NUCLEAR REGULATORY COMMISSION

[Docket Nos. 50–277 and 50–278]

Peco Energy Company Peach Bottom Atomic Power Station, Unit Nos. 2 and 3; Issuance of Final Director's Decision Under 10 CFR 2.206

Notice is hereby given that the Director, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission (NRC) has denied in part a Petition, dated October 6, 1994, submitted by the Maryland Safe Energy Coalition (Petitioner). The Petition requested that the NRC take action regarding the Peach Bottom Atomic Power Station, Unit Nos. 2 and 3 (PBAPS). The Petition consisted of a press release which was reviewed by the NRC pursuant to 10 CFR 2.206.

The October 6, 1994, Petition requests the NRC to immediately shut down both reactors at Peach Bottom and keep them shut down until certain conditions are corrected. Specifically, the Petitioner stated that (1) the risk of fire near electrical control cables due to combustible insulation could cause a catastrophic meltdown; (2) cracks were discovered in the structural support (core shroud) of the reactor fuel in Peach Bottom Unit 3, indicating possible cracks in other parts of the reactor vessel; (3) the NRC discovered that both reactors had no emergency cooling water for an hour on August 3, 1994; and (4) other chronic problems exist at Peach Bottom according to an August 16, 1994, NRC report. The Petitioner also indicated his support for the demands from the Nuclear Information Resource Service that (a) all safety class component parts in both reactor vessels, including the cooling system, the heat transfer system, and the reactor core, be inspected and (b) the Peach Bottom operating license be suspended until an analysis of the synergistic effects of cracks in multiple parts is conducted (incorporated into Request 2).

The Director of the Office of Nuclear Reactor Regulation has denied Requests (2), (3) and (4) of the October 6, 1994, Petition. The reasons for this denial are explained in the ''Final Director's Decision Under 10 CFR 2.206'' (DD–96–05), the complete text of which is published elsewhere in this separate part of the Federal Register, and which is available for public inspection at the Commission's Public Document Room, the Gelman Building, 2120 L Street, NW., Washington, DC, and at the local public document room for the Peach Bottom Atomic Power Station located at the State Library of Pennsylvania, (REGIONAL DEPOSITORY) Government Publications Section, Education Building, Walnut Street and Commonwealth Avenue, Box 1601, Harrisburg, Pennsylvania, 17105. A Director's Decision denying Request (1) of the October 6, 1994 Petition was issued under separate cover on April 3, 1996 (Director's Decision DD–96–03).

A copy of this Final Director's Decision will be filed with the Secretary of the Commission for review in accordance with 10 CFR 2.206(c). As provided in that regulation, the Decision will constitute the final action of the Commission 25 days after the date of the issuance of the Decision, unless the Commission, on its own motion, institutes a review of the Decision within that time.

For the Nuclear Regulatory Commission.

Dated at Rockville, Maryland, this 10th day of June 1996.

William T. Russell,

Director, Office of Nuclear Reactor Regulation.

[FR Doc. 96–15150 Filed 6–13–96; 8:45 am]

BILLING CODE 7590–01–P

[Docket Nos. 50–277 and 50–278 (10 CFR 2.206)]

PECO Energy Company, (Peach Bottom Atomic Power Station, Unit Nos. 2 and 3; Final Director's Decision Under 10 CFR 2.206

I. Introduction

On October 6, 1994, the Maryland Safe Energy Coalition (Petitioner) issued a press release describing its concerns with the operation of PECO Energy Company's Peach Bottom Atomic Power Station (PBAPS). In the press release, the Petitioner requested that the U.S. Nuclear Regulatory Commission (NRC) take action to address those concerns. The Petitioner requested the NRC, among other things, to immediately shut down both reactors at Peach Bottom and keep them shut down until certain conditions are corrected. Specifically, the Petitioner stated that (1) the risk of fire near electrical control cables due to combustible insulation could cause a catastrophic meltdown; (2) cracks were discovered in the structural support (core shroud) of the reactor fuel in Peach Bottom Unit 3, indicating possible cracks in other parts of the reactor vessel; (3) the NRC discovered that both reactors had no emergency cooling water for an hour on August 3, 1994; and (4) other chronic problems exist at Peach Bottom according to an August 16, 1994, NRC report.

The Petitioner seeks relief from the risk of fire (Request 1) due to cable insulation on the basis of a September 30, 1994, article in the Baltimore Sun that described the indictment of Thermal Sciences, Inc., on charges of falsifying laboratory records related to Thermo-Lag. Thermo-Lag is a material used to insulate electrical cables and other equipment from fire damage. The Petition states that a fire in combustible insulation near electrical control cables could cause a catastrophic meltdown.

The Petition also seeks the correction of cracks that were discovered in the structural support (core shroud) of the reactor fuel in Peach Bottom Unit 3, indicating possible cracks in other parts of the reactor vessel (Request 2). In support of this request, the Petitioner also references an earlier demand by the Nuclear Information and Resource Service (NIRS) [1] that all safety class component parts in both reactor vessels, including the cooling system, the heat transfer system, and the reactor core, be inspected and that an analysis be conducted of the synergistic effects of cracks in multiple parts. The Maryland Safe Energy Coalition did not, however, provide any information to support the application of the NIRS Petition to PBAPS.

The Petitioner also raises equipment problems at PBAPS, stating that: (a) the NRC discovered both reactors at PBAPS had no emergency cooling water for approximately one hour on August 3,

[1] On September 19, 1994, NIRS sought relief, pursuant to 10 CFR 2.206, regarding safety class reactor internal components at Oyster Creek Nuclear Generating Station (OCNGS) on the following premises: (a) the core shroud in General Electric boiling water-reactors (BWRs) is vulnerable to age-related deterioration; (b) 12 domestic and foreign BWR owners have found extensive cracking on welds of the core shroud; (c) only 10 of 36 U.S. BWR owners have inspected their core shrouds and 9 of the 10 core shrouds had cracks at the time of the NIRS Petition; (d) 19 of 25 selected BWR internal components are susceptible to stress corrosion cracking and 6 of 19 are susceptible to irradiation-assisted stress corrosion cracking; (e) as the oldest operating General Electric Mark I BWR and the third oldest operating reactor in the United States, OCNGS has been subjected for the longest period to operational conditions that cause embrittlement and cracking; (f) according to the BWR Owners Group (BWROG), cracking of the core shroud is a warning signal that additional safety class reactor internals are increasingly susceptible to age-related deterioration; (g) cracking of any single part or multiple components jeopardizes safe operation of that nuclear station; (h) Oyster Creek did not inspect for core shroud cracking prior to the current refueling outage and other safety-class reactor internals have not been adequately inspected for cracking; and (i) a safety analysis has not been performed on the potential synergistic effects of multiple-component cracking. The relief sought in the Petition based upon these concerns was denied in a Partial Director's Decision issued on August 4, 1995 (*See General Public Utilites Nuclear Corporation* (Oyster Creek Nuclear generating Station), DD–95–18, 42 NRC 67 (1995)).

1994 (Request 3), and (b) an NRC inspection report dated August 16, 1994, which the Petitioner asserts described numerous chronic problems at PBAPS [2] (Request 4).

In a letter dated December 2, 1994, I acknowledged receipt of the October 6, 1994, Petition and denied the Petitioner's requests for immediate relief. In the acknowledgement letter I informed the Petitioner that the remaining requests were being evaluated under 10 CFR 2.206 of the Commission's regulations and that action would be taken in a reasonable time.

The issues raised by the Petitioner concerning the use of Thermo-Lag fire barriers raised by Request 1 of the October 6, 1994, Petition have been previously considered. A Director's Decision (DD–96–03) (see attachment) addressing this specific request as well as the requests of other Petitioners with concerns regarding the use of Thermo-Lag by reactor licensees, was issued on April 3, 1996.[3] The NRC staff's review of the issues related to cracking of reactor internal components and concerns regarding equipment problems raised by Requests 2, 3 and 4 of the October 6, 1994, Petition is now complete. Accordingly, I am issuing a Final Director's Decision with regard to Requests 2, 3, and 4. A discussion of the Final Director's Decision follows.

II. Discussion

A. Correction of Cracks in the Core Shroud and Assertion of Possible Cracks in Other Parts of the Reactor Vessel (Request 2)

Nuclear power reactor licensees, including PECO, are required by 10 CFR 50.55a to implement inservice inspection programs that meet the requirements set forth in the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code). The scope of the inservice inspection programs for reactor pressure vessels and their internal components are prescribed by ASME Code, Section XI, Division 1, Subsections IWA and IWB. Licensees are also required by ASME Code, Section XI, Article IWA–6000, to submit the results of these inspections to the NRC within 90 days of completion. The NRC staff performs periodic audits of licensee-implemented inservice inspection programs to determine compliance with applicable codes and regulations. These audits are documented in NRC inspection reports, which are publicly available at the NRC Public Document Room, the Gelman Building, 2120 L Street, NW., Washington, DC. Inspection reports related to PBAPS are also available at the local public document room for PBAPS located at the State Library of Pennsylvania (REGIONAL DEPOSITORY), Government Publications Section, Education Building, Walnut Street and Commonwealth Avenue, Box 1601, Harrisburg, Pennsylvania 17105.

The licensee's inservice inspection program contains provisions for the periodic inspection of the PBAPS reactor vessel internal components, including such components as the top guides, core shroud welds, shroud support plate access hole covers, incore instrument tubes, steam dryer drain channels, core spray piping, and jet pump assemblies. By letter dated April 8, 1986, the NRC found the Inservice Inspection Program for the Second Ten-Year Interval at PBAPS Units 2 and 3 to be satisfactory (September 1986–November 1997 and December 1985–August 1997, for Units 2 and 3, respectively).

In addition to the ASME Code design and inservice inspection program requirements, the NRC provides information to the nuclear power industry on various emerging phenomena that may potentially affect the safe operation of nuclear power plants. For example, intergranular stress corrosion cracking (IGSCC) of BWR internal components has been identified as a technical issue of concern by both the NRC staff and the nuclear industry. The core shroud is among the internal reactor components susceptible to IGSCC. Identification of cracking at the circumferential beltline region welds in several plants during 1993 led to the publication of NRC Information Notice (IN) 93–79, ''Core Shroud Cracking at Beltline Region Welds in Boiling-Water Reactors,'' issued on September 30, 1993. Several licensees inspected their core shrouds during planned outages in the spring of 1994 and found cracking at the circumferential welds. To disseminate this information to nuclear power plant licensees, the NRC issued IN 94–42, ''Cracking in the Lower Region of the Core Shroud in Boiling-Water Reactors,'' on June 7, 1994, and Supplement 1 to IN 94–42, on July 19, 1994, concerning cracking found in the core shrouds at Dresden Unit 3 and Quad Cities Unit 1. On July 25, 1994, the NRC issued GL 94–03, ''Intergranular Stress Corrosion Cracking of Core Shrouds in Boiling Water Reactors,'' requesting that BWR licensees inspect their core shrouds by the next refueling outage and justify continued operation until inspections could be completed. The NRC has been closely monitoring these inspection activities. Additional examples of NRC action regarding reactor vessel internal component reliability issues are the issuance of Bulletin 80–13, ''Cracking in Core Spray Spargers'', on May 12, 1980, after the detection of cracks in core spray system sparger piping at several operating BWRs and the issuance of IN 95–17, ''Reactor Vessel Top Guide and Core Plate Cracking,'' issued on March 10, 1995, that concerned reactor vessel top guide and core plate cracking.

Core Shroud Cracks

The licensee submitted letters dated March 14, 1994, November 7, 1994 and November 3, 1995, regarding the results of its inspections of the PBAPS Unit 2 and 3 core shrouds. The inspections revealed a moderate amount of crack indications in the Unit 2 and Unit 3 core shrouds, totaling 5 percent of the weld length examined in Unit 2 and 12 percent of the weld length examined in Unit 3. Along with the inspection results, the licensee presented an analysis of the impact of the crack indications on the structural strength of the core shrouds for Unit 2 and Unit 3. For both the Unit 2 and Unit 3 core shroud, the staff reviewed the licensee's analysis of structural loading of the as-found shroud weld which showed that the loadings were less than ASME Code allowable values. In a letter dated February 6, 1995, the NRC staff issued a safety evaluation of the 1994 Unit 2 core shroud inspection concluding that sufficient structural margin remained in the Unit 2 shroud to justify operation of PBAPS 2 for another operating cycle (current operating cycle 11 that ends in September 1996) without modification to the shroud. In a letter dated January 29, 1996, the NRC staff issued a safety evaluation of the 1995 Unit 3 core shroud inspection concluding that sufficient structural margin remained in the Unit 3 shroud to justify operation of PBAPS 3 for another operating cycle (current operating cycle 11 that ends in

[2] The Petitioner stated that the problems described in the August 16, 1994, NRC report included: cooling tower leaks, coolant injection system vibration, injection valve failures, feedwater vibrations and leakage, fuel pool hot spots, incore probe failures, auxiliary boiler unreliability, valve failures, air solenoid failure, and hydraulic leaks and malfunctions.

[3] *All Reactor Licensees with Installed Thermo-Lag Fire Barrier Material*, DD–96–03, 43 NRC (1996). In addition to the Maryland Safe Energy Coalition, Petitioners with concerns about the use of Thermo-Lag included the Citizens for Fair Utility Regulation and the Nuclear Information and Resource Service, the GE Stockholder's Alliance and Dr. D.K. Cinquemani, the Toledo Coalition for Safe Energy, R. Benjan, B. DeBolt and the Oyster Creek Nuclear Watch. In the Decision under 10 CFR 2.206, the Director of the Office of Nuclear Reactor Regulation determined that the Petitioners' requests concerning the use of Thermo-Lag should be denied.

September 1997) without modification to the shroud.

Reactor Vessel Internals Cracking

In addition to the inspection of core shrouds, PECO performs inspections of the PBAPS Unit 2 and 3 reactor vessel internals and other internal safety-related components in accordance with the PBAPS inservice inspection program, as set forth in 10 CFR 50.55a and ASME Code, Section XI. By letter dated January 17, 1995, PECO submitted, in accordance with 10 CFR 50.55a(g)(3), a report on its inservice inspection activities conducted during the September 1994, Unit 2, refueling outage. In the report PECO listed the inspections performed and discussed the disposition of indications in certain components. In addition to the core shroud flaws described above, the licensee discovered some minor defects, such as a crack in a jet pump assembly restrainer adjustment screw tack weld, and performed an engineering evaluation to determine if a repair was needed. In the case of the jet pump restrainer adjustment screw tack weld crack, a second existing weld was found intact and no repair was necessary. The NRC staff conducted an inspection of the licensee's inservice inspection activities during the PBAPS Unit 2 refueling outage. The results of that inspection are documented in Inspection Report 50–277/94–28 and 50–278/94–28 (IR 94–28). The staff concluded that PBAPS inservice inspection programs and nondestructive examination programs were well planned, controlled, and executed for both PBAPS 2 and PBAPS 3. Therefore, the requirements of 10 CFR 50.55a and the ASME Code have been met in this area, and the results confirm that satisfactory material conditions exist for the safe operation of both units.

The NRC staff has reviewed the content and results of other licensee inspection activities, as discussed below.

NRC Bulletin 80–13, issued on May 12, 1980, requested that BWR licensees visually inspect core spray piping inside the reactor vessel at each subsequent refueling outage. During inspections conducted as requested by the staff in Bulletin 80–13, PECO detected cracks in core spray piping inside the reactor vessel in Unit 2 and Unit 3 in 1982 and 1985, respectively. In both instances, the licensee installed clamps on the affected piping to mitigate the consequences of the cracks. In letters dated June 10, 1982, and November 21, 1985, the NRC staff reviewed the licensee's analysis of the crack consequences and repair plans[4] and found them acceptable for PBAPS Units 2 and 3, respectively.

In November 1993, during subsequent inspections, PECO identified cracking in the downcomer portion of the Unit 3 core spray piping. By letters dated November 5 and November 10, 1993, the licensee provided an analysis which demonstrated that this downcomer piping had sufficient structural integrity to justify operation without repair for the subsequent operating cycle. In a letter dated November 16, 1993, the NRC found PECO's proposal to operate for one operating cycle without repairing the core spray downcomer cracks acceptable. During the September 1995 refueling outage for PBAPS Unit 3, PECO performed additional inspections of the core spray piping within the reactor vessel. As documented in its letter dated October 9, 1995, PECO stated that this inspection revealed additional cracking. In its letter of October 9, 1995, as supplemented by a letter dated October 12, 1995, PECO proposed to repair the core spray piping by installing mechanical clamps over the affected cracked welds. The NRC staff reviewed the design of the proposed clamps and found that the clamps provided the required structural integrity for the piping. The NRC staff also approved restart of the Peach Bottom Unit 3 based on PECO's installation of the clamps.[5]

Although cracking of the top guide has not been detected at PBAPS, the licensee has implemented a program to inspect the top guide and has included the top guide inspection into the PBAPS inservice inspection program.

Analysis Regarding Synergistic Effects of Cracking of Multiple Components

The Petitioner raises a concern about the lack of an analysis of the synergistic effects of cracks in multiple reactor vessel components.

Most reactor internals are fabricated from high-toughness materials such as stainless steel and were designed with significant margins on allowable stresses. Cracking must be severe to adversely impact plant safety. It is unlikely that licensee inspections would not find such severe degradation. In fact, the PECO inspections, using qualified inspectors and procedures, have been effective in identifying and sizing of the cracks in the Peach Bottom Unit 2 and Unit 3 core shrouds. In addition, after evaluating the results from internals inspections performed to date at PBAPS, the NRC staff has concluded that ASME Code structural margins have been maintained to meet ASME design requirements. Thus, these components will perform their function in the safe operation of the plants.

Implementation of an effective inservice inspection program serves to detect cracking. Upon detection of cracking, proper actions by the licensee to maintain component integrity will prevent cracks, large enough to affect operability, from existing in multiple components at the same time. Nevertheless, the NRC has asked the BWR Vessel Internals Project (BWRVIP), an industry group, to develop an assessment to address this unlikely situation. A report from the BWRVIP on this issue, ''Reactor Pressure Vessel and Internals Examination Guidelines (BWRVIP–03; EPRI Report TR–105696,'' dated November 10, 1995, is currently under NRC staff review. In addition, the NRC has undertaken a longer term evaluation of the effects of cracking in multiple internal components. This evaluation will involve appropriate probabilistic treatment of the key variables (such as material susceptibility, loading and environment).

Moreover, the licensee is not required by 10 CFR 50.55a or the ASME Code to perform an analysis that addresses the synergistic effects of cracking in multiple safety-class components. Since the NRC staff has found during reviews of the initial plant design and reviews of the licensee's response to subsequently identified cracks, as described above, that each affected component has been shown to meet the ASME design margins; the NRC staff is satisfied that these components will perform their intended function in the safe operation of the facilities. Because of this and the inspection requirements that pertain to reactor internals and the results of the inspections performed to date, the NRC staff does not consider the lack of an analysis of the synergistic effects of cracks in multiple reactor components for PBAPS, to be a substantial safety concern.

In summary, on the basis of the NRC inspections and the evaluations of the licensee inspections required by 10 CFR 50.55a and the ASME Code, the NRC staff has concluded that the licensee has taken appropriate actions to ensure the structural integrity of the PBAPS reactor vessel internal components. The NRC staff, however, continues to overview PECO's inspections, evaluations, and

[4] Correspondence regarding these cracks, including letters from PECO to the NRC dated April 29, 1982, May 11, 1982, June 4, 1982, and November 8, 1985 are available in the local public document room.

[5] The NRC staff's review of the clamp design is addressed in Inspection Report 50–277/95–18; 50–278/95–18 and in a letter dated October 13, 1995.

repairs as necessary to meet these requirements. At this time, the NRC staff has not found any reason to question the safe operation of PBAPS. Therefore, the NRC staff has concluded that the Petitioner has not presented a substantial health or safety issue to warrant taking the actions requested in the Petition.

B. Correction of Equipment Problems Identified in Recent NRC Inspection Reports (Requests 3 and 4)

Emergency Core Cooling

The Petition referred to a situation on August 3, 1994, wherein the PBAPS emergency service water (ESW) system was placed in a degraded condition. The Petitioner asserted that both reactors at PBAPS had no emergency cooling water for about one hour. The NRC resident inspectors at the Peach Bottom site conducted an inspection of this event and documented their findings in Inspection Report 50–277/94–24 and 50–278/94–24, dated September 29, 1994 (IR 94–24). In the report the NRC inspectors concluded that the discharge valve from the ESW system back to the Susquehanna River was shut and left unattended for approximately fifty minutes after maintenance and testing on the valve. In the report, the NRC staff concluded that, if an accident requiring the use of safety equipment (including emergency diesel generators and emergency core cooling equipment) had occurred during that fifty minute period, the operation of that safety equipment could have been jeopardized.

By letter dated November 21, 1994, the NRC issued a Notice of Violation and Proposed Imposition of Civil Penalty (EA–94–197) to PECO Energy Company regarding the circumstances surrounding the August 3, 1994, event. The NRC staff cited the licensee for failure to implement maintenance and testing procedures that were adequate to ensure that the ESW system could perform its intended function while maintenance activities were being performed. The staff noted that since the August 3, 1994, event, the licensee had restored the ESW to its intended configuration and had initiated steps to assure that future maintenance activities would not lead to a degraded ESW system. Notwithstanding the specific corrective actions implemented by the licensee, the staff imposed a civil penalty in the amount of $87,500. On December 21, 1994, PECO Energy paid the civil penalty.

Because appropriate NRC action has been taken and the licensee has restored the ESW system to its intended configuration and has implemented corrective actions to prevent recurrence of the deficiencies that occurred on August 3, 1994, no specific concern about the ability of the ESW system to perform its intended function currently exists.

Chronic Equipment Problems

The Petition also referenced a list of chronic equipment problems at PBAPS.[6] The Petition referenced an NRC report dated August 16, 1994 (NRC Inspection Report 50–277/94–17; 50–278/94–17 (IR 94–17)), as the source of the chronic problems.

In this inspection report the NRC assessed the performance of the licensee's engineering and technical support organization at Peach Bottom. The NRC inspector reviewed various facets of PECO's engineering department's performance in order to identify potential organizational weaknesses and deficiencies. The NRC uses the inspection findings to maintain a close understanding of the licensee's performance in areas that can affect safe plant operation. As such, the NRC reviews the licensee's program for identifying, addressing, and resolving recurring or ''chronic'' equipment problems. At the time that IR 94–17 was issued, the basis document for the licensee's program was the ''Chronic Equipment/System Problems'' list. This was a list of recurring problems for which the licensee had either identified the need for engineering department review and action or had determined a method for resolving the problem but had not yet implemented the solution.

The ''Chronic Equipment/System Problems'' list included equipment problems with potential safety impact as well as obvious non-safety-related problems. In assessing the management of recurring problems, the NRC evaluates the licensee's ability to address and resolve problems in a timely manner and the licensee's ability to evaluate the safety significance of each problem. The existence of a list of issues does not in itself indicate poor engineering department performance. As noted in IR 94–17, the licensee had developed solutions for a number of the problems on the list and had developed plans to implement these solutions. Further, the NRC staff assessed the PBAPS Chronic Equipment/System Problem list as a positive management feature and a commitment on the part of the licensee to improve overall plant performance.

The NRC staff, including the resident inspectors and the Region I inspection staff, periodically reevaluate the performance of the licensee's engineering department. In addition, NRC inspectors continue to review the licensee's action on many of the individual problems on the PBAPS Chronic Equipment/System Problem list. Accordingly, the NRC performed a follow-up inspection to IR 94–17. In the follow-up inspection, documented in Inspection Report 50–277/94–21; 50–278/94–21 (IR 94–21), dated November 4, 1994, the NRC staff examined the safety significance of those items that were on the Chronic Equipment/System Problem List as of September 13, 1994. The staff concluded that none of the items on the list was a significant current safety concern. The inspectors concluded that the licensee had initiated appropriate action to evaluate and correct those items detailed in IR 94–21. The staff concluded that the licensee used the Chronic Equipment/System Problem list to appropriately focus long-term engineering and management attention to known reliability problems.

In summary, the staff considers proper management of recurring equipment problems important to the continued safe operation of a nuclear power plant. Accordingly, the NRC staff views positively the licensee's activities such as the formulation of the Chronic Equipment/Systems Problem list, which was cited in the Petition. On the basis of the review efforts by the NRC staff, I conclude that no substantial health or safety issues have been raised by the Petitioner.

IV. Conclusion

The institution of proceedings in response to a request pursuant to Section 2.206 is appropriate only when substantial health or safety issues have been raised. *See Consolidated Edison Co. of New York* (Indian Point Units 1, 2, and 3), CLI–75–8, 2 NRC 173, 176 (1975) and *Washington Public Power Supply System* (WPPSS Nuclear Project No. 2), DD–84–7 19 NRC 899, 923 (1984). This standard has been applied to the concerns raised by the Petitioner to determine whether the action requested by the Petitioner is warranted. With regard to the specific requests made by the Petitioner discussed herein, the NRC staff finds no basis for taking any additional actions. Rather, as explained above, the NRC staff considers that no substantial health or safety issues have been raised by the Petitioner. Accordingly, the Petitioner's requests for additional action pursuant to Section 2.206, specifically requests 2, 3, and 4, are denied. Accordingly, no action pursuant to Section 2.206 is being taken in this matter.

[6] See footnote 2.

A copy of this Final Director's Decision will be filed with the Secretary of the Commission for review in accordance with 10 CFR 2.206(c). This Decision will become the final action of the Commission 25 days after issuance unless the Commission, on its own motion, institutes review of the Decision within that time.

Dated at Rockville, Maryland, this 10th day of June 1996.

For the Nuclear Regulatory Commission.

William T. Russell,

Director, Office of Nuclear Reactor Regulation.

Office of Nuclear Reactor Regulation

William T. Russell, Director

In the Matter of: All Reactor Licensees With Installed Thermo-Lag Fire Barrier Material.

Director's Decision Under 10 CFR 2.206

I. Introduction

By letter dated September 26, 1994, the Citizens for Fair Utility Regulation and the Nuclear Information and Resource Service (NIRS); by press release dated October 6, 1994, the Maryland Safe Energy Coalition; by separate letters dated October 21, 1994, the GE Stockholders' Alliance and Dr. D. K. Cinquemani; by letter dated October 25, 1994, the Toledo Coalition for Safe Energy; by letter dated October 26, 1994, R. Benjan; by letter dated November 14, 1994, B. DeBolt; and by letter dated December 8, 1994, NIRS and the Oyster Creek Nuclear Watch (the Petitioners), requested that the U.S. Nuclear Regulatory Commission (NRC) take action with regard to the use of Thermo-Lag by reactor licensees and that their letters be treated as Petitions pursuant to Section 2.206 of Title 10 of the *Code of Federal Regulations* (10 CFR 2.206).

The Citizens for Fair Utility Regulation and NIRS requested that (1) Texas Utilities Electric Company (TU Electric), licensee of Comanche Peak Steam Electric Station, Unit 1, perform additional destructive analysis for Thermo-Lag configurations in proportion to the total installed amount of Thermo-Lag to determine the degree of ''dry joint'' occurrence, (2) the licensee perform fire tests on upgraded ''dry joint'' Thermo-Lag configurations for conduit and cable trays to rate the barrier as a tested configuration in compliance with fire protection regulations, and (3) the NRC immediately suspend the Comanche Peak Unit 1 license until the above corrective actions are taken. The Maryland Safe Energy Coalition requested immediate shutdown of both reactors at the Peach Bottom plant until the risk of fire near electrical control cables due to combustible insulation is corrected.[1] Dr. Cinquemani and the Toledo Coalition for Safe Energy requested that the NRC immediately shut down all reactors where Thermo-Lag is used until it has been removed and replaced. The GE Stockholders' Alliance requested shutdown of all reactors where Thermo-Lag is used until it has been removed and replaced with fire-retardant material meeting NRC standards. R. Benjan requested immediate shutdown of all reactors where Thermo-Lag is used. B. DeBolt requested shutdown of all reactors in which Thermo-Lag is used until it has been removed and replaced. NIRS and the Oyster Creek Nuclear Watch requested that NRC immediately suspend GPU Nuclear Corporation's (GPUN's) operating license for Oyster Creek Nuclear Generating Station (OCNGS) until GPUN removes Thermo-Lag fire barrier material and replaces it with a competitive product that meets current NRC fire protection regulations.

As a basis for their requests concerning Thermo-Lag 330–1 fire barrier upgrades, the Citizens for Fair Utility Regulation and NIRS Petitioners stated that (1) the licensee's records on the original installation of Thermo-Lag fire barriers on conduits and cable trays indicate that its contractor followed specifications for pre-buttering all joints; (2) NRC Inspection Reports 50–455/93–42 and 50–446/93–42 found, based on destructive analysis documents, that a concern did exist where Thermo-Lag conduit joints fell apart easily and did not appear to have any residual material of a buttered surface, indicative of a joint that had not been pre-buttered; (3) the ''dry joint'' deficiency appeared in Room 115A and other areas of the unit; (4) the licensee directly contradicts an NRC inspector's findings that were determined in part by destructive analysis; (5) the ''dry joint'' or absence of pre-buttering of Thermo-Lag panels can be determined only by destructive analysis and cannot be determined by a walkdown visual inspection; (6) the findings reported in the Comanche Peak Unit 1 Region IV Inspection Reports 50–455/93–42 and 50–446/93–42, based on the limited amount of destructive analysis conducted at the unit, constitute a substantial documentation of installation deficiencies found in Thermo-Lag fire barriers as documented in NRC Information Notice (IN) 91–79, ''Deficiencies in the Procedures for Installing Thermo-Lag Fire Barrier Materials,'' December 6, 1991, and IN 91–79, Supplement 1, ''Deficiencies Found in Thermo-Lag Fire Barrier Installation,'' August 4, 1994; (7) neither the NRC nor the industry, by its agent Nuclear Energy Institute (NEI), nor a utility, have conducted fire tests on dry-fitted or ''dry joint'' upgraded configurations of Thermo-Lag 330–1; and (8) the presence of ''dry joint'' upgraded configurations in Comanche Peak Unit 1 constitutes an untested application of Thermo-Lag fire barriers.

As a basis for the requests concerning Thermo-Lag 330–1 fire barrier upgrades, the Maryland Safe Energy Coalition stated that the manufacturer of the flame retardant (Thermo-Lag insulation) was indicted on criminal charges (of falsifying tests of the effectiveness of the insulation as a fire barrier), and fire near the electrical control cables, due to combustible Thermo-Lag insulation, could cause a catastrophic meltdown.

As the bases for their requests, Dr. Cinquemani, the Toledo Coalition for Safe Energy, the GE Stockholders' Alliance, and R. Benjan stated either individually or collectively that (1) the widespread use of Thermo-Lag in more than 70 reactors presents a safety crisis; (2) the NRC has known since 1982 that Thermo-Lag fails NRC performance standards for material that protects vital electrical cables for ampacity rating and fire resistance; (3) Thermo-Lag has failed not only NRC tests, but almost all other independent tests; (4) Thermo-Lag is combustible, contrary to NRC regulations, and is an ineffective fire barrier; (5) the use of Thermo-Lag could lead to shorts, to failure of the cables in an emergency, and to fire; (6) Thermo-Lag is faulty in that fraudulent ampacity ratings allowed utilities to use smaller cable than permitted by design requirements, causing the cable to overheat and its insulation to deteriorate; (7) the NRC has stated that fire at some nuclear power plants can contribute as much as 50 percent of the risk to a core meltdown, and a typical reactor will have three to four significant fires during its licensed lifetime; (8) Thermal Science, Inc. (TSI), the manufacturer of Thermo-Lag, and its President were indicted by a Federal grand jury on seven criminal charges related to conspiracy to defraud the U.S. Government in regard to the effectiveness of Thermo-Lag; and (9) the hourly fire watches at the Davis-Besse

[1] The Petition submitted by the Maryland Safe Energy Coalition expressed several concerns in addition to the fire hazard issue. These other issues, that is other than the fire hazard issue, will be the subject of a separate Director's Decision.

Nuclear Power Plant operated by Toledo Edison do not replace fire barrier material and do not prevent fires.

As the bases for his request, B. DeBolt stated that Thermo-Lag fails to meet NRC regulations concerning combustibility and that the manufacturer of Thermo-Lag was indicted for defrauding the Government and the utilities. Among the many bases for their request, NIRS and the Oyster Creek Nuclear Watch stated that (1) Southwest Research Institute (SwRI) conducted fire tests on Thermo-Lag 330–1 specimens for GPUN and reported that all specimens ignited approximately 2 seconds after it was inserted into the furnace and failed specified criteria because of flaming after the first 30 seconds of testing, an outside temperature rise higher than 30 °C, and a weight loss of 50 percent; (2) GPUN's operation of OCNGS with knowledge of the SwRI report is an example of GPUN's reckless disregard for fire protection and public safety; (3) in the event of fire, Thermo-Lag is likely to fail its intended function of protecting vital electrical cables running from the control room to plant safety systems used to shut down the reactor; (4) current installations of Thermo-Lag are likely to fail in less time than 1 hour (when smoke detectors and automatic sprinkler systems are present) or 3 hours (when there are no fire detection and suppression systems) that NRC regulations require for fire barriers to withstand fire; (5) the NRC Inspector General issued a report in August 1992 condemning NRC's handling of the Thermo-Lag issue and documenting the NRC staff's failure to understand the scope of the problem; (6) in April 1994, Industrial Testing Laboratories and its President pleaded guilty to five felony counts of aiding and abetting the distribution of falsified test data; (7) on September 29, 1994, the U.S. Department of Justice issued a seven-count indictment against the manufacturer of Thermo-Lag and its Chief Executive Officer for willful violations of the Atomic Energy Act, conspiracy to conceal material facts, and making false statements to defraud the United States in connection with $58 million in fire barrier material; (8) GPUN has known since at least August 11, 1992, that Thermo-Lag 330–1 as a structural base material is combustible and that GPUN was in violation of Appendices A and R to 10 CFR Part 50 and the NRC Standard Review Plan, NUREG–0800; (9) GPUN failed to report the SwRI test results in response to a request for additional information regarding Generic Letter (GL) 92–08 (''Thermo-Lag 330–1 Fire Barriers'') of February 10, 1994, when asked to describe the Thermo-Lag 330–1 fire barriers installed as required to meet 10 CFR Part 50, Appendix R; and (10) continued reliance on fire watches at OCNGS is an unreasonable and unnecessary hazard to the public health and safety because of an inoperable fire protection system for safe shutdown of the reactor and installed combustible material on the shutdown systems.

On November 7, 1994, I informed the Citizens for Fair Utility Regulation and NIRS that the request for an immediate suspension of the Comanche Peak Unit 1 operating license was denied. On December 2, 1994, I informed the Maryland Safe Energy Coalition that the request for an immediate shutdown of the Peach Bottom plant and for an immediate suspension of the Peach Bottom license was denied. On December 15, 1994, I informed the GE Stockholders Alliance, Dr. D. K. Cinquemani, the Toledo Coalition for Safe Energy, and R. Benjan that the immediate suspension of the operating licenses of all reactors where Thermo-Lag is used was denied. On January 3, 1995, I informed NIRS and the Oyster Creek Nuclear Watch that the immediate suspension of the OCNGS operating license was denied. On January 19, 1995, I informed B. DeBolt that the request for immediate suspension of the operating licenses of all reactors in which Thermo-Lag is used was denied. The decisions were based on the following: (1) the staff is addressing deficiencies in fire barriers constructed with Thermo-Lag material as part of a Commission-approved action plan and has issued several bulletins and a generic letter to the nuclear industry to provide information and guidance, (2) fire barrier systems constructed with Thermo-Lag have been identified and declared inoperable, and (3) compensatory measures (fire watches) approved by the NRC have been instituted. Additionally in the above correspondence, all Petitioners were informed that the Petitions were being treated pursuant to 10 CFR 2.206 and had been referred to this office for action pursuant to 10 CFR 2.206 of the Commission's regulations and that appropriate action would be taken within a reasonable time.

For the reasons stated below, the Petitions have been denied.

II. Background

The picture painted by the Petitioners of inaction by the NRC staff in responding to the issues presented by the use of Thermo-Lag is at odds with the facts. A review of the chronological development of the issues shows that the NRC staff has been working diligently to resolve the issues and has consistently sought to ensure that there is adequate protection of the public health and safety. It is also inaccurate to contend that Thermo-Lag generic deficiencies have been known since 1982. As can be seen from the following information, the development of the Thermo-Lag issue has been evolutionary. Reports of problems regarding Thermo-Lag began to surface in the late 1980s when Gulf States Utilities, the licensee for River Bend Station, discovered some cracks and wear damage due to installation deficiencies (Licensee Event Report 87–005, March 25, 1987) and declared the material inoperable as a fire barrier. The licensee further discovered that stress skin was missing on all 3-hour Thermo-Lag fire barriers in the turbine building as a result of an installation error. In a series of plant-specific tests performed by Gulf States Utilities in 1989, Thermo-Lag barriers failed to meet the fire endurance test acceptance criteria. Gulf States Utilities categorized all 1-hour and 3-hour barriers as indeterminate and implemented compensatory measures in the form of fire watches. Other isolated plant-specific fire protection problems had been found during NRC inspections at various utilities as early as 1982 and had been acted on by the NRC staff. These problems were treated as plant-specific issues and were not considered as indications of generic problems.

In February 1991, the NRC received allegations that Thermo-Lag did not provide fire protection for electrical cables as claimed by the vendor. In response, in May 1991, the NRC visited River Bend Station to review the installation procedures and the failed fire endurance tests and concluded that a generic concern existed with 30-inch-wide cable trays. The NRC alerted the industry of the results of the test failures in IN 91–47, ''Failure of Thermo-Lag Fire Barrier Material To Pass Fire Endurance Test,'' August 6, 1991.

In June 1991, the Office of Nuclear Reactor Regulation (NRR) established a special review team to investigate the safety significance and generic applicability of technical issues regarding allegations and operating experience concerning Thermo-Lag fire barriers. In its final report, which was issued with IN 92–46, ''Thermo-Lag Fire Barrier Material Special Review Team Final Report Findings, Current Fire Endurance Testing, and Ampacity Calculation Errors,'' June 23, 1992, the special review team reached the following conclusions:

- The fire-resistive ratings and the ampacity derating factors for the Thermo-Lag fire barrier system were indeterminate.
- Some licensees had not reviewed and evaluated the fire endurance test results and the ampacity derating test results used as the licensing basis for their Thermo-Lag barriers to determine the validity of the tests and the applicability of the test results to their plant designs.
- Some licensees had not reviewed the Thermo-Lag fire barriers installed in their plants to ensure that they met NRC requirements and guidance, such as that provided in GL 86–10, ''Implementation of Fire Protection Requirements,'' April 24, 1986.
- Some licensees used inadequate or incomplete installation procedures during the construction of their Thermo-Lag barriers.

After the special review team completed its charter, the NRC staff prepared an action plan that provided a process to resolve technical issues identified with Thermo-Lag fire barrier systems. The NEI, formerly the Nuclear Management and Resources Council (NUMARC), agreed to coordinate industry efforts to resolve the issues.

In regard to the Petitioners' allegations of NRC's inaction in responding to the issues presented by the use of Thermo-Lag, the significant progress made by the NRC staff and the nuclear reactor licensees in resolving Thermo-Lag issues speaks to the contrary. The NRC staff has issued a number of generic communications related to Thermo-Lag, which include the following: (1) two bulletins: BUL 92–01, ''Failure of Thermo-Lag 330 Fire Barrier System To Maintain Cabling in Wide Cable Trays and Small Conduits Free From Fire Damage,'' June 24, 1992, and BUL 92–01, Supplement 1, ''Failure of Thermo-Lag 330 Fire Barrier System To Perform Its Specified Fire Endurance Function,'' August 28, 1992; (2) two generic letters: GL 92–08, ''Thermo-Lag 330–1 Fire Barriers,'' December 17, 1992, and GL 86–10, Supplement 1, ''Fire Endurance Test Acceptance Criteria for Fire Barrier Systems Used To Separate Redundant Safe Shutdown Trains Within the Same Fire Area,'' March 25, 1994; and (3) 12 information notices: IN 91–47; IN 91–79; IN 91–79, Supplement 1; IN 92–46; IN 92–55, ''Current Fire Endurance Test Results for Thermo-Lag Fire Barrier Material,'' July 27, 1992; IN 92–82, ''Results of Thermo-Lag 330–1 Combustibility Testing,'' December 15, 1992; IN 94–22, ''Fire Endurance and Ampacity Derating Test Results for 3-Hour Fire-Rated Thermo-Lag 330–1 Fire Barriers,'' March 16, 1994; IN 94–86, ''Legal Actions Against Thermal Science, Inc., Manufacturer of Thermo-Lag,'' December 22, 1994; IN 95–27, ''NRC Review of Nuclear Energy Institute, Thermo-Lag 330–1 Combustibility Evaluation Methodology Plant Screening Guide,'' May 31, 1995; IN 95–32, ''Thermo-Lag 330–1 Flame Spread Test Results,'' August 10, 1995; IN 95–49, ''Seismic Adequacy of Thermo-Lag Panels,'' October 27, 1995, and IN 94–86, Supplement 1, ''Legal Actions Against Thermal Science, Inc., Manufacturer of Thermo-Lag,'' November 15, 1995.

The NRC staff, the nuclear industry, and others have expended much time and many resources to address and resolve the Thermo-Lag issues. The NRC staff developed comprehensive fire test guidance and acceptance criteria and worked with industry to improve existing ampacity test procedures. The NRC staff and industry performed about 100 fire endurance and ampacity derating tests of Thermo-Lag fire barrier materials and full-scale test assemblies. The fire endurance tests established the limitations and the true fire-resistive capabilities of certain Thermo-Lag fire barrier configurations, without relying on the fire endurance test data supplied by TSI, the manufacturer of Thermo-Lag. On the basis of some of these tests, the NRC staff concluded that existing Thermo-Lag barriers could be upgraded with some additional Thermo-Lag material to satisfy NRC regulations. Precluding all use of Thermo-Lag materials for current and future fire barrier installations would remove a realistic option for resolving safety issues. Therefore, the NRC staff does not object to the use of Thermo-Lag in specific applications, where, through upgrades, NRC requirements are satisfied. The NRC staff issued three requests for additional information (RAIs) regarding GL 92–08 to each licensee using Thermo-Lag to obtain information on the specific Thermo-Lag material installed at each plant. The NRC staff reviewed and approved comprehensive Thermo-Lag fire barrier programs proposed by TU Electric for Comanche Peak Steam Electric Station, Unit 2, and by Tennessee Valley Authority (TVA) for Watts Bar Nuclear Power Plant, Unit 1, which attests to the fact that Thermo-Lag barriers can meet NRC fire protection guidelines and requirements. The NRC staff completed toxicity tests of Thermo-Lag material. The NRC staff and the industry completed chemical composition, combustibility, and flame spread tests of Thermo-Lag materials. Finally, the NRC staff reassessed previous technical conclusions to determine the extent to which the NRC staff and industry relied on information supplied by TSI to reach these conclusions. The staff had concerns about the reliability of information and data supplied by TSI that have been or could be used to make judgments regarding Thermo-Lag materials. The NRC staff identified and categorized the issues and previous conclusions and used the results of the industry-wide testing program regarding the chemical composition of Thermo-Lag, as discussed below, to determine if the in-plant Thermo-Lag materials were consistent. The results of this reassessment indicated that previous technical conclusions were valid independent of the information provided by TSI. The staff therefore concluded that additional action to reassess the issues or reverify the previous conclusions was not needed.

The NEI testing program on the chemical composition of Thermo-Lag analyzed samples from 18 utilities representing 25 nuclear power plants. The samples represented Thermo-Lag material manufactured between 1984 and 1995. NEI performed pyrolysis gas chromatography evaluation of 169 samples to assess organic chemical composition and performed energy-dispersive X-ray spectroscopy of 33 samples to assess inorganic chemical composition. On the basis of the tests, NEI concluded that (1) all of the samples contained the constituents identified by TSI as essential to fire barrier performance; (2) the composition of the samples was consistent; and (3) the test results provided a basis on which to close NRC questions about chemical composition and product consistency and for utility use of generic test data relative to fire endurance ratings, flame spread, heat release, ampacity derating, and other material properties.

The NRC staff test program on the chemical composition of Thermo-Lag was conducted by the National Institute of Standards and Technology (NIST) during 1992 and 1995. NIST analyzed 21 samples that were either collected by the staff during site visits to plants and test laboratories or provided by TVA, Gulf States Utilities, Commonwealth Edison Company, and NEI. The analysis included elemental and ammonia analysis, pyrolysis, gas chromatography, mass spectrometry, and X-ray fluorescence. These analytical techniques indicated that all of the samples were similar in their bulk chemical composition. These results were consistent with the results of the NEI chemical testing program pertaining

to the chemical composition and uniformity of Thermo-Lag.

Industry-wide progress has generally been commensurate with the complexity of the plant-specific issues and the amounts of Thermo-Lag installed at the individual plants. Several licensees have initiated programs to replace Thermo-Lag and are performing plant-specific tests of other fire barrier materials such as Mecatiss (Florida Power & Light for Crystal River Unit 3) and Darmatt KM–1 (Carolina Power & Light for Brunswick, IES Utilities, Inc., for Duane Arnold Energy Center, Commonwealth Edison Company for LaSalle County Station, and Northern States Power Company for Prairie Island Nuclear Generating Plant). The NRC staff is reviewing the plant-specific fire endurance test programs and has recently approved the plant-specific application of Darmatt KM–1 fire barrier at the LaSalle plant. The remaining licensees have submitted to the NRC staff detailed plans and schedules for resolving the issues at their plants. Most licensees are pursuing a combination of such options as upgrading existing Thermo-Lag fire barriers to meet NRC fire barrier requirements, replacing Thermo-Lag fire barriers with another type of fire barrier, reducing or eliminating reliance on Thermo-lag fire barriers by relocating equipment and cables and by post-fire safe-shutdown reanalysis, installing additional fire protection features such as automatic sprinkler systems, and requesting configuration-specific exemptions when such exemptions are allowed by NRC regulations and are technically justified to provide a level of safety equivalent to that prescribed by the regulations. The NRC staff has completed its review of the plans for resolving fire protection issues that were proposed by most of the licensees. As with any issues as technically complex, challenging, and resource intensive as those presented by Thermo-Lag barriers, some plant-specific questions remain. However, the number of issues has steadily declined. The NRC staff and the licensees will continue to address the residual questions on a case-by-case basis as they arise, and the NRC staff will continue to follow up with individual licensees on their corrective actions, as appropriate. Every licensee with Thermo-Lag fire barriers will continue to maintain NRC-approved compensatory measures, such as fire watches, until its permanent corrective actions are implemented. Therefore, the public health and safety are protected.

The NRC's ''defense-in-depth'' fire protection concept relies on protecting safe shutdown functions by achieving a balance among three echelons or levels of protection, which are (1) fire prevention activities; (2) the ability to rapidly detect, control, and suppress a fire; and (3) physical separation of redundant safe shutdown functions. Weaknesses found in one area may be dealt with by enhancing the protection capabilities of the remaining areas.[2] The NRC foresaw cases in which fire protection features would be inoperable and required licensees, through technical specifications or approved fire protection plans controlled by license conditions, to provide compensation for the deficient condition. The concept of allowing alternative actions to compensate for an inoperable condition or component is used in various programs associated with the operation of nuclear power plants and has long been an integral part of NRC regulatory requirements.[3]

The fire endurance test results contained in NRC BUL 92–01 and NRC BUL 92–01, Supplement 1, confirmed that certain Thermo-Lag fire barrier configurations compromise one facet of the fire protection defense-in-depth concept. In response to NRC BUL 92–01 and its supplement, the licensees for plants using Thermo-Lag fire barriers established fire watches in accordance with their technical specifications or license conditions as a compensatory measure. Fire watches are personnel trained by the licensees to inspect for the control of ignition sources, fire hazards, and combustible materials; to look for signs of incipient fires; to provide prompt notification of fire hazards and fires; and to take appropriate actions to begin fire suppression activities. Generally, therefore, by providing additional fire prevention activities through enhanced detection capabilities to find fire hazards and in the case of a fire, augmented suppression activities before a barrier's ability to endure a fire is challenged, fire watches compensate for degraded fire barriers.

The NRC staff has carefully evaluated the issues associated with continued use of Thermo-Lag material, including the use of fire watches to compensate for any degradation in the effectiveness of required fire barriers. Such compensatory actions provide an adequate level of fire protection without an undue risk to the health and safety of the public. Licensees have established fire watches to compensate for degraded and possibly inoperable fire barriers. Also, licensees rely on a defense-in-depth concept that incorporates multiple safety measures. Automatic fire detection and suppression systems are provided in most areas that have safe shutdown equipment. Trained fire brigades are required 24 hours a day at all plants. All areas that have safe shutdown equipment have manual fire suppression features. Fuels that can feed a fire and ignition sources to start a fire are controlled. The combination of fire watches and the defense-in-depth fire protection features provides an adequate level of fire protection until licensees implement permanent corrective actions.

Taken together, these factors represent an adequate means of fire protection at the plants using Thermo-Lag to ensure, with margin,[4] that operation can be conducted without an undue risk to the health and safety of the public. Nevertheless, with these considerations in mind, the NRC staff addressed below the Petitioners' specific concerns to demonstrate that no substantial health and safety issue has been raised.

III. Response to Specific Concerns

The Petitioners alleged that (1) the NRC has been slow to enforce its own regulations, (2) fire watches do not replace fire barriers and continued reliance on fire watches is an unreasonable and unnecessary hazard to the public health and safety because of an inoperable fire protection system for safe shutdown of the reactor and installed combustible material on the shutdown systems, (3) utilities are in violation of NRC requirements because Thermo-Lag is combustible and could contribute to a fire instead of protecting from it, and, in spite of the danger, the NRC allows continued use of Thermo-Lag, (4) faulty ampacity ratings could result in the use of inappropriate cables, which, if undersized, could overheat and cause its insulation to deteriorate, (5) the licensee for Oyster Creek did not report to the NRC its findings regarding the combustibility of Thermo-Lag and, (6) the Thermo-Lag barriers have been improperly installed at Comanche Peak Unit 1, which contributes further to the poor performance of Thermo-Lag.

[2] The ''defense-in-depth'' concept is detailed in the ''NRC Standard Review Plan,'' NUREG–0800, Section 9.5.1, ''Fire Protection Program,'' page 9.5.1–10.

[3] NRC GL 91–18, ''Information to Licensees Regarding Two NRC Manual Sections on Resolution of Degraded and Nonconforming Conditions and Operability,'' issued November 7, 1991, and NRC Inspection Manual, Part 9900, ''Resolution of Degraded and Nonconforming Conditions,'' issued October 31, 1991.

[4] The fact that Thermo-Lag barriers, as installed, will provide protection for some period of time is supported by, among others, the fire endurance test results documented in IN 92–55.

The NRC staff acknowledged and has stated that certain Thermo-Lag fire barrier configurations have failed to demonstrate the ability to perform their fire resistance functions. In this regard, the NRC staff, in BUL 92–01, Supplement 1, has stated that Thermo-Lag fire barriers should be treated as inoperable until licensees can declare the fire barriers operable on the basis of successful, applicable tests. Given the foregoing deficiencies identified for Thermo-Lag, the NRC staff concluded that compensatory measures are necessary until a licensee can declare fire barriers operable on the basis of applicable tests that demonstrate successful barrier performance.

The Petitioners also asserted that (1) the NRC should have protected the public and not Rubin Feldman, the President of the company manufacturing Thermo-Lag, and (2) public safety has been compromised by NRC's seeming complicity with utilities.[5]

A. Regulatory Compliance

The NRC staff acknowledges that certain fire endurance tests have demonstrated that Thermo-Lag barriers may not meet the fire endurance rating criteria set forth in Section III.G. of Appendix R to 10 CFR Part 50. This acknowledgment does not mean, however, that there no longer is reasonable assurance of protection of the public health and safety or that such actions as the shutdown of all reactors using Thermo-Lag and the suspension of Comanche Peak, Peach Bottom, and Oyster Creek operating licenses are warranted.

It should first be noted that Appendix R, which sets forth criteria for specific fire protection features to protect safe shutdown systems, is applicable only to facilities that commenced operation prior to 1979. Facilities commencing operation on or after January 1, 1979, although not bound by Appendix R, generally are bound by licensing commitments to follow the criteria set forth in Appendix R through license conditions.[6]

Even assuming that all of the plants in which Thermo-Lag is installed and that commenced operation prior to 1979 are not in compliance with Appendix R, it does not follow that the failure to comply with a regulation indicates the absence of adequate protection. The Commission has explained that—

> [W]hile it is true that compliance with all NRC regulations provides reasonable assurance of adequate protection of the public health and safety, the converse is not correct, that failure to comply with one regulation or another is an indication of the absence of adequate protection, at least in a situation where the Commission has reviewed the noncompliance and found that it does not pose an ''undue risk'' to the public health and safety.
>
> (Ohio Citizens for Responsible Energy, DPRM 88–4, 28 NRC 411 (1988).)

All the plants using Thermo-Lag have instituted fire watches as required by their action statements regarding inoperable barriers contained in their technical specifications or fire protection programs subject to license conditions. Generally, action statements provide alternative remedial actions to shutting down a plant when limiting conditions for operation are not met. Compliance with the required remedial actions provides reasonable assurance that the public health and safety is protected notwithstanding the plant's continued operation and its failure to meet the respective limiting condition for operation. Here, since all of the plants using Thermo-Lag have implemented the required fire watches in accordance with plant-specific requirements, their continued operation does not pose an undue risk to the public health and safety.

The Petitioners assert that fire watches do not replace fire barriers and continued reliance on fire watches is a hazard to public safety. The NRC staff acknowledges that fire watches do not replace fire barriers. However, as will be discussed in greater detail later in this Decision, fire watches are judged by the NRC to be acceptable compensatory measures and are legally sanctioned remedial actions based on 10 CFR 50.36(c)(2).[7]

In sum, notwithstanding the failure to have operable fire barriers meeting the fire endurance rating criteria specified by Section III.G. of Appendix R, a plant is not necessarily unsafe to continue operation. To the contrary, fire watches are judged by the NRC to be adequate remedial measures that provide reasonable assurance that the public health and safety is protected. By reason of compliance by all facilities using Thermo-Lag with their technical specifications or fire protection program action statements requiring the implementation of fire watches, protection of the public health and safety is still reasonably ensured for such plants. Because the Commission has discretion regarding enforcement of its regulations, and given the circumstances here in which no significant health and safety issues have been raised, enforcement action of the nature requested by the Petitioners is not warranted.

B. Ability of Fire Watches To Compensate for a Degraded Barrier

One of the Petitioners' allegations is that the measures taken by licensees to compensate for degraded barrier conditions, specifically fire watches, are not adequate to protect the public health and safety. The Petitioners have questioned the continued reliance on fire watches in the light of an inoperable fire protection system for safe plant shutdown and the combustibility of Thermo-Lag. In addition, the Petitioners claim that a fire watch does not replace a fire barrier in that fire watches are not preventive.

Despite the acknowledged shortcomings identified with certain Thermo-Lag fire barriers and after fully considering the arguments presented by the Petitioners regarding the ability of fire watches to provide adequate compensation, the NRC staff has determined that compensatory measures using fire watches are adequate and acceptable to ensure public health and safety until permanent corrective measures are implemented.

The use of fire watches in instances of degraded or inoperable barriers is an integral part of NRC-approved fire protection programs. In general, these NRC staff-approved compensatory measures specify the establishment of a continuous fire watch or an hourly fire watch in cases in which automatic detection systems protect the affected components. Although it is true that Thermo-Lag is intended as a barrier and fire watch personnel cannot act as physical shields, a fire watch provides more than simply a detection function. Personnel assigned to fire watches are trained by the licensee to inspect for the control of ignition sources, fire hazards, and combustible materials; to look for signs of incipient fires; to provide prompt notification of fire hazards and fires; and to take appropriate action to begin fire suppression activities. Fire watch personnel are capable of

[5] These statements could be interpreted as the appearance of unwarranted favoritism toward the manufacturer of Thermo-Lag and complicity with utilities. Therefore, the Petitions were referred to the NRC Office of the Inspector General.

[6] In addition, there are a very limited number of plants which commenced operation on or after January 1, 1979, that are not subject to specific license conditions but whose licensees have made commitments to comply with NRC fire protection requirements, including Section III.G. of Appendix R. The NRC is elevating these commitments to license conditions.

[7] In instances in which fire protection programs have been moved from technical specifications and are now subject to license conditions, the NRC's approval of the fire protection programs subject to license conditions provides the legal basis for the implementation of fire watches as a remedial measure.

determining the size, the actual location, the source, and the type of fire—valuable information that cannot be provided by an automatic fire detection system.

During a plant fire, compartment temperatures are likely to be less severe at the early stages. On the basis of enhanced capabilities provided by fire watches and notwithstanding that the level of barrier-type protection may be reduced, the NRC staff has determined that there is an adequate margin of safety to ensure protection in cases in which fire watches are approved.

The goal of the NRC staff's Thermo-Lag Action Plan is directed towards restoring the functional capability of fire barriers as soon as practicable. There is not a time limit associated with the use of fire watches as a compensatory measure. Given the margin of safety a fire watch brings to a fire protection program, as discussed above, the NRC staff has determined that continuing the use of fire watches while barriers are inoperable is acceptable. However, the NRC believes that notwithstanding interim reliance on compensatory measures, appropriate actions must be taken by licensees to restore operability of Thermo-Lag barriers. Individual licensees have provided schedules for restoring operability and these are being tracked by the NRC staff.

The NRC staff has carefully evaluated the use of fire watches to compensate for any degradation in the effectiveness of required fire barriers and has concluded that fire watches continue to ensure protection of the public health and safety. Therefore, the Petitioners' assertion that the measures taken by licensees to compensate for degraded fire barrier conditions, specifically fire watches, are a hazard is without merit.

C. Combustibility

The Petitioners alleged that, contrary to NRC regulations, Thermo-Lag is combustible.

The NRC staff recognizes that Thermo-Lag is combustible. To assess Thermo-Lag combustibility, the NRC staff conducted a testing program at the National Institute of Standards and Technology (NIST) based on the American Society for Testing and Materials (ASTM) Standard E–136. Under this testing standard, the material is considered to be ''combustible'' if three out of four samples tested exceed the following criteria: (1) the recorded temperature of the specimen's surface and interior thermocouples, during the test, rises 54 °F (30 °C) above the initial furnace temperature; (2) there is flaming from the specimen after the first 30 seconds of irradiance; and (3) the weight loss of the specimen, due to combustion during the testing, exceeds 50 percent. Of the four Thermo-Lag specimens tested, all experienced a weight loss of greater than 50 percent and flaming continued in excess of 30 seconds. IN 92–82, which provided licensees with the results of the E–136 tests and confirmed the combustibility of Thermo-Lag, restated the NRC fire protection requirements of Section III.G. of Appendix R to 10 CFR Part 50 and asked that licensees review the information for applicability to their facilities.

The NRC's basic fire protection regulation for commercial nuclear power plants is Section 50.48 of 10 CFR Part 50 ''Fire protection.'' Section 50.48 references General Design Criterion (GDC) 3 of Appendix A to 10 CFR Part 50, ''Fire protection,'' Appendix R to 10 CFR Part 50 ''Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979,'' and various NRC fire protection guidance documents. Specifically, Section 50.48(a) states that each operating nuclear power plant must have a fire protection plan that satisfies GDC 3, and Section 50.48(b) states that Appendix R to 10 CFR Part 50 establishes fire protection features required to satisfy GDC 3 with respect to certain generic issues for nuclear power plants licensed to operate prior to January 1, 1979.[8] These issues are addressed in Section III.G, ''Fire protection of safe shutdown capability,'' Section III.J, ''Emergency lighting,'' and Section III.O, ''Oil collection system,'' of Appendix R. Of these three sections of Appendix R, Section III.G addresses the use of fire barriers to protect one train of systems necessary to achieve and maintain hot shutdown conditions in the event of a fire and, therefore, is the regulation of interest here.

Section 50.48(a) notes that fire protection guidance for nuclear power plants is contained in two NRC documents. These are (1) Branch Technical Position (BTP) Auxiliary Power Conversion Systems Branch (APCSB) 9.5–1, ''Guidelines for Fire Protection for Nuclear Power Plants,'' for new plants docketed after July 1, 1976, and (2) Appendix A to BTP APCSB 9.5–1, ''Guidelines for Fire Protection for Nuclear Power Plants Docketed Prior to July 1, 1976.'' These two NRC documents specify preferred methods for fire protection program design including the use of fire barriers to satisfy Section III.G of Appendix R. Fire barriers that meet the criteria of Section III.G of Appendix R to 10 CFR Part 50 and these NRC guidance documents satisfy GDC 3. NUREG–0800, ''Standard Review Plan,'' (SRP) Section 9.5–1, ''Fire Protection Program,'' incorporates the guidance of BTP APCSB 9.5–1 and Appendix A to BTP APCSB 9.5–1 and the criteria of Section III.G of Appendix R to 10 CFR Part 50. Therefore, fire barriers that meet the guidelines of SRP Section 9.5–1 also satisfy 10 CFR 50.48 and GDC 3.

As stated in 10 CFR 50.48(a), the purpose of the fire protection plan is ''to limit fire damage to structures, systems, or components important to safety so that the capability to safely shut down the plant is ensured.'' In general, a fire protection plan consists of administrative controls and procedures, personnel for implementing the plan and for fire prevention and manual fire suppression activities, fire detection systems, automatic and manually operated fire suppression systems and equipment, and fire barriers.

Section III.G of Appendix R to 10 CFR Part 50 is the only part of the fire protection regulations that addresses the use of fire barriers. It addresses the use of fire barriers to protect one train of systems necessary to achieve and maintain hot shutdown conditions in the event of a fire. Fire barriers are required to have either a 1-hour or 3-hour rating depending on the specific requirement. However, Section III.G does not provide acceptance criteria for fire barriers, nor does it address the combustibility of fire barrier materials. The criteria are set out in BTP APCSB 9.5–1, Appendix A to BTP APCSB 9.5–1, and SRP Section 9.5–1. These NRC documents do not preclude the use of combustible materials for construction of fire barriers required to have a 1-hour or 3-hour rating. On March 25, 1994, the staff consolidated and clarified in Supplement 1 to Generic Letter (GL) 86–10, the fire barrier criteria specified in the BTPs and the SRP. This GL supplement provides detailed staff guidelines for assessing the combustibility of fire barrier materials, but it does not preclude the use of combustible materials for fire barriers required to satisfy a 1-hour or 3-hour rating. In fact, the fire barrier criteria are appropriately focused on the performance of the fire barrier and its ability to achieve its intended design function, that is, its ability to limit temperature rise within the barrier enclosure and to prevent the passage of flame or gasses hot enough to adversely

[8] While Appendix R is applicable only to facilities that commenced operation prior to January 1, 1979, as discussed earlier in this Director's Decision, facilities commencing operation on or after January 1, 1979, are bound to satisfy the criteria of Appendix R through license conditions or licensing commitments.

affect the functionality of the safe shutdown components (e.g., cables) enclosed within the fire barrier.

Thermo-Lag 330–1 is a sacrificial material. When it is exposed to elevated temperatures, such as those experienced during a fully-developed room fire, it sublimes and transitions from a solid to a vapor. The vapors go through an endothermic decomposition process (pyrolysis) which absorbs heat from the fire. As a result of the pyrolysis, the unreacted Thermo-Lag material is replaced by an insulating char layer which is composed of small interconnecting cells having a large surface area. The char layer re-radiates energy and limits heat transfer through the Thermo-Lag material. The low thermal conductivity of the char layer provides additional thermal insulation. Therefore, even though Thermo-Lag is classified as a combustible material when testing in accordance with the guidance of Supplement 1 to GL 86–10, properly designed, qualified, and installed Thermo-Lag can yield fire barriers with a 1-hour or 3-hour rating which will protect safe shutdown components from the effects of the fire. Therefore, such barriers can satisfy the requirements of 10 CFR 50.48 and GDC 3.

To provide reasonable assurance that Thermo-Lag fire barriers installed in the nuclear power plants can meet their intended function, representative Thermo-Lag fire barrier assemblies have been subjected to full-scale qualification-type fire endurance tests conducted in accordance with the guidance of Supplement 1 to GL 86–10. This guidance provides standard and uniform test methods and acceptance criteria for assessing the fire-resistive capabilities of these barriers. The staff has found the use of Thermo-Lag acceptable as a fire barrier material when it is used in accordance with existing NRC regulations and guidance and where supported by appropriate tests and analyses.

However, there are two types of applications where the use of Thermo-Lag material is not appropriate. These are (1) Enclosing combustible materials (e.g., insulated cables) within Thermo-Lag fire barriers to eliminate the combustible materials as a fire hazard and (2) using Thermo-Lag as radiant energy heat shields inside noninerted containments.

Section III.G of Appendix R (and the equivalent SRP guidance) specifies three options for protecting redundant trains of systems necessary to achieve and maintain hot shutdown conditions located within the same fire area outside of containment. Two of the three options (Sections III.G.2.a and c) rely on the use of fire barriers with a 1-hour or 3-hour rating, as discussed above. The third option, Section III.G.2.b, specifies the separation of redundant safe shutdown trains by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards. (A typical example of intervening combustibles is a cable tray loaded with cables, because cable jacket materials are combustible.) Therefore, spacial separation, and not fire barriers, are used to meet Section III.G.2.b. However, to meet this requirement, some licensees have enclosed combustibles that are installed between redundant shutdown trains within a fire barrier. In theory, the fire barrier prevents an exposure fire from igniting the intervening combustible materials and spreading along them from one redundant train to the other. Thus the fire barrier effectively eliminates the intervening combustible as a fire hazard. If the fire barrier itself is noncombustible and the redundant safe shutdown trains are separated by a horizontal distance of more than 20 feet, then the configuration meets Section III.G.2.b of Appendix R. However, if the fire barrier material used to enclose the intervening combustibles is also combustible, such as Thermo-Lag, then the licensee has simply installed one combustible material over another and has not eliminated the intervening fire hazard. In a limited number of cases, licensees have enclosed intervening combustibles within Thermo-Lag fire barriers under the incorrect assumption that the Thermo-Lag fire barrier would eliminate the intervening combustibles as a fire hazard. Corrective actions will be required in these cases.

As an alternative to the three options discussed above, Section III.G.2.f of Appendix R (and the equivalent SRP guidance) provides a fourth option for noninerted containments, that is, the separation of redundant safe shutdown components with noncombustible radiant energy heat shields. Thermo-Lag is classified as a combustible material when tested in accordance with the guidance of Supplement 1 to GL 86–10. Therefore, it does not meet the criteria for radiant energy heat shields. Licensees using Thermo-Lag in this fashion will also be required to take corrective action.

To assure that corrective actions are taken in these cases, the NRC staff issued IN 95–27. In that IN, the staff addressed enclosing combustible materials within Thermo-Lag fire barriers in an attempt to eliminate the combustible materials as a fire hazard and using Thermo-Lag to construct radiant energy heat shields inside noninerted containments. The staff identified such solutions for reevaluating the use of Thermo-Lag for these applications as: (1) Reanalyzing post-fire safe shutdown circuits inside containment and their separation to determine if the Thermo-Lag radiant energy shields are needed, (2) replacing Thermo-Lag barriers installed inside the containment with noncombustible barrier materials, (3) replacing Thermo-Lag barriers used to create combustible-free zones with noncombustible barrier materials, (4) rerouting cables or relocating other protected components, or (5) requesting plant-specific exemptions where technically justified.

One of the Petitioners also asserted that subsection 5a(3) of Section 9.5–1 of the SRP states that fire barrier designs ''should utilize only non-combustible materials.'' This section of the SRP does not apply to fire barriers which are used to separate redundant safe shutdown components located *within* a nuclear power plant fire area. Rather, it applies to fire barrier penetration seals, which are typically installed in fire area boundaries. Thermo-Lag 330–1 is not used in such applications.

The principal consideration for 1-hour and 3-hour rated fire barriers installed to meet NRC fire protection requirements and guidelines is that they can achieve their intended design function. That is, that they can limit temperature rise within the barrier enclosure and prevent the passage of flame or gasses hot enough to adversely affect the functionality of the safe shutdown components enclosed within the fire barriers. The fact that Thermo-Lag material is combustible does not preclude Thermo-Lag fire barriers from achieving the intended function of preventing fire damage if the fire barriers are properly designed, qualified, and installed. The Petitioners' contention that Thermo-Lag material should not be used because it is combustible is without basis.

D. Ampacity Derating

The Petitioners assert that Thermo-Lag could contribute to starting a fire instead of protecting from it. They further alleged that faulty ampacity derating factors could result in the use of inappropriate cables that, if undersized, could overheat and cause its insulation to deteriorate.

Ampacity derating is the lowering (derating) of the current-carrying capacity of power cables enclosed in electrical raceways protected with fire barrier materials because of the insulating effect of the fire barrier material. This insulating effect may

reduce the ability of the cable insulation to dissipate heat. If not accounted for in the plant design, the increased cable insulation temperature could lead to premature insulation failure. Other factors also affect ampacity derating, including the extent of cable fill in the raceway, cable type, raceway construction, and ambient temperature. The National Electrical Code, Insulated Cable Engineers Association (ICEA) publications, and other industry standards provide ampacity derating factors for open air installations. These standards do not provide derating factors for fire barrier systems. Although a national standard test method is in the process of being developed but has not yet been established, ampacity derating factors for raceways enclosed with fire barrier material are determined by testing for the specific installation configurations.

TSI, the manufacturer of Thermo-Lag, has documented a wide range of ampacity derating factors that were determined by testing, for raceways enclosed within Thermo-Lag fire barrier materials. On October 2, 1986, TSI informed its customers that, while conducting tests in September 1986 at Underwriters Laboratories, Inc. (UL), it found that the ampacity derating factors for Thermo-Lag barriers were greater than previous tests indicated. However, the cable fill and tray configurations were different for each test than those tested previously. In addition, the NRC staff learned that UL performed a duplicate cable tray test that resulted in an even higher derating factor. The NRC staff also learned of the determination of other derating factors during its review of other tests conducted at Southwest Research Institute (SwRI).[9]

The NRC special review team concluded that the ampacity derating test results completed at the time of the review, including the UL test results, were indeterminate. This conclusion was based on observed inconsistencies in the derating test results of the various testing laboratories. The special review team found that there was no national consensus test standard (e.g., Institute of Electrical and Electronics Engineers (IEEE) or American National Standards Institute (ANSI)) for conducting these tests, and that some licensees had not adequately reviewed ampacity derating test results to determine the validity of the tests and the applicability of those test results to their plant design. The special review team recognized that, in hypothetical cases, nonconservative ampacity derating factors could have been instrumental in the installation of inappropriate cables, which as a result, could suffer premature cable jacket and cable insulation failures over a period of time. However, since that time, the NRC staff has determined that in practice the ampacity derating factor resulting from Thermo-Lag insulating properties represents only one of many variables used in determining the design ampacity for power cable systems and that, as discussed below, sufficient margin exists in this area to preclude any immediate safety concerns.

For actual installations, various derating factors are typically applied to the ICEA ampacity values provided for each cable size. In general, the cables typically used in actual installations have higher current-carrying capacity than the ICEA ampacity values.[10] Also, cables are sized based on full-load current plus a 25 percent margin to account for starting current requirements of the load. Given the short duration of typical equipment starts, this margin is available to compensate for any errors in ampacity derating. Further, use of a cable size larger than normal may be required as a result of voltage drop considerations for long circuit lengths. In typical applications this also provides additional current-carrying capacity. Given these conservatisms inherent in the design ampacity of cable systems and in addition the fact that most power cables required for safe shutdown are not normally energized, but are typically operated during surveillance testing for short time periods, the likelihood that cables could ignite as a result of Thermo-Lag ampacity derating errors has been judged by the NRC staff to be unlikely. In addition, based on these conservatisms and the currently available information on existing plants, ampacity design, and operating history, the NRC staff believes that the ampacity derating issue is not an immediate safety issue but rather is an aging issue to be resolved over the long term.[11]

E. Oyster Creek Failed To Report Test Results on Combustibility to the NRC

The Petitioners requested that Oyster Creek's license be suspended based on the following: (1) SwRI conducted fire tests on Thermo-Lag 330–1 specimens for GPUN, the licensee for Oyster Creek, and reported that all specimens ignited approximately 2 seconds after they were inserted into the furnace and failed specified criteria because of flaming after the first 30 seconds of testing, an outside temperature rise higher than 30 °C, and a weight loss of 50 percent; (2) GPUN's operation of Oyster Creek with knowledge of the SwRI report is an example of GPUN's reckless disregard for fire protection and public safety; (3) in the event of fire, Thermo-Lag is likely to fail its intended function of protecting vital electrical cables running from the control room to plant safety systems used to shut down the reactor; (4) current installations of Thermo-Lag are likely to fail in less time than the 1 hour (when smoke detectors and automatic sprinkler systems are present) or 3 hours (when there are no fire detection and suppression systems) that NRC regulations require for fire barriers to withstand fire; (5) the NRC Inspector General issued a report in August 1992 condemning NRC's handling of the Thermo-Lag issue and documenting the NRC staff's failure to understand the scope of the problem; (6) in April 1994, ITL and its President pleaded guilty to five felony counts of aiding and abetting the distribution of falsified test data; (7) on September 29, 1994, the U.S. Department of Justice issued a seven-count indictment against the manufacturer of Thermo-Lag and its Chief Executive Officer for willful violations of the Atomic Energy Act, conspiracy to conceal material facts, and making false statements to defraud the United States, in connection with $58 million in fire barrier material; (8)

[9] The test procedures and test configurations differed among the testing laboratories. Therefore, the results from the different ampacity tests may not be directly comparable to each other.

The NRC staff is concerned that the ampacity derating factors, as determined in UL tests for Thermo-Lag barrier designs, are inconsistent with TSI results for similar designs because different times were allowed for the temperature to stabilize before taking current measurements. Inconsistent stabilization times would call into question the validity of previous TSI results. The NRC also noticed during the review of the Industrial Testing Laboratories (ITL) test reports that ambient temperature and maximum cable temperature were allowed to vary widely for some tests. Therefore, those tests in which the ambient and maximum cable temperatures were not maintained within specified limits may be questionable. Additionally, a licensee discovered a mathematical error for the ampacity derating factor published in an ITL test report. A preliminary assessment of the use of a lower-than-actual ampacity derating factor indicates that higher-than-rated cable temperatures are possible for Thermo-Lag installations. Higher-than-rated cable temperatures could accelerate the aging effects experienced by the cable.

[10] ICEA ampacity values include conservatisms to compensate for skin and proximity effects and shield and/or sheath losses which may or may not apply in specific situations.

[11] Generic Letter 92–08 requires licensees to review the ampacity derating factors used for all raceways protected by Thermo-Lag 330–1 (for fire protection of safe shutdown capability or to achieve physical independence of electrical systems) and to determine whether the ampacity derating test results relied upon are correct and applicable to the plant design. Presently, the staff is conducting reviews of followup actions to close out ampacity derating concerns with licensees pursuant to GL 92–08.

GPUN has known since at least August 11, 1992, that Thermo-Lag 330–1 as a structural base material is combustible and that it was in violation of Appendices A and R to Part 50 of Title 10 of the *Code of Federal Regulations* (10 CFR) and the NRC Standard Review Plan, NUREG–0800; (9) GPUN failed to report the SwRI test results in response to GL 92–08 of February 10, 1994, when asked to describe the Thermo-Lag 330–1 fire barriers installed as required to meet 10 CFR Part 50, Appendix R; and (10) continued reliance on fire watches at Oyster Creek is an unreasonable and unnecessary hazard to the public health and safety because of an inoperable fire protection system for safe shutdown of the reactor and installed combustible material on the shutdown systems.

Several of the issues listed above have been addressed earlier in this decision. Therefore, the NRC staff will only address below the remaining plant-specific issues. As discussed earlier in this decision, the NRC issued IN 92–82 to inform the industry of the results of combustibility tests performed by NIST in early August 1992. These tests confirmed the combustibility of Thermo-Lag. As a result of discussions with the NRC staff on the subject of Thermo-Lag combustibility, GPUN decided to independently verify the results of the E–136 tests performed by NIST and contracted SwRI to perform the E–136 tests. The results of these tests, as documented by the telecopy transmittal sheet submitted with the Petition, confirmed the combustibility of Thermo-Lag. Contrary to the Petitioners' allegations, the NRC staff does not require that licensees report the results of their independent testing. It should be noted here that, prior to the SwRI testing that confirmed combustibility, the NRC was aware of the combustibility of Thermo-Lag and that the NRC was also well aware of the results of the E–136 tests performed by GPUN through telephone conversations with GPUN personnel, even though there was no requirement for GPUN to report these test results.

The Petitioners also alleged that GPUN did not report to NRC its findings of the SwRI test results in its ''Response to Request for Additional Information Regarding Generic Letter 92–08, 'Thermo-Lag Fire Barriers,' '' (RAI) dated February 10, 1994.

The RAI quoted by the Petitioners did not request that GPUN report to NRC its findings of the SwRI test results and, in addition, the NRC staff does not require that licensees report the results of their independent testing. Therefore the NRC staff has concluded that, contrary to the Petitioners' allegation, GPUN did not have to report to the NRC its findings of the SwRI test results.

For the reasons stated above, the suspension of Oyster Creek's license, as requested by the Petitioners, is not warranted.

F. Dry-Joint Issue at Comanche Peak Unit 1

The Petitioners requested that (a) the Comanche Peak Unit 1 license be suspended, (b) the licensee perform additional destructive analysis for Thermo-Lag configurations, and, (c) the licensee perform fire tests on upgraded ''dry-joint'' Thermo-Lag configurations based on the following: (1) the licensee's records on the original installation of Thermo-Lag fire barriers on conduits and cable trays indicate that its contractor followed specifications for pre-buttering all joints; (2) NRC Inspection Report Nos. 50–445/93–42; 50–446/93–42 found, based on destructive analysis documents, that a concern did exist where Thermo-Lag conduit joints fell apart easily and did not appear to have any residual material of a buttered surface, indicative of a joint that had not been pre-buttered; (3) the ''dry joint'' deficiency appeared in Room 115A and other areas of the unit; (4) the licensee directly contradicts an NRC inspector's findings that were determined in part by destructive analysis; (5) the ''dry joint'' or absence of pre-buttering of Thermo-Lag panels can be determined only by destructive analysis and cannot be determined by a walk down visual inspection; (6) the findings reported in the Comanche Peak Unit 1 Region IV Inspection Reports 50–445/93–42 and 50–446/93–42, based on the limited amount of destructive analysis conducted at the unit, constitute a substantial documentation of installation deficiencies found in Thermo-Lag fire barriers as documented in NRC IN 91–79 and Supplement 1; (7) neither the NRC nor the industry, by its agent NEI, nor a utility, have conducted fire tests on dry fitted or ''dry joint'' upgraded configurations of Thermo-Lag 330–1; and (8) the presence of ''dry joint'' upgraded configurations in Comanche Peak Unit 1 constitutes an untested application of Thermo-Lag fire barriers.

These allegations were based on the Petitioners' interpretation of NRC Inspection Report 93–42 issued on February 21, 1994. By letter of November 29, 1994, TU Electric, the licensee for Comanche Peak Unit 1, sent a letter to the NRC staff responding to the Petition.

The term ''joint'' refers to the interface between two adjacent Thermo-Lag surfaces. Comanche Peak Unit 1 installation procedures for Thermo-Lag fire barriers specify that, during the initial installation process, the joints should be pre-buttered (or covered) with Thermo-Lag trowel grade material before the mating surfaces are joined to ensure adhesion of the surfaces. The term ''dry joint'' refers to the lack of Thermo-Lag trowel grade material in a joint. The failure to pre-butter a joint with trowel grade Thermo-Lag could result in a weakening of the joint during a potential fire exposure and could provide an exposure path in the fire barrier envelope. The NRC performed an inspection at Comanche Peak Unit 1 on November 2–5, and 23–24, 1993, and January 26–28, 1994, to compare the Thermo-Lag test specimens with the upgraded Thermo-Lag configurations on site. The results of this inspection are documented in NRC Inspection Report 93–42. The report stated that there appeared to be a large number of deficiencies with the installed fire barriers and that an example of these deficiencies involved dry joints on conduit overlays installed on pedestal hangers. The NRC inspector did not personally observe the dry joints in question. His statements were based on observations made by TU Electric and documented in an Operations Notification and Evaluation (ONE) form. However, the ONE form in question did not identify a dry joint. Instead, the ONE form identified a condition that was conservatively reported as an apparent dry joint. Upon further evaluation of the ONE form, TU Electric determined that the joint in question had in fact been pre-buttered with trowel grade Thermo-Lag. These facts are discussed in more detail below.

On November 25, 1992, a speed memo was written by a TU Electric contractor identifying ''apparent unsatisfactorily conditions on Unit 1 commodities.'' This memorandum identified ''an apparent'' dry joint on an oversize coupling section (on top of a pedestal hanger). The speed memo also stated that, ''we have decided that the best vehicle to call attention to these apparent deficiencies would be a letter to your attention for further evaluation of the situation. * * *'' The letter was forwarded to the appropriate TU Electric engineering section.

The cognizant TU Electric engineer performed a walkdown of the described areas and evaluated the commodities. He conservatively initiated a ONE form (the process used by TU Electric to report problems and develop resolution for the identified problems). A comprehensive evaluation of this condition determined that the joint had been pre-buttered. Therefore, the

engineering resolution for this condition was that ''this is not a deficient condition, and there are no generic implications.''

The originator of the speed memo initially believed that the condition in question was a dry joint because of the appearance of the joint. During alignment of Thermo-Lag panels, the leading edge of one panel contacts the outer edge of a preceding panel and forces most of the trowel grade along the initial contact edge toward the inside of the Thermo-Lag envelope. Subsequent shrinkage of the trowel grade in the joint can give the appearance of a dry joint because the trowel grade material is not visible. Therefore, contrary to the Petitioners' allegation, there was no ''dry joint'' deficiency on the pedestal hanger.

The Petitioners also alleged that dry joints appear in other Thermo-Lag installations at Comanche Peak Unit 1. In response to the Petition, TU Electric performed an electronic search of its ONE form data base. The search did identify additional ONE forms related to dry joints. However, Thermo-Lag rework crews and the quality control inspectors at Comanche Peak Unit 1 have used the term ''dry joints'' and ''no visible trowel grade material'' synonymously. Upon further investigation of these ONE forms, it was determined that trowel grade material had in fact been applied to the joints in question. Therefore, these ONE forms were also dispositioned as ''not a nonconforming condition.'' These findings support the NRC staff's conclusion that, contrary to the Petitioners' allegations, there is no evidence of dry joints at Comanche Peak Unit 1. The Petitioners' allegations regarding dry joints at Comanche Peak Unit 1 are based on premises that are faulty and contrary to the information contained in Inspection Report 93–42.

In regard to the Petitioners' request that the licensee perform fire tests on upgraded ''dry joint'' Thermo-Lag configurations and additional destructive analysis, the NRC staff has reviewed the documentation provided by the licensee in response to the RAIs regarding GL 92–08 and concluded that the licensee's quality assurance program gave adequate confidence that the as-installed Thermo-Lag configurations at Comanche Peak Unit 1 conform with NRC specification requirements for both material and installation attributes.

Accordingly, suspension of the Comanche Peak Unit 1 license, as requested by the Petitioners, is not warranted.

G. Protection of Rubin Feldman

The Petitioners assert that, rather than protecting the public, the NRC is protecting Rubin Feldman, President of the company that manufactures Thermo-Lag.

As discussed earlier, the NRC received allegations in 1991 that questioned the adequacy of Thermo-Lag fire barriers. In response (1) the Office of the Inspector General (OIG) and the Office of Investigations (OI) formed a joint task force to investigate the allegations and (2) the Office of Nuclear Reactor Regulation (NRR) established a special team to review the safety issues raised by the allegations. Throughout its review, the special team gave expert technical advice and assistance to the OIG/OI task force. The Director of NRR tasked the NRR staff to resolve the technical issues raised by the special team. The NRC staff continued to cooperate fully with the investigative task force. Further, the NRR staff carried out a full-scale test program and developed other technical data and information for the investigative task force. These NRC staff efforts contributed significantly to a referral to the Department of Justice of possible wrongdoing by TSI. The referral resulted in a seven-count criminal indictment of TSI, the manufacturer and supplier of Thermo-Lag fire barriers and of its President, Rubin Feldman, by a Federal Grand Jury. The NRC staff continued to support the Department of Justice throughout the criminal case.[12] In addition, throughout the trial, the NRC staff continued to pursue corrective actions consistent with its action plan for the resolution of the Thermo-Lag issues. The above facts contradict the Petitioners' assertion that the NRC was protecting Rubin Feldman.

H. NRC Seeming Complicity With Utilities

The Petitioners also assert that there is seeming complicity between the NRC and the licensees and that licensees seek to avoid costly replacement of the Thermo-Lag.

In May 1991, the NRC Office of the Inspector General performed an inspection of the NRC's staff performance in regard to Thermo-Lag barriers and found indications of inadequate performance by the NRC staff in the acceptance and review of Thermo-Lag barriers. Subsequently, the NRC staff initiated an aggressive program of corrective actions to rectify the deficiencies identified in the review and response process, as summarized earlier in this decision.

In addition, the staff has expended considerable time and effort to address and resolve Thermo-Lag issues to ensure that licensees return to compliance with existing NRC fire protection requirements. The NRC staff issued three requests for additional information regarding GL 92–08 to each licensee using Thermo-Lag to obtain information on the specific Thermo-Lag material installed at each plant, details about the corrective actions each licensee intended to take to return to compliance with NRC fire protection requirements, and schedules for the implementation of these corrective actions. The response of each licensee was evaluated by the NRC staff. As a consequence of this substantial NRC staff effort, a number of licensees have already returned to compliance with NRC requirements by a variety of means which include replacing, rerouting, or upgrading existing Thermo-Lag barriers, performing post-fire safe shutdown reanalysis, and installing additional fire detection and suppression features. All of these measures involve some burden on licensees. In addition, some licensees have initiated costly programs to perform plant-specific fire endurance tests of other fire barriers with the intention of replacing Thermo-Lag with these barriers. All licensees who utilize Thermo-Lag will need to expend resources commensurate with their reliance on Thermo-Lag to come into compliance with NRC fire protection requirements. NRC staff oversight will ensure that this is the case.

The Petitioners' assertion of seeming complicity with utilities on the part of the NRC staff is unfounded in the light of the significant NRC staff efforts to ensure that licensees expend the resources necessary to return to compliance with NRC requirements.

IV. Conclusion

The Petitioners request that the NRC order the immediate shutdown of all reactors using Thermo-Lag and the suspension of Oyster Creek, Peach Bottom Units 1 and 2, and Comanche Peak Unit 1 operating licenses.

For the reasons discussed above, I find no basis for taking such actions. Rather, on the basis of the review efforts by the NRC staff, I conclude that the issues raised by the Petitioners are being addressed by licensees in a manner which assures adequate protection of the public health and safety. Accordingly, the Petitioners' requests for action pursuant to 10 CFR 2.206 are denied.

[12] The jury returned a verdict of ''not guilty'' on all counts of the indictment against TSI and Mr. Feldman.

A copy of this Decision will be placed in the Commission's Public Document Room, Gelman Building, 2120 L Street, N.W., Washington, D.C., and at the Local Public Document Room for the named facilities. A copy of this Decision will also be filed with the Secretary for the Commission's review as provided in 10 CFR 2.206(c) of the Commission's regulations.

As provided by this regulation, the Decision will constitute the final action of the Commission 25 days after issuance, unless the Commission, on its own motion, institutes a review of the Decision within that time.

Dated at Rockville, Maryland this 3rd day of April 1996.

For the Nuclear Regulatory Commission.

William T. Russell,

Director, Office of Nuclear Reactor Regulation.

[FR Doc. 96–15149 Filed 6–13–96; 8:45 am]

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