U-601163
L47-88(05-18)-LP
1A.120

ILLINOIS POWER COMPANY

CLINTON POWER STATION, P.O. BOX 678, CLINTON, ILLINOIS 61727

DPH-0453-88
May 18, 1988

10CFR50.90

Docket No. 50-461

Document Control Desk
Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Clinton Power Station
Proposed Amendment to Facility
Operating License NPF-62

Dear Sir:

Pursuant to 10CFR50.90, Illinois Power Company (IP) hereby applies for an amendment of Facility Operating License NPF-62 Clinton Power Station (CPS). In accordance with 10CFR50.91(b)(1), a copy of this request for amendment has been sent to the Illinois Department of Nuclear Safety as indicated below.

This proposed amendment request revises Technical Specification Table 2.2.1-1 and 3.3.2-2 for the Main Steam Line Radiation - High full power background radiation levels and associated trip setpoints (see Attachment 2). These changes will permit IP to test the feasibility of a Hydrogen Water Chemistry System as a mitigator of Intergranular Stress Corrosion Cracking (IGSCC) of stainless steel components at CPS. Attachment 2 to this letter provides a description and justification for the requested change including a basis for no significant hazards consideration. This change does not affect IP's ability to safely operate CPS under its current license. An affidavit supporting the facts set forth herein accompanies this letter.

In accordance with the provisions of 10CFR170.12 and 170.21, IP is enclosing a check made out to the U.S. Nuclear Regulatory Commission in the amount of $150.00 as payment of the application fee for this amendment.

Add w/check
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IP has reviewed the proposed Technical Specification changes against the criteria of 10CFR51.22 for the environmental considerations. The proposed changes do not involve a significant hazards consideration, significantly increase the types and amounts of effluents that may be released offsite, or significantly increase individual or cumulative occupational radiation exposures. Based on the foregoing, IP concludes that the proposed Technical Specification changes meet the criteria given in 10CFR51.22(c)(9) for a categorical exclusion from the requirement for an Environmental Impact Statement.

Sincerely yours,

D. P. Hall
Vice President

GSL/krm

Attachments

cc: NRC Resident Office
NRC Region III, Regional Administrator
NRC Clinton Licensing Project Manager
Illinois Department of Nuclear Safety

Attachment 1
to U-601163

STATE OF ILLINOIS

COUNTY OF DEWITT

DONALD P. HALL, being first duly sworn, deposes and says: That he is Vice President of Illinois Power Company; that the provided information has been prepared under his supervision and direction; that he knows the contents thereof; and that to the best of his knowledge and belief said request and the facts contained therein are true and correct.

DATED: This 18th day of May 1988

Signed: D. Hall
Donald P. Hall

Subscribed and sworn to before me this 18th day of May 1988.

Debora L. Bean
Notary Public

My commission expires:

"OFFICIAL SEAL"
Debora L. Bean
Notary Public, State of Illinois
My Commission Expires 10/1/90

Description and Justification of the Proposed Change

Illinois Power Company (IP) is proposing to revise CPS Technical Specification Table 2.2.1-1, Reactor Protection System Instrumentation Setpoints, and Table 3.3.2-2, CRVICS Instrumentation Setpoints, to footnote a discussion regarding the hydrogen injection test and its effect on the Main Steam Line Radiation - High trip function. The footnote will read as follows:

> "Within 24 hours prior to the planned start of the hydrogen injection test, with reactor power at greater than 20% of RATED THERMAL POWER, the normal full power background radiation level and associated trip setpoints may be changed based on a calculated value of the radiation level expected during the test. The background radiation level and associated trip setpoints may be adjusted during the test based on either calculations or measurements of actual radiation levels resulting from hydrogen injection. The background radiation level shall be verified and the associated trip setpoints shall be returned to their normal value within 24 hours of re-establishing normal radiation levels after completion of the hydrogen injection test at greater than 20% of RATED THERMAL POWER or within 12 hours of establishing reactor power levels below 20% of RATED THERMAL POWER."

The proposed revision therefore will permit the main steam line radiation monitor setpoints (which are based on normal full power background radiation levels) to be temporarily changed based on either calculations or measurements of actual radiation levels resulting from the hydrogen injection test discussed below.

Illinois Power Company intends to perform a hydrogen injection test (currently scheduled for late July, 1988) on the reactor coolant system at Clinton Power Station (CPS). The purpose of this test is to determine the feasibility of hydrogen water chemistry control as a means of reducing Intergranular Stress Corrosion Cracking (IGSCC) of stainless steel piping. The test involves the addition of hydrogen to the reactor coolant at increasing increments over a range of approximately 0 to 80 standard cubic feet per minute (scfm). As a result of the hydrogen injection, the effects of radiolysis of water are suppressed, thereby lowering the free oxygen content in the reactor coolant. The reduction of free oxygen eliminates one of the necessary causative agents of IGSCC; therefore, the use of hydrogen injection, together with the stringent controls imposed on coolant conductivity, will inhibit the initiation and growth of IGSCC (see NUREG 0313, Technical Report on Material Selection and Processing Guidelines for BWR Coolant Pressure Boundary Piping, Rev. 2 Final Report).

A by-product of oxygen suppression by hydrogen addition is an increase of radiation levels from the main steam lines caused by Nitrogen-16 (N-16). The increased carry-over of nitrogen is due to a conversion of N-16 from a soluble form to a gaseous form in the reactor. The proposed revisions to the Technical Specification tables identified above permit a temporary increase in the Main Steam Line Radiation - High trip setpoints to allow operation with expected higher radiation levels

resulting from hydrogen injection. The Main Steam Line Radiation - High trip setpoint will remain at 3 times the full power background level and the allowable value will remain at 3.6 times the full power background level; however, the nominal trip setpoint will be increased prior to the hydrogen injection test based on a projection of the anticipated background level. The changes also permit the Main Steam Line Radiation - High trip setpoint to be adjusted during the test to correct for uncertainties in the initial computation. At the maximum planned hydrogen injection rate, an increase of approximately one to five times the normal main steam line background radiation levels is expected. The pretest main steam line radiation monitor setpoints will be restored promptly following the conclusion of the hydrogen injection test and whenever power is decreased to less than 20% of rated thermal power (this latter restriction is in accordance with guidance provided in References 1 and 2). The hydrogen injection test will be discontinued whenever reactor power is reduced to less than 20% of rated thermal power.

Hydrogen Test Summary

IP has decided to employ an experienced contractor to develop, prepare and execute the hydrogen injection test under the management of IP personnel. The contract has not yet been awarded, although contractor selection is expected by June 1988; therefore, complete test details have not yet been finalized. However, the following information is available on the test itself:

1) Rated thermal power of at least 90 percent will be maintained in order to develop full-power radiation background levels and optimize hydrogen effectiveness.

2) Hydrogen will be supplied from a tank truck located outside the turbine building near the existing generator cooling hydrogen trailer and will be supplied to the turbine building through flex hosing and/or tubing.

3) Hydrogen injection points for the feedwater system will be installed on the suction side of the condensate booster pumps.

4) Radiation levels will be monitored at various points inside CPS (such as the turbine deck, the control room and at selected points within the plant) as well as outside the plant (such as the service building, parking lots and at various points at and within the site boundary and immediate general population areas) using monitors already in place and additional portable monitors.

5) Oxygen will be added to the offgas system prior to entering the offgas recombiners to scavenge any free hydrogen and minimize hydrogen build-up in the offgas system.

These general guidelines have been developed and will be included in request for bids from contractors. The experience of the selected contractor will be used to refine test details and provide additional test information. CPS is also working with selected utilities which have previously performed a hydrogen water chemistry test, including Public Service Electric and Gas Company and Iowa Electric Light and Power Company.

Radiological Consequences

From a review of previous tests conducted at other domestic boiling water reactors (Hope Creek, Duane Arnold, Plant Hatch Unit 1 and Unit 2, Peach Bottom Unit 2 and Unit 3, Pilgrim and Brunswick Unit 2), radiation levels can be expected to increase approximately one- to five-fold. Therefore, extensive preplanning will identify the proper areas to monitor radiation levels. Radiation surveys will be conducted at regular intervals during the test to monitor the actual radiation levels. The surveys will be performed by qualified CPS or contractor Radiation Protection technicians using approved site procedures. The objectives of the survey program will be:

1) To provide data for shielding design should additional shielding be necessary.

2) To determine radiation levels in and around the facility as well as at the site boundaries.

3) To determine the potential effects on operation and maintenance activities.

4) To determine the impact on the site ALARA (As Low As Reasonably Achievable) program.

In addition to the above survey program, radiation protection measures will be implemented to maintain doses to plant personnel as low as reasonably achievable. These measures include:

1) Scheduling the test during a weekend and at night to the extent feasible in order to minimize the number of on-site personnel affected.

2) Establishing access control by Radiation Protection personnel in accordance with existing site procedures.

3) Training of operations personnel in test procedures prior to the start of the test to ensure efficient performance of duties.

4) Other than activities required by or in support of the Hydrogen Water Chemistry (HWC) test, access to the turbine building for general maintenance will not be permitted. If emergency maintenance or access for other reasons is necessary, the HWC test will be terminated. Due to the short half-life of N-16, radiation levels will return to pre-HWC test conditions within minutes of the hydrogen shutoff.

As noted earlier, the increased radiation levels are a result of an increased carry-over of N-16 in the main steam, not from increased N-16 production. Due to the short half-life of N-16 (approximately 7 seconds), CPS does not expect hydrogen injection to have a significant effect on the gaseous effluent release rates. Although the offsite dose is expected to increase slightly, the 40 CFR 190 site boundary limit of 25 mrem/year will not be exceeded. Offsite and perimeter radiation surveys will typically be performed during each planned step increase in hydrogen injection. These measures will be implemented for the duration of the test. The conduct of the test and radiological surveys during the test will ensure occupational exposure is kept as low as reasonably achievable (ALARA). One of the major goals of the HWC test is to determine the radiological impact of HWC and to utilize the results of the test in deciding whether a HWC system should be permanently installed at CPS.

Protective Measures Regarding Hydrogen and Oxygen

Compressed hydrogen will be supplied to the plant site in gaseous form via a supply trailer. The supply trailer will be located outside the turbine building, in accordance with the requirements of NFPA Code No. 50A, "Gaseous Hydrogen Systems at Consumer Sites," Section 5.0. A detailed review of the HWC test will be performed to insure proper onsite bulk storage of hydrogen and oxygen during the test. This review will insure compliance with the recommendations for hydrogen and oxygen handling as contained in EPRI Report NP-5283-SR-A (Reference 2).

CPS has determined from a review of the design requirements that the hydrogen supply and distribution system will meet the requirements of Section 4.D.2.b of Branch Technical Position APCSB 9.5-1, Appendix A (see CPS Fire Protection Evaluation Report Section 4.D.2.b).

The hydrogen supply and distribution system consists of supply lines, control valves, a safety relief valve, an excess flow check valve, a safety valve and a mechanical pipe break valve. The supply line will be routed outdoors from the supply trailer to the turbine building using high pressure flex hose and/or tubing. The lines will then be routed to the condensate booster pump rooms. The hydrogen supply system will be leak tested and purged with an appropriate gas prior to the introduction of hydrogen. To further ensure that combustible levels of hydrogen are not reached due to leakage, hydrogen monitors will be utilized during the test. The hydrogen monitors will be located in various locations such as at the condensate booster pumps, near the control valves and/or at various locations along the supply lines. The monitors will alarm when hydrogen concentration exceeds 2 percent and isolate the hydrogen supply when concentration reaches 4 percent in order to prevent an explosive concentration from being reached.

Basis for No Significant Hazards Consideration

According to 10CFR50.92, a proposed change to the license (Technical Specifications) involves no significant hazards consideration if operation of the facility in accordance with the proposed change would not (1) involve a significant increase in the probability or

consequences of an accident previously evaluated, or (2) create the possibility of a new or different kind of accident from any accident previously evaluated, or (3) involve a significant reduction in a margin of safety.

(1) The proposed change to CPS Technical Specifications does not involve a significant increase in the probability or consequences of an accident previously evaluated. The only design basis accident which takes credit for the Main Steam Line Radiation - High trip is the Control Rod Drop Accident (CRDA) as described in Final Safety Analysis Report (FSAR) Section 15.4.9. Specifically, the Main Steam Isolation Valves (MSIVs) are assumed to receive an automatic closure signal after detection of high radiation in the main steam lines and to be fully closed at 5 seconds from the receipt of the closure signal. The main steam line radiation monitors are provided to detect a gross failure of the fuel cladding. When high radiation is detected, a reactor scram is initiated to reduce the continued failure of fuel cladding. At the same time, the main steam isolation valves are closed to limit the release of fission products. The trip setting is high enough above background radiation levels to prevent spurious trips yet low enough to promptly detect gross failures in the fuel cladding.

As indicated in the NEDO Report, "General Electric Rod Drop Accident Analysis for Large Boiling Water Reactors" (Reference 1), the consequences of the CRDA are most severe under Hot Standby conditions. In fact, the consequences of the CRDA are increasingly less severe above 10 percent power due to a faster Doppler response and a lower rod worth. Above 20 percent power, the consequences of the CRDA are minimal. Since the Main Steam Line Radiation Monitor setpoints will only be adjusted for the purpose of the hydrogen injection test at power levels above 20 percent (as specified in the proposed Technical Specification footnote), there is no significant impact on the probability or consequences of the CRDA. Therefore, the change to the footnotes in the referenced Technical Specification tables have no effect on the probability or consequences of an accident previously evaluated.

2) The proposed change to CPS Technical Specifications does not create the possibility of a new or different kind of accident from any accident previously evaluated. The proposed change does not affect the design of any safety-related systems and as such does not affect the performance of any safety functions. The proposed change does permit the performance of a hydrogen injection test; however, this test does not introduce a new kind of accident since the presence of hydrogen in the primary system has already been analyzed (see FSAR Sections 10.2.2.2, 10.4.2 and 11.3.2) and is already monitored and controlled (see Technical Specification 3.11.2.6). Further, as discussed previously, in the "Protective Measures Regarding Hydrogen and Oxygen" section, additional protective measures (EPRI Report NP-5238-SR-A) are being applied which ensure that the physical presence of test equipment and temporary hydrogen and oxygen storage equipment does not create the potential for a different kind of accident to occur.

Since the Technical Specification change itself does not affect existing system functions, or create a situation which has not been previously analyzed and appropriately designed for, the change to the Technical Specification does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3) The proposed change to CPS Technical Specifications does not involve a significant reduction in a margin of safety. The proposed temporary increase in the Main Steam Line Radiation - High trip setpoint will be permissible only when reactor thermal power is above 20 percent. As discussed above, the only design basis accident which takes credit for the isolation and scram function is the CRDA. However, above 20 percent power, the consequences of a CRDA are so minimal that they may be considered negligible (Ref. 1), and hence, the change in the Technical Specification setpoints has no significant effect on the margins of safety for this accident scenario.

The proposed change is necessary to conduct a hydrogen injection test which will increase the carry-over of N-16. This in turn will cause the background radiation levels in the main steam system to be increased. As discussed previously, several precautionary and preplanning measures are being taken to maintain plant personnel exposures As Low as Reasonably Achievable (ALARA). In addition, radiation levels will be monitored to ensure they are within acceptable limits with respect to the plant ALARA program. Due to the relatively short half-life of N-16 (approximately 7 seconds), gaseous effluent release rates will not be significantly affected. Therefore, it can be concluded that the proposed change will not present a risk to the public health and safety nor significantly reduce a margin of safety for plant personnel.

References

1. NEDO-10527, Supplement 1, "General Electric Rod Drop Accident Analysis for Large Boiling Water Reactors" dated July 1972.

2. EPRI Report NP-5283-SR-A, "Guidelines for Permanent BWR Hydrogen Water Chemistry Installations - 1987 Revision".