

NEW DEVELOPMENTS IN DRY SPENT FUEL STORAGE LICENSING

John P. Roberts

Irradiated Fuel Section

Fuel Cycle Safety Branch

Division of Industrial and Medical Nuclear Safety

Office of Nuclear Material Safety and Safeguards

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INTRODUCTION

Last year when I spoke on dry spent fuel storage licensing at Spent Fuel Storage Seminar IV,¹ I noted the progress of Nuclear Regulatory Commission (NRC) dry spent fuel storage licensing under Title 10 Code of Federal Regulations (CFR) Part 72 and the research and development (R&D) support that the Department of Energy (DOE) had provided for dry spent fuel storage licensing under the Nuclear Waste Policy Act of 1982 (NWPA). As a result, dry spent fuel storage has become an option available to utilities.

So, what is new since last year?

Well, first let me note what remains unchanged. Last year I concluded that, "With the new storage options established and accessible to utilities, we can remain confident that adequate and safe interim spent fuel storage capacity can be made available under present planning by DOE for monitored retrievable storage and/or geologic repository operations."¹ That expressed confidence holds and is stronger today because of the continued development this year of the dry storage option and of the reactor pool consolidated fuel assembly storage option.

TOPICAL REPORT REVIEWS

At this time last year, we had approved the General Nuclear Systems, Inc., (GNSI) CASTOR V/21 nodular cast iron cask design for restricted use with a stainless steel basket design to accommodate spent fuel with an initial enrichment of 2.2 weight percent U235 and five years' decay. The CASTOR V/21 has since been approved for use with a borated stainless steel basket for storage of spent fuel with an initial enrichment of 3.5 weight percent U235 and five years' decay.² These casks are deployed at the Virginia Power (VP) Surry Independent Spent Fuel Storage Installation located on the Surry Power Station site in Surry County, Virginia.

We have also completed a safety review and approved for reference in 10 CFR Part 72 site-specific license applications a Topical Report (TR) design submitted by Westinghouse Electric Corporation.³ In September 1987, we issued a

letter of approval and safety evaluation report for the Westinghouse Electric Corporation forged steel body with solid neutron shield MC-10 cask design.⁴ This cask has a capacity of 24 PWR spent fuel assemblies. These assemblies must be decayed 10 years with a maximum initial enrichment of 3.7 weight percent U235 and a maximum average burnup of 35,000 MWD/MTU.⁴

A second TR for which we have completed a safety review covers the Nuclear Assurance Corporation (NAC) stainless steel and lead body with solid neutron shield S/T cask design.⁵ This cask has a capacity of 26 PWR spent fuel assemblies. These assemblies must be decayed five years with maximum initial enrichment of 3.3 weight percent U235 and a maximum average burnup of 35,000 MWD/MTU. As this paper is being written, we are completing our safety evaluation report for this TR.

A third TR design for which NRC staff review is nearly completed is the FW Energy Applications, Inc., (FWEA) Modular Vault Dry Store (MVDS).⁶ The MVDS is a modular concrete vault design which will accommodate PWR and/or BWR spent fuel assemblies. The FWEA design assumes two modules expandable to five modules. A single module may store up to 83 PWR or 150 BWR spent fuel 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. CE's revised 1.7 is under review now, and TN is revising its design in response to NRC staff comments.⁸ CE includes allowance for burnup credit in its basket designs. This matter is being considered on a site-specific basis for licensing-related actions only at this time. It may remain an open item in this safety review for future specific vendor/licensee resolution.⁹

Nuclear Packaging, Inc., (NuPac) submitted a TR in November 1987 for its concrete cask design model CP-9.¹⁰ This cask, which may be dry loaded, has a capacity of 9 PWR assemblies. Review on the cask has just begun.

We expect in 1988 a number of new TR submittals from NUTECH, GNSI, and NAC. All of these are associated with new licensing actions, discussed later in this paper. NUTECH plans to submit in January a modified NUHOMS design with a canister containing 24 PWR spent fuel assemblies decayed 10 years. GNSI plans to submit in January its CASTOR X nodular cast iron cask design. This cask will have a storage capacity, depending on basket designs, of 28 and 33 PWR spent fuel assemblies decayed 10 years. The NUTECH design and the CASTOR X 33 PWR assembly design rely on allowance for burnup credit in their criticality design.

NAC plans to submit in early 1988 a TR for a modified version of its S/T design incorporating a new basket designed to contain 28 consolidated fuel assembly canisters for a total capacity of fuel rods from up to 56 PWR assemblies. Subsequently, in about April 1988, NAC plans to submit a TR for another modification to its S/T design. This would incorporate a basket, designed to rely on allowance for burnup credit, with a capacity of 31 PWR spent fuel assemblies.

LICENSE REVIEWS

During the past year license reviews for dry storage have involved actions related to existing installations at Virginia Power's Surry site and CP&L's H. B. Robinson site. In VP's case the final resolution of our review of the material tests and design questions related to the use of borated stainless steel in CASTOR V/21 cask basket design has allowed VP to store spent fuel with initial enrichment of up to 3.5 weight percent U235.11 In CP&L's case, redesign of the fuel tubes in the NUHOMS design stainless steel canister allowed for significant reduction in B10 use with a substitution of a boron-aluminum alloy for Boral.12

In 1988, we expect a series of applications for amendments to VP's license storage at Surry. These are associated with both the GNSI CASTOR X and the NAC modified S/T designs involving burnup credit, and the NAC modified S/T design for consolidated spent fuel assembly storage. VP will be involved directly in the design effort related to allowance for burnup credit in the criticality analysis.

We have received a letter of intent from Duke Power Company and NUTECH13 regarding Duke's intention to apply in April 1988 for a new license under 10 CFR Part 72 to store spent fuel in the modified NUTECH NUHOMS already mentioned. Duke also will be directly involved in criticality design which involves allowance for burnup credit and will be directly involved in the design of the modified NUHOMS concrete module as well.

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 the past year are not related per se to dry storage, the successful development and licensing of this option will influence the development of storage of consolidated fuel assembly rods in dry storage casks at reactor sites. At present sufficient confidence exists for the planned submittal by NAC of a dry cask design for storage of consolidated assembly fuel rods in conjunction with a license amendment application planned by Virginia Power for spent fuel storage at its Surry site installation.

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 1987.¹⁴ Issues associated with it will also be discussed at a workshop on burnup credit in criticality analysis sponsored by the Department of Energy. This workshop is tentatively scheduled for February 24-25, 1988, in the Washington, DC, metropolitan area.

In regulatory development there has also been progress. In early December 1987 the NRC staff submitted to the Commission for its consideration a proposed final rule for licensing DOE to store spent fuel and high level waste in a monitored retrievable storage facility (MRS). With the issuance of this rule, which amends 10 CFR Part 72, NRC staff will be prepared to review a license application for a MRS, should Congress authorize its construction.

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 Sections 133 and 218(a) of the Nuclear Waste Policy Act of 1982. It provides 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.¹⁵

In December 1987, NRC's Executive Director for Operations approved this rulemaking action. NRC staff has initiated development of the proposed rule for Commission consideration. Issuance of the proposed rule is expected in mid-1988, with final rule issuance in 1989.

CONCLUSION

Dry spent fuel storage is an option available to utilities. Developments, both technical and regulatory, continue to extend the scope of this option. For utilities the growing availability of diverse dry storage technologies and the possibility of increasing modular storage capacity provide additional alternatives for meeting added spent fuel storage capacity requirements in the coming decade. Two rulemaking actions have been taken to amend 10 CFR Part 72 in accordance with the instructions of Congress in the NWPA. These regulatory developments are expected, on one hand, to provide for more efficient at-reactor-site dry storage licensing through storage cask certification and general license provisions for utilities and, on the other hand, to allow for offsite long-term storage of spent fuel and high level waste in a MRS by DOE, should Congress authorize that activity.

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