EEG-40

REVIEW OF THE FINAL SAFETY ANALYSIS REPORT (DRAFT), DOE WASTE ISOLATION PILOT PLANT, DECEMBER 1988

Environmental Evaluation Group
New Mexico

May 1989

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Environmental Evaluation Group
7007 Wyoming Boulevard NE, Suite F-2
Albuquerque, New Mexico 87109

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FOREWORD

The purpose of the Environmental Evaluation Group (EEG) is to conduct an independent technical evaluation of the Waste Isolation Pilot Plant (WIPP) Project to ensure protection of the public health and safety and the environment. The WIPP Project, located in southeastern New Mexico, is being constructed as a respoitory for permanent disposal of transuranic (TRU) radioactive wastes generated by the national defense programs. The EEG was established in 1978 with funds provided by the U. S. Department of Energy (DOE) to the State of New Mexico. Public Law 100-456, the National Defense Authorization Act, Fiscal Year 1989, Section 1433, assigned EEG to the New Mexico Institute of Mining and Technology and provided for continued funding from DOE through Contract DE-AC04-79AL10752.

EEG performs independent technical analyses of the suitability of the proposed site; the design of the repository, its planned operation, and its long-term integrity; suitability and safety of the transportation systems; suitability of the Waste Acceptance Criteria and the generator sites' compliance with them; and related subjects. These analyses include assessments of reports issued by the DOE and its contractors, other federal agencies and organizations, as they relate to the potential health, safety and environmental impacts from WIPP. EEG also performs environmental monitoring for background radioactivity in air, water, and soil, both on-site and in surrounding communities.

Robert H. Neill
Director

STAFF

Sally C. Ballard, Environmental Technician
William T. Bartlett, Ph.D., Health Physicist
James K. Channell, Ph.D., P.E., CHP, Sr. Environmental Engineer
Lokesh Chaturvedi, Ph.D., Deputy Director & Engineering Geologist
Laura H. Connolly, M.A., Librarian/Editor
Anthony F. Gallegos, Ph.D., Sr. Performance Assessment Specialist
Jim W. Kenney, M.S., Environmental Scientist
C. Robert McFarland, B.S., Sr. Quality Assurance Engineer
Robert H. Neill, M.S., Director
Kevin J. Shenk, M.S., Health Physicist
Mary Stetton, B.A., Administrative Secretary
Susan C. Stokum, Administrative Secretary
Georgina M. Temple, Secretary
Brenda J. West, B.A., Administrative Officer

SUMMARY

These are the Environmental Evaluation Group's comments on the December 1988 Draft of the DOE Final Safety Analysis Report (FSAR) on WIPP which was received by EEG on February 13, 1989. Previously we commented (October 14, 1988 letter from the Director of EEG to the DOE WIPP Project Manager) on the earlier Draft FSAR, the initial 1980 Safety Analysis Report (SAR), and all nine subsequent amendments to the SAR. EEG's comments on the SAR and its amendments are summarized in EEG-29, Marshall S. Little, "Evaluation of the Safety Analysis Report for the Waste Isolation Pilot Plant Project," May 1985.

EEG's October 1988 comments were extensive and indicated there was much we believed needed to be corrected, amplified, and included in the FSAR. The current comments are equally extensive and we believe a significant amount of work still needs to be done by DOE to produce an acceptable FSAR. Many comments are repeated from our October 1988 review because the December 1988 Draft either failed to respond to all of our comments, or responded inadequately. Additional comments on the current draft involve the hazardous wastes analyses in Chapter 6 and 7 which are in the Draft FSAR for the first time. A few of the comments address issues not covered in our October 1988 review but which may have been raised previously in EEG's comments on the various SAR amendments or in other WIPP Project Office (WPO) Reports.

Another point needs to be made. The FSAR does not contain all of the detailed information and procedures necessary to determine operational readiness of the WIPP facility. In fact, it is apparent from the detailed description in the Working Agreement to the July 1, 1989, Consultation and Cooperation Agreement (see Appendix B,

Working Agreement, Revision 1, March 23, 1983, Article IV, K. Operations) that the review of the FSAR is intended to be only one of the milestones under the Operations Key Event and not the sole criteria for determining operational readiness. EEG has concluded, from participation in the DOE Preoperational Readiness Appraisal in March 1989, that there are a significant number of outstanding items. We have made no attempt to address all of these concerns in our FSAR comments because they don't appear to be pertinent to the document and because we intend to make our operational readiness decision separate from the FSAR.

Our more important comments are summarized below in the order the items are addressed in the Draft FSAR. The significance we attach to each should be apparent from our discussion. More detail is provided on these issues under individual chapter comments.

1. Since the FSAR does not include the long-term risk assessment required by EPA in their disposal standards for TRU waste (40 CFR 191, Part B Performance Assessment), the Safety Analysis Report only applies to the five-year demonstration phase of the project. This should be clearly stated in Chapter 1 of the FSAR. There must then be a supplement to the FSAR prior to a disposal phase of the WIPP Project. Also, the supplement would need to contain the operational safety requirements for handling RH-TRU waste.

2. The Second Modification to the July 1, 1981, "Agreement for Consultation and Cooperation" on WIPP by the State of New Mexico and the U.S. Department of Energy requires the FSAR to "document DOE's ability to comply with the provisions of Subpart A of...(40 CFR 191)." This Draft FSAR does not explicitly address Subpart A compliance. Explicit documentation must be provided.

3. EEG strongly objects to the exclusion of calculations for the hoist drop scenario (C8) on the grounds that it is not a credible event. We have never believed that failure mode analysis can be relied on to prove that low probability accidents will not occur. The history of evaluations on the waste hoist system support this skepticism. The DOE WIPP Project Office published a report in 1985 showing the probability of a catastrophic accident was less than 1E-07 per year. Then in 1987, as part of the Operational Readiness Review, a DOE study indicated the probability to be 1E-03 per year. But we are assured (on page 1A.4-5) that this will be corrected and the event will still be incredible. Implicit in this assurance is the belief that every possible failure sequence has now been recognized and correctly evaluated. EEG does not share this conclusion and believes calculations for this scenario should be included in the FSAR.

4. We consider the assumed low failure rate (1E-04) of the exhaust filtration system claimed on page 1A.4-6 to be unproven. For one thing, the system did not work properly during a scheduled drill during the March 1989 Preoperational Appraisal Audit. Secondly, even if this portion of the system performed perfectly, the Continuous Air Monitors (CAMs) would also have to perform adequately with the required sensitivity in order to signal the switch to the filtration mode. As mentioned below, we also consider the CAM system to be unproven. We believe a great deal of effort needs to go into proving the capability and insuring the reliability of both systems.

5. The FSAR should specify in as much detail as possible the volumes, curies, and distribution within both CH-TRU and RH-TRU containers and the totals. Also, possible

ranges and uncertainties in these estimates should be discussed directly. All of these parameters have a bearing on evaluating different aspects of safety at WIPP and are required (by Article VI of the Consultation and Cooperation Agreement) to be included. (See comment in Chapter 3.)

6. Appendix 6A, which contains the methodology necessary for evaluating airborne radionuclide concentrations from routine operations, contains serious flaws. The corresponding radionuclide concentrations and doses in Chapter 6 are incorrect. Appendix 6A and related portions of Chapter 6 need to be completely redone.

7. The CAMs located in the Waste Handling Building, underground, and in the Exhaust Filtration Building are vital to the protection of workers and to the warning of environmental releases. The ability of these instruments to detect airborne radionuclide concentrations with the required degree of sensitivity has not yet been proven. The adequacy of the CAMs must be established by the WPO and verified by an outside peer review group, including EEG, before wastes can be brought to WIPP. (See Chapter 6 comments.)

8. Several of our comments on Chapter 6 refer to concerns about the WIPP Operational Health Physics Program. Since the FSAR does not address this Program in a comprehensive manner, these comments will not respond in detail. However, EEG's serious reservations about the present status of this Program were provided to DOE in our April 7, 1989, comments on the WIPP Phase II Preoperational Appraisal.

9. Analytical samples for both high- and low-level counting rooms should not be prepared in the same preparation room. Also, routine (as well as incident) bioassays must be carried out on radiation workers. (See Chapter 6 comments.)

10. The use of a 1000 PE-Ci upper limit for individual waste containers at WIPP is unacceptable to EEG. Even with a somewhat lower limit it may still be necessary to impose operational restrictions on high-curie drums. (See our comments under Chapter 7.)

11. The potential doses calculated in Chapter 7 to radiation workers from accidents involving CH-TRU waste handling are unreasonably low because the assumptions include only an average PE-Ci quantity in a drum and because (in the C2 and C3 scenarios) the forklift operator is not considered to be exposed. It should be recognized that very high occupational doses are possible and that operational restrictions need to be employed to minimize them.

12. It is appropriate to include the safety aspects of the non-radiological hazardous waste component coming to WIPP. There are some numerical inconsistencies or ambiguities in this draft (see our comments on Chapters 6 and 7) which should be corrected in the next draft. Our principal observations on the methodology and assumptions are:

(a) the exclusion of all chemicals that represent less than 1% of the hazardous waste constituents (by weight) may not be conservative, because toxicities can vary over several orders of magnitude, and should be reconsidered;

(b) the assumption that average concentrations of Rocky Flats Plant waste are conservative averages for the entire system has not been adequately explained;

(c) the atmospheric dispersion models used give drastically different results than the ones used for radionuclides; and

(d) assumptions about zero mobility of lead and any other hazardous chemical (except VOC's in head space gas) following accidents is non-conservative and inconsistent with assumptions and observations about loss of transuranics (which should be as immobile as virtually all chemicals) from damaged containers.

Because of the extensive re-writing needed on the hazardous waste sections in Chapters 6 and 7 we will not try to reach a conclusion at this time about the potential hazard.

13. The FSAR takes credit in Chapter 8 for a Peer Review Panel providing assurance on suitability of WIPP as a repository. Since the Department has never involved EEG with any of the Peer Review Panels, nor provided us with the agenda, minutes, or recommendations, we believe that the committees do not provide credibility as stated in the FSAR, but in actuality detract from it. In order to take credit, EEG must be involved.

14. It is noted that all references to backfilling the waste storage rooms have been deleted from the FSAR. The FSAR should clearly state whether backfilling will be done during the experimental phase, when the decision on backfill will be made, and the probable final backfill design during operation. (See Chapter 1 comments.)

15. The Operational Safety Review (Chapter 10) lacks sufficient detail to permit us to evaluate the operational safety of WIPP. EEG's specific comments describe the areas in which extensive expansion and revision are needed.

16. A Design Basis Accident (DBA) assessment addressing the requirements of DOE Order 6430.1 and the guidelines to "A Guide to Radiological Accident Consideration for Siting and Design of DOE Non-Reactor Nuclear Facilities," LA-10294-AC,

should be performed and summarized in Chapter 7.

17. This draft of the FSAR evaluates only the proposed disposal mode waste emplacement procedure. Yet, the FSAR is fully applicable to only the (approximately) Five-Year Performance Assessment and Operational Demonstration Test Phase which is not evaluated in any manner. The FSAR should contain analyses of the operations required during the Test Phase. The analysis should include the period at the end of the Test Phase when the wastes at WIPP must be either permanently emplaced or retrieved and shipped elsewhere. (See our comments in Chapters 6 and 12.)

CHAPTER 1
Introduction and General Description

A. General Comments

1. This chapter, including Appendix 1A, has several significant improvements, including a more comprehensive list of pertinent references and an updating of general scientific, technical and physical descriptions. The WPO has made significant responses to EEG's previous comments and recommendations. The chapter provides a good introduction to the FSAR, and there are only a few areas where further changes are recommended. These are discussed in the detailed comments below.

2. After reviewing the entire FSAR, it was noted that it does not contain the performance assessments required by 40 CFR 191 Part B. Therefore, the safety analyses appear to be limited to the five-year pilot plant phase of the WIPP operations. This fact should be clearly stated in Chapter 1.

3. Chapter 1 should include a brief discussion of the status of the potash leases which cover part of the WIPP site, and indicate how and when DOE plans to address this problem.

4. The decision to dispose of the wastes at WIPP or retrieve them will not be based on the results of the Five-Year Pilot Phase as described in the text, but should be based on the ability to meet the EPA Standards for disposal.

B. Detailed Comments

1. Section 1.1, Introduction, Page 1.1-2. The second paragraph on this page refers to the WIPP facility as a "low hazard facility," namely, one "which presents minor onsite and negligible offsite impacts to people of the environment." This conclusion is contrary to DOE/AL Order 5481.1B. According to this Order, a low hazard facility involves only "hazards of a type and magnitude routinely encountered and accepted by the public." As pointed out in the FSAR, the WIPP is a first-of-a-kind facility and, pursuant to DOE Order 5480.5, it is a nuclear facility. Therefore, the hazards of a nuclear facility should not be considered as a type "routinely encountered and accepted by the public." DOE/AL Order 5481.1B also states that all nuclear facilities shall be supported by a SAR. The second paragraph on page 1.1-2 also states that this classification of WIPP as a low hazard facility is in accord with Chapter II of DOE/AL Order 5481.1B. Chapter II discusses "Operational Safety Requirements" and provides no guidance whatsoever for classification of nuclear facilities.

On page 1.1-4, the third paragraph discusses experiments and operational demonstrations needed to reach a decision regarding the permanent isolation of wastes at WIPP. Such experiments and demonstrations are not described in the FSAR, therefore it does not seem appropriate to refer to them in Chapter 1 until such time as they become a part of the FSAR. Also, the latter part of this paragraph discusses the EPA Standard, 40 CFR 191, and leaves the impression that WIPP compliance with the standard is delayed because the standards were vacated and remanded by the courts back to EPA for reconsideration. It should be added that DOE and the State of New Mexico have formally agreed that DOE will proceed to demonstrate compliance with the vacated standard.

On page 1.1-7, there is a statement that technical data, unless it directly supports the Safety Analysis of recent facility modifications, is current through December 1986. Please clarify why technical data on site characterization collected in 1987 and 1988 is not included.

At the bottom of page 1.1-7 and top of page 1.1-8, there is a discussion of the plans to prepare a Supplemental Environmental Impact Statement. Among the reasons which should be added for the need for the SEIS is to summarize the considerable amount of information acquired between 1980 and 1989. This information may change the assessment of the site for the mission of WIPP. For example, concerning the Castile brine reservoirs, FEIS (p. 9-134) stated, "...brine pockets of the size assumed in this example are extremely unlikely near the repository..." In 1981, WIPP-12 borehole, located at the edge of the repository, was deepened and a brine reservoir was encountered which was estimated to contain 17 million barrels of brine, 2 million barrels more than the amount assumed in the FEIS example. After the location of the repository was moved 1.25 miles to the south geophysical surveys performed over the new location showed, "...brine appears to be present 250 meters below portions of the waste panel horizon..." (DOE letter to EEG, 12/29/87). Many such examples of new facts, revised concepts and updated data will need to be addressed in the SEIS.

2. Section 1.1.2, Mission, Page 1.1-11. The Mission Statement emphasizes the research and development aspect of WIPP and mentions the possibility that wastes will not be permanently disposed of at the site. Because of this possibility, the FSAR should indicate where retrieved waste would be sent for storage or disposal.

3. Section 1.1.2, Mission, Page 1.1-11. The Mission of WIPP includes permanent disposal of TRU waste and not simply "to demonstrate many technical and operational principles." The FSAR should clearly state this.

The statement in this section that "the studies and experiments using simulated wastes...are discussed in numerous publications by Sandia National Laboratories and other project participants" is wrong. We are not aware of any published report that lists, describes, or discusses experiments with simulated or real TRU wastes. Room J experiments to evaluate the corrosion effects of brine on the 55 gallon drums cannot be considered to be a "simulated wastes" experiment. The heater experiments were designed to simulate the high level waste and not the TRU waste.

As we have stated before (EEG comments on Draft FSAR, October 1988, Chapter 1, #3, P. 7), the decision to use WIPP for permanently disposing of the waste should be based on demonstration of compliance with the EPA Standards 40 CFR 191, Subpart B, and not "until sufficient operating and scientific data have been accumulated." The Standards do not require operating experience.

4. Section 1.1.3, Design Capabilities, Page 1.1-12. Please delete all references to experiments which are not described and made a part of the FSAR.

5. Section 1.1.4, Schedule, Page 1.1-13. This section should indicate when experimental data and other information will be provided which support the need for the pilot plant phase of WIPP, i.e., emplacing CH-TRU waste at WIPP.

6. Section 1.3, Page 1.3-1. "The shipments are surveyed for external contamination prior to their movement

into the WHB..." During the preoperational audit this was done at the gate. What is planned? EEG believes the check should not be done at the main entrance gate (see our comments on the Phase II Preoperational Appraisal).

7. Section 1.3.1. It is noted that references to backfilling the waste storage rooms that were in Amendment 9 of the SAR have been deleted from the FSAR. We know that the Department has decided to emplace the experimental CH-TRU waste without backfill to avoid crushing the drums during the retrieval period. The FSAR should clearly state this decision and the reason for it and should state that when the waste is emplaced for disposal, a properly selected, tailored backfill will be used to fill the space between the drums, above the drums, and between the walls of the drums. The FSAR should also state that only the amount of waste expressly needed for conducting experiments to help in performance assessment (to show compliance with the EPA Standards 40 CFR 191, Subpart B) will be emplaced in a temporary mode without backfill.

8. Section 1.5.2.1, Repository Plugging and Sealing Studies, Page 1.5-4. It would be helpful to include in this discussion an indication of when the final decision on plug and seal design will be made. Such a decision is important to the Final Safety Analysis.

9. Section 1.5.3, Site and Design Validation Activities, Page 1.5-9. The last paragraph should be revised to delete the indication that there is no recognized function for crushed-salt backfill. There is a well recognized value for such backfill as was discussed in the paper by Chaturvedi, Channell, and Chapman (1988) published in the Waste Management 1988 Conference Proceedings.

10. Section 1.5.3.1, Site Validation Program, Page 1.5-11. In the discussion of Hydrologic Tests, it should be pointed out that the piezometers in the C&SH shaft have not performed well. The groundwater pressures measured in the water-bearing zones of the Rustler were approximately the same as pressures measured at levels where no groundwater is supposed to exist. Also, please clarify the statement that "pressure changes could be diagnostic of changing conditions in the rock or deterioration of seal materials."

11. References for Section 1.5, Page 1.5-15. This reference list includes several unpublished documents which are not available for evaluation. Yet, the discussion in Section 1.5 failed to recognize many of the published works of EEG which are quite relevant to the topics discussed.

CHAPTER 1A
Summary Safety Analysis

A. General Comments

This Summary Safety Analysis Chapter reflects items and conclusions covered in somewhat greater detail elsewhere in the FSAR. Our reaction to the presentation and conclusions of the individual items is expressed elsewhere in comments on the other chapters and is usually not repeated below.

1. This draft responded reasonably well to our October 1988 comments on Chapter 1A. Responses were made to 7 of our 11 comments, with partial responses to two others. However, all responses were not completely satisfactory.

Our first comment asked for a summary of the criteria used to determine that the facility could be operated safely. This was partially answered by mentioning original site design criteria. However, there are other safety-related EPA regulations and DOE Orders the facility will be required to meet. What are they? Have you shown that you met them?

2. This draft of the FSAR appropriately includes an assessment of occupational and public exposures to the hazardous waste component of TRU waste; yet, this is not mentioned in Chapter 1A. It should be.

3. Section 1A.1.1.2, Wind, Page 1A.1-5. The exhaust filter building is mentioned elsewhere as a Design Class II Structure (not III). Also, since it is Design Class II, why is it not designed for a 110 mi/hr wind?

4. Table 1A.3-1, Page 1A.3-3. The title and column

heading in this table are confusing. What is being reported is the average dose for six CH-TRU workers (four waste handlers and two radiation control) and three RH-TRU workers (two waste handlers and one radiation control). See Table 6.1-9.

5. Section 1A.4.5, Waste Hoist Hydraulic Brake System, Page 1A.4-5. The discussion on hopefully reducing the estimated waste hoist brake system annual failure rate from 2.7E-02 is not convincing. All that is expressed is a feeling of faith that the total system failure rate will be shown to be less than 1E-06 per year. See our comments under Section 7.3.2.

6. Section 1A.4.5, HVAC Waste Handling and Exhaust Filter Building, Page 1A.4-6. The estimation that the unavailability of the Exhaust Filter Building would be only 1.4E-04 per release event is unproven. It is understood that this system did not perform properly during the March 1989 Preoperational Appraisal Audit. Furthermore, no allowance is made for the failure of the CAMs to deliver a proper signal in the event of a release. The ability of the CAMs to perform with the required sensitivity in the underground environment has yet to be proven. Also, EEG would appreciate receiving information on the relay test circuits "being considered." How can the problem be considered solved when the specific correction is still being considered?

CHAPTER 2
Site Characteristics

A. General Comments

1. This Chapter has been greatly improved, and we were gratified to note that many of the improvements were in response to comments and recommendations of EEG.

B. Detailed Comments

1. Section 2.1.2.1.2, Potash Leases, Page 2.1-7. This section does not provide adequate discussion of the potash leases. Because there is indication that these private leases may involve large sums of money, it is important that they be resolved before the first shipment of wastes to WIPP. Please add information on when a resolution is anticipated. Also, add a description by section numbers of the 1600 acres referred to.

2. Section 2.2.3.1, Fort Bliss/Biggs AAF, Texas, Page 2.2-2. We understand that there have been 14 flights per year of UH-1H aircraft from the Biggs Air Force Base which fly 500 ft. above the ground directly over the WIPP site. These flights pose a threat to the safety of the WIPP facility, and DOE should take steps to insure they will not occur in the future.

CHAPTER 3
Principal Design Criteria

A. General Comments

1. Although Chapter 3 was extensively revised since the earlier version of the FSAR, and there were many editorial corrections, there was little substantive response to EEG's previous comments and recommendations. We continue to be opposed to the Design Classification definition of Class I items, and believe that the definition should be consistent with that contained in 10 CFR 60.

2. EEG would appreciate the opportunity of reviewing the design classification evaluations for all Design Class II items prepared in accordance with WIPP PROCEDURE WP-300, CHAPTER 4. Please provide information on where this documentation may be obtained.

3. Additional sections should be added to describe the application of the Quality Codes 1, 2, and 3 that are assigned to on-site work requests, to design documents, and to purchase requisitions and for certain analytical or laboratory services for Design Class I, II, and IIIA facility SSC's. Also, the Quality Codes should be described as they apply to certain services associated with the design validation, environmental monitoring, radiological monitoring and geological programs. An additional section should also be added, either here or in Chapter 11 to describe the implementation of the Quality Assurance Surveillance Program.

4. The total expected inventory of CH-TRU and RH-TRU wastes is never stated directly in Chapter 3 or elsewhere in the FSAR. One can make estimates from various sources,

including: (1) Tables in Section 3.1; (2) Table 6.1-4; and (3) statements about design volumes, operating lifetime, and maximums permitted (for RH-TRU). But none of these calculations are as likely to lead to as good an estimate as that determined by those in the WPO who are most knowledgeable about waste characteristics, generation rates, and treatment and emplacement plans. Inventory data affect several aspects of safety analysis: (1) estimates of the number of transportation and operational accidents; (2) probabilities of given concentrations of radionuclides being involved in accidents; and (3) the amounts of radionuclides available for release in post closure scenarios. The FSAR should summarize as much detail as is available on quantities, curies, and distribution in containers for both CH-TRU and RH-TRU. Possible ranges and uncertainties should be discussed in all these values.

B. Detailed Comments

1. Section 3.1.1.1, Container Configuration. Pages 3.1-3,30,31. The text on page 3.1-3 and the Tables 3.1-1 and 3.1-2 on pages 3.1-30,31 do not give a complete picture of the CH-TRU containers since the TRUPACT Efficient Box (Standard Waste Container) is not mentioned on any of these pages. Also, several of the approved CH-TRU waste containers (Table 3.1-2) cannot be shipped in TRUPACT II and it is unclear how the waste in these containers will be transported to WIPP. These pages should be updated and adequately describe the present situation.

2. Section 3.1.1.2.4, Thermal Power, Page 3.1-6. It is unreasonable to assume an average thermal power of 60w for RH-TRU if the average concentration is really similar to that shown in Table 3.1-5. The watts from the Table 3.1-5 inventory would be about 0.6/canister. Furthermore, a

maximum canister subject to the constraints of 1000 PE-Ci, 23 Ci/l and 200 gm fissile material would produce only about 86 watts (assuming the same fission and activation product mixture as in Table 3.1-5). A 1000 PE-Ci CH-TRU drum would generate about 36 watts with no MAP or MFP radioactivity.

3. Table 3.1-5, Page 3.1-35. The average curies per canister of RH-TRU waste has been reduced from 1000 in the previous draft FSAR to 37 (47 if daughter radionuclides are included). This drastic change is not discussed in the FSAR. The current Table is closer to the values reported in the latest Integrated Data Base and in DOE/WIPP 88-005 but there are a lot of internal inconsistencies within these documents. It can only be concluded from the various reports that the volume of RH-TRU coming to WIPP may be as little as 2500 m^3 or it may be over 5000 m^3. The number of curies may be from less than 50,000 to over a million. There are other uncertainties; for example, some of the waste reported in DOE/WIPP 88-005 do not appear to be TRU (less than 100 nCi/gm).

The FSAR should explicitly discuss what is known as well as the uncertainties of the total RH-TRU inventory expected to come to WIPP. This discussion should include estimated ranges of volumes and curies expected to come to WIPP during its lifetime.

4. Table 3.3-2, CMS Vital Information Processing, Pages 3.3-31 through 3.3-34. This table should be revised to tabulate the CMS functions for each of the systems described in Section 3.3.2 Air Handling, i.e., Section 3.3.2.1 Surface Ventilation Systems for the Radioactive Materials Area, Section 3.3.2.2 Surface Support Facilities Ventilation System, Section 3.3.2.3 Subsurface Facilities Ventilation System, Section 3.3.2.4 Interactions Between Air Handling

Systems. The present table appears to incorporate all of the air handling functions in the one designation, HVAC, which could be interpreted to be only the surface air systems with air conditioning. The CMS functions for the Subsurface Facilities Ventilation System, Section 3.3.2.3 are detailed on pages 3.3-12 through 3.3-16 and should be tabulated in Table 3.3-2.

On page 3.3-32, Table 3.3-2 should be revised to tabulate the CMS functions for each of the four Shaft & Hoist Systems identified in Table 3.1-8, i.e., Waste Hoist, Construction & Salt Handling Hoist, Exhaust Shaft, and Air Intake Shaft. For the Waste Hoist, the CMS functions should indicate when TRU waste is being transported, when there is hoist or shaft maintenance, shaft inspection, and personnel transportation.

5. Section 3.4, Decommissioning and Decontamination Design Criteria, Pages 3.4-1 through 3.4-3. The Decommissioning and Decontamination Design Criteria section should discuss and reference the design criteria and programmatic requirements of DOE Order 5820A, "Radioactive Waste Management, Chapter V, Decommissioning of Radioactively Contaminated Facilities." The current reference to Chapter 12, which references DOE 5820.2A, is considered to be inadequate for the purposes of the FSAR since neither Section 3.4 nor Chapter 12 address each of the major design and programmatic requirements (5.1 through 5.e) of DOE 5820.2A.

The reference to the ALARA program should reference DOE Order 5480.11, "Radiation Protection for Occupational Workers," which references (paragraph 9.a) PNL-6577, "Health Physics Manual of Practices for Reducing Radiation Exposure to Levels that are As Low as Reasonably Achievable (ALARA)."

CHAPTER 4
Plant Design

A. General Comments

1. This chapter has been expanded to include significantly improved descriptions of ventilation, fire protection, electrical and water distribution. This information was quite helpful to EEG's review.

2. Inspections and testing of important equipment and mechanical systems is discussed throughout this chapter, but only occasionally is the frequency given for such inspections and tests. This additional information should be added for all of the important systems, or a reference cited where such information is specified.

B. Detailed Comments

1. Figure 4.1-2, WIPP Surface Structures, Page 4.1-8. Buildings 364 and 365 are not identified on the Explanation page.

2. Section 4.2.1.1, Inventory and Preparation Area, Page 4.2-4. The description of this area refers to a waste surge storage area, a battery recharge area, and office space for waste handling personnel. These areas should be identified in Figure 4.2-1 or reference made to other figures where the areas are identified.

3. Section 4.2.1.2, RH Waste Handling Area, Page 4.2-6 to 4.2-10. Figures 4.2-1 and 4.2-3 should be changed to label and identify the cask preparation area, the cask maintenance station, and the cask transfer cell.

4. Section 4.2.1.5, Fire Protection, Page 4.2-14. The last paragraph of this section discusses solidification of contaminated liquid wastes. As previously requested, the FSAR should provide further details of this processing - either here or elsewhere in the FSAR. It should address radiation protection and include the processing procedure, where such processing will take place, and how separation will be maintained of contaminated RH-waste water from CH-waste water.

5. Section 4.2.1.6, Effluent Monitoring System, Page 4.2-15. The air that exhausts the WHB is filtered by a prefilter and two HEPA filters, not "...3 multiple stages of HEPA filters..."

6. Section 4.2.2.2, Construction and Salt Handling Shaft Headframe and Hoist House, Page 4.2-17. Please provide further clarification of the "placement of the emergency escape hoist over the C&SH shaft." Is the emergency escape hoist not part of the existing/in-place mucking hoist, or will there be a requirement to change cages prior to evacuating the mine through the C&SH shaft?

7. Figure 4.2-7, Support Building, Page 4.2-34. Rooms 124 and 125 are mislabeled. The High- and Low-Level Counting Labs are not located here. The walls that remodeled rooms 107 and 139 into offices are not shown.

8. Figure 4.2-8, Support Building, Page 4.2-35. The floor plan for rooms 250 through 253 are incorrect.

9. Section 4.3.2.1.2, Electrical Utility Services, Page 4.3-9. The description of the Electrical Utility Services should be revised to state that one diesel generator can be remotely started and brought on line from the Central

Monitoring Room, as stated in Section 4.4.2.1.2. As shown on the legend to Table 4.4-6, DG No. 25P-E504 is able to be synchronized and brought on line automatically.

10. Section 4.3.2.1.3, Subsurface Structural Features, Page 4.3-10. The third paragraph on this page suggests that vapors from diesel fuel constitute the principal risk of an underground explosion. Of possible greater risk is an explosion from hydrogen formation around the battery recharge areas. Battery recharge in the WHB is shown in Figure 4.4-2 and discussed in Section 4.4.3.1.2, but no mention is made of subsurface battery charging. This should be addressed here and in other sections of the FSAR. This deficiency was mentioned in previous EEG comments. Also, it was previously brought out that the wastes may contain small amounts of pyrophoric materials, or materials which may produce explosive mixtures. Since backfill will not be used during the first five years, some consideration of this potential problem should be discussed.

11. Section 4.3.2.3, RH-TRU Waste Storage Area, Page 4.3-13. EEG requests that up-to-date reference design documentation be cited on pages 4.3-13 and 4.3-15, and that EEG be supplied with drawings of the current design of the shield plug and documentation that supports the 3 - 5 mrem/hour statement.

12. Section 4.4.1, Ventilation Systems, Page 4.4-1. The last paragraph on this page refers to WP 04-1, "Facility Operation Manual." This is an important document which EEG needs to complete review of the FSAR. As of this date, it has not been made available.

13. Section 4.4.1.2.1, CMR and Instrument Shop, Page 4.4-10. The last paragraph should be revised to reflect the

fact that the CAMs located at stations B and C do not monitor ambient air, but monitor only HEPA-filtered "clean" air and therefore do not necessarily represent ambient air.

14. Section 4.4.1.3.2, System Description, Page 4.4-18, 4.4-19, 4.4-20. On page 4.4-18, the statement, "Alarm of any two CAMs can activate HEPA filtration" is misleading. According to J.P. Harvill, at the 28th Quarterly Meeting between DOE and EEG, an alarm by any two underground alpha or any two underground beta/gamma CAMs will initiate HEPA filtration.

On page 4.4-19, please clarify how the reversal of air flow will impact the emergency traffic flow underground pursuant to the escape markings.

The last two paragraphs on page 4.4-20 refer to "periodic" leak and operational tests. Please indicate the frequency of testing, and appropriate action levels.

15. Section 4.4.2.1.5, Backup Loads, Page 4.4-25. This discussion of the backup loads should be revised on page 4.4-25 and in Table 4.4-8 on page 4.4-126. The electrical power needs of the Exhaust Fans, items 28 and 29 on the Legend to Table 4.4-5, page 4.4-105, should be identified rather than the backup electrical load for ventilation for the Air Intake Shaft Hoist on page 4.4-25 and the Air Intake Shaft Hoist Fans on Table 4.4-8. Also, the discussion of the minimum load for backup should be consistent with the above revision.

16. Section 4.4.3.1.2, Fire Characteristics, page 4.4-32. The discussion of <u>spontaneous ignition</u> includes mention of hydrogen formation and venting through a separate exhaust system. It is presumed that this "separate exhaust" venting of hydrogen applies only to the battery recharge area of the

WHB. Please also indicate what safety design features are available in the subsurface battery recharge areas.

17. Section 4.4.6, Radioactive Waste Systems, Pages 4.4-49 and 4.4-50. This section refers to section 5.4 for a description of decontamination procedures, process operation, and radwaste properties. Section 5.4 anticipates radioactive waste will be generated above and below ground at WIPP, however no mention is made of how water mixed with waste and salt in the underground will be collected, assayed or solidified, nor how the underground tunnels will be decontaminated.

The last paragraph of this section on page 4.4-50 refers to the "Waste Handling Operations Manual," WP 05-1. The EEG has not been provided a copy of this manual which is necessary to complete our review of the FSAR. The section also refers to the FMEA, Table 4.4-13. This table does not appear to address the waste water from the RH area, which is contaminated and may have to be treated separately from the CH-liquid waste. This problem should be addressed.

18. Section 4.4.6.2, Liquid Radioactive Wastes, Page 4.4-52. This section describes a trench system which holds fire water pending sampling and analysis for radioactive contamination. If contamination is confirmed, then the contaminated water is manually transferred to a collection tank. This section does not provide details of radiation protection for workers, and procedures needed to collect, mix and measure the activity of the supernatant or precipitate in the holding tank and sump.

19. Section 4.4.9.4, Air Filtering Equipment, Page 4.4-63. Please provide more information on the criteria for filter changeout - the radiation level or pressure drop.

This information should either be provided here or a reference to where such information is available should be provided. Also, it is noted that there is no airlock included in the present design of the Exhaust Filter Building HEPA filter plenum. Further details of the changeout procedure are needed.

20. Section 4.4.9.4, Air Filtering Equipment, Page 4.4-64. It seems likely that the negative pressure of the filter plenum in the Waste Handling Building would collapse the bag for the used filters.

21. Section 4.4.10.2.2, Exhaust Filter Building, Pages 4.4-69, 4.4-70. This section indicates that the compressed air requirements are met by two compressors. It was EEG's understanding that compressed air to the EFB is provided by a buried pipe to the Compressor building.

22. Table 4.4-1, FMEA for the WHB HVAC System, Page 4.4-79. Item 6 on this page describes a Failure Mode as "Permissive to supply air handling unit fails." Please clarify this failure mode.

CHAPTER 5
Process Description

A. Detailed Comments

1. Section 5.1.1.2, Inventory/Preparation Area, Page 5.1-4. Further details are needed here or elsewhere in the FSAR on the procedures for removal and assay of the HEPA filters to avoid potential contamination.

2. Table 5.1-3, CH-TRU Waste Handling Failure Mode and Effects Analysis. This table fails to consider the potential for fire or explosion resulting from hydrogen gas around the battery recharge area in the subsurface. According to Figure 4.3-5, there are five battery recharging stations in the subsurface.

3. Table 5.1-3, CH-TRU Waste Handling Failure Mode and Effects Analysis, Pages 5.1-16, 5.1-19. On page 5.1-16, accident 13 refers to use of breathing air masks for fire in a site-generated rad waste room. Only SCBA would be approved for use during a fire. Please clarify.

On page 5.1-19, Item A1 for Accident 19 is not a safety feature as stated.

4. Table 5.2-1, RH-TRU Waste Handling Failure Mode and Effects Analysis. This table also fails to consider fire or explosion in the underground battery recharge areas. See previous comment.

5. Section 5.4.2, Solid Radwaste System, Page 5.4-2. This section states that all solid radwaste is anticipated to be CH, however, if contamination is found or occurs in the

hot lab or RH-canisters, the resultant cleanup could produce RH-waste. This should be reevaluated and a procedure developed to handle RH-TRU generated wastes.

6. Table 5.5-1, Waste Package Information, Page 5.5-7. This table omits several items which are required pursuant to WIPP/DOE -157, Rev. 2. For example, the Shipment Certification Date, the name of the official who certified the TRUPACT payload, the organic materials volume present, the thermal power (if the amount exceeds the specified limit), the Pu-239 Gram Equivalent, the Waste Package Certification Date, and name of the certifying official are either required or conditionally required.

CHAPTER 6

Environmental, Safety and Health Protection

A. General Comments

1. Appendix 6A, which is necessary for the review of the radionuclide concentration and dose calculations in this chapter, was not received until April 26, 1989, after most comments for the chapter were completed. Our comments on the appendix are summarized at the end of the chapter. We consider the appendix to be seriously flawed.

2. There appears to have been a failure to address in this chapter the changes brought about by the introduction of the new ventilation shaft and the new fans. Also, there is a need for more careful consideration of the placement of monitoring equipment in the Waste Handling Building. There should be a systematic ventilation and contaminant migration study with smokes and tracer gases to arrive at more realistic decisions on placement.

3. The Draft FSAR makes only two brief references to the requirements of 40 CFR 191 Part A and does not explicitly say how compliance will be shown. Neither does the Draft FSAR compare expected doses estimated in this chapter with Part A. The Second Modification of the C&C Agreement requires that the FSAR document comply with Subpart A. Therefore, this documentation of compliance must be included in the FSAR.

4. The Draft FSAR does not fully cover the disposal phase of the project because compliance with 40 CFR 191, Part B, has not been shown, and final decisions have not been made on waste treatment, backfill, and emplacement details.

The need for a supplement to the FSAR has been recognized in the Draft FSAR and is included elsewhere in our comments. However, this Draft FSAR does not address any of the operational procedures that will take place in the proposed experimental phase of WIPP. There are important differences in the waste form that would be used for proposed bin experiments and in underground handling procedures for both experimental and proposed operational demonstration wastes. In addition, the movement and/or backfilling of wastes emplaced during the experimental phase into the final disposal mode must be evaluated. There are possibilities of increased radiation exposure and perhaps mine safety when working in rooms that will have been open for six to eight years. In addition, treatment of waste containers on-site is a possibility. Also, some emplacement rates which have been proposed during the experimental phase could lead to a three-panel operation during the first few years when experimental phase waste is being finally emplaced and new waste is being brought in for the disposal phase. The adequacy of the ventilation system to allow waste handling operations in three panels needs to be evaluated.

B. Detailed Comments

1. Section 6.1.1.2, Design Consideration, Page 6.1-2. In view of recent moves to super-compact waste and heavily load boxes, and the possibility that the existing inventory of boxes may be repacked into the smaller TRUPACT-II standard waste containers, it may be prudent to reevaluate the assumption that radiation fields from boxes will be smaller than from a 55 gallon drum.

2. Section 6.1.2.1, Direct Radiation Sources, Page 6.1-5. The third paragraph uses "mr/h" as allowed neutron dose rate. This should be "mrem/h." Also, please provide

the basis for ignoring the neutron contribution to total dose rate, particularly from high alpha content (heat source Pu-238 and enhanced Am-241) wastes.

3. Section 6.1.3.1, Plant Arrangement Designs for Keeping Exposures ALARA, Pages 6.1-8, 6.1-9. On page 6.1-8, there is a need for further information on the contamination check points. For example, describe the equipment to be used, the procedure for survey of personnel and control of potential contamination, and the procedures and facilities for handling contaminated personnel when or if found. On page 6.1-9, please include information which supports the assumption that pressure differential values created by the ventilation system correspond correctly and appropriately to the identified contamination "zones" in the WHB such that contamination spread between zones will be controlled.

4. Section 6.1.3.3, Radiological Control Zoning and Access Control, Page 6.1-12. More detail is needed here on how personnel are surveyed for contamination at the control points, equipment used, what action is taken when contaminated workers are found (where decontamination occurs), etc.

5. Section 6.1.3.4, Radiation Shielding, Page 6.1-17 to 6.1-18. It is very difficult to review input parameters for the operation of the QAD-P5A computer code from figures 6.1-6 through 6.1-8. A listing of the structural and configurational, as well as source term magnitude/location for this analysis, and those involving the execution of two other shielding codes (G3 and ANISN) is required to make an analysis of this activity with any degree of confidence.

6. Section 6.1.3.5, Ventilation, Page 6.1-20. Please clarify and revise the grammatical errors in the first

paragraph on this page.

7. Section 6.1.3.6, Radiation Monitoring Equipment, Pages 6.1-24,25. The discussion on page 6.1-24 concerning the placement of alpha CAMs and FASs is misleading and implies a lack of understanding of the purpose of these sampling systems in meeting the monitoring requirements of DOE Order 5480.11:

(a) CAMs are not designed to provide indications of concentrations of airborne radioactivity. Their role is to provide alarm in the event of accidental releases;

(b) The decision to utilize a CAM, according to DOE Orders, is not based on whether personnel occupancy is "low" or not; and

(c) FAS sampling is not an adjunct to CAM monitoring in cases of "low occupancy." FASs have their own proper function in monitoring and control of worker exposure. This should be clearly described here.

The second paragraph on page 6.1-25 states that each monitoring system is set to alarm within "acceptable levels of the limits in DOE 5480.1B, Chapter XI." Since DOE 5480.1B does not address alarm levels, please provide an indication of the criteria which will be used to establish these levels. For example, perhaps the level will be set at some designated fraction of the maximum permissible exposure range. It would be desirable to specify that fraction either in the FSAR or the Radiation Safety Manual, so that it could be verified and would not become an arbitrary value.

Also, the discussion of airborne radioactivity monitoring assumes that the monitors are "designed to operate in the expected environmental conditions." Based on recent reviews of the CAMs for both collecting and detecting transuranics in a radon daughter and salt loading environment, this assumption is unproven. Also the calibration of the CAMs, while traceable to NBS and which provide instrument checking, do not calibrate for the actual environmental conditions. Proper operation of the CAMs is vital to the protection of workers at WIPP and to the warning of environmental releases. EEG's concerns about the ability of these instruments to detect radionuclide concentrations with the required sensitivity (particularly in the repository where the greatest amount of interference from salt loading and radon daughters are encountered) have been well documented elsewhere. It is mandatory that further studies be carried out to insure that an adequate monitoring system will be in place before wastes arrive.

8. Section 6.1.4.2, Normal Operation, Page 6.1-27. In the description of the input for annual exposure during normal CH-TRU and RH-TRU waste handling operations, dose rates of 14 mrem/h, 5 mrem/h, and 2 mrem/h four inches from the surface are given for CH-drum, CH-box, and RH-cask, respectively. Please provide the basis for these values. Also, please clarify whether the surface level on a drum is from an individual drum or a 7-Pack.

9. Section 6.1.5.3, Radiation Protection Instrumentation, Page 6.1-34, 6.1-38.

On page 6.1-34, it is stated that samples for both the low level laboratory and the high-level laboratory are prepared in the sample preparation room. It is unacceptable to prepare a sample for high-level counting in the same room as samples for low-level counting since cross contamination of the low-level facilities will likely occur.

Please provide a reference where further details for the calibration procedures may be found.

The first paragraph on page 6.1-38 states that bioassay services are available on a contract basis. The implication is that bioassays would be performed only following evidence of a contamination incident. The WIPP "Radiation Safety Manual," WP 12-5, Revision 1, indicates that preassignment baseline assays and annual bioassays will be routinely carried out. This would suggest that on-site capability for certain types of bioassays (urine, fecal and chest counting) should be available, and the annual bioassays for radiation workers scheduled to minimize assay work loads. This section should be revised to clarify that routine and incident assays will be carried out pursuant to the "Radiation Safety Manual." The discussion on page 6.1-41 clarifies this ambiguity to some degree, but has a typographical error in the sixth paragraph where "routing" should be "routine."

10. Section 6.1.5.5, Radiological Control Facilities, Page 6.1-43, 6.1-44. Please provide more information on the facilities and methods for personnel decontamination, and for detecting such contamination. With respect to personnel decontamination, reference is made to the transport of patients to "a hospital, which has agreed to handle injuries involving radioactive materials." Has a hospital(s) been identified for this purpose? If so, please identify it in this document.

On page 6.1-45, under equipment for the dosimetry laboratory, a statement indicates that compressed nitrogen gas is used for heating. Please clarify this statement.

11. Section 6.1.6.1, Sources of Potential Release, Page 6.1-48. The first paragraph states that the assumptions used in assessing releases are shown in Table 6.1-5. This table provides the estimated results only, but does not indicate

the basic assumptions used to obtain these values. The basic assumptions are needed in order to properly evaluate these data. Neither Table 6.1-4 or Appendix 6A provide sufficient information to arrive at the data shown in Table 6.1-5. Also the first sentence in this paragraph should be revised to state that "the design of WIPP recognizes that very small amounts of radioactivity will be released." To state that it "may" be released implies that no radioactivity may be released, which is not possible.

12. Section 6.1.6.2, Dose Calculation Models, Page 6.1-51. The use of the mean reciprocal wind speed in the atmospheric dispersion equation instead of the mean wind speed biases the equation toward the lower wind speeds. The resulting deposition would be higher than if the numerical average of the wind speeds were used in the equation. Please clarify how the average of the reciprocal wind speeds can save computer time, or other reason why these values were used.

Also on the following page (page 6.1-52), in the determination of the effective stack height for air discharges, credit is taken for the effluent air velocity in the vertical direction. It is our understanding that these stacks are not arranged to release air in the vertical direction, nor will they emit air equally well in all directions. Therefore, the angle of discharge, and the effects of shrouding to effect releases in one direction from the stacks, should be taken into consideration when utilizing the Rupp equation to determine effective stack height. Lower effective stack heights and greater momentum of air in the horizontal direction (and possibly turbulence when the airstream must change direction) after exiting would be expected. Some consideration should be given toward determination of the exiting plume as a function of wind direction and velocity since the dry deposition rate is affected by wind speed in the horizontal direction as well as by radionuclide concentration.

On page 6.1-53, the use of a constant precipitation factor for the determination of radionuclide deposition is questionable for several reasons. The first reason is stated in the document: precipitation occurs in discrete events of varying magnitude throughout the year. At the WIPP, there are about three to nine events/month on the average (Climates of the United States, U.S. Dept. of Commerce, Washington, D.C. 1973) depending on the month of the year. However, most of the precipitation, and the greatest number of precipitation events, occur during the growing season. Hence, most of the deposition of this type occurs during livestock foraging periods and does not occur equally throughout the year. This period also marks the greatest surface contamination of forage plants which are consumed by livestock. During the spring when biomass densities are limited, livestock must forage over large areas to obtain their food requirements when compared to later in the growing season. During the growing season the deposition is affected by the leaf area index of the plant on the one hand, and lower grazing areas/animal unit as well as tissue dilution of the areal radionuclide concentration on the plants. Thus a complex set of processes involving both precipitation events and biomass densities affect livestock intake of radionuclides deposited on plant surfaces. A simplistic approach in using a constant scavenging coefficient is probably not conservative, and should be tested with a model that can take these factors into consideration in evaluating this dose pathway to man to give it validity.

This document does not mention, and presumably does not include, resuspension events which can contaminate plant surfaces via additions to the air concentration resulting from stack emissions. They are mentioned only with respect to inhalation hazards to man. Curiously, it does mention washoff of contamination from these surfaces in estimating pathways. The document is totally silent on soil saltation-creep (erosion) events which contaminate forage and crops up to about one meter above the ground, and also rainsplash momentum which does the same thing. In a region where radionuclides accumulate on the soil surface as a result of deposition from a plume, these processes become very important to consider as pathways of radionuclides to man. It is well known that insoluble plutonium compounds are not readily eluviated from the soil surface. Hence, this pathway is ever present, particularly in an arid environment, and should be taken into account in a risk model for this purpose.

Although dose calculation equations from reference (39) were used, it is not clear what specific equations were used, and what differences in parameter input assumptions were made. This should be clarified. Also the meaning of "exponential transfer from one segment to another" is not clear. Presumably this refers to the four-segment catenary model of the GI tract developed by Eve. This should be stated. Generally, the integrated form of transport processes can be expressed as exponential equations with constant or time variant coefficients, but the actual transport processes are not of this type.

13. Section 6.1.6.3, Dose Calculation Parameters and Discussion of Results, Page 6.1-55. The assumed value for the deposition velocity at the WIPP site of 0.18 cm/sec was not found in reference (38), however, a value of 0.68 cm/sec was found for typical meteorological conditions at Oak Ridge, Tennessee. This value for the WIPP site appears to be low by

a factor of about two. A justification and an exact reference for this parameter should be added. It is generally assumed that there is a one order of magnitude difference between wet and dry deposition amounts (wet = 10 x dry).

It is not clear whether the 0.28 kg/m^2 and 1.9 kg/m^2 values on page 6.1-56 are wet or dry weight units. The value of grassland biomass density appears to be greater than expected by a factor of two for arid sites if wet weight units are assumed. Please clarify whether the reference cited specifically addresses arid sites. The value used for forage consumption for cattle is 15.6 kg/day dry weight. The value recommended by NRC is 12.5 kg/day. Why was the latter value not used? Also, it is not clear why it was assumed that the entire beef herd was consumed on an annual basis, or why a specific fractional part of the herd was assumed to be consumed per day if one assumes constant biomass density and an adequate number of beef cows are available to feed the individual(s). Because beef cows are not slaughtered until they have reached a certain stage of maturity (discrete event), and a human's beef consumption is continuous, a lag period accounting for maturation (seasonal), and another between slaughter and consumption (NRC recommends 20 days, although it is not important for transuranics) should be implemented. Please indicate how the seasonal factor was addressed in these analyses. If mean annual concentrations in beef tissue are being utilized each day to account for the maturation period, the validity of this assumption should be documented. Please also indicate the extent to which water ingestion was considered in these analyses.

14. Section 6.1.6.4, Effluent and Environmental Monitoring and Exposure Pathways, Page 6.1-57. The first paragraph of this section states that the nonradiological

monitoring is discussed in Chapter 3. We could find no such discussion in Chapter 3. There was a reference to handling non-radioactive hazardous materials, namely the "Operations Program Plan," DOE/WIPP 85-001, Rev. 3, July 1988. This document has not been provided to EEG.

On page 6.1-62, it is not proven that either of the alpha CAMs can correctly measure the release of TRU from underground in the presence of salt loading of the filters. In the case of the beta CAM, the correction for radon progeny beta emitters is not discussed, and how the salt loading on the monitor will affect the gamma correction on the opposed "nonloaded" detector. What are the lower limits of detectability for the WIPP radionuclides in environmental media for these detector systems?

On page 6.1-64, first sentence. This sentence should read: "The filters obtained from this FAS will be collected and analyzed by the New Mexico Environmental Evaluation Group, for independent verification of releases from the facility."

On page 6.1-64, please provide more information on the minimum detectable concentrations (MDC) which determine quantitatively the meaning of the phrase "significant release." Also indicate what total release and/or release rate would correspond to these levels based on calculated X/Q and deposition velocities for the predominant plume direction. It should be noted that once the HEPA filters are activated in the EFB, Station B must remain in operation continuously from that time on, because it is the sole point at which this effluent can be monitored after it passes through the HEPA filtration system.

15. Section 6.1.7.1.1, Overall Approach, Page 6.1-70.

Under item (4) it is stated that a 50-year effective committed dose equivalent is used. This concept is commonly used for radionuclides, but it should be made clear how the methodology would be applied for hazardous wastes.

On page 6.1-72, the first paragraph includes a statement that risks for hazardous wastes are being overestimated by one to three orders of magnitude by the use of conservative assumptions. The basis for this statement should be added or the statement deleted.

16. Section 6.1.7.1.2, Assumptions and Considerations of Uncertainty, Pages 6.1-71, and 6.1-72. The first sentence of this section indicates that conservative estimates are provided in Table 6.1-16. Please provide a justification for this statement. EEG agrees with the first sentence of the second paragraph on page 6.1-72 in that this statement recognizes the uncertainties in the chemical data base. Also, the assumption of 24 hours-a-day, 365 days-a-year occupancy may lead to a conservative factor of two or three, but not a factor of 10 to 1000.

17. Section 6.1.7.2.1, Migration Pathways, Page 6.1-73. We agree that for normal operations the volatile organic gases would be the predominant releases, however, it is not obvious that 100% of the lead would be in a monolithic form. Since there is so much lead in the waste, the mobility of only a few percent of it could be significant. A contrary assumption should be justified.

Also there is no indication that surface contamination has been considered. Data is needed on surface contamination so that exposure can be evaluated.

This section concludes that the ingestion pathway was not evaluated. This conclusion is based on the assumption that the chemicals are relatively insoluble and tend to break down in the atmosphere and through biodegradation. Please provide data or references which support such assumptions.

18. Section 6.1.7.2.2, Characteristics of Potential Hazardous Contaminants, Page 6.1-74. It may not be valid to consider only those hazardous wastes present to the extent of 1% or more. It is possible that a highly toxic component present in amounts less than 1% by weight may be of greater significance in toxicity evaluations. For example, cadmium has a cancer potency factor about 425 times as great as methylene chloride and is listed in Table 6.1-17 as having an average concentration about .006 of that of methylene chloride. Therefore, perhaps cadmium should have been considered. Was the data base examined to determine the presence in low concentrations of other highly toxic waste?

The statement in the second paragraph on this page that the method of calculation leads to a "worst case" scenario is correct for some of the waste forms but not for those waste forms in which the concentration of a hazardous constituent may be greater than the "calculated" average. Also, the concentrations of hazardous waste from other generators may substantially exceed that from RFP/INEL. Therefore, more convincing evidence is needed to support the claim that this is a conservative estimate.

At the bottom of page 6.1-74, it appears to be assumed that lead is not one of the mobile constituents. With the very high quantities of lead in some of the drums, this may not be valid. Evidence should be provided to support such an assumption. Furthermore, lead can be assumed to be controlling for the other heavy metals only if the mobile fraction and/or toxicity of these other metals is substantially less than for lead.

On page 6.1-75, a statement that volatilization of liquid organics need not be considered because the WAC does not allow liquids is inaccurate. Actually, the WAC does allow small amounts of liquid residues.

As previously indicated, the statement at the top of page 6.1-77 that using an average concentration represents a worst case assumption is not valid for all waste containers.

19. Section 6.1.7.2.3, Exposure Modeling, Page 6.1-78. Using the "nearest residence," the Mills Ranch, as the location of the maximum exposed individual from routine releases is probably not conservative. The X/Q concentrations at Crawford Ranch (5 miles NNW-NW in the prevailing downwind direction) are about 50% greater than at Mills Ranch (Table H-49, page H-93 of FEIS). For accidents, Mills Ranch has one hour X/Q values about 10% higher than Crawford Ranch.

In the second paragraph on page 6.1-78, there appears to be a typographical error in the first sentence. The volatile releases should be "from" the waste handling building and underground area rather than "to." Also please address the potential for adsorption of the VOC's to particulates. In which case, why should not the particulate form of hazardous materials be considered? Please also clarify whether the mixing heights utilized for VOC's are the same as those used for the dispersion of radioactive material. Do VOC's have a higher effective mixing layer because of diffusion?

20. Section 6.1.7.3, Routine Releases and Exposures for Hazardous Chemicals, Page 6.1-80. This section states that "before opening the TRUPACT-II, samples will be taken from the sample port to detect any accumulation of hazardous

chemicals." This monitoring procedure is not described in Chapter 5. It should be indicated whether such analyses of hazardous chemicals will be a routine procedure, and, if so, what methods of analysis will be used. If these materials will be routinely analyzed in the gases of all TRUPACT-II's, the procedure should be addressed in Chapter 5. The average flow rates in Table 6.1-19 for 14 drums sealed in TRUPACT-II for 100 hours would lead to air concentrations in the TRUPACT-II cavity that exceed threshold limit values for carbon tetrachloride and are about 15% of the TLV for 1,1,1 trichloroethane. Therefore, concentrations inside the TRUPACT-II may be significant and routine sampling should be required.

21. Section 6.1.7.3.1, Routine Releases, Page 6.1-80. The statement is made here that "backfilling is expected to effectively reduce exposure to VOCs to negligible levels." This would be true only after a storage chamber has been sealed, but not necessarily during the filling of a chamber with waste.

Also on this page, there appears to be an error in the assumed air velocity in a storage room. Since the empty room has a cross-sectional area of about 40 m^2, the velocity of 3 m/s yields a ventilation in the storage room of 120 m^3/s or 254,000 ft^3/min, which is 60% of the entire repository ventilation air. Also using the data in Table 6.1-22, one can calculate the air flow to be in the vicinity of 116 to 123 m^3/s. The WPO ventilation drawings indicate that the entire flow in a waste panel will be 122,000 ft^3/min. Thus the air flow assumption here appears to be high by at least 108% and the calculated air concentrations in Table 6.1-22 should be more than doubled. (Methylene chloride concentration appears high by a factor of 10.)

22. Section 6.1.7.4, Health Risks and Ecological Consequences of Chemical Releases, Page 6.1-83. Please clarify this paragraph and indicate whether the acceptable excess cancer risks (1 in 10,000 occupational, etc.) are per year or per lifetime.

The assumption of 65 to 70 individuals exposed does not appear consistent with information in Tables 6.1-8, and 6.1-10. Please clarify. Also the significance of the last sentence on this page is not clear.

Concerning the discussion at the top of page 6.1-84, the use of human risk standards when considering exposure risks to animals may be conservative for certain species, and/or hazardous materials, but not valid for others. For example, herbivores do not wash forage prior to consumption and are more likely to inhale resuspended contamination for longer periods of time in a contaminated area. Therefore, it may be desirable to carry out additional environmental studies of the ecological system to further support these assumptions.

On page 6.1-85, it was possible for EEG to derive the risk factor for carbon tetrachloride as stated in the second paragraph by using a cancer potency factor of 0.13 $(mg/kg/d)^{-1}$, and by assuming the values in Table 6.1-22 are in mg/kg/d. However it was not possible for us to arrive at the risk factor for methylene chloride. Please clarify these derivations. Also, the statement that 2.7E-06 is "at least two orders of magnitude less than 1E-04," is not correct.

23. Tables 6.1-16 and 6.1-17, Pages 6.1-108 and 6.1-109. By using the values in Table 3.1-6, it was possible to derive the values shown in Tables 6.1-16 and 6.1-17. It is recommended that these two tables reference Table 3.1-6.

24. Table 6.1-20, Page 6.1-112. Except for the values of Freon 113, it is not possible to correlate the values in this table with the respective emanation rates shown in Table 6.1-19. Please provide the methodology for deriving these values or information to indicate why the respective routine releases should not be the product of the number of drums times the emanation rate per drum.

25. Table 6.1-21, Page 6.1-113. The inhalation values given in this Table cannot be obtained from data in other tables when using normal inhalation rates of 12 m^3/d for occupational exposure and 22 m^3/d for the public. Possibly these tables should have been labeled as mg/kg body weight per day.

26. Table 6.1-22, Page 6.1-114. In evaluating this Table, and as indicated in comment 21 on this Chapter, the air flows appear to be high by a factor of at least two. Also if the mg/day values in Table 6.1-21 should be mg/kg/d and are multiplied by 70 for a 70 kg individual, and using an AIC value of 6.30 mg/Kg/day the risk would be 5.1E-04 for 1,1,1 trichloroethane. The risk value for carbon tetrachloride was verified but we did not agree with the methylene chloride value when using a cancer potency factor of .0143 $(mg/kg/d)^{-1}$. Also, isn't the cancer risk the excess lifetime risk from a 25-year exposure at WIPP, rather an excess annual risk as stated in the footnote?

27. Table 6.1-23, Page 6.1-115. No information is given on the EPA ISG Dispersion Model used to calculate off-site air concentrations. The values reported in Table 6.1-23 could be obtained by using an effective X/Q factor of about 5E-08 s/m^3. The X/Q factor used in the FEIS (Table H-49) is about 6E-07. Even the equivalent X/Q factor used to calculate individual radiation doses in this chapter (in

Table 6.1-13 from releases in Table 6.1-12) is over six times greater (about 3.3E-07 s/m^3). It was not possible to check the values for carcinogens. Also, as mentioned in comment 19 on this chapter, it appears that Crawford Ranch would have higher concentrations than at Mills Ranch.

The risk values were verified for all hazardous chemicals except methylene chloride by assuming the mg/d values from Table 6.1-21 should have been mg/kg/d.

28. Figure 6.1-16, Page 6.1-135. The shaded areas referred to in this figure are not shown.

29. Section 6.2, Environmental Protection, Page 6.2-2. In the discussion of the applicability of subpart B of 40 CFR 191 to the FSAR, it is not clear how WIPP can become a disposal facility without demonstration of compliance beforehand. The FSAR will be incomplete until such demonstration has been achieved, and this should be clearly stated.

30. Section 6.2.1.3, Non-Radiological Environmental Surveillance Program, Page 6.2-7. This section should be expanded to indicate the extent to which environmental studies, if any, will be made of the ecological system to support the assumptions and conclusions in the FSAR concerning RCRA requirements.

31. Section 6.3.2, Occupational Medical Program, Page 6.3-4. Please provide additional information on this program, such as how employees are informed about the program, particularly the termination medical examinations.

32. Section 6.4, Industrial Hygiene, Pages 6.4-1 through 6.4-5. While this section has been expanded from two

to five pages, there is nothing WIPP-specific in the section, neither are there any references. This section is inadequate in describing the potential industrial hygiene problems at WIPP or the program being developed to control them. More WIPP specific detail is needed to demonstrate that industrial hygiene problems have been evaluated and control is assured. Please include in this discussion an indication of how RCRA requirements will be interfaced into the industrial hygiene program. Also references to documents which support the discussion should be added.

C. Appendix 6A

EEG believes this draft of Appendix 6A is seriously flawed. There are two major errors of logic in the calculations. The values that are calculated are not reflected in appropriate tables in Chapter 6. Also, there are non-conservative changes in assumptions from the previous draft FSAR that are not justified.

One principal problem is that the procedure used to calculate the radionuclides present in the surface contamination is incorrect if one starts from the assumption (which you did, and EEG agrees with) that "the internal content of the drum would also tend to reflect the radionuclide distribution on the external surfaces of the respective container." The average drum contains 65% alpha radioactivity and 35% beta plus gamma radioactivity. Yet, the calculation method assumes that the beta plus gamma contamination limit (which is nine times the alpha limit) is reached first and depresses the maximum alpha contamination. The final result is that, from an alpha/beta plus gamma ratio of 1.86 in the drum, the calculation ends up with a ratio of 0.024 on the surface! Because of a different radionuclide distribution in boxes, the Appendix 6A methodology is only in error by about 3%. However, because alpha radiation delivers most of the internal dose, the overall dose would be about 90% higher than calculated with the Table 6A-2 and 6A-3 values.

Furthermore, it does not appear that the values calculated with the Appendix 6A methodology are used in Chapter 6. For example, the 6A calculation indicates a normal Pu-239 concentration of 6.6E-16 $\mu Ci/cm^3$ near the drum from resuspension, while the value in Table 6.1-5 is 6.1E-14 $\mu Ci/cm^3$. Appendix 6A does not explicitly state how one goes from resuspended activity from a drum or box to the average concentration for the year. Apparently, it is assumed that the resuspended concentration endures for one hour for each contaminated drum or box. The number of workers exposed during each incident is not stated. Likewise, there is no indication of how long the resuspended concentration from damaged containers is assumed to persist. If it is assumed that all 24 workers are exposed to the "6A concentration" for 1,900 hours per year and six persons were exposed to damaged containers for 20.4 hours/year (which seems low), then the dose would still be 0.30 + 1.00 = 1.3 person-rem/year committed effective dose equivalent (CEDE). But Table 6.1-10 presents a value of 0.66 person-rem. To further confuse the issue, the concentrations in Table 6.1-5 would result in a CEDE of 0.54 rem per worker-year of exposure. It is noted that DOE/WIPP 88-012 estimates about 10.3 person-hours of handling for each trailer and this would be about 3.4 person-years/year near enough to containers to receive external radiation doses. This would result in a dose of 1.8 person-rem/year (CEDE) from Table 6.1-5. We conclude that the estimated doses in Table 6.1-10 cannot be reproduced from assumptions given in either Chapter 6 or Appendix 6A and are probably low.

Another fundamental error in methodology is the use of the resuspension factor to calculate the amount of radioactivity being discharged to the atmosphere from surface contamination. Using the assumptions in Appendix 6A, one can calculate that the total amount of radioactive contamination on containers brought on-site during a year would be about 2.8E-05 PE-Ci. Yet, Table 6.1-12 indicates that 1.2E-03 PE-Ci are released to the atmosphere in storage exhaust and about 0.3E-03 PE-Ci/y is released into the Waste Handling Building. The total in Table 6.1-12 is then almost 55 times the amount brought in! Similarly, the amount of Pu-239 reported as being released in Appendix 6A (1.9E-5 Ci/y) is about 4.7 times that calculated in Tables 6A-2 and 6A-3. The resuspension factor cannot be used to determine amounts lost from a contaminated surface over a period of time because it includes a fraction that is being continuously deposited (as well as suspended material being transported from the location).

The "Assumptions Used" table (Table 6.1-4) corresponds to Table 6.1-5 in the earlier FSAR draft. However, two key assumptions are less conservative compared to the previous draft:

1) the assumed number of contaminated containers received during a year is only 5%; and

2) the assumed number of damaged containers received per year is only 19%.

What is the basis for these reductions? Are there data from waste generation and storage facilities to justify them?

CHAPTER 7
Accident Analysis

A. General Comments

1. This chapter failed to adequately respond to several of EEG's previous comments. For example:

(a) There is still no indication that a formal Design Basis Accident (DBA) has been performed. There are requirements for such a DBA assessment in DOE Order 6430.1, Chapter 1. This assessment should be performed and summarized in Chapter 7.

(b) Contamination of the underground by releases from several accident scenarios in the CH-TRU portion of the WHB from ventilation air flow down the Waste Handling Shaft should be assumed. Of even greater probability would be the transport of contamination off-site by workers, visitors or equipment. Such incidents have occurred in nuclear facilities on several occasions over the years. Because of the difficulty of detecting alpha particles this could be of particular importance at facilities like WIPP.

(c) We had also recommended that some of the events of moderate frequency be considered for a drum loaded with the maximum PE-Ci level. This comment was ignored with no explanation or justification for retaining the "average" loading. Also see comment 2 below.

(d) Concerning Accident C2, Drum Drop from a Forklift in the Inventory and Preparation Area, we had recommended that 100% credit not be taken for safety features of the facility and equipment, and for worker training. Instead, no change was made in the assumptions, and the exposure "allowed" is to a worker located in a remote location. What if the forklift operator is injured or stunned by the falling drums, or trapped and fails to immediately leave the scene? Therefore, we still consider this scenario to be insufficiently conservative.

2. Although the WPO has assured EEG the 1000 PE-Ci upper limit value would not be adopted until we had resolved our differences, the WIPP Waste Acceptance Criteria has incorporated it and it appears to be becoming a de-facto limit. The EEG has objected to this limit since 1985, and remains opposed to such a high value. For example, significant comments have been made by EEG on September 27, 1985 (see comments on Chapter 7 of the SAR), November 1, 1985, and June 22, 1988. Most of these comments are still applicable. The basis for our objections include the following:

(a) Such a limit permits a drastic increase in the consequences of the scenarios presented in the FEIS. The need to limit accident consequences from the newer inventories to those estimated in the FEIS was the principal reason why the WPO developed the PE-Ci concept in early 1983.

(b) The occurrence of the C2, C3, C4, and C6 operational accident scenarios with a 1000 PE-Ci container would result in a committed effective dose equivalent of 400 to 700 rem to a worker. The effective dose equivalent delivered in the first year would be about 42 rem. Those are unacceptable doses. The FSAR avoids presentation of this problem by assuming that these scenarios (each assumed to occur once a year for 25 years for a total of about 100 accidents during the lifetime of WIPP) will always occur with a container with the average concentration.

(c) The results of Accident C10 indicate a committed effective dose equivalent to the maximum off-site individual of 1.7 rem. Dose commitments of 3.9 rem to the lung, 29.8 rem to endosteal surfaces, and 6.5 rem to the liver would also occur. These doses greatly exceed a maximum dose of 0.5 rem to any organ of an off-site individual. NRC regulations (10 CFR 60) for a high-level waste repository require "important to safety" structures, systems, and components to prevent or mitigate accidents that could result in a one-time off-site dose greater than 0.5 rem. The FSAR has concluded that there are no items important to safety at the WIPP facility, consequently accident doses off-site from the WIPP facility are allowed to exceed those from a high-level waste repository. The effect of a serious accident could be greatly reduced by significantly lowering the PE-Ci limit.

(d) If a drum containing very high PE-Ci concentrations were intercepted by a human intrusion borehole, there could be more curies of TRU reaching the surface than would be permitted by the EPA standard. It would be possible to produce about 7,000 drums of newly-generated waste at SRP and LANL during the lifetime of WIPP with an average of 470 Ci/drum. The probability of hitting one of these drums would be about 0.1.

(e) Hydrogen gas generation is likely to limit the concentration of radionuclides in most waste forms that can be transported in the TRUPACT to much below 1000 PE-Ci per container.

(f) We don't believe DOE should encourage the production of newly-generated waste that may approach concentrations of 1000 PE-Ci per container and are unaware of any need to do so. If the intent is not to encourage the creation of such containers, why does DOE insist on such a high limit?

In summary, we believe that the 1000 PE-Ci limit has to be significantly lowered. Even with a somewhat lower limit it may still be necessary to address related problems in some other way, such as limiting the number of high PE-Ci drums, imposing more restrictive operational procedures for these drums, etc. We would be pleased to meet with representatives of the WPO to discuss such options.

B. Detailed Comments

1. Section 7.2.1, Source Term, Page 7.2-1. The assumption is made that for accidents expected to happen once a year the

average waste package radioactivity will be used. This is not sufficiently conservative. There should be a consideration of the dose workers could receive from high curie packages, which are likely to be involved in some of the approximately 100 accidents (once each year for C2, C3, C4, and C6 over 25 years) estimated to occur. This assumption also renders the maximum permitted PE-Ci content irrelevant for operational accidents. The FSAR should calculate doses to workers from the C2, C3, C4, and C6 accidents with high-curie containers, including the maximum PE-Ci limit that is finally established.

2. Section 7.2.2.1.2, Dose Assessment, Page 7.2-4. Please clarify whether the described use of the Rupp equation adjusts for the acute angle release of the effluent (45 deg.), and the forced exit direction. If not, the adjustment should be made.

On page 7.2-5, it is difficult to see the logic in excluding scavenging from consideration. In Chapter 6, a constant scavenging coefficient was used for estimating non-accident exposures, and although there was some question as to the validity of using this approximation, it was not specifically excluded. The discussion here should address the possibility of an accident during a precipitation event assuming that an average of about 4 such events occur per month throughout the year at WIPP (U.S. Climate Atlas), with the greatest number of events occurring during the summer. Also it should be made clear whether resuspension of deposited radionuclides and/or saltation-creep-rainsplash contamination were considered. The latter phenomenon is particularly important in affecting plant surface contamination in arid environments. As noted in an earlier comment under Chapter 6 (Comment 13), the deposition velocity assumed for the WIPP site appears to be low by a factor of two. The basis for the selected value should be more clearly documented.

3. Section 7.2.2.2, Doses to Individuals Inside the

Facilities, Page 7.2-6. Consideration should be given to doses to non-radiation workers inside the facilities. It is possible that a significant exposure could occur within the fence from a release from the exhaust stack.

4. Section 7.3.1, Incidents of Moderate Frequency Involving CH-TRU Waste, Page 7.3-1. We concur with the conclusions in the CO scenario that accidents involving the unopened TRUPACT-II in the radiological control area would be less than the hypothetical accident tests and no release would be anticipated.

On pages 7.3-2 and 7.3-3, two changes were made in the C2 Accident scenario. One clarified that only one drum was assumed to be breached. The other updated the average PE-Ci value for a drum. However, EEG's two main concerns (use of an average drum instead of maximum, and assumption of maximum exposed worker) were not addressed. It is not sufficiently conservative to assume the forklift operator has left his position in about 6 seconds and thereby receives no dose. Ten seconds of inhalation from an average drum would result in a committed effective dose equivalent of about 38 rem, whereas a 1000 PE-Ci drum would result in a dose of 2900 rem. This illustrates that very significant doses are possible from handling TRU waste, and this fact needs to be recognized when establishing a maximum PE-Ci limit and operating procedures for drums. The location of the maximum exposed worker and the assumption of the average drum also applies to the C3 scenario.

EEG comments on Amendment 9 of the SAR objected to the low assumed fractions of the damaged drum's waste contents that were assumed to be aerosolized and respirable (1.25E-05 in this case). We still believe they are non-conservative by a factor of 2 to 5. We don't want to resurrect this issue except to note that the release fraction used should not be claimed to be a conservative assumption to offset the non-conservative assumptions of an average drum and the maximum exposed individual being 20 feet away.

5. Section 7.3.1, Accident C4, Page 7.3-5. In the second paragraph on this page, it is assumed that the depletion of the released activity is 20%. Please provide the basis for assuming that this is a conservative value.

6. Section 7.3.2, Limiting Incidents Involving CH Waste, Page 7.3-7. The C8 (hoist cage drop) scenario is still listed as "not credible" and is not evaluated. There has been a long standing difference of opinion between EEG and the WPO about the credibility of this event. In 1985, the WPO produced calculations indicating the probability was about 1.7E-08 per year ("Probability of a Catastrophic Hoist Accident at the Waste Isolation Pilot Plant," TME-063).

However, a December 1987 draft report ("Quantitative Fault Tree Analysis of the Waste Isolation Pilot Plant Waste Hoist Hydraulic Brake System"), prepared as part of the Operational Readiness Review, evaluated this same system and concluded that "the total probability of a catastrophic accident of the Waste Hoist is 1.0E-03 per year (or one failure expected in 1000 years of hoist operation)." This draft report goes on to assure the reader that the suggested modification (providing a solenoid-operated emergency dump value) reduced this probability to 5.2E-08, so failure is still a "not credible" event.

We are not sanguine about the assurance the probability is now 5.2E-08. The 1987 analysis concluded that the 1985 analysis was in error by a factor of 60,000. How can we be expected to now accept the 5.2E-08 value as reliable? EEG still insists that the C8 hoist drop accident be considered credible and the dose consequences of it be evaluated in the FSAR.

It is noted that when using the assumptions for the C8 accident in the FEIS and assuming a load of seven 7-Packs, each with the maximum thermal load permitted in TRUPACT II (40 watts for two 7-Packs), one calculates a release to the environment of 1.15 PE-Ci. By extrapolation from the C10 Accident in Table 7.3-1, this would result in a maximum off-site dose of 3.9 rem (committed effective dose equivalent).

Concerning the C9 Accident on page 7.3-8, EEG had urged in its October 1988 comments on the draft FSAR that the procedures necessary to protect against a diesel fire be incorporated into the "WIPP Standard Operating Procedure Manual," and that the FSAR reference these procedures. This comment was not responded to in the discussion of the C9 Accident. It is essential that these procedures be formally adopted and rigorously followed during the life of the facility.

7. Table 7.3-1, Page 7.3-13. The internal inconsistences in this table that were commented on by EEG in October 1988 have been corrected (except that the second footnote is no longer applicable). The doses in the table can be obtained by using X/Q factors of 2.0E-05 s/m^3 for the maximum individual, 1.7E-05 s/m^3 at the site boundary, and 1.3E-05 s/m^3 at Mills Ranch. The X/Q value at the location of the maximum individual dose is only 1/3 of the 50% frequency 1-hour value from the FEIS. The X/Q values for the other locations are 20% to 40% of the 5% frequency 1-hour values in the FEIS. Without a detailed reevaluation of both of these computations, it is not possible to judge which values are the more appropriate. However, the value for the C10 accident is high enough to be considered "important to safety" as defined in the FSAR and the NRC regulations without using the higher X/Q values.

8. Table 7.3-2, Page 7.3-15. The doses presented in this

table are correct for the assumptions described in Chapter 7, however they are misleading because they apply only to an average drum and assume the forklift operator is not exposed. Assuming a 1000 PE-Ci drum, the C2 scenario dose would be 400 rem (committed effective dose equivalent). For our assumptions discussed in comment 4 above, the forklift operator would receive 2900 rem.

9. Section 7.4, Accidental Releases and Exposure to Hazardous Wastes, Page 7.4-1, 7.4-2. These accidental releases are related to the same scenarios used for radionuclide releases, which is a reasonable approach. The assumption that all VOC head space gases would be released in an accident seems quite likely because of the properties of VOC's. However, it also seems likely that a fraction of the hazardous components of the drums which are not in gaseous (or volatile) form would be released. Therefore, it is recommended that these releases be revised to assume a fractional release of the hazardous components in a manner similar to the fractional release of the radionuclides. The SAR has always assumed that radionuclides would be released from the waste matrix following an accident and there is experimental evidence to indicate that such releases are likely. The release fraction being used in the draft of the FSAR is 1.25E-05 of the container's waste contents in an aerosolized and respirable form except for the C10 fire scenario which uses 2.5E-03 to the drift and 5.0E-04 to the environment. Therefore it seems appropriate to assume that all hazardous constituents in the containers will be released from the waste matrix in the same proportion as the radionuclides. Also, the assumed concentration of the constituents in the drums should be that in the highest waste form category rather than the average. These assumptions will increase the VOC release by 20% to 70% except for the fire scenario, where it would be increased by factors of 5 to 28. The lead release would be increased about 2.5 times for those scenarios other than the fire scenario, and 100 times for the

fire scenario.

On page 7.4-2, third paragraph, either the ground receptor concentration or the 30 minute intake value for lead is in error. A person would inhale about 0.6 m^3 of air in 30 minutes and if the air concentration was 5.46E-12 g/m^3 the intake would be about 3.3E-09 mg.

10. Table 7.4-1, Releases and Exposures from Projected Accidents During WIPP Facility Operations, Page 7.4-3.

(a) We agree with the release values for the VOC's (based on the assumptions) except for Freon. The Freon values are high by a factor of about 14, however, the amount of Freon inhaled by both the worker and off-site individual is consistent with the correct release value (assuming that the fraction of release inhaled is the same for all VOC's). It is of interest that the No-Migration Variance Petition, February 1989, DOE/WIPP 89-003, Table 5-10, has a consistent value for Freon.

(b) Based on the assumptions presented, the lead release and inhalation values cannot be reproduced. The value of "potentially vaporized lead" is not given. Also the fraction of release that is inhaled is only about 1.5% of that for the VOC's after adjusting the amount removed by filters and that plated out. Credit should not be taken for the HEPA filters being in operation and reducing a release, because credit is not taken in other accident scenarios due to the fact that the filtration system is only operative following an alarm and therefore may not engage in a timely manner. Also a lead release could occur without releasing enough radioactivity to trigger an alarm.

(c) The fraction of the release assumed to be inhaled by a worker is unusually high, about 1.3% of the total release. The fraction for radionuclide inhalation in this chapter is less than .01% of the release. Also Table 5-10 in the No-Migration Variance Petition referred to above shows a worker's intake to be only 5.3E-03% of the release. Therefore, the 1.3% inhalation value is obviously in error and should be corrected.

(d) The effective X/Q values at the location of the maximum off-site individual for the VOC releases are 1200 times greater than the X/Q values used for the radionuclides. Please explain the basis for this difference.

CHAPTER 8

Long Term Waste Isolation Assessment

A. General Comments

1. In our October 14, 1988 review of the Draft FSAR, EEG strongly objected to the deletion of 159 pages of detailed discussion, summary, and tabulations estimating the consequences from long-term waste isolation and pointed out that this violated the 1981 DOE/State Consultation and Cooperation Agreement which specified content of the SAR. This Draft FSAR responded to our objection by reinstating 18 pages of summary statements, conclusions and tabulations heavily referencing Amendment 9 of the SAR.

This re-insertion of consequence analyses in Chapter 8 by reference to an earlier SAR could be claimed to have resolved the issue of non-compliance with the C&C Agreement. However, it is a superficial outdated effort. None of the tabulations and figures are more recent than March, 1983. There have been drastic changes in the inventory since that time and the method of calculating radiation dose has been changed. EEG considers this long-term Waste Isolation Assessment to be inadequate.

2. Failure to Meet 1981 C&C Agreement

The text begins with the statement "The purpose of this Chapter is to discuss the long term isolation assessments that will apply to the WIPP facility" (emphasis added). While the text does provide a minimal discussion, that is not the purpose mutually agreed upon by DOE and New Mexico in the July 1, 1981 Stipulated Agreement, Appendix B, Working Agreement that specified the contents of the Safety Analysis Report, Chapter 8, Long Term Waste Isolation Assessment. It was agreed that the document would analyze the long term impact on public health and safety following decontamination and site control termination and would include consequence analyses. This chapter does not discuss the 1981 commitment by DOE to perform consequence analyses or even reference the Working Agreement.

3. Failure to Provide Comparable SAR to DOE HLW SAR

DOE has agreed to complete their SAR for the HLW repository in Nevada before they begin construction of the repository. That SAR will include an evaluation of the performance of the proposed geologic repository for the period after permanent closure and give the rates and quantities of releases of radionuclides to the accessible environment as a function of time and a similar evaluation which assumes the occurrence of unanticipated processes and events. Why can the Department agree to provide this detailed information in their SAR for HLW in Nevada and not provide it in the FSAR for TRU waste in New Mexico? Note that this issue is independent of whether the facility is a repository or is a research and development facility. Both are analyses of the safety of a proposal to place unwanted radioactive materials in a mine.

4. It is stated that until the decision is made regarding the use of the WIPP facility as a permanent repository, compliance with Subpart B of 40 CFR 191 is not required. The following reasons are advanced for not demonstrating compliance at this time:

- Possibility of Revision of Subpart B by EPA.
- Further experiments and analyses are needed to complete a performance assessment.

Since it is not expected that there will be any major changes in Subpart B, and an agreement with New Mexico to adhere to the vacated standards is in effect, anticipation of a revision is not a justified reason for non-compliance. The FSAR should be more specific as to the analyses involving the collection of data. What is the specific data that must be collected to refine assumptions? What are these assumptions? If undefined assumptions have been formulated, then they should be stated in this report, as well as any supporting analyses. If experiments are to be performed, then they should be described and schedules presented.

5. The issue of demonstrating compliance with Subpart B of the EPA Standards for the disposal of transuranic waste and performing long term waste isolation assessment of consequence analyses is separate and administratively unrelated as the following chronological sequence indicates.

- 7/81 DOE agrees to conduct consequence analyses in the SAR (Ref. W.A.)
- 11/84 DOE agrees to meet any future EPA disposal standards (Ref. 1st Mod.)
- 9/85 EPA promulgates standards for disposal of TRU waste.

Since there is nothing in the C & C Agreement and subsequent modifications to relieve the Department of its obligation to conduct these SAR Analyses, on what basis does the Department contend that the obligation to demonstrate compliance with Subpart B of 40 CFR 191 relieve DOE of the 1981 SAR obligation?

B. Detailed Comments

1. Section 8.1, Summary of Initial Consequence Analyses

Performed for WIPP, Page 8.1-2. This section references Amendment 9 of the Safety Analysis Report. Since the FSAR will supersede all previous amendments to the SAR, it does not seem reasonable to adopt or take credit for passages in earlier versions by reference. As previously recommended, the long-term consequence analyses should be included in the FSAR, Chapter 8.

2. Page 8.1-2, "These standards now exist in 40 CFR 191..." - Subpart B of the standards does not now exist.

"The WIPP facility must demonstrate compliance to these new standards..." - They were promulgated in September 1985 and are not new.

3. Section 8.1-12. While the issues of compliance with the EPA standards and performing consequence analyses in the SAR are mutually unrelated events, the discussion of EPA standards contains a number of misleading and incorrect statements.

The text states that compliance with Subpart B of 40 CFR 191 is not required until the decision is made to use the WIPP facility as a permanent repository. Two reasons are provided for not demonstrating compliance at this time:

A) Possibility of Revision of Subpart B by EPA, and B) Further experiments and analyses are needed during the Pilot Plant Phase to complete the performance assessment.
Neither are correct.

With respect to A), a formal agreement exists between New Mexico and DOE to evaluate the expected performance of the proposed repository with the vacated standards. Hence, the possibility that the standards may change is not germane. Additionally, anticipation of a revision of the standard is not a justified reason for non-compliance, particularly when all parties agree that most of the standard will be salvaged. With respect to B), to date there are no experiments nor analyses that have been identified that are needed for performance assessment.

4. Section 8.1, Tables 8.1-1-6. It is noted that all doses in these Tables are from Amendment 6 (March 1983) or earlier versions of the SAR. The inventories used have been changed significantly. Also, old dose conversion factors and the pre ICRP-26 & 30 method of dose calculation is still used.

5. References for Section 8.1. Other than a 1986 revision of the SAR, the remaining references are 1978 or earlier.

6. Section 8.2.1, Performance Assessment, Page 8.2-3. As stated in our earlier comments, DOE-WIPP 86-013 requires that sensitivity and uncertainty analysis be carried out. This section again fails to recognize the need to include uncertainty analysis in the performance assessment methodology. Also, the final scenario report has not been published as of April 1, 1989.

7. Section 8.2.1.1, Scenario Development and Screening, Page 8.2-4. As previously recommended, the discussion on human intrusion modeling should include consideration of the possibility of Castile brine reservoirs under the repository. (See EEG reports EEG-11 and EEG-15).

8. Section 8.2-3, 8.2.1.1, "A final scenario report will be published in 1988..." - It is now May 1989, the report has not yet been published, and the future tense should not be used to describe a 1988 publication date.

9. Section 8.2-2, "Activity to address each of the assurance requirements is scheduled to begin in FY88..." - FY89 is now over half over and the sentence should be rewritten as, "Activity began..." or will begin in FY89.

10. The following paragraphs "summarize the progress to date" - What progress has occurred since September 1985? Nothing but a schedule has been published.

Section 8.2-7, 8.2.1.5. Our October 14, 1988 comments on the internal Peer Review Panel have been ignored and are reprinted again.

11. The text states that DOE is the only implementing agency responsible to determine compliance with the standards and an internal Peer Review Panel will provide assurance to state officials can be assured that DOE's conclusions are credible. That philosophy virtually guarantees a loss of credibility with the New Mexico EEG if the intent is merely to ask us to review the results. The authors appear unfamiliar with the 1978 contract between DOE and the State of New Mexico.

12. Section 8.2-10. The schedule shows completion of Subpart B compliance in October 1992. No indication is provided of the amount of time between completion by DOE and review by EEG and others. Contrary to the text, the Compliance Strategy (Plan) does not provide such a schedule.

13. What does "major" and "supporting" mean in the diagram? For example, will scenario development be completed in April 1990? That is not consistent with the plan to publish scenario development before October 1988.

CHAPTER 9
Conduct of Operations

A. General Comments

1. This chapter contained several significant improvements, and evidences considerable response to previous EEG comments and recommendations.

"Although DOE is responsible for all aspects of the WIPP facility, it delegates those functions to various contractors." The chapter is silent on the responsibility to protect the workers and the general population except for identifying the Safety, Security, and Environmental Protection Department as being responsible for "health and safety related programs which satisfy the requirements of the DOE and other...agencies." The philosophy and tone of the responsibilities and authorities of the various officials do not convey a strong commitment to health and safety matters.

B. Detailed Comments

1. Section 9.1.1, Owner Organization. The text states that the functions, responsibilities, and authorities of DOE and its contractors are discussed in Section 11.1.1. They are not.

2. Section 9.1.2.2.1, Page 9.1-2, General Manager. The General Manager has overall responsibility for the operation, maintenance, and modification of the WIPP facility. Is the General Manager ultimately responsible for the health and safety of WIPP personnel or has this authority been delegated to a lower level?

3. Section 9.1.2.2.7, Page 9.1-4, Safety, Security, and

Environmental Protection Department. This paragraph assigns the responsibility of health and safety to the "department." The department should have "functions," and responsibilities should be assigned to an individual, such as the Department Manager. This comment also applies to other sections in the chapter where the "department" is assigned responsibilities.

4. Figure 9.1-1, Page 9.1-8, Management & Operating Contractor Organization Diagram. The management diagram does not reflect a communication line between the General Manager and the Radiation Safety Manager. The WIPP "Radiation Safety Manual," WP 12-5, assigns the responsibility for interpreting the radiation safety program to the Radiation Protection Manager, yet the FSAR, Section 6.1.5.2, assigns responsibility for the radiation safety program to the Safety, Security, and Environmental Protection Manager.

The radiological safety program responsibilities should be clearly defined and reflected in the formal organization structure. Please clarify the reporting and communication lines.

5. Section 9.1.3.2, Page 9.1-6, Staff Managers. Although there is reference to staff manager's qualifications, there are no requirements specified. The words "typically have" should be replaced with "as a minimum requirement shall have." The importance of qualifications should be reviewed with respect to guidance found in ANSI/ANS-3.1-1987, "American National Standard for Selection, Qualification, and Training of Personnel for Nuclear Power Plants." Although this document is not a general DOE requirement, the overall guidance should be followed at WIPP. Chapter 9 should state commitments to high level management qualifications, and specifically to appropriate technical experience of the Radiation Protection Manager. As per ANSI/ANS-3.1-1987, the collective qualifications of management and technical managers shall be reviewed and supplemented, as

necessary, with personnel with applicable qualifications.

6. Section 9.2, Acceptance Testing, Page 9.2-1. This section refers to the "WIPP Procedure Manual." Presumably this is a reference to "Standard Operating Procedures," WIPP-DOE-103. If so, this title should be correctly presented. EEG does not have a document entitled "WIPP Procedure Manual."

7. Sections 9.2.2, 9.3.5, and 9.4.1, Acceptance Tests, Administration and Records, and Plant Procedures, Pages 9.2-3, 9.3-5, and 9.4-1. These sections refer to Sections 11.1.11, 11.1.12, and 11.1.17. There are no such sections. They should refer to Sections 11.11, 11.12, and 11.17.

8. Section 9.4.4, Operational Occurrences, Page 9.4-2. The text discusses compliance with U.S. DOT regulations in the transportation of TRU wastes, but fails to discuss compliance with U.S. NRC regulations.

9. Section 9.4.4, Operational Occurrences, Page 9.4-3. This section refers to DOE Order 5484.2 which has been superceded by DOE Order 5000.3.

10. Section 9.4.4.1, Page 9.4-3. The assumption that a contaminated drum, box, or canister would not contaminate the interior of the Internal Containment Vessel on the TRUPACT may not be valid and can result in reduced worker safety.

CHAPTER 10

Operational Safety Requirements

A. General Comments

1. There have been substantial improvements in this chapter, and it has been responsive to many of EEG's comments and recommendations.

2. The introduction states that RH-TRU waste handling is not covered and that, "This document will be expanded to include those OSRs (Operational Safety Requirements) prior to receipt of RH-TRU." EEG agrees that this supplement will be necessary.

B. Detailed Comments

1. Section 10.1, Introduction, Page 10.1-1. We disagree that, "It is inconceivable that non-radioactive hazardous materials would be released from containers without the simultaneous release of radioactive materials." Our reasons include:

(a) the VOC's are much more volatile than the transuranics;

(b) in some containers there may be heavy concentrations of hazardous chemicals and low amounts of radioactivity; and

(c) the amount of radioactivity released may not be enough to trigger an alarm.

This assumption should not be made before sufficient operational experience is obtained to verify it.

2. Section 10.1.4, Definitions and Acronyms, Page 10.1-4. The following acronyms should be added: AC (Page 10.6-4,5), OSR (Page 10.6-3).

3. Section 10.3.1.1, Continuous Air Monitors, Page 10.3-2. This section implies that only two CAMs are mandatory, and therefore the CAMs used for Effluent Monitors, as discussed under Section 10.2.1.2, are not required. This is incorrect. Also, the title of this section should be amended to "Continuous Air Monitors for Waste Handling Building."

4. Section 10.3.1.2, Effluent Monitors, Page 10.3-4. The second paragraph under LCO should be amended to include activity alarm limits for the Station B CAM. Since Station B represents filtered exhaust from the storage horizon, it should have the same alarm limits as Station C from the Waste Handling Building. Such an alarm system would provide an alert to defective filtration in the event of a release followed by an alarm at Station A (also see discussion on page 10.3-11). Furthermore, there is a reference to the LCO for Station B under "Applicability" on page 10.3-5.

On page 10.3-5, it is recommended that this discussion be amended to indicate that portable equipment would only be acceptable for use at Station C if it were connected to the isokinetic probe. The use of batch sampling for monitoring of this effluent point should be used only as a last resort, and for a very short time period.

5. Section 10.3.2.1, Waste Handling Building Differential Pressures, Page 10.3-6. Normal differential pressure ranges for the four WHB areas were given in the first Draft FSAR, but deleted here. Why? Is the system in the WHB able to meet these previously mentioned differential pressures? On page 10.4-2 this draft still takes credit for listing the pressure differentials.

6. Section 10.3.2.3, Underground Exhaust Air Filtration System, Page 10.3-11. The last paragraph on this page discusses

the HEPA filtration system provided for the underground exhaust. It states that periodic verification of the efficacy of the filters is required to maintain confidence in their ability. This discussion should refer to Section 10.4 for information on how verification will be provided. Section 10.4 indicates that the filters will be verified by local examination at each shift. A local visual examination may not be sufficient to determine that a filter system is ineffective. A more definitive description of "local examination" is needed here. At the present time, there is no alarm if the exhausted air exceeds prescribed radiation limits; therefore, the filters could be defective throughout an entire shift, or longer, if the "local examination" is not adequate. See comment 3 above.

The CAM at Station A would be sampling a significant dilution of the radioactive particulates if there should be a release. Consideration should be given to initiating filtration of the underground effluent based upon alarms from CAMs located inside the RMAs of the underground. Dilution of the contaminated air would be less and the air being monitored would be comparatively free of interfering salt dust.

7. Section 10.4.1.2, Effluent Monitors, Page 10.4-2. This section also uses the ambiguous phrase "local examination." This phrase should be more definitive. For example, it could refer to a specific WIPP procedure. In Section 10.4.2.3, the requirements indicate that the filter banks will be tested only annually. Therefore, it is essential that the "local examination" can actually determine effectiveness of the effluent monitors.

8. Section 10.4.2.3, Underground Exhaust Air Filtration System, Page 10.4-4. This section requires only annual verification of the effectiveness of the HEPA filter banks. Because of their importance, it would seem desirable to increase the frequency of such verification. Please provide the basis for

such infrequent verification.

9. Section 10.5.4, Ventilation Systems, Page 10.5-3. The first paragraph on this page states that, "All effluent air streams from areas that contain radioactive materials are filtered and monitored for activity." It should be made clear that the normal operating mode is to exhaust unfiltered monitored air from the exhaust shaft. All air effluents at WIPP are not filtered.

10. Sections 10.6.1, 10.6.2 and 10.6.3, Training, Design and Procurement, and Document Control, Pages 10.6-2, 10.6-3 and 10.6-4. The references listed on these pages should include the "Radiation Safety Manual," WP 12-5.

11. Section 10.6.4, Audit Program, Page 10.6-4 to 10.6-6. The references listed on this page should include the "Radiation Safety Manual," WP 12-5, since there are several important limits which are set forth only in this manual.

12. Section 10.6.8.2, Area Radiation Monitors, Page 10.6-10. This section allows the ARMs to be reset to higher levels for an indefinite period if a higher radiation source is in the area. This seems to defeat the purpose of the ARMs and could allow indiscriminate violation of the established limit of 10 mr/hr. The section should be revised to more definitively establish criteria for resetting to a higher level, and limiting the time at which it may remain at the higher level. Also resetting to a higher level should be permitted only if authorized by a health physicist.

CHAPTER 11
Quality Assurance

A. Detailed Comments

1. Table 11.1, Applicable Quality Assurance Standards, Page 11.1-4. Part B of this table and associated discussions should be revised to include reference to ANSI/ASME NQA-2, Current Editions, "Quality Assurance Requirements for Nuclear Power Plants." NQA-2 is applicable to the operations phase of work at nuclear facilities and is to be used in conjunction with applicable portions of ANSI/ASME NQA-1.

2. Section 11.2.2, General Responsibilities, Page 11.2-5. Documentation should be added to describe the implementation of the Quality Code Classification work described in Guidelines for Requisitions to Determine Quality Code Classification for Purchase Requisitions and Purchase Requisitions Change Notice Attachment 2 of Westinghouse Procedure 15-009, Revision 2. Documentation should also be added to describe the Quality Surveillance work required by the Westinghouse Procedure 13-011, Revision 0, Quality Assurance Surveillance.

CHAPTER 12

Decontamination and Decommissioning of the WIPP Facility

A. General Comments

1. Chapter 12 <u>assumes</u> that the facility will meet the EPA Standards for disposal of TRU waste during the five-year demonstration period and that the removal of 65,000 drums will not be required. A safety analysis should reflect conservative assumptions on matters affecting the health and safety of workers and the general public. Hence, this chapter should contain plans and safety analyses of potential radiation doses to workers and the public from operations and transportation if the wastes need to be retrieved, returned to the generating sites, sent to the high-level waste repository, left indefinitely on the surface at WIPP, sent to a new site, or left in place.

B. Detailed Comments

1. Section 12.1, General, Page 12-2. In the first paragraph of page 12-1, the reference to "DOE Order 5280.2A" should be 5820.2A.

2. Section 12.2, Decontamination and Decommissioning, Page 12-3. This section lists the sequence of future planned events for decontamination and decommissioning, but does not provide meaningful information either in this section, or the chapter, to permit a safety evaluation of the processes. Additional detail is needed for a safety analysis.

3. Section 12.5, Post Closure Physical and Environmental Surveillance, Page 12-5. As previously indicated, additional detail is needed. For example, further information should be

included on how mining will be controlled. Furthermore, the plans for surface environmental surveillance do not appear to address the intent of the NRC in 10 CFR 60 which requires subsurface early warning detection. The National Academy of Science report also recommended subsurface surveillance.