

FEBRUARY 3 1982

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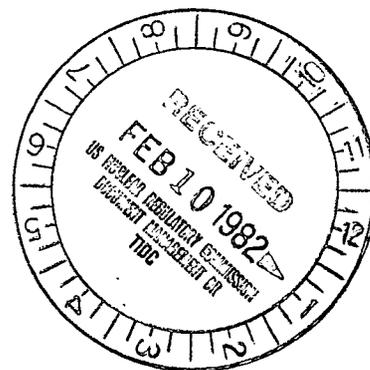
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DMB 016

Dockets Nos. 50-269, 50-270
and 50-287

Mr. William O. Parker, Jr.
 Vice President - Steam Production
 Duke Power Company
 P. O. Box 33189
 422 South Church Street
 Charlotte, North Carolina 28242

Dear Mr. Parker:



We have completed our review of Item II.K.2.9 "Failure Mode Effects Analysis on the Integrated Control System (ICS)" contained in NUREG-0737. Our review of the information you provided in response to this Item has not identified any control system failures or actions that would lead to unacceptable consequences at the Oconee Nuclear Station. The results of our review are contained in the enclosed Safety Evaluation Report.

Since all vendor designs and all control systems that affect plant safety will be reviewed under Unresolved Safety Issues (USI) A-47 "Safety Implications of Control Systems," we will no longer pursue ICS failures on a plant by plant basis, and no additional licensing action will be taken under Item II.K.2.9. Resolution of USI A-47 will determine the necessity of any additional requirements for control systems in the future.

Consequently, we consider NUREG-0737, Item II.K.2.9 to be completed for the Oconee Nuclear Station,

Sincerely,

ORIGINAL SIGNED BY

Philip C. Wagner, Project Manager
 Operating Reactors Branch #4
 Division of Licensing

Enclosure:
 Safety Evaluation
 Report

cc w/enclosure:
 See next page

OFFICE	ORB#4:DL	ORB#4:DL	C-ORB#4:DL	AD:OR:DL			
SURNAME	PWagner:c.f.	MPadovan	JStolz	TNovak			
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

February 3, 1982

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and 50-287

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Vice President - Steam Production
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Consequently, we consider NUREG-0737, Item II.K.2.9 to be completed for the Oconee Nuclear Station.

Sincerely,

A handwritten signature in cursive script that reads "Philip C. Wagner".

Philip C. Wagner, Project Manager
Operating Reactors Branch #4
Division of Licensing

Enclosure:
Safety Evaluation
Report

cc w/enclosure:
See next page

Duke Power Company

cc w/enclosure(s):

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

OCONEE NUCLEAR STATION

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

FAILURE MODE EFFECTS ANALYSIS

ON THE INTEGRATED CONTROL SYSTEM

NUREG-0737, ITEM II:K.2.9

Following the Three Mile Island Unit 2 event, the staff expressed concerns regarding the response of Babcock & Wilcox (B&W) design reactors to transients. Since the staff did not perform a detailed review of failure modes and potential interactions within the Integrated Control System (ICS), it was unsure of the role the ICS might play in initiating or exacerbating transients. Therefore, the staff required a failure mode and effects analysis (FMEA) of the system. In August, 1979, B&W submitted a report, BAW-1564, "Integrated Control System Reliability Analysis", which provided the results of a FMEA and an operating history review for the ICS installed at all operating B&W plants. BAW-1564 was endorsed by the licensee as applicable to the Oconee Nuclear Station.

The staff completed its review of BAW-1564 through a technical assistance contract with Oak Ridge National Laboratory (ORNL). As a result of this review, both the staff and ORNL concluded that the ICS itself had a relatively low failure rate and did not appear to initiate a significant number of plant upsets. However, there were aspects of the plant control system and related components outside the ICS for which improvements should be investigated. In BAW-1564, B&W recommended six actions aimed at improving system performance. In November, 1979, the licensees with B&W plants (except Three Mile Island Unit 1) were requested to address the B&W recommendations.

Duke Power Company letter dated December 21, 1979, provided the Duke position on the B&W recommendations as requested by the staff. A summary of the response on each recommendation is as follows:

- 1) The staff asked Duke to address the B&W recommendation to improve the reliability of the Non-Nuclear Instrumentation (NNI)/ICS power supply. Duke described equipment modifications to be made to improve the reliability of the power supply to these systems. In Attachment 3 to Duke Power Company letter dated July 23, 1980, Duke delineated further equipment modifications and emergency procedure changes for use in mitigating the effects of power supply failures.

- 2) The staff asked Duke to address the B&W recommendation to improve the reliability of the input signal from the Nuclear Instrumentation/Reactor Protection System to the ICS - specifically, the Reactor Coolant flow signal. Duke stated that consideration was being given to auctioneering two flow signals on each loop as input to the ICS in order to improve reliability of the flow signal. Subsequent to the letter of December 21, 1979, Duke concluded that the reliability of the existing flow measurement system had been such that no modification was needed.

- 3) The staff asked Duke to address the B&W recommendation to improve ICS/Balance of Plant tuning, particularly the interaction between the feedwater condensate systems and the ICS controls. The staff further asked that the licensee address any particular operational problems experienced with the ICS, procedures used by the operator to take manual control of ICS functions, and ICS training provided for the operators. Duke indicated that some problems had occurred during startup due to excess leakage through the Main Feedwater Valves. Duke described a maintenance program for these valves and other modifications being made to improve the reliability of the feedwater/condensate system. No specific procedures are used to tell the operator when to intervene with automatic ICS control, but, rather operator training is relied upon to enable the operators to decide when it is appropriate and necessary to take manual control.
- 4) The staff asked Duke to address the B&W recommendation to improve the main feedwater pump turbine drive minimum speed control. Duke stated that a modification was being made to increase the oil pressure to the main feedwater pump to prevent loss during minimum speed control.
- 5) The staff asked Duke to address the means of preventing or mitigating the consequences of a stuck-open main feedwater startup valve. Duke stated that the valves will be tested for leakage and proper operation during every refueling outage. If a valve sticks open, the operator can close the block valve to mitigate the consequences.

- 6) The staff asked Duke to address the means of preventing or mitigating the consequences of a stuck-open turbine bypass valve. Duke indicated that if a valve sticks open, the operator mitigates the consequences by closing the block valve.

In May, 1981, subsequent to the review of the response on the B&W recommendations, the staff held a meeting with Duke Power Company. The meeting was held not only to review the specific Duke response to the B&W recommendations, but also to provide the staff with an opportunity to better understand the details of the ICS design and its effect on plant safety. B&W representatives were in attendance at this meeting to give a presentation on the functions of the ICS and respond to staff questions on the effects of failures in the ICS. The basic contention was that plant transients caused by ICS failures will be terminated by the Reactor Protection System prior to exceeding any plant safety limit.

Based on the meeting with Duke Power Company and reviews made to date, the staff has identified no specific control system failures or actions which would lead to unacceptable consequences nor any control system design feature on B&W designed plants which violates any Commission regulation. The staff has concluded that little more can be gained by pursuing the issue of control system failures on a plant by plant basis for operating plants, but, rather intends to pursue the issue on a broader basis which will include all vendor designs and all control systems that could affect plant safety. The Commission has designated the "Safety Implications of Control Systems" (USI A-47) as an Unresolved Safety Issue (see NUREG-0705, "Identification of New Unresolved Safety Issues Relating to Nuclear Power Plants, Special Report to Congress" dated March 1981). The purpose of this Unresolved Safety Issue is to perform in-depth evalu-

ations of control systems that are typically used during normal plant operation and to evaluate the adequacy of current licensing requirements.

In summary, the staff has reviewed the Reliability Analysis of the ICS (BAW-1564) and the licensee's response to the six recommendations contained in BAW-1564. Based upon these reviews, the staff believes that the Oconee design meets all current regulatory requirements. In addition, since the staff has not identified any specific control system failures or actions that would lead to unacceptable consequences, the staff does not believe that any additional immediate licensing action is warranted at this time. However, for the longer term, USI A-47, which was begun in December 1980, has as its principle task, the assessment of the adequacy of current regulatory requirements for control systems. Resolution of A-47 will determine whether it will be necessary to impose additional and more stringent requirements on control systems in the future.