UNITED STATES COURT OF APPEALS
FOR THE DISTRICT OF COLUMBIA CIRCUIT

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| STATE OF MAINE,<br><br>Petitioner,<br><br>v.<br><br>NUCLEAR REGULATORY COMMISSION and THE UNITED STATES OF AMERICA,<br><br>Respondents.[1] | No. 00-1476 |

**RESPONDENTS' OPPOSITION TO MOTION FOR EMERGENCY STAY**

**Introduction and Summary**

On November 9, 2000, the State of Maine filed a petition asking this Court to review the Nuclear Regulatory Commission's (NRC) approval, by rule, of the NAC-UMS Universal Storage System (NAC-UMS) design for casks for the storage of spent nuclear fuel from nuclear power reactors. On the same day, Maine filed a motion for an "emergency stay" of the effective date of the NRC's approval of this cask design. That date is today, November 20, 2000.

There is, however, no "emergency." The challenged NRC rule simply authorizes use of the NAC-UMS cask for spent fuel storage at a power reactor site, pursuant to a general license embodied in an NRC rule. There is no prospect that the NAC-UMS cask will be used for spent

[1] The petition for review names only the Nuclear Regulatory Commission as respondent. Under the Administrative Orders Review Act (sometimes known as the Hobbs Act), the United States is a statutory party to this action. See 28 U.S.C. § 2344. We have added the United States to the caption of the case, and file this response on behalf of both the NRC and the United States. *See generally Arnow v. NRC*, 868 F.2d 223, 225 (7th Cir. 1989), *cert. denied*, 493 U.S. 813 (1989).

fuel storage in the immediate, or even near-term, future. The parties to this litigation expect that the Maine Yankee Atomic Power Company, a utility that has an NRC license and is now decommissioning the Maine Yankee nuclear power plant in Maine, will not load spent fuel into casks of the approved design before April 2001. *See* Petitioner's Motion (Pet. Motion) at 10. The fuel then would be stored onsite until the Department of Energy (DOE) picks up the fuel for transfer to a federally managed and federally regulated high-level waste repository, to be licensed by the NRC.[2]

Maine argues that the NRC unlawfully approved the NAC-UMS cask design, and that Maine will be irreparably harmed if the NRC rule becomes effective, permitting Maine Yankee to load spent fuel into casks of the approved NAC-UMS design. The storage design consists of two parts: a metal canister into which the fuel is place directly, and a concrete, ventilated, cask into which the canister is placed. Maine believes that without a "binding commitment" from DOE that DOE will accept the loaded casks for transportation to the national repository without inspection, DOE may open the canisters containing the fuel to inspect the fuel before transport, thus exposing workers in Maine, and possibly the public, to radiation. Indeed, Maine appears to argue that DOE review and approval of the cask design is required by law. Maine believes

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[2]In an affidavit Maine attaches to its motion, the State's Nuclear Advisor notes that Maine Yankee may begin in December to load what is known as "Greater-than-Class-C waste" (GTCC) into NAC-UMS casks. Pet. Motion, Att. 8 at 2. However, under the laws governing GTCC waste, Maine Yankee, under its current license, could load such waste into an NAC-UMS cask whether the NRC had approved the cask or not, as long as the utility performed the safety analyses required by its current license and met the applicable safety criteria. Thus the possibility that Maine Yankee might use the NAC-UMS casks for GTCC waste is irrelevant to this litigation. We note that the State's motion does not itself mention GTCC waste.

further that the State might be "forced to assume direct responsibility for ensuring DOE's acceptance" of the fuel. *See* Pet. Motion at 5.

Maine's arguments are insufficient to support a stay motion. To begin with, there is no probability that Maine's petition for review in this Court will succeed on the merits. Its claim that the NRC is *legally required* to obtain DOE approval before passing on the NAC-UMS design cannot be squared with the actual language of the Nuclear Waste Policy Act (42 U.S.C. 10101 *et seq.*) or NRC regulations. And Maine's argument that the NRC should not proceed absent a binding commitment from DOE that it will never open the canisters within the NAC-UMS casks before transport is imprudent from a safety perspective. Whatever commitments might be made now, if unexpected developments over the 20-year (or possibly longer) life expectancy of a NAC-UMS cask system make reopening desirable to assure public safety, then reopening should not be precluded.

Moreover, even assuming that Maine had made out a plausible merits case, Maine has not come close to showing the kind of irreparable harm required to obtain a judicial stay of an agency rule. Maine says that its employees and citizens might suffer radiation injury if, years from now, it proves necessary to reopen an NAC-UMS canister prior to transport. But this claimed injury is entirely speculative.

Even if the canisters are reopened, the reopening will be done in accordance with federal regulations[3] that reasonably assure safety of workers and the public and protection of the environment. And, just as important, the NRC knows of no unavoidable need to reopen the

[3]*See, e.g.*, 10 CFR Part 20 (includes NRC limits on radiation doses to workers and the general public) and 10 CFR 834 (DOE's equivalent to Part 20).

canisters and to inspect the fuel before transport, because DOE has in fact already committed to accept spent fuel for transport and disposal regardless of its condition. There is in any event sound reason, based on the NRC's review of the cask design, to expect that the fuel will be in good condition. *See* 65 Fed. Reg. 62581, 62585 (October 19, 2000, final rule approving design). Moreover, if during storage there emerge reasons to investigate the condition of the fuel, gas sampling is capable of detecting fuel damage without removing the cask lid. *See* NRC Safety Evaluation Report on the NAC-UMS cask system, section 8.3.1 (October 19, 2000, issued in conjunction with the final rule) (pertinent page attached to this Opposition).

Finally, even if the Court were to stay the NRC's approval of the NAC-UMS cask design, other cask systems already approved in previous rulemakings would probably be available to Maine Yankee. To the extent that the harm Maine fears has any likelihood of actually occurring, that likelihood would be at least as great if Maine Yankee employed those other cask systems.

In any case, the guarantee Maine insists on, that the storage canisters, once loaded, will never be opened for inspection, no matter what, would actually threaten public health and safety and therefore be contrary to the public interest, for if, contrary to expectations, a reason should emerge to inspect the fuel directly, it seems clear that such an inspection should take place, rather than be barred because of "binding commitments" from DOE. Any such inspection would take place under federal oversight and pursuant to federal regulations that reasonably assure public health and safety. The State's resources would not be called upon should such an inspection take place. Under federal statute, only the federal government has authority to regulate the handling, storage, or disposal of spent nuclear fuel from nuclear power plants.

## LEGAL AND FACTUAL BACKGROUND

1. Statutory and Regulatory Framework.

Under the Nuclear Waste Policy Act of 1982, as amended (NWPA, 42 U.S.C. 10101 *et seq.*), DOE has responsibility for building and operating a national repository for the disposal of spent nuclear fuel from civilian nuclear power reactors licensed by the NRC. 42 U.S.C. 10134.[4] DOE also has the responsibility to transport the spent fuel from reactor sites around the country to the repository. 42 U.S.C. 10175. The NRC will be reviewing DOE's application to build and operate the repository. 42 U.S.C. 10134. Under the Atomic Energy Act of 1954, as amended, 42 U.S.C. 2011 *et seq.*, the NRC also reviews the fuel-handling and storage activities of its licensees. States have no legal authority to regulate the handling, storage, and disposal of spent fuel (42 U.S.C. 2021c), but the NRC seeks to make available to the States and their citizens as much information as possible about its own activities in these areas.

Until the national repository is built and operated, spent fuel is being stored mainly at reactor sites. Originally, almost all of it was stored at reactor sites in deep pools of circulating water, which controls the temperature of the fuel and shields workers and the general public from radiation. However, the NWPA called for demonstration projects aimed at showing that long term dry storage of spent fuel in low-maintenance casks was workable, thus providing an alternative to the often more elaborate and costly spent fuel pools for continued long-term

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[4]On page 2 of its motion, Maine points to the ongoing litigation in federal court over DOE's obligation, under section 302 of the NWPA, "beginning not later than January 31, 1998, [to] dispose of the high-level radioactive waste or spent nuclear fuel involved as provided in this subtitle." 42 U.S.C. 10222(a)(5)(B). Important though this litigation is, it has no bearing on whether the NRC's approval of the NAC-UMS design was arbitrary and capricious, or otherwise contrary to law.

storage. 42 U.S.C. 10198. The same legislation directed the NRC to find a way to approve cask designs efficiently and generically, and to avoid, "to the maximum extent practicable," requiring site-specific NRC approval of a power reactor's use of a cask built according to an NRC-approved design. *Id.* In 1990, the NRC established a rulemaking process for approvals of cask designs, and gave power reactor licensees a "general license", embodied in a rule (10 CFR 72.210, 72.212), to use NRC-approved casks. *See* 55 Fed. Reg. 29181 (July 18, 1990). Only one of the approvals the NRC has granted under this process has been litigated on the merits in federal court, and that approval was upheld. *Kelley v. Selin*, 42 F.3d 1501 (6th Cir.), *cert. denied*, 515 U.S. 1159 (1995).

2. Dual-Purpose Casks.

Over the decade that the process has been in place, the NRC has approved several cask designs, the most recent being the one at issue here. They are listed in 10 CFR 72.214. The NAC-UMS design is one of a handful of designs for canisters intended to serve as containers both for storage at the reactor site and for transportation of the spent fuel to a national repository. If the reactor licensee uses a dual purpose canister, once fuel is loaded into the canister the fuel does not have to be handled again until it reaches the repository. Fuel stored in canisters not approved for transporting will eventually have to be repackaged in canisters approved by the NRC for transportation. The NRC has thus far approved the NAC-UMS cask system for storage only, that being the immediate use for the system, and NAC has submitted an application requesting agency approval of the design for use in transporting the stored fuel. Approximately 5 percent of the nation's spent nuclear fuel is now being stored in dry casks, and that proportion is expected to increase significantly, because many reactor licensees have reached the storage limits of their spent fuel pools, or soon will, and because dry cask storage has advantages during both operation and decommissioning.

3. NRC Rulemaking on the NAC-UMS Cask Design.

The NRC published its proposed approval of the NAC-UMS design in the *Federal Register* on January 21, 2000. 65 Fed. Reg. 3397. In April 2000, Maine submitted detailed comments, to which the NRC responded in the final rule approving the design. *See* Pet. Motion, Att. 5 (Maine comments); Pet. Motion, Att. 1 (NRC final rule and supporting Statement of Considerations). In its comments on the proposed approval, Maine raised, among other matters, the issue of whether NAC-UMS canisters would have to be opened and the condition of the fuel inspected. Maine argued that periodic verification of the condition of the fuel would be necessary and would even require direct inspection of the fuel, were there no other way to verify the condition of the fuel. *Id.*, Specific Comment 4. But Maine raised neither a concern about radiation exposures if the canisters had to be opened, nor a concern that the State would not have the resources to oversee any fuel handling that might have to take place before transport of the stored fuel -- two issues that the State raises in this Court. Instead, the State focused on the claim that the NRC was by its own rules required to obtain "binding assurances" from DOE that it would in fact accept the Maine Yankee fuel for transport to the national repository, as long as the fuel had been stored in accordance with NRC-approved procedures. *See* Pet. Motion, Att. 5, letter from Governor King at 1.

In the Statement of Considerations accompanying the final rule, the NRC addressed both the State's concern about binding assurances from DOE and the State's claim that the condition of the fuel would have to be verified periodically. The NRC said that its review of the cask design had determined, with reasonable assurance, that no canister of this design would have to be reopened before transport. *See* 65 Fed. Reg. at 62585. The NRC's final approval of the cask design was based in significant part on this determination. Moreover, the NRC pointed out that the Director of DOE's Office of Civilian Radioactive Waste Management, Dr. Ivin Itkin, wrote Governor Angus King of Maine on May 3, 2000, to confirm that DOE's contract for disposal with Maine Yankee covers the acceptance, transport, and disposal of all spent nuclear fuel from the Maine Yankee reactor, regardless of the condition of the spent fuel, only the schedule for acceptance being possibly affected by the condition of the fuel. *Id.*, at 62596, *citing* Itkin letter (Pet. Motion, Att. 12).

4. Maine's Stay Application.

As required by Federal Rule of Appellate Procedure 18, Maine, before coming to this Court, sought from the NRC a stay of the effective date of the NRC's approval of the cask design. *See* Pet. Motion, Att. 10. The NRC denied the request. *See* Pet. Motion, Att. 11. In its letter denying the request, besides summarizing its responses to Maine's comments during the rulemaking, the NRC also addressed new issues the State had raised in its request. In the letter, the NRC said that it had "reasonable assurance" that "periodic verification of cladding conditions during storage and prior to transportation, *i.e.*, unsealing and inspection of the cask system, is not warranted." The letter also said that "[i]f inspection of the spent fuel is required for any unanticipated reason, opening of the canisters will be conducted in accordance with established procedures that reasonably assure the safety of all persons involved in the operation." The letter also indicated that NRC officials were willing to meet with the State to discuss its concerns.

## ARGUMENT

Four well-known factors govern the issuance of a stay pending judicial review of an agency decision. As set forth in Circuit Rule 18, they are "(i) the likelihood the moving party will prevail on the merits; (ii) the prospect of irreparable injury to the moving party if relief is withheld; (iii) the possibility of harm to other parties if relief is granted; and (iv) the public interest." A judicial stay of a decision by a federal agency is an "extraordinary" remedy, and it is "the movant's obligation" to demonstrate that the four stay factors warrant relief. *Cuomo v. NRC*, 772 F.2d 972, 974 (D.C. Cir. 1985). In this case, Maine has not met its obligation. Indeed, Maine's stay motion turns upside down both the true distribution of regulatory responsibilities between the NRC and DOE, and any sensible allocation of safety priorities.

Moreover, a petitioner seeking judicial review of action by an agency with special expertise faces an obligation that is especially great:

> [A] reviewing court must remember that the Commission is making predictions, within its area of special expertise, at the frontiers of science. When examining this kind of scientific determination, as opposed to simple findings of fact, a reviewing court must generally be at its most deferential.

*Baltimore Gas & Electric v. NRDC*, 462 U.S. 87, 97 (1983).

1. <u>Maine Has Not Shown a Likelihood of Success on the Merits</u>.

Maine makes three claims on the merits, none of which withstands scrutiny.

a. <u>DOE Lacks Authority to Approve Cask Designs</u>.

Maine contends that the NRC acted illegally by approving the NAC-UMS design without having obtained DOE's "binding commitment" that it would accept and remove fuel from Maine

Yankee without examination or processing. Pet. Motion at 1. The State even goes so far as to contend that the NRC should have gotten DOE's approval of the design. *Id.* at 4.

Maine's argument here turns the regulatory scheme upside down. Federal law gives the NRC, not DOE, the authority to review applications for approval of cask designs, and NRC regulations, which rest on authority that comes directly from the statutory language, take the same approach. Section 218(a) of the NWPA, 42 U.S.C. 10198(a), says of storage casks:

> The Secretary [of Energy] shall establish a demonstration program, in cooperation with the private sector, for the dry storage of spent nuclear fuel at civilian nuclear power reactor sites, with the objective of establishing one or more technologies that the [Nuclear Regulatory] Commission may, by rule, approve for use at the sites of civilian nuclear power reactors ....

And section 180(a) of the NWPA, 42 U.S.C. 10175(a), says of transportation casks:

> No spent nuclear fuel or high-level radioactive waste may be transported by or for the Secretary [of Energy] ... except in packages that have been certified for such purpose by the [Nuclear Regulatory] Commission.

There is no evidence whatsoever that Congress ever contemplated giving DOE review authority over storage or transport casks while at the same time requiring DOE to apply to the NRC for a license for the national high-level waste repository.

With this as the statutory background, Maine's argument (Pet. Motion at 9-10) that 10 CFR 72.236(m)[5] of the NRC's regulations requires DOE approval of cask designs must fail. Certainly that rule says nothing explicit about DOE approval. It says only that NRC must take into account transportation needs "to the extent practicable," and the NRC has certainly done that, having, for example, determined during review of the design for storage that nothing

[5]Section 72.236(m) provides as follows: "To the extent practicable in the design of spent fuel storage casks, consideration should be given to compatibility with removal of the stored spent fuel from a reactor site, transportation, and ultimate disposition by the Department of Energy."

precluded its consideration for transportation certification also. *See* NRC Safety Evaluation Report on the NAC-UMS cask system, section 1 (attached). The NAC-UMS design has, in fact, been submitted for NRC review for use as a transport cask. *See* 10 CFR Part 71 (requirements governing transportation of radioactive materials).

b. The NRC Adequately Responded to Comments.

Maine appears to believe that the NRC did not respond adequately to the State's comments during the rulemaking on the NAC-UMS design. To the contrary, the NRC responded fully to all of Maine's comments. Under *Reytblatt v. NRC*, 105 F.3d 715, 722 (D.C. Cir. 1977), the agency must "respond in a reasoned manner" to comments that raise "significant problems." The NRC has more than met this standard. As recounted above, the NRC dealt fully with Maine's technical claim that canisters of the NAC-UMS design will have to be reopened if necessary to assure acceptability of the fuel for transport, and DOE gave the State written assurance (Dr. Itkin's letter) that DOE fully intended to comply with its contractual obligation to Maine Yankee to remove all spent fuel from the reactor site, whatever the condition of the fuel.[6] The NRC also responded to a host of other technical comments by Maine and others. *See* 65 Fed. Reg. at 62581-62598. Maine's rulemaking comments called for no further response.

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[6]In the NRC's responses to Maine's comments, the NRC also said that, because DOE had not yet formalized its fuel acceptance criteria for ultimate disposal, it would not be practical to preclude storage now. 65 Fed. Reg. at 62596. Maine now claims that this response is wide of the mark, that Maine's issue is with *transport*, not disposal. *See* Pet. Motion at 8. The NRC understands that Maine is raising an issue about transport, and, as argued above, the agency has responded to Maine's raising of that issue. However, in pointing to the lack of formal DOE fuel acceptance criteria for ultimate disposal, the NRC was responding to two comments it understood to be about *both* transport *and* disposal. *See id.* (Comment I-20 and the NRC's response). More generally, it does not make sense to delay storage in dry casks until all transportation and disposal issues are resolved.

c. The NRC's Rule is Protective of Health and Safety of Workers and the Public.

In its stay application, Maine raises a new concern, *i.e.*, the claim that the NRC's approval of the NAC-UMS cask unlawfully jeopardizes the safety of workers and the public during any repackaging of the fuel that might, against expectation, be necessary before its transport. There is no likelihood that Maine would succeed on the merits on this issue, because it was not raised by any participant in the rulemaking on the NAC-UMS design. In any case, the Commission's regulations governing the approval of spent fuel storage casks (10 CFR 72) do not, and could not, require that a cask design provide absolute assurance that repackaging will never be necessary. Therefore the radiation protection issue Maine raises simply has no bearing on the lawfulness of the NRC's rule approving the NAC-UMS design.

Nonetheless, the NRC addressed the new issue in its response to Maine's request to the NRC for a stay. As we noted above, in its response to Maine's request, the NRC said that it had "reasonable assurance" that verification of the condition of the fuel was "not warranted" while in storage before transportation, and that if verification were required for any unanticipated reason, opening of the canisters would be conducted "in accordance with established procedures that reasonably assure the safety of all persons involved in the operation." Pet. Motion, Att. 11 (NRC denial of Maine stay request) at 1.

2. Maine Will Not Suffer Irreparable Injury in the Absence of a Stay.

In an earlier case involving the NRC, this Court turned down claims of irreparable harm on the basis that "[a] party moving for a stay is required to demonstrate that the injury claimed is 'both certain and great.'" *Cuomo v. NRC*, 772 F.2d at 976, *quoting Wisconsin Gas Co. v. FERC*, 758 F.2d 669, 674 (D.C. Cir. 1985). The injuries Maine claims are neither certain nor great.

The principal harm Maine alleges is the possibility, years from now, that workers and the public might be exposed to radiation during any repackaging or inspection that might prove necessary. Such allegations do not support a stay. Maine's injury claim presupposes (a) that it will prove necessary to reopen NAC-UMS canisters, and (b) that the reopening will be handled in such a way that dangerous radiation exposures will occur. Neither presupposition is likely to become reality. To allege that fuel handling might have to be conducted, and that it moreover might be conducted improperly, is mere speculation about improbable events remote in time.

The NAC-UMS canister was designed to make inspection unnecessary, and the NRC approved the design on that basis, there being reasonable assurance that reopening would not be necessary. *See* 65 Fed. Reg. at 62585. But even assuming that, for reasons unexpected, there is a need to know the condition of the fuel in some future year, reopening the canister, let alone repackaging of the fuel, is not a given, because there are ways short of opening a canister to determine whether the fuel has suffered degradation. For example, the NAC-UMS design permits gas sampling, which allows for the detection of potentially damaged or oxidized fuel. *See* NRC Safety Evaluation Report on the NAC-UMS cask system, section 8.3.1 (attached to this Opposition).

Furthermore, assuming that the canisters must be reopened, either for closer inspection or to repackage the fuel, certainly exposure to radiation within acceptable limits is not *per se* a "great" harm, and thus, under *Cuomo*, not "irreparable injury." Properly conducted and regulated fuel handling poses no undue risk to health, safety, or the environment. The total occupational exposure acquired in loading a single canister is small and well within federal regulatory limits. *See id.*, section 10.3 (attached to this Opposition). The exposure acquired in unloading a canister for inspection prior to transport is also expected to be well within regulatory limits, in part because the fuel will have become less radioactive over time.

The court in *Kelley v. Selin* had little difficulty upholding an NRC rule approving a cask design that will require canisters built according to it to be reopened and emptied before transport of the fuel. The design was for storage alone, with no potential for transport. The same is true for most cask designs approved already by the NRC. If such repackaging is acceptable in other cases dealing with other designs and other sites, there is no reason why it is not acceptable here also.

Maine appears to conceive of its injury as also due in part to what it believes is the possibility of the State's having to oversee any inspection or repackaging before transport. However, that possibility can never arise. Although Maine has some regulatory authority over the civilian uses of radioactive materials within its boundaries -- under a "Section 274 Agreement" with the NRC (see 42 U.S.C. 2021) -- no State can be given authority to regulate the handling and disposition of spent nuclear fuel. *Id.*, subsection c. Any inspection or repackaging of the fuel would be a federal matter entirely. Any state monitoring or oversight would be entirely voluntary.[7]

One final point: Overturning the NRC's approval of the NAC-UMS design will not give Maine the redress it seeks. Were the NAC-UMS design rendered unavailable, Maine Yankee is free under federal statute and NRC regulations to use other designs that are suitable for the fuel at

[7]Under long-standing policy, *see* 57 Fed. Reg. 6462 (Feb. 25, 1992), the NRC allows states to observe NRC inspections at power reactors, and Maine does observe some NRC inspections at Maine Yankee. The State also conducts environmental surveillance at the site. However, under no circumstances does Maine have the authority to *regulate* fuel handling, and its observation of NRC inspections is strictly voluntary.

the Maine Yankee site and already approved for both storage and transportation, or for storage alone.[8] None of those designs is the subject of an irrevocable assurance from DOE that it would not reopen the cask before transportation.

3. The Possibility of Harm to Other Parties Weighs Against a Stay.

Clearly, grant of a stay will harm the manufacturer of the NAC-UMS cask. Delay in the effective date of the NRC's approval of the cask design will mean delay in marketing and recovery of investment. There is also potential harm to the utilities (like Maine Yankee) wishing to use the cask design, harm in the form of more delay and uncertainty in decommissioning sites. NAC-UMS casks are currently under construction and scheduled for delivery to Maine Yankee, and no other cask is. Thus, staying the effectiveness of the NRC rule would introduce undesirable uncertainty into the schedule for emptying and dismantlement of Maine Yankee's spent fuel pool. There may be some question whether Maine Yankee could recover the costs of significant delay.

4. The Public Interest Will Not be Served by a Stay.

Finally, a stay may harm the general public and the administrative process. Harm to the public may occur if availability of the Maine Yankee site for other purposes is delayed ( *i.e.*, if Maine Yankee must continue to maintain its spent fuel pool). The harm to the administrative process would take the form of a needless increase in the uncertainty of the process and the

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[8]Given Maine's redressability problem -- *i.e.*, Maine's injury turns on decisions by a third party -- it is not at all clear that Maine even has standing to challenge the NAC-UMS rule. *See US Ecology, Inc. v. Department of the Interior*, 2000 WL 1617852, at *5-*7 (D.C. Cir., Nov. 14, 2000). Maine's participation in the rulemaking does not, in and of itself, give it standing to challenge the rule. *See Competitive Enterprise Institute v. Department of Transportation*, 856 F.2d 1563, 1565 (D.C. Cir. 1988). Maine's questionable standing is all the more reason to refuse an emergency stay, as it lessens Maine's likelihood of success in this case.

attendant costs to all participants in the process. The NRC has fully carried out its responsibilities for careful review of the NAC-UMS cask design, and for careful consideration of comments on the NRC's proposed approval. Under these circumstances, a stay here may well introduce needless uncertainty into the NRC's cask design review process.

Public health and safety, and thus the public interest, will not be served if Maine is allowed to prevail on its notion that irrevocable guarantees are required that none of the canisters of this design will be reopened. The NRC approved the design at issue here on the basis of reasonable assurance that canisters of this design would not have to be reopened while in storage before transportation. However, it is the nature of things that no significant regulatory decision can be made with 100 percent certainty. Therefore a regulator must allow for actions that may be called for in the light of new information and new experience. The NRC's regulations are replete with such allowances, notably in the area of standardized designs, both of casks and of reactors. *See, e.g.*, 10 CFR 52.103(f) (challenges to terms of certifications of standard reactor designs), 72.242(d) (reports of deficiencies in cask fabrication), and 72.62 (backfitting of components of an Independent Spent Fuel Storage Installation).

In keeping with the necessities posed by the unexpected, no agency with safety responsibilities can bind itself in advance not to take such steps as it may later determine, in a manner consistent with its jurisdiction and the requirements of correct procedures, are necessary to maintain minimum standards of safety. Maine's demand for ironclad assurances against reopening contradicts this fundamental principle of safety regulation.

## CONCLUSION

For the reasons given above, Maine's motion for an emergency stay should be denied, and the NRC's approval of the NAC-UMS cask design should be allowed to remain effective pending litigation on the merits of the approval.

Respectfully submitted,

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## CERTIFICATE OF SERVICE

I hereby certify that copies of the Respondents' Opposition to Emergency Motion for Stay were served by hand, this 20th day of November, 2000, upon the following:

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# NAC INTERNATIONAL INC.

# NAC UMS UNIVERSAL STORAGE SYSTEM (NAC-UMS)

# SAFETY EVALUATION REPORT

# 1.0 GENERAL DESCRIPTION

The objective of the review of the general description of the NAC UMS Universal Storage System (NAC-UMS) is to ensure that NAC International Inc. (NAC) has provided a non-proprietary description that is adequate to familiarize reviewers and other interested parties with the pertinent features of the system.

## 1.1 System Description and Operational Features

The NAC-UMS system is a transport-compatible dry storage system that uses a stainless steel transportable storage canister (TSC) stored within the central cavity of a vertical concrete cask (VCC). The TSC is designed to be compatible with the NAC-UMS transport cask to allow future shipment. The VCC provides radiation shielding and contains internal air flow paths that allow decay heat from the TSC spent fuel contents to be removed by natural air circulation around the canister wall.

The principal components of the NAC-UMS system are the TSC, the VCC, and the transfer cask. The transfer cask is used to move the loaded TSC to and from the VCC and provides radiation shielding while the TSC is being closed and sealed. The TSC is placed in the VCC by positioning the transfer cask on top of the VCC and subsequently lowering the TSC. Each NAC-UMS system component is assigned a safety classification (Category A, B, or C) in Table 2.3-1 of the Safety Analysis Report (SAR). The component safety classification is based on NUREG/CR-6407, "Classification of Transportation Packaging and Dry Spent Fuel Storage System Components According to Importance to Safety."

The NAC-UMS is designed to store up to 24 Pressurized Water Reactor (PWR) or up to 56 Boiling Water Reactor (BWR) spent fuel assemblies. Based on the length of the fuel assemblies, PWR fuels are grouped into three classes (Classes 1 through 3), and BWR fuels are grouped into two classes (Classes 4 and 5). Class 1 and 2 PWR fuel assemblies include non-fuel-bearing inserts (components which include thimble plugs and burnable poison rods installed in the guide tubes). Class 4 and 5 BWR assemblies include the Zircaloy channels. The spent fuel is loaded into a TSC which contains a stainless steel gridwork referred to as a basket.

### 1.1.1 Transportable Storage Canisters and Baskets

There are 5 TSCs of different lengths, each to accommodate a different class of PWR or BWR fuel assembly. Each TSC has an outside diameter of about 67 inches and the lengths vary from about 175- to 192-inches long. The maximum weight of a loaded PWR TSC is slightly less than 73,000 lbs. The maximum weight of a loaded BWR TSC is slightly less than 76,000 lbs. The TSC assembly consists of a right circular cylindrical shell with a welded bottom plate, a fuel basket, a shield lid, two penetration port covers, and a structural lid. The cylindrical shell, plus the bottom plate and welded lids, constitute the confinement boundary.

The TSC assembly is designed to facilitate filling with water and subsequent draining and drying. Vent and drain ports through the shield lid allow the inner cavity to be drained, evacuated, and backfilled with helium to provide an inert atmosphere for long-term storage. After draining, drying, backfilling, and testing operations are completed, port covers are installed and welded to the shield lid to seal the penetration. The designs of the shield and structural lids provide a redundant confinement seal at the top of the canister.

PWR Baskets

The stainless steel PWR fuel basket is a right circular cylinder configuration with 24 stainless steel fuel tubes for PWR contents. The fuel tubes are laterally supported by a series of up to 34 half-inch thick stainless steel support disks (depending on the length of the TSC), which are retained by spacers on 8 radially located stainless steel tie rods. The square fuel tubes include neutron poison sheets (Boral) on all four sides for criticality control. Aluminum heat transfer disks are spaced midway between the support disks and are the primary path for conducting heat from the spent fuel assemblies to the TSC wall.

BWR Baskets

The stainless steel BWR fuel basket is a right circular cylinder configuration with 56 stainless steel fuel tubes for BWR contents. The fuel tubes are laterally supported by a series of up to 41 5/8-inch-thick carbon steel support disks (depending on the length of the TSC), which are retained by spacers on 6 radially located tie rods. The carbon steel support disks are coated with electroless nickel. Three types of square fuel tubes are provided for criticality control: (1) Boral sheets on two sides, (2) Boral sheets on one side, and (3) no Boral sheets. Aluminum heat transfer disks are spaced midway between the support disks and are the primary path for conducting heat from the spent fuel assemblies to the TSC wall.

### 1.1.2 Vertical Concrete Cask

The VCC is the storage overpack for the TSC. Five concrete casks of different heights, ranging from about 209 to 226 inches, are each designed to accommodate a different TSC. Each VCC design has an outside diameter of about 136 inches. The five VCC's vary in weight between 221,000 and 238,000 lbs., empty. The VCC side walls consist of about 28 inches of reinforced concrete (Type II Portland cement), with a 2.5-inch thick carbon steel liner. The VCC provides structural support, shielding, protection from environmental conditions, and natural convection cooling of the TSC during long-term storage. The VCC has an annular air passage to allow the natural circulation of air around the TSC. The air inlet and outlets take non-planar paths to the VCC cavity to minimize radiation streaming. The spent fuel decay heat is transferred from the fuel assemblies to the tubes in the fuel basket and through the heat transfer disks to the TSC wall. Heat flows by radiation and convection from the TSC wall to the circulating air and is exhausted through the air outlets. The passive cooling system is designed to maintain acceptable reinforced concrete and peak cladding temperatures for the authorized fuel types during storage.

The top of the VCC is closed by an approximately 5-inch thick shield plug consisting of carbon steel plate (gamma shielding), NS-4-FR (neutron shielding), and a carbon steel lid. The lid is bolted in place and has tamper indicating seals on two of the bolts.

### 1.1.3 Transfer Cask

The transfer cask provides shielding during TSC movements between work stations, the VCC, or the NAC-UMS transport cask. Five transfer casks of different lengths are designed to handle the five TSC's of different lengths. The transfer cask is a multi-wall (steel/lead/NS-4-FR/steel) design, each with about an 85-inch outer diameter. The five transfer casks range in height between about 177 and 194 inches, and in empty weight from about 112,000 to 121,000 lbs. The transfer cask has a bolted top retaining ring to prevent a loaded canister from being inadvertently removed through the top of the transfer cask. Retractable (hydraulically operated) bottom shield doors on the transfer cask are used during unloading operations.

The transfer cask has eight supply and two discharge lines passing through its wall. Two of the lines are used to circulate clean water in the gap between the transfer cask and the TSC during spent fuel pool loading operations to minimize contamination of the transfer cask and TSC. The eight lines can also be used for the introduction of forced air at the bottom of the transfer cask to achieve cooling of the canister contents. This allows the canister to remain in the transfer cask for a longer period, if necessary, during canister closing operations, and also supports the use of the transfer cask in the event that a canister must be removed from a concrete cask.

A transfer cask extension is also designed to be used to extend the operational height of a transfer cask. This height extension allows a transfer cask designed for a specific canister class to be used with the next longer canister, and thus accommodates the increase in overall height of a standard fuel assembly resulting from the insertion of a control element assembly. The extension is a carbon steel ring that is bolted to the top of the transfer cask.

### 1.1.4 Auxiliary Equipment

Section 1.2.1.5 of the SAR describes the following principal auxiliary equipment necessary to operate the NAC-UMS system in accordance with its design:

- Adapter Plate - mates the transfer cask to the VCC or the NAC-UMS transport cask.
- Air Pad Rig Set - allows movement of the VCC on the storage pad, trailer, or plant transport bay.
- Automatic Welding System - Performs TSC closure welding with minimum radiation exposure.
- Draining and Drying System - used to remove moisture and establish a TSC vacuum.
- Helium Leak Test Equipment - mass spectrometer to verify the integrity of the shield lid weld.
- Heavy Haul Trailer - used to move the VCC.
- Lifting Jacks - used to lift the VCC to insert/remove the Air Pad Rig Set.
- Riggings and Slings - provided for major components such as shield and structural lids and the transfer cask.
- Temperature Instrumentation - located at VCC outlets for local and/or remote temperature indications and compared with the ambient temperature to verify performance of the cask heat removal system.

### 1.1.5 NAC-UMS Cask Arrays

Section 1.4 of the SAR describes and depicts a typical storage pad layout for an Independent Spent Fuel Storage Installation (ISFSI). Spacing limitations on cask arrays (15 feet minimum) are specified in Section 8.1.3 of the Operating Procedures. Technical Specification (TS) 3.2.2 controls the maximum allowable average surface dose rates for any individual cask.

## 1.2 Drawings

The drawings associated with the NAC-UMS structures, systems, and components (SSCs) important to safety are provided in Section 1.8 of the SAR. Sufficiently detailed drawings regarding dimensions, materials, and specifications were provided by the applicant and allow a thorough evaluation of the entire system. Specific SSCs are evaluated in Sections 3 through 14 of this SER.

## 1.3 Cask Contents

The approved contents for the NAC-UMS are: (1) up to 24 intact Zircaloy-clad PWR spent fuel assemblies with a maximum initial enrichment of 4.2 wt% $^{235}U$, or (2) up to 56 intact Zircaloy-clad BWR spent fuel assemblies with a maximum initial peak planar-average enrichment of 4.0 wt% $^{235}U$. Unenriched PWR or BWR spent fuel assemblies were not evaluated by the applicant and are not allowed as approved contents. The enrichment and physical, thermal, and radiological characteristics of the approved contents are given in the CoC Appendix B fuel specifications. The fuel specifications also provide definitions for intact fuel rods and assemblies.

If all spent PWR or BWR fuel assemblies to be loaded in a given TSC have cooling times greater than 7 years, they can be loaded in any basket position. However, any spent PWR or BWR fuel assemblies with cooling times between 5 and 7 years must be preferentially loaded and administratively controlled as described in Appendix B of the TS. Preferential loading provisions are based on cooling times to ensure that the allowable cladding temperature for a given intact BWR or PWR spent fuel assembly is not exceeded.

Intact PWR assemblies shall not contain control components but Class 1 and Class 2 PWR assemblies may contain non-fuel-bearing inserts (thimble plugs and burnable poison rods installed in the guide tubes). Stainless steel spacers may be used in TSCs to axially position intact PWR assemblies that are shorter than the available cavity length.

Intact BWR assemblies can be stored with or without the Zircaloy fuel channels. Intact BWR assemblies with stainless steel fuel channels are not authorized for storage. Stainless steel spacers may be used in TSCs to axially position intact BWR assemblies that are shorter than the available cavity length.

## 1.4 Qualifications of the Applicant

NAC is the prime contractor for the NAC-UMS design, and all design and specification activities are performed by NAC. Fabrication of steel and concrete components are specified to be performed by qualified vendors and in accordance with quality assurance (QA) programs meeting the requirements of 10 CFR Parts 71 and 72. Section 1.6 of the SAR adequately details NAC's technical qualifications and previous experience in the area of dry cask storage licensing.

## 1.5 Quality Assurance

The QA program is evaluated in Section 13 of this SER.

## 1.6 Evaluation Findings

**F1.1** A general description and discussion of the NAC-UMS system is presented in Section 1 of the SAR, with special attention to design and operating characteristics, unusual or novel design features, and principal safety considerations.

**F1.2** Drawings for SSCs important to safety are presented in Section 1.8 of the SAR. Specific SSCs are evaluated in Sections 3 through 14 of this SER.

**F1.3** Specifications for the spent fuel to be stored in the dry cask storage system (DCSS) are provided in SAR Sections 1.3 and 2.1. Additional details concerning these specifications are presented in Section 2 of the SAR and in Appendix B of the CoC.

**F1.4** The technical qualifications of the applicant to engage in the proposed activities are identified in Section 1.6 of the SAR and are acceptable to the Nuclear Regulatory Commission (NRC) staff.

**F1.5** The QA program is described in Section 13 of the SAR and is evaluated in Section 13 of this SER.

**F1.6** The NAC-UMS transport cask system was not reviewed in this SER for use as a transportation cask.

**F1.7** The staff concludes that the information presented in this Section of the SAR satisfies the requirements for the general description under 10 CFR Part 72. This finding is based on a review that considered the regulation itself, Regulatory Guide 3.61, and accepted dry cask storage practices detailed in NUREG-1536.

## 8.2 Cask Handling and Storage Operations

All accident events applicable to the transfer of the TSC to the VCC and of the VCC to the storage location are bounded by the design events described in SAR Sections 2 and 11. All conditions for lifting and handling methods are bounded by the evaluations in SAR Sections 3 and 4. Appendix A of the CoC, Section 5.6, requires that a cask transport evaluation program be established, implemented, and maintained. The program provides a means for evaluating various on-site transport configurations and route conditions to ensure that the design basis drop limits are met.

Inspection, surveillance, and maintenance requirements that are applicable during ISFSI storage are discussed in SAR Section 9. Surveillance and monitoring requirements to verify the proper operation of the passive heat removal system are included in the TS. The staff determined that these were acceptable.

Occupational and public exposure estimates are evaluated in SAR Section 10. Each cask user will develop detailed cask handling and storage procedures that incorporate the ALARA objectives of their site-specific radiation protection program.

## 8.3 Cask Unloading

Detailed unloading procedures must be developed by each cask user.

The NAC-UMS system unloading procedures describe the general actions necessary to remove the TSC from the VCC for placement in another VCC or transport cask or to unload the TSC in the spent fuel pool. The TSC unloading procedure describes the general actions necessary to remove the lid welds, cool the stored fuel assemblies, flood the TSC cavity, and unload the spent fuel assemblies. The operating procedure for transferring a loaded TSC from the VCC to the NAC-UMS transport cask is discussed in the NAC-UMS transport SAR and is not evaluated in this SER. Special precautions are outlined to ensure personnel safety during the unloading operations.

### 8.3.1 Cooling, Venting & Reflooding

The operating procedures in Section 8 of the SAR specify, prior to initiating cooldown, the sampling for radioactive gases and the subsequent flushing of the radioactive gases with nitrogen while monitoring the exit temperatures. A cooldown system is subsequently attached to the drain connection (inlet) and the vent connection (outlet). A controlled water flow rate, with a specified minimum water temperature, is established with the steam and water being discharged to the spent fuel pool or radioactive water treatment system. The applicant's evaluation of the controlled TSC reflooding and cooling of the stored fuel assemblies determined that the associated thermal stresses on cladding and the steam pressures developed within the canister are acceptable. The procedures reflect the appropriate TS which stipulates the minimum cooling water temperature, maximum cooling water flow rate, and maximum canister pressure.

Procedures for obtaining a gas sample are included to provide for assessment of the condition of the fuel assembly cladding. This allows for detection of potentially damaged or oxidized fuel. The procedures include ALARA caution steps to prevent the possible spread of contamination and allow for the implementation of additional measures appropriate for the specific conditions.

### 8.3.2 ALARA

The unloading procedures incorporate general ALARA principles and practices. ALARA practices include provisions for radiological surveys, exposure and contamination control measures, temporary shielding, and caution statements related to specific actions that could change radiological conditions. Each cask user will develop detailed unloading procedures that incorporate the ALARA objectives of their site-specific radiation protection program.

### 8.3.3 Fuel Crud

The ALARA practices and procedures provide for the mitigation of the possibility of dispersal of fuel crud particulate material. However, experience with wet unloading of BWR fuel after transportation has involved handling significant amounts of crud. This fine crud includes $^{60}Co$ and $^{55}Fe$, and it will remain suspended in water or air for extended periods. The TSC reflood process during unloading of BWR fuel has the potential to disperse crud into the fuel transfer pool and pool area atmosphere, thereby, creating airborne exposure and personnel contamination hazards. Therefore, detailed procedures incorporating provisions to mitigate the possibility of fuel crud particulate dispersal must be developed by each cask user.

## 8.4 Evaluation Findings

**F8.1** The NAC-UMS system is compatible with wet loading and unloading. General procedure descriptions for these operations are summarized in SAR Sections 8.1 and 8.3. Detailed procedures will be developed and approved on a site-specific basis.

**F8.2** The bolted VCC closure and welded TSC shield and structural lids of the cask allow ready retrieval of the spent fuel for further processing or disposal as required.

**F8.3** The general operating procedures are designed to minimize and facilitate decontamination. Routine decontamination will be necessary after the transfer cask is removed from the spent fuel pool.

**F8.4** No significant radioactive effluents are produced during storage. Any radioactive effluents generated during the cask loading and unloading will be governed by the 10 CFR Part 50 license conditions.

**F8.5** The contents of the general operating procedures described in the SAR are adequate to protect health and minimize danger to life and property. Detailed procedures will need to be developed and approved on a site-specific basis.

**F8.6** SER Section 10 assesses the operational restrictions to meet the limits of 10 CFR Part 20. Additional site-specific restrictions may also be established by the site licensee.

The specific design features which demonstrate the ALARA philosophy include:

Thick steel and concrete walls to reduce the side surface dose rate of the concrete cask.

Nonplanar cooling air pathways to minimize radiation streaming at the inlets and outlets of the VCC.

Material selection and surface preparation that facilitate decontamination.

Positive clean water flow in the transfer cask/canister annulus to minimize the potential for contamination on the canister surface during in-pool work.

Passive confinement, thermal, criticality, and shielding systems that require no maintenance.

Use of remote, automated outlet air temperature equipment to reduce surveillance time.

The staff evaluated the radiation protection design features and design criteria for the NAC-UMS and found them acceptable. The SAR analysis provides reasonable assurance that use of the NAC-UMS storage cask can meet the regulatory requirements in 10 CFR Part 20, 10 CFR 72.104(a), and 10 CFR 72.106(b).

## 10.2 ALARA

Section 10.1 of the SAR presents the ALARA considerations for the NAC-UMS storage system. Radiation protection design features and the design criteria address ALARA requirements consistent with the requirements in 10 CFR Part 20 and guidance provided in Regulatory Guides 8.8 and 8.10. The NAC-UMS storage system features are designed to maintain radiation exposures ALARA and within the proposed design basis surface dose rates and surface contamination limits specified in SAR Chapter 12. SAR Section 10.1.3 includes the operational considerations for ALARA and describes optional auxiliary shielding devices to minimize occupational and public doses.

Each general licensee, in accordance with 10 CFR 72.212, will implement its existing site-specific radiation protection program, ALARA policies, and procedures for all cask operations to ensure that occupational personnel exposure requirements in 10 CFR Part 20 are met.

The staff evaluated the ALARA elements incorporated into the NAC-UMS storage system design and found them to be acceptable. Based upon the information presented in the SAR, there is reasonable assurance that the ALARA objectives in 10 CFR Part 20 will be met.

## 10.3 Occupational Exposures

SAR Section 8 discusses the general operating procedures that licensees will use for fuel loading, cask operation, and fuel unloading. SAR Section 10.3 discusses the estimated number of personnel, the estimated dose rates, and the estimated time for each task. The estimated occupational person-rem is based upon the minimum number of personnel needed to accomplish the activities in the general operating procedures and the dose rates determined from the shielding evaluation in SAR Section 5.

The person-mrem exposure for operation of the NAC-UMS system is presented in SAR Table 10.3-1. The dose estimates indicate that the total occupational dose in loading a single cask with design basis fuel is approximately 1.1 person-rem for PWR fuel and 0.8 person-rem for BWR fuel. The estimated yearly exposure for surveillance and cask maintenance for a 20 cask array with PWR fuel is approximately 1.1 person-rem. The estimated yearly exposure for surveillance and cask maintenance for a 20 cask array with BWR fuel is approximately 0.7 person-rem.

The staff reviewed the estimated occupational exposures and found them to be acceptable. The occupational exposure dose estimates provide reasonable assurance that occupational limits in 10 CFR Part 20 Subpart C can be achieved. Actual occupational doses will depend on site-specific parameters taken to maintain exposures ALARA. Each licensee will have an established radiation protection program, as required in 10 CFR Part 20 Subpart B. In addition, each licensee must demonstrate compliance with all dose limits in 10 CFR Part 20, 10 CFR Part 72, and any site-specific 10 CFR Part 50 license requirements with evaluations prior to loading of the casks.

## 10.4 Public Exposures

SAR Section 10.4 summarizes the calculated dose rates to members of the public located beyond the controlled area. As determined from the containment evaluation in SAR Chapter 7, the confinement boundary of the TSC is designed to be leak tight, and therefore, no discernable leakage of radioactive material from the TSC is credible. The staff's evaluation and confirmatory analysis of the shielding and confinement dose calculations are presented in SER Sections 5 and 7. The staff concludes that the dose rate from a non-mechanistic release is negligible. Therefore, direct radiation (including skyshine) is the primary dose pathway to individuals beyond the controlled area during normal and off-normal conditions.

Public exposure from normal and off-normal conditions will be from direct radiation from the storage casks. The SKYSHINE-III code was used to evaluate the placement of the controlled area boundary for a single cask containing design basis fuel and for a 20 cask array. For the 20-cask array, the casks are assumed to be loaded with design basis fuel at the rate of two casks per year.

SAR Table 10.4-1 presents a summary of the results of the SKYSHINE-III evaluation which determined the minimum distance necessary to achieve an annual dose of 25 mrem from a single cask containing design basis PWR or BWR fuel. Dose rates at 100 meters from a single cask containing PWR design basis fuel would be 14.8 mrem/year. Dose rate at 100 meters from a single cask containing BWR design basis fuel would be 9.9 mrem/year.

Based upon NAC's evaluation for a 2 by 10 cask array of PWR design basis fuel, a minimum site boundary distance of 160 meters around the ISFSI will ensure compliance with the dose limit in 10 CFR 72.104(a). The minimum site boundary distance for a 2 by 10 cask array of BWR design basis fuel would be 150 meters. Each licensee who intends to use the NAC-UMS storage system must perform a site-specific dose analysis to demonstrate compliance with all the requirements in 10 CFR Part 72. Site-specific boundary distances may vary based on fuel type, fuel cooling time, natural site barriers, and number of casks in service.

The staff evaluated the public dose estimates from direct radiation for normal and off-normal (anticipated occurrences) conditions and found them to be acceptable. The staff has