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Docket No. 50-346

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Mr. Richard P. Crouse
Vice President - Nuclear
Toledo Edison Company
Edison Plaza - Stop 712
300 Madison Avenue
Toledo, Ohio 43652

Dear Mr. Crouse:

The Commission has issued the enclosed Amendment No. 66 to Facility Operating License No. NPF-3 for the Davis-Besse Nuclear Power Station, Unit No. 1. The amendment consists of the deletion of Operability Requirement 3.6.4.2 and Surveillance Requirement 4.6.4.2 relating to the Containment Recirculation System in the Appendix A Technical Specifications in response to your application dated January 13, 1984, supplemented by letter dated January 17, 1984.

A copy of the Safety Evaluation is also enclosed. Notice of Issuance and Final Determination of No Significant Hazards Consideration and Opportunity for Hearing will be included in the Commission's Monthly Notice.

Sincerely,

"ORIGINAL SIGNED BY
JOHN F. STOLZ"

John F. Stolz, Chief
Operating Reactors Branch #4
Division of Licensing

Enclosures:
1. Amendment No. 66 to NPF-3
2. Safety Evaluation

cc w/enclosures:
See next page

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Telephoned Concurrence from Joe Scinto 1/20/84 regarding incorporation of suggested changes.

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Toledo Edison Company

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

THE TOLEDO EDISON COMPANY

AND

THE CLEVELAND ELECTRIC ILLUMINATING COMPANY

DOCKET NO. 50-346

DAVIS-BESSE NUCLEAR POWER STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 66
License No. NPF-3

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by The Toledo Edison Company and The Cleveland Electric Illuminating Company (the licensees) dated January 13, 1984, as supplemented January 17, 1984, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

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2. Accordingly, Facility Operating License No. NPF-3 is hereby amended as indicated below and by changes to the Technical Specifications as indicated in the attachment to this license amendment:

   Revise paragraph 2.C.(2) to read as follows:

   Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 66, are hereby incorporated in the license. The Toledo Edison Company shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

John F. Stolz

John F. Stolz, Chief
Operating Reactors Branch #4
Division of Licensing

Attachment:
Changes to the Technical
Specifications

Date of Issuance: January 20, 1984

ATTACHMENT TO LICENSE AMENDMENT NO. 66

FACILITY OPERATING LICENSE NO. NPF-3

DOCKET NO. 50-346

Replace the following pages of the Appendix "A" Technical Specifications with the enclosed pages as indicated. The revised pages are identified by Amendment number and contain vertical lines indicating the area of change. The corresponding overleaf pages are also provided to maintain document completeness.

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3/4.6.4 COMBUSTIBLE GAS CONTROL

HYDROGEN ANALYZERS

LIMITING CONDITION FOR OPERATION

3.6.4.1 Two independent containment hydrogen analyzers shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTION:

With one hydrogen analyzer inoperable, restore the inoperable analyzer to OPERABLE status within 30 days or be in at least HOT STANDBY within the next 6 hours.

SURVEILLANCE REQUIREMENTS

4.6.4.1 Each hydrogen analyzer shall be demonstrated OPERABLE at least once per 92 days on a STAGGERED TEST BASIS by performing a CHANNEL CALIBRATION using sample gases containing:

a. Zero volume percent hydrogen, balance nitrogen, and

b. 2.5 $\pm$ 0.5 volume percent hydrogen, balance nitrogen.

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leakage rate are consistent with the assumptions used in the safety analyses. The leak rate surveillance requirements assure that the leakage assumed for the system during the recirculation phase will not be exceeded.

3/4.6.2.2 CONTAINMENT COOLING SYSTEM

The OPERABILITY of the containment cooling system ensures that 1) the containment air temperature will be maintained within limits during normal operation, and 2) adequate heat removal capacity is available when operated in conjunction with the containment spray systems during post-LOCA conditions.

3/4.6.3 CONTAINMENT ISOLATION VALVES

The OPERABILITY of the containment isolation valves ensures that the containment atmosphere will be isolated from the outside environment in the event of a release of radioactive material to the containment atmosphere or pressurization of the containment. Containment isolation within the time limits specified ensures that the release of radioactive material to the environment will be consistent with the assumptions used in the analyses for a LOCA.

3/4.6.4 COMBUSTIBLE GAS CONTROL

The OPERABILITY of the Hydrogen Analyzers, Containment Hydrogen Dilution System, and Hydrogen Purge System ensures that this equipment will be available to maintain the maximum hydrogen concentration within the containment vessel at or below three volume percent following a LOCA.

The two redundant Hydrogen Analyzers determine the content of hydrogen within the containment vessel.

The Containment Hydrogen Dilution (CHD) System consists of two full capacity, redundant, rotary, positive displacement type blowers to supply air to the containment. The CHD System controls the hydrogen concentration by the addition of air to the containment vessel, resulting in a pressurization of the containment and suppression of the hydrogen volume fraction.

The Containment Hydrogen Purge System Filter Unit functions as a backup to the CHD System and is designed to release air from the containment atmosphere through a HEPA filter and charcoal filter prior to discharge to the station vent.

3/4.6.5 SHIELD BUILDING

3/4.6.5.1 EMERGENCY VENTILATION SYSTEM

The OPERABILITY of the emergency ventilation systems ensures that containment vessel leakage occurring during LOCA conditions into the annulus will be filtered through the HEPA filters and charcoal adsorber trains prior to discharge to the atmosphere. This requirement is necessary to meet the assumptions used in the safety analyses and limit the site boundary radiation doses to within the limits of 10 CFR 100 during LOCA conditions.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO.66 TO FACILITY OPERATING LICENSE NO. NPF-3

TOLEDO EDISON COMPANY

AND

CLEVELAND ELECTRIC ILLUMINATING COMPANY

DAVIS-BESSE NUCLEAR POWER STATION, UNIT 1

DOCKET NO. 50-346

Introduction

By letter dated January 13, 1984, as supplemented by letter dated January 17, 1984, Toledo Edison Company (the licensee or TECo) proposed amendment to the Technical Specifications (TSs) appended to Facility Operating License No. NPF-3 for Davis-Besse Nuclear Power Station, Unit No. 1 (DB-1). The amendment would delete the Operability Requirement 3.6.4.2 and the Surveillance Requirement 4.6.4.2 relating to the Containment Recirculation System from the TSs. The proposed change would also delete the associated bases.

Background and Evaluation of Emergency Circumstances

When DB-1 was licensed, credit was given to the Containment Recirculation System (CRS) to prevent hydrogen stratification in the post-accident containment atmosphere. The CRS, which consists of two independent trains of ducts and fans, is designed to recirculate the air from the top of the containment dome to the lower elevations in the containment. The CRS, which is designed to safety grade conditions, is a separate system from the safety grade fan cooler system.

Operability of the CRS is required in the plant's TSs, (Limiting Conditions for Operation, Section 3.6.4.2, Surveillance Requirements 4.6.4.2 and the associated bases for the containment recirculation system). The specifications for the recirculation system were required as part of the original plant design to assure proper mixing of hydrogen in the containment dome area to prevent a localized hydrogen burn in that area following a Loss of Coolant Accident (LOCA). The concern that prompted the design for the containment recirculation system was originated from the thought that hydrogen, being a light density gas, may rise up and concentrate in the containment dome area creating a stratified hydrogen distribution.

In addition to the post-accident function, the CRS is typically operated during normal plant operation. The primary operational concern is to prevent grease from the polar crane from melting.

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By letter dated January 13, 1984, supplemented by letter dated January 17, 1984, the licensee informed the NRC staff that a Containment Recirculating Fan failed on January 5, 1984, which placed the Davis-Besse, Unit No. 1, in an action which requires the fan to be fixed within 30 days or be placed in Mode 3 (Hot Standby). The licensee was in the process of preparing a proposed Technical Specification Change which would delete the containment recirculating fan operability and surveillance requirements when, on January 8, 1984, the unit shut down due to an unrelated event. The Technical Specifications prohibit restart of the unit when the unit is in an action statement. Therefore, the unit is presently not permitted to restart until the fan is operable. The licensee has stated that it will take 5-6 weeks to obtain a fan assembly from the fan vendor and efforts are continuing to obtain a replacement fan through other vendors and through other utilities. However, the licensee has stated that it is doubtful that a replacement can be obtained and installed prior to the currently scheduled startup. The unavailability of Davis-Besse coupled with the fact that another power generation unit is off-line and not expected to be operating until January 21, 1984, has resulted in the need for the licensee to purchase 300 MW of power. Even if the other power generation unit were to be brought on line, the licensee has stated that it would be necessary to purchase 150MW of power. This need is projected to continue until Davis-Besse is restarted. Following the repair of other unrelated equipment, which is projected to be complete by January 18, 1984, the only restraint to startup will be the inoperable containment recirculating fan. Heatup is scheduled to commence by January 19, 1984. Emergency action to delete the operability and surveillance requirements for the containment recirculating fan from the Technical Specifications is required to remove this restraint. Therefore, no prior notice of any type is to be issued since time does not allow the issuance of the short notice and a valid emergency exists in that failure to act in a timely way would result in extending the shutdown of the facility.

Discussion

The licensee's combustible gas control system is designed to control the concentration of hydrogen which may be released within the containment atmosphere following a LOCA. The system is composed of the Hydrogen Dilution (containment atmosphere dilution) System, the Hydrogen Purge System, and the Containment Recirculation System.

The Containment Hydrogen Dilution System is designed to add air to the containment vessel to effectively maintain hydrogen concentrations within acceptable limits. Although the licensee does not rely on a hydrogen recombiner for post-accident hydrogen control, the licensee indicated that the design is in compliance with 10 CFR Part 50.44 in that they have the capability to bring a recombiner on-site and manually hook it up to a dedicated containment penetration.

The Hydrogen Purge System functions as a backup to the Containment Hydrogen Dilution System and is designed to release air from the containment atmosphere through HEPA and charcoal filters to the station vent.

The Containment Recirculation System is designed to mix the atmosphere in the containment vessel to provide an adequate interchange between areas of high and low hydrogen concentrations in order to maintain hydrogen peaking factors acceptably low.

Standard Review Plan 6.2.5, "Combustible Gas Control in Containment," Section II.3, "Acceptance Criteria," states:

> "In meeting the requirements of 10 CFR Part 50, 10 CFR Part 50.44 and 50.46 to provide the capability for insuring a mixed atmosphere in the containment, and of GDC 41 to provide systems as necessary to assure that containment integrity is maintained, a system should be provided to mix the combustible gases within the containment. The functional design of this system will depend on the type of containment. This system may consist of a fan, a fan cooler, or containment spray. An analysis should be presented which shows that excessive stratification of combustible gases will not occur within the containment or within a containment subcompartment. For containments which rely on convective mixing in conjunction with systems operation to mix the combustible gases, the containment internal structures must have design features which promote the free circulation of the atmosphere."

The licensee has stated that hydrogen mixing can be adequately done without the CRS. The mixing of hydrogen would be accomplished through other existing systems namely mechanisms such as convective mixing and the molecular diffusion.

The containment spray system (safety grade) is automatically initiated by the high containment pressure resulting from a LOCA. This creates a turbulent condition in the containment which ensures proper mixing of hydrogen generated from the required assumed initial metal-water reaction in the core.

Two of the three containment air coolers (safety grade) will be in operation after a LOCA to provide the heat sink for the containment atmosphere and recirculate the air in the areas below the operating deck. The radiolytic hydrogen generated from the water on the floor and in the containment sump will be mixed by the air coolers.

Davis-Besse, Unit 1, has a large dry containment with 2.8 million cubic feet of free volume. Total height from the floor to the ceiling is more than 250 feet. The heat loss through the containment wall will promote the natural convective air circulation downward along the wall. The licensee has stated that this process is further enhanced by the concrete structure for the steam generator compartment (the D-rings) which have a natural chimney effect providing an upward draft in the inner portion of the containment. The combined effects provide the natural internal recirculation of atmosphere in the containment with flow rates much greater than the containment recirculation system flow.

A research project was conducted by the Los Alamos National Laboratory in 1978. Their report, NUREG/OR-0304, "Mixing of Radiolytic Hydrogen Generated Within a Containment Compartment Following a LOCA," provides detailed mathematical and experimental evidence that the molecular diffusion process and the turbulent mixing caused by small temperature differences between the floor and the ceiling of the containment will be sufficient to ensure proper mixing of hydrogen in containment. The same process also ensures that the mixture will not separate by gravitational force or other processes.

Evaluation

During the early 1970's, when Davis-Besse was designed, there had been only limited research performed on the diffusion and/or mixing of hydrogen. As noted above, since that time analysis has been performed which provides additional understanding of hydrogen mixing and diffusion processes.

The NRC has recently approved a number of plant applications that did not include a separate CRS. These plants rely on natural convective forces in addition to the containment spray system and the fan cooler system to provide adequate post-accident hydrogen mixing. In particular, the licensee has made a comparison of the similarities between the Davis-Besse and Midland containment. Both of these B&W plants used Bechtel as their architect engineer and contractor. In approving the Midland combustible gas control system (which does not have a separate CRS), the NRC staff made the following conclusion in the Safety Evaluation Report:

> "Natural convective currents with the containment following an accident will mix the containment atmosphere sufficiently to preclude high concentrations of combustible gases from occurring locally. However, mixing of the containment atmosphere will also be enhanced by the containment spray system and the recirculating air cooling system, both of which are designed to ESF criteria. This will ensure that samples drawn by the hydrogen monitoring subsystem are representative of the containment atmosphere."

We recognize that post-accident hydrogen mixing can be accomplished through a number of means. The previously discussed Los Alamos report provides a basis to conclude that natural convective currents and molecular diffusion will provide sufficient mixing. Although, the NRC staff has not performed a detail review of the Los Alamos report, we do note that it is based on generally accepted engineering and scientific principles. The Standard Review Plan (SRP), which provides the criteria for staff review, does not require a separate CRS to promote hydrogen mixing. The SRP recognizes that adequate mixing can be accomplished by either a fan recirculation system, a fan cooler system <u>or</u> a containment spray system. This view is underscored in the above excerpt from the Midland Safety Evaluation Report.

Although the CRS will be removed from the plant's TSs, it will still remain in the plant and will be available in the post-accident mode. As previously discussed, the licensee intends to maintain both CRS trains operable due to the polar crane grease concern.

We conclude that the Davis-Besse facility possesses diverse means of promoting post-accident hydrogen mixing. The natural convective currents along with the turbulence created by the combined action of the containment spray and the fan coolers will provide sufficient containment mixing. Therefore, we conclude that, as in the Midland design, adequate post-accident containment mixing will occur at Davis-Besse without the CRS. We find the DB-1 design includes sufficient equipment and features to comply with SRP 6.2.5 and therefore the licensee's proposed TSs change is acceptable.

Environmental Consideration

We have determined that the amendment does not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further concluded that the amendment involves an action which is insignificant from the standpoint of environmental impact and, pursuant to 10 CFR §51.5(d)(4), that an environmental impact statement, or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of this amendment.

Final No Significant Hazards Consideration Determination

The State was informed by telephone of our proposed no significant hazards consideration determination on January 18, 1984. The State contact had no comments on the proposed determination. Based on our review of the licensee's submittals as described in our above evaluation and for the reasons stated below, we have made a final determination that the licensee's amendment request does not involve a significant hazards consideration.

The Commission has provided guidance for the application of the criteria in 10 CFR 50.92 by providing examples of amendments that are considered not likely to involve significant hazards considerations (48 FR 14870). One of the examples of actions involving no significant hazards considerations relates to a change which either may result in some increase to the probability or consequences of a previously-analyzed accident or may reduce in some way a safety margin, but where the results of the change are clearly within all acceptable criteria with respect to the system or component specified in the Standard Review Plan: for example, a change resulting from the application of a small refinement of a previously used calculational model or design method (Example (vi)).

Davis-Besse, Unit No. 1, Technical Specifications include the containment recirculation system. Since the issuance of the license, reviews and data have shown that the Technical Specification related function performed by these fans (namely the prevention of the formation of explosive or flammable pockets of hydrogen within the containment during accident conditions) is also performed by other existing systems, namely containment spray, containment air coolers, and naturally occurring mechanisms such as convective mixing and molecular diffusion. We have reviewed the issue of no safety grade containment recirculation system against the criteria of the Standard Review Plan and accepted it on other similar Babcock and Wilcox reactor plants designed by the same architect engineer, Bechtel Corporation. From a comparison of Davis-Besse with these plant designs, it can be determined that Davis-Besse also fits the criteria for determining that containment recirculating fans are not required for safety reasons. In addition we have reviewed the proposed change against each of the criteria in 10 CFR 50.92, namely that 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.

In addressing each of the above criteria, the proposed deletion of the CRS requirements from the TSs has no relation to the probability of an accident previously evaluated. The deletion of these TSs requirements of the CRS would not create a new or different kind of accident from any accident previously evaluated. The proposed change would not involve an increase in the consequences of an accident previously evaluated because there are other means of preventing the accumulation of pockets of hydrogen following an accident. The proposed change would possibly involve a reduction in a margin of safety. However, as explained in our evaluation above, the DB-1 facility possesses other means of promoting post accident hydrogen mixing. Therefore, we consider the possible reduction of a margin of safety not significant.

On the basis of the above, the Commission has determined that the application does not involve a significant hazards consideration.

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.

Dated: January 20, 1984

The following NRC personnel have contributed to this Safety Evaluation: D. Pickett, and Guy Vissing.