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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Charles Bechhoefer, Chairman
Dr. Richard F. Cole
Dr. Charles N. Kelber

In the Matter of	Docket No. 50-423-LA-3
NORTHEAST NUCLEAR ENERGY COMPANY	ASLBP No. 00-771-01-LA
(Millstone Nuclear Power Station, Unit No. 3; Facility Operating License NPF-49)	October 26, 2000

MEMORANDUM AND ORDER
(Adopting Agreed License Condition, Denying Request for Evidentiary Hearing on Other Issues, and Terminating Proceeding)

Appearances:

David A. Repka, Esq.,Donald P. Ferraro, Esq., Washington, D.C., and Lillian M. Cuoco, Esq., Berlin, Connecticut, for Northeast Nuclear Energy Company (NNECO), Licensee

Nancy Burton, Esq., Redding Ridge, Connecticut, for the Connecticut Coalition Against Millstone and the Long Island Coalition Against Millstone (CCAM/CAM), Intervenors

Ann P. Hodgdon, Esq., Robert M. Weisman, Esq., Susan L. Uttal, Esq. and Brooke D. Poole, Esq., for the Nuclear Regulatory Commission Staff

This proceeding pertains to the proposed increase in capacity of the spent fuel pool (SFP) of the Millstone Nuclear Power Station, Unit No. 3 (Millstone-3), through the use of additional high-density storage racks. At the request of Northeast Nuclear Energy Co. (NNECO or Licensee), the proceeding is subject to the hybrid hearing procedures of 10 C.F.R. Part 2, Subpart K (10 C.F.R. §§ 2.1101-2.1117). Under those procedures, the Atomic Safety and Licensing Board on July 19-20, 2000 conducted an oral argument

pursuant to 10 C.F.R. § 2.1113 (Tr. 308-540), concerning the question of whether a full evidentiary hearing on any of the issues in controversy is warranted.

Of the three contentions that we admitted (designated as Contentions 4, 5 and 6), one (number 5) was essentially settled by the parties, leading to a license condition that we indicated at the oral argument we would approve (Tr. 337). We do so here. Of the others, for reasons set forth below, we have determined that a further evidentiary hearing is not warranted.

A. Background.

On March 19, 1999, NNECO submitted a license amendment application to NRC seeking to increase the capacity of the Millstone-3 SFP from 756 fuel assemblies to 1860 assemblies. A Notice of Opportunity for a Hearing was published in the Federal Register of September 7, 1999.[1] In response, a timely joint petition for leave to intervene was filed on October 6, 1999, by the Connecticut Coalition Against Millstone (CCAM) and the Long Island Coalition Against Millstone (CAM)(hereinafter collectively referred to as "CCAM/CAM" or "Intervenors"). This Atomic Safety and Licensing Board was constituted on October 19, 1999 to preside over this proceeding.[2] Both NNECO and the NRC Staff (Staff) opposed the petition for lack of standing of either petitioner.[3]

By our Memorandum and Order (Intervention Petition), dated October 28, 1999 (unpublished), we noted that, as filed, the CCAM/CAM petition failed to set forth adequately the petitioners' standing. But we also pointed out that the NRC Rules of Practice afford a

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[1]64 Fed. Reg. 48,672-75 (1999).

[2]See 64 Fed. Reg. 57,485-86 (Oct. 25, 1999).

[3][NNECO's] Answer to Request for a Hearing and Petition to Intervene, dated Oct. 21, 1999; NRC Staff's Response to the Petition to Intervene filed by [CCAM] and [CAM], dated Oct. 26, 1999.

petitioner the right to amend its petition, without prior approval of the Licensing Board, at any time prior to 15 days before the first prehearing conference. 10 C.F.R. § 2.714(a)(3). We permitted such an amendment to be filed at the same time as proposed contentions were to be filed, and we scheduled a prehearing conference that was held on December 13, 1999, in New London, Connecticut.[4]

CCAM/CAM filed a Supplemental Petition on November 17, 1999, that included the amendments to their statements of standing, together with 11 proposed contentions. Both NNECO and the Staff concluded that CCAM had demonstrated standing, that CAM had not successfully done so, and that none of the eleven proposed contentions was admissible.[5] On February 9, 2000, the Licensing Board issued its Prehearing Conference Order (Granting Request for Hearing), LBP-00-02, 51 NRC 25, finding both CCAM and CAM to have established their standing and three of their joint contentions (numbers 4, 5 and 6) to be admissible.[6] Each of the admitted contentions dealt with an aspect of SFP criticality.

On February 22, 2000, NNECO, in accordance with 10 C.F.R. § 2.1109(a), invoked the hearing procedures of 10 C.F.R. Part 2, Subpart K, which are mandatory for use in a proceeding of this type when requested by any party. Those hearing procedures establish limits on discovery plus provide for written summaries and affidavits leading to an oral argument with respect to whether an evidentiary hearing is warranted on any contention. 10

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[4]A Notice of Prehearing Conference was issued on November 2, 1999. See 64 Fed. Reg. 60,854 (Nov. 8, 1999).

[5][NNECO's] Answer to Supplemental Petition to Intervene, dated November 30, 1999; NRC Staff's Response to Supplemental Petition to Intervene Filed by [CCAM/CAM], dated December 7, 1999.

[6]Simultaneously, on February 9, 2000, the Licensing Board issued a Notice of Hearing. See 65 Fed. Reg. 7,573 (Feb. 15, 2000). Neither NNECO nor the Staff filed an appeal of LBP-00-02 pursuant to 10 C.F.R. § 2.714a.

C.F.R. §§ 2.1111, 2.1113, 2.1115. On April 18, 2000, the Licensing Board conducted a telephone conference call with the parties to establish schedules for the proceeding in accordance with the Subpart K requirements. (A 90-day discovery period, as authorized under Subpart K, had already commenced, pursuant to an approximately 90-day pre-Subpart-K-designation discovery period prescribed in LBP-00-02, 51 NRC at 47.) The schedules were memorialized by our Memorandum and Order (Schedules for Proceeding), dated April 19, 2000, unpublished, which acknowledged that discovery was to be completed by May 30, 2000, that written summaries were to be filed by June 30, 2000, and that oral argument would be conducted in the New London, Connecticut area on July 19-20, 2000.[7]

On April 18, 2000, the same day as the above-referenced conference call, NNECO advised the Licensing Board and parties that it was modifying its proposed license amendment to incorporate a technical specification dealing with the boron question that was the subject of Contention 5. The parties later reached agreement that the technical specification would be incorporated into the proposal at issue, leading to acknowledgement by the parties that the substantive concerns advanced by CCAM/CAM in Contention 5 had been satisfied. (This is the technical specification that the Licensing Board adopted, as referenced earlier in this opinion.)

During discovery, NNECO and the Staff filed several motions for protective orders to limit the matters on which they would have to respond. On May 9, 2000, NNECO filed a motion to bar the proposed deposition of Robert Griffin, a chemistry manager at Millstone, on the primary ground that NNECO did not intend to present Mr. Griffin as one of its

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[7]The prescribed discovery period was subsequently extended for the limited purpose of allowing NNECO time to respond to certain interrogatories and requests for production of documents filed by CCAM/CAM on May 19, 2000. The June 30, 2000 date for filing CCAM/CAM's written summaries was subsequently briefly extended to accommodate certain technical problems (such as a computer lockup) encountered by the Intervenors.

witnesses. Taking into account the CCAM/CAM response filed on May 10, 2000, the Licensing Board, by Memorandum and Order dated May 10, 2000 (unpublished), denied the motion for a protective order. We found that NNECO had not shown “good cause” for barring the deposition in that Mr. Griffin might be able to provide information relevant to Contention 5, if not also Contention 4.

On May 22, 2000, NNECO filed another Motion for Protective Order, on the ground that certain discovery requests of CCAM/CAM were untimely, in that, taking into account normally prescribed periods for responding to interrogatories and motions for production of documents (including mailing time for first-class mail), the discovery would extend beyond May 30, 2000, the date previously set for the close of discovery. On May 25, 2000, the NRC Staff filed its own Motion for Protective Order, based on similar reasoning. In a filing dated May 24, 2000, CCAM/CAM opposed these motions, on the ground that the discovery in question had arisen out of evasive or incomplete information provided in response to previous of their discovery requests, including a deposition of Michael C. Jensen (a proposed NNECO witness) that CCAM/CAM took on May 11, 2000. On May 26, 2000, the Licensing Board conducted a telephone conference call to resolve these and other discovery questions.

As later memorialized in a Memorandum and Order (Discovery Rulings, 5/26/00 Telephone Conference), dated June 8, 2000 (unpublished), the Licensing Board permitted certain discovery sought by all parties, notwithstanding the extension of the discovery period in certain cases beyond the May 30 termination of discovery, but it granted protective orders for certain other requested discovery. The Board’s discovery rulings noted that, even though certain response times were extended beyond May 30, the June 30 date

for filing written summaries was not being extended.[8] The Board's intent was to assure that as complete a record as possible was achieved on important questions bearing upon the resolution of each of the contentions (but, in particular, Contention 4).

On June 8, 2000, the NRC Staff filed a motion to dismiss CCAM/CAM Contention 4, on the ground that the Intervenors had not been responsive in answering certain Staff discovery requests concerning that contention. (The Intervenors had responded to the Staff discovery inquiries, but their response was not what the Staff had expected.) The Licensing Board, after advising the Licensee and Intervenors that they need not respond to the Staff motion, dismissed that motion in a June 13, 2000 Memorandum and Order (Denying Staff's Motion to Dismiss CCAM/CAM Contention 4)(unpublished).

On June 30, 2000, NNECO and the Staff filed their written summaries and affidavits, as provided by our earlier scheduling orders.[9] In those summaries, they also responded to technical questions posed by the Licensing Board to the parties on May 23, 2000. NNECO's written summary was founded upon the affidavits of Mr. Joseph J. Parillo, a Senior Engineer in the Nuclear Analysis Section at Millstone; Dr. Stanley E. Turner, the Senior Vice President and Chief Nuclear Scientist at Holtec International; Mr. Michael C. Jensen, the Supervisor of Operator Training for Millstone Unit 2; Mr. Robert G. McDonald, the primary systems chemist for Millstone Units 2 and 3; and Mr. David W. Dodson, the Supervisor--Millstone Unit 3

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[8]On May 12, 2000, the Licensing Board issued a Notice of Oral Argument and Opportunity for Oral Limited Appearance Statements. (The Notice was published at 65 Fed. Reg. 31,617 (May 18, 2000).) The Notice provided for oral argument on July 19-20, 2000, and for oral limited appearance statements on July 18, 2000 and July 20, 2000. A site tour for the Licensing Board and all parties was also scheduled for July 20, 2000.

[9]Summary of Facts, Data, and Arguments on which [NNECO] Proposes To Rely at the Subpart K Oral Argument, dated June 30, 2000 [NNECO Written Summary]; NRC Staff Brief and Summary of Relevant Facts, Data and Arguments Upon Which the Staff Proposes to Rely at Oral Argument on Contentions 4, 5 and 6, dated June 30, 2000 [NRC Staff Written Summary].

Licensing. The Staff's written summary was founded upon the affidavits of Dr. Anthony C. Attard, a reactor Physicist/Engineer in the NRC Reactor Systems Branch; Dr. Laurence I. Kopp, Senior Reactor Engineer in the Reactor Systems Branch, Division of Safety Systems and Analysis, Office of Nuclear Reactor Regulation (NRR); Mr. James C. Linville, Acting Director, Division of Reactor Projects, NRC Region 1 (and, until recently, Acting Director of the Millstone Project Directorate, Region 1); and Mr. Antone C. Cerne, Senior Resident Inspector at Millstone-3.

The Intervenors likewise responded to the Board's questions on June 30, 2000,[10] but filed motions to request extensions to file their written summaries because of computer lockup and technical problems in getting a "declaration" from one of their expert witnesses. The Licensee offered no objection to the extension because of computer lockup, as long as the Intervenors would certify that, as a result of the extension, they had not revised their statements to take account of the other parties' filings. (At the oral argument, CCAM/CAM so certified. Tr. 316-317.) CCAM/CAM filed its initial written summary on July 3, 2000 but, by motion dated July 6, 2000, moved to file a Supplementary Declaration (of David A. Lochbaum) and to conform their summary to reflect the Declaration of Mr. Lochbaum. Both the Staff and NNECO opposed this July 6, 2000 motion by filings dated July 6, 2000 and July 7, 2000, respectively. In addition, the NRC Staff on July 7, 2000, filed a motion to strike the CCAM/CAM written summary. The Licensee on July 12, 2000 supported that motion. By Memorandum and Order (Ruling on Various Motions and Procedure at Oral Argument), dated July 14, 2000 (unpublished), the Licensing Board rejected all of the NNECO and Staff

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[10]Response of the Intervenors, [CCAM/CAM], to Atomic Safety and Licensing Board Panel's Questions Per Memorandum, May 23, 2000.

motions and, in effect, permitted the extended filing dates for CCAM/CAM. See Tr. 314-15.[11] The Board acknowledged the importance of simultaneous filings, as contemplated by 10 C.F.R. Part 2, Subpart K, but also emphasized the desirability of having as complete a record as possible. As filed,[12] the CCAM/CAM written summary was founded upon the declarations of Dr. Gordon Thompson, Executive Director of the Institute for Resource and Security Studies; and Mr. David A. Lochbaum, nuclear safety engineer with the Union of Concerned Scientists, with responsibility for directing the UCS' nuclear safety program. (In accepting the CCAM/CAM filing, the Board also found that the Staff position concerning whether the Intervenors' written summaries were sworn testimony, as required by Subpart K, to be legally untenable given the Commission's long-standing practice of treating filings under either oath or affirmation as sworn statements and determining that Intervenors' declarations qualified under that practice.) The Board also prescribed certain procedures to be followed at oral argument.

On July 17, 2000, two days prior to the oral argument, the NRC Staff filed a "Motion to File Affidavit of Antone Cerne Regarding Refueling Outage 6." The motion sought permission for the Staff to supplement its earlier filings with an additional affidavit of one of its affiants, Mr. Antone C. Cerne, concerning a topic (refueling outage 6, or RFO6) that was dealt with by the Intervenors' written summary. The Staff claimed that it was surprised by the Intervenors' reliance in their presentation on the events of RFO6, inasmuch as the

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[11]Citations in this Memorandum and Order to the Intervenors' written summary will be to the version filed on July 6, 2000. Pages in that written summary were not numbered, but the Licensing Board has hand-numbered the pages, beginning with the initial page and not the transmittal form, and will use those numbers in its citations.

[12]Corrected Detailed Summary of Facts, Data and Arguments and Sworn Submission on Which [CCAM/CAM] Intend to Rely at Oral Argument to Demonstrate the Existence of a Genuine and Substantial Dispute of Fact With the Licensee Regarding the Proposed Expansion of the Spent Fuel Storage Capacity at [Millstone-3], dated July 6, 2000 [hereinafter, CCAM/CAM Written Summary].

Intervenors had not included such events in their prior responses to Staff discovery. The motion was opposed by CCAM/CAM[13] but supported by the Licensee.[14] CCAM/CAM in particular cited the simultaneous filing requirement of Subpart K but also noted that CCAM/CAM had only obtained the underlying documents from NNECO at a late date and that the Staff had neglected to send a representative to the NNECO plant (as it had a right to do under previous Licensing Board discovery rulings) at the time the logs were produced for the Intervenors. Taking into account its previous lenience to the Intervenors with respect to filing dates, as well as the desirability of having as complete a record as possible on the various incidents relied on by the parties in their presentations, the Licensing Board granted the Staff motion and permitted the record to be supplemented with Mr. Cerne's additional affidavit and the underlying documents relative to RFO6 (Tr. 328-29).

At the oral argument, we heard the parties' presentations with respect to each of the contentions, although, as indicated earlier, we truncated the presentations with respect to Contention 5 in view of the parties' agreement on a technical specification that would resolve that contention. Following the oral argument, the Licensing Board and parties' representatives took a site tour of the Millstone Unit 3 SFP.[15]

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[13][CCAM/CAM's] Objection to NRC Staff's Motion to File Affidavit of Antone Cerne Regarding Refueling Outage 6, dated July 18, 2000.

[14]Tr. 317-19 (CCAM/CAM); Tr. 319-21 (NNECO).

[15]At the conclusion of the oral argument on July 20, 2000, CCAM/CAM moved that the forthcoming site tour be transcribed. The Licensing Board denied that motion (Tr. 539). There is no regulatory requirement that a tour of this type be transcribed. When a Licensing Board tours a facility that is of concern in an adjudicatory proceeding, each of the parties is invited to attend, to avoid any ex parte contacts between the Licensing Board and the Licensee. See Dairyland Power Cooperative (La Crosse Boiling Water Reactor), LBP-80-2, 11 NRC 44, 50 (1980). Here, a representative of CCAM/CAM accompanied the Licensing Board for the duration of the tour, in order to ensure that adequate opportunity was present for the Intervenors to be aware of any communication that occurred between Board members and representatives of the Licensee. Sufficient precautions were thus taken to ensure that ex parte

(continued...)

We turn now to a discussion of each of the contentions before us, to determine whether any of them warrants a further evidentiary hearing.

B. Contention 4.

CCAM/CAM Contention 4, as admitted in LBP-00-02, 51 NRC at 32-33, reads as follows:

> "Undue and Unnecessary Risk to Worker and Public Health and Safety."
>
> The new set of administrative controls trades reliance on physical protection for administrative controls to an extent that poses an undue and unnecessary risk of a criticality accident, particularly due to the fact that the licensee has a history of not being able to adhere to administrative controls with respect, inter alia, to spent fuel pool configuration.

This contention asserts that NNECO's proposed reliance on administrative controls to assure proper fuel rod placement (in terms of age of the fuel and burnup considerations) will potentially lead to a criticality accident, in view of the past history of the Licensee of failing to adhere to--indeed, ignoring--various administrative controls concerning the SFP configuration.

As a genesis for this claim, we note that among the reasons leading to the voluntary shutdown of Millstone Unit 3 (following its being placed on the Commission's "Watch List" because of numerous regulatory violations) from 1996 to 1998 was NNECO's past failure to adhere to technical specifications concerning, inter alia, placement of fuel in the SFP[16] and, indeed, NNECO's inadequate corrective measures and, in some cases, its attempts to cover

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[15](...continued)
contacts did not occur, without the additional logistical problems that would have arisen if the court reporter, with his transcribing equipment, were to have accompanied the parties on the tour.

[16]See Staff Exh. 12, Plant Information Report No. 3-94-079 (January 14, 1991); Staff Exh. 13, Adverse Condition Report #710 (April 27, 1995). Both errors were identified during the spent fuel process and corrected before any assemblies were physically stored in an incorrect location. See also First Cerne Affidavit ¶ 6.

up similar failures.[17] CCAM/CAM claim in essence that the failures must be attributable to the inability and/or unwillingness of NNECO to carry out complex administrative controls that, in CCAM/CAM's view, are proposed to become more complex as the capacity of the SFP to hold fuel rods is increased. Not only does CCAM/CAM deem such controls (indeed any ongoing controls) to be legally impermissible (see discussion under Contention 6) but, in this contention, they attempt to demonstrate that NNECO is incapable of successfully administering such controls, leading necessarily (in their view) to the likelihood of a potential criticality accident.

At the outset, we must define what a criticality accident is. CCAM/CAM defines "criticality accident" as "a criticality accident or a violation of criticality limits."[18] Criticality will not be reached until the k_{eff} of the SFP[19] is at least 1.0. A regulatory goal (not a regulation) is to keep the k_{eff} at 0.95 or lower. Notwithstanding CCAM/CAM's claim, there is no "accident" when the k_{eff} exceeds 0.95 but is less than criticality of 1.0. Further, the widely accepted double contingency principle provides that:

> At all locations in the LWR spent fuel storage facility where spent fuel is handled or stored, the nuclear criticality safety analysis should demonstrate that criticality could

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[17]See Notice of Violation and Proposed Imposition of Civil Penalties ([NNECO], Millstone Station Units 1, 2, and 3)(Dec. 10, 1997)(NRC Staff Exh. 11), which identifies alleged violations relating to inadequate engineering, inadequate corrective actions, failure to comply with technical specifications, and failure in implementing aspects of the quality assurance program; see also United States v. Northeast Nuclear and Northeast Utilities, No. 3-99-CR-211 (D. Conn. Sept. 29, 1999)(judgment ordering Northeast Utilities and subsidiary NNECO to pay penalties for nuclear safety and environmental law violations relating to false statements made to the NRC regarding the qualifications of reactor operator candidates and the deliberate alteration of wastewater discharge readings).

[18]CCAM/CAM Written Summary at 32 n.41 (emphasis supplied).

[19]The measure of criticality is the estimated ratio of neutron production to neutron absorption and leakage, or k_{eff}. See 10 C.F.R. § 50.68 (b)(2). See also Kopp/Attard Affidavit ¶ 9.

> not occur without at least two, unlikely, independent, and concurrent failures or operating limit violations.[20]

Finally, as a historical fact, no criticality accident resulting from improper use of administrative controls in a SFP has ever occurred. Indeed, there has never been, to any party's knowledge, a criticality accident in a SFP.[21] It is the potential for such an accident that underlies the Intervenors' contention. We turn here to this claim.

1. CCAM/CAM Position: In support of its claim that the proposed license amendment would significantly increase the probability of a criticality "accident"--defined by CCAM/CAM (although, as indicated above, improperly so) as a situation where the regulatory goal of K_{eff} of 0.95 is exceeded, CCAM/CAM identifies five factors that they claim would increase the probability of a criticality accident:[22]

> First, the amendment would lead to increased complexity of the administrative controls upon which NNECO will rely to prevent a criticality accident. Second, failure of administrative controls can lead to a criticality accident, and a failure of this type is more likely if administrative controls are more complex. Third, criticality calculations can contain errors, and reliance on administrative controls of increased complexity will increase the potential that such errors will lead to a criticality accident. Fourth, experience shows that administrative controls on fuel positioning are likely to fail, and failure is more likely if these administrative controls are more complex. Fifth, there is a significant probability that the concentration of soluble boron in the pool water will be insufficient to prevent a criticality accident at the time of or subsequent to a fuel mispositioning event.

As an additional factor, CCAM/CAM further stress the existence of ongoing, as well as historical, maintenance problems at the facility.

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[20]See NNECO Written Summary at 23; CCAM/CAM Written Summary, Appendix A. Neither the Intervenors nor the Staff was willing to define what they mean by the term "likely" or "unlikely" (Tr. 365-7, 442).

[21]Tr. 361; see Los Alamos National Laboratory, United States Dept. Of Energy, Report # LA 13638, A Review of Criticality Accidents (2000 Rev.) at 64.

[22]CCAM/CAM Written Summary at 32.

Additionally, in support of their claim, the Intervenors first assert that the administrative controls under the license amendment would be more complex than previously, on the basis both of (1) the number of parameters considered--from enrichment and burnup at present to enrichment, burnup and decay time under the proposed amendment--and (2) the increased number of fuel rods proposed to be stored. Next, CCAM/CAM refer to a set of mispositioning events at the SFPs of a number of U.S. nuclear power plants.[23] In addition, they cite the January 21, 1987 violation at Oyster Creek Unit 1: Licensee Event Report 219/87-006-00 (February 24, 1987)(CCAM/CAM Exh. 22).[24]

In support of the proposition that criticality calculations can contain errors, CCAM/CAM cite Licensee Event Reports from two reactors, together with an NRC Information Notice.[25]

The proposition that boron dilution can occur is not tied to the amendment, but is pertinent because the Licensee relies on soluble boron in the water to conform to regulatory

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[23]Byron Station: May 28, 1996 (Licensee Event Report 454/96-008-00 (June 25, 1996))(CCAM/CAM Exh. 19); Farley Unit 1: March 23, 2000 (Licensee Event Report 348/2000-004-00 (April 20, 2000)(CCAM/CAM Exh. 20); McGuire Unit 1: October 24, 1991 (Licensee Event Report 369/91-016-00 (November 25, 1991 (CCAM/CAM Exh. 21). Fuel handling errors at Millstone (CCAM/CAM Exh. 23) are described in the disclosures of NNECO in response to the Intervenors' First Set of Interrogatories dated March 21, 2000 (request for "all instances of error at Millstone in managing, moving, placing or tracking fresh or spent fuel at Millstone").

[24]This event is not, however, a fuel mispositioning event; fresh fuel assemblies were placed where they were supposed to be pending refueling, but the Technical Specification governing the enrichment permitted in the rack had not been amended to account for the increased enrichment of the new fuel.

[25]McGuire Units 1 and 2: March 2, 2000 (Licensee Event Report 369/0003 (March 30, 2000)(CCAM/CAM Exh. 16); Millstone Unit 2: February 14, 1992 (Licensee Event Report 336/92-003-01)(June 25, 1992))(CCAM/CAM Exh. 17); Millstone Unit 2: April 22, 1992 (NRC Information Notice 92-21, Supplement 1, Spent Fuel Pool Reactivity Calculations)(CCAM/CAM Exh. 18).

limits in the case of a design basis accident. NNECO Exh. 1, Tables 4.2.7 and 4.2.8. CCAM/CAM cite a boron dilution event at McGuire Unit 1, July 11,1994 ,[26] as well as a number of other events which demonstrate that errors have occurred at a number of plants while handling fuel.[27]

Additionally, the Intervenors cite specific entries in the Reactor Engineering logs at Millstone Unit 3 during Refueling Outage 6 (RFO6) as a demonstration of both a continued weakness in maintenance at Millstone Unit 3 and an example of the failure of administrative controls. Finally, the Intervenors cite a Memorandum (CCAM/CAM Exh. 12) from J. F. Beaupre, NNECO Unit 3 Technical Support Engineering, regarding the performance of the equipment during RFO6, in which the equipment performance is said to show an adverse trend in maintenance of fuel handling equipment.

2. NNECO and Staff Positions: NNECO and the Staff take similar positions--concluding that the proposed use of administrative controls is consistent with current industry practices and regulatory norms--in particular, the double contingency principle cited above--and is based on a defense-in-depth approach.[28] The Staff points to a long history of the use

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[26]Licensee Event Report 369/94-005-00)(August 10,1994)(CCAM/CAM Exh. B-11).

[27]See CCAM/CAM Written Summary, Appendix B.

[28]NNECO Written Summary at 15, 17; Turner Affidavit ¶¶ 42-49. NNECO further asserts that its proposal is consistent with the intent of the Nuclear Waste Policy Act (NWPA), 42 U.S.C. § 10101 (1982), particularly § 131(a), 42 U.S.C. § 10151, where Congress finds that "the persons owning and operating civilian nuclear power reactors have the primary responsibility for providing interim storage of spent nuclear fuel from such reactors by maximizing, to the extent practical, the effective use of existing storage facilities at the site of each civilian nuclear power reactor, and by adding new onsite storage capacity in a timely manner where practical . . ." In our opinion, this position of NNECO primarily reflects its motivation for expanding the capacity of its SFP and has no bearing on the question before us, NNECO's ability to implement administrative controls safely.

of administrative controls like those proposed by NNECO,[29] and that administrative controls of various types are currently used throughout the Millstone-3 plant to assure safe operation. The Staff explicitly points to the quality assurance/quality control provisions of 10 C.F.R. Part 50, App. B.[30] The Staff also observes that both the American National Standards Institute (ANSI) Standard ANSI/ANS 8.1 (section 4.2.1, in particular[31]) and 10 C.F.R. § 50.68 allow the use of administrative controls to prevent criticality in fuel handling and storage,[32] that the NRC endorsed ANSI/ANS 8.1, 1983, in Revision 2 to Regulatory Guide 3.4,[33] and that nothing in the governing regulations distinguishes between one-time and ongoing administrative controls.

Further, NNECO claims that the proven fuel handling procedures, as well as the practical implications of the proposed physical layout for the Unit 3 SFP, provide ample controls to ensure that fuel assemblies will be placed in appropriate regions in the SFP. NNECO further claims that the potential for boron dilution in the SFP has been addressed so that a dilution event is extremely unlikely at Millstone Unit 3; that criticality analyses show a substantial margin of safety; and that the Millstone recovery initiative has progressed to the

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[29]Licensees have used administrative controls in essentially all burn-up-dependent storage pools since the early 1980s. Kopp/Attard Affidavit ¶13.

[30]First Cerne Affidavit at ¶ 8.

[31]Section 4.2.1 of ANSI standard ANSI/ANS 8.1 states that criticality safety may be achieved by controlling one or more parameters of a system within subcritical limits and that control may be exercised administratively through procedures.

[32]According to the Staff, 10 C.F.R. §50.68 allows the use of administrative controls to prevent inadvertent criticality in fuel handling and storage. Specifically, 10 C.F.R. § 50.68(b)(1) allows a licensee to rely upon plant procedures to "prohibit the handling and storage at any one time of more fuel assemblies than have been determined to be safely subcritical under the most adverse moderation conditions feasible by unborated water."

[33]Kopp/Attard Affidavit ¶ 13; Reg. Guide 3.4 (March 1986); Staff Exh. 48.

point that past performance deficiencies have no bearing on the current ability of NNECO successfully to carry out administrative controls as required by the amendment at issue.

As set forth in the affidavits of Joseph J. Parillo and Michael C. Jensen,[34] NNECO argues that the proposed Unit 3 storage racks and regional storage system do not add significant complexity to the spent fuel storage system. The Staff observes that the proposed administrative controls only serve to augment the current procedures to the extent necessary to accommodate the 15 new storage racks and changes in the regions.[35] As set forth by NNECO, the net effect will be to add two new burnup versus enrichment curves via Technical Specifications (TS) 3.9.3 and 3.9.4, in addition to the existing TS 3.9.1. Administrative procedures in place to comply with TS 3.91 will be replicated for TS 3.9.3 and 3.9.4.[36] Fuel assemblies (125 in number) currently stored in the SFP are qualified to be stored in either of the new regions 1 or 2 of the proposed configuration. Consequently, upon initial reconfiguration of the SFP, all the fuel assemblies will be in the correct locations. Subsequent storage will utilize the same procedures as used with the initial 125 assemblies.[37]

Most significantly, the raw statistic of the frequency to date of fuel misplacements at the Millstone Units 2 and 3 SFPs is estimated by NNECO as one in three thousand (1/3000) moves.[38] According to the Staff, there have been no reportable instances of fuel misplacements at Millstone Unit 3.

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[34]Parillo Affidavit ¶ 6; Jensen Affidavit ¶ 11.

[35]Staff Written Summary at 37-38.

[36]Parillo Affidavit ¶¶6-18; Jensen Affidavit ¶¶12-35.

[37]Jensen Affidavit ¶¶14-15.

[38]Parillo Affidavit ¶41.

With respect to the potential for boron dilution, on which CCAM/CAM rely to some extent, NNECO claims, through the affidavit of Robert G. McDonald, that there has never been a boron dilution event at Millstone station (¶ 7); that the determination of boron concentration in the revised TS surveillance procedure will be no more complex or burdensome [than the current one] as a result of the proposed license amendment request (¶¶ 9, 11-16). Amendment 158 to the Unit 3 Technical Specifications on April 9,1998 revised the Unit 3 SFP boron concentration surveillance frequency to every 72 hours whenever fuel assemblies are in the SFP; since that time, the largest observed change in boron concentration was a decrease of 49 ppm from December 1,1999 to December 3, from a level of 2850 ppm. The change was attributed to evaporative make up and normal sample accuracy (¶ 10). Additionally, Mr. Parillo points out that it would take 500,000 gallons of unborated water to dilute the water in the SFP to 800 ppm boron from its normal level of 2600 ppm.[39] Further, overhead piping in the Millstone-3 SFP building does not go over the pool (Tr. 408), thus reducing the potential for a boron-dilution event.

Dr. Stanley Turner illustrates the degree of margin against exceeding criticality limits via a series of beyond design basis criticality analyses, summarized in Tables 1-3 of his affidavit.[40] These tables were generated using computer codes that have been extensively reviewed in peer-reviewed technical literature and which have been benchmarked against well-documented critical experiments. These results can be summarized as follows:

For region 1, the regulatory limit of $k_{eff} \leq 0.95$ is exceeded only for the case of the entire rack filled with fresh fuel of 5% enrichment, accompanied by the loss of all soluble boron. The predicted k_{eff} in that case is 0.9728.

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[39]Parillo Affidavit ¶25.

[40]Turner Affidavit at 26-28.

For region 2, the worst case occurs in the hypothetical event of the region being completely filled with fresh fuel of 5% enrichment, with the simultaneous loss of soluble boron to a level of 2000 ppm. In that case the k_{eff} = 0.9842.

In region 3, where there is no credit taken for fixed poison, there are a number of interesting beyond design basis events. If the region were entirely filled with fresh, 5% enriched fuel, the boron concentration would have to be about 1320 ppm to prevent criticality. (The k_{eff} is 0.9811 in this case.) Another configuration is that of eight fresh assemblies loaded into an otherwise empty rack; in that case the k_{eff} = 0.9752. Finally, the case of a single misplaced assembly composed of fresh fuel in a rack filled otherwise with spent fuel leads to k_{eff} = 0.9707 if all soluble boron were lost at the same time. Additionally, if both trains of SFP cooling were lost, the temperature of the pool could rise to the point (150°F) at which criticality would be achieved. (If as little as 30 ppm boron were available, this would not occur.)

In conjunction with these analyses, Dr. Turner notes that "[t]o the best of my knowledge, there have never been any incidents involving the mislocation of a fresh unburned assembly of high enrichment."[41]

The progress of the Millstone recovery initiative is addressed by NNECO in the affidavit of David W. Dodson, who, in discussing the shutdown of all Millstone plants in 1996 and the subsequent recovery and restart proceedings, states:

> Over a recovery period of more than two years, NNECO rebuilt its nuclear organization and programs with an emphasis on developing an improved safety culture, responding in a timely and constructive manner to adverse conditions and employee concerns, verifying and validating the design basis,

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[41] Id. ¶ 66.

> and establishing program controls that would ensure compliance with NRC requirements into the future.[42]

The details of the processes of recovery are described in ¶¶ 10-17, and the post restart performance in ¶¶ 18-20. On this basis, Mr. Dodson finds the Intervenors' fundamental premise that NNECO will not comply with administrative controls related to fuel handling and boron concentration "incomprehensible."[43]

The Staff likewise addresses the past violations and subsequent recovery initiative, finding that the December 1997 Notice of Violation "does not reference any spent fuel pool violations at Millstone Unit 3." First Cerne Affidavit ¶ 6. The two incidents reported in 1994 and 1995 regarding errors in spent fuel pool movement were identified and corrected before any assemblies were stored in an incorrect location (id). With respect to a wider range of problems, the Staff states that "[p]rocedure quality and adherence had been a chronic problem since the early 1990s (Linville Affidavit ¶ 11). Following the shut-down and execution of the Restart Assessment Plan, NRC inspections found substantial improvement in procedure quality and adherence, and that the procedures were acceptable for restart (id. ¶¶ 12-13). Following restart in June 1998, oversight of the plant continued, with a conclusion in April 1999 that the plant had not yet demonstrated sustained, successful plant performance. Thus, Unit 3 was placed in the status of a regional-focus plant (id. ¶ 14). Continued improved plant performance led the Commission to close the order requiring third party oversight on March 11, 1999 (id. ¶ 17). The plant was returned to normal oversight in May 2000, following demonstration of sustained, successful plant performance (id. ¶ 18). As part of the plant surveillance during RFO6, NRC inspectors noted the problems with the

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[42]Dodson Affidavit ¶9.

[43]Id. ¶ 21.

refueling machinery in Inspection Report 50-423/99-06 dated July 9,1999. An excerpt from that report, referring to problems encountered with the refueling machinery, states:

> We understand that your staff is developing longer-term corrective actions to reinforce station management's configuration expectations and ensure that such events are not repetitive and do not result in more severe consequences.[44]

The Staff further observes that the refueling machinery maintenance problems detected during RFO6 (and referenced by CCAM/CAM) will be repaired (or machinery replaced) prior to RFO7: "the licensee [NNECO] is currently proceeding with corrective action plans to replace both the Unit 3 fuel transfer system and SIGMA refueling machine prior to the start of the next refueling outage, scheduled for 2001."[45]

The Staff also states that nothing in the applicable regulations makes a distinction between one-time and on-going administrative controls. Because human action is necessary to move fuel between the reactor and the storage facility, it is inescapable that administrative controls on fuel movement be used to ensure that the physical measures for preventing criticality are properly employed. To date, there have been no reported instances of criticality in a SFP in the United States.[46]

Finally, the Staff points out that the administrative controls currently in place at Millstone-3 include TS 3.9.13, Figure 3.9-1 (NNECO Exh. 1, Att. 1), the Millstone Nuclear Power Station Surveillance Procedure SP 3866, Rev. 3, "Spent Fuel Pool Boron Concentration, Nov. 8, 1996 (Staff Exh. 18); and Millstone Nuclear Power Station Surveillance Procedure SP 31022, Rev. 4, "Spent Fuel Pool Criticality Requirements," Apr. 20,1997 (Staff Exh, 19). According to the Staff, they are similar to those proposed in the

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[44]Second Cerne Affidavit ¶ 10; see also NRC Staff Exh. 11.

[45]Second Cerne Affidavit ¶ 12.

[46]Kopp/Attard Affidavit ¶¶ 15, 40.

amendment. These administrative controls have not resulted in any reportable instances of fuel assembly misplacements at Millstone Unit 3.[47]

4. Licensing Board Conclusions on Contention 4.

There is a two-part test established in 10 C.F.R. §2.1115(b) for determining whether a full evidentiary hearing is warranted on a given contention:

> (1) There must be a genuine and substantial dispute of fact which can only be resolved with sufficient accuracy by the introduction of evidence in an adjudicatory hearing; and,
>
> (2) The decision of the Commission is likely to depend in whole or in part on the resolution of that dispute.

After an exhaustive review of the entire record on this contention, we conclude that Contention 4 fails the first test; hence we do not need to reach the second. We do not wish, however, to denigrate the importance, in terms of licensing, of the substantive questions raised by this contention.

At the heart of the matter is whether the revision of Millstone Unit 3's Technical Specifications to include Figures 3.9-1, 3.9-3, and 3.9-4, detailing the limits on fuel placement, are so complex as to make fuel misplacement likely. Although expert testimony on the human factors involved in implementing the revised TS might be helpful, the parties' arguments present no issue of fact to be resolved.

a. Fuel Misplacements. Intervenors' claim that fuel misplacements do indeed occur is not disputed. However, close examination of the LERs cited by CCAM/CAM indicates that the regulatory limit on reactivity of 0.95 was not breached in either the Byron (CCAM/CAM Exh. 19), the Farley (CCAM/CAM Exh. 20), or the McGuire (CCAM/CAM Exh. 21) events.

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[47] Id. ¶ 16.

In the Byron event, the three fuel elements of burnup 32648, 32638, and 32728 Mwd/t were loaded in regions where the minimum burnups were 32651, 32651, and 32771 Mwd/t respectively.[48] Because the burnup was essentially the same (within 0.1%) of the fuel rods already stored in the same regions, the reactivity limit of 0.95 was not challenged.[49]

At Farley, three fuel elements were found to be misplaced. No details are given and the safety analysis simply states that the reactivity limit of 0.95 was not exceeded inasmuch as the boron concentration in the SFP was 2000 ppm.

At McGuire Unit One, on October 24, 1991, eleven fuel elements were found not to have been placed in a pattern allowing a vacant row between normal storage locations and a "checkerboarded" region. Using a Monte Carlo analysis, the plant staff found that the criticality limit of 0.95 was not exceeded, even without taking credit for the 2000 ppm boron in the SFP.

Another McGuire Unit One event, on August 10, 1994 (see CCAM/CAM Written Summary, Appendix B at B-23; CCAM/CAM Exh. B-11) invoked the inadvertent transfer of unborated water from the fuel transfer canal to the SFP. The event took place over two days, involving about 28,000 gallons of unborated water and resulted in lowering the boron concentration in the SFP from 2105 ppm to 1957 ppm. No criticality limits were exceeded, but the Technical Specification limit of 2000 ppm was violated.

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[48]Actually, only the first 3 digits are significant; the other figures represent bookkeeping carry-over.

[49]One can estimate the change in reactivity from the approximate expression $\delta k/k = 1/4\ \delta m/m$ where m is the mass of uranium. This approximate relationship is valid for typical LWR lattices. This yields an estimated change in reactivity of less than 0.00025; since there were other fuel assemblies loaded with more than the minimum required burnup, this estimate is a very conservative upper limit. See C.N. Kelber & R. Avery, "Physics Analysis of Proposals for EBWR Core 2," ANL 6306 (1963).

The Intervenors also referred to the Oyster Creek event of January 21, 1987, in which fresh fuel of 3.19 % was loaded into fresh fuel positions in the SFP. The array had only been qualified for fuel of 3.01% enrichment. This event was not a misplacement, because the fuel was where it was supposed to be. In any event, analysis showed that the criticality limit of 0.95 was not exceeded. (Indeed, because of the different configuration of the more highly enriched fuel, the array reactivity probably decreased.)

Finally, the April 26,1994 incident at this reactor, Millstone Unit 3, involved an aborted attempt to load a fuel assembly into location N-7 instead of N-6, and did not involve loading an assembly into a region for which it was not qualified (Tr. 349), inasmuch as the two locations are in the same region. Further, whatever its significance, this event occurred prior to the 1996-98 shutdown and restart of this reactor and thus does not necessarily reflect on the Licensee's current capability for carrying out administrative controls properly.

Taking into account the relatively large number (more than 50) of SFPs in the United States with administrative controls to provide for burnup credit, these errors are commensurate with the conservatively estimated error rate for Millstone of 1 per 3000 moves.[50]

b. Boron dilution.

Because the Farley event report relies on the Boron concentration for the assertion that the reactivity limit of 0.95 was not exceeded, it is appropriate to consider the so-called boron-dilution (or boron-loss) event described by the Intervenors. The event happened at Millstone Unit 2: as described by counsel for NNECO, "that incident involved basically a two inch drop in the level and it was identified by a plant equipment operator even before the alarm level was reached" (Tr. 409). The Staff stated that it lasted eighteen minutes (Tr.

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[50]Parillo Affidavit ¶ 41.

438). Approximately 2370 gallons of borated water were transferred. The Boron concentration was not reduced. This event patently does not qualify as a boron dilution event. Not only was the Boron concentration not changed, but the plant safety systems worked as intended--the drop in water level was detected even before the alarm level was reached (Tr. 439).

c. Errors in criticality calculations.

We turn now to the issue of errors in criticality calculations. Because the Intervenors specifically do not allege any errors in NNECO's criticality calculations (Tr. 348), this matter is tangential to the contention. In the older case at Millstone Unit 2, there was a calculational error that was a mistake in calculating the effective epithermal capture cross-section of boron. The error was not in any way related to the use of complex administrative controls, or taking credit for burnup.

The error at McGuire Units 1 and 2 on March 2, 2000 was related to accounting properly for the axial distribution of burnup. Initially, the licensee at McGuire used methods similar to those routinely used by the NRC Staff to perform criticality calculations, but neglected to correct these for the axial variation of burnup. The Staff (Kopp/Attard Affidavit at 19) claims to provide a correction to two-dimensional calculations to account for axial variation of burnup. Apparently this was not done during the initial NRC Staff review of McGuire. There was no case of exceeding the k_{eff} limit of 0.95. A reanalysis of hypothetical misloading accidents showed that the minimum Boron concentration set in the Technical Specification should be changed to 460 ppm and 550 ppm for regions 1 and 2 of the SFP. Since the normal Boron concentration is 2475 ppm, there was no appreciable change in the margin of safety.

d. Maintenance Problems.

It is common knowledge that the Millstone plant has been plagued by many problems, including maintenance problems. The Affidavit of James C. Linville of the NRC Staff summarizes the history of this plant and details the efforts of the NRC and NNECO to resolve these problems. On May 25, 2000, the NRC staff testified to the Commission that

"[v]ery good operational performance has been noted by the NRC over the past year at Millstone 3,...but the NRC will continue to follow Licensee and third party activities.[51]. . ."

With respect to the particular matters cited by the Intervenors with regard to RFO6, Mr. Cerne's Second Affidavit, at Paragraph 12, states that "[t]he licensee is currently proceeding with corrective action plans to replace both the Unit 3 fuel transfer system and SIGMA refueling machine prior to the start of the next refueling outage, scheduled for 2001."

Misoperation of the fuel transfer system imposes an economic penalty on NNECO; it does not affect the actual location of the fuel in the SFP. Hence, there is an economic incentive for NNECO to make the proposed repairs, and no safety significance if they do not.

e. Summary. We find that NNECO has demonstrated that it can adhere to administrative controls, with adequate safety margin and defense-in-depth, without posing an undue or unnecessary risk to plant workers or the public. The conservatively estimated error rate of fuel assembly misplacement of 1 in 3000 moves (or once every 9 years) is not high enough to characterize such an event as likely. Safety margins are maintained by the regulatory requirement that rack reactivity be less than 0.95, while the use of soluble boron adds defense-in-depth against an accidental criticality. Criticality calculations have used conservative assumptions, thereby introducing additional margin. We find, therefore, that, relative to Contention 4, there is no genuine and substantial dispute of fact or law that can only be resolved with sufficient accuracy by the introduction of evidence in an evidentiary hearing. As such, based on the record before us, we dispose of this contention as being resolved in favor of NNECO.

C. Contention 5.

CCAM/CAM Contention 5, as admitted in LBP-00-02, 51 NRC at 34, reads as follows:

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[51]Linville Affidavit ¶18.

"Significant Increase in Probability of Criticality Accident."

This contention, when admitted, was premised on a then-proposed technical-specification (TS) amendment that would have required surveillance of SFP boron concentration only during times of fuel movement within the SFP. The TS specification, prior to amendment, required that soluble boron be maintained in the SFP at any time irradiated fuel assemblies are stored in the pool, that the minimum concentration would be 1,750 ppm, and that surveillance be carried out every 72 hours.[52] The contention read:

> Will the proposed change in schedule of surveillance of the soluble boron in the fuel pool lead to a significantly increased likelihood of a criticality accident stemming from a misloaded fuel element, during the interval between fuel movements? (LBP-00-02, 51 NRC at 36.)

Since the admission of that contention, and in part because of it, NNECO modified the proposed TS specifically to address the Intervenors' concerns. In an April 17, 2000 supplement to its application, NNECO submitted a modification to the proposed TS revisions that would amend TS 3.9.1.2 to require that soluble boron concentration be maintained at greater than or equal to 800 ppm whenever fuel assemblies are within the SFP. The modification also would amend TS 4.9.1.2 to require verification of the boron concentration every 7 days.[53]

In their written summary, see CCAM/CAM Written Summary at 51-52, Intervenors clearly stated that their concerns articulated in Contention 5 would be satisfied by implementation of the TS revisions proposed by NNECO on April 17, 2000. See also Oral Argument Tr. 330-337. CCAM/CAM expressed uncertainty, however, that the Staff would accept the proposed TS inasmuch as it had found no merit to the contention. The

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[52]Staff Written Summary at 44, citing Staff Exh. 1, Attach. 1 at 6.

[53]NNECO Exh. 2 at 1-2; NNECO Exh. 2, Att. 1 at 1.

Intervenors requested that no license amendment be issued in this proceeding unless it contains a requirement to verify the SFP's boron concentration at least once every seven days. CCAM/CAM Written Summary at 51-52. At the oral argument, CCAM/CAM also raised questions whether the proposed surveillance requirement would actually be put into effect. Tr. 332. The Licensing Board stated that it would order the TS, as proposed by NNECO on April 17, 2000 and accepted by CCAM/CAM, and to which the Staff, at oral argument, offered no objection (Tr. 335), to be included in any amended license (assuming other aspects of the proposed change were found acceptable).[54] By this Order, we are directing that this TS be included in the license. This result appears to satisfy all parties to this proceeding.

D. Contention 6.

CCAM/CAM Contention 6, as admitted in LBP-00-02, 51 NRC at 36, reads as follows:

"Proposed Criticality Control Measures Would Violate NRC Regulations."

The basis that we accepted for litigation, and which gives substance to the contention, states:

> GDC 62 [General Design Criterion 62] requires that: "Criticality in the fuel storage and handling system shall be prevented by physical systems or processes, preferably by use of geometrically safe configurations." NNECO proposes to seek to prevent criticality at Millstone 3 by the use of ongoing administrative methods.

We went on to point out, in LBP-00-02, that, except with respect to identifying the precise administrative controls proposed to be utilized, as well as the existing administrative controls that would be superseded, the litigable issue posed by this contention essentially boils down

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[54]According to CCAM/CAM, their acceptance of the boron monitoring condition was explicitly not an agreement that, contrary to their legal position on Contention 6, the presence of soluble boron in pool water can be relied on as a criticality prevention measure, under either normal or accident conditions. They state that any benefit of soluble boron can only be supplemental to a primary and sufficient set of criticality prevention measures that rely on physical systems or processes and which do not require support by ongoing administrative controls. CCAM/CAM Written Summary at 52.

to a question of law: "[d]oes GDC 62 permit a licensee to take credit in criticality calculations for enrichment, burn-up, and decay time limits, limits that will ultimately be enforced by administrative controls?" LBP-00-02, 51 NRC at 41.

In their written summary, as well as at the oral argument, CCAM/CAM continue to treat this contention as a question of law.[55] They claim that the proposed license amendment fails to comply with GDC 62 because it improperly relies on administrative controls for criticality prevention. CCAM/CAM further claims that the license amendment application is inconsistent with NRC Staff guidance for analysis of criticality prevention measures.[56]

1. Background for claim. NNECO's license-amendment proposal involves placing additional storage racks in the SFP. The new racks would be divided into two regions. Region 1 would store fuel in either a 3-out-of-4 array or 4-out-of-4 arrangement, depending on enrichment and burnup considerations. Region 2 would store fuel in a 4-out-of-4 arrangement, with more restrictive burnup/enrichment limitations than Region 1. The new racks in both Regions are to use Boral panels (fixed neutron absorbers). Finally, the existing storage racks would be re-designated as Region 3, where fuel would be stored in a 4-out-of-4 array, subject to restrictive burnup/enrichment decay limits.[57] These latter restrictive burnup/enrichment decay limits in Region 3 are the primary administrative controls upon which CCAM/CAM's legal claims are focused.

2. Foundation for claim. The Intervenors first claim that the GDC, appearing in 10 C.F.R. Part 50, Appendix A ("General Design Criteria for Nuclear Power Plants"), constitutes

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[55]The Licensee and NRC Staff agree with this characterization. NNECO Written Summary at 52-53; Tr. 494 (Licensee); NRC Staff Written Summary at 53.

[56]CCAM/CAM Written Summary at 53-54.

[57]NNECO Written Summary at 50, relying on Parillo Affidavit ¶¶ 7-12.

the minimum design criteria for nuclear power plants, that they are intended to provide basic guidance for the more detailed safety regulations, and that there are a variety of methods for demonstrating compliance with the GDC. But although allowing flexibility, the "fundamental principles of the GDC must be adhered to in choosing these methods.[58]

CCAM/CAM claims that sole regulatory foundation for criticality controls in spent fuel pools (SFPs) is GDC 62 and that the plain language of that criterion requires the use of "physical systems or processes to prevent criticality" and thereby precludes the use of administrative controls. GDC 62 reads as follows:

> Prevention of criticality in fuel storage and handling. Criticality in the fuel storage and handling system shall be prevented by physical systems and processes, preferably by use of geometrically safe configurations.

The types of administrative controls proposed by NNECO that CCAM/CAM find inconsistent with GDC 62 are (1) maintenance of a given content of soluble boron in the pool water; (2) limits on fuel enrichment/fuel burnup in Region 1 4-out-of-4 racks and Region 2 racks; and (3) limits on fuel enrichment/fuel burnup and fuel decay time in Region 3 racks.[59] CCAM/CAM recognizes that GDC 62 does not define the phrase "physical systems or processes," but claims it may be understood by reference to the single example provided of an acceptable physical system or process, a "geometrically safe configuration."[60]

3. Definition of Administrative Controls. CCAM/CAM differentiate between types of administrative controls. In claiming that physical systems and processes are distinct in nature from ongoing administrative controls, they concede that any physical measure has some administrative component and any administrative measure has a physical component.

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[58]CCAM/CAM Written Summary at 54 (citations omitted).

[59]LBP-00-02, 51 NRC at 37.

[60]CCAM/CAM Written Summary at 55.

On the one hand, they maintain that if a subcritical margin of reactivity is to be maintained in a SFP solely by use of a geometrically safe configuration, one-time administrative controls will be needed to ensure that the fuel racks provide the required configuration. After the racks are designed, fabricated and installed, ongoing administrative controls would not be required. Similarly, if a subcritical margin of reactivity were to be maintained partly by exploiting the neutron-absorbing properties of the racks, then one-time controls would be needed to assure that those properties are provided--e.g., if Boral panels are attached to the racks, one-time controls will be needed to assure that the panels are properly designed, fabricated and installed. Although periodic inspections may be needed to assure that the panels retain their needed properties, such inspections will be "comparatively straightforward."[61]

In contrast, CCAM/CAM distinguishes ongoing administrative controls requiring continuing actions by persons, such as inputting information into a computer system, and operating and maintaining equipment, which must be carried out throughout the period when criticality is possible, on a continuing, ongoing and completely reliable basis. In particular, they observe that, if restrictions on fuel burnup/enrichment or fuel age are to be used--as here--as a means of criticality suppression, then ongoing administrative controls must ensure that a fuel assembly is never placed in the rack unless its burnup/enrichment level or age is within a specified range.

4. Rulemaking history of GDC 62. To support their reading of GDC 62 as precluding ongoing administrative controls, CCAM/CAM reviewed the rulemaking history of the regulation, finding it to make even more clear that the Commission intended to impose the fundamental requirement that criticality must be controlled by physical rather than

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[61] Id. at 56.

administrative or procedural measures. According to CCAM/CAM, a set of draft General Design Criteria first appeared as an attachment to an Atomic Energy Commission (AEC) press release of November 22, 1965.[62] Draft Criterion 25 proposed language that

> The fuel handling and storage facilities must be designed to prevent criticality and to maintain adequate shielding and cooling for spent fuel under all anticipated normal and abnormal conditions, and credible accident conditions. Variables upon which health and safety of the public depend must be monitored.

Following the receipt of comments from the AEC Staff and the Advisory Committee on Reactor Safeguards (ACRS), the AEC issued a revised draft on October 6, 1966, which included draft Criterion 10, stating:

> Possibilities for inadvertent criticality must be prevented by engineered systems for processes to every extent practicable. Such means as geometric safe spacing limits shall be emphasized over procedural controls.[63]

Another draft appears as a February 6, 1967 attachment to a February 8, 1967 letter from J. J. DiNunno of the AEC to Nunzio J. Palladino of the ACRS.[64] Criterion 61 of that draft read:

> Possibilities for criticality in new and spent fuel storage shall be prevented by physical systems or processes to every extent practicable. Such means as favorable geometries shall be emphasized over procedural controls.

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[62] Id. at 59-60; see also CCAM/CAM Exh. 30.

[63] CCAM/CAM Written Summary at 59, citing AEC memorandum from G. A. Arlotto to J. J. DiNunno and Robert H. Bryan, dated October 7, 1966, and attached Revised Draft of GDC for Nuclear Power Plant Construction Permits, dated October 4, 1966, both attached as CCAM/CAM Exh. 31. The same language appeared in an October 20, 1966 draft, attached to an October 25, 1966 letter from J. J. DiNunno to David Okrent of the ACRS, set forth as CCAM/CAM Exh. 32.

[64] CCAM/CAM Written Summary at 59-60; see also CCAM/CAM Exh. 33.

Shortly thereafter, a proposed appendix to 10 C.F.R. Part 50, setting forth the GDC, was published in the Federal Register for comment.[65] 32 Fed. Reg. 10,213 (1967). Proposed GDC 66 read as follows:

> Criticality in new and spent fuel storage shall be prevented by physical systems or processes. Such means as geometrically safe configurations shall be emphasized over procedural controls.

Few substantive comments were submitted with respect to the proposed GDC. However, the Nuclear Safety Information Center, Oak Ridge National Laboratory (ORNL), commented as follows:

> We do not understand the implication of 'or processes' at the end of the first sentence, nor do we believe that it is practical to depend upon procedural controls to prevent accident criticality in storage facilities of power reactors. Hence, the last sentence of this criterion should be changed to read as follows: 'Such means as geometrically safe configurations shall be used to insure that criticality cannot occur.[66]

The then-AEC thereafter issued another revision of the proposed GDC, commenting that the revised proposed GDC included "minimum requirements" for reactors, whereas the initial proposed criteria had been only "guidance." The proposed revised GDC included GDC 62 as it reads today: i.e. , "Criticality in the fuel storage and handling systems shall be prevented by physical systems or processes, preferably by use of geometrically safe configurations." As adopted in final form, the GDC includes the same language for GDC 62.[67]

5. Other Arguments. After concluding that both the plain language and the rulemaking history of GDC supports their position that precludes reliance on ongoing administrative controls, CCAM/CAM claim that the plain language of GDC 62 is not altered or

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[65]CCAM/CAM Written Comments at 60; see also CCAM/CAM Exh. 35.

[66]CCAM/CAM Written Comments at 61; see also CCAM/CAM Exh. 36.

[67]CCAM/CAM Written Summary at 62; see also CCAM/CAM Exh. 38.

contradicted by other relevant NRC criticality standards but, indeed, is supported by them. They refer in particular to 10 C.F.R. §§ 70.24, 50.68, 72.124, and Draft Regulatory Guide (Reg. Guide) 1.13, or other NRC Staff Guidance.[68]

(1) With respect to 10 C.F.R. §§ 70.24 and 50.68, CCAM/CAM state that, prior to 1998, NRC's only criticality-related regulation for nuclear power plants was 10 C.F.R. § 70.24, requiring criticality monitoring for any licensee authorized to possess significant quantities of special nuclear material (SNM). Under this provision, Licensee's could seek an exemption for good cause shown (§ 70.24(d)).

According to CCAM/CAM, on December 3, 1997, the NRC concurrently published in the Federal Register a proposed rule and a direct final rule, making changes to § 70.24 and adding a new § 50.68. 62 Fed. Reg. 63,911 (1997)[proposed rule]; 62 Fed. Reg. 63,825 (1997)[direct final rule with opportunity to comment]. The purpose was asserted as being the elimination of case-by-case exemptions under § 70.24 (for those meeting the qualification-requirements set forth in the new § 50.68) and to establish a blanket exemption under § 50.68 for licensees that followed a set of criticality accident protection requirements.[69] According to CCAM/CAM, the discussion of safety in criticality control in the statement of considerations for § 50.68 made it clear that the finding of negligible risk set forth therein was "based in part on the assumption that during fuel storage, physical measures such as design features would be used to prevent criticality."[70]

To establish this claim, CCAM/CAM then go on to cite a portion of the Statement of Considerations for 10 C.F.R. § 50.68 (emphasis added by CCAM/CAM):

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[68]CCAM/CAM Written Summary at 62-74.

[69]Id. at 63.

[70]Id.

> At power reactor facilities with uranium fuel nominally enriched to no greater than five (5.0) percent by weight, the SNM in the fuel assemblies cannot go critical without both a critical configuration and the presence of a moderator. Further, the fresh fuel storage array and the spent fuel pool are in most cases designed to prevent inadvertent criticality, even in the presence of an optimal density of unborated monitor. Inadvertent criticality during fuel handling is precluded by limitations on the number of fuel assemblies permitted out of storage at the same time. In addition, [GDC 62] reinforces the prevention of criticality in fuel storage and handling through physical systems, processes, and safe geometrical configuration. Moreover, fuel handling at power reactor facilities occurs only under strict procedural control. Therefore, the NRC considers a fuel-handling accidental criticality at a commercial nuclear plant to be extremely unlikely. The NRC believes the criticality monitoring requirements of 10 CFR 70.24 are unnecessary as long as design and administrative controls are maintained. [71]

The Intervenors thus construe § 50.68 as affirming the language of GDC 62 which, under their reading, restricts criticality prevention measures to physical systems and processes and excludes the use of ongoing administrative controls. CCAM/CAM acknowledge that, although § 50.68 contains some references to procedures and "administrative measures" (certain of which they cite), such references do not undermine or contradict the general requirement of GDC 62 for physical criticality prevention measures.[72] In particular, they construe the "administrative measures" referenced in 10 C.F.R. § 50.68(b)(4) (which relate to the storage of fuel in SFPs) as not undermining the basic requirement (in their view) that criticality be prevented without resort to administrative controls and without taking credit for soluble boron. Further, they note that the type of ongoing administrative measures proposed by NNECO (i.e., control of burnup/enrichment or fuel age) is neither condoned by nor even mentioned in 10 C.F.R. § 10.68).[73]

(2) As for 10 C.F.R. § 72.124, that section relates, as CCAM/CAM point out, to the control of criticality at Independent Spent Fuel Storage Installations (ISFSIs). According to

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[71] Id. at 64-65, citing 62 Fed. Reg. at 63,825-26 (1997).

[72] Id. at 65.

[73] Id. at 67-68.

the Intervenors, these regulations are inconsistent with GDC 62 inasmuch as they do not unequivocally require the use of physical systems or processes for criticality control and instead require a "practicability" standard. CCAM/CAM points out that, as recognized in the preamble to the ISFSI regulations, the design and operation of an ISFSI is fundamentally different from the design and operation of a nuclear power plant and dismisses these regulations as applicable only to ISFSIs and not to this type of proceeding.[74] For all of these reasons, CCAM/CAM reiterate that the administrative criticality prevention measures proposed by NNECO (including the presence of soluble boron to prevent criticality under accident conditions) would violate the "plain meaning and intent" of GDC 62.[75]

(3) With regard to Draft Reg. Guide 1.13, CCAM/CAM assert that NNECO and the NRC Staff had earlier urged that reliance on administrative controls is permitted by Draft Reg. Guide 1.13. The Intervenors recognize a prior Commission statement to the effect that, if there is conformance with Reg. Guides, there is "likely to be compliance with the GDC."[76] But they observe that, where there is inconsistency, the regulation is controlling. They conclude that, to the extent they permit use of administrative controls and procedures, Draft Reg. Guide 1.13 and "the Kopp Memorandum" (presumably CCAM/CAM Exh. 4,[77] although not otherwise identified) violate GDC 62.

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[74]Id. at 68-70. CCAM/CAM add that 10 C.F.R. § 72.142(b), in their view, was not duly promulgated in compliance with the procedural requirements of the Administrative Procedure Act, see 5 U.S.C. § 553, and hence is entitled to no precedential value.

[75]CCAM/CAM Written Summary at 73.

[76]Id. at 73-74, citing Petition for Emergency and Remedial Action, CLI-78-6, 7 NRC 400, 407 (1978).

[77]CCAM/CAM Exh. 4, Memorandum from Laurence Kopp, NRC, to Timothy Collins, NRC, re: Guidance on the Regulatory Requirements for Criticality Analysis of Fuel Storage at Light-Water Reactor Power Plants (August 19, 1998).

(4) CCAM/CAM further criticize the Staff for its previously expressed reliance on its own past practice as justifying reliance on ongoing administrative controls to prevent criticality. The Intervenors claim that the Staff has followed this course without conducting any safety analysis to determine whether its "radical departure" from their view of the requirements of GDC 62 could be justified on safety grounds. CCAM/CAM deplores the absence of any such analysis and further concludes that the Staff, although advocating the so-called Double Contingency Principle in evaluating criticality accidents, has made no attempt to determine what combinations of fuel handling or fuel management errors would violate that principle but, instead, has merely watered down the Double Contingency Principle to a Single Contingency Principle.[78] At oral argument, CCAM/CAM further both expressed disapproval of, and attempted to distinguish, a recent (May 2000) Licensing Board decision in the Shearon Harris proceeding that relied in part on past Staff practice in reading GDC 62 as permitting the use of administrative controls (Tr.473, 482)[79].

6. NNECO Position. Not surprisingly, NNECO takes a vastly different view concerning the permissibility of its using administrative controls. The Licensee recognizes the applicability of GDC 62, but it does not read GDC 62 as precluding the use of the type of administrative controls it is here proposing. NNECO instead asserts that credit for enrichment, burnup and decay time limits (the types of administrative controls in question) involves a "physical system or process" as those terms appear in GDC 62 and thus are explicitly permitted by GDC 62.

There are essentially six parts to the Licensee's argument. First, NNECO cites the recent Shearon Harris Licensing Board decision referenced above (LBP-00-12), which

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[78]CCAM/CAM Written Statement at 74-76.

[79]See Carolina Power & Light Co. (Shearon Harris Nuclear Power Plant), LBP-00-12, 51 NRC 247 (2000).

rejected a contention brought by the Intervenors in that proceeding (who utilized the same expert witnesses as used by CCAM/CAM) similar to the claim advanced here by CCAM/CAM.[80] The Licensing Board in LBP-00-12 held, inter alia, that GDC 62 did not bar the use of administrative controls of the type here sought to be utilized by NNECO. NNECO particularly references the portions of LBP-00-12 dealing with the regulatory history of GDC 62, the requirements of 10 C.F.R. § 50.68, the Draft Regulatory Guide 1.13 (Rev. 2), and the adjudicatory history of GDC 62.

Second, according to NNECO, credit for enrichment, burnup, and decay time limits involve a "physical system or process" fully consistent with GDC 62. The Licensee goes on to explain that there are four--and only four--methodologies for criticality control in SFPs: (1) geometric separation, (2) solid neutron absorbers (e.g., Boral, Boraflex), (3) soluble neutron absorbers (e.g., soluble boron), and (4) fuel reactivity limits (enrichment, burnup, and decay).[81] NNECO portrays fuel reactivity as determined by three factors: (1) fuel assembly structure; (2) initial ("fresh") fuel enrichment; and (3) fuel depletion (or "burnup"). Moreover, according to NNECO, each of the four types of criticality control measures is physical and involves (at some level) a "physical system or process,"[82] and each requires administrative controls at some level. To NNECO, the issue of whether a criticality control measure is

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[80]NNECO acknowledges, however, that the legal interpretation adopted in LBP-00-12 has not yet been reviewed by the Commission (Tr. 495) and thus does not constitute binding legal precedent for interpreting GDC 62 (NNECO Written Summary at 54). Although not binding precedent, NNECO portrays the decision as a "strong indicator that the identical CCAM/CAM Contention 6 also has no merit." Id.

[81]NNECO Written Summary at 52, 55.

[82]Id. at 52.

implemented by administrative controls is irrelevant under the GDC. The Licensee adds that it will employ all four methodologies to control criticality in the Millstone-3 SFP.[83]

Third, NNECO claims that GDC 62 does not preclude the use of administrative controls.[84] The Licensee focuses on its view of the plain language of GDC 62, as well as arguments made by CCAM/CAM to the effect that fuel enrichment and burnup restrictions require--in implementation--administrative controls, which involve assuring that only fuel of the permitted reactivity is moved into a particular storage location, and that GDC 62 (in their view) prohibits such reliance.

Specifically, NNECO claims that nothing in the plain language of GDC 62 lends support to CCAM/CAM's claim that reactivity limits or soluble boron are not permitted because these measures require some administrative measures to implement. The Licensee notes that the term "administrative controls" does not appear in GDC 62. NNECO adds that an interpretation of GDC 62 that would prohibit a method of criticality control because it requires administrative controls would not make sense in that all four methods of criticality control are implemented using some administrative measures.[85]

Fourth, NNECO claims that reactivity limits and boron credit have been previously accepted by the Commission (or at least the Staff), establishing a long course of practice. NNECO reviews Staff practice over almost 20 years, including its approval of at least 20 license amendment requests to expand the capacity of SFPs where use of enrichment and burn-up limits were adopted. NNECO explicitly reviews the history of Reg. Guide 1.13, the guidance of the April 14, 1978 letter from Brian K. Grimes, and the Staff's 1998 guidance

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[83]Id. at 55.

[84]Id. at 57.

[85]Id. at 57-58.

memorandum on criticality control (all of which CCAM/CAM had also reviewed) and concludes, contrary to CCAM/CAM's interpretation, that all of these measures permit reliance on administrative controls.[86]

Fifth, NNECO asserts that 10 C.F.R. § 50.68 affirms that the Commission permits administrative measures, fuel enrichment limits and fuel burn-up limits for criticality control. The Licensee cites the rulemaking history and the regulation itself as demonstrating Commission endorsement of administrative measures to implement criticality control and permission for fuel reactivity limits and soluble boron credit to be used as methods of criticality control for spent nuclear fuel.[87]

Finally, the Licensee claims, contrary to the assertion of CCAM/CAM, that the Commission's GDC rulemaking demonstrates no intent to preclude administrative controls. In reviewing the rulemaking history, details of which we need not here reiterate inasmuch as they are included in the position of CCAM/CAM which we previously have set forth, NNECO stresses that the Commission did not accept the 1967 ORNL comment that "processes" be deleted from the proposed "physical systems or processes". NNECO further stresses that the deletion of "procedural controls" from the proposed second sentence of the rule and the substitution of a "preference" for geometrically safe configurations does not signify an intent to preclude administrative controls but only a preference for geometrically safe configurations. Id. at 66.

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[86]Id. at 60-63.

[87]Id. at 63-65.

7. Staff Position. The NRC Staff reaches the same legal conclusion on this contention as NNECO--i.e. that GDC 62 does not preclude administrative controls--but it reaches that result in a different way. It presents three basic arguments.[88]

First, the Staff claims that the rulemaking history of GDC 62 does not support a prohibition of administrative controls. In reviewing that history--essentially the same events relied on by the Intervenors (described supra)--the Staff interprets it differently. The Staff in particular referenced the ORNL comments on the proposed rule, but emphasized the Staff view that deletion of the phrase "or processes" was inappropriate and that, although assurance of geometrically safe configurations was the preferable means for preventing criticality, procedural controls should not be ruled out. It points out that, given comments recommending against the inclusion of the phrase "physical systems or processes," the AEC proceeded to include that very language. It also asserts that the use of administrative controls to aid in preventing criticality in SFPs has been approved in Consumers Power Co. (Big Rock Point Nuclear Power Plant), ALAB-725, 17 NRC 562 (1983). Finally, the Staff claims that, because human action is necessary to move fuel between the reactor and

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[88]At the outset of its argument (Staff Written Summary at 29), the Staff claims that Intervenors' expert witness, Dr. Gordon Thompson, should be disqualified as an expert witness and his testimony/declaration stricken from the record. The Staff reasons that the Intervenors have not demonstrated Dr. Thompson's expertise in criticality control or any other issue related to the three admitted contentions. We reject that claim, for reasons similar to those assigned by the Licensing Board in the Shearon Harris SFP proceeding for dismissing a similar Staff claim. LBP-00-12, 51 NRC at 259-60. Without expressing any opinion as to the relative weight to be accorded to Dr. Thompson's testimony (vis-a-vis that of other witnesses), we note that Dr. Thompson's experience and training has some bearing upon the subject matter of this proceeding and that it is not necessary for a witness' expertise to be precisely focused on the subject of the testimony to avoid being stricken. The weight to be accorded such testimony depends, of course, in part on the relative expertise of the witness compared to that of other witnesses.

The Staff also claims that the testimony/declaration of Intervenors' other witness, David Lochbaum, should be given no weight, in that he has no training or experience in the area of human factors. We reject that claim for the same reason, noting also that none of the Staff witnesses is an expert in human factors.

storage facilities, it is inescapable that administrative controls on the fuel movement be used to ensure that the physical measures for preventing criticality are properly employed. The Staff adds that it has authorized the use of credit for burnup for at least 18 years and there has never been a criticality accident in any SFP.

Second, the Staff asserts that the Commission itself has authorized the use of administrative controls relating to the prevention of criticality in SFPs. It references the 1998 approval process for 10 C.F.R. § 50.68, the explicit reference to administrative controls in 10 C.F.R. § 50.68 (b)(2) and (3), and the reference to soluble boron in § 50.68(b)(4).

Third, the Staff claims there is no basis for CCAM/CAM's theory that GDC 62 prohibits the use of ongoing administrative controls.[89] The Staff points out that the Intervenors have offered no regulatory, statutory, or scientific support--other than the "untested, unsupported" opinion of their witness, Dr. Gordon Thompson--for the theory that there are two categories of administrative controls, only one of which (one-time controls) is acceptable under GDC 62.[90] The Staff adds that a large number (50 or more) of SFPs operate in a mode similar to that proposed for Millstone-3, with very few incidents of fuel element misplacement and none of inadvertent criticality.[91]

8. Licensing Board Analysis.

After reviewing the positions of each of the parties, we conclude that, contrary to the claim of CCAM/CAM, GDC 62 does not bar the types of administrative controls sought to be used by NNECO. Nor does any other regulation of which we are aware. Indeed, we agree

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[89]Staff Written Summary at 27.

[90]Id. at 62.

[91]Id. at 63-64, 64 n. 30.

with NNECO that such administrative controls are inherently comprehended within the phrase "physical systems and processes" that appears in GDC 62. For, as defined by the Merriam Webster Third New International Dictionary, the term "process," used as a noun, means "an artificial or voluntary progressively continuing operation that consists of controlled actions or movements systematically directed toward a particular result or end"[92]--with the end in this case being adequate criticality control, as set forth in GDC 62. It follows that there is no basis in law or language for differentiating between one type of administrative control and another. We thus adopt the same legal conclusion that was recently reached by the Licensing Board in the Shearon Harris proceeding, LBP-00-12, 51 NRC at 255-69.

We recognize, of course, that this interpretation of GDC 62 has never been explicitly endorsed by the Commission itself. The Appeal Board decision in Consumers Power, ALAB-725, 17 NRC 562, relied on in part by the Staff but discounted by CCAM/CAM, is not directly

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[92]Webster's Third New International Dictionary (G. & C. Merriam Co., Springfield, MA 01101), at 1808, defines "process" (used as a noun) as : "1a: a progressive forward movement from one point to another on the way to completion; 1b: continued onward flow; 1c: something (as a series of actions, happenings, or experiences) going on or carried on; 1d (1): a natural continuing operation or development marked by a series of gradual changes that succeed one another in a relatively fixed way and lead toward a particular result or end; 1d(2): an artificial or voluntary progressively continuing operation that consists of a series of controlled actions or movements systematically directed toward a particular result or end; 1d(3): a set of facts, circumstances, or experiences that are observed and described or that can be observed and described throughout each of a series of changes succeeding each other; 1d(4): a succession of related changes by which one thing gradually becomes something else; 1e: a particular method or system of doing something , producing something, or accomplishing a specific result; 2a: the course of procedure in a judicial action or in a suit in litigation...(specific examples of use of the word in law); 3. (Obsolete) report or account; 4. a part of the mass of an organism or organic structure that projects outward from the main mass; 5. (Obsolete) a royal edict; 6. (Roman Catholicism) the canonical procedure followed in beatification or canonization."

The definition numbered 1d(2) is most relevant to the term "processes" as used in GDC 62. Although some of the broader definitions apply in the sense that physical processes in a SFP may be described as a series of events, the only definition that clearly applies to an engineered system is 1d(2). In that connection, the term artificial clearly refers to an engineered system; the root "arte" means (in Latin) "by skill." Webster's Dictionary at 122. The term controlled, id. at 496, also implies an engineered system. Nothing in the definition places limitations on the type of controls used.

in point,[93] Nor is the Staff's long-standing interpretation of GDC 62 controlling--the Staff could have been mistakenly interpreting the provision since its promulgation. The plain language of GDC 62 does not, by its terms, differentiate between the types of administrative controls that CCAM/CAM finds permissible or objectionable; nor does it bar the use of any type of administrative controls, either the one-time controls that CCAM/CAM would permit or the ongoing administrative controls that CCAM/CAM find objectionable.

The Intervenors read GDC 62 as expressing a preference for what they call "one-time" controls[94]. From the examples they cite, such as specifications of fuel assembly spacing, or the emplacement of Boral plates, it appears that they are referring to the class of autonomous controls. Such controls, once set in operation, do not require, as a regular event, external intervention. Speed governors, safety valves, etc. also fall into this category. The preference appears to be based on the notion that such controls are more reliable than controls which rely on continuing human action. While this inherent reliability may not always obtain (governors break, valves fail), in the present instance the preference appears to be well-founded. But it is just that--a preference. Nothing in the language of the definition modifies the term "controlled." GDC 62 does indeed express a preference for certain types of engineered systems: the Intervenors' desire to rely only on autonomous controls appears to be a natural extension of the preference set forth in GDC 62. But it is just that: a preference, not a prohibition. Thus, the "preference" in GDC 62 for "geometrically safe configurations" does not appear to us to be a bar to using other additional means for preventing criticality in SFPs. In that connection, the rulemaking history of GDC 62 suggests

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[93]Staff Written Summary at 58; CCAM/CAM Written Summary at 54 n.81.

[94]CCAM/CAM Written Summary at 56.

that, in adopting the rule in its current form, the Commission rejected the view of ORNL that took serious issue with any reliance upon ongoing administrative controls.

We further note that 10 C.F.R. § 50.68, which explicitly refers to administrative controls, does not govern the question before us here. As the Staff observes (Tr. 455-58), the provision deals with the need for criticality monitors and steps to be taken by a licensee to avoid use of such monitors in SFPs, but not with the criticality question before us now. But, according to the Staff, it does indicate that the Commission is knowledgeable in the use of administrative controls and has approved them in certain circumstances.

E. Conclusions.

We have concluded, with respect to Contention 5, that the license condition agreed to by all parties with respect to boron surveillance and concentration should be imposed on the amended license. With respect to Contentions 4 and 6, we have concluded that there are no significant factual disputes that would warrant a further evidentiary hearing. Thus, we are authorizing the Staff to issue an amended license authorizing expansion of the SFP at Millstone Unit 3, subject to its completion of its own review and subject to the condition concerning boron surveillance and concentration.

F. Order.

Based on the foregoing discussion, and taking into account the entire record of this proceeding, it is, this 26th day of October, 2000,

ORDERED:

1. The license condition concerning boron concentration and surveillance, to which the parties have agreed, is hereby adopted.

2. The request of CCAM/CAM for a further evidentiary hearing on Contentions 4 and 6 is hereby denied. Those contentions are resolved as set forth herein.

3. This proceeding is hereby terminated.

4. This Memorandum and Order is effective immediately and, absent appeal, will become the final order of the Commission forty (40) days after date of issuance. See 10 C.F.R. §§ 2.760, 2.764. As provided by 10 C.F.R. § 2.786(b), within fifteen (15) days after service of this Memorandum and Order, any party may file a petition for review with the Commission on the grounds specified in 10 C.F.R. § 2.786(b)(4). Any such petition must conform to the requirements set forth in 10 C.F.R. § 2.786(b)(2). Any other party may, within ten (10) days after service of a petition for review, file an answer supporting or opposing Commission review and conforming to requirements specified in 10 C.F.R. § 2.786(b)(3).

The Atomic Safety and
Licensing Board

/RA/

Charles Bechhoefer, Chairman
ADMINISTRATIVE JUDGE

/RA/

Dr. Richard F. Cole
ADMINISTRATIVE JUDGE

/RA/

Dr. Charles N. Kelber
ADMINISTRATIVE JUDGE

Rockville, Maryland
October 26, 2000

Attachment: Appendix A, Oral Argument Transcript Corrections

[Copies of this Memorandum and Order were transmitted this date by e-mail to counsel for each of the parties.]

Appendix A		Oral Argument Transcript Corrections
Page	Line	Correction
324	4	replace plan with plant
327	24	replace very with every
334	14	replace 260 with 2600
344	16	replace ind with mind
362	12	replace incidence with incidents
368	25	replace is with if
370	5	insert who between person and is
371	21	replace Bopre with Beaupre
393	25	replace 160 with 150
407	10	replace dilutions with dilution
408	6	THE should be lower case
409	13	replace sighted with cited
409	18	replace y with you
409	25	replace lost with loss
410	1	replace lost with loss
411	8	replace coalitions with Coalitions and replace NRE with NRC
412	23	replace coalitions with Coalitions
413	6	replace lose with loss
413	9	replace in with or
413	23	replace Mr. Lochbaum with Judge Kelber
414	6, 11, 16, 20, 25	replace Mr. Lochbaum with Judge Kelber
415	5, 10	replace racktivity with reactivity
415	8, 11, 15, 18	replace Mr. Lochbaum with Judge Kelber
416	515	replace Mr. Lochbaum with Judge Kelber
420	3,14,19	replace Mr. Lochbaum with Judge Kelber

420	9	replace let with load
420	23	replace Beaucoup with burnup
421	2	replace Mr. Lochbaum with Judge Kelber
421	5	replace Intervenery with Intervenors’
421	13	replace refuels with refueling
424	12	replace know with now
424	22	replace planed with planned
427	16	replace NECO with NNECO
429	23	replace Mr. Lochbaum with Judge Kelber
430	1	replace Mr. Lochbaum with Judge Kelber
430	11	replace not with no
430	20	replace there with they
432	13	replace Mr. Lochbaum with Judge Kelber
432	14	replace at with any
432	17	replace licensees plants with licensee’s plans
433	2,4,18, 22	replace Mr. Lochbaum with Judge Kelber
434	5	replace worst with worse
438	13, 20	replace lost with loss
439	1, 22	replace Mr. Lochbaum with Judge Kelber
439	7	replace the with they
440	1, 13, 19, 25	Replace Mr. Lochbaum with Judge Kelber
440	6	MS. HODGDON should be on following line.
440	8	replace NC with NRC
440	15.16	replace UT-35 with U235
441	2, 10, 13, 25	replace Mr. Lochbaum with Judge Kelber
441	7	replace U2-35 with U235
442	12	replace r with or

442	25	replace they with the; add include at end of line.
444	3, 24	replace Mr. Lochbaum with Judge Kelber
445	2, 18	replace Mr. Lochbaum with Judge Kelber
446	12	replace Mr. Lochbaum with Judge Kelber
447	5	replace Mr. Lochbaum with Judge Kelber
448	18	replace Mr. Lochbaum with Judge Kelber
449	11	Line doesn’t make sense
449	12	replace the with there
449	19, 23	replace Mr. Lochbaum with Judge Kelber
450	5,19,21	replace Mr. Lochbaum with Judge Kelber
451	2, 24	replace Mr. Lochbaum with Judge Kelber
451	2	replace were with where
452	2, 9	replace Mr. Lochbaum with Judge Kelber
452	17	replace NCR with 10 C.F.R.
453	6	replace Mr. Lochbaum with Judge Kelber
454	21	replace is with has; replace ANSI 81 with ANSI 8.1
455	16	replace 10C with 10 C.F.R.
456	9, 14	replace Mr. Lochbaum with Judge Kelber
457	6	replace GD with GDC
457	15	replace and with in
460	12	replace hasfor with has for
460	18	replace and with to
461	12	replace find with fined
461	17	replace and with in
464	12	replace shown with showed
464	23	replace were with we’re
466	17	replace planed with planned
467	2, 5, 13	replace Mr. Lochbaum with Judge Kelber

467	11	replace Mr. Burton with Ms. Burton
467	21	replace trangent with transient
470	18	replace for with four
472	13	replace grade with grave
480	14	replace also with all
485	5	replace epidemia with epitome
487	15	replace National Policy with National Waste Policy
489	12	replace room with ruin
489	24	replace you've with you
489	25	replace gone with go on
490	25	replace Bopraflex with Boroflex
491	23	replace the 1750 with rack 3
492	19	replace lone with alone
496	18	replace engineer with engineered
504	15	replace issue with issued
521	7	replace apt fit with apposite
522	7	replace Hog Wash with Hogwarts

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
NORTHEAST NUCLEAR ENERGY COMPANY	)	Docket No. 50-423-LA-3
	)	
	)	
(Millstone Nuclear Power Station, Unit No. 3)	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing LB MEMORANDUM AND ORDER (ADOPTING AGREED LICENSE CONDITION, DENYING REQUEST FOR EVIDENTIARY HEARING ON OTHER ISSUES, AND TERMINATING PROCEEDING) (LBP-00-26) have been served upon the following persons by U.S. mail, first class, or through NRC internal distribution.

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Washington, DC 20555-0001

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Docket No. 50-423-LA-3
LB MEMORANDUM AND ORDER
(ADOPTING AGREED LICENSE
CONDITION, DENYING REQUEST
FOR EVIDENTIARY HEARING ON
OTHER ISSUES, AND TERMINATING
PROCEEDING) (LBP-00-26)

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[Original signed by Adria T. Byrdsong]

Office of the Secretary of the Commission

Dated at Rockville, Maryland,
this 26th day of October 2000