



ENTERED

EEG-29



**EVALUATION OF THE SAFETY ANALYSIS REPORT
FOR THE WASTE ISOLATION PILOT PLANT PROJECT**

Marshall S. Little



**Environmental Evaluation Group
Environmental Improvement Division
Health and Environment Department
State of New Mexico**

May. 1985

850501





Environmental Evaluation Group
Reports

- EEG-1 Goad, Donna. A Compilation of Site Selection Criteria Considerations and Concerns Appearing in the Literature on the Deep Disposal of Radioactive Wastes, June 1979.
- EEG-2 Review Comments on Geological Characterization Report, Waste Isolation Pilot Plant (WIPP) Site, Southeastern New Mexico SAND 78-1596. Volumes I and II, December 1978.
- EEG-3 Neill, Robert H., et al, eds. 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-4 Little, Marshall S. Review Comments on the Report of the Steering Committee on Waste Acceptance Criteria for the Waste Isolation Pilot Plant, February 1980.
- EEG-5 Channell, James K. Calculated Radiation Doses From Deposition of Material Released in Hypothetical Transportation Accidents Involving WIPP-Related Radioactive Wastes, November 1980.
- EEG-6 Geotechnical Considerations for Radiological Hazard Assessment of WIPP. A Report of a Meeting Held on January 17-18, 1980. April 1980.
- EEG-7 Chaturvedi, Lokesh WIPP Site and Vicinity Geological Field Trip. A Report of a Field Trip to the Proposed Waste Isolation Pilot Plant Project in Southeastern New Mexico, June 16 to 18, 1980, November 1980.
- EEG-8 Wofsy, Carla The Significance of Certain Rustler Aquifer Parameters for Predicting Long-Term Radiation Doses from WIPP September 1980.
- EEG-9 Spiegler, Peter An Approach to Calculating Upper Bounds on Maximum Individual Doses From the Use of Contaminated Well Water Following a WIPP Repository Breach, September 1981.
- 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-11 Channell, James K. Calculated Radiation Doses From Radionuclides Brought to the Surface if Future Drilling Intercepts the WIPP Repository and Pressurized Brine, January 1982.
- EEG-12 Little, Marshall S. Potential Release Scenario and Radiological Consequence Evaluation of Mineral Resources at WIPP, May 1982.

(Continued on back cover)

**EVALUATION OF THE SAFETY ANALYSIS REPORT
FOR THE WASTE ISOLATION PILOT PLANT PROJECT**

Marshall S. Little

**Environmental Evaluation Group
Environmental Improvement Division
Health and Environment Department**

P.O. Box 968

Santa Fe, New Mexico 87503

May, 1985



FOREWORD

The purpose of the Environmental Evaluation Group (EEG) is to conduct an independent technical evaluation of the potential radiation exposure to people from the proposed Federal radioactive Waste Isolation Pilot Plant (WIPP) near Carlsbad, in order to protect the public health and safety and ensure that there is minimal environmental degradation. The EEG is part of the Environmental Improvement Division, a component of the New Mexico Health and Environment Department -- the agency charged with the primary responsibility for protecting the health of the citizens of New Mexico.

The Group is neither a proponent nor an opponent of WIPP.

Analyses are conducted of available data concerning the proposed site, the design of the repository, its planned operation, and its long-term stability. These analyses include assessments of reports issued by the U. S. Department of Energy (DOE) and its contractors, other Federal agencies and organizations, as they relate to the potential health, safety and environmental impacts from WIPP.

The project is funded entirely by the U. S. Department of Energy through Contract DE-AC04-79AL10752 with the New Mexico Health and Environment Department.



Handwritten signature of Robert H. Neill in black ink.

Robert H. Neill
Director

STAFF AND CONSULTANTS

James K. Channell⁽¹⁾, Ph.D., P.E., Environmental Engineer
Lokesh Chaturvedi, Ph.D., Engineering Geologist
Teresa Ortiz, Administrative Secretary
Marshall S. Little⁽¹⁾, M. S., Health Physicist
C. Robert McFarland, B. S., Quality Assurance Engineer
Jack M. Mobley, B.A., Scientific Liaison Officer
Robert H. Neill, M.S., Director
Dan Ramey,⁽³⁾ M. S., Hydrologist
Norma I. Silva, Administrative Officer
Donna Shomaker, M.L.S., Librarian
Peter Spiegler^{(1) (2)}, Ph.D., Radiological Health Analyst

-
- (1) Certified, American Board of Health Physics
(2) Certified, American College of Radiology
(3) Presently employed by Hydrogeochem, Tucson, Arizona



SUMMARY

The Safety Analysis Report ¹ (SAR) for the Waste Isolation Pilot Plant (WIPP) Project was first published by the U. S. Department of Energy (DOE), WIPP Project Office (WPO) in 1980. Since that time a total of eight amendments to this Report have been published. As part of its independent evaluation of the WIPP Project for the State of New Mexico, the Environmental Evaluation Group (EEG) maintains a continuing technical assessment of the information in this Report and its amendments.

Beginning with the initial publication, and following the amendments, the EEG prepares detailed written comments and recommendations which are submitted to the WPO for consideration in future amendments.

The WPO has made many substantial changes to the SAR in response to the EEG's comments. On frequent occasions, meetings between the two groups have been held in an effort to reach an accord on some of the more controversial issues. These meetings generally have been very constructive, but several important areas of conflict remain. In many instances, these areas represent changes which are to be considered by the WPO at some future date, rather than irreconcilable issues.

The most important issues remaining to be resolved are included in the discussions of this report, and could be summarized as follows:

- 
1. An amendment of the topical content to be more in accord with the DOE Order 5481.1A and AL 5481.1A.
 2. Substantial revisions of the classification of components, structures and systems, and related quality assurance.
 3. Revisions to the site geological and hydrologic data based on studies agreed to between DOE and the State.

TABLE OF CONTENTS

Foreword..... i
Staff and Consultants..... ii
Summary..... iii
I. INTRODUCTION.....1
II. EEG COMMENTS AND RECOMMENDATIONS.....5
 A. Chapter 1, Introduction and General Description.....5
 B. Chapter 2, Site Characteristics.....10
 C. Chapter 3, Principal Design Criteria.....17
 D. Chapter 4, Plant Design..... 25
 E. Chapter 5, Process Description.....27
 F. Chapter 6, Radiation Protection.....29
 G. Chapter 7, Accident Analysis.....34
 H. Chapter 8, Long Term Waste Isolation Assessment.....37
 I. Chapter 9, Conduct of Operations.....41
 J. Chapter 10, Operations Safety Requirements.....41
 K. Chapter 11, Quality Assurance.....46
III. REFERENCES.....48



1. INTRODUCTION

The U. S. Department of Energy (DOE) published the Safety Analysis Report (SAR) for the Waste Isolation Pilot Plant Project (WIPP) in 1980.¹ Although the WIPP is not subject to licensure by the U. S. Nuclear Regulatory Commission (NRC), DOE order 5481.1A suggests that the SAR be patterned after the Safety Analysis Report required for licensure under the regulations of the NRC for nuclear reactors (10 CFR 50). It is a five volume report which, according to the NRC regulations, should include (1) the description and safety assessment of the site; (2) a description and discussion of the facility with special attention to design and operating characteristics; (3) the current design of the facility; (4) an analysis and evaluation of the design and performance of structures, systems and components to reflect their risk to health and safety; (5) the technical safety specifications for the facility and the bases for these specifications; (6) the plan for training and operation of the facility; the quality assurance program to be applied to the design, construction, and testing of components, structures and systems to confirm their adequacy; and (7) those plans and procedures which would apply in the event of emergencies.



In September, 1982 the Albuquerque Operations Office of DOE issued the current Order, AL 5481.1A for nuclear operations of the Albuquerque Operations Office of DOE. Chapter 1, section 3.b. lists the Table of Contents for SARs^(a) as follows:

"b. Table of Contents for SARs.

<u>Chapter</u>	<u>Title</u>
1.....	Introduction
2.....	Summary
3.....	Description and Safety Assessment of Site ^(b)
4.....	Description of Facility
5.....	Description of Operations
6.....	Accident Analysis
7.....	ES&H Systems Critical to the Safety of the Facility
8.....	Air and Water Pollution Control System
9.....	Environmental Monitoring Program
10.....	Waste Management
11.....	Quality Assurance and Acceptance Programs
12.....	Facility Expansion Decontamina- tion and Decommissioning
13.....	ES&H Safety Management Program
14.....	Summary of Emergency Response Plan
15.....	Summary Plan for Employee Training
16.....	Summary Plan for Operating Procedures
17.....	Operations Safety Requirements
18.....	Conclusions
19.....	Glossary"

(a) Chapters 1 through 12 and 18 constitute the Preliminary Safety Analysis Report (PSAR). Additional sections shall be included in the Final Safety Analysis Report (FSAR).

(b) When a formal site study has already been prepared, the study can be referenced in Chapter 3. Pertinent data specific to the facility can then be extracted and placed in Chapter 3.

As stated in Appendix B of the Consultation and Cooperation Agreement between the State of New Mexico and DOE.²

"The Safety Analysis Report (SAR), as amended from time to time, constitutes the most comprehensive document concerning WIPP both in general and specifically as related to public health and safety as well as other matters. The SAR is a dynamic document describing all aspects of the WIPP design and shall be amended by way of revision and additions throughout the entire WIPP project."

The SAR has been rather extensively amended by DOE a total of eight times. These amendments were made in response to comments of the State Environmental Evaluation Group (EEG), as a result of changes in design of structures, systems and components, or because of new information considered by DOE to be more reliable. The EEG has reviewed each of these amendments and has forwarded detailed written comments and recommendations to DOE. This report represents a summary of the more significant EEG comments and associated DOE responses. In most instances, following the submission by EEG of written comments, appropriate DOE staff, and contractor representatives meet with EEG to discuss the DOE's interpretations and planned response to the EEG comments. Any controversial issues may be further debated in an effort to reach a resolution. This report includes a listing at the end of the discussion of each Chapter of those issues which remain unresolved.

The comments and DOE responses as presented below do not include all topics addressed in the original documents nor are they intended to be verbatim quotations from those originals. Instead, an effort has been made to provide only a summary of the more substantive issues raised. Copies of the original submittals, and the written response from DOE are available from EEG upon request. The comments are presented according to the organization of the SAR rather than in relation to their importance to health and safety. However, the more significant health issues are highlighted as appropriate following the discussion of each chapter.



II. EEG COMMENTS AND RECOMMENDATIONS

A. Chapter 1. Introduction and General Description

This Chapter of the SAR provides an introduction and very general description of the facilities, the types of wastes, and the DOE Contractors involved in either design, construction, or operation of WIPP. EEG has suggested additional information to be added to this Chapter, and recommended deleting conclusions not fully substantiated by the data. For example, in the original versions, the statement was made that there are "no major technical problems with the site as it is now understood." In the early stages of the site evaluation, discussed further with respect to Chapter 2 below, EEG urged that more information be provided on the Site and Preliminary Design Validation Program (SPDV) and that several geological issues relative to the suitability of the site be resolved through additional studies. EEG also recommended that the SAR provide details on procedures for verification and enforcement of the Waste Acceptance Criteria.

In general, the DOE responded favorably to these recommendations for additional geotechnical information by including the information in several chapters of the SAR, rather than Chapter 1. The DOE also agreed to perform additional geotechnical studies to resolve the questions concerning site suitability. This agreement, however, was made as a result of a lawsuit filed by the State against DOE. The DOE has continued to maintain in the SAR that there are no significant



geotechnical problems with the site. The State/DOE litigation resulted in a Stipulated Agreement ² signed July 1, 1981, requiring the execution of a Consultation and Cooperation Agreement between the parties. Appendices B and C of this Agreement provided for the completion of several topical reports and five additional studies designed to improve the understanding of the geology at or near the site and the hydrology of the water-bearing zones at the site. The following final or interim reports were to be completed before the decision to construct the repository:

- 
1. Deep Dissolution: Including all available pertinent up-to-date data and arguments for and against the hypothesis of deep dissolution in the Delaware Basin and its potential effect on WIPP.
 2. Disturbed Zone: Including all available pertinent up-to-date data and analyses of the nature, extent and potential significance to the repository.
 3. Breccia Pipes: Including all available pertinent up-to-date data and analyses concerning the existence of breccia pipes in the basin and the reef, potential for future breccia pipe development, and their significance to WIPP.
 4. DMG Hydrology: Including all available pertinent up-to-date data and analyses of the hydrologic characteristic, geochemistry, potential and rates for salt removal, and directions of flow and

possible communication with other aquifers e.g., reef aquifer, San Andres Limestone aquifer and shallow aquifers.

5. Regional Hydrology: Including all available pertinent up-to date data and analyses of the recharge and discharge area, flow times and interconnections of aquifers near the site.
6. Natural Resources: Including detailed plans to control recovery of potash and hydrocarbons without disturbing the repository, and the evaluation of potential consequences of these plans.
7. Results of SPDV Site Validation Experiments: Including all pertinent results and analyses of experiments as listed in WIPP-TME-2975, pp. 15-16.
8. Plans for SPDV Design Validation: Updated, detailed plans and rationale for the proposed design validation experiments as outlined in TME-0358 and TME-3063."

The additional studies of the geology and hydrology at the site included the following:

- "1. Test a (known) brine reservoir in the deformation zone (ERDA-6).
2. Present an up-to-date report of all data on other known brine reservoirs in the area.



3. Carry out horizontal exploration of the disturbed zone from the depth of the repository. (By mutual agreement between the State and DOE, this plan was deleted and instead the drill hole WIPP-12, located just north of Zone II and in the disturbed area, was deepened to the Delaware Mountain Group. In the process of deepening, another pressurized brine reservoir was encountered.)



4. Evaluate the extent of fracture flow in the Rustler aquifers.

5. Study the characteristics of other aquifers in the area."

In commenting on planned or ongoing studies referred to in Chapter 1 and other Chapters of the SAR, EEG has urged that target dates for completion of these studies also be included in the summary tables of Chapter 1. In some cases, DOE has preferred to delete reference to such studies. As an illustration, section 2.6.63 was deleted in that it referred to "Ongoing Studies" to determine the timing and magnitude of past climatic changes in the site region, and their impact on geologic events over the past ten thousand years. These studies were to include examination of cores, and radiometric dating of organic and ash fall materials. It was to be completed in Mid-1981. DOE stated in 1982 that "These studies have been temporarily suspended due to the magnitude of effort being expended to satisfy the requirements of the DOE State Stipulated Agreement. A schedule for completion of these studies will be established in a future amendment." This new schedule

has not been included in any revision through Amendment 8. EEG recommended that provisions be added to this Chapter to reflect the fact that some wastes which do not meet all of the Waste Acceptance Criteria may be accepted at WIPP with prior approval of the WIPP Project Office. DOE had previously agreed that the State will be notified in advance of such shipments and be permitted to review these proposals before the decision is made to ship the waste. DOE responded to this comment by proposing that such provisions related to DOE/State agreements be added to the Consultation and Cooperation Agreement (C. & C.) and the WIPP Operational Procedures instead of the SAR. DOE stated on December 29, 1983, that draft provisions of such an amendment would be submitted to EEG. To date, no such amendment of the C. & C. agreement nor the WIPP Operational Procedures has been submitted.

Unresolved Comments



1. Although the First Modification to the C & C Agreement will provide for a description and anticipated schedule of reports on geotechnical studies, revisions should be added to the SAR to reflect all studies underway or planned by DOE and its contractors. Such revisions should include the anticipated completion date for each study.
2. The C & C agreement and the WIPP Operational Procedures should be amended to indicate that the EEG will be notified in advance and be given an opportunity to review any proposal to ship waste to WIPP which does not meet the WIPP Waste Acceptance Criteria.

B. Chapter 2. Site Characteristics



This Chapter provides details on the geography and demography of the site, nearby facilities, meteorology, seismicity, hydrology, and regional and site geology. Although DOE concluded in Chapter 1 that there were "no major problems" with the site, the data in Chapter 2 of the original SAR seemed to EEG to be inconsistent with this conclusion. For example, although the seismic reflection profile data were conflicting and inconclusive, they did suggest that faults may exist in the northern part of Zone III and IV from the DMG to the Salado formation, extending through the Castile. This zone of instability appeared to begin only about 3/4 mile north of Zone II, which originally represented the northern-most boundary of the repository. In early comments, EEG also called attention to the depression in Marker Bed 124 about two miles north of ERDA-9 (center of the repository). This collapse feature was considered possible evidence of deep dissolution such as a breccia pipe. Also an anticline in the Castile exists at WIPP-12 borehole, at the northern edge of Zone II, and the northern boundary of the proposed repository. Figure 2.7-25 illustrates three known depressions in MB 124, and since the depression two miles north of ERDA 9 is not reflected in the Salado and higher formations, the possibility was considered that it is a collapse feature due to deep dissolution.

EEG stated that the SAR had inadequately evaluated the extent of deep dissolution within or near the site. It was noted that several studies were being planned or in progress by DOE and its contractors

which would help to resolve the questions on deep dissolution, and these were completed prior to the decision on the suitability of the site.



EEG called attention to the inaccuracies of the SAR's data and discussion with respect to numerous brine reservoirs in the Castile formation and their location and possible interconnection.

Certain of the reservoirs may be interconnected and cover a broad area including the WIPP site, however the data on the reservoirs at ERDA-6 and WIPP-12 suggest that these reservoirs are not connected. There remains the possibility that the WIPP-12 brine extends beneath the WIPP repository.

EEG also expressed concern over the natural resources present at the site and believed that this provided further evidence that the SAR should not conclude that no major problems exist at the site.

DOE responded by deleting Figures 2.7-23, 2.7-24, and 2.7-25, on the basis of Westinghouse "reinterpreting" the seismic profile data. The "disturbed zone" was considered a misnomer, and instead the zone was referred to as an "anomalous zone." The fact that the disturbed area did not extend into the Salado was considered by DOE to be evidence that it was not active "instability" and therefore would present no threat to WIPP. The MB-124 depression and the WIPP-12 anticline also were not considered problems for WIPP but rather reflect slow geologic processes of general interest. As a result of the State/DOE

Stipulated Agreement². DOE carried out several additional studies to try and improve the understanding of possible deep dissolution, brine reservoirs and the nature of the anomalous zone and its potential impact on the proposed repository. The agreement provided that a final or interim report on these studies would be completed prior to a decision to construct the repository. For example, DOE agreed to drill an additional hole in the area 2 miles north of ERDA-9 to determine the cause of the depression of MB-124. This is being planned for the Summer of 1985. Horizontal drill holes at the level of the repository were to be drilled 3000 feet north of the northernmost drift in the repository, to obtain further data on the "Zone of Anomalous Reflection." This decision was subsequently rescinded by mutual agreement between the State and DOE and instead the Drill Hole WIPP-12 was deepened into the Castile to determine the cause of the anticline at this location. This well encountered a large pressurized brine reservoir at 3016 feet below the surface within fractures in the Castile formation, about 900 feet below the repository horizon.

More detail on the issues addressed above by EEG may be obtained from the EEG reports 2, 3, 6-18, 21, 22, 23, 25 and 27.

The original WIPP design put the underground 100 acre repository in the northern part of Zone II, which would have located a part of it directly above the deformed beds of the Castile Formation. From the seismic and borehole data, this area was thought to contain the potential problems of deformed salt at the repository horizon as well as the long-term uncertainties associated with regional deformation.

EEG proposed to DOE in the Spring, 1982 to reorient the WIPP repository to the southern part of Zone II in order to take advantage of an area with apparently more predictable structure and much less deformation. This decision received a strong impetus when pressurized brine was encountered in the borehole WIPP-12, one mile north of the center of the site, in late November, 1981. The DOE announced the decision to reorient the site to the south in Summer, 1982. To confirm the predictions of the geologic structure in the southern part, the DOE drilled a well, DOE-1, just outside Zone II. The data from this well showed a lack of deformation in the geologic units in this area.

There continues to be disagreement between DOE and EEG in the interpretation of the WIPP site characteristics in Chapter 2 of the SAR. EEG interprets the descriptions to be inaccurate or incomplete in many respects and omits references to potential problems which are not yet resolved. EEG maintains that the SAR should accurately reflect the current status of understanding of these issues and should describe the efforts being made to resolve them. The DOE agreed to address these concerns in SAR Amendment 9. Although additional information is needed to improve understanding of the geologic processes, EEG concluded in EEG-23 that the site has been characterized sufficiently to warrant site validation for the present WIPP project.

In commenting on section 2.1.1.2 concerning the boundaries for establishing effluent release limits, EEG argued against use of the

Zone IV boundary for purposes of accident releases. In the published interagency agreement between DOE and the Bureau of Land Management of the Department of Interior (BLM), it was clearly stated that BLM would have control of Zones II, III and IV and that only Zone I was under DOE control. In meeting with DOE¹⁹, their representatives stated to EEG that they would seek an amendment to the Interagency Agreement to reflect DOE control of access to all four zones. This amendment has not been issued to date. In a recent communication from the WIPP Project Office, it was pointed out that the present Department of the Interior Administrative Land Withdrawal for the development of WIPP specifically prohibits bringing radioactive waste on site. Therefore no change is needed for radiological accidents under the current withdrawal authority. Legislation for permanent withdrawal of the WIPP area is being drafted and will provide for appropriate DOE control.



Unresolved Comments

1. Revisions are needed to the discussions of site characterization to reflect data as it becomes available from studies in progress or planned. Particular effort should be made to see that statements accurately reflect the current status.
2. Either the Department of Interior Withdrawal Legislation or the Interagency Agreement between DOE and the Bureau of Land Management should be revised to provide for DOE control of Zones I, II, III and IV for purposes of accidental release of radionuclides. This change is needed prior to shipment of the wastes to WIPP.

WIPP SAR

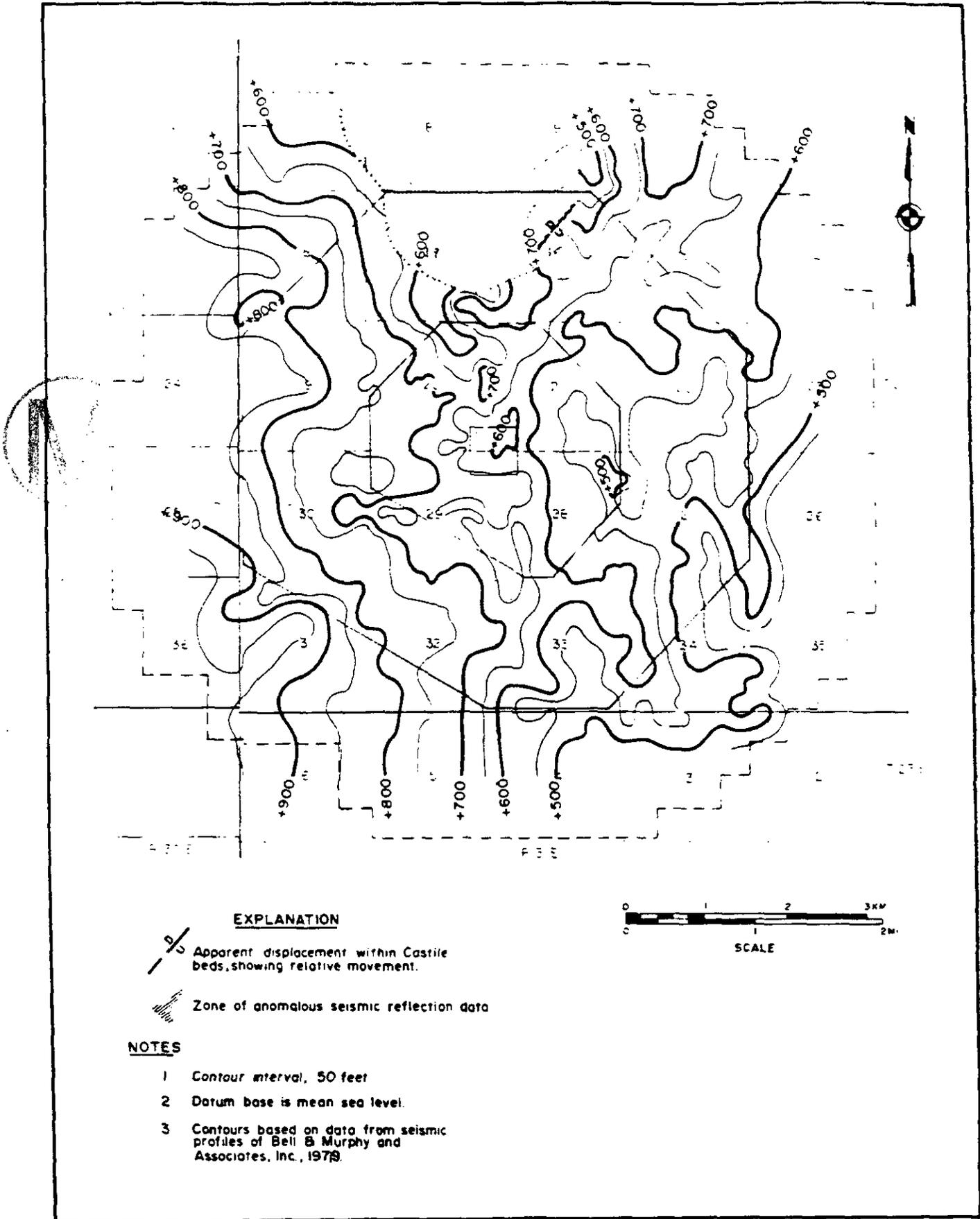
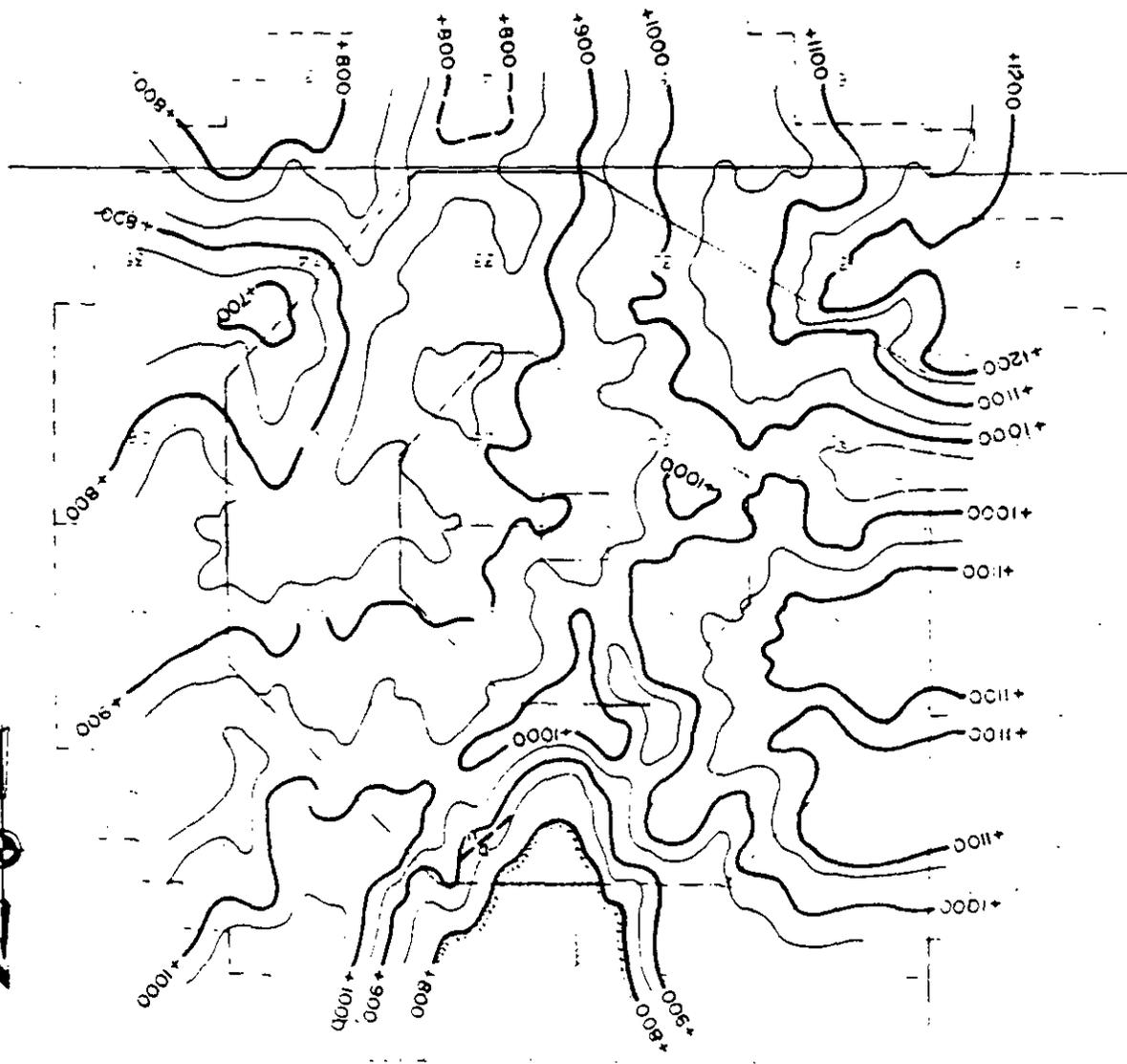


Figure 2.7-23 Structure Contours on Top of Castile Formation



EXPLANATION

Apparent displacement within Cowden Anhydrite, showing relative movement

Zone of anomalous seismic reflection data



SCALE

NOTES

- 1 Contour interval, 50 feet.
- 2 Datum base is mean sea level.
- 3 Contours based on data from seismic profiles of Bell & Murphy and Associates, Inc., 1979.



Figure 2.7-24 Structure Contours near the Cowden Anhydrite

WIPP SAR

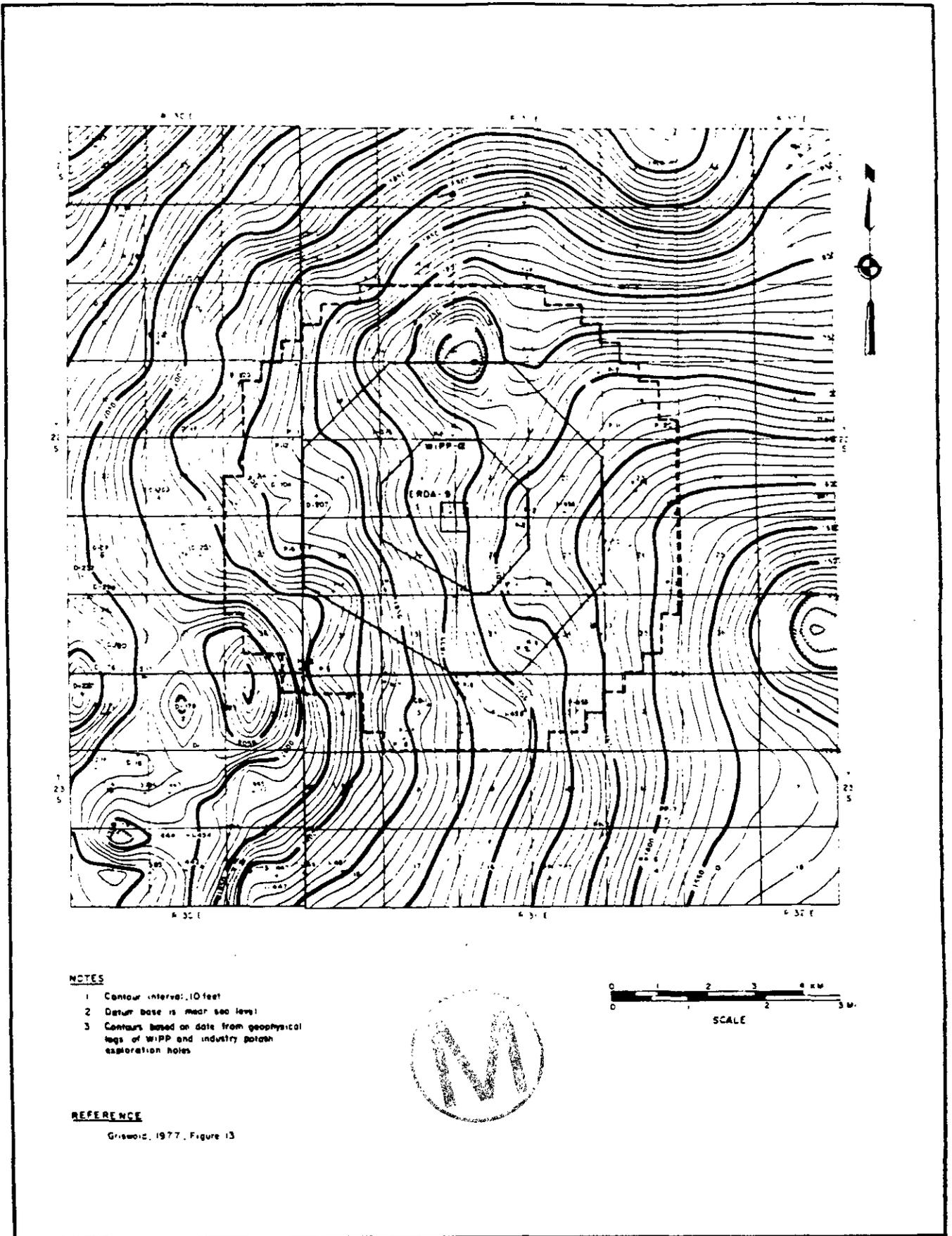


Figure 2.7-25 Structure Contours on Base of MB124

C. Chapter 3, Principal Design Criteria

This Chapter describes the principal design criteria for the WIPP project. This includes the characteristics of the waste, waste handling and storage capacities, structural and mechanical design criteria, safety protection criteria, classification of structures, systems and components for purposes of quality assurance, and a few statements on decommissioning.

The EEG has pointed out some discrepancies between the wastes inventory in the SAR and the inventory as reported in the FEIS and other DOE publications. Also the characteristics of the wastes as described in the narrative (e.g. subsection 3.1.1.1) are not consistent with the tabulated characteristics in the SAR (e.g. Table 3.1-1A). DOE agreed that these inconsistencies exist and stated in November 1983 that a study was underway to obtain more accurate data, and on completion of this study, the SAR will be revised. Although subsequent amendments have been issued (Amendments 7 and 8), this data has not been revised. For example, subsection 3.1.1.1 states that the average density of the CH-Waste is 2 gm/cc, or approximately 930 lbs/55 gal drum. However, Table 3.1-1A indicates an average weight of 330 lbs/drum. The SAR indicated in Table 3.1-2 a maximum alpha TRU/55 gal drum of CH-Wastes of about 15 Ci, whereas on pages 3.1-4, a maximum of 85 Ci was indicated. This was changed in amendment 8 to indicate that a maximum ²³⁹Pu equivalent limit would be provided at a later date.



Concerning the experimental Defense High-Level Waste (DHLW), the FEIS stated that the equivalent of 40 canisters would be emplaced, whereas the SAR indicated 60. The SAR since has been amended to be consistent with the FEIS on the number of equivalent canisters (40), but also stating that about 60 experiments may be carried out. Additionally, subsection 3.1.1.3.2 and Table 3.1-3 stated a volume of 23 ft³/canister DHLW, an increase over the previous volume of 520%. When EEG commented on this increase, DOE responded that the Ci/l for many nuclides will be sharply reduced in a future amendment, resulting in the same total curies/canister. Amendment 8 reported the nuclides of DHLW as 54.2 Ci/Lb. Based on a density of 2.8 gm/cc for the glassified waste, the total curies/canister of DHLW has been reduced from 444,000 to about half that number. However, a recent draft of the "Interim Bounding Criteria for Defense High-Level Waste for Receipt at the WIPP"³³ establishes a maximum of 430,000 curies/canisters. The SAR needs to be revised to reflect the authorized maximum.



EEG commented in 1983 that although the SAR discussed the possible retrieval of wastes, no information was given on the criteria to be used to determine the necessity for retrieval. EEG urged that this criteria be included in the SAR at an early date, so that it is clear that the decision process is based upon public health considerations, and there will be an opportunity for public input into the development of the criteria. In a letter of October 1, 1984, the DOE Albuquerque Operations Office stated that the retrieval criteria would be provided to the State by the end of 1985. In the reply from the State, this date was accepted.

In 1980 EEG objected to certain provisions of the classification system for structures, components and systems to be used in the construction and operation of WIPP. This classification system originally was based on Title 10, Parts 20, 21, 71, 100 of the Code of Federal Regulations. A design Class I item was regarded in the SAR as a basic component as defined in Title 10, Part 21, and applied to items essential to the prevention or mitigation of the consequences of an accident that could result in an annual radiation dose beyond the exclusion area boundary to the whole body, bone marrow, and gonads of 0.5 rem, or 1.5 rem to all other organs. "Exclusion Area" is defined in Title 10, Part 100. 3(a), and was interpreted by DOE as the area within Zones I, II, III and IV. The SAR concluded that no design Class I items have been identified at WIPP. EEG's original objections were based on the DOE conclusion that no items fell into Class I. For example, EEG urged that the shipping containers for the three types of waste be considered Class I, EEG contended that it was meaningless to define a Class such that no items were included. The purpose of the classification system is to designate the extent of quality assurance and design requirements for each item in relation to their potential hazard. The response from DOE was that the quality of the shipping container will be assured through the Waste Acceptance Criteria.

In January 1981, the definition of Design Class I was amended to apply to items essential to the prevention or mitigation of the consequences of an accident that could result in a 50 year dose commitment to the whole body, bone marrow and gonads of 25 rem, or



75 rem to all other organs beyond the protective area boundary. "Protective Area" was defined on p.4.1-2 as "Controlled Zone I." But subsequent statements indicated that DOE interpreted the "Protective Area" as the four zones of WIPP. The conclusion that no items fell into Design Class 1 remained unchanged. In October, 1982 EEG pointed out that the classification system was inconsistent with the proposed final rule of the Nuclear Regulatory Commission (NRC) for "Disposal of High-Level Radioactive Waste in Geologic Repositories", 10 CFR 60. For example, 10 CFR 60 defined the phrase "important to safety" with reference to structures, systems, and components, or "Those structures, systems and components essential to the prevention or mitigation of an accident that could result in a radiation dose to the whole body, or any organ of 0.5 rem or greater at or beyond the nearest boundary of the unrestricted area at any time until the completion of permanent closure." The preamble to this final NRC rule indicated that this value of 0.5 rem is equal to the annual dose to the whole body in an unrestricted area that would be permitted under 10 CFR 20 for normal operations. However under the SAR interpretation, a Class I component would be one which upon failure would allow a 50 year dose commitment of 25 rem, which could be delivered in a single incident. This would imply a higher radionuclide release limit for WIPP than for a high level waste repository. Although WIPP is not subject to NRC regulations, it certainly should not be a greater public health risk than a high level waste repository.



In further comments on the classification system in November, 1983, EEG noted that the Class assigned to various components, structures and systems did not seem consistent with the definition of the Class as stated in Chapter 3, and in some cases the assigned class was downgraded for no apparent basis. Also, the definition of Class II was changed. For example, items used to process waste, the Central Monitoring System (CMS), certain contamination alarms, and the auxiliary generator, were all downgraded from Class II to Class III. The word "permanent" was added to the Class II definition leaving the impression that items for occasional or emergency use only would not be assigned Class II, but would fall into Class III. Also the relationship between the quality assurance and the various classes was not clearly defined in the SAR.

The SAR indicated that the quality assurance requirements are applied on "a selective basis" to Design Class II and III items, and the methods used in the selection process are described in manuals and procedures developed by DOE and the major project participants. In reviewing these manuals and procedures, EEG has been unable to find reference to the classification system except in references 28, 29, 30. These describe a classification somewhat different from that used in the SAR. As further illustration of the inconsistency in the classification system EEG compared the WIPP classification as shown in Table 3.4-2 of the SAR with the office of Nuclear Waste Isolation (ONWI) classification of similar structures and components for an exploratory shaft for a HLW repository in the Permian Basin.¹⁴ In the



ONWI classification several components of the Exploratory Shaft are identified as Class I and II, and there is a direct correlation between the design and QA requirements and the assigned Class. For the WIPP project, all shaft components are Class III. It is also interesting to note that the DOE Albuquerque Operations Office Order AL5481.1A on "Safety Analysis and Review System For AL Operations"¹⁵ provided the following directive for new DOE facilities containing large quantities of radioactive material:

"The postulated exposures to the general public (from credible accidents) shall be compared to 10 CFR 100 limits ^{Draft Exclusion Order of the site} as maximal allowable dose commitments. More desirable upper limit accidental dose commitments are 5 rem whole body and 15 rem to an internal organ including the thyroid and 30 rem to the bone (limits in Draft of 10 CFR 101). These are 50 year dose commitments to be applied for each individual accident situation analyzed."

In reference to the DOE (ALO) Order, it was further noted that this Order presented a suggested Table of Contents for a SAR. This also was found to be significantly different from the WIPP SAR. For example, unlike the SAR the Table of Contents in the DOE (ALO) Order included Chapters covering "Summary of Emergency Response Plan", "Waste Management," "Summary Plan for Employee Training," and a "Glossary". EEG has repeatedly recommended that the SAR be revised to be more in accord with this Order, but the WIPP Project Office has

replied that this Order is only a guide and the information on these topics is available in other published reports.

It is obvious that some inconsistency exists between the quality assurance criteria for WIPP, the more restrictive criteria of a HLW repository, and the directives of DOE (ALO) for new nuclear facilities.

In August, 1984, the EEG retained the Tenera Corporation to further examine the adequacy of the WIPP classification system, design requirements and quality assurance. A report of their findings has been prepared and will be distributed as an EEG report ³¹. In general, this report concludes that the health or hazard implications of the classification system, as defined by Bechtel, is not substantially different from that used for a civilian nuclear reactor. However, they also noted inconsistencies between the classification as described in the SAR and that of Bechtel. Tenera's report recommended that the 0.5 rem dose in 10 CFR 60 be established as a WIPP criterion for determining whether components must comply with the quality assurance program. The report recommended that the EEG review the implementation of the quality assurance program during the construction of the WIPP facilities and the underground repository. At the present time, the EEG has a full-time radiological physicist and a part-time engineer on site. Their responsibilities include evaluation of the WIPP quality assurance program.

Unresolved Comments

1. Revisions should be added to the information in the SAR on the characteristics of the wastes and waste containers so that this information accurately reflects the waste packages coming to WIPP. It is understood that this information will be included in Amendment 9.

2. Extensive revisions are needed in the SAR to the definitions, data and discussions of the classification system for structures, systems and components. These revisions should show more clearly the relationship between the class, the design requirements, and the required quality assurance. The classification system should provide for the protection of the public at least to the same extent as that required for a high level waste repository licensed by NRC, and should conform more rigorously to applicable orders of DOE and the Albuquerque Operations Office. According to the WIPP Project Office of DOE, some of these revisions will be included in Amendment 9.

3. The SAR should be amended to include the criteria to be used to determine the necessity for retrieval of the wastes. DOE has indicated that these criteria will not be available until December, 1985.



D. Chapter 4. Plant Design

The principal features of the Plant are described in this Chapter, including surface and subsurface facilities. There is also provided a description of the service and utility systems, the waste handling, emplacement and retrieval equipment, and the underground excavation equipment.

The comments of EEG on this Chapter have previously focused on the need for more detailed information covering the various subjects. For example, EEG has noted the need for more details on the emplacement procedures and equipment for the RH waste. Additional information was also needed on the fire protection systems, components and procedures. In responding to the EEG comments on RH emplacement, the DOE indicated that this information would not be available until Title II plans were completed. Concerning the EEG comments on fire suppression, DOE responded by the addition of considerably more information in the SAR on fire protection facilities and consequence assessment.

In section 7B.2.17, the SAR recognizes that a fire could occur in the sample preparation room, because of the chemicals to be used there. After analysis of this event, the DOE concluded that such a fire is bounded by the fire considered in the underground facilities, but this conclusion was based on the assumption that the fumes and radioactive effluents would be removed by the fume scrubber and HEPA filters, and

the fire would be extinguished by the automatic sprinkler system. As indicated in DOE Order 6430,¹⁷ these assumptions may not be valid unless the fire protection systems are considered "critical", or Class I or II components.

Unresolved Comments

1. More detail is needed in either Chapter 4 or 5 on the waste emplacement procedures.



Chapter 5. Process Description



A description of the waste handling system for each type of waste is included in this Chapter. The Chapter also discusses process interruption modes, underground excavation operations, and procedures for the retrieval of each type of waste, when retrieval is decided upon.

The early comments of EEG requested additional information on how the WIPP facility intends to verify compliance of the waste shipments with the waste acceptance criteria and what action would be taken if a shipment fails to meet the criteria. Subsequent additions to this Chapter and Chapter 9 (section 9.5) have revealed that aside from routine visual inspection the only waste acceptance criteria to be verified at WIPP are the containment configuration, labeling, surface contamination, external dose limits, and documentation. In discussion with the Westinghouse staff, the EEG also was informed that the other waste acceptance criteria would be verified at the waste generator sites by means of DOE audits. Limited information has been provided to EEG on the frequency and the nature of these audits. Also, the WPO has agreed to have an EEG representative on each of these audits, so that EEG may verify their adequacy in protecting the public health of New Mexico.

The EEG also recommended that additional information be added on procedures for solidification of radioactive liquid waste generated at the site. The DOE response stated that solidification would be

carried out on site by a local contractor, but no procedures were added to the SAR to provide sufficient information to make a radiation safety evaluation. The EEG also objected to the logging procedure for waste shipments illustrated in Table 5.5.1. This Table listed the type of information which would be recorded on each shipment of waste. It was satisfactorily revised in Amendment 4 as shown below to add logging information on all of the Waste Acceptance Criteria.

The SAR (Chapter 4) has indicated that RH-TRU is to be emplaced in rooms or entries where CH waste also is to be emplaced. However EEG requested additional information in Chapter 5 on the procedures for retrieval of CH waste when RH waste is emplaced in the walls. Additionally, more information is needed to evaluate shielding in the underground storage area. The DOE responded by clarifying in both Chapters 4 and 5 that CH and RH Waste would not be combined in a storage room until after the retrieval decision. Therefore it now appears that both wastes will be emplaced prior to the retrieval decision, but such emplacement will be in separate rooms or entries until after the retrieval decision. Concerning underground shielding, DOE indicated that results of their evaluation would not be available until after completion of Title II design.

Unresolved Comments

Additional information is needed in the SAR to provide evaluation of shielding in the underground facilities.

F. Chapter 6. Radiation Protection

This chapter reviews the measures designed to ensure that radiation doses to workers at WIPP and the general public are "as low as reasonably achievable" (ALARA). It discusses the types of radiation sources, the design features of the facility intended to prevent undue exposure, or radiation risks, the radiation protection instrumentation and the estimated on-site and off-site dose assessments to workers and the general population as a result of normal releases. The WPO has established the operational dose limit to workers at 1 rem/year, approximately 20% of the allowable occupational limit.

EEG's initial comments urged that more information be added to allow evaluation of the radiation shielding in the underground areas. Also the dose assessments did not address potential internal doses to workers using respiratory equipment. DOE subsequently expanded the dose assessment information to include doses to workers with respirators, but indicated that the underground shielding could not be completely evaluated until the Title II designs are complete. The SAR also contained inadequate information on the environmental sampling planned. Additional information was added, but this did not include location or frequency of sampling. In early 1985, the WPO provided for review by EEG a draft report on "Preoperational Environmental Monitoring Program for the Waste Isolation Pilot Plant".

This chapter refers to the DOE Order 6430 (Draft)¹⁶ as a basis for the design criteria for WIPP. As reflected in our comments on Chapter 3,

the EEG has repeatedly called attention to the fact that the design criteria should be upgraded to the DOE (ALO) Order 5481.1A or 10 CFR 60. We note that the draft document ¹⁶ referred to in Chapter 6 has been superceded by a revised DOE Order.¹⁷ In Chapter XXI of this more recent Order, it defines "critical items" as "those structures, systems, and components whose continued integrity and/or operability are essential to assure confinement or measure the release of radioactive materials in the event of the DBA (Design Basis Accident)..." DOE has maintained that there are no critical items at WIPP. We also noted that the definition of the "Design Basis Fire" is consistent with EEG's recommendation for consideration of fires in the surface facilities at WIPP. EEG has pointed out to DOE that their failure to consider the fire suppression and manual fire protection equipment as "critical items" (either Class I or II) means that they must assume failure of this equipment in evaluating the design basis fire.

The recent DOE Order (6430.1)¹⁷ defines the DBF as "That fire which is the most severe DBA of this type. In postulating such a fire, failure of the automatic and manual fire suppression provisions shall be assumed except for those systems considered critical items."

(Emphasis added.) This point is discussed further under Chapter 7. The response from the WIPP Project Office on this point was that Chapter XXI of the DOE Order refers only to Plutonium Processing Facilities and WIPP is not such a facility. This does not appear



consistent with the language of Chapter XXI. As stated in the first paragraph:

"This Chapter supplements these other sources and provides, specific direction and guidance on particular requirements which must be met in the design and construction of facilities for processing and handling of substantial quantities of plutonium. These particular requirements are necessary because of specific toxicological problems associated with plutonium."

Certainly WIPP is a facility for handling large quantities of plutonium contaminated wastes, therefore it would appear to be subject to Chapter XXI. Furthermore in the third paragraph of this chapter, it states that:

"Questions on the application of these design criteria in the planning and design of new DOE facilities should be addressed to the Director, Office of Project and Facilities Management and to the Deputy Assistant Secretary for Environment, Safety, and Health, EP-30, at DOE Headquarters, for resolution."

Therefore EEG believes that the question of the application of Chapter XXI should be referred to the offices indicated above for resolution.

EEG has also opposed the definition of Class I items on the basis that the radiation limits referred to are not consistent with current

national criteria. This EEG argument, also, is supported by the more recent DOE Order¹⁷, Chapter XXI, and DOE Order 5480.1A,¹⁸ Chapter XI. The radiation limits for members of the public are prescribed as 0.5 rem/year and in DOE Order 6430.1, XXI-6, it states that "in no case shall the applicable exposure regulation be exceeded, either with respect to the operating personnel, or to the public at the boundary or nearest point of public access".

More recently, EEG has questioned the assumptions used for certain of the dose assessment calculations. For example, it is not clear why the RH-TRU gamma spectrum was used for CH-TRU. This would tend to ignore the neutron and ²⁴¹Am radiation. Also, further information is needed to support the assumptions used to calculate resuspended radionuclides (Section 6.2.2.1). DOE responded by pointing out that this assumption (RH-TRU spectrum) provided conservatism with respect to shielding calculations, and the Am-241 was ignored because it would cause no significant change in the shielding design. Also, the neutron dose will be monitored during operations, and appropriate action taken if neutrons are detected. This response was acceptable to EEG.



Unresolved Comments

1. Additional information is needed in the SAR on the environmental monitoring program for WIPP.

2. As recommended under comments on Chapter 5, more information is needed to permit evaluation of the adequacy of underground shielding.

3. As recommended for Chapter 3, revisions are needed to the definitions, and data on classification and quality assurance for structures, systems and components.



Chapter 7. Accident Analysis

This Chapter provides analyses of the radiological consequences of accidents which might occur during handling of the radioactive wastes at WIPP. These accident scenarios were based on studies of the effect of the misuse or breakdown of handling equipment on waste containers. It has not been revised since the 4th amendment to the SAH which was issued by DOE in September 1982. Therefore, it has not addressed certain changes in the design of components, facilities and source terms. For example, the cost reduction changes of 1983 led to several substantive changes in design, which might effect the Design Basis Accident (DBA). Also there have been changes in the characteristics of the wastes to be shipped to WIPP.

In commenting on Chapter 7, EEG noted that no consideration was given to the buildup of radioactive contamination during the operational life of WIPP. Because of the long-lives of some of the transuranics, and perhaps contribution of Sr⁹⁰, the total buildup could exceed the EPA limits of 0.2 uCi/m² in the top centimeter of soil. DOE responded adequately by extensive revision of Chapter 6 to include the total releases.

EEG recommended to DOE that additional surface accident scenarios be considered. For example, EEG considers a major surface fire credible if one assumes that fire suppression equipment fails. (See comments on Chapter 5.) Also transportation accidents in Zones II, III or IV



should be considered. The DOE rejected these comments in that DOE does not agree that a major surface fire is credible, and transportation accidents will be addressed in the Safety Analysis Report on Packaging (SARP). (The draft SARP was transmitted to the EEG in December, 1984, and is currently under review.) EEG also urged that the SAR consider radiation doses to individuals within Zones II, and III because the general public will have temporary access to these areas. DOE agreed and included consideration of a person located between Zones I and IV at the point of maximum deposition from an airborne release. Concerning surface fires of serious proportions at WIPP in section 7B.2.17, the SAR recognizes that a fire could occur in the sample preparation room, because of the chemicals to be used there. After analysis of this event, the DOE concluded that such a fire is bounded by the fire considered below ground. This analysis was not included in the SAR, but it was based on the assumption that the fumes and radioactive effluents would be recovered by the fume scrubber and HEPA filters, and the fire would be extinguished by the automatic sprinkler system. As previously indicated, these assumptions may not be valid unless the fire protection systems are considered "critical", or Class I or II components, as required by DOE 6430.1¹⁷. Furthermore, it would seem reasonable to include the analysis of this event in the SAR, even if the consequences are bounded.

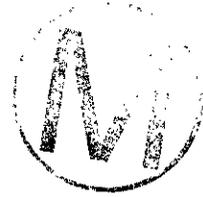


Unresolved Comments

1. This chapter needs extensive revisions to reflect changes in design and waste characteristics.
2. The analyses should be consistent with DOE Order 6430.1.
3. The analyses of potential surface fires should be included.



H. Chapter 8. Long Term Waste Isolation Assessment



This chapter assesses the long-term consequences to the public health and safety of hypothetical sequences of events leading to breach of the salt formation and repository by aqueous solution and movement of the radioactive material to the biosphere. It includes a description of the communication modes, the criteria for the selection of the modes, and the assumptions and methods of analyses used.

EEG offered some suggestions in 1980 and 1981 for clarifying some of the assumptions made in the communication modes considered, and also urged consideration of other plausible modes. The DOE responded by adding additional clarification, and also added a detailed analysis of some of the additional modes recommended. For example, DOE has indicated that the high salt content of the Rustler water ruled out the likelihood of a well into the Rustler between the WIPP repository and Malaga Bend, which could shorten the time needed for transport of the breached waste to the biosphere. However in response to EEG's comments, the DOE added a well scenario to Section 8.3.1.4. The results were acceptable and comparable to a similar study by EEG. ²⁰ Also, DOE revised one of the earlier Communication Events (#1) on page 8.3-7 to consider the effect of buildup of radionuclides in the environment of Malaga Bend following a breach and leach scenario. The results demonstrated that accumulation of radionuclides over thousands of years at the maximum release rate would not lead to significant annual doses to the affected population. EEG also suggested that the



scenario analyses include, or discuss, potential doses to infants and children. DOE agreed and included the results in a revision to the SAR. This analysis was acceptable to EEG.

Another area addressed in 1981 by EEG was the need for evaluating the effect of uncertainties in the distribution coefficients used by DOE to estimate the travel time from the repository to Malaga Bend. DOE agreed that there was considerable uncertainty in the Kd coefficients but did not revise the SAR. EEG subsequently published a report which included a sensitivity analysis for changes in several parameters including the absorption coefficient. This report²¹ concluded that assuming wide variations in absorption coefficient (down to 0 ml/gm) did greatly affect the rate of transport of the radionuclides released from a breached repository, but did not substantially increase the resultant doses associated with use of the water at Malaga Bend.

In 1981, EEG suggested that additional detail is needed in section 8.3 to describe the communication events and methods of analysis, particularly the specific equations used. DOE agreed with this comment and stated that the detail would be provided "in a future amendment." It was added to an appendix to Chapter 8. EEG published several reports containing EEG's analyses of potential breach of the repository including transport, release and consequences. On September 16, 1981, these analyses²²⁻²⁶ also were discussed by EEG at an open meeting with experts in several disciplines to further resolve whether all reasonable analytical approaches and potential breach and transport mechanisms had been adequately examined.²⁷ Although it was

agreed that considerable uncertainty remains concerning the hydrology parameters used in the scenarios presented in the Final Environmental Impact Statement (FEIS) on WIPP²⁸. There were no new scenarios recommended at this public forum. Also there were no major objections to the EEG proposals or the approaches taken in the EEG analyses.

Additionally, in 1981, EEG urged DOE to consider scenarios in which human intrusion leads to the transport of the waste directly from the repository to the surface, such as possible communication with a brine reservoir below the repository. DOE believed that such a release would be bounded by scenarios already considered in the FEIS, and therefore did not agree to add such a scenario to the SAR. This type of release was considered by EEG in 1982^{23,26}, and DOE in 1983 (amendment 6 to the SAR). The results showed that if the communication events occurred at least 400 years after decommissioning, the resultant doses would be less than what might be associated with normal background. The highest 50 year dose commitment to an individual was found to occur at 100 years post-closure and was 590 mrem from the inhalation of contaminated dust resuspended into the atmosphere.

In 1983, in commenting on amendments 4, 5, and 6 of the SAR, EEG noted that the assumed maximum CH-TRU/drum of 85 Ci is no longer consistent with the 140 Ci/drum of Pu-239 equivalent which is being considered by DOE as an amendment to the Waste Acceptance Criteria (WAC). DOE



agreed to evaluate the effect of this change in a future amendment, but to date the change to the WAC has not been finalized, so no such evaluation has been made.

EEG called attention to the need to revise Chapter 8 scenarios as new hydrology data for the Rustler becomes available. DOE agreed to make such changes, if needed.

Unresolved Comments

1. An early decision is needed by DOE on the maximum TRU to be authorized for waste packages to be shipped to WIPP. This level must be sufficiently low so that long-term consequences will not exceed those published in the Final Environmental Impact Statement for the WIPP project ³⁴ Chapter 8 will need to be revised to reflect this new limit.

2. An amendment may be needed to reflect the final results of hydrology studies currently in progress .





1. Chapter 9, Conduct of Operations

This chapter provides general information on the organization and administration of the WIPP project. It includes an overview of simulation preoperational tests, training programs, security and emergency plans.

In EEG's early comments on this chapter, in 1980, it was brought out that the organization of the WIPP project, as reported in Chapter 9, was not consistent with information reported in Chapter 6. Also the references to regulations applicable to WIPP should have included the environmental health regulations of the State Health and Environment Department. A subsequent revision corrected these deficiencies.

In EEG's comments on amendments 4, 5, and 6, in December 1983, it was noted that section 9.2 stated that all equipment and systems designed for the WIPP are tested prior to operation. No detail was provided on the nature of these tests or who is responsible. The section also indicated that administrative procedures are established to ensure that test procedures are prepared, reviewed and approved. Such a testing program is commendable, and is of considerable interest to EEG to ensure that it is carried out. However, when it was recommended to DOE that these administrative procedures be added to the SAR, DOE stated that "these procedures are beyond the scope of the document" (the SAR). In commenting on amendments 7 and 8, in April 1984, EEG requested a copy of these procedures because of their potential importance to health and safety. DOE responded in September, 1984.

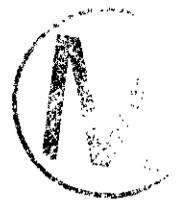
that they were being transmitted under separate cover. To date, no such procedures have been received. EEG also noted that WIPP does not have an Emergency Plan to cover the construction phase. The SAR makes several references to an emergency plan, but no such plan has been prepared since the Site Preliminary Design Validation phase. DOE replied that a plan has been drafted, and a copy was transmitted to EEG in November, 1984. Shortly thereafter, EEG transmitted to WPO detailed comments on the plan.

Unresolved Comments

1. This chapter should be revised to provide more detail on the nature of the tests carried out on equipment and systems designed for WIPP, and what group or groups are responsible.
2. The WPO provided in November, 1984 to EEG for review a draft Emergency Plan for WIPP. EEG submitted comments on this plan in December, 1984. The plan should be completed without further delay, and referenced in this Chapter of the SAR.



J. Chapter 10. Operations Safety Requirements



This chapter was intended to provide operational limits to maintain compliance with the basic design assumptions used in Chapters 7 and 8, and to meet the operational objectives of WIPP. This information was intended to parallel the technical specifications for a commercial nuclear power reactor, as specified in 10 CFR 50.36. It subsequently was amended to delete reference to regulations of the Nuclear Regulatory Commission, and instead, references as a basis the DOE Order 5481.1A, pages I-3, and II-2. This does not appear to be a substantive change, since these provisions of the DOE Order closely parallel the NRC requirements pertaining to a Safety Analysis Report.

EEG concluded in its initial review of this chapter that the information was not useful, because so much of the detailed data were not available (to be included in a later amendment). Also many of the terms and administrative positions referenced in the chapter were not consistent with other chapters. For example, the description of RH-Waste in Section 10.1.9 was not correct, and the design limits in Section 10.2 referred to only some, but not all of the Waste Acceptance Criteria (WAC). Also no criteria were provided as a basis for rejecting a waste shipment. Some of the WAC were incorrectly described.

In Amendments 1 and 2, this chapter was extensively revised in response to the EEG comments. The consistency of the terms and position titles was expanded to be more in accord with the established

criteria. Also additional information was added to more clearly reflect action if a waste shipment is received which is not in accord with the criteria. It was noted, however, that the certification papers of the waste shipments would be checked for compliance with the WAC, but other than containment configuration, contamination, surface dose rate, labeling and documentation, no other verification would be made. Also there was no provision for notifying the State if a shipment is received which is not in compliance with the WAC. In discussions with the WPO on this point, at a meeting on December 9, 1983, it was agreed that the Consultation and Cooperation Agreement would be amended to indicate that the State EEG would be notified in advance of an approved shipment which is not in accord with the WAC. Also, the WIPP operational procedures would reflect this point. The WPO did not believe that such an agreement should be stated in the SAR. To date, this amendment to the C & C Agreement has not been made; also, the WIPP Operational Procedures should be revised to verify that the procedures require notification of EEG if a nonconforming shipment is received at the site. Such a notification is needed so that the State can evaluate the possible health implications to the public of New Mexico during transportation of the shipment.



It has been pointed out to the WPO through several letters from EEG during 1984 that the SAR is not in complete accord with DOE Order 5481.1A or the supplement to this Order issued by the Albuquerque Operations Office, AL 5481.1A. Specifically in reference to Chapter 10, the SAR is not in accord with certain of the provisions on page I-

3. I-4, and I-5 of AL 5481.1A. For example, this order indicates that desirable upper limits for accidental 50 year dose commitments would be 5 rem whole body and 15 Rem to any internal organ. The WIPP SAR has a 25 rem 50 year dose commitment upper limit. Additionally, it has been repeatedly called to the attention of the WPO by EEG, that the content of the SAR does not include all of the topics referred to on page I-5 of AL 5481.1A, such as a Summary, Environmental Safety and Health Systems Critical to the Safety of the Facility, Environmental Monitoring Program, Conclusions and a Glossary. The WPO indicated that these sections may be added at a later date, however, more recent correspondence states that they have no plans to add the information referred to above, and in AL 5481.1A.

Unresolved Comments

1. It was also stated in a previous chapter that DOE needs to revise the DOE/State agreement and the WIPP Operational Procedures to document DOE's commitment to notify EEG in advance of a proposed shipment which is not in compliance with the WAC.

2. The SAR should be revised to be more fully in accord with the Orders of DOE and Albuquerque Operations Office.



K. Chapter 11. Quality Assurance

This chapter describes the Quality Assurance (QA) Program to be implemented by the WIPP Project Office and the major project participants -- the architect-engineer, the construction manager, the scientific advisor, and the technical support contractor. It is applicable to the site evaluation, design and construction phases of the WIPP Project.

Sections 11A and 11B are blank. Section 11C of Chapter 11 contained a summary of the comments of the EEG on the SAR and the DOE (WIPP Project Office) responses covering all eleven chapters. Section 11C was deleted in Amendment 4.

As stated on page 11.1-1, it is the intent of DOE that each of the QA Programs of the Project Participants be based upon the American National Standard ANSI/ASME NQA-1-1979 and selected supplements. However, that document has been updated and is now ANSI/ASME NQA-1 1983.³³

In the early comments on this chapter (1981)' EEG called attention to lack of clarity and consistency with other chapters in the description of the organizations as they relate to QA. Amendment 4 extensively revised this chapter to more clearly describe the organization and to define responsibilities for QA. However, the descriptive information of the QA program for each of the Project Participants was provided by



reference to their individual operational manuals. Therefore the QA procedures for the WIPP project could only be reviewed by reviewing the procedural manuals of each of the Project Participants, which is neither practical nor consistent with the established format for a SAR. The only documents which provided detailed procedures for QA were references 28, 29 and 30, however, these procedures were not entirely consistent with various chapters in the SAR.

EEG has requested that the WPO extensively revise the SAR with respect to Quality Assurance to include more details on the relationship between the classification of structures, systems and components and the quality assurance assigned to each class. In section 11.1.2.3 it is stated that such a design classification document is in preparation. However, Chapter 11 has not been revised since Amendment 4, so perhaps the information from this document will be added to the SAR in a future amendment.

Unresolved Comments



As discussed extensively under Chapter 3, the SAR does not adequately provide information on the relationship of the classification system to quality assurance. This information should also be provided in Chapter 11. Information referred to in section 11.1.2.3 should be provided without delay, because it is applicable to the construction activities now in progress.

III. References

1. U. S. Department of Energy, "Waste Isolation Pilot Plant Safety Analysis Report," 5 volumes, 1980.
2. U. S. Department of Energy and the State of New Mexico, civil action No. 81-0363, U. S. District Court for the District of New Mexico, July 1, 1981.
3. Environmental Evaluation Group, "Evaluation of the Suitability of The WIPP Site," EEG-23, May 1983.
4. Borns, D. J., L. J. Barrows, D. W. Powers, R. P. Snyder, "Deformation of Evaporities Near the WIPP Site," SAND 82-1069, March 1983.
5. Chaturvedi, L., "WIPP Site and Vicinity Geological Field Trip," EEG-7, 1980.
6. Powers, D. J., S. J. Lambert, S. E. Shaffer, L. R. Hill, and W. D. Weart, "Geological Characterization Report, WIPP Site, S. E. New Mexico," SAND 78-1596, V. I, II, 1978.
7. Spiegler, P., "Hydrologic Analyses of Two Brine Encounters in the Vicinity of the Waste Isolation Pilot Plant (WIPP) Site," EEG-17 December 1982.



8. Spiegler, P., and Updegraff, D., "Origin of the Brines Near WIPP From the Drill Holes ERDA-6 and WIPP-12 Based on Stable Isotope Concentrations of Hydrogen and Oxygen." EEG-18, March 1983.
9. Faith, S., Spiegler, P., Rehfeldt, K. R., "The Geochemistry of Two Pressurized Brines from the Castile Formation in the Vicinity of the WIPP Site." EEG-21, April 1983.
10. Bard, Stephen T. "Estimated Radiation Doses Resulting if an Exploratory Borehole Penetrates a Pressurized Brine Reservoir Assumed to Exist Below The WIPP Repository Horizon." EEG-15, March 1982.
11. Channell, James K. "Calculated Radiation Doses From Radionuclides Brought to the Surface if Future Drilling Intercepts the WIPP Repository and Pressurized Brine." EEG-11, January 1982.
12. Spiegler, P., "Analysis of the Potential Formation of a Breccia Chimney Beneath the WIPP Repository." EEG-13, May 1982.
13. Sandia National Laboratories, "Basic Data Report for Drillhole WIPP-14 (Waste Isolation Pilot Plant-WIPP)." SAND 82-1783, August 1982.
14. Office of Nuclear Waste Isolation, Batelle Memorial Institute, "Exploratory Shaft Facility Preliminary Design-Permian Basin." ONWI-498, September 1983.

15. U. S. Department of Energy. Albuquerque Operations Office.
"Safety Analysis and Review System for AL Operations." AL 5481.1A.
September 15, 1982.
16. U. S. Department of Energy. DOE Order 6430 (Draft). "General
Design Criteria Manual," June 10, 1981.
17. U. S. Department of Energy. DOE Order 6430.1. "General Design
Criteria Manual," December 12, 1983.
18. U. S. Department of Energy. DOE Order 5480.1A. "Environmental
Protection Program for DOE Operations," August 13, 1981.
19. Letter and enclosures of December 15, 1983, from R. H. Neill
Director, Environmental Evaluation Group, to Joseph M. McGough,
Project Manager on WIPP (3-156AG2-7-10).
20. Spiegler, Peter "An Approach to Calculating Upper Bounds on
Maximum Individual Doses From the Use of Contaminated Well Water
Following a WIPP Repository Breach," EEG-9, September 1981.
21. Wofsy, Carla "The Significance of Certain Rustler Aquifer
Parameters for Predicting Long-Term Radiation Doses from
WIPP." EEG-8, September, 1980.



22. Environmental Evaluation Group. "Review Comments on Geological Characterization Report, Waste Isolation Pilot Plant (WIPP) Site, Southeastern New Mexico (SAND 78-1596, Vol. 1 and II)" EEG-2, August 1979.
23. Channell, James K. "Calculated Radiation Doses From Radionuclides Brought to the Surface if Future Drilling Intercepts the WIPP Repository and Pressurized Brine" EEG-11 January 1982.
24. Little, Marshall S. "Potential Release Scenario and Radiological Consequence Evaluation of Mineral Resources at WIPP." EEG-12, May 1982.
25. Spiegler, Peter. "Analysis of the Potential Formation of a Breccia Chimney Beneath the WIPP Repository". EEG-13, May, 1982.
26. Bard, Stephen T. "Estimated Radiation Doses Resulting if an Exploratory Borehole Penetrates a Pressurized Brine Reservoir Assumed to Exist Below the WIPP Repository Horizon". EEG-15 March 1982.
27. Environmental Evaluation Group. "Radionuclide Release, Transport and Consequence Modeling for WIPP. A Report of a Workshop Held on September 16-17, 1981." EEG-16 February 1982.

28. Bechtel National, Inc., "Quality Assurance Manual, Waste Isolation Pilot Plant," Bechtel Job No. 12484, 3/16/83.
29. Bechtel National, Inc., "Waste Isolation Pilot Plant, Title I Design Report Supplement", VL.1-A, Bechtel Job 12484, January 1980.
30. Westinghouse Electric Corporation, Technical Support Contractor, "Design Criteria Waste Isolation Pilot Plant," WIPP-DOE 71, Revision 4, February, 1984.
31. Tenera Corporation, "Evaluation of Waste Isolation Pilot Plant Classification of Systems, Structures and Components," November, 1984. (Unpublished)
32. Letter and enclosure of December 27, 1984, from W. R. Cooper, Project Manager of WIPP Project Office, to R. H. Neill, Director EEG (WIPP:AEH 84-121).
33. American Society of Mechanical Engineers, "Quality Assurance Program Requirements for Nuclear Facilities," ANSI/ASME NQA-1-1983 (and supplements), An American National Standard.
34. U. S. Department of Energy, "Final Environmental Impact Statement, Waste Isolation Pilot Plant, " DOE/EIS 0026, two volumes, October 1980.
35. U. S. Department of Energy WIPP Project Office and U. S. Department of Interior, N. M. State Office, Bureau of Land Management, Memorandum of Understanding, June 29, 1983.

