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UNITED STATES
NUCLEAR REGULATORY COMMISSION

In the matter of	
ENTERGY NUCLEAR INDIAN POINT 2, L.L.C, ENTERGY)	
NUCLEAR INDIAN POINT 3, L.L.C, And Entergy Nuclear)	License No. DPR 26 an
Operations, Inc. and Entergy North East, Inc., regarding the)	License No. DPR 6
Indian Point Energy Center)	
Unit 2 and Unit 3)	Docket No. 50-247 an
License Amendment Regarding Fire Protection Program)	Docket No. 50-28

OBJECTION TO GRANT OF EXEMPTION
AND LICENSE AMENDMENT,
PETITION TO REOPOEN FOR CONSIDERATION,
PETITION FOR LEAVE TO INTERVENE and
REQUEST FOR HEARING, AND CONTENTIONS

Westchester Citizen's Awareness Network (referred to hereinafter as "WestCAN"), Rockland County Conservation Association (referred to hereinafter as "RCCA"), and Public Health and Sustainable Energy (referred to hereinafter as "PHASE"), Sierra Club –Atlantic Chapter ("Sierra Club"), Beyond Nuclear, and New York State Assemblyman Richard Brodsky ("Brodsky") , are individually and jointly referred to hereinafter as "Stakeholders", pursuant to 10 CFR § 2.309 (d) and (e), object to the Nuclear

Regulatory Commission's grant of an exemption to the requirements under federal rules in an amendment to License No DPR 64 for Indian Point Unit 3. Exhibit No. FP1, by Entergy Nuclear Indian Point 3, LLC and Entergy Nuclear Operations, (collectively referred to as the Applicant, or Licensee, or Entergy).

Stakeholders object to the NRC's grant of a finding of no significant hazard with regard to an exemption to the requirements under Federal Rules to be reflected in a forthcoming Safety Evaluation; and for failure to incorporate the requirements of 10CFR73.1 for IP3 as was mandated by Congress for Licensee DPR-64 for Indian Point Center Unit 3 (IP3), therefore Stakeholders request that consideration of the exemption request be reopened due to new, substantial and significant information, and Stakeholders request a hearing under 10 C.F.R. §2.309 (a).

I. PARTICIPATION AS A MATTER OF RIGHT

A. WestCAN, RCCA, PHASE, SIERRA CLUB, BEYOND NUCLEAR and New York State Assemblyman Richard Brodsky have standing on their own behalf and on behalf of their members.

1. WestCAN is a grassroots coalition that has advocated for a nuclear free northeast and has consistently followed the events at Indian in order to keep the

public informed through its listserve, WestCAN has approximately five hundred members who live within the State of New York, in Westchester, Rockland, Putnam and Orange County, and who make their residences, places of occupation and recreation within fifty (50) miles of Indian Point, and whose concrete and particularized interests will be directly affected by this proceeding. WestCAN has participated in hearings on this issue 2005, Exhibit FP no. 20. **WestCAN 's central office is located at 2A** Adrian Court, Cortland Manor, NY which is within five miles of Indian Point and situated within the Plume Exposure Pathway (EPZ), also referred to as the Peak Fatality Zone.

2. RCCA has standing on its own behalf and on behalf of its members. RCCA is non-profit organization, founded in 1930 and incorporated in 1936. RCCA is dedicated to the conservation of our natural resources, promote sound land use, advocate clean air and water quality, develop proper drainage, support energy conservation and preservation of natural beauty. RCCA has membership of approximately 450, who live within the State of New York, primarily in Rockland, County, and who make their residences, places of occupation and recreation within twenty (20;) miles of Indian Point, and whose concrete and particularized interests will be directly affected by this

DS.9

proceeding. RCCA 's central office is located in Pomona, NY which is within nine miles of Indian Point and situated within the Plume Exposure Pathway (EPZ), also referred to as the Peak Fatality Zone.

3. PHASE as standing on its own behalf and on behalf of its members. PHASE is a grassroots think tank, that advocates for the development and use of sustainable energy, in an effort to protect public health and safety, and the protection of the environment. PHASE has members who live within the State of New York, primarily in Rockland and Westchester Counties, and who make their residences, places of occupation and recreation within thirty (30) miles of Indian Point, and whose concrete and particularized interests will be directly affected by this proceeding. PHASE's central office is located at 21 Perlman Drive, Spring Valley, NY 10977, which is within eleven miles of Indian Point and situated within the Plume Exposure Pathway (EPZ), also referred to as the Peak Fatality Zone.

4. SIERRA CLUB, ATLANTIC CHAPTER has standing on its own behalf and on behalf of its members. The Sierra Club is North America's oldest, largest and most influential grassroots environmental organization, is a

non-profit, member-supported, public interest organization that promotes conservation of the natural environment through public education and lobbying. Grassroots advocacy has made The Sierra Club America's most influential environmental organization. Founded in 1892, the Club is now more than 700,000 members strong. The Atlantic Chapter applies the principles of the national Sierra Club to the environmental issues facing New York State

SIERRA CLUB, Atlantic Chapter has 45, 000 members who live within the State of New York, including in the Hudson Valley, including New York City, and who make their residences, places of occupation and recreation within fifty (50) miles of Indian Point, and whose concrete and particularized interests will be directly affected by this proceeding, many of who live within the Peak Injury Zone.

5. BEYOND NUCLEAR, located at Nuclear Policy Research Institute 6930 Carroll Avenue, Suite 400 Takoma Park, MD 20912 has standing on its

own behalf and on behalf of its members. Beyond Nuclear aims to educate and activate the public about the connections between nuclear power and nuclear weapons and the need to abandon both to safeguard our future. Beyond Nuclear advocates for an energy future that is sustainable, benign and democratic.

6. New York State Assemblyman Richard Brodsky of the 92nd district, has standing on his own behalf and on behalf of his constituents who live in Westchester County, Town of Greenburg, Ardsley, Dobbs Ferry, Elmsford, Hartsdale, Hastings, Irvington, Scarsdale, Tarrytown and part of White Plains, and Town of Mount Pleasant, including Hawthorne, Briar Cliff, Pleasantville, Sleepy Hollow, Thornwood. Valahalla, North Yonkers. His office is located at 5 West Main Street, Elmsford, NY 10523.

WestCAN, RCCA. PHASE, SIERRA CLUB, BEYOND NUCLEAR and New York State Assemblyman Richard Brodsky meet the requirements of 10 CFR §2.310(d) for a full adjudicatory hearing on all contentions it raises, WestCAN, RCCA. PHASE, SIERRA CLUB, BEYOND NUCLEAR and New York State Assemblyman Richard Brodsky do not concede the procedures of 10 CFR §2.310 which restrict use of full adjudicatory hearing procedures are lawful and reserves the right to challenge, in an appropriate

02.12

legal forum, these procedures, as applied to WestCAN, RCCA. PHASE, SIERRA CLUB, BEYOND NUCLEAR and New York State Assemblyman Richard Brodsky in this case, should that be necessary to permit WestCAN, RCCA. PHASE, SIERRA CLUB, BEYOND NUCLEAR and New York State Assemblyman Richard Brodsky to fully adjudicate the important nuclear safety and environmental issues it raises.

C. WestCAN, RCCA. PHASE, SIERRA CLUB, BEYOND NUCLEAR and New York State Assemblyman Richard Brodsky Meet Prudential Standing Requirements

In addition, Courts have created a prudential standing requirement that if a petitioner's interests fall within the "zone of interests" protected by the statute on which the claim is based. *Bennett v. Spear*, 520 U.S. 154, 162(1997). The Atomic Energy Act and NEPA, the statutes at issue here, protect the same interests of protecting public health and safety, that are held by WestCAN, RCCA. PHASE, SIERRA CLUB, BEYOND NUCLEAR and New York State Assemblyman Richard Brodsky's constituents, and furthered by WestCAN, RCCA. PHASE, SIERRA CLUB, BEYOND NUCLEAR and New York State Assemblyman Richard Brodsky's purpose.

II. WestCAN, RCCA. PHASE, SIERRA CLUB, BEYOND

NUCLEAR and New York State Assemblyman Richard Brodsky DO NOT WAIVE THEIR RIGHTS TO SUBMIT SUPPLEMENTAL CONTENTIONS AND AMEND THE CONTENTIONS SET FORTH HEREIN, AND TO OTHER PROCEDURAL MATTERS

A. Right to supplement and amend contentions is not waived.

WestCAN, RCCA. PHASE, SIERRA CLUB, BEYOND NUCLEAR and New York State Assemblyman Richard Brodsky are submitting a statement of the contentions that reflect the concerns of the Stakeholder community and should be accepted for hearing by the Nuclear Regulatory Commission on behalf of WestCAN, RCCA. PHASE, SIERRA CLUB, BEYOND NUCLEAR and New York State Assemblyman Richard Brodsky members and broad constituency. The contentions submitted herein should not be deeded to waive WestCAN, RCCA. PHASE, SIERRA CLUB, BEYOND NUCLEAR and New York State Assemblyman Richard Brodsky's right to submit further contentions in the future or amend the contentions set forth herein. Further, WestCAN, RCCA. PHASE, SIERRA CLUB, BEYOND NUCLEAR and New York State Assemblyman Richard Brodsky reserves their right to submit additional contentions, and amend the contentions set forth herein.

B. Efficiency of Cross Examination of Expert or Fact Witnesses

The most efficient manner by which statutory rights can be exercised is to allow both depositions and live testimony to the extent the issues are not

fully developed during discovery. Although not specifically mentioned in 10 CFR §2.102, cross-examination of witnesses will be more efficient when possible for WestCAN, RCCA. PHASE, SIERRA CLUB, BEYOND NUCLEAR and New York State Assemblyman Richard Brodsky and the Applicant to submit cross-examination outlines five days before the hearing, to alert each witness to the subjects which the parties will explore.

WestCAN, RCCA. PHASE, SIERRA CLUB, BEYOND NUCLEAR and New York State Assemblyman Richard Brodsky have the right to seek production of documents, if for no other reason than production of documents will facilitate interrogation of witnesses and narrow the scope of their examination. Otherwise, witnesses will be asked questions about issues which are addressed in documents which either are not present during the interrogation or the analysis of which will require a hiatus in the interrogation.

Relevant documents and cross-examination outlines are hereby requested to be submitted by all parties wherever possible, at least five days in advance such that the witness may be prepared to fully answer the questions posed.

C. WestCAN, RCCA. PHASE, SIERRA CLUB, BEYOND

NUCLEAR and New York State Assemblyman Richard Brodsky (the Stakeholders) contend that the Nuclear Regulatory Commission and Applicant have had and will continue to have ex parte communications in violation of the requirements of Title 5, Part 1 Chapter 5 subchapter 11 § 557. Ex parte communication by the parties shall adhere in the strictest sense to the requirements of Title 5, Part I Chapter 5 subchapter II, §557.

The Stakeholders request that the NRC follows the regulations with regard to ex parte communications with the Applicant as required by Title 5, Part 1, Chapter 5 subchapter II§557. The sections that have particular relevance are provided below. In any agency proceeding which is subject to subsection (a) of this section, except to the extent required for the disposition of ex parte matters as authorized by law:

(i) No interested person outside the agency shall make or knowingly cause to be made to any member of the body comprising the agency, administrative law judge, or other employee who is or may reasonably be expected to be involved in the decisional process of the proceeding, an ex parte communication relevant to the merits of the proceeding;

(ii) No member of the body comprising the agency, administrative law judge, or other employee who is or may reasonably be expected to be involved in the decisional process of the proceeding, shall make or knowingly cause to be made to any interested person outside the agency an ex parte

communication relevant to the merits of the proceeding;

(iii) A member of the body comprising the agency, administrative law judge, or other employee who is or may reasonably be expected to be involved in the decisional process of such proceeding who receives, or who makes or knowingly causes to be made, a communication prohibited by this subsection shall place on the public record of the proceeding:

(A) All such written communications;

(B) Memorandum stating the substance of all such oral communications; and

(C) All written responses, and memoranda stating the substance of all oral responses, to the materials described in clauses (i) and (ii) of this subparagraph

(iv) Upon receipt of a communication knowingly made or knowingly caused to be made by a party in violation of this subsection, the agency, administrative law judge, or other employee presiding at the hearing may, to the extent consistent with the interests of justice and the policy of the underlying statutes, require the party to show cause why his/her claim or interest in the proceeding should not be dismissed, denied, disregarded, or otherwise adversely affected on account of such violation; and

(v) The prohibitions of this subsection shall apply beginning at such time as the agency may designate, but in no case shall they begin to apply later than the time at which a proceeding is noticed for hearing unless the

person responsible for the communication has knowledge that it will be noticed, in which case the prohibitions shall apply beginning at the time of his acquisition of such knowledge.

(vi) Therefore the Nuclear Regulatory Commission bound under these regulations throughout the License Renewal Application proceedings may not have ex parte communications with the Applicant.

III. STAKEHOLDERS SUBMIT SIX ADMISSIBLE CONTENTIONS

The following summary clearly raises in scope, material issues, supported by facts and expert opinions, that raise genuine issues of material law or facts, regarding the NRC grant of Entergy's modified exemption request to reduce fire safety standards for Indian Point 3, from 1 hour to 24 minutes, approved by on September 28, 2007, and published in the Federal Registry on October 4, 2007.

SUMMARY OF ISSUES AND CONTENTIONS

The current license amendment, Indian Point 3 less protected from fire than Browns Ferry plant was in 1975. Specifically, in less than 24 minutes a fire at Indian Point 3 could cause irreversible loss of control to the reactor, and loss of use of the emergency cooling systems power cables. The new exemption from federal law flagrantly disregards the Presidential order for protecting nuclear power against Design Basis Threat, partially codified in 10CFR73.1.

The 1975 fire at the Browns Ferry Nuclear Plant damaged more than 1600 electrical cables and required almost eight hours to contain. It caused loss of ability to control reactor power and to safely shut down the plant during that period. Prior to Brown's Ferry the fire potential of insulation on

cables was not considered to be relevant by the industry or the NRC in establishing standards by which nuclear plants should be constructed.

Since then the NRC have reacted with dysfunctional and failed attempts to perform Congress' mandate: " To protect the health and safety of the public". After more than 30 years since the Browns Ferry fire the NRC continues to allow prima facie violations of federal rules by the nuclear industry that directly reduce adequate protection of public health and safety.

By the NRC granting Entergy the exemption on October 4, 2007, they have granted a substantial reduction in Fire Protection Program for Indian Point 3, and condoned the dangerous conditions currently at the facility. This exemption to federal rules, has made Indian Point 3 more vulnerable to fire then Browns Ferry was in 1975. The reduction from a 1 hour fire rating to a 24 minute fire rating, is a significant change in the Current License Basis and Design Basis.

Now, a single fire ignited in an electrical cable tunnel must be fully detected, responded to by a fire brigade, and FULLY EXTINGUISHED in less than 24 minutes, or loss of the control of reactor power will occur, and combined with expected valve openings, will likely cause catastrophic core melt.

Since 1995 the NRC has permitted ongoing violations, and non-

compliance by plant operators. This exemption codifies these violations, and permits substantial reduction in defense-in-depth.

The exemption granted did not add in the potential of a deliberate act of sabotage or terrorism, as is required under federal rules mandated after September 11, 2001. The NRC and Entergy failed to consider the act of an insider with specific knowledge of the target, as is required under the Design Basis Threat (DBT), codified in 10CFR73.1.

Under this exemption one individual could set fires in both Unit 2 and Unit 3, causing a melt down both plant, in a matter of hours. This does not require smuggling in the combustibles needed for ignition for sufficient burn time, nor, the act of more than one individual.

The exemption granted on October 4, 2007, only 6 year after 9/11 does not consider ignition of a fire by a light aircraft accidentally or deliberately crashing into the specific and easily identified, above-ground, tunnels, penetrating a two foot wall of concrete, and thus igniting fires. Due to the reduction in fire protection from 1 hour to 24 minutes cables required for safe shut down will be destroyed within 24 minutes

Fire is the single highest threat to plant operational safety.

BACKGROUND

In 1979, four years after Browns Ferry, the NRC enacted new

federal regulation intended to strengthen fire protection, however, in spite of new regulation strengthening fire protection standards, the NRC began granting exemption request and after exemption request, for licensee holders.

Over 900 exemptions to date have been granted by the NRC on fire safety. In particular, the one hour rule for suppression without manual action has been set aside by numerous licensees. Licensees routinely credited manual operator action inside the one hour limit to safely shutdown the plant. Many licensees did not even bother to request exemptions, but simply credited manual actions in the safe shut down procedures thus deliberately setting aside the federal rules.

When the industry lobbied the NRC they adopted a cost benefit analysis disguised as a probabilistic analysis being codified in 10CFR50.48(c), "alternative analysis." Profits of the nuclear industry are now being weighed against protection of public health and safety. Unfortunately it appears that the bias is leaning heavily in favor of corporate profits.

<u>HEMYC fire wrap improperly tested and found to perform for only 24 minutes, instead of 1 hour, as advertised.</u>

In 1995 inspection reports the NRC specifically identified a wire wrap, fire protection, material known as HemyC as not being properly tested, but accepted by the NRC for protecting electrical tunnels at Indian Point 3. Full-scale fire tests recently performed by the NRC revealed that HemyC, a fire barrier system used to protect cables in electrical raceways in nuclear power plants, does not perform as designed. The outer covering of the barrier can shrink during a fire, opening joints in the material and potentially allowing the fire to damage cables inside. These results show that HemyC does not serve as a fire barrier for the full hour required.

Despite these new test that identified that HemyC could not withstand a fire for more than 24 minutes in certain cable set-us, required to be 1 hour it is still be used at Indian Point 3. The NRC issued Generic Letter 2006-03 in April 2006 to ensure that the affected licensees take appropriate corrective actions.

On August 16, 2007, Entergy notified the NRC that deficient design of the HemyC fire wrap would not withstand the originally proposed exemption of 30 minutes, but for an unknown duration with a best guess of 24 minutes --- and that guessed duration would only be *after plant modifications* were completed. The necessary modifications may remain

unimplemented up to December 2008.

There was no public comment period . The changes made to the proposed exemption on August 16, 2007 where never made formally public, *almost no one noticed* until after the grant. Even the New York State Attorney General's Office who objected on the same day, believed that the exemption was still pending.

Complete and proper analysis of the implications on fire safety caused by the greatly reduced fire standard usually takes months. However, in a matter of a few short weeks the amended exemption request was accepted by the NRC.

The affect of NRC's grant of the October 4, 2007 exemption, are 1) reduction of fire safety parameters by more than 50%; 2) non-compliance by the operator for more than 10 year, is condoned, despite long term safety violations; 3) failure to consider public comment; and most importantly, 4) erosion of the time available to detect, respond and extinguish a fire that affects both *power* of emergency core cooling systems and the *controls* for those emergency systems and for normal control of reactor criticality itself.

The NRC's public statements regarding fire protection, plant security, and design basis threats are in direct contradiction of the approval of the amended exemption request, in violation of the requirements of 10CFR50.48

and Appendix R.

Congressional Hearings.

The Congressional Energy and Commerce Oversight Committee held a number of hearings questioning the Nuclear Regulatory Commission on the subject of Fire Protection beginning about fifteen years ago. Each NRC Chairmen listened, accepted responsibility, made commitments, and then failed to act.

Promises by the NRC Chairman Selin in 1993, and by NRC Chairman Meserve in 2001 to the Congressional Energy and Commerce Committee Oversight Committee on Energy and Safety were made independently, 8 years apart and each remain unfulfilled today.

Instead, of fulfilling commitments to improve fire protection compliance to the 1979 rule, the NRC has stripped down the technical basis and fundamental goals of the federal rules regarding fire protection with several initiatives enacting "alternative analysis" to those rules.

There is a substantial record of the NRC's mistakes 1980s and early 1990s, and in more recent hearings in 2004, 2005, and 2006 are obvious. The Nuclear Regulatory Commission was warned in 1993, and then admonished in 2001 for its failure to implement the 1979 rule, and recently

questioned again regarding lack of fully implemented rules regarding Design Basis Threat, and the pending rulemaking regarding that by passes the key elements of the 1979 rule completely.

The NRC's failure to enforce the 1979 rules dates back more than 25 years. Portions of the DBT rule, have been side stepped since 2001. Then the NRC began an alternative approach to compliance based upon an industry lobbyist standard NFPA 805. The premise of the new approach lobbied by NEI and the NFPA is currently being codified by direct reference of NFPA 805 into federal regulations. It is based solely on probabilistic analysis, improperly grounded in unsubstantiated assumptions regarding fire event probabilities.

The Energy Policy Act of 2005 (EPAct) , in response to September 11, 2001, compelled the NRC to improve fire protection coping ability across the nations fleet, yet instead of improving fire protection, the NRC is systematically reducing fire safety measures.

HISTORY OF FIRE SAFETY ISSUES

1993 – Congress Together With The NRC Office Of Inspector General Responded To Symptoms indicating a Troubled Agency:

In 1993 Congress called for hearings on Fire Protection, to correct problems with a fire-retarding material at nuclear power plants. The Justice

Department began a criminal investigation into whether the NRC and the nuclear industry were misled about the fire-retarding capabilities of Thermo-Lag, a gypsum-like material used to protect critical electrical wires at nuclear power plants in case of fire in 1993. See Exhibit FP No. 1

Under NRC regulations, the retardant material must be able to withstand very high fire temperatures -- for one hour if the plant has a sprinkler system, three hours if it doesn't. The current situation with HemyC, unfortunately is reminiscent of Thermo-Lag.

Investigations found Thermo-Lag was approved as a protective barrier in the early 1980s. The NRC staff, however, never conducted independent tests to determine if the material met federal standards.

According to Leo Norton, the NRC's Assistant Inspector General of Investigations, in one test, THERMO-LAG collapsed within 22 minutes. He also said the NRC never bothered to personally test the product, preferring to take the word of vendors and utility company officials who swore under oath test results showed the product worked.

The Office of the Inspector General said NRC staff members who approved the fire-protective material "operated under the premise that the information was accurate because it was submitted under oath." The material in question, Thermo-Lag, was used in 79 nuclear power plants

nationwide. See exhibit FP No. 2

During a 10 year period there also were a number of reports - some from utilities - indicating that the material failed to meet NRC requirements, including one that it produced toxic gases when burned. But each time, the NRC failed to pursue them, agency investigators said.

David Williams, Inspector General for the U.S. Nuclear Regulatory Commission, also told lawmakers the NRC " that, "Between 1981 and 1991, the NRC staff did not observe any tests of THERMO-LAG. Further, the NRC staff did not investigate the qualifications of or visit the laboratory which purportedly supervised most of the THERMO-LAG tests."

"The NRC blindly accepted the utilities' assurances," said Rep. John Dingell, D-Mich., chairman of the subcommittee and of the full Energy and Commerce Committee. "This is hardly a regulatory success." He charged that the use of THERMO-LAG has resulted in "substandard fire protection" for nuclear plants that employ the material.

In response to these allegations, nuclear power plant officials said they're taking added safety precautions, some of which have been ordered recently by the NRC.

NRC "inquiries to date indicate that repairs of upgrading may be needed," Selin said the agency is holding off on further action until it has

"adequately identified what criteria are appropriate to decide what standards have been met." See Exhibit FP No 3.

Implementing Risk-Informed, Performance-Based Fire Protection

The Commission approved the 50.48(c) rule in May 2004, and published the rule in June. It took effect in July.

The Commission also unlawfully allowed the staff to use its discretion in enforcing certain fire protection issues for plants transitioning to the new rule. The enforcement discretion provided an incentive for licensees to adopt NFPA 805, even though it is completely unlawful.

It provided a "get out of jail card" for non-compliant licensees that failed to implement the rules enacted in 1979 with no penalty for violating federal rules and risking the health and safety of the public for decades.

Subsequently, by the end of February 2006, operators of 42 reactors had sent letters of intent indicating their commitment to adopt the voluntary standard.

Manual Fire Safety Protection

Licensees are required to protect plant equipment necessary for safe shutdown using a combination of physical separation, barriers, and methods to detect and control or extinguish fires. The NRC has also reviewed and

approved operator manual actions, as another acceptable method, to safely shut down the plant in the event of a fire. An example is manually opening a valve to prevent it from closing improperly during a fire.

There are a substantial number of licensees relying on operator manual actions that have not been reviewed and approved by the NRC to mitigate fires in fire areas with redundant safety trains (commonly referred to as III.G.2 areas since Section III.G.2 of Appendix R to 10 CFR 50 provides the requirements).

The NRC staff proposed a rule change that would enable the licensee to demonstrate acceptability of manual actions used to safely shut down a plant in the event of a fire. The rule's primary objective was to improve efficiency by minimizing the number of exemption requests. This is an unacceptable rationale for avoiding the basis of federal rules enacted in 1979, in response to the Browns Ferry fire.

Stakeholders contend that the current failure of fire protection at Indian Point and the NRC rushed approval of the amended exemption request that reduces the 1 hour requirement to only 24 minutes is a violation of the Presidential Order to protect nuclear power plants against Design Basis Threats- partially codified in 10CFR73.1.

In defiance of Congress, the NRC has stripped down the rules by

using so called "alternative analysis" favored by the nuclear industry and the nuclear industry lobbyists. "Alternative analysis" is a cost benefit analysis disguised as a probabilistic analysis being codified in 10CFR50.48(c). Profits of the nuclear industry are now being weighed against protection of public health and safety. Unfortunately it appears that the bias is leaning heavily in favor of corporate profits.

Stakeholders contend that the NRC has wrongfully granted the exemption from fire safety regulations for the following reasons of fact and law, that are within scope of the license amendment.

1. 24 minute exemption to a Appendix R, and 10CFR50.48 are incorporated into the plants operating license, and is as a matter of fact and law, an amendment to the operating license.

2. Fire or fires could be set by insiders, and could quickly bring down both Indian Point 2 and Indian Point 3, based on the 24 minutes rule, in violation to the Design Basis Threat10 CFR 73.1.

3. A fire caused by an aircraft penetrating a two foot thick above ground tunnel could not be extinguished in 24 minutes and could prevent safe shut down.

4. The original exemption request March 24, 2006, was for a reduction from 1 hour to 30 minutes. Then after the license renewal application has already been submitted by Entergy, Entergy amended the exemption request from 30 minutes to 24 minutes. See exhibits FP No, 5 and Exhibit FP No. 6

The public was not aware of this. Although the NRC could not have done an adequate independent Safety Evaluation in a few weeks, the NRC approved this in a only nine weeks later.

NRC staff have explained that the NRC approved the exemption on the bet that the industry would fully adopt NFPA 805, Performance based Standard for light water Reactor Electric Generating Plants, 2001 edition, now codified under 10CFR50.48(c).

5. The NRC is aware of multiple plants directly defying the present rules regarding fire protection with prima

facie evidence in operational procedures of depending on manual actions to save essential equipment, without exemptions even requested. The NRC approved the amended exemption request in violation of promises to Congress to correct deficiencies from a similar material failure – thermolag affecting 79 plants—instead tolerating of deficiencies.

6. The exemption was argued by Entergy as not requiring an environmental assessment—because the previous exemptions did not require the assessment. This again is a fatally flawed argument, the difference between fire protection of 1 hour instead of 24 minutes has significant Environmental consequences, that must be fully understood. The NRC approval of this exemption is a violation of NEPA.

7. The NRC has violated §51.101(b) in allowing changes to the operating license be done concurrently with the renewal proceedings. The exemption request was modified by Entergy on August 16, 2007 for IP3, only two weeks after of the License Renewal Application Renewal was accepted by the NRC on August 2, 2007.

The exemption was then approved and published on October 4, 2007, without public involvement and in defiance of §51.101(b).

Therefore Stakeholders contend that NRC wrongfully granted Entergy the amended exemption request, filed in the Federal Registry on October 4, 2007, thereby reducing adequate protection of public health and safety, by reducing the fire safety requirement from one hour to 24 minutes.

Contention No. 1

The Fire Protection Program described in the Current License Basis Documents including the unlawfully approved exemptions to Appendix R, the Safety Evaluation and the amended license for Indian Point 3 fail to adequately protect the health and safety of the public, and fail to meet the requirements of 10 CFR 50 and Appendix R

Allowance of conditions that require a fire to be extinguished in the unreasonably short time span of 24 minutes or else risk a complete loss of control of crucial safety systems is unacceptable and significantly increases the likelihood of uncontrolled reactor criticality, inadequate cooling of the reactor core and the potentially catastrophic outcome of a core melt.

Background and Summary of Contention

The fire protection program advanced by Entergy for IP 3 is deficient in that it fails to safeguard the control room operation of achieving safe shutdown of the reactor in the event of a significant fire. The program is based on preposterously optimistic time and capability assumptions that significantly increase the likelihood of uncontrolled reactor criticality, inadequate cooling of the reactor core and the potentially catastrophic outcome of a core melt.

Specifically, the highly implausible scenario upon which Entergy gambles is that: fire ignition, fire detection, confirmation thereof, a determination of proper control acts, fire brigade formation and dispatch, and conflagration extinguishment, can all occur in a time span of less than 24 minutes. Moreover, under conditions of high heat, choking and blinding smoke and with electrically energized circuits present, plant responders will also be able to save operability of major cables required for safe shutdown. And all of the necessary actions and outcomes may be relied upon, even should the fire be one of several unfolding plant emergency conditions.

Entergy's dubious fire protection plan is part and parcel of a series of requests for exemptions from critical and long-standing fire (and other)

safety regulations. The basic fire safety regulatory scheme was instituted nearly 30 years ago after a major fire at the Browns Ferry nuclear plant in Alabama, burned out of control for almost seven hours and nearly disabled the reactor's emergency core cooling system.

To reduce the critical threat, exposed by Browns Ferry, of a fire disabling all redundant safe shutdown electrical circuits in the same zone of a nuclear power plant, regulations were enacted to require either significant physical separation between cable trays and conduits, or the use of physical fire barriers. Fire barriers can be in the form of fireproofing material or insulation wraps. However the barrier must be qualified to withstand standardized American Standard Test and Measures (ASTM) E-119 furnace conditions. [Section III.G. of 10 CFR 50 Appendix R.]

At IP3, one such fire barrier employed is an insulation system known under the brand name HemyC, which is required to be able to withstand fire conditions for at least 1 hour (as per the requirements of 10 CFR 50.48, Appendix A, Branch Technical Position 9.5.1, and Appendix R). The 1 hour period was designated as necessary to protect safe shutdown power, instrumentation and control circuits from fire damage in the event of a significant fire.

In 2005, however, independent laboratory tests revealed that Hemcy, could, in fact, fail in as little as 15 minutes. According to published test results, the HemyC material was identified to shrink under standardized fire test conditions, opening seams and exposing electrical circuits vital to the safe shutdown of the reactor to fire damage, potentially rendering them inoperable as well as introducing electrical short circuits to safety significant associated circuits.

In response to this safety problem, Entergy has asked the NRC for an exemption from the rule requiring the fire barrier to be able to hold up for at least 1 hour. In doing so, Entergy has effectively asked the NRC to alter the very assumptions of how a fire can affect areas containing critical plant cabling and equipment and how long fires might last.

Simply put, Entergy wants the NRC to degrade the fire safety rules to accommodate Indian Point's degraded fire safety condition.

A Viable Protection Program is Central to the Safety of a Nuclear Power Plant

The NRC "Severe Accidents study (NUREG-1150) recognized that

fire is a significant risk contributor to core damage frequency, as much as 50 percent of the total risk and that fire can both initiate a nuclear accident and compromise the operator's ability to control reactor shutdown and maintain it in stable cool down. This study further recognized that a typical nuclear power station will have 3 to 4 significant fires.

As a preliminary matter, a fire protection program must take due cognizance of the realities of fire. (This should be obvious, but the posture of Entergy indicates that such realities are not apparent to all.)

The Applicant requested the NRC grant an exemption from federal rules for a extinguishing a fire in the tunnel whose duration was unknown. Applicant stated that class 1E cables in trains separated by less than 12 inches would be inoperable in less than 24 minutes. These cables are vital for operating both normal and emergency systems for the safe operation and emergency shutdown of the plant.

Loss of these power cables together with diminished operation of safety related valves, (such as, Pressurizer Operator Relief Valve, Core Spray System operation, or the Charging System), which may reasonably be anticipated during a tunnel fire, can render the reactor energy uncontrolled and the reactor condition degradation immitigable. Both control and Power cables run through the two tunnels. See exhibit FP No. 9, and 10 On December 17, 2003, President Bush issued Homeland Security Presidential

Directive 7 (HSPD-7), which supersedes portions of PDD-63 and clarifies that the Department of Energy is the lead agency with which the energy industry will coordinate responses to energy emergencies.

This condition has been known since 1995, See exhibit FP No. 8 when NRC inspectors reviewed the in-progress plans to install an untested fire wrap HemyC in the tunnels, and acknowledged lack of ASTM 119 testing. Despite these issues, the NRC inspectors approved the modification with the understanding that testing of the wrap would be done at a later date. Doing this allows Applicant to, in effect, make "an agreement to agree".

It defies logic that 11 years, later the NRC declared the HemyC material unacceptable to meet 1 hour fire limits when it published Generic Letter 2006-03.

The improper design of the tunnel and the susceptibility of the tunnel to single failure criteria was identified in 1976, in a report by the Project Manager, Division of Project management, U.S. Nuclear Regulatory Commission on February 6, 1976. As early as this report, the operator and the NRC both knew that both tunnels were required to be functional in order to safely shut the plant down. . See page 19 of Exhibit FP no. 10 where the NRC points out that system logic requires that two, of out three, systems be operable following an accident.

In addition, the problem of associated circuits was not dealt with at all. This entire issue languished for years. The 1995 NRC inspection report acknowledges use of HemyC material inside containment. Yet, the Applicant's LRA does not provide a resolution of unacceptable burn times for that configuration.

Title 10 of the Code of Federal Regulations (10 CFR), Part 50, [Section] 50.48, requires that nuclear power plants that were licensed before January 1, 1979, including IP2 and IP3, must satisfy the requirements of 10 CFR Part 50, Appendix R, Section III.G. Subsection III.G.2 addressing fire protection features for ensuring that one of the redundant trains necessary to achieve and maintain hot shutdown conditions remains free of fire damage in the event of a fire. Subsection III.G.2.c provides use of a 1-hour fire barrier, fire detection and automatic fire suppression in the area, as a method to comply with this fire protection requirement.

In an NRC letter and safety evaluation (SE) dated February 2, 1984, the NRC improperly granted the applicant exemptions from the requirements of Appendix R, Section III.G.2, for Fire Area ETN-4 (Fire Zones 7A, 60A and 73A). The exemption was applicable where redundant safe-shutdown trains are not separated by more than 20 feet, without intervening combustibles or fire hazards, and that redundant safe-shutdown trains are not separated by 1-hour rated fire barrier in an area protected by automatic fire

detection, and suppression systems.

The exemption was based on the minimum of 12" spatial separation between the redundant trains, minimal fire hazards in the area, the use of asbestos-jacketed flame-retardant cables, and the installed automatic fire detection and cable tray suppression systems.

Following a comprehensive reassessment of the IP2 & IP3 Appendix R compliance basis, the need for additional separation measures was identified and the untested fire barrier system was installed to provide 1-hour rated fire barriers on several redundant safe-shutdown raceways in Fire Area ETN-4 (Fire Zones 7A, 60A and 73A) for Unit 3. By Safety Evaluation dated January 7, 1987, the NRC accepted the use of 1-hour rated fire barriers in the above fire area and confirmed continued validity of the exemption granted by the February 2, 1984 SE. IP3 used the untested HemyC fire barrier system to provide the 1-hour rated fire barriers. In the January 7, 1987 SE, the NRC also approved an exemption from Appendix R, Section III.G.2, separation requirements for Fire Area PAB-2 (Fire Zone 1) allowing redundant safe-shutdown trains to be separated by more than 20 feet without intervening combustibles or fire hazards, and with an automatic suppression system.

This exemption required physical separation between redundant safe shutdown trains; low fire loading in the area; and continuation of the

existing fire protection features, including an automatic fire detection system, manual hose stations and portable extinguishers; a partial-height non-combustible barrier designed to protect redundant equipment against radiant heat from a fire; and a 1 hour rated HemyC cable wrap around the normal power feed to the redundant Component Cooling Water (CCW) Pump 33.

Testing by a laboratory retained by the NRC in 2005 identified HemyC electrical raceway fire barrier system (ERFBS) as a nonconforming barrier, potentially failing in a little as 13 minutes and thus, not capable of providing a 1-hour fire rating, and Information Notice (IN) 2005-07, "Results of HEMYC Electrical Raceway Fire Barrier System Full Scale Fire Testing," Exhibit FP no. 11 and Generic Letter (GL) 2006-03, "Potentially Nonconforming HemyC and MT Fire Barrier Configurations," were issued to licensees to inform them of the issue and to collect information regarding HemyC fire barrier installations.

In response to GL 2006-03, the Applicant informed the NRC that it declared the HemyC Electrical Raceway Fire Barrier System Full Scale Fire Testing RFBS IP3 inoperable, and implemented temporary compensatory measures, including an hourly fire watch and verification that fire detection systems are operable in the affected fire areas until compliance is restored for the HEMYC Electrical Raceway Fire Barrier System Full Scale Fire

Testing.

In a letter dated July 24, 2006, Applicant stated it would modify the installed HemyC ERFBS to provide only a 24 minute rated fire barrier for cable tray configurations and a 30 minute rating for conduit and junction box configurations between redundant trains of safe shutdown equipment and cables, i.e., allowing for fire barrier failure in less than half the time as the previously approved 1-hour fire barrier. Applicant asserted that IP3 did not need to employ a 1 hour fire barrier because there were minimal fire hazards and fire protection features in the affected areas.

In summary, by letter dated July 24, 2006, and supplemental letters dated April 30, May 23, and August 16, 2007, Applicant requested revisions to the pending exemptions from fire safety regulations for the Upper and Lower Electrical Tunnels (Fire Area ETN-4, Fire Zones 7A and 60A, respectively) and the Upper Penetration Area (Fire Area ETN-4, Fire Zone 73A), to allow only 24 minute rated fire barriers be used to protect redundant safe shutdown trains in lieu of 1 hour rated fire barriers. For the 41" Elevation CCW Pump Area (Fire Area PAB-2, Fire Zone 1). Applicant requested the existing exemptions to be revised to allow for only a 30 minute rated fire barrier to protect redundant safe shutdown trains located in the same fire area.

Besides the obvious reduction in adequate protection to public health

and safety, the blinding speed that this exemption was granted, is stunning. It is doubtful that the NRC staff was able to rigorously evaluate the significant change in only a few short weeks.

Furthermore, this reduction allows fire protection at nuclear power plant sited within 50 miles of over 20 million people, to be inferior to that required by New York State Building codes, which require a provide either 1 or 2 hour firewalls in commercial buildings, depending on use.

There are numerous sufficient alternatives that could be used to retrofit the plant, to restore fire protection to at least one hour. This exemption is clearly a reduction of safety rules made to accommodate the financial interest of the Applicant, and is clear violation of the NRC's mandate to protect public health and safety.

Discussion

Pursuant to 10 CFR 50.12, the NRC may grant exemptions from the requirements of 10 CFR Part 50 when:

(1) the exemptions are authorized by law, will not present an undue risk to public health or safety, and are consistent with the common defense and security; and (2) when special circumstances are present.

One of these special circumstances, described in 10 CFR 50.12(a)(2)(ii), is that the application of the regulation is not necessary to achieve the underlying purpose of the rule. The underlying purpose of Subsection III.G.2 of 10 CFR 50, Appendix R, is to ensure that one of the redundant

trains necessary to achieve and maintain hot shutdown conditions remains free of fire damage, in the event of a fire. The provisions of III.G.2.c through the use of a 1-hour fire barrier with fire detectors and an automatic fire suppression system is one acceptable way to comply with this fire protection requirement.

However, Applicant's most recent amendment to the exemption, modified it to reduce the requirement to 24 minutes was dated August 16, 2007. This was a modification of their exemption request dated July 24, 2006 in which they requested a reduction of the 1hour minimum requirement to 30 minutes. In addition on August 16, 2007 the Applicant acknowledged that in order to meet the reduced time of 24 minutes, it would require a modifications.

This is a significant amendment of IP3's operating license, as allows for far less than the minimum of 1 hour, fails to provide adequate protection and lacks even the most basic foundational support. (Such an analysis, for example, would patently require a detailed description of modifications that would need to be made to the cable trays and junction boxes in the tunnel.)

Stakeholders strongly object to the exemption being granted. The scenario upon which Entergy gambles, to wit: fire ignition, detection, confirmation, determination of proper control acts, fire brigade formation

and dispatch, and extinguishment – all in less than 24 minutes – under conditions of high heat, smoke and with electrically energized circuits present, is profoundly implausible. Significantly, Applicant proffers no evidence that this scenario has been adequately tested or can be relied upon. Indeed the broadly available literature on fire safety as well as plain common sense leads to the conclusion that placing confidence in Applicant's scenario is foolhardy.

The Applicant asserts that fire hazards and ignition sources in both Fire Areas ETN-4 and PAB-2 remain materially unchanged from those described in the Safety Evaluations dated February 2, 1984, and January 7, 1987. For Fire Area ETN-4, the ignition sources consist of limited transient combustibles (in all fire zones), and several instrument cabinets and a 3kVA 480V/120V instrument power transformer in Fire Zone 73A.

Significantly, the class 1E cables in trains, separated by less than 12 inches, could well be rendered inoperable in under 24 minutes. These cables are vital for operating both safe operation and the emergency shutdown of the plant. Degradation or destruction of these power cables together with loss of full operation of safety related valves (such as the Pressurizer Operator Relief Valve, the Core Spray System or the Charging System) would be reasonably likely to occur during a plant fire in this tunnel. Under such circumstances, the 30,000 BTU of reactor energy could be rendered

uncontrolled and the reactor condition degradation would probably be un-mitigatable.

Stakeholders assert the following: (1) the fire hazards analysis and the fire safe shutdown analysis are living documents that are an element of the Current License Basis. These documents require examination and reanalysis as the Applicant implements modifications to the facility. (2) The 1984 analysis was not updated until well beyond 10 years. The most recent safe shutdown analysis appears to be revision 2, dated August 2000, which is more than seven years out-of-date. Thus these analyses are historical and void, given the reality that modifications were made to the facility during the intervening years. Without the baseline analysis being kept current, it is essentially impossible for engineering analyses, engineering design changes, operational function changes and even the most fundamental changes to the facility, to be performed in conformance with 10 CFR 50.48 and Appendix R.

The 24 minute minimum can only be obtained after modifications of the cable trays and boxes occurred, such modification many not even be made until 2008. Thereby leaving the current unsafe conditions of non-compliance with Appendix R.

For the 41" Elevation CCW Pump Area (PAB-2, Fire Zone 1), the current IP3 Fire Hazard Analysis indicated a fire severity of less than 10

minutes. Combustibles include the CCW pump bearing lubricating oil and transient materials.

The HemyC-wrapped Box-Type Configuration installed in Fire Area ETN-4 (Fire Zone 73A) is comparable to Configuration 2G in NRC Test 2, *except for the lack of the stainless steel over-banding*. These enclosures are protected by a direct-attached 2"-thick HemyC blanket wrap. Both NRC and industry-sponsored tests of fire protection cable function when tested in accordance with ASTM E-119. To more closely reflect Configuration 2G, the Applicant is committed to install over- banding on the Box-Type Configuration at IP3. Cable Tray Configuration The HemyC-wrapped Cable Tray Configuration installed in Fire Area ETN-4 (Fire Zones 7A and 73A) is comparable to Configuration 2B and 2D of NRC Test 2. These cable trays are protected by a 1-1/2"-thick HemyC blanket wrap with a nominal 2" air gap between the protected cable tray and the blanket.

Fire tests conducted by both NRC and industry indicated that these HemyC-wrapped cable tray configurations will provide up to 24 minutes of thermal protection in accordance with the ASTM E-119 time-temperature profile.

The Applicant stated that administrative controls of hot work and transient combustibles allowed designated Fire Areas ETN-4 and PAB-2 as "Level 2" combustible control areas, which constrain transient combustibles

to "moderate" quantities as follows, in both IP2 and IP3:

- 100 pounds of fire retardant treated lumber, or
- 25 pounds of loose ordinary combustibles or plastics, or
- 5 gallons of combustible liquids stored in approved containers, or
- One pint of flammable liquids stored in approved containers, or
- One 20 ounce flammable aerosol can.

With the proposed additional protection of electrical raceway supports and installation of over-banding on HemyC box configurations, the modified fire barrier configurations are expected to afford at least 24 minutes for cable tray configurations and 30 minutes of protection for conduit and box configurations; 50% or less than the time required by Design Basis.

Since the HemyC electrical raceway fire barrier system is expected to provide protection for redundant components and cables in the event of a fire, the NRC staff, inappropriately, concluded that the minimal combustibles in the areas and existing active/passive fire protection features can compensate for the reduction in Defense-in-Depth of objectives 3 and would not impact IP3 post-fire safe-shutdown capability.

Stakeholders disagree with this conclusion. Material facts in genuine dispute include the following:

(1) The proffered findings are not demonstrably applicable to IP3. Namely, the use of HemyC wrap to protect cabling critical for control and safe shutdown of the plant is based solely upon generic testing. No test configuration matches the conditions of the HemyC wrapped cable in the IP3 tunnel. Applicant is thus engaging in unsubstantiated speculation regarding longevity of the cable function.

(2) The unique characteristics of the EDG output voltage of 480 volts (as compared to 4160 volts) impose a much higher amperage through the cables, necessitating larger gauge cable and more energy lost in power transmission in the form of heat. The tested configurations do not account for these conditions, which are unique to Indian Point's emergency generators, and buses.

(3) The scenario upon which Entergy gambles, to wit: fire ignition, fire detection, confirmation, determination of proper control acts, fire brigade formation and dispatch, and extinguishment – all in less than 24 minutes – under conditions of high heat, smoke and with electrically energized circuits present, is highly unlikely, and cannot be relied upon as credible. Notably, in addition to putting out the blaze, plant responders would also need to save operability of on train and major cables required for safe shutdown.

Expert opinion by Ulrich Witte as former Project Engineer for the Appendix R Program to the Sacramento Utilities District Rancho Seco plant is provided in his Declaration contained in Exhibit FP-7.

Inadequate Justification for Invoking 10 CFR 50.12

The exemption the Applicant has sought would allow use of a fire barrier expected to provide less than 1 hour of fire protection. Stakeholders assert that the grant of this exemption constitutes an abuse of the Commission's discretion and violates the letter and spirit of the Atomic Energy Act of 1954, as amended.

These regulations, §10 CFR 50.12 and Appendix R were promulgated specifically in response to the 1975 Browns Ferry accident.

Brown Ferry continues to provide a particularly dramatic example of how quickly a nuclear plant can be put in jeopardy and how difficult responsive action can be. The Browns Ferry fire burned out of control for some 7 hours with temperatures as high as 1500 degrees Fahrenheit. Within 15 minutes of initiation, a high number of safety-related circuits were destroyed. By the time it was extinguished, 1600 electrical cables, including 628 safety-related circuits needed to shut down the reactor and keep it cool, coolant had been destroyed. In a 1976 report prepared by the Union of

Concerned Scientists, entitled "Browns Ferry: The Regulatory Failure," the investigators noted that thick smoke, the chaos resulting from the loss of control over equipment, and inadequate breathing apparatuses made it difficult for operators to save the plant. The report revealed that the operator's nuclear engineers had stated privately to the investigators "that a potentially catastrophic radiation release from Browns Ferry was avoided by 'sheer luck.'"

Twenty million residents living within 50 miles of Indian Point Units 2 & 3 should not have to depend on "sheer luck". The NRC has the responsibility to maintain reasonable regulations with regard to fire safety protection that will adequately protect public health and safety. Stakeholders assert that a grant of Applicant's request for exemption would abuse the authority granted to the NRC by Congress.

The underlying purpose of Subsection III.G.2 of 10 CFR Part 50, Appendix R, is to ensure that one of the redundant trains necessary to achieve and maintain hot shutdown conditions remains free of fire damage in the event of a fire. This safety margin is an imperative to protect public health and safety. It dramatically reduces the defense-in-depth criteria.

Special Circumstances: One of the special circumstances, described in 10 CFR 50.12(a)(2)(ii), is that the application of the regulation is necessary to

achieve the underlying purpose of the rule. The underlying purpose of Subsection III.G.2 of 10 CFR Part 50, Appendix R, is to ensure that one of the redundant trains, necessary to achieve and maintain hot shutdown conditions remains free of fire damage in the event of a fire. As shown, this is not possible given the physical characteristics, including the layout of the cabling in the tunnel, and the material used as insulation.

Based upon consideration of the information in the Applicant's Fire Hazards Analysis, administrative controls for transient combustibles and ignition sources, previously-granted exemptions for this fire zone, and the considerations noted above, it is incorrect for the NRC staff to conclude that the Applicant's exemption request meets the underlying purpose of the rule.

There are numerous options available that do not require unacceptable risks to be placed on the safe operation, and emergency shutdown of Indian Point 2 and Indian Point3, as well as, and protection of the health and safety of the public are available.

There are no special circumstance is present, which would justify allowance the exemption requested by Entergy.

Conclusion

Stakeholders assert that Applicant and the NRC have improperly

determined that pursuant the Exemption is authorized by law. The exemption is not authorized by law, as it causes an undue risk to the public health and safety and thwarts the very purpose of the regulation.

Contention Number 2.
Fire Protection Design Basis Threat

The Applicant's License Renewal Application fails to meet the requirements of 10 CFR54.4 "Scope," and fails to implement the requirements of the Energy Policy Act of 2005.

Issue Summary:

Congress imposed upon the Nuclear Regulatory Commission rulemaking requirements to implement defenses against twelve distinct threats as contained under a classified documents. The Commission partially codified the Energy Policy Act of 2005 (EPAct) requirements most recently on April 18, 2007, under 10 CFR73.1, 21, 55, 56, and 10 CFR26. This contention raises issues of conformance with the *existing rule*, regardless of the controversy associated with whether the current rule fully implements the Energy Policy Act of 2005 (EPAct).

The Stakeholders assert that the existing rules as currently promulgated is within scope of the license renewal application submitted by Entergy. Yet they are not addressed in the LRA with regard to the Fire Protection Program enhancements necessary for implementation.

In fact, the Applicant has requested and has been granted an exemption to specific federal rules, that actually erodes safety at Indian Point 2 and 3, and increases vulnerability to the facility to a design basis

threat that was required to be strengthened by Energy Policy Act of 2005 (EPAct).

The Applicant's LRA fails to comply with applicable law with respect to fire protection. Fire protection is one of the twelve specific components within the DBT rule. This exemption affects the current operating license, and will be carried over into the proposed new superceding license.

The Final Rule Regarding Design Basis Threat and Fire:

Congress also recognized the need for the NRC to conduct a rulemaking to update the DBT regulation in light of the events of September 11, 2001. On August 8, 2005, the President signed into law the Energy Policy Act of 2005, Pub. L. No.109-58, 119 Stat. 594, which mandated that, within 90 days, the NRC "initiate a rulemaking proceeding, including notice and opportunity for public comment, to be completed not later than 18 months after that date, to revise the design basis threats of the Commission." *Id.* § 651, *codified at* 42 U.S.C. § 2210e. The Act specifically listed 12 factors that the NRC had to consider in conducting its rulemaking, including "the events of September 11, 2001," "the potential for attack on facilities by multiple coordinated teams of a large number of individuals," and "the potential for water-based and air-based threats." 42 U.S.C. § 2210e(b).

The NRC published its final rule in the Federal Register on March 19, 2007. 72 FR 12705 (ER 1). Although the Commission made some changes in the language of the proposed rule (adding, for example, a provision requiring defense against the threat of cyber-attacks), the agency made no changes in response to comments that had challenged its refusal to conduct an EIS, its failure to require a defense against attacking forces as large as those assembled by al Qaeda on 9/11, and against the threat of suicide attacks by large aircraft. Indeed, the Commission explicitly declined to require a defense against a force as large as that involved in the 9/11 attacks (72 FR at 12708), and it refused to incorporate any provisions concerning air attacks in the DBT (*id.* at 12710-11).

1. Commission's "Reasonableness" Limit on the Design Basis Threat and the Size of the Attacking Force

Throughout the final rule, the Commission emphasized that a fundamental principle animating the DBT was that it would require a licensee to do no more than defend against attacks that a private security force could reasonably be expected to counter. As the agency put it, "The Commission has determined that the DBTs, as articulated in the rule, are based on adversary characteristics against which a private security force can reasonably be expected to defend." 72 FR at 12713.

The agency provided only one example of what might make it "unreasonable" to expect a private security force to respond to a threat: that there are "legal limitations" on the types of weapons and defensive systems available to private security forces. "Thus," the agency asserted, "it would be unreasonable to establish a DBT that could only be defended against with weapons unavailable to private security forces." *Id.* at 12714.

The NRC did not preclude the potential deliberate use of transient combustibles already available on site, to be use serendipitously to interfere with the safe operation of the facility. In fact, the rule provides that the licensee must assume that the assailant has knowledge of specific target selection and access to transient combustibles. As directed by the Energy Policy Act, the final rule has the principal objective of making the security requirements imposed by the April 29, 2003, DBT orders generically applicable. Although specific details of the revised DBT were not released to the public, in general the final rule:

- clarifies that physical protection systems are required to protect against diversion and theft of fissile material;
- expands the assumed capabilities of adversaries to operate as one or more teams and attack from multiple entry points;
- assumes that adversaries are willing to kill or be killed and are knowledgeable about specific target selection;

- expands the scope of vehicles that licensees must defend against to include water vehicles and land vehicles beyond four-wheel-drive type;

- revises the threat posed by an insider to be more flexible in scope; and

- adds a new mode of attack from adversaries coordinating a vehicle bomb assault with another external assault.

The above reflect the need to enhance the facility against the threat of fire. However, in Entergy's most recent request for an exemption dated August 16, 2007, reducing the one hour rule contained in Appendix R to 10 CFR50 to and unacceptable 24 minutes.

The scenario upon which Entergy gambles, to wit: fire ignition, fire detection, confirmation, determination of proper control acts, fire brigade formation and dispatch, and extinguishment – all in less than 24 minutes – under conditions of high heat, smoke and with electrically energized circuits present, is highly unlikely, and cannot be relied upon as credible. Notably, in addition to putting out the blaze, plant responders would also need to save operability of on train and major cables required for safe shutdown. Under requirements of 10 CFR73.1, a single event, fire in one of the two tunnels, Fire Area ETN-4 (Fire Zones 7A, 60A and 73A) if not extinguished in less than 24 minutes violates safety margins.

CONTENTION No. 3

Fire initiated by a light airplane strike risks penetrating vulnerable structures.

Stakeholders contend that fire initiated by a crash or deliberate strike of an airplane crash at the facility can initiate a fire or serve fires that spread and disable critical safety systems, specifically the above ground cable tunnels. These tunnels are constructed above ground and consist of two foot concrete walls, which are easily breached by a large or even a small aircraft.

Due to the decrease in fire protection standards, and accidental or planned crash into these structures would probably cause a fire or fires, that could not be extinguished with in 24 minutes, thereby cause safe shut down systems to become inoperable, and creating a core melt scenario.

NRC cannot refute the very real fact that a large commercial aircraft commandeered by terrorists flew right past the twin domes of Indian Point on September 11th, 2001. The reports by the Project on Government Oversight (POGO), on December, 2003 Exhibit FP No, 12, the August 9, 2005, CRCS report to Congress by Carl Behrens and Mark Holt, Nuclear Power Plants: Vulnerability to Terrorist Attack Exhibit FP No, 13 and the

Council on Intelligent Energy & Conservation Policy (CIECP) Comments to Proposed Rule 10 CFR 50,72, and 73 regarding Power Reactor Security Requirements at License Nuclear Facilities, filed with the NRC on March 27, 2007 Exhibit FP no. 14 are referred and fully incorporated, as if set forth herein.

In a 2005 updated, report by Carl Behrens and Mark Holt, Nuclear Power Plants: Vulnerability to Terrorist Attack Exhibit FP no. 15 "Protection of nuclear power plants from land-based assaults, deliberate aircraft crashes, and other terrorist acts has been a heightened national priority since the attacks of September 11, 2001. the industry has been too slow and that further measures are needed.

There is no justification for jeopardizing national security and the health and safety of the public and violating NEPA - even to the smallest degree - to safeguard corporate profits.

In March 2005, a joint FBI and Department of Homeland Security assessment stated that commercial airlines are "likely to remain a target and a platform for terrorists," and that "the largely unregulated," area of general aviation (which includes corporate jets, private airplanes, cargo planes, and chartered flights) remains especially vulnerable. The assessment further noted that Al Qaeda has "considered the use of helicopters as an

alternative to recruiting operatives for fixed-wing operations," adding that the maneuverability and "non-threatening appearance" of helicopters, even when flying at low altitudes, makes them "attractive targets for use during suicide attacks or as a medium for the spraying of toxins on targets below."

The vulnerability of nuclear power plants to malevolent airborne attack is detailed extensively in the Petition filed by the National Whistleblower Center and Randy Robarge in 2002 pursuant to 10 CFR Sec. 2.206. A number of studies of the issue are also reviewed in Appendix A to these Comments. The particular vulnerability of nuclear spent fuel pools to this kind of attack is detailed in the January 2003 report of Dr. Gordon Thompson, director of the Institute for Resource and Security Studies entitled "Robust Storage of Spent Nuclear Fuel: A Neglected Issue of Homeland Security" and in the findings of a multi-institution team study led by Frank N. Von Hippel, a physicist and co-director of the Program on Science and Global Security at Princeton University and published in the spring 2003 edition of the Princeton journal Science and Global Security under the title "Reducing the Hazards from Stored Spent Power-Reactor Fuel in the United States." It is worthy of note that, even post-demonstrate that the NRC considers such attacks to be reasonably foreseeable for purposes of requiring a NEPA review.

There is no no-fly zone over Indian Point. This presents a clear and significant danger since planes of all shapes and size, including private jets and large commercial planes. There are at least 7 major airports within the 50 miles of Indian Point, including Westchester County Airport, Stewart International Airport, JFK International Airport, La Guardia Airport, and Newark International.

International carriers are planning to use the plane for flights in and out of Kennedy,. In January 2008, Airbus will be flying into Steward Airport, located approximately 9 miles from Indian Point. Airbus's superjumbo A380, the world's largest passenger plane, It has a wingspan almost as long as a football field, it is eight stories tall, and it weighs 118 tons heavier than the Boeing 747, the planes that were used in the terrorist attack on 9/11. "The biggest purchases of Airbus are from the United Arab Emirates., the craft is certified to carry up to 853 — about twice the capacity of the biggest version of the Boeing 747". (March 2007 NYT).

The residents in the Hudson Valley, specifically Rockland County, all of which is within 20 miles of Indian Point, have been recently advised of the FAA's decision to increase air traffic in the region by 600 flights a day. On average every two to three minutes the noise of aircraft flying overhead will be heard, and danger from an accidental or intantial crash into the vulnerable above ground part of the plant are greatly increased.

Yet the fire protection has been decreased by more than 50%, due to

the NRC's improper approval of Entergy's modified Exemption Request.

The Cost Rationale is flawed as found under 10CFR12

The NRC "disagreed" with comments that urged it to make clear that licensees were required to defend against an attacking force *at least* as large as the 19 attackers assembled by al Qaeda on September 11, 2001. *Id.* at 12708.[1] Instead, the NRC stated that the limit on the size of the attacking forces incorporated in the DBT was based on the "reasonableness" concept. The DBT, in the NRC's words, "represents the largest adversary against which the NRC believes private security forces can reasonably be expected to defend." *Id.* at 12714.

The NRC acknowledged that consideration of costs would be unlawful. *See id.* The NRC did not, however, explain how "reasonableness" figured into a limit on the *size* of the attacking force (and hence the size of the defending force) if it was not a cost-based consideration. The Commission also denied that the reasonableness limitation was a violation of its obligation to ensure adequate protection of

[1] These comments did not ask the Commission to say exactly how many attackers it was requiring licensees to defend against, as such a disclosure would create an obvious risk that an attacker would tailor the size of its force to exceed that specified in the rule. Rather, commenters urged the Commission to make clear that the DBT required defense against forces the size of the 9/11 attack groups, but not that it was limited to groups of that size, but its explanation on this point amounted only to the assertion that adequate protection of safety and health somehow followed logically from the reasonableness limit.

the public:

> "The rule text set forth at § 73.1 represents the largest adversary against which the Commission believes private security forces can reasonably be expected to defend. Thus, when the DBT rule is used by licensees to design their site specific protective strategies, the Commission is thereby provided with reasonable assurance that the public health and safety and common defense and security are adequately protected. *Id.*

Elsewhere, the Commission appeared to acknowledge that the defense forces required by the DBT would not be "adequate" if attacked by a force larger than the Commission felt it was "reasonable" to expect a private security force to defend against, but it stated that it was "confident" that the defenders would still try their best if attacked by such a superior force:

> Within this requirement is the expectation that, if confronted by an adversary beyond its maximum legal capabilities, on-site security would continue to respond with a graded reduction in effectiveness. The Commission is confident that a licensee's security force would respond to any threat no matter the size or capabilities that may present itself.

Stakeholders assert that the exemptions and the failure to adequately Indian Point from the threat of a rapidly spreading fire a wholly untenable risk to public health and safety. Approval of this exemption constitutes a violation of the law and the principal mandate of the Atomic Energy Act and violates 10 CFR 73.1.

CONTENTION 4

The NRC improperly rushed approval Entergy's modified exemption request reducing fire protection standards from 1 hour to 24 minutes while deferring necessary design modifications.

In the proposed exemption request filed on July 24, 2006, whereby Entergy requested a reduction from 1 hour to not 30 minutes was not inconsequential. But then, the amended request August 16, 2007, to less than 24 minutes and if design modifications were implemented, is a significant change to the exemption request and a substantial reduction in fire protection.

Full-scale fire tests recently performed by the NRC revealed that HemyC, a fire barrier system used to protect cables in electrical raceways in nuclear power plants, does not perform as designed. The outer covering of the barrier can shrink during a fire, opening joints in the material and potentially allowing the fire to damage cables inside. These results show that HemyC does not serve as a fire barrier for the full hour required.

Despite these new test that identified that HemyC could not withstand a fire for more than 24 minutes in certain cable set-us, required to be 1 hour it is still be used at Indian Point 3. The NRC issued Generic Letter 2006-03 in April 2006 to ensure that the affected licensees take

appropriate corrective actions.

On August 16, 2007, Entergy notified the NRC that deficient design of the HemyC fire wrap would not withstand the originally proposed exemption of 30 minutes, but for an unknown duration with a best guess of 24 minutes --- and that guessed duration would only be *after plant modifications* were completed. The necessary modifications may remain unimplemented up to December 2008.

There was no public comment period. The changes made to the proposed exemption on August 16, 2007 where never made formally public, and *almost no one noticed* until after the grant. Even the New York State Attorney General's Office who objected on the same day, believed that the exemption was still pending.

Complete and proper analysis of the implications on fire safety caused by the greatly reduced fire standard usually takes months. However, in a matter of a few short weeks the amended exemption request was accepted by the NRC.

The affect of NRC's grant of the October 4, 2007 exemption, are 1) reduction of fire safety parameters by more than 50%; 2) non-compliance by the operator for more than 10 years, is now pardoned, despite long term safety violations; 3) failure to consider public comment; and most importantly, 4) erosion of the time available to detect, respond and

extinguish a fire that affects both *power* of emergency core cooling systems and the *controls* for those emergency systems and for normal control of reactor criticality itself.

Stakeholder contend that the NRC improperly granted the exemption request, that in fact is an license amendment, without allowing for public comment. Therefore Stakeholder request a hearing on all the exemption request reduction to 24 minutes.

CONTENTION 5:

In violation of promises made to Congress the NRC did not correct deficiencies in fire protection, and instead have reduced fire protection by relying on manual actions to save essential equipment.

In bold violation of promises to Congress to correct deficiencies from a similar material failure – thermolag affecting 79 plants, the NRC instead has accepted deficiencies in fire safety. The current approval of the exemption for Indian Point requiring manual actions to save equipment is unconscionable and fails to adequately protect public health and safety.

The NRC was aware of multiple plants directly defying the present rules regarding fire protection with prima facie evidence in operational procedures of depending on manual actions to save (not repair) essential equipment without exemptions even requested.

In 1993 Congress called for hearings on Fire Protection, to correct

problems with a fire-retarding material at nuclear power plants. The Justice Department began a criminal investigation into whether the NRC and the nuclear industry were misled about the fire-retarding capabilities of Thermo-Lag, a gypsum-like material used to protect critical electrical wires at nuclear power plants in case of fire in 1993. Exhibit FP No. 3

Under NRC regulations, the retardant material must be able to withstand very high fire temperatures -- for one hour if the plant has a sprinkler system, three hours if it doesn't. The current situation with HemyC, unfortunately is reminiscent of Thermo-Lag.

Investigations found Thermo-Lag was approved as a protective barrier in the early 1980s. The NRC staff, however, never conducted independent tests to determine if the material met federal standards.

According to Leo Norton, the NRC's Assistant Inspector General of Investigations, in one test, THERMO-LAG collapsed within 22 minutes. He also said the NRC never bothered to personally test the product, preferring to take the word of vendors and utility company officials who swore under oath test results showed the product worked.

The Office of the Inspector General said NRC staff members who approved the fire-protective material "operated under the premise that the information was accurate because it was submitted under oath." The

material in question, Thermo-Lag, was used in 79 nuclear power plants nationwide. .

During a 10 year period there also were a number of reports - some from utilities - indicating that the material failed to meet NRC requirements, including one that it produced toxic gases when burned. But each time, the NRC failed to pursue them, agency investigators said.

David Williams, Inspector General for the U.S. Nuclear Regulatory Commission, also told lawmakers the NRC " that, "Between 1981 and 1991, the NRC staff did not observe any tests of THERMO-LAG. Further, the NRC staff did not investigate the qualifications of or visit the laboratory which purportedly supervised most of the THERMO-LAG tests."

"The NRC blindly accepted the utilities' assurances," said Rep. John Dingell, D-Mich., chairman of the subcommittee and of the full Energy and Commerce Committee. "This is hardly a regulatory success." He charged that the use of THERMO-LAG has resulted in "substandard fire protection" for nuclear plants that employ the material.

In response to these allegations, nuclear power plant officials said they're taking added safety precautions, some of which have been ordered recently by the NRC.

NRC "inquiries to date indicate that repairs of upgrading may be

needed," Selin said the agency is holding off on further action until it has "adequately identified what criteria are appropriate to decide what standards have been met."

Stakeholders assert that the issues with regard to the failure of ThermoLag to perform as advertised, put the NRC on notice to adequate perform test on other similar materials, such as HemyC. The NRC subsequently failed to properly test HemyC, used at Indian Point 3.

Stakeholders contend that NRC improperly approved Entergy amended exemption request. Stakeholder further contend that the NRC must order retrofits to bring Indian Point 3 into compliance, not reduce the standards of the regulations to meet non-compliant facilities.

CONTENTION 6.

The NRC routinely violates §51.101(b) in allowing changes to the operating license be done concurrently with the renewal proceedings.

While Stakeholders are trying to prepare Intervenor Contentions to the License Renewal Application (LRA) which was accepted by the NRC on August 2, 2007, Entergy submitted a modified exemption request on August 16, 2007, which was first filed on June 6, 2006.

Without public involvement and in defiance of §51.101(b), approved and published on October 4, 2007

On September 28th, the NRC granted the exemption to fire protection. The NRC did so, without a public comment period or hearing. The NRC claimed the change from 1 hour to 24 minutes of fire protection, was insignificant, and therefore public comment was not necessary.

On October 4, the exemptions was published in the Federal Registry.

This kind of exemption, which constitutes an operating license amendment, requires 6 and 9 months to be fully evaluated, and often more than a year.

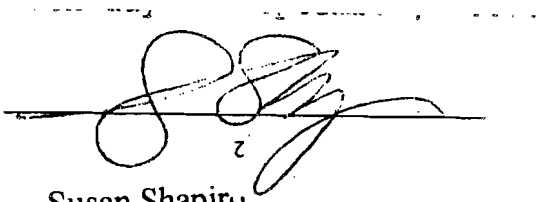
On August 16 , 2007 Entergy informed the NRC that the exemption they were requesting was not 30 minutes, but rather only 24 minutes. This was a significant reduction and physically unrealistic to accomplish the necessary analysis and required Safety Evaluation in five short weeks on this brand new issue.

Stakeholders contend that the NRC acted improperly in approved the license amendment/modified exemption request without the required Safety Evaluation. Therefore the exemption must be cancelled.

Stakeholders object to the NRC's grant a finding of no significant hazard with regard to an exemption to the requirements under Federal Rules to be reflected in a forthcoming Safety Evaluation and resulting in an amendment to License No DPR 64 for Indian Point Unit 3, Notice published

on October 4, 2007, in the Federal Register. and Stakeholders Petition for Leave to Intervener and Request a Hearing on the above issues, and reopen for consideration the exemption requested due to new, substantial and significant information published on October 4, 2007.

Respectfully submitted by:



Susan Shapiro
Representing:
New York State Assemblyman Richard Brodsky
Westchester Citizen's Awareness Network
Rockland County Conservation Association
Public Health & Sustainable Energy
Beyond Nuclear
Sierra Club – Atlantic Chapter

pg. 12

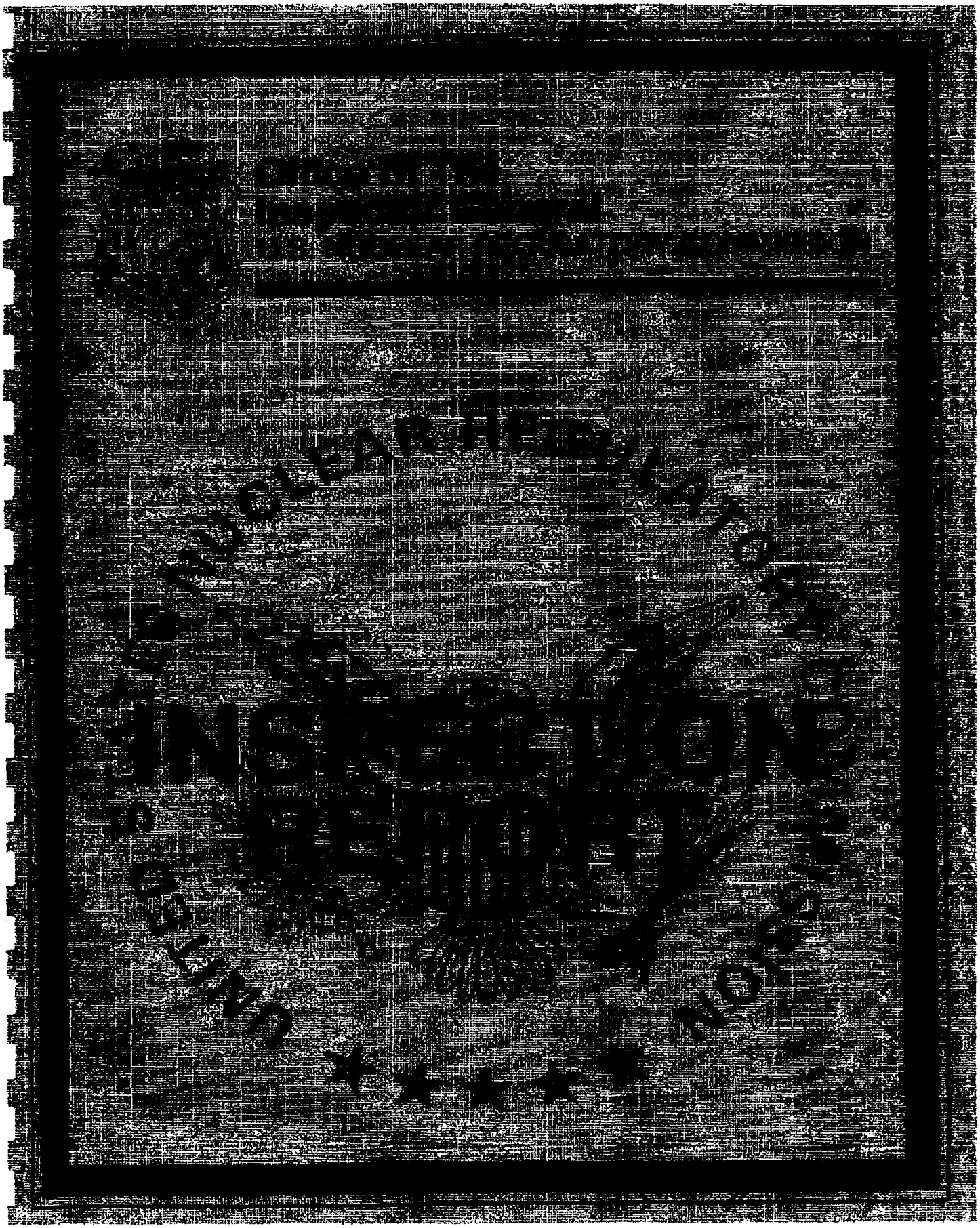
Exhibit FP No. 1

This Exhibit contains two news articles that are protected by copyright and have therefore not been included. The extracted pages are pages 74 – 78.

The first copyright article is entitled "Problems With Fire-Retarding Material Went Uncorrected, Panel Told," a byline by H. Josef Herbert, Associated Press, dated March 3, 1993.

The Second copyright article is entitled "Congressional Panel Says Area Nuclear Power Plants May Employ Defective Fire Retardants: Protectant Supposed To Aid In Emergency Shutdowns," a byline by Jennifer Babson, States News Service, dated March 3, 1993.

Exhibit FP No. 2



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

August 12, 1992

OFFICE OF THE
INSPECTOR GENERAL

MEMORANDUM FOR: Chairman Selin
Commissioner Rogers
Commissioner Curtiss
Commissioner Remick
Commissioner de Planque

FROM: David C. Williams
David C. Williams
Inspector General

SUBJECT: INSPECTION OF THE NRC STAFF'S ACCEPTANCE AND REVIEW OF THERMO-LAG 330-1 FIRE BARRIER MATERIAL

The attached Office of the Inspector General (OIG) Report of Inspection addressed the adequacy of the staff's performance related to the acceptance and review of Thermo-Lag fire barrier material by the NRC. This inspection was initiated as a result of allegations received in early 1991 that questioned the adequacy of Thermo-Lag to provide the level of fire protection required by the NRC.

In addition to this inspection, OIG is conducting an investigation, in conjunction with the Office of Investigations, of Thermal Science Inc., the manufacturer of Thermo-Lag. Also, OIG is examining several allegations of NRC employee misconduct.

As always the OIG experienced full cooperation on the part of the staff. This body of work presented unusual complexities in coordination and cooperation between the staff and my office. Your role in the development of the ongoing OI/OIG Task Force was greatly appreciated. Because of health and safety considerations, the staff also set up a Special Review Team. The EDO and Senior NRR officials were instrumental in assuring that the Investigative Task Force and the Special Review Team worked effectively together. I am appreciative of their efforts as well.

If you have any questions regarding the OIG's report, I will be happy to meet with you at your convenience.

Attachment:
Report of Inspection

cc: J. Taylor

OFFICE OF THE INSPECTOR GENERAL
INSPECTION REPORT

ADEQUACY OF NRC STAFF'S ACCEPTANCE AND REVIEW OF THERMO-LAG 330-1 FIRE BARRIER MATERIAL

[redacted]

Harold L. Isserd 8/12/92
INSPECTOR DATE

George A. Mulley Jr. 8/12/92
INSPECTOR DATE

Leo J. Norton 8/12/92
ASSISTANT INSPECTOR GENERAL FOR INVESTIGATIONS DATE

83

TABLE OF CONTENTS

EXECUTIVE SUMMARY

This Office of the Inspector General (OIG) inspection was initiated in the spring of 1991, based on receipt of allegations that questioned the adequacy of Thermo-Lag 330-1. Thermo-Lag 330-1 is a fire barrier material manufactured by Thermal Science, Inc. (TSI), St. Louis, Missouri. The Nuclear Regulatory Commission (NRC) staff estimates that Thermo-Lag 330-1 is utilized in approximately 80-100 nuclear power plants to protect redundant safe shutdown electrical circuits from fire as required by NRC regulations. It has been alleged however, that the material does not provide the required level of fire protection and also, that the ampacity derating figures for Thermo-Lag 330-1 are actually much higher than the figures reported by TSI. Our inspection addressed the adequacy of the NRC staff's acceptance and review of Thermo-Lag 330-1, and the staff's response to reports of problems with Thermo-Lag 330-1 that were reported over a period of about 10 years.

On March 22, 1975, a fire occurred at the Browns Ferry nuclear power plant in Alabama. A Special Review Group (SRG) was established by the NRC shortly after the Browns Ferry fire to identify lessons learned and to make recommendations. The SRG concluded that improvements, in fire prevention and fire control were needed and proposed a number of recommendations. One recommendation involved the need to protect redundant electrical systems required to achieve and maintain safe shutdown in the event of a fire. The NRC provided immediate guidance on this issue to the nuclear power industry. In 1981, Appendix R was issued and Section III.G. specifically addressed the requirements involving the protection of safe shutdown systems. These requirements have been made applicable to all nuclear power plants.

One method of satisfying this safe shutdown requirement is to enclose the redundant electrical circuits with fire-rated barriers. Before licensees could use a fire barrier material to satisfy the requirements of Appendix R, the NRC required that the products have a fire resistance rating of either one or three hours. If a one hour barrier was chosen, an automatic sprinkler system was required. The NRC and industry required that this rating be achieved by having a nationally recognized, fire testing laboratory subject the fire barrier material to a standard fire exposure test.

In 1981, the NRC began receiving requests from licensees for acceptance of Thermo-Lag 330-1 to satisfy the safe shutdown requirements in Appendix R. Since its initial acceptance in 1981, Thermo-Lag 330-1 has been the fire barrier material most extensively accepted by the NRC and installed by licensees.

When electric cables are placed in trays and conduits and enclosed by fire barrier material, the temperature of the cable insulation increases because the heat generated by electricity passing through the cables is retained within the barrier. Since electrical cable insulation is vulnerable to premature degradation when operating at higher than

normal temperatures, the ampacity of the enclosed cables must be derated (lowered) to adjust for the insulating effect of the fire barrier material. Therefore, a low ampacity derating requirement would be an important consideration relative to the fire barrier material selected for installation in nuclear power plants.

The NRC requires that cable derating due to the use of fire retardant coatings be considered by utilities during plant design or when design changes are made to existing electrical system configurations. The NRC electrical staff is responsible for reviewing cable derating to ensure compliance with accepted industry practice.

Beginning in 1981, the NRC received reports documenting fire tests of Thermo-Lag 330-1 that were conducted by TSI. Fire tests conducted by TSI were witnessed by Industrial Testing Laboratories, Inc. (ITL), St. Louis, Missouri. A review of a number of ITL reports of fire tests conducted by TSI and witnessed by ITL disclosed that the TSI tests had not been performed in accordance with the required standards. For example, the test furnace and temperature measuring devices used by TSI during the tests did not meet the standards. Although the NRC requires a full scale fire endurance test, the tests conducted at TSI were "small scale" tests. NRC requirements state that a fire endurance test on barrier materials must be conducted by a nationally recognized, fire testing laboratory. The NRC staff accepted ITL test reports, and ITL test reports were used throughout the industry to qualify Thermo-Lag 330-1 for use in power plants. It has been recently determined that ITL had no fire testing expertise.

TSI fire endurance tests were reportedly validated by the presence of a representative from ITL, utility officials, and inspectors from the American Nuclear Insurers (ANI). OIG found that utility officials and ANI inspectors merely witnessed the conduct of fire tests. They did not inspect the test articles as they were being constructed by TSI employees, and they were often absent during significant portions of the fire tests.

Although the ITL test reports state the fire tests were supervised and controlled entirely by ITL, the ITL representative was present only as a witness to verify that a test was conducted. The test reports were actually written by TSI and then signed by the President of ITL with no substantive verification that the data in the reports reflected the actual tests. In some instances, the ITL President simply signed test report cover sheets for TSI without seeing the test report.

The NRC managers of the fire protection staff advised OIG that the NRC conducted reviews by auditing paperwork. The NRC staff considered it the responsibility of the utilities to provide accurate information concerning the conduct of the qualification tests. Consequently, the NRC did not find it necessary to observe qualification tests of Thermo-Lag 330-1.

In 1982, the NRC received from Susquehanna nuclear power plant two reports of TSI tests of one hour Thermo-Lag 330-1. In June 1982, the NRC fire protection staff

rejected both TSI reports because the tests were simulated and differed from the required fire testing standards. The NRC recommended that Susquehanna have a test conducted at an approved laboratory. The OIG inspection found that within months of rejecting the TSI tests submitted by Susquehanna, the NRC staff accepted a fire test from Washington Nuclear Project-2 (WNP-2) which was conducted using the same substandard procedures.

During the fall of 1982, TSI conducted two additional tests of Thermo-Lag 330-1 that passed and that had applicability to many power plants. These test reports were used throughout the nuclear power industry to qualify Thermo-Lag 330-1 with the NRC. Specific power plants that used these generic tests included Comanche Peak, Palo Verde, River Bend, Prairie Island, Callaway, and Susquehanna. ITL was witness to these tests which were conducted under the same inadequate conditions as previous TSI tests.

Ampacity derating

Originally, TSI reported to Comanche Peak that Thermo-Lag 330-1 would require a 10 percent ampacity derating. In 1982, TSI conducted an ampacity derating test with ITL as the witness and produced a derating figure of about 17 percent. During this same time period, manufacturers of other fire barrier materials conducted ampacity derating tests and reported ampacity derating figures far higher than those reported by TSI, some as high as 40 percent.

In 1986, an ampacity derating test on Thermo-Lag 330-1 was conducted at a nationally recognized laboratory-Underwriters Laboratories (UL). The UL test produced ampacity derating figures of about 31 percent for the three hour and about 28 percent for the one hour Thermo-Lag 330-1. These figures were significantly higher than those previously reported by TSI.

In the above test, UL officials told OIG that TSI refused to follow the UL ampacity derating testing procedure. After the TSI representatives left the UL facility, an additional ampacity derating test on Thermo-Lag 330-1 was conducted by UL which followed the UL ampacity derating test procedure. The second UL test produced ampacity derating figures for Thermo-Lag 330-1 of nearly 40 percent for the three hour barrier and 36 percent for the one hour barrier. These figures were not reported to the NRC.

Indications of inadequate performance of Thermo-Lag 330-1 not addressed by the NRC

During its inquiry, OIG learned of instances over the past ten years which were reported to the NRC and which questioned the ability of Thermo-Lag 330-1 to perform as claimed by the manufacturer. However, our review of much of this information disclosed that the NRC staff did not effectively respond to these indicators. Several of these instances are discussed below:

Inadequate TSI test reports submitted by Susquehanna

In June 1982, the NRC fire protection staff rejected two TSI test reports submitted by Susquehanna and recommended that a test be conducted at an approved testing laboratory. One reason for rejecting the tests was because the tests were not performed in accordance with adequate quality assurance procedures. In October 1982, however, the NRC staff accepted a test report from WNP-2 that was conducted at TSI in the same manner. The nuclear industry continued to use TSI tests that were documented in ITL test reports to qualify the installation of Thermo-Lag 330-1. OIG found no action by the NRC staff to address the fact that utilities were using TSI tests that were documented in ITL test reports to qualify their installation of Thermo-Lag 330-1. Nor was any effort made to resolve the fact that tests using the same TSI procedures were rejected and then accepted by the NRC.

10 CFR Part 21 Report on ampacity derating

On October 2, 1986, TSI notified the NRC by mailgram of ampacity derating figures that were significantly higher than those reported earlier by TSI. The earlier TSI figures were used by utilities to design electric power systems utilizing Thermo-Lag 330-1. The TSI mailgram was administratively recorded as a Part 21 Report by the NRC. In December 1990, the Part 21 Report was closed by the NRC without taking any action.

Comanche Peak report on new ampacity derating figures

In 1987, Comanche Peak provided a written report to the NRC detailing new ampacity derating figures provided by TSI. The new figures were 31 percent and 20 percent, substantially higher than the 10 percent originally reported by TSI and used in the initial cable sizing calculations at Comanche Peak. In its report to the NRC, Comanche Peak stated that failure to consider the additional derating of power cables due to Thermo-Lag 330-1 installation could cause the power cables to exceed the design temperature rating of the cables. OIG found no NRC follow-up with TSI in order to obtain an explanation for the significant increase over the ampacity derating figures initially provided by TSI to Comanche Peak.

Allegations regarding the performance of Thermo-Lag 330-1

In March 1989, the NRC received an allegation that, when burned, Thermo-Lag 330-1 gave off lethal gases. In support of this concern, the alleger provided the staff with information from a test of Thermo-Lag 330-1 documented in a May 1986 SwRI report. During an Allegation Review Board meeting it was decided to close the allegation without further action.

The alleger also informed the NRC about a fire endurance test that involved Thermo-Lag 330-1 as a fire barrier used in conjunction with a fire penetration seal. The alleger

pointed out that the Thermo-Lag 330-1 had disintegrated during the test. OIG did not find any indication that the NRC staff conducted an inquiry into the information that Thermo-Lag 330-1 had been consumed in a fire test.

Problems with Thermo-Lag 330-1 at Comanche Peak

In 1989, NRC Region IV was informed that panels of one hour Thermo-Lag 330-1 were arriving at Comanche Peak from TSI, that measured less than the required thickness. Subsequently, Comanche Peak management discussed the situation with TSI. In a July 13, 1990, letter to the NRC, Comanche Peak explained that the behavior of Thermo-Lag 330-1 under fire conditions is dependent on the density of the product and not on the thickness. After reviewing the Comanche Peak July 13, 1990, letter and without further inquiry of TSI or Comanche Peak, Region IV accepted the resolution of the matter and closed this issue.

OIG learned from the NRC and National Institute of Standards and Technology staff that the Comanche Peak quality control practice of checking weights was not an accurate indication of the performance of Thermo-Lag 330-1 panels. The identification of this problem provided another opportunity for the NRC to inquire into the performance of TSI and Thermo-Lag 330-1 that was not pursued.

Concerns about the performance of Thermo-Lag 330-1 at River Bend

In December 1989, the River Bend nuclear power plant submitted an Informational Report to the NRC regarding an October 1989 test of Thermo-Lag 330-1 that failed. As a result, River Bend conducted an investigation and identified several generic issues with Thermo-Lag 330-1 that were outlined in the Informational Report. The OIG inspection did not identify any immediate action by the NRC to address the generic concerns with Thermo-Lag 330-1. It was not until May 1991, after additional allegations regarding the performance of Thermo-Lag 330-1 were received by the NRC, that NRC inspectors made a fact finding visit to River Bend to review problems with the performance of Thermo-Lag 330-1.

Current status

In June 1991, in response to both the allegations and the problems identified at River Bend, the NRC established a Special Review Team to review Thermo-Lag 330-1 issues and make recommendations for their resolution. In August and December 1991, the NRC issued Information Notices (IN 91-47 and IN 91-79) which discussed the test failure of Thermo-Lag 330-1 at River Bend.

In December 1991, the NRC Vendor Inspection Branch (VIB) conducted its first inspection at TSI. This inspection disclosed problems with the TSI quality assurance

program and that ITL did not act as an independent testing laboratory when it witnessed TSI qualification tests of Thermo-Lag 330-1.

In January 1992, the Special Review Team completed its activities and in April 1992, issued a final report documenting its review of the performance of Thermo-Lag 330-1. One conclusion in the report was the fire resistance ratings and ampacity derating factors for the Thermo-Lag 330-1 fire barrier system are indeterminate.

The NRC is continuing to monitor the Thermo-Lag 330-1 testing being conducted by Comanche Peak. Further, the NRC is currently sponsoring testing of Thermo-Lag 330-1 at the National Institute of Standards and Technology. This testing was still ongoing at the time this report was prepared.

FINDINGS

Based on the information developed during this inspection, the OIG found that the NRC staff did not conduct an adequate review of fire endurance and ampacity derating information concerning the ability of the fire barrier material, Thermo-Lag 330-1. Had the staff conducted a thorough review of the test reports submitted by industry or verified the test procedures and test results reported by TSI, a number of problems with the test program and Thermo-Lag 330-1 would have been discovered.

An NRC vendor inspection at TSI at an earlier date would have determined there were problems with the TSI testing program. Further, it would have been discovered that the test reports were actually written by the vendor with no substantive verification that the data in the reports reflected the data recorded during the tests. Because these reviews and inspections were not conducted, it was not until 1992 that the NRC staff determined that the performance of Thermo-Lag 330-1 with respect to fire resistance ratings and ampacity derating was indeterminate.

In addition to the inadequate initial review process discussed above, the staff did not take any significant action between 1982 and 1991 when reports of problems with Thermo-Lag 330-1 were received. Our inspection disclosed seven instances in which NRC did not pursue reports of problems with Thermo-Lag 330-1.

BASIS AND SCOPE

This Office of the Inspector General (OIG) inspection was initiated in the spring of 1991, when the U.S. Nuclear Regulatory Commission (NRC), received allegations that questioned the adequacy of Thermo-Lag 330-1. Thermo-Lag 330-1 is a fire barrier material manufactured by Thermal Science, Inc. (TSI), St. Louis, Missouri. The NRC staff estimates that Thermo-Lag 330-1 is utilized in approximately 80-100 nuclear power plants. Thermo-Lag 330-1 was accepted by the NRC to protect redundant safe shutdown electrical circuits from fire. However, it has been alleged that the material does not provide the required level of protection with respect to fire endurance. Further, information was received that indicated that the ampacity derating figures for Thermo-Lag 330-1 are much higher than the reported figures. Ampacity derating figures are used in assuring the useful life of cables is achieved.

This OIG inspection addressed the adequacy of the NRC staff's acceptance and review of Thermo-Lag 330-1 as a fire barrier material for use in nuclear power plants. In addition, the inspection included a review of the staff's response to reports of problems with Thermo-Lag 330-1 that were received over a period of about 10 years. Our efforts involved interviews with utility officials at Comanche Peak, Susquehanna, Salem, Washington Nuclear Project, and Palo Verde. At each of these plants, we reviewed the documentation involving the decision to use Thermo-Lag 330-1. Interviews were also conducted with current and former NRC employees involved in the process of reviewing and accepting Thermo-Lag 330-1 for installation in nuclear power plants. We reviewed 12 years of correspondence among the utilities, vendors and the NRC involving the acceptance and installation of Thermo-Lag 330-1. We interviewed personnel from three fire testing laboratories, the Industrial Testing Laboratories, Inc. (ITL), and the manufacturer of a competing fire barrier material, Minnesota Mining and Manufacturing Company (3M). We reviewed reports of tests conducted at each of the laboratories. These tests also involved fire barrier materials other than Thermo-Lag 330-1.

In addition to this inspection effort, OIG, in conjunction with the Office of Investigations, is conducting an investigation involving the manufacturer of Thermo-Lag 330-1. OIG is also examining several allegations of NRC employee misconduct.

BACKGROUND

On March 22, 1975, a fire occurred at the Browns Ferry nuclear plant in Alabama. At that time, the nuclear reactors in Units 1 and 2 at Browns Ferry were operating, and a third unit was under construction. The fire began in the cable spreading room where technicians were testing for air leaks in the penetration seals between the cable spreading room and the reactor building. The fire caused minimal damage in the cable spreading room; however, it quickly spread through a seal into the Unit 1 reactor building located adjacent to the cable spreading room. The fire continued for about seven hours inside cable trays and conduits in the reactor building. Approximately 1600 electrical cables were damaged. Electrical shorts and grounding occurred as the insulation burned off the cables. This resulted in the loss of control power for much of the equipment, such as valves, pumps, and blowers. Although all of the emergency core cooling systems for Unit 1 were rendered inoperable, and portions of Unit 2 cooling systems were also affected, sufficient equipment remained operational to shut down the reactors and maintain the reactor cores in a cooled and safe condition. The damage to electric power and control systems also jeopardized the ability of the operators to monitor the status of the plant, including the reactor.

A Special Review Group (SRG) was established by the NRC shortly after the Browns Ferry fire to identify lessons learned and to make recommendations for the future. The SRG concluded that improvements, especially in the areas of fire prevention and fire control, should be made in most existing nuclear facilities. In its report, "Recommendations Related to Browns Ferry Fire" (NUREG-0050, February 1976), the SRG pointed out a lack of definitive criteria, codes, or standards related to fire prevention and fire protection in power plants. The review group also noted that the existing criteria covering separation of redundant electrical control circuits and power cables needed revision. The NRC developed technical guidance from the recommendations in the SRG report. In May 1976, the NRC issued guidance in Branch Technical Position (BTP) 9.5-1. This guidance, however, did not apply to nuclear facilities already in operation at that time. Guidance to operating plants was provided in July 1976 in Appendix A to the BTP.

By early 1980, most operating plants had implemented the guidelines in Appendix A, one of which was to protect redundant electrical systems required to achieve and maintain safe shutdown in the event of a fire. However, the fire protection program had some significant problems. Some licensees had expressed continuing disagreement with and refused to adopt recommendations relating to a number of issues. To resolve these contested issues, the Commission issued a fire protection rule for operating nuclear power plants. The new rule, contained in Title 10, Code of Federal Regulations, Part 50.48 (10 CFR 50.48) and 10 CFR 50, Appendix R, set out minimum fire protection requirements. These guidelines became effective on February 19, 1981, and applied to all plants licensed to operate before January 1, 1979.

As originally proposed to the public, all of the requirements in Appendix R would have applied to plants licensed to operate prior to January 1, 1979. Based on a review of public comments, the Commission determined that only three items in Appendix R were of such safety significance that they should apply to all plants. Accordingly, 10 CFR 50.48 requires that each nuclear power plant licensed to operate before January 1, 1979, meet the requirements of Appendix R, Sections III.G, III.J, and III.O. These sections deal with protection of safe shutdown capability, emergency lighting, and the reactor coolant pump lubrication system. Due to the safety significance of these items, the Commission approved the staff's recommendation that plants receiving operating licenses after December 31, 1978, must also satisfy the requirements of these sections.

The requirements of Section III.G, pertain to the protection of redundant safe shutdown electrical systems. The objective of this section is to ensure that at least one electrical circuit capable of achieving and maintaining the safe shutdown of the plant will remain free of damage and be available during and after a fire in the plant. Licensees can satisfy Section III.G by separating one train of electrical systems from its redundant train by: 1) a horizontal distance of 20 feet with no intervening combustibles, or 2) with fire-rated barriers. The fire resistance rating required of the barriers is either one hour or three hours depending on the other fire protection features provided in the fire area. The feature distinguishing the one hour from the three hour requirement is that an automatic sprinkler system must be installed when the one hour barrier is utilized.

For power plants unable to achieve a horizontal separation of 20 feet for the redundant safe shutdown systems, the installation of an acceptable fire barrier material was critical. However, in 1981 when Appendix R became effective, fire barrier materials that could be used to protect electrical circuits were still in the developmental stage. Before licensees could use a fire barrier material to satisfy the requirements of Appendix R, the NRC required that the products have a fire resistance rating of either one or three hours. The NRC and industry required that this rating be achieved by having a nationally recognized, fire testing laboratory subject the fire barrier material to a standard fire exposure test.

In 1981, the NRC began receiving requests from licensees for acceptance of Thermo-Lag 330-1 to satisfy the fire protection requirements in Appendix R. Since its initial acceptance in 1981, Thermo-Lag 330-1 has been the fire barrier material most extensively accepted by the NRC. It has been installed by many licensees to comply with the fire protection requirements of Section III.G of Appendix R. Thermo-Lag 330-1 has been installed in about 80-100 nuclear power plants to protect redundant safe shutdown electrical systems for both the one hour and three hour requirements of Section III.G of Appendix R.

93

Fire barrier qualification

When the NRC proposed 10 CFR 50.48 and Appendix R, the NRC stated that although nuclear power plants have few combustible materials and the chances of a fire are low, the potential consequences of fire are serious. For this reason, three hours was selected as the minimum fire resistance rating for fire barriers used to separate redundant safe shutdown electrical systems. The NRC considered a one hour barrier with an automatic fire detection and suppression system to be equivalent to a three hour fire barrier. Therefore, fire barriers relied upon to protect redundant safe shutdown systems need to have a fire resistance rating of either one hour or three hours.

The NRC adopted the standard fire test defined by the American Society for Testing and Materials (ASTM) in ASTM E-119, "Standards for Fire Resistance of Building Materials." The fire resistance rating is defined as "the time that materials or assemblies have withstood a fire exposure as established in accordance with the test procedure of Standard Methods of Fire Tests of Building Construction and Materials." ASTM E-119 also requires that a "hose stream" test be conducted. This consists of directing a stream of water onto the fire barrier immediately following the fire endurance test. The success criteria for the hose stream test would be that no opening in the barrier developed which permitted a projection of water to penetrate the fire barrier. Further, the NRC also required that the fire endurance qualification tests be conducted by nationally recognized, fire testing laboratories.

An NRC guidance document, Generic Letter (GL) 86-10, provided additional information on existing NRC fire barrier acceptance criteria. One criteria discussed was the requirement that the transmission of heat through the fire barrier during a fire endurance test shall not have been such as to raise the temperature to more than 325 degrees Fahrenheit inside the fire barrier. The 325 degree temperature criterion is used by the NRC because it functions to preserve the integrity of the cables and keep them free of fire damage.

Additional NRC criteria discussed in GL 86-10 required that the fire barrier specimen being exposed to the standard fire test duplicate what would be installed in the power plant. This is significant because construction variations between the test article and the installed assembly could substantially change the performance of the fire barrier. Consequently, this requirement applies to materials, methods of construction, the dimensions, and the configuration of the test barrier. GL 86-10 stated that licensees should either install barriers that replicate the configurations that were tested, or justify to the NRC that installed fire barriers that deviate from the tested configurations provide an equivalent level of protection.

94

Ampacity Derating Requirements

As electric current passes through a cable, heat is generated which raises the temperature of the cable. Ampacity is the electrical current-carrying capacity of a cable specified by the manufacturer. To avoid damage to cable insulation, the manufacturer's recommended temperature should not be exceeded during normal operations. When cables are placed in trays and conduits and enclosed in fire barrier material, the temperature of the cable insulation increases because the heat is retained by the barrier. Because electrical cable insulation is vulnerable to premature degradation when operating at abnormally high temperatures, the ampacity of the enclosed cables must be derated (lowered) to adjust for the insulating effect of the fire barrier material. To ensure that the expected life of electrical cables was not shortened, cable ampacity derating became an important consideration relative to the fire barrier material selected for installation in the nuclear power plants.

The "Protection Systems" section of 10 CFR 50.55a(h), requires that protection systems meet certain requirements for the ampacity derating of components. These requirements are set forth in the Institute of Electrical and Electronics Engineers Standard "Criteria For Protection Systems For Nuclear Power Generating Stations." Additionally, in accordance with NRC requirements, cable derating due to the use of fire retardant coatings must be considered by utilities during plant design or when design changes are made to existing electrical system configurations. The NRC electrical staff is responsible for reviewing cable derating to ensure compliance with accepted industry practice.

DETAILS

This OIG inspection was initiated upon receipt of allegations and other information indicating that Thermo-Lag 330-1 did not perform adequately with respect to fire endurance and ampacity derating. Because Thermo-Lag 330-1 is installed in about 80-100 nuclear power plants, the OIG inspection addressed the adequacy of the NRC staff's acceptance and review of Thermo-Lag 330-1 as a fire barrier material. Our inspection also involved a review of how the NRC staff has responded over the years to incidents that indicated problems with Thermo-Lag 330-1. OIG efforts included interviews with officials of utilities, vendors, fire testing laboratories, current and former NRC employees, and a review of documents extending over a period of nearly 12 years. The results of our inspection are presented in this section.

Fire endurance

To comply with the NRC fire protection requirements, utilities could separate redundant, safe shutdown circuits by at least 20 feet or protect the circuits with a fire barrier. The fire barrier material could have a one hour fire endurance rating if fire detection and automatic sprinkler systems were installed. If no sprinkler system were used, the barrier material must have a three hour fire endurance rating. In 1981, the practice of enclosing cable trays and conduits in nuclear power plants with fire barrier material was new; therefore, the availability of products for this purpose was limited. At this time, TSI began its efforts to adapt and qualify Thermo-Lag 330-1 for use in nuclear power plants.

Because Thermo-Lag 330-1 had no history of use in nuclear power plants to protect safe shutdown circuits, utilities proposing to install this fire barrier material sought NRC staff acceptance. Along with their proposals to use Thermo-Lag 330-1, the utilities submitted test reports and other documentation to qualify Thermo-Lag 330-1 as a fire barrier that met NRC fire protection requirements.

Beginning in 1981, the NRC received reports documenting fire tests of Thermo-Lag 330-1 that were conducted by TSI. These test reports were submitted to the NRC by utilities during the licensing process and by TSI. One example of this occurred in early 1982, when Washington Nuclear Project 2 (WNP-2) officials informed the NRC fire protection staff of a plan to have both one hour and three hour fire endurance tests conducted on cable trays enclosed with Thermo-Lag 330-1. In May and June 1982, the two tests were conducted by TSI in its St. Louis, Missouri facility. The tests were witnessed by ITL, also located in St. Louis, Missouri. WNP-2 provided the test reports to the NRC in August and October of that year. The test results indicated both one hour and three hour materials passed the fire endurance tests. NRC requirements state that a fire endurance test on barrier materials must be conducted by a nationally recognized, fire testing laboratory. As discussed in this OIG report, it has been recently determined that ITL was not a nationally recognized, fire testing laboratory. Nevertheless, the NRC staff

96

accepted ITL test reports. ITL test reports were used throughout the industry to qualify Thermo-Lag 330-1 for use in nuclear power plants.

Subsequent to initiation of this inspection, NRC technical staff reviewed a number of the reports of fire tests conducted by TSI and witnessed by ITL. These reviews disclosed that the TSI tests had not been performed in accordance with ASTM Standard E-119 as required by the NRC. The test furnace and temperature measuring devices used by TSI during the tests did not meet the requirements of ASTM E-119. In fact, although the NRC requires a full scale fire endurance test, the tests conducted at TSI are considered to be "small scale" tests. Additionally, the reports prepared to document the TSI tests did not contain sufficient detail to verify that some basic requirements of the ASTM E-119 test procedure, such as equipment calibration, were performed. Further, although the NRC required that the tested configurations duplicate the field installation, it was later determined that many of the configurations tested by TSI were not typical of field installations.

TSI fire endurance tests were reportedly validated by the presence of a representative from ITL, utility officials, and inspectors from American Nuclear Insurers (ANI). ANI is a property insurance organization which witnessed several of the TSI tests of Thermo-Lag 330-1 for utilities that planned to install Thermo-Lag 330-1. ANI witnessed the TSI tests to determine if Thermo-Lag 330-1 could provide acceptable protection of property for insurance purposes. OIG found that utility officials and ANI inspectors merely witnessed the conduct of fire tests. They did not inspect the test articles as they were being constructed by TSI employees to ensure all quality control and technical specifications were followed. They also could not verify that the tested articles were constructed the same as the ones described in the test reports. In fact, OIG was told that utility and ANI representatives were often absent during significant portions of the fire tests.

Although the ITL test reports state the fire tests were supervised and controlled entirely by ITL, it was determined that TSI controlled the tests and the ITL representative was present only as a witness to verify that a test was conducted. Quality control and construction of the test assemblies were completed by TSI with no independent verification by ITL. Further, even though the fire test reports were published with an ITL cover sheet, they were actually written by TSI and then signed by the President of ITL with no substantive verification that the data in the reports reflected the actual tests. Further, the ITL President related that in several instances he signed cover sheets for test reports without seeing the test reports.

Upon receipt of proposals to use Thermo-Lag 330-1, the NRC fire protection staff reviewed the written material to determine the acceptability of Thermo-Lag 330-1. When interviewed by the OIG, the NRC staff responsible for reviewing and accepting the proposals indicated that their managers told them that their review should consist of an examination of the documents submitted by the utilities. For example, when a utility

97

submitted a test report on a fire barrier material, the staff reviewed the test report to see that the report stated that the test was conducted in accordance with the NRC and industry fire endurance test standards and that the results were acceptable based on NRC criteria. The NRC managers of the fire protection staff advised OIG that the NRC review consisted of an audit of the paperwork submitted by the utilities. The NRC staff considered it the responsibility of the utilities to provide accurate information concerning the conduct of the qualification tests. The managers explained that utilities formally submitted information under oath. Consequently, the NRC did not find it necessary to observe any qualification tests of Thermo-Lag 330-1.

In 1981, Comanche Peak submitted a proposal to install Thermo-Lag 330-1 in Unit 1. The proposal was supported by a one hour fire endurance test conducted at Southwest Research Institute (SwRI). SwRI is a nationally recognized, fire testing laboratory. This is the only fire endurance test involving Thermo-Lag 330-1 conducted by a nationally recognized, fire testing laboratory that passed the NRC fire protection requirements. The Thermo-Lag 330-1 material that was tested at SwRI included an embedded layer of fiberglass. However, Comanche Peak decided not to install Thermo-Lag 330-1 with the fiberglass, and no other utility installed Thermo-Lag 330-1 with embedded fiberglass.

In May 1982, the NRC received from Susquehanna two TSI one hour test reports documenting TSI tests conducted in 1981 at the TSI facility. These reports were provided to the NRC by Susquehanna in an effort to support the installation of Thermo-Lag 330-1 and eliminate the need to conduct an additional test. However, in June 1982, the NRC fire protection staff rejected both TSI reports because they found the tests were not performed in accordance with adequate quality assurance procedures. Further, the tests conducted by TSI were "simulated" ASTM E-119 tests which differed from the required ASTM E-119 standard test. Although the NRC staff reviewers identified significant problems with these TSI reports, the OIG inspection found that within months, the NRC staff accepted a fire test which was conducted in the same furnace and under the same inadequate quality assurance procedures. The test was submitted by Washington Nuclear Project 2 as a basis for installing Thermo-Lag 330-1 in that plant.

In August 1982, the NRC fire protection reviewers also received fire endurance test results on one hour Thermo-Lag 330-1 conducted at SwRI for Susquehanna Unit 1. Unlike the one hour fire test conducted for WNP-2 at TSI and witnessed by ITL, the fire test conducted at SwRI did not pass the one hour Thermo-Lag 330-1 fire test. The test that failed was conducted at a nationally recognized, fire testing laboratory, while the test that passed was conducted by TSI and witnessed by an employee of ITL, a laboratory with no fire testing expertise. Therefore, during the same time period, the NRC fire protection staff received conflicting results of fire tests of one hour Thermo-Lag 330-1 conducted at different laboratories. The OIG inspection determined that the NRC reviewers did not pursue why one test passed and the other failed.

During the fall of 1982, TSI conducted two additional tests of Thermo-Lag 330-1. These were one and three hour fire endurance tests on cable trays containing a cable configuration that had applicability to many power plants. The tests were conducted in September and October 1982, at TSI with ITL witnessing the tests. As noted earlier, ITL did not possess any fire testing expertise. In both of these tests (ITL Reports 82-11-80 and 82-11-81), ITL represented that Thermo-Lag 330-1 passed the NRC requirements. Due to the generic nature of the test articles, these test reports were used throughout the nuclear power industry to qualify Thermo-Lag 330-1 with the NRC. Specific power plants that used these generic tests included Comanche Peak, Palo Verde, River Bend, Prairie Island, Callaway, and Susquehanna.

Once the NRC staff accepted Thermo-Lag 330-1 as a fire barrier that met NRC requirements, numerous proposals to use Thermo-Lag 330-1 were submitted by other utilities. For example, in the case of Palo Verde in early 1983, utility personnel verbally informed the NRC of their proposal to install Thermo-Lag 330-1 because it had been previously tested and the NRC had already accepted it. Palo Verde personnel told OIG that the NRC staff reviewer expressed no concerns with the use of Thermo-Lag 330-1; therefore, Palo Verde had no reason to conduct their own tests. Rather, Palo Verde used one of the generic tests conducted by TSI and witnessed by ITL as the basis for installing Thermo-Lag 330-1.

During this inspection, OIG became aware of about 25 tests of Thermo-Lag 330-1 that were conducted by TSI with ITL acting as a witness. ITL test reports prepared to document these tests indicated that with few exceptions, Thermo-Lag 330-1 met NRC fire protection requirements. Many of these tests conducted by TSI were used to qualify the installation of Thermo-Lag 330-1 at nuclear power plants.

Ampacity derating

As electric current passes through cables, heat is generated which raises the temperature of the cables. When cables are placed in cable trays and conduits, and enclosed in fire barrier material, the temperatures of the cables increase because heat is retained by the barrier. Electrical cables that operate in temperatures that are too high will deteriorate prematurely. Because of the negative effect of abnormally high temperatures, the electrical current-carrying capacity (ampacity) of the enclosed cables must be derated (lowered) to adjust for the insulating effect of the fire barrier material. Therefore, those fire barrier materials requiring the least derating would be most attractive to the user. As a result, cable ampacity derating became an important consideration relative to the fire barrier material selected for installation in nuclear power plants.

TSI conducted ampacity derating tests of Thermo-Lag 330-1. Originally, TSI reported to Comanche Peak that Thermo-Lag 330-1 would require a 10 percent ampacity derating. In 1982, TSI conducted a test with ITL as the witness and produced an ampacity derating figure of about 17 percent. As with the fire endurance test reports written by TSI and

signed by ITL, the TSI ampacity derating test reports stated that the tests were conducted under the supervision and total control of ITL. However, as noted earlier the ITL representatives told us they only witnessed the conduct of the tests, they did not control the tests, and they did not write the reports.

During this same time period, manufacturers of other fire barrier materials conducted ampacity derating tests and reported ampacity derating figures far higher than those reported by TSI. For example, Underwriters Laboratories (UL) conducted ampacity derating tests on the fire barrier material manufactured by Minnesota Mining and Manufacturing (3M) and reported ampacity derating figures of about 40 percent. Because TSI reported significantly lower derating figures compared to other manufacturers, Thermo-Lag 330-1 was an attractive choice for use by the utilities in reducing the negative effects of heat in the barriers.

In 1986, an engineering firm associated with the construction of the South Texas nuclear plant requested an ampacity derating test on Thermo-Lag 330-1. TSI arranged with UL to use its facility to conduct an ampacity derating test. The September 1986 tests at UL produced ampacity derating figures of about 31 percent for the three hour and about 28 percent for the one hour Thermo-Lag 330-1. These figures were significantly higher than the 10 per cent first reported by TSI.

The officials at UL told OIG that TSI refused to follow the UL ampacity derating testing procedure. After the TSI representatives left the UL facility, an additional ampacity derating test on Thermo-Lag 330-1 was conducted. This test followed the UL testing procedure and was conducted at UL's own expense. This additional test was conducted because UL believed the earlier tests and results were not valid. When the second UL test was conducted, the ampacity derating figures for Thermo-Lag 330-1 increased to nearly 40 percent for the three hour barrier and 36 percent for the one hour barrier. This information was not submitted to the NRC.

The NRC electrical staff was responsible for ensuring that utilities considered cable ampacity derating when designing and modifying their electrical systems. However, OIG found no evidence indicating the staff reviewed the ampacity derating tests on the Thermo-Lag 330-1 material even though it was being installed in the majority of nuclear power plants. The NRC staff explained it was the responsibility of the utilities to ensure that ampacity derating was considered when designing their electrical systems. Further, according to staff, if the utilities based their cable installation configurations on specific ampacity derating tests of fire barrier materials, it was the utilities responsibility to ensure the tests and the results were valid. The staff told OIG they had not reviewed ampacity derating test reports for fire barrier materials.

100

Indications of inadequate performance of Thermo-Lag 330-1 not addressed by the NRC

The NRC Vendor Inspection Branch (VIB) develops and conducts inspections of 1) vendors and licensee contractors who supply safety-related products and services to the nuclear industry, and 2) licensee procurement programs and interfaces with vendors. These inspections are often performed in response to allegations and reports of defective and substandard components and equipment in nuclear service or being offered for nuclear service. The VIB also determines the safety significance and generic implications of substandard vendor products. During its inquiry, OIG learned of instances over the past ten years which were reported to the NRC and which questioned the ability of Thermo-Lag 330-1 to perform as claimed by the manufacturer. However, our review of this information disclosed that the NRC staff did not effectively respond to these indicators. Several of these instances are discussed below:

Inadequate TSI test reports submitted by Susquehanna

In May 1982, during the NRC staff review of the Susquehanna fire protection program, Susquehanna submitted two TSI test reports involving one hour Thermo-Lag 330-1. The reason for this submittal was to assure the NRC that Thermo-Lag 330-1 was an acceptable fire barrier that performed in accordance with NRC requirements. In June 1982, after reviewing the two TSI test reports, the NRC fire protection staff rejected both and recommended that Susquehanna conduct a test at an approved testing laboratory. Among the reasons for the rejection, was the NRC reviewers findings that 1) TSI tests were not performed in accordance with adequate quality assurance procedures, and 2) the TSI tests were "simulated" ASTM E-119 tests, not the standard ASTM E-119 test as required by the NRC. However, in October 1982, the NRC staff accepted a test report from Washington Nuclear Project 2 that was conducted at TSI in the same manner and in the same furnace.

TSI tests documented in ITL test reports continue to be used to support the installation of Thermo-Lag 330-1 in nuclear power plants. These tests were witnessed by ITL, not a nationally recognized fire testing laboratory. OIG found no action by the NRC staff to address the fact that utilities were using TSI tests that were documented in ITL test reports to qualify their installation of Thermo-Lag 330-1. Nor was any effort made to resolve the fact that tests using the same TSI procedures were rejected and then accepted by the NRC.

Problems with ampacity derating identified during an NRC inspection

In 1985, an NRC inspection at Fort Calhoun nuclear power plant identified an apparent deficiency concerning the failure to verify the ampacity derating figures provided by the fire barrier material manufacturer, Minnesota Mining and Manufacturing Company (3M). A VIB inspection at 3M disclosed that the 3M ampacity figures were computer generated. The VIB inspector questioned the lack of documented 3M procedures to

ensure the computer generated derating figures were accurate. Because TSI also supplied ampacity derating information for Thermo-Lag 330-1 to a large segment of the nuclear industry, the NRC inspector asked TSI to provide the NRC with ampacity derating information. In April 1987, TSI forwarded to the VIB the UL report on the ampacity derating tests which had been conducted in September 1986. In addition, TSI provided two test reports and a TSI technical note on ampacity derating of Thermo-Lag 330-1. However, due to other priorities, the ampacity derating information provided by TSI was not reviewed by the NRC staff to determine if the TSI ampacity derating figures were adequately validated.

10 CFR Part 21 Report on ampacity derating

On October 2, 1986, TSI notified the NRC by mailgram that ampacity derating tests on Thermo-Lag 330-1 conducted at UL in September 1986 indicated ampacity derating figures that were significantly higher than those reported earlier by TSI. The earlier TSI figures were used by utilities to design electric power systems utilizing Thermo-Lag 330-1. The TSI mailgram was administratively recorded as a 10 CFR Part 21 Report by the NRC. Part 21 pertains to the reporting of defects to the NRC by the nuclear industry. At the time the report was received, NRC follow-up of 10 CFR Part 21 Reports was the responsibility of the Office for Analysis and Evaluation of Operational Data. This responsibility was later transferred to the VIB. In December 1990, the VIB closed the October 2, 1986, Part 21 Report without taking any action.

Comanche Peak report on new ampacity derating figures

In 1987, Comanche Peak responded to new information from TSI which established ampacity derating figures for Thermo-Lag 330-1 that were higher than the 10 percent originally reported by TSI and used in the initial cable sizing calculations at Comanche Peak. The new figures were 31 percent for single cable trays and 20 percent for single conduits enclosed in Thermo-Lag 330-1. On June 17, 1987, this information was verbally provided by Comanche Peak to the NRC resident inspector. On December 23, 1987, Comanche Peak provided a written report on this issue to the NRC. In its report to the NRC, Comanche Peak stated that failure to consider the additional derating of power cables due to Thermo-Lag 330-1 installation could cause the power cables to exceed the design temperature rating of the cables. Comanche Peak further noted that if left uncorrected, the higher ampacity derating could adversely affect the safety of plant operations. OIG found no NRC follow-up with TSI in order to obtain an explanation for the significant increase over the initial ampacity derating figures provided by TSI to Comanche Peak. Also, the NRC did not take any steps to ensure that other utilities were notified of the increased ampacity derating figures for Thermo-Lag 330-1.

Allegations regarding the performance of Thermo-Lag 330-1

On March 28, 1989, the NRC received an allegation that Thermo-Lag 330-1 gave off lethal gases when it burned. In support of this concern, the alleger provided the staff with information from a test of Thermo-Lag 330-1 documented in a May 1986 SwRI report. One month later, this issue became the subject of an Allegation Review Board meeting. During this meeting, it was decided to close the allegation without further action. In June 1989, the alleger was notified by letter of this decision.

OIG noted during its review of the staff's handling of the above allegation that in addition to concerns about toxicity, the alleger also informed the NRC in April 1989 about a fire endurance test of fire penetration seals for the River Bend nuclear power plant. This test had been conducted on June 18, 1985, at SwRI. The test involved Thermo-Lag 330-1 as a fire barrier used in conjunction with a fire penetration seal. The alleger provided the summary of the test which stated that the installation of Thermo-Lag 330-1 had no apparent effect on the outcome of the test because most of the Thermo-Lag 330-1 was totally gone when the assembly was removed from the furnace. In the letter, the alleger pointed out that the Thermo-Lag 330-1 had disintegrated during the test. The alleger also stated that he had heard the 3M company had experienced the same result when testing Thermo-Lag 330-1.

The alleger further related that River Bend was scheduled to conduct a full scale test of Thermo-Lag 330-1 at SwRI. OIG did not find any indication that the NRC staff conducted any inquiry into the information that Thermo-Lag 330-1 had been consumed in a fire test or that the staff attempted to obtain the results of the scheduled full scale test.

Problems with Thermo-Lag 330-1 at Comanche Peak

In 1989, NRC Region IV was informed that panels of one hour Thermo-Lag 330-1 were arriving at Comanche Peak, from TSI, that measured less than the required thickness. To provide one hour protection for cable trays in the event of a fire, Thermo-Lag 330-1 was required to be one half inch thick. Subsequently, Comanche Peak management discussed the situation with TSI. In a July 13, 1990, letter to the NRC, Comanche Peak explained that the behavior of Thermo-Lag 330-1 under fire conditions is dependent on the density of the product and not on the thickness. Therefore, in conjunction with a TSI recommendation, Comanche Peak developed new receipt inspection criteria based on panel weight instead of thickness. Comanche Peak also informed the NRC that TSI's quality assurance program required that Thermo-Lag 330-1 prefabricated panels be subjected to detailed thickness measurements prior to shipment to the plant. Comanche Peak assured the NRC that the TSI panel fabrication and quality control inspection methodology had remained essentially unchanged since TSI began production of prefabricated panels in the early 1980's. After reviewing the Comanche Peak July 13,

1990, letter and without further inquiry of TSI or Comanche Peak, Region IV accepted the resolution of the matter provided by Comanche Peak and TSI and closed this issue.

During this inspection, OIG learned from the NRC and National Institute of Standards and Technology staff that the Comanche Peak quality control practice of checking weights was not an effective inspection method for Thermo-Lag 330-1 panels. Additionally, in December 1991, during the only NRC VIB inspection of TSI, the NRC found that the TSI quality assurance program did not specify a requirement for measuring minimum thickness of Thermo-Lag 330-1 panels fabricated at TSI. This finding was not consistent with the explanation given to NRC Region IV by Comanche Peak personnel and was relied on by Region IV to close the issue at that time. The problems at Comanche Peak provided another opportunity for the NRC to inquire into the performance of TSI and Thermo-Lag 330-1 that was not pursued.

Concerns about the performance of Thermo-Lag 330-1 at River Bend

In December 1989, the River Bend nuclear power plant submitted an Informational Report to the NRC regarding an October 1989 test of Thermo-Lag 330-1. The fire test was conducted at SwRI, a nationally recognized, fire testing laboratory, to verify Thermo-Lag 330-1 performance and to compare the three hour rated Thermo-Lag 330-1 with the product from a competing company. Both fire barriers were applied to 30 inch wide aluminum cable trays. The Informational Report documented that at approximately 41 minutes into the three hour test, the Thermo-Lag 330-1 covering the bottom of the cable tray fell off. As the test continued, temperatures inside the cable tray enclosure increased with a loss of circuit integrity at 47 minutes.

As a result, River Bend conducted an investigation and identified several generic issues with Thermo-Lag 330-1 that were outlined in the Informational Report. The Informational Report noted that prior to the River Bend test of a 30 inch cable tray, the maximum size previously tested was 12 inches. However, cable trays of a larger size than 12 inches are used in power plants. The OIG inspection did not identify any immediate action by the NRC to address the generic concerns with Thermo-Lag 330-1. It was not until May 1991, after additional allegations regarding the performance of Thermo-Lag 330-1 were received by the NRC, that NRC inspectors made a fact finding visit to River Bend to review problems with the performance of Thermo-Lag 330-1.

Current status

In February 1991, the NRC received allegations from a confidential alleger that Thermo-Lag 330-1 did not provide the protection for electrical cables required by NRC and as claimed by the vendor.

In May 1991, the NRC staff visited River Bend to review with utility officials installation discrepancies and failed fire endurance tests. These problems were first reported to the

NRC by the utility in April 1989. As a result of this visit, the staff concluded that a generic concern existed with respect to the abilities of Thermo-Lag 330-1 to protect 30 inch cable trays. In June 1991, in response to both the allegations and the problems identified at River Bend, the NRC established a Special Review Team to review Thermo-Lag 330-1 issues and make recommendations for their resolution. In August and December 1991, the NRC issued Information Notices (IN 91-47 and IN 91-79) which discussed the test failure of Thermo-Lag 330-1 at River Bend and problems that could result from improperly installing Thermo-Lag 330-1.

In December 1991, the VIB conducted its first inspection at TSL. This inspection disclosed problems with the TSI quality assurance program and that ITL did not act as an independent testing laboratory when it witnessed TSI qualification tests of Thermo-Lag 330-1.

In January 1992, the Special Review Team completed its activities and in April 1992, issued a final report documenting its review of the performance of Thermo-Lag 330-1. One conclusion in the report was that the fire resistance ratings and ampacity derating factors for the Thermo-Lag 330-1 fire barrier system are "indeterminate." Additionally, as a result of concerns developed during the review by the Special Review Team, the NRC prepared a draft Generic Letter in February 1992. This Generic Letter would require licensees to provide information to verify that their Thermo-Lag 330-1 fire barrier installations comply with NRC requirements. As of July 31, 1992, the NRC had not finalized the Generic Letter.

On June 24, 1992, NRC Bulletin 92-01 was issued as a result of further fire endurance tests of Thermo-Lag 330-1 at Omega Point Laboratories. These tests were conducted by Comanche Peak to qualify their Thermo-Lag 330-1 fire barrier system. The testing resulted in failures of several Thermo-Lag 330-1 fire barrier systems that were designed to duplicate actual plant configurations. The bulletin stated that the NRC considered these tests to be failures of the Thermo-Lag 330-1 fire barrier system. In this bulletin, the NRC concluded that the one hour and three hour Thermo-Lag 330-1 preformed assemblies installed on small conduits and on cable trays wider than 14 inches did not provide the level of safety required by the NRC. The bulletin required that where applicable, utilities implement appropriate compensatory measures. On June 23, 1992, in conjunction with the bulletin, the NRC issued Information Notice 92-46 which informed the industry of the findings of the Special Review Team and the results of the fire endurance tests conducted at Omega Point.

During the week of July 13-17, 1992, pursuant to a contract between NRC and the National Institute of Standards and Technology, tests of Thermo-Lag 330-1 one and three hour fire barriers were conducted. Both tests failed the NRC fire protection requirements. On July 27, 1992, the NRC issued Information Notice 92-55 addressing the results of these tests. Additionally, as a result of these efforts, the NRC staff has become concerned that Thermo-Lag 330-1 is a combustible material. The staff is

reviewing this matter of combustibility in light of the fact that Thermo-Lag 330-1 has been used in areas of nuclear power plants that were required to be free of combustibles.

NRC efforts are also underway to assure that accurate ampacity derating figures for Thermo-Lag 330-1 are being used by the nuclear industry. The life of cables enclosed in Thermo-Lag 330-1 may have been shortened, and the utilities may not be aware of the extent of this problem since they assumed the ampacity figures initially provided by TSI were accurate.

FINDINGS

Based on the information developed during this inspection, we found that the NRC staff did not conduct an adequate review of fire endurance and ampacity derating information concerning the ability of the fire barrier material, Thermo-Lag 330-1. Had the staff conducted a thorough review of the test reports submitted by industry or verified the test procedures and test results reported by TSI, a number of problems with the test program and Thermo-Lag 330-1 would have been discovered. For example, the staff would have found that the test furnace at TSI was not adequate to conduct the required standard fire endurance test; however, it has continued to be used since 1981. Also, the staff would have discovered that the quality assurance procedures at the TSI test facility were not adequate.

Identification of such problems could have resulted in an NRC vendor inspection at TSI. The vendor inspection would have determined there were problems with the TSI testing program and that the fire endurance and ampacity derating tests were not conducted, as required, by a nationally recognized testing laboratory. Further, it would have been discovered that the test reports were actually written by the vendor with no substantive verification that the data in the reports reflected the data recorded during the tests. Because these reviews and inspections were not conducted, it was not until 1992 during the conduct of reviews by the NRC Special Review Team and the OIG/OI investigative taskforce, that the staff determined that the performance of Thermo-Lag 330-1 with respect to fire resistance ratings and ampacity derating was indeterminate.

In addition to the inadequate initial review process discussed above, the staff did not take any significant action between 1982 and 1991 when reports of problems with Thermo-Lag 330-1 were received. Our inspection disclosed seven instances in which the NRC did not pursue reports of problems with Thermo-Lag 330-1.

Exhibit FP No. 3

This Exhibit contains a news article that is protected by copyright and has therefore not been included. The extracted pages are 107 – 110.

The copyright article is entitled " Nuclear Security Language For Anti-Terrorism Bill Approved," a byline by Suzanne Struglinski, Environment and Energy Daily, dated October 4, 2001.

Exhibit FP No. 5

Entergy

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Indian Point Energy Center
450 Broadway, GSB
P.O. Box 249
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Tel 914 734 6700

Fred Dacimo
Site Vice President
Administration

112

July 24, 2006

Re: Indian Point Unit No. 3
Docket No. 50-286
NL-06-078

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

SUBJECT: Request for Revision of Existing Exemptions from 10 CFR 50, Appendix R: One-Hour Hemyc Electrical Raceway Fire Barrier System, Fire Areas ETN-4 and PAB-2

References:

1) NRC Information Notice 2005-07, "Results of HEMYC Electrical Raceway Fire Barrier System Full Scale Fire Testing," April 1, 2005

2) NYPA Letter, J. C. Brons to S. A. Varga (NRC), "Appendix R Fire Protection Program," August 16, 1984

3) NYPA Letter, J. C. Brons to S. A. Varga (NRC), "Information to Support the Evaluation of IP3 to 10 CFR 50.48 and Appendix R to 10 CFR 50," September 19, 1985

4) NRC Letter and SER, S. A. Varga to J. C. Brons (NYPA), "Indian Point 3 Nuclear Power Plant - Exemption From Certain Requirements of Section III.G and III.J of Appendix R to 10 CFR Part 50," January 7, 1987

5) IPEC Letter NL-06-060, F. Dacimo to Document Control Desk, "Response to Generic Letter 2006-03 (Potentially Nonconforming Hemyc and MT Fire Barrier Configurations)," June 8, 2006

Dear Sir or Madam:

NRC Information Notice (IN) 2005-07 (Reference 1) notified licensees of potential performance concerns associated with the one-hour rated Hemyc electrical raceway fire barrier system (ERFBS), indicating that the system may be incapable of fulfilling the stated one-hour fire resistance rating when tested in accordance with Generic Letter 86-10, Supplement 1 criteria. Indian Point Unit No. 3 (IP3) utilizes the one-hour rated Hemyc

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ERFBS that is the subject of IN 2005-07 in two areas of the plant. In a Safety Evaluation Report (SER) dated January 7, 1987 (Reference 4) , the Staff granted a number of exemptions from specific requirements of 10 CFR 50, Appendix R, which included these two plant areas. Entergy has reviewed the Hemyc fire test results provided by the NRC in IN 2005-07 and has determined that it is necessary to revise the fire resistance rating of the Hemyc ERFBS configurations credited in two of the exemptions. The two affected exemptions are those applicable to Fire Area PAB-2 in the Primary Auxiliary Building, and Fire Area ETN-4 in the Electrical Tunnels and Electrical Penetration Areas.

In accordance with 10 CFR 50.12, the purpose of this letter is to request revision of the January 7, 1987 SER to reflect that the installed Hemyc ERFBS configurations provide a 30-minute fire resistance rating, in lieu of the previously stated one-hour fire resistance rating. The requests for the exemptions granted by the January 7, 1987 SER were docketed in NYPA Letters dated August 16, 1984 (Reference 2) and September 19, 1985 (Reference 3). Based on a review of these letters and of the NRC test results, it is Entergy's position that a Hemyc ERFBS fire resistance rating of 30 minutes will provide sufficient protection for the affected raceways, with adequate margin, to continue to meet the intent of the original requests for exemption and the conclusions presented in the January 7, 1987 SER. This evaluation is summarized in Attachment 1.

As documented in Attachment 1, it is Entergy's conclusion that the revised fire resistance rating of the Hemyc ERFBS does not reflect a reduction in overall fire safety, and presents no added challenge to the credited post-fire safe-shutdown capability. The remainder of the credited fire protection features, the fire hazards and ignition sources, fire brigade and operator response to fire events, and the credited post-fire safe-shutdown capability remain materially unchanged from the configuration as originally described in the NYPA letters and as credited in the January 7, 1987 SER.

Entergy has reviewed the as-built configurations of the Hemyc ERFBS installed at IP3 against the results of the NRC Hemyc fire test program as referenced by IN 2005-07. This review has determined that the installed ERFBS can be expected to afford a thermal protection rating of at least 30 minutes, contingent upon the installation of a modification to augment raceway support protection and to install over-banding of certain enclosures. A commitment to install these modifications is contained in our response to Generic Letter 2006-03 (Reference 5). The conclusions from the engineering evaluation are also summarized in Attachment 1.

There are no new commitments contained in this letter. If you have any questions or require additional information, please contact Mr. Patric W. Conroy at 914-734-6668.

Sincerely,

FOR - Fred R. Dacimo
Site Vice President
Indian Point Energy Center

Attachment 1: Request for Revision of Existing Exemptions from 10 CFR 50, Appendix R: One-Hour Hemyc Electrical Raceway Fire Barrier System, Fire Areas ETN-4 and PAB-2

cc: Mr. Samuel J. Collins, Regional Administrator, NRC Region I
Mr. John P. Boska, Senior Project Manager, NRC NRR DORL
NRC Resident Inspectors Office, Indian Point Energy Center
Mr. Paul Eddy, New York State Department of Public Service
Mr. Peter R. Smith, NYSERDA

ATTACHMENT 1 to NL-06-078

Request for Revision of Existing Exemptions from 10 CFR 50, Appendix R: One-Hour Hemyc Electrical Raceway Fire Barrier System, Fire Areas ETN-4 and PAB-2

Entergy Nuclear Operations, Inc.
Indian Point Nuclear Generating Unit No. 3
Docket No. 50-286

Request for Revision of Existing Exemptions from 10 CFR 50, Appendix R: One-Hour Hemyc Electrical Raceway Fire Barrier System, Fire Areas ETN-4 and PAB-2

1.0 INTRODUCTION

The Indian Point Unit No. 3 (IP3) electrical raceways provided with Hemyc ERFBS protection consist of several conduits, cable trays, and a box-type enclosure. The locations of the Hemyc ERFBS installations are illustrated by Figures 1 through 4.

To support the request for revision to the two exemptions applicable to Fire Areas ETN-4 (Electrical Tunnels and Electrical Penetration Areas) and PAB-2 (Component Cooling Pump Area) contained in the January 7, 1987 SER (Reference 8.1), this attachment:

- Discusses the licensing basis for the one-hour Hemyc electrical raceway fire barrier system (ERFBS) (Section 2.0);
- Discusses the fire hazards, combustible controls, and fire protection features of the areas (Section 3.0);
- Evaluates the acceptability of a 30-minute rating considering the current fire hazards and fire protection features in the areas (Section 4.0);
- Presents a summary description of the installed one-hour Hemyc ERFBS configurations, and of the evaluation of the results of the NRC Hemyc fire test program (Reference 8.11) (Section 5.0).

As documented in Reference 8.11, the NRC Hemyc test specimens provided acceptable thermal performance for a period of at least 30 minutes, or the results provided insight into the observed failure mechanisms. Further, each of the installed IP3 Hemyc configurations is bounded by one or more of the NRC test specimens, or is subject to a planned modification based on the insights learned from the NRC test program. As determined in Reference 8.11, the Hemyc ERFBS at IP3 can be expected to provide a fire resistance rating of a minimum of 30 minutes, consistent with ASTM E 119 temperature rise acceptance criteria. A fire resistance rating of 30 minutes will provide adequate protection for the affected IP3 safe-shutdown raceways, in consideration of the additional mitigating factors of low fire loading and active and passive fire protection features installed in each of the two affected plant areas.

2.0 EXISTING LICENSING BASIS FOR ONE-HOUR ERFBS IN AFFECTED PLANT AREAS

2.1 Electrical Tunnels and Penetration Areas: Fire Area ETN-4: Upper and Lower Electrical Tunnels (Fire Zones 7A and 60A, respectively) and Upper Penetration Area (Fire Zone 73A)

By SER dated February 2, 1984 (Reference 8.4), the Staff approved an exemption from the Appendix R Section III.G separation requirements, to the extent that redundant safe-shutdown systems are not separated by more than 20 feet free of intervening combustibles or fire hazards, and that redundant safe-shutdown systems are not separated by a one-hour rated fire barrier in an area which is protected by automatic fire detection and suppression systems. The bases for this exemption included the existing separation between redundant safe-shutdown trains, minimal fire hazards, flame-retardant characteristics of cable insulation, and the installed active and passive fire protection features.

Following a comprehensive reassessment of the IP3 Appendix R compliance basis, by letters dated August 16, 1984 and September 19, 1985 (References 8.3 and 8.2, respectively), NYPA informed the NRC of the need for additional separation measures to be installed in Fire Area ETN-4. These measures included the installation of one-hour rated fire wrap on several safe-shutdown raceways. By SER dated January 7, 1987 (Reference 8.1), the Staff acknowledged this clarification and the addition of one-hour rated fire wrap, and confirmed the continued validity of the exemption granted by the February 2, 1984 SER (Reference 8.4).

2.2 Primary Auxiliary Building, Fire Area PAB-2: Fire Zone 1, 41' Elevation CCW Pump Area

In the SER dated January 7, 1987 (Reference 8.1), the Staff approved an exemption from the Section III.G separation requirements for this fire zone, to the extent that an automatic suppression system has not been provided, and redundant safe-shutdown systems are not separated by more than 20 feet free of intervening combustibles. The bases for this exemption included the existing separation between redundant safe-shutdown trains, low fire loading, a fire detection system, manual hose stations and portable extinguishers, a partial height noncombustible barrier designed to protect the CCW pump against radiant heat from a fire, and a one-hour fire rated cable wrap around the normal power feed conduit to the 33 CCW pump.

3.0 FIRE HAZARDS, COMBUSTIBLE CONTROLS, AND FIRE PROTECTION FEATURES IN FIRE AREAS ETN-4 AND PAB-2

3.1 Evaluation of Hazards/Ignition Sources and Combustible Controls

The fire hazards and ignition sources in Fire Areas ETN-4 and PAB-2 remain materially unchanged from the characteristics of these areas as described in the SERs dated February 2, 1984 (Reference 8.4) and January 7, 1987 (Reference 8.1), and the NYPA correspondence referenced therein, as applicable to the specific fire zone.

Transient combustible and hot work controls have been enhanced since the transition from NYPA to Entergy operation of IP3, with the issuance of procedures EN-DC-127, "Control of Hot Work and Ignition Sources" (Reference 8.8) and ENN-DC-161, "Transient Combustible Program" (Reference 8.9). Notably, per Transient Combustible Program procedure ENN-DC-161, Fire Areas ETN-4 and PAB-2 are designated as "Level 2" combustible control areas, which constrains transient combustibles to moderate quantities. Any planned introduction of more than the allowable quantities of combustibles into these areas requires a prior review by Fire Protection Engineering, which will include the definition of additional protective/compensatory measures as determined to be applicable. In addition, per procedure EN-DC-127, any planned hot work in IP3 Fire Areas ETN-4 or PAB-2 requires the prior review and approval of Fire Protection Engineering. This constraint provides assurance that hazards and potential effects consistently receive proper prior evaluation, and that compensatory measures, as applicable, are adequately defined in advance of the hot work activity.

The administrative controls imposed by ENN-DC-161 and the structured Fire Protection Engineering review of planned hot work activities per EN-DC-127 provide additional assurance that the potential for, and potential effects of, significant floor-based transient combustible fires is sharply limited.

3.2 Active Protection: Fire Detection and Suppression Features

The installed fire detection systems and automatic and manual fire suppression features in the affected zones of Fire Areas ETN-4 and PAB-2 remain functionally unchanged from those described in SERs dated February 2, 1984 (Reference 8.4) and January 7, 1987 (Reference 8.1), and the NYPA correspondence referenced therein, as applicable. Preaction automatic water spray suppression is provided in ETN-4 for protection of cable trays; manual suppression capabilities are provided in both Fire Areas ETN-4 and PAB-2, in the form of accessible fire hose stations and portable fire extinguishers.

3.3 Passive Fire Protection Features

The installed passive fire protection features (fire barriers and penetration seal systems) in Fire Areas ETN-4 and PAB-2 remain functionally unchanged from those described in SERs dated February 2, 1984 (Reference 8.4) and January 7, 1987 (Reference 8.1), and the NYPA correspondence referenced therein, as applicable.

3.4 Transient Combustible Control and FP Equipment Operating History

A review of IP3 condition reports for the period beginning with Entergy ownership through the present indicated that no significant fire protection related deficiencies applicable to Fire Zones 1, 7A, 60A, or 73A were identified during this time period. Topics searched included fire barriers, ERFBS, fire suppression, fire detection, and housekeeping/combustible loading. Hence, there is reasonable assurance that the design and operational controls (as described above) in place since the transition to Entergy operation of IP3 have maintained the fire protection defense-in-depth measures consistent with the IP3 fire protection licensing basis.

4.0 ADEQUACY OF A 30-MINUTE ERFBS TO PROTECT SAFE-SHUTDOWN CABLES

4.1 Fire Area ETN-4, Fire Zones 7A, 60A, and 73A

As described in the SER dated February 2, 1984 (Reference 8.4), the fire hazards in the affected zones of this area are small. As given by Reference 8.7, the calculated fire severity in Fire Area ETN-4 is less than 60 minutes, of which less than one minute of fire severity is attributable to the expected transient fire loading. The balance of the combustible inventory is predominantly asbestos-jacketed, flame-retardant electrical cable insulation. The flame-retardant characteristics of the principal combustible ensure that fire will not propagate along the cables to any significant degree, thereby limiting the rate of development and damage incurred by credible fires. As the credible fire scenarios involve floor-based transient combustibles, the impact of such a fire, at any location within the area, is expected to be slight, and insufficient to involve substantial quantities of the predominant fixed combustibles (the flame-retardant cables in trays). In addition, the fire detection, automatic cable tray fire suppression system, and manual fire suppression features provide further assurance that fire damage will be limited in scope and severity. Therefore, based on the current Fire Hazards Analysis, an ERFBS with a 30-minute fire resistance rating is adequate to protect the safe-shutdown cables in this area.

Based on a review of the fire zones in this area using the guidance and tools of NUREG-1805 (Reference 8.10), it was found that the credible fire challenge would be less severe than that imposed by an ASTM E 119 fire exposure. Further, with the installed smoke detection system and the preaction water spray system for the cable trays in the area, the credible fire challenge in the affected zones of Fire Area ETN-4 can be expected to result in a temperature profile that is substantially less severe than that of the ASTM E 119 time-temperature curve. Therefore, based on the insights using NUREG-1805 guidance and tools, the expected fire effects in this Fire Area will not challenge a Hemyc ERFBS installation that has a fire resistance rating of 30 minutes.

4.2 Fire Area PAB-2, Fire Zone 1

As described in the SER dated January 7, 1987 (Reference 8.1), the fire load in this area is low. As given by Reference 8.7, the calculated fire severity in Fire Area PAB-2, Fire Zone 1 is less than 10 minutes. The small quantity of combustible materials (e.g., CCW pump lubricating oil or transient materials) would be expected to result in a credible fire which is localized, with a low aggregate heat release, and no challenge to redundant safe-shutdown cables or components caused by radiant or convective energy. The installed fire detection system would ensure timely detection, enable prompt manual suppression of the fire, and provide assurance that any fire damage will be limited in scope and severity. Therefore, the credible fire challenge can be expected to result in a temperature profile less severe than that of the ASTM E 119 time-temperature curve.

Hence, an ERFBS capable of providing at least 30 minutes of protection for the enclosed cables when tested in accordance with ASTM E 119 will provide adequate protection for the safe-shutdown cables in this area, given the hazards in the area and the active fire protection features.

5.0 EVALUATION OF IP3-SPECIFIC HEMYC ERFBS VERSUS NRC-TESTED CONFIGURATIONS

The installed IP3 Hemyc ERFBS is summarized as follows:

- Two 4" rigid steel conduits, each with a cable percent fill of approximately 30%. The two 4" rigid steel conduits are protected with direct-attached 2" thick Hemyc blanket wrap.

- Seven 18" cable tray sections, with a cable percent fill in these trays ranging from approximately 10% to 25%. Also wrapped are two 24" cable tray sections, each with a cable percent fill of approximately 50%. All cable trays

are wrapped using 1-1/2" thick Hemyc blanket with a 2" air gap between the blanket and the protected raceway.

- Box-type enclosure at containment electrical penetrations H19/H20, consisting of 2" thick Hemyc blanket directly attached to the enclosure.

The IP3 Hemyc ERFBS configurations have been compared to the size, orientation, materials, methods of construction, and thermal performance of the test specimens of References 8.5 and 8.6 in an engineering evaluation (Reference 8.11). The detailed thermal performance results of the NRC Hemyc fire tests indicated that several of the tested configurations provided at least 30 minutes of protection for the enclosed safe-shutdown cables, or provided insights into the failure mechanisms that occurred during testing. The engineering evaluation compares the details of these tested configurations with the details of the IP3 Hemyc ERFBS configurations. This evaluation establishes that the IP3 Hemyc ERFBS configurations are sufficiently comparable to the NRC-tested configurations, with minor enhancements to several IP3 configurations, which include the need to augment the ERFBS on raceway supports and to install additional over-banding on certain enclosures. Pending implementation of those modifications to the affected configurations, all of the IP3 Hemyc ERFBS configurations can be expected to provide a fire resistance capability of at least 30 minutes for the enclosed safe-shutdown cables.

6.0 REGULATORY ANALYSIS

10 CFR 50.12(a) states that the Commission may grant exemptions from the requirements of the regulations contained in 10 CFR 50 which are:

(1) Authorized by law, will not present an undue risk to the public health and safety, and are consistent with the common defense and security; and,

(2) If special circumstances are present.

This request for revision of existing exemptions meets the criteria set forth in 10 CFR 50.12, as discussed herein.

6.1 The requested exemption is authorized by law

10 CFR 50.12(a) authorizes the NRC to grant exemptions from its regulations, and no law is known that precludes the NRC from granting the requested revision to the existing exemptions.

6.2 The requested exemption does not present an undue risk to the public health and safety

The Hemyc ERFBS configurations installed in IP3 Fire Areas ETN-4 and PAB-2 will provide a fire resistance capability of at least 30 minutes, as discussed in Section 5.0. The minimal fire hazards and ignition sources, combined with the nature of the fire hazards in the areas, the active and passive fire protection features, and the controls on transient combustibles and ignition sources, as discussed in Section 3.0, provide assurance that the credible fire challenge to the IP3 Hemyc ERFBS will be substantially less than that of an equivalent ASTM E 119 30-minute fire exposure. Therefore, as discussed in Section 4.0, the installed ERFBS can be expected to provide adequate protection for the affected safe-shutdown raceways and enclosed cables.

Therefore, given the existing level of fire protection defense in depth, combined with the minimal fire challenge presented by the credible fire scenarios in these areas, and the favorable FP equipment operating history, the change in credited ERFBS fire resistance rating from one hour to 30 minutes will not degrade the effectiveness of the IP3 fire protection program, nor will it challenge the credited post-fire safe-shutdown capability. Based on the determination that safe shutdown in the event of a fire can be achieved and maintained with less than a one-hour fire resistance rating, the requested revision to the existing exemptions does not present an undue risk to the public health and safety.

6.3 The requested exemption is consistent with the common defense and security

The requested revision to the existing exemptions is not directly related to and should not adversely impact the common defense and security.

6.4 Special circumstances are present – underlying purpose of the rule

10 CFR 50.12(a) requires that special circumstance be present in order for the Commission to consider granting an exemption. Per 10 CFR 50.12(a)(2)(ii), one special circumstance is that application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule.

The underlying purpose of 10 CFR 50, Appendix R, Section III.G is to provide reasonable assurance that at least one means of achieving and maintaining safe shutdown conditions will remain available during and after any postulated fire. For the areas containing the Hemyc ERFBS installations, the credible fire challenge to the IP3 Hemyc ERFBS due to any postulated fire will be substantially less than that of an equivalent ASTM E 119 30-minute fire exposure. Therefore, a fire

6.2 The requested exemption does not present an undue risk to the public health and safety

The Hemyc ERFBS configurations installed in IP3 Fire Areas ETN-4 and PAB-2 will provide a fire resistance capability of at least 30 minutes, as discussed in Section 5.0. The minimal fire hazards and ignition sources, combined with the nature of the fire hazards in the areas, the active and passive fire protection features, and the controls on transient combustibles and ignition sources, as discussed in Section 3.0, provide assurance that the credible fire challenge to the IP3 Hemyc ERFBS will be substantially less than that of an equivalent ASTM E 119 30-minute fire exposure. Therefore, as discussed in Section 4.0, the installed ERFBS can be expected to provide adequate protection for the affected safe-shutdown raceways and enclosed cables.

Therefore, given the existing level of fire protection defense in depth, combined with the minimal fire challenge presented by the credible fire scenarios in these areas, and the favorable FP equipment operating history, the change in credited ERFBS fire resistance rating from one hour to 30 minutes will not degrade the effectiveness of the IP3 fire protection program, nor will it challenge the credited post-fire safe-shutdown capability. Based on the determination that safe shutdown in the event of a fire can be achieved and maintained with less than a one-hour fire resistance rating, the requested revision to the existing exemptions does not present an undue risk to the public health and safety.

6.3 The requested exemption is consistent with the common defense and security

The requested revision to the existing exemptions is not directly related to and should not adversely impact the common defense and security.

6.4 Special circumstances are present – underlying purpose of the rule

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The underlying purpose of 10 CFR 50, Appendix R, Section III.G is to provide reasonable assurance that at least one means of achieving and maintaining safe shutdown conditions will remain available during and after any postulated fire. For the areas containing the Hemyc ERFBS installations, the credible fire challenge to the IP3 Hemyc ERFBS due to any postulated fire will be substantially less than that of an equivalent ASTM E 119 30-minute fire exposure. Therefore, a fire

resistance capability of at least 30 minutes provides protection of the components required for achieving and maintaining safe shutdown. Therefore, the underlying purpose of the rule is satisfied and the application of the regulation in these particular circumstances is not necessary to achieve the underlying purpose of the rule.

7.0 CONCLUSION

The defense-in-depth objectives of the Fire Protection Program are to

1) Prevent fires from occurring;

2) Detect, control, and extinguish promptly those fires that do occur; and,

3) Provide protection from the effects of a fire for structures, systems, and components needed to achieve and maintain safe shutdown.

The fire hazards analysis of the fire zones containing the Hemyc ERFBS installations and the existing protection (after completion of modifications discussed in Section 5.0) of the electrical raceways show that these objectives are met. The first objective is supported by the fact that there are few significant ignition sources[1] in the areas, and transient combustibles are controlled. Supporting the second objective are the active fire detection and suppression features in each area. The third objective is supported by the Hemyc ERFBS configurations which provide protection from credible fire exposures, which have an expected duration less than that of the proposed 30 minute rating.

This request for revision of existing exemptions is warranted under the provisions of 10 CFR 50.12, in that it is authorized by law, does not present an undue risk to the public health and safety, and is consistent with the common defense and security. Further, it meets the requirement for a special circumstance in that it satisfies the underlying purpose of 10 CFR 50 Appendix R by providing an ERFBS that will provide protection for the duration of any postulated fire such that safe shutdown can be achieved and maintained.

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[1] Ignition sources in the affected fire zones consist of limited transient combustibles (all zones), several equipment cabinets and (3kVA) 480/120V instrument power transformer BH8 (Fire Zone 73A), and a CCW pump motor (Fire Zone 1)

8.0 REFERENCES

8.1 NRC Letter and SER, S. A. Varga to J. C. Brons (NYPA); Indian Point 3 Nuclear Power Plant - Exemption From Certain Requirements of Section III.G and III.J of Appendix R to 10 CFR Part 50, January 7, 1987

8.2 NYPA Letter, J. C. Brons to S. A. Varga (NRC); Information to Support the Evaluation of IP3 to 10 CFR 50.48 and Appendix R to 10 CFR 50, September 19, 1985

8.3 NYPA Letter, J. C. Brons to S. A. Varga (NRC); Appendix R Fire Protection Program, August 16, 1984

8.4 NRC Letter and SER, S. A. Varga to J. C. Brons (NYPA); Exemptions From the Requirements of 10 CFR 50, Appendix R, for the Indian Point Nuclear Generating Plant, Unit No. 3 (IP-3), February 2, 1984

8.5 Hemyc (One-Hour) Electrical Raceway Fire Barrier Systems Performance Testing; Conduit and Junction Box Raceways (Omega Point Laboratories Fire Test Report, Project 14790-123263, dated April 11, 2005)

8.6 Hemyc (One-Hour) Electrical Raceway Fire Barrier Systems Performance Testing; Cable Tray, Cable Air Drop and Junction Box Raceways (Omega Point Laboratories Fire Test Report, Project 14790-123264, dated April 18, 2005)

8.7 IP3-ANAL-FP-02143, Indian Point 3 Fire Hazards Analysis, Revision 4

8.8 EN-DC-127, Control of Hot Work and Ignition Sources, Revision 2

8.9 ENN-DC-161, Transient Combustible Program, Revision 1

8.10 NUREG-1805, "Fire Dynamics Tools (FDTs) Quantitative Fire Hazard Analysis Methods for the U.S. NRC Fire Protection Inspection Program," December 2004.

8.11 Entergy Engineering Report IP-RPT-06-00062, Revision 0; "Comparison of IP3 Hemyc Electrical Raceway Fire Barrier System to NRC Hemyc Fire Test Results."

9.0 FIGURES

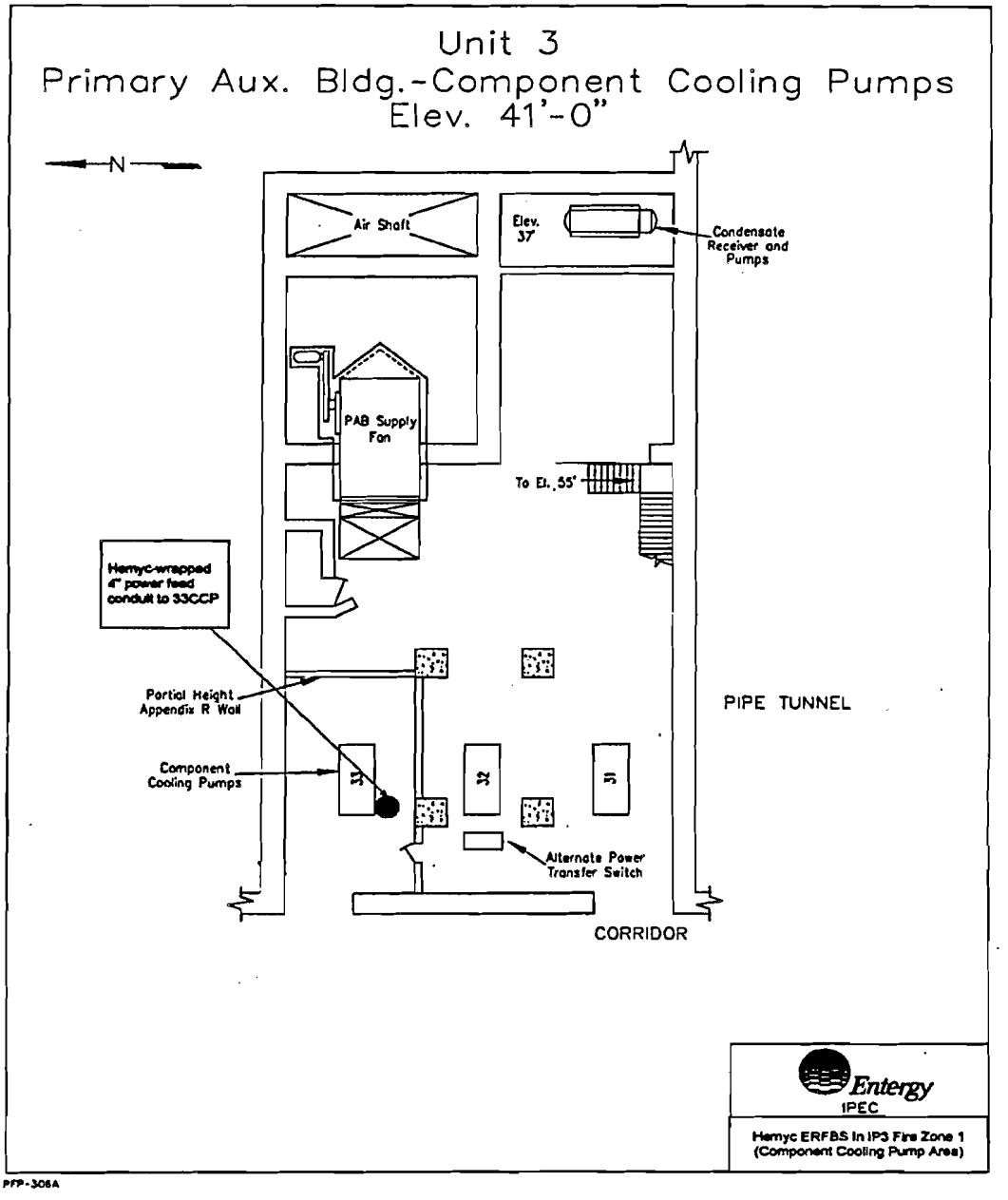

Figure 9.1: Hemyc ERFBS in Fire Zone 1

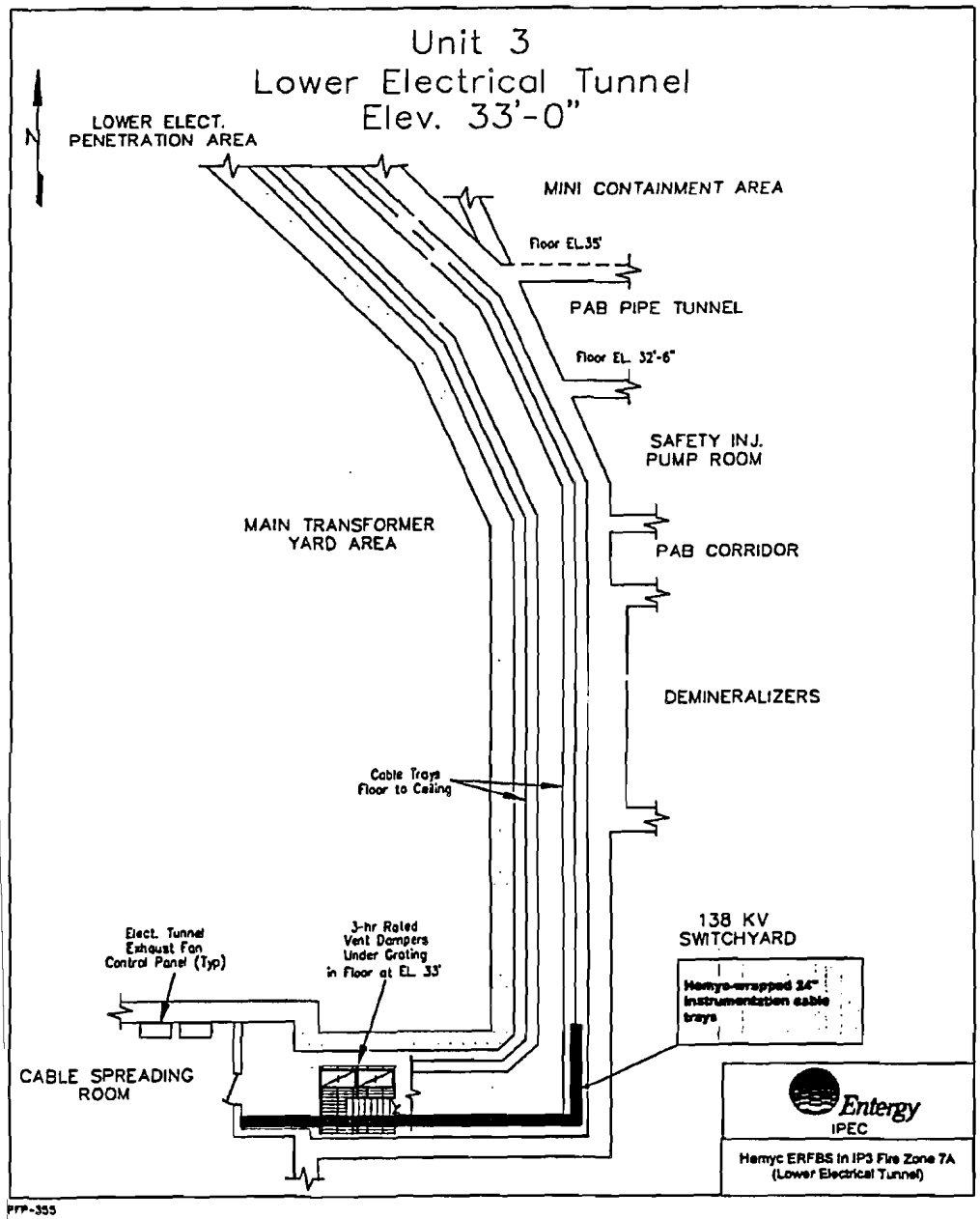

Figure 9.2: Hemyc ERFBS In Fire Zone 7A

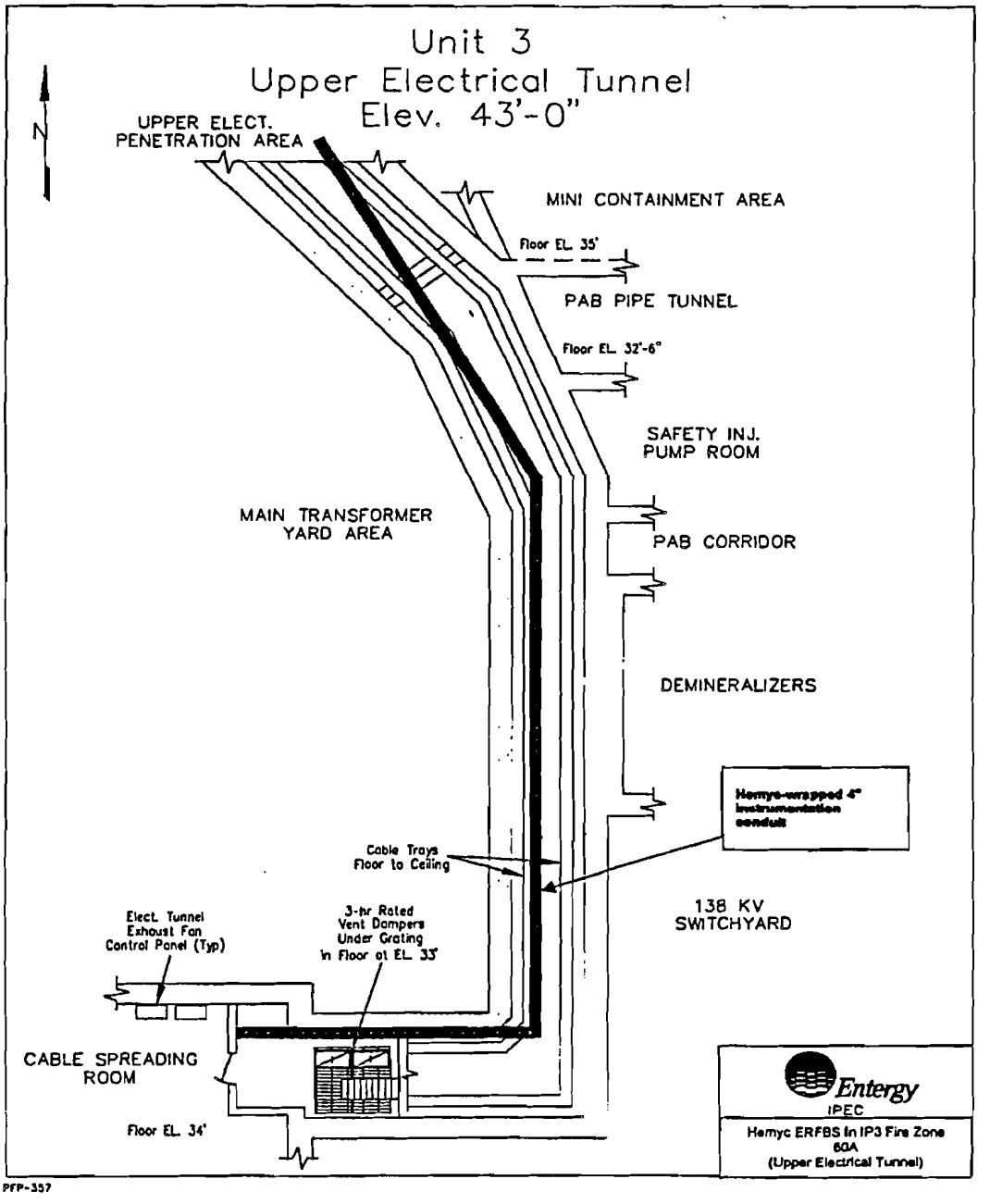

Figure 9.3: Hemyc ERFBS In Fire Zone 60A

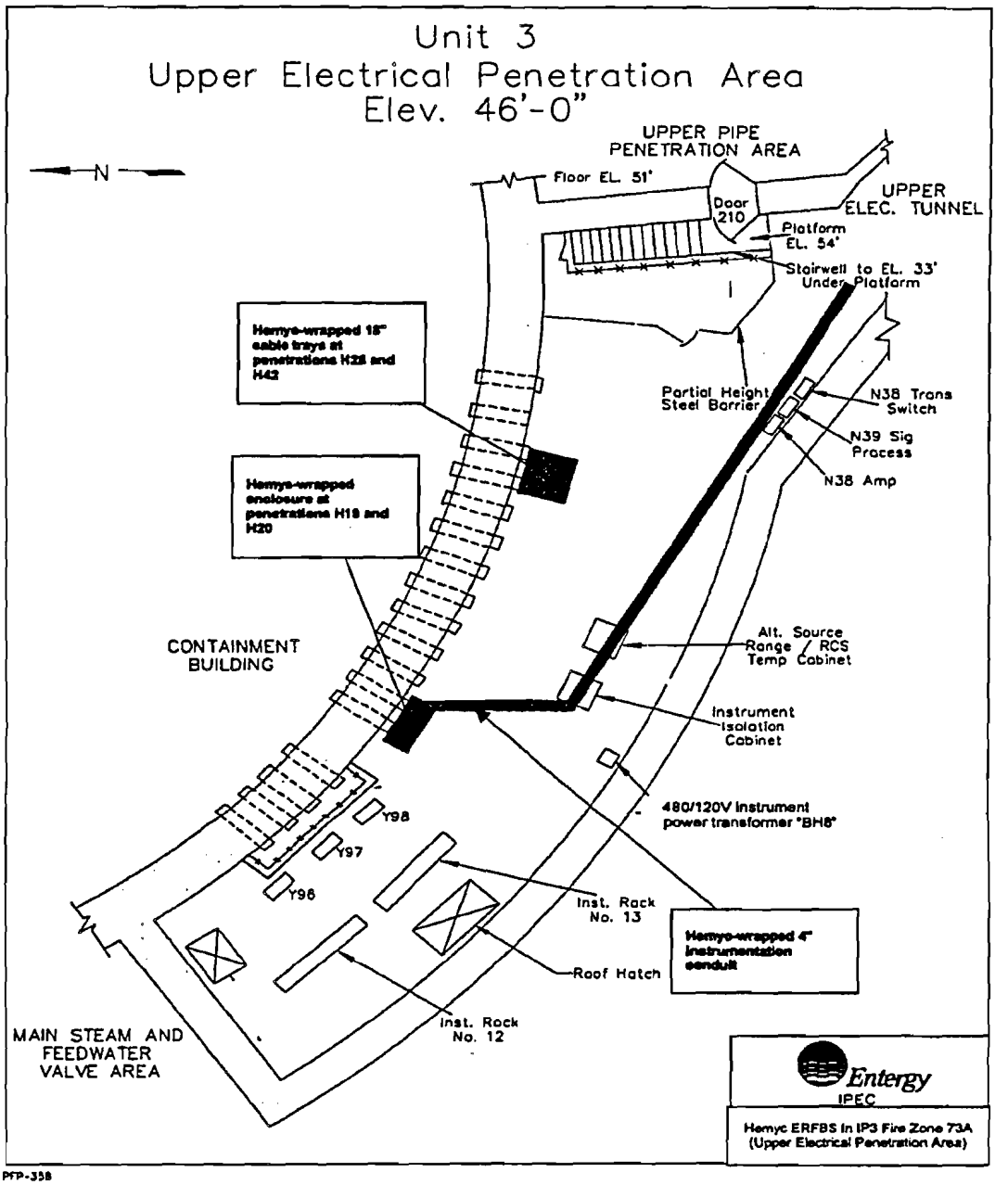

Figure 9.4: Hemyc ERFBS In Fire Zone 73A

Exhibit FP No. 6

132

Entergy Nuclear Northeast
Indian Point Energy Center
450 Broadway, GSB
P.O. Box 249
Buchanan, NY 10511-0249
Tel 914 734 6700

Fred Dacimo
Site Vice President
Administration

August 16, 2007

Re: Indian Point Unit No. 3
Docket No. 50-286

NL-07-084

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

SUBJECT: **Supplement to the Request for Revision of Existing Exemptions from 10 CFR 50, Appendix R: One-Hour Hemyc Electrical Raceway Fire Barrier System, Fire Areas ETN-4 and PAB-2 for Indian Point Nuclear Generating Unit No. 3 (TAC No. MD2671)**

REFERENCES:

1. Entergy letter dated July 24, 2006, F.R. Dacimo to Document Control Desk, "Request for Revision of Existing Exemptions from 10 CFR 50, Appendix R: One-Hour Hemyc Electrical Raceway Fire Barrier System, Fire Areas ETN-4 and PAB-2"

2. NRC Letter and SER dated January 7, 1987, S.A. Varga to J.C. Brons (NYPA), "Indian Point 3 Nuclear Power Plant – Exemption from Certain Requirements of Section III.G and III.J of Appendix R to 10 CFR Part 50"

3. NRC letter dated March 15, 2007, J.P. Boska to M.R. Kansler, "Indian Point Nuclear Generating Unit No. 3 - Request for Additional Information Regarding the Revision of Existing Exemptions from Title 10 of the Code of Federal Regulations Part 50, Appendix R Requirements (TAC No. MD2671)"

4. Entergy letter dated April 30, 2007, F.R. Dacimo to Document Control Desk, "Response to Request for Additional Information Regarding the Request for Revision of Existing Exemptions from 10 CFR 50, Appendix R: One-Hour Hemyc Electrical Raceway Fire Barrier System, Fire Areas ETN-4 and PAB-2 for Indian Point Nuclear Generating Unit No. 3"

5. Entergy letter dated May 23, 2007, F.R. Dacimo to Document Control Desk, "Supplemental Response to Request for Additional Information Regarding the Request for Revision of Existing Exemptions from 10 CFR 50, Appendix R: One-Hour Hemyc Electrical Raceway Fire Barrier System, Fire Areas ETN-4 and PAB-2 for Indian Point Nuclear Generating Unit No. 3 (TAC No. MD2671)"

A006
NRR

Dear Sir or Madam:

By letter dated July 24, 2006 (Reference 1), Entergy Nuclear Operations, Inc. submitted a "Request for Revision of Existing Exemptions from 10 CFR 50, Appendix R: One-Hour Hemyc Electrical Raceway Fire Barrier System, Fire Areas ETN-4 and PAB-2." The letter requested revision of the January 7, 1987 NRC SER (Reference 2) to reflect that the installed Hemyc Electrical Raceway Fire Barrier System (ERFBS) configurations provide a 30-minute fire resistance rating, in lieu of the previously stated one-hour fire resistance rating. This applies to Hemyc ERFBS that is installed on conduit, cable tray, and a box-type enclosure in Fire Areas ETN-4 and PAB-2. The NRC staff requested additional information by letter dated March 15, 2007 (Reference 3) in order to complete its review of the request. Responses to questions 2 through 6 were provided by letter dated April 30, 2007 (Reference 4), and the response to question 1 was provided in a letter dated May 23, 2007 (Reference 5).

The purpose of this letter is to revise the request made in Reference 1 relative to the cable tray Hemyc ERFBS configurations, in light of new information obtained since the letter was submitted. Entergy herein requests revision of the January 7, 1987 SER to reflect that the installed Hemyc ERFBS configurations in Fire Area ETN-4 on the cable tray provide a 24-minute fire resistance rating, in lieu of the previously stated one-hour fire resistance rating in the January 7, 1987 NRC SER. The revised request for a 24-minute fire resistance rating for the cable tray Hemyc ERFBS configurations is in lieu of the 30-minute fire resistance rating requested in our July 24, 2006 letter. Attachment 1 contains supporting information for this revised request. We consider this conservatively interpreted fire resistance rating for the cable tray Hemyc ERFBS configurations to provide an adequate level of protection for the enclosed safe-shutdown cables in Fire Area ETN-4, given the limited amounts and types of hazards in the area and the active and passive fire protection features that are provided.

Commitments made in this letter are identified in Attachment 2. If you have any questions or require additional information, please contact Mr. R.W. Walpole, Manager, Licensing at (914) 734-6710.

I declare under penalty of perjury that the foregoing is true and correct. Executed on 8/16/2007.

Sincerely,

For Fred R. Dacimo
Site Vice President
Indian Point Energy Center

Attachments:

1: Supplement to the Request for Revision of Existing Exemptions from 10 CFR 50, Appendix R: One-Hour Hemyc Electrical Raceway Fire Barrier System, Fire Areas ETN-4 and PAB-2

2: Commitments made in Supplement to the Request for Revision of Existing Exemptions from 10 CFR 50, Appendix R: One-Hour Hemyc Electrical Raceway Fire Barrier System, Fire Areas ETN-4 and PAB-2

cc: Mr. John P. Boska, Senior Project Manager, NRC NRR DORL

Mr. Samuel J. Collins, Regional Administrator, NRC Region 1

NRC Resident Inspector, IPEC

Mr. Peter R. Smith, President, NYSERDA

Mr. Paul Eddy, New York State Dept. of Public Service

ATTACHMENT 1 to NL-07-084

Supplement to the Request for Revision of Existing Exemptions from 10 CFR 50, Appendix R: One-Hour Hemyc Electrical Raceway Fire Barrier System, Fire Areas ETN-4 and PAB-2

ENTERGY NUCLEAR OPERATIONS, INC.
INDIAN POINT NUCLEAR GENERATING UNIT NO. 3
DOCKET NO. 50-286

Supplement to the Request for Revision of Existing Exemptions from 10 CFR 50, Appendix R: One-Hour Hemyc Electrical Raceway Fire Barrier System, Fire Areas ETN-4 and PAB-2

By letter dated July 24, 2006 (Reference 1), Entergy requested revision of the January 7, 1987 NRC SER (Reference 2) to reflect that the installed Hemyc Electrical Raceway Fire Barrier System (ERFBS) configurations in Fire Areas ETN-4 and PAB-2 provide a 30-minute fire resistance rating, in lieu of the previously stated one-hour fire resistance rating. This applies to Hemyc ERFBS that is installed on conduit, cable tray, and a box-type enclosure. Responses to a request for additional information (Reference 3) were provided by letters dated April 30, 2007 (Reference 4) and May 23, 2007 (Reference 5). In the referenced Entergy correspondence, information was provided to support a revision of the 1-hour fire resistance rating, establishing that a 30-minute fire resistance rating would provide adequate protection for the safe-shutdown cables, in light of the hazards and fire protection features of the areas. The information herein supplements and revises the request for revision of the January 7, 1987 SER for the installed cable tray Hemyc ERFBS configurations in Fire Area ETN-4 from a one-hour fire resistance rating to a 24-minute fire resistance rating.

Cable Tray Sections

As stated in Reference 1, the installed cable tray Hemyc ERFBS configurations consist of the following:

> Seven 18" cable tray sections, with a cable percent fill in these trays ranging from approximately 10% to 25%. Also wrapped are two 24" cable tray sections, each with a cable percent fill of approximately 50%. All cable trays are wrapped using 1-1/2" thick Hemyc blanket with a 2" air gap between the blanket and the protected raceway.

In preparing Reference 1 and as documented in Reference 6, the results from several test configurations from the NRC Hemyc fire test program conducted in 2005 were applied to those of comparable Indian Point 3 (IP3) installed Hemyc ERFBS configurations in the affected fire areas. For the cable tray configurations, Entergy referenced the fire test results (Reference 7) of cable tray Configurations 2B and 2D, noting that Configuration 2B provided thermal protection for the enclosed cables of at least 30 minutes, and Configuration 2D provided thermal protection for approximately 27 minutes before exceeding the temperature rise acceptance criteria. Recognizing that Configuration 2D failed to provide 30 minutes of thermal protection, and interpreting Hemyc joint separation as a contributing factor, it was proposed to install additional stainless steel over-banding on the installed cable tray Hemyc ERFBS configurations in the affected fire zones of Fire Area ETN-4 to minimize the potential for mechanical failure of the ERFBS under fire exposure conditions in the belief that this would enable the installed configurations to better resist a 30-minute exposure fire.

As of the date of the Entergy submittal (Reference 1), additional Hemyc fire testing by the industry had not yet been completed, and thus further meaningful comparative data was not available for consideration. By NRC letter dated March 15, 2007 (Reference 3), Entergy was requested to consider the results of other industry Hemyc fire testing to assess whether the results of this testing impacted any of the conclusions reached in Entergy's July 24, 2006 request.

In the response to Reference 3 provided by letter dated May 23, 2007 (Reference 5), the results for tested cable tray Hemyc ERFBS Configurations A-1, A-2, and A-3 from industry fire testing (documented in Reference 8), all constructed with zero percent fill and a 2" air gap, were used to evaluate comparable IP3 installed cable tray Hemyc configurations. Configuration A-2 consisted of multiple 24" cable trays, while Configurations A-1 and A-3 each consisted of a single 24" cable tray. Configurations A-2 and A-3 provided thermal protection for at least 30 minutes before exceeding the temperature rise acceptance criteria, but Configuration A-1 exceeded the temperature rise acceptance criteria at approximately 24 minutes into the exposure period. To compensate for the failure of Configuration A-1, which Entergy attributed to the apparent infiltration of hot gases due to joint separation, it was reiterated in Reference 5 that Entergy intended to install over-banding on the installed cable tray configurations to minimize the potential for joint separation in an effort to achieve a 30-minute fire resistance rating.

Subsequent to Entergy letter dated May 23, 2007 (Reference 5), discussions with the Staff were held and further review of the industry Hemyc fire test data in Reference 8 was performed. Despite the successful minimum 30-minute performance of Configurations A-2 and A-3, the postulated success of a third comparable Configuration (A-1) to perform for a minimum of 30 minutes via the use of over-banding cannot be definitively demonstrated. Moreover, the affected IP3 cable trays contain at least 10% cable fill versus the zero percent fill in the tested configurations, and although not qualifiable the heat sink afforded by the copper conductors can be expected to moderate the temperature inside the IP3 installed cable tray Hemyc ERFBS configurations. As a result, it has been determined that the more limiting performance of Configuration A-1 should be used as the basis for the installed cable tray Hemyc ERFBS configurations fire resistance rating. Therefore, for purposes of this request, Entergy considers the fire resistance capability of the installed cable tray Hemyc ERFBS configurations in Fire Area ETN-4 to be 24 minutes without the use of over-banding.

A comparison of the 24-minute fire resistance rating to the fire hazards in Fire Area ETN-4 demonstrates the adequacy of this rating. The subject cable trays provided with Hemyc ERFBS configurations are located in Fire Zones 7A, 60A, and 73A. These fire zones have computed combustible loading values as shown below, with electrical cable insulation in the cable trays being the dominant contributor in each zone.

Fire Zone	Total Combustible Load (BTU/ft^2)	Equivalent Fire Severity (Minutes)	Combustible Load Contributed by Cables (BTU/ft^2)	Incidental Combustible Loading, (BTU/ft^2)	Equivalent Fire Severity, Combustibles Other Than Cables (Minutes)
7A	78,716	59	78,316	400	< 1
60A	90,991	68	90,591	400	< 1
73A	127,239	95	126,839	400	< 1

The electrical cables installed in cable trays in Fire Area ETN-4, inclusive of the fire zones listed above, are of flame-retardant construction, and will not constitute a significant component of the fuel source for credible fire scenarios in this area. In an SER dated February 2, 1984 (Reference 9), the NRC Staff stated that (given the flame-retardant cable construction and the results of testing as described in a NYPA letter dated November 22, 1982 (Reference 10)), "... a postulated fire commensurate with the transient fire hazard [in Fire Area ETN-4] would not cause propagation along the cables to a significant degree." This was the basis for the granting of an exemption in that SER from the requirement to consider electrical cable in the Electrical Tunnels as an intervening combustible. Therefore, the electrical cables in the fully-suppressed cable trays in Fire Area ETN-4 are considered to be a negligible contributor to any credible fire scenario in that area.

The fuel loading contribution from the credible fire hazards in the area, exclusive of the cable insulation and inclusive of transient and incidental combustibles, represents an insignificant fire challenge to systems, structures, and components in Fire Area ETN-4. For the range of credible fire scenarios, a 24-minute fire resistance rating provided by the installed cable tray Hemyc ERFBS configurations will provide adequate protection, with margin, of the credited safe-shutdown capability.

Conclusions

In light of the limited amounts and types of hazards in Fire Area ETN-4, the full-area coverage fire detection system, the fixed automatic cable tray fire suppression system, and available manual suppression features, the conservative fire resistance rating of 24 minutes of the IP3 installed cable tray Hemyc ERFBS configurations is considered to provide adequate protection, with margin, for the enclosed safe-shutdown cables in Fire Area ETN-4.

Therefore, by this letter, Entergy Nuclear Operations, Inc.:

1. Requests revision of the January 7, 1987 SER to reflect that the installed Hemyc ERFBS configurations in Fire Area ETN-4 on the cable tray provide a 24-minute fire resistance rating, in lieu of the previously stated one-hour fire resistance rating in the January 7, 1987 NRC SER. The revised request for a 24-minute fire resistance

rating for the cable tray Hemyc ERFBS configurations is in lieu of the 30-minute fire resistance rating requested in our July 24, 2006 letter.

2. Modifies the Commitment (Number 3) originally presented in Attachment 2 to Reference 11 and subsequently modified as presented in Attachment 2 to Reference 5, to clarify the commitment on installation of stainless steel over-banding. Given that a definitive solution for the failure of test Configuration A-1 to meet temperature rise criteria has not been demonstrated, the value of installing over-banding on the installed cable tray Hemyc ERFBS configurations is indeterminate. As such, Entergy will not install such over-banding on IP3 installed cable tray Hemyc ERFBS configurations as discussed in References 1 and 5. This revised commitment is contained in Attachment 2 to this letter.

References

1. Entergy letter dated July 24, 2006, F.R. Dacimo to Document Control Desk, "Request for Revision of Existing Exemptions from 10 CFR 50, Appendix R: One-Hour Hemyc Electrical Raceway Fire Barrier System, Fire Areas ETN-4 and PAB-2"

2. NRC Letter and SER dated January 7, 1987, S.A. Varga to J.C. Brons (NYPA), "Indian Point 3 Nuclear Power Plant – Exemption from Certain Requirements of Section III.G and III.J of Appendix R to 10 CFR Part 50"

3. NRC letter dated March 15, 2007, J.P. Boska to M.R. Kansler, "Indian Point Nuclear Generating Unit No. 3 - Request for Additional Information Regarding the Revision of Existing Exemptions from Title 10 of the Code of Federal Regulations Part 50, Appendix R Requirements (TAC No. MD2671)"

4. Entergy letter dated April 30, 2007, F.R. Dacimo to Document Control Desk, "Response to Request for Additional Information Regarding the Request for Revision of Existing Exemptions from 10 CFR 50, Appendix R: One-Hour Hemyc Electrical Raceway Fire Barrier System, Fire Areas ETN-4 and PAB-2 for Indian Point Nuclear Generating Unit No. 3"

5. Entergy letter dated May 23, 2007, F.R. Dacimo to Document Control Desk, "Supplemental Response to Request for Additional Information Regarding the Request for Revision of Existing Exemptions from 10 CFR 50, Appendix R: One-Hour Hemyc Electrical Raceway Fire Barrier System, Fire Areas ETN-4 and PAB-2 for Indian Point Nuclear Generating Unit No. 3 (TAC No. MD2671)"

6. Entergy Engineering Report IP-RPT-06-00062, Revision 0; "Comparison of IP3 Hemyc Electrical Raceway Fire Barrier System to NRC Hemyc Fire Test Results"

7. Hemyc (One-Hour) Electrical Raceway Fire Barrier Systems Performance Testing; Cable Tray, Cable Air Drop, and Junction Box Raceways (Omega Point Laboratories Fire Test Report, Project 14790-123264, dated April 18, 2005)

8. Report of Testing Hemyc 1-Hour ERFBS for Compliance with the Applicable Requirements of the Following Criteria: Generic Letter 86-10, Supplement 1 (Intertek Testing Services NA Inc. Fire Test Report 3106846, dated January 16, 2007; Revised February 5, 2007)

9. NRC letter dated February 2, 1984, D.G. Eisenhut to J.P. Bayne, "Exemptions from the Requirements of 10 CFR 50, Appendix R, for the Indian Point Nuclear Generating Plant, Unit No. 3 (IP-3)"

10. NYPA letter dated November 22, 1982, J.P. Bayne to H.R. Denton, "Indian Point 3 Nuclear Power Plant, Docket No. 50-286, Appendix R"

11. Entergy letter dated June 8, 2006, F.R. Dacimo to Document Control Desk, "Response to Generic Letter 2006-03, Potentially Nonconforming Hemyc and MT Fire Barrier Configurations"

ATTACHMENT 2 to NL-07-084

Commitments made in Supplement to the Request for Revision of Existing Exemptions from 10 CFR 50, Appendix R: One-Hour Hemyc Electrical Raceway Fire Barrier System, Fire Areas ETN-4 and PAB-2

ENTERGY NUCLEAR OPERATIONS, INC
INDIAN POINT NUCLEAR GENERATING UNIT 3
DOCKET NO. 50-286

This table identifies actions discussed in this letter for which Entergy commits to perform. Any other actions discussed in this submittal are described for the NRC's information and are not commitments.

Number	Commitment	Type	Scheduled Completion Date
3	Complete modification (including supporting engineering evaluation) to install additional protection of the electrical raceway supports and protection of certain metallic penetrating items associated with the existing Hemyc ERFBS located outside containment, and to install stainless steel over-banding on the box-type configuration (as described) located outside containment. [This is a further clarification of commitment 3 (licensee reference number COM-07-00034) which was initially made in Entergy Letter NL-06-060 dated June 8, 2006, and which was clarified in Entergy Letter NL-07-061 dated May 23, 2007]	One-Time Action	12/01/2008

Exhibit FP No. 7

Exhibit FP No. 5

146

BACKGROUND

The NRC's concern with the performance of fire barriers at NPPs began with the failure of Thermo-Lag to pass performance tests in October 1989 at Southwest Research Institute. The tests were done for the Gulf States Utilities Company after visual observations of degradation of Thermo-Lag at River Bend Station. In June and August 1992, two sets of full-scale fire endurance tests on Thermo-Lag were conducted at Omega Point Laboratories in San Antonio, Texas, by Texas Utilities Electric Company for Comanche Peak Steam Electric Station, with similar results. In July 1992, the NRC sponsored a series of small-scale fire endurance tests at the National Institute of Standards and Technology. Again, 1-hour and 3-hour rated Thermo-Lag barrier material failed to consistently provide its intended protective function.

On August 6, 1991, the NRC issued Information Notice (IN) 91-47, "Failure of Thermo-Lag Fire Barrier Material to Pass Fire Endurance Test," the first in a series of INs issued between 1991 and 1995 on performance test failures and installation deficiencies related to Thermo-Lag 330 fire barrier systems.

Because of questions about the ability of 1-hour and 3-hour rated Thermo-Lag fire barrier material to perform its specified function, and because of the widespread use of Thermo-Lag in the nuclear industry, the NRC issued the following generic communications to inform licensees of the Thermo-Lag test results and to request that licensees implement appropriate compensatory measures and develop plans to resolve any noncompliances with 10 CFR 50.48:

- Bulletin 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,
- Bulletin 92-01, Supplement 1, "Failure of Thermo-Lag 330 Fire Barrier System To Perform its Specified Fire Endurance Function," August 28, 1992,
- GL 92-08, "Thermo-Lag 330-1 Fire Barriers," December 17, 1992, and
- Supplement 1 to GL 86-10, "Fire Endurance Test Acceptance Criteria for Fire Barrier Systems Used To Separate Redundant Safe Shutdown Trains Within the Same Fire Area," March 25, 1994.

GL 92-08 included the NRC staff expectation that licensees review other fire barrier materials and systems credited for 10 CFR 50.48 compliance and consider actions to avoid problems similar to those identified with Thermo-Lag.

In response, the licensees reviewed their fire protection safe shutdown plans to determine if corrective actions were needed. Some licensees had made conservative commitments and installed Thermo-Lag in locations where it was not needed to satisfy NRC requirements; therefore, no corrective actions were required. Where fire barrier materials were required, licensees took one or a combination of the following corrective actions:

- Rerouted cables through other fire areas so that redundant safe shutdown trains were not located in the same fire area,

151

configurations. This guidance is repeated in RG 1.189, "Fire Protection for Operating Nuclear Power Plants."

REQUESTED ACTIONS

Within 60 days of the date of this letter, all addressees are requested to determine whether or not Hemyc or MT fire barrier material is installed and relied upon for separation and/or safe shutdown purposes to satisfy applicable regulatory requirements. In addition, licensees are asked to describe controls that were used to ensure the adequacy of other fire barrier types, consistent with the assessment requested in GL 92-08.

Addressees that credit Hemyc or MT for compliance are requested to provide information regarding the extent of the installation, whether the material complies with regulatory requirements, and any compensatory actions in place to provide equivalent protection and maintain the safe shutdown function of affected areas of the plant in light of the recent findings associated with Hemyc and MT. Licensees are requested to provide evaluations to support conclusions that they are in compliance with regulatory requirements for the Hemyc and MT applications. Licensees that cannot justify their continued reliance on Hemyc or MT are requested to provide a description of corrective actions taken or planned and a schedule for milestones, including when full compliance will be achieved.

Compensatory and corrective actions must be implemented in accordance with existing regulations commensurate with the safety significance of the nonconforming condition. The NRC expects all licensees to fully restore compliance with 10 CFR 50.48 and submit the required documentation to the NRC by December 1, 2007.

REQUESTED INFORMATION

All addressees are requested to provide the following information:

1. Within 60 days of the date of this GL, provide the following:

    a. A statement on whether Hemyc or MT fire barrier material is used at their NPPs and whether it is relied upon for separation and/or safe shutdown purposes in accordance with the licensing basis, including whether Hemyc or MT is credited in other analyses (e.g., exemptions, license amendments, GL 86-10 analyses).

    b. A description of the controls that were used to ensure that other fire barrier types relied on for separation of redundant trains located in a single fire area are capable of providing the necessary level of protection. Addressees may reference their responses to GL 92-08 to the extent that the responses address this specific issue.

2. Within 60 days of the date of this GL, for those addressees that have installed Hemyc or MT fire barrier materials, discuss the following in detail:

    a. The extent of the installation (e.g., linear feet of wrap, areas installed, systems protected),

152

b. Whether the Hemyc and/or MT installed in their plants is conforming with their licensing basis in light of recent findings, and if these recent findings do not apply, why not,

c. The compensatory measures that have been implemented to provide protection and maintain the safe shutdown function of affected areas of the plant in light of the recent findings associated with Hemyc and MT installations, including evaluations to support the addressees' conclusions, and

d. A description of, and implementation schedules for, corrective actions, including a description of any licensing actions or exemption requests needed to support changes to the plant licensing basis.

3. No later than December 1, 2007, addressees that identified in 1.a. Hemyc and/or MT configurations are requested to provide a description of actions taken to resolve the nonconforming conditions described in 2.d.

REQUIRED RESPONSE

In accordance with 10 CFR 50.54(f), an addressee is required to respond as described below so that the NRC can determine whether a facility license should be modified, suspended, or revoked, or whether other action should be taken.

Within 30 days of the date of this GL, addressees are required to submit a written response if they are unable to provide the information or it cannot meet the requested completion date. Addressees are requested to address any alternative course of action that they propose to take, including the basis for the acceptability of the proposed alternative course of action.

The required written response should be addressed to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, 11555 Rockville Pike, Rockville, Maryland 20852, under oath or affirmation under the provisions of Section 182a of the Atomic Energy Act of 1954, as amended, and 10 CFR 50.54(f). In addition, a copy of the response should be submitted to the appropriate regional administrator.

REASON FOR INFORMATION REQUEST

The recent confirmatory testing of the Hemyc and MT fire barriers revealed that similar barriers installed at NPPs may not perform their intended protective function during a fire. The NRC staff will review the responses to this GL and will notify addressees if concerns are identified regarding compliance with NRC regulations. The NRC staff may also conduct inspections to determine addressees' effectiveness in addressing the GL.

RELATED GENERIC COMMUNICATIONS

1. Regulatory Issue Summary 05-07, "Compensatory Measures To Satisfy the Fire Protection Program Requirements," April 19, 2005.

2. IN 05-07, "Results of Hemyc Electrical Raceway Fire Barrier System Full Scale Fire Testing," April 1, 2005.

153

3. IN 99-17, "Problems Associated with Post-Fire Safe-Shutdown Circuit Analysis," June 3, 1999.

4. IN 95-52, Supplement 1, "Fire Endurance Test Results for Electrical Raceway Fire Barrier Systems Constructed from 3M Company Interam Fire Barrier Materials," March 17, 1998.

5. IN 95-49, Supplement 1, "Seismic Adequacy of Thermo-Lag Panels," December 10, 1997.

6. RIS 2005-20, Revision to Guidance Formerly Contained in NRC Generic Letter 91-18, "Information to Licensees Regarding Two NRC Inspection Manual Sections on Resolution of Degraded and Nonconforming Conditions and on Operability," September 26, 2005.

7. IN 97-70, "Potential Problems With Fire Barrier Penetration Seals," September 19, 1997.

8. IN 97-59, "Fire Endurance Test Results of Versawrap Fire Barriers," August 1, 1997.

9. IN 94-86, Supplement 1, "Legal Actions Against Thermal Science, Inc., Manufacturer of Thermo-Lag," November 15, 1995.

10. IN 95-52, "Fire Endurance Test Results for Electrical Raceway Fire Barrier Systems Constructed from 3M Company Interam Fire Barrier Materials," November 14, 1995.

11. IN 95-49, "Seismic Adequacy of Thermo-Lag Panels," October 27, 1995.

12. IN 95-32, "Thermo-Lag 330-1 Flame Spread Test Results," August 10, 1995.

13. IN 95-27, "NRC Review of Nuclear Energy Institute, "Thermo-Lag 330-1 Combustibility Evaluation Methodology Plant Screening Guide," May 31, 1995.

14. IN 94-86, "Legal Actions Against Thermal Science, Inc., Manufacturer of Thermo-Lag," December 22, 1994.

15. IN 94-34, "Thermo-Lag 330-660 Flexi-Blanket Ampacity Derating Concerns," May 13, 1994.

16. IN 94-28, "Potential Problems With Fire Barrier Penetration Seals," April 5, 1994.

17. 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.

18. IN 94-22, "Fire Endurance and Ampacity Derating Test Results for 3-Hour Fire-Rated Thermo-Lag 330-1 Fire Barriers," March 16, 1994.

19. IN 93-41, "One Hour Fire Endurance Test Results for Thermal Ceramics Kaowool, 3M Company FS-195 and 3M Company Interam E-50 Fire Barrier Systems," May 28, 1993.

154

20. IN 93-40, "Fire Endurance Test Results for Thermal Ceramics FP-60 Fire Barrier Material," May 26, 1993.

21. GL 92-08, "Thermo-Lag 330-1 Fire Barriers," December 17, 1992.

22. IN 92-82, "Results of Thermo-Lag 330-1 Combustibility Testing," December 15, 1992.

23. Bulletin 92-01, Supplement 1, "Failure of Thermo-Lag 330 Fire Barrier System to Perform its Specified Fired Endurance Function," August 28, 1992.

24. IN 92-55, "Current Fire Endurance Test Results for Thermo-Lag Fire Barrier Material," July 27, 1992.

25. Bulletin 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.

26. IN 92-46, "Thermo-Lag Fire Barrier Material Special Review Team Final Report Findings, Current Fire Endurance Tests, and Ampacity Calculation Error," June 23, 1992.

27. IN 91-79, "Deficiencies in the Procedures for Installing Thermo-Lag Fire Barrier Materials," December 6, 1991.

28. IN 91-47, "Failure of Thermo-Lag Fire Barrier Material To Pass Fire Endurance Test," August 6, 1991.

29. IN 88-56, "Potential Problems With Silicone Foam Fire Barrier Penetration Seals," August 4, 1988.

30. GL 88-12, "Removal of Fire Protection Requirements From Technical Specifications," August 2, 1988.

31. GL 86-10, "Implementation of Fire Protection Requirements," April 26, 1986.

32. GL 83-33, "NRC Position on Certain Requirements of Appendix R to 10 CFR Part 50," October 19, 1983.

33. GL 81-12, "Fire Protection Rule (45 FR 76602, November 19, 1980)," February 20, 1981.

BACKFIT DISCUSSION

Under the provisions of Section 182.a of the Atomic Energy Act of 1954, as amended, and 10 CFR 50.54(f), this GL asks addressees to evaluate their facilities to confirm compliance with the existing applicable regulatory requirements discussed in this GL. Specifically, although Hemyc and MT fire barriers in NPPs may be relied on to protect electrical and instrumentation cables and equipment that provides safe shutdown capability during a fire, 2005 NRC testing revealed that these materials may not provide the protective function intended for compliance

with existing regulations. The NRC staff performed these tests using the fire barrier thermal acceptance criteria from NFPA 251; the test details of thermocouple spacing and arrangement were applied in accordance with the guidance in GL 86-10, Supplement 1.

This GL is an information request in accordance with 10 CFR 50.54(f). Information requests are not considered by the NRC to be subject to the Backfit Rule, 10 CFR 50.109. Furthermore, this GL is based on current regulations and guidance and does not constitute a change in NRC staff position. Accordingly, the NRR staff's interpretations of current fire protection requirements in this GL do not constitute backfitting as defined in 10 CFR 50.109(a)(i).

The NRC staff has determined, in accordance with 10 CFR 50.54(f), that the information sought in this GL is necessary to verify licensee compliance with current licensing basis for each facility. If licensees identify nonconforming conditions, they have several options. A licensee may make plant modifications, for example, replacing the Hemyc or MT fire barriers with an appropriately rated fire barrier material, upgrading the Hemyc or MT to a rated barrier, or rerouting cables or instrumentation lines through another fire area. Alternatively, licensees may voluntarily commit to 10 CFR 50.48(c), NFPA 805 Standard, and by following the process in the rule and the NFPA 805 Standard, establish compliance through the application of technical evaluations that consider potential adverse effects, DID, and safety margins.

FEDERAL REGISTER NOTIFICATION

A notice of opportunity for public comment on this GL was published in the *Federal Register* (70 FR 42596) on July 25, 2005.

SMALL BUSINESS REGULATORY ENFORCEMENT FAIRNESS ACT

In accordance with the Small Business Regulatory Enforcement Fairness Act of 1996, the NRC has determined that this GL is not a major rule and the Office of Information and Regulatory Affairs of the Office of Management and Budget (OMB) has confirmed this determination.

PAPERWORK REDUCTION ACT STATEMENT

This GL contains information collection requirements that are subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.). These information collections were approved by OMB, clearance no. 3150-0011, which expires February 28, 2007.

The burden to the public for these mandatory information collections is estimated to average 120 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collection. Send comments on any aspect of these information collections, including suggestions for reducing the burden, to the Records and FOIA/Privacy Services Branch (T5-F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by Internet electronic mail to INFOCOLLECTS@NRC.GOV; and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0011), Office of Management and Budget, Washington, DC 20503.

Public Protection Notification

The NRC may not conduct or sponsor, and a person is not required to respond to, an information collection, unless the requesting document displays a currently valid OMB control number.

CONTACT

Please direct any questions about this matter to the technical contacts or the Lead Project Manager listed below, or to the appropriate NRR project manager.

/RA by H. Nieh for/
Christopher I. Grimes, Director
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Technical Contacts: Daniel Frumkin, DRA/NRR
(301) 415-2280
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Angie Lavretta, DRA/NRR
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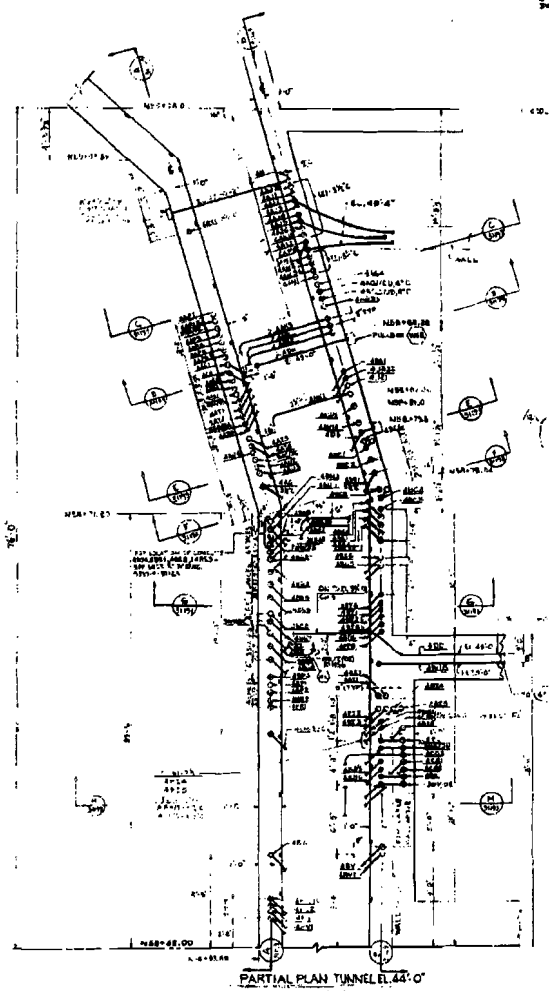
Lead Project Manager: Quynh T. Nguyen, PGCB/NRR
301-415-8123
E-mail: qtn@nrc.gov

Note: NRC generic communications may be found on the NRC public Web site, http://www.nrc.gov, under Electronic Reading Room/Document Collections.

Exhibit FP No. 8

UELC 9321-F-31193 UELC 9321-F-31193



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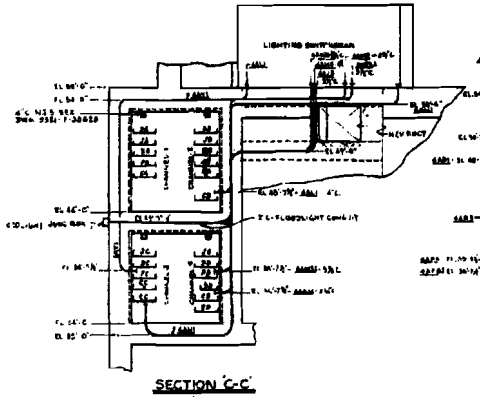

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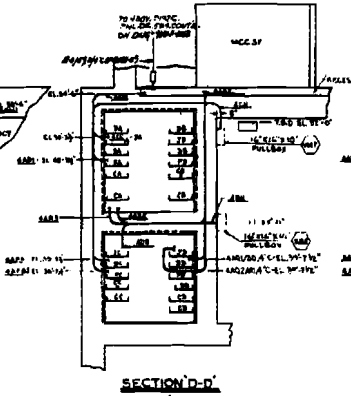

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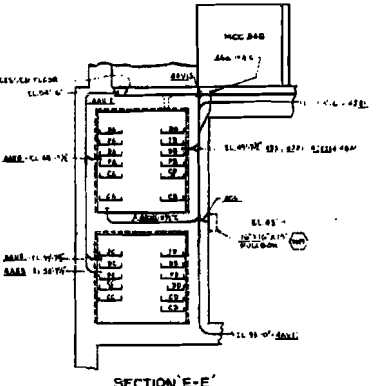

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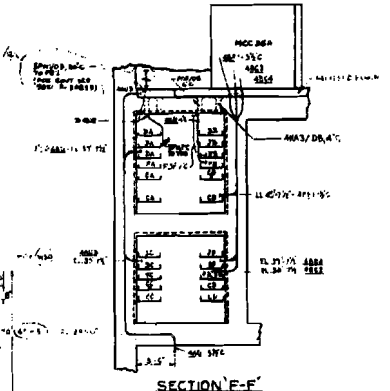

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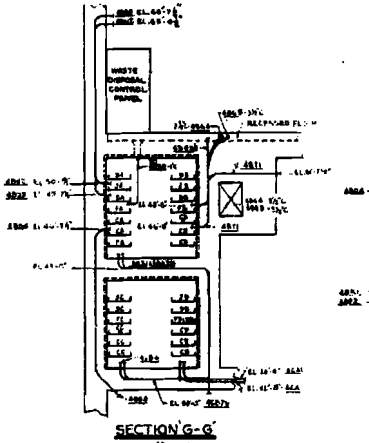

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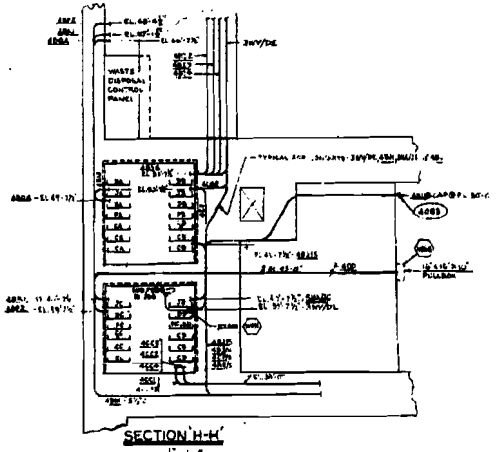

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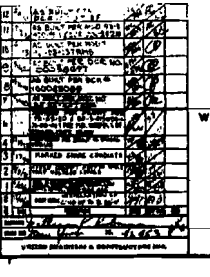

WESTINGHOUSE ELECTRIC CORPORATION

CONDUIT PLAN

P.A.B.- ELECTRICAL TUNNELS

ENCASED CONDUITS

FOR

CONSOLIDATED EDISON COMPANY

INDIAN POINT GENERATING STATION

UNIT NOS. 3

9321-F-31193 | 12 | A202364

158

Exhibit FP No. 10

REPORT ON THE NUCLEAR REGULATORY COMMISSION REACTOR SAFETY REVIEW PROCESS

By

Robert D. Pollard

Project Manager

Division of Project Management

U. S. Nuclear Regulatory Commission

February 6, 1976

INTRODUCTION

The purpose of this report is to prove two points. The points are that in reviewing the safety of nuclear reactors the Nuclear Regulatory Commission suppresses the existence of unresolved safety problems and fails to resolve those problems prior to allowing reactors to operate. The principal evidence of this practice is contained in "For Official Use Only" documents of the AEC and the NRC in *which* staff experts discuss reactor safety problems not brought to the attention of the public, particularly if to do so could delay the issuance of a license for a reactor.

This report is not a definitive statement of every unresolved and previously undisclosed safety problem. Such a report would require months of preparation by a task force and free, unfettered access to all of the internal documents of the NRC. In the brief time available all that could be done is to select some specific examples of what are recurring problems. The two large reactors owned by Consolidated Edison Company of New York and the Power Authority of the State of New York known as Indian Point 2 and Indian Point 3 have been selected for more thorough review. Their proximity to New York City (24 miles) and the substantial controversy that has surrounded them made them particularly appropriate for study. The public attention would presumably have produced the maximum disclosure of safety problems. The proximity to New York City

would presumably warrant the most careful safety review. As will be seen, even here where the highest safety should have been achieved, glaring defects remain.

This report is not a definitive safety evaluation of the Indian Point plants. Such an analysis has purportedly been completed by the Regulatory Staff. Rather specific examples are selected to illustrate the point being made. The examples begin in the late 1960's during the construction of Indian Point 2 and follow the history of Indian Point 2 and 3 through to today. This historical perspective highlights the long-standing existence of the review practices which suppress the existence and ignore the resolution of serious safety problems -- practices which have survived four Commission Chairpersons and seen two complete turnovers in the membership of the Commission. Clearly the problems are deep-rooted and extensive and the cure will require a far greater involvement of the Commissioners themselves than has previously occurred and a real commitment to the principle of "adequate protection for public health and safety" rather than "necessary protection for the vendor and utility investment".

This will hopefully be the first of many reports on the NRC safety review process. Further reports will depend upon the NRC's willingness to continue to allow access to internal documents. A decision now to shut the door on access to those

documents will of course not solve the problems, only hide them. What is most needed now is an open, public scrutiny of the NRC hand in hand with a Commissioner directed and conducted investigation. Unless this is done the same forces responsible for the sordid Indian Point story will apologize, camouflage and obfuscate the problems out of the public domain and it will once again be business as usual.

The four specific examples discussed in this Report relate to serious safety problems which currently exist at Indian Point 2 and 3. However, they are also to some extent generic problems which affect many plants. For instance the problem of reactor coolant pump overspeed remains unresolved for all PWRs. The problems described are by no means isolated examples. The Technical Activities Safety Report for December, 1975, a document claimed to be an "internal working paper" although it is published quarterly and lists the status of technical reviews seeking to resolve safety problems, lists nearly 183 specific serious unresolved safety problems as "currently receiving attention, [and] which have an important impact on the licensing review process" (Category A). Another 44 equally serious unresolved safety problems are described as "requiring NRR [Office of Nuclear Reactor Regulation] attention, but review has not been initiated because of manpower limitations or information is not available" (Category B). A third category of 8 serious unresolved safety

problems involve technical safety activities "planned for the future that would improve the quality of the review or facilitate the review process" (Category C).

These generic unresolved safety problems are so-fundamental to the basic evaluation of reactor safety that it is not possible to conclude on a technical basis that operation of any nuclear reactors is safe enough to provide reasonable assurance of adequate protection for the public health and safety. Even compliance with safety regulations can not be determined unless and until the unresolved safety problems have been resolved.

The seriousness of the unresolved problems is apparent to anyone who reads the December, 1975 Status Report. For illustration purposes a few examples are cited below:

Category A -- Currently receiving attention and have an important impact on the licensing review process.

Title: Definition of Experimental Program for Structural Response Evaluation to Turbine Missile Impacts

Problem Definition:

Information in the area of structural response to impacts of turbine missiles is seldom available if not totally lacking. The safety concerns derived from consideration of occurrence of a missile generated by failure of a turbine have been consistently expressed in almost all the ACRS letters to the Commission recommending issuance of CP or OL licenses during the last two years. Since there are significant differences between the parameters governing turbine generated missiles and that associated with tornado, the design procedures applicable to tornado generated missiles may not be applicable to protection barrier design against turbine missiles. An experimental program intended to develop design procedures and criteria for use in the protection barrier design against turbine missiles is urgently needed to resolve the outstanding concerns of both the ACRS and the NRC staff.

Current Status:

Only limited information related to turbine missiles is available. As a part of the work scope for item II.A.B.1, a preliminary definition for turbine missile experimental program was planned. However, NSWC could not undertake this task due to lack of available personnel. EPRI has indicated its interest to undertake limited tests designed to evaluate the impact of turbine missiles on reinforced concrete barriers.

Plans for Resolution:

A fairly extensive experimental program intended for obtaining the structural response data to turbine missile impacts will be proposed in FY 77. The program scope will depend on future work to be undertaken by EPRI. [EPRI is industry supported)

Schedule for Completion:

To be established later.

Category B -- Require attention but review not yet initiated due to lack of manpower or lack of information.

Title: Calculation of Dose Rates from Certain Radioactive Sources at Nuclear Facilities

Problem Definition:

In order to evaluate radiation exposure to nuclear power plant employees, visitors, onsite construction workers, etc., it is necessary to determine the dose rate at specific onsite locations due to specific radioactive sources in the plant. These include storage tanks for low level radioactive liquids, the turbine building sources in a BWR, etc. Simple calculational methods are needed to give reasonably accurate, fast results for these cases for various evaluations which the staff is required to carry out.

Current Status:

Some empirical formula exist for such cases. These are limited in application, in both accuracy and useful range. New data have been taken at two BWR power plants and are being evaluated.

Plans for Resolution:

Discussions have been held with various contractors in the area of radiation transport calculations. Measurements have been made around certain BWR nuclear power plants. It is our plan to use the information gathered in both these activities to develop either better empirical formula or to develop calculational methods which will treat the cases of *concern.*

Schedule for Completion:

One Year

Category C -- Reviews planned for the future that would improve the quality of or facilitate the safety reviews.

Title: Economics of Occupational Radiation Exposure Reduction at Nuclear Facilities

Problem Definition:

Very little data exists on the costs related to the many methods available for occupational radiation exposure reduction at nuclear power plants. *Information* is also lacking on the benefit in man-rem reduction that is related to these methods. These data are needed in order to make a quantitative determination of the occupational radiation exposure that is ALAP for a particular nuclear facility.

Current Status:

Talks have been held with various segments of industry. Data has been collected on exposure related to certain activities and steps have been taken to get additional pertinent input.

Plans for Resolution:

As data and *information* become available, Radiation Protection Section staff members will develop a generic description of the proper means to evaluate the economics of radiation exposure reduction. Some guidance in this regard is being developed for the revised Regulatory Guide 8.8, now in progress.

Schedule for Completion:

Two years

What follows is a description of four specific serious safety problems at Indian Point 2 and 3 which have not been resolved but the existence of which are well known to those at NRC charged with the responsibility of deciding whether to allow a reactor to begin operating or to continue to operate. These "responsible" officials have no adequate technical justification for allowing reactor operation in the face of these problems. The justification is the implementation of the NRC policy that priority be given to the goal that reactor operations not be interrupted or delayed. On rare occasions this goal has not been achieved such as when an Intervenor "discovers" the existence of one of these unresolved safety problems (i.e. the fuel densification problem resulting in derating or operating modifications to twenty BWRs). Hopefully the disclosures contained in this Report will result in similar actions.

ILLUSTRATIVE SAFETY PROBLEMS

T. CONTAINMENT ISOLATION

The General Design Criteria set forth in Appendix A to 10 CFR Part 50 establish the "minimum requirements for the principal design' criteria for water-cooled nuclear power plants". (10 CFR Part 50.34) General Design Criteria 54, 55, 56 and 57 establish minimum requirements concerning isolation of piping systems that penetrate the reactor containment. Criterion 55 and Criterion 56 specify four containment isolation valve arrangements. Each isolation valve arrangement involves a combination of locked closed isolation valves and/or automatic isolation valves to prevent the release of radioactive material. These criteria specify that one of the four valve arrangements "shall be provided -- unless it can be demonstrated that the containment isolation provisions for a specific class of lines, such as instrument lines, are acceptable on some other defined basis".

In contrast to these specific requirements, the staff is aware that many of the lines at the Indian Point 3 plant do not have isolation valve arrangements which correspond to any of the arrangements specified by Criterion 55 and Criterion 56. Furthermore, neither the staff nor the licensee has identified a "specific class of lines" that need not utilize the specified arrangements. Nor has either the staff or licensee identified "some other defined basis" on which the Indian Point 3 isolation valve arrangement can be demonstrated to be acceptable.

Rather than adhere to the requirements of the General Design Criteria, the licensee has proposed technical specifications which would permit plant operation with containment isolation valves (which have no provision for automatic closure) in their open positions. The licensee states that reliance on the reactor operator to manually initiate closure of such valves is adequate. The staff apparently gives tacit approval to this evasion of NRC regulations by stating the "We have reviewed the isolation valve arrangements for conformance to General Design Criteria 54, 55, 56 and 57, and conclude that the design meets the intent of these criteria". (Safety Evaluation of the Indian Point Nuclear Generating Unit No. 3, dated September 21, 1973).

This is one of the safety problems I became aware of as project manager for Indian Point 3. The pressure to issue a license on a schedule compatible with the applicant's desires notwithstanding, I questioned those staff personnel with specific expertise in the reactor containment area about their bases for accepting the Indian Point 3 design. Their responses indicated that: a) it was known that the design did not meet the General Design Criteria, b) the design was not different than other licensed nuclear power plants, and c) it was too late to require design changes to the plant. These experts stated that they saw

no reason to change their previous conclusions as stated in the Indian Point 3 Safety Evaluation Report and referenced above. The bases for these conclusions remain obscure if not non-existent. The staff's' Safety Evaluation Report mentions the "double barrier protection -- provided so that no single valve or piping failure can result in loss of containment integrity". Also described briefly are the two groups of containment isolation valves which are closed automatically by the safety injection signal and the actuation of containment spray. No mention is made of the non-automatic containment isolation valves, the criteria used to judge the acceptability of reliance on manual operator action, or the specific "closed system" which is purported to constitute one of the barriers to escape of radioactive materials.

. I believe that the-provisions for containment isolation following an accident at Indian Point 3 should be evaluated or re-evaluated. If the present design and proposed technical specifications are found acceptable, the NRC should state the specific technical bases for its conclusion that the design meets the NRC regulations. Indian Point 2 should also be evaluated in this regard. It is likely that the situation there is the same as or more hazardous than the situation at Indian Point 3.

The staff should have discussed the non-automatic containment isolation valves, the nature of the "closed systems upon which the "acceptability" was partially based, and the criteria used

to judge the adequacy of manual operator action.
The Safety Evaluation Report, in discussing only those aspects of containment isolation which were not a problem and then stating the conclusion that the design meets the "intent" of the General Design Criteria, presented a more favorable picture of containment isolation than the actual design warrants. By presenting only the favorable aspects, the remainder of the licensing process, i.e., scrutiny by public, independent decisions by the licensing boards, was subverted and therefore less likely to be able to reach a sound decision based on all the facts.

II. SUBMERGED VALVES

During my assignment as project manager for the Indian Point 3 plant, the problem concerning submerged valves arose. Basically, this problem is that following an accident, much of the water from the reactor coolant system and from operation of the emergency core cooling systems collects in the containment. Recently, it has been discovered that many valves located inside the containment, including some valves intended to be used to mitigate the consequences of accidents, could become submerged and, thereby, rendered inoperable. Why the vendor, applicant or staff did not discover this problem over the past years is a question worth explaining for the future, with the aim of preventing similar fundamental oversights. For now, it is better to concentrate on determining an acceptable solution to the problem.

Con Ed has proposed a scheme to solve the problem. Basically, their proposal is to elevate only a few of the valve motors (but not the valves) above the calculated water level which is expected following an accident. For most of the valves whose motors will be sacrified, Con Ed has expressed their conclusion that this will have no adverse effect on accident consequences. Since not all the valve motors (which were previously to be relied upon to cope with the accident) will be elevated, it is necessary to modify equipment and to develop new operating procedures for the manual operator actions that are required soon after the accident. Whether the new procedures and resulting core cooling system performance using these new procedures have been evaluated as thoroughly as the original design by either the staff or the applicant is questionable. Whether the plant operators have been adequately "debriefed" on the old procedures and retrained in the use of the new procedures is also questionable.

The deficiencies in the evaluation of the revised design and operating procedures are illustrated by the following questions which have not been adequately analyzed:

a) Do the platforms used to support the elevated motors have adequate capability to withstand an earthquake? (Of course, until a decision concerning the magnitude of the earthquake that must be withstood is reached, the question of the seismic adequacy of the entire plant remains unanswerable.)

b) Is there any circumstance under which the submerged valves might be needed to cope with an accident, especially if the accident sequence does not follow the predicted sequence?

c) What "new" " equipment will need to be relied on, e.g., core cooling system flow instrumentation? Has this equipment been designed, procured and installed in accordance with the regulations and standards applicable to safety equipment?

d) What are the disadvantages (and what are their significance) of using operator's trained on Unit 2 to operate Unit 3 which has had substantive design changes compared to Unit 2?

e) What other equipment besides valves will become submerged following an accident? Has the effect on safety of submerging this equipment been evaluated?

More urgent from a public safety viewpoint than the review of Indian Point 3 is the question of the status of Indian Point 2 and other operating plants. The most recent correspondence on this matter (Reference 35) of which I am aware seems to indicate that nothing will be done to alter plant design or operating procedures prior to "the first refueling outage (which) is currently scheduled to commence April 1, 1976". 1 consider

this to be a totally irresponsible course of action. The NRC should not allow continued operation of a plant when there is good cause to believe that an unresolved safety question exists and that the plant is not in compliance with the regulations. In fact, the regulations would appear to require a completely different course of action (see 10 CFR 50.100). Legal interpretation of the regulations notwithstanding, the proper course for a purely regulatory agency to follow is to permit operation only when there are sound technical bases to demonstrate safety of operation rather than to permit operation until the licensee or public can provide the sound technical bases for requiring immediate shutdown of the plant.

III. PUMP FLYWHEEL MISSILES GENERATED BY REACTOR COOLANT PUMP OVERSPEED

References 37 through 50 are some of the documents which discuss this unresolved safety problem

As a result of a reactor coolant system pipe rupture and the blowdown of reactor coolant through the reactor coolant pump, "the pump impeller may act as a hydraulic turbine causing the pump, motor, and the flywheel to overspeed and become potential sources of missiles". (Reference 38) This is a significant problem because of the tremendous inertial energy of the missiles, especially flywheel parts, and the difficulty of predicting the course of these missiles. Whether containment integrity can be

maintained and whether the performance of emergency core cooling systems can be assured if pump missiles are generated following a LOCA are significant unresolved questions.

Numerous statements by experts on the staff and outside the agency indicated the severity of the problem. It is not practical to limit overspeed by mechanical braking systems because of the significant amounts of energy they would have to absorb. Furthermore, inadvertent operation of a braking system could result in a locked rotor accident. Provision of barriers to retain any missiles also appears impractical and could also significantly increase the cost of construction.

During the review, expert after expert expressed the conclusion that empirical data was needed to determine the magnitude of the threat to the health and safety of the public. For example:

> "Unfortunately, due to the sparsity of empirical information, the above statement (that the pump may not overspeed) has to be considered as speculative at the present time." (Reference 41)

> "Two-phase pump performance is an area which requires further investigation. The evaluation of the accuracy of any particular model depends on the performance of adequate pump tests which simulate the conditions expected during a LOCA." (Reference 37)

> "A large uncertainty is associated with the prediction of the hydraulic torque generated by a time-varying, two-phase fluid passing through the impeller at sonic or near sonic conditions... Although the theory of pump and turbine performance is understood, designers resort to experimental programs or at least to confirmatory tests even for normal operation to establish performance characteristics". (Reference 44)

> "The summary of my presentation incorrectly contains the assertion that the current treatment of two-phase flow behavior results in conservative overspeed predictions. My position is that we do not know whether the results are conservative or not and to the best of my recollection that is the view I expressed in the presentation". (Reference 49 enclosure)

Attempts to justify continued licensing and operation of plants while this problem remains unresolved met with similar expressions of disagreement. Aside from the generic excuse that the occurrence has a low probability the only other argument available is the use of electrical braking to prevent overspeed. Reference 45 details the arguments against electrical braking as a method of protecting' the health and safety of the public. Reference 47 also expresses succinctly a disagreement with unsupported reliance on expected experimental results, low probability of occurrence, or electrical braking.

In summary, the potential for missiles from pump overspeed remains an unresolved safety problem for Indian Point 2 and 3, as wells other plants. Based on the files concerning review of the Westinghouse topical report, WCAP-8163, the status of resolution is that, as of August 13, 1975, the staff is waiting for information. I believe this matter should be reconsidered in connection with continued operation of Indian Point 2 and commencement of operation of Indian Point 3 as well as a similar reconsideration in connection with all PWRs.

*/ The low probability argument has not been accompanied by a discussion of the consequences of such an accident.

IV. SEPARATION OF ELECTRICAL EQUIPMENT

Much emphasis is placed on the single failure criterion in attempting to assure the public that nuclear plants are safe. Much less emphasis is given to the underlying assumptions which must be satisfied in order that the single failure criterion be a valid criterion. One of these basic assumptions is that failures will occur only in a random *manner*. Stated another way, the assumption is that failure (or operation) of one system or *component* will not affect the performance of its redundant counterpart.

One of the basic methods used to try to satisfy this assumption is to physically separate redundant equipment. The separation must be sufficient both to assure that failure of one safety system does not cause failure of the other and to assure that failures in non-safety systems do not cause failure of either safety system. A more detailed explanation of this philosophy can be found in IEEE Std 379 and the NRC standard review plan Chapter 7.

Based on my knowledge of the Indian Point 2 and 3 designs and the current separation criteria, I conclude that the physical separation provisions at *Indian* Point 2 and 3 are not adequate for the health and safety of the public. There is no adequate basis for concluding that a common mode failure will not result in a very serious accident other than sheer good luck. In fact,

based on the documents in the NRC files, this conclusion appears to be almost identical to the conclusions other knowledgeable staff members reached as early as 1969.

An ACRS Subcommittee meeting was held in April, 1970 and the staff made a rather detailed presentation of the poorer design aspects related to the *Indian* Point 2 protection and electrical systems. This included discussion of the single cable tunnel, the engineered safety feature manual actuation panel in the control room without separation in the panel, the common diesel location in a sheet metal structure, cable separation, and cable penetrations at the containment. "The Subcommittee was 'appalled' at the situation. They asked if we did not have an Oyster Creek situation in hand and whether we should not have the applicant make an independent review of his work as we required of Jersey Central." (Reference 18)

By the time the Electrical Systems Branch provided its input (Reference 22) for use in preparing a report to ACRS the electrical items which did not meet present day criteria earlier in the review, had either been "accepted", "resolved", or "approved with some reluctance", or they remained "unresolved".

The two reports to the ACRS prepared by the staff and classified as "Official Use Only" (References 26 and 28) should be reviewed by NRC to determine whether the previous bases for reluctantly accepting design deficiencies are adequate for protecting

the health and safety of the public. Based on those reports, it appears that many items were accepted solely because so many other areas of the plant were deficient that it wouldn't do much good to require upgrading only a few. In other cases, it appears that a judgment was made that the cost in time and money needed to provide substantial additional protection for the public health and safety was too great. The bases for this staff conclusion should be made public.

In the case of the separation between Unit 2 diesels, the apparent resolution is inconsistent in itself. The applicant claimed that there was no history of diesel explosions that damaged the diesel's environs. Nevertheless, a concrete wall was installed to protect the common control panel but no similar protection was installed between the diesels.

In summary, I consider the physical separation, or more accurately the lack of adequate physical separation, to be one of the significant safety hazards at Indian Point 2 and 3 which should be reconsidered. The single electric cable tunnel, the cable spreading room, the containment electrical penetration area, the main control board, the safety injection pump and containment spray pump areas, and the auxiliary feedwater pump areas are among the vital areas that should be re-evaluated.

*/ The fact that Unit 3 has two cable tunnels is not significant Because the system logic requires that two out of three systems be operable following an accident. In addition, the problem of associated circuits was apparently not considered at all.

[redacted]

[redacted]

[redacted] publicly reveal the existence of the problems. Most of these documents have not been placed in the Public Document Room or otherwise made available to the general public. The release of these and similar so-called internal memoranda is essential if public participation in licensing decisions and independent licensing board reviews is to have any meaning. At present these processes involve a very limited examination of licensing decisions, inhibited by the Staff refusal to honestly disclose the serious unresolved safety problems that are known to it and that are relevant to licensing decisions.

This Report is based on materials contained in the NRC internal files and available to any NRC official sufficiently concerned to want to look into the files. The Report demonstrates that the NRC is fully aware of serious unresolved safety problems but deliberately refuses to allow these problems to interfere with licensing. If any NRC official wants to be responsive to the concerns of this report he or she should focus on ways of removing the censorship from disclosure and handling of these problems in

licensing reviews, not to ask those responsible for suppressing the existence of the problems to give rationalizations for their prior failures to take action on these problems.

This is a great cross-roads for the NRC. It can continue on the current path of encouraging rapid and uninterrupted reactor licensing while seeking to defend itself from valid criticism or it can follow the new path charted for it by Congress in declaring that the sole agency function is to regulate nuclear power to protect the public health and safety regardless of the impact on the nuclear industry or electric utilities. The purpose of this Report is to inform the public of the present state of the NRC safety review process and to thereby put pressure on the NRC to fulfill its statutory responsibilities.

APPENDIX I

DOCUMENTS RELATED TO OR BEARING ON
THE REPORT ON THE NUCLEAR REGULATORY
COMMISSION REACTOR SAFETY REVIEW PROCESS
BY ROBERT D. POLLARD

DATED FEBRUARY 6, 1976

A. INDIAN POINT 2 DOCUMENTS

1. Report to the Advisory Committee on Reactor Safeguards in the matter of Indian Point Unit No. 2, February 23, 1968 - OFFICIAL USE ONLY.

2. Memorandum to R. S. Boyd from V. A. Moore, March 11, 1969, reporting the results of "a cursory examination of the Indian Point #2 FSAR in order to identify major areas of concern".

3. Memorandum to Roger S. Boyd from V. A. Moore, March 17, 1969, reporting additional areas of concern as a result of meeting with the applicant on March 12, 1969.

4. Memorandum to R. S. Boyd from Karl Kniel, April 17, 1969, summarizing the discussions with the applicant on March 12, 1969.

5. Memo Route Slip to R. C. DeYoung from V. A. Moore, June 10, 1969, discussing problems with the proposed Indian Point No. 2 questions dated June 6, 1969.

6. Memo Route Slip to Ray Fraley from Roger S. Boyd, August 19, 1969, transmitting "some draft copies of an informal report on our Indian Point 2 review -- for use by the (ACRS) Subcommittee at the August 23 meeting".

7. Report to the ACRS, Indian Point Nuclear Generating Unit No. 2, August 19, 1969 - OFFICIAL USE ONLY.

8. Memorandum to Peter A. Morris from Voss A. Moore, Jr., September 8, 1969, discussing and providing additional information on the areas' of concern identified by 3. above.

9. "Note to Pete (Morris)" from R. S. Boyd, September 19, 1969 responding to "poison pen memo RT-671A". (Note: RT-671A is item 8. above)

10. Memorandum to R. T. Carlson from Olan D. Pare and Vincent D. Thomas, January 5, 1970, transmitting results of the Indian Point No. 2 Plant inspection of December 15-19,1969.

11. Memorandum to Saul Levine from O. D. Parr and R. D. Pollard, January 12 1970, providing minutes of meetings held on December' and 30, 1969.

12. Memorandum to Peter A. Morris from Voss A. Moore, Jr., January 16, 1970, discussing "electric items which do not meet present day criteria".

13. Memorandum to Saul Levine from O. D. Parr and R. D. Pollard, January 29, 1970, providing the minutes of the meeting held on January 16, 1970, and identifying unresolved items.

14 Memo randum to Peter A. Morris from Edson G. Case, April 3, 1 70, regarding "unresolved electrical and instrumentation items". (Note: The Electrical, Instrumentation, & Control Systems Branch's file copy also has identified whether the eight areas were "accepted", "resolved" or remained "unresolved". No explanation is recorded concerning the difference between "accepted" and "resolved".)

15. Memo Route Slip to Edson G. Case from Voss Moore, April 7, 1970, providing a tabulation of those areas "which we believe have been resolved but not documented".

16. Letter to R. C. DeYoung from M. W. Libarkin, April 2, 1970, regarding the tentative agenda for the ACRS Subcommittee meeting on April 25, 1970.

17. Memo Route Slip to Edson G. Case from Voss A. Moore, April 14, 1970, regarding assignments to prepare to discuss each of the items on the ACRS Subcommittee agenda.

18. Memorandum to P. A. Morris from R. C. DeYoung, May 5, 1970, transmitting a "summary report of the ACRS Subcommittee meeting on Indian Point 2 held at O'Hare Airport on April 25,. 1970".

19. Letter to R. C. DeYoung from M. W. Libarkin, May 15, 1970, regarding the tentative agenda for the ACRS Subcommittee meeting on May 28, 1970.

20. Memorandum to R. C. DeYoung from Karl Kniel, May 15, 1970, transmitting a "summary report of a meeting on Indian Point 2 held at 1717 H Street on May 5, 1970."

21. Memorandum to P. A. Morris from Edson G. Case, May 18, 1970, transmitting a report on the engineered safety feature manual actuation panels to be used in case "the ACRS agrees to consider the problem".

22. Memorandum to P. A. Morris from Edson G. Case, May 19, 1970, transmitting a "report -- prepared by the DRS Electrical Systems Branch for use in the DRL ACRS report concerning the Indian Point No. 2 plant".

23. Memorandum to R. C. DeYoung from Karl Kniel, May 25, 1970, transmitting a "summary report of an ACRS Subcommittee Meeting, held at the site on May 11, 1970".

24. Letter to Dr. Joseph M. Hendrie from Peter A. Morris, June 5, 1970, transmitting a "Special Report to the ACRS, Indian Point Nuclear Generating Unit No. 2, Operating License Review" relating to two unresolved items concerning reactor protection and engineered safety feature instrumentation and controls - OFFICIAL USE ONLY.

25. Letter to Dr. Peter A. Morris from R. F. Fraley, June 17, 1970, regarding "resolution of items discussed during the 122nd ACRS meeting".

26. Report to the ACRS, Indian Point Nuclear Generating Unit No. 2, Operating License Review, July 2, 1970 - OFFICIAL USE ONLY.

27. Letter to Consolidated Edison from Peter A. Morris, July 24, 1970, transmitting additional questions regarding Indian Point 2.

28. Report to the ACRS, Indian Point Nuclear Generating Unit No. 2, Operating License Review, Report No. 2, September 4, 1970 - OFFICIAL USE ONLY.

29. Memorandum to P. A. Morris from Edson G. Case, September 10, 1970, transmitting additional information to supplement the report transmitted on May 19, 1970 (Item 22. above).

30. Safety Evaluation by the Division of Reactor Licensing in the matter of Indian Point Nuclear Generating Unit No. 2, November 16, 1970.

31. Memorandum to J. P. O'Reilly from N. C. Moseley, March 18, 1971, transmitting CO Report No. 247/71-4 by G. L. Madsen dtd 3/10/71.

32. Supplements Nos. 1, 2 and 3 to the Safety Evaluation by the Division of Reactor Licensing in the matter of Indian Point Nuclear Generating Unit No. 2.

33. memorandum to R. C. DeYoung from R. H. Engelken, November 16, 1971, regarding a preliminary report of the Indian Point fire.

34. Memorandum to J. G. Keppler from Eldon J. Brunner, February 4, 1972, transmitting Co Inquiry Report No. 50-247/7203.

35. Letter to Robert W. Reid from William J. Cahill, Jr., September 15, 1975, regarding future action for resolution of the submerged valve problem and analysis of the Indian Point 2 emergency core cooling system performance.

36. Memorandum to Robert W. Reid from Zoltan R. Rosztoczy, December 8, 1975, regarding "evaluation of Con Ed's proposed change of reactor coolant pump underfrequency trip setpoint".

B. DOCUMENTS RELATED TO MISSILES GENERATED BY REACTOR COOLANT PUMP OVERSPEED DURING A LOSS OF COOLANT ACCIDENT.

37. Report; R. F. Farman and N. R. Anderson, "A Pump Model for Loss-of-Coolant Accident Analysis, date unknown. (This work was performed by Aerojet Nuclear Company for AEC under Contact AT(10-1)-1375.)

38. Memorandum to R. C. DeYoung from R. R. Maccary, January 26, 1973, regarding evaluation of pump flywheel overspeed.

39. Note to R. C. DeYoung from R. W. Kiecker, March 14, 1973, transmitting copies of notes of the meeting held with reactor vendors regarding reactor coolant pump overspeed during a LOCA.

40. Memorandum to D. F. Ross from Paul E. Norian, June 19, 1973, regarding calculations of PWR pump overspeed during a LOCA.

41. Note to' R. C. DeYoung from R. W. Klecker, July 5, 1973, providing a brief discussion of reactor coolant pump overspeed during a LOCA "which may be useful as background information for further AEC deliberations regarding this matter".

186

42. Memorandum to R. C. DeYoung from R. W. Klecker, July 10, 1973, transmitting minutes of a joint meeting on pump overspeed analytical models.

43. Letter to Mr. Howard Arnold of Westinghouse from R. C. DeYoung, July 19, 1973, requesting a report on various aspects of the pump overspeed problem. (Note: Distribution did not. include the Public Document Room)

44. Note to S. H. Hanauer, et al. from R. C. DeYoung, July 27, 1973, transmitting a draft of the proposed presentation to ACRS on pump overspeed during a LOCA.

45. Memorandum to Victor Stello, Jr. from T. A. Ippolito, August 3, 1973, transmitting an evaluation of electrical braking as a means of limiting pump overspeed during a LOCA.

46. Letter to Harold C. Mangelsdorf from R. C. DeYoung, August 6, 1973, transmitting the staff's report on reactor coolant pump overspeed during a LOCA.

47. Memorandum to John F. O'Leary from S. H. Hanauer, August 9, 1973, titled "Pump Overspeed Patches" transmitting comments on the report on reactor coolant pump overspeed during a LOCA.

48. Memo Route Slip to R. C. DeYoung, et al. from Dr. Hendrie, August 10, 1973, transmitting item 4.7 above and discussing future action.

49. Memorandum to R. W. Klecker from Roger J. Mattson, September 7, 1973, transmitting an ANC internal memorandum which corrects the minutes of the June 21, 1973 meeting on pumps, i.e., Memorandum from R. F. Farman to W. A. [illegible]

50. [illegible]

C. [illegible]

[illegible]

52. Memo Route Slip to EI&CS Branch from T. Ippolito, April 4, 1974, regarding evaluation of interruption of power to ESP au a during the accident sequence.

53. Memorandum to Joseph M. Hendrie from Thomas A. Ippolito, September 12, 1973, regarding a technical position on the application of the single failure criterion to manually-controlled electrically-operated valves.

54. Memo Route Slip to T. Ippolito from J. Hendrie, September 17, 1973, responding to item 53 above.

55. Memorandum to R. C. DeYoung and V. A. Moore from Victor Stello, Jr., October 1, 1973, transmitting "Technical Position on the Application of the Single Failure Criterion to Manually-Controlled Electrically-Operated Valves".

56. Letter to L. *Manning Muntzing* from W. Kerr, January 14, 1975 regarding "Locking Out of ECCS Power Operated Valves".

57. Note to Lester Rogers from A. Giambusso, October 24, 1973, regarding the need for and requirements on *instrumentation* to monitor 'post-accident *conditions.*

58. Memorandum to Victor Stello, Jr. from Thomas A. Ippolito, September 6, 1973, transmitting recommendations on "Design Improvements for Standard Plant Reviews".

59. Note to V. Stello from Thomas A. Ippolito, January 9, 1974, regarding "certain assumptions made in the analyses of the following accidents (which) are in violation with the established Staff's requirements".

60. Memorandum to Electrical, *Instrumentation* and Control Systems Branch Members from Thomas A. Ippolito, October 22, 1975, regarding responsibilities for evaluation of steam line break accidents.

61. Letter to Commissioner Gilinsky from S. H. Hanauer, March 13, 1975, entitled "Technical Issues". Dr. Hanauer discusses some technical issues he believes "to be important subjects for Commission consideration, although not necessarily in the immediate future".