ENCLOSURE 1

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

AUG 22 1980

MEMORANDUM FOR: Harold R. Denton, Director
Office of Nuclear Reactor Regulation

THRU: Thomas E. Murley, Acting Director TEM
Office of Nuclear Regulatory Research

FROM: Robert M. Bernero, Director
Division of Systems and Reliability Research
Office of Nuclear Regulatory Research

SUBJECT: ALAB DECISION 603 DATED JULY 30, 1980 ON STATION BLACKOUT AT ST. LUCIE UNIT 2

The purpose of this memorandum is to offer comments on the recent ruling by the Appeal Board on St. Lucie 2 (ALAB-603). We do not agree with conclusion 4, "that a complete loss of AC power--station blackout--must be considered a design basis event for St. Lucie Unit 2." Flaws are apparent in ALAB-603 in a number of areas:

1. The quantitative criterion for action.

2. The foreclosure of alternatives to deal with blackout.

3. Assumption that St. Lucie 2 is exceptionally prone to blackout.

These problem-areas are discussed further below.

1. Quantitative Criterion for Action

It is clear the criterion of acceptability chosen by ALAB (p. 31 of the decision) was never intended by the staff to be applied in such a way. Section 2.2.3 of the Standard Review Plan explicitly limits the use of the 10^{-7} criterion (areas of review) to "accidents involving nearby industrial, military, and transportation facilities" and "potential accidents involving hazardous materials or activities in the vicinity of the plant"--that is, to external hazards such as nearby transportation of toxic gases or explosives. This is not to say that a probability goal is not appropriate for station blackout. Station blackout lends itself more readily to a probabilistic goal than do some other event sequences. However, we believe a probabilistic goal in the neighborhood of 10^{-5} per plant-year is more reasonable for a potential core damage accident resulting from station blackout. As an interim goal, for say 5 years, a range of 10^{-5} to 10^{-4} would entail a minimal risk at operating reactors

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while a more permanent probabilistic staff objective is developed. Indeed, improvements over the last 7 or 8 years in our knowledge of the severity of core damage accidents raise the question of whether the 10^{-7} criterion might be unnecessarily restrictive even for external hazards.

We recognize that there exists no criterion in the record, so one can hardly blame the Appeal Board for somewhat arbitrarily selecting Section 2.2.3 as their basis. Clarification of the staff objective is sorely needed, and we believe this should be a top priority--not only for station blackout but for other important transients such as loss of feedwater.

2. Foreclosure of Alternatives

The ALAB-603 conclusions do not provide for what we think is an acceptable alternative to making station blackout a design basis event. One alternative is to reduce the probability of a station blackout. This could be done by improving the reliability of the emergency onsite AC power supply system. For example, an additional diesel generator (with diversity in manufacturer, size, testing, etc.), or a gas turbine could make significant improvement. Another alternative would be an NRC-approved plan and procedures for the restoration of offsite power and emergency onsite power. Note that ALAB assumed the probability of restoring offsite power was zero and also that the probability of getting one of the diesel generators started (after initially failing to start) was zero. Yet, the conclusion was drawn on page 69 that "there is a high likelihood that following station blackout, a source of AC power can be restored before events resulting from its loss produce reactor core damage." If the Board had included a probability for AC power restoration, we think (and their above-stated conclusion supports us) it could reduce the calculated core damage probability from station blackout by as much as a factor of 10. Approved AC power restoration procedures could also significantly limit the time interval for which it is necessary to assure that the decay heat removal systems are independent of AC power.

3. Assumption that St. Lucie is Exceptionally Prone to Blackout

There are at least two potential major impacts of ALAB-603 on the licensing process and on operating reactors. First, if the conclusion requiring station blackout to be a design basis event at St. Lucie is accepted, then it surely must be applied to other operating reactors since most are in the same probability range, i.e., 10^{-5} to 10^{-4} per plant-year for experiencing a station blackout. Current estimates of station blackout probability, based on operating experience, do not confirm the premise that Florida-based plants are exceptionally prone to that event. Compared to other plants in

the U.S., for example, the loss of offsite power at Florida plants is only a little more frequent (perhaps a factor of 2) than the national average. A crude survey of operating experience indicates to us that there are at least 8 plant sites with more frequent loss of offsite power than any of the Florida plants. This may be because different failure mechanisms such as tornadoes, ice storms, lightning, electrical demand surges, grid reliability, etc. are operating in different geographical regions. For example, two of the higher frequency plants are in the midwest (tornadoes?), two are on northern great lakes (winds, ice, lightning?), three are on the northeast seaboard (weather, grid ties, demand surges?) and one is near the Gulf of Mexico (weather, grid connection?). Thus, while grid reliability may be somewhat lower for Florida plants, a number of other causes of power loss are not present in Florida.

Furthermore, the loss of onsite emergency AC power does not appear to be a strong function of geographical location. Thus, Florida plants (including St. Lucie Unit 2) would not appear to have inherent failure mechanisms of their emergency AC power that are peculiar to the peninsular geography.

A second possible impact could occur if the application of the 10^{-7} criterion to a potential accident sequence (such as a station blackout transient) is accepted; it might then become a precedent by which to judge other transients and LOCAs. It is likely that no current or planned commercial operating reactor could meet such a severe criterion. The probability of core damage accidents due to other transient and LOCA sequences has frequently been estimated by NRC over the last 8 years to be in the 10^{-3} to 10^{-4} range at operating reactors.

In summary, while we agree with much of ALAB-603 and feel it is a well-written lucid presentation of the station blackout concerns, we do not agree that station blackout must be considered a design basis event at St. Lucie Unit 2.

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ENCLOSURE 2

TO: ALL LICENSEES OF OPERATING NUCLEAR POWER REACTORS AND APPLICANTS FOR OPERATING LICENSES

SUBJECT: EMERGENCY PROCEDURES AND TRAINING FOR STATION BLACKOUT EVENTS

A recent decision by the Atomic Safety Licensing and Appeal Board (ALAB-603) concluded that station blackout (i.e., loss of all AC power) should be considered a design basis event for St. Lucie Unit 2. An amendment to the Construction Permit for St. Lucie Unit 2 was subsequently issued on September 18, 1980. The NRC staff is currently assessing station blackout events on a generic basis (Generic Task A-44). The results of this study, which is scheduled to be completed in 1982, will identify the extent to which design provisions should be included to reduce the potential for or consequences of a station blackout event.

However, the Board has recommended that more immediate measures be taken to ensure that station blackout events can be accommodated while Task A-44 is being conducted. Although we believe that, qualitatively, there appears to be sufficient time available following a station blackout event to restore AC power, we concur that some interim measures should be taken.

Consequently, we require that you promptly implement interim emergency procedures and a training program for the existing systems in your facility for station blackout events, if such procedures and training do not already exist. The emergency procedures should consider, but are not limited to:

a. The actions and equipment necessary to maintain the reactor coolant inventory and heat removal with only DC power available, including consideration of the unavailability of auxiliary systems such as ventilation and component cooling.
b. The estimated limiting time to restore AC power and its basis.
c. The actions for restoring offsite AC power in the event of a loss of the grid.
d. The actions for restoring offsite AC power when its loss is due to postulated onsite equipment failures.
e. The actions necessary to restore emergency onsite AC power. The actions required to restart diesel generators should include consideration of the unavailability of AC power. For example, unsuccessful attempts to start diesel generators may result in depletion of the compressed air tanks. After repairs or adjustments, further attempts to start the diesels may not be possible without recharging the air tanks. In the absence of AC power, provisions may be necessary for portable air tanks, manual air pumps, DC compressors, etc.
f. Consideration of the availability of emergency lighting, and any actions required to provide such lighting, in equipment areas where operator or maintenance actions may be necessary.

g. Precautions to prevent equipment damage during the return to normal operating conditions following restoration of AC power. For example, the limitations and operating sequence requirements which must be followed to restart the reactor coolant pumps following an extended loss of seal injection water should be considered in the recovery procedures.

The annual requalification training program should consider the emergency procedures and include simulator exercises involving the postulated loss of all AC power and decay heat removal accomplished by natural circulation and the steam-driven auxiliary feedwater system for PWR plants, and by the steam-driven RCIC and/or HPCI and the safety-relief valves in BWR plants.

We require that the actions described above be completed by June 1, 1981 for the licensed nuclear power reactors and plants licensed before that date, or prior to licensing for plants licensed after that date. The staff's review of these actions will be accomplished as part of the implementation of the recommendations which evolve from Task A-44 and implementation of the long-term programs related to emergency procedures and training in the TMI-2 Action Plan (NUREG-0660). The interim procedures developed in response to this request will eventually be placed by the final procedures which evolve from Tasks I.C.1 (3) and I.C.9 of the TMI-2 Action Plan.

Accordingly, pursuant to 10 CFR 50.54(f) licensees are requested to furnish, within forty-five (45) days of this letter, confirmation that the implementation date of June 1, 1981 will be met. For plants licensed after this letter, these actions and the implementation schedule will be incorporated as license conditions. In the event that the completion date cannot be met, furnish a proposed revised date, justification for the delay, and any planned compensating safety actions during the interim. After our evaluation of your response, the NRC staff will take action, as necessary, to assure that such requirements and commitments are appropriately enforceable. This may include, as needed, issuance of a Confirmatory or Show-Cause Order.

Darrell G. Eisenhut, Director
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