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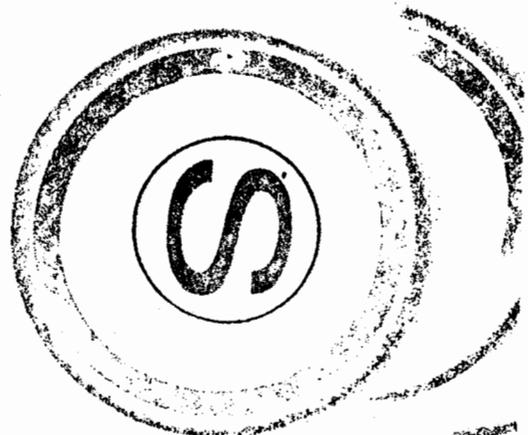
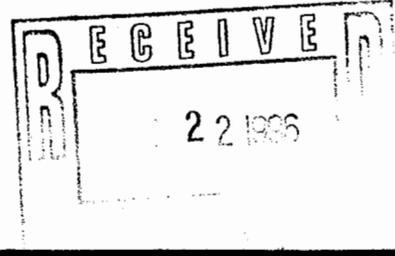
ADDRESSEE:

C. Dials

CC: Hunter / Kilgore
Farley

ACTION:

REC'D ON:





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January 17, 1996

Mr. George E. Dials, Manager
U.S. Department of Energy
Carlsbad Area Office
P.O. Box 3090
Carlsbad, NM 88221-3090

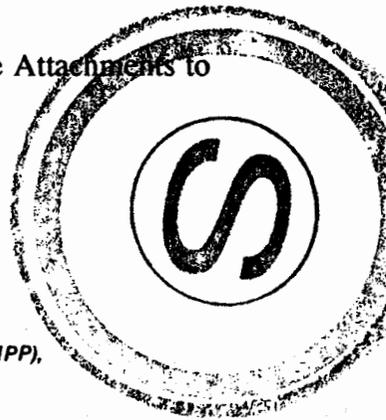
Dear Mr. Dials:

Enclosed are comments on the Waste Isolation Pilot Plant (WIPP), Safety Analysis Report (SAR), DOE/WIPP-95-2065 REV.0, Copy # 17, dated November 1995, and received December 27, 1995.

This letter responds to the DOE request for SAR comments by January 15, 1996. Because the final SAR and most of the supporting information were not received until December 1995, our review is not comprehensive.

Of particular importance is our pending review of the assessment of potential doses to workers from postulated accidents at the WIPP (ITRI-951101, dated November 30, 1995 and received December 27, 1995). The need for worker dose calculations has been consistently stated at DOE/EEG 1995 Quarterly Meetings. Worker dose calculations are an essential part of the SAR, and consequently, the report will be carefully reviewed. CAO has chosen to delete from the SAR calculations of worker dose from the accidental release of radioactivity despite the precedent of including such calculations in the past, the C&C Agreement between NM and DOE, and DOE's own internal regulations for the material to be included in the SAR.

Notable comments from our review to date are summarized below and in the Attachments to this letter.



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Radionuclide Limits for Waste Containers

Chapter 5 requires the CH-TRU waste drum radioactive content to be limited to 80 PE-Ci, and standard waste boxes to 130 PE-Ci. We agree that these are reasonable limits and introduce a conservatism in accident calculations that significantly reduce the potential risks to WIPP workers and the public.

The adequacy of generator site waste container assay methods should be carefully reviewed in order to insure conformance with the required radioactive limits.

Worker Dose Calculations

As stated above, the EEG intends to carefully review the ITRI calculations. Following the review, we have proposed a technical meeting with the report authors, and formal comments will then be prepared for transmittal to the DOE. We would like to complete this technical review prior to meeting with the DOE to discuss our formal SAR comments.

Spontaneous Ignition of Waste Containers

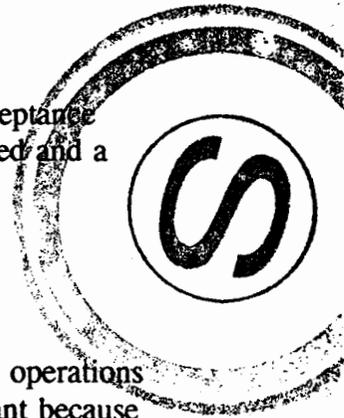
Although the SAR provides additional information on fire potential and accident analyses as compared to the previous FSAR, there is a need to review and discuss the probability of such events. Comments in Attachment 1 to this letter (under the heading "Appendix D"), explain some of our concerns.

WAC Requirements

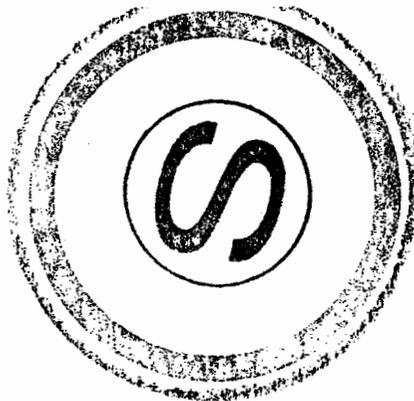
In the hazard and operability analyses (Appendix C of the SAR), the Waste Acceptance Criteria (WAC) are cited as important safeguards. The WAC have been modified and a review is necessary to assess the impact on the SAR.

RH-TRU Waste Analyses

The SAR did not consider remote-handled (RH-TRU) operations, although these operations were previously addressed in the May, 1990 FSAR. These analyses are important because RH-TRU waste emplacement, handling, and storage involve use of common facilities with



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CH-TRU waste, and emplacement timetables may be affected as well as the maximum amount of RH-TRU that can be emplaced.

Seismicity

Attachment 2 contains a discussion of current issues regarding the seismicity of the WIPP site. Additional information, including some on-going studies, should be considered for inclusion in the SAR. In addition, the importance of secondary oil recovery operations by water flooding has been established as a likely cause of earthquakes in the Central Basin Platform area east of the WIPP site. The effect of these activities on WIPP seismicity should be considered for the site operational period.

VOC Monitoring

Chapter 1 states that volatile organic compound (VOC) concentrations are orders of magnitude below regulatory limits, but Chapter 7 data does not support this contention. Chapter 7 states that VOC monitoring is not planned during operations. It appears that the rationale for the SAR positions are not substantiated.

Backfilling

Backfilling of waste after emplacement is required by the Consultation and Cooperation (C&C) agreement. The rationale for deleting this requirement needs to be addressed. For example, use of backfilling can significantly affect operational methods and air monitoring.

SAR Review

The format and content of the Safety Analysis Report was completely changed in 1995. This was a significant effort on the part of the DOE and WID. The EEG tried to provide meaningful and timely comments during this process, but obtaining the supporting information has complicated our review. In the future, we do not expect the magnitude of SAR changes to be as large as in 1995, and it should be easier for us to review the draft SAR and for you to provide supporting documentation and address our comments. We would like to discuss methods for streamlining the review process.

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We appreciate the effort of your staff to cooperate and integrate the EEG comments into the safety analysis report.

Sincerely,

A handwritten signature in cursive script, appearing to read 'Robert H. Neill'.

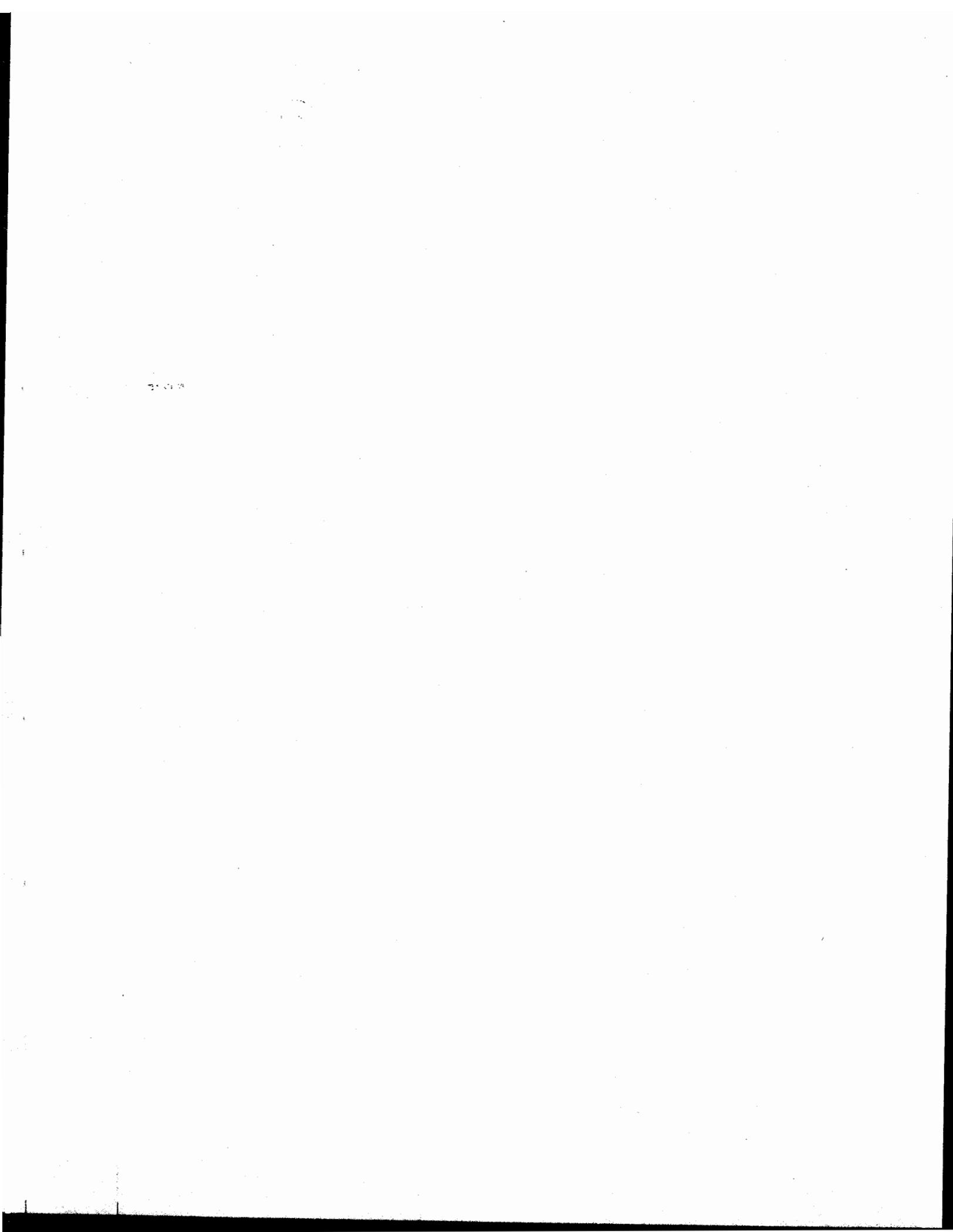
Robert H. Neill
Director

RHN:WTB:pf

Attachments (2)

cc: Richard Farrell, DOE/CAO
Kent Hunter, DOE/CAO ✓
Doug Gerstner, DOE/WID
Lindsay Lovejoy, NMAG
Chuan-Fu Wu, WID
Larry Weinstock, EPA
Chris Wentz, NMEMD



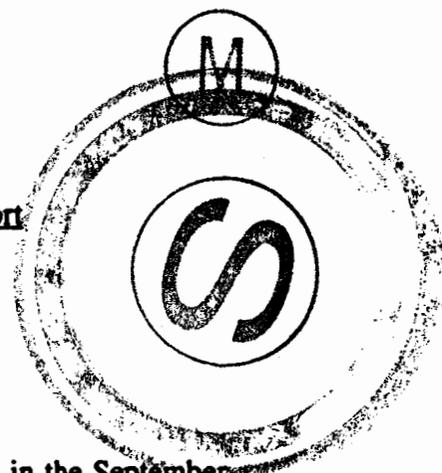


ATTACHMENT 1

Specific EEG Comments on the
Waste Isolation Pilot Plant Safety Analysis Report

November 1995

DOE/WIPP-95-2065 REV. 0



To facilitate the review process, page and line references are as found in the September 1995, Draft B, edition of the SAR. If pagination changed in the November 1995 edition, the change is noted in parentheses.

CHAPTER 1

This Chapter is an executive summary and detailed comments are more appropriately discussed in the respective chapter comments.

Page 1-4, lines 46-47

It is claimed that active institutional controls will continue for at least 100 years.

(Edit and/or Request) We are not aware that there has been such a commitment.

Please reference the commitment (if it exists) or modify the statement.

Page 1-5, lines 1-2

The SAR is said to document "safety bases to ensure the safety of workers". However, no accident dose calculations are presented.



(Request) The November 30, 1995, document on accident dose calculations, ITRI-951101, was received on December 27, 1995. Pending the EEG review of this document, the calculations should be referenced and a summary of the information should appear in the SAR.

Page 1-8, line 7 (now in third paragraph)

It is stated that: "A typical disposal panel consists of up to seven disposal rooms."

(Editorial, please answer the questions and clarify the SAR text) Are panels with less than 7 rooms being considered?

Page 1-16, Safety Analysis Report Organization.

This section lists the 10 chapters in this SAR volume and provides 3 Tables (a total of 13 pages of tables) showing where the current organization covers topics that were: (1) covered in the FY-94 SAR; (2) required by the Consultation and Cooperation agreement with the State of New Mexico; and (3) required by DOE Order 5480.23.

(Comment) This appears to be a conscientious effort to resolve these concerns, although some specific questions are identified below.

Page 1-20, lines 24-27 and page 1-22, lines 17-19.

(Comment) It does not appear to be technically correct to state that the outside of waste containers will be contamination free.





Page 1-22, lines 24-26

VOC concentrations during normal operations are said to be many orders of magnitudes below health based limits.

(Recommendation) The statement here and in other parts of the SAR is misleading. Table 7.2-1 shows that maximum carbon tetrachloride concentrations from normal underground operations are 5.2% and 0.4% of health based limits for the public (at the land withdrawal boundary) and occupational workers respectively. The SAR data is inconsistent with the SAR conclusions. The text should be changed to accurately reflect the limits shown in Table 7.2-1.

Page 1-22, lines 32-33

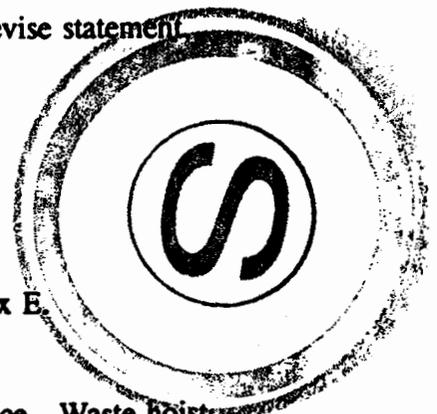
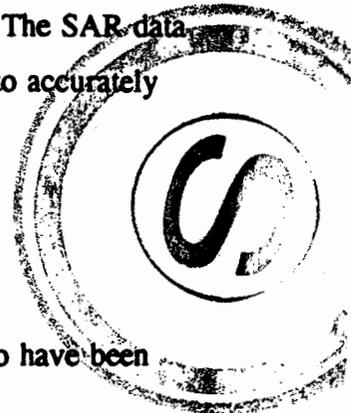
Decontamination and overpack and repair operations consequences were said to have been addressed.

(Request) No analysis were found in Chapters 5 or 7. Please revise statement identify location of analysis data, and/or put analysis in SAR.

Page 1-31, Table 1.3-1, 7B

The reliability of the Waste Hoist is said to now be covered in Appendix E.

(Comment and Request) We can not find the Appendix E reference. Waste hoist accidents are covered in Section 5.2.3.5 and reference is made to Appendix D waste hoist probability calculations. In Appendix D, there is a statement about the probability of hoist failure being much less than 10^{-7} annual probability of occurrence,





and there is a reference to WCAP-13800. In November 1995, the EEG published an analysis of the annual probability of waste hoist failure of the waste hoist brake system (EEG-59). We agree that the calculation of the probability of waste hoist failure is less than 10^{-6} , but this failure rate is contingent upon the "mission time," and the mission time is significantly reduced by the "preoperational check" tests. It is requested that the SAR be modified accordingly to require preoperational checks. We would like to discuss this issue and the SAR requirements during the resolution phase of the Implementation Plan, due to be completed by April 15, 1996.

Page 1-34, lines 3, 10, 19.

Backfilling as required by the C & C Agreement has been deleted without explanation.

(Recommendation) The information or rationale for not including this information should be provided in the SAR.

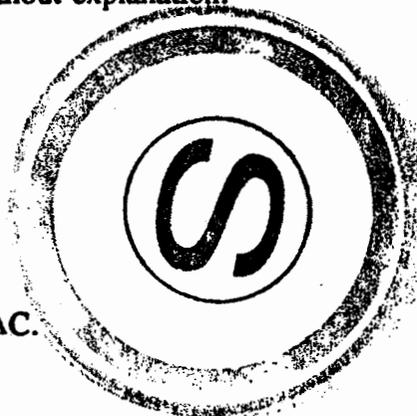
Page 1-37, line 15.

The security topic required by the C&C Agreement has been deleted without explanation.

(Request) Where is the information located in the SAR?

Page 1-20 lines 14-15

Reference is made that "Surface Dose Rate" requires revision in the WAC.





(Request) We can find nothing in Chapter 5 (or Chapter 7) regarding either surface dose rate or surface contamination that suggests a change is indicated. Please explain this statement if it is correct or delete it if it is a mistake.

CHAPTER 2

Page 2-10, Line 12-15

The sentence "With the exception of existing rights..."

(Editorial) The sentence lacks a verb.

Page 2-10, Line 34

The sentence "...a DOE/Bureau of Land Management (BLM) Memorandum of Understanding (MOU) and the BLM Resource Management Plan."

(Editorial) There is more than one MOU. Please provide the reference in the SAR.

Page 2-11, Lines 1 through 5, Section 2.1.2.1

The paragraph uses the same acronym, LWA, for Land Withdrawal Act and for Land Withdrawal Area.

(Editorial) To be consistent with other documents, use LWA for Land Withdrawal Act.



Page 2-11, Line 6

(Editorial) It appears that reference 1 should be reference 2.



Page 2-11, Lines 18 through 24, Section 2.1.2.1.3.

(Recommendation) The discussion should indicate that there is potash mining within five miles of the WIPP Land Withdrawal Boundary. Also, the disposal of salt water in several salt water disposal wells needs to be mentioned. The SAR should include a map of the area to clearly communicate the location of these reserves and facilities.

Page 2-19, Section 2.2.2, (no line numbers)

The first sentence states that "Within a five mile radius from the center of the WIPP Land Withdrawal Area (LWA), both oil and gas are extracted from the Salado formation."

(Editorial) Contrary to the opening sentence in this paragraph, oil and gas are not extracted from the Salado Formation, and the sentence should be corrected.

The statement that the wells are stratigraphically below the WIPP horizon is incorrect.

(Editorial) Include a statement that stratigraphically, all oil and gas wells pass through the WIPP horizon.

The paragraph cites 83 plugged wells.





(Editorial) Identify how many wells are considered temporarily abandoned and how many have been plugged and abandoned.

Page 2-21, Section 2.2.8 (no line numbers on page)

There is no mention of the salt water disposal wells which surround the WIPP Site and are operated by the oil and gas industry.

(Recommendation) Identify the location of the existing and proposed salt water disposal wells.

There is no mention of the salt water storage facilities (tank batteries) adjacent to the WIPP Site which are also operated by the oil and gas industry.

(Recommendation) Identify location of these facilities.

There is no mention of the anticipated, post-potash drilling by the oil and gas industry.

(Recommendation) Provide a map of the potash reserves and leases and the oil and gas leases.

The description of the location of the slant drilled gas well is incomplete.

(Recommendation) Provide a complete description.



Page 2-22, Figure 2.2-1



The figure fails to show the dozens of producing oil wells from the major field directly to the south of the site in Township 23S Range 31E.

(Editorial) Correct the figure.

Page 2-23, Figure 2.2-2a.

The figure is incomplete and does not show 136 oil wells, 21 gas wells, and 21 plugged wells within five miles of the WIPP Boundary.

(Editorial) Complete the figure.

Page 2-27, Section 2.3, Line 16 .

There is no identification of mineral ownership in the area.

(Recommendation) Identify mineral ownership.



Page 2-28, Section 2.3.1.1, Lines 6 through 9.

The estimated reserves of potash are being revised by Griswold to reflect the BLM definition of minable reserves and to address the concerns of the potash industry regarding the NMBM&MR report.

(Recommendation) Use the estimated potash reserves noting the October 12, 1995, letter from Cone (U.S. BLM) to Griswold (consultant) indicating that in the last five



years a significant amount of sylvite has been mined at or below the 10% minimum standard and langbeinite has been mined at or below the 4% minimum standard.

Page 2-28, Section 2.3.1.2, Line 13,

The text incorrectly states that the closest mine to the WIPP Site is approximately 10 miles. The map published by the U.S. BLM shows that the closest mine to the WIPP Site is approximately 1 mile away from the southwest corner of the WIPP Site boundary.

(Editorial) Correct the text.

Page 2-28, Line 26 .

Prior to publication of the 1995 NMBM&MR mineral reevaluation, EEG-55 (Silva, 1994) comprehensively summarized the previous hydrocarbon evaluations.

(Editorial) Credit EEG-55 (Silva, 1994) for providing a summary and analyses of the previous hydrocarbon evaluations.

Page 2-29, Line 25.

(Editorial) Reference the comprehensive discussion of James Ranch Unit 13 and the active leases in section 31 found in EEG-50 (Silva and Channell, 1992) and EEG-55 (Silva, 1994).

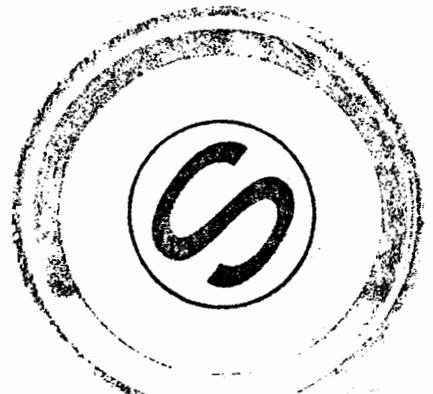




Table 2.3-1.

The October 12, 1995 letter from Cone (U.S. BLM) to Griswold suggests that this table is incorrect.

(Editorial) Correct the table to reflect the concerns of the U.S. BLM and the potash industry.

Page 2-47, Section 2.4.4.4.2 Groundwater Radiological Characterization.

The section states that ^{60}Co and ^{137}Cs were found above detection limits in water collected from the Culebra and Magenta. The average concentration of ^{60}Co is reported as 12×10^{-4} Bq/g and ^{137}Cs is 7.2×10^{-4} Bq/g.

(Recommendation) It is unlikely that the man-made radionuclides ^{60}Co and ^{137}Cs are present above the detection limits in ancient-time waters near the WIPP. It is probable that these data are in error because of a laboratory error, such as incomplete precipitation of ^{40}K and subsequent confusion of the interfering beta signal from ^{40}K . The accuracy of the information should be determined and the SAR changed accordingly.



CHAPTER 3

Page 3-5, lines 21-23.

The sentence states "When initiated, the placement of waste in the WIPP will be for the purpose of permanent disposal with no intent to retrieve."



(Recommendation) Please change the SAR to reflect the basis for this policy, such as the Land Withdrawal Act or the C and C Agreement, and the specific section of appropriate document(s). This recommendation appeared in our May 1995 preliminary comments and has not been resolved.

Page 3-6, Section 3.1.3.1.

This section references and generally discusses Design Class Definitions. Design Class is referred to through out the draft Chapters.

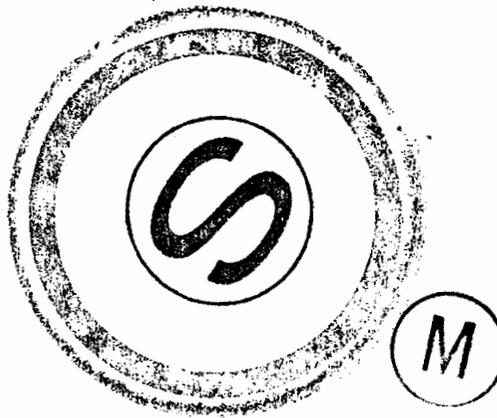
(Recommendation) Reference 2. on page 3-9, Waste Isolation Pilot Plant General Plant System Design Description (GPDD), Rev. 0, September 1993 was removed from the final SAR edition, and the EEG had requested a copy of this document. EEG would like to have unlimited access to this information, and we would prefer having a copy of this material in the EEG offices. We would like to discuss this request at the planned meeting between the EEG and WIPP staff on the SAR comment resolution.

Page 3-17, 18, 3.2.3.3

Flood Protection.

(Comment and Request) We previously commented that this section discusses the need for local flood prevention around on-site water tanks, but the narrative does not describe design provisions. The response was to delete the section. We are still requesting the analyses that indicate the potential risks involved with tank or water main ruptures.





Page 3-24, 3.2.9

Thermal Loadings (Salt)

(Comments) The thermal loading from RH-TRU waste is evaluated but that from CH-TRU is ignored. The use of an average 60 W per canister is conservative. The limits of 23 Ci/l on RH-TRU and 1000 PE-Ci lead to a maximum permissible value of about 95W/canister. The average (from Baseline Inventory Report, Revision 1, February 1995) thermal output from an RH-TRU canister would be slightly less than 1.0 W. For a loading density of about 126 canisters/acre in the repository this would be ≈ 125 W (0.125 kw) per acre from RH-TRU.

The same acre that contained 126 RH-TRU canisters would also include an entire room (about 6,000 drum equivalents) of CH-TRU. An average activity of 3.04 Ci/drum α -TRU and 1.19 Ci/drum ^{241}Pu would produce 0.098 W/drum or 588 W/room. Thus the average CH-TRU heat load per acre is over 4 times that of the average RH-TRU heat load. Also, any room that had an average CH-TRU loading of about 52 α -Ci/drum would exceed the 10 kw/acre value from CH-TRU alone. Such a loading is not impossible. It has been estimated there will be 42,281 drums and 6504 boxes containing 20-100 Curies/containers and 5159 drums and 2040 boxes containing > 100 Ci/container in the full repository (Peterson memo, Appendix A in SAND 92-0700/3).

(Request) This comment was made previously and the WID responded by stating that the 10kw/acre was conservative and the rationale was found in WIPP/DOE-71-IIA. EEG did not find a discussion of thermal loading anywhere in WIPP/DOE-71 Revisions 1, 3, or 4. Please give a specific reference (including page number) where

the 10 kw/acre value is justified. Also, please tell us whether the 10 kw/acre limit applies to each acre or can be averaged over a number of acres.

CHAPTER 4

Page 4-20, lines 22, 25.

It is stated that the shielded holding area can accommodate seven-packs of drums as well as standard waste boxes (SWBs).

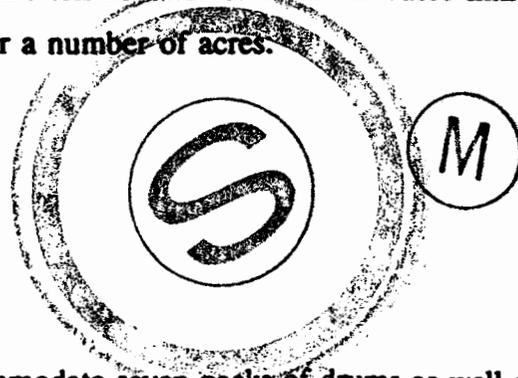
(Recommendation) Please include information on maximum storage capacity and maximum storage time in this area as provided in the October 25, 1995 transmittal.

Page 4-31, lines 27-30 (Page 4-32, third paragraph)

DOE (October 24, 1995) stated that dose rate calculations for emplaced canisters are available in WTSD-TME-041.

(Comment) The following observations are provided about WTSD-TME-041 RH-TRU shielding calculations:

- (1) The calculations are based on a maximum surface dose rate of 100 rem/hour. The maximum surface dose rate allowed for WIPP RH-TRU canisters is 1000 rem/hour (10 times as great). Use of a 1000 rem/hour surface dose rate would give much higher radiation dose levels than indicated in TME-041.
- (2) The dose-rate calculations assumed that all gamma emissions were those of ^{60}Co , 1.173 and 1.332 Mev. Later studies were done with a more up-to-date





(for 1984) radionuclide distribution. These later studies indicated doses of about one-half (for a sleeved borehole) and the decision was made to stay with the ⁶⁰Co spectrum, for slight conservatism.

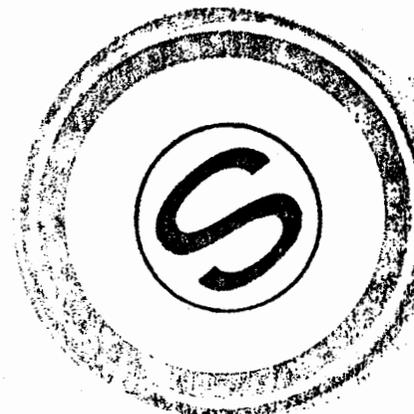
It should be noted that the later distribution is much different than indicated in the latest inventory (Baseline Inventory Report, Revision 1, CA-94-1005 Revision 1, February 1995). The comparison of the gamma emitting radionuclide distribution is shown below.

Radionuclide	Fraction of all γ Emitter Activity	
	Table 6-1*	BIR
^{137m} Ba	.253	.754
¹⁴⁴ Pr	.197	.001
⁶⁰ Co	.312	.026
¹³⁴ Cs	.238	.005
¹⁵² Eu	-	.128
¹⁵⁴ Eu	-	.067
Other	-	.020
	—	—
	1.000	1.001

Table 6-1 in WTSD-TME-041 adjusted to eliminate non gamma emitting radionuclides. All MFP assumed to be ⁶⁰Co in analysis.

Page 4-43, line 38 and Table 43-2 (Page 4-44, next to last sentence)

"The average CH TRU waste..."



(Editorial) The DOE stated (October 24, 1995, memo) that two shifts per day and 5 days a week were assumed for throughput calculations. This data should be in the SAR.

Page 4-81, lines 3-6 (Page 4-82, Section 4.4.1.2)



Discussion on underground confinement.

(Comment) The DOE stated (October 24, 1995 memo) that there is secondary confinement, although it is not required. The EEG is reviewing worker dose calculations (ITRI-951101, November 1995) received December 27, 1995, and this document is germane to the confinement requirements.

Page 4-84, lines 10-11 (Page 4-85, third paragraph)

Information was supposedly added concerning automatic tornado dampers.

(Comment) No changes were found.

Page 4-84, line 41. (Apparently deleted from Chapter 4)

The draft SAR discussed the design of the underground ventilation system and how 10 CFR 835 requirements were satisfied and, whenever radioactivity above a predetermined level is detected in the air stream, the volume is reduced to HEPA filtration capacity and directed through HEPA filters before being released.





We made the following comments and requests, but the discussion was apparently moved to Chapter 3 and 7 of the final SAR. Please let us know what changes were made and where the changes can be found in the final SAR.

(Request) Please provide the basis for the determination that the ventilation system satisfies requirements in 10 CFR 835.

(Request) State the exact sections of 10 CFR 835 that are referenced.

(Recommendation) Is the predetermined level for switching the HEPA filtration a fixed number and is it stated and justified anywhere in the SAR? If not, specify the predetermined level that must be detected and state the justification for this level.

CHAPTER 5

Page 5-7, lines 1-26

The approach used in calculating the radionuclide limit for individual containers is described in these three paragraphs.

(Comments) There is logic to using the Pu-51 through Pu-57 mixes since accidents will occur with individual containers, not with inventory averages. There are two comments on the use of these mixes:

- (1) The reference where these mixes are defined should be given. there are partial definitions for INEL and LANL in Appendix H of the Baseline





Inventory Report, Revision 1 but the definitions are not complete or consistent between the 2 laboratories;

- (2) None of the mixtures shown include ^{241}Am , which comprises about 14% of the alpha-TRU inventory. Since 200 FGE of ^{241}Am is 37,000 Ci this could be an important omission if it was appropriate to tie the maximum FGE limit, with the PE-Ci limit in a container. See comments below.

Page 5-7 lines 35-41 (Page 5-8, first paragraph)

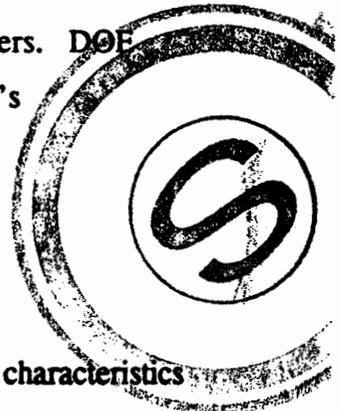
(Comment) EEG has long believed that a limit of about 80 PE-Ci is appropriate to minimize accident consequences. However, we believe the logic or the calculation used to arrive at the value should appear in the SAR. At present, we are reviewing worker dose calculations (ITRI-951101, November 1995) received December 27, 1995, and this information is relevant to the SAR discussions. We would like to defer further comment until our review is completed.

Page 5-9, line 8

EEG asked DOE to explain how pyrophoric wastes will be detected and shipment to WIPP precluded. Also, they were asked to identify WIPP safeguards to protect workers. DOE made no changes in the text and said in their response that this was the WACC's responsibility.

Page 5-8 line 17 (Page 5-9, third paragraph)

The SAR states, "The WIPP WAC restricts wastes for disposal that exhibit the characteristics of spontaneous ignition, chemical reaction, or accelerated corrosion."





(Comment) The request below was made regarding the draft SAR, and we believe the request needs additional discussion.

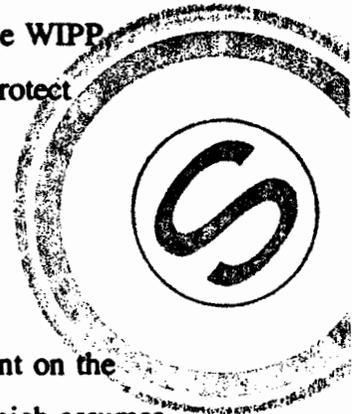
(Request) Although the WAC appears to contain the appropriate administrative criteria for characterizing waste, these criteria do not necessarily provide an appropriate safeguard for restricting pyrophoric waste content. In fact, pyrophoric wastes are the potential source of fire, explosion and high-pressure hazards associated with some DOE waste drums and containers. In reference to the DOE Office of Nuclear Safety, Safety Notice, DOE/NS-0013, February 1993, please explain how pyrophoric wastes will be detected and shipment to WIPP precluded. If pyrophoric wastes are inadvertently received at the WIPP then the SAR should identify the appropriate safeguards necessary to protect WIPP workers.

Page 5-21, old Table 5.1-3

(Comment) The milligrams of VOC in the drum headspace is dependent on the volume of head space gas which is not factored into the calculation (which assumes there is one mole per drum). The appropriate expression is:

$$\text{Drum Inventory} = \left(\frac{\text{moles VOC}}{\text{moles gas}} \right) \left(\frac{\text{gm VOC}}{\text{moles VOC}} \right) \left(\frac{\text{moles gas}}{\text{drum}} \right) \left(\frac{10^3 \text{ mg}}{\text{gm}} \right)$$

Page 5-2 of DOE/WIPP 89-003 Revision 1 (original NMVP) uses an average value of 147 L of gas/drum. This would be 6.56 moles at STP. Thus, the drum inventories should be 277 mg for methylene chloride and 412 mg for carbon tetrachloride. The





SWB inventory would change depending on the average moles of gas in a SWB. This will change the release value proportionally in Table 5.2-4.

Pages 5-65 to 5-69, Table 5.2-4

(Recommendation) This Table gives the estimated toxicological concentrations and comparison to criteria. The values in this table need to be recalculated. We believe the drum inventories calculated in Table 5.1-3 of methylene chloride and carbon tetrachloride are low by a factor of (perhaps) 6.56 for drums and probably a similar amount for Standard Waste Boxes.

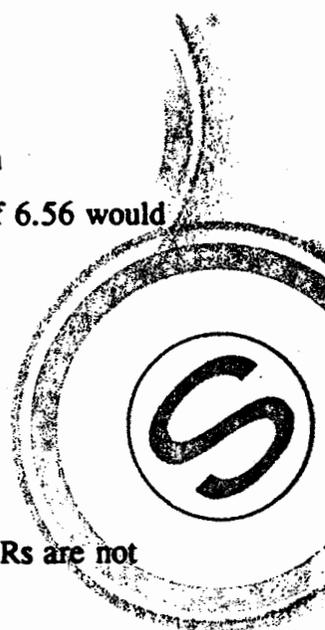
It was also noted that the Total Released (mg) values are not always even multiples of the contents of SWBs. For example:

<u>Accident</u>	<u>Boxes involved</u>	<u>Boxes indicated in Column</u>
CH-3	2	1.89
CH-4	2	1.89
CH-11	5	4.78

The net effect of these apparent mistakes is not trivial. For example, the carbon tetrachloride release in the CH-11 accident for 5 SWBs and scaled by a factor of 6.56 would equal about 23% of the TLV-STEL limit.

CHAPTER 6

Because of Chapter 5 Hazards and Accident Analyses, SLs, LCSs, LCOs, and SRs are not required in Chapter 6.



(Comment) The EEG defers comments on Chapter 6 until a thorough review of worker dose calculations (ITRI-951101, November 1995) received December 27, 1995 is completed.

CHAPTER 7

Page 7-5, Radiological Protection

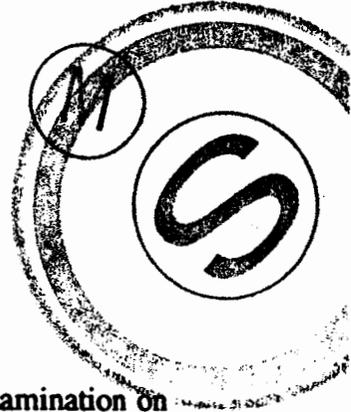
No airborne releases are assumed from routine operations due to external contamination on containers because they are considered contamination free.

(Comment) The WAC allows up to 50 pCi/100 cm² of removable alpha and 450 pCi/100Cm² of removable beta-gamma radiation, and therefore the waste containers are not necessarily clean. The SAR does state that procedures require the surveys of all containers received at the WIPP. Even so, residual contamination may accumulate in the waste handling bay over a long period of time. The SAR should either provide calculations, or empirical information from generator storage sites, to indicate the potential for residual contamination.

Pages 7-10 and 7-11, Direct Radiation Sources (Page 7-11, first paragraph)

A few neutron sources have been identified for CH TRU wastes, but the neutron component of the total dose rates for these few identified waste forms is negligible.

(Recommendation) Please provide a reference or basis for this statement.





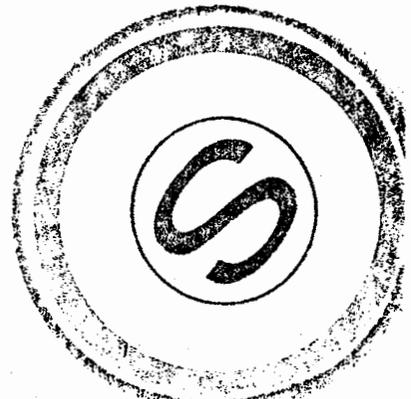
Pages 7-11 and Tables 7.1-1 and 7.1-2 , Gamma Source Strengths and Surface Dose Rates.

(Comment) There are several questions about the manner in which the maximum source strengths were calculated. This is a potentially important calculation because the source strengths were used in shielding design. The inventory being used to determine the RH-TRU spectrum is the same as was used in the June 1989 SAR. There is a Revision 1 to the Baseline Inventory Report (2/95) that is somewhat different for RH-TRU that should have been used: The Revision 1 inventory shows that 67% of the total gamma decay energy comes from the 0.66 Mev ^{137m}Ba gamma and that only 22% of the energy is from gamma radiation greater than 1 Mev. Conversely, Table 7.1-2 shows that 79% of the energy is from > 1 Mev gamma and only 9.6% is from 0.7 Mev gamma. Although the source strengths shown in the SAR are undoubtedly conservative, they are so different from the present inventory that they should be redone.

Page 7-16, lines 28-34 (Page 7-17)

The upper limit for radiation in a high radiation area is 500 rem/hr at 30 cm. The lower limit for a very high radiation area is 500 rem/hr at 1 meter.

(Comment) Although this approach is consistent with DOE/EH-0256T, the Radiation Control Manual does not include radiation dose that is greater than 500 rem/hr at 30 cm but less than 500 rem/hr at 1 meter.



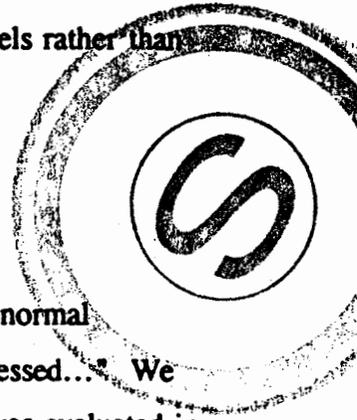


Page 7-16, lines 35-38 (Page 7-17)

(Comment) It would be helpful to actually give the contamination levels rather than refer the reader to the RadCon Manual.

Page 7-21, lines 35-36

(Request) Please reference the exact location in Chapter 5 where "Abnormal operations, such as decontamination and overpack operations are addressed..." We have been unable to find this discussion in the present document. It was evaluated in the May 1990 FSAR (Table 6.1-9)



Page 7-22, lines 1-6 (Page 7-22, next to last paragraph)

This version of the SAR says that waste containers are considered contamination free and therefore, there are no expected airborne releases or internal doses to workers from normal operations.

(Comment) Previous SARs assumed that a portion of the containers would be contaminated and calculated the airborne concentrations and internal doses from resuspension. For example, Chapter 6 in the May 1990 FSAR devoted 4 pages of text and 11 pages of tables to evaluating airborne radionuclide concentrations and doses. EEG agreed with the approach and the assumptions were generally acceptable. The calculated EDE to workers was 0.37 person-rem; about 2.6% of the occupational external dose.



(Recommendation) Implying that internal doses will be zero is not technically correct, even though the doses may be very low. The statement should be modified and referenced accordingly.

Page 7-22, lines 17-39 (Page 7-23)

The estimated doses to workers from external radiation are discussed here and presented in Table 7.1-3.

(Recommendation) There is no reference to the origin of these calculations in this Chapter. The FSAR, May 1990, contains an identical table (Table 6.1.18, September 1993) and references WIPP-DOE-88-012 and 013. There should be appropriate references in the SAR, whether they are these previous references or more current references.

Page 7-23, lines 3-5 (Page 7-23)

The statement is made that "...WIPP normal operations do not involve or entail *any* planned or expected releases of airborne radioactive materials."

(Comment) Previous analyses (FSAR, 1990) indicate that this statement is technically incorrect. It would be more appropriate to state that WIPP does not expect any significant releases of airborne radioactivity from normal operations, and these levels are expected to be well below the regulatory limits.





Page 7-31, lines 7-8 (Page 7-23)

It was stated that the risk at the WIPP site boundary for carbon tetrachloride is about 100,000 times below the public exposure health-based levels pertaining to releases from the WHB.

(Recommendation) Table 7.2-1 indicates that the calculated maximum public exposure from underground emissions is 5.2% of the health-based level and seems to contradict the above statement. It would be more appropriate to quote the 5.2% value.

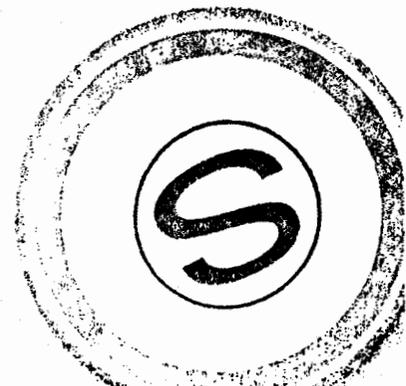
Page 7-34, lines 31-33 (Page 7-35)

The DOE does not plan to monitor for VOCs in the environment during disposal operations.

(Comment) There seems little basis for this policy because data are not based on VOCs from emplaced waste.

Table 7-2.1

(Comment) Enough information should be given in the SAR so that the rationale for these calculations and the values in this table can be checked. We are now aware that all of the information in this Table is also in Table D-3 of the Revision 5 Part B RCRA Permit. However, Table D-3 was not referenced. Appendix D-9 of Revision 5 (which was not referenced) is actually the most useful source for checking most of these calculations. The values appear to be reasonable.





CHAPTER 9

(General Comment) EEG originally expected this chapter to contain information on the quality assurance on the SAR operations--What QA documentation, for instance, covers the hazard and accident analysis? The waste container inventory calculations? Source term/dose calculations? Accident frequency analysis? EEG also found no requirement that such information must be included--but inclusion of additional information could facilitate an understanding of the QA process.

(General Recommendation) The Consultation and Cooperation (C & C) Agreement established between the DOE and the State of New Mexico specifies that the SAR QA chapter should provide "...information on organizational and administrative programs during site investigation, design, construction and operation." DOE should provide the information required by the C & C Agreement.

Page 9-2 lines 2-3

This chapter discusses the quality assurance (QA) requirements applicable to WIPP nuclear safety as specified in Title 10 CFR 830, *Nuclear Safety Management*.

(Comment) It is unclear why 10 CFR 130 was chosen. DOE-STD-3009-94, "Preparation Guide For U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports" offers a set of guidelines for describing the QA program (Chapter 14) which place an emphasis on the safety aspects not found in 10 CFR 130 or its derivatives, or in this chapter. The DOE guide offers specific content guidance which fulfill the QA requirements of DOE Order 5480.23, *Nuclear Safety Analysis*.





(Comment) If 10 CFR 130 is used, then 10 CFR 130.4(c) states explicitly that any plan required by 10 CFR 130 "...shall be the basis used to determine compliance with the relevant nuclear safety requirements of this section." A Quality Assurance Plan (QAP) is required by 10 CFR 130.120(b)(1). WP 13-1, the WID QAPD, Rev 15 dated January 1995, was submitted to DOE in accordance with the 10 CFR 130.120 requirement (WP 13-1 preface, p. iii). Unless WP 13-1 has been rejected by DOE it should be the basis of QA compliance requirements for 10 CFR 130--by 10 CFR 130's own direction.

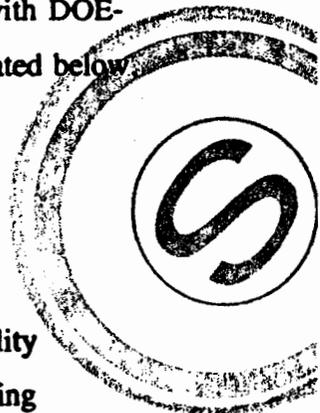
(Recommendation) WP 13-1 is the general QA program, and the SAR is specific to safety. The topics addressed in DOE-STD-3009-94 are similar to those addressed by 10 CFR 130 and its derivatives but the emphasis is on safety QA concerns, not the general QA program. The DOE should use DOE-STD-3009-94, which is derived from DOE Order 5280.23, as the basis for discussing SAR quality assurance, not 10 CFR 130 or its derivatives.

(Comment) Many of the Chapter 9 sections are already in conformance with DOE-STD-3009-94. The first part of the chapter which has problems, is delineated below and the guideline has a few different criteria than 10 CFR 130.

Page 9-2, lines 6-8

To provide a comprehensive QA program, 10 CFR 830 provides the general quality assurance requirements: Management, Performance and Assessment. The following requirements apply to those activities required to comply with the SAR.

(Comment) Section 9.1 needs to be rewritten--the second sentence is nearly incomprehensible. The sense (after reading the complete chapter) seems to be that 10





CFR 830 establishes three general QA areas and that these areas will be addressed in this chapter. A possible rewrite:

10 CFR 830 establishes QA requirements for management, performance, and assessment. Each of these areas is individually addressed below.

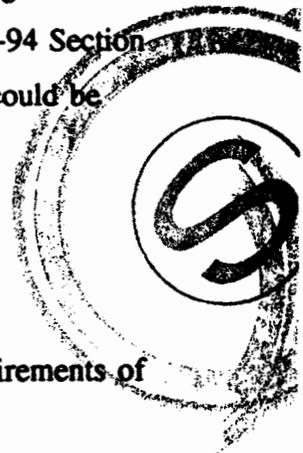
But this is misleading. There are 10 QA criteria which are addressed in 10 CFR 830, and the superheadings of management, performance, and assessment are administrative categorizations which could just as easily be left out of the chapter. (DOE-STD-3009-94 has essentially the same criteria, without the administrative categorization.)

Page 9-2 lines 10-17 (9.1.1.1 Program)

(Recommendation) A description of the safety management policies and philosophies is used as a basis for the QA program and should be included. The structure of the QA organization should be identified, including staffing levels and qualifications, positions of authority and responsibilities, and interfaces to other safety organizations and facility operations (This recommendation is based on DOE-STD-3009-94 Section 14-3; Chapter 8 of the SAR has some of the management policies which could be included by reference).

Page 9-2 lines 11-13

The WID Quality Assurance Program Description (QAPD) includes the QA requirements of 10 CFR 830.120.





(Comment) Under 10 CFR 830, the WID QAPD should not be used as evidence for compliance, but rather should be the document to be complied with, as explained in the comments addressing page 9-2 lines 2-3. Under DOE-STD-3009-94 the inclusion of the QAPD and other facility documents detailing the QA program is mandatory.

The QA requirements that are specific to safety analysis should also be listed.

Page 9-2 line 12

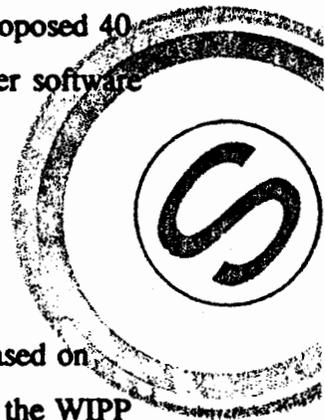
The QAPD also incorporates QA requirements of ASME NQA-1, ASME NQA-2, 10 CFR 71...

(Comment) ASME NQA-2 covers many QA areas which are usually considered not applicable to the WIPP; other WIPP-related documents (including the proposed 40 CFR 194) reference only ASME NQA-2 Part 2.7, which covers computer software QA requirements. Is WID implementing the full NQA-2?

Page 9-2 lines 14-17

During the design and construction phase of the WIPP, the QA program was based on ANSI/ASME NQA-1-1979, basic and supplementary requirements. Therefore, the WIPP Design Class system, showing a graded approach to the application of the QA requirements for design and construction of WIPP systems also reflects ANSI/ASME NQA-1-1979.

(Comment) This seems more an example of stretched and tenuous logic than evidence of compliance. If a linkage of NQA-1 (1979) to the graded approach used in the WIPP Design Class system needs to be established then the connection should be explicitly traced and documented. This could include reference to allowance of





graded approaches in NQA-1 (1979) and its implementation in WID QA documents for the period. DOE-STD-3009-94 suggests that for the graded approach, summaries of the major features of the QA program's commitment to the safety basis should be written.

Page 9-2 lines 18-23 (9.1.1.2 Personnel Training and Qualification).

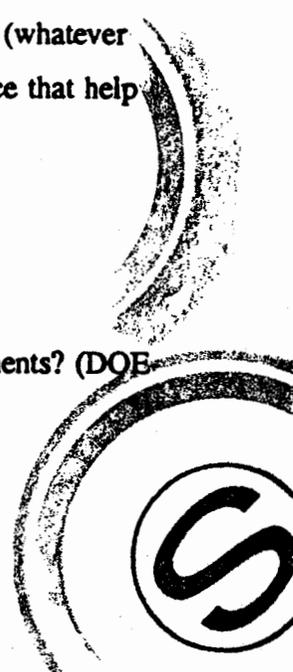
(Comment) The section does not specifically address safety training. A description of nuclear safety training, training specific to accident scenarios, and training specific to other SAR issues could be documented.

(Comment) The general WID training program addressed is under-described. Section 8.2 could be referenced as an additional source of information, but WID has an even more extensive personnel training and evaluation program which is given little credit in the SAR. How personnel are selected, how often they are evaluated, issuance of qualification certificates, and other processes that help assure the quality of safety at WIPP are not described; and the QA documents governing these activities are not listed.

(Comment) The question for each of the criteria addressed in this chapter (whatever document is used as a basis) should perhaps be, what practices are in place that help assure the quality in this area as it relates to SAR activities?

Page 9-2 line 24 (9.1.1.3 Quality Improvement)

(Comment) What happens to nonconforming materials, parts, and components? (DOE-STD-3009-94 makes a specific of this.)

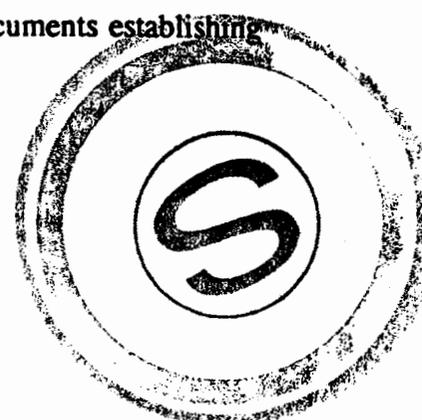




Page 9-2 lines 27-29

Quality improvement programs in place include the nonconformance program, the work authorization program, the process improvement program, and the corrective action program.

(Comment) The various programs listed--nonconformance program, work authorization program, process improvement program, and corrective action program--could use brief individual descriptions, and references to the documents establishing them.



APPENDIX C

Page C-25, Node 13

The Hazard Rank in this table is shown as 2,2. In Table 5.1-7 the CH. 4 accident (which is Node 13) is shown as 2,3. Appendix D calculations show the probability per fork lift is 0.064 y⁻¹ and for two fork lifts it is greater than 0.1 y⁻¹ and thus in category 4 (as recognized in Appendix D-9, line 22).

(Comment) The HAZOP Summary Table and Table 5.1-7 should be changed to indicate a relative probability of 4.

Page C-26, Node 14 Spontaneous Combustion

(Comment) Why is there no Hazard Rank for this scenario when radioactive releases can occur?



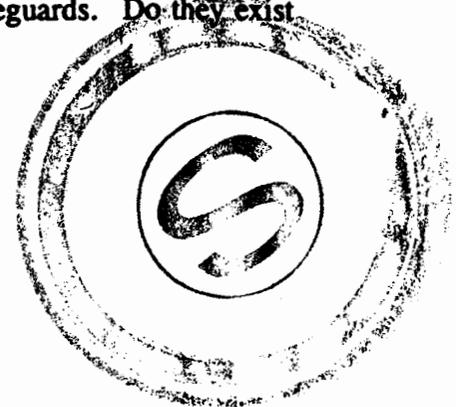
Page C-36, Node 19 Vehicular Collision

(Comment) The likelihood of a vehicular collision with an underground waste transporter may be greater than 10^{-6} y⁻¹. Also, over the years the WIPP Project has said that underground transporters would have governors and fuel tanks that were highly resistant to damage from collisions in order to minimize the consequences of accidents. Neither of these features are mentioned under Safeguards. Do they exist on the transporters?

APPENDIX D

Page D-2, Lines 3 through 5.

The text mentions the DOE WIPP Position Paper on Flammability Concerns Associated with TRU Waste Destined for WIPP summarized as an "an extremely unlikely event." Yet that statement in the DOE Position Paper was based on the assumption that operating procedures were in place to mitigate fires and explosions, that those procedures were completely adequate and would not be ignored, and that the WAC document would protect workers at WIPP. However, as noted by Silva (1992) and in the Safety Notice issued by the Office of Nuclear Safety (1993), "records show that at least eight incidents of fire, explosion, and drum overpressurization occurred at DOE facilities from 1970 through 1985." The DOE position paper maintains that "adequate safety regulations exist for TRU waste to be shipped to the WIPP. With proper implementation, these regulations should minimize any hazards with flammability concerns." However, the EEG (Silva, 1992) observed that "accidents, such as fires and explosions have occurred at several facilities in the DOE complex because guidelines and procedures have been inadequate, improperly used, or not used at all."





(Recommendation) Include the information from the article from the Journal of Nuclear Safety (Silva, 1992) and the Safety Notice issued by the Office of Nuclear Safety (1993) in the analyses.

Page D-2, Line 13.

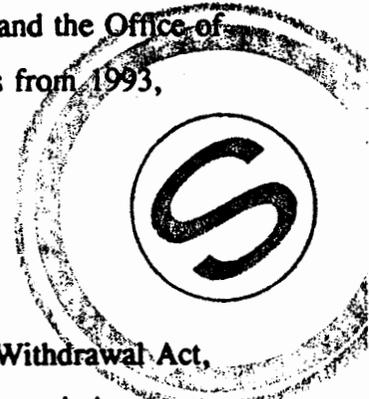
The calculation assumes eight incidents have occurred since 1970 rather than one, citing the summary by the EEG contained in the Office of Nuclear Safety Notice - Safety Notice Issue No. 93-1. However, the FSAR fails to mention a key observation. The Safety Notice updated the list of incidents to include incidents from 1991 and 1992, bringing the total to at least sixteen incidents. Further, the observation of the additional incidents tends to undermine many of the arguments in the position paper, specifically arguments that such event would not occur because of standard operating procedures at DOE facilities. The eight additional problems were discussed in the Safety Notice. These are documented in the DOE's own unusual occurrence reporting system, the data base which can be readily searched by topic.

(Recommendation) In addition to the sixteen incidents cited by Silva and the Office of Nuclear Safety, the FSAR needs to update the list to include incidents from 1993, 1994, and 1995.

Page D-2, Line 18.

As part of the RH TRU Study which was required by the 1992 WIPP Land Withdrawal Act, the DOE has published, in the Federal Register, notification that RH TRU waste is just as flammable and explosive as CH-TRU.

(Recommendation) Do not subtract the volume of RH-TRU.





Page D-2, Line 25.

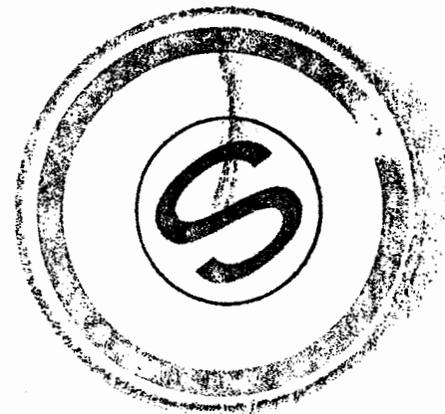
The argument appears to be simply an attempt to reduce the calculated number of anticipated incidents by multiplying the probability of spontaneous by 0.1 on line 8 of the following page. There is no such justifiable factor for these calculations.

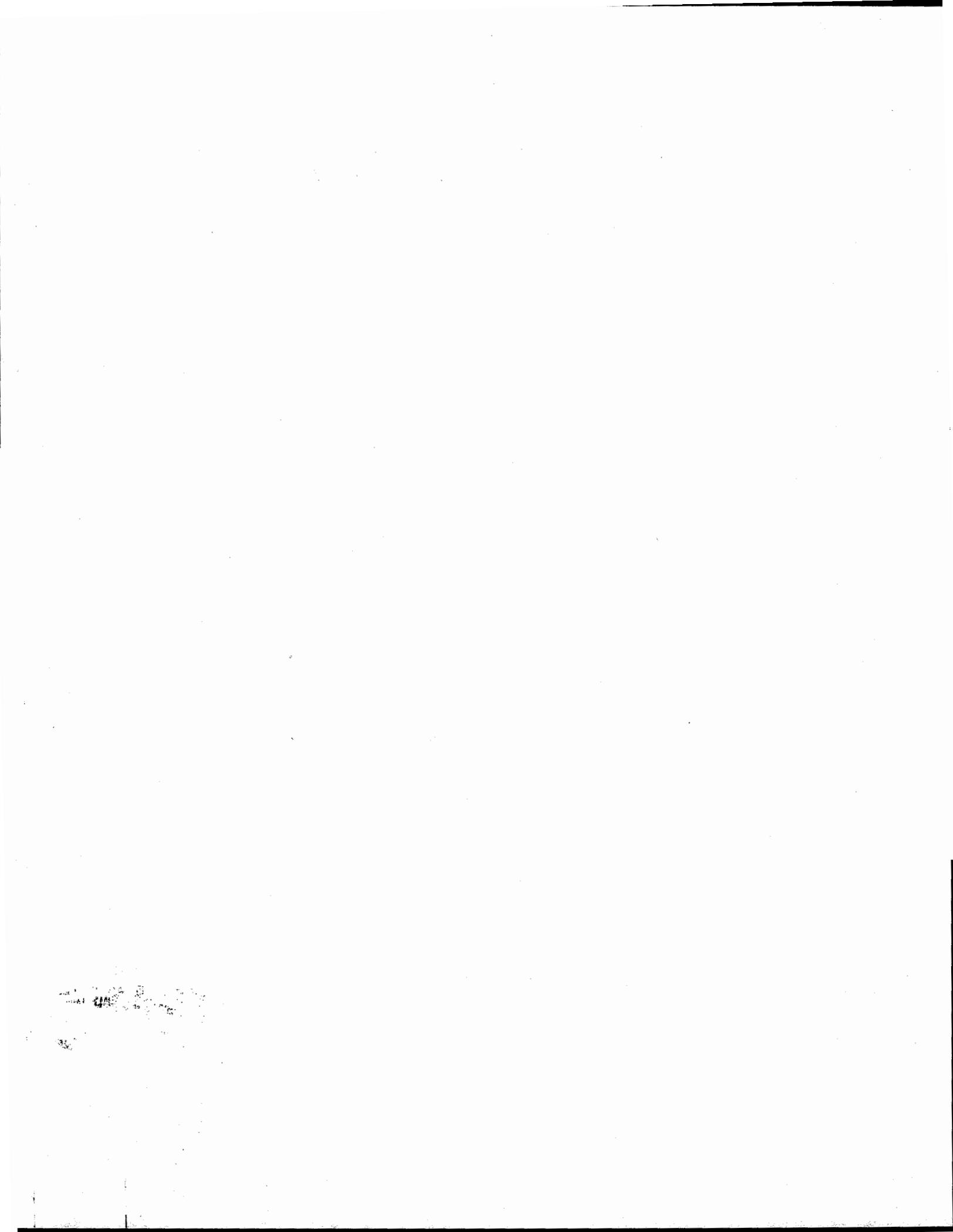
(Recommendation) Remove this factor.

Page D-3, Line 4.

Given the requirement that all containers be vented, the probability of sufficient oxidant being available is now 1.0 (not $4.2 \text{ E-}3$). The old value was based on air leaking into a drum through a faulty seal, etc. (see DOE/WIPP 87-005). Hence, $P(B)$ = the probability of sufficient oxidant = 1.0.

(Recommendation) Update incident list and recalculate using the observations provided in the discussion above. For 16 incidents from 1970 to 1995, the probability of a sustained fire = 2.94E^{-1} .





ATTACHMENT 2



Discussion of SAR Section 2.8, Vibratory Ground Motion

This section is an expanded version of Section 2.6 of the Draft Compliance Certification Application (DCCA, DRAFT-DOE/CAO-2056, 1995), and it is essentially the same as Section 2.8 of the 1990 FSAR which was based on Chapter 5 of the Geological Characterization Report (SAND78-1596). The only change from the 1990 FSAR is that there is a brief mention of the January 2, 1992 (Rattlesnake Canyon) and April 13, 1995 (Alpine) earthquakes.

While the EEG did not raise any significant issues with respect to the seismicity of the WIPP site in its evaluation of the 1990 FSAR, Paul Sanchez (who was with the New Mexico Environment Department at that time, and is now with the Sandia National Laboratories WIPP staff) conducted a detailed review of the WIPP site seismicity after the January 2, 1992, Rattlesnake Canyon earthquake. The following comments and recommendations were contained in the April, 1992 Preliminary Report (The January 2, 1992, M=5.0 Rattlesnake Canyon Earthquake of Southeastern New Mexico - Observations at WIPP Site) by Paul Sanchez.

Geoscience

The epicenter (32.258 N, 103.156 S) of the "Rattlesnake Canyon" earthquake, 90 km east of the WIPP site, is located in a geologic province known as the Central Basin Platform (CBP). The CBP is a zone of deeply buried faults, associated with the production of oil, and has been recognized as a zone of seismicity since the early 1960's. It was considered a "seismic source zone" in the seismic design of the WIPP facilities.





Published DOE/WIPP studies (see, for example, GCR, SAND78-1596, pages 5-22 to 5-25) reasoned that earthquakes in the CBP are caused directly by secondary oil recovery operations, which formed the basis for assuming the maximum size earthquake the CBP is capable of producing. These studies considered an earthquake of magnitude 5.0-to-6.0 to be a very conservative estimate of the maximum earthquake potential (maximum credible earthquake) of the CBP. The recent (1/2/1992) earthquake underlines the uncertainty of the seismic potential of the CBP. This suggests that periodic assessments of seismic risk are warranted as seismic data are collected and analyzed by universities studying in this area, such as the University of Texas at El Paso or the New Mexico Institute of Mining and Technology.

The magnitude of the Rattlesnake Canyon Earthquake, and a recent study by Diaz et al., (1992), suggest that earthquake potential in the CBP may be more complex than previously believed. In a reevaluation of epicentral locations (1976-1979), Diaz et al., (1992) demonstrate that only 10% of the earthquakes recorded within the CBP during that period actually occurred within oil field areas (Diaz et al., 1992). This suggests several possible explanations for the seismicity:

- Fluids migrating away from areas of secondary recovery may be reaching and initiating movement on pre-existing faults,
- Fluids moving away from areas of secondary recovery may be facilitating movement on pre-existing faults, already active in the current tectonic stress regime, and
- Pre-existing faults are tectonic and unrelated to oil production.





Conservative estimates of earthquake potential should consider the various models and their potential for activation of the largest, continuous seismogenic structures. Previous studies considered magnitude 5.0 and 6.0 earthquakes very conservative estimates of the earthquake potential of the CBP (DOE/WIPP 89-003). A fresh perspective may be in order, in that an earthquake of the Rattlesnake Canyon magnitude ($M = 5.0$) was characterized by some investigators as a one thousand year event.

Seismotectonics

Seismotectonics is the analysis of the cause of active faulting and seismicity characteristic of a particular tectonic regime. The CBP is similar to many examples of buried intraplate seismic zones, which sometimes occur well away from plate boundaries. Southeastern New Mexico is subject to a regional stress regime oriented such that extensional faulting on steeply-dipping NNW trending faults would be expected to occur. The activation of the normal fault responsible for the Rattlesnake Canyon Earthquake is consistent with this model.

In contradiction to reasoning cited in the FSAR and No-Migration Petition, the lack of topographic or geologic evidence for large magnitude earthquakes at the surface does not preclude the periodic recurrence of such events. The 1811 New Madrid Earthquake and intensive paleo-liquefaction studies of lake sediments provide the only evidence for long-term recurrence intervals of large magnitude earthquakes in the New Madrid Fault Zone. Like the New Madrid Fault Zone, the CBP is a buried Precambrian structure, one also possibly reactivated by the current stress regime. The point is not to imply that southeastern New Mexico may experience a catastrophic earthquake. Rather it is to emphasize that the earthquake potential of the CBP may or may not be underestimated. Critical to such a reevaluation is the following:





- the maximum size of earthquake that could be reactivated through introduction of fluids into a pre-existing fault, if secondary recover operations are indeed responsible, or
- whether or not the larger wavelength tectonic stress field controls the maximum magnitude even in the CBP, and introduction of fluids merely triggers displacement.

The maximum credible magnitude of an earthquake in the CBP has an effect on the design ground motion for the facility. A 6.4 magnitude earthquake occurring in the same area as the Rattlesnake Canyon Earthquake would reach the design ground acceleration for the WIPP facility. This is why seismic studies by Diaz et al., (1992) and New Mexico Tech should be followed closely. Such studies may identify discrete fault segments that better characterize the length of potentially seismogenic structures. Diaz et al., (1992), in an analysis of 1976-1979 data, notes that east-west zones of seismicity trending orthogonal to the main trend of the CBP are evident. This pattern is also characteristic of segmentation boundaries, in which the intervening fault lengths between east-west trending zones may better define the potential size of the maximum magnitude earthquake (maximum credible earthquake) and the selection of a defensible maximum probable earthquake.

Seismic Monitoring System

There is no critical disagreement between Westinghouse Engineering and NMED site staff concerning the interpretation of the available earthquake data collected by the Seismic Monitoring System (SMS). One conclusion reached in that report was that "...ground acceleration from this event was less than .015g in the frequency range 1 - 10 hz, and less than 0.1g in the bandwidth of .05 - 15 hz." Fostering an element of uncertainty, however, were the initial conflicting results indicated by the two redundant SMS's located onsite. A





continuous tape record was not generated by the Kinometrics, and this lack of response is the only basis for the above conclusion. While the Kinometrics system is likely accurate, a "time history" with a continuous record of the event would have eliminated lingering doubts caused by the discrepancy. One way to prevent recurrence of this dilemma is:

- Establish a redundant "active" Kinometrics system unattached to a trigger and separate from the CMR alarm system, and
- Lower the trigger threshold to .005g to ensure a continuous tape record is obtained.

The California Division of Mines and Geology operate all their research accelerometers at .005g to describe and quantify the variability of site response. As a research facility, and not a nuclear power plant, it would be consistent with the mission of WIPP to carry out this recommendation.

Facility Seismic Design

Several areas of investigation based on the initial NMED preliminary report were followed-up, specifically those involving the seismic design of the facility. Engineering documents were reviewed to verify the seismic design of large irregularly-shaped structures (exhaust shaft) and nonstructural components, such as ventilation duct work, fire sprinkler systems, and equipment. Nonstructural components tend to vibrate at frequencies much higher than conventional structures, and although displacements are small at high frequencies, they are vulnerable to damage because of their different mode of vibration with the structure.

This study found that many Design Class III nonstructural components and irregularly-shaped structures at WIPP have been designed for minimum code standards, and have not allowed





for dynamic interaction between component and structure. Design Class II structures are the only onsite designed structures/components using the design basis earthquake (DBE): Station A exhaust shaft and elbow, and the Waste Handling Building. One important recommendation:

Assess agreement of operational safety requirements defined in the WIPP FSAR with the facilities/components identified in the report. Additional bracing or seismic qualification of the unit may be warranted.

Miscellaneous: Lessons Learned

- Reference Hazardous Materials Storage Facility (FAC 474) and MSDS storage areas prominently in WP-907 "Force of Nature Response" procedure. A damaging earthquake could tip unrestrained shelves or lockers, especially in trailers. FAC 474 metal shelves are not attached to walls. Include specific reference to attachment sheet "checklists" contained in procedure WP-907.
- Following the earthquake, key personnel may desire or may have to immediately evacuate the building. Procedures are unclear as to which personnel would be responsible for implementing safe shut-down and securement of critical operations in the absence of the WH Supervisor. The FOSS has responsibility for initiating appropriate shut-down actions, but there is no specific reference in procedures (WP-907) to which duties/activities these shut-down actions may apply. WIPP procedure 12-910 addresses essential personnel who may remain on duty, but does not list critical duties and activities, or the personnel classification.

Recommend designating and training primary personnel and an alternate for safe shut-down duties.





- Train personnel (as above) and damage inspection teams to focus on potential earthquake damage to specific nonstructural equipment, tubing, piping, ductwork, and large irregularly-shaped structures; and include these items on checklists in procedure WP-907. Training should augment the existing checklist (WP-907; attachment 4) to pre-identify specific vulnerable "structural, mechanical, electrical components etc." that have Limiting Conditions Operations (LCO) status.
- Recommend a system procedure to ensure that primary and back-up personnel are present when needed (i.e., scheduling chart). Designate and train an alternate for all significant response and recovery operations to verify operation of emergency engineering controls and monitoring systems (i.e., cognizant engineers).
- Include a facility landlord on inspection teams because of their knowledge of the existing condition of the building.
- Require photographs to document conditions in the event of a damaging earthquake or other natural disaster. None were taken of surface facilities and there is no reference to such documentation in the procedures.

Additional EEG Concerns and Suggestions

The EEG has the following additional concerns with respect to the seismicity of the WIPP site.

- The Alpine earthquake of April 13, 1995, should be described in detail and discussed in the SAR with respect to its effect on the assumed seismicity of the WIPP site.





- Section 2.8.1.3 of the SAR (The events of July 26, 1972 and November 28, 1974) is a slightly modified version of Section 5.2.5 of the Geological Characterization Report (GCR, SAND78-1596). The EEG has stated before and repeats here that the remarkable correspondence between the timing and the location of the two earthquakes with the observed (both times) *rockfall and considerable ground cracking* at the National Potash Company Eddy County Mine near the WIPP site, cannot be just coincidences. In view of the importance of these observations, more effort should be made to explain the phenomenon.
- Secondary oil recovery operations by water flooding have been established as a likely cause of frequent earthquakes since 1964, originating in the Central Basin Platform area east of the WIPP site. (GCR, pages 5-22 to 5-25; SAR, page 2-177; RCRA Part B Permit Application, Rev. 5, page D6-65). Since the water flooding and salt-water injection activity is currently taking place at several locations immediately surrounding the WIPP site, the effect of these activities on the seismicity of the WIPP area during the next 40 years (postulated operational period for WIPP) should be considered.

