



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO PROPOSED EMERGENCY PLAN STAFFING LEVEL CHANGE

DUKE POWER COMPANY

OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3

DOCKET NOS. 50-269, 50-270, AND 50-287

I. BACKGROUND

By letter dated May 8, 1995, Duke Power Company requested a review and prior approval of changes to minimum emergency staffing levels for the nuclear site emergency plan for its Oconee Station. Duke Power requested the review under the Cost Beneficial Licensing Action (CBLA) process. The proposed savings in this case would be realized by reducing the number of on-shift responders and the overtime costs associated with maintaining these individuals on-shift.

Telephone calls between Duke Power and the NRC occurred on October 25, 1995, May 22 and June 26, 1996, to discuss some of these issues. Duke Power submitted additional information by letters dated May 31 and July 25, 1996, in response to questions raised by the NRC staff. This Safety Evaluation was written using information from the CBLA submittal, the letters of May 31 and July 25, 1996, and the contents of the currently approved site emergency plan and procedures.

II. APPLICABLE REGULATIONS AND GUIDANCE

10 CFR 50.47(b)(2)

On-shift facility licensee responsibilities for emergency response are unambiguously defined, adequate staffing to provide initial facility accident response in key functional areas is maintained at all times, timely augmentation of response capabilities is available and interfaces among various on-site response activities and offsite support and response activities are specified.

Enclosure 1

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10 CFR 50, Appendix E, IV. Content of Emergency Plans

The applicant's emergency plans shall contain, but not necessarily be limited to, information needed to demonstrate compliance with the elements set forth below, i.e., organization for coping with radiation emergencies, assessment actions, activation of emergency organization, notification procedures, emergency facilities and equipment, training, maintaining emergency preparedness, and recovery. In addition, the emergency response plans submitted by an applicant for a nuclear power reactor operating license shall contain information needed to demonstrate compliance with the standards described in 50.47(b), and they will be evaluated against those standards.

10 CFR 50, Appendix E, IV. A. Organization

The organization for coping with radiological emergencies shall be described, including definition of authorities, responsibilities, and duties of individuals assigned to the licensee's emergency organization and the means for notification of such individuals in the event of an emergency.

Regulatory Guide 1.101 "Emergency Planning and Preparedness for Nuclear Power Reactors", C. Regulatory Position

The criteria and recommendations contained in Revision 1 of NUREG-0654/FEMA-REP-1 are considered by the NRC staff to be acceptable methods for complying with the standards in 10 CFR 50.47 that must be met in onsite and offsite emergency response plans.

NUREG-0654/FEMA-REP-1, Rev. 1, Criterion B. Onsite Emergency Organization

5. Each licensee shall specify the positions or title and major tasks to be performed by the persons assigned to the functional areas of emergency activity. For emergency situations, specific assignments shall be made for all shifts and for plant staff members, both onsite and away from the site. These assignments shall cover the emergency functions in Table B-1 entitled, "Minimum Staffing Requirements for Nuclear Power Plant Emergencies." The minimum on-shift staffing levels shall be as indicated in Table B-1. The licensee must be able to augment on-shift capabilities within a short period after declaration of an emergency. This capability shall be as indicated in Table B-1. (See Table B-1)

7. Each licensee shall specify the corporate management, administrative, and technical support personnel who will augment the plant staff as specified in the table entitled "Minimum Staffing Requirements for Nuclear Power Emergencies," (Table B-1) and in the following areas:

- a. logistic support for emergency personnel, ...;
- b. technical support for planning and reentry/recovery operations;
- c. management level interface with governmental authorities; and
- d. release of information to news media during an emergency (coordination with governmental authorities).

NUREG-0737 Supplement No. 1 "Clarification of TMI Action Plan Requirements"

Table 2, "Minimum Staffing Requirements for NRC Licensees for Nuclear Power Plant Emergencies" (See Table 2). (Note: Table 2 of NUREG-0737 is the same information contained in Table B-1 of NUREG-0654. While the requirements of Supp. 1 of NUREG-0737 were mandated to the industry by Generic Letter 82-33, the Generic Letter states that the staffing levels contained in Table 2 are only goals, and not strict requirements.)

III. ANALYSIS

Duke Power Company currently uses an emergency staffing scheme that is slightly modified from that provided in Table B-1 of NUREG-0654, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants." Whereas NUREG-0654 specifies certain numbers of responders that should be available within 30 and 60 minutes of the declaration of an emergency, Duke Power Company, because of the remote locations of its sites, committed to respective 45 and 75-minute response times from the declaration of the Alert, or higher, emergency. Since all of Duke Power's response facilities are activated at an Alert classification, their 45 and 75-minute staffing commitments are referenced to the declaration time of the Alert condition. The proposal upon which this Safety Evaluation is based seeks to eliminate the 45-minute category of responders by placing one of those responders on shift, eliminating two of the positions and increasing the response time of the remainder to 75 minutes. Also, the proposal seeks to eliminate two of the on-shift personnel expected to respond to emergencies and increase their response times to 75 minutes. Finally, this proposal seeks to eliminate two 75-minute responders used for rescue operations and first-aid.

The NRC recognizes that the response times stated in the proposal and recounted in this Safety Evaluation represent maximum response times to which Duke Power intends to commit under the proposed change. The NRC also recognizes that for emergency response initiated during normal working hours, many more responders than the minimum noted in the proposal would arrive in considerably less time than the maximum times listed. Furthermore, the NRC recognizes that for emergency response initiated during backshifts, the arrival times for some responders would be sooner than the maximum times stated. However, in order to ensure a conservative analysis, the numbers of responders are assumed to be at the minimum committed level and the arrival times assumed to be at the maximum committed time lapse in the discussion which follows. All times (45 minutes or 75 minutes) mentioned in this Safety Evaluation are referenced to the declaration of the initiating Alert, Site Area Emergency or General Emergency declaration.

Duke Power's overall proposal consists of ten different staffing changes. Each proposed change is described and evaluated separately in this Safety Evaluation with separate conclusions for each. The goals stated in the submittal letter were as follows:

- Eliminate the 45-minute response for all categories of responders. Due to the difficulty of ensuring this response within 45 minutes of the declaration of an emergency by personnel responding from home during off-hours times, Duke Power maintains this response by keeping some of the 45-minute responders on shift. These responders are required to be able to perform their function within 45 minutes of an Alert declaration.
- Decrease the minimum number of radiation protection (RP) technicians assigned to shift.
- Provide consistency between the three Duke Power nuclear sites in the development of the minimum shift staffing levels.

The analysis of the specific staffing changes proposed to accomplish those goals are listed below:

1. Duke Power proposes to eliminate the one responder providing 45-minute augmentation in the area of communications. This responder is intended to augment the normal on-shift control room staff to notify offsite authorities of the emergency event. The existing plan and procedures call for a member of the control room staff from an unaffected unit to make such notifications. Since these notifications need to be made within 15 minutes of an emergency condition, the 45-minute responder is not able to assist in the initial notification, but rather with follow-up communications with offsite authorities. These follow-up communications are required at one hour intervals from the initial notification. Duke Power requires two additional communicators to report to both the Technical Support Center (TSC) and the Emergency Operations Facility (EOF) within 75 minutes of the declaration of an Alert or higher emergency classification. These responders will be able to respond in time to perform these follow-up notifications.

#### Staff Analysis

Oconee is a three-unit site, and two of the Oconee units share a common control room. This arrangement provides for a readily available communicator for events affecting one of these units. The other unit's control room is a short distance away (less than a two minute walk) so that control room personnel are available within a reasonable amount of time to make a 15-minute notification for emergency conditions, which affect only one unit. For events affecting all three units, Duke Power relies on the training of non-licensed operators to handle communications while the control room staff handles plant response to the event.

Until the overall management of the event passes to the TSC or the Emergency Operations Facility (EOF), the Control Room is tasked with making offsite notifications. Included in the notification is a description of plant status and site environmental conditions. Control room operators are the most knowledgeable of these items during the initial stages of an emergency. The augmentation of an outside communicator from elsewhere in the plant or from offsite does not provide for as timely a transfer of information as does the use of operators familiar with the progress of the event. The value, to the Control Room, of a communicator responding to the TSC before that facility is fully functional is questionable, since the Control Room must direct that individual's actions remotely and this could be more burdensome to the Control Room staff.

Since the on-shift staff is most qualified to give informed notification of plant conditions, and since the augmentation of the communication function by an unfamiliar responder provides a very limited enhancement of this function, this particular proposal is acceptable.

2. Duke Power proposes to eliminate the responder providing 45-minute augmentation in the area of dose assessment, maintaining that dose projections are not required for initial emergency classification or to provide protective action recommendations (PARs) at a General Emergency classification. This function would be covered exclusively by the Rad Assessment Manager who would be required to report within 75 minutes of the Alert declaration to the EOF.

### Staff Analysis

Nuclear power plant licensees must maintain, in accordance with Appendix E to 10 CFR Part 50, the capability to perform dose assessment using effluent release information and real-time meteorology at all times. The currently approved Oconee emergency plan does not require an on-shift capability for assessing or projecting the dose consequences of plant conditions or releases of radioactive materials. Until this, Appendix E required on-shift capability is restored, the need for early augmentation in this area is even greater than if the Control Room was able to project the dose consequences of a release of radioactive material.

In the event a General Emergency is declared by the on-shift Emergency Coordinator, the current emergency plan calls for a default PAR to be given regardless of meteorological conditions. That PAR calls for an evacuation of a 5-mile radius around the site. All other areas within the 10-mile emergency planning zone (EPZ) are sheltered. This PAR is given for any General Emergency declaration resulting from a release of radioactive material and is given by the Control Room Emergency Coordinator. The PAR is not modified in any way based on the meteorological conditions existing at the time of the release or declaration. Such a PAR, if based on a release of radioactive materials, may be overly conservative if it lacks refinement based on a real-time dose assessment. This would be particularly true if the meteorological conditions at the time of the declaration or release are such

that the doses at the site boundary are not actually at the General Emergency level. Conversely, if a unique combination of meteorological conditions and release rate existed such that a PAR more conservative than the default PAR were required, then a real-time dose assessment would define the most appropriate PAR for these conditions. A refined, real-time dose assessment, performed by knowledgeable personnel, needs to be available for consideration in the development of the ultimate PAR that is given to the offsite authorities.

For these reasons, the ERO needs to refine the projected dose impact of a release of radioactive material as soon as possible after the release has begun. The delay of dose assessment expertise until 75 minutes after an Alert condition has been declared does not support this need. Without a real-time dose assessment capability existing on-shift, the NRC does not approve the relaxation of response time for dose assessment expertise from 45 to 75 minutes. When Duke Power restores the on-shift dose assessment capability, they may wish to resubmit this proposal to be reevaluated for its acceptability.

3. Duke Power proposes to eliminate the on-shift radwaste operator and instead provide the person to perform this function within 75 minutes of an Alert declaration.

#### Staff Analysis

The site Chemistry Section is responsible for handling radwaste operations in addition to primary and secondary chemistry sampling. The on-shift Operations Department personnel are able to pump liquid radwaste during the initial stages of any event/accident that results in excessive leakage outside the containment structure. For leakage of reactor fluid systems outside the containment, the leak would be stopped by either operator-initiated or automatic isolation. Leaks within the containment building would be contained therein until the recovery from the event was well underway. In either case, the need for a dedicated radwaste operator would exist after the activation of the ERO such that the individual reporting 75 minutes after the Alert declaration would be adequate. This response time is consistent with the guidance given in Table 2 of Supplement 1 to NUREG-0737, when the 15-minute extension in response time that has already been approved for the Oconee site is assumed. This proposal is acceptable.

4. Duke Power proposes to reduce the minimum number of RP technicians on-shift by one, from three to two. Duke Power lists the following duties as those to be performed by the two on-shift technicians:
  - a. Coverage for repair/corrective actions as needed (Individual electronic dosimeters are used as standard dosimetry).
  - b. Search and rescue as requested.

- c. Radiological consequence support to Medical Emergency Response Team, Fire Brigade, and Hazmat Emergency Team as needed.
- d. In-plant surveys as required.
- e. Radioanalysis of liquid/gas samples.
- f. Onsite (protected area) plume surveys as needed.

#### Staff Analysis

Table 2 of Supplement 1 to NUREG-0737, which is the predominant guidance given by the NRC in the area of onsite emergency response staffing levels, lists the following major onsite tasks, which should be met by on-shift RP technicians:

- a. In-plant surveys.
- b. Radiochemistry.
- c. Access control.
- d. Coverage for repair, corrective actions, search and rescue, first-aid, and firefighting.
- e. Personnel monitoring.
- f. Dosimetry.

Duke Power mentions its increased use of modern technology as a means of providing additional assistance to shift personnel. Specific mention is made of the use of new digital alarming dosimeters that alarm on any or all of three parameters: integrated dose, dose rate, and time.

Current guidance at Oconee is for the dosimeter to be used in place of an RP technician escort for personnel access to areas where the general radiation levels are less than 100 mrem/hr. RP escort may still be required in areas with dose rates higher than this value. Dosimeters are usually set to alarm at 100 mrem/hr dose rates as well as at 25 mrem of accumulated dose when used under the standing general entry radiation work permit.

During the early phases of accident sequences, radiation levels are usually not a major concern if the fuel clad barrier is still intact. However, for scenarios in which the fuel clad is the first barrier breached, or where the inventory of radioactive material in the RCS is released directly to the environment, radiation levels within the plant or the immediate area onsite may be a concern. Additionally, for emergencies that do not follow a core damage sequence, such as damage to spent fuel assemblies during handling or accidents involving releases from onsite storage tanks, the release of radioactive material could conceivably be the initiating event. In these cases, RP escort for personnel entering high dose areas will be necessary.

Personnel entries into the radiologically controlled area (RCA) to mitigate the accident sequence in its early stages can frequently occur. In otherwise generally accessible areas, dose rates under accident conditions may be high, indeterminate, or rapidly changing. Area radiation monitor output can be read at certain remote locations at Oconee such as the Control Room or the Operations Support Center, but these systems do not provide the same level of detail available from a detailed area radiation survey. Duke Power plans to install a Dose Rate Monitoring System that will provide multiple monitoring points throughout the RCA, but this system is not scheduled for installation at Oconee until calendar year 1998. Once this system is operational, then proposals to reduce staffing levels further can be reexamined.

When an accident occurs, it is likely that the two on-shift RP technicians will be involved in determining local radiation levels either before or during the entry of repair teams or operators that are dispatched from the Control Room. RP technician presence at the scene of in-plant operations may be needed to provide the level of on-scene radiological assessment, decision making, and leadership that may not be possible at the remote location from which the workers are dispatched.

These duties, along with the responsibility for performing radiochemical analysis, will present a challenge to two RP technicians, particularly at a three-unit site. It is possible that one or both of the RP technicians could be engaged in activities within the RCA of an unaffected unit when an emergency occurs on another. With the technological advancements mentioned by Duke Power in its proposal, two RP technicians could adequately respond to perform the more immediate functions listed above; however, these two technicians would need timely augmentation to accomplish the other tasks that are listed in Table 2 of Supp. 1 to NUREG-0737, such as outside and in-plant surveys. For these reasons, this proposal is acceptable when considered with the assumption that certain other ERO augmentation would remain as it currently exists (i.e., within 45 minutes of an Alert declaration). The discussion of these RP technicians is contained in the following paragraphs.

5. Duke Power proposes relaxing the response time commitment for the two RP technicians currently listed as 45 minute responders to perform offsite radiation surveys. These two technicians would be required to respond within 75 minutes after the Alert declaration. They would augment two other RP technicians who currently respond within 75 minutes for a total of four RP technicians responding within 75 minutes to perform offsite radiation surveys.

#### Staff Analysis

Duke Power has justified this proposal as it pertains to RP responders by stating that immediate radiological concerns are not necessarily present at the onset of a classifiable emergency and that radiological problems occur primarily after the onset of fuel damage. Duke Power cited results of the

submitted Individual Plant Examination (IPE) as stating that less than 8 percent of events resulting in core damage frequency results in offsite releases within 5 hours of event initiation.

Duke Power also states that the use of onsite radiation surveys following releases of radioactive materials would give early indication of the severity of the release. Duke Power states that these surveys would be performed by the on-shift RP technicians, but as is stated in 4. above, these technicians would most probably be involved in performing in-plant surveys or repair team escort. However, if such surveys are performed by either the on-shift technicians or short-term augmentation (45-minute responders), this function would serve to give a rapid indication that a release of radioactive materials has involved offsite consequences. Such a determination, if made in a timely fashion, could compensate for a later mobilization of offsite survey teams.

Based on the low occurrence of early offsite releases and the fact that early onsite radiation monitoring will occur by both on-shift and early augmentation responders, the response time for offsite survey personnel can be relaxed to 75 minutes from the currently required 45-minute response time. This proposal is acceptable when considered with the assumption that certain other ERO augmentation would remain as it currently exists. It is therefore acceptable.

6. Duke Power also proposes to relax the response time for one RP technician used for performing plume surveys inside the protected area but outside of the power block (out-of-plant onsite surveys). This responder, who currently reports within 45 minutes following an Alert declaration, would be a member of a team of ten RP technicians reporting to the Operations Support Center (OSC) within 75 minutes following an Alert declaration.

#### Staff Analysis

Duke Power states that the proposed two on-shift RP technicians would be expected to perform the onsite surveys. With the need for them in the plant to escort operators, repair, search and rescue, first-aid or firefighting teams as stated in 4. above, it is unlikely that they would be available for plume or radiation monitoring outside of the plant. As stated in 4. above, certain accident sequences can result in releases of radioactive materials either as the initiating condition or occurring soon thereafter. There is no assurance that the proposed staffing plan would adequately address the particular need for onsite surveys, given the workload of the onsite RP technicians.

The relaxation of the offsite survey response from 45 minutes to 75 minutes places greater importance on the need to perform early onsite external surveys. This proposal, therefore, is not acceptable.

7. The response time for one additional RP technician who currently responds within 45 minutes would also be relaxed to 75 minutes under this proposal. This individual is called in to augment the task of performing in-plant radiation surveys.

#### Staff Analysis

As stated in 4. above, the proposed two on-shift RP technicians would rely on timely augmentation to perform the six tasks assigned to them. To relax the response time for this RP technician would delay that augmentation for another 30 minutes. This specific proposal is not acceptable.

8. Table 2 of Supp. 1 to NUREG-0737 and Oconee's current minimum staffing commitment both list two RP technicians reporting within 45 minutes (Oconee time commitment) to perform the functions of:
  - a. Access control.
  - b. Coverage for repair, corrective actions, search and rescue, first-aid, and firefighting.
  - c. Personnel monitoring.
  - d. Dosimetry.

#### Staff Analysis

Duke Power proposes to eliminate the 45-minute response time commitment for these individuals and include them in the team of ten RP technicians reporting to the OSC within 75 minutes of the Alert declaration. Since these RP technicians perform functions supporting other responders, their need is based on the presence of additional responders within 45 minutes. Duke Power is eliminating the 45-minute response time for all repair personnel, so these RP technicians would not be needed except to support the on-shift responders. The on-shift RP technicians already support the on-shift responders in the four functions listed above; therefore, eliminating these two 45-minute responders would not degrade these functions. This specific proposal, therefore, is acceptable.

9. Under the current staffing scheme, two instrument and electrical (I&E) technicians respond within 45 minutes to augment the task of performing repair and corrective actions. Duke Power trains these technicians to perform all electrical and I&C maintenance, thus increasing the availability of repair expertise for each technician assigned. A minimum of four I&E technicians are available for emergency response as listed in the currently approved emergency plan.

Under the current staffing scheme, one of these technicians is assigned on-shift duties, two respond within 45 minutes and one other responds within 75 minutes. Duke Power proposes to split the two 45 minute responders and have one of them maintained on-shift and the other respond within 75 minutes. This proposal would result in an on-shift staffing level in excess of the minimum guidance of Table 2 of Supp. 1 to NUREG-0737 and a 75-minute staffing level equal to the guidance of Table 2 for I&E technicians.

#### Staff Analysis

The cross-qualification of these responders provides greater flexibility for their use where needed during the initial stages of any accident progression. This proposal does not involve a loss of response capability, but rather, enhances this capability by keeping a greater number of responders continuously available by being on-shift. The Control Room is the only facility that will direct the actions of these technicians from the onset of the event until the OSC is activated at 75 minutes. The proposal results in a reduction of the number of I&E technicians that are available between 45 minutes and 75 minutes (from three to two), but two I&E technicians would be adequate to respond to the direction of the Control Room during this period.

This specific proposal is acceptable.

10. The current Oconee Emergency Plan lists two on-shift responders to fulfill the task of rescue operations and first-aid administration. Two additional responders are listed as reporting within 75 minutes to augment these functions. The plan also states that the station will rely on local (offsite organization) support. The May 8, 1995, proposal describes Oconee Memorial Hospital as providing this service. Duke Power proposes to eliminate the commitment to provide the two additional station responders within 75 minutes and rely solely on local support from the hospital to augment the on-shift responders. Duke Power's July 25, 1996, letter, sent to provide additional information, describes that this local support will be in accordance with letters of agreement between Oconee station and the local agencies.

#### Staff Analysis

This proposal is acceptable because it does not result in any loss of capability. Duke Power lists the expected hospital response time as 15-20 minutes, which is well in advance of the existing 75-minute commitment. The resources that the hospital possesses for dealing with long-term emergency rescue and/or first-aid administration are decidedly better than what onsite responders can provide. The NRC approves this specific proposal based on the expected response times for the local support agencies.

#### IV. CONCLUSIONS

Since the overall proposal consists of ten discrete proposals, each proposal was individually analyzed for its impact on onsite preparedness. Proposals related to changes in on-shift staffing levels were analyzed first because of their more direct effect on the cost of continuously maintaining such staffing levels. For individual proposals that were analyzed and determined to be acceptable, subsequent individual proposal analyses were made assuming the implementation of proposals previously determined to be acceptable.

Based on this methodology, the following conclusions were made:

- A. The NRC has determined that the following individual proposals do not decrease the level of onsite preparedness and approves them. The NRC approves these proposals with the assumption that the response commitments of all other responders not listed in this paragraph continues to be in accordance with the emergency plan as approved prior to the proposed changes. All times are referenced to the declaration of the earliest Alert or higher emergency classification. Numbers listed correspond to the numbers assigned to the individual proposals in the analysis section:
1. Eliminate the 45-minute communicator response.
  3. Relax the radwaste operator response time from on-shift to 75 minutes.
  4. Reduce the minimum number of on-shift RP technicians from three to two.
  5. Relax the response time of two RP technicians used for performing offsite radiation surveys from 45 minutes to 75 minutes.
  8. Relax the response time of two RP technicians for access control, team coverage, personnel monitoring and dosimetry from 45 minutes to 75 minutes.
  9. Revise I&E technician response to two personnel on-shift and two within 75 minutes.
  10. Eliminate the two 75-minute onsite responders for the task of rescue operations and first-aid.
- B. The NRC has determined that the following individual proposals, if implemented along with the ones listed above, will result in a reduction of onsite preparedness without an adequate compensating offset. These proposals are not approved. All times are referenced to the declaration of the earliest Alert or higher emergency classification. Numbers listed correspond to the numbers assigned to the individual proposals in the analysis section:

2. Eliminate the 45-minute dose assessment responder.
6. Relax the response time of the one onsite survey (out-of-plant) responder from 45 minutes to 75 minutes.
7. Relax the response time of the in-plant survey responder from 45 minutes to 75 minutes.

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