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SUBJECT: Application for amends to licenses DPR-58 & DPR-74,adding TS for distributed ignition sys.

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INDIANA MICHIGAN POWER

December 3, 1998

AEP:NRC:1291
10 CFR 50.92

Docket Nos.: 50-315
50-316

U.S. Nuclear Regulatory Commission
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Gentlemen:

Donald C. Cook Nuclear Plant Units 1 and 2
TECHNICAL SPECIFICATION AMENDMENT - DISTRIBUTED IGNITION SYSTEM
TECHNICAL SPECIFICATION AND ASSOCIATED BASES

This letter and its attachments constitute an application for amendment to the technical specifications (T/Ss) for Cook Nuclear Plant units 1 and 2. This amendment will add a new T/S for the distributed ignition system (DIS). As described in attachment 1, previous submittals on a proposed T/S for the DIS are superceded by this submittal.

Background information relevant to the T/S and our analyses concerning significant hazards considerations are contained in attachment 1 to this letter. Attachment 2 contains current T/S pages, marked up to show where the new T/S will be inserted. Attachment 3 contains the new proposed T/S pages.

Our supporting analysis, provided in attachment 1, indicates that the proposed DIS T/S will not result in a significant change in the types of effluents or a significant increase in the amounts of any effluents that may be released offsite, or a significant increase in individual or cumulative occupational radiation exposure.

The proposed change has been reviewed by the plant nuclear safety review committee and the nuclear safety and design review committee. We request that the approved T/S amendment be effective thirty days from issuance.

A001

In accordance with the requirements of 10 CFR 50.91(b)(1), copies of this letter and its attachments have been transmitted to the Michigan Public Service Commission and the Michigan Department of Public Health.

Sincerely,

R. P. Powers
Vice President

SWORN TO AND SUBSCRIBED BEFORE ME

THIS 3rd DAY OF December, 1998

Janice M. Bickers
Notary Public

My Commission Expires 2/16/2001

/jmc

Attachments

JANICE M. BICKERS
Notary Public, Berrien County, MI
My Commission Expires Feb. 16, 2001

c: J. A. Abramson, w/attachments
J. L. Caldwell, w/attachments
MDEQ DW & RPD, w/attachments
NRC Resident Inspector, w/ attachments
J. R. Sampson, w/attachments

bc: T. P. Beilman - w/attachments
J. J. Euto
FOLIO - w/attachments
D. F. Kunsemiller/J. B. Kingseed/G. P. Arent/ M. J. Gumns
M. W. Rencheck/E. R. Eckstein/D. F. Powell/D. R. Hafer/
K. R. Baker
J. F. Stang, Jr., NRC - Washington, DC - w/attachments

ATTACHMENT 1 TO AEP:NRC:1291

SUPPORTING ANALYSES FOR
AMENDMENT TO THE TECHNICAL SPECIFICATIONS
DISTRIBUTED IGNITION SYSTEM

Background

10 CFR 50.44, "Standards for Combustible Gas Control System in Light-Water-Cooled Power Reactors", requires the design and installation of systems to control the concentration of combustible gas inside containment following design basis loss-of-coolant accidents (LOCAs). In addition, for ice condenser containments, a system is required to control an amount of hydrogen associated with degraded core scenarios that go beyond design basis LOCAs. In this scenario, the regulation assumes, for design purposes, that the requirements of 10 CFR 50.46, "Acceptance Criteria for Emergency Core Cooling Systems for Light-Water Nuclear Power Reactors", were not met by the emergency core cooling system, resulting in a degraded core. The regulation further postulates that the extent of core damage results in hydrogen generation in an amount equal to that from a metal-water reaction involving 75% of the fuel cladding surrounding the active fuel region (excluding the cladding in the plenum volume). The regulation is concerned about the potential for high concentrations of hydrogen gas inside containment to be ignited by a random ignition source with consequent containment failure.

An extensive program of testing and analysis has demonstrated that a system of strategically placed igniters can be relied upon for controlled burns of the hydrogen gas postulated for degraded cores by 10 CFR 50.44. At Cook Nuclear Plant, these igniters are called the distributed ignition system (DIS).

The controlled burning approach to mitigation of the hydrogen postulated by 10 CFR 50.44, for degraded core LOCAs, was jointly developed by American Electric Power with other owners of Westinghouse Pressurized Water Reactors utilizing ice condenser containments. Other owners included the Duke Power Company (Catawba and McGuire) and the Tennessee Valley Authority (Watts Bar and Sequoyah). This collaboration resulted in hydrogen ignition systems that shared many common design features and were frequently based on test results applicable to all of the owners. Safety evaluation reports (SERs), for each of the nuclear plants involved, often referred to SERs of the other plants. By 1982 virtually all of the owners had completed installation of their systems, although finalization of studies for equipment survivability during hydrogen burning generally remained an open issue. Lists of equipment required to survive hydrogen burning were developed by each of the owners and included the hydrogen igniters. At this time, 10 CFR 50.49, Environmental qualification of electric equipment important to safety for nuclear power plants, had not been issued. Industry requirements for equipment qualification were described by the provisions of two NRC documents - the Division of Operating Reactors "Guidelines for Evaluating Environmental Qualification of Class 1E Electrical Equipment in Operating Reactors" (DOR Guidelines) or NUREG-0588,

"Interim Staff Position on Environmental Qualification of Safety-Related Electrical Equipment," December 1979. Extensive testing was performed to ensure the hydrogen igniters would perform properly in an environment of hydrogen burning, however the ice condenser owners did not include hydrogen ignition systems within the programs to meet the DOR Guidelines or NUREG-0588. This was best described in the McGuire SER for their final DIS (NUREG-0422, Supp. No.7, May 1983). This SER discussed the Duke equipment qualification program and noted "Hydrogen igniters are also not included in the qualification program. However, the functional capability of the igniters has been demonstrated in tests conducted at Fenwal and Whiteshell in an atmosphere of burning hydrogen. Moreover, similar igniter assemblies were recently qualified by Grand Gulf in accordance with NUREG-0588 Category I requirements. Based on these findings the staff concludes that there is adequate assurance that the hydrogen igniters will survive the hydrogen burn event." Recent discussion with owners of ice condenser plants has indicated that the above description in the McGuire SER reflects the current practice of the owners including AEP. AEP believes that adequate assurance of DIS operability has been provided by the ice condenser containment owners without specifically including the DIS in the equipment qualification program. In addition, the DIS has been provided for degraded core events that go beyond the design basis LOCA and is being included in the T/Ss due to the applicability of criterion 4 of 10 CFR 50.36(c)(2)(ii)(D) (See Justification for Amendment). This criterion may include structures, systems, or components that are not required for design basis accidents as addressed by Criterion 2 and 3 of the regulation. The provisions of 10 CFR 50.49 are directed to equipment involved in mitigating design basis events and are, therefore, not applicable to the DIS. Nothing in this submittal is intended to establish a degraded core LOCA as a design basis accident for Cook Nuclear Plant.

The design, analysis, and testing of the Cook Nuclear Plant's DIS were the subject of numerous previous submittals to the NRC, commencing with AEP:NRC:0500, dated January 12, 1981, and ending with AEP:NRC:0500Y, dated February 26, 1993. The NRC's review of the system was documented in a safety evaluation report (SER) dated December 17, 1981. An NRC letter dated September 11, 1991, indicated that the December 1981 SER was expected to be final unless the NRC review of Cook Nuclear Plant's individual plant examination (IPE) results indicated that the SER should be supplemented. AEP:NRC:0500Y was a final summary document on the DIS, including analysis based on significant accident sequences identified by the IPE. Our submittal AEP:NRC:0500Y did not result in the issuance of a supplement to the December 1981 SER.

Proposed technical specifications (T/Ss) for the DIS were initially described in attachment 2 to AEP:NRC:0500C dated May 29, 1981. The proposed T/S was modified by attachment 8 to AEP:NRC:0500G, dated February 17, 1982. The modification was made to reflect the addition (at the NRC's request) of 1 igniter per train in the containment instrument rooms. This current submittal supercedes all previous submittals involving a T/S for the DIS.

Description of Amendment Request

This proposed amendment adds a T/S and associated bases for the DIS (no changes to an existing T/S are involved). The T/S being proposed for the DIS incorporates the technical requirements of the improved technical specifications (NUREG-1431, Revision 1, "Standard Technical Specifications, Westinghouse Plants", April 1995) however, the current format of our T/Ss is retained. It should also be noted that the improved technical specifications refer to this system as the hydrogen ignition system (HIS). The term DIS will be retained for Cook Nuclear Plant.

System Description

The DIS at Cook Nuclear Plant consists of two independent trains of resistance heating elements (igniters), power supply transformers, breakers, switches, interconnecting wiring, and control power annunciators. It is manually actuated when necessary and remains energized until no longer needed.

Each DIS train has 35 igniters, 18 igniters in upper containment and 17 in lower containment. The upper igniters in each train are further divided into three groups (or phases) and the lower igniters in each train are also divided into three groups (or phases). These six groups per train are each powered from a different phase of two three-phase transformers. It is the transformer phase that uniquely defines a group. The design approach for location of the igniters was based on where hydrogen was expected to be produced or accumulate, and also to burn as much hydrogen as possible in the lower volume of containment to prevent hydrogen migration to the top of containment. The lower compartment igniters are, in effect, the first level of defense for controlled burning of the hydrogen. It is anticipated that most unburned hydrogen escaping the lower volume will migrate to the upper volume via the ice condensers. The ice condenser upper plenum igniters minimize escape of this hydrogen to upper containment. Finally, hydrogen not burned in the lower containment or ice condenser plenums could be burned by the intermediate level igniters outside the steam generator and pressurizer cubicles or in the upper dome. Because of the general openness of the upper dome and the ability of the flame front from hydrogen burning to freely propagate to adjacent areas, it is

expected that each igniter in the dome would be individually the least critical for the overall function of the DIS. Even in the lower containment, hydrogen burning by flame propagation is expected to occur between adjacent compartments/areas.

Justification for Amendment

The DIS is the method selected to mitigate the hydrogen generation from degraded core scenarios postulated by 10 CFR 50.44. The DIS has generally been shown by probalistic risk analysis to be significant in limiting the severity of accident sequences that are commonly found to dominate risk for units with ice condenser containments. As such the system is considered significant to public health and safety and meets 10 CFR 50.36(c)(2)(ii)(D), Criterion 4, for inclusion in the plant T/Ss.

Basis for No Significant Hazards Determination

An extensive program of testing and analysis has demonstrated that a system of strategically placed igniters can be used for controlled burns of the hydrogen gas postulated by 10 CFR 50.44. It has been shown that these burns can be accomplished at combustion temperatures and pressures that will not challenge the integrity of the containment structure or the operability of containment equipment necessary to shut down (and maintain shutdown) the reactor. Due consideration was given to the possibility of different accidents (such as a burn induced transition to hydrogen detonation) resulting from use of the system. As previously discussed above under "Background", the design, analysis, and testing of the DIS were the subject of numerous previous submittals to the NRC and the NRC's review and approval of the system has been previously documented in the SER dated December 17, 1981. This amendment request is the proposed T/Ss for the previously reviewed and approved DIS and no design bases changes to the DIS are being made as a result of this submittal.

In accordance with 10 CFR 50.92, this proposed amendment does not involve a significant hazards consideration if it does not:

1. involve a significant increase in the probability or consequences of an accident previously evaluated;
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.

Criterion 1

The T/S being proposed for the DIS is consistent with its design and operation as previously reviewed and approved, and therefore, does not involve a significant increase in the probability or

consequences of an accident previously evaluated. The amendments involve new requirements for the T/Ss and do not delete any existing requirements.

Criterion 2

The T/S being proposed for the DIS is consistent with its design and operation as previously reviewed and approved, and therefore, does not create the possibility of a new or different kind of accident from any accident previously evaluated.

Criterion 3

The T/S being proposed for the DIS is consistent with its design and operation as previously reviewed and approved, and therefore, does not involve a significant reduction in a margin of safety. Compliance with the proposed T/S will provide additional assurance of system availability to maintain a margin of safety for containment integrity during degraded core events.

Based on the preceding, it is concluded that the proposed DIS T/S does not involve a significant hazards consideration as defined in 10 CFR 50.92.

Environmental Assessment

This licensing amendment request has been evaluated against the criteria for identification of licensing actions requiring environmental assessment in accordance with 10 CFR 51.21. It has been determined that an environmental assessment is not required because the request meets the criteria for a categorical exclusion as described in 10 CFR 51.22(c)(9). This determination is based on the fact that the proposal is an amendment to a license for a reactor pursuant to 10 CFR 50 involving a change to a surveillance requirement and the amendment meets the following specific criteria:

(i) The amendment involves no significant hazards consideration.

As previously described above under Basis for No Significant Hazards Determination, this proposed amendment does not involve significant hazards consideration.

(ii) There is no significant change in the types or significant increase in the amounts of any effluent that may be released off site.

This proposal does not change the manner of DIS operation during potential degraded core scenarios and, therefore, does not change the types or amounts of any effluents that may be released offsite.

(iii) There is no significant increase in individual or cumulative occupational radiation exposure.

The proposed change will not result in changes in the operation or configuration of the facility. The proposed change will not result in changes to the level of controls or methodology used for processing of radioactive effluents or handling of solid radioactive waste, nor will the proposed change result in any changes in the normal radiation levels within the plant. Measurement of igniter tip temperatures in accordance with the proposed 18-month surveillance may involve some personnel exposure for igniters located in radiation areas. However, normal good radiological work practices will minimize this exposure. Therefore, it was concluded that there will be no significant increase in individual or cumulative occupational radiation exposure resulting from this change.