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DEC 20 1974

Docket No. 50-293

Boston Edison Company
ATTN: Mr. Maurice J. Feldman
Vice President
Operations and Engineering
800 Boylston Street
Boston, Massachusetts 02199

Gentlemen:

The Commission has issued the enclosed Amendment No. 7 to Facility License No. DPR-35. This amendment includes Change No. 9 to the Technical Specifications and is in response to your request dated November 11, 1974, and an earlier filing dated August 27, 1973.

This amendment adds interim surveillance requirements to the Technical Specifications for the Pilgrim Nuclear Power Station Unit 1 pending completion and acceptance of certain modifications to the facility to assure that it will withstand the consequences of postulated ruptures in the high energy fluid piping outside containment without loss of capability to achieve and maintain safe shutdown of the facility.

Copies of the Safety Evaluation and the Federal Register Notice relating to this action also are enclosed.

Sincerely,

Dennis L. Ziemann, Chief
Operating Reactors Branch #2
Directorate of Licensing

Enclosures:
1. Amendment No. 7 w/Change No. 9
2. Safety Evaluation
3. Federal Register Notice

L:DD/RP
AGiambusso
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OFFICE ➤	L:ORB-2	L:ORB-2	L:ORB-2	OGC	L:OR	L:ORB-2
SURNAME ➤	RMDiggs/tlc	PWO'Connor	DLZiemann	R. Kinsey	for KRGoller	JCSnell
DATE ➤	11/27/74	11/25/74	11/28/74	12/9/74	12/20/74	11/29/74

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DEC 20 1974

cc w/enclosures:
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Boston Edison Company
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Boston, Massachusetts 02199

Mr. J. Edward Howard, Superintendent
Nuclear Engineering Department
Boston Edison Company
800 Boylston Street
Boston, Massachusetts 02199

Mr. Grant Baston, Pilgrim Division Head
Boston Edison Company
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Plymouth, Massachusetts 02360

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Senior Licensing Engineer
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Mr. David F. Tarantino
Chairman, Board of Selectman
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Plymouth, Massachusetts 02360

cc w/enclosures and copy of
incomings dtd. 8/27/73 and 11/11/74:
Henry Kolbe, M. D.
Acting Commissioner of Public
Health
Massachusetts Department of
Public Health
600 Washington Street
Boston, Massachusetts 02111

Mr. Wallace Stickney
Environmental Protection Agency
JFK Federal Building
Boston, Massachusetts 02203

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SURNAME➤						
DATE➤						

BOSTON EDISON COMPANY

DOCKET NO. 50-293

PILGRIM NUCLEAR POWER STATION

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 7
License No. DPR-35

1. The Atomic Energy Commission (the Commission) has found that:

   A. The application for amendment by Boston Edison Company (the licensee) dated November 11, 1974, and the related information dated August 27, 1973, comply with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public, and

   E. No request for a hearing or petition for leave to intervene was filed following notice of the proposed action.

2. Accordingly, the license is amended by a change to the Technical Specifications as indicated in the attachment to this license amendment and Paragraph 3.B of Facility License No. DPR-35 is hereby amended to read as follows:

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DATE➤						

"B. <u>Technical Specifications</u>

The Technical Specifications contained in Appendices A and B, as revised, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications, as revised by issued changes thereto through Change No. 9."

3. This license amendment is effective as of the date of its issuance.

FOR THE ATOMIC ENERGY COMMISSION

Original signed by
Roger S. Boyd
A. Giambusso, Deputy Director
for Reactor Projects
Directorate of Licensing

Attachment:
Change No. 9 to the
Technical Specifications

Date of Issuance: DEC 20 1974

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SURNAME➤						
DATE➤						

ATTACHMENT TO LICENSE AMENDMENT NO. 7

CHANGE NO. 9 TO THE TECHNICAL SPECIFICATIONS

FACILITY OPERATING LICENSE NO. DPR-35

Replace page 151 with the attached page 151 and add the attached new pages 127A and 138A. The revised page has a marginal line indicating where the change appears.

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DATE ➤						

3.6.H High Energy Piping (outside containment)

1. The high energy line sections identified in Table 4.6.2 shall be maintained free of visually observable through-wall leaks.

2. If a leak is detected by the surveillance program of 4.6.H, efforts to identify the source of the leak shall be started immediately.

3. If the source of leakage cannot be identified within eight hours of detection or if the leak is found to be from a break in the sections identified in Table 4.6.2, the leak shall be isolated or the reactor shall be in a cold shutdown condition within 48 hours.

4. When the modifications, described
9 in FSAR Amendment No. 34, to
provide protection against high
energy line breaks outside of the
primary containment have been
completed, Technical Specifications
3.6.H and 4.6.H will no longer be
required.

4.6.H High Energy Piping (outside containment)

The inspections listed in Table 4.6.2 shall be performed as specified to verify the structural integrity of the specified high energy line sections. The standards of Section XI of the ASME Boiler and Pressure Vessel Code, 1974, Article IWB 3000 shall be used in these inspections.

TABLE 4.6.2

INSERVICE INSPECTION REQUIREMENTS FOR HIGH ENERGY LINES OUTSIDE CONTAINMENT

ITEM NO.	HIGH ENERGY AREA	INSPECTION METHOD*	FREQUENCY	
1.	Main steam lines outside containment from containment to turbine stop valves	Visual	Monthly When Operating	
2.	HPCI steam line in torus area and in HPCI turbine area	Visual	Monthly When Operating	
3.	RCIC steam line in valve compartment and pump compartment	Visual	Monthly When Operating	9
4.	RWCU line in pump, heat exchanger compartments and valve compartment	Visual	Monthly When Operating	
5.	Feedwater lines outside containment to the reactor feedwater pump check valves	Visual	Monthly When Operating	

* A visual inspection for indications of leakage from all design basis piping break locations

BASES:

3.6.G and 4.6.G

Structural Integrity (Cont'd)

The more frequent inspections delineated for the Category J, Group I pipe welds is to provide additional conservatism in the overall approach of protection against pipe whip which has the potential to breach the containment. A pipe whip protection system is being installed consisting of steel members attached to a reinforcing plate and located such that the postulated pipe weld failure will not breach the containment. Additional inspection of critical welds is also included in the inservice inspection program. The Group I welds listed are those pipe welds of interest.

After five years of operation, a program for in-service inspection of piping and components within the associated auxiliary systems and engineered safety features boundaries, as defined in Section XI of the 1970 ASME Boiler and Pressure Vessel Code, shall be submitted to the AEC.

3.6.H and 4.6.H

High Energy Piping Outside of Containment

Analyses performed and submitted to the AEC as Pilgrim Nuclear Power Station, Unit #1, FSAR Amendment #34 indicate that certain modifications to the station would increase the protection against the potential effects of postulated high energy piping failures outside the primary containment. In order to provide greater assurance that the integrity of the high energy piping outside the primary containment is maintained at an acceptable level in the interim until these modifications can be completed, an increase in the frequency of inspections of the areas of concern will be initiated. The monthly visual inspection of high energy piping outside the containment while the station is operating will provide greater assurance of the timely detection of postulated piping failures and allow appropriate corrective 9
action to be performed. Reference to Article IWB 3000 of the 1974 ASME Boiler and Pressure Vessel Code ensures that appropriate in-service visual examination techniques and evaluations are used to implement the requirements of Technical Specification Table 4.6.2. These in-service visual examinations will normally be made with the indicated piping and insulation in its operating condition. Subsequent to the completion of the modifications, the original in-service inspection requirements defined in Section 4.6.G of these Technical Specifications will provide adequate inspections to allow timely detection of postulated failures

UNITED STATES ATOMIC ENERGY COMMISSION

SAFETY EVALUATION BY THE DIRECTORATE OF LICENSING

DOCKET NO. 50-293

PILGRIM NUCLEAR POWER STATION

ANALYSIS OF THE CONSEQUENCES OF HIGH ENERGY PIPING FAILURES OUTSIDE CONTAINMENT

INTRODUCTION

On December 18, 1972, and January 19, 1973, the Atomic Energy Commission's Regulatory staff sent letters to Boston Edison requesting a detailed design evaluation to substantiate that the design of the Pilgrim Nuclear Power Station is adequate to withstand the effects of a postulated rupture in any high energy fluid piping system outside the primary containment, including the double-ended rupture of the largest line in the main steam and feedwater system. It was further requested that if the results of the evaluation indicated that changes in the design were necessary to assure safe plant shutdown, information on these design changes and plant modifications would be required. Criteria for conducting this evaluation were included in the letters. A meeting was held on February 7, 1973, to discuss the information already available on the Pilgrim Station design concerning postulated pipe ruptures, to discuss the criteria, and to assess those areas where additional information was required. In response to our letters, FSAR Supplement No. 34 concerning postulated high energy pipe ruptures outside containment was filed by Boston Edison on August 27, 1973.

EVALUATION

Criteria

A summary of the criteria and requirements included in our letter of December 18, 1972, is set forth below:

a. Protection of equipment and structures necessary to shut down the reactor and maintain it in a safe shutdown condition, assuming a concurrent and unrelated single active failure of protected equipment, should be provided from all effects resulting from ruptures in pipes carrying high energy fluid, where the temperature and pressure conditions of the fluid exceed 200°F and 275 psig, respectively, up to and including a double-ended rupture of such pipes. Breaks should be assumed to occur in those locations specified in the "pipe whip criteria". The rupture effects to be considered include pipe whip, structural (including the effects of jet impingement), and environmental.

b. In addition, protection of equipment and structures necessary to shut down the reactor and maintain it in a safe shutdown condition, assuming a concurrent and unrelated single active failure of protected equipment, should be provided from the environmental and structural effects (including the effects of jet impingement) resulting from a single open crack at the most adverse location in pipes carrying fluid routed in the vicinity of this equipment. The size of the cracks should be assumed to be 1/2 the pipe diameter in length and 1/2 the wall thickness in width.

High Energy Systems

Our evaluation included the following piping systems containing high energy fluids:

Main, Extraction, and Auxiliary Steam Systems

Feedwater System

Condensate System

Reactor Core Isolation Cooling System (RCIC)

High Pressure Coolant Injection System (HPCI)

Reactor Water Cleanup System (RWCU)

Residual Heat Removal System (RHR)

Sample Lines (Environmental Effects Only)

Areas or Systems Affected by High Energy Pipe Breaks

An evaluation was conducted of the effects of high energy pipe breaks on the following systems, components, and structures which would be necessary (in various combinations, depending on the effects of the break) to safely shutdown, cooldown, and maintain cold shutdown conditions:

a. General

1. Control Room

2. Control and Instrument Cables and Tunnels

3. Electrical Distribution System

4. Emergency dc Power Supply (batteries)

5. Emergency ac Power Supply (diesels)

6. Heating and Ventilation Systems (needed for long-term occupancy to maintain the reactor in safe shutdown condition)

b. Reactor Control Systems and associated instrumentation

c. Cooling and Service Water Systems

d. ECCS components

Specific Areas of Concern

The applicant has provided the results of his examination of all postulated safety related high energy line break locations and evaluated the break consequences. We have reviewed all of this information, including the following specific areas of concern where the potential consequences might be severe or where specific corrective action would further assure safe cold shutdown of the plant.

a. Compartment Pressurization

Large pipe breaks, including the double-ended rupture of the largest pipes in a system, and small leakage cracks up to the design basis size have been considered for the main steam tunnel, the turbine building, the ECCS rooms, and the valve compartments.

In the condenser compartment, a failure of a main steam line would pressurize the condenser compartment to 1.4 psig maximum at 210°F maximum temperature with a vent area of approximately 506 ft^2. In order to assure that the pressure remains below this value, plugs in the turbine deck will be removed to provide added vent area and some doors will be reinforced. Shielding will be provided to compensate for the removal of the plugs.

In the main steam tunnel, the effects of a combined main steam line break and a feedwater line rupture were considered as the worst cases. The resultant pressure was calculated to increase to 7.2 psig with a 296°F maximum temperature.

However, jet loadings on the main steam tunnel floor resulting from main steam line or feedwater line slot failures could result in loadings which exceed the structural capacity of the floor of 4.6 psi. Therefore, additional beams and bracing will be installed to increase the tunnel floor capability to 14.0 psi which is almost twice the calculated pressure from a worst case pipe break.

The calculated pressure increase resulting from the worst break of a main steam line in the condenser compartment would pressurize the condenser compartment to 1.4 psig maximum pressure and 210°F maximum temperature. In order to assure that this maximum pressure will not be exceeded, some concrete plugs in the turbine deck will be removed.

A failure of the Reactor Core Isolation Cooling System (RCIC) steam line could result in a maximum pressurization of 0.4 psig in the valve compartment and 0.3 psig in the RCIC pump room compartment which have respective design pressures of 5.4 psig and 10.6 psig and, therefore, no structural changes are required.

An HPCI steam line failure in the HPCI valve compartment or pump room could result in discharge of steam until automatic isolation is achieved. A maximum pressure occurring in the valve compartment has been calculated to be 13.2 psig which is below the structural capabilities of the structure with the exception of a portion of a block wall which will be reinforced.

An HPCI pump compartment ceiling pressure less than the pressure limit of 8.5 psi has been assured by adding vent paths through existing equipment hatches. With this design, the maximum calculated pressure in the event of an HPCI steam line break is 1.5 psig.

A postulated RWCU high energy line failure in the cleanup system pump or heat exchanger compartments results in a single ended piping failure until isolation is achieved. A check valve in the upstream connection into the feedwater piping would prevent extensive backflow. The calculated pressure resulting from a pipe failure would be 6.0 psig in the heat exchanger room, 0.3 psig in the pump compartment, and 0.4 psig in the valve compartment. The minimum design capacities of the reinforced walls in these areas are 10.6 psi for the heat exchanger and pump compartments and 12.7 psi for the valve compartment.

To prevent removable concrete blocks from being ejected from wall openings, additional structural reinforcement will be provided.

b. Pipe Whip

The steam tunnel has been designed with thick reinforced concrete capable of withstanding large static and dynamic loads. The reinforced concrete steam tunnel in which the main steam and feedwater lines are routed from the primary containment to the turbine room is subjected only to the loads of the piping and a live load from the floor on top of the tunnel roof. The tunnel walls and roof have been evaluated for impact loads in excess of 1873 kips caused by the postulated pipe break of the main steam and feedwater lines and have been found to be satisfactory. The largest force impacted by a whipping line in the tunnel was calculated to be 400 kips. The resultant force on the floor exceeds the design and reinforcement will be added to assure the floor will withstand the resultant pipe whip.

In most cases of previously described high energy line breaks within compartments, the structure is capable of withstanding the force of the whipping line by at least a factor of 10. The exceptions are where previously described alterations were required to withstand pressure buildup, the structure will be capable of withstanding an impacted line with little damage, but in no way exposing any safeguards systems to any damaging forces.

High energy lines to the HPCI and RCIC turbine inlet are routed above the torus and may penetrate the torus if either line was to rupture. Modifications will be made to the HPCI steam line in this area to prevent penetration of the torus by the addition of piping restraints over areas where possible pipe whip could occur.

Whipping of the RCIC steam line resulting from failure at potential break points identified in the suppression chamber compartment cannot result in sufficient impact force on the suppression chamber wall to cause loss of suppression chamber integrity.

Other high energy lines such as the sample lines and reactor water cleanup line are located such that their rupture would not cause damage to the torus. A whip of either the RCIC or HPCI steam line outside the torus compartment could damage system isolation valves on the HPCI, RCIC, or RWCU lines. Restraints will be provided to assure operability of these isolation valves.

c. <u>Control Room Habitability</u>

The main control room is physically located away from and isolated from all high energy lines. Neither the control room equipment nor its ventilation system will be affected by environmental effects caused by a rupture of a high energy line.

d. <u>Environmental Effects</u>

Components and equipment were analyzed and checked for possible adverse environmental effects which could be caused by the rupture of a high energy line. Adverse temperature, pressure, and humidity were the parameters which were used in the evaluation of safety related equipment. We have reviewed the licensee's assessment of the consequences of environmental effects on safety related equipment. We find that safety related equipment has been designed to limits in excess of postulated conditions which could arise from the rupture of a high energy line.

<u>Modifications</u>

Modifications to the existing facility currently are being undertaken by Boston Edison to assure that the design will have adequate safety margins in the event of a high energy line rupture outside the containment. The following is a summary of these modifications:

a. Provide additional compartment vent areas as follows:

1. Remove concrete hatch plug at elevation 51' on the west end of turbine building.

2. Provide a vent path from the high pressure coolant injection pump room through the equipment hatches to the 23' elevation in the reactor auxiliary bay.

Additional shielding will be provided, as necessary, in the areas local to a.1 and a.2 above after normal in-plant operational radiation levels are established following completion of these modifications.

3. Modify the main turbine combined intermediate valve enclosures at elevation 51' in the turbine building to assure blowout at 0.25 psi differential pressure.

b. Provide structural reinforcement for the main steam tunnel floor, the south wall in the residual heat removal system valve compartment at elevation 23' in the reactor building, the removable block wall in the north side of the reactor water cleanup system pump, the heat exchanger compartments at elevation 51' in the reactor building, and a portion of the high pressure coolant injection system valve compartment west wall at elevation 23' in the reactor building.

c. Reinforce two doors at elevation 6'-0" in the east condenser compartment wall.

d. Provide pipe whip restraints and/or valve motor operator protection to assure the operability of high pressure coolant injection (HPCI) outboard isolation valve MO-2301-5, reactor core isolation cooling (RCIC) outboard isolation valve MO-1301-17, reactor water cleanup (RWCU) outboard isolation valve MO-1201-5, and RWCU return line check valve 1201-81.

e. Install backup manual reactor building closed cooling water isolation valves for the equipment area cooling systems unit coolers (which serve the RCIC and HPCI pumps) in areas remote from these pump rooms. These valves will be installed to provide for early restoration of reactor building closed cooling water loop redundancy.

CONCLUSIONS

On the basis of this review of the information submitted to us and on our discussion with representatives of the Boston Edison Company, we have concluded that their assessment of the consequences of high energy line failures outside containment is acceptable. Some modifications are necessary. We have concluded that the potential consequences of these postulated high energy pipe failures, following the modifications, will not prevent the capability to achieve safe cold shutdown conditions consistent with the single failure and redundancy requirements as described in our letter of December 18, 1972.

The licensee has stated, in a letter dated October 31, 1974, that modifications will be completed during the next refueling outage scheduled for September 1975. In the interim, Boston Edison has proposed to undertake an increased surveillance program in the areas of concern. This additional surveillance and the limited time required for completion of final modifications will reduce the likelihood of a high energy line break. We have concluded that there is reasonable assurance that the health and safety of the public will not be endangered by continued operation in the manner proposed.

/S/
James C. Snell
Operating Reactors Branch #2
Directorate of Licensing

Original signed by
Dennis L. Ziemann, Chief
Operating Reactors Branch #2
Directorate of Licensing

Date: DEC 20 1974

UNITED STATES ATOMIC ENERGY COMMISSION

DOCKET NO. 50-293

BOSTON EDISON COMPANY

NOTICE OF ISSUANCE OF AMENDMENT TO FACILITY OPERATING LICENSE

No request for a hearing or petition for leave to intervene having been filed following publication of the notice of proposed action in the Federal Register on October 15, 1974 (39 F.R. 36887), the Atomic Energy Commission (the Commission) has issued Amendment No. 7 to Facility Operating License No. DPR-35 to the Boston Edison Company (the licensee) for the Pilgrim Nuclear Power Station (the facility), a boiling water reactor located in Plymouth County, Massachusetts, and currently authorized for operation at power levels up to 1998 MWt. The amendment is effective as of its date of issuance.

The license amendment revised the Technical Specifications for the facility to incorporate increased interim surveillance requirements for the high energy fluid piping outside containment pending completion and acceptance of certain modifications to the facility to assure that it will withstand the consequences of postulated ruptures in the high energy fluid piping outside containment without loss of capability to achieve and maintain safe shutdown of the facility as required by the Commission's regulations.

The Commission has found that the information filed by the licensee pertaining to the above action dated August 27, 1973 and November 11, 1974,

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comply with the requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's regulations published in 10 CFR Chapter I. The Commission has made appropriate findings as required by the Act and the Commission's rules and regulations in 10 CFR Chapter I, which are set forth in the license amendment.

The Commission's Directorate of Licensing has completed its evaluation of the above action and a Safety Evaluation is being issued concurrently with this notice concluding that there is reasonable assurance that the health and safety of the public will not be endangered by the operation of the facility with the changes to the Technical Specifications as authorized by Amendment No. 7 to License No. DPR-35.

Copies of (1) Amendment No. 7 with Change No. 9 to the Technical Specifications of Facility Operating License No. DPR-35, and (2) the Commission's concurrently issued Safety Evaluation are available for public inspection at the Commission's Public Document Room at 1717 H Street, N. W., Washington, D. C., and at the Plymouth Public Library, North Street, Plymouth, Massachusetts 02360. Single copies of items 1 and 2 may be obtained upon request addressed to the U. S. Atomic Energy Commission, Attention: Deputy Director for Reactor Projects, Directorate of Licensing - Regulation.

Dated at Bethesda, Maryland, this 20 th day of December, 1974.

FOR THE ATOMIC ENERGY COMMISSION

Original signed by
Dennis L. Ziemann

Dennis L. Ziemann, Chief
Operating Reactors Branch #2
Directorate of Licensing

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DATE ➤						

"B. <u>Technical Specifications</u>

The Technical Specifications contained in Appendices A and B, as revised, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications, as revised by issued changes thereto through Change No. 9."

3. This license amendment is effective as of the date of its issuance.

FOR THE ATOMIC ENERGY COMMISSION

Karl R. Goller, Assistant Director
for Operating Reactors
Directorate of Licensing

Attachment:
Change No. 9 to the
Technical Specifications

Date of Issuance:

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SURNAME ➤						
DATE ➤						

the heat exchanger compartments at elevation 51' in the reactor building, and a portion of the high pressure coolant injection system valve compartment west wall at elevation 23' in the reactor building.

c. Reinforce two doors at elevation 6'-0" in the east condenser compartment wall.

d. Provide pipe whip restraints and/or valve motor operator protection to assure the operability of high pressure coolant injection (HPCI) outboard isolation valve MO-2301-5, reactor core isolation cooling (RCIC) outboard isolation valve MO-1301-17, reactor water cleanup (RWCU) outboard isolation valve MO-1201-5, and RWCU return line check valve 1201-81.

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James C. Snell
Operating Reactors Branch #2
Directorate of Licensing

Dennis L. Ziemann, Chief
Operating Reactors Branch #2
Directorate of Licensing

OFFICE➤						
SURNAME➤						
DATE➤ Date:						