. This RH WAP addresses waste stream identification requirements; waste stream parameters; waste characterization and confirmatory methods; data validation; and reporting. Characterization requirements for RH-TRU mixed waste are the same regardless of waste stream designation (i.e., debris, homogeneous solids, soil/gravel) or when the waste was generated (i.e., newly generated versus retrievably stored).

Criterion 9

Does the WAP included in the draft *Request for RCRA Class 3 Permit Modification* (DOE 2001a) contain excessive requirements for characterizing hazardous waste?

Finding of the RP

Although the WAP follows guidance documents for characterizing hazardous waste, DOE has interpreted the requirements quite conservatively such that various proposed characterization methods have no legal or safety basis.

Criterion 10

Is the *Notification of Proposed Change to the EPA 40 CFR Part 194 Certification of the Waste Isolation Pilot Plant* (DOE 2001b) clear and descriptive of the nature and scope of the proposed RH-TRU waste Characterization Program?

Finding of the RP

Section 2.0 "Nature and Scope" of the *Notification of Proposed Change to the EPA 40 CFR Part 194 Certification of the Waste Isolation Pilot Plant* (DOE 2001b) describes the nature and scope of the proposed RH-TRU Waste Characterization Program. Attachment C is a matrix that lists 40 CFR Part 194 requirements and the manner that the RH-TRU program complies with the requirements. Attachment D is a checklist that demonstrates how the RH-TRU program—as compared to the CH-TRU program—complies with the EPA's Compliance Application Guidelines (CAG). All items are completed as suggested by the EPA's CAG. There are no items completed differently than suggested by the CAG, and there are no open items.

Criterion 11

Is the DOE's assessment of the consequences for compliance with EPA disposal regulations clearly and adequately presented in the *Notification of Proposed Change* (DOE 2001b) document?

Finding of the RP

Consistency with EPA disposal regulations is fully demonstrated and documented in resource documents. The performance assessment conducted by Sandia National Laboratory is complete and consistent with EPA regulations in 40 CFR 191 and 40 CFR 194. Also, this conclusion is validated by the recent National Research Council's analysis of disposing RH-TRU at WIPP. The RP fully concurs with the analysis as presented.

Criterion 12

Is the significance of the change in the *Notification of Proposed Change* (DOE 2001b) clearly and adequately addressed?

Finding of the RP

The significance of the change in the *Notification of Proposed Change* (DOE 2001b) is clearly and adequately addressed in section 2.0 "Nature and Scope" and section 3.0 "New Information." Section 2.0 reviews the historical record leading to the need to submit a change to the EPA's WIPP 40 CFR 194 certification to permit the disposal of RH-TRU in the WIPP. It also summarizes the RH-TRU Waste Characterization Program that is discussed in detail in Appendix A "RH-TRU Waste Characterization Implementation Plan." Section 3.0 explains the changes in the DOE's TRU waste characterization program to accommodate RH-TRU.

Criterion 13

Are the consequences for compliance determinations clearly stated in the *Notification of Proposed Change* (DOE 2001b) document and technically justified in the *RH TRU Inventory Impact Assessment Report* (DOE 2001b)?

Finding of the RP

The consequences for compliance determinations are clearly-stated in the *Notification of Proposed Change* (DOE 2001b) document and are technically justified in the *RH TRU Inventory Impact Assessment Report* (DOE 2001b) which is Attachment B of the *Notification of Proposed Change* (DOE 2001b) document. Attachment B demonstrates by analysis that the repository performance of the WIPP would not be compromised even for large deviations from the planned inventories of both radioactive and non-radioactive waste placed in the repository.

Criterion 14

Does the *RH TRU Waste Characterization Program Implementation Plan* (DOE 2001b) present a viable, effective, and efficient performance-based waste characterization program?

Finding of the RP

The *RH TRU Waste Characterization Program Implementation Plan* (DOE 2001b) presented meets the performance factors of the waste characterization program. Applying knowledge of the characteristics of the waste using available information minimizes additional risk and exposure due to RH-TRU. There is an overall balance in the program activities to characterize RH-TRU waste to the extent possible. The efficiencies are gained by balancing the requirements for providing definitive characterizations data of the waste streams with those circumstances where sampling and analysis are neither feasible nor necessary, given the need for the data. The AK—when used appropriately in combination with NDA/NDE—yields a viable, effective, and efficient performance-based waste characterization program. The *RH TRU Waste Characterization Program Implementation Plan* (DOE 2001b) provides the sites with considerable latitude in meeting the WIPP-Waste Acceptance Criteria (WAC) requirements; it would be better if WIPP provided definitive requirements for the different sites.

Criterion 15

Does the *RH TRU Waste Characterization Program Implementation Plan* (DOE 2001b) clearly identify and justify the waste components to be characterized?

Finding of the RP

Comprehensive RH-TRU inventory and waste streams were identified, along with a comparison between CH and RH-TRU disposal volume projections. The waste components have been identified and justified in a general sense, but a detailed description of waste streams from the waste-generating sites is lacking. The documents fail to adequately describe the contact and communication among WIPP and the RH-TRU generators.

Criterion 16

Is the associated DQO appropriate for each waste component and consistent with the relevant guidance of the EPA?

Findings of the RP

The documents and the Project Team presentation indicate that the DOE-Carlsbad Field Office has adopted DQOs for metals; liquids; and cellulosic, plastics, and rubber (CPR) materials. The programmatic AK steps outlined in the *RH TRU Waste Characterization Program Implementation Plan* (DOE 2001b) are sufficient to accomplish the DQOs adopted by the DOE-Carlsbad Field Office and can be reasonably relied upon to meet the DQOs for materials received at WIPP. The DQOs are somewhat conservative but they are consistent with the NMED and EPA requirements.

The WIPP-limiting values for radiological components in RH-TRU waste are based on surface-level exposure rates. The methodologies for determining exposure levels are well established, and these levels will be measured and documented for all shipments and disposal containers. These measured values constitute one of the criteria for meeting the DQOs for RH-TRU exposure levels, and therefore, supplement AK.

Criterion 17

Is the reliance on AK as the primary method to meet DQOs and satisfy characterization objectives fully-justified?

Finding of the RP

The acceptability of relying on AK as the primary method in order to: 1) meet the DQOs; and 2) satisfy the characterization objectives, is fully justified for those RH-TRU wastes that have well-documented information regarding their generation and control. The DQOs for the WIPP facility were established using the EPA's Guidance for the DQO's Process (EPA 2000c). Furthermore, the DQOs are identified in the proposed WAP, and they reflect parameters that must be known in order to dispose of waste at the WIPP facility. The DQOs are derived from making a determination of the following waste characteristics: physical form of the waste; absence of prohibited items; and hazardous constituents in the waste. In many cases, the existing documentation would allow these DQOs to be verified with no further characterization efforts required on the part of the waste generator. If the physical form or the absence of prohibited items can not be determined from AK, then other methods (such as radiography) can be used to supplement AK in making a determination that satisfies both the DQOs and the characterization objectives.

Criterion 18

Is the acceptability of relying on AK as the sole method to meet characterization requirements and any DQOs sufficiently explained in relation to the relevant regulations—as interpreted jointly by the EPA and USNRC?

Finding of the RP

The use of AK as a sole method is not sufficiently explained or justified. The AK can be the dominant measure for determining DQOs for RCRA-regulated materials and even for meeting the DQO for radionuclide concentration limits for RH-TRU materials. The explanation of the acceptability of sole reliance on AK represents an apparent inconsistency because as explained in Finding 16 of the RP, meeting the DQOs for RH components at WIPP relies on measured radiation levels for all containers which supplant AK. Therefore, although AK can be a dominant method and sometimes a completely adequate method, it is unlikely to be the sole method.

Criterion 19

Does the *RH TRU Waste Characterization Program Implementation Plan* (DOE 2001b) draw a clear distinction between characterization activities using AK versus supplementary; confirmatory; or verification activities involving physical measurement?

Finding of the RP

The distinction among the characterization activities, AK, supplementary, confirmatory, or verification is inadequate in the *RH TRU Waste Characterization Program Implementation Plan* (DOE 2001b), and is made particularly confusing by the definitions. All available information about the state of the waste should be used in deciding whether or not the characterization is adequate. It is inefficient to perform additional measurements unnecessarily. The AK is information that has already been obtained (such as process knowledge) before any specific WIPP RH-TRU requirements have been established and sometimes when the waste is already in a container. Supplementary information is used to fill in gaps in the required knowledge. Confirmatory and verification data determine whether the AK is reliable, but the distinction between confirmatory and verification is less clear. There are insufficient examples showing how the required information will be obtained using each of the various methods for each of the major types of waste.

Criterion 20

Does the *Notification of Proposed Change* (DOE 2001b) adequately explain and justify how AK and the WIPP Waste Information System are used to satisfy quantification and control requirements?

Finding of the RP

The *Notification of Proposed Change* (DOE 2001b) adequately explains and justifies how AK and the WIPP Waste Information System (WWIS) are used to satisfy the quantification and control requirements. The WWIS tracking and control system is currently in use in the CH-TRU waste program, and it is operating satisfactorily. To meet additional tracking and control requirements imposed on RH-TRU waste by the Land Withdrawal Act, WWIS will be modified by the addition of data fields. Each waste cannister will be assigned an identification number that will be entered into the WWIS. Characteristics such as curie content and surface dose rates (when the dose equivalent rate exceeds 100 rem/h) will be entered into WWIS to enable tracking and control for that particular container.

Criterion 21

Does the *RH TRU Waste Characterization Program Implementation Plan* (DOE 2001b) adequately describe a Quality Assurance program that meets or exceeds appropriate requirements?

Finding of the RP

In general, the *RH TRU Waste Characterization Program Implementation Plan* (DOE 2001b) describes a Quality Assurance program that addresses the appropriate requirements but lacks sufficient detail. However, to meet the WIPP WAC, the site must develop and implement a quality assurance program that addresses all the applicable requirements specified in the waste analysis plan. Sites may use AK, Radiography, and/or Visual Examination (VE) to assist in the characterization of the waste streams. Qualitative data generated by AK, Radiography, and VE are not amenable to statistical data quality analysis. Rather, these methods provide qualitative data useful for determining the Summary Category Group: EPA Hazardous Waste numbers; and the absence of prohibited items in a waste container. Quality Assurance Objectives (QAOs) complement the DQOs by defining the precision, accuracy, completeness, comparability, and representativeness for each of the characterization methods (AK, Radiography, VE) that may be used. The validation methods are appropriately described and evaluated in Attachment R3 of the *RH TRU Waste Characterization Program Implementation Plan* (DOE 2001b) .

Criterion 22

Does the Plan clearly and adequately explain how the provisions of 40 CFR 194.22 (b) will be utilized in the RH-TRU waste characterization program?

Finding of the RP

Use of the provisions of 40 CFR 194.22 in waste characterization is sufficiently-explained; however, it is important for DOE-CBFO to recognize that additional amplification (similar to that provided to the RP during the peer-review meeting) may be needed. The NMED's earlier limitation of its certification to CH-TRU was clearly based on the information provided which was deemed insufficient for inclusion of RH-TRU in the permit.

Criterion 23

Does the Plan present an RH-TRU waste characterization program that is consistent with recommendations from the National Research Council's Report, *Improving Operations and Long-Term Safety of the Waste Isolation Pilot Plant* (2000; 2001)?

Finding of the RP

The RH-TRU waste characterization program is reasonably consistent with the National Research Council's Report, *Improving Operations and Long-Term Safety of the Waste Isolation Pilot Plant* (2000; 2001), including its finding of self-imposed requirements that have no legal or safety basis.

Criterion 24

Are the *Request for RCRA Class 3 Permit Modification* (DOE 2001a) and *RH TRU Waste Characterization Program Implementation Plan* (DOE 2001b) consistent with the ALARA concept?

Finding of the RP

The *Request for RCRA Class 3 Permit Modification* (DOE 2001a) and *RH TRU Waste Characterization Program Implementation Plan* (DOE 2001b) are consistent with the ALARA concept. However, the reduction of worker exposure—as interpreted by the USNRC Guidance RM-30-2—is by itself not an argument for a modification, nor is it possible to use ALARA to justify repackaging in the interest of repository performance. In the proposed modification, there is no explicit explanation of why the AK-based waste characterization approach is needed to maintain repository integrity and avoid exposures. Reference is made to 40 CFR 194 and a presumption is made that if the requirements of 40 CFR 194 are met, the integrity of the repository will be maintained and such exposures will be ALARA.

Additional Findings of the RP

Finding 25

The AK is the key methodology proposed by the WIPP for characterization of RH-TRU waste. The AK can be most useful. However, its usefulness can be improved by ensuring that the stakeholders achieve a clear understanding of the basis for, and use of AK in a suite of analytical characterization tools.

Finding 26

The communication between the regulated and regulatory communities does not appear to be optimal for the efficient processing of permit modifications. It appears

that there are not sufficient free and full exchanges to keep all parties fully informed of each other's needs and accomplishments. An example of this is the apparent lack of communication regarding the advances in nondestructive testing using radiography to identify the absence of prohibited items.

Finding 27

Although there is a clear statement of the regulatory requirements for the characterization of the waste, there is no statement of the scientific requirements for such characterization upon which the regulatory requirements are based. It would, for example, be useful to know that many safety factors are already included in these requirements before discussing whether or not the requirements can be met. A failure to discuss such matters inevitably results in requirements not justified by safety as decried by the National Research Council's review panel.

Finding 28

Communication between WIPP and the waste-generating sites is not at a level to foster efficient planning and implementation of WIPP WAC.

Finding 29

The draft *Request for RCRA Class 3 Permit Modification* (DOE 2001a) has a good basic structure but lacks—in many cases—sufficient details and specificity to facilitate regulatory review.

Finding 30

Audit plans were not provided to the RP.

Finding 31

It is unclear what fraction of the RH-TRU waste has already been containerized or packaged as compared to that which is still to be generated or is stored in bulk.

Finding 32

Significant emphasis is placed on determining EPA's Hazardous Waste Numbers for either listed or characteristic wastes, which in some cases may include organic

compounds. Based on the impact study (Appendix B of the *Notification of Proposed Change* (DOE 2001b), there appears to be no impact on repository performance that depends on this identification.

Finding 33

In keeping with the National Research Council's recommendation to "think smart" good health physics practice and the ALARA philosophy, the efforts to swipe all RH-TRU waste containers is questionable. The containers hold sealed units that have been determined by waste generators and shippers to be "free" of contamination. The commitment to take and analyze six smears—because of the difficulty and complexity of the remote swiping operation—can be a single-point failure in an otherwise straightforward system of waste receipt and emplacement. This approach appears to have evolved from conservative health physics practices used in laboratories and facilities that are relatively clean and quite variable. Records of contamination detected on CH-TRU packages already received could provide a useful baseline of the effectiveness of the waste system in controlling contamination and the degree to which such information has affected WIPP operations. For example, is minimal contamination on one smear (or the absence of a smear result) a basis for not placing an RH-TRU container in the WIPP?

RECOMMENDATIONS

Based on a careful assessment of the information presented to the RP and the findings developed in response to the review criteria, the RP provides the following recommendations:

1. A detailed procedure for determining whether there is sufficient AK available on a waste, should be developed as part of the permit application. This procedure should be consistent across all waste- generating sites.
2. In the final *Request for RCRA Class 3 Permit Modification* (DOE 2001a) a detailed procedure should be provided to go to other characterization methods if AK is found to be insufficient. For example, figures such as Figure R-2 of the draft *Request for RCRA Class 3 Permit Modification* (DOE 2001a) and the accompanying text, should be reviewed.
3. The DOE should implement the National Research Council's recommendation that review of characterization and packaging requirements continue, especially implementation "... over the entire National TRU Program."

4. The DOE should provide to the EPA a complete inventory of radionuclides and waste forms so that the EPA may verify the repository performance (that WIPP complies with 40 CFR 191 and 40 CFR 194) using its own methods for certification.
5. The DOE should initiate a more appropriate interaction with the EPA and the NMED, not only to determine and meet their respective requirements but also to ensure that the relevant recommendations—such as those by the National Research Council—are evaluated and implemented.
6. Prior to submission, all permit-related documents—in addition to currently planned reviews—should be reviewed in detail for completeness, specificity, and clarity by a team experienced in the permitting process.
7. The *Request for RCRA Class 3 Permit Modification* (DOE 2001a) must be expanded to include more specifics and examples for clarity and completeness.
8. The discussion for Table 1 of the draft *Request for RCRA Class 3 Permit Modification* (DOE 2001a) should be expanded to justify why sections of the documents require "no action" or "no changes".
9. As part of the permit application, supplemental information should be supplied detailing the waste characterization plans for each waste-generating site and DOE's procedures for determining that these plans meet the WIPP WAC.
10. Detailed audit procedures for WIPP and the waste-generating sites should be provided as part of the permit application.
11. More detail and specificity on WAC using AK, VE, and Radiography (including types of instrumentation to be used) should be provided in the permit application.
12. The DOE should evaluate the necessity of identifying waste streams by the EPA's Hazardous Waste Numbers or Characteristics. If there is no impact on WIPP performance and integrity, the DOE should work with the regulatory agencies to remove this requirement.
13. Whereas it is desirable to preclude contamination and its potential spread, a complete review should be made of what is gained from the remote swiping procedure for "clean" RH-TRU containers and how the information will be used.