

**Entergy  
Operations**

**Entergy Operations, Inc.**  
Route 3, Box 137G  
Russellville, AR 72801  
Tel 501-964-3100

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U. S. Nuclear Regulatory Commission  
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SUBJECT: Arkansas Nuclear One - Units 1 and 2  
Docket No. 50-313/50-358  
License No. DPR-51 and NPF-6  
Response to Inspection Report  
50-313/90-01; 50-368/90-01

Gentlemen:

Pursuant to 10CFR2.201, attached is the response to the violation identified in the subject inspection report concerning the failure to adequately establish and maintain the ANO-2 Emergency Operating Procedure (EOP). The inspection report also requested that we address the NRC's concern regarding the lack of timeliness of our response to previous assessments of the ANO-2 EOP. This is discussed in a separate addendum to the violation response. As discussed with Mr. Tom Westerman of the NRC Region IV staff, the due date of this response was extended one day.

Although the existing EOP does contain inadequacies, we have concluded independently of the NRC inspection team's assessment that the skills and knowledge of our operators is such that safe operation of the plant is ensured. The current EOP, coupled with the operators' expertise, is sufficient to operate and maintain the plant in a safe condition should a transient occur which necessitated use of the EOP.

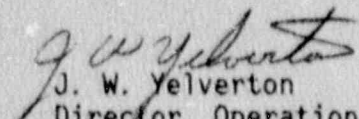
The management of ANO is fully appreciative of the significance of this violation. Concerns regarding the adequacy of the ANO-2 EOP had been raised prior to the inspection and an EOP upgrade had been included in the ANO Business Plan. Considerable efforts and resources are dedicated to providing an interim revision to the ANO-2 EOP and to upgrading the EOP to procedures based on the Combustion Engineering Owners Group Generic Guidelines Document CEN-152. The end result of this effort will be a quality EOP well supported by a verification and validation process, the EOP writers guide, the operator training program, and a documented method of applying the CEN-152 generic guidelines to our specific plant. Consistent with Generic Letter 82-33, ANO will be developing a procedures generation package for NRC review. Our goal is to achieve excellence in plant operations at ANO, and the ANO-2 EOP upgrade is viewed as a vital step in achieving that goal.

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Very truly yours,

  
J. W. Yelverton  
Director, Operations

JWY/JDJ/sgw  
Attachment  
cc:

Regional Administrator  
Region IV  
U. S. Nuclear Regulatory Commission  
611 Ryan Plaza Drive, Suite 1000  
Arlington, Texas 76011



### Failure to Establish and Maintain Appropriate Plant Procedures

Unit 2 Technical Specification 6.8.1 requires that "written procedures be established, implemented, and maintained," covering a list of activities including the applicable procedures recommended in Appendix A of Regulatory Guide 1.33, November 1972. Appendix A to Regulatory Guide 1.33, November 1972 lists typical safety-related activities such as combating emergencies (Section F) which should be covered by written procedure. Licensee Procedure EOP 2202.01, "Emergency Operating Procedure," had been promulgated as the procedure for combating operational emergencies.

#### 1. Failure to Establish Appropriate Plant Procedures

Contrary to the above, the licensee did not establish procedures for certain aspects of operational emergencies. Specifically, Procedure EOP 2202.01 did not appropriately establish the process to achieve plant recovery for certain operational emergencies, nor did it adequately consider multiple failures as stipulated in NUREG-0737, Item I.C.1, and implemented by the order of December 17, 1982, pursuant to 10CFR50.54(f). The following examples pertain:

- a. While responding to a simulated reactor coolant system leak using Procedure EOP 2202.01, Section 9.0 SIAS (safety injection actuation signal), recovery actions could not be completed because the procedure did not provide guidance for natural circulation cooldown in the saturated condition with partial voids. The recoverability of pressurizer level and subsequent subcooled margin was assumed, but no procedure was provided in the event these conditions could not be achieved.
- b. While responding to a simulated inadequate core cooling event following a feed line rupture, the emergency core cooling system (ECCS) was to be used to establish cooling in accordance with Procedure EOP 2202.01, Section 12.8. When emergency feedwater was restored, the EOP gave no guidance for securing ECCS cooling and continuing recovery using emergency feedwater. Further, the long-term recovery actions using the ECCS took the plant to the cold shutdown condition. Shutdown cooling was achieved using Operating Procedure (OP) 2104.04, "Shutdown Cooling System," without terminating the vent release path.
- c. For a simulated steam line break inside containment concurrent with a tube rupture in the same steam generator, main steam isolation signal, recovery could not be completed using Procedure EOP 2202.01, Section 8.0. The EOP failed to account for the inability to recover pressurizer saturated condition. The procedure also failed to provide for an evaluation of a tube rupture and did not direct the operator to proceed to either Section 10.0, "Steam Generator Tube Rupture Greater Than Charging Pump Capacity," or Section 11.0, "Inadequate Core Cooling." In addition, the recovery actions specified in Section 8.0 of the procedure would have worsened recovery by increasing the loss of reactor coolant and containment radiation levels.

- d. While responding to a simulated steam generator tube rupture (with coolant loss greater than charging capacity) that was compounded by a blackout condition, recovery could not be made using the EOP as structured. Section 11.0 of Procedure EOP 2202.01 provided guidance for the tube rupture, but made no provision for handling the blackout condition. Therefore, plant conditions could be worsened and core integrity could be challenged unless experienced operators intervened to compensate for the EOP inadequacy.

2. Failure to Maintain Appropriate Plant Procedures

Contrary to the above, the licensee failed to maintain certain aspects of the plant procedure for combating operational emergencies. Specifically, Procedure EOP 2202.01 had not been adequately verified and validated as demonstrated by the following examples:

- a. The verification and validation (V&V) process failed to ensure that previously identified technical issues, such as the use of the reactor vessel level monitoring system (NUREG-0737, II.F.2), void formations in the reactor coolant system, and the verification of adequate safety injection flow, had been incorporated in the EOPs.
- b. The V&V process failed to include sufficient plant walkthroughs to identify safety hazards that could negate in-plant recovery evolutions.
- c. The V&V process failed to provide for complete and comprehensive feedback to management to ensure that inadequate conditions, such as resource allocation, were corrected.
- d. The V&V process failed to ensure that the EOPs were modified following the installation of the diverse scram system and the control room annunciator upgrade modifications installed during refueling outage 2R7 (October 1989).

The above examples constitute a Severity Level IV violation. (Supplement 1)  
(368/9001-01)



1. The reason for the violation:

The violation is cited in two parts: failure to establish appropriate procedures and the failure to maintain appropriate procedures.

The ANO-2 Emergency Operating Procedure (EOP) in its current format was established as a result of the ANO TMI-2 Response Program, an internal action program initiated prior to the issuance of NUREG-0737. Both the Babcock & Wilcox Owners Group (BWOG) and the Combustion Engineering Owners Group (CEOG) were developing technical guidelines for use in writing EOPs. However, the CEOG made the decision initially to use event specific optimal recovery guidelines rather than a symptom-based approach. The BWOG Abnormal Transient Operating Guidelines (ATOG) was using a symptom-based approach which was also plant specific. This philosophy was in line with the direction which ANO-2 wanted to take in developing the EOP. (The ATOG document was subsequently reviewed and accepted by the NRC in a safety evaluation, Generic Letter 83-31, dated September 19, 1983.) Therefore, the decision was made to base the ANO-2 EOP on plant-specific guidelines using input from ATOG. In accordance with Generic Letter 82-33, "Supplement 1 to NUREG-0737 - Requirements for Emergency Response Capability," ANO-2 developed plant-specific guidelines which were submitted for NRC review by our letter dated December 5, 1984 (2CAN128403). Since ANO-2 was the only CE unit not to use generic technical guidelines, it was difficult to perform an effective comparison for methods of compliance with generic recommendations. Also, due to a lack of effective management involvement, the use of plant-specific guidelines tended to insulate the ANO-2 EOP effort from improvements occurring in the industry with the CEOG guidelines and in the areas of human factors and human performance, verification and validation, and EOP development and revision.

Regarding the failure to appropriately maintain the EOP, the violation specifically states that the EOP had not been adequately verified and validated. The verification and validation (V&V) process was developed in house without fully utilizing existing industry expertise. The V&V process also had not been revised to conform to the guidance in NUREG-0899 and NUREG-1358. Specific weaknesses in the process included (1) the failure to perform complete walkdowns of the procedure which included actions outside the control room, (2) the resolution of validation comments or concerns by the individual who originated the comment, and (3) lack of a multidiscipline review of revisions. Also, the resolution process did not ensure proper feedback of concerns to management.

The cause of the violation was a lack of effective management involvement to ensure that the ANO-2 EOP effort kept pace with industry standards.

Although the current EOP requires improvement, ANO management is confident that the operators are fully capable of performing the actions required to maintain the plant in a safe condition during a transient.

2. The corrective steps which have been taken and the results achieved:

As discussed in our letter of April 20, 1990 (OCAN049012), several actions have been taken to upgrade the existing ANO-2 EOP. These actions will result in an adequate procedures generation package to ensure the proper maintenance of the ANO-2 EOP. Actions have also been taken to ensure the operators' continued ability to use the existing EOP. The EOP action plan includes the following:

- The ANO Business Plan item C.11.c, "Procedure Upgrade - Emergency Operating," has been revised to include the detailed EOP action plan submitted in our letter of April 20, 1990.
- Discussions have been held with the operating crews by the Operations Manager on operating philosophy using the existing EOP. Strategies for coping with inadequacies in the procedure were presented.
- An experienced and knowledgeable senior Shift Operations Supervisor from ANO-2 has been assigned through December 1990 to assist in simulator training. This action provides more uniform and consistent training to sustain operator performance and helps standardize acceptable approaches to handling plant transients which may not be completely bounded by instructions in the EOP. Also, time on the simulator during the training week has been increased for each crew from approximately 10 hours per week to approximately 16 hours per week. In addition, EOP lesson plans will be written for each specific tab of the EOP. These lesson plans will incorporate changes being made by the interim EOP revisions and will address certain elements of CEN-152. Training to the revised lesson plans is scheduled to begin during August 1990 in preparation for implementation of the interim EOP revision. Suggestions for improvements to training will continue to be made using the Training Evaluation-Action Request forms.
- A self-assessment of the ANO-2 EOP was performed. Previous assessments conducted by Combustion Engineering and various contractors (e.g., human factors subject matter expert) were reviewed as well as the NRC's findings from the EOP inspection. No concerns were identified of such safety significance to warrant immediate corrective actions. The review also included the thirty-eight procedure improvement forms submitted by operators on the ANO-2 EOP since the inspection. Items were identified which could appropriately be addressed in a planned interim revision to the EOP (discussed below). The remaining items will be resolved by the upgrade of the EOP to the CEN-152 guidelines.
- The V&V process has been upgraded with the assistance of a subject matter expert in the area of human performance and human factors. The revised V&V process has been verified against the appropriate NUREG guidelines. This process now includes multidisciplinary reviews of EOP revisions and will provide comprehensive feedback of concerns to operations management. The upgraded V&V process was available by June 30, 1990, and will be used to implement the interim revision to the EOP and the planned upgrade to the CEN-152 guidelines.



- As a conservative measure during the inspection, staffing of non-licensed operators per crew was increased to ensure that a sufficient number of operators would be available to implement the EOP. Required staffing levels have been validated, and the results of the validation will be provided in separate correspondence.
- An interim revision to the AKS-2 EOP has been initiated which will address many identified concerns, such as inclusion of more contingency actions, incorporation of certain human factors enhancements, inclusion of the Reactor Vessel Level Monitoring System and the Diverse Scram System, and further direction concerning actions to mitigate/combat RCS voiding. This revision, scheduled to be implemented October 15, 1990, will also include the thirty-eight items identified by the operators on procedure improvement forms to date.
- CEN-152 is being used as the basis document in the development of an upgraded EOP. (This action had been initiated prior to the inspection.) The upgraded EOP will be implemented by December 31, 1991.
- A separate Writers Guide specific to the EOP was developed with the assistance of a subject matter expert in the area of human performance and human factors. The Writers Guide was available by June 30, 1990, and is being used to write the upgraded EOP. This guide provides specific requirements for EOP writers to use during EOP development and revision.

The technical deficiencies cited in the violation have been evaluated for either inclusion in the interim revision to the EOP or resolution during the CEN-152 upgrade. The interim revision to the EOP will include use of the Reactor Vessel Level Monitoring System and instructions for cooling steam generators if voiding is suspected. This will assist operators in dealing with a natural circulation cooldown in a saturated condition. The upgrade of the EOP will fully address this concern in the functional recovery EOP. The interim revision will also include instructions to close the ECCS vent valves should the steam generators become available during an inadequate core cooling (ICC) event. Long term recovery actions from an ICC will be addressed in the upgraded EOP. The other two examples cited involved response to multiple failure scenarios and will be resolved by the upgrade to CEN-152.

The examples of V&V process deficiencies cited in the second part of the violation have been resolved by (1) participation in the CEN-152 maintenance program, which will help ensure inclusion of technical issues in the future, and (2) the upgrade to the V&V process, which now requires in-plant walkdowns of EOP changes, simulator validations to NUREG-0899 guidelines and multidiscipline reviews by operations, engineering, and training.

Management involvement has increased in this area. The EOP action plan is included in the ANO Business Plan. The Nuclear Operations Standards group is focused on procedure preparation and includes a project lead specifically dedicated to the ANO-2 EOP. Also, operations management has recently become unit specific up through the plant manager, allowing increased upper management involvement.

3. The corrective steps which will be taken to prevent recurrence:

The improved V&V process and the scheduled interim EOP revision and upgrade of the EOP to CEN-152 will ensure the proper establishment and maintenance of this procedure.

To increase the effectiveness of Quality Assurance (QA) audits of the EOPs, both Unit 1 and Unit 2, a separate, "stand alone" audit of selected EOPs and Abnormal Operating Procedures (AOPs) is being developed. Outside technical assistance will be used to further enhance the assessment capabilities of the audit team. Those actions will increase the breadth and depth of QA audits of the EOPs and provide further assurance that the EOPs are being properly maintained. The 1990 audit of EOPs and AOPs is currently scheduled to begin in September. Additionally, changes to the V&V process and the procedure writers guide are reviewed by QA and QA will be reviewing sections of the upgraded EOP as they are distributed for comment prior to implementation.

4. The date of full compliance:

The interim revision to the current EOP will be implemented upon completion of operator training by October 15, 1990. The CEN-152 EOP upgrade and operator training will be completed and fully implemented by December 31, 1991.



ADDENDUM

Inspection Report 50-313/90-01; 50-368/90-01 requested that ANO address the NRC's concern regarding the lack of timeliness in our response to previous assessments of our EOP performed by consultants and by the NRC with the ANO-1 EOP inspection.

Comments had been previously received from evaluations performed by the Institute of Nuclear Power Operations (INPO) and CE. Both of these evaluations were based on the guidelines in CEN-152 and many of the comments were not properly evaluated for generic applicability to the ANO-2 plant-specific EOP guidelines. The results of the NRC inspection conducted on ANO-1 were reviewed by ANO-2 personnel. Because the comments tended to be technical comments specific to the ANO-1 EOP, ANO management did not adequately review these technical comments for any common applicability to the ANO-2 EOP.

Based on ANO's reviews of these comments and the lack of adequate review for ANO-2 applicability, we concluded that management involvement was inadequate during the decision-making process to address these comments. The December 21, 1989, Diagnostic Evaluation Team Report identified the same type of concerns with management involvement. In our response to the DET report dated March 14, 1990, these concerns were addressed. In particular, the strengthening of the organization by recruiting management personnel with outside nuclear industry experience and by unitizing plant functions will help ensure that management will be adequately involved in future EOP efforts.

As a result of ANO management's review of the ANO-2 EOP, a concern regarding the adequacy of the ANO-2 EOP had been raised during the fall of 1989. This had resulted in the formation of the EOP committee to review issues concerning the ANO-2 EOP, and the decision had been made in February 1990 to convert the EOP to a document based on the guidelines in CEN-152. ANO agrees that the timeliness of this action was less than adequate and believes the current management structure is more involved in daily decisions, which will enable more appropriate responses should similar situations arise in the future.