



BOSTON EDISON

Executive Offices
800 Boylston Street
Boston, Massachusetts 02199

Proposed Change 86-09
September 9, 1986
BECO 86-136

James M. Lydon
Chief Operating Officer

Mr. John A. Zwolinski, Director
BWR Project Directorate #1
Division of Licensing
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

License DPR-35
Docket 50-293

Proposed Technical Specification Change to
Allow Hydrogen Injection

Dear Sir,

By letter of April 5, 1985 the NRC transmitted Amendment No.86 to Facility Operating License No. DRR-35 for the Pilgrim Nuclear Power Station. This responded to our request for change transmitted by letters of February 1, 1985 and February 15, 1985. The change added a note to Tables 3.1.1 and 3.2.A permitting changes in the normal full power background trip level for the main steam line high radiation scram and isolation setpoints to accommodate a short-term test of operation with hydrogen injection into the reactor coolant.

Boston Edison has concluded, based on the testing, that hydrogen injection is desirable at Pilgrim Station as a mitigator of intergranular stress corrosion cracking (IGSCC) in stainless steel piping. To permit future injection, we herein submit a request for amendment to our license which removes reference to short-term testing in the note, and thereby makes permanent the change granted in Amendment No.86.

8609230208 860909
PDR ADOCK 05000293
P PDR

*Approval w/check \$150⁰⁰
#967808*

Should you wish further information concerning this proposal, please contact us.

Very truly yours,
James M Lydon

Attachment
Three signed originals and 37 copies
cc: see next page

Commonwealth of Massachusetts)
County of Suffolk)

Then personally appeared before me, James L. Lydon, who, being duly sworn, did state that he is Chief Operating Officer of Boston Edison Company and that he is duly authorized to execute and file the submittal contained herein in the name and on behalf of Boston Edison Company and that the statements in said submittal are true to the best of his knowledge and belief.

My commission expires:

Apr. 13, 1992
DATE

Gerald G. Whitney
NOTARY PUBLIC

Gerald G. Whitney
Notary Public

My Commission Expires April 3, 1992

BOSTON EDISON COMPANY
September 9, 1986
Page 3

cc: Mr. Robert M. Hallisey, Director
Radiation Control Program
Mass. Dept. of Public Health
150 Tremont Street F-7
Boston, MA 02111

Proposed Change

Reference is made to Pilgrim Operating License No. DPR-35, Appendix A, pages 29 and 46. Pages 27 and 45 are provided for reference. Page 27 contains Table 3.1.1, "Reactor Protection System (SCRAM) Instrumentation Requirement," and page 29 provides notes associated with that table. Page 45 contains Table 3.2.A, "Instrumentation That Initiates Primary Containment Isolation", and Page 29 provides notes associated with that table.

Currently, Table 3.1.1 states that the main steam line high radiation trip level setting is " $\leq 7x$ Normal Full Power Background, and references Note (18)." This applies to Refuel, Startup, Hot Standby and Run modes.

The desired amendment would change Note (18) by deleting the word "test" wherever it currently appears. Note (18) shall now state:

Within 24 hours prior to the planned start of hydrogen injection with the reactor power at greater than 20% rated power, the normal full power radiation background level and associated trip setpoints may be changed based on a calculated value of the radiation level expected during the injection of hydrogen. The background radiation level and associated trip setpoints may be adjusted based on either calculations or measurements of actual radiation levels resulting from hydrogen injection. The background radiation level shall be determined and associated trip setpoints shall be set within 24 hours of re-establishing normal radiation levels after completion of hydrogen injection, or prior to withdrawing control rods at reactor power levels below 20% rated power.

Table 3.2.A includes the main steam line high radiation instrumentation. The proposed change will delete the word "test" in Note (9) of page 46, resulting in the identical wording of the above note.

Reason for Change

This amendment is proposed to permit changes in the normal full power background trip level setting for the Main Steam Line High Radiation scram and isolation setpoints to allow hydrogen injection as an IGSCC mitigating activity.

The purpose of hydrogen injection is to allow Boston Edison to employ hydrogen water chemistry as a mitigator of intergranular stress corrosion cracking (IGSCC) of stainless steel BWR piping. This technique consists of adding hydrogen to the primary coolant to lower the free oxygen concentration by suppressing radiolysis of water. By reducing free oxygen, one of the three necessary causative agents of IGSCC is eliminated. Testing of hydrogen injection as a mitigator was conducted at Pilgrim, and experience gained from that testing indicates that the injection of hydrogen will benefit Pilgrim Station.

In sum, the purpose of employing hydrogen water chemistry is to effect the following benefits:

1. The elimination or reduction of IGSCC concerns.

2. The elimination of the costly replacement or repair of IGSCC, as well as the lost plant availability associated with such activities.
3. The reduction of radiation exposure to personnel engaged in pipe crack repairs and non-destructive examinations which stem from IGSCC.

When hydrogen is injected for oxygen suppression, nitrogen (N-16) carry-over increases in the main steam, which increases radiation in areas where main steam is found. The increased carry-over and radiation is caused by a conversion of N-16 from a soluble to a volatile form in the reactor.

The requested revision of Tables 3.1.1 and 3.2.A, and the addition of notes (18) and (9) permit an increase in the Main Steam Line High Radiation scram and isolation setpoints to allow operation with the higher radiation levels resulting from hydrogen injection. The main steam high radiation setpoint will remain at "< 7 Normal Full Power Background"; however, because of increased N-16 in the steam, the background radiation level used to determine the high radiation setpoint will be increased prior to injection in accordance with a predetermined background level value. These will permit the full load background radiation level to be adjusted such that spurious scrams are avoided. Pre-injection setpoints will be restored following the conclusion of injection, or when power is decreased to below 20% power. Hydrogen injection will not be performed with the reactor at less than 20% power.

Safety Considerations

At the planned hydrogen injection rate, experience indicates an expected increase of approximately 3 to 8 times the normal main steam line background radiation level. The only event which takes credit for the main steam line high radiation (MSLRM) trip is the design basis control rod drop accident (CRDA). As stated in Section 14.7.1.2 of the Pilgrim FSAR, a CRDA is only of concern below 10% of rated power. Since the Main Steam Line Radiation Monitor (MSLRM) setpoint will be adjusted at power levels above 20% power, the FSAR analysis and the design function of the MSLRM trip will remain valid. An increase in the MSLRM setpoint will not impact any other FSAR Chapter 14 accident or transient analysis since no credit is taken for MSLRM trips. Therefore, this proposed technical specification change will not reduce plant safety margins. In addition, the effect of hydrogen injection on the gaseous effluent release rate is expected to be insignificant because of the short decay time for N-16.

Hydrogen injection testing has provided data which resulted in additional shielding and procedural changes such that personnel exposure is minimized during injection. Likewise, steps have been taken so that injection will not have a significant impact on the public.

This proposed change has been reviewed and approved by the Operations Review Committee (ORC), and reviewed by the Boston Edison Nuclear Safety Review and Audit Committee (NSRAC).

Significant Hazards Considerations

The Commission has provided guidance concerning the application of the standards for determining whether license amendments involve no significant hazards considerations by providing certain examples (48 FR 14870). Example (vi) of actions involving no significant hazards consideration is a change

which may reduce in some way a safety margin, but where the results of the change are clearly within all acceptable criteria. The change proposed by this applications fits this example because it would permit the normal full power background level, associated with the Main Steam High Radiation scram and isolation setpoints, to be increased only so as to compensate for the increase in the main steam radiation levels during hydrogen injection. The capability to monitor for fuel failures, which is the mission of the MSLR trip setpoint, is maintained by: (1) the continued operability of the main steam radiation monitors, which provide signals to the reactor protection system and primary containment isolation system; (2) routine radiation surveys; (3) the performance of primary coolant water analyses; and (4) the continued operability of the Steam Jet-Air Ejector Off-Gas Radiation Monitor.

Although the potential for error exists whenever instrument setpoints are adjusted, the resulting increase in the probability or consequences of accidents previously evaluated is considered insignificant because of Boston Edison's existing quality assurance program and operating procedures as applied to instrument adjustments.

If, due to a recirculation pump trip or other unanticipated power reduction event, the reactor drops below 20% rated power without setpoint readjustment, control rod withdrawal is prohibited until the necessary setpoint readjustment is made. This ensures that fuel failures of the type concerning the MSLRM are unlikely.

Radiation protection practices will be performed during hydrogen injection based upon injection test data. Steps have been taken to make changes to plant design and procedures deemed appropriate to minimize personnel exposure during the injection of hydrogen. Changes in gaseous effluent release rates for hydrogen injection are negligible due to the short decay times for N-16.

Based on the diverse means for maintaining the ability to detect fuel failures, on the protection of primary coolant system piping promised by implementing hydrogen water chemistry, on the efficacy of programs and procedures to assure accurate instrument setpoint adjustment, on both routine and exceptional ALARA actions which have been taken, on the ability of existing technical specifications to ensure that inimical control rod movement cannot occur below 20% power, and on the insignificant effect of increased N-16 activity on gaseous effluent release rates, Boston Edison concludes that the proposed amendment will not significantly increase the probability or consequences of accidents previously considered, will not create the possibility of a new or different accident from any previously evaluated, and will not significantly reduce a safety margin. Therefore, Boston Edison proposes to the NRC that it should make a determination that the proposed amendment does not involve significant hazards considerations.

Schedule of Change

This change will become effective upon Boston Edison's receipt of approval by the NRC. It is our intention to begin injection concomitant with startup from RFO #7.

Fee Determination

Pursuant to 10CFR 170.12 (c), an application fee of \$150.00 is included with this proposed amendment.