EEG 64

REVIEW OF THE DRAFT SUPPLEMENT TO THE WIPP ENVIRONMENTAL IMPACT STATEMENT DOE/EIS-0026-S-2

Robert H. Neill
James K. Channell
Peter Spiegler
Lokesh Chaturvedi

Environmental Evaluation Group
New Mexico

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Robert H. Neill
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Lokesh Chaturvedi

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

and

P.O. Box 3149, 505 North Main Street
Carlsbad, NM 88221

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FOREWORD

The purpose of the New Mexico Environmental Evaluation Group (EEG) is to conduct an independent technical evaluation of the Waste Isolation Pilot Plant (WIPP) Project to ensure the protection of the public health and safety and the environment. The WIPP Project, located in southeastern New Mexico, is being constructed as a repository for the 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 continued the original contract DE-AC04-79AL10752 through DOE contract DE-ACO4-89AL58309. The National Defense Authorization Act for Fiscal Year 1994, Public Law 103-160, continues the authorization.

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. Another important function of EEG is the independent environmental monitoring of background radioactivity in air, water, and soil, both on-site and off-site.

Robert H. Neill
Director

EEG STAFF

Sally C. Ballard, B.S., Laboratory Scientist

William T. Bartlett, Ph.D., Health Physicist

Radene Bradley, Secretary III

James K. Channell, Ph.D., Environmental Engineer/Health Physicist

Lokesh Chaturvedi, Ph.D., Deputy Director & Engineering Geologist

Thomas M. Clemo, Ph. D., Senior Scientist

Patricia D. Fairchild, Secretary III

Donald H. Gray, M.A., Environmental Specialist

Jim W. Kenney, M.S., Environmental Scientist/Supervisor

Lanny King, Assistant Environmental Technician

Betsy J. Kraus, M.S., Technical Editor/Librarian

Robert H. Neill, M.S., Director

Dale Rucker, M.S., Engineer/Computer Modeler

Jill Shortencarier, Administrative Secretary

Matthew K. Silva, Ph.D., Chemical Engineer

Susan Stokum, Administrative Secretary

Ben A. Walker, B.A., Quality Assurance Specialist

Brenda J. West, B.A., Administrative Officer

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The editorial support of Betsy J. Kraus and the secretarial support of Patricia D. Fairchild, Jill Shortencarier, and Radene Bradley contributed substantially to the quality and timeliness of this report.

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OUTSTANDING CONCERNS

EEG has published reviews of the previous DOE Environmental Impact Statements (EIS) on WIPP including:

EEG-3 *Radiological Health Review of the Draft Environmental Impact Statement (DOE/EIS-0026-D) Waste Isolation Pilot Plant, U.S. Department of Energy*, August 1979

EEG-10 *Radiological Health Review of the Final Environmental Impact Statement (DOE/EIS-0026) Waste Isolation Pilot Plant, U.S. Department of Energy*, January 1981

EEG-41 *Review of the Draft Supplement Environmental Impact Statement, DOE Waste Isolation Pilot Plant*, July 1989.

Written comments also were provided to DOE on the Final 1990 Supplement to the EIS on WIPP in April 1990. The 1996 Draft Supplement to the EIS (SEIS-II), DOE/EIS-0026-S-2, was received on November 25, 1996, and this review contains our analysis of that document. The 90 day deadline for comments established by DOE was not adequate to do a thorough job since it was necessary to also review the final DOE Compliance Certification Application (CCA) as well as the Safety Analysis Report (SAR) in the same time frame.

Our principal concerns are as follows

- The long-term disposal impact of the Proposed Action is being addressed in much more detail through the DOE Compliance Certification Application (CCA) which provides one year for review. Evaluating alternatives to the Proposed Action outlined in the SEIS cannot be meaningfully addressed in sufficient detail in 90 days.

- Chapter 6 lists all regulatory agencies and the status of permits for WIPP. One regulatory agency is notably absent. It is DOE. The Department has the legal authority to self regulate operational activities at WIPP. The status of WIPP's compliance with DOE Orders or even a list of DOE Orders is conspicuously absent. Indeed, DOE has the authority to self-approve the Draft Supplement to the EIS but fails to describe the internal system to be used. As an example, the DOE long-term disposal calculations in the SEIS are approved by DOE and in the CCA by EPA.

- Parameters and analyses differ in the various DOE WIPP documents such as the SEIS-II, the Compliance Certification Application (CCA) and the Safety Analysis Report (SAR).

- The alternatives are not reasonably viable. As DOE notes, alternative #1 and alternative #3 are in violation of the WIPP Land Withdrawal Act. Alternative #2 exceeds the limits of RH-TRU in the NM/DOE C&C Agreement. The problems of underground stability in leaving the repository open for 150 to 190 years (which would also require new shafts and surface facilities) are not addressed. It would make more sense to complete WIPP and then propose a second repository, tailored to the unique needs of RH-TRU waste emplacement including limits on thermal loading and criticality. The SEIS should address this alternative.

- The alternatives include almost doubling the authorized waste volume, bringing non-defense TRU waste and commercial TRU waste. Increasing the curie inventory would increase the amount of transuranics allowed to be released.

- While several EEG documents are cited, there are a number of relevant EEG publications that the SEIS-II authors have not cited that are directly relevant to the environmental impact of WIPP.

- The text indicates that DOE has a need to dispose of all TRU wastes and does not consistently recognize that only defense TRU wastes can be disposed at WIPP according to law. Transuranic wastes generated by non-defense activities or civilian nuclear activities of the Department are not eligible for disposal at WIPP. (This point is recognized later by DOE on page 5-7, lines 5 and 6). To avoid confusion, non-authorized waste issues should be clearly identified.

- The document acknowledges that the expected quantity of RH-TRU waste of 35,000 m^3 far exceeds the WIPP design capacity of 7,080 m^3. But the Basic Inventory Table for the Proposed Action shows 35,000 m^3 and the Draft PEIS shows all TRU waste as coming to WIPP. Since RH-TRU waste is not scheduled for shipment for several years, the effective capacity for RH-TRU will only be about 4,300 m^3 with the present design. SEIS-II makes no mention of the need to modify the waste emplacement design in order to accommodate 7,080 m^3 of RH-TRU. Again, footnotes indicate that only the authorized amounts would be disposed at WIPP but it is needlessly confusing.

- EEG is pleased that DOE is seriously considering treatment of radioactive wastes. For years EEG has noted that waste is respirable, soluble and confined by a carbon steel Type A drum. The 20 year longevity requirement for the drum has been deleted by DOE from the WAC as has the 1% limit on respirable particles. In contrast, certain low level wastes are required by NRC to have a 300 year design life for the waste container or the waste form. We believe that modifying the waste form through thermal treatment and shredding and grouting should be vigorously pursued to accommodate the anticipated volume of TRU waste which is twice the capacity of WIPP.

- The inhalation risks to people on the surface from future human intrusion were deemed inconsequential and not calculated in the SEIS-II despite earlier work by both EEG (EEG-11) in January 1982 and DOE (TME 3151) in July 1982 that concluded inhalation is a significant concern.

- Unwarranted claims of conservatism for long-term performance calculations are made in the SEIS-II.

- EEG compared the results of the routine and accidental risks from truck transportation to WIPP with findings in EEG-46 ("Risk Analysis of the Transport of Contact Handled Transuranic (CH-TRU) Wastes to WIPP Along Selected Highway Routes in New Mexico Using RADTRAN IV," Anthony F. Gallegos and James K. Channell, EEG-46, August 1990). Agreement was quite close when allowance was made for differences in miles traveled and other assumptions. Therefore we believe the assessment of transportation risks in SEIS-II is reasonable and adequately conservative.

- For over 20 years, the Department's policy has been to dispose of defense transuranic waste at WIPP rather than leave it at the generator sites indefinitely. The August 1995 DOE Draft Waste Management Programmatic Environmental Impact Statement provides calculations that indicate leaving the waste at the generating sites indefinitely rather than disposal at WIPP would result in fewer cancer fatalities, a smaller collective radiation dose, and a cheaper cost. The SEIS-II needs to explain the reasons why technical objections have not been raised by CAO on these 8/95 DOE conclusions. It is important for credibility that a detailed analysis of the basis of these diametrically opposed conclusions be provided. (SEIS-II, page 3-46 and PEIS, page 8-86).

- Calculations of the long-term consequences should use the analyses submitted in the EPA Application. SEIS-II used methods and data in the Draft Application. EEG had extensive comments on the draft and published them in EEG-61.

SUMMARY

EEG's review of the WIPP Disposal Phase Draft Supplemental Environmental Impact Statement (SEIS-II) concentrated on the radiological aspects of the Proposed Action, including transportation. The alternatives were reviewed in less detail. Some calculations were checked, mostly for the Proposed Action. Because of time constraints, there was little review of Hazardous Chemicals, Economics, or other Environmental Assessments.

SEIS-II was written as a pre-decision document with the Alternatives all plausible and eligible to be selected. Also, the inventory of TRU waste for disposal went well beyond that portion of TRU waste that has been historically considered to be the WIPP inventory. This broadened scope is probably appropriate for an EIS but it is confusing to the reviewer who is aware of the statutory limits of wastes that are allowed to come to WIPP at the present time. EEG has attempted to keep the broadened scope of SEIS-II in mind during our review.

A number of calculations, logic, and perhaps typographical errors were found and are pointed out in the detailed comments. Also, omissions that we believe should be included are mentioned. The more important issues are discussed below.

Alternatives

EEG is bothered by the choice of Alternatives considered. Compared to the Proposed Action, they deal with larger volumes of TRU waste, continue over a much longer period of time and have been evaluated in a more preliminary manner. There is a question of whether these were intended to be viable options. Certainly there is a need for real options to dispose of TRU wastes not included in the WIPP statutory limits.

EEG recommends that short-term, partial solution options be included in the Final SEIS-II and be considered in the Record of Decision (ROD).

Related Documents

SEIS-II recognizes and refers to other important WIPP related documents such as the Compliance Certification Application (CCA), Baseline Inventory Report (BIR - Revisions 2 and 3), and the Safety Analysis Report (SAR). However, SEIS-II, which was published after the CCA and the latest SAR, does not incorporate the latest information or use the same methodology as these documents. The use of different methodology and results in DOE documents published around the same time is inconsistent, confusing and unnecessary. EEG recommends that the Final SEIS-II use methodologies and results from the CCA and the latest SAR because these documents contain more detailed and peer reviewed analyses.

Transportation

EEG checked the transportation calculations in Appendix E and compared these results to those contained in EEG-46. It is concluded that the assessment of transportation risks in SEIS-II is reasonable and adequately conservative.

Analyses in SEIS-II indicated potential advantages to using rail rather than truck transportation for wastes. The rail analyses were not as rigorous as those for truck transportation. However, the findings were consistent with analyses in the FEIS, SEIS-I, and other documents. There appears to have been no serious re-evaluation of WIPP's "truck only" policy in the approximately 12 years since it was established. EEG believes that DOE should take this opportunity to seriously re-evaluate the merits of a "truck/rail mix" or a "maximum rail" policy for WIPP wastes.

Questionable Assumptions

There are a number of questionable assumptions, omissions, or errors in SEIS-II. These are mentioned in the page-by-page comments. The more important ones are given below. The page location in SEIS-II is given in parenthesis.

Human Intrusion at 100 years. The assumption is made that drilling into the repository 100 years after repository closure would lead to maximum consequences. This determination cannot yet be made. Increased releases from higher pressures in the repository after 100 years may more than offset radionuclide reductions due to radioactive decay. (page 5-45).

Use of 75th Percentile Values. It is argued that the use of 75th percentile parameter values in modeling of long-term releases due to human intrusion will yield consequences that fall in the "upper tail of a full probabilistic analysis." In the actual analysis SEIS-II used median values for most of these parameters and came up with values of radionuclide releases to the surface that were identical to those with median values (Table H-24). We conclude that these are not upper tail releases. (page 5-40).

Family Farm Scenario and Inhalation Doses. The decision was made in SEIS-II that a family farm scenario with inhalation doses from resuspended drilling mud pit material was inappropriate. This is directly contrary with conclusions in SEIS-I as well as EEG and Westinghouse reports. (page 5-41).

Modification of BRAGFLO Volumes. The z distance in a two-dimensional grid was increased by factors of approximately 8 (see Table H-8) in order to accommodate the larger waste volumes in Action Alternatives 1, 2, and 3. This violates the two-dimensional assumption of the BRAGFLO grid. A three-dimensional analysis may be needed to give reliable results. Table H-8 is confusing.

Emplacement of RH-TRU Wastes. Values are given for the volumes of CH-TRU and (especially) RH-TRU wastes that will have to be put into Panels 9 and 10 in order to meet design capacity for the Proposed Action. There is no indication of whether such an increase is possible. (page 3-12).

Conversion Error. Numerous Figures in the Summary Chapter, Chapter 5, and appendix H show the wrong conversion factor from Ci/m^3 to pCi/l. The correct conversion factor is 1 pCi/l= 10^{-9} Ci/m^3. There is uncertainty about which value is used in the plots and this is potentially important. (pages S-51 and 5-43).

__**RH-TRU Cask**__. The statement is made that "The Department is currently awaiting NRC certification of the RH-72B cask. DOE had not submitted an application to NRC for certification of the RH-72B cask at the time the SEIS-II was published.

GLOSSARY

Page GL. Line 1.

The definition of backfill as "materials placed in storage panels or drifts" is too ambiguous. CH-TRU waste and RH-TRU waste as well as the drums and containers are placed in storage panels, but they do not qualify as backfill.

Page GL-2. Line 4.

The definition of background radiation does not include global fallout as it exists in the environment. Global fallout is considered to be man made radiation.

Page GL-2. Line 12.

The glossary should include a definition for the Becquerel since it includes a definition for the curie.

Page GL-3. Lines 28-32.

The definition of contact-handled transuranic waste should start with the term "TRU waste" instead of the word "waste".

Page GL-3. Line 13.

The spelling of sievert is incorrect. Also, the sievert is abbreviated as Sv.

Page GL-5. The definition of disposal should use the definition in the WIPP Land Withdrawal Act.

Page GL-5. The definition of disposal phase should use the definition in the WIPP Land Withdrawal Act.

Page GL-5. Lines 33-36.

The definition of absorbed dose should also include the mks unit known as the gray and abbreviated as Gy.

Page GL-5. Lines 37 through 39.

The definition of dose conversion factor should use "resultant dose equivalent" instead of "resultant radiation dose."

Page GL-9. Lines 4 through 7.

The definition of high-level waste should include unreprocessed spent fuel.

Page GL-9. Lines 22 through 26.

The definition of the phrase "immediately dangerous to health" only includes" maximum airborne concentration". The phrase also applies to a dose rate, e.g. 1,000 rem/hour.

Page GL-14. Lines 16 through 20.

The definition of remote-handled transuranic waste should start with the term "TRU waste" instead of the word "waste". Also, while the radiation level at the outer surface of the container is less than 1,000 rem/hour, there is a volume limit of 12,500 cu ft for wastes that have radiation doses that are greater than 100 rem/hr at the outer surface.

Page GL-18. Lines 1 through 4.

The definition of WIPP should be changed. WIPP is no longer an experimental facility.

ACRONYMS

Page AC-1. Line 19.

Only BIR-2 is defined. BIR-3 should also be defined since it is described on page 1-8.

Page AC-1. Line 42.

The AC-section has an acronym for design-basis earthquake, but it does not have an acronym for design-basis criteria.

Page AC-3. Line 46.

PA stands for Performance Assessment. The acronym for Preliminary Performance Assessment would be PPA.

Page AC-4. Line 15.

At present the RH-72B cask is only a proposed RH-TRU shipping container. The design was not submitted by the DOE to the NRC until 12/96.

Page AC-4. Line 33.

The definition of SWIFT-II should indicate that it is computer software.

Page MC-2. Table MC-1.

The table should include other conversion factors such as a conversion factor from Psi to Pa and conversion factors from darcy to other units of permeability.

SUMMARY CHAPTER

Page S-1. Lines 40 and 41.

The statement "DOE subsequently decided to perform the tests in aboveground laboratories instead of at WIPP" is misleading. Most of the tests planned for the test phase (e.g. the alcove tests, which comprised the majority of the wastes in the experiments) are not being performed anywhere.

Page S-2. First Full Paragraph.

The relation of SEIS-II to the Draft WM PEIS is described in this paragraph. DOE apparently believes they need to follow the approach of the WM PEIS and also to consider the disposal of all DOE TRU wastes. This goes beyond the portion of the defense TRU wastes that has historically been considered for disposal at WIPP and includes commercial TRU as well as non-defense TRU. The desire of DOE to consider the universe of TRU waste is understandable and it could probably be argued that NEPA requires it. But it is confusing to the reader who is aware of the statutory limits of wastes that are allowed to come to WIPP at the present time. Also, additional wastes and alternatives have not been evaluated in the detail that the Proposed Action has been. It is realized that a Draft EIS is supposed to be written as a pre-decisional document.

Page S-3. Related Documents.

The major planning and compliance documents that are integrated with SEIS-II that are related to decisions on WIPP are listed and described briefly. A generic comment is that the contents of SEIS-II are not current with the latest DOE documents that were issued before the SEIS (e.g. the CCA and Baseline Inventory Report, Revision 3). Also, SEIS-II developed its own assumptions and methodology rather than using that developed in other official WIPP Project documents (e.g. WIPP Operational Accident modeling was different than that in the Safety Analysis Report). These differences are confusing and unnecessary.

Page S-4. Comprehensive Disposal Recommendations.

The Comprehensive Disposal Recommendations (in preparation, schedule uncertain) document will recommend "disposal options and the time tables for all TRU waste under DOE control." It is unclear how the ROD that is expected with the Final SEIS-II will relate to the Comprehensive Disposal Recommendations. Are these expected before Final SEIS-II? If not, wouldn't the ROD be preempting the Recommendations? Or, is SEIS-II the first step in preparing for the disposition of all TRU wastes under DOE control at WIPP?

Page S-4. List of DOE Decisions.

Although this is mentioned later, it would be helpful to mention here those potential decisions which could be made under current WIPP Authorization and those which would require new Congressional Authorization.

Extensive comments are made later on the truck vs. rail issue. It is hoped that this decision is open and will be seriously re-evaluated.

Page S-9. Emplacement Volumes.

The text and various tables give different values for emplaced volumes of waste in No Action Alternative 2. Table S-3 says 135,000 m^3 CH, 35,000 RH (32,000 being treated). Figures S-2 and S-3 show 143,000 m^3 CH-TRU and 50,000 m^3 RH-TRU (both post-treatment). The text (page S-16) says 170,000 m^3 total. Table 3-16 and the text (on page 3-42) say 135,000 m^3 CH and 35,000 m^3 RH. It is unclear what becomes of the additional 15,000 m^3 of RH-TRU in NAA 2 (which is included in the Proposed Action as excess RH-TRU). This is confusing and needs to be clarified.

Page S-13. Lines 19-20.

The berm is to be constructed around the perimeter of the waste panel footprint (not of the Site).

Pages S-13 to S-19. Alternative Actions.

A general conclusion on the alternatives evaluated is that they are so different from the proposed action as to stretch credibility. The entire TRU waste universe is included. Implementation times of 150-190 years that use present-day technology are mind boggling and there is no indication that the SEIS-II analysis has seriously considered the problem of keeping the underground, shaft, and surface facilities at WIPP open until the latter half of the 22th Century. Nor have the institutional problems that might occur over such long time periods been mentioned.

Three of the Alternatives not considered (deep borehole disposal, greater confinement, and geologic repositories at sites other than WIPP) appear to be as reasonable as the ones chosen.

The concept of making piece meal decisions on solving the TRU waste disposal problem is as reasonable as the Alternatives listed here. For example: (1) make the decision of how to dispose of those wastes that are authorized to come to WIPP; (2) then evaluate how all or a portion of the remaining TRU wastes will be disposed of. It may be better to evaluate these remaining wastes in more than one category (e.g., RH-TRU as one category and buried waste as another).

Page S-14. Text Box.

See comments on this text box (Conservatism of TRU Waste Inventory Estimate) under page 3-6.

Page S-16.

It is noted that No Action Alternative 1, which would have thermally treated wastes, provides for overpacking of waste at 20-year intervals. No Action Alternative 2, which does not have treated wastes, has no plans for repackaging. This is an example of how the alternatives provide different levels of assurance that must be kept in mind when making decisions between alternatives.

Page S-23. Sixth Paragraph.

The value of 0.3 LCF reported for the population dose around the Hanford Site is incorrect. The Hanford Site Environmental Report for Calendar Year 1994 (PNL 10574) reports a total dose of 0.6 person-rem to the population of 380,000 persons. This would be 3 x 10^{-4} LCF. The values for INEL and NTS also seem to be too high but have not been checked.

Page S-29.

See comments on this text box (Long Disposal Periods and SEIS-II Results) under page 5-49.

Page S-32. Noise.

It would be useful to state the normal non-WIPP truck traffic through Carlsbad as a comparison to the relative noise effect of WIPP traffic.

Page 5-33. Socioeconomics.

The life-cycle cost analyses for Action Alternatives 1, 2, and 3 apparently does not include the cost of exhuming the CH-TRU waste disposed of before 1970.

Page S-34. Table S-5.

It is surprising that No Action Alternative 2 (NAA2) waste treatment costs are only 16% of those for the proposed Action. There is no itemized waste treatment cost in Appendix D for the No Action Alternative 2. However, NAA2 is planning to treat all newly generated waste to WAC standards (73,000 m^3 CH and 32,000 m^3 RH). The proposed action would treat 168,500 m^3 CH and 50,000 m^3 RH. This needs to be explained. The sum of the parts of the proposed action is \$18.7B while the total cost is \$19.1B. While rounding off is expected, this fails to account for \$0.4B or 2.2% of total.

Pages S-42 through S-44.

The analysis for Alternatives 1, 2, and 3 apparently do not include the radiological health impacts from exhuming the pre-1970 disposed TRU waste, which is not considered in the

WM PEIS either, and which in the past was considered important. These radiological health impacts could be important when comparing Alternatives 1, 2, and 3 with the Proposed Action and No-Action Alternatives 1 and 2.

Pages S-51 through S-55.

The conversion factor on Figures S-5 through S-9 relating Ci/m^3 to pCi/l is incorrect. The correct value is 1 pCi/l = 10^{-9} Ci/m^3. This is important. See comment under page 5-43.

Page S-61 to S-68. Table S-7.

This table summarizes all the calculated health and safety effects from transportation, routine treatment and disposal operations, and from accidents. Deaths from transportation and operational accidents, Latent Cancer Fatalities (LCFs) from radiation exposure, cancer incidence from hazardous chemicals, and fatalities from truck pollution are all considered. Presumably, this information will be used in deciding on alternatives. However, SEIS-II does not discuss the relative merits of the alternatives in light of these estimated health and safety effects. Neither is any indication given of how they will be used in decision making. We have several observations.

The estimated cancer incidence from exposure to hazardous chemicals is below 0.05 in all alternatives. This is less than 5% of the expected radiological LCFs in NAA2 and is less than 1% in all other alternatives. The effect of hazardous chemical exposure can be ignored in choosing between alternatives.

EEG Summary of Health and Safety Effects.

EEG has condensed from the Table S-7 tabulation the expected deaths (of all kinds) for each of the Alternatives as shown in Table 1. Also included are the more significant high consequence/low probability accidents (which are not expected to happen) and the consequences of long-term releases.

Table 1

EEG Summary of Expected and Possible Deaths Listed in SEIS-II

Effect	Alternative								
	Proposed	AA1	AA2a	AA2b	AA2c	AA3	NAA1a	NAA1b	NAA2
Routine Radiation (LCFs)									
Truck Transportation	3.3	12	5.4	5.4	6.6	15	0.11	0.57	--
Operations	2.6	3.8	11	8.5	4.3	4.3	11	8.7	1.1
Accidents									
Truck Fatalities	6	19	9	9	12	25	0	1	--
Other Fatalities	6	10	15	13	12	12	1.3	1.1	1.3
Agg. Rad. (LCFs) Truck	0.4	0.8	0.4	0.4	0.7	1.2	.0068	.02	--
TOTAL DEATHS	18	46	41	36	36	58	12	11	2.4
High Consequence Accident Deaths LCFs)									
Storage Facilities	2	300	10	10	2	10	10	10	300
WIPP Disposal	4	4	24	24	24	24	--	--	--
Long Term Releases (LCFs)									
10,000 year Aggregate	<0.9	--	--	--	--	--	<2325	<2325	2325
Original Waste Volume(10^3m^3)	218	336	313	313	313	312	313	313	170
Deaths/10^3m^3	.084	0.14	0.13	0.12	0.11	0.18	.040	.036	.014

All values from Table S-7, pages S-62 through S-68, SEIS-II.

If these estimates are assumed to reasonably reflect the differences between the Alternatives one can come to several conclusions:

- The Proposed Action disposes of waste at a lower expected death per volume of waste ratio than any of the Action alternatives. However, all of these ratios are within a factor of about two. The primary variables affecting the deaths/volume ratio are the miles of transportation and amount of treatment required;

- AA1 and NAA2 have very high consequence storage accidents. This is because of long-term above ground storage of waste treated only to WAC standards;

- The aggregate LCFs from long-term release for NAA2 are very high because of assumed loss of institutional control of WAC standard wastes stored above or near the surface. NAA1 LCFs were not calculated but would also be substantial. The thermal treatment of wastes would be expected to provide some reductions during the early part of the 10,000 year period because of greater waste stability.

The Health and Safety aspect of the decision on alternatives would seem to basically reduce to a trade-off between a few expected deaths during the disposal period and a possibility of a much larger number of future LCFs from accidents or environmental releases. A secondary consideration is whether some types of death (e.g. a transportation accident fatality rather than a radiation caused LCF) and the effects on some population groups (workers versus the general public) are more acceptable than others.

In making this decision one needs to keep in mind the uncertainly in these comparative estimates. Also, these various alternatives are not identical and provide different levels of assurance.

CHAPTER 1

Page 1-1. Lines 5 through 16.

The section does not make it clear that only defense TRU can be disposed at WIPP. Instead, the section discusses the need to dispose of all TRU wastes generated by the Department.

Page 1-1. Lines 37 through 39 or Footnote 1.

The footnote indicates that the DOE has sole authority to decide if waste should be disposed of at WIPP. In 1992 Congress reassigned the authority to approve disposal at WIPP from the DOE to the EPA.

Page 1-1. Box entitled TRANSURANIC WASTE.

Since the description of TRU waste includes the maximum dose rate for CH-TRU waste, the description of TRU wastes should also include the maximum dose rate for RH-TRU waste, which is 1,000 rem/hour.

Page 1-1. Box entitled TRANSURANIC WASTE.

The material in the box defines transuranic waste but fails to incorporate the adjective "defense" to modify the noun. The inference is that non-defense DOE TRU waste is eligible for disposal at WIPP.

Page 1-1. Section 1.2 OVERVIEW.

Since the SEIS describes the history to TRU waste disposal, it should include the history of the unilateral decision by the DOE to redefine the threshold of TRU from 10 nCi/g to 100 nCi/g.

Page 1-5. Table 1-2.

The fifth WIPP NEPA document notes that a 1982 deviated gas well at WIPP was discovered by the DOE in 1991.

Page 1-7. Footnote.

Statement: "Overpacking involves placing the 55-gallon drums inside another container and essentially provides double containment of the TRU waste."

The statement is incorrect. Overpacking does not provide "double containment" of a Type A drum in the context of the NRC packaging regulations 10 CFR Part 71.

Page 1-8. Lines 23 through 26.
The purpose of the WIPP/SAR is summarized, but does not do justice to the formal commitment by DOE and the State of New Mexico.

Waste Isolation Pilot Plant Safety Analysis Report, Revision 1 (SAR) Rev. 1 (DOE 1995 i)
"The intent of this document is to demonstrate the safe disposal of CH-TRU waste in compliance with DOE orders."

The Consultation and Cooperation Agreement between NM and DOE states that the SAR"... constitutes the most comprehensive document concerning WIPP both in general and specifically as related to public health and safety as well as other matters." Include this statement as well as a commitment for RH-TRU waste as well.

CHAPTER 2

Page 2-1. Lines 9 through 19.

The Geography of the nuclear weapon complex is described.

States that contain the 10 additional sites are identified in *Identification of Additional TRU Waste Generator Sites.* It appears that the TRU waste generated at the 10 additional sites is not defense TRU waste and is thus not eligible for disposal at the WIPP under the current law.

Page 2-2. Section 2.1.1 Introduction.

The SEIS includes plans to dispose of non-defense TRU waste at WIPP which violates the existing laws. DOE should include a discussion on their plans to modify the law to include commercial and non-defense TRU wastes.

Page 2-2. Section 2.1.1.

The DOE states that the total inventory will now be almost double the amounts authorized for disposal under the WIPP Land Withdrawal Act. The total expected inventory is 312,500 m^3. The authorized volume is 175,000 m^3. Describe the plans for dealing with this excess volume, including amendments to the law.

Page 2-2. Text Box entitled WASTE ACCEPTANCE CRITERIA (WAC). Lines 17 and 18.

Statement: "For the purposes of SEIS-II analyses, all waste would be treated at a minimum to the current planning-basis WAC."

Since the current WAC does not require treatment of most wastes, it is misleading to describe untreated waste as "treated at a minimum to the current planning-basis WAC."

Page 2-2. Text Box entitled WASTE ACCEPTANCE CRITERIA (WAC). Line 1.

It is stated that the WAC was first developed in 1989.

The statement is incorrect. The first set of criteria were issued in 1979. There is no recognition of the work the EEG has done on the WAC (for example, the report EEG-4, Little, Marshall S., *Review Comments on the Report of the Steering Committee on Waste Acceptance Criteria for the Waste Isolation Pilot Plant* dated February 1980).

Page 2-3. Section 2.1.2 TRU Waste.

The section fails to show that there is a volume limit of 12,500 ft^3 for disposal at WIPP of RH-TRU waste between 100 rem/hour and 1,000 rem/hour.

Page 2-3. Text Box entitled *TRU WASTE TRANSPORTATION PACKAGING.*

Lines 10 and 11. Statement: "The Department is currently awaiting NRC certification of the RH-72B cask."

The statement is misleading, since the Department did not submit an application to the NRC for certification until December 1996.

Page 2-3. The text refers to a "specially adapted rail car".

EEG is unaware of an existing rail car nor have we received plans of a design. Please provide them in text.

Page 2-5. 1,800 PE-Ci/Drum.

It is correct that the WAC allows 1,800 PE-Ci CH-TRU drums if the waste is over packed or solidified. EEG has expressed some reservations about this limit. Also, an 1,800 PE-Ci drum could not be shipped in TRUPACT-II because the drum would exceed the 40 watt thermal limit.

Page 2-5. Footnote.

The text cites an August 1995 Draft PEIS which has not been issued in final form and an unidentified undated more recent estimate. Provide specifies.

Page 2-6. Table 2-2.

Statement: "There is uncertainty in the total waste volume figures presented in Table 2-2 and 2-3."

The discussion should include numbers that provide an indication of the uncertainties in the waste volumes of the six alternatives.

Page 2-7. Table 2-3.

Commercial/Non-defense TRU waste is not eligible for disposal at WIPP and should be deleted from the Table.

CHAPTER 3

Page 3-1. Lines 31 through 37.

Statement: "Decisions based on SEIS-II may be a combination of the option presented within alternatives analyzed. This means that portions of two or more of the alternatives analyzed in SEIS-II may be combined and used by the Department for the management or disposal of TRU waste." It would help to clarify this statement if the Final SEIS-II provided hypothetical examples of how the different Alternatives might be combined. The text box on page 5-51 does not provide this clarification.

Proposed Action

Page 3-2.

While there is a clear understanding of the Proposed Action, the description includes activities not in the Proposed Action described in the SEIS. The RH-TRU waste increased considerably, from 7,000 m^3 to 35,000 m^3, and the volume projections show thermal treatment of the waste reduces the volume. These are not included in the Proposed Action submitted by DOE to EPA in the 10/28/96 Compliance Certification Application. Revise this section on the Proposed Action to only include items that are in the Proposed Action.

Page 3-2.

Paragraph 2. The text indicates that the proposed volume of RH-TRU is much less than that allowed by the WIPP Land Withdrawal Act. Not so. While the expected number of curies in RH-TRU are less than the LWA permits, the volume of RH-TRU is considerably greater and the WIPP repository's current design will not accommodate the greater volume.

Page 3-5.

"All waste has been assumed to be treated and packaged to planning basis WAC." There are no requirements in the WAC to treat waste.

Page 3-6. Text Box.

The conservatism of TRU Waste Inventory Estimates text box is limited to the volumes of estimated TRU waste. There is no discussion of the radioactive inventory (in curies or PE-Ci) and its uncertainty. Also, credit is taken for conservatism when the reverse is true. For example:

First bullet. It is more accurate to consider the inventory as uncertain, rather than overestimated. Also, overestimating the TRU waste volume (and of the alpha emitting inventory) permits a larger quantity of plutonium to be released in meeting the EPA 40 CFR 191 Containment Requirements. Update the reference from Rev. 2 to Rev. 3 of the BIR.

Second bullet. The additional Inventory includes TRU waste burial prior to 1970 when the definition of the threshold was 10 nCi/g rather than the current 100 nCi/g. Although DOE indicates that 80,000 m^3 would be excavated from the 141,000 m^3 that was previously disposed, no indication is provided as to whether it is the higher or lower concentration waste. Logically it would be the higher, making the calculation less conservative. No explanation is provided why 80,000 m^3 of buried waste would be exhumed and 60,000 m^3 of other buried waste left in place.

Third bullet. Assuming that 7,000 m^3 of RH-TRU will be emplaced in the repository, when the available capacity may be only 4,300 m^3, may overestimate the amount of actinides allowed to be released.

Fifth bullet. The assumption that 100% of the TRU waste would be treated as TRU mixed waste is no longer true.

Page 3-8.

Since the text cites U.S. DOT regulations (49 CFR Part 391) for driver qualification, also cite the appropriate U.S. DOT regulations for routing (49 CFR 177) and the type A container certification (49 CFR 173).

Page 3-9. 3.1.3.1

"The Department estimates that it would require up to three years to excavate a panel."

Why would it take 3 years to excavate 7 rooms when 4 rooms were excavated in 6 weeks for the SPDV Program? Revise the estimate.

Page 3-9.

"The facility would be inspected a minimum of 4 times a year by the Mine Safety and Health Administration." State that the WIPP Land Withdrawal Act requires this.

Page 3-9.

Shipping Routes. It would be helpful to specify the DOT regulations to change routes including public hearing procedures.

Page 3-12. 3.1.3.4 Emplacement of RH-TRU Waste.

This section states that RH-TRU waste will need to be placed in the access tunnels (Panels 9 and 10). In order to reach design capacity Panels 9 and 10 will each have to be modified to accommodate 944 m^3 of RH-TRU (compared to 649 m^3 in a panel) and 17,500 m^3 of CH-TRU (compared to 16,700 in a panel). Is it physically possible to do this? Please specify the necessary design changes to the repository.

Page 3-12.

Please provide information for a seal that would prevent water from entering the repository and impede gas and brine from migrating out.

Page 3-12.

Closure and decommissioning. Use the definitions of disposal phase and disposal used in the WIPP Land Withdrawal Act. The definitions in the text do not match those in the Act.

Page 3-12.

The projected area above the 10 panel equivalents is said to be 100 acres. It is about 125 acres.

Page 3-12.

Is the proposed fence outside of the 150 acre berm?

Page 3-13.

The commitment to place markers at the site makes no mention that they are required by (PL102-579) and need to be approved by EPA (40 CFR 191).

Page 3-14.

The text states that it is reasonable to examine alternatives that include disposing of all DOE-owned and controlled TRU waste at WIPP. It should also be reasonable to discuss plans to amend the law and explain why DOE did not ask Congress to amend the WIPP LWA at the same time this section was written.

Page 3-14.

Action Alternative 1 would nearly double the repository waste volume. However the SEIS-II does not address the necessary redesign nor operational problems associated with keeping the repository open for 160 years.

Page 3-14.

Problems associated with storage at Consolidation Sites for 160 years are not discussed. DOE has taken the position that such storage would be impracticable and offering this as a viable alternative appears to reverse the Department's position totally.

Page 3-15 and A-14. Tables 3-2 and A-6.

The total volume for column 2, Additional Inventory, should be 139,000 not 136,000.

Page 3-18.

While the text states that the number of panels would be increased from 8 to 68, no specifics are provided on the design to accommodate this. We question whether the current design would be optimum if CH-TRU was not going to be emplaced in the rooms.

Page 3-19.

The surface projection for 68 panels would be about 850 acres rather than the 680 acres estimated if the design is unchanged.

Page 3-19. Text Box, Long Disposal Periods and SEIS Results.

Statement: "The long disposal periods could be shortened by constructing additional shafts, employing additional shifts, or changing the design criteria for thermal loading." The assumptions mentioned in the statement are more reasonable than the assumptions of 160-190 year disposal periods. The analysis of AA1, 2, 3 should contain more detailed and quantitative information about how the periods could be shortened.

Page 3-43.

The SEIS states that alternatives such as transmutation, co-processing with high level waste, and disposal in space were not considered in detail. The desire to use current technology for projects to be completed in 30 or 40 years is understandable. However, it seems unwise for 160-190 year projects. The alternatives that are discussed in the text are also not considered in detail. Problems associated with keeping the mine open for 180 years are not discussed nor are plans to increase the number of panels from 8 to 68.

An alternative not considered at all, which is similar to Action Alternatives 2 and 3, would consist of acid digestion of certain TRU waste followed by volume reduction and solidification. During the 1970s and 1980s the DOE had a research program at Hanford on the acid digestion of TRU waste. The alternative might be preferable to Action alternative 2, which involves a costly thermal treatment process.

Page 3-44. Lines 2 through 8.

Statement: *"While the Storage and Disposition of Weapons-Usable Fissile Materials Programmatic Environmental Impact Statement (DOE 1996b)* considered this process to be a reasonable alternative for analysis the relative large volume of TRU waste (compared to the volume of fissile material) would produce much more waste than the currently planned high-level waste repository could dispose of. This alternative would further delay TRU waste disposal until such a time as sufficient high-level waste repository space was available. In addition, transportation and safety concerns associated with high level waste would need to be addressed."

The statement is not correct. Because of thermal loading constraints, a high-level repository is mostly empty space that may have to be back-filled. The currently planned high-level waste repository at Yucca Mountain will have over 100 miles of tunnel. However, a high-level waste repository is not expected to be operational for more than 10 years. The transportation and safety concerns associated with high-level waste will be addressed in the licensing of a high-level waste repository. The major difficulty with this alternative is that a high-level waste repository will be licensed by the NRC and Congress does not want the disposal of defense TRU waste to be under the jurisdiction of the NRC.

Page 3-44. Lines 18 and 19.
Statement: "*Underground detonation.* Such detonations would produce a large amount of hazardous fission products."

The statement implies that the underground detonation can only be carried out with nuclear devices. This is not correct and the statement should be clarified.

Page 3-45. Lines 17 through 22.
The following statement is made in the discussion entitled *Alternative Engineered Barriers:* "The Department examined these as alternatives and determined based on the evaluation conducted in the *Engineered Alternatives Cost/Benefit Study Final Report* (DOE 1995c) that they were less effective than the engineered barriers examined in SEIS-II."

There is no discussion of engineered barriers in SEIS-II. However, of the 4 disposal options analyzed, Action Alternatives 2 and 3 include an engineered barrier (waste treatment).

Page 3-45. Lines 11 through 16.
In the discussion entitled *Geologic Repositories at Sites Other than WIPP,* it is implied that salt is a more favorable disposal media than granite, basalt, and tuff. The reference for this conclusion is the 1980 FEIS for WIPP.

Much has been written on the disposal of nuclear waste since 1980. With regards to spent fuel and high level waste, the DOE maintains that the unsaturated zone in tuff is the most favorable medium. Also, Sweden has successfully constructed and is successfully operating a repository in granite for intermediate level waste.

Page 3-46.

"The SEIS-II Proposed Action is similar to the Draft WM PEIS Decentralized Alternative". The Decentralized Alternative described in the WM PEIS is more expensive than the No Action Alternative ($1.7B vs. $7.4B). It also has more worker deaths (4 vs. less than 0.5) and a larger collective dose to workers (1,500 person-rem compared to 20 person-rem). These PEIS findings are similar to those in SEIS-II. The text should clearly explain why these results are totally opposite the DOE conclusion to consolidate the material for disposal at a particular site.

CHAPTER 4

Page 4-1.

The 1996 Amendments to the 1992 WIPP Land Withdrawal Act are not recognized.

Page 4-6.

The text states that backfill is not required for subsidence control or repository performance, but may be placed into the repository for final disposition.

DOE committed to backfill with salt in the 1980 FEIS.

Page 4-9 (Box).

"....... has resulted in confirmation of the Salado's extremely low permeability."

This statement is meaningless. The Salado pure salt has extremely low permeability, impure salt is more permeable, and the fractured anhydrite beds and the clay/anhydrite and clay/halite interfaces are permeable enough to transmit a substantial amount of brine for gas generation.

"...elevated gas pressure may slow down or stop brine inflow, thereby slowing gas-generating processes."

The important point is that sufficient gas is expected to be generated to result in lithostatic pressure in the repository. Once the pressure is dissipated through fractures, brine inflow is expected to resume.

"Geophysical surveys indicate that pressurized brine reservoirs in the Castile Formation occur as three or four discrete pockets." No new geophysical surveys have been conducted to detect Castile brine over the WIPP repository since the publication of SEIS-I. No basis has been provided to alter the previous interpretation of the 1987 TDEM survey over the WIPP site found in SEIS-I, as follows:

"A continuous deep conducting zone underlies the region of the WIPP waste - emplacement panels." (DOE/EIS-0026-FS, Vol. 1, p. 4-71).

and

"In this report, the brines underlying the repository are assumed to be present, as they are at WIPP-12" (DOE/EIS-0026-FS, Vol. 1, p. 4-73).

The EEG position is that, based on the size of the brine reservoir intercepted by the borehole WIPP-12 and the results of the TDEM survey, the WIPP repository is underlain by a continuation of the brine reservoir that was encountered by WIPP-12.

Page 4-10.

"Major tectonic activity (movements of the earth's crust) associated with the development of the Delaware Basin ended over 250 million years ago, and the WIPP site has been geologically stable ever since."

Since its deposition in the Delaware Basin in the late Permian times, the WIPP area has been uplifted, submerged, tilted, intruded by igneous dikes, deformed or dissolved by water, and eroded. In addition, according to Lambert and Canter (1984), Castile brine reservoirs were formed during the past 360,000 years to 800,000 years by an episodic process that "could have resulted from an intermittent hydraulic connection between the Capitan Limestone and Castile anhydrites." (SEIS-I, Vol. 1, p. 4-71).

The WIPP site has not remained geologically stable for 250 million years.

Comments on Page 4-15.

Natural Resource Exploration and Development.

Hydrocarbons

Hydrocarbon resource is a very important issue and merits much more than a cursory overview by three short paragraphs.

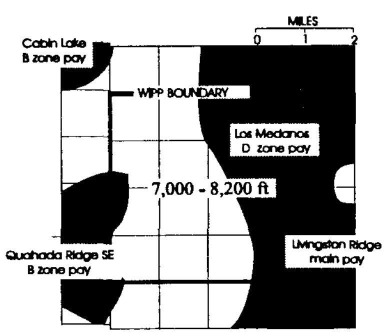

Figure 1. Proven and Probable Hydrocarbon Reserves for Brushy Canyon (after Broadhead et al, 1995, as published in EEG-62).

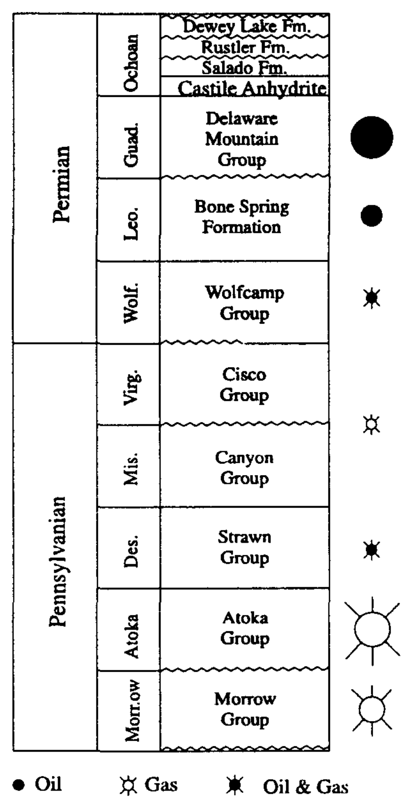

Figure 2. Formation Production (after Broadhead et al, 1995 as published in EEG-62).

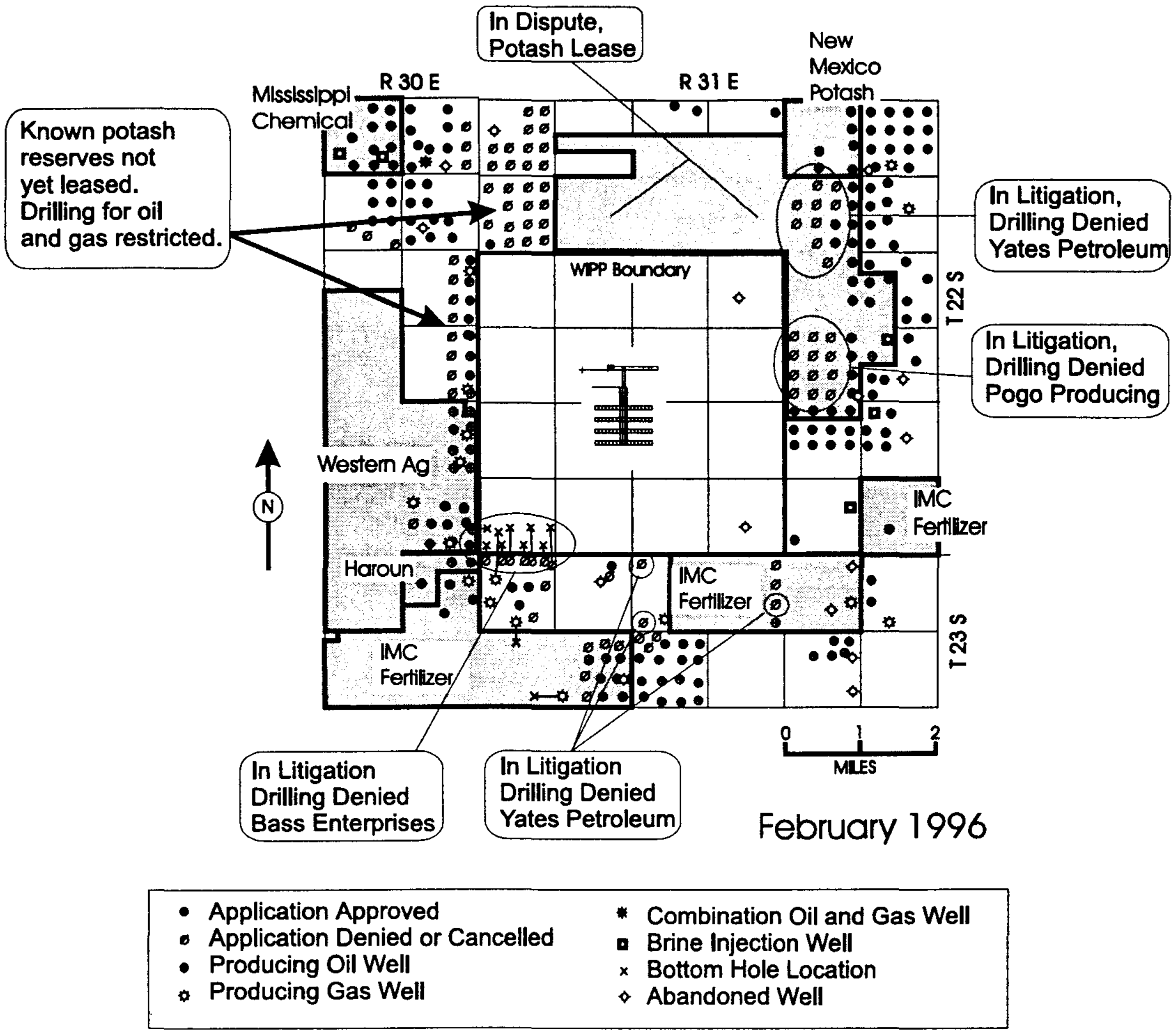

Figure 3. Interest in resources near WIPP (see EEG-62 for more detailed discussions).

The SEIS should have at least a series of maps showing proven and probable reserves at the various reservoir depths (eg. Figure 1), an illustration of the geologic cross section of the area resources and current production (eg. Figure 2), and a current map indicating drilling interest in the area and the extent of drilling delayed due to the presence of potash (eg. Figure 3). See EEG-62 (Silva, 1996) for a discussion of these figures.

Due to the extensive changes from the FEIS, there should also be a detailed discussion of the anticipated resource recovery activities. Topics should include:

- The massive hydrofracturing required by the oil reservoirs surrounding the WIPP.
- Extensive brine injection surrounding the WIPP due to the need for salt water disposal.
- Brine injection for pressure maintenance to enhance oil recovery.

- Documented concerns by the potash industry of the potential impact of fluid injection on the Salado Formation.
- The estimated value of hydrocarbon resources in the area.
- Areas for which there are no estimates due to the lack of drilling and testing as a result of the presence of potash.

Potash

This section should have maps showing the extent of lease grade potash reserves including the extent of potash reserves under the WIPP Site. Further, the SEIS should rely on the official position of the Department of Interior. The text should then discuss the maps and the impact of WIPP on the potash industry and the potential impact of potash mining on the WIPP based on potash reserve estimates by the Department of Interior.

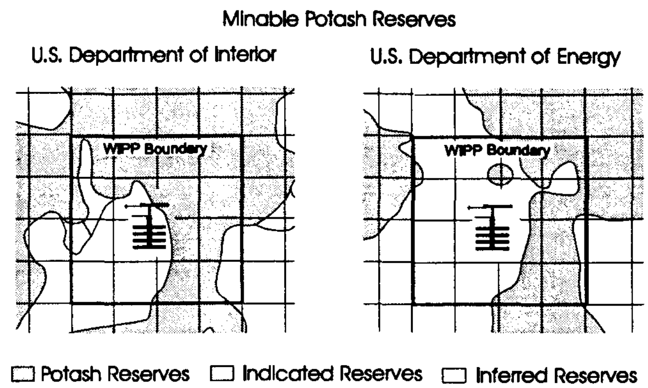

Figure 4. Estimated areal extent of potash reserves.

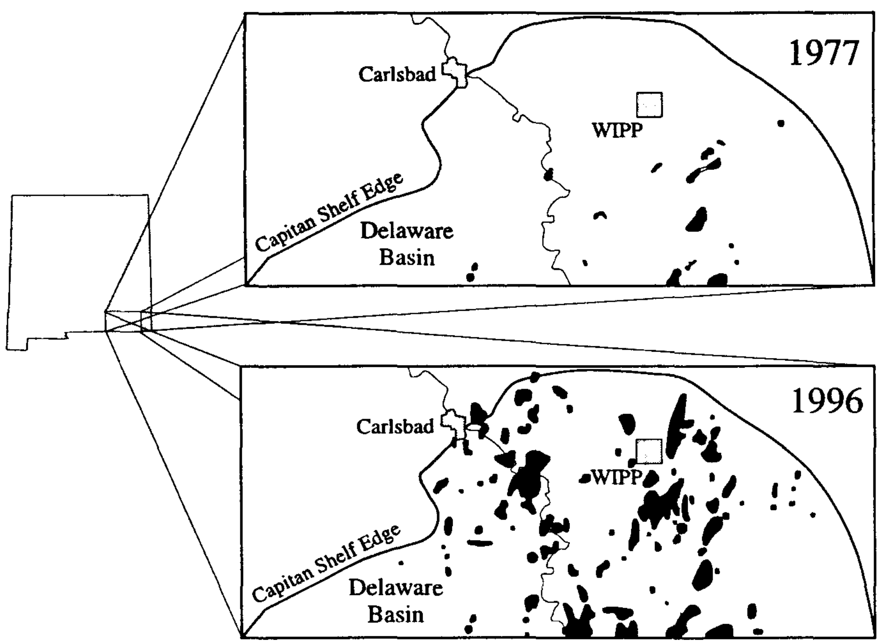

Figure 5. Actual growth of oil production.

Halite

The increase in oil and gas drilling activities, shown in Figure 5, continues to put demands on the need for brine supplies in the areas of new drilling.

There needs to be a section discussing the decades long activity of solution mining of halite, shown in Figure 6, from the Salado Formation to produce brine for drilling oil and gas wells throughout southeast New Mexico.

Pages 4-18, 4-19 Salado Formation Hydrology. This section should describe the higher permeability of the Salado marker beds which act as conduits for flow of water and gas in the Salado.

Also, the assumption of Darcy Flow is not a conservative but a reasonable assumption. According to Beauheim, et al. (SAND 92-0533), "An assumption of Darcy flow through the evaporites is thought to be a reasonable interpretive approach because Darcy-flow models are able to replicate the flow and pressure behavior observed during entire testing sequences involving different types of tests performed with different hydraulic gradients."

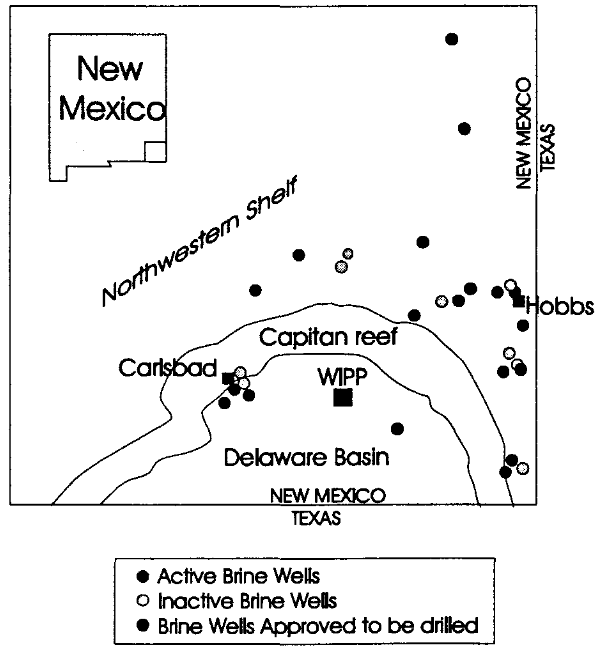

Figure 6. Solution mining of the Salado Formation.

Pages 4-19, 4-20 Castile Formation Hydrology.

The discussion in this section is incorrect in certain aspects and incomplete in others. There are not two but at least thirteen reported boreholes at and near the WIPP site which encountered pressurized brine in the Castile Formation. When the borehole WIPP-12 encountered pressurized brine at the WIPP site in 1981, more than 1.14 million gallons (4.3 million liters) of brine "unavoidably" flowed to the surface and was collected in a large pond on the surface before the well was brought under control (See DOE report on Brine Reservoirs, WIPP/TME 3153, P. H-9). The pore volume of this brine occurrence was estimated by DOE to be 714 million gallons (2.7 million m^3). Accommodation of this volume requires the assumption that the brine reservoir intercepted by WIPP-12 spreads under the repository. The TDEM survey confirmed the existence of brine under the repository. Assumption of four distinct brine reservoirs underlying the repository has no basis. A more justifiable assumption is that the pressurized brine reservoir encountered by WIPP-12 extends under the repository.

Page 4-21.
The discussion of the water level rises in the Culebra Aquifer and the potential impact of salt water disposal wells would be clearer by preparing and presenting a figure such as the one shown here and published in EEG-62.

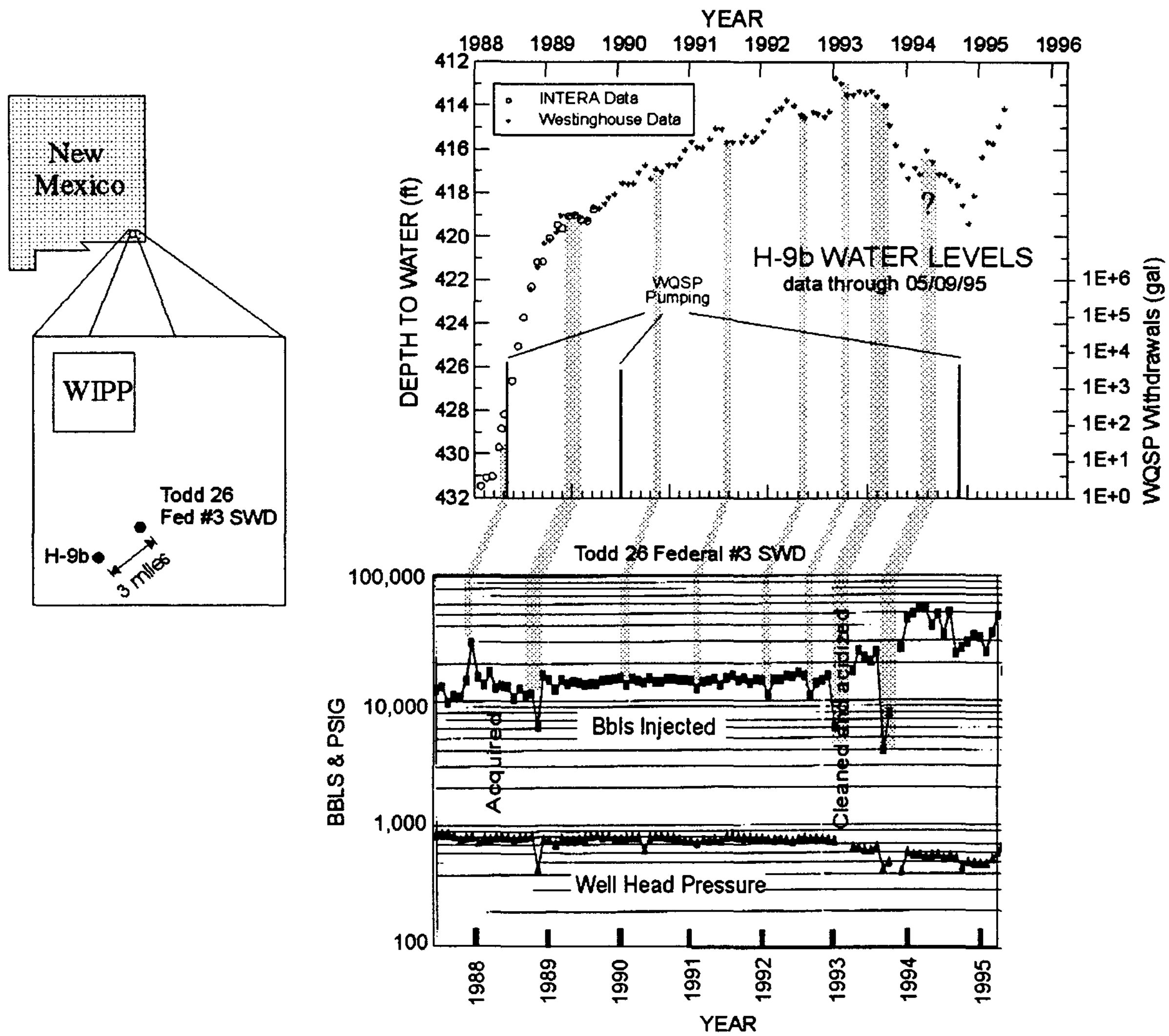

Figure 7. Postulated correlation between oilfield salt water injection and water level rises.

The discussion of potash mining and subsidence would benefit from a more detailed discussion of 40 CFR 194, the CCA, and a map of the extent of potash reserves as determined by the Department of Interior.

CHAPTER 5

Page 5-4.

The statement is made (3 lines above Section 5.1.2) that "No activity is occurring under these leases, and the Department may acquire these leases in the Future." The current status of these leases, including the producing gas wells and the recent court judgement, deserve a more detailed description in the final SEIS.

Page 5-9. Table 5-2.

The total in the second column (Basic Inventory RH-TRU Wastes) should be $4,800 million (not $4,500 million). Estimates should be rounded off using a consistent system.

Page 5-11. Transportation.

Detailed transportation comments are included in the Appendix E comments and are not repeated in these comments. Calculations were checked and compared to the results reported in previous EEG reports. The transportation risks reported in SEIS-II are reasonable and adequately conservative.

Page 5-13.

Highway route-controlled quantities (HRCQ) are discussed in the last paragraph. HRCQs are defined in 49 CFR 173.403(1) and routing is described in 49 CFR Part 177.825. The reference cited is not specific or useful. The statement that a majority of WIPP shipments are not HRCQs is misleading. Any waste shipment containing over 6 Ci of ^{239}Pu or ^{240}Pu, 9 Ci of ^{238}Pu, and 24 Ci of ^{241}Am is a HRCQ. Virtually all WIPP CH-TRU shipments will be HRCQs. Interestingly, the average RH-TRU inventory falls below the HRCQ limits and so the majority of RH-TRU shipments probably are not HRCQs.

Page 5-16.

The Footnote to Table 5-7 states that "shipments would stop at sites chosen, in part, for their lack of population,...." Have such sites been chosen and is their usage required? Unless the answer to both questions is 'yes', this claim should not be made.

Page 5-18. Lines 11 and 12.

The statement is made that, the State inspectors "dose would be limited by administrative rules and the inspector would be rotated to a new position." Unless DOE knows the requirements of the various States they should not take credit for actions by the States.

Table 5-8 is said to indicate that Site and State inspectors would receive the highest probability of health effects. Table 5-8 and Appendix E indicates that the rest stop employee has the highest probability.

Page 5-21. Lines 18 and 19.

The population density should be stated as "3,861 persons per square kilometer"

Page 5-26. Table 5-11.

Footnote d states that the MEI for RH-TRU is located at SRS. There is no RH-TRU at SRS.

Page 5-33. Lines 3 and 4 from bottom.

The assumption that there would be no dose to the maximally exposed involved worker in the T1 and T2 accidents is apparently based on the assumption stated on page G-11 ("The involved workers, positioned outside of the glovebox, were assumed to exit the facility immediately and thus would escape impact"). The assumed geometry and operational procedures need to be described in more detail so that the reasonableness of this assumption could be evaluated.

Page 5-34.

The text box on criticality contains information on the amount of Fissile Gram Equivalents present in the WIPP Waste streams that is inconsistent with Table 1, Appendix B2 of the Baseline Inventory Report Revision 3. This Table shows there are 2,800 m^3 of RFETS residue waste with an average concentration per 0.208 m^3 drum of 13.7 Ci ^{239}Pu and 53.6 Ci of ^{241}Pu. This is an average of 218 FGE per 0.208 m^3 (55-gallon) drum. The permissible limit is 200 FGE/55-gallon drum. Furthermore, Table 1 indicates there are about 151 m^3 of waste at SRS, INEL, and Hanford that have average concentrations that exceed 200 FGE/ 55-gallon drum. This discrepancy needs to be reconciled and the Final SEIS-II should use the values published in the latest BIR. Also, the final disposition of wastes that exceed 200 FGE/drum should be stated.

The RFETS residues deserve more attention in SEIS-II than they have received. On February 20, 1997, the NRC granted DOE Revision 8 to the TRUPACT-II Certificate of Compliance. This Revision allows use of a pipe overpack to transport up to 200 FGE of residues in a pipe that is positioned inside a 55-gallon drum. The volumes of this pipe component would be either about 11 liters or about 45 liters. Up to 2,800 FGE of waste can be placed in a TRUPACT-II containing 14 of these pipe overpacks. The limit for 55-gallon drums or Standard Waste Boxes is only 325 FGE per TRUPACT-II. Some of these residues must be much more concentrated than the average concentration or DOE would not have needed to develop the pipe overpack. So now DOE can ship up to 2,800 FGE in a TRUPACT or 8,400 FGE on a trailer containing 3 TRUPACTs. Eight kilograms of plutonium is considered a significant quantity by IAEA because it is the approximate amount required to manufacture a nuclear explosive device. Such a shipment could be a candidate for a terrorist act of diversion during transportation. the Final SEIS-II should discuss the precautions that will be taken to present diversion of high FGE waste shipments.

Page 5-35.

We were able to approximately reproduce the LCFs for the RH-TRU Waste Storage Accident in Table 5-17 by using the overall release factor for stored CH-TRU waste from Page G-40 ($3.125x10^{-6}$) rather than the values described on this page for RH-TRU ($6.25x10^{-8}$). This overall RH-TRU release factor seems unreasonably low. Once again, the SEIS-II calculations are difficult to check because the specific input values are not given. It was necessary to retrieve numbers from two locations in Appendix G and one in Appendix A. We trust these were the values used in the calculation. Please provide more detail to enable the reader to reconstruct the calculation.

Page 5-35 to 37.

WIPP disposal accidents and their consequences are summarized in this section. More detail is provided in Appendix G.4. The WIPP Safety Analysis Report also contains a suite of WIPP disposal accident consequences. The SEIS-II scenarios and SAR Scenarios are not identical. They differ in numbering, description, assumptions, and consequences. A comparison of the consequences of common scenarios is shown in the following table

Table 2

EEG Comparison of SEIS-II and SAR
WIPP Accident Consequences

	Ratio of SEIS-II/SAR Latent Cancer Fatalities		
Scenario	MEI Public	Non-involved Worker	Involved Worker
CH 7 Spont. Ignition, UG	0.72	1.75	—
CH 3 Puncture, Drop in WHB	1.7	0.25	2.7
CH 4 Drop in WHB	2.0	0.29	3.6
CH 5 Waste Hoist	30.	4.0	—
CH 9 Drop in UG	1.0	0.15	15.6
CH 11 Roof Fall	10.	1.9	—

There is no clear pattern to the above ratios. MEI and Involved Worker consequences are mostly greater in SEIS-II, while non-involved worker consequences are mixed. It is unnecessary and confusing to use different scenarios and assumptions in the SEIS-II than were used in the SAR. The scenarios in the SAR evolved over a number of years and influenced by discussions between DOE/Westinghouse and EEG. These SAR scenarios are more specific to WIPP conditions and should be used in the final SEIS-II.

Page 5-36.

As shown in the following Table, the frequency of various accident scenarios are different in SEIS-II than in the 1996 Draft Safety Analysis Report (SAR). An explanation should be provided.

Table 3

EEG Comparison of Accident Scenario Frequencies
in SEIS-II and 1996 SAR

Table 5-18, Disposal	Annual Occurrence Frequency	
Accident Scenarios	Draft SEIS-II	Draft 1996 SAR
W1, WHB Drum Drop	0.1	0.011 (CH4)
W2, WHB Drum Puncture	0.1	0.006 (CH3)
W3, Underground Drum Drop	0.01	0.015 (CH9)
W4, Underground Drum Puncture	0.01	0.015 (CH9)
W5, Underground Container Fire	0.01	No scenario
W6, Hoist Failure	1E-4	1.4E-9
W7, Roof Fall	0.01 Panel 1	4.3E-7 (CH11)
W8, RH-TRU Canister Breach	1E-4 to 1E-6	no scenario

Page 5-39. Long-Term Post-Closure Performance.

The text says that the analysis in Draft SEIS-II are based on results computed for the Draft No-Migration Variance Petition and the Draft Compliance Certification Application (Draft CCA). Also, that "The final SEIS-II will re-examine its long-term performance assessment in light of any changes in methodology adopted for the compliance certification application." This re-examination should be made. It is unfortunate that Draft SEIS-II, even though it was released after the Final CCA was sent to EPA, could not incorporate the same methodology and results for the Proposed Action. We have comments on the current analysis.

Page 5-40 & 41. 75th Percentile Values.

The rationale for using median and 75th percentile parameter values is described: "The 75th percentile parameter values are used to yield model results that should fall in the upper tail of a full probabilistic analysis." But it is then said (lines 1-3 on page 5-41) that there is remarkably little difference between the mean and 75 percentile values. In fact Table H-24 indicates that direct radionuclide releases to the ground surface are identical for the median and 75th percentile values.

This is inconsistent with the CCA (see Figure 6-40) where the median values on the CCDF plot are 67% of the mean value at 0.1 Probability and 40% of the mean value at 0.001 Probability. The reason for this discrepancy is probably because more parameters were sampled over a distribution of values in the CCA than in SEIS-II. For example, the CCA sampled some parameters in the following areas that SEIS-II did not: (1) shaft materials; (2) gas generation, (3) the Culebra aquifer; (4) borehole plugs; and (5) borehole shear resistance. The SEIS-II calculation is, in most cases, using the same parameter values for the 75th percentile as for the median.

The methodology does not yield results that "fall in the upper tail of a full probabilistic analysis."

Page 5-40 & 41. Family Farm Scenario.

The decision was made to not include the family farm scenario (500 meters from drill cuttings) that was used in SEIS-I because the land was poor, little water was available, and water quality is poor. All of these facts are correct but there are ranch houses nearby and the majority of the dose (>99% in SEIS-I, Tables 5.63 and 5.64) is from inhalation. EEG-11[1] calculated CEDE inhalation doses of about 175 mrem/y at 360 m from 13 Ci of TRU radionuclides brought to the surface and deposited in a brine pit. Doses to nearby residents should be included in SEIS-II.

Page 5-41. Third Paragraph.

It is stated that "No population impacts were calculated because only small amounts of radioactive material would be brought to the surface, remain in a wet, relatively nondispersable form, and would

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[1]Channell, James K., "Calculated Radiation Doses from Radionuclides Brought to the Surface if Future Drilling Intercepts the WIPP Repository and Pressurized Brine," NM Environmental Evaluation Group, EEG-11, January 1982.

remain localized." The material brought to the surface will not remain wet. The mud pit will dry, enabling wind erosion to transport the radioactive material over long distances. It is quite possible that the mud pit will be dry prior to dismantling the drill rig and be disturbed by that process, exposing those workers to the risk of inhaling radioactive dust.

The assumption of wet, non-dispersable material in the brine pond is inconsistent with assumptions used in SEIS-I, EEG-11 and TME-3151.[2] Both EEG-11 and TME-3151 calculated inhalation doses to the population within 50 miles from wind erosion. EEG-11 estimated a population dose of 39 person-rem per year (50-year Committed Effective Dose Equivalent) and assumed the exposure would last for many years. TME-3151 projected a population-dose of 76 person-rem CEDE for the one year period before the pond is covered.

Intrusion into the repository would definitely expose the neighboring population to risk. This risk should be calculated.

Page 5-42. 4th line from bottom.

Reference is made to the 5-kilometer subsurface lateral boundary. The appropriate boundary of concern is the WIPP site boundary which is less than 3 km from the waste panels to the south (down gradient in the Culebra aquifer).

Page 5-43. Figure 5-1.

There is a 10^6 conversion error on this Figure (and on lines 18-19 on page 5-42) that is repeated on numerous other Figures in this Chapter and Appendix H. A concentration of 1 pCi/l is equal to $10^{-9}\ Ci/m^3 \left[(1 \frac{pCi}{l})(10^{-12} \frac{Ci}{pCi})(10^3 \frac{l}{m^3}) = 10^{-9} \frac{Ci}{m^3}) \right]$ not 10^{-15} Ci/m^3. This mistake raises an uncertainty about which value was used in plotting the extent of migration areas in the various figures. This is important; it must be clarified, corrected, and the areas re-plotted if necessary.

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[2] Radiological Consequence of Brine Release by Human Intrusion into WIPP," US DOE, TME-3151, July 1982.

Page 5-44. Last paragraph.

This paragraph (which concludes on the top of page 5-45) concludes that intrusion at 100 years will have the maximum consequences. This determination cannot be made until calculations are made with an acceptable spallings model. Large spallings releases are possible at higher repository pressures which are expected to increase after 100 years. These increased spallings releases could more than offset the reduction in curies from radioactive decay.

Page 5-46. Fourth Paragraph.

The statement is made here (and elsewhere) that "no radionuclides or hazardous materials would be released into the Culebra within 10,000 years of repository closure for the deep drilling scenario under the proposed action." This is inconsistent with calculations in the CCA which show radionuclide release to the Culebra is a significant fraction of the E1, E2, and E1E2 scenario realizations. Calculations in the Final SEIS-II for the Proposed action need to be consistent with the CCA.

Page 5-48. Section 5.1.12.5.

The statement is made that if all the stored excess RH-TRU waste were released it would cause less than 2 deaths over a 10,000 year period but that if stored it would result in less than 2 worker deaths per 100 years. This suggests that it would be better to release the waste than to store it! This section should go beyond the statement that population may increase around the sites and present a rationale for storing the waste.

Page 5-49. Text Box.

We have several comments about the Long Disposal Periods on SEIS-II results discussed in the text box:

(1) The problems of keeping a facility open for 160 to 190 years are undoubtedly much more complex than SEIS-II suggests. The current shafts and drifts almost certainly can't be maintained for that long and surface facilities would probably also need to be replaced. Institutional problems would also be expected. The discussion also suggests that large work forces would be employed on these long periods and would thus be uneconomical. The concept of committing to any plan for this long a time is unprecedented and probably unwise;

(2) Thermal loading in the repository should not be a major problem. The excavated waste disposal area in the Proposed Plan is about 27 acres (for CH-TRU wastes). This would permit 270 Kw with the present criteria of 10 Kw/acre. The inventory in Appendix A (Tables A-31 and A-33) for Action Alternative 2 would generate less than 170 kilowatts;

(3) We agree that differences in long-term alternatives should be compared in long-term aggregate impacts rather than annual impacts. These comparisons should include the same universe of wastes, regardless of how they are managed.

Page 5-51. Text Box.

The discussion in this text box on Factors to Consider in Combining Alternatives provides useful information. The brief statements on Waste Treatment and Waste Management should be expanded because they contain much of the rationale for choosing the Proposed Action.

Page 5-59. Rail Accident Methodology.

The conclusion that the number of rail accidents using dedicated trains will be 23 times that expected for regular rail service is unrealistic. The methodology used could be used to calculate a wide range of numbers, including zero additional accidents (with the assumption that no new locomotives would ever be used). Some of the potential benefits from dedicated trains (e.g., lower potential accident rate per mile, more control over waste package, and shorter shipment times) should be discussed. It is noted that both regular train and dedicated train shipments have less impacts than truck shipments (Table 5-29 versus Tables 5-25, 5-26, 5-28).

Page 5-60.

Detailed evaluations of rail mileage in the SEIS-I and other earlier documents indicates that rail mileage from the major generating sites to WIPP is 16%-26% greater than truck mileage, not similar as claimed here.

Page 5-67.

The Radiological Impacts storage accidents for Action Alternative 1 in Table 5-34 are from Table G-28. We reproduced the calculation for population and MEI LCFs from the Earthquake Scenario. However, the maximally exposed non-involved worker should have only 0.4 LCFs and not 0.7 LCFs for a dose of 1,050 person-rem. We calculated only 760 person-rem for this accident.

Page 5-85. 2nd Line Beneath Table.

What is the justification for assuming that thermal treatment of waste reduces the release fraction by a factor of 1,000?

Page 5-104. Section 5.3.

The impacts of disturbed and undisturbed cases of potash mining and brine reservoirs have not been adequately evaluated for the various Action Alternatives.

Page 5-142. Lines 7-9.

The assumption (for No Action Alternative 1) that DOE would indefinitely maintain institutional control at all of the storage sites is inconsistent with regulatory requirements at WIPP. Active institutional control may be allowed by EPA for 100 years at WIPP and credit (or partial credit) for up to 600 additional years of passive institutional control may be allowed. An assumption of perpetual institutional control for a No Action Alternative unfairly biases its comparison with the Proposed Action.

Page 5-145. Table 5-88.

The lifetime waste treatment impacts to involved workers in No Action Alternative 2 are only 0.08 LCFs. Yet for the Proposed Action they are 1.7 LCFs (Table 5-13). NAA 2 would treat 43% of the CH-TRU volume and 64% of the RH-TRU volume as the Proposed Action. Both actions treat waste to the WAC criteria at the generating sites. Why are the human health impacts for the Proposed Action 20 times as great?

Page 5-148. Section 5.6.12.

Detailed comments of intruder scenario modeling for long-term postclosure will be included in the comments on Appendix I.

The discussion of why the Record of Decision (ROD) for the FEIS and SEIS-I came to the conclusion that a No Action Alternative was "unacceptable" is very good.

Page 5-153. First paragraph.

The estimated 2,325 radiological LCFs in 10,000 years from environmental releases at all storage sites is noted. The EPA allowed limit for WIPP amounts to a maximum of 42 LCF's over 10,000 years. If the limit is met, the analysis indicates that disposal at WIPP is clearly more protective than storage at the generating sites.

Page 5-154. Lines 34 through 38.

Statement: "In contaminated areas, currently remote-controlled mining equipment or equipment modified with off-the-shelf systems may be used. Where practical, removal operations would be performed remotely. All support, radiation and air quality monitoring and geotechnical surveying would be performed remotely in the contaminated areas."

The discussion of waste recovery in section 5.7.2 relies almost entirely on remote controlled activities as expressed in the above statement. At present, remote controlled handling of CH-TRU and RH-TRU does not exist. The discussion of radiological impacts in section 5.7.2.1 Operational Impacts of Waste Recovery, has no basis or justification.

Page 5-155. Second complete paragraph.

This discussion mentions the greater external radiation hazard from waste recovery (compared to waste emplacement). However, inhalation exposures from dealing with breached containers and contaminated salt could also be significant and this needs to be recognized in the Final SEIS-II.

Page 5-156. Second complete paragraph.

Was any analysis involved in arriving at the conclusion that health impacts to the public and non-involved workers from recovery operations was 1,000 times that in Action Alternative 3?

Page 5-159. Lines 6 to 9 bottom.

The statement is made that DOE is considering transportation of fissile materials for storage and disposition. Is this being considered for WIPP?

Page 5-161. Lines 5 and 6.

More information is needed on the statement: "Emissions of radionuclides would be 134% of the standards for the alternatives that would involve treatment to the LDRs at LANL;" Page 5-88 mentions a 9×10^{-5} chance of an LCF but doesn't mention standards. Is this the 10 millirem/year NESHAPs Standard?

Page 5-162. Last paragraph.

The elimination of former "Control Zone IV" made this land available for oil and gas recovery as well as for potash mining. There are a number of producing wells in this area now. Water flooding is also permitted and is occurring.

Page 5-163. Section 5.11.

The LWA prohibits the extraction of mineral and hydrocarbon resources from the Land Withdrawal Area in perpetuity, not just during the period of disposal operations.

CHAPTER 6

Chapter 6 lists all the regulatory agencies and the status of permits for WIPP. One regulatory agency is notably absent. It is DOE. The Department has the legal authority to self regulate operational activities at WIPP. The status of WIPP's compliance with DOE Orders or even a list of DOE Orders is conspicuously absent. Indeed, DOE has the authority to self-approve the Draft Supplement to the EIS but fails to describe the internal system to be used. For example, the DOE long-term disposal calculations in the SEIS are approved by DOE and in the CCA by EPA.

LIST OF ACRONYMS

BIR:	Baseline Inventory Report
CCA:	Compliance Certification Application
CAO:	Carlsbad Area Office
CCDF:	Complementary Cumulative Distribution Function
CEDE:	Committed Effective Dose Equivalent
CH-TRU:	Contact Handled TRU Waste
DOE:	U.S. Department of Energy
DOT:	U.S. Department of Transportation
EIS:	Environmental Impact Statement
EPA:	U.S. Environmental Protection Agency
FEIS:	Final EIS
FGE:	Fissile Gram Equivalent
HRCQ:	Highway Route-Controlled Quantity
INEL:	Idaho National Engineering Laboratory
IRF:	Impact Release Fractions
LDR:	Land Disposal Regulations
LWA:	Land Withdrawal Act
LCF:	Latent Cancer Fatality
MEI:	Maximum Exposed Individual
NESHAPS:	National Emissions Standards for Hazardous Air Pollutants
NTS:	Nevada Test Site
NRC:	U.S. Nuclear Regulatory Commission
RH-TRU:	Remote Handled Transuranic Waste
ROD:	Record of Decision
RFETS:	Rocky Flats Environmental Technology Site
SAR:	Safety Analysis Report
SEIS:	Supplemental EIS
SRS:	Savannah River Site
TEDE:	Total Effective Dose Equivalent

LIST OF ACRONMYS (CONTINUED)

TRU:	Transuranic
WAC:	Waste Acceptance Criteria
WIPP:	Waste Isolation Pilot Plant
WM PEIS:	Waste Management Programmatic EIS

APPENDIX A
WASTE INVENTORY

Comments on Appendix A are made in the page order they occur. The importance attached to these comments by EEG can be inferred from the text of the comment. Comments related to waste inventory that occur in the Summary or the Chapters will be addressed in those locations.

Page A-2. Lines 19 through 22.

Statement: "The volume of TRU waste for the SEIS-II Basic Inventory is estimated at 135,000 cubic meters (4.7 million cubic feet) for CH-TRU waste and 35,000 cubic meters (1.2 million cubic feet) for RH-TRU waste. These estimates are based on current volumes of stored waste and waste expected to be generated through the year 2033."

The estimates of 135,000 cubic meters for CH-TRU and 35,000 cubic meters for RH-TRU involve significant uncertainties that should be estimated and discussed. A generic weakness of SEIS-II is a lack of discussion of uncertainty in the TRU inventory over the past 18 years.

Page A-6. Lines 22 through 25.

Statement: "Some heat is generated by TRU waste due to the interaction of alpha radiation, emitted in the radioactive decay of plutonium isotopes, with the walls of the waste container."

The heat is not generated in the wall of the waste containers. It is generated in the waste. The alpha particle range is too short to reach the walls of the waste containers.

Page A-7. Lines 2 and 3.

Statement: "The amount of gas generated is a function of the amount of heat produced from radioactive decay and the amount of plastic material present in the TRU waste."

The amount of gas generated is not a function of the amount of heat produced from radioactive decay. The amount of hydrogen gas generated is a function of the amount of energy deposited by ionizing radiation in the hydrogenous material present in the TRU waste and from anoxic corrosion of the drums.

Page A-8. Lines 9 through 14.

The estimated values for V_{site} could also be expressed as: $V_{site} = V_{stored} + (38/28[V_{projected} - V_{stored}])$.

In this form the writing of equation A-1 is consistent with the writing of equation A-7 and A-8. Also, to be consistent V_{stored} should be defined as TRU waste volume stored at the generator storage site through 1995. The use of "in 1995" is ambiguous.

Page A-8. Lines 27 through 33 and Page A-10. Table A-4.

Estimated total volumes of previously disposed TRU waste by site are discussed and presented.

The volumes of previously disposed TRU wastes are based on manifests that were written before 1970. If the waste is excavated and repackaged, the volumes will be significantly different due to compaction and the inclusion of contaminated soils. A discussion of the uncertainty in these volumes should be included.

Page A-12. Lines 5-7.

The statement is made that "only a few waste forms need packaging to meet thermal power limits, provided that plastic wrap is not used when the drums are filled (bagless posting)." Table A-16 indicates that average concentrations in about 19,400 m^3 (about 14%) of stored plus projected wastes do exceed the thermal power limits for bagless posting. Furthermore, our understanding is that the majority of presently stored wastes containers uses bags. Please comment. Does DOE plan to repackage wastes to remove bags? The plans to repackage and treat stored waste in order to meet the WIPP WAC limits should be explicitly addressed in detail in the SEIS-II.

Page A-12. Lines 8 through 17.

The calculation of $V_{Expansion}$ is discussed.

The calculation of $V_{Expansion}$ cannot readily be followed since the input data are contained in other documents such as TRUCON. Tables of adjustment factors similar to those provided in Tables B-2 and B-3 of Appendix B should be provided. See page A-22 to A-28 comment below.

Page A-12. Lines 19 through 24.

The statement is made that some of SRS waste would be processed to become RH-TRU. There is no evidence in the SEIS-II or other documents reviewed that there will be any RH-TRU at SRS.

Page A-13. Lines 21 through 23.

The Statement is made. "A 65-percent reduction in the TRU waste volume to be disposed of was assumed due to LDR thermal treatment of both CH-TRU and RH-TRU."

No justification is presented for the assumption of a 65-percent reduction factor in the TRU waste volume due to LDR thermal treatment. Also, it is questionable whether a 65-percent reduction should be applied to the additional inventory, since it has been compacted and will contain considerable amounts of soil.

Page A-13. Lines 35 through 38.

The statement: "A density change assumption, therefore, is made such that a 55 gallon drum containing the slag would weigh 454 kilograms (1,000 pounds). Waste density values are used in the determination of the number of shipments (Section A.3.9). See Table A-2 for the CH-TRU average drum weights used to determine the number of shipments."

Table A-2 does not provide data for a drum weighing 454 kilograms. It's not clear from Table A-2 whether it is permissible to use any number of waste drums between 11 and 42 as long as the weight of drums plus dunnage does not exceed the payload per shipment.

Page A-16. Table A-8.

The values for INEL and total in the columns labeled Post-Treatment Disposal Volume are in error. The values for INEL should be 10,000, 20,000, 30,000 m^3, instead of 10,000, 31,000, 41,000 m^3. The values for total at the bottom of the page should be 47,000, 49,000, 96,000 m^3 in Tables A-8, A-9, and A-10.

Page A-20. Table A-12.

The values for RFETS Total in the columns labeled Post-Treatment Disposal Volume are in error. The values for RFETS should be 13,000, ---, and 13,000 instead of and 19,000, ---, 19,000, and the values for Total at the bottom of the page should be 162,000, 166,000 and 329,000 m^3.

Page A-22 to A-28.

This section calculates the number of waste shipments for the various alternatives. The methodology is explained about shipping weights (Table A-2) and volume expansion to meet thermal limits (Equation A-2) earlier in the Appendix However, all assumptions were not given (e.g. how volumes were scaled to full repository size and whether the number of drums per shipment is interpolated between values given in Table A-2). For LANL CH-TRU Proposed Action shipments our calculated values were 6% lower than the 5,009 shipments indicated in Table A-15.

Page A-23. Table A-14.

The use of the term "Newly Generated Waste" for waste that doesn't exist is misleading. Use "To be-Generated Waste."

Page A-23. Table A-14.

The values in Table A-14 have not been rounded off, which is unlike Tables A-3 thru 13. Also, the columns labeled Existing Stored Volume should be relabeled Stored (1995) to be consistent with Table A-3.

Page A-28. Table A-17.

The PE-Ci/m^3 values for RFETS residues in Table A-17 are incorrect. From the inventory in Table A-23 it is apparent that the concentration should be about 17.3 PE-Ci per 55-gallon drum or 83.7 PE-Ci/m^3.

Page A-33 to A-40.

The method described here for scaling up radionuclide inventories is said to rely heavily on the Baseline Inventory Report, Revision 2 and the 1995 Integrated Data Base. Yet the results are different from those presented in the CCA and BIR Revision 3 as shown in Table 4. Values are also different for Pu-241, Am-241, Pu-240, Co-137 and Sr-90.

Table A-1

EEG Comparison of Inventories Used in
Different DOE Documents

Source	CH-TRU		RH-TRU	
	^{238}Pu CI	^{239}Pu	^{238}Pu	^{239}Pu
CCA at 2033	$1.94\text{x}10^6$	$7.85\text{x}10^5$	$1.07\text{x}10^3$	$1.0\text{x}10^4$
BIR Rev 3,2033	$1.93\text{x}10^6$	$7.85\text{x}10^5$	$1.07\text{x}10^3$	$1.0\text{x}10^4$
Table A-27&28	$1.70\text{x}10^6$	$6.82\text{x}10^5$	$6.48\text{x}10^2$	$3.93\text{x}10^3$

We were not able to reproduce the volume factors reported in Table A-25 for the Proposed Action. Our values were about 3.5% higher for CH-TRU at LANL and SRS when using V_{IDB} values from the 1994 IDB in equation A-8. This Appendix did not specify what volumes were used or how the inventory was scaled to a full repository.

More importantly, we do not see any reason for SEIS-II to derive a different disposal inventory for the Proposed Action. The Final SEIS-II should use the same values as the CCA.

APPENDIX B
SUMMARY OF WM PEIS AND ITS USE IN DETERMINING HUMAN HEALTH IMPACTS

Page B-9. Line 5 or equation B-1.

The equation for site adjustment factors is presented. Equation B-1 is confusing and needs additional brackets and explanations. The subscript $_{site}$ appears inside the square bracket and the subscript $_{keysite}$ appears outside the square bracket. The definition of SF_{site} contains the word site and the phrase key contributing sites. The definition of V_{sites} and $V_{WM\ PEIS}$ contain the word site only. The definition of C_{SEIS} and $C_{WM\ PEIS}$ contain the phrase "site Key" only. It appears that there is a multiplication of data from $_{site}$ tables with data from $_{keysite}$ tables. Finally, the large curved brackets have the subscript $_{alternative,\ subalternative}$ where alternative pertains to the SEIS-II and subalternative pertains to the Draft WM PEIS, which suggests that SF_{site} is a matrix.

Page B-9. Lines 14 through 16.

Statement: "Key contributing sites were determined by ranking the sites by cancer incidence risk for each alternative. The sites with the largest risk were then selected until a contribution of at least 90 percent of the total cancer incidence risk as reported in the Draft WM PEIS was reached."

It is not clear what this paragraph has to do with the calculation of site adjustment factors. Presumably it deals with the evaluation of the ratio of site key radionuclide concentration in SEIS-II/site key radionuclide concentration in the Draft WM PEIS.

Page B-9. Lines 31 through 33.

Statement: "Key radionuclides are those defined in Appendix D of the Draft WM PEIS as the single radionuclide contributing the highest risk cancer fatality at each site under each alternative. Key radionuclides are identified in Appendix D of the Draft WM PEIS."

Equation B-1 deals with "site key radionuclides" and not "key radionuclides."

Page B-11. Line 17 equation B-2.

The equation for adjusting the site-specific cancer incidence values of the WM PEIS is presented.

Equation B-2 is confusing and may contain misplaced subscripts. Again the subscript $_{site}$ appears inside rounded brackets and the subscript $_{keysite}$ appears outside the same rounded brackets. Presumably the subscript $_{keysite}$ should be beneath the summation symbol. Also the large square brackets that enclose $R(adj)_{WM\ PEIS}$ have the subscript $_{alternative,\ subalternative}$ which suggest that $R(adj)_{WM\ PEIS}$ is a matrix. SF_{site}, which is inside the large square brackets also involved the subscript $_{alternative,\ subalternative}$.

Page B-12. Table B-4.

The site adjustment factor for LANL should be 0.13 since this is the value used in the results of the calculations that are presented in Table B-5. The rounded off value of 0.1 is not used in the calculations.

APPENDIX C
AIR QUALITY

No Comments

APPENDIX D

LIFE-CYCLE COSTS AND ECONOMIC IMPACTS

Page D-1. Section D.1. Life-Cycle Cost.

The section does not indicate that life-cycle costs were determined for exhuming the CH-TRU waste disposed before 1970. It does not appear that these costs were analyzed in the draft WM PEIS.

Page D-2. Table D-1.

The bottom part of the table calculated the Volume Adjustment Factor. The volumes in column 5, SEIS-II CH-TRU Waste, column 6, and column 7, SEIS-II RH-TRU Waste, should be rounded off to be consistent with Table A-5. Also, the RH-TRU volumes are quite different in the two tables. The lack of consistency is confusing. It should indicate that the volumes are in cubic meters.

Page D-3. Table D-2.

Volumes in columns 5, 6, and 7, should be rounded off to be consistent with Tables A-6 and A-7.

Page D-4. Table D-3.

Volumes in columns 5, 6, and 7 should be rounded off to be consistent with Tables A-8 and A-11.

Page D-5. Table D-4.

Volumes in columns 5, 6, and 7, should be rounded off to be consistent with Tables A-9 and A-11.

Page D-5. Table D-5.

Volumes in columns 5, 6, and 7, should be rounded off to be consistent with Tables A-10 and A-11.

Page D-6. Table D-6.

Volumes in columns 5, 6, and 7, should be rounded off to be consistent with Tables A-12 and A-13.

Page D-7. Table D-7.

Volumes in columns 5, 6, and 7, should be rounded off to be consistent with Tables A-8 and A-11.

Page D-8. Table D-8.

Volumes in columns 5, 6, and 7, should be rounded off to be consistent with Tables A-9 and A-11.

Page D-10. Line 4.

The discount factor is presented as $(1/1+r)$. There appears to be an error. It is not possible to reproduce the numbers in Table D-10 using the above formula for the discount factor.

Page D-10. Table D-10.

The rounding off of numbers is very crude. The values for Inflation-Adjusted Discount Rate of $r=3$ percent and $r=5$ percent in column 3 are the same. It is not possible to come close to the numbers in row 3 using a discount factor of $1/1.05^{35}$. Rounding off to the nearest $0.5 B in column 3 on a value of $3.5B does not build confidence. This amounts to 15%.

APPENDIX E
TRANSPORTATION

The Appendix E, review concentrates on the discussions and calculations relevant to the radiological aspects of the Proposed Action for truck transportation, since this is the most likely final choice for waste shipments to WIPP. Implications of the alternative actions, rail transport, and hazardous chemical impacts were evaluated in less detail.

EEG reviewed various DOE WIPP transportation documents over the years and produced several related reports. None are referenced. One report ("Risk Analysis of the Transport of Contact Handled Transuranic (CH-TRU) wastes to WIPP along Selected Highway routes in New Mexico using RADTRAN IV," Anthony F. Gallegos and James K. Channell, EEG-46, August 1990) is particularly relevant to Appendix E. EEG-46 is a reasonable and adequately conservative evaluation of transportation risks. Our review of Appendix E is a comparison with EEG-46. Consideration was given to the fact that Appendix E is a nationwide assessment and changes in assumptions have occurred since 1990.

Page E-2.
The statement "The SARP application for the RH-72B shipping cask is to be submitted to the NRC in September of 1996 is incorrect." It was submitted in December of 1996.

TRUCK TRANSPORTATION

Routes and Mileage

The proposed waste shipment routes to WIPP agree with our understanding. The distance reported in Table E-5 from LANL to the WIPP site (549 km, with 512 km being rural, 34 suburban and 3 urban) agrees favorably with that used in EEG-46 (548 km, with 509 km rural and 39 km suburban). Distances from the other sites were not checked, but appear reasonable.

Non-radiological Accidents

DOE reported accident, injury, and fatality impacts per roundtrip shipment from each site to WIPP in Table E-8. However, since accident rates per kilometer were not given, the values in Table E-8 could not be checked. The back-calculated accident rates for the LANL to WIPP route (1.62×10^{-6}/km in suburban areas and 3.13×10^{-7}/km for rural areas) are reasonably close to the values used in EEG-46 (3.21×10^{-6}/km rural and 1.78×10^{-6}/km urban and 1.78×10^{-6}/km suburban).

Accident per shipment data from Table E-8 and the number of shipments values from Tables E-1 and E-2 were used to check the total values for the proposed values in Table E-9. Agreement was within 3% and differences were probably due to rounding error. The EEG-46 value of 5.0 accidents (while carrying wastes) in New Mexico extrapolated to 52 CH-TRU roundtrip accidents. This was adequate agreement (-10%) with the SEIS-II value of 58 accidents.

We agree with the value of 0.165 (rounded to 0.2) LCFs from vehicle pollution in urban areas.

Accident Free Radiation Doses

In Table E-10 (RADTRAN INPUT, Etc.) it is not clear why the number of people exposed per stop and the exposure distance is different for CH-TRU and RH-TRU.

The aggregate accident-free dose to occupational and nonoccupational persons is presented in Table E-14. The non-occupational value for CH-TRU (4,200 person-rem) is similar to the value obtained (4,050 person-rem) by scaling up the EEG-46 value of 330 person-rem by a mileage factor of 40.7×10^{6} mi/7.8×10^{6} = 5.22 and a Transportation index (TI) adjustment of 4.0/1.7 mrem. This is good agreement.

The aggregate occupational dose of 710 person-rem was reproduced within 1% from methodology in SAND 84-0036 (RADTRAN III) and when using the actual average TI value (1.5 mrem/hr.) from Table E-11. This dose was not calculated directly in EEG-46.

Scenarios for calculating doses to the maximum exposed individual (MEI) are described on page E-32 and the doses are shown in Table E-15. The scenario description does not provide all the assumptions necessary to make the calculations. We were able to reproduce the CH-TRU doses for the Departure Inspector, the State Inspector, and the rest stop employee within $\pm$ 12% by using either the TI values reported in Table E-11 or the 4 rem/h value (that the text said was being used). The scenarios are sufficiently conservative so that the MEI doses in Table E-15 adequately represent the doses to members of the public and to occupational workers that do not wear dosimeters.

The calculated risk to these MEIs are not large. However, the doses average several hundred millirem/year for 10 years. This is somewhat greater than the 100 mrem/y value that most national and international agencies believe should not be exceeded from all radiation exposure combined (radiation doses from natural background and medical usage are not included in the 100 mrem/y value). These considerations suggest that the following operational control procedures should be implemented:

(1) persons who routinely inspect vehicles should be classified as radiation workers and required to wear dosimeters;

(2) normal procedures should not allow trucks carrying CH-TRU or RH-TRU wastes to routinely stop for long periods of time at locations where public exposure is likely to occur.

Maximum Transportation Accident Doses

EEG-46 calculated a maximum of 10 LCFs from a category VIII accident in North Carlsbad with an average SRS shipment (1,670 PE-Ci in 3 TRUPACTS). The probability of this event was calculated as 4.7×10^{-8}. SEIS-II calculated a bounding accident value of 16 LCF with a maximum allowable PE-Ci content in a TRUPACT-II (928 PE-Ci) and 3 LCF with an average inventory (191 PE-Ci). There were numerous differences in assumptions and there is an uncertainty about the actual population density used in EEG-46.

Attempts to extrapolate EEG-46 LCFs resulted in only about 60% of the doses reported in SEIS. The SEIS-II bounding values are appropriately conservative and indicate that very low probability accidents could have serious consequences.

It was noted in the PEIS (page E-77) that "waste shipments from LANL were found to result in the highest potential transportation accident doses." SEIS-II did not give highest potential transportation accident doses by site. The WM PEIS (footnote to Table E-26) assumed that all 3 TRUPACTs would fail in an accident. SEIS-II (page E-42) assumed only one would fail.

Aggregate Radiological Impact from Accidents

The aggregate radiological impacts from accidents in Table E-22 present the expected population dose (person-rem) from multiplying the person-rems for each accident by the probability of occurrence. The total dose for the Proposed Action is 850 person-rem (829 from CH-TRU shipments and 15 from RH-TRU. These doses are over two orders of magnitude greater than would be predicted from EEG-46 even after scaling for total system mileage. Most of this difference can be attributed to the higher impact release fractions (IRF) for accident categories V, VI, and VII used in SEIS-II. These IRF values are 100, 40, and 4 times (for categories V, VI, VII) those used in EEG-46. These categories have a much higher probability of occurrence and actually contribute more to the expected doses than category VIII accidents. It is concluded that these aggregate population doses from accidents are appropriately conservative.

Rail Shipments

On page 3-7 the SEIS gives four reasons why truck only transport was chosen: (1) limited interest by rail carriers; (2) higher cost of dedicated trains relative to truck shipments; (3) cost of acquiring additional TRUPACT-IIs; and (4) rail carriers would not assure DOE that transport could occur in less than 60 days. SEIS-II discusses 7 issues (bottom of page E-58 and top of page E-60) that need to be addressed before a decision can be made to use rail transport. The present uncertainties mentioned for these issues are largely true. However, it is unclear whether DOE has seriously re-evaluated this issue since the decision about 12 years ago to have truck only transport to WIPP. There is no indication in DOE/WIPP 93-050 (Comparative Study of WIPP Transportation Alternatives, February 1994) that the decision was really re-evaluated.

The values reported in Tables E-29 through E-32 were "determined by adjusting the transportation impacts from truck shipments" (page E-58). Examples of questionable assumptions used in this analysis are:

(1) The average speed in all population zones was said to be 55 miles per hour for truck transport. This is inconsistent with Table E-10;

(2) The total miles assumed to be the same for truck and rail. SEIS-I actually developed rail route distances (see Table D.4.2). Distances by rail were 16%-26% greater for all of the major generating sites;

(3) The origin of the 89% rural, 10% suburban, and 1% urban breakdown is not given. The mileage - average for the distances in SEIS-I (weighted for the number of SEIS-II shipments) is 87%, 12%, and 1%;

(4) The basis for the assumption that the number of individuals sharing the transportation corridor is at least two orders of magnitude less is not given;

(5) We cannot reproduce the value in equation E-5 from equation E-4. The value of TI in E-4 should be 0.033 (from the previous page). Also, a value is needed for N (number of rail shipment transfers per shipment). If N were about 3.2 and TI was .033 the dose would be 1.7×60^{-4}(TI)M;

(6) The logic for assuming that the aggregate radiological consequences of rail accidents were identical to truck accidents (first paragraph under E.7.3, page E-62) is unclear (same miles traveled times less frequency for rail accidents = same as truck). Is this because the release would be double in rail accidents?

A comparison of the Rail Transportation impacts in Tables E-29 (Action Alternative 1) and E-30 (Action Alternative 2) indicates there are less effects from rail transport than from truck transport (Tables E-9 and E-14. This suggests that SEIS-II should provide a better rationale for using truck only transportation or else seriously re-evaluate whether a truck and rail mix might be preferable.

Alternatives

The results of Alternative Impacts from accidents, vehicle pollution, and routine radiation exposure that are presented in various tables were studied to see if the values were reasonable compared to the Proposed Action. In all cases, the values appear to deviate in the expected direction from the Proposed Action and the magnitude of the deviation seemed reasonable. More description in the text explaining these differences would be helpful however. For example, is the lower (relative to the Proposed Action) non-occupational radiation dose total in Table E-14 for CH-TRU waste in Alternatives 2A and 2B due solely to the fact that there are fewer miles travelled (which can be implied from Table E-9)? Does this calculation use the TI values from Table E-11, or does it use a TI of 4 in both cases?

The statement on page E-53 that for thermally treated waste "The release fraction would be reduced by a factor of 1,000, ..." is not referenced or justified. Some reduction would be expected, but a three order-of-magnitude reduction requires justification.

A large number of comparisons are made about the transportation effects between alternatives in Appendix E. These comparisons include expected radiological and non-radiological risks from both incident free and accident conditions. The consequences of severe low probability accidents are also evaluated. Yet there is no discussion in this Appendix of using this information to aid in the selection of the appropriate action. The impression given at this time is that the Proposed Action is the only one being considered.

Page E-43. Equation E-1.

There appears to be a typographical error. Equation E-1 has a parameter named FMPI while the explanatory text has a parameter named FMRPI.

Page E-45. Equation E-2.

There appears to be a typographical error. Equation E-2 has a parameter named FMRT while the explanatory text has a parameter named FMRPT.

Page E-64. Section E.8.2.

There is a conversion error in the first paragraph of this section: 3.4×10^6 cubic meters is equal to 1.2×10^8 cubic feet (not 10^6).

APPENDIX F

HUMAN HEALTH

(from Routine Operations)

Page F-14. Section F.2.3.3 External dose of Involved Workers.

No units are given in Tables F-11 through F-15. This should be corrected in the Final SEIS-II.

Page F-17, last paragraph.

The statement that only a small volume of waste would require packaging is perhaps misleading. "Repackaging" is intended, not "packaging". As mentioned under page A-12 comments, about 14% of wastes exceed thermal limits even with bagless posting and a significant percentage of existing wastes are believed to contain bags. Also note that the Draft SAR Appendix A states that DOE plans to repackage or process 88% of the existing CH-TRU waste.

Page F-18, first paragraph.

Dose rates are said to be reducible by administrative controls but no credit is taken for this. Credit should not be taken because there is no commitment to exercising administrative controls.

Page F-18. Equation F-1.

No reference is provided as to where the input data of D_{id} and C_{ic} can be found. Without these input data, it is not possible to verify independently the average surface dose rate in Table F-17.

Page F-20.

The reason for calculating the worker lifetime dose on a per waste panel basis is not apparent since the exposure assumptions are unrelated to the filling of a panel. All that is needed is the assumption of the hours per year that the worker is present at 1 meter from the drum and the average 1-meter dose rate from Table F-17. The workers should have exposure time limited to 345 hours per year in order to have the annual dose $\leq$ 1 rem for an average 1-meter dose rate of 2.9 mrem/hr. Furthermore the assumption in Table F-18 that the 10 panels will be completed in 20 years is inconsistent with the rationale described in the last paragraph of page F-20 that would require 23.2 years in order to hold doses to 1 rem/year. These calculations do not appear to address exposures from the installation of MgO around the drums.

Page F-21.

Attempts to reproduce two of the individual dose values for storage site workers for alternative 1 resulted in values that were +12% and -17% of the Table F-22 values. In this effort we started with the average 1-meter dose rate in Table F-17 and decayed screening values from Table F-12 over the 20 to 55 year period to obtain average annual dose rates for the 35 years. Ingrowth of ^{241}Am from decay of ^{241}Pu was also included. It would be helpful to reviewers if SEIS-II gave more details of the calculations so they could be checked without making numerous assumptions.

The SEIS-II chose to evaluate the radiological effects of routine operations involving lag storage and no action alternatives on the 35-year working lifetime of individual workers. These results are presented in Table F-22 and this is an appropriate way to evaluate the risk to an individual worker or a (35-year) generation of workers. However, it does not indicate the cumulative effect over several generations (for the various action alternatives) and perpetually for the No Action Alternatives. The method used makes the human health effects (LCFs) of the alternatives appear better in comparison with the proposed action than it would be if multi-generational effects were included.

Page F-21. Equation F-3.

No reference is provided for the input data of $V_{CH,S}$ and T. The definition of T as a worker throughput rate of one worker per 1,000 cubic meters is confusing. It is not possibly to verify independently the values in Table F-19.

Page F-25.

The involved worker lifetime radiological impacts from routine CH-TRU waste disposal operations in Table F-21 total 720 person-rem for the entire disposal phase. This total is derived from 36 workers x 20 rem/worker =720. The WIPP Safety Analysis Report (DOE/WIPP-Draft - 2065 Revision 1, Table 7.1-2) used 36.9 rem/year for 38 persons and a 35 year disposal period. This totals 1,292 person-rem and a dose of 34 rem/per person. This is 1.8 times the worker population dose used in SEIS-II. The main difference is in assuming a 35 year disposal phase rather than a 20 year phase. DOE should present consistent methodology and results in its related WIPP documents.

The individual lifetime worker doses in Table F-22 for RFETS are excessively high. Both Action Alternative 1 and No Action Alternative 2 exceed occupational limits (5 rem/y) every year for 35 years. Surely such doses would not be allowed. These doses need to be explained or the text needs to be corrected.

APPENDIX G
FACILITY ACCIDENTS

There is no statement that SEIS-II is in compliance with the report, U.S. Department of Energy, 1993, *Recommendation for the Preparation of Environmental Assessment and Impacts Statement,* Washington, DC: Office of National Environmental Policy Act Oversight nor that it is in compliance with the DOE/New Mexico C & C Agreement. The second statement in the WM PEIS, APPENDIX F, Treatment and Storage Facility Accidents, F.1.1. SUMMARY, indicates compliance with the above cited document.

Page G-1. Lines 31 and 32.

Statement: "The health impacts from acute exposures to radionuclides from accidental releases were calculated as described in Appendix F."

The statement is incorrect. Appendix F deals with human health impacts that may result from exposures to radioactive materials and hazardous chemicals during routine storage operations at waste storage sites and during routine disposal operations at the WIPP.

Page G-2. Lines 3 through 5.

Dose-to-risk conversion factors for a population are given with a unit of /rem.

The unit is incorrect. The unit for dose to risk conversion factor for a population is /(person-rem). The dose-to-risk conversion factors are correctly presented on page F-2.

Page G-8. Table G-4.

If Pu-238 and Pu-240 are considered to be major contributors to dose at ORNL, Pu-239 should also be listed in that category.

Page G-13. Line 40.

Statement: "Because of the serious nature of the accident, the involved workers were assumed to be fatally injured."

There should be an indication of the number of workers involved.

Page G-14. Table G-9.

The text on page G-13 states that thermally treated waste is placed in 5 drums simultaneously. Scenario T4 shows 4.9 drums. The difference is small, but the lack of consistency is confusing.

Page G-17. Line 4.

Q is defined as the radionuclide or hazardous metal inventory of a waste container (from Appendix A). Appendix A provides radionuclide inventories only on a per treatment site basis. Additional calculations are required to convert the data to a per drum basis. It is not possible to independently verify the health impacts data presented in Tables G-13, G-16, and G-19.

Page G-18. Equation G-2 and line 6.

The quantity E/Q is known as the relative concentration (NUREG 1.145 or WIPP/SAR). The quantity is not defined in the Glossary and E/Q cannot be found in Acronyms and Abbreviations. In Table G-12, E/Q is referred to as the atmospheric dispersion factor. There should be consistency and the omission from the Glossary and from the Acronyms and Abbreviation should be corrected. This term has historically been labeled as χ/Q (Chi/Q). The use of the E/Q terminology is unnecessary and confusing.

Page G-18. Table G-11.

Column 3 of Table G-11 presents "population-Weighted E/Q (sec/cubic meter)".

The quantity "Population-Weighted E/Q" is not defined in the Glossary. Presumably, the units of "Population-Weighted E/Q" should be (person-sec)/(cubic meter). The parameter and its correct units should be included in the glossary.

Page G-21. Lines 11 through 15.

Statement: "Acute releases were assumed to be dispersed in one direction, so population impacts were estimated for a single, maximally exposed, 22.5 degree sector (out to 80 kilometers [50 miles]) and not for the entire 80-kilometer (50 mile) region population. Population weighted atmospheric dispersion values were calculated and used to determine the maximally-impacted sector, considering both the change in air concentration over distance and the population impacts in a single 22.5-degree sector."

The description does not make it possible to independently verify the calculations. The discussion should include equations for the calculations of the population-weighted atmospheric dispersion values and for the calculations of the population impacts in a single 22.5 degree sector.

Page G-30. Lines 3 through 5.

Statement: "Intakes of radionuclides could result in a dose of up to 14,800 rem, with a corresponding probability of an LCF of greater than 1."

Numerically, a probability is a dimensionless number with values between 0.0 and 1.0. 0.0 indicates that the event cannot occur and 1.0 indicates that the event will occur with absolute certainty. A probability cannot be greater than 1.0. Also, a TEDE of 14,800 rem may be a lethal dose (rather than an LCF) even for transuranic wastes where internal doses are delivered over many years.

Page G-36. Lines 28 and 29.

Statement: "The fission products contributing the most to external dose rates were Cs-137/Ba-137m and Co-60,...."

Co-60 is an activation product and not a fission product.

G-42. Table G-28.

Insufficient data are provided in the text to verify the dose calculations. The text does not provide a reference for the dose conversion factor, DCF, for PE-Ci, and it is not possible to calculate the source term for accident scenario 3 (earthquake) because there is no reference to the number of waste drums involved.

Page G-46. Table G-31.

See comment page G-42. Table G-28.

Page G-49. Table G-33.

See comment page G-42. Table G-28.

APPENDIX H

LONG-TERM CONSEQUENCE ANALYSIS FOR PROPOSED ACTION AND ACTION ALTERNATIVES

A general comment is that EEG believes that the Final SEIS-II should use methodology, codes, and selected data from the CCA. Any modifications to the October 1996 CCA available prior to writing the Final SEIS-II should also be incorporated.

The EEG has identified a number of concerns on the long-term consequence analysis in our review of the Compliance Certification Application (CCA). A number of plausible scenarios have not been analyzed, many conceptual models of breach are invalid, and many parameter values selected for analysis are wrong. The EEG has submitted detailed comments on the CCA to the EPA and plans to publish a report (EEG-65) outlining these concerns, in the near future. These concerns should be taken into account before a record of decision is developed.

Some of the EEG concerns published in our review of the draft CCA (EEG-61) have been incorporated in Section H-8 of this Appendix. The discussion in this section shows that most of these issues remain unresolved. We recommend, therefore, that no decision on the basis of SEIS-II analysis be made until these concerns are resolved in the process of the CCA review and the EPA's certification rule-making process.

Pages H-7&8. 75th Percentile Values.

There is no justification for the claim that the 75th Percentile Values as used lead to a realization that is "within 1% of the maximum release statistically possible." See comments under Page 5-40 & 41.

Page H-8. Last full paragraph.

The analysis is said to have shown no releases into the Culebra dolomite. This is inconsistent with the CCA, which showed releases in a number of realizations.

Page H-24. Next to last paragraph.

Contrary to the statement in this paragraph, the impacts of chemical retardation are being calculated in the PA for the CCA.

Page H-30. Table H-7.

These solubility values are from the DCCA. They are somewhat higher than those being used in the CCA because of the effect of MgO backfill. Final SEIS-II should use the CCA values.

Page H-34. Lines 1 through 6.

Reference is made to Figure H-7 and to Table H-8.

It is difficult to follow what the relationship is between Figure H-7 and the data in Table H-8. There is no explanation on how the last row of Table H-8, entitled Total Repository Volume, is obtained. It is not clear what the relationship is between Rest of Repository, Separately Modeled Panel Volume, and Total Repository Volume. Some additional clarification should be presented.

Page H-36. Table H-8.

The z distance in a two-dimensional grid was increased by factors of approximately 8 in order to accommodate the larger waste volumes in Action Alternatives 1, 2, and 3. This violates the two- dimensional assumption of the BRAGFLO grid. A three-dimensional analysis may be needed to give reliable results.

Page H-49. Table H-22.

The CCA used much smaller brine reservoir values than the volume estimated for WIPP-12. EEG has reservations about this CCA assumption. Also, the compressibility value shown should be for rock compressibility, not pore compressibility (pore compressibility = rock compressibility ÷ effective porosity).

Page H-52. Lines 1 and 2.

Statement: "The pressure release of the waste panel, as a result of the exploratory drilling event at 100 years post-closure, is clearly evident for Case 2 and 4 in Figure H-8."

In Figure H-8, the pressure release for cases 2 and 4 appears to occur at 400 years post-closure. No explanation is provided in the text for the delay in pressure release from 100 years post-closure (time of drilling event) to 400 years post-closure (time of pressure release). Also, Figure H-8 indicates a significant pressure increase between 700 years and 1,300 year post-closure for cases 2 and 4. Finally, the asymptotic behavior for cases 2 and 4 at 10,000 years post-closure is significantly different. Are the differences in the brine pressure for cases 2 and 4 the result of error propagation in numerical solutions of the differential equations? Some discussion should be provided in the text.

Page H-52, Figure H-9.

The appropriate conversion factor between pCi/1 and Ci/m^3 is 1 pCi/1 = 10^{-9} Ci/m^3 (not 10^{-15} pCi/1). See page 5-43 comment.

Page H-55 and Later. Table H-24.

No attempt was made to check the reasonableness of the assumptions and calculations of releases and doses to the driller. It is noted in Table H-24 that the value for Pu-240 is incorrect. It will be a few percent of the Pu-239 value, not less than 0.01%.

Page H-57. Last paragraph.

Because of the pCi/1 to Ci/m^3 conversion error mentioned, we are unsure whether the 1 pCi/1 value quoted here is correct or whether the value is 10^{-6} pCi/1.

Page H-60. Lines 1 and 2.

Statement: "The pressure release of the waste panel as a result of the exploratory drilling event at 100 years post-closure is clearly evident for case 7 and 9 in this figure."

Figure H-11 indicates a pressure release at almost 500 years post-closure. This is significantly different from 100 years post-closure, which is the time of the drilling event. No explanation is provided in the text for this delay. Are the differences in the asymptotic behavior at 10,000 years post-closure between cases 6 and 8 and cases 7 and 9 the result of error propagation in the numerical solutions of the differential equations? An explanation should be provided in the accompanying text.

Page H-62. Table H-29.

For the radionuclides of Am-241, Cm-244, Pu-238, Pu-239, Pu-240, Pu-241, U-233, and U-234, column 3, CH-TRU and RH-TRU Waste Panel, is the sum of column 1, CH-TRU Waste Panel, and column 2, RH-TRU Waste Panel. For other radionuclides such as Ac-227, Cm-243, Cs-137, Pa-231, Sr-90, and Y-90, column 3 is not the sum of columns 1 and 2. A more detailed explanation for columns 1, 2, and 3 should be provided in the accompanying text.

Page H-66. Lines 25 and 26.

Statement: "The pressure release of the waste panel as a result of the exploratory drilling event at 100 years post-closure is clearly evident for cases 12 and 14 in the figure."

Unlike the spiked brine pressure curves for cases 2 and 4 in Figure H-8 and for cases 7 and 9 in Figures H-11, the brine pressure curves for cases 12 and 14 are smooth and peak close to 1,500 years post closure. No explanation is provided for the difference in behavior of the brine pressure curve for cases 12 and 14 from cases 2, 4, 7, and 9.

Page H-72. Lines 15 and 16.

Statement: "The pressure release of the waste panel as a result of the exploratory drilling event at 100 years post-closure is clearly evident for cases 17 and 19 in this figure."

See comment page H-52, lines 1 and 2. See also comment page H-60, lines 1 and 2.

Page H-74. Table H-39.

See comment Page H-62. Table H-29.

APPENDIX I
LONG-TERM CONSEQUENCES OF NO ACTION ALTERNATIVE 2

This Appendix was reviewed for general approach, assumptions used, and conclusions reached. Little was done to check calculations. The calculations were done in a preliminary manner compared to those for the Proposed Action and (especially) in the CCA. Therefore it is not possible to compare results in more than general terms.

Page I-1. Last paragraph.

The statement is made that both the FEIS and SEIS-I records of decision (ROD) determined that the No Action Alternative was unacceptable "because of the potential impacts of natural, low-probability events and human intrusion at storage facilities after government control of the site is lost." Presumably, this will also be the decision in the SEIS-II ROD. However, this Draft SEIS-II has not addressed the issue of whether it is appropriate to trade-off predictable early fatalities from accidents and routine radiation exposure against the threat of low-probability events far in the future. Nor is there an estimate of the probabilities that these future events will occur.

Page I-3. Section 1.2.1.

The set of assumptions used for inadvertent human intrusion impacts are appropriately conservative.

Page I-6. Equation 1-2.

The convolution integral appears first in equation I-2. All the explanations pertaining to the convolution integral given much later with equation I-7, should be given first with equation I-2.

Page I-9. Equation 1-7.

The symbol for the convolution operation is used twice, the second time inside an integral.

The use of the convolution symbol inside the integral is incorrect. A symbol representing multiplication should be used inside the integral.

Page I-11. Next to last paragraph.

The dimensions given here (66 cm diameter and 91 cm height) for a 55-gallon drum differ from those used in WIPP Performance Assessment (60.2 cm diameter and 89.2 cm height). Use of the PA dimensions gives a surface-area-to-volume ratio of 0.11 cm^{-1}.

Page I-12. Line 3.

The effective lifetime of 500 years for cemented TRU waste forms in this analysis may not be conservative.

Page I-12. Line 9.

Statement: "BIR-2 specifies a waste volume and waste density for each of 10 waste material types (Table I-1). These waste material types were categorized into one of the generated TRU waste-form categories modeled in this analysis."

The reference in parenthesis to Table I-1 belongs at the end of the second sentence.

Page I-12. Lines 23 through 25.

Statement: "These relative quantities were multiplied by the total TRU Waste volumes for the site (see appendix A) to determine final site volumes for each TRU waste form category. Volumes are also reported in Table I-2."

It is not possible to obtain the waste volumes reported in Table I-2 (columns 3 and 4) by multiplying the waste volumes of Table A-14 by the relative quantities given in Table I-2 (columns 1 and 2).

Page I-17. Fourth Paragraph.

Buried wastes are assumed to not release any wastes by surface erosion/dispersion mechanisms. Yet Table I-6 predicts that 6 of the 7 major sites will have enough surface erosion to expose wastes in less than 10,000 years. The assumption used may maximize groundwater contamination. Does it necessarily maximize total population dose?

Page I-27. Table I-7.

Our calculations (for inhalation and soil ingestion only) of driller impacts at LANL and SRS gave values that were 1.6 and 3.1 times as high as the values in this table. We had to make several assumptions that should have been provided.

Page I-31. Twelveth line from bottom.

The maximum dose of 14.5 rem should be per lifetime (not per year).

Page I-31. Figure I-4.

Why are the lifetime doses for MEIs at all sites totalled? These are all different individuals and there is no significance to a total dose.

Pages I-33, 34. Figure I-5 and Table I-11.

The curves in Figure I-5 can be used to approximate the total of 2,325 LCFs over 10,000 years mentioned on page I-31. Our estimate was about 10% higher than this.

It is interesting to compare these estimated LCFs with values that are permitted for geological disposal of TRU wastes in 40 CFR 191. However, in doing so, we realize that these estimates do not have the level of detail and justification required in 40 CFR 191.

The standards in 40 CFR 191 (which apply to WIPP) were based on the assumption that a permissible limit was 10 LCFs per million curies of alpha-emitting transuranic radionuclides with half-lives longer than 20 years. This scales to about 42 LCFs in 10,000 years for the various inventories listed in Appendix A. The estimate in this Appendix of 2,325 LCFs for NAA 2 is over 50 times higher than would be allowed at WIPP.

A conclusion that long-term storage is much worse is site specific. If one uses the curves in Figure I-5 and the inventories in Tables A-36 and A-38 to determine the amount of activity stored at each site it can be shown that wastes left at SRS, Hanford, and ORNL would be under the 40 CFR 191 limit. Again, there is the caveat that these calculations are less detailed and justified than would be required to show compliance with 40 CFR 191.