

JUN 30 1992

Docket No. 50-397

Washington Public Power Supply System
P. O. Box 968
3000 George Washington Way
Richland, Washington 99352

Attention: G. C. Sorensen, Manager
Regulatory Programs

SUBJECT: REVIEW OF THE WASHINGTON PUBLIC POWER SUPPLY NUCLEAR PROJECT
UNIT 2 (WNP-2) EMERGENCY PREPAREDNESS PLAN (EPP), REVISION 11,
AND EMERGENCY PLAN IMPLEMENTING PROCEDURE (EPIP) 13.1.1,
REVISIONS 13 AND 14

Reference is made to your letter dated November 1, 1991, File: G02-91-201,
Subject: NUCLEAR PLANT NO. 2, OPERATING LICENSE NPF-21 ADDENDUM 1 TO REVISION
11 OF THE EMERGENCY PLAN.

The Office of Nuclear Reactor Regulation (NRR) has reviewed the EPP Revision 11 and Revisions 13 and 14 to EPIP 13.1.1. The EPP review (Enclosure 1 hereto) has determined that all except one of the five changes indicated as potentially decreasing the effectiveness of the emergency plan were found acceptable for inclusion in the plan. The one element found not acceptable is indicated in Enclosure 1. Accordingly, you are to follow your previously approved plan in regard to this item. Resubmit corrected plan pages as necessary to maintain plan continuity.

The review of Revisions 13 and 14 of the EPIP 13.1.1 (Enclosure 2 hereto) indicated 28 items concerning the emergency action levels (EALs) where it appears the EAL scheme is less conservative than the guidance established by NUREG-0654. Please provide a response to the items identified in Enclosure 2, Section II, indicating how your EAL scheme meets the guidance provided by NUREG-0654.

It was also indicated by NRR that with Revision 11 of the EPP and Revision 13 of EPIP 13.1.1, the Supply System has introduced mode dependence to the EAL scheme. NRR will evaluate the adequacy of mode-dependent EALs when the current NRC shutdown risk study is completed and guidance for shutdown EALs is issued. This review therefore should not be considered an endorsement of the mode-dependent EAL scheme.

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If you have any questions concerning this matter, please contact Art McQueen of my staff at (510) 975-0241.

Ross A. Scarano, Director
Division of Radiation Safety and
Safeguards

Enclosures as stated

cc w/enclosure:

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- M. J. Virgilio, NRR/ADR4-5
- R. A. Erickson, NRR/PEPB
- D. M. Barss, NRR/PEPB
- R. C. Sorensen, RV SRI, WNP-2
- A. D. McQueen, RV/SEPNRB

bcc w/o enclosure

- Docket File
- J. Martin
- B. Faulkenberry
- P. Johnson
- State of Washington
- J. Zollicoffer
- EP File 1-3-2

RV/gmd	REQUEST COPY	REQUEST COPY	SEND TO PDR
<input checked="" type="checkbox"/> YES	<input checked="" type="checkbox"/> NO	<input checked="" type="checkbox"/> YES	<input checked="" type="checkbox"/> YES
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**REVIEW OF WNP-2'S REVISION 11
TO THE EMERGENCY PREPAREDNESS PLAN**Background

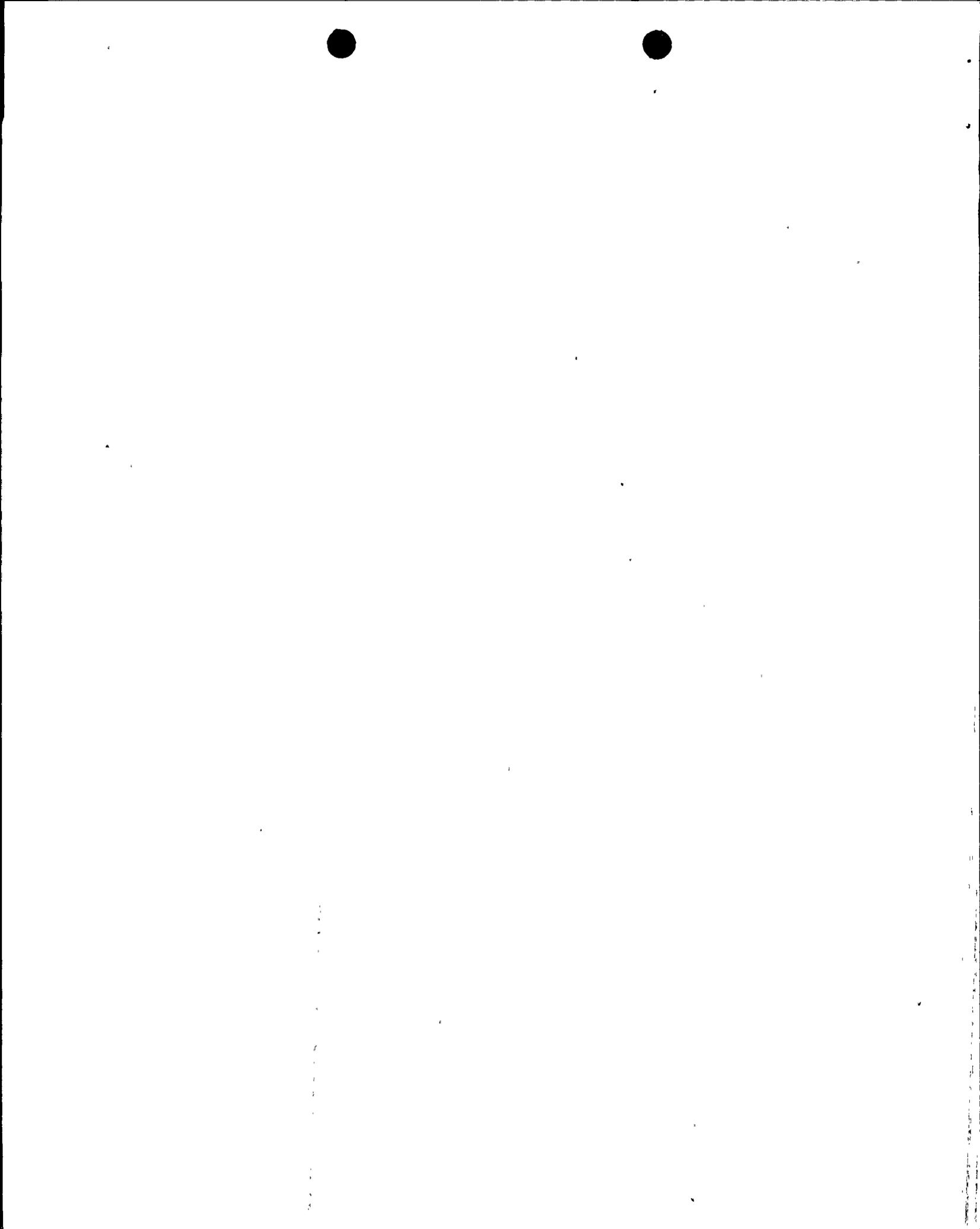
By letter dated November 19, 1991, Region V submitted a request for NRR/PEPB to review WNP-2's Revision 11 to the Emergency Plan (EPP) dated July 1991. The licensee indicated in their forwarding correspondence that five of the changes in the plan may be perceived as decreasing the effectiveness of the Emergency Plan. The changes were therefore being submitted for approval prior to implementation in accordance with 10 CFR 50.54(q).

Evaluation

The EPP changes made by Revision 11 were generally viewed by the licensee as editorial in nature or enhancements to the program. The licensee identified five changes which were perceived to potentially decrease the effectiveness of the emergency plan. The changes are: (1) field team deployment within 30 minutes; (2) expertise of the technical manager's staff; (3) elimination of the responsibility of field kitchen operations from the Administrative Support Manager; (4) elimination of a fourth hospital from the EPP due to distance; and (5) elimination of examples of situation-based emergency action levels (EALs) from the EPP.

PEPB has determined that with regard to Item 5 above, the plan as changed does not meet the requirements of 10 CFR 50, Appendix E, IV.B, "Assessment Actions," and is therefore unacceptable, and needs to be revised before implementation. Items 1 through 4 above, as well as the editorial changes and enhancements to WNP-2 EPP do not significantly affect the plan and are therefore acceptable. The following are specific comments on each of the items:

- Item 1: Item 1 was determined by PEPB to be a clarification of licensee response time for the field monitoring teams.
- Item 2: The Item 2 change will make available to the Technical Manager appropriate personnel resources to draw from during emergency needs.
- Item 3: Item 3 involved an editorial change to the EPP.
- Item 4: Item 4 was determined by PEPB to be acceptable since the licensee's EPP continues to meet the NUREG-0654 guidance for this item.
- Item 5: Item 5 was judged unacceptable by PEPB because it does not meet the requirements in 10 CFR 50, Appendix E.IV.B. This item contains two issues -- deletion of Table A.2 from the EPP and an incorrect subcaption on Table A.1.



The first issue concerns Revision 11 of the EPP. Section 6 of the EPP contains two tables, Table A.1, "Symptomatic Initiating Conditions" and Table A.2, "Situation Based Emergency Action Levels." The licensee deleted a table contained in Revision 10 of the EPP, formerly identified as Table A.2, "Examples of Situation Based Emergency Action Levels." Deletion of this table has resulted in an EPP which contains an inadequate level of detail as required by 10 CFR 50, Appendix E.IV.B, "Assessment Actions."

The second issue concerns the subcaption to the title of Table A.1. On page 6-6, the EPP states, "All conditions alarm on the graphics display system (GDS)." This statement is incorrect and inconsistent with information provided on page EP 6-2 which implies that only certain symptomatic initiating conditions will alarm the GDS. This inconsistency needs to be corrected.

Additional licensee action is necessary to resolve the above two issues. The deletion of Table A.2, "Examples of Situation-Based Emergency Action Levels," could be considered acceptable if the licensee provides assurances that this information, with the same level of detail, was made available to all interested parties, including State and local governments, in other references (i.e., EPIP 13.1.1). These references should be stated in Section 6 and should be on controlled distribution to appropriate recipients commensurate with the EPP distribution. The reference which contains the level of detail originally in Table A.2 of Revision 10 would need to meet the requirements in 10 CFR 50, Appendix E.IV.B, which states: "These emergency action levels (EALs) shall be discussed and agreed on by the applicant and State and local governmental authorities and approved by the NRC. They shall also be reviewed with State and local governmental authorities on an annual basis."

The licensee has also deleted Tables 6-1 through 6-4 from Revision 11 as well as notes associated with these tables. Though the information contained in these tables is not required to be contained in the EPP, it was considered helpful. Removal of this information is acceptable, but its absence will make future evaluations of WNP-2's unique EAL scheme much more difficult.

Mode Dependency

With Revision 11 of the EPP, the licensee has introduced mode-dependency to its EAL scheme. As a result, some EALs are proposed to apply only in cold shutdown and refueling mode, and others to power operation, startup, and hot shutdown modes. This approach implies that the licensee attributes a different level of risk to different modes of operation.

The guidance in Appendix 1 of NUREG-0654 is not mode-dependent. The NRC staff is studying shutdown risk to gain more insight on the risks associated with shutdown and to provide a basis for developing a comprehensive set of shutdown EALs.

PEPB did not attempt to make a determination as to the adequacy of the proposed mode dependency. We will determine the adequacy of mode-dependent EALs when the shutdown risk study is complete and guidance for shutdown EALs

is issued. Thus, this review should not be considered an endorsement of the licensee's mode-dependent EAL scheme.

Conclusion

PEPB has determined that WNP-2's Revision 11 to the EPP is not acceptable due to an inadequate level of detail in Section 6 regarding EALs. Resolution of this inadequacy is necessary prior to implementation of Revision 11 of the EPP. Other changes proposed by the licensee in Revision 11 were found acceptable.

REVIEW OF WNP-2'S REVISION 13 AND 14
OF EPIP 13.1.1, "CLASSIFYING THE EMERGENCY"
AND COMPARISON TO NUREG-0654, APPENDIX 1

Background

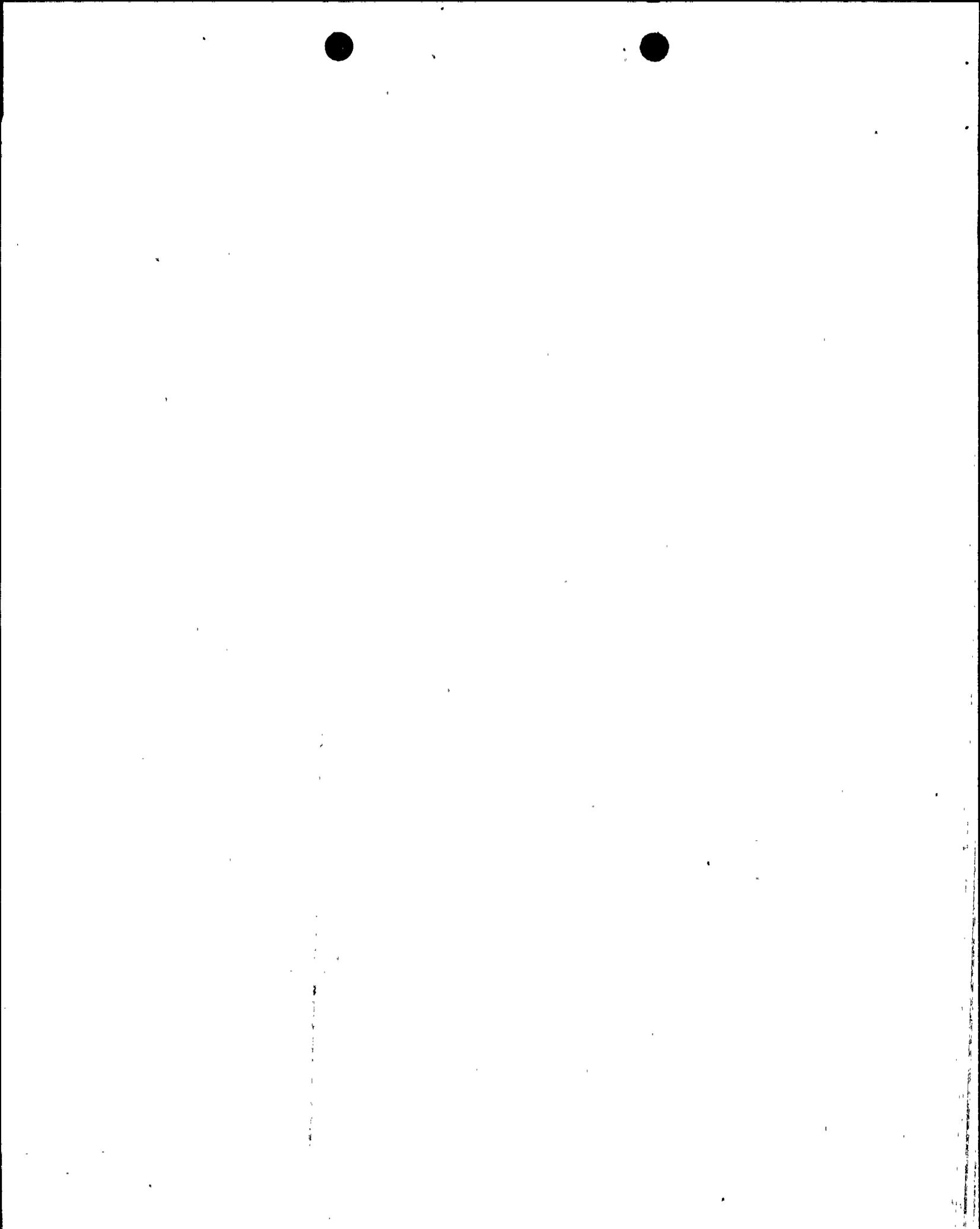
By letter dated November 19, 1991, Region V submitted a request for NRR/PEPB to review WNP-2's Revisions 13 and 14 of Emergency Plan Implementing Procedure (EPIP) 13.1.1, "Classifying the Emergency," dated August 8, 1991, and September 5, 1991, respectively. The NRC staff found Revision 11 to WNP-2's Emergency Preparedness Plan (EPP) unacceptable in the area of EALs. Therefore an overall review of EPIP 13.1.1 was also conducted to assure conformance with the guidelines established by NUREG-0654, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," and Appendix 1, "Emergency Action Level Guidelines for Nuclear Power Plants."

Evaluation

I. Review of Revision 13 and 14 of EPIP 13.1.1 Against Previously Approved Revision 12

The changes implemented by the licensee with Revisions 13 and 14 were reviewed by PEPB and compared to previously approved Revision 12 of EPIP 13.1.1. The following items were noted:

- A. Revision 13 of EPIP 13.1.1, page 5 of 24: Symptomatic initiating condition unusual event (UE) core cooling was changed to read, "Except momentary design low level transients;" however, the licensee does not define "momentary." The licensee should include a definition or limit to establish the parameters that would encompass "momentary."
- B. Revision 14 of EPIP 13.1.1, page 5 of 24: The note previously explaining exceptions to graphic display system (GDS) alarms has been deleted. Since not all conditions alarm on the GDS, the note should be retained for clarity.
- C. Revisions 13 and 14 of EPIP 13.1.1 were submitted without "revision bars" to indicate changes. This information was supplied by the licensee at a later date when requested by the reviewer.
- D. With Revision 13 of EPIP 13.1.1, the licensee has introduced mode-dependency to its EAL scheme. As a result, some EALs are proposed to apply only in cold shutdown and refueling mode, and others to power operation, startup, and hot shutdown modes. This approach implies that the licensee attributes a different level of risk to different modes of operation.



The guidance in Appendix 1 of NUREG-0654 is not mode-dependent. The NRC staff is studying shutdown risk to gain more insight on the risks associated with shutdown and to provide a basis for developing a comprehensive set of shutdown EALs.

PEPB did not attempt to make a determination as to the adequacy of the proposed mode dependency. We will determine the adequacy of mode-dependent EALs when the shutdown risk study is completed and guidance for shutdown EALs is issued. Thus, this review should not be considered an endorsement of the licensee's mode-dependent EAL scheme.

II. Comparison of EPIP 13.1.1 Revision 14 to NUREG-0654.

Comments are included in the order of Tables 6-1 through 6-4, "WNP-2 Initiating Condition NUREG-0654 Cross Reference for Unusual Event, Alert, Site Area Emergency and General Emergency Classification," found in Revision 10 of WNP-2 EPP. The Tables were also used extensively in establishing equivalency between NUREG-0654 and WNP-2 EALs. The comparison format lists the NUREG-0654 Example Initiating Condition (IC) first, followed by the equivalent WNP-2 EAL. Comments concerning the EAL then follow.

A. Unusual Event (UE)

1. NUREG-0654 IC UE #2: Radiological effluent.
technical specification limits exceeded.
WNP-2 EAL: "Release of radioactive material in liquid, gaseous, or particulate form in excess of Technical Specification limits, but no offsite monitoring required."

Comment: The modifying phrase, "...but no offsite monitoring required." implies an alternate situation if monitoring is required, but that situation is not included in the EALs. Further, some offsite monitoring may be appropriate for such a release, but still only warrant an Unusual Event. Thus the modifying phrase could be deleted in the interest of clarity.

This recommendation is made to provide clarity to the existing EAL.

2. IC UE #3: Fuel damage indication. Examples:
 - a. High offgas at BWR air ejector.WNP-2 EAL: No direct equivalent EAL. WNP-2 listed equivalent is the same EAL stated in 1. above.

Note 2 for Emergency Plan Table 6-1 states that the air ejector monitor is not a good indicator of



failed fuel because that is not their design function, and that the main steam line radiation monitors fulfill the function. "If these detectors sense failed fuel, they will isolate the main steam lines, which by the way isolates the steam flow to the Offgas monitors, and trips the reactor, placing the plant in a safe condition."

Comment: The purpose of this Unusual Event IC is recognition of a fuel failure precursor. Relying on the main steam monitors does not provide the anticipatory classification required by the NUREG-0654 IC for the following reasons. The main steam line monitors are typically set with a threshold (about 3X normal) to assure they do not alarm with 100% power N16 gamma. At 100% power, coolant activity due to N16 gamma is about 100 uCi/ml; approximately 90% N16 coolant activity is seen at the monitor, thus approximately 270 uCi/ml activity would have to pass the monitors to obtain the protective features identified in Note 2, Table 6-1 of the EP. The 180 uCi/ml additional activity above normal N16 gamma (without considering energy effects, etc.) due to constituents other than N16 begins to approach the equivalent fuel damage that would result in an Alert declaration. A monitor with much more sensitivity than the steam line monitors should be used to fulfill the intent of IC UE #3. a.

The absence of an equivalent WNP-2 EAL for NUREG-0654 IC UE #3. a. results in an Emergency Plan less conservative than the guidance provided by NUREG-0654.

3. IC UE #4: Abnormal coolant temperature and/or pressure or abnormal fuel temperatures outside of technical specification limits.
WNP-2 EAL: No equivalent EAL. WNP-2 EP Table 6-1 lists this IC as "PWR unique".

Comment: Contrary to Table 6-1, in the experience of the reviewer there are several technical specification related temperature and pressure limits that are not unique to PWRs, and are precursors to fuel or vessel damage in BWRs. EAL examples might include, "Inadequate metal temperature prior to exceeding 200 degrees F. moderator temperature", or exceeding maximum pressure limits prior to HPCI/RCIC operability testing."

The absence of an equivalent WNP-2 EAL for NUREG-0654 IC UE #4 results in an Emergency Plan less conservative than the guidance provided by NUREG-0654.

4. IC UE #5: Exceeding primary system leak rate technical specification.

WNP-2 EAL: "Drywell Drains Cumulative Flow greater than or equal to 36,000 gallons in any 24 our period, or Drywell Floor Drain Flow Rate greater than or equal to 5 gpm."

Comment: No EALs have been prepared for the "Symptomatic Initiating Conditions" table, Attachment 4.2, EPIP 13.1.1, that reflect the increased activity that would be seen by Containment Air Monitors in event of increased primary leakage. The licensee may wish to consider this additional symptomatic indicator for loss of coolant system integrity.

This recommendation is made to provide improvement to the existing EAL.

5. IC UE #7: Loss of offsite power or loss of onsite AC power capability.

WNP-2 EAL: "Loss of all offsite power".

Comment: EAL is adequate for first portion of IC.

WNP-2 EAL: "Loss of one critical switchgear bus (excluding Division 3) for more than 8 hours and not in Hot Shutdown (Operational Condition 3) or colder.

Comment: The example IC is interpreted to mean, Insufficient on-site emergency generators operative to power the required minimum number of ESF busses (without regard to time). The WNP-2 EAL does not address the criteria of loss of essential power for a short period of time, and thus does not fulfill the intent of the IC. No other EAL appears to fulfill the intent of IC #7 for loss of on-site AC power capability.

The absence of an equivalent WNP-2 EAL for NUREG-0654 IC UE #7 results in an Emergency Plan less conservative than the guidance provided by NUREG-0654.

6. IC UE #11: Indications or alarms on process or effluent parameters not functional in control room to an extent requiring plant shutdown or other significant loss of assessment or communication capability.

WNP-2 EAL: "3.03 Tech. Spec. Applicability is met."

Comment: No explanatory Notes were provided in Table 6-1 to indicate that the intent of the NUREG-0654 IC is fulfilled by the listed EAL, nor is the subject of significant loss of assessment or communication capability addressed by any other EAL. In the experience of the reviewer, a significant loss of off-site communication

capability (as an example) is not addressed by Technical Specifications, and thus must be covered by a separate EAL.

The absence of an equivalent WNP-2 EAL for NUREG-0654 IC UE #11 results in an Emergency Plan less conservative than the guidance provided by NUREG-0654.

7. IC UE #14.e.: Turbine rotating component failure causing rapid plant shutdown.
WNP-2 EAL: No direct equivalent. WNP-2 listed equivalent in Emergency Plan Table 6-1 is "TSAS 3.0.3 Tech Spec Applicability is met".

Comment: Although Table 6-1 lists Technical Specification Action Statement 3.0.3 as the equivalent EAL, it is very doubtful that any Shift Supervisor would declare an Unusual Event based on the listed EAL if the turbine rotating element failed during operations requiring rapid shutdown since the Technical Specifications do not address that circumstance. Furthermore, any ensuing shutdown from such an event would not necessarily ensure an Unusual Event declaration from any other EAL.

The absence of an equivalent WNP-2 EAL for NUREG-0654 IC UE #14.e. results in an Emergency Plan less conservative than the guidance provided by NUREG-0654.

8. IC UE #15: ...shutdown....other than normal controlled shutdown...
WNP-2 EAL: No direct equivalent.

Comment: As discussed in Item 7 above (abnormal shutdown due to turbine gross failure), the WNP-2 classification methodology does not address an abnormal shutdown. Many Technical Specification initiated shutdowns have associated EALs; however, a generic, judgmental EAL for a shutdown initiated for off-normal conditions (such as a pipe cracking found during operation) or a shutdown that has gone awry is not addressed.

The absence of an equivalent WNP-2 EAL for NUREG-0654 IC UE #15 (portion) results in an Emergency Plan less conservative than guidance provided by NUREG-0654.

B. Alert

9. IC Alert #1.: Severe loss of fuel cladding.
a. High offgas at BWR air ejector monitor.



WNP-2 EAL: No directly equivalent EAL. "Projected Exclusion Area Boundary (1.2 miles) whole body dose rates greater than or equal to 0.5 mR/hr; or 2.5 mR/hr to the thyroid." was listed as an equivalent EAL in EP Table 6-2.

Comment: See discussion in Item #2 above. EALs must be "based not only on onsite and offsite radiation monitoring information, but also on readings from a number of sensors that indicate a potential emergency...". More direct EALs than dose projections must be established to determine potential fuel damage. If the other fission product barriers and safety systems function as designed, a large fuel failure could occur, but would not be classified by this EAL

The absence of an equivalent WNP-2 EAL for NUREG-0654 IC Alert #1.a. results in an Emergency Plan less conservative than guidance provided by NUREG-0654.

10. IC Alert #1.b.: Very high coolant activity sample.
WNP-2 EAL: Site Area Emergency EAL - "Significant failed fuel (Defined in this specific context to mean approximately 1% cladding failure or 0.1% fuel melt. Refer to PPM 9.3.22; Core Damage Evaluation)".

Comment: WNP-2 conservatively declares a Site Area Emergency for failed fuel with no other plant safety systems degradation. The expected doses offsite for such a condition would be a small fraction of EPA guidelines, consistent with an Alert declaration. Since a SAE declaration for this EAL is inconsistent with the industry, such an EAL is discouraged.

As discussed in Item #9 above, EALs should be directly observable values, with a minimum of conversion or mathematical manipulation taking no more than a few moments. In the experience of the reviewer, core damage calculations typically take a large portion of an hour or more, and thus are inconsistent with permissible times frames to make emergency classifications. An example of an EAL able to be quickly read and interpreted related to fuel damage is the containment high range radiation monitor. Even if all the coolant (with normal activity) were released to the drywell, the calculated dose rate would be approximately 15 - 25 R/hr. Only with fuel damage, would the monitors read, e.g., 1000 R/hr. Directly observable values should be established as EALs for this example IC.

The absence of an equivalent WNP-2 EAL for NUREG-0654 IC Alert #1.b. results in an Emergency Plan less conservative than guidance provided by NUREG-0654.

11. IC Alert #5: Primary coolant leak rate greater than 50 gpm.

WNP-2 EAL: No direct equivalent EAL. EP Table 6-2 lists the equivalent EAL as, "Exceeding a Limiting Safety System Setpoint, as defined in the Technical Specifications," but this definition does not address the fission product barrier failure for an Alert.

Comment: The Note accompanying the EP Table 6-2 entry states that "... a leak rate greater than 50 gpm is by default a PWR example because BWRs do not have instrumentation that measures beyond 30 gpm." Further, "... the maximum leakage allowable by Technical Specifications is 25 gpm, and if exceeded," results in shutdown and Unusual Event declaration. Some other symptomatic EALs (Attachment 4.2, EPIP 13.1.1) for loss of coolant system integrity such as containment pressure and floor drain pumping rates are listed as an Alert, but do not represent the full set of necessary EALs. The licensee should prepare a comprehensive set of RCS barrier EALs and conservatively declare an Alert based upon the instruments available. Specifically, "greater than 30 gpm and activity increasing above _____ in containment" may represent an example EAL.

The absence of an equivalent WNP-2 EAL for NUREG-0654 IC Alert #5 results in an Emergency Plan less conservative than guidance provided by NUREG-0654.

12. IC Alert #6: Radiation levels or airborne contamination which indicates a severe degradation in the control of radioactive materials (increase of factor of 1000).

WNP-2 EAL: No directly equivalent EAL. EP Table 6-2 lists exclusion area boundary dose rates as the equivalent EAL. The Note accompanying Table 6-2 states that the NUREG-0654 IC, "...is not discrete enough to be implementable."

Comment: The intent of the example IC is to identify symptomatic indicators (e.g., monitors where reactor coolant flows and/or is processed) that indicate severe degradation in plant safety and impede safe operation. Several of the above Items (e.g., #10, #11) have suggested the use of radiation monitors as symptomatic indicators of degraded conditions that can not be otherwise directly measured. As discussed in Item 9. above, it is not acceptable to classify based only on what is or may be seen in the environs. This IC is intended to cause licensees to identify those discrete indicators that can be used as symptomatic EALs.

The absence of an equivalent WNP-2 EAL for NUREG-0654 IC Alert #6 results in an Emergency Plan less conservative than guidance provided by NUREG-0654.

13. IC Alert #8: Loss of all onsite DC power.
WNP-2 EAL: No equivalent EAL. EP Table 6-2 Note 8 states that to lose all DC power, all AC power would have to be lost since AC/DC converters are installed on the front-end of the batteries. Since a loss of all AC would result in an Alert declaration, no additional DC power EAL is required.

Comment: Simply stated, if the AC/DC inverters failed open, a subsequent loss of DC would be independent of AC availability. Therefore, an Alert declaration for the IC should be made independent of AC power availability.

The absence of an equivalent WNP-2 EAL for NUREG-0654 IC Alert #8 results in an Emergency Plan less conservative than guidance provided by NUREG-0654.

14. IC Alert #10: Complete loss of any function needed for plant cold shutdown.
WNP-2 EAL: No direct equivalent EAL. Table 6-2 lists the "primary safety parameter that would indicate a problem with core cooling" as reactor water level, less than or equal to -129".

Comment: The EAL is acceptable for the power operation and hot shutdown condition, but omits consideration of the cold shutdown/refueling modes as written. Since this IC is mode dependent, it is not acceptable to have only the one level; other conditions may exist that place the water level above -129", but are clearly degraded safety conditions such as Technical Specification required functions to maintain cold shutdown, or uncontrolled temperature rises during cold shutdown.

The absence of an equivalent WNP-2 EAL for NUREG-0654 IC Alert #10 results in an Emergency Plan less conservative than the guidance provided by NUREG-0654.

15. IC Alert #11: Failure of the reactor protection system to initiate and complete a scram which brings the reactor subcritical.
WNP-2 EAL: (Reactor Power) "GE 5%; 10 or more seconds after a scram."

Comment: The important point about the Alert IC is that the RPS failed to scram the plant, subsequent manual attempts to scram were successful, and no power generation occurred.

Since the RPS was called on to scram, the fuel or RCS integrity was challenged, i.e., one fission product barrier, and thus an Alert is appropriate. With continued power generation, an ATWS is a Site Area Emergency (SAE) because both the fuel and the RCS integrity are challenged. As written, the EAL threshold is too high - i.e., only an Alert with power generation. This is inconsistent with the intent of NUREG-0654. It was parenthetically noted that the WNP-2 UE EAL of "(Reactor Power) GE 1% with Suppression Pool Temp GE 110 degrees F." lacks the anticipatory conservatism of NUREG-0654 in that power generation is above the point of adding heat, and the suppression pool temperature is at a technical specification limit to reach the EAL threshold - i.e., the WNP-2 UE EAL has too high a threshold to be an Alert EAL.

The absence of an equivalent WNP-2 EAL for NUREG-0654 IC Alert #11 results in an Emergency Plan less conservative than the guidance provided by NUREG-0654.

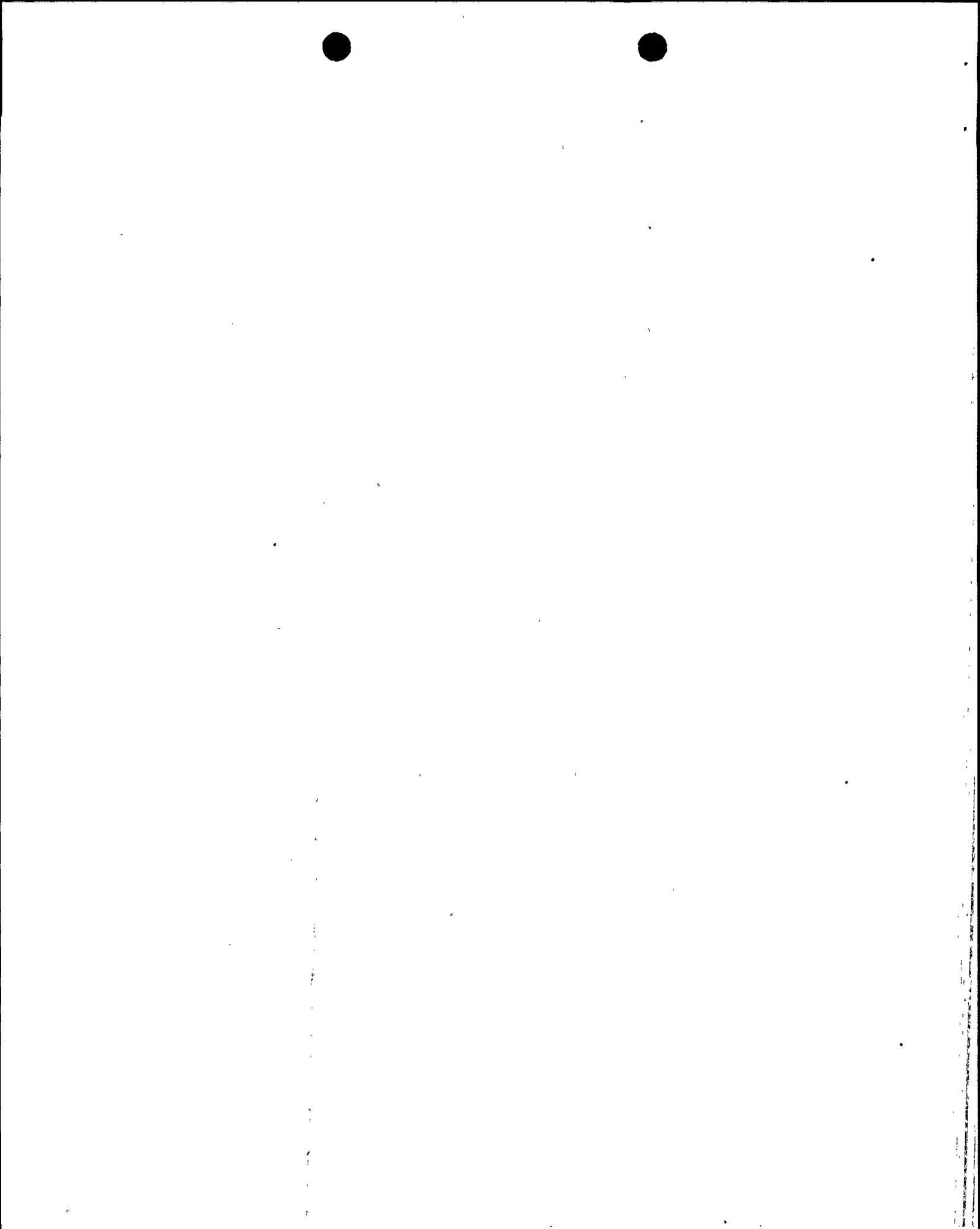
16. IC Alert #12: Fuel damage accident with release of radioactivity to containment or fuel handling building.
WNP-2 EAL: "Fuel handling accident resulting in the reactor bldg exhaust plenum radiation level above 13 mR/hr. ("Z" signal)"

Comment: In addition to the above EAL, the licensee may wish to consider EALs that address the precursor to fuel damage condition of uncovered, irradiated fuel.

This recommendation is made to provide improvement to the existing EAL.

17. IC Alert #15: Radiological effluents greater than 10 times technical specification instantaneous limits.
WNP-2 EAL: "Exclusion Area Boundary Whole Body Dose Rate and Thyroid Dose Rate greater than or equal to (GE) 0.5 mR/hr and GE 2.5 mR/hr respectively."

Comment: Unless real-time, on-line dose assessment capability has been installed at WNP-2, or computerized dose assessment capability to promptly obtain computed values has been demonstrated by on-shift personnel, the EAL as written does not meet classification guidelines of 15 minutes to classify from the time plant conditions are in place that require the classification. Instrument values that require minimal conversion and chemical grab sample values where appropriate, that are routinely monitored, alarmed, or measured, should be provided as EALs equivalent to the NUREG-0654 IC.



If dose assessment equipment with adequate backup capability has demonstrated its ability to meet classification criteria with the listed EALs, no action is required by the licensee. If such capability does not exist, the absence of an equivalent WNP-2 EAL for NUREG-0654 IC Alert #11 results in an Emergency Plan less conservative than the guidance provided by NUREG-0654.

18. IC Alert #18: Other hazards being experienced or projected:
18.a. Missile impacts from whatever source on facility,
18.e. Turbine failure causing casing penetration.
WNP-2 EAL: No equivalent EAL.

The absence of an equivalent WNP-2 EAL for NUREG-0654 IC Alert #18.a and 18.3 results in an Emergency Plan less conservative than the guidance provided by NUREG-0654.

C. Site Area Emergency (SAE)

19. IC SAE #2: Degraded core with possible loss of coolable geometry (indicators should include instrumentation to detect inadequate core cooling, coolant activity and/or containment radioactivity levels).
WNP-2 EALs: "Reactor Vessel Water Level LE -161";
and other symptomatic indicators such as drywell pressure, temperature, and suppression pool parameters.

Comment: As written, this EAL is conservative since fuel damage is not expected for the single event of water level at the top of active fuel. However, no activity or radiation levels in the coolant or containment were listed as additional symptomatic indicators of a degraded core geometry. As discussed in Item 10. above, correlation between the extent of fuel damage and containment high range radiation monitors (CHRM) may be demonstrated mathematically. For example, compute the CHRM indication for activity equal to 100% gap in containment. Establish a threshold EAL for the 100% gap activity CHRM reading, based on an assumption that coolable geometry must be degraded for a CHRM reading greater than the computed threshold. Containment high range radiation monitors should be incorporated into the symptomatic EALs of Attachment 4.2, EPIP 13.1.1.

An additional EAL related to in-core neutron detectors may be considered - inability to obtain motion on some detectors implies a degraded geometry. Hydrogen generation may also be correlated with degraded core conditions.



This recommendation is made to provide improvement to the existing EALs.

20. IC SAE #7: Loss of all vital onsite DC power for more than 15 minutes.

WNP-2 EAL: No direct equivalent. EP Table 6-2 Note 8 states that to lose all DC power, all AC power would have to be lost since AC/DC converters are installed on the front-end of the batteries. Since a loss of all AC would result in an Alert declaration, no further DC power EAL is required.

Comment: Simply stated, if the AC/DC inverters failed open, a subsequent loss of DC would be independent of AC availability. Therefore, a SAE declaration for the IC should be made independent of AC power availability. See also discussion at Item #13.

The absence of an equivalent WNP-2 EAL for NUREG-0654 IC SAE #7 results in an Emergency Plan less conservative than the guidance provided by NUREG-0654.

21. IC SAE #9: Transient requiring operation of shutdown systems with failure to scram (continued power generation but no core damage immediately evident).

WNP-2 EAL: (Reactor Power) "GE 5% and Suppression Pool Temp. GE 110 degrees F and either an SRV open or Drywell Pressure. GT 1.68 psig."

Comment: (See discussion in Item #15 above). The important point about the SAE IC is that the RPS failed to scram the plant, subsequent manual attempts to scram were unsuccessful, and power generation continued. With continued power generation, an ATWS is a Site Area Emergency (SAE) because both the fuel and the RCS integrity are challenged, but not yet the containment. As written, the WNP-2 EAL threshold is too high - i.e., power level 5%, Suppression Pool Temperature 110 degrees F, and system pressure causing blowdown to the pressure suppression pool. These conditions place the containment under challenge - i.e., approaching a General Emergency, and are inconsistent with the anticipatory conservatism of NUREG-0654. The WNP-2 EAL should embody the more conservative approach.

The absence of a conservative equivalent WNP-2 EAL for NUREG-0654 IC SAE #9 results in an Emergency Plan less conservative than the guidance provided by NUREG-0654.

22. IC SAE #12: Most or all alarms (annunciators) lost and plant transient initiated or in progress. WNP-2 EAL: No equivalent EAL. EP Table 6-3 Note 14 implies this EAL is



covered by guidance in Table B.1. Table B.1 does not provide specific guidance which would ensure this condition was recognized and appropriately classified.

The absence of an equivalent WNP-2 EAL for NUREG-0654 IC SAE #12 results in an emergency plan less conservative than the guidance provided by NUREG-0654.

23. IC SAE #13. a.: Effluent monitors detect levels corresponding to greater than 50 mR/hr ... (or five times these levels to the thyroid) at the site boundary for adverse meteorology.
b.: These dose rates are projected based on other plant parameters ... or are measured in the environs.
WNP-2 EAL: "Exclusion Area Boundary Whole Body Dose Rate and Thyroid Dose Rate greater than or equal to (GE) 50 mR/hr and GE 250 mR/hr respectively."

Comment: (See discussion at Item #17 above). Real time dose assessment capability with adequate backup should be demonstrated as able to meet time-to-classification guidelines (15 minutes), and/or instruments should be identified with specific readings that if exceeded represent an EAL threshold. The dose assessment correlations should exist not only for effluent monitors (IC SAE 13. a.), but for plant condition monitors such as containment high radiation monitors and containment overpressure (IC SAE 13. b.).

If dose assessment equipment has demonstrated the capability to meet classification criteria with the listed EALs, no action is required by the licensee. If such capability does not exist, the absence of an equivalent WNP-2 EAL for NUREG-0654 IC SAE #13 results in an Emergency Plan less conservative than the guidance provided by NUREG-0654.

24. IC SAE #18: Evacuation of control room and control of shutdown systems not established from local stations in 15 minutes.
WNP-2 EAL: No equivalent EAL. EP Table 6-3 states that although the IC "seems explicit, its relation to safety is not clear." and since "there is no direct correlation to plant safety ... it ... has not been specifically listed in the Tables."

Comment: The anticipatory conservatism of NUREG-0654 is evident in this clear, objective IC that is adequate as an EAL when implemented directly as written. Assuming evacuation of the control room has been required, if control of all shutdown functions has not been established within 15 minutes, a severe challenge to safety systems may

potentially occur since the systems will have to function without human control. This situation has conservatively been defined as a SAE.

The absence of an equivalent WNP-2 EAL for NUREG-0654 IC SAE #18 results in an Emergency Plan less conservative than the guidance provided by NUREG-0654.

C. General Emergency (GE)

25. IC GE #1. a.: Effluent monitors detect levels corresponding to 1 R/hr W. B. or 5 Rem/hr thyroid at the site boundary under actual meteorology.
b.: These dose rates are projected based on other plant parameters ... or are measured in the environs.
WNP-2 EAL: "Exclusion Area Boundary Whole Body Dose Rate and Thyroid Dose Rate greater than or equal to (GE) 1 R/hr and GE 5 R/hr respectively."

Comment: (See discussion at Item #17 and #23 above). Real time dose assessment capability should be demonstrated as able to meet time-to-classification guidelines (15 minutes), and/or instruments should be identified with specific readings that if exceeded represent an EAL threshold. The dose assessment correlations should exist not only for effluent monitors (IC 1. a.), but for plant conditions such as containment high radiation monitors, containment overpressure, and containment conditions of integrity (IC 1. b.). Small break LOCAs outside of containment and waste gas decay tank ruptures are other accident sequence examples that should have plant condition EALs.

If dose assessment equipment has demonstrated the capability to meet classification criteria with the listed EALs, no action is required by the licensee. If such capability does not exist, the absence of an equivalent WNP-2 EAL for NUREG-0654 IC GE #1 results in an Emergency Plan less conservative than the guidance provided by NUREG-0654.

26. IC GE #2: Loss of 2 of 3 fission product barriers with a potential loss of 3rd barrier (e.g., loss of primary coolant boundary, clad failure, and high potential for loss of containment).
WNP-2 EAL: "Significant failed fuel and loss of, or high potential for loss of, primary containment."
(Defined in this specific context to mean approximately 1% cladding failure or 0.1% fuel melt (Refer to PPM 9.3.22; Core Damage Evaluation)."
"Significant hydrogen concentration with high oxygen concentration that causes risk of hydrogen deflagration.

(Defined in this context to mean hydrogen concentration GT 6%, and oxygen concentration GT 5%)."

"A loss of or high potential for loss of primary containment and significant failed fuel."

Comment: The first EAL appears to be a more restrictive statement of the third EAL, and as such, adds confusion rather than adds clarity to the EAL set. One EAL should be derived for the pair.

This recommendation is made to provide clarity to the existing EAL.

An adequate set of EALs for this IC must include criteria that permits the Emergency Director to determine what constitutes a "loss of fission product barrier." The WNP-2 classification methodology does not define the criteria by which fission product barrier integrity may be measured although some of the appropriate EALs are used in the classification scheme. Two of these type of criteria (EALs) are clearly defined as NUREG-0654 ICs, either of which should cause an Alert classification:

- 50 gpm or greater primary leak is a loss of the RCS barrier, and
- 300 uCi/gm DEI-131 coolant activity is a loss of the fuel clad barrier.

Such definitions are not provided in the WNP-2 scheme - some EALs that potentially represent the criteria are listed as discrete classifications as discussed above, e.g., "Reactor Pressure GE 1250 psig". These EALs are not, however, identified specifically as barrier integrity indicators. The following EALs are examples of plant conditions that if exceeded represent a loss of the barrier:

Fuel Cladding Integrity EALs

Reactor coolant sample greater than 300 uCi/gm DEI-131 OR
Off-gas activity at the steam jet air ejector Hi-Hi
Alarm (proper setpoint)

OR Drywell radiation monitor reading greater than
1000 Rem/hr (proper setpoint)

OR Containment continuous air monitors (CAMs) for
particulate, iodine, or noble gas increase 1000X above
normal readings due to normal leaks of reactor coolant to
containment (proper setpoint) or grab samples

OR Area radiation monitors increase 1000X above
normal readings where reactor coolant (spent fuel pool
coolant) flows, is processed, or leaks (proper setpoint).

OR Reactor vessel level decreases to 2/3 height of active fuel.

RCS Integrity EALs

Primary coolant leak rate greater than 50 gpm
OR Inability to maintain reactor water level above TAF
OR Drywell pressure greater than 2 psig with operating drywell coolers
OR Safety or relief valve stuck open

Containment Integrity EALs

Primary containment not isolated when required
OR Observed loss of primary containment structural integrity
OR Drywell pressure greater than 50 psig (proper value)
OR Explosive oxygen/hydrogen mixture in containment (proper value, not applicable for inerted containments)
OR High radiation (greater than 5 E+4 Rem/hr) in containment

The absence of a comprehensive, equivalent set of WNP-2 EALs that fully define the intent of NUREG-0654 IC GE #2 results in an Emergency Plan less conservative than the guidance provided by NUREG-0654.

27. IC GE #4: Other plant conditions exist, from whatever source, that make release of large amounts of radioactivity in a short time period possible, e.g., any core melt situation. See the specific ... BWR sequences below. WNP-2 EAL: "A situation where significant amounts of radioactive material has or could be released in a short period of time."

Comment: The example IC includes "any core melt situation" which is omitted from the stated WNP-2 equivalent EAL. As noted in Item 26 above, the equivalent words are included in another EAL. However, clarity would be added to the EAL set by having only one EAL that addresses the IC.

IC GE #4 refers to several core melt accident sequences in IC GE #6 that are not specifically addressed by the WNP-2 classification methodology. As discussed in Item 26 above, without a comprehensive set of objective indicators of fission product barrier integrity, it is not clear that all conceivable accident sequences would be classified in as timely a manner as possible. If the concerns associated with IC GE #2 are corrected, confidence is gained that



conceivable accident sequences with potential radiological consequences can be classified in a timely manner. The absence of a comprehensive, equivalent set of WNP-2 EALs that fully define the intent of NUREG-0654 IC GE #4 results in an Emergency Plan less conservative than the guidance provided by NUREG-0654.

E. Generic Comment

28. The licensee may wish to consider the use of unique identifiers for each EAL, such as UE-1, AL-7, and SAE-17. Identifiers such as these are very useful when referencing a specific EAL, such as a notification message or during conversations regarding classifications.

Conclusion

PEPB has determined that Revisions 13 and 14 of EPIP 13.1.1 do not significantly affect the licensee's emergency plan when compared to the previously approved Revision 12 and therefore are acceptable subject to comments in Section I of this evaluation. Two items (a definition of "momentary" and clarification of GDS alarms) should be addressed by the licensee.

Additional information is requested from the licensee to resolve the 28 other items identified which raise the concern that the licensee's EALs are less conservative than the guidance provided by NUREG-0654.