NRC PDR

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

July 22, 1980

Dockets Nos. 50-338
and 50-339

MEMORANDUM FOR: B. J. Youngblood, Chief
Licensing Branch No. 1, DL

FROM: Brian K. Grimes, Program Director
Emergency Preparedness Program Office

SUBJECT: NORTH ANNA POWER STATION EMERGENCY PLAN EMERGENCY ACTION LEVELS

It is requested that a letter, similar to the sample enclosed, be sent to VEPCO concerning our review of the Emergency Action Levels for the North Anna Emergency Plan.

Brian K. Grimes, Program Director
for: Emergency Preparedness Program Office

Enclosure: As stated

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ENCLOSURE

Dockets Nos. 50-338
and 50-339

Mr. Ashby Baum
Executive Director
Licensing and Quality Assurance
Virginia Electric and Power Company
Post Office Box 26666
Richmond, Virginia 23261

Dear Mr. Baum:

We have reviewed the Emergency Action Levels of Section 4 of the North Anna Power Station Emergency Plan. This review was conducted against the evaluation criteria of NUREG-0654. The results of our review are enclosed.

Accordingly, your emergency plan should be revised to address our comments and a revision to the plan provided within 45 days of receipt of this letter.

Sincerely,

B. J. Youngblood, Chief
Licensing Branch #1
Division of Licensing

Enclosure: Review of North
Anna Emergency Action Levels

EVALUATION OF EMERGENCY ACTION LEVELS

NORTH ANNA EMERGENCY PLAN

TABLE 4.1D 6/18/80

GENERAL EMERGENCY

Intiating Condition 1 is a projected dose at the site boundary which exceeds 2 rem whole body exposure or 12 rem thyroid exposure. The emergency action level is a calculation by the Health Physics staff or a determination from an unspecified individual according to projected dose monographs (sic). The emergency plan should state that the operators or the senior reactor operators or the shift technical advisor will be trained to make determinations of projected dose within 15 minutes. Otherwise the requirement to have calculations performed by Health Physics may prevent a timely declaration of an emergency.

Intiating condition 2 is the loss of 2 of the 3 fission product barriers with a potential loss of the third barrier. The emergency action level for this condition only considers 1 of the 3 possible ways in which 2 of the 3 fission prime barriers may be lost. The plan considers the case where the core has been disrupted and the reactor coolant system has lost its integrity. Not mentioned are the accidents where the core has been disrupted and the containment had failed to isolate, or when the reactor coolant system has lost its integrity and the containment has failed to isolate. The emergency action levels which are given for this condition are too vague. The terms "confirmed loss" or "high potential" do not constitute fixed observable conditions. The loss of core geometry can be indicated by core temperature, containment building radiation levels,

reactor coolant system radioactivity levels, pressure vessel water level, or other process radiation monitors. The integrity of the reactor coolant system can be measured from the pressure vessel water level, the pressurizer water level and the pressurizer pressure. The potential for a loss of the third barrier can be indicated by a loss of offsite power, a loss of the emergency core cooling systems, or a system which has approached its designed pressure limits and which is tending to exceed those limits. For example, a containment building pressure of 40 or 50 psig, and a steadily rising containment building pressure may constitute a suitable emergency action level.

SITE EMERGENCY

Intiating Condition 1 is a known major loss of coolant. North Anna correctly interprets this as an accident which can be identified by monitoring the containment pressure and the pressurizer pressure. The pressurizer level, the coolant level in the pressure vessel, and the temperature difference between the inlet and outlet of the pressure vessel may also be used as emerency action levels. However, the North Anna plan states that the signals must not be spurious. The plan does not provide further information about what a spurious containment pressure or pressurizer pressure signal might be. It is recommended that for accidents as serious as a site emergency such vague emergency action levels should not be allowed. The licensee should either increase the reliability of the emergency action levels which are used or the licensee should state which corroborating signals would be used to determine whether the emergency action levels are or are not spurious.

Initiating Condition 2 is a loss of core subcooling. The emergency action level is a subcooling margin of 0° F or less. This margin is not very large. It is recommended that the margin should be at least 10° to 30° F with a simultaneous indication of increasing saturation margin. Corroborating emergency action levels could be high reactor building pressure or high reactor coolant activity.

Initiating Condition 3 is a multiple steam generator tube rupture with loss of offsite power. North Anna correctly identifies the emergency action levels for multiple tube ruptures in a steam generator and for loss of offsite power. However, the emergency action level includes a safety

injection signal. This additional emeregency action level is not necessary. If the parameter values for detecting significant steam generator tube ruptures are appropriate in the existing plan and are confirmed by Health Physics staff as indicated in the plan, then there should be no need for additional verification of the accident. In fact, if there were a loss of offsite power and multiple ruptures of steam generator tubes, an additional failure of safety injection to actuate would consitute a severe emergency, yet, would not satisfy the requirements for a site emergency under these emergency action levels.

Initiating Condition 4 is a steam line break with significant primary to secondary leakage and indication of fuel damage. The emergency action levels for identifying signficant steam line breaks and primary to secondary leakage are adequate. The indications of fuel damage are not adequate in that North Anna relied solely on indications of specific activities in the coolant. Under conditions of stagnate flow or subcooling (presence of voids in the primary system) such an emergency action level would not be adequate. Please reference the discussion under the general emerency category.

Initating Condition 7 is a loss of all functions needed to take the unit to hot shutdown. The licensee response is that this condition would occur if all the following systems were lost: auxiliary feed water system, boric acid transfer, pressurizer heaters, atmosphere steam dump, charging pumps, and letdown isolation valves. It is recommended that pressurizer heaters be deleted from this list of systems, since a loss of the other 5 systems would be significant enough to warrant classification of a site emergency.

Initiating Condition 8 is major damage to spent fuel in a containment or fuel building. The emergency action level is based upon the weight of an object which impacts the spent fuel. The weight of this object is not measureable in a control room. The licensee should refer to the emergency action levels which are based upon radiation indications in the alert and unusual event categories. The use of reactor vessel water level as an emergency action level for this initiating condition should be consistent with other initiating conditions which relate to fuel damage. Initiating Condition 10 is a loss of all annunciators for more than 15 minutes or loss of annunciators during a transient. North Anna has not addressed the second condition. The loss of annunciators during a transient has not been assigned an emergency action level. It is suggested that the emergency action level be rewritten to state: "Annunciators panels a - k are all inoperable for more then 15 minutes or during a declared emergency."

Initiating Condition 11 is a projected dose at the site boundary from 0.5 to 2 rem whole body. The emergency action levels do not indicate that estimates of leakage from the containment would be used to project doses at the site boundary. The emergency action levels should be augmented to include an action level or a set of conditions describing a containment area radiation monitor.

Initiating Condition 15 is an evacuation of the control room where control of the shutdown systems is not established in 15 minutes. The licensee identifies the safety systems which must be brought under control within 15 minutes. However, there is no stated means of verifying that the systems are in fact under control. It is difficult to understand how the licensee

could detect a lack of control in these systems from an onsite location. A completely satisfactory response to this initiating condition apparently requires the installation of the nuclear data link.

ALERT CATEGORY

Initiating Condition 1 is a severe loss of fuel cladding. The emergency action level is 300 microcuries per gram of dose equivalent iodine-131, as determined by sampling and analysis. It is difficult to understand how a specification of dose equivalent iodine-131, whatever that is, can be a useful indicator of severe core damage. A specification of allowable concentrations of iodine-132, iodine-133, or iodine-135 would be more appropriate. The simpler analysis indicated in the emergency action level could be appropriate for a remote measuring device. The specification of sampling and analysis implies that the power plant's radioanalytical capabilities were brought to bear on the problem. These capabilities should be adequate to perform an isotopic analysis of radioiodine. The shorter lived radioiodine isotopes are better indicators of core damage than iodine-131. In addition, high core temperature, low presure vessel water level, or high containment building radioactivity levels may constitute acceptable emergency action levels.

Initiating Condition 3 is a multiple steam generator tube rupture. In this case, North Anna has correctly identified the radiation instrumentation and associated action levels which indicate multiple steam generator tube ruptures. North Anna has also required the initiation of safety injection for the declaration of an emergency in this case. Again, it is recommended that the safety injection signal be deleted from the emergency action levels because it is redundant.

Initiating Condition 9 is a locked rotor in a reactor coolant pump leading to fuel failure. Please reference previous comments relating to a reliance

on reactor coolants specific activity as an emergency action level for fuel failure.

Initiating Condition 10 is a failure of the reactor protection system to initiate and complete a trip when required. The licensee relies upon "no rod bottom lights" do detect a failure of control rods to fully insert. The licensee should use indications of neutron flux or rate of change of neutron flux (reactor period) as emergency action levels.

Initiating Condition 11 is a fuel damage accident with release of radioactivity to the containment or fuel building. The emergency action level does not specify whether a "release of fission products" refers to a release from the fuel bundle or a release from the site. This emergency action level might be rewritten to specify a confirmation of the presence of fission products released from the fuel.

In general, the emergency action levels for this category are commendable for their clarity and specificity.

Unusual Event Category

Initiating Condition No. 1 is the initiation of safety injection. The emergency action level is a safety injection signal which is valid according to the technical specifications. The licensee should simply state the requirements for a valid safety injection signal. A corroborating indication of flow in an injection flow path may be sufficient.

Initiating Condition No. 3 is an indication of fuel damage. Please see the previous comment concerning the use of reactor coolant activity as the sole indicator of sole damage.

Initiating Condition No. 4 is a technical specification safety limit being exceeded. North Anna could specify what constitutes abnormal temperature and pressure for the coolant system. Likewise, the limiting leak rates for the primary to the secondary system could be specified.