

APPENDIX

U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV

NRC Inspection Report: 50-313/88-16  
50-368/88-16

Operating Licenses: DPR-51  
NPF-6

Dockets: 50-313  
50-368

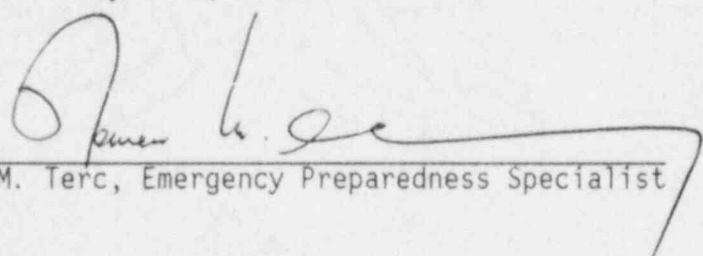
Licensee: Arkansas Power & Light Company (AP&L)  
P.O. Box 551  
Little Rock, Arkansas 72203

Facility Name: Arkansas Nuclear One (ANO)

Inspection At: ANO, Russellville, Arkansas

Inspection Conducted: May 9-12, 1988

Inspector:

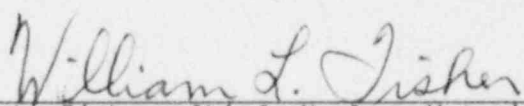
  
N. M. Terc, Emergency Preparedness Specialist

Date 6/1/88

Accompanying  
Personnel:

D. H. Schultz, Comex Corporation

Approved:

  
W. L. Fisher, Chief, Nuclear Materials and  
Emergency Preparedness Branch

Date 6/1/88

Inspection Summary

Inspection Conducted May 9-12, 1988 (Report 50-313/88-16; 50-368/88-16)

Areas Inspected: Routine, announced inspection of review of the operational status of the emergency preparedness program. In particular, the NRC inspector reviewed the revised Emergency Action Levels (EALs), and the training and proficiency of personnel in using them.

Results: Within the areas inspected, no violations or deviations were identified.

DETAILS1. Persons ContactedAP&L

\*J. Vandergrift, Operations Manager  
 \*D. Lomax, Plant Licensing Supervisor  
 \*D. Boyd, Supervisor, Emergency Planning  
 \*W. Perks, Manager, Training  
 \*A. Cox, Operations Supervisor  
 \*P. Michalk, Licensing Specialist  
 \*S. Quennoz, Plant General Manager  
 \*F. Van Buskirk, Emergency Planning Coordinator  
 \*R. Greshman, Emergency Planning Coordinator  
 \*R. Harris, Emergency Plan Trainer  
 L. McClure, Operations Trainer  
 J. Haynes, Operations Trainer

\*Indicates those present at exit interview.

The NRC inspector also held discussions with other station and corporate personnel in the areas of security, health physics, operations, training, and emergency response organization.

2. Follow-up on Previous Inspection Findings (92701/92702)

(Closed) Deficiency (313/8704-01; 368/8704-01): Deficient Emergency Action Levels - The NRC inspector noted that Procedure EPIP 1903.10, Revision 21, "Emergency Action Level Classification," is a new and improved revision of Emergency Action Levels (EALs).

3. Emergency Plan and Implementing Procedures (82701-02.01)

The NRC inspector reviewed Procedure EPIP 1903.10, Revision 21, "Emergency Action Level Classification," for compliance with the requirements of 10 CFR 50 and the guidance of NUREG-0654, Appendix 1. Revision 21 represented a significant improvement and change in format and content to the EAL classification procedure.

The following observations resulted from differences between the example initiating conditions of Appendix 1, NUREG-0654, and the new EALs used by the licensee to classify emergencies. Each observation begins with a reference to the appropriate 0654 Appendix 1 initiating condition. These differences could result in a less conservative or less timely classification of accident conditions than intended by existing regulatory guidance. As a result, the licensee should consider EAL changes as shown below.

Since differences exist between the units, EPIP 1903.10 describes two sections of EALs, one each for Units 1 and 2. The following comments apply to both units unless otherwise noted. The licensee EALs have a decimal format.

- a. (NOUE No. 1) Delete the phrase "after receipt of an ES signal." (EAL 1.1). Any inadvertent initiation of ECCS, with flow to the vessel, should be the subject of an unusual event classification.
  - b. (NOUE No. 2, ALERT No. 15) Verify that essential power is available to dose assessment computers to convert effluent monitor indications to the EAL values listed in EALs 5.1, 5.2, or provide a means to convert effluent monitor units (counts per minute) into appropriate offsite dose related units (MPC, mh/hr).
  - c. (NOUE No. 10) Add the condition that if a fire inside the protected area continues for more than 10 minutes, the licensee should declare an NOUE (EAL 7.5).
  - d. (NOUE No. 11) Remove the following modifying condition stated in EAL 6.4, 1.D., "The affected ventilation exhaust fans are running." The loss of dose assessment capability should result in a NOUE declaration without regard to ventilation fans operating. Other motive forces, such as pressure, may cause a release.
  - e. (NOUE No. 12) Remove the modifier, "Ongoing . . . ." from EAL 7.1, dealing with a security threat. The condition should result in a NOUE declaration even if the event is not ongoing. An ongoing threat is the subject of an Alert declaration.
  - f. (Alert No. 1.b) Verify that if 1 percent fuel failure is intended as the threshold indicator of severe loss of fuel cladding, then 400 uCi/gm specific I-131 (versus DEI-131) is the equivalent EAL (1.3). The same verification applies to EAL 1.2, NOUE, 0.1 percent failed fuel = 40 uCi/gm specific I-131.
  - g. (Alert No. 5, Unit 2) Be sure that the EAL uses 50 gpm. This is a more conservative value of primary leakage for loss of RCS (primary) integrity (EAL 2.2). As written, a leak rate of approximately 130 gpm could exist before an Alert declaration. This action is not consistent with the conservative and anticipatory philosophy of NUREG-0654, and it affects others EALs (e.g., 2.3).
  - h. (Alert No. 15) Remove the time modifier, "Projected dose rates . . . indicate greater than 10 MPC for greater than one hour at the site boundary." (EALs 5.1 and 5.2) The staff should classify the emergency based on radiological effluents (dose rates) as well as integrated dose rates (doses).
- (SAE Nos. 6 and 7) Add a time limit (e.g., 15 minutes) to existing EALs regarding the total loss of AC or DC power for an extended

period of time (EALs 4.4 and 4.5). As written, the EAL plant degradation will occur before the EAL is exceeded to the extent that subcooled margin to boiling would be reduced to 50°F. At that time the staff will make the SAE declaration. For the type of event postulated, this could take hours. Because of this, the EAL, as written, does not retain the early warning conservatism of NUREG-0654.

In a related issue, the Unit 2 EAL 4.5 states that a loss of all vital DC power must be accompanied by a total loss of AC power before declaration of an SAE. Modify the EAL to declare an SAE upon loss of all vital DC for an extended time, about 15 minutes. The SAE can be declared without contingency upon AC power availability. In the event of a serious emergency during the loss of DC, normal staffing (especially back-shifts) would not permit a timely manual operation of breakers necessary to mitigate the emergency.

- j. (SAE No. 9) Remove Unit 1 EAL 6.3 regarding a reactor scram signal without rod insertion. The EAL states, "AND 2. Subsequent efforts to manually trip the reactor fail." Operators interpreted the EAL to mean that, notwithstanding continued power generation following the trip signal, reactor shutdown occurring by other mitigative strategy warrants only an Alert declaration. The EAL could state that an SAE is declared when a scram occurs without reactor shutdown.
- k. (SAE No. 18) Add time constraints to EALs about evacuation of the Control Room (EAL 6.9). An SAE should be declared in about 15 minutes if evacuation of the control room must take place before verifying shutdown control of the reactor. The conservatism implied in the use of a time limit is lost by waiting for further plant degradation (e.g., loss of subcooled margin to boiling of less than 50°F prior to classifying the accident).
- l. (GE No. 2) Modify EAL 1.8 to reflect that the loss or challenge, in any combination, of the three fission product barriers, would result in a General Emergency.

In addition, the licensee should consider the following items:

- a. Following loss of the first and second fission product barriers, consider the inability to monitor the third fission product barrier's integrity as equivalent to the loss of that barrier.
- b. Define the term "fission product barrier," and the relationship of integrity and thresholds of failure.
- c. The ANO EAL basis document addresses the term "challenge," but this term was not included in the classification procedure. Address the term challenge in the classification procedure to aid the user.

- d. The Basis Document defined challenge as "containment pressure greater than 59 psig," or "Hydrogen concentration in containment greater than 3.5%." These values are at or near design. The licensee needs to consider a more conservative definition of challenge, such as "Containment pressure is 15 psig, increasing, with low probability of restoring heat removal system capability to reduce pressure/temperature."

No violations or deviations were identified in this area.

4. Training (82701-02.04)

In completing the assigned sections of this inspection module, the NRC inspector:

- o reviewed sections of the Emergency Plan,
- o reviewed Emergency Plan Implementing Procedures (EIPs),
- o reviewed Normal, Abnormal, and Emergency Operating Procedures, and
- o conducted walkthroughs of a hypothetical accident scenario with six teams, each consisting of one Control Room Shift Operating Supervisor (SOS) and one Shift Administrative Assistant (SAA). (SAAs have notification and dose assessment responsibilities in the ANO emergency response organization.)

The inspector performed walkthroughs in the Control Room (CR), with all reference material available to the teams during the interview that is normally available to the CR staff. Each walkthrough lasted about 1 hour. The inspector used the same accident scenario for every team. At least one ANO staff member witnessed every walkthrough.

Based upon the above, the NRC inspector made the following findings in the areas of:

- o Knowledge of Duties and Responsibilities,
- o Accident Detection,
- o Accident Classification,
- o Accident Notifications,
- o Dose Assessment, and
- o Formulation of Protective Action Recommendations (PARs).

a. Knowledge of Duties and Responsibilities

All teams demonstrate an adequate overall knowledge of their duties and responsibilities in event of Emergency Plan activation. However, one SOS reversed the meanings of classification and EALs, and one SOS was unable to identify Emergency Coordinator duties that were nondelegable in a reasonable time.



b. Accident Detection

All SOSs were able to recognize accident conditions postulated by the accident scenario and implement mitigative strategies using emergency operating procedures.

c. Accident Classification

All SOSs were able to classify at least two sets (in two cases, three sets) of plant conditions, by reference to EALs, in the proper severity level. However, the following observations related to classification were made:

- (1) Two of three Unit 1 SOSs classified an ATWS event (scram due to loss of flow, continued power operation at 78 percent power to 50 percent flow ratio) and degrading plant conditions (fuel damage and primary system relieving to quench tank) as a Site Area Emergency. The scenario then postulated a successful rod insertion several minutes later due to other emergency response actions. Upon control rod insertion, two of three SOSs immediately ordered a downgrading of the emergency classification to an ALERT, without consideration of other plant conditions, based upon their interpretation of the ATWS EAL 6.3.
- (2) One Unit 1 SOS properly classified postulated plant conditions as a General Emergency, but was unsure of the relationship of high containment radiation levels and release of fission products to the containment volume from extensive core damage, and did not know that a high power-to-flow ratio would cause core damage. As a consequence, the SOS was uncertain about the correct classification and PAR.

d. Accident Notifications

All SAAs were able to start and complete the proper notification forms in response to an emergency declaration by the SOS.

e. Dose Assessment

The NRC inspector provided the six SAAs with all data necessary to perform a dose calculation using the RDACS Computer Method by Procedure EPIP 1904.002. Two of six SAAs were unable to obtain the correct dose projection results. One of the SAAs erred in making the hand calculation necessary to convert the instrument reading (in counts per minute) to obtain release rate. Another SAA made an error that resulted in a projection of zero dose rate at the site boundary, notwithstanding a large release rate.

f. Protective Action Recommendation (PAR) Formulation

The NRC inspector requested that the SOSs formulate a PAR for the postulated General Emergency conditions and write the PAR as though they were making the entry on the message form.

- (1) One SOS was unable to formulate the correct PAR from memory, and could not locate the proper procedure within a reasonable time. When prompted, the SOS was able to define the basic configuration of the affected areas orally, but reversed the affected sectors, due to misinterpretation of wind direction. In addition, his PAR was limited to the 2-mile radius evacuation. He did not consider the protective actions necessary for downwind sectors outside the 2-mile zone.
- (2) One SOS issued an improper PAR of sheltering versus evacuation, because of a misinterpretation of plant conditions. (See the comments on General Emergency classification above.)
- (3) Three of the four remaining SOSs were careless in their definition of "downwind." They failed to define the affected sectors until prompted by the NRC inspector. After prompting, the SOSs demonstrated adequate knowledge.
- (4) One of the six SOSs did not initiate a plant evacuation of nonessential personnel upon declaration of Site Area Emergency. He detected his omission upon declaration of the General Emergency and promptly initiated the action.

No violations or deviations were identified in this area.

5. Exit Interview

The NRC inspector met with licensee personnel identified in paragraph 1 on May 12, 1988, and summarized the scope and findings of the inspection as presented in this report. The licensee stated that individuals who showed weakness during the walkthroughs conducted in this inspection would be retrained immediately. In addition, the licensee made specific commitments: to complete all required follow-up training on EALs by June 30, 1988; by July 1, 1988, to revise EPIP 1903.10, Revision 21, "Emergency Action Level Classification," to include the improvements outlined in Appendix A; and to complete all required classroom and practical training of essential personnel on revised EALs by August 29, 1988.