ON-SITE STORAGE AND VOLUME REDUCTION OF LOW LEVEL WASTE

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LOW-LEVEL RADWASTE VOLUME REDUCTION AND ON-SITE STORAGE-A SURVEY OF POWER PLANT ACTIONS AND PLANS

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ABSTRACT

Low-Level radwaste disposal for years has been characterized by rapidly increasing disposal costs and reduction in the availability of commercial disposal facility space. Many nuclear utilities have responded to this situation by at least considering augmenting radwaste volume reduction systems and on-site storage facilities. A survey is now being performed under EPRI sponsorship to contact nuclear power utilities to detail their actions and plans as regards radwaste volume reduction and on-site storage. This information will be analyzed to determine the influence of site specific and regional factors on the utilities individual responses. A final report will be published to summarize the survey findings, and present facility drawings that characterize typical nuclear utility actions and planning. This information should assist nuclear power utilities that are about to commence similar planning.

PROJECT DESCRIPTION

This technical planning study sponsored by the Electric Power Research Institute solicits engineering and operations personnel at commercial nuclear power plants to determine low-level radwaste advanced volume reduction (VR) and on-site storage provisions that are completed, in progress, or planned. Advanced volume reduction technologies and on-site storage may be adopted individually or in combination by nuclear power plants to satisfy specific low-level radwaste management requirements. A comprehensive survey is being performed to relate site specific radwaste conditions with selected VR and storage options as a guide for similar planning by nuclear power utilities.

PROJECT OBJECTIVES

It appears that many nuclear power utilities are responding to the uncertain availability for low-level radwaste disposal, and the regulations and guidance by the NRC to facilitate VR and on-site storage systems and structures. A principal objective of this study is to obtain by surveying nuclear power plants, a definitive compilation of advanced VR and on-site storage retrofits and new additions that have been made recently or are planned to meet projected needs. This compilation of advanced VR technologies (by specific vendor systems) and on-site storage options selected by nuclear power plants will be analyzed to determine the relation of the responses to site and external factors (plant type, waste characteristics, regional compacts, etc.). Another objective of this study is to provide a compendium of facility designs already implemented or being planned, as a guide for similar utility planning.

DESCRIPTION OF WORK

This study project will compile and analyze nuclear power plant actions and plans to adopt advanced VR and on-site storage options for low-level radwaste management. A telephone survey and followup visits to selected nuclear power stations will be used to collect data. All major nuclear power utilities will be solicited to participate in the survey.

A questionnaire was prepared to determine the advanced VR and on-site storage planning by nuclear power plants. The questionnaire is divided into two sections. The first section is an overview to gain a perspective on planning for advanced volume reduction systems and on-site storage facilities, and the reasons (economic and otherwise) for those decisions. The second section is a detailed questionnaire to characterize on-site storage facility and volume reduction modifications already implemented and those to be completed. Questions are also posed to relate volume reduction and on-site storage actions and plans to plant and waste characteristics, and off-site factors such as distance to burial facilities, and commercial disposal availability as influenced by regional compacts.

A transmittal letter and attached questionnaire will be sent in advance of the telephone survey to provide adequate time to prepare a considered and detailed response. The questionnaire has been reviewed to ensure clarity and accuracy of questions. Of particular interest are drawings or sketches, as available, of VR and storage systems and facilities that are being planned, or completed.

The following is a list of some of the information that is considered in this survey. Some of the question topics apply both to on-site storage and VR facilities, and for brevity, are not repeated in the following lists.

On-site Storage Facilities

- Present low-level radwaste disposal practices (burial facilities used, and allocations)
- Waste description (composition, volume, activity, packaging)
- Current or planned on-site storage capacity (original and augmented)
  - date of completion, or planned completion if augmented
  - cost breakdowns
  - arrangement drawings
- Reason for storage facility (cost/benefit,no disposal available)
- Storage facility design (prefab, concrete structure, etc.) and shielding provided (roof,walls) by storage area.

- o Site boundary (distance, dose-rate, dose) and licensing information (design basis)
- o Material handling (forklift, crane), inventory control, inspection, sampling, building exhaust filtration, drainage
- o Interface with possible VR facility (separate, modular, combined)
- o Storage capacity (cubic feet, years)

Volume Reduction Facility

- o Retrofit or new structure
- o Facility (planned or completed) cost, schedule, and arrangement drawings
- o VR technologies and major vendor equipment included
- o Solidification and disposal product form
- o VR achieved for each waste stream
- o Special techniques for high activity bead resins
- o Incidental storage provisions
- o Design waste throughput and capacity
- o Potential cost savings

Detailed telephone followups and visits will be made to those utilities that express interest to participate in the study and are actively planning on-site storage or VR modifications. The visits will provide additional specific information required for this technical planning study. To gather information on VR installations, several equipment vendors will be visited instead of visiting individual nuclear power plants. These few visits for VR installation information eliminate the need to visit the larger number of nuclear plants for which VR installation have been completed or are planned.

There is no common dominator for on-site storage facility planning; therefore, individual visits will be made to nuclear plants which have taken significant steps for on-site storage facility implementation.

Of particular interest is to see if plants sharing similar disposal options (that is, in the same regional compact) and to see if similar types of plants tend to elect similar VR and storage alternatives. Another important part of this study will be to include sketches to describe VR and storage facility actions and plans. Burns and Roe will redraw submitted drawings to put them all on a common basis.

Final results will be in a report to be published by EPRI. It may not be possible to identify the individual responses of each utility because of requests for confidentiality. In that case, responses will be characterized by regional compact location, plant type, etc., in order to make the results most useful to users of the published final report.

DISCUSSION

Formerly there were six commercial low-level radwaste disposal facilities in operation in the United States. Now, only the Barnwell, South Carolina, and Richland, Washington burial facilities are operational. The reduced availability of burial space and the potential for being denied access to those two facilities with implementation of the Low-Level Radioactive Waste Policy Act of 1980 have forced many nuclear utilities to consider an increase of their on-site storage capability. By coupling increased on-site storage with advanced volume reduction utilities would further gain self sufficiency when faced with rising costs and reduced availability of burial space for low-level radwaste. Surveys performed several years ago by Edison Electric Institute and NRC of then operating or soon to be operating nuclear plants indicated that over 70% of the plants were considering augmenting their storage capability, and in fact, some 37% of the plants had already implemented some on-site storage additions. Widely different survey results were reported for volume reduction planning. One survey indicated about 16% of the surveyed plants were considering volume reduction additions and the other survey indicated about 53% of the plants were considering volume reduction additions. If improved compaction is included in the volume reduction figures, then the percentage of the plants considering volume reduction additions was as large as 72%. Clearly, on-site storage and volume reduction planning was a concern of most nuclear power plants a few years ago.

What has been done by nuclear power utilities to implement those plans is not clear, and is a prime reason for the performance of this survey. An informal telephone survey was performed by Burns and Roe to find out utility plans for on-site storage. It was found that about nine plants had already constructed on-site radwaste storage facilities that ranged from simple metal sided warehouse to concrete shielded structures. It was also found that even nuclear plants in the process of construction were adding on-site storage facilities to their sites. As new plants they will not have allocations in the Barnwell Waste Management Facility in South Carolina, unless the plant is located in that regional compact, and therefore, are in need of on-site storage to ensure future operation.

Another survey sponsored by EPRI of Advanced Low-Level Radwaste Treatment Systems (performed by Sargent and Lundy) reported in 1981 that a total of 35 advanced volume reduction systems have been ordered. Of that total seven are for WasteChem asphalt volume reduction systems, 20 HPD evaporator and crystallizers, and eight Aerojet Energy Conversion Company fluid bed dryer/incinerator systems.

A rough accounting of reported on-site storage and volume reduction actions and plans indicates that about 21 plants have future plans for on-site storage, perhaps 17 plants are now actively planning on-site storage additions, and that 9 plants have in the past few years completed some on-site radwaste storage addition.

As for advanced volume reduction planning, about 27 nuclear plants have indicated interest in future planning for some advanced volume reduction system, and about 35 nuclear plants have already ordered or have now on-site advanced volume reduction systems as retrofits or totally new facilities.

With the 1986 date approaching for implementation of the Low-Level Radioactive Waste Policy Act of 1980 it can be expected that most nuclear plants will go ahead with their plans to build on-site waste storage facilities. The future actions of nuclear plants is not so apparent for implementation of volume reduction installations. Volume reduction facilities can be an expensive alternative. The success of nuclear plants to achieve significant volume minimization by upgrading existing volume reduction equipment, and to implement effective procedural controls to reduce radwaste generation may result in some nuclear plants deferring their volume reduction plans. Also, recent pricing changes for disposal that include a curie surcharge may tend to reduce the benefits of volume reduction. However, the now operational WasteChem system at the Palisades plant, eight HPD Crystallizers

now in operation or tested; and future successful operation of the AECC fluid bed technology systems may spur further interest in advanced volume reduction systems. The actions of the Oconee Station to build a new volume reduction facility that will include an AECC incinerator/dryer system, HPD crystallizer, and Stock Equipment Company solidification system using Dow binder and cement, is a strong statement in support of volume reduction, especially when one considers that the Oconee Station is located in the State of South Carolina.