

EEG-4



Review Comments on the Report of the Steering Committee on Waste  
Acceptance Criteria for the Waste Isolation Pilot Plant

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NOTICE TO THE READER

The Environmental Evaluation Group (EEG) was assigned to the New Mexico Institute of Mining and Technology in October 1988 by the National Defense Authorization Act, Fiscal Year 1989, Public Law 100-456, Section 1433, and is no longer a part of the New Mexico Health and Environment Department, Environmental Improvement Division. Continued funding is being provided by the Department of Energy through Contract DE-AC04-79AL10752.

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REVIEW COMMENTS ON THE REPORT OF THE STEERING COMMITTEE ON WASTE  
ACCEPTANCE CRITERIA FOR THE WASTE ISOLATION PILOT PLANT

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TABLE OF CONTENTS

	<u>Page</u>
FOREWORD . . . . .	1
INTRODUCTION . . . . .	2
GENERAL COMMENTS ON WASTE ACCEPTANCE CRITERIA . . . . .	3
SPECIFIC COMMENTS ON WAC FOR CH-TRU . . . . .	5
SPECIFIC COMMENTS ON WAC FOR RH-TRU . . . . .	10
REFERENCES . . . . .	12

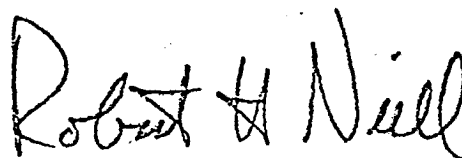
## FOREWORD

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 no 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 reports issued by the U.S. Department of Energy (DOE) and its contractors, other Federal agencies and other 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.

A handwritten signature in cursive script that reads "Robert H. Neill". The signature is written in dark ink and is positioned above the printed name and title.

Robert H. Neill  
Director

## I. INTRODUCTION

Preliminary comments on the "Waste Acceptance Criteria for the Waste Isolation Pilot Plant" were submitted by Mr. Robert H. Neill, Director, Environmental Evaluation Group (EEG) to the U. S. Department of Energy on July 29, 1979.<sup>(1)</sup>

These comments along with other concerns of the EEG were discussed by the author with representatives of Westinghouse Electric Corporation and Sandia Laboratories, contractors for the Department of Energy, on October 11, 1979.<sup>(2)</sup>

A revised "Report of the Steering Committee on TRU Waste Acceptance Criteria for the WIPP"<sup>(3)</sup> along with a "Summary of Research and Development Activities in Support of Waste Acceptance Criteria for WIPP", printed November, 1979,<sup>(4)</sup> was received by EEG on January 7, 1980. The comments and recommendations contained herein are based on these more recent Waste Acceptance Criteria (WAC) documents. The EEG supports the need for waste acceptance criteria to provide the waste generating sites with necessary information to prepare the TRU waste for safe disposal at the WIPP repository. Such criteria are one of the essential elements to a successful nuclear waste management program. Their development by the Waste Acceptance Criteria Steering Committee (WACSC) concurrently with a research program carried out by Sandia Laboratories has been effective in defining and quantitating the parameters for control, and in arriving at meaningful criteria and rationale. It was particularly helpful to have the rationale summary<sup>(3)</sup> and the research reports<sup>(4)</sup> during this review.

## II. GENERAL COMMENTS ON WASTE ACCEPTANCE CRITERIA

A. It was noted that neither the report of the WACSC nor the "Summary of Research and Development Activities in Support of Waste Acceptance Criteria for WIPP" provided information on the methods to be used by the waste generating facilities in assaying or processing their TRU wastes to determine compliance with the WAC, and to provide quality assurance. Although it may not have been a responsibility of the WACSC, it is our view that the methods are an integral part of effective criteria, and therefore their omission is considered a serious deficiency. Information is also needed on whether a program will be provided for inspection of the waste generating facility and WIPP by an outside agency to periodically evaluate the degree of compliance with the final WAC. Such an agency should have the authority to require whatever corrective action is needed. It is difficult to assess the adequacy of the WAC in protecting the public health and safety of the people of New Mexico without this additional information; therefore, the comments below are based on the assumption that this information will be forthcoming, and that it will include (1) adequate methods for evaluating compliance with the WAC, and (2) an effective quality assurance and enforcement program.

B. The language used in several of the criteria is nonuniform, and in some cases implies something less than, or different from, a mandatory requirement (e.g. use of "must" or "will" rather than "shall"), or that the WIPP facility, rather than the generating facility will be evaluating the waste packages to determine compliance (e.g. use of the phrase "... to be accepted at WIPP . . ."). It is recommended that all criteria be worded to clearly reflect their mandatory nature, and that it be made clear that the waste generating facility is responsible for measuring and certifying compliance. (See Sections III and IV below for further examples.)

C. The criteria contained in Reference 3 apply only to CH- and RH-TRU wastes for shipment to WIPP. They do not apply to experimental high-level wastes. Criteria for the experimental wastes are required to evaluate the full impact on the health and safety of the public of New Mexico.

D. Page 6, last paragraph (Reference 3); A statement is made that some radioactive waste resulting from dismantling of Hanford reactors would be buried at WIPP. If this is no longer planned, the revised criteria document should clarify the name of the waste generating facilities and the types of waste, i.e. CH-TRU, RH-TRU, experimental high level, to be shipped to WIPP.

E. Page 8, last paragraph (Reference 3): This statement implies that WIPP will be responsible for surveying and overpacking a contaminated waste shipment, but would take no further action. The revised criteria document should indicate that other action would be taken as needed, such as (1) notify shipper, (2) notify appropriate state radiation control agencies and response teams to evaluate extent of contamination in transit.



### III. SPECIFIC COMMENTS ON WAC FOR CH-TRU

A. Gas Generation (p. 21, Reference 3) The limit specified in this criterion is 10 moles per cubic meter of storage room volume per year. In the rationale for this criterion (p. 34), it is indicated that a drum containing 60 kg of organics would produce about 5 moles per year of gas. This gas generation rate when combined with the loading density of repository rooms (Table 3-8 in SAND 79-1305) would meet the 10 mole per cubic meter criteria. Consequently it is not clear how the organic limit of  $220 \text{ kg/m}^3$  was derived (the limit would be  $280 \text{ kg/m}^3$  for 60 kg per drum, or  $240 \text{ kg/m}^3$  if the organic content of the drum liner is not included). Also, since no information has been found on the loading density of boxes in repository rooms it is not possible to check the  $100 \text{ kg/m}^3$  value. The derivation of these values should be clarified. Furthermore, specifying an average limit for the organic content per waste container, and use of the word "may" rather than "shall", is too vague and may lead to difficulty in measuring compliance with respect to a given drum or shipment. It is recommended that the criterion be revised as follows (changes are underlined):

"Gas generation by all mechanisms shall not exceed 10 moles per cubic meter of storage room volume per year under reference repository conditions. In terms of waste composition, this criterion shall be interpreted to mean that the maximum organic content of CH-TRU waste shall not exceed ?  $\text{kg/m}^3$  for waste in 210 liter drums and ?  $\text{kg/m}^3$  for waste in other containers."

B. Pyrophoric Materials (p. 22, Reference 8) There appears to be no limit specified for pyrophoric materials other than radionuclides. Also, the use of the term "safe" is unclear. It is suggested that this criterion be reworded as follows:

"Pyrophoric materials in excess of 1% by weight shall not be shipped to WIPP. No pyrophoric materials shall be shipped unless they have been mixed with chemically stable materials (e.g. concrete, glass, etc.) so that they will not ignite spontaneously under the ambient conditions of shipment or storage at the repository."

C. Toxic and Corrosive Materials (p. 22, Reference 3) Although the rationale for this criterion (p. 47) recognizes the danger to personnel involved in transporting, handling and emplacing wastes contaminated with toxic materials, and that the WIPP design includes no provisions for handling toxic and corrosive materials other than radioactive materials, this criterion appears to allow unlimited quantities to be shipped to WIPP on the approval of the WIPP operator. It was probably intended that no more than trace quantities would ever be allowed, but the criterion does not reflect such a limitation. Furthermore, because the risk in transporting nonradioactive toxic materials may differ from those risks associated with the radioactivity, it is important that the WIPP operator and the shipping facility take into account the regulations of the states which may be affected. A suggested rewording is shown below (changes underlined):

"TRU contaminated toxic substances shall not be shipped to WIPP unless the toxic materials are identified as prescribed under "Labeling" and "Data Package", and the WIPP operator has been notified and grants approval prior to shipment. The shipment containing nonradioactive toxic materials shall also be in accord with the regulations of the State of New Mexico and the toxic materials shall be uniformly dispersed in the waste. TRU contaminated corrosive materials shall not be contained in the TRU wastes unless they have been neutralized or otherwise rendered non-corrosive."

D. Waste Containers & Overpacks (p. 23, Reference 3) This criterion fails to indicate how the waste generating facility will determine the 10 year design life to allow for intact package retrievability. Also it fails to specify the criteria for an "approved metal container". This information should be included in the criterion, or reference added to applicable standards or regulations.

E. Waste Package Size (p. 24, Reference 3) As indicated in Section II B, the wording of the criteria should be uniform, and use of the word "must" or "will" in place of "shall" should be avoided. This criterion should be revised as follows (changes underlined):

"All CH TRU waste packages or package assemblies for shipment to WIPP shall not exceed 12 x 8 x 8.5 feet (3.7 x 2.4 x 2.5 m) in overall L x W x H dimensions."

F. Surface Dose Rate (p. 24, Reference 3) The wording of this criterion implies that it is imposed on the WIPP facility rather than the waste generating facility. The wording should be modified so that it is consistent with the wording of other criteria, and so that the dose rate limit will not be interpreted as an average. The following rewording is suggested (changes underlined):

"Waste packages shall have a maximum surface dose rate at any point no greater than 200 mRem/hr. CH-TRU waste packages with surface dose rates of more than 10mRem/hr., but not greater than 200 mRem/hr., shall be prominently color coded in accordance with WIPP operating requirements."

G. Surface Contamination (p. 24, Reference 3) As indicated in Section II B, the wording of the criteria should be uniform, and should not imply that they are to be imposed on WIPP operations rather than the waste generating facility. Use of the phrase ". . . to be accepted at WIPP . . ." should be

avoided. Furthermore, to assure uniformity between measurements made by the generating facility, persons in transit, and the WIPP operational staff, the method of sampling should be specified. Alternatively, the wording of the criterion should contain a method of measurement similar to 49 CFR 397(a).

H. Nuclear Criticality (p. 25, Reference 3) As indicated in Section II B, the wording of the criteria should be uniform to avoid erroneous interpretations and ambiguity. This criterion should be revised as follows (changes underlined):

"The fissile isotope content of individual CH-TRU waste containers shall be no greater than 200 g per 55 gallon (0.21 m<sup>3</sup>) or larger drum, 100 g per 30 gallon (0.11 m<sup>3</sup>) drum, 500 g per DOT 6 m container, 350 g per 4 x 4 x 7 ft (1.2 x 1.2 x 2.1 m) FRP DOT 7 A box or 5 g in any ft<sup>3</sup> (0.028 m<sup>3</sup>) in other boxes."

I. Certification (p. 25, Reference 3) As indicated in Section II B, the wording of the criteria should be uniform to avoid erroneous interpretations and ambiguity. This criterion should be revised by changing the word "must", wherever it appears, to "shall". Also, as discussed in Section II A, for self-certification to be successful, a means must be provided to assure compliance, and quality control.

J. Labeling This criterion implies that Federal requirements for labeling shall be met, but fails to specify which requirements. So that shippers, carriers, and those encountered en route to WIPP may know the radioactive materials and other hazardous contents of the package; it is recommended that this criterion be modified as follows (changes underlined):

"In addition to Federal labeling requirements, each waste package or waste package assembly shall be uniquely identified by means of a label which

is permanently attached in a conspicuous location. Information obtainable from the label shall include the following:

1. Package identification number (to be standardized)
2. The highest recorded radiation levels: mRem/hour neutron and beta-gamma radiation, at the surface and at a point 1 meter from the surface.
3. The names of the radionuclides contained in the package or package assembly and the approximate number of curies of each.
4. For a fissile material, the weight in grams or kilograms of the radioisotope.
5. The transportation index (See 49 CFR 173.389(1)).
6. The name and approximate amount of toxic materials (other than radionuclides).
7. The name and address of the shipper, and the name and phone number of the person who could be contacted for further information in an emergency.
8. The weight in kilograms.

#### IV. SPECIFIC COMMENTS ON WAC FOR RH-TRU

A. Gas Generation If it is planned to store RH waste on the same horizon as CH waste, there would seem to be no justification for not making RH waste subject to the same gas generation criterion as the CH waste. Therefore, it is recommended that the following criterion be added for RH-TRU:

"Gas generation by all mechanisms shall not exceed 10 moles per cubic meter of storage room volume per year under reference repository conditions. In terms of waste composition, this criterion shall be interpreted to mean that the maximum organic content of RH TRU waste shall not exceed 100 kg/m<sup>3</sup>."

B. Pyrophoric Materials (p. 29, Reference 3) This criterion should be reworded as recommended above for CH criteria.

C. Toxic and Corrosive Materials (p. 29, Reference 3) This criterion should be reworded as recommended above for CH criteria.

D. Waste Containers & Overpacks (p. 29, Reference 3) The word "must" as used in the last sentence of the second paragraph of this criterion should be changed to "shall", for reasons previously discussed.

E. Surface Dose Rate (p. 30, Reference 3) For purposes of consistency and clarity, this criterion should be reworded as follows (changes underlined):

"RH TRU waste packages shall have a surface dose rate no greater than 100 Rem/hour."

F. Nuclear Criticality (p. 31, Reference 3): For purposes of consistency and clarity, this criterion should be reworded as follows (changes underlined):

"The fissile isotope content of remote-handled TRU waste shall be limited to 5 g in any cubic foot (0.028 m<sup>3</sup>). Waste packages for which the fissile content exceed this value shall not be shipped to WIPP without the advance approval and conditions specified by the WIPP operator."

G. Certification (p. 31, Reference 3) As discussed in Section II A, this

criterion implies that waste generation and shipping sites will provide self-certification and documentation. There should be a means provided to assure compliance and uniformity in the packaging, certification, and quality assurance of the waste generating and shipping sites. Also, for reasons previously discussed, the word "must" as used throughout this criterion should be changed to "shall".

H. Labeling (p. 32, Reference 3) This criterion should require labeling in accord with Federal regulations and so that the radionuclides or other toxic materials contained in the package would be readily identified and appropriate action taken in the event of an emergency during transportation. It should be reworded as follows:

"In addition to Federal labeling requirements, each waste package or waste package assembly shall be uniquely identified by means of a label permanently attached to the container in a conspicuous location and with the information specified below large enough to be easily read through a hot cell window (2" or larger characters). The information on the label shall include the following:

- "1. Package identification number (to be standardized).
- "2. The highest recorded radiation levels: Rem/hour neutron and beta-gamma radiation, at the surface and at a point 1 meter from the surface.
- "3. The name of each radionuclide which might be contained in the package or package assembly and the approximate number of curies of each.
- "4. The name and approximate amount of toxic materials, other than radionuclides, which are contained in the waste package.
- "5. The name and address of the shipper, and the name and phone number of the shipper, and the name and phone number of the person who could be contacted in the event of an emergency.

V. REFERENCES

1. Letter of July 24, 1979, from EEG to DOE, EEG File TECH-26 (copy available on request).
2. Memorandum record of meeting, dated October 12, 1979, EEG File TECH-26 (copy available on request).
3. Report of the Steering Committee on TRU Waste Acceptance Criteria for the Waste Isolation Pilot Plant, edited by H. H. Irby, Westinghouse WIPP Project, undated. Copy provided to EEG by James F. Bresson, January 2, 1980.
4. Summary of Research and Development Activities in Support of Waste Acceptance Criteria for WIPP, SAND 79-1305, November, 1979.