see Pocket 1 Sec for excl. excl. Same as 8/7/85 encl.

SUMMARY OF NRC/DOE MEETING ON RETRIEVABILITY AND RETRIEVAL

DATE/LOCATION OF MEETING:

July 31, 1985, Forrestal Building, Room BE069,
1000 Independence Avenue
Washington, D.C.

WM Record File 109.4
WM Project 1
Docket No.
PDR ✓
LPDR
Distribution:
GORN
(Return to WM, 623-SS) 23

Rec'd from Dan Coleman's group & appropriate staff members.

ATTENDEES/ORGANIZATIONAL AFFILIATION:

A list of attendees is attached as Enclosure 1.

BACKGROUND/FACTS:

The purpose of the meeting was to discuss a generic position paper prepared by DOE on Retrievability and Retrieval. DOE provided the aforementioned document to NRC on June 28, 1985, and stated in their transmittal letter that the purpose of the document is to fully describe all design, construction, operation, and maintenance requirements associated with high level nuclear waste retrievability. Furthermore, DOE stated in the transmittal letter that their objective is to utilize the position to arrive at a common understanding of the design requirements associated with retrieval within the repository program and between DOE and NRC. The transmittal letter and the position are attached as Enclosure 2. A copy of the meeting agenda is attached as Enclosure 3.

Prior to the meeting, NRC provided DOE with written comments which are attached as Enclosure 4. A short telephone conversation to clarify some of NRC comments took place on July 24, 1985.

The meeting started with a DOE presentation summarizing their generic position on retrievability and retrieval. This presentation is attached as Enclosure 5. The rest of the meeting was devoted to discussions between DOE and NRC staff on the DOE position and NRC comments, as well as discussions by state representatives.

NRC OBSERVATIONS

1. IMPACT OF HOST ROCK/WASTE EMPLACEMENT/EQUIPMENT INTERACTIONS

- The emphasis of the document appears to be on equipment prototype and demonstrations, whereas the geotechnical problems possibly will create the most severe difficulties.

- The impact of the host rock characteristics on retrievability, and associated T-M-C-H response to waste emplacement, needs further elaboration. It is recognized that much of the work is site-specific, however, generic aspects and DOE's intentions can be identified, as they were under the ventilation and storage sections. A balance of treatment between equipment design and geotechnical concerns is desirable.

  Sections devoted to host rock characteristics and site-specific concerns would greatly enhance the position.

2. DEMONSTRATION OF RETRIEVAL EQUIPMENT AND METHODS

- The NRC observed that the position would be enhanced by including further discussion concerning (a) the analysis of the retrieval method and (b) clarification of the relationship of Proof-of-Principle, Prototype Development, and Performance Confirmation.

- Further discussion of the topical areas of interest for the "mock-up" to be used during Proof-of-Principle needs to be addressed, as well as why these areas are important and how they will be incorporated into the Prototypical Development work and their impact on Performance Confirmation Plans.

3. DURATION OF RETRIEVABILITY PERIOD

- NRC observed that the retrieval decision period (i.e. 50 years in part 60) could be longer or shorter based on license conditions set by the Commission.

4. RETRIEVAL DEFINITION

- Restating that waste removal for reasons other than public health and safety and resource recovery is not governed by this position implies such removal is simply not governed at all. Stating the governing guidelines would be sufficient to satisfy this issue.

5. WASTE PACKAGE

- The NRC observed that little information is provided related to waste package operations and design, related to retrieval and non retrieval activities.

6. POST RETRIEVAL ISOLATION CAPABILITY

- Although consideration was given to the geotechnical aspects of partial retrieval, it is felt further discussion on retrieval methodology and how it affects the repository isolation capability should be included in the position. Aspects related to areas adjacent to the retrieval area and to geohydrological and geochemical considerations should be considered.

7. OTHERS

- NRC noted that retrieval issues for salt sites and any site that incorporates long horizontal hole concepts should receive early attention by both NRC and DOE.

- NRC regulations will cover site decommissioning even after complete retrieval (i.e. removal of all waste from a repository).

- DOE believes the question of in-situ testing requirements related to retrievability (i.e. incorporation of testing related to retrievability design and methodology within the in-situ testing plan) is a site-specific topic. NRC would like to see it included in the in-situ test plans.

DOE OBSERVATIONS

None

STATE OBSERVATIONS

One of the state representatives expressed concern as to the disposition of the repository once retrieval is completed. Retrieval might have an effect on part of the underground environment such as aquifers, therefore it would not be prudent for the DOE to simply walk away from the site. It was also suggested that a section on "decommissioning" be included as part of the text in the revised position paper with wording to show the intent of restoring the site to an acceptable condition.

It was requested that the states have a participatory roll in the decision making in any retrieval action. For example, the retrieval document Page 1, second paragraph, final sentence, should be revised to include those who are involved in "Siting".

Concern was expressed that the proof-of-principle tests might be conducted in other salt domes which would not give similar conditions to those at the subject repository.

The state representative was pleased that the last sentence on page 7 of the retrieval position document would be deleted by DOE. He expressed some concern however as to the lack of discussion of other forms of waste possibly being emplaced. It was felt that the document should discuss what other forms of waste would have to be considered for retrieval.

Another state representative suggested that the wording on page 12, third line from the bottom, "high water pressure" be re-worded to avoid confusion with inundation.

AGREEMENTS

AGREEMENTS BASED ON THE SIX NRC WRITTEN COMMENTS

1. DOE agreed to expand Chapter 3, Design Requirements, to cover and add emphasis to host rock design conditions. DOE agreed to add a subsection to Section 3.0, in which DOE will address broader aspects of retrieval design. Specifically, DOE committed to consider aspect of rock behavior, thermal characteristics, opening design, support design, and the general impacts of coupled effects on retrieval design requirements.

2. Section 3.4 will be expanded to place greater emphasis on the development of methods (not just equipment) necessary to retrieve from hostile (and possibly) abnormal conditions. This will also be part of the added language to satisfy comment #1. DOE agreed to elaborate on proof-of-principle and prototypical development in the next version of the position paper.

3. The language used in 10 CFR 60 and the Mission Plan on the period of retrievability and retrieval matters will be incorporated into the position. This will include the re-drafting of the chart on page 8 to make it consistent with the Mission Plan. All discussions regarding a "shorter period" will be deleted to include the possibility of either a shorter or longer period.

4. DOE agreed to state that all activities related to waste handling that are not associated with retrieval will be subject to appropriate NRC regulations where these action are addressed in the position paper.

5. DOE agreed to acknowledge the need to maintain containment during retrieval consistent with 10 CFR 60.135b(3)) and to commit to the use of retrieval methods that will allow compliance with the requirement. The position will also make it clear that during credible abnormal events, a breached container could also be retrieved.

6. Section 4.1 will be renamed: Integrity of the Natural and Engineered Barriers. This section will include recognition that, during partial retrieval, geohydrologic, geochemical, and adjacent areas aspects will be incorporated, and that the integrity of engineered barriers will also be addressed.

GENERAL AND MISCELLANEOUS AGREEMENTS

1. DOE will remove the sentence referring to the effect of temporary interruptions in waste emplacement on page 7.

2. It was requested (and agreed by DOE) that footnote #6 will be put into the text using the language from Part 60 regarding a "reasonable schedule" to retrieve. The observation will be made (not as a redefinition) that retrieval should be done as quickly as is safely practicable.

3. The tone of the Position is not meant to restrict the NRC by removing flexibility at a later stage. Rather the objective was to provide clear guidance to the repository designers. The position will be changed to explicitly note that flexibility exists. (Such as on p. 20 regarding need for monitoring). These areas will also be brought to the attention of the DOE in the formal NRC written response.

4. For NRC and DOE to arrive at a common understanding of the site-specific design requirements associated with retrieval, DOE must provide and NRC must review site and design specific information. It was agreed that this would be provided in future meetings and documents by DOE and reviewed by NRC for each of the sites to be characterized. Dates for the development of these products and associated meetings will be proposed by DOE within 90 days.

5. DOE and NRC agreed to include and discuss retrievability (to the extent possible) on the agenda for the site-specific in-situ test plan meetings.

6. NRC agreed to provide formal comments on DOE's Position Paper within 30 days. DOE will revise the paper based on the July 31 agreements, the formal NRC comments, and internal DOE comments. The revised position will then be issued to the projects as an appendix to the Generic Requirements Document. Concurrently, copies will also be provided to the NRC for information.

   It was agreed that the DOE position paper when revised, based on the discussion and agreements at the meeting, should represent a reasonable interpretation of 10 CFR 60 as a generic-level statement of requirements.

7. The document will clarify that health and safety protection, and environmental protection were made equivalent for the purpose of the document.

AGREEMENTS BASED ON STATE COMMENTS

1. Mississippi requested (and DOE agreed) that a specification be included in the position regarding the decommissioning of the repository in the event of full retrieval, consistent with the 10 CFR 60 requirements on termination of the license. The last sentence of that paragraph will also be modified.

2. A representative of several salt states asked that "high water pressure" be reworded so as not to infer the sudden inflow of water. This will be reworded, but it was DOE's intent to infer the inflow of water. Suggested rewording may be "sudden inflow" in lieu of "high water pressure".

3. DOE agreed to the Mississippi comment that the word "siting" be added to page 1 to infer a certain amount of state involvement in retrievability activities.

OPEN ITEMS

1. DOE plans to develop policies on both resource recovery and the disposition of retrieved waste (e.g. ultimate disposal of retrieved waste). It was identified that these are important topics which will have to be addressed.

2. The development of a DOE position on performance confirmation program was identified as a high priority open issue at the July 18 ESF meeting. It was agreed that the implications of the performance confirmation program on retrieval by the duration of the retrieval decision period is an important subset of the overall program and reinforces the high priority previously established.

3. Future interactions are required between DOE and NRC to clarify what requirements for retrieval must be placed on TRU and other forms of radioactive wastes. Currently 10 CFR 60 requires all radioactive materials emplaced underground to be retrievable. Also, the definition of high level waste (i.e., whether or not TRU is classified as high level waste requiring repository disposal,) is under review by NRC. NRC also pointed out that the potential exists for an exclusion to the retrieval requirements if it can be assured that the health and safety of the public is not adversely impacted. There is a need to resolve this open issue as quickly as feasible to provide guidance to DOE.

APPROVED:

NRC [signature] DATE 8/20/85

DOE [signature] DATE 8/16/85

ENCLOSURE 1

LIST OF ATTENDEES

NRC/DOE MEETING ON THE PROPOSED DOE POSITION ON RETRIEVABILITY AND RETRIEVAL FOR A GEOLOGIC REPOSITORY

July 31, 1985

NAME	AFFILIATION	PHONE
Naiem S Tanious	NRC - Engineering Branch	FTS - 427-973
Michael Tokar	NRC/Matls. Section/EB	FTS - 427-4742
S.J. Basham	BATTELLE - ONWI	FTS 976-5765
Leo Scully	Sandia Nat. Labs/NNWSI	FTS 844-1849
Richard Flores	Sandia Nat. Labs/NNWSI	FTS 844-3269
Larry Skousen	D.O.E/NNWSI	" 575-0933
Szymanski Jerry S	DOE/HQ	575-1503
Tony Knepp	DOE/RL	" 444-4934
Craig Stableum	NRC	" 427-4611
John Rhodenk	DOE-HQ	252-1462
Tom Schmitt	NRC-RES	FTS-427-4318
Jack Daemen	Univ of Arizona for NRC	(602) 621 2501
John Peshel	NRC-WMEG	FTS-427-4755
A.K. Ibrahim	NRC/GTG	FTS-427-4211
Tim St. Clair	State of Utah	801-538-5551
Jack Wittman	DOE/OGR	(801) 538-5552
Mark Knudson	NRC/NMEG	538-5553
M.S. Nataraja	NRC/WMEG	FTS 427-4319
Dinesh Gupta	NRC/WMEG	FTS 427-4742
Banad Jagannath	NRC/WMEG	FTS-427-4629
Sher Bahadur	NRC/WMEG	FTS 427-4495
John S. Trapp	NRC/WMGT	FTS 427-4545
Terry Bates	Weston	301-963-6850
Malachy D. Murphy	Nevada	206-754-6001
John Buckley	NRC - NMEG	427-4544
John Graham	BWIP - Licensing	509-376-8506
Stan Echols	DOE - OGC	252-6947
Fred Sargent	BWIP - Licensing	509-376-7957
Andy Avel	DOE-CH/SRPO	614 424 (FTS 976) 5916

ATTENDEES

DOE/NRC Meeting on the Proposed DOE Position on Retrievability and Retrieval for a Geologic Repository. July 31st 1985

VIRGIL LOWERY	DOE/OGR	202 252 9313
Mark W. Frei	"	" 5355
Derrick Wagg	JACOBS/WESTON	301-963- 6842
Tilak R. Verma	NRC/Columbus	FTS 976-5916
Robert L. Johnson	NRC/WHRP	FTS 427-4785
Maxine M. Dunkelman	NRC/WMRP	FTS 427-4685
JEROME R PEARRING	NRC/WMEG	FTS 427-4648
John T. Greeves	NRC/WMEG	FTS 427-4734
John N. GERVERS	LATIR ENERGY CONSULTANTS	505 586-1024
PHILIP L. COLLYER	BATTELLE - WASH. D.C.	202 785-8400
James L. Ash	Rockwell - BWIP	FTS 444-9273
R.E (BILL) COTTAM	Rockwell - BWIP	FTS 444-6034 (509-376-6034
JAMES J. FRILOUX	LA/LSU	(504) 342-7462
Francis S. Kendorski	Terraform Engrs, Inc.	312-357-3588
Michael B.E. Bograd	Mississippi Bureau of Geology	(601) 354-6228
ROBERT A. CUMMINGS	ENGINEERS INT'L. (TUCSON)	602/884-8818
Matthew I. DeMarco	U.S. Bureau of Mines	(303) 236-0745
R. Lindsay Mundell	Bureau of Mines (Denver)	(303) 236-0741
Earle B. Amey	U.S. Bureau of Mines (Wash, D.C.)	(202) 634-1253
David Tiktinsky	US NRC/WMEG	FTS 427-4646
S.J.S. PARRY	ACRS, NRC	FTS 634-1413
James Van Vliet	Battelle ONWI	FTS 976-7724
LOKesh CHATURVEDI	Env. Eval. Group, Santa Fe, NM	505-827-8240

ENCLOSURE 2

DOE TRANSMITTAL LETTER

AND POSITION PAPER

Department of Energy
Washington, D.C. 20585

JUN 28 1985

Mr. Hubert Miller, Chief
Repository Projects Branch
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Miller:

On July 31, 1985, we plan to meet with your staff to discuss the attached proposed Department of Energy Position on Retrievability and Retrieval for a Geologic Repository, dated June 28, 1985.

The purpose of this position is to fully describe and document all design, construction, operation and maintanence requirements associated with high level nuclear waste retrievability. Our objective is to utilize the position to arrive at a common understanding of the design requirements associated with retrieval within the repository program and between DOE and NRC. Once we have obtained this objective, the position will be added as an appendix to the baselined Generic Requirements for a Mined Geologic Disposal System (GR) document to serve as the program retrieval requirements for repository design.

We have also prepared a suggested agenda for the meeting. A copy is attached for your consideration. To insure a focused and well considered discussion on the major points, we request that informal written comments on the Position be provided to Mark Frei one week prior to the meeting. I believe this approach will allow both agencies to be as well prepared as possible and thus ensure a productive interchange. This approach has been discussed with M. Dunkelman.

If you have any question on this matter, please contact Mark Frei on 252-5355 or Virgil Lowery on 252-9313.

Sincerely,

Mark W. Frei, for

Ralph Stein, Director
Engineering and Licensing
Division
Office of Geologic Respositories

Attachments

8507150268 2pp.

DEPARTMENT OF ENERGY

POSITION ON RETRIEVABILITY AND RETRIEVAL

FOR A

GEOLOGIC REPOSITORY

June 28, 1985

8507150276

2980

TABLE OF CONTENTS

1. INTRODUCTION

Presented in this document is the statement of the U.S. Department of Energy position on the retrievability and retrieval of spent fuel andhigh-level waste from a geologic repository.[1] This position is in conformity with all Federal laws, regulations, and standards regarding the retrieval of waste (The Nuclear Waste Policy Act of 1982, 10 CFR Part 60, 10 CFR Part 960, and 40 CFR Part 191).

The purpose of this statement of position is to specify the period of retrievability; to state the reasons for retrieval; and to describe and document design, construction, operation, and maintenance requirements for the retrieval of waste from an operating repository. The objective is to establish a standardized understanding of retrievability and retrieval for the Department of Energy and those who are involved in the design and in the regulation of repositories.

In this statement, "retrievability" means the capability that is provided by the repository system--by means of design approaches, construction methods, and operational procedures--to allow retrieval to be performed. The terms "retrieval" and the act of "retrieving" mean the process of intentionally

[1]For brevity and convenience, the term "waste" will henceforth be used in this statement of position to mean both spent fuel and high-level waste.

removing waste from the underground location in which it had been emplaced for disposal in order to protect the health and safety of the public (and the environment) or to recover the resources contained in spent fuel.

All other efforts to remove, extract, or relocate any portion of the emplaced waste during the preclosure lifetime of the repository will be done for reasons unrelated to the reasons mandating retrieval. The removal of emplaced waste for performance confirmation, inspection, analysis, or any other purpose not directly related to public health and safety (and the environment) or resource recovery will not be considered retrieval and will not be governed by the requirements set forth here.

2. GENERAL REQUIREMENTS

The design of the waste-retrieval capability of the repository shall be based on all instructions and specifications in this statement of position. Retrieval, as defined here, shall be for the purposes of removing any or all of the emplaced waste[2]. The design, construction, operation, and maintenance of the repository shall be in accordance with these retrieval criteria. Failure to include in this position specific instructions on all aspects of retrievability and retrieval shall in no way relieve the architect/engineer of the repository from the obligation to design the repository to allow the retrieval of any or all of the emplaced waste.

2.1 Retrievability

The repository shall be designed, constructed, and operated so that, at any time within the limits set forth in this statement of position, it will be possible to retrieve any or all of the waste emplaced for disposal. The capability to retrieve the waste, if necessary, shall extend to all waste regardless of container size or shape, temperature, radiation level, and age. The capability to retrieve shall also extend to all areas of the repository in which the waste is emplaced.

---

[2]"Any or all waste" shall refer to the quantity of emplaced waste ranging from one container to the entire inventory. See Section 2.5 (Retrieval of Waste Types) for a description of the waste to be considered for retrieval.

No act, whether by design or circumstance, shall preclude the possibility of, or the opportunity for, retrieval for the reasons given in this statement of position. This applies to the emplacement (preclosure) lifetime of the repository and continuously through the end of the retrievability period stipulated by the U.S. Nuclear Regulatory Commission in 10 CFR 60.111(b)(1) until the last of the waste is removed.

The act of retrieving any or all of the emplaced waste shall be considered complete and in compliance with this statement of position at the time waste is brought back to the surface of the repository.[3]

2.2 Reasons for Retrieval

There are two reasons for which the Nuclear Regulatory Commission or the Department of Energy can order the permanent retrieval of any or all of the emplaced waste. These reasons will be related to either (1) public health and safety and the environment (retrieval ordered by the Nuclear Regulatory Commission) or (2) the recovery of resources (retrieval ordered by the Department). Removal for all other reasons, whether temporary or permanent, will not be subject to the conditions, criteria, and requirements defined in this statement of position.

---

[3]The Department recognizes that while this meets the NRC definition of retrieval ("... the act of intentionally removing radioactive waste from the underground location at which the waste had been previously emplaced for disposal" 10 CFR 60.2), it does not address the ultimate disposition of the retrieved waste. The final destination of retrieved material will be discussed at the time of license application.

Retrieval would be a reversal of the emplacement and isolation mission of the repository. The initiation of retrieval would be an extraordinary event incurring great cost and effort. No action requiring the retrieval of substantial portions of the emplaced waste shall be taken without the full consideration of the consequences.

Public Health and Safety and the Environment

The single reason the Nuclear Regulatory Commission may require the retrieval of some, part, or all of the emplaced waste is evidence that the health and safety of the public would otherwise be adversely affected by the emplaced waste (10 CFR Part 60, Statements of Consideration, Retrievability). If the Commission has cause to believe that the geologic repository isolation system as planned and implemented will not meet the performance standards and objectives governing the disposal of the waste, they have the authority to require retrieval.

This statement of position considers the requirement of retrieval "...for any reason pertaining to...the environment..." (the Nuclear Waste Policy Act of 1982, Section 122) to be one and the same with public health and safety. The effects on the environment would be the same as the effects on public health and safety.

Resource Recovery and Economics

The permanent emplacement of waste into a repository will prevent access to potentially useful isotopes and metals of potential strategic value. If,

at some time before permanent closure, the Department of Energy elects to recover any or all of the waste inventory, this recovery will be accomplished under the Department's authority and policy of resource recovery.[4]

All other operations in which the emplaced waste is moved, relocated, or transported to another area of the repository (surface or underground) for reasons other than those stated in this section shall be the responsibility of the repository operations management under the authority of the operating license. This handling of the waste shall not be considered retrieval and shall not be governed by any regulations, standards, or requirements in this statement of position.[5]

2.3 Duration of the Retrievability Period

The period of time during which the repository must be prepared to begin the retrieval of any or all of the emplaced waste shall be that period of time during which waste is being emplaced and a period of time thereafter sufficient for the Department of Energy to complete the performance-confirmation program and for the Nuclear Regulatory Commission to

---

[4]The Department of Energy future policy on the retrieval of spent fuel for resource recovery will address all the conditions and criteria under which retrieval for resource recovery would be carried out.

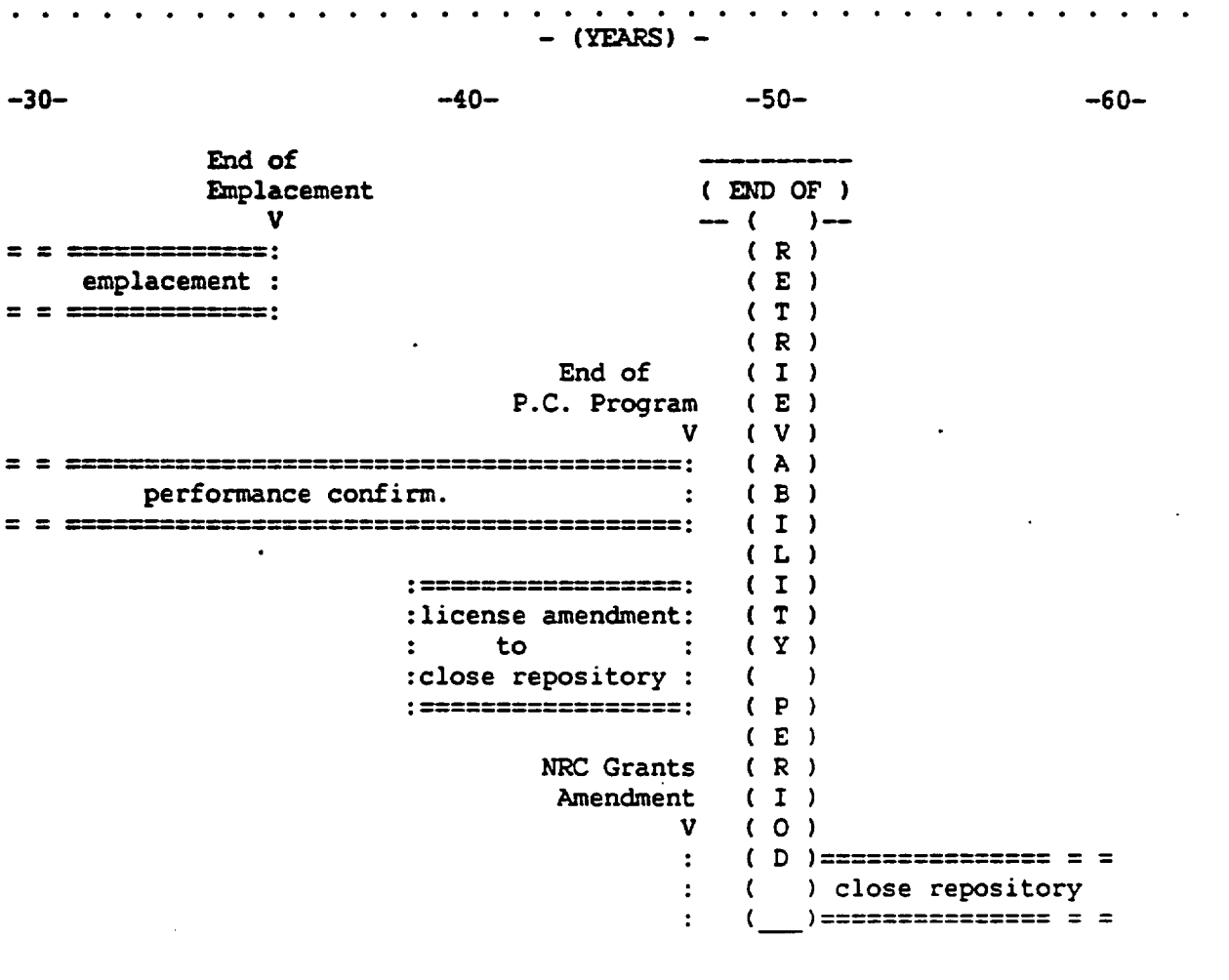
[5]Reasons for the rehandling or removal of emplaced waste for purposes other than retrieval would include all research and inspection related to the performance-confirmation program. They also might include the redistribution of inventory for ventilation purposes or similar operational considerations not related to public health and safety.

review the results of that program. By rule, this period of time, defined as the retrievability period, is not to exceed 50 years from the start of waste emplacement (see diagram next page). The duration of the retrievability period (the period of time during which retrieval can be initiated) can be adjudicated by the Nuclear Regulatory Commission on a case-by-case basis as part of the construction-authorization process. "Insofar as health and safety considerations are concerned, the Commission intends to grant such approval [for a shorter period] so long as its technical criteria are satisfied..." (10 CFR Part 60, Statement of Consideration, Retrievability, footnote 4).

The repository license application may include a petition for a shorter retrievability period (10 CFR Part 60.111(b)(1)). The duration of the retrievability period might include only the period of time required for (1) emplacement, (2) completion of the performance-confirmation program and the submittal of a license amendment to close the repository, and (3) a review of the performance-confirmation program by the Nuclear Regulatory Commission and the (presumed) granting of the license amendment. However, at this stage of repository planning, the full 50-year period of retrievability shall be assumed to be in full force and effect. This period will continue for no more than 50 years whether or not the waste-emplacement operations have been completed and the repository is in a caretaker status.

No temporary interruptions of the waste-emplacement schedule shall cause the retrievability period to be extended beyond 50 years.

DURATION OF RETRIEVABILITY PERIOD



2.4 Time for Retrieval

If the full inventory of emplaced waste is to be retrieved, the retrieval shall be accomplished as quickly as safely practicable. This does not mean that all equipment, systems, and procedures must be designed, constructed, and operated in a constant state of readiness for the retrieval of the complete inventory. Rather all methods, plans, and contingencies for retrieval shall have been designed, tested (see Section 3.4, Demonstration of Retrieval Equipment and Methods), and made ready for implementation as required. If either full or partial retrieval is necessary, all changes of equipment, modifications of ventilation (Section 3.2), reversal of waste receipt and handling operations, construction of temporary storage if needed (Section 3.3), and other major operational and construction revisions shall be accomplished before retrieval begins.

The Department of Energy fully expects and anticipates that the retrieval of the entire inventory of waste will require a lengthy period of preparation. It is further expected and anticipated that the retrieval of individual containers of waste will require, per unit, more time than did their emplacement. Therefore, the total amount of time to retrieve the complete inventory of waste will depend on the number of waste packages, the degree of difficulty, and the amount of preretrieval construction necessary. To the extent it is feasible, retrieval should be accomplished in the approximate time necessary to originally construct the repository and emplace

the waste. Reasonable efforts shall be employed to meet this guideline, but nothing in this statement of position shall be construed as an absolute time limit for retrieval.[6]

In the event the retrieval of a specific portion of the emplaced waste is required for the recovery of resources, no specific time limit shall apply as long as repository emplacement operations are scheduled to continue. If emplacement has been concluded and partial retrieval is required, reasonable efforts shall be employed to retrieve that portion of the waste in as short a time as is safely practicable.

All other forms of waste removal, for purposes of performance confirmation or any other reason not related to public health and safety or resource recovery, shall not be considered retrieval and therefore are not governed by the retrieval time criteria in this statement of position.

2.5 Affected Waste Types

All forms of spent nuclear fuel, defense high-level waste, and civilian high-level waste (including the high-level waste from the West Valley

---

[6]10 CFR Part 60.111(b)(3) states clearly that the time required to retrieve should be based on a "reasonable schedule" that is "about" or approximately the same as the time to construct and emplace. Since the health and safety of both the repository workers and the public could be affected if the schedule were rushed, "reasonable schedule" here means a schedule that allows retrieval as quickly as is safely practicable.

Demonstration Project) are governed by the retrievability requirements and criteria of this statement of position. The size, shape, weight, and other physical characteristics of these wastes and their containers shall not preclude their individual or collective retrieval, if required.

All other forms of waste potentially acceptable in the repository are specifically excluded from consideration in this statement of position at this time. Transuranic waste and other forms of radioactive waste not mentioned here are not governed by the requirements of this statement and will be addressed, if necessary, at a later time.

3. DESIGN REQUIREMENTS

This section presents requirements and criteria for waste retrieval for the purposes of guiding the design of the repository. These requirements and criteria are to be used in conjunction with all other design criteria that have been established by the Department of Energy.

All persons responsible for the design and construction of a repository shall bear in mind at all times that the primary function of the repository is to provide containment and isolation for the waste. Retrievability and retrieval constitute a contingency that must be incorporated into the design. This contingency shall not affect or unnecessarily complicate the design of the repository to the exclusion, compromise, or interference with the primary function of the repository. All design efforts shall be directed toward making retrievability and retrieval compatible with repository operations.

The method of retrieval planned for the repository shall anticipate and identify all credible malfunctions or accidents to the emplacement system, the engineered barriers, and the host rock that could affect retrievability. The method of retrieval shall be designed to operate, if required, under these abnormal conditions. These conditions or design bases shall potentially include such credible events as failed containers (loss of containment through a mechanical breach), stuck waste packages (pinched borehole liner or packing material), disoriented emplacement boreholes, high water pressure, release of radionuclides (as limited by 10 CFR Part 20), or any other circumstances that could affect the safety and mechanical removal of the emplaced waste.

The physical act of retrieval shall be designed to minimize occupational health and safety hazards due to radiation exposure, high temperatures, and other underground safety risks.

3.1 Current Technology

The design of all methods of retrieval shall be based on and employ levels of technology that are determined to be reasonably available at the time of the license application. The determination of the status of technology shall be made under the authority of the Department of Energy by technically qualified personnel who are responsible for the repository. At no time shall the engineering design of retrieval methods, equipment, and procedures exceed the technology accepted by the Department and the engineering community as capable of development within the limits of currently proved technology.

3.2 Ventilation

The ventilation of the undergound facilities of the repository shall be designed and constructed for all construction and operation demands, including mining, emplacement, and performance-confirmation testing. Additional ventilation requirements for the retrieval of any or all of the emplaced waste shall be designed at the same time as the repository.

The facilities that must provide the additional ventilation air needed for retrieval need not be constructed at the time the repository is constructed. The construction of these additional facilities shall be at the

discretion of the repository operations management. Such additional facilities may include an additional shaft or shafts; larger conveyances in the existing shafts; additional drifts, cross-cuts, or stoppings; additional chilling equipment, cooling towers, and fans; and other services on surface and underground.

All design and construction criteria for the additional retrieval ventilation shall be established before the submittal of the license application. This includes, but is not limited to, space for additional shafts, as required. All retrieval-ventilation structures, systems, and components important to the health and safety of the repository workers and the public shall be planned, designed, and incorporated into the overall repository layout before the license application.

The additional time required for the remedial construction of facilities to meet ventilation requirements shall be consistent with Section 2.5 (Time for Retrieval).

3.3 Temporary Storage

The use of temporary or lag storage for the waste being retrieved, either underground or on the surface of the geologic repository operations area, will be acceptable. Nothing in this statement of position shall be interpreted as a requirement for temporary storage during retrieval; rather it shall be up to the repository operations management to determine whether temporary storage for retrieved waste is necessary. The design and layout of the repository operations area, surface and underground, shall be planned so as not to

preclude the possibility of constructing facilities for temporary storage at a later time, if needed.

In the event any or all of the emplaced waste is to be retrieved, the time and the labor necessary to provide temporary storage shall be considered part of the retrieval effort (Section 2.5).

A certain amount of temporary storage will be constructed at the same time as the repository, to accommodate normal emplacement operations. If retrieval is later required for a small and distinct portion of the waste inventory, the use of this existing temporary storage until a final disposition of the waste is arranged will be allowed.

If emplaced waste is temporarily removed or handled for purposes of performance confirmation, it shall not be considered retrieved, and the temporary storage of this material within portions of the geologic repository operations area shall not be treated as the temporary storage of retrieved waste.

3.4 Demonstration of Retrieval Equipment and Methods

All retrieval concepts, methods, and non-standard equipment necessary for the retrieval of any or all of the emplaced waste shall be (1) designed and fabricated for mock-up tests during a proof-of-principle demonstration period before the license application and (2) further developed and tested under simulated repository conditions during the review of the license application and repository construction (see diagram page 19).

Proof-of-Principle Demonstration

The proof-of-principle demonstration period shall include an analysis of the retrieval system and shall result in the identification of normal and expected as well as abnormal and unexpected operating conditions for retrieval. During this proof-of-principle period the planned retrieval method shall have been sufficiently designed so that nonstandard retrieval equipment, not currently available or in use under these conditions, can be identified and where necessary fabricated for a mock-up demonstration.

The mock-up of actual retrieval equipment shall be in sufficient detail to provide, before the license application, a level of confidence that the planned method of retrieval is in principle feasible. This proof-of-principle mock-up demonstration shall be required to simulate both normal and abnormal conditions that might credibly exist at that time of retrieval at the particular site. This latter requirement, however, shall be limited in scope to the extent that it will not be required to completely re-create the repository environment, but to demonstrate the capability of the retrieval equipment to operate under adverse conditions.

If the repository operations management plans to backfill before the end of the retrievability period, the proof-of-principle mock-up demonstration shall show the feasibility of using the equipment fabricated at that time to (re)mine either backfill material or rock (rock simulating consolidated backfill) which has been heated to temperatures representative of retrieval conditions.

All mock-up retrieval equipment and procedures shall be tested in an appropriate environment necessary only for their intended demonstration. These tests may take place in the laboratory, on the surface or underground, or in any other location suitable for the demonstration of the particular equipment or procedure in question.

Development of Prototypical Equipment

After the proof-of-principle demonstration, a development period for advanced prototype retrieval equipment and procedures will be required. The purpose of this prototypical development shall be to establish full confidence in the overall retrieval capability under geotechnical conditions approximating those of the actual repository environment. These conditions would include lithologies, temperatures, and hydrologic properties similar to those likely to be encountered in the repository.

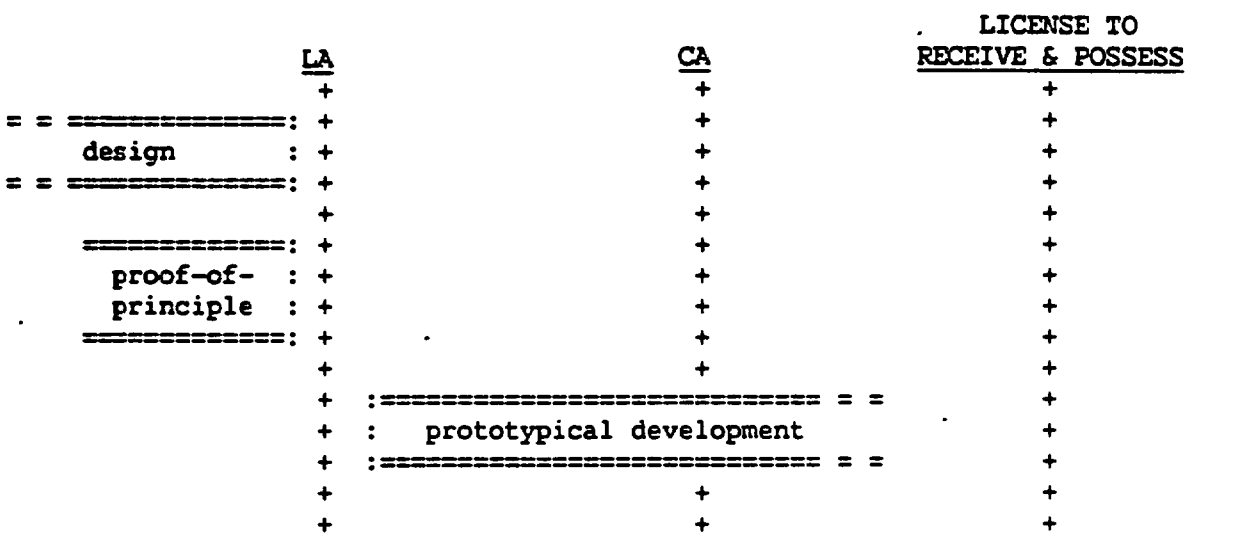
The development and demonstration of prototypical equipment and procedures need not occur at the repository location. It may take place at a location that approximates the geologic conditions of the proposed repository site, as long as a reasonable correlation exists between the sites.

This development period shall start after the proof-of-principle demonstration and continue into, during, and beyond the license-application period as necessary. All documentation and results, as obtained, from the development and demonstration of prototypical retrieval equipment shall be given to the Commission prior to the time the license to receive and possess is granted.

The waste container used in the retrieval demonstration shall be of a size and weight approximating the actual container that is planned for the disposal of waste at the repository.

The use of radioactive material is not required in either the proof-of-principle demonstration or the prototypical development of retrieval equipment. Furthermore, proof-of-principle demonstrations need not be conducted with all radiation-safety measures in place. Prototypical development equipment shall incorporate radiation-safety equipment necessary to completely test the mechanical systems.

TIMING OF RETRIEVAL DEMONSTRATIONS



4. OPERATION REQUIREMENTS

The repository shall be operated, from the time waste emplacement begins until the end of the retrieval period, in such a manner that any of the emplaced waste can be retrieved within the time limits given in this statement of position. The operating equipment needed for retrieval shall be maintained in working condition until the end of the retrieval period.

4.1 Integrity of the Geologic Barriers

As long as the primary mission of the repository remains unchanged (i.e., the containment and isolation of waste), the overall integrity or physical continuity of the geologic barriers must not be disturbed by the retrieval of any or all of the emplaced waste.

In the event partial retrieval is required, the overall geologic integrity of the host rock must remain unaffected. After retrieval, the structural or geomechanical condition of the emplacement rooms and boreholes from which waste is retrieved may be allowed to deteriorate as long as the integrity of the geologic barriers surrounding the repository in general is not adversely affected.

If all of the waste is retrieved (because, for example, of a loss of confidence in the site), no further protection of the integrity of the geologic barriers is necessary. This would apply only under circumstances where no additional nuclear material is emplaced at the repository.

After retrieval, the decision to reuse emplacement rooms shall be based on cost, space efficiency, and other operational considerations at the discretion of the repository operations management. If after waste retrieval new waste is emplaced in the same area, all the original performance requirements for the geologic barriers in that area of the repository shall remain unchanged.

4.2 Backfilling

The placement of backfill material before the permanent closure of the repository is an option available to the repository operations management. The placement of backfill material in emplacement rooms or other areas of the repository is specifically permitted provided that all requirements of this statement of position are fulfilled.

Nothing in this statement of position shall cause the repository architect/engineer or operations management to assume that repository backfilling before permanent closure is either required or prohibited. However, if early backfilling is part of the planned emplacement operations of the repository, it shall be made part of the design at the time of the license application.

Backfilling, if exercised early, must not preclude the possibility of retrieval before the end of the retrievability period. Assurance of retrievability in backfilled areas must have occurred during the proof-of-principle retrieval demonstration before the construction authorization (Section 3.4, Demonstration of Retrieval Equipment and Methods).

The removal of backfill material for purposes of retrieval shall not affect the integrity of the repository in areas where emplacement will not be disturbed.

If waste is to be retrieved from a portion of the repository that has been previously backfilled, the retrieval of any or all of the waste shall be subject to the time guidelines given in Section 2.5.

4.3 Monitoring and Verification

Monitoring and instrumentation, for purposes affecting retrieval, shall be confined to areas of performance confirmation, test and evaluation facilities, and any other in-situ research portions of the underground repository. No ongoing monitoring of individual waste packages shall be required for the maintenance of the retrieval capability.

Nothing in this statement of position shall preclude the possibility or opportunity to monitor and instrument various other areas of the repository for geomechanical or other reasons associated with the overall preclosure performance of the repository.

The initial verification of the ability to retrieve emplaced waste shall be accomplished in the proof-of-principle retrieval demonstration before the license application. Further retrieval verification shall occur during the prototypical development of equipment (Section 3.4, Demonstration of Retrieval Equipment and Methods).

The performance-confirmation program, which will begin before and continue during the emplacement lifetime of the repository, will necessitate the recovery of emplaced waste on a planned schedule for inspection and analysis (Section 5, Performance Confirmation). This scheduled recovery shall serve as another verification of the retrieval capability even though this is not the intended purpose of the performance-confirmation program. In the event the repository operations management elects to backfill early, the removal of backfill shall also be accomplished in the performance-confirmation area(s), and the removal of waste containers from those areas shall be a further demonstration of retrieval under normal conditions.

No other specific retrieval-verification program, other than those described in this statement of position, will be necessary during the emplacement lifetime of the repository.

4.4 Access Maintenance

The repository shall not be operated or maintained in a manner such that any areas of the repository become permanently inaccessible during the period of retrievability if those areas of the repository are necessary for the retrieval of any or all of the emplaced waste.

Immediate or ready access into emplacement areas for the purpose of retrieval is not required for operating personnel or equipment. The time required to retrieve any or all of the emplaced waste does not depend on the repository operator's ability to start retrieving waste as soon as the need for retrieval is identified.

Portions of the repository that have been backfilled early or have been temporarily closed (e.g., for purposes of conserving ventilation air) need not be available for quick entry or ready access if retrieval is required.

4.5 Equipment Reversibility

Ready or instantaneous reversal of the repository emplacement equipment is not necessary for the purposes of retrieval. The reversal of the repository emplacement operations will be a designed, but not constructed, contingency.

The mechanical equipment required for the retrieval of any or all of the emplaced waste shall be tested during the proof-of-principle demonstration before the license application (and during further prototypical development, as needed). During operations, no equipment or personnel needed solely for either the partial or the complete retrieval of emplaced waste need be located at the repository. Such equipment or personnel need be available only at the time retrieval becomes necessary, but it may be available earlier at the discretion of the repository operations management.

This exemption of onsite retrieval equipment does not include the equipment necessary to remove portions of the emplaced waste for the performance confirmation or any other reason not associated with retrieval. The equipment necessary to handle waste containers for these reasons shall be part of the functioning repository and shall be in place at the time emplacement operations commence.

Routine operating conditions encompass all activities necessary to carry out the repository mission for the permanent isolation of the waste. The required retrieval of any or all of the emplaced waste shall be considered a nonroutine operating condition and shall not require ongoing emplacement operations to continue without interruption. "Nonroutine" means a repository operation that might, in some way, conflict with or interrupt the primary operating function of the repository—the emplacement of waste.

Routine repository emplacement operations may continue during retrieval at the discretion of the repository operations management, as long as they do not conflict or interfere with those portions of the repository where retrieval is under way.

Other nonroutine operating conditions unrelated to retrieval will not be governed by this statement of position.

5. PERFORMANCE CONFIRMATION

The performance-confirmation program is an integral part of the operation of the repository and will continue until permanent closure. The primary purpose of this program is to develop a level of confidence in the capacity of the repository to achieve the performance objectives required for long-term isolation (10 CFR 60.140) so that the Commission can decide with reasonable assurance that permanent closure will not cause an unreasonable risk to public health and safety.

The removal, whether temporary or permanent, or emplaced waste from the performance area(s) shall be done for the purposes of inspection, analysis, and research and will not be classified as retrieval. Actual retrieval, as defined in this statement of position, from performance-confirmation areas shall be made only for reasons of public health and safety or resource recovery.

The results and data of the performance-confirmation program will drive or directly influence the decision to retrieve. The purpose of the performance-confirmation program is not to demonstrate the capability to retrieve emplaced material.

The major responsibility for demonstrating retrievability rests in the proof-of-principle and prototypical equipment demonstrations (Section 3.4, Demonstration of Retrieval Equipment and Methods) conducted before the start of emplacement operations. The removal of waste containers from the performance-confirmation area(s), for purposes of inspection, analysis, and other research related to the natural and engineered barriers will, of itself,

demonstrate a continued ability to retrieve. This "simulated retrieval" from the performance-confirmation area(s) will continue through the retrievability period of the repository and will, in effect, demonstrate that retrieval is possible until the termination of the retrievability period.[7]

No other planned demonstrations or simulated retrieval experiments other than those required in this statement of position shall be required during the emplacement lifetime of the repository. The period of retrievability shall continue in full force and effect until the Nuclear Regulatory Commission has reviewed and approved the performance-confirmation program.

---

[7]If backfilling is planned before permanent closure, portions of the performance-confirmation area(s) will have been backfilled. The selective removal of waste from these backfilled areas will also demonstrate the ability to retrieve, if necessary, from the backfilled areas of the repository.

ENCLOSURE 3

MEETING AGENDA

AGENDA

DOE/NRC MEETING ON DOE'S RETRIEVAL POSITION PAPER
8:30 A.M. ROOM BE-069 FORRESTAL BUILDING
1000 INDEPENDENCE AVE. WASHINGTON, D.C.

PURPOSES:

1) TO IDENTIFY AND RESOLVE NRC COMMENTS ON THE RETRIEVAL POSITION PAPER

2) TO REACH AN UNDERSTANDING THAT THE POSITION REPRESENTS AN ACCEPTABLE INTERPRETATION OF 10 CFR 60

OVERVIEW OF DOE'S RETRIEVAL POSITION PAPER	DOE
REVIEW OF NRC COMMENTS	NRC
DOE RESPONSE TO NRC COMMENTS	DOE
DISPOSITION OF NRC COMMENTS	NRC/DOE
IDENTIFICATION OF FUTURE INTERACTIONS ON RETRIEVABILITY	NRC/DOE
ADJOURN	

ENCLOSURE 4

NRC WRITTEN COMMENTS

DRAFT

BROAD NRC TOPICS RELATED TO DOE RETRIEVABILITY
AND RETRIEVAL GENERIC POSITION PAPER

1) Impact of Host Rock/Waste Emplacement/Equipment Interactions.

2) Demonstration of Retrieval Equipment and Methods.

3) Duration of Retrievability Period.

4) Retrieval Definition.

5) Waste Package.

6) Post Retrieval Isolation Capability.

DRAFT

BROAD NRC COMMENTS RELATED TO DOE RETRIEVABILITY AND RETRIEVAL GENERIC POSITION PAPER TOPICS

1. In discussing Design requirements emphasis is placed upon equipment needs for retrieval and limited discussion is presented regarding the impact of host rock characteristics and waste emplacement on retrievability. Recommend DOE expand the discussion to address the combined effects of thermal/mechanical/chemical and hydrological loadings on retreivability and the impact of that effect on relevant design considerations.

2. The discussion related to demonstration of retrieval equipment and methods does not clearly describe the "proof of principle" demonstration that is proposed for analysis of the retrieval method and the demonstration program for "prototypical equipment and methods." Recommend this section of the position paper be expanded to address these topics in detail.

3. The definition of the retrievability period and the time for retrievability do not appear to be completely consistent with 10CFR Part 60. Recommend DOE clarify the working definition presented to clearly maintain consistency with 10 CFR Part 60.

4. The need for reiterating that the definition of retrieval does not include non retrieval activities as discussed in section 1.0 (page 2), section 2.2 (page 6), and section 2.4 (page 10), is not clear. Recommend DOE expand the discussion to clarify this point.

5. A discussion of how assurance will be provided that the waste package, if removed, will maintain substantially complete containment of radioactive material during retrieval is not provided in the document. Recommend such a discussion be provded.

6. In the event of a requirement for partial retrieval of the waste the post retrieval isolation capability of the vacated emplacement rooms and boreholes becomes an important consideration. Recommend DOE address this topic in the document.

ENCLOSURE 5

DOE PRESENTATION

SUMMARIZING THEIR GENERIC POSITION ON

RETRIEVABILITY AND RETRIEVAL

Department of Energy/Nuclear Regulatory Commission

MEETING ON THE PROPOSED DEPARTMENT OF ENERGY POSITION ON RETRIEVABILITY AND RETRIEVAL FOR A GEOLOGIC REPOSITORY

JULY 31, 1985

AGENDA

DOE/NRC MEETING ON DOE'S RETRIEVAL POSITION PAPER
8:30 A.M. ROOM BE-069 FORRESTAL BUILDING
1000 INDEPENDENCE AVE. WASHINGTON, D.C.

PURPOSES:

1) TO IDENTIFY AND RESOLVE NRC COMMENTS ON THE RETRIEVAL POSITION PAPER

2) TO REACH AN UNDERSTANDING THAT THE POSITION REPRESENTS AN ACCEPTABLE INTERPRETATION OF 10 CFR 60

OVERVIEW OF DOE'S RETRIEVAL POSITION PAPER	DOE
REVIEW OF NRC COMMENTS	NRC
DOE RESPONSE TO NRC COMMENTS	DOE
DISPOSITION OF NRC COMMENTS	NRC/DOE
IDENTIFICATION OF FUTURE INTERACTIONS ON RETRIEVABILITY	NRC/DOE
ADJOURN	

THE PRIMARY OBJECTIVES IN ASSEMBLING THE DOE POSITION ON RETRIEVABILITY AND RETRIEVAL FOR A GEOLOGIC REPOSITORY

- TO CLEARLY AND CONCISELY ESTABLISH A WORKABLE AND STANDARDIZED SET OF REQUIREMENTS TO DEFINE EXACTLY *WHAT* RETRIEVAL IS, *WHERE* RETRIEVAL MIGHT OCCUR, AND *WHEN* RETRIEVAL MIGHT BE NECESSARY

- TO REQUIRE A COMPREHENSIVE PROGRAM OF EQUIPMENT AND METHODOLOGY DEMONSTRATION SO THAT REASONABLE CONFIDENCE CAN BE ESTABLISHED THAT THERE ARE NO SITE-SPECIFIC OR GENERIC REASONS RETRIEVAL CANNOT BE ACCOMPLISHED ON DEMAND

DEPARTMENT OF ENERGY
POSITION ON RETRIEVABILITY AND RETRIEVAL
FOR A
GEOLOGIC REPOSITORY

June 28, 1985

0211-0015 7/30/85

TABLE OF CONTENTS

CHAPTER BY CHAPTER HIGHLIGHTS
CHAPTER 2 GENERAL REQUIREMENTS

2.1 RETRIEVABILITY

- THE REPOSITORY SHALL BE DESIGNED, CONSTRUCTED, AND OPERATED SO THAT IT WILL BE POSSIBLE TO RETRIEVE ANY OR ALL OF THE WASTE EMPLACED

- FOR THIS VERSION OF THE POSITION, RETRIEVAL IS COMPLETE WHEN THE WASTE IS BROUGHT BACK TO THE SURFACE OF THE REPOSITORY

CHAPTER BY CHAPTER HIGHLIGHTS
CHAPTER 2 GENERAL REQUIREMENTS

2.2 REASON FOR RETRIEVAL

- POSITION COVERS TWO REASONS FOR RETRIEVAL (1) PUBLIC HEALTH AND SAFETY (RETRIEVAL ORDERED BY THE NRC) (2) RECOVERY OF RESOURCES (RETRIEVAL ORDERED BY THE DOE)

CHAPTER BY CHAPTER HIGHLIGHTS
CHAPTER 2 GENERAL REQUIREMENTS

2.3 DURATION OF THE RETRIEVABILITY PERIOD

- THE DURATION OF THE RETRIEVABILITY PERIOD MIGHT INCLUDE ONLY THE PERIOD OF TIME REQUIRED FOR:

  1. EMPLACEMENT
  2. COMPLETION OF THE PERFORMANCE CONFIRMATION PROGRAM AND THE SUBMITTAL OF LICENSE AMENDMENT TO CLOSE THE REPOSITORY
  3. REVIEW OF THE PERFORMANCE CONFIRMATION PROGRAM BY THE NRC AND THE (PRESUMED) GRANTING OF THE LICENSE AMENDMENT

- AT THIS STAGE IN PLANNING, THE FULL 50-YEAR PERIOD OF RETRIEVABILITY SHALL BE ASSUMED

- DOE INTERPRETS THE NRC STATEMENT OF CONSIDERATION TO PART 60 ON THE RETRIEVABILITY PERIOD AS NOT REQUIRING A DURATION LONGER THAN 50 YEARS FROM THE START OF WASTE EMPLACEMENT

CHAPTER BY CHAPTER HIGHLIGHTS
CHAPTER 2 GENERAL REQUIREMENTS

2.3 DURATION OF THE RETRIEVABILITY PERIOD (Continued)

PROPOSED MODIFICATION TO 2.3

- PER NWPA SECTION 122, DISPOSAL OF SPENT FUEL, THE DOE SECRETARY MAY SPECIFY AN APPROPRIATE PERIOD OF RETRIEVABILITY, POTENTIALLY LONGER THAN 50 YEARS, SUBJECT TO APPROVAL OR DISAPPROVAL BY THE COMMISSION

CHAPTER BY CHAPTER HIGHLIGHTS
CHAPTER 2 GENERAL REQUIREMENTS

2.4 TIME FOR RETRIEVAL

- NO RIGID CONSTRAINT ON THE TIME FOR RETRIEVAL IS APPLIED
- RETRIEVAL WILL BE CONDUCTED AS QUICKLY AS IS SAFELY PRACTICABLE
- TO THE EXTENT FEASIBLE, RETRIEVAL WILL BE ACCOMPLISHED IN THE APPROXIMATE TIME NECESSARY TO CONSTRUCT THE REPOSITORY AND EMPLACE THE WASTE
- IT IS NOT REQUIRED TO HAVE THE RETRIEVAL SYSTEM IN A CONSTANT STATE OF READINESS FOR THE RETRIEVAL OF THE COMPLETE INVENTORY
- MAJOR MODIFICATIONS OF THE FACILITY TO ACCOMPLISH RETRIEVAL ARE ACCEPTABLE AND SHALL BE COMPLETED BEFORE RETRIEVAL BEGINS

CHAPTER BY CHAPTER HIGHLIGHTS
CHAPTER 2 GENERAL REQUIREMENTS

2.5 AFFECTED WASTE TYPES

- POSITION COVERS ALL FORMS OF SPENT FUEL, DEFENSE HIGH-LEVEL WASTE, AND CIVILIAN HIGH-LEVEL WASTE

- POSITION SPECIFICALLY EXCLUDES ALL OTHER FORMS OF WASTE

- POSITION WILL BE AMENDED, IF NECESSARY, AT A LATER TIME TO ADDRESS ADDITIONAL WASTE FORMS

CHAPTER BY CHAPTER HIGHLIGHTS
CHAPTER 3 DESIGN REQUIREMENTS

CHAPTER 3 DESIGN REQUIREMENTS

- RETRIEVABILITY AND RETRIEVAL CONSTITUTE A CONTINGENCY THAT MUST BE INCORPORATED INTO THE DESIGN WITHOUT UNNECESSARILY COMPLICATING OR INTERFERING WITH THE PRIMARY FUNCTION OF THE REPOSITORY

- RETRIEVAL MUST BE DESIGNED TO OPERATE UNDER CREDIBLE MALFUNCTIONS OR ACCIDENTS TO THE EMPLACEMENT SYSTEM. THIS INCLUDES STUCK WASTE PACKAGES, DISORIENTATED EMPLACEMENT BOREHOLES, WATER UNDER HIGH PRESSURE AND BREACHED CONTAINERS RELEASING RADIONUCLIDES

CHAPTER BY CHAPTER HIGHLIGHTS
CHAPTER 3 DESIGN REQUIREMENTS

3.1 CURRENT TECHNOLOGY

- RETRIEVAL SHALL BE BASED ON AND EMPLOY LEVELS OF TECHNOLOGY THAT ARE DETERMINED TO BE REASONABLY AVAILABLE AT THE TIME OF THE LICENSE APPLICATION

- THE DETERMINATION OF THE STATUS OF TECHNOLOGY SHALL BE MADE UNDER THE AUTHORITY OF THE DOE BY TECHNICALLY QUALIFIED PERSONNEL

CHAPTER BY CHAPTER HIGHLIGHTS
CHAPTER 3 DESIGN REQUIREMENTS

3.2 VENTILATION

- INCREASED VENTILATION NECESSARY FOR RETRIEVAL DOES NOT HAVE TO BE IN-PLACE, BUT CAN BE CONSTRUCTED AFTER RETRIEVAL IS REQUIRED

- ALL DESIGN AND CONSTRUCTION CRITERIA FOR THE ADDITONAL VENTILATION SHALL BE ESTABLISHED BEFORE THE SUBMITTAL OF THE LICENSE APPLICATION

CHAPTER BY CHAPTER HIGHLIGHTS
CHAPTER 3 DESIGN REQUIREMENTS

3.3 TEMPORARY STORAGE

- UTILIZATION OF EXISTING EMPLACEMENT LAG STORAGE FOR THE WASTE BEING RETRIEVED IS ACCEPTABLE

- ANY ADDITIONAL STORAGE REQUIRED TO SUPPORT RETRIEVAL MAY BE CONSTRUCTED AFTER THE DECISION TO RETRIEVE

CHAPTER BY CHAPTER HIGHLIGHTS
CHAPTER 3 DESIGN REQUIREMENTS

3.4 DEMONSTRATION OF RETRIEVAL EQUIPMENT AND METHODS: PROOF-OF-PRINCIPAL DEMONSTRATION

- PROOF-OF-PRINCIPLE DEMONSTRATION PERIOD SHALL INCLUDE AN ANALYSIS OF THE RETRIEVAL SYSTEM FOR BOTH NORMAL AND ABNORMAL OPERATING CONDITIONS
- A PROOF-OF-PRINCIPLE MOCK-UP RETRIEVAL DEMONSTRATION WILL BE CONDUCTED TO PROVIDE, BEFORE THE LICENSE APPLICATION, A LEVEL OF CONFIDENCE THAT THE PLANNED METHOD OF RETRIEVAL IS *IN PRINCIPLE* FEASIBLE
- THE DEMONSTRATION MUST SIMULATE BOTH NORMAL AND ABNORMAL CONDITIONS THAT MIGHT CREDIBLY EXIST AT THE TIME OF RETRIEVAL

CHAPTER BY CHAPTER HIGHLIGHTS
CHAPTER 3 DESIGN REQUIREMENTS

3.4 DEMONSTRATION OF RETRIEVAL EQUIPMENT AND METHODS: PROOF-OF-PRINCIPLE DEMONSTRATION (Continued)

- IF THE PLAN IS TO BACKFILL BEFORE THE END OF THE RETRIEVABILITY PERIOD, THE PROOF-OF-PRINCIPLE MOCK-UP DEMONSTRATION SHALL SHOW THE FEASIBILITY OF THE METHOD AND EQUIPMENT PROPOSED
- PROOF-OF-PRINCIPLE MOCK-UP DEMONSTRATION WILL BE CONDUCTED IN AN APPROPRIATE ENVIRONMENT
- POSITION DOES NOT REQUIRE IN-SITU PROOF-OF-PRINCIPLE TESTS

CHAPTER BY CHAPTER HIGHLIGHTS
CHAPTER 3 DESIGN REQUIREMENTS

3.4 DEMONSTRATION OF RETRIEVAL EQUIPMENT AND METHODS: DEVELOPMENT OF PROTOTYPICAL EQUIPMENT

- DEVELOPMENT PERIOD FOR PROTOTYPE RETRIEVAL EQUIPMENT AND PROCEDURES IS REQUIRED TO ESTABLISH FULL CONFIDENCE IN THE OVERALL RETRIEVAL CAPABILITY UNDER GEOTECHNICAL CONDITIONS APPROXIMATING THOSE OF THE ACTUAL REPOSITORY

- PROTOTYPE RETRIEVAL DEMONSTRATION NEED NOT OCCUR AT THE REPOSITORY LOCATION NOR UTILIZE RADIOACTIVE MATERIAL

- DEVELOPMENT PERIOD STARTS AFTER PROOF-OF-PRINCIPLE TESTS AND CONTINUES, AS NECESSARY, WITH COMPLETION PRIOR TO THE GRANTING OF THE LICENSE TO RECEIVE AND POSSESS

CHAPTER BY CHAPTER HIGHLIGHTS
CHAPTER 4 OPERATION REQUIREMENTS

4.1 INTEGRITY OF THE GEOLOGIC BARRIERS

- PARTIAL RETRIEVAL SHALL NOT AFFECT OVERALL GEOLOGIC INTEGRITY
- TOTAL RETRIEVAL, UNDER CIRCUMSTANCES WHERE NO ADDITIONAL NUCLEAR MATERIAL WOULD BE EMPLACED, NEED NOT PROTECT THE GEOLOGIC BARRIER
- IF AFTER WASTE RETRIEVAL NEW WASTE IS EMPLACED IN THE SAME AREA, ALL THE ORIGINAL PERFORMANCE REQUIREMENTS REMAIN IN FORCE

CHAPTER BY CHAPTER HIGHLIGHTS
CHAPTER 4 OPERATION REQUIREMENTS

4.2 BACKFILLING

- PLACEMENT OF BACKFILL MATERIAL BEFORE PERMANENT CLOSURE IS PERMISSIBLE PROVIDED THAT ALL REQUIREMENTS OF THE POSITION ARE FULFILLED

CHAPTER BY CHAPTER HIGHLIGHTS
CHAPTER 4 OPERATION REQUIREMENTS

4.3 MONITORING AND VERIFICATION

- NO ONGOING MONITORING AND INSTRUMENTATION FOR PURPOSES OF RETRIEVAL IS REQUIRED IN THE REPOSITORY AT LARGE

- NO SPECIFIC RETRIEVAL-VERIFICATION PROGRAM WILL BE REQUIRED DURING THE EMPLACEMENT LIFETIME OF THE REPOSITORY

CHAPTER BY CHAPTER HIGHLIGHTS
CHAPTER 4 OPERATION REQUIREMENTS

4.4 ACCESS MAINTENANCE

- READY OR IMMEDIATE ACCESS TO ALL PORTIONS OF THE REPOSITORY TO INSURE IMMEDIATE INITIATION OF RETRIEVAL IS NOT REQUIRED

CHAPTER BY CHAPTER HIGHLIGHTS
CHAPTER 4 OPERATION REQUIREMENTS

4.5 EQUIPMENT REVERSIBILITY

- DURING OPERATIONS, NO EQUIPMENT OR PERSONNEL NEEDED SOLELY FOR RETRIEVAL NEED BE LOCATED AT THE REPOSITORY

- ROUTINE REPOSITORY EMPLACEMENT MAY CONTINUE DURING RETRIEVAL AS LONG AS THEY DO NOT CONFLICT OR INTERFERE WITH RETRIEVAL

CHAPTER BY CHAPTER HIGHLIGHTS
CHAPTER 5 PERFORMANCE CONFIRMATION

CHAPTER 5 PERFORMANCE CONFIRMATION

- THE REMOVAL, WHETHER TEMPORARY OR PERMANENT, OF WASTE FROM THE PERFORMANCE CONFIRMATION AREA(s) IS NOT CLASSIFIED AS RETRIEVAL

- THE REMOVAL OF WASTE FROM PERFORMANCE-CONFIRMATION AREA(s) WILL IN EFFECT, DEMONSTRATE THAT RETRIEVAL IS POSSIBLE, HOWEVER IT IS NOT TO BE CONSIDERED A REQUIREMENT FOR RETRIEVAL

WORK YET TO BE DONE

DEVELOP A DOE POLICY ON RESOURCE RECOVERY

- GUIDANCE NEEDS TO BE PROVIDED REGARDING THE LIKELIHOOD, CONDITIONS, AND CRITERIA UNDER WHICH RETRIEVAL OF SPENT FUEL FOR RESOURCE RECOVERY MAY BE REQUIRED BEFORE PERMANENT CLOSURE OF THE REPOSITORY

DEVELOP A DOE POLICY ON DISPOSITION OF RETRIEVED WASTE

- THE DEPARTMENT NEEDS TO DEFINE AN APPROPRIATE SYSTEM STRATEGY FOR ULTIMATE DISPOSAL OF RETRIEVED WASTE

DEVELOP DOE POSITION ON PERFORMANCE CONFIRMATION TESTING EFFECTS ON RETRIEVABILITY DURATION

- THE DEPARTMENT NEEDS TO ADDRESS THE TYPE OF PERFORMANCE CONFIRMATION PROGRAM THAT COULD BE THE BASIS FOR A SHORTER RETRIEVABILITY DURATION

WORK YET TO BE DONE (Continued)

DOE/NRC POLICY ON TRU AND OTHER NON-STANDARD HIGH-LEVEL WASTE

- **FURTHER WORK IS NEEDED TO CLARIFY THE IMPLICATIONS OF TRANSURANIC WASTE AND OTHER FORMS OF RADIOACTIVE WASTE ON RETRIEVAL REQUIREMENTS**

DOE TECHNICAL COMPLIANCE PLAN ON PROOF-OF-PRINCIPLE AND PROTOTYPICAL DEVELOPMENT

- **DOE PLANS TO CONDUCT WORK LEADING TO THE DEVELOPMENT OF PRELIMINARY PROOF-OF-PRINCIPAL AND PROTOTYPICAL DEVELOPMENT TEST PLANS**