UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 82 TO FACILITY OPERATING LICENSE NO. NPF-37,

AMENDMENT NO. 82 TO FACILITY OPERATING LICENSE NO. NPF-66,

AMENDMENT NO. 74 TO FACILITY OPERATING LICENSE NO. NPF-72,

AND AMENDMENT NO. 74 TO FACILITY OPERATING LICENSE NO. NPF-77

COMMONWEALTH EDISON COMPANY

BYRON STATION, UNITS 1 AND 2

BRAIDWOOD STATION, UNITS 1 AND 2

DOCKET NOS. STN 50-454, STN 50-455, STN 50-456 AND STN 50-457

1.0 INTRODUCTION

By letter dated October 3, 1995, Commonwealth Edison Company (ComEd, the licensee) proposed changes to the Byron Station and Braidwood Station Technical Specifications (TS) to implement ten of the line-item TS improvements included in NRC Generic Letter (GL) 93-05, "Line-Item Technical Specifications Improvements to Reduce Surveillance Requirements for Testing During Power Operation," dated September 27, 1993. The licensee submitted additional information on February 21, 1996. This letter provided surveillance, maintenance, and operating history in support of the line-item TS improvements. In a letter dated April 2, 1996, the licensee submitted a correction to TS 4.5.1.1.b for Byron. The TS section was correct as submitted for Braidwood, but was inadvertly submitted differently for Byron in the October 3, 1995, submittal. Neither of the two additional submittals changed the initial proposed no significant hazards consideration determination. The proposed changes also include editorial changes on the affected TS pages.

Specifically, the licensee proposed adopting the following line-item improvements from GL 93-05:

1. TS 4.1.3.1.2 (GL 93-05, Item 4.2) - extending the interval for checking the operability of each full-length rod not fully inserted in the core from 31 days to 92 days;

2. TS 4.6.4.1 (GL 93-05, Item 5.4) - extending the interval for testing each hydrogen monitor for combustible gas control from 31 days to 92 days for the analog channel operational test, and from 92 days to each refueling outage for channel calibration;

3. Table 4.3-3 (GL 93-05, Item 5.14) - extending the interval for the digital channel operational test for radiation monitoring instrumentation from monthly to quarterly;

4. TS 4.4.6.2.2.b (GL 93-05, Item 6.1) - extending the time the plant may be in cold shutdown before pressure isolation valve testing is required, prior to entry into Operational Mode 2, from 72 hours to 7 days;

5. TS 4.4.3.2 (GL 93-05, Item 6.6) - extending the interval between current tests of the required groups of pressurizer heaters from 92 days to each refueling outage;

6. TS 4.5.1.1.b (GL 93-05, Item 7.1) - revising the requirement to verify the boron concentration in an accumulator within 6 hours of any volume increase to the accumulator (greater than or equal to 70 gallons) so that the verification is not required when the volume increase is from the refueling water storage tank (RWST) and the RWST has not been diluted since verifying that the boron concentration of the RWST is within the concentration limits for the accumulators;

7. TS 4.6.2.1 (GL 93-05, Item 8.1) - extending the interval between tests to verify each containment spray nozzle is unobstructed from 5 years to 10 years;

8. TS 4.6.4.2 (GL 93-05, Item 8.5) - extending the interval between tests to demonstrate operability of the hydrogen recombiner system from 6 months to once each refueling outage;

9. TS 4.7.1.2.1.a (GL 93-05, Item 9.1) - extending the interval between tests of the auxiliary feedwater pumps from 31 days to 92 days on a staggered test basis; and

10. TS 4.11.2.6 (GL 93-05, Item 13) - extending the interval for determining the quantity of radioactivity contained in each gas decay tank, when radioactivity is being added to the tanks, from 24 hours to 7 days, with the 24-hour frequency maintained during the primary coolant degassing operation.

The editorial changes include: (1) TS 4.4.6.2.1.c, changes the word "from" to the word "to," (2) TS 4.5.1.1.c, the change clarifies that the motor control center compartment for each accumulator isolation valve is open, (3) TS 4.5.1.2, deletes the footnote because the operating cycle in the footnote is over for each unit, and (4) TS 4.7.1.2.1.a.2 and 4.7.1.2.1.c, renumbers and rephrases other surveillance requirements for the auxiliary feedwater pumps because of the proposed change to TS 4.7.1.2.1.a to implement GL 93-05, Item 9.1.

2.0 EVALUATION

NUREG-1366, "Improvements to Technical Specification Surveillance Requirements," December 1992, reported the TS line-item improvements that were identified by the NRC staff. The TS improvements were based on an NRC study of surveillance requirements and included information provided by licensee personnel that plan, manage, and perform surveillances. The study included insights from a qualitative risk assessment of surveillance requirements based on the standard TS for Westinghouse plants and the TS for the Edwin I. Hatch Nuclear Plant, Unit 2. The staff examined operational data from licensee event reports, the nuclear plant reliability data system (NPRDS), and other sources to assess the effect of TS surveillance requirements on plant operation. The staff evaluated the effect of longer surveillance intervals to reduce the possibility for plant transients, wear on equipment, personnel radiation exposure, and burden on personnel resources. Finally, the staff considered surveillance activities for which the safety benefits are small and not justified when compared to the effects of these activities on the safety of personnel and the plant. The NRC staff issued guidance on the proposed TS changes to all holders of operating licenses or construction permits for nuclear power reactors in GL 93-05.

2.1 Proposed Change to TS 4.1.3.1.2 (GL 93-05, Item 4.2)

TS 4.1.3.1.2 requires each full-length control rod not fully inserted in the core to be determined operable by movement of at least ten steps in any one direction at least once per 31 days. The surveillance detects immovable control rods that would prevent meeting rod insertion limits.

The licensee reviewed the surveillance history for the rod control system at both Byron and Braidwood and found that in approximately 100 monthly surveillance checks, there were no instances of an untrippable control rod. However, there have been instances in which immovable control rods were detected, as a result of electrical failures within the rod control system. A review of the corrective and preventative maintenance history for the rod control system at both sites has shown that there have been no component failures identified during maintenance that could have resulted in an untrippable control rod. A review of the operating history for the rod control system has shown that all control rods have fully inserted on each reactor trip of the Byron and Braidwood units except for one instance at Braidwood, Unit 2. That instance would not have been detected during performance of the movable control assemblies monthly surveillance.

The staff has reviewed the proposed TS change as well as the operating and maintenance history provided by the licensee and finds the proposed change to TS SR 4.1.3.1.2 to increase the allowable interval between tests to demonstrate the operability of any partially or fully withdrawn control rod from 31 days to 92 days to be acceptable.

2.2 Proposed Change to TS 4.6.4.1 (GL 93-05, Item 5.4)

The licensee is proposing to increase the frequency for the allowable interval between analog channel operational tests used to demonstrate operability of the containment hydrogen monitors from 31 days to 92 days, and increase the frequency for the channel calibration from 92 days to once each refueling outage. The hydrogen monitors are used after a loss-of-coolant accident (LOCA) so that operators know when to initiate the hydrogen recombiners which maintain hydrogen concentration within containment below its flammable limit.

The licensee reviewed the surveillance history, corrective and preventative maintenance history, and operating history for the post-LOCA hydrogen monitors at Byron and Braidwood. In approximately 200 performances of the monthly analog channel operational test on each unit, there have been only 11 documented failures. In approximately 150 performances of the quarterly channel calibration test on each unit, only 4 failures have been documented. In addition, a review of the corrective and preventative maintenance history has shown that there has been no additional components identified during these maintenance activities that would have resulted in the post-LOCA containment hydrogen monitors being unable to perform their intended safety function.

The staff has reviewed the proposed TS change as well as the operating and maintenance history provided by the licensee, and finds the change to be consistent with the guidance in GL 93-05 and is acceptable.

2.3 Table 4.3-3 (GL 93-05, Item 5.14)

TS Table 4.3-3 lists surveillance requirements for radiation monitoring instruments including a monthly digital channel operational test for the following functional units: (1) ORE-AR055/56, Fuel Building Isolation-Radioactivity-High and Criticality; (2) 1/2RE-AR011/12, Containment Isolation-Containment Radioactivity-High; (3) 1/2RE-PR011B, Gaseous Radioactivity-RCS Leakage Detection; (4) 1/2RE-PR011A, Particulate Radioactivity-RCS Leakage Detection; and (5) ORE-PR031B/32B/33B/34B, Main Control Room Isolation-Outside Air Intake-Gaseous Radioactivity High. The radiation monitors send actuation signals to initiate alarms and automatic actuation of systems in the event that setpoints are exceeded. The licensee is proposing to extend the interval for the digital channel operational test for the instruments listed in Table 4.3-3 from monthly to quarterly. At Byron and Braidwood, the digital channel operational test corresponds to the channel functional test listed in GL 93-05, Item 5.14.

The licensee provided a review of the surveillance history, corrective and preventative maintenance history, and the operating history for the instruments listed in Table 4.3-3. There have been no failures of the monthly digital channel operational test at either site. In addition, there have been no component failures that would have resulted in these radiation monitors failing to fulfill their intended safety function. The instruments have always performed their intended safety function when challenged. Based on the licensee's review of the performance history of the instruments listed in

Table 4.3-3 and the fact that the proposed change meets the intent of GL 93-05, the staff finds the change acceptable.

2.4 TS 4.4.6.2.2.b (GL 93-05, Item 6.1)

TS 4.4.6.2.2.b requires each reactor coolant system (RCS) pressure isolation valve in Table 3.4-1 to be demonstrated operable by verifying leakage to be within its limit prior to entering Mode 2 whenever the plant has been in cold shutdown for 72 hours or more and if leakage testing has not been performed in the previous 9 months. This surveillance requirement provides added assurance of valve integrity, thereby reducing the probability of gross valve failure and consequent intersystem LOCAs. The licensee is proposing to increase the time the plant may be in cold shutdown before pressure isolation valve testing is required prior to entering Mode 2, from 72 hours to 7 days.

A review of the surveillance history for the RCS pressure isolation valves at Byron and Braidwood has shown that there has been only one valve at Byron that has failed this surveillance. That valve was subsequently replaced due to excessive leakage. The licensee also reviewed the corrective and preventative maintenance history for these valves and found no component failures that could have resulted in a failure of the valve to perform its intended function. Also, the operating history for these valves showed that they have always performed their intended safety function when actuated.

Based on the staff review of the licensee's valve performance history and the fact that the proposed change is consistent with the recommendations of GL 93-05, the staff finds the change to 7 days from 72 hours acceptable.

2.5 TS 4.4.3.2 (GL 93-05, Item 6.6)

Surveillance requirement 4.4.3.2 requires that the capacity of each of the required groups of pressurizer heaters be verified by energizing the heaters and measuring circuit current at least once per 92 days. This requirement demonstrates that the capacity of the heaters has not degraded. The licensee is proposing to increase the allowable interval between tests from 92 days to each refueling outage.

The staff noted in NUREG-1366 that most pressurizer heaters are used constantly and operators would be aware of any problems that may arise. In addition, the staff noted that overall industry experience shows that pressurizer heaters are fairly reliable.

The licensee reviewed the surveillance history, corrective and preventative maintenance history, and the operating history for the pressurizer heaters at Byron and Braidwood. This review indicated no failures of the heater group quarterly surveillance, very little required maintenance, and no instance where the heaters were not available to support plant operations.

Based on the staff's review of the licensee's performance history for the pressurizer heaters and the fact that the proposed change conforms to the

guidance provided in GL 93-05, the staff finds the increase in the allowable interval between the surveillance tests for the pressurizer heaters from 92 days to each refueling outage to be acceptable.

2.6 TS 4.5.1.1.b (GL 93-05, Item 7.1)

TS surveillance requirement 4.5.1.1.b requires verification of the boron concentration of the accumulator solution at least once per 31 days and within 6 hours after each solution volume increase of greater than or equal to 70 gallons. Maintenance of the required boron concentration ensures that safety analysis assumptions for accumulator injection are met. The licensee is proposing to eliminate the need to perform TS 4.5.1.1.b when the volume increase makeup source to the accumulators is the RWST and the RWST has not been diluted since verifying that the RWST boron concentration is within the accumulator boron concentration limits.

The licensee's proposed change to TS 4.5.1.1.b differs slightly from the guidance given in GL 93-05. At Byron and Braidwood, the minimum boron concentration requirement for the RWST is 2300 parts per million (ppm). Therefore, no dilution can be caused by adding water from the RWST to the accumulator, which has a minimum boron concentration limit of 2200 ppm. The licensee's deviation from the wording suggested in GL 93-05 is more restrictive in that GL 93-05 does not require verification of the boron concentration of the accumulator solution after a volume increase of 1 percent or more if the makeup water is from the RWST and the minimum concentration of boron in the RWST is greater than or equal to the minimum boron concentration in the accumulator, the recent RWST sample was within specifications, and the RWST has not been diluted. This would mean that the boron concentration in the accumulator inventory would not have to be verified as long as the RWST boron concentration is greater than 2200 ppm. The licensee's proposed change to TS 4.5.1.1.b does not require the surveillance to be performed as long as the RWST boron concentration is between 2200 and 2400 ppm. This change ensures that the boron concentration in the accumulator does not exceed the upper limit. Since the RWST boron concentration may be as high as 2500 ppm, the additional control is appropriate to ensure that the safety analysis assumptions are maintained.

The proposed change to TS 4.5.1.1.b meets the intent of GL 93-05 and, therefore, the staff finds the change acceptable.

2.7 TS 4.6.2.1 (GL 93-05, Item 8.1)

TS surveillance requirement 4.6.2.1.d requires each containment spray system to be demonstrated operable at least once per 5 years by performing an air or smoke flow test through each spray header and verifying that each spray nozzle is unobstructed. The licensee is proposing to increase the surveillance interval from 5 to 10 years consistent with GL 93-05.

This surveillance test only ensures that the nozzles are not obstructed. The test does not measure flow rate. The staff noted in NUREG-1366 that the only

reported problems with this test have been related to blockage occurring during the construction phase and no problems are expected during normal operation. The licensee has stated that the Byron and Braidwood system components are all stainless steel and there have been no reported in-service problems at plants with stainless steel headers and nozzles. Further, the licensee reviewed the surveillance history, corrective and preventative maintenance history, and operating history for the containment spray system. This review did not identify any surveillance test failures or required maintenance for the spray system header. The containment spray system at Byron and Braidwood has never been actuated during plant operation.

The staff finds the proposed change to TS 4.6.2.1.d acceptable based upon the licensee's review of the surveillance and maintenance history, the staff's findings in NUREG-1366, and the guidance provided in GL 93-05.

2.8 TS 4.6.4.2 (GL 93-05, Item 8.5)

TS surveillance requirement 4.6.4.2.a requires that each hydrogen recombiner system be demonstrated operable at least once per 6 months by verifying that the minimum heater sheath temperature is reached within 90 minutes and that the minimum heater power is reached. The licensee is proposing to increase the allowable interval between tests from 6 months to once each refueling interval in accordance with GL 93-05.

In NUREG-1366, the staff noted that hydrogen recombiners have a high reliability and there is sufficient redundancy with the opposite train or alternate system to ensure that the system would be operable when challenged. The licensee provided surveillance history data that shows that the functional test has been performed at least 20 times on each of the units and there have been four documented failures. In three of the four cases, the surveillance was immediately reperformed and successfully completed. The maintenance history shows no component failures identified during maintenance activities that could have resulted in the hydrogen recombiners failing to perform their intended function. The licensee indicated there has been no actual operating experience.

The staff finds the proposed change to TS 4.6.4.2 acceptable based upon the staff's findings in NUREG-1366 and a review of the licensee's surveillance and maintenance history at Byron and Braidwood.

2.9 TS 4.7.1.2.1.a (GL 93-05, Item 9.1)

TS surveillance requirement 4.7.1.2.1.a.1 requires that each auxiliary feedwater (AFW) pump be demonstrated operable at least once per 31 days by verifying that the pump develops the required differential pressure and flow. The licensee is proposing to increase the allowable interval between tests from 31 days to 92 days on a staggered test basis consistent with the guidance provided in GL 93-05.

In NUREG-1366, the staff discussed two studies that were performed on the AFW system. Both studies concluded that a significant cause of AFW pump failure is testing the pumps by recirculating flow through a minimum flow line that is not adequately sized. Manufacturers currently recommend that the pumps be tested at a flow no less than 25 percent of the best efficiency point flow. During the surveillance test at Byron and Braidwood, the AFW pumps take suction from the condensate storage tank and return the water to the tank through a recirculation line. The flow rate during this test is approximately 10 percent of the design flow rate. The studies identified in NUREG-1366 concluded that testing in the 10 percent flow range causes hydraulic instability of the pumps and leads to pump degradation. The staff concluded that the optimal solution would be modification of the orifice to allow testing at a higher flow rate. The staff recognized that this solution would be costly to implement. The staff concluded that a reasonable solution would be to extend the test interval to reduce the rate of wear on the pumps. The licensee provided information on the surveillance, maintenance, and operating history for the AFW pumps. The AFW pumps have been run at least 100 times on each of the Byron and Braidwood units for surveillance testing and only two failures were identified. No additional component failures have been identified during maintenance activities that could have resulted in the AFW pumps failing to fulfill their intended function. When challenged, the AFW pumps have performed as required.

Based upon the staff's findings in NUREG-1366 and a review of the AFW pumps' performance history, the staff finds the proposed change to increase the allowable interval between surveillance tests of the AFW pumps from 31 days to 92 days acceptable.

2.10 TS 4.11.2.6 (GL 93-05, Item 13)

TS surveillance requirement 4.11.2.6 requires that the quantity of radioactive material contained in each gas decay tank be determined to be within a specified activity limit at least once per 24 hours when radioactive materials are being added to the tank. The licensee is proposing to increase the surveillance interval for determining the quantity of radioactivity contained in each gas decay tank from 24 hours to 7 days when radioactive materials are being added to the tank. The 24 hour frequency is maintained during primary coolant degassing operation. This change is consistent with the recommendations in GL 93-05.

In NUREG-1366, the staff noted that the current limit placed on allowed curies in the waste gas decay tanks is considerably above the value that would occur, even if the reactor were operating at the TS RCS specific activity limit of 1 microCurie per gram dose equivalent I-131. For Byron, the maximum waste gas decay tank activity during plant operations was calculated to be 8,800 Curies. For Braidwood, the calculation shows a maximum activity of 19,700 Curies. Since it has been shown that the tank activity limit of 50,000 Curies will not be exceeded, the dose limits will be met. The 24 hour frequency is maintained during primary coolant system degassing operation as recommended in GL 93-05.

Based upon the calculated maximum waste gas decay tank activity for each site, the staff finds the proposed change to TS 4.11.2.6 to increase the surveillance interval for determining the quantity of radioactivity contained in each gas decay tank from 24 hours to 7 days when radioactive materials are being added to the tank acceptable.

2.11 Proposed Editorial Changes

The proposed editorial changes include: (1) TS 4.4.6.2.1.c, changes the word "from" to the word "to," (2) TS 4.5.1.1.c, the change clarifies that the motor control center compartment is for each accumulator isolation valve, (3) TS 4.5.1.2, deletes the footnote because the operating cycle in the footnote is over for each unit, and (4) TS 4.7.1.2.1.a.2 and 4.7.1.2.1.c, renumbers and rephrases other surveillance requirements for the auxiliary feedwater pumps because of the proposed change to TS 4.7.1.2.1.a to implement GL 93-05, Item 9.1.

The staff finds the editorial changes acceptable because they are administrative in nature and only serve to improve readability and provide consistency within the TS.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Illinois State official was notified of the proposed issuance of the amendments. The State official had no comments.

4.0 ENVIRONMENTAL CONSIDERATION

The amendment changes surveillance requirements. The staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (60 FR 58397). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

5.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such

activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

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