UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

DOCKETED 05/10/01

COMMISSIONERS:

SERVED 05/10/01

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Edward McGaffigan, Jr.
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Docket No. 50-423-LA-3

In the Matter of

NORTHEAST NUCLEAR ENERGY COMPANY

(Millstone Nuclear Power Station, Unit No. 3)

CLI-01-10

MEMORANDUM AND ORDER

This proceeding arises out of a request by Northeast Nuclear Energy Company ("NNECO") for a license amendment to increase the storage capacity of Millstone Unit No. 3's spent fuel pool from 756 assemblies to 1860 assemblies. The Connecticut Coalition Against Millstone ("CCAM") and the Long Island Coalition Against Millstone ("CAM") (collectively, "CCAM/CAM") oppose the requested amendment.[1] The Licensing Board granted standing to CCAM and CAM as intervenors and admitted three of their contentions for adjudication in a proceeding under 10 C.F.R. Part 2, Subpart K (10 C.F.R. §§ 2.1101-2.1117).[2] On October 26, 2000, the Board issued a Memorandum and Order that adopted an agreed-upon license condition resolving Contention 5,[3] denied the request for an evidentiary hearing on other issues, and terminated the proceeding. See Northeast Nuclear Energy Co. (Millstone Nuclear Power Station, Unit 3), LBP-00-26, 52 NRC 181 (2000).

The Board ruled that there was no genuine dispute of fact or law meriting an evidentiary hearing regarding CCAM/CAM's Contention 4, relating to the risk of criticality accidents. See id. at 200. The Board also denied an evidentiary hearing as to Contention 6, relating to the legal question whether an NRC rule, General Design Criterion 62 ("GDC 62"), allows the use of administrative controls (i.e., human oversight or monitoring of physical devices or systems) to prevent criticality in the spent fuel pool. See id. at 212-214. The Board held that administrative controls are permissible under GDC 62. Id. CCAM/CAM filed a joint petition for Commission review of LBP-00-26 concerning contentions 4 and 6.

The Commission denied review regarding Contention 4, on the ground that the Board's fact findings seemed reasonable. See Northeast Nuclear Energy Co. (Millstone Nuclear Power Station, Unit No. 3), CLI-01-03, 53 NRC 22, 25-27 (2001). As to Contention 6, the Commission noted that the Licensing Board in the pending Shearon Harris proceeding had reached the same conclusion as the Board in the instant case,[4] and that the issue might recur. See id. at 28. Thus, the Commission granted review and directed the parties to address in particular the question whether GDC 62 permits a licensee to take credit in criticality calculations for fuel enrichment, burn-up, and decay time limits. See id. We permitted the parties in the Shearon Harris proceeding (Carolina Power & Light Co. ("CP&L") and BCOC) to file amicus curiae briefs, and they did so.

For the reasons stated below, we affirm the Board's ruling regarding Contention 6.

I. Background

In Contention 6, CCAM/CAM alleged that proposed criticality control measures would violate NRC regulations. CCAM/CAM relied on GDC 62, one of the General Design Criteria for Nuclear Power Plants listed in 10 C.F.R. Part 50, Appendix A. GDC 62 provides:

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

See 10 C.F.R. Part 50, Appendix A ("General Design Criteria for Nuclear Power Plants"). CCAM/CAM contend that NNECO

proposes to violate GDC 62 by using measures that CCAM/CAM characterize as "administrative" or "procedural" rather than "physical" to prevent criticality at Millstone 3. Credits for soluble boron in the pool water and for fuel enrichment, burn-up, and decay time limits are the disputed "administrative" methods of criticality control, considered by CCAM/CAM to be precluded by GDC 62.

The Board rephrased Contention 6 as a question of law: "Does 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?" See LBP-00-02, 51 NRC at 41. The Board analyzed the parties' arguments and answered the question in the affirmative. See LBP-00-26, 52 NRC at 212-214. To the Board, "such administrative controls are inherently comprehended within the phrase 'physical systems or processes' that appears in GDC 62." See id. at 212. As noted above, we agreed to review the Board's decision.

II. Discussion

The crux of the current appeal is the meaning of GDC 62; specifically, whether it prohibits so-called "administrative" criticality prevention measures such as the use of soluble boron and restrictions on fuel enrichment, burn-up, and decay time. CCAM/CAM argue that the Board erred, inter alia, by violating basic principles of construing agency regulations and by failing to recognize a supposedly obvious distinction between measures that are fundamentally physical and those that are fundamentally procedural or administrative. BCOC's amicus brief supports CCAM/CAM's position, and CP&L's amicus brief supports the NRC Staff's and NNECO's position.

In considering whether GDC 62 invalidates NNECO's license amendment, we start with several observations apparent from the record in this case. First, after considering the parties' competing expert presentations, the Board ruled that NNECO's proposed criticality prevention measures provide an "adequate safety margin and defense-in-depth." See LBP-00-26, 52 NRC at 200. Finding the Board's factual determination "well grounded in the extensive original record," we declined to review it. See CLI-01-03, 53 NRC at 26. Second, over the past 20 years, the NRC staff frequently, perhaps as many as 20 times, has approved criticality prevention measures identical or equivalent to NNECO's. See LBP-00-26, 52 NRC at 210. Third, these measures have proved effective, for there have been no criticality accidents in spent fuel pools. See id. at 191.

CCAM/CAM nonetheless argue that GDC 62, promulgated some 30 years ago, overrides all of this, and invalidates the criticality prevention measures that the NRC staff has approved at Millstone (in this case) and at numerous other facilities. In CCAM/CAM's view, when GDC 62 calls for preventing criticality in spent fuel pools through "physical systems or processes," it creates a legal bar against using so-called "administrative" or "procedural" means -- i.e., human intervention -- to implement physical protections against criticality.

We find no persuasive support for CCAM/CAM's position. On the contrary, we agree with the Board in this case, and with the Shearon Harris Board, that GDC 62 does not prohibit the criticality control measures challenged here. Nothing in GDC 62's language, in its regulatory history, in related statutes and agency rules, or in NRC practice establishes a prohibition against human intervention advocated by CCAM/CAM.

A. The Language of GDC 62

At the outset, it is important to understand the nature of the general design criteria set out in 10 C.F.R. Part 50, Appendix A. As observed long ago, the GDC are "cast in broad, general terms and constitute the minimum requirements for the principal design criteria of water-cooled nuclear power plants. There are a variety of methods for demonstrating compliance with the GDC." See Petition for Emergency and Remedial Action, CLI-78-6, 7 NRC 400, 406 (1978). They include little implementing detail. The general design criteria are "only a regulatory beginning and not the end product." Nader v. N.R.C., 513 F.2d 1045, 1052 (D.C.Cir. 1975).

Unsurprisingly, then, GDC 62 speaks broadly and lacks specific directives. As with all rules, its interpretation begins with the language and structure of the provision itself. See Louisiana Energy Services, L.P (Claiborne Enrichment Center), CLI-97-15, 46 NRC 294, 299 (1997). GDC 62 instructs NRC licensees in general terms to prevent criticality "by physical systems or processes." CCAM/CAM see in this clause a prohibition against "administrative" measures (i.e., human intervention). But the text of GDC 62 contains no such restrictive provisions.

In the context of regulations pertaining to nuclear power facilities, the term "physical" means simply "characterized or produced by the forces and operations of physics." See Webster's Third New International Dictionary of the English Language Unabridged, 1706 (1993). The term "process" means "a particular method of doing something, producing something, or accomplishing a specific result." See id. at 1808. And the term "system" is "an organized or established procedure or method." See id. at 2322. Thus, a "physical process" is a method of doing something, producing something, or accomplishing a specific result using the forces and operations of physics. Similarly, a "physical system" is an organized or established procedure or method based on the forces and operations of physics. Neither term excludes human intervention to set physical forces in motion or to monitor them. On the contrary, as both Board decisions at issue here held, one of the regulatory terms, "processes," appears to directly contemplate administrative controls. See LBP-00-26, 52 NRC at 212; LBP-00-12, 51 NRC at 260. As we further detail below, GDC 62 is not incompatible with "administrative" implementation of physical properties -- which is what NNECO proposes to do here.

1) **Physical Systems or Processes**

A brief summary of the physical principles involved in achieving or preventing criticality will provide context for the language of GDC 62. Criticality is the achievement of a self-sustaining nuclear chain reaction. Fission can occur when a neutron is absorbed by uranium-235. Fission releases one or more neutrons, as well as energy and fission products. Neutrons resulting from fission have high energy (i.e., they are said to be "fast") and cannot readily be captured in uranium-235 to produce additional fissions. The fast neutrons must lose energy in the presence of a moderator such as water to become "thermal" neutrons, which can be captured effectively by the remaining uranium-235 to produce additional nuclear fissions.

Not all of the thermal neutrons cause fission of uranium-235, as some of them leak out of the system and some are absorbed by nonproductive capture in the fuel, the moderator, or the structural materials. The nuclear chain reaction depends upon neutrons which are *effectively* absorbed by the fissile material to produce additional fission, resulting in additional neutrons. When the production of effective neutrons is sufficient for the process to continue on its own, generating one *effective* neutron for each one consumed, the system is denoted "critical."

Controlling neutrons is the *physical* basis of all criticality control measures, and only physical measures can achieve this control. Four methods of criticality control are in common use: (1) geometric separation of fuel; (2) solid neutron absorbers; (3) soluble neutron absorbers; and (4) reactivity limits. All recognize the physical characteristics of the fuel, and their application includes consideration of such factors as the media surrounding the fuel. The reactivity of the fuel depends on its original enrichment, fuel burn-up and decay time of the fission products, and the neutronic characteristics of the fuel array, including the geometry, external absorbers, and the media.

CCAM/CAM agree that two of these measures -- geometric separation and use of solid boron -- are physical systems or processes acceptable for criticality control under GDC 62.[(5)] Varying the physical spacing between fuel assemblies changes the neutronic coupling between assemblies. Solid neutron absorbers physically remove neutrons that could cause fission. Although CCAM/CAM disagree, the remaining criticality control measures -- soluble neutron absorbers and fuel reactivity limits -- also depend on "physical" processes. Soluble neutron absorbers work on the same physical principle as solid neutron absorbers, and even CCAM/CAM find solid absorbers acceptable. Fuel reactivity limits also rest on laws of physics. Reactivity increases as the enrichment of the fuel increases because the production of neutrons is greater and because more fissile material is available. Fuel burn-up is a well understood physical process which both reduces the amount of fissile uranium in the fuel and replaces the uranium with other elements which are neutron absorbing. Decay time recognizes the physical phenomenon of reduction in the amount of fission products available in the spent fuel assemblies as they physically decay into other isotopes.

In short, only physical processes or systems are at issue in the instant case; therefore, the license amendment requested by NNECO complies with the terms of GDC 62. We agree with NNECO's observation that its criticality control system is "physical, at every conceivable level -- from the atomic to the system level."[(6)] As noted by the Board, GDC 62 "does indeed express a preference for certain types of engineered systems: the Intervenors' desire to rely only on autonomous controls [such as (1) and (2), supra] appears to be a natural extension of the preference [for geometrically safe configurations] set forth in GDC 62. But it is just that: a preference, not a prohibition." See LBP-00-26, 52 NRC at 213.[(7)]

2) **Procedural or Administrative Measures**

CCAM/CAM assert that the criticality control measures proposed by NNECO would violate GDC 62 because they involve the use of administrative measures, such as monitoring, placement of fuel assemblies, and burn-up and decay calculations. But CCAM/CAM acknowledge that every physical criticality control measure, including those they find acceptable, includes administrative controls to some degree. See CCAM/CAM Brief at 23-25. CCAM/CAM attempt to distinguish one-time administrative controls -- acceptable in their view -- from ongoing administrative controls which they maintain are prohibited. For example, say CCAM/CAM, geometric separation of the spent fuel assemblies entails one-time administrative controls to ensure proper design, fabrication and installation of racks in the spent fuel pool, whereas, by contrast, using burn-up credit requires ongoing programming and inputting of data into computers, as well as surveillance of every fuel movement. According to CCAM/CAM, criticality prevention methods that employ complex, ongoing administrative controls provide more opportunities for a criticality event because of their greater reliance on human factors. See id. at 24-25.

To illustrate their point, CCAM/CAM have provided a summary of the evolution of criticality prevention in fuel pools. See CCAM/CAM Brief at 11-16. Noting the trend toward higher density fuel storage, CCAM/CAM assert that "the stringency of measures for criticality prevention at nuclear power plants has eroded over time in response to increasing demand for higher and higher density spent fuel storage." See id. at 11. We disagree with the conclusion of CCAM/CAM that today's measures for criticality control are insufficiently stringent or are unlawful under GDC 62.

The nuclear power industry does, indeed, use criticality control methods that require reliance on administrative measures. Those measures have evolved from the use of low density storage racks to reliance on neutron-absorbing storage racks, to use of soluble boron, and, finally, to controlling reactivity (initial enrichment, burn-up level, and decay time) of the fuel. The physical criticality control methods used over the years form a continuum that includes increasingly substantial administrative or human components. Although all of these storage methods have been found safe and all are based on physical processes or systems, CCAM/CAM arbitrarily attempt to draw a line which would permit the use of neutron-absorbing racks, but nothing further along the continuum. There is no scientific or regulatory basis for drawing such a line between permissible and impermissible administrative controls.[(8)] Indeed, GDC 62 itself does not use the term "administrative controls" or purport to prohibit them. Any attempted further distinction between classes of such controls is, at best, artificial.

CCAM/CAM maintain that if we construe GDC 62 to allow administrative criticality controls, we would "read out of the rule" the word "physical." See CCAM/CAM Brief at 17. This argument proves too much. As we have stressed, all criticality prevention methods currently in use, including those CCAM/CAM support, require administrative controls for safe and effective implementation. In practicality, GDC 62's use of the term "physical" simply reinforces an obvious point: effective criticality prevention requires protective physical measures. The regulatory term excludes, at the most, marginal (and implausible) criticality prevention schemes lacking any physical component, such as, perhaps, mere observation without accompanying physical mechanisms.

Our reading of GDC 62 does not render it meaningless. As a "general" design criterion, GDC 62 reminds NRC licensees of the important "engineering goal" of preventing criticality, and requires licensees to meet that goal. See CLI-78-6, 7 NRC at 406. General design criteria do not purport to prescribe "precise tests or methodologies." See id. CCAM/CAM nonetheless would have us construe GDC 62 to distinguish between "one-time" and "ongoing" administrative controls and to allow only "one-time" controls. Nothing in the text of GDC 62 suggests that, when promulgating the rule, the Commission envisioned anything like CCAM/CAM's complex approach, and we decline to adopt it today.

We are satisfied, in short, that the criticality control measures proposed by NNECO rely on "physical systems or processes" and do not violate GDC 62. So long as criticality is prevented by a physical process, the types of administrative procedures used to implement or maintain the process are simply not relevant, presuming, of course, that the procedures are safe.

B. History of GDC 62[(9)]

The history of GDC 62 supports our view of the meaning of its text. In the Commission's proposed rulemaking, the text of GDC 62 (then entitled GDC 66) was:

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.[(10)]

Like the final rule, the proposed rule stated that physical systems or processes were to be used as acceptable means of criticality control. Procedural controls, as mentioned in the second sentence of the proposed rule, were considered to be within the scope of physical systems or processes, although the proposed rule called for emphasis on "geometrically safe configurations."[(11)]

The Nuclear Safety Information Center at Oak Ridge National Laboratory ("ORNL") filed comments on the proposed rule. ORNL stated that it did not believe that procedural controls to prevent criticality were "practical," and expressed concern over the proposed rule's use of the terms "processes" and "procedural controls." See LBP-00-26, 52 NRC at 205. Despite ORNL's concerns, GDC 62 was revised to its current form, which emphasizes but does not require geometrically safe configurations, leaves in place the term "processes," and does not prohibit procedural or administrative controls. An amicus curiae, BCOC, interprets the ORNL comment combined with the wording of the final rule as embodying a decision that "procedural controls" are not permitted because that term appeared in the 1967 proposed rule but did not appear in the 1971 final rule. See BCOC Brief at 11. In drawing this inference, BCOC forgets that procedural controls are part of every physical system used for criticality control, including the use of geometrically safe configurations; the type, extent and timing of the administrative controls merely differ from one method to another. BCOC's position also does not take account of the final rule's retention of the term "processes," which implies a human role in triggering or overseeing criticality prevention through physical means. The change from the proposed rule to the final rule is thus better explained as merely stating a non-binding preference for the use of geometrically safe configurations. Procedural controls, as discussed above and expressed in the proposed GDC 66, are inherent in the physical processes and systems available for criticality control; therefore, we find no significance in omitting the term "procedural controls" from the final rule.[(12)]

Examining the history of criticality prevention, we observe that, at the time GDC 62 was promulgated, the use of higher density configurations for spent fuel storage was in its infancy. The use of configurations which were geometrically safe, without other criticality control measures, was standard in 1971. In historical context, the language of GDC 62 that criticality "shall be prevented by physical systems or processes, preferably by use of geometrically safe configurations" reflected then-current practice. By using general (and flexible) language in GDC 62, the Commission left the door open to employ any other physical systems or processes that would, as technology developed, safely prevent criticality in the spent fuel pool. It is not reasonable to interpret a broadly phrased regulation, promulgated by an agency charged with oversight of an evolving technical industry, as barring the use of later technological developments.

C. Subsequent Regulation: 10 C.F.R. § 50.68

In construing a regulation's meaning, it is necessary to examine the agency's entire regulatory scheme. Regulations dealing with the same subject should be construed together, and a later regulation is presumed to be in accord with the policy embedded in prior regulations. See Strickland v. U.S., 199 F.3d 1310, 1315 (Fed. Cir. 1999) (citing 2A Sutherland, Statutory Construction § 51.01 (4th ed. 1984)). Recently (in 1998) the Commission promulgated a new rule, 10 C.F.R. § 50.68, dealing with "criticality accident requirements" that NRC licensees may satisfy in lieu of maintaining a monitoring system capable of detecting criticality. Section 50.68 expressly provides for the use of enrichment, burn-up, and soluble boron as criticality control measures. Both the regulation and its history demonstrate that the Commission endorses the use of physical controls with significant procedural aspects for criticality control. The Commission was mindful of GDC 62

when it approved the use of administrative controls in 10 C.F.R. § 50.68. The Statement of Considerations refers specifically to GDC 62 as reinforcing the prevention of criticality in fuel storage and handling "through physical systems, processes, and safe geometrical configuration." See "Criticality Accident Requirements," 62 Fed. Reg. 63,825, 63,826 (Dec. 3, 1997).

The Statement of Considerations for the rule also includes the statement, "[n]uclear power plant licensees have *procedures* and the plants have design features to prevent inadvertent criticality...The NRC believes the criticality monitoring requirements of 10 C.F.R. § 70.24 are unnecessary as long as design and *administrative controls* are maintained." See id. at 63,825-26 (emphasis supplied). Notably, the use of soluble boron is expressly permitted by 10 C.F.R. § 50.68((b)(4), which sets standards for the k-effective (i.e., the neutron multiplication factor, a measure of reactivity) of the spent fuel pool *with and without taking credit for soluble boron*. Moreover, 10 C.F.R. § 50.68(b)(7), providing that criticality monitors are not required if enrichment of the fresh fuel assemblies is maintained at a maximum of 5.0 percent by weight, specifically recognizes credit for fuel enrichment for criticality control.

Promulgated in 1998, 27 years after GDC 62, 10 C.F.R. § 50.68 belies the notion that GDC 62 should be construed narrowly, as CCAM/CAM suggest. As the latest expression of the rulemakers' intent, the more recent regulation prevails if there is a perceived conflict with an earlier regulation. See 2B Sutherland, Statutory Construction § 51.02 (1992). The specific provisions of Section 50.68 provide strong evidence for our current reading of the more general strictures of GDC 62.

D. Nuclear Waste Policy Act

In 1982, the Nuclear Waste Policy Act ("NWPA") was enacted by Congress, recognizing that the accumulation of spent nuclear fuel is a national problem and that federal efforts to devise a permanent solution to problems of civilian radioactive waste disposal have not been adequate. See 42 U.S.C. § 10131(a)(2)-(3). The NWPA established federal responsibility and a definite federal policy for the disposal of spent fuel. See 42 U.S.C. § 10131(b)(2). Further, the Act declared as one of its purposes the addition of new spent nuclear fuel storage capacity at civilian reactor sites. See 42 U.S.C. § 10151(b)(1). The NWPA directed nuclear power reactor operators to exercise their "primary responsibility" for interim storage of spent fuel "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." See 42 U.S.C. § 10151(a)(1). Under the NWPA, the Commission was to promulgate rules for an expedited hearing process on applications "to expand the spent nuclear fuel storage capacity at the site of civilian nuclear power reactor[s] through the use of high-density fuel storage racks." See 42 U.S.C. § 10154.[(13)]

Notwithstanding this Congressional mandate encouraging high-density fuel storage at reactor sites, CCAM/CAM asks the Commission to interpret GDC 62 as forbidding physical measures, such as use of soluble boron and reactivity limits, that make high-density storage of spent nuclear fuel not only possible, but also safe. Such a reading of GDC 62 would prohibit safe and effective spent fuel storage expansion methods and frustrate the purpose of the NWPA. Thus, we conclude that the Board's understanding of GDC 62 is compatible with the NWPA, while CCAM/CAM's viewpoint cannot be reconciled with Congressional policy on nuclear waste storage.

E. NRC Agency Practice

We turn next to NRC staff practice and find that it reinforces our interpretation of GDC 62. "Agency practice, of course, is one indicator of how an agency interprets its own regulations." Yankee Atomic Electric Co. (Yankee Nuclear Power Station), CLI-96-6, 43 NRC 123, 129 (1996).[(14)] The NRC Staff has been authorizing credit for fuel enrichment and burnup limits for nearly 20 years.[(15)] No criticality accidents have been reported in any spent fuel pool. See LBP-00-26, 52 NRC at 191. Notwithstanding this record of safety, the Staff has, according to CCAM/CAM, misunderstood and misapplied GDC 62 for that period of time. We disagree. The NRC Staff has continuously interpreted GDC 62 in a manner consistent with the language of the criterion, the history of GDC 62, the practical realities of spent fuel storage, and the NWPA.

F. CCAM/CAM's Motion for Reconsideration

One final point requires Commission attention. On December 18, 2000, CCAM/CAM filed a motion to reopen the record, based on recent reports of two fuel rods allegedly missing at NNECO's Millstone Unit No. 1 and alleged discovery violations by NNECO. We remanded that motion to the Board for its consideration regarding CCAM/CAM's Contention 4. See Northeast Nuclear Energy Company (Millstone Nuclear Power Station, Unit No. 3), CLI-00-25, 52 NRC 355. The Board denied the motion[(16)] and CCAM/CAM filed a motion for reconsideration by the Board. Our decision today has no effect on the pending motion for reconsideration.

III. Conclusion

For the foregoing reasons, the Commission *affirms* the Board's ruling in LBP-00-26 as to CCAM/CAM's Contention 6 and *holds* that the phrase "physical systems or processes" in GDC 62 comprehends the administrative and procedural measures necessary to implement or maintain such physical systems or processes.

IT IS SO ORDERED.

For the Commission

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Annette L. Vietti-Cook
Secretary of the Commission

Dated at Rockville, Maryland
this 10th day of May, 2001.

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1. The NRC Staff issued the amendment on Nov. 28, 2000, after finding that it posed "no significant hazards considerations" under 10 C.F.R. § 50.92. See 65 Fed. Reg. 75,736 (Dec. 4, 2000).

2. See Northeast Nuclear Energy Co. (Millstone Nuclear Power Station, Unit 3), LBP-00-02, 51 NRC 25 (2000). The Board admitted Contentions 4, 5, and 6 -- all dealing with criticality questions -- and rejected eight other contentions.

3. In Contention 5, CCAM/CAM contested a proposed technical specification ("TS") amendment that would have required surveillance of boron concentration in the spent fuel pool only during fuel movement. Previously, the TS required that soluble boron be maintained at a minimum of 1750 ppm, with surveillance every 72 hours, whenever spent fuel is stored. Intervenors queried whether the proposed change in surveillance schedule would lead to an increased likelihood of a criticality accident arising from a misloaded fuel assembly between fuel movements. The agreed-upon TS includes a requirement that soluble boron concentration be greater than or equal to 800 ppm and that the concentration be verified at least once every 7 days.

4. See Carolina Power & Light Co., (Shearon Harris Nuclear Power Plant), LBP-00-12, 51 NRC 247, 255-60 (2000). In Shearon Harris the Board of Commissioners of Orange County, North Carolina ("BCOC") contended that the requirement of GDC 62 that criticality in a facility's fuel storage and handling system must be prevented by "physical systems or processes, preferably by use of geometrically safe configurations," precludes the use of administrative controls. BCOC characterized burn-up and enrichment level controls and the presence of soluble boron in the spent fuel pool as forbidden administrative controls. See id. at 255. The Board found that, while geometric configuration is preferred for criticality control, the term "processes" in GDC 62 includes the administrative measures they encompass. See id. at 260.

5. See "Connecticut Coalition Against Millstone and Long Island Coalition Against Millstone Reply Brief on Appeal of LBP-00-26 at 1-2 (Mar. 15, 2001) ("CCAM/CAM Reply Brief"). BCOC also admits that the absence of water as a moderator is a physical system. See "Orange County's Amicus Brief on Review of LBP-00-26" at 15 (Feb. 7, 2001) ("BCOC Brief"). Without a moderator, the neutrons are too "fast" and, therefore, ineffective in continuing the nuclear chain reaction. See "Connecticut Coalition Against Millstone and Long Island Coalition Against Millstone Brief on Review of LBP-00-26," at 22-23 (Feb. 7, 2001) ("CCAM/CAM Brief").

6. See "Northeast Nuclear Energy Company's Brief on Review of LBP-00-26 (Contention 6)," at 9 (Feb. 28, 2001) ("NNECO Brief").

7. The Board renamed as "autonomous controls" the one-time controls, such as categories (1) and (2), supra, that are favored by Intervenors. "Such controls, once set in operation, do not require, as a regular event, external intervention." See id.

8. The Board found that "there is no basis in law or language for differentiating between one type of administrative control and another." See LBP-00-26, 52 NRC at 212.

9. The Board discussed the rulemaking history of GDC 62 in greater detail than this decision. See LBP-00-26, 52 NRC at 204-206.

10. See Proposed Rule, "Licensing of Production and Utilization Facilities: General Design Criteria for Nuclear Power Plant Construction Permits," 32 Fed. Reg. 10,213, 10,217 (July 11, 1967).

11. As noted by amicus curiae, CP&L, it would be meaningless to emphasize that geometrically safe configurations were preferred over a prohibited function. See "Carolina Power & Light's Brief Amicus Curiae Supporting Affirmance of the Licensing Board Decision in LBP-00-26," at 14 (Feb. 28, 2001) ("CP&L Brief").

12. The Shearon Harris Board interpreted the revision similarly, stating, "...the agency revised the final rule to its present configuration by incorporating the second suggestion, i.e., to indicate that geometric configuration is a preference, but without deleting the reference to 'processes' or, it seems apparent, the administrative measures they encompass." See LBP-00-12, 51 NRC at 260.

13. Subpart K, added to 10 C.F.R. Part 2, implemented this Congressional directive. The instant proceeding has been conducted according to Subpart K.

14. See also Public Service. Co. of Ind., Inc. (Marble Hill Nuclear Generating Station, Units 1 and 2), ALAB-459, 7 NRC 179, 190 (1978) (reasonable interpretation of an act by officials charged with its administration entitled to deference).

15. See U. S. Nuclear Regulatory Commission, Draft Regulatory Guide, "Proposed Revision 2 to Regulatory Guide 1.13, 'Spent Fuel Storage Facility Design Basis'" (Dec. 1981). Although the regulatory guide was never issued in final form, it has been followed for 18 years or more as Staff policy. See "NRC Staff Response to 'Connecticut Coalition Against Millstone and Long Island Coalition Against Millstone Brief on Review of LBP-00-26' and 'Orange County's Amicus Brief on Review of LBP-00-26'" at 5, 14 (Feb. 28, 2001).

16. See "Memorandum and Order (Denying Motion to Reopen Record on Contention 4)," LBP-01-01, 53 NRC __ (Jan. 17, 2001).