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FORWARDING CORRECTION TO ERRO CONTAINED IN REPT SUBMITTED BY APPLICANT ON 10/13/78 ENTITLED: "DESIGN AND SAFETY EVALUATION FOR REPLACEMENT OF SPENT FUEL RACKS"...NOTARIZED 06/09/78.

PLANT NAME: DUANE ARNOLD

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05/04/78

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50-330 CONSUMERS POWER COMPANY MIDLAND #2		
50 330 C	04/17/78	ACCESSION NBR: 78122-0122 TASK NBR: DOCUMENT TYPE: OTHERS FICHE NBR : DOCUMENT SIZE: 2P+1P+3P NOTARIZED: DOCKET DATE: 04/24/78 LPDR: REPORT NBR: RECP: RECP AFFI ORG: HOWELL S H ORG AFFIL DELINE D D SUBJECT: SUPPLEMENTAL RESPONSE OF CONSUMER INTERROGATORIES OTHER THAN DOW...
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IOWA ELECTRIC LIGHT AND POWER COMPANY

General Office
CEDAR RAPIDS, IOWA

50-331

June 6, 1978
IE-78-821

LEE LIU
VICE PRESIDENT – ENGINEERING

Mr. Edson G. Case, Acting Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Case:

A report was submitted to you by Iowa Electric on October 13, 1978 entitled, "Design and Safety Evaluation for Replacement of Spent Fuel Racks" for the Duane Arnold Energy Center.

The intent of this letter is to correct an error in Section 4.3.6 on page 16. On line three from the top of the page the word "mechanical" is being changed to "electrical" by this revision.

Three signed and notarized originals and 37 copies are transmitted herewith.

This submittal consisting of the foregoing letter and enclosure hereto is true and accurate to the best of my knowledge and belief.

IOWA ELECTRIC LIGHT AND POWER COMPANY

BY: _____
Lee Liu
Senior Vice President, Engineering

LL/RFS/gan

Attach.

cc: R. Salmon
D. Arnold
R. Lowenstein
R. Clark (NRC)
L. Root
File J-81d

Subscribed and Sworn to before me on this 7th day of June

_____
Notary Public in and for the State of Iowa

781660012

Jean R. Smith
NOTARY PUBLIC
STATE OF IOWA
Commission Expires
September 30, 1978

A001
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3/40

4.3.6 Dropped Shipping Cask

The shipping cask pool is physically separated from the spent fuel pool. Crane movement is restricted by electrical stops to the area around the cask loading area. This precludes a cask tip or drop into the spent fuel pool.

A postulated cask drop into the shipping cask pool was calculated to penetrate the cask pool bottom in the FSAR. As stated in the Staff SER, as amended, this item is to be resolved in a manner satisfactory to the Regulatory Staff prior to the first refueling operation requiring movement of a shipping cask.

4.3.7 Pool Interface Loads

A structural analysis was made to establish the maximum load carrying capacity of the existing spent fuel pool. This analysis was based on the actual material strength and latest ACI code requirements (ACI 318-71). A compressive concrete strength of 7400 psi and a yield strength of reinforcing steel of 65,700 psi, as determined from laboratory test reports were used. The results of the analysis indicated that the maximum live load (including the associated earthquake loading from fuel rack and fuel elements) should not exceed 2.56×10^6 lbs.

Rack leg vertical gap forces were computed for each time step of the analysis. These loads were used to determine the bearing and punching shear stress in the reinforced concrete floor. The allowable stresses are defined by: Section 1.10, Alternative Design Method, of American Concrete Institute Building Code Requirements for Reinforced Concrete (ACI 318-71). As described in the Commentary to the Code, this section carries forward the working stress design method of ACI 318-63. Under dynamic impact loads, a factor of 1.25 is applied to allowable compressive stress. Information supporting use of this factor is from a publication entitled "Structural Analysis and Design of Nuclear Plant Facilities", prepared by the Committee on Nuclear Structures and Materials of the Structural Division of the American Society of Civil Engineers.

The overall floor load was checked taking the force in the floor spring "Kf" on Figure 4-2 and calculating a total for all the racks by a SRSS technique. This load, 2.04×10^6 lbs, was compared against the floor slab capacity of 2.56×10^6 lbs.

MAY 26 1978

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Docket No. 50-331

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

Gentlemen:

RE: MANPOWER REQUIREMENTS FOR OPERATING REACTORS

We are enclosing a document entitled, "Manpower Requirements for Operating Reactors." We are using the bases given in this document for allowing the sharing of duties to meet minimum staffing requirements for fire brigades at nuclear power plants. This is being provided for your guidance in meeting NRC requirements in this area.

Sincerely,

Original Signed by
Victor L. Stello

Victor Stello, Jr., Director
Division of Operating Reactors
Office of Nuclear Reactor Regulation

Enclosure:
Manpower Requirements for
Operating Reactors

cc w/encl:
See next page

MA 4
GD

OFFICE	ORB#1	ORB#3	ORB#3	D/DOR		
SURNAME	TWambach	DClark:acr	GLear	VStello		
DATE	5/23/78	5/25/78	5/26/78	5/26/78		

NRC FORM 318 (9-76) NRCM 0240 ☆ U. S. GOVERNMENT PRINTING OFFICE: 1976 — 626-624

cc:

Mr. Robert Lowenstein, Esquire
Harold F. Reis, Esquire
Lowenstein, Newman, Reis and Axelrad
1025 Connecticut Avenue, N. W.
Washington, D. C. 20036

Cedar Rapids Public Library
426 Third Avenue, S. E.
Cedar Rapids, Iowa 52401

MANPOWER REQUIREMENTS FOR OPERATING REACTORS

The NRC has established requirements for personnel at operating reactors for purposes of plant operation, industrial security, and fire fighting. The following discussion considers the extent to which plant personnel assigned to either plant operation or security may also be temporarily allowed to man a fire brigade in the event of a fire for a single unit facility and sets forth an acceptable sharing scheme for operating reactors.

Summary of Manpower Requirements

1. Fire Brigade: The staff has concluded that the minimum size of the fire brigade shift should be five persons unless a specific site evaluation has been completed and some other number justified. The five-man team would consist of one leader and four fire fighters and would be expected to provide defense against the fire for an initial 30-minute period. See Attachment A for the basis for the need for a five-man fire brigade.

2. Plant Operation: Standard Review Plan Section 13.1.2 requires that for a station having one licensed unit, each shift crew should have at least three persons at all times, plus two additional persons when the unit is operating. For ease of reference, Attachment B contains a copy of this SRP.

3. Plant Security: The requirements for a guard force are outlined in 10 CFR Part 73.55. In the course of the staff's review of proposed security plans, a required minimum security response force will be established for each specific site. In addition to the response team, two additional members of the security force will be required to continuously man the Central Alarm Station (CAS) and Secondary Alarm Station (SAS). It is expected that many facilities will have a security organization with greater numbers of personnel than the minimum number assumed for purposes of discussion in this paper.

The NRC staff has given consideration to the appropriateness of permitting a limited degree of sharing to satisfy the requirements of plant operation, security and fire protection and has concluded that, (1) subject to certain site and plant specific conditions, the fire brigade staffing could generally be provided through operations and security personnel, and (2) the requirements for operators and the security force should remain uncompromised. Until a site specific review is completed, the following indicates the interim distribution and justification for these dual assignments, and therefore our interim minimum requirements for a typical presently operating commercial single unit facility. The staff believes that manpower for the fire brigade for multi-unit facilities is not now a problem because of the larger numbers of people generally present at the sites. Situations which do pose problems will be reviewed on a case-by-case basis.

1. Plant Operation: The staff has concluded that for most events at a single unit nuclear facility, a minimum of three operators should be available to place the reactor in a safe condition. The two additional operators required to be available at the nuclear facility are generally required to be present to perform routine jobs which can be interrupted to accomodate unusual situations that may arise. That is, there is the potential for the remaining two members of the operating crew to assume other short-term duties such as fire fighting. In light of the original rationale for providing extra plant operators to cope with off-normal conditions, it appears justified to rely on these personnel for this function. The staff recommends that one of the two operators assigned to the fire brigade should be designated as leader of the fire brigade in view of his background in plant operations and overall familiarity with the plant. In this regard, the shift supervisor should not be the fire brigade leader because his presence is necessary elsewhere if fires occur in certain critical areas of the plant.

2. Plant Security: In the event of a fire, a contingency plan and procedures will be used in deploying the security organization to assure that an appropriate level of physical protection is maintained during the event. The staff has determined that it is possible in the planning for site response to a fire, to assign a maximum of three members of the security organization to serve on the fire brigade and still provide an acceptable level of physical protection. While certain security posts must be manned continuously (e.g., CAS, SAS), the personnel in other assignments, including the response force, could be temporarily (i.e., 30 minutes) assigned to the fire brigade. In judging the merits of this allowance the underlying question is whether the minimum security force strength must be maintained continuously in the event of a plant emergency such as a fire. Further examination of this issue leads to two potential rationales for reaching an affirmative decision. First, could there be a causal connection between a fire and the security threat? Second, are there compelling policy reasons to postulate a simultaneous threat and fire?

   The first potential rationale would only be credible if, (1) the insider (posed as part of the threat definition) was an active participant in an assault and started a fire coincident with the attack on the plant or, (2) a diversionary fire was started by an attack force somewhere external to the plant itself where no equipment required for safe shutdown is located. The role of the insider will be discussed first. While 73.55 assigns an active status to the insider, the rule also requires that measures be implemented to contain his activities and thereby reduce his

effectiveness. At present, these measures include background checks on plant employees, limited access to vital plant areas, badging systems and the two-man rule. Here, limited access means that only designated employees are allowed in vital areas and that their entry is controlled by either conventional locks or card-key systems. Also, if separate trains of safety equipment are involved, then either compartmentalization or the two-man rule is required. These measures to contain the insider are presently being implemented and will provide assurance that people of questionable reliability would not be able to gain employee status at a nuclear plant and should they become an employee with unescorted access, significant restraints would be interposed on the ability of such a person to carry out extensive damage to plant vital areas. Recognizing that additional safeguards may still be appropriate, the staff has recommended to the Commission that plant personnel also be required to obtain an NRC security clearance. The staff believes that the attendant background investigation associated with a clearance, in conjunction with the other 73.55 measures, will provide a high degree of assurance that plant personnel will not attempt to take an active sabotage role. If the clearance rule is adopted the staff believes some of the measures, such as the two-man rule, designed to contain the insider can be relaxed. Thus, there does not now appear to be a reasonably credible causative relationship between a fire intentionally set by an insider and the postulated external security threat. For the case of diversionary fires set external to the plant itself, adequate security forces can still be maintained by allowing only part of the fire brigade to respond while both fire fighters and security force armed responders maintain a high degree of alertness for a possible real attack somewhere else on the plant. Thus, the effective number of armed responders required by 73.55 can be maintained for external diversionary fires.

The second potential rationale concerns whether a serious, spontaneous fire should be postulated coincident with an external security threat as a design basis. In evaluating such a requirement it is useful to consider the likelihood of occurrence of this combination of events. While it is difficult to quantify the probability of the 73.55 threat, it is generally accepted that it is small, comparable probably to other design basis type events. The probability of a fire which is spontaneous and located in or in close proximity to a vital area of the plant and is serious enough to pose a significant safety concern is also small. It would appear, therefore, that the random coincidence of these two unlikely events would be sufficiently small to not

require protection against their simultaneous occurrence. In addition, it should be noted that the short time period (30 minutes) for which several members of the security force would be dedicated to the fire brigade would further reduce the likelihood of coincidence.

As neither of the two potential rationales appear to preclude the use of members of the security force in the event of a fire the staff has concluded that the short assignment of security personnel from the armed response force or other available security personnel to the fire brigade under these conditions would be acceptable.

To ensure a timely and effective response to a fire, while still preserving a flexible security response, the staff believes that the fire brigade should operate in the following manner. In the event of an internal fire, all five members of the fire brigade should be dispatched to the scene of the fire to assess the nature and seriousness of the fire. Simultaneously, the plant security force should be actively evaluating the possibility of any security threat to the plant and taking any actions which are necessary to counter that threat. For external fires, a lesser number than the five-man brigade should respond for assessment and fire fighting. As the overall plant situation becomes apparent it would be expected that the most effective distribution of manpower between plant operations, security and fire protection would be made, allowing a balanced utilization of manpower resources until offsite assistance becomes available. The manpower pool provided by the plant operations personnel and security force are adequate to respond to the occurrence of a design basis fire or a security threat equivalent to the 73.55 performance requirements. It is also recognized that other, more likely combinations of postulated fires and security threats of a lesser magnitude than the design basis, could be considered. While the probabilities of these higher likelihood events may be sufficient to warrant protecting against them in combination, the manpower requirements required to cope with each event would be similarly reduced thereby allowing adequate coverage by plant personnel.

Conclusion

The staff believes that it would be reasonable to allow a limited amount of sharing of plant personnel in satisfying the requirements of plant operation, security, and fire protection. An acceptable sharing scheme would entail reliance on two plant operators and three members of the security organization to constitute the fire brigade. Since availability of the full fire brigade would only

be required for fires with potential for serious damage, actual distribution of plant personnel during a plant emergency would be governed by the exigencies of the situation. Of course, all personnel assigned to the fire brigade would have to fulfill all applicable training requirements. It should also be recognized that the diversion of personnel to the fire brigade would be of short duration and that substantial additional offsite assistance would be forthcoming in accordance with the emergency and contingency plan developed for each facility. In evaluating licensee proposals for manpower sharing due consideration will also have to be made of unique facility characteristics, such as terrain and plant lay-out, as well as the overall strengths of the licensee's fire and security plans. Minimum protection levels in either area could preclude the sharing of manpower.

Staff Position

Minimum Fire Brigade Shift Size

INTRODUCTION

Nuclear power plants depend on the response of an onsite fire brigade for defense against the effects of fire on plant safe shutdown capabilities. In some areas, actions by the fire brigade are the only means of fire suppression. In other areas, that are protected by correctly designed automatic detection and suppression systems, manual fire fighting efforts are used to extinguish: (1) fires too small to actuate the automatic system; (2) well developed fires if the automatic system fails to function; and (3) fires that are not completely controlled by the automatic system. Thus, an adequate fire brigade is essential to fulfill the defense in depth requirements which protect safe shutdown systems from the effects of fires and their related combustion by-products.

DISCUSSION

There are a number of factors that should be considered in establishing the minimum fire brigade shift size. They include:

1) plant geometry and size;
2) quantity and quality of detection and suppression systems;
3) fire fighting strategies for postulated fires;
4) fire brigade training;
5) fire brigade equipment; and
6) fire brigade supplements by plant personnel and local fire department(s).

In all plants, the majority of postulated fires are in enclosed windowless structures. In such areas, the working environment of the brigade created by the heat and smoke buildup within the enclosure, will require the use of self-contained breathing apparatus, smoke ventilation equipment, and a personnel replacement capability.

Certain functions must be performed for all fires, i.e., command brigade actions, inform plant management, fire suppression, ventilation control, provide extra equipment, and account for possible injuries. Until a site specific review can be completed, an interim minimum fire brigade size of five persons has been established. This brigade size should provide a minimum working number of personnel to deal with those postulated fires in a typical presently operating commercial nuclear power station.

If the brigade is composed of a smaller number of personnel, the fire attack may be stopped whenever new equipment is needed or a person is injured or fatigued. We note that in the career fire service, the minimum engine company manning considered to be effective for an initial attack on a fire is also five, including one officer and four team members.

It is assumed for the purposes of this position that brigade training and equipment is adequate and that a backup capability of trained individuals exist whether through plant personnel call back or from the local fire department.

POSITION

1. The minimum fire brigade shift size should be justified by an analysis of the plant specific factors stated above for the plant, after modifications are complete.

2. In the interim, the minimum fire brigade shift size shall be five persons. These persons shall be fully qualified to perform their assigned responsibility, and shall include:

   One Supervisor - This individual must have fire tactics training. He will assume all command responsibilities for fighting the fire. During plant emergencies, the brigade supervisor should not have other responsibilities that would detract from his full attention being devoted to the fire. This supervisor should not be actively engaged in the fighting of the fire. His total function should be to survey the fire area, command the brigade, and keep the upper levels of plant management informed.

   Two Hose Men - A 1.5 inch fire hose being handled within a windowless enclosure would require two trained individuals. The two team members are required to physically handle the active hose line and to protect each other while in the adverse environment of the fire.

   Two Additional Team Members - One of these individuals would be required to supply filled air cylinders to the fire fighting members of the brigade and the second to establish smoke ventilation and aid in filling the air cylinder. These two individuals would also act as the first backup to the engaged team.

ATTACHMENT B

4. a. Assignments of personnel meeting ANSI N18.1-1971 qualifications, Section 4.3.1 or Section 4.5.1, should be made to onsite shift operating crews in numbers not less than the following:

For a station having one licensed unit, each shift crew should have at least three persons at all times, plus two additional persons when the unit is operating. For a multi-unit station, each shift crew should have at least three persons per licensed unit at all times, plus one additional person per operating unit.

b. Operator license qualifications of persons assigned to operating shift crews should be as follows:

(1) A licensed senior operator who is also a member of the station supervisory staff should be onsite at all times when at least one unit is loaded with fuel.

(2) For any station with more than one reactor containing fuel, (1) the number of licensed senior operators onsite at all times should not be less than the number of control rooms from which the fueled units are monitored, and (2) the number of licensed senior operators should not be less than the number of reactors operating.

(3) For each reactor containing fuel, there should be at least one licensed operator in the control room at all times. Shift crew compositions should be specified such that this condition can be satisfied independently of licensed senior operators assigned to shift crews to meet the criteria of (1) and (2) above.

(4) For each control room from which one or more reactors are in operation, an additional operator should be onsite and available to serve as relief operator for that control room. Shift crew compositions should be specified such that this condition can be satisfied independently of (1), (2), and (3), and for each such control room.

c. Radiation protection qualifications of at least one person on each operating shift should be as follows:

The management of each station having one or more units containing fuel should either, (1) qualify and designate at least one member of each shift operating crew to implement radiation protection procedures, including routine or special radiation surveys using portable radiation detectors, use of protective barriers and signs, use of protective clothing and breathing apparatus, performance of contamination surveys, checks on radiation monitors, and limits of exposure rates and accumulated dose, or (2) assign a health physics technician to each shift, such assignment to be in addition to those assigned to shift operating crews in accordance with (a) and (b) above.

III. REVIEW PROCEDURES

Selection and emphasis of various aspects of the areas covered by this review plan will be made by the reviewer on each case. The judgment on the areas to be given attention during

MAY 24 1978

Docket No. 50-331

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

Gentlemen:

This letter is to confirm with you the cancellation of our previous schedule for meeting with you and your staff on May 24, 1978 and to confirm rescheduling this meeting to 10:00 a.m., on June 27, 1978, at the Iowa Electric corporate office.

The purpose of the meeting will be to review with you the status of the matters related to management controls that were addressed at a previous meeting held on October 19, 1976. It is requested that you be prepared to present the status of your corrective measures including your evaluation of their overall affect on the operation of Duane Arnold Energy Center. Time will also be available for discussion of any additional items that are of interest to you or your staff.

If you have any questions regarding the meeting or agenda, we will gladly discuss them with you.

Sincerely,

James G. Keppler
Director

cc: Mr. E. L. Hammond,
Chief Engineer
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