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

FIRE PROTECTION SAFETY EVALUATION REPORT

BY THE

OFFICE OF NUCLEAR REACTOR REGULATION

U. S. NUCLEAR REGULATORY COMMISSION

IN THE MATTER OF

IOWA ELECTRIC LIGHT AND POWER COMPANY

DUANE ARNOLD ENERGY CENTER
DOCKET NO. 50-331

Supplement 1
Dated: February 10, 1981

Hose Carts - Section 3.1.5

In the Duane Arnold Fire Protection Safety Evaluation Report, the concern was that a hose cart be provided at a central location equipped with adequate hose and other fire fighting tools.

By letter dated August 29, 1978, the licensee indicated that a hose cart capable of handling 250 feet of 2 1/2 inch and 200 feet of 1 1/2 inch hose will be provided with accessories in a steel box on the hose cart.

We conclude that the licensee's proposed course of action meets our requirements and is, therefore, acceptable.

Administrative Controls - Section 3.2.9

In the Duane Arnold Fire Protection SER, the concern was that the program of administrative controls should be in conformance to the guidelines, "Nuclear Plant Fire Protection Functional Responsibilities, Administrative Controls, and Quality Assurance."

By letter dated March 7, 1980, the licensee provided its commitment to meet these guidelines.

Based on the licensee's commitment to meet our guidelines, we find Iowa Electric's response to Section 3.2.9 requirements acceptable.

Water Suppression Systems, Section 3.1.7(a)

In the Duane Arnold Fire Protection SER the concern was that a fire in the railroad airlock area adjacent to the 757 ft. elevation of the reactor building could damage redundant safe shutdown systems in the reactor building. We required that an automatic sprinkler system be installed in the railroad airlock area.

By letter dated October 30, 1978, the licensee indicated that an automatic sprinkler system hydraulically designed to provide 0.3 gpm/ft^2 will be provided for the railroad airlock area.

We conclude that the licensee's proposal to provide an automatic sprinkler system for the railroad airlock area meets our requirement and is, therefore, acceptable.

Water Suppression Systems, Section 3.1.7(c)

In the Duane Arnold Fire Protection SER the concern was that a fire in the area near the turbine lube oil reservoir at elevation 734 feet in the turbine building could affect redundant safe shutdown cabling routed in the area.

We required that the automatic sprinkler system at elevation 734 feet in the turbine building be extended to provide coverage of the unprotected areas in the vicinity of the lube oil reservoir.

By letter dated October 30, 1978, the licensee indicated that the automatic sprinkler system in the north end of the turbine building will be extended to provide coverage to all areas presently unsprinklered so that the entire area bounded by column rows 10 to 13 and P to Q (typographical error in letter said "P to G") and rows 12 to 13 and N to P will be protected by an automatic sprinkler system with a design density of 0.30 gpm/ft^2.

We conclude that the licensee's proposal to extend the automatic sprinkler system on elevation 734 feet in the turbine building meets our requirement and is, therefore, acceptable.

Smoke Detection System Tests, Section 3.2.2

In the Duane Arnold Fire Protection SER the concern was that the smoke detectors might not respond to the products of combustion for the combustibles in the areas where smoke detectors are installed. We were also concerned that ventilation air flow patterns in the area might reduce or prevent detector response of the detectors. We recommended that the licensee perform in-situ smoke detector testing and bench testing of the detectors to verify that the detectors will have adequate sensitivity to the products of combustion for the combustibles in an area and that they will provide prompt response.

By letter dated July 3, 1978, the licensee stated that all newly-installed smoke detectors will be bench tested as requested. However, for presently-installed detectors, the licensee proposes to provide verification from the detector manufacturer's test data to show that the detectors' sensitivity to products of combustion of combustibles located in each area where the detectors are installed is adequate.

The required methodology for an in-situ smoke detector test is beyond the current state-of-the-art and, therefore, an in-situ test cannot be performed at this time.

We find that, with acceptable bench testing of the newly installed smoke detectors and manufacturers verification of the sensitivity of the existing smoke detectors to the products of combustion of combustibles in each area, and considering that the smoke detection systems meet appropriate NFPA Codes and are designed by experienced personnel, we find the smoke detectors to be acceptable.

Control Room Fire Hazards, Section 3.2.4

In our SER, the concern was that a fire in the control room proper, the cable spreading area which is open to the control room, the computer area or support areas could result in the loss of redundant safe shutdown systems.

By letter dated October 30, 1978, the licensee listed several modifications which they proposed to reduce the fire exposure hazard to the control room. Initially, they stated that they plan to apply a fire retardant coating on the cables in the cable spreading area behind the control room control board.

Other proposed modifications for the control room area include: upgrading the glass partition wall between the computer room and the control room to a minimum one-hour fire-rated design; the installation of ionization detectors in the control room panels, the control room air intake, and the computer room; the addition of portable extinguishers to the computer room and control room; and development of an administrative control procedure to minimize the accumulation of transient combustibles in the control room and other safety-related areas.

We have considered that the licensee is providing an alternate shutdown system which is electrically isolated from the control room such that a fire which destroys redundant safe shutdown system circuits in either area will not affect the ability to reach safe shutdown from the other area. Therefore, we conclude that the licensee's proposed protection for the control room area meets the guidelines of Section F.2 of Appendix A to BTP 9.5-1 and is therefore acceptable.

Smoke and Heat Vents, Section 3.1.12

In the SER, the concern was that installed ventilation systems would not be adequate to remove the smoke and heat from a fire in most areas of the plant.

By letter dated August 29, 1978, the licensee indicated that the following portable smoke ejector units and accessories will be provided:

1. One electric motor driven smoke ejector fan with air flow capacity of 5200 cfm.

2. One gasoline engine driven smoke ejector fan with air flow capability of 5500 cfm.

3. One adaptor to attach 16 inch diameter flexible duct to fan.

4. Forty feet of 16 inch diameter flexible duct.

5. Two smoke ejector covers.

We are of the opinion that three portable smoke ejector units with a combined capacity of 17,000 - 20,000 cfm be provided to adequately remove heat and smoke from the fire areas, and therefore the two smoke ejector units proposed by the licensee is not sufficient.

To meet the guidelines of Section D-4 of Appendix A to BTP 9.5-1 and Section III K of Appendix R to 10 CFR Part 50, the licensee should provide at least three portable smoke ejectors with a combined capacity of at least 17,500 cfm. The smoke ejectors provided should be capable of being operated in case of loss of offsite power.

Cable Fire Barrier Penetrations Test Data, Section 3.2.3

In the SER, the concern was that the various fire barrier penetration seal designs used at DAEC would not be adequate to prevent a fire in one fire area from spreading to adjacent fire areas.

By letter dated April 1, 1980, the licensee submitted a document on test data for various fire barrier penetrations used at Duane Arnold. Also tested were various methods to repair these penetrations.

The tests described in the test report submitted by the licensee do not substantiate the fire resistance of the penetration seals installed at the plant. Because of subsequent quality control on the tested seals, the tests do not establish that the penetration seals tested are representative of the full range of penetration seals actually installed in the plant.

To meet the requirements of Section III M of Appendix R to 10 CFR Part 50, the licensee should provide additional documentation to verify that the seals which were tested and passed were representative of those actually installed.

Turbine Building Fires, Section 3.2.7

In the SER, the concern was that a fire involving the lube oil liner and other combustibles in the turbine building located near the diesel generator room may damage both diesel generator units. We required that the licensee analyze the impact of turbine building fires on the diesel generators.

By letter dated November 29, 1979, the licensee stated that they did not include lube oil in the combustible loading list because it is enclosed in piping and that the amount of turbine lube oil piping in Fire Zone 8D is small compared to the hydrogen seal unit. They concluded that additional protection for this area is "neither practical nor necessary."

The licensee has not considered the total amount of lube oil which could be introduced into this area from a rupture of the lube oil piping, and has not considered the effect of a fire which could involve all the combustibles in this area. Such a fire could cause a collapse of the turbine building structure and thus affect the availability of the emergency diesel generators.

To meet the requirements of Section II.A of Appendix R to 10 CFR Part 50 and Section D.2 of Appendix A to BTP 9.5-1, the licensee should provide an automatic sprinkler system throughout Fire Zone 8D which is designed and installed to provide a water density of 0.3 gpm/sq. ft. and meets the requirements of NFPA 13.

Fire Dampers, Section 3.2.8

In the SER, the concern was that the dampers installed in fire barriers would not be adequate to prevent a fire in one area from spreading to an adjacent area through the ventilation openings.

The licensee has not yet responded to our concern.

To meet the recommendations of Section D1(j) of Appendix A to BTP APCSB 9.5-1, the licensee should provide 3-hour fire rated fire door dampers in all ventilation penetrations of 3-hour rated fire barriers and 1 1/2-hour fire rated dampers in barriers with 2-hour or less fire resistance rating.

Diesel Generator Air Intakes, Item 3.2.6

Item 3.2.6 of the Duane Arnold SER requires the licensee to evaluate the need for a barrier between the diesel generator air intakes to prevent combustion products due to a fire in one room from entering the other room via the air intakes, and to propose modification if necessary.

Analyses by BNL and their consultants had indicated that even with a barrier separating the two 13'H x 11'W intake louvers which are mounted 1.5' apart on the side wall of the turbine building at a base elevation of 816 feet, vitiated air, comprising roughly 70% air and 30% products of combustion, at a temperature of 200°C, can be injested into the air-intake system. This vitiated air, resulting from a fire in one of the diesel generator rooms would normally efflux from the diesel generator exhaust system located approximately 40 feet below the air intake louvers. Induction of this gas mixture, at the temperature calculated, has been considered to significantly affect the performance of the other diesel generator in the adjacent non-fire involved room.

Accordingly, the licensee responded by letter, dated November 29, 1979, to this item. To reduce effects of possible fire-plume entrainment their proposal, consisting of a set of drawings, indicated how they intended to take intake suction from above the turbine roof instead of from side-wall mounted intakes.

As indicated on the drawings, the licensee will remove the common air intake plenum which presently serves both emergency diesel generators, and will separately duct the air intake for each diesel generator through the roof of the turbine building. An air intake penthouse will be provided on the roof for each of the two air intake ducts, with the two penthouses located 30 feet apart on the roof.

This modification has, in effect, reduced the problem significantly due to three basic factors:

(1) Increasing the vertical separation between the intake/exhaust system necessarily provides further distance for the fire-plume to entrain the ambience thus reducing the plume temperature and increasing the mass fraction of oxygen within the plume before . can possibly be entrained by the intake system.

(2) A 30 foot lateral separation of the roof-mounted intake ducts, in effect, provides an approximate 15 foot horizontal spacing between the fire plume centerline and the air intake to the non-involved diesel generator. This assures that a greater amount of fresh air can be inducted compared to that which would have been provided had the exhaust and intake ports been mounted in the same vertical plane.

(3) Placing the exhaust ducts on the roof can insure that they are now in the "dead" air region of the fire plume as it travels (like a wall jet) up along the turbine building wall.

Accordingly, the licensee's proposal to separate the emergency diesel generator air intakes as described above, adequately addresses the concerns indicated in SER item 3.2.6 and is satisfactory.

Environmental Considerations

We have determined that this 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 Section 51.5(d)(4) that an environmental impact statement, negative declaration, or environmental impact appraisal need not be prepared in connection with the issuance of this amendment.

Conclusion

We have concluded, based on the considerations discussed above, that: (1) because the amendment does not involve a significant increase in the probability or consequences of accidents previously considered and does not involve a significant decrease in a safety margin, the amendment does not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) 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: February 10, 1981