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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 11 TO FACILITY OPERATING LICENSE NPF-62

ILLINOIS POWER COMPANY

DOCKET NO. 50-461

1.0 INTRODUCTION

By letters dated May 18 and June 2, 1988, the licensee proposed Technical Specification changes for the Clinton Power Station to test the feasibility of a hydrogen water chemistry (HWC) system which will be used to mitigate inter-granular stress corrosion cracking of stainless steel components. The Technical Specification changes will permit a temporary increase in the Clinton main steam line radiation-high scram and isolation setpoints to allow operation with expected higher radiation levels resulting from hydrogen injection into the reactor coolant.

2.0 EVALUATION

2.1 High Main Steam Line Radiation Scram and Isolation Set Points

The Main Steam Line Radiation Monitors (MSLRMs) provide reactor scram as well as reactor vessel and primary containment isolation signals upon detection of high activity levels in the main steam lines. Additionally, these monitors serve to limit radioactivity released in the event of fuel failures. The proposed Technical Specification changes to Tables 2.2.1-1 and 3.3.2-2 would allow adjustments to the normal background radiation level and associated trip set points for the MSLRMs at reactor power levels greater than 20% of rated thermal power. The adjustments will be based on either calculations or measurements of actual radiation levels resulting from increased N-16 levels in the main steam lines due to hydrogen injection. The background radiation level shall be verified and the associated trip set points 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 licensees state that the only design basis accident which takes credit for the Main Steam Line Radiation - High trip is the control rod drop accident (CRDA). Generic analysis of 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 hydrogen injection will be limited to above 20 percent of rated power and the increased MSLRM trip setpoint will be reduced to normal levels below this power level, the staff concludes that the currently approved CRDA analysis for the Clinton Power Station is appropriately bounded and remains valid. Therefore, the proposed Technical Specification changes are acceptable.

2.2 Radiation Protection

The staff has reviewed the proposed Technical Specification changes to assure that the licensees have considered the radiological implications of dose rate increases associated with N-16 activity increases due to hydrogen injections into the reactor system. Radiation surveys will be conducted at regular intervals during the test to determine radiation levels in and around the facility as well as at the site boundary. Additionally, the licensees have stated that data will be obtained for shielding design should additional shielding be necessary for a permanent hydrogen water chemistry installation.

Radiation protection measures will be implemented to maintain doses to plant personnel as low as reasonably achievable (ALARA). These measures include:

(a) scheduling the test during a weekend or at night where feasible to minimize the number of affected on-site personnel,

(b) establishing access control in accordance with existing site procedures,

(c) training of operations personnel in performing test procedures, and

(d) terminating hydrogen injections to permit maintenance activities in the high radiation areas resulting from HWC.

Other plants have operated with HWC and have not experienced an increase in offsite dose. The licensees do not expect a significant site boundary dose rate increase at Clinton during the test and will make appropriate measurements to assure compliance with 40 CFR 190 limits. The conduct of the test and radiological surveys obtained during the test will ensure ALARA in accordance with Regulatory Guide 8.8 and is, therefore, acceptable.

2.3 Hydrogen Storage and Distribution System

Compressed hydrogen will be supplied to the plant site in gaseous form in a 120,000 SCF capacity tube trailer. The tube trailer will be used as the storage facility and will be located no closer than 432 feet from any

building containing safety-related or class 1E components. This distance exceeds the minimum required separation distance of 70 feet as specified in Figure 4.2 of the BWR Owners Group Guidelines, "Guidelines for Permanent BWR Hydrogen Water Chemistry Installations - 1987 Revision," EPRI NP-5283-SR-A, September 1987. Although the test facility is not a permanent HWC installation, the facility will meet all applicable sections of the BWR Owners Group Guidelines.

The hydrogen supply and distribution system consists of supply lines, control valves, a safety relief valve and an excess flow check valve (limit release of hydrogen in the event of a pipe break). Hydrogen supply lines will be routed to and piped into the suction side of the condensate booster pump. The hydrogen supply system will be leak tested and purged with an inert gas prior to introduction of hydrogen. To prevent the accumulation of combustible levels of hydrogen due to leakage, hydrogen monitors will be located at the condensate booster pumps, near the control valves and/or various locations along the supply lines. The monitors will alarm when hydrogen concentrations exceed 2 percent and isolate the hydrogen supply when the hydrogen concentration reaches 4 percent in order to prevent an explosive concentration from being reached.

Since the licensees currently store substantial quantities of chlorine onsite for water and sewage treatment, the staff evaluated the potential synergistic effect associated with the storage of hydrogen. The combination of hydrogen gas and chlorine gas can explode in the presence of any form of energy, such as sunlight or heat (250°C). Therefore, it is prudent to maintain an adequate separation distance between the chlorine and hydrogen storage facilities. The hydrogen tube trailer will be parked a distance of over 100 feet from the chlorine storage containers. The closest approach the hydrogen tube trailer will make to the chlorine storage containers exceeds 100 feet. The 100 feet separation distance is judged to be sufficient to prevent interaction of these two gases in the event of a simultaneous chlorine and hydrogen release, since it meets the requirements of NFPA 50A-5984, "Standards for Gaseous Hydrogen Systems at Consumer Sites."

On the basis of the above evaluation, we find that the proposed Technical Specification changes are in accordance with applicable sections of the BWR Owners Group Guidelines, "Guidelines for Permanent BWR Hydrogen Water Chemistry Guidelines - 1987 Revision" and are, therefore, acceptable.

3.0 ENVIRONMENTAL CONSIDERATION

Pursuant to 10 CFR 51.21, 51.32, and 51.35, an environmental assessment and finding of no significant impact has been prepared and published (53 FR 37885) in the Federal Register on September 28, 1988. Accordingly, based upon the environmental assessment, the Commission has determined that the issuance of this amendment will not have a significant effect on the quality of the human environment.

4.0 CONCLUSION

We have 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, and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

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Dated: September 29, 1988