STATUS OF LICENSING OF DRY STORAGE TECHNOLOGIES

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INTRODUCTION

Last year, I spoke on dry spent fuel storage licensing at Spent Fuel Storage Seminar V.[1] I noted that dry spent fuel storage has become an option available to utilities. This year, I can say that it appears to be an option that utilities are ready to use. Duke Power Company filed an application for dry storage in April 1988,[2] and in 1989, we expect more utilities to apply for dry storage.[3,4,5] Judging from projections of needed additional storage capacity by the Department of Energy (DOE),[6] we can expect many more applications from utilities into the early 21st century. To meet this need, the Nuclear Regulatory Commission (NRC) staff is proceeding not only with licensing under existing 10 CFR Part 72, but also with the drafting of a proposed rulemaking for the consideration by the Commission to provide a more efficient process for safe dry cask storage at reactor sites.[7]

TOPICAL REPORT REVIEWS

Six dry storage designs submitted for NRC safety review in topical safety analysis reports have been approved for referencing in site-specific license applications for dry storage at reactor sites under 10 CFR Part 72. These include the General Nuclear Systems, Inc. (GNSI), nodular cast iron CASTOR V/21 cask with a capacity of 21 PWR assemblies; the NUTECH NUHOMS concrete and stainless steel canister modular system with a capacity of 7 PWR assemblies; the Westinghouse MC-10 ferritic steel cask with a capacity of 24 PWR assemblies: and since last year, the FW Energy Applications, Inc., Modular Vault Dry Store with a capacity of 83 PWR or 150 BWR assemblies per concrete vault module (approved for up to five modules); the Nuclear Assurance Corporation (NAC) stainless steel and lead cask with a capacity of 26 PWR assemblies; and the NAC cask with basket designed for a capacity of 28 canisters of fuel rods from 56 PWR assemblies.

Other TR designs under review include the Combustion Engineering, Inc. (CE), Dry Cap and the Transnuclear, Inc., TN-24P. Both of these are ferritic steel cask designs with solid resin neutron shields. Both have a storage capacity

of 24 PWR spent fuel assemblies. The CE design also provides for a basket to store up to 60 BWR spent fuel assemblies. Both TN's and CE's revised TRs are under review.[8,9] CE includes allowance for burnup credit in its basket designs. At this time, this matter is being considered on a site-specific basis for licensing-related actions only. It may remain an open item in this safety review for future specific vendor/licensee resolution.[10]

Nuclear Packaging, Inc., (NuPac) submitted a TR in November 1987 for its concrete cask design model CP-9.[11] This cask, which may be dry loaded, has a capacity of 9 PWR assemblies. Review on the cask is continuing.

We received in 1988 new TR submittals from NUTECH and GNSI. These are associated with new licensing actions, discussed later in this paper. NUTECH submitted in February a modified NUHOMS design with a canister containing 24 PWR spent fuel assemblies decayed 10 years.[12] GNSI submitted in July its CASTOR X nodular cast iron cask design.[13] This cask has a storage capacity, depending on basket designs, of 28 and 33 PWR spent fuel assemblies decayed 10 years. The NUHOMS-24 P design and the CASTOR X 33 PWR assembly design may rely on allowance for burnup credit in their criticality design.

NAC submitted in February a TR for a modified version of its S/T design, incorporating a new basket design to contain 28 consolidated fuel assembly canisters for a total capacity of fuel rods from up to 56 PWR assemblies. NRC staff reviewed this TR and approved it for referencing in September 1988.[14] In August 1988, NAC submitted a TR for another modification to its S/T design.[15] This would incorporate a basket design to rely on allowance for burnup credit, with a capacity of 31 PWR spent fuel assemblies.

LICENSE REVIEWS

Duke Power Company submitted its application in April 1988 for a new license under 10 CFR Part 72 (Docket No. 72-4) to store spent fuel in the modified NUTECH NUHOMS already mentioned. Duke is directly involved in criticality design which involves allowance for burnup credit and is directly involved in

the design of the modified NUHOMS concrete module as well. In November, NRC issued an environmental assessment and Finding of No Significant Impact related to the Duke application.[16] Site work has begun at the Oconee storage location.

In December 1988, we expect an application for amendment to Virginia Power's (VP) cask storage license at Surry. It is associated with both the GNSI CASTOR X and the NAC modified S/T designs involving burnup credit. VP will be involved directly in the design effort related to allowance for burnup credit in the criticality analysis.

In 1989, we expect license applications for dry spent fuel storage from two or more utilities. Carolina Power and Light Company (CP&L) plans to apply to store H. B. Robinson 2 spent fuel in a dry modular system to be located at its Brunswick Steam Electric Plant. This is spent fuel that is now in pool storage at Brunswick. CP&L plans to use the NUTECH NUHOMS design employed at H. B. Robinson 2 (Docket No. 72-3).

This design provides for storage of 7 PWR assemblies in a stainless steel canister in a concrete module. Up to 44 modules would be constructed for a total storage capacity of 304 fuel assemblies. CP&L is also interested in additional storage capacity at a new location on its H. B. Robinson 2 site. An application could be filed in 1989.

Baltimore Gas and Electric Company (BG&E) also plans to submit a license application for dry concrete module storage at its Calvert Cliffs Station.[4] In this case, BG&E plans to use the NUTECH NUHOMS-24P design[12] presently being reviewed by NRC staff in association with Duke Power Company's license application for its Oconee Station site.

Consumers Power Company (CP) is examining dry spent fuel storage and in-pool consolidated fuel rod storage as options.[3] However, the rod consolidation

option does not provide sufficient storage capacity through life of plant. Palisades is expected to lose full core reserve in March 1992. Therefore, we expect CP to act in 1989.

OTHER DEVELOPMENTS

Progress in the storage of consolidated spent fuel assemblies continues. This progress is of importance to dry spent fuel storage. While the consolidation and storage of limited amounts of spent fuel at Millstone 2 and Prairie Island in 1987 were not related per se to dry storage, the successful development and the licensing of this option for the Millstone 2 reactor pool in 1988 will influence the development of storage of consolidated fuel assembly rods in dry storage casks at reactor sites. At present, one dry cask design for storage of consolidated assembly fuel rods, submitted by NAC in a TR, has been reviewed and received a letter of approval from NRC staff.[14]

In addition to storage of consolidated spent fuel assemblies in dry spent fuel storage casks, a number of vendors are also interested in increasing individual cask capacity by allowing for burnup credit in cask criticality design. I addressed some issues associated with this topic at a session of the American Nuclear Society Winter Meeting in November 1987.[17] Associated issues were subsequently discussed at a workshop on burnup credit in criticality analysis sponsored by the Department of Energy (DOE). This workshop was held on February 24-25, 1988, in Arlington, Virginia. A session on burnup credit was also held at the American Nuclear Society/European Nuclear Society Winter Meeting, October 31-November 4, 1988, in Washington, DC.[18] Separate proceedings will be published for this session.

There has also been progress in regulatory development. In August 1988, the NRC issued a final rule for licensing DOE to store spent fuel and high-level waste in a monitored retrievable storage facility (MRS).[19] With the issuance of this rule, which amended 10 CFR Part 72, NRC staff is prepared to review a license application for a MRS if a decision is made to pursue an MRS facility under the provisions of the Nuclear Waste Policy Act, as amended in 1987.

At this time last year, in addition to mentioning the MRS rulemaking, I noted that NRC staff would be developing a rule for non-site-specific dry cask storage of spent fuel at reactor sites.[1] This rulemaking is in response to Congressional direction in Section 133 and 218(a) of the Nuclear Waste Policy Act of 1982. It provided for amending 10 CFR Part 72 to provide for certification of dry spent fuel storage casks and for general licenses for reactor operating licensees for at reactor site storage.[7]

In December 1987, NRC's Executive Director for Operations approved development of this rulemaking action. NRC staff has completed development of a draft proposed rule for Commission consideration. If approved by the Commission, issuance of a proposed rule is expected in early 1989, with final rule issuance in mid-1989.

CONCLUSION

Dry spent fuel storage is an option being used by utilities. Given projections of the need for additional reactor spent fuel storage capacity[6], use of this option is expected to increase through the early 21st century. In addition to continuing to conduct licensing reviews of dry storage applications, NRC is taking additional rulemaking actions to preclude potential utility spent fuel storage capacity shortfalls. In August 1988, the Commission issued its final rulemaking amending Part 72 to cover monitored retrievable storage. Also, NRC staff has drafted a proposed rulemaking for Commission consideration amending Part 72 to provide a general license for reactor operating licensees to store spent fuel in certificated dry spent fuel storage casks at their respective sites. This rulemaking will make dry spent fuel cask storage at reactor sites a more easily available option for utilities, reducing costs to them, and increasing NRC licensing efficiency in the late 20th through the early 21st century.

REFERENCES

1. Roberts, J. P., "New Developments in Dry Spent Fuel Storage Licensing," Proceedings Institute of Nuclear Materials Management, Spent Fuel Storage Seminar V, Washington, DC, January 20-22, 1988.

2. Letter from Duke Power Company, to Leland C. Rouse, Chief, Fuel Cycle Safety Branch, USNRC, dated April, 1988. Available from USNRC Public Document Room, 2120 L Street NW., Washington, DC, under Docket No. 72-4.

3. Memorandum from John P. Roberts, Section Leader, Irradiated Fuel Section, Fuel Cycle Safety Branch, to Leland C. Rouse, Chief, Fuel Cycle Safety Branch, dated August 18, 1988. Available from USNRC Public Document Room, 2120 L Street NW., Washington, DC, docketed under Docket No. 50-255.

4. Memorandum from John P. Roberts, Section Leader, Irradiated Fuel Section, Fuel Cycle Safety Branch, to Leland C. Rouse, Chief, Fuel Cycle Safety Branch, dated November 8, 1988. Available from USNRC Public Document Room, 2120 L Street NW., Washington, DC, docketed under Project No. M-49 and Docket Nos. 50-317,-318.

5. Memorandum from John P. Roberts, Section Leader, Irradiated Fuel Section, Fuel Cycle Safety Branch to Leland C. Rouse, Chief, Fuel Cycle Safety Branch, dated October 4, 1988. Available from USNRC Public Document Room, 2120 L Street NW., Washington, DC, docketed under Docket Nos. 50-324, 50-325.

6. Initial Version Dry Cask Storage Study (DOE/RW-0196), U.S. Department of Energy, August 1988, p. 20.

7. Advisory Committee on Nuclear Waste Meeting Transcript for June 28, 1988, Subject: Rulemaking: Storage of Spent Nuclear Fuel in NRC Approved Storage Casks at Nuclear Power Reactor Sites. Available from USNRC Public Document Room, 2120 L NW., Washington, DC.

8. Letter from Donald J. Nolan, Chief Engineer, Transnuclear, Inc., to Leland C. Rouse, Chief, Division of Industrial and Medical Nuclear Safety, USNRC, dated July 27, 1988. Available from USNRC Public Document Room, 2120 L Street NW., Washington, DC, docketed under Project No. M-42.

9. Letter from A. E. Scherer, Director, Nuclear Licensing, Combustion Engineering, Inc., to Leland C. Rouse, Chief, Fuel Cycle Safety Branch, USNRC, dated July 25, 1988. Available from USNRC Public Document Room, 2120 L Street NW., Washington, DC, docketed under Project No. M-43.

10. Letter from Leland C. Rouse, Chief, Fuel Cycle Safety Branch, USNRC, to A. E. Scherer, Director, Nuclear Licensing, Combustion Engineering, Inc., dated December 2, 1987. Available from USNRC Public Document Room, 2120 L Street NW., Washington, DC, docketed under Project No. M-43.

11. Letter from Richard T. Haelsig, President, Nuclear Packaging, Inc., to Leland C. Rouse, Chief, Fuel Cycle Safety Branch, USNRC, dated November 3, 1987. Available from USNRC Public Document Room, 2120 L Street NW., Washington, DC, docketed under Project No. M-44.

12. Letter from W. J. McConaghy, Vice President, Waste Management Business Unit, NUTECH, Inc., to Leland C. Rouse, Fuel Cycle Safety Branch, USNRC, dated February 26, 1988. Available from USNRC Public Document Room, 2120 L Street NW., Washington, DC, docketed under Project No. M-49.

13. Letter from R. T. Anderson, Executive Director, Engineering & Technology, General Nuclear Systems, Inc., to Leland C. Rouse, Chief, Fuel Cycle Safety Branch, USNRC, dated July 1, 1988. Available from USNRC Public Document Room, 2120 L Street NW., Washington, DC, docketed under Project No. M-50.

14. Letter from John P. Roberts, Section Leader, Irradiated Fuel Section, Fuel Cycle Safety Branch, USNRC to James M. Viebrock, Senior Vice President, Nuclear Assurance Corporation, dated September 29, 1988. Available from USNRC Public Document Room, 2120 L Street NW., Washington, DC, docketed under Project M-51.

15. Letter from Alan H. Wells, Manager, Licensing and Analysis Engineering and Transportation Systems, Nuclear Assurance Corporation, to Chief, Fuel Cycle Safety Branch, USNRC, dated July 20, 1988. Available from USNRC Public Document Room, 2120 L Street NW., Washington, DC, docketed under Project No. M-52.

16. U.S. Nuclear Regulatory Commission [Docket No. 72-4 (50-269,-270,-287)], "Duke Power Co.; Issuance of Environmental Assessment and Finding of No Significant Impact for Oconee Independent Fuel Storage Installation at Oconee Nuclear Station," Federal Register, Vol. 53, No. 211, November 1, 1988, 44133-44134.

17. Roberts, J. P., "Burnup Credit Considerations in Dry Spent Fuel Storage Licensing," Transactions of the American Nuclear Society, Volume 5, p. 391, 1987 Winter Meeting, November 15-19, 1987.

18. Transactions of the American Nuclear Society, Volume 7, 1988 Winter Meeting, October 31-November 4, 1988.

19. U.S. Nuclear Regulatory Commission, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste," Federal Register, Vol. 53, No. 161, August 19, 1988, 31651-31682.