

RULEMAKING ISSUE  
NEGATIVE CONSENT

SECY-00-0129

June 12, 2000

FOR: The Commissioners  
FROM: William D. Travers  
Executive Director for Operations  
SUBJECT: WORKSHOP FINDINGS ON THE ENTOMBMENT OPTION FOR DECOMMISSIONING POWER REACTORS AND STAFF  
RECOMMENDATIONS ON FURTHER ACTIVITIES

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## **PURPOSE:**

To provide the findings from a public workshop on the entombment option for decommissioning power reactors and the staff's recommendation on whether or not to pursue further activities related to entombment.

## **BACKGROUND:**

In response to COMSECY-96-068, April 3, 1997, the Commission requested the staff to provide an analysis of whether the staff viewed entombment as a viable decommissioning option. In [SECY-98-099](#), May 4, 1998, the staff provided an interim status report to the Commission and stated their preliminary conclusion that entombment appeared to be a viable decommissioning option. In [SECY-99-187](#), July 19, 1999, the staff informed the Commission of the technical viability of entombment as a decommissioning option for power reactors. The staff concluded that decommissioning a power reactor using the entombment option can be safe and viable for many situations, and that it could offer benefits to licensees by providing them with more choices to accommodate their particular decommissioning situation. However, as also noted, the 60-year provision in [10 CFR 50.82\(a\)\(3\)](#) for completion of decommissioning would need to be revised to reflect the period of time required for reduction in dose to meet the license termination rule ([10 CFR Part 20](#), Subpart E). Periods on the order of 100 years were identified. As the next step in considering the entombment option, the staff announced its intention to conduct a workshop to solicit stakeholder views on the technical basis, issues, and options for treating entombment (ENTOMB) equally with the other decommissioning alternatives, prompt and deferred dismantlement (DECON and SAFSTOR) evaluated in NUREG-0586, Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities (August 1988).

## **ENTOMBMENT OPTION WORKSHOP:**

The workshop was held on December 14 and 15, 1999, to solicit stakeholder views on the entombment option as a decommissioning alternative to terminate the reactor license. Prior to the workshop, a *Federal Register* notice (FRN) (64 FR 63061; November 18, 1999) ([Attachment 1](#)) was issued announcing the workshop's purpose, schedule, and issues that the NRC proposed to discuss.

The workshop was attended by 76 people from industry, public interest groups, Federal agencies, the States, and NRC staff (see [Attachment 2](#)). Formal presentations were on regulatory considerations and on technical aspects specific to power reactor entombment. Specific topics addressed contaminant isolation issues such as concrete performance assessments, hydrological isolation considerations, and engineering facilitation for entombment design and implementation. Additionally, panels reviewed each issue from the *Federal Register* notice, followed by discussions with the panelists and the audience. The workshop resulted in much audience discussion of the issues and provided useful information to the NRC staff on potential public impacts and concerns.

## **MAJOR CONCLUSIONS FROM WORKSHOP:**

A summary of the workshop is presented in Attachment 2. A condensed version of the workshop follows.

1. No attendees challenged the capability to construct a technically viable entombment and they appeared to accept that its use could have potential benefits as a decommissioning alternative. However, there was concern about the lack of any decommissioning experience with NRC-licensed power reactors using this option. In essence, proceed with caution appeared to be the audience consensus on the question of permitting entombment. Many attendees who might favor the use of the entombment option appeared to want the NRC to continue to maintain some type of licensing

responsibility for the entombment. Under that condition, they appeared to be willing to accept entombment as a decommissioning option.

2. While the States (seven States represented) looked favorably at entombment as potentially worthwhile, their special concern was that, once the license was terminated, the responsibility for handling any entombment failure would revert to the State, at least temporarily. That situation could burden the State with large expenditures should entombment problems occur. Accordingly, the States requested that they play an active role in any entombment regulatory development and that they have a role in the approval of any entombment requests in their State. The States, and the audience in general, were more amenable to the NRC continuing to maintain regulatory responsibility for entombments, at least until a history of good experience with entombments had developed.
3. There was general agreement by the audience that the Low Level Waste (LLW) Policy Act was not working and the entombment decommissioning option needs serious consideration.
4. Many licensees were strongly in favor of having the option of entombment available as a decommissioning alternative.
5. Finally, the States, the industry, and many other workshop participants prefer excluding consideration of entombing Greater Than Class C (GTCC) waste at this time. It is believed that the GTCC waste issue could significantly delay addressing the main issue of whether entombment should be permitted. Moreover, the GTCC waste issue is regarded as a complex one that still requires further technical and legislative analysis. However, the audience generally believed that if rulemaking for entombment is completed, it would be worthwhile to reconsider entombment of GTCC waste at that time.

## **REGULATORY OPTIONS:**

Based upon the entombment information base,<sup>(1)</sup> the staff believes that rulemaking is needed to address the entombment option. In that vein, the staff has developed the following preliminary options for the use of entombment for decommissioning.

- A. Do not modify the regulations and handle entombment requests on a case-by-case basis.
- B. Amend 10 CFR 50.82 with respect to modifying or removing the 60-year time frame for completion of decommissioning, and 10 CFR 20, Subpart E with respect to changing the restricted license termination provision to one that maintains the same dose limits, but recognizes the need for State acceptance of oversight of the entombment after the NRC terminates the license (after the material has been entombed).
- C. Amend regulations to permit entombment under an NRC license and specify the time when the license could be terminated.

However, the staff believes that further public input is needed before recommending an option. Absent Commission objection, the staff intends to proceed with development of a rulemaking plan. As part of that plan, the staff intends to propose seeking this additional input through an advanced notice of proposed rulemaking (ANPR).

## **RESOURCES:**

Currently, no resources are budgeted for these activities. The priority, resources and schedule will be addressed through internal reprogramming.

## **COORDINATION:**

OGC has reviewed this paper and has no legal objections. The Office of the Chief Financial Officer has reviewed this paper for resource implications and has no objections.

## **RECOMMENDATION:**

Absent Commission objection, the staff will proceed with the development of a Rulemaking Plan to address the entombment option for power reactors. Staff requests action within 10 days. Action will not be taken until the SRM is received. We consider this action to be within the delegated authority of the EDO.

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William D. Travers  
Executive Director for Operations

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Attachments: 1. [FRN for Workshop](#)  
2. [Workshop Summary](#)

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## FRN for December 1999 Workshop

[Federal Register: November 18, 1999 (Volume 64, Number 222)]  
 [Notices]  
 [Page 63061]  
 From the Federal Register Online via GPO Access [wais.access.gpo.gov]  
 [DOCID:fr18no99-79]

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 NUCLEAR REGULATORY COMMISSION

Power Reactor Decommissioning; Entombment; Workshop;

AGENCY: Nuclear Regulatory Commission.

ACTION: Announcement of workshop on power reactor entombment.

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 SUMMARY: The Nuclear Regulatory Commission will hold a workshop from 9:00 am-4:00 pm December 14-15, 1999, to discuss the feasibility of entombment as a reactor decommissioning option. The workshop will be held in the TWFN Auditorium of the Nuclear Regulatory Commission, 11545, Rockville Pike, Rockville, MD.

SUPPLEMENTARY INFORMATION: An information paper discussing the technical feasibility of entombment as a decommissioning option for power reactors was given to the Commission (SECY-99-187) on July 19, 1999. The information paper is available on the NRC public website and can be viewed at [www.nrc.gov/reading-rm/doc-collections/commission/secys/index.html](http://www.nrc.gov/reading-rm/doc-collections/commission/secys/index.html). The information paper provides the staff's assessment of the viability of the entombment option for decommissioning power reactors. The staff informed the Commission that, as a next step in considering entombment as a decommissioning option, they intend to conduct a workshop in the near future. The purpose of this workshop is to obtain public comment on the issues associated with considering entombment on an equal basis with other decommissioning alternatives. Issues that the NRC proposes to discuss include:

1. How meaningful are the assumptions in the PNNL report that institutional controls will be effective?
2. Does the PNNL analysis rely too much on long term engineering features that would be needed for entombment? What criteria would be used for approving a licensee's request for using the entombment option, and what quantitative values could be examined for establishing the high degree of contaminant isolation confidence that would be considered acceptable?
3. What financial provisions would be required to pay for the future expenses that could be expected during the time when restrictions for the entombment must be maintained?
4. How significant would the entombment option be on State resources if it were implemented?
5. If new legislation were required for disposing of the GTCC waste through the entombment option, is it worth pursuing? Is the current legislation consistent with what has been implemented by the NRC for LLW disposal of GTCC waste for case-specific circumstances, including considerations of eventual license termination? What is the role of DOE with respect to the GTCC waste considerations?
6. Is entombment consistent with the LLW Policy Act, which encourages centralized disposal and the encouragement of regional compacts, as well as economic incentives through exclusivity by only permitting disposal of LLW in a 10 CFR Part 61 licensed facility?
7. What is the opinion of the States on the entombment option? Is the possibility of ultimate or long term management by the State a concern?
8. Is there any indication of the number of licensees intending to use the entombment option?

The workshop agenda will be posted on the NRC Web site at [www.nrc.gov/RES/meetings.html](http://www.nrc.gov/RES/meetings.html) by November 19, 1999. Interested persons are invited to attend the meeting. Anyone interested in making a presentation at the workshop should contact the individual listed below.

FOR FURTHER INFORMATION CONTACT: Dr. Carl Feldman, Radiation

Protection, Environmental Risk and Waste Management Branch, Division of Risk Analysis and Applications, Office of Nuclear Regulatory Research, Washington, D.C. 20555-0001, telephone (301) 415-6194.

Dated at Rockville, Maryland, this 12th day of November 1999.

For the Nuclear Regulatory Commission.

Cheryl A. Trottier,  
Chief, Radiation Protection, Environmental Risk and Waste Management  
Branch, Division of Risk Analysis and Applications, Office of Nuclear Regulatory Research.

[FR Doc. 99-30111 Filed 11-17-99; 8:45 am]  
BILLING CODE 7590-01-P

ATTACHMENT 2

### Summary of December 1999 Workshop

The issues are listed by major topic rather than by the questions in the FRN because some important themes were not addressed in the questions and because the questions were intended to initiate discussion on the overall topic of consideration of entombment for decommissioning.

#### 1. Acceptability of Entombment Option

There was no anti-entombment reaction from any of the participants. However, there was concern because this option is new and untried for power reactors. The majority of participants appeared to favor the NRC continuing to explore the possibility of rulemaking that would permit use of entombment.

#### 2. Lack of Federal Oversight

The proper implementation of entombment was further stressed because of concern of the lack of any Federal oversight. When a license is terminated under restricted release, and especially for the entombment option, the NRC would no longer have licensing oversight. If significant problems with the entombment occurred after the license was terminated, the responsibility for mitigation would likely be borne by the States. While it was recognized that the Federal government would ultimately accept responsibility for cleanup situations, concern, especially by the State representatives, still persisted that much burden could be imposed on the States, particularly with respect to monetary matters, during the interim time period. It was recommended that any NRC approval of a decommissioning plan using an entombment option be based on a careful site-specific technical evaluation of the entombment's ability to isolate its radioactive contaminants from the environment over the duration of time required.

#### 3. Financial Savings

Many participants believed that use of the entombment option had a potential for large financial savings because licensees would dispose of a much smaller volume of decommissioning waste offsite. Some State representatives thought that States should also benefit if such savings occurred. They stipulated that before a State offers no objection to the use of entombment, financial benefit-sharing arrangements would need to be made between the State and the licensee.

#### 4. State Approval of Entombment

The States wanted a legal clarification of their role in approval of entombment. Some believe the States have the authority to prohibit use of the entombment option in their State. Their rationale was based on some existing State legislation that prohibits low level waste (LLW) disposal facilities in their State. Many attendees (especially those representing the States) believed that the Federal government (NRC) would be sensitive to a State's concerns and not allow entombment to be chosen as a decommissioning alternative in a State where it is unacceptable.

#### 5. New Entombment License

Industry representatives suggested that the NRC explore a limited type of license for an entombed reactor. This limited license would continue until the radioactivity had decayed and the State was no longer concerned about public health and safety risk. Alternatively, after a period of entombment with no problems, the State could recommend elimination of this license. Many participants were concerned with licensing inconsistency. They believe concerns about entombed radioactive waste are similar to concerns about waste in LLW disposal facilities under Part 61. For consistency, it was recommended that an entombed facility be required to maintain some type of NRC license, as well.

#### 6. Payment to States with Entombed Facilities

Industry suggested that there could be some type of financial benefit as an incentive for States to accept an entombment plan. In such cases, the industry could provide some monetary compensation to the States, such as a percentage of the profits they might save with onsite waste disposal, or a donation for the development of restricted site land (e.g., recreational park).

## 7. Entombment of Greater Than Class C (GTCC) Waste

The DOE panel members stated that entombment could be a way to dispose of GTCC waste when terminating the reactor license. They also emphasized that the LLW Act was developed with a focus on flexibility and accommodation, provided conditions are safe. They believe that GTCC waste can be entombed at the reactor facility under the existing legislation. Also, they believe that this is a preferable alternative to currently planned disposal of this waste in a high-level waste (HLW) depository. They had no health and safety concerns with the entombment of GTCC waste when it is performed under an NRC license.

## 8. Volume Averaging for GTCC Waste

DOE staff members stated their agreement with the NMSS technical branch position that allows volume averaging of the measured quantities of specific radionuclides (listed in Part 61 as those having potential for GTCC waste categorization), over the containment volume boundary. The concentration values obtained can then be used to determine whether these waste concentrations are less than the GTCC concentration limits specified in Part 61. For the entombed reactor, concentration averaging could be performed over the volume of the reactor pressure vessel (RPV).

## 9. Postponement of GTCC Waste Issue

Many workshop attendees (industry and some of the States) thought that entombment of GTCC waste should not be dealt with now because it is a difficult technical and political problem. These considerations could delay completion of rulemaking on the more fundamental problem of allowing entombment to be used. Also, industry stated that they anticipate only occasional need for entombment of GTCC waste because their current intention is to dismantle the RPV. Therefore, they believe that this issue is not a significant current concern. However, they still want entombment of GTCC waste considered later. They indicated that this issue could become an important one in the future.

## 10. Hydrogeological Modeling for Performance Assessment

It was believed by industry and DOE contractors that when entombment is performed properly, existing, relatively simple hydrogeological modeling would be sufficient to use. Adequate site-specific models are available from various DOE contractors to account for site-specific behavioral properties, such as an inability to specify average values for soil-radionuclide sorptive properties because of heterogeneous site characteristics.

## 11. Radioactivity Isolation

It was stipulated by both the industry and DOE contractor representatives that a proper entombment should afford a very high degree of confidence that the entombed radioactivity will remain isolated from the environment for the time determined necessary to ensure adequate protection of public health and safety. They also indicated that proper implementation of an entombment would consider both site-specific characteristics and use of engineered structures to demonstrate that potential release to the environment would be highly unlikely.

## 12. Water Erosion

Although some public interest group representatives were concerned about the effects of water erosion on the entombment structure (especially the concrete), there was much agreement among various experts in attendance (National Institute of Standards and Technology, etc.) that protected concrete (using soil or other coverings) could last for at least 500 years. While concrete had good possibilities for lasting much longer, it was considered too speculative, by these experts, to specify any longer concrete survival times.

## 13. Need for Study Specific to NRC-Licensed Reactors

There was some agreement by the attendees that a study should be performed for NRC-licensed reactors, since the PNNL study relied heavily on DOE-reactors. This information could provide realistic guidance for critiquing proposed NRC-licensed power reactor entombments. The study would also provide a basis for estimating the funding requirements needed for upkeep (i.e., monitoring and maintenance) of restricted release entombments. It was pointed out by various attendees that in the current PNNL study, the lack of specificity causes conservative assumptions to be made (such as the amount of maintenance that is required). This could lead to significantly overestimating the funds needed for upkeep of the entombed facility. For a properly implemented entombment, only very small monetary expenditures would be expected. For example, a major part of the PNNL estimated expenses for upkeep was liability insurance (likely to be maintained by the licensee for financial protection, even after license termination). However, based on good experience with entombed facilities, this insurance cost could be significantly reduced.

## 14. Isolation Capability Research Status

The industry consensus was that sufficient technical information is currently available on entombment for rulemaking activities to proceed. It was mentioned that investigation of entombment isolation capabilities for power reactors is continuing, and that Idaho National Engineering Laboratory has an ongoing research program for DOE in this area.

## 15. Licensees Considering Entombment

The industry expressed a strong desire to have this decommissioning alternative available, even if only a few licensees are presently considering entombment. The industry was concerned with the current high waste disposal costs and the lack of available waste disposal facilities. They indicated that present circumstances make it prudent to have other realistic alternatives to complete decommissioning. Industry interest and support for the availability of a generic entombment option was evident in the participation by many industry representatives in the discussions favoring entombment as a decommissioning alternative. This was further pointed out by an industry representative, who took an audience poll that showed about 33 reactor facilities were represented at the workshop.

## 16. Entombment Relationship to the LLW Act

Some commenters suggested that the LLW Act would be compromised by allowing entombment to be used for waste disposal. A few State representatives believed that the economic health of the LLW compacts, as mandated in the Act, is of major concern. They argued that entombment would have a negative effect on the compacts' ability to be profitable. However, the strong audience consensus was that the compacts are not working, and other things must be considered. If it is determined that entombment is prohibited by the LLW Act, the Act should be changed.

### **Organizations Represented at Workshop**

Connecticut	Bechtel
Florida	Chem Nuclear
Illinois	Envirocare
New Hampshire	JAI Corporation
New York	MREM, Limited
Pennsylvania	Quality Services Associates Incorporated
Vermont	Radiological Services Incorporated
Entergy	TLG Services
Florida Power Corporation	Viking Systems International
Florida Power and Light	Westinghouse/West ValleyUS Ecology
GPU Nuclear	Science Applications International Corporation
Nebraska Public Power District	Idaho National Engineering Laboratory
PECO/AmerGen	Pacific Northwest National Laboratory
Sacramento Municipal Utility District	Department of Energy
South Carolina Electric & Gas	Environmental Protection Agency
Southern Nuclear	National Institute of Standards & Technology
Nuclear Energy Institute	Nuclear Information Resource Service
Low Level Waste Forum	Public Citizen
Business Publishers Incorporated	British Nuclear Fuels LTD
Exchange Monitor Publications	

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1. Information discussed in SECY-98-099 (status report on the staff's assessment of the viability of the entombment option, May 4, 1998), SECY-99-187 (update report to SECY-98-099 based on completion of Pacific Northwest National Laboratory (PNNL) contractor report on the feasibility of using the entombment option, July 19, 1999), and the results of the entombment option workshop held December 14-15, 1999.