

Docket No. 50-331

DEC 20 1977

Iowa Electric Light & Power Company
ATTN: Mr. Duane Arnold, President
P. O. Box 351
Cedar Rapids, Iowa 52406

Gentlemen:

During the period November 28 - December 2, 1977, members of the NRC fire protection review team and their consultants met with your representatives at the Duane Arnold site to evaluate the fire protection program for the facility. During the course of the visit, a meeting was held each morning, with a summary meeting on December 2, 1977, during which the NRC staff identified its concerns and positions that require resolution or additional information required to permit the staff to complete its review. Enclosure 1 lists the staff's positions and comments resulting from the onsite review. Enclosure 2 is a request for additional information. Enclosure 3 is a list of the commitments made by your personnel to resolve staff concerns.

We require your response to the items in the three enclosures by December 27, 1977. With respect to the staff positions in Enclosure 1, we require your adoption of the staff's position or a commitment to an acceptable alternative for each item. The information requested in Enclosure 2 is needed to complete the staff's review prior to January 3, 1978. With respect to the items in Enclosure 3, we request confirmation of your commitments.

We also request that you attend a one-day meeting in Bethesda, Maryland during the week of January 3-6, 1978 to discuss the final resolution of the staff's concerns and positions.

Sincerely,

Original signed by

George Lear, Chief
Operating Reactors Branch #3
Division of Operating Reactors

Enclosures and ccs:
See next page

*SEE PREVIOUS YELLOW FOR CONCURRENCES

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| SURNAME➤ | *RClark:mjf | GLear | *WButler | *TDunning | | |
| DATE➤ | 12/15/77 | 12/ /77 | 12/15/77 | 12/15/77 | | |

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Gentlemen:

During the period November 28 - December 2, 1977, members of the NRC fire protection review team and their consultants met with your representatives at the Duane Arnold site to evaluate the fire protection program for the facility. During the course of the visit, a meeting was held each morning, with a summary meeting on December 2, 1977, during which the NRC staff identified its concerns and positions that require resolution or additional information required to permit the staff to complete its review. Enclosure 1 lists the staff's positions and comments resulting from the onsite review. Enclosure 2 is a request for additional information. Enclosure 3 is a list of the commitments made by your personnel to resolve staff concerns.

We are requesting a response to the items in the three enclosures by December 27, 1977. With respect to the staff positions in Enclosure 1, we request that you state in your response whether you plan to commit to the staff recommendations or provide an alternative action. For the staff positions in Enclosure 1 which you cannot accept at this time, we request that you so indicate and provide reasons therefor. Information requested in Enclosure 2 is needed to complete the staff's review prior to January 3, 1978. With respect to the items in Enclosure 3, we request confirmation of your commitments.

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Sincerely,

George Lear, Chief
Operating Reactors Branch #3
Division of Operating Reactors

*OK as modified.
WB*

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| SURNAME | | 12/15/77 | 12/19/77 | 12/15/77 | 12/15/77 |
| DATE | | | | | |

Iowa Electric Light &
Power Company

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Enclosures:

1. Staff Positions
2. Request for Additional Information
2. Commitments by Licensee

cc w/enclosures:

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Harold F. Reis, Esquire
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426 Third Avenue, S. E.
Cedar Rapids, Iowa 52401

Enclosure 1
Staff Positions - Fire Protection
Duane Arnold Energy Center

PF.1 Control Room Support Areas

Staff Concern: Support areas including a plant process computer, office areas, and a kitchen contain combustibles which are a fire exposure hazard to safety-related controls within the control room. A non-fire rated glass partition wall with glass doors separates the two areas, but does not extend up to the ceiling fire barrier. Smoke due to a fire in the support areas would communicate to the control room operating area.

Staff Position: The support areas should be isolated from the control room by one hour fire rated construction, or the glass in the existing partition should be replaced with wire glass, the partition should be extended to the ceiling fire barrier to provide a smoke barrier and an automatic suppression systems should be provided to protect the support areas.

PF.2 Control Room Cable Spreading Area

Staff Concern: One division of safety-related cables are located in a cable spreading area above auxiliary electrical cabinets behind the L-shaped control board in the control room. The cables are routed in stacked open ladder trays and are a fire exposure hazard to redundant safety-related systems located in the panels below.

Staff Position:

The electrical cables in the control room cable spreading area should be covered with a flame retardant coating.

A booster hose station with a low flow capacity nozzle should be provided with sufficient hose reach to provide water suppression capability for the electrical cables in the control room cable spreading area and for the control room support areas.

PF.3 Control Room Fire Detection

Staff Concern: Separation of redundant safety-related systems within the control room control boards is provided by the use of metal barriers. Similar protection is afforded to redundant systems by the use of separate cabinets for auxiliary electrical systems located behind the control room control boards. Prompt detection and extinguishment of fires in these areas are essential to limiting fire damage to a single division of redundant safety-related systems. The present fire detection in these areas is provided by ionization detectors located at the ceiling above the cable spreading area.

Staff Position: Fire detection systems should be provided in the control boards and auxiliary electrical equipment cabinets which contain safety-related systems to provide prompt fire detection capability.

PF.4 Air Breathing Apparatus for Control Room Operators

Staff Concern: Four portable air breathing apparatus are stored in the control room for emergency use. Spare air bottles should be also provided for ready use by the control room operators.

Staff Position: At least two spare air bottles should be stored for ready areas for each air breathing apparatus provided for control room operator's use.

PF.5 Switchgear Room Fire Door

Staff Concern: A roll up fire door is provided in the wall separating redundant safety-related switchgear rooms. A fuse link is provided only on one side of the fire door. The location of the fuse link device does not provide adequate protection to prevent an exposure due to a fire on the other side of the door.

Staff Position: The fire door in the wall separating redundant switchgear rooms should be electrically supervised or provided with an electro/thermal link actuated by smoke detectors in either room.

PF.6 Battery Operated Emergency Lighting

Staff Concern: Battery operated emergency lighting units are set on the floor in the switchgear room and in other areas of the plant. As such it does not provide effective illumination of the area and is subject to damage by the movement of materials in the area.

Staff Position: Wall brackets should be provided for battery operated emergency lighting to provide effective illumination of the area.

PF.7 Switchgear Rooms Hose Stations

Staff Concern: The existing hose station does not have sufficient reach to independently serve each switchgear room. The hose would have to be routed through one room to reach the other room. The hose nozzle is not suitable for use near high voltage switchgear.

Staff Position: A booster hose station(s) with a low flow nozzle should be provided to reach all areas of each switchgear room. The hose should not have to be run through one switchgear room in order to reach the other room.

PF.8 Air Flow Supervision Battery Rooms

Staff Concern: The ventilation system assures that hydrogen gas does not accumulate in the battery rooms. The exhaust from each battery room joins to a common duct which feed the exhaust fans. The loss of exhaust flow from any room would go undetected.

Staff Position: Air flow supervision of the exhaust from each battery room should be provided to actuate an alarm in the control room.

PF.9 Diesel Fire Pump Room Door

Staff Concern: A flood control door is provided at the entrance to the diesel fire pump room. The electrically driven fire pump is located in close proximity to the door. A fire in the diesel pump room could result in an exposure to the redundant fire pump if the access door is not closed.

Staff Position: The door to the diesel fire pump room should be electrically supervised or a Class A fire door should be provided for the opening.

PF.10 Manual Actuation of Deluge Systems

Staff Concern: The manual means to actuate the deluge systems for the HPCI and RCIC equipment rooms are located within the fire area. Access should not be required to a fire area in order to actuate the deluge suppression system.

Staff Position: The manual actuation station for deluge systems should be located outside of the fire area for all such systems.

PF.11 Reactor Building Fire Detection

Staff Concern: Both fixed and transient combustibles exist in the reactor building. Fires involving such materials should be promptly detected to permit manual fire suppression to minimize damage to safety-related systems.

Staff Position: Fire detection systems should be provided at elevation 833 and 812 of the reactor building.

PF.12 Railroad Airlock Fire Protection

Staff Concern: Non-fire rated doors isolate the railroad airlock area from the reactor building and combustibles are stored in this area. A fire in this area would threaten the integrity of the airlock doors.

Staff Position: An automatic sprinkler system should be provided in the reactor building railroad airlock, or all combustibles should be removed from the area and fixed fire detection provided in the area.

PF.13 Turbine Building Fire Exposure of Diesel Intakes

Staff Concern: The accumulation of transient combustibles at the south end of the turbine building in the trackway and at elevation 780 feet pose a fire hazard which could threaten the integrity of the turbine building. A diesel locomotive is stored in the trackway. The collapse of the turbine building or the ventilation intake for the diesel generator could result in the loss of this emergency onsite power source.

Staff Position: Resins and Ecodex stored in combustible containers should be removed from the area or should be protected by automatic sprinklers if left in place. Automatic sprinkler protection should be provided for the trackway area of the turbine building.

PF.14 Turbine Building Cable Tray Protection

Staff Concern: Safety-related cables are routed through the north area of the turbine building at elevation 734 feet. The turbine lube oil reservoir is suspended just below the upper floor level. The potential for oil spill and spray fires exist which are beyond the bounds of the area protected by deluge systems.

Staff Positions: Automatic sprinkler protection should be provided to protect safety-related cables from exposure fires at the north end of the turbine building at elevation 734 feet. The area of sprinkler coverage should include the areas bounded by column rows 10 to 13 and P to G, and rows 12 to 13 and N to P.

PF.15 Turbine Building Fire Detection

Staff Concern: Power and control cables for the diesel generators are routed in conduit through the south end of the turbine building at elevation 734 feet. Fire detection is not provided in this area to permit prompt action to reduce the potential of fire damage to these safety-related systems.

Staff Position: Fire detection should be provided at elevation 734 feet of the turbine building to protect areas between column rows 4 to 7 and M to Q.

PF.16 Cable Penetration Fire Barrier Test

Staff Concern: The electrical cable penetration for fire barriers have not been tested to demonstrate that their fire resistance rating is adequate.

Staff Position: The cable penetration fire barriers should be tested to demonstrate a fire rating equivalent to the rating required for the barrier in which the penetrations are used. The tests should be performed or witnessed by a representative of a qualified independent testing laboratory, and should include the following:

- (1) The tests should be performed in accordance with ASTM E-119 and the following conditions.
- (2) The cables used in the test should include the cable insulation materials used in the facility.
- (3) The test sample should be representative of the worst case configuration of cable loading, cable tray arrangement, anchoring and penetration fire barrier size and design. The test sample should also be representative of the cable sizes in the facility. Testing of the penetration fire barrier in the floor configuration will qualify the fire stop for use in the wall configuration also.
- (4) Cable penetrating the fire barrier should extend at least three feet on the unexposed side and at least one foot on the exposed side.
- (5) The fire barrier should be tested in both directions unless the fire barrier is symmetrical.
- (6) The fire barrier should be tested with a pressure differential across it that is equivalent to the maximum pressure differential a fire barrier in the plant is expected to experience.
- (7) Temperature levels of the cable insulation, cable conductor, cable tray or conduit, and fire stop material should be recorded for the unexposed side of the fire barrier.
- (8) Acceptance Criteria - the test is successful if:
 - a. The cable penetration fire barrier has withstood the fire endurance test without passage of flame or ignition or cables on the unexposed side for a period equal to the required fire rating, and
 - b. The temperature levels recorded for the unexposed side are analyzed and demonstrate that the maximum temperatures are sufficiently below the cable insulation ignition temperature, and

- c. The fire barrier remains intact and does not allow projection of water beyond the unexposed surface during the hose stream test.

If the previous tests can be shown to meet the above position, the licensee should provide the results of the tests to show that the above position is met.

PF.17 Smoke Detection Systems Tests

Staff Concern: The type and location of ionization smoke detectors may not provide prompt detection of fires in areas where they are used. Ventilation air flow patterns or detector sensitivity may prevent effective fire detection.

Staff Position: In situ tests should be conducted with a suitable smoke generation device to verify that the products of combustion from a fire would be promptly detected by installed smoke detectors and that ventilation air flow pattern in the area do not significantly reduce or prevent detection response. Bench tests should be conducted to verify that smoke detectors will provide prompt response and have adequate sensitivity to the products of combustion for the combustibles in the area where smoke detectors are installed. If any fire detection systems are found to be inadequate, appropriate modifications should be made to provide adequate detection system performance.

PF.18 Supervision of Fire Doors

Staff Concern: Fire doors have to be closed to provide an effective barrier against the spread of fires between different areas as well as to contain suppression agents for total flooding suppression systems.

Staff Position: Appropriate administrative controls should be provided to assure the effectiveness of fire doors protecting safety-related areas as follows:

1. Fire doors should be inspected semi-annually to verify that self-closing mechanisms and latches are in good working order.
2. Routine supervision of fire doors should consist of one of the following:
 - a. Electrical supervision of the closed position with alarms at a central location
 - b. Locked closed doors should be inspected weekly to verify that the doors are in the closed position. The fire brigade commander should have ready access to keys for all locked doors

- c. Automatic release mechanism doors should be inspected monthly to verify that doorways are free of obstructions
 - d. Unsupervised and unlocked self-closing fire doors should be inspected daily to verify that they are in the closed position.
3. Areas protected by automatic total flooding gas suppression systems should have electrically supervised self-closing fire doors. Automatic release mechanism fire doors should not be used in such areas.

PF.19 Self-Closing Fire Doors

Staff Concern: Self-closing fire doors have been provided with fuse link release mechanisms. This feature permits the door to be held in the open position. The use of such closing mechanisms does not prevent the spread of smoke and products of combustion from one area to another until the heat from a fire is sufficient to melt the fuse link. Thus unnecessary damage or loss of access may result from the use of such devices.

Staff Position: Fuse links should be removed from unsupervised self-closing fire doors protecting safety-related systems or providing access to such areas.

PF.20 Fire Retardant Lumber

Staff Concern: Untreated wood is used in many safety-related areas and is an unnecessary addition to the combustible loading in such areas.

Staff Position: All untreated wood should be removed from the reactor building and other safety-related areas. All wood used in such areas should be treated fire retardant lumber and should be limited to temporary use, to be removed when no longer required. Wood should be replaced with a suitable non-combustible substitute where in permanent use.

PF.21 Yard Hydrant Gate Valves

Staff Concern: Hydrants must be shut off to add a second hose line. Such action would shut off the supply of fire fighting water at the time that additional hose streams are required.

Staff Position: A 2 1/2 inch gate valve should be installed on each port for the yard fire hydrants.

PF.22 Hose House Equipment

Staff Concern: The hose houses are not provided with a suitable complement of fire fighting equipment. No means have been provided to insure the availability of equipment for use with the yard hydrants.

Staff Position: A hose cart should be provided for ready access by the fire brigade equipped as a minimum with the following items.

1. 200 feet 1 1/2 inch fire hose
2. 250 feet 2 1/2 inch fire hose
3. Two 1 1/2 inch nozzles
4. Two 2 1/2 inch nozzles
5. One 2 1/2 x 1 1/2 inch gated wye valve
6. Two spanner wrenches
7. One hydrant wrench
8. One hose clamp
9. One assortment of hose gaskets
10. One set each of 1 1/2 and 2 1/2 inch hose adapters to convert from national standard thread to Cedar Rapids hose thread and vice versa.

PF.23 Seal Beam Battery Operated Portable Lighting

Staff Concern: Only a minimal amount of fixed battery operated emergency lighting has been provided. Hard wired emergency lighting may be lost due to fire damage.

Staff Position: Ten seal beam, high intensity battery operated, portable lighting units should be provided for emergency and fire brigade use.

PF.24 Fire Fighting Protective Clothing

Staff Concern: Protective clothing has not been provided to adequately equip the fire brigade.

Staff Position: Fire fighting protective clothing should be provided for ten men.

PF.25 Equipment Storage Areas

Staff Concern: Fire fighting equipment should be centrally located to assure its availability in a minimum amount of time in a fire situation.

Staff Position: A central location should be provided to assemble the fire brigade and equip them with protective clothing, portable lighting, air breathing apparatus, and hand tools. The same area or a second area should be provided for larger equipment items such as fire hoses, smoke venting equipment, etc.

PF.26 Air Breathing Equipment

Staff Concern: Two types of air breathing equipment have been provided. The licensee has noted that air bottles are not interchangeable. During an emergency a shortage of spare air bottles could occur due to the use of the two different air masks provided. The cascade air charging system does not include any provisions for cooling of bottles being filled. Thus, recharging of air bottles takes a period of 15 minutes or longer. At this rate, air bottles cannot be refilled to meet the need of the fire brigade and operating personnel.

Staff Position: The air breathing apparatus use by the fire brigade and emergency control personnel should be provided by the use of apparatus and spare air bottles which are compatible. The complement of air breathing apparatus, spare bottles, and recharge capability should be sufficient to meet the needs of seven people for a period of six hours at a usage rate of three air bottles per hour.

PF.27 Emergency Lighting

Staff Concern: Only a few battery operated sealed beam emergency lighting units have been provided. Hard wired emergency lighting may be damaged as a result of fire.

Staff Position: Fixed emergency lighting should be provided consisting of seal beam units with individual eight-hour minimum battery power supplies. These units should be provided in all safety-related areas and areas where fires could result in the release of radioactive materials. In addition all access and egress routes from these areas should be provided with this type of emergency lighting.

PF.28 Fire Detection Power Source

Staff Concern: The power source for fire detection systems is dependent upon the availability of offsite power. In the event of a loss of offsite power, fires in safety-related areas of the plant not protected by automatic suppression systems, could result in extensive damage before the cause is identified.

Staff Position: The fire detection systems should be connected to a power source which will restore power to fire detection systems following the loss of offsite power.

PF.29 Motor-Operated Fire Pump Power Source

Staff Concern: The power source for the motor-operated fire pump is dependent upon the availability of offsite power. The loss of offsite power is a potential consequence of fires. A failure of the diesel fire pump or an outage of the diesel fire pump would result in reliance on the motor-operated pump for both primary and backup fire suppression capability in many areas of the plant. Although a backup source of water is available by a connection to the service water system, this source operates at a pressure which is insufficient to meet fire water demands and is also dependent upon offsite power sources.

Staff Position: Modifications should be made which would permit the manual transfer of the motor operated fire pump to an essential bus supplied power from the diesel generators.

Enclosure 2
Request for Additional Information
Duane Arnold Energy Center

Sections in parenthesis refer to number pages of the licensee's fire hazards analysis submitted on January 18, 1977.

1. (III.202) Provide a list of those safety-related systems required for shutdown which were identified as a part of your fire hazards analysis.
2. (III.2-2) Provide a summary of the consequences of fires on safety-related systems in each area of the plant that were determined in your fire hazards analysis.
3. Provide a brief summary of the communications systems which would be used to coordinate fire fighting activities. Describe the limitations on the use of this equipment in any area of the plant.
4. (III.1-21) Provide a definition of significant cable tray concentration. Identify those areas where cable trays exist which do not have hose station or portable extinguisher protection.
5. (III.1-25) Provide a summary of the test data and a description of planned testing which indicates that cables will pass a IEEE 383 test.
6. (III.1-24) Provide a description of the fire breaks which are used and the basis that such are effective.
7. Provide a list of those areas where safety-related equipment is located and fire detection does not exist nor is it a proposed modification and the justification for not providing fire detection.
8. Provide a list of equipment which is provided in each hose house.
9. The fire hazards analysis indicates recommended modification to fire protection. Provide a summary of the modifications which will be made and the schedule for their implementation.
10. Describe the consequences of a fire involving the contents of the fire pump day tank without automatic sprinkler protection.
11. (III.2-1-4) Please clarify recommendation since section referenced, B.6, is not applicable.
12. (III.1.6) Identify the areas where fire dampers have not been provided in ventilation openings in fire barriers. State the ratings for fire dampers and the basis for their adequacy.
13. (III.2-16) State whether the plant has the capability for remote shutdown which is independent of fire damage in the control room. If so, describe.

14. Describe the thermal and pressure protection for hot water heater above the control room.
15. State the depth of fire mains.
16. State the fire rating of the diesel generator day tank room roof.
17. During the site visit it was noted that redundant division of electrical cables were routed such that both divisions could be damaged by a fire and that measures were not taken nor proposed to prevent such damage. Examples of such instances are:
 - a. Control boards with redundant divisions of cables not separated by a barrier.
 - b. Conduit 2D215 routed above a redundant division cable tray.
 - c. Two division of cables routed in conduit in close proximity in the reactor building.

Provide a summary of the consequences of fire damage for all areas where redundant electrical cables are routed in close proximity to each other such that fire damage to both division could result. Where fire damage could result in spurious transients, they should be identified along with those systems, not subject to the same fire damage, which would be used to mitigate the consequences of such transients. Provide a description of the fire protection provided in these areas.

18. (Figure I-3) The plan drawing for the turbine building elevation 757 feet indicates that turbine lube oil piping shall be protected by a sprinkler system. In addition a guard pipe is noted. This protection does not appear to be provided for this oil piping as it penetrates the south wall enclosing the condenser and the oil piping appears to be routed through the diesel generator room. Clarify the routing of these lines and the protection afforded. Describe the consequences of oil spill fires resulting from the failure of these lines.

Enclosure 3
Additional Licensee Fire Protection Modification Commitments
Duane Arnold Energy Center

1. A large wheeled unit Halon extinguisher will be provided for fire suppression in the area behind the control room control boards.
2. Exposed steel columns in the switchgear rooms will be protected with a suitable coating material based upon the fire severity within each room.
3. An evaluation will be made for the diesel generator air intakes and the need for a barrier partition between them to prevent combustion products due to a fire in one room from entering the other room via the air intake.
4. Protective coatings on the structural steel in the diesel generator rooms will be repaired to restore its fire resistance rating and the need for protecting exposed steel will be evaluated.
5. Curbs will be provided at doors to the following areas to minimize the spread of a combustible liquid spill fire:
 - a. Diesel generator rooms
 - b. Diesel fire pump day tank room
 - c. Reactor coolant recirculation pump motor generator set room
 - d. Switchgear room at northeast corner of turbine building at elevation 734 feet
6. The ventilation ducts penetrating the diesel fire pump room ceiling will be protected with three-hour fire rated protection.
7. Protective coatings on the structural steel in the diesel fire pump room will be repaired to restore its fire resistance rating.
8. Permanent wood barricades and the wood and plastic enclosure at elevation 812 and 786 feet in the reactor building will be replaced with non-combustible construction.
9. A curb will be provided at the north end of the turbine building at elevation 734 feet below the area under the turbine lube oil reservoir. An additional curb will be provided at column line ten from the outside wall to the wall for the condenser area.
10. Yard hydrant hose cabinet associated with curb valve 33-66 will be relocated to remove the obstruction to the operation of the hydrant or a ratchet wrench will be provided in the cabinet.