



UNITED STATES  
**NUCLEAR REGULATORY COMMISSION**  
ADVISORY COMMITTEE ON NUCLEAR WASTE  
WASHINGTON, D.C. 20555-0001

January 24, 2000

The Honorable Richard A. Meserve  
Chairman  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

Dear Chairman Meserve:

**SUBJECT: RUBBLIZATION — A DECOMMISSIONING OPTION**

During its 114<sup>th</sup> meeting on November 17-19, 1999, the Nuclear Regulatory Commission (NRC) staff briefed the Advisory Committee on Nuclear Waste (ACNW) on the rubblization dismantlement approach to meeting the license termination rule. The subject was discussed with the Commission on December 15, 1999, in a public meeting. Rubblization is the sequence of operations whereby the above-grade parts of concrete structures are emptied and the partially decontaminated structures are demolished and disposed of in the intact and partially decontaminated parts of the structures that are below grade. After rubblization, the sub-surface material would be covered with fill material. A desired goal is to produce a site with unrestricted-use license termination and has no requirement for ongoing monitoring of radioactivity in the soil. This goal is interpreted to mean that the 25-mrem/yr requirement and as low as reasonably achievable (ALARA) principle have been met.

Recommendation

It is recommended that methods be developed for verifying radiation doses of rubblized sites. The primary requirement is that radioactivity in the bulk material be measured with sufficient accuracy to ensure that if the site is breached and the rubblized material is exposed, no one will receive a radiation dose greater than 25 mrem/yr. It is noted that the NRC Office of Nuclear Regulatory Research has commissioned two studies on how to measure radioactivity in bulk material.

The ACNW believes that rubblization may be a viable option, but there are numerous technical and policy issues. For instance, the method of measuring and monitoring residual radioactivity should be consistent with that used for other decontamination and decommissioning (D&D) and waste disposal activities. We, furthermore, suggest that in light of the projected cost savings, industry should take the lead in developing a basis for this process. The quantification of release levels for the applicable standard should be resolved early on. It is recognized that interagency discussions may be necessary. The ACNW will continue to interact with the NRC staff on this most significant issue.

## Discussion

The nuclear power industry is giving serious consideration to rubbleization of reactor containment and associated buildings. Maine Yankee Atomic Power Company, supported by the Nuclear Energy Institute, has engaged the NRC staff in discussions on application of such a concept to the decommissioning of Maine Yankee. In anticipation of future requests from industry to use rubbleization for license termination, NRC is studying rubbleization. The current level of effort by the NRC staff is minimal, but reasonable, as it waits to see to what extent the industry follows through with an application to use this process in decommissioning nuclear facilities. It is the current view of the NRC staff that existing regulations are adequate to provide a basis for evaluating license termination requests employing rubbleization.

Although rubbleization is now being considered with respect to decommissioning reactor buildings, it should be borne in mind that the concept may be extended to the decommissioning of other facilities.

Concerns have been expressed by government agencies, and public and special interest groups that rubbleization may violate the ALARA principle or would not lead to unrestricted-use sites and may, in fact, lead to a proliferation of what are in essence low-level waste (LLW) disposal sites. Concerns have also been expressed that rubbleization is contrary to the philosophy NRC has adopted in the past for disposing of radioactive wastes. It is the view of the ACNW that as presently conceived, rubbleization has little in common with LLW disposal sites.

It is the view of the ACNW that the basic issue with rubbleization as a method of unrestricted license termination is whether the NRC can reach a finding of reasonable assurance that rubbleized sites meet the license termination requirements and are safe. This view derives from concerns about the applicability and use of methods currently accepted for estimating the radiation doses at rubbleized sites. The nature of the rubbleized material is such that evaluating its radioactive material content and doses from it, both at the site and in ground water, may prove to be difficult and expensive.

Structural steel reinforcing rods, as well as chemical elements in the concrete biological shield, may have become radioactive from neutron activation. Therefore, the resultant radioactive contamination may not only be superficial but also may be within the body of the rubble. In other cases there may be penetration of radioactive contaminants into cracks in the concrete resulting in internal contamination. This internal contamination will not be removed by commonly employed surface decontamination procedures such as scabbling<sup>1</sup> and sand blasting. Furthermore, and more importantly, the amount and extent of internal contamination may not be easily measured by the usual radiation survey techniques.

There will be a tradeoff between the hazards and costs associated with rubbleization and the hazards and costs associated with removing the contaminated structural material offsite to an LLW burial site. In some cases, a combination of rubbleization and removal offsite may prove to

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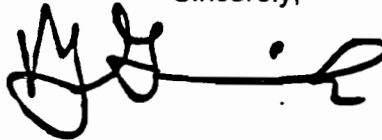
<sup>1</sup> Scabbling is a decontamination process whereby a few millimeters, up to several centimeters, of the concrete surface are removed by mechanical means such as scraping or chipping.

be the best approach. ALARA considerations may play an important role in determining the best course of action.

Although the potential cost savings through rubbleization could be considerable, they could be offset by requirements for extensive decontamination or for taking large numbers of samples and performing large numbers of analyses. Any application to support the use of the rubbleization process should include a risk comparison for various options and a cost-benefit analysis.

The ACNW views the use of rubbleization as a potentially attractive approach to license termination. However, it is essential that methods of measurement of radioactivity contained in the rubble be available to provide reasonable assurance that rubbleized sites meet the license termination requirements and are safe. It is very important to study a rubbleization test case to elucidate the problems and the potential approaches to their solution.

Sincerely,

A handwritten signature in black ink, appearing to read "B. John Garrick". The signature is stylized and cursive, with a long horizontal stroke extending to the right.

B. John Garrick  
Chairman

