ATTACHMENT 1

NUREG-0654 COMPARISON WITH SHNPP

EMERGENCY ACTION LEVEL

FLOWPATH

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FISSION PRODUCT BARRIER ANALYSIS

Preface:

The philosophy applied, directed by NUREG-0654, while building the SHNPP Emergency Action Level Flowpath is that the classification of emergencies should be anticipatory to allow early notification for events that could escalate into major specific events and major releases.

A comparison of the events recommended by NUREG-0654 and the events included in the SHNPP EAL Guidelines is provided, in the next attachment.

In many cases the NUREG-0654 recommendation was based upon the Actual or predicted loss of one or more of the Fission Product Barriers. Instead of attempting to develop a group of procedures that would address the specifics recommended in NUREG-0654, SHNPP took the approach that the loss of a Fission Product Barrier should be analyzed. Action should be taken based upon the number of Barriers that have been breached or are in jeopardy of being breached.

In order to accomplish this task, the plant had to determine what indications would show that any single Fission Product Barrier had breached or potentially could breach (is in jeopardy). This task was accomplished and resulted in the development of the first forty-seven steps of the flowpath.

The Site Emergency Coordinator can quickly access the status of the three Fission Product Barriers by answering the questions listed on the flowchart. In this manner, if the Fission Product Barriers are breached or in jeopardy (potential for breach is present), the event can be quickly escalated to the correct classification.

Once all of the Fission Product Barriers are examined, the flowpath is completed to determine if any other reason exists that would require the classification of an Emergency Action Level (EAL). In using this method, we handle the major emergencies, followed by other types of emergencies which could become major emergencies.

The average SRO licensed individual should take approximately five minutes to go through the entire flowpath and determine that an Emergency Classification is or is not warranted. In the case of an Unusual Event, Alert, or Site Emergency condition, the time delay is acceptable. If conditions are quickly deteriorating, then a faster method of classification is needed.

Preface: (continued)

Because of this, the Site Emergency Coordinator is directed on the flowpath to declare a General Emergency as soon as it is determined to exist. If conditions warrant this declaration, notification should begin IMMEDIATELY! The required notifications due to a Site Emergency, Alert, or an Unusual Event are reduced sufficiently that it is worth the time necessary to finish the flowpath, to find out if a higher level classification exists, prior to the declaration of the event.

The flowpath is designed to look at the worst case event first, then the other events in descending order of importance. Some consideration was given to the layout of the path, so some of the potential events were moved to make the path flow better.

The EAL flowpath follows the same rules and conventions that the EOP (Emergency Operating Procedure) flowpath's follow. This is an aid to the user in that he does not have to learn two conventions, just follow the one on which he has been trained. In addition, items previously covered by attachments to the PEP-101 are now directly on the flowpath. This eases the use of the flowpath and ensures that the entire spectrum is covered, every time that the flowpath is entered.

General:

Each of the Barriers is analyzed to determine if it is breached or in jeopardy. The first indication of either event results in declaring the specific barrier to be either breached or jeopardized. From an EAL declaration standpoint, it does not matter whether the barrier is breached or in jeopardy. However, it is important to the actions executed by other plant documents; therefore, the breach indicators are examined before the Jeopardy indicators.

When any single indicator shows any barrier to be breached or jeopardized, the FPB Status Board is marked to show the indication, and the rest of the indications are bypassed. If you have proof that a barrier is breached, there is no need to continue to examine that barrier.

General: (continued)

The EOP Network has many indications that would prove one or more of the Fission Product Barriers to be breached. The plant staff has analyzed the EOP Network in an effort to determine those points at which any one (or more) of the barriers indicates a breach. These points are identified in the EAL flowpath as entry points T, U, and V. If the Fuel indicates breached, in the EOP Network, then the EOP Network orders the operators to enter the EAL flowpath at ENTRY POINT T. The same process is used for entry points U (RCS breached) and V (Containment breached).

These entry points serve two purposes: first, they force a reentry into the EAL flowpath in case the Emergency Action Level should be upgraded; and, second, since the entry point, as determined by the EOP's, has already determined that one of the Fission Product Barriers is breached, it reduces the time necessary to arrive at the correct Emergency Classification. This aid is used throughout the Fission Product Barrier Analysis.

FISSION PRODUCT BARRIER STATUS

Fuel Fission Product Barrier:

Flowpath Questions 1 through 14

1. WAS ENTRY POINT AT T?

   EXPLANATION:

   If the entry point was at T, then the Fuel Fission Product Barrier is indicating breached, based upon the EOP Network determination.

2. GFFD INCREASES LESS THAN 1 E^5CPM IN 30 MINUTES?

   EXPLANATION:

   Item 2 complies with the NUREG-0654 recommendation for Alert level declaration. An increase of this magnitude indicates that the Fuel FPB is breached. The set point is below the NUREG-0654 "Alert" classification which is based on 1% failed fuel in 30 minutes or 5% failed fuel. Only two set points were provided by Westinghouse on the Gross Failed Fuel Detector (the lower set point was used for the Unusual Event Declaration).

Flowpath Questions 1 through 13 (continued)

3. ANY RAD MONITOR IN ALARM?

EXPLANATION:

If none of the Rad monitors are in alarm, then Steps 4 thru 10 can be bypassed which speeds up the time to go through the flowpath. If none of the monitors are in alarm, then Questions 4 thru 10 would be answered in a manner such that the next valid question could be Question 11.

4. CNMT LEAK DET RAD MON NOBLE GAS CHNL INC LESS THAN 85 TIMES IN 2 HOURS?

EXPLANATION:

An increase of this magnitude indicates that a Fuel Breach has occurred. This action level is based upon the activity from 300 uCi/cc failed fuel "Alert" action level in NUREG-0654 entering the Containment via a 10 gpm RCS to Atmospheric leak (Tech. spec. limit for leakage).

5. BOTH CNMT HI RANGE ACCIDENT MONITORS LESS THAN 17.5 R/HR?

EXPLANATION:

The CNMT monitors would not indicate this level of radiation, unless a fuel breach had occurred. This radiation level is based upon 300 uCi/cc RCS activity (Alert level) and 40 gpm leakage from the RCS to Containment in addition to the 10 gpm allowable by T.S.

6. CNMT VENT ISOL RAD MON LESS THAN 1.22 E^4 mR/HR?

EXPLANATION:

The CNMT VENT rad monitor would not ever reach this level without some loss of fuel integrity. This level equates to a reading of 17.5 R/HR on the Containment Hi Range Accident Monitors and serves as a backup to those monitors.

7. PLANT VENT STACK #1 WIDE RANGE GAS MON EFFL CHNL LESS THAN 3.6 E^5 uCi/sec?

EXPLANATION:

The plant has determined that the effluent monitor would exceed this level if the Containment airborne concentration of radioactivity was due to a 50 gpm RCS leak with an RCS activity of 300 uCi/cc. This includes the dilution effects that are predicted to occur during the release through the Plant Vent Stack release path.

8. ALL MAIN STEAM RAD MONITORS LESS THAN 20 mR/HR?

9. STEAM PRESSURE BELOW 980 PSIG?

EXPLANATION:

The limit of 20 mR/HR is based upon having 300 uCi/cc RCS activity (I-131) leaking at 40 gpm into a Steam Generator. This does not include the 10 gpm of leakage from the RCS to the Containment Atmosphere. If the main steam pressure is less than 980 PSIG, then the SG safeties and PORV's will not be challenged, and the radiation may be due to the concentration effects of the steam generator. If the radiation is due to the loss of the Fuel Fission Product Barrier, then another indicator will confirm the loss of the fuel barrier. Therefore, even though the integrity of the Steam Generator tubes is questionable (and will cause an RCS breach declaration), the fuel boundary is intact.

10. ALL FUEL BREACH AREA RAD MONITORS LESS THAN 1000 TIMES NORMAL?

EXPLANATION

This value was taken directly from the NUREG-0654 recommendations.

11. RCS ACTIVITY (I-131 DOSE EQUIVALENT) LESS THAN 300 uCi/cc?

EXPLANATION

The value of 300 uCi/cc was taken directly from NUREG-0654.

12. SECONDARY COOLANT ACTIVITY LESS THAN 100 uCi/cc?

EXPLANATION

The value of 100 uCi/cc was taken directly from NUREG-0654.

13. CSF-1 GREEN OR YELLOW?

EXPLANATION

CSF-1 is the criticality Status Tree. If an unplanned and/or uncontrolled criticality occurred, the status tree would indicate Red or Magenta. An unplanned/uncontrolled criticality is assumed to put the fuel in JEOPARDY.

14. CSF-2 RED?

EXPLANATION

A Red CSF-2 would be due to either core temperatures above 1200°F or core temperatures above 730°F and RVLIS less than 39%. In either case, the fuel is in Jeopardy.

REACTOR COOLANT SYSTEM FISSION PRODUCT BARRIER

Flowpath Questions 15 through 28:

15. WAS ENTRY POINT AT U?

EXPLANATION

If the entry point, into the EAL Network, was at entry point U, then the EOP Network has already determined that the RCS boundary is either breached or in jeopardy.

The determination is made and time is saved in going through the EAL Network.

16. ANY RAD MONs IN ALARM?

EXPLANATION

If none of the Radiation Monitors is in alarm, the section of the RCS Barrier that asks if the Radiation Monitors have exceeded a specific level, is bypassed. This reduces the time needed to go through the path, and is appropriate because all of the Radiation Monitors questioned have alarm points substantially below the level used to determine the RCS breached.

17. CNMT LEAK DET RAD MON NOBLE GAS CHNL LESS THAN 8.0 E^{-3} uCi/cc?

EXPLANATION

With normal activity in the RCS, if the Containment Detector Rad. Mon. noble gas channel increases to greater than 8.0 x 10^{-3} uCi/cc, the RCS is leaking at a rate greater than 40 gpm in addition to the Tech. Spec. limit of 10 gpm.

18. BOTH CNMT HI RANGE ACCIDENT MONs LESS THAN 17.5 R/HR?

EXPLANATION

If either monitor exceeds 17.5 R/HR, the RCS and the FUEL FPB's are declared to be breached (Fuel is breached as a result of Step 5 in the Fuel FPB barrier analysis). The level of 17.5 R/HR is based upon an RCS activity of 300 uCi/cc and an RCS leak rate of 50 gpm (40 gpm unidentified plus 10 gpm as allowed by Tech. Specs.).

19. CNMT VENT ISOL RAD MON LESS THAN 1.22 E^{4} mR/HR?

EXPLANATION

The CNMT VENT rad monitor would not ever reach this level without some loss of fuel integrity. This level equates to a reading of 17.5 R/HR on the Containment Hi Range Accident Monitors and serves as a backup to those monitors.

20. PLANT VENT STACK #1 WIDE RANGE GAS MON EFFL CHNL LESS THAN 9.4 E^2 uCi/sec.

EXPLANATION

This level of activity would indicate that a release from the Containment was occurring (CNMT FPB breached) at the same time that an RCS breach was occurring. This level would occur if the RCS breached with 300 uCi/cc activity levels in the system and the activity released was fully diluted by the Containment atmosphere and the plant vent stack.

21. ALL MAIN STEAM LINE RAD MONs LESS THAN 20 mR/HR?

EXPLANATION

The Main Steam Line rad monitors would not reach a level of 20 mR/HR unless the RCS was breached with at least 300 uCi/cc activity. Also assumed is the allowable Tech. Spec. leakage of 10 gpm, unidentified. If this were to occur, at least a Site Emergency would be declared if SG press was greater than 980 psig because the same question is asked when assessing the Fuel FPB. Otherwise, an alert would be declared.

22. RAB NORMAL OR EMERG EXH RAD MON EFFL CHNL LESS THAN 1.0 E^4 uCi/sec?

EXPLANATION

If the RCS were to breach outside of the Containment structure (RHR), then this level of activity could be expected if the RCS activity levels were within the normal range of operation, and the leak rate exceeded 40 gpm. Also taken into consideration is the dilution of the RAB exhaust system.

23. RCS LEAKAGE LESS THAN 50 GPM?

EXPLANATION

This is an indication of an RCS breach, regardless of the activity level in the system. This was taken directly from NUREG-0654.

24. CNMT SUMP WIDE RANGE LEVEL STABLE.

EXPLANATION

The Wide Range CNMT sump will not even indicate for small RCS leaks, until well into the event. An increase in Wide Range level is indication of a moderate to large LOCA, in progress.

25. SG PRESS LESS THAN 1230 PSIG?

EXPLANATION

The first SG safety valve lifts at 1170 PSIG. In order for SG press. to be above 1230 PSIG, either a SG tube rupture has occurred or the Reactor has not tripped. If the RCS has breached resulting in a SG tube rupture, it will be evident when the next question is asked.

26. SG LEVEL LESS THAN 82.4%?

EXPLANATION

If SG pressure is greater than 1230 PSIG and SG level is above 82.4% (SG hi level trip), then a SG tube rupture has probably occurred. This would result in a breach of the RCS and would be identified on the flowchart.

27. SECONDARY COOLANT ACTIVITY LESS THAN 100 uCi/cc?

EXPLANATION

This level of secondary activity was determined directly from NUREG-0654.

28. CSF-4 GREEN OR YELLOW?

EXPLANATION

CSF-4 is the RCS INTEGRITY status tree. If it does not indicate green or yellow, then the RCS FPB is in jeopardy. This is a definite aid in classification of the event. Even if all of the available RCS indicators are good, the CSF will require an indication of jeopardy, if the RCS boundary is in jeopardy.

CONTAINMENT FISSION PRODUCT BARRIER

29. ENTRY POINT AT V?

EXPLANATION

If the EOP Network has ready determined that the CNMT FPB has breached, then we do not need to ask Questions 31-46. We declare the breach and bypass the steps.

30. ALL MAIN STEAM SAFETY VALVES SHUT?

EXPLANATION

An open Main Steam Safety Valve is one indication of a Main Steam break outside of Containment (Containment breach). If they are all shut, we can bypass Step 31, which looks for a stuck open safety. If the answer is NO, then we have to determine if the safety valve should be open, or is stuck.

31. SG AFFECTED PRESSURE LESS THAN 1180 PSIG?

EXPLANATION

If the answer is NO, then we assume that the safety valve is functioning properly. If it is stuck and pressure is above 1180 PSIG, then we will catch it on our next pass through the flowpath. However, it is very rare that SG pressure gets above 1180 PSIG, and when it does, it is only for a moment. So, if the safety were stuck open, it would be clearly evident because the pressure would be much less than 1180 and the safety would be open.

32. ALL SG PORVs SHUT?

EXPLANATION

This is normally the case, following a Reactor Trip. The PORV's may open momentarily, but quickly close as the energy is dissipated. By the time that the Shift Foreman gets to this point in the flowchart, all of the PORV's should be closed and this step can be bypassed. If one (or more) is open, then he must determine if it is stuck open. This is done by doing the next two steps.

33. ANY MAIN STEAM PORV STUCK OPEN?

EXPLANATION

If the PORV's are working correctly, the answer is NO and the rest of the indications of the Containment Barrier are examined. If the answer is YES, then Question 34 is asked.

34. BLOCK VALVE FOR STUCK OPEN PORV CAN BE SHUT?

EXPLANATION

If the stuck PORV block valve can be shut, then the Containment is not breached, and the path should be continued. If the block valve cannot be shut and the PORV is stuck open, then the Containment FPB is breached. This is indicated on the FPB status board and the number of lost barriers is queried.

35. ALL CNMT PENETRATIONS ISOLABLE PER TECH. SPECs?

EXPLANATION

If all Containment penetrations are isolable, then Steps 36, 37, and 38 can be bypassed. This is because they further confirm the status of the penetrations. If all of them are operable, this is unnecessary.

36. CNMT PHASE A ISOLATION ACTUATED?

EXPLANATION

If a Phase A Isolation has been received and any of the Containment penetrations are not isolable (per T.S.), then the Containment FPB has been breached and is so indicated on the FPB status board.

37. CNMT VENT ISOL ACTUATION?

EXPLANATION

If a Containment Ventilation Isolation Actuation has occurred, then the Containment FPB is declared breached because the unisolable penetration MAY be a ventilation penetration and a Phase A Isolation will probably follow. If the penetration is not a ventilation penetration, this becomes an anticipatory declaration, in a conservative direction.

38. FUEL AND RCS INTACT ON FPB STATUS BOARD?

EXPLANATION

If a Phase A isolation has not occurred and one or more Containment penetrations is not isolable, then the Containment is declared breached, if either of the other FPB's has indicated breached/jeopardy. This is because a Containment isolation is imminent and it will be an unsuccessful isolation.

39. NONISOLABLE STEAM AND/OR FEED BREAK OUTSIDE CNMT?

EXPLANATION

A nonisolable steam and/or feed break outside of the containment is a breach of the containment FPB.

40. PLANT VENT STACK #1 WIDE RANGE GAS MON EFFL CHNL LESS THAN 9.4 E^2 uCi/cc.

EXPLANATION

With acceptable activity in the Reactor Coolant System, the wide range effluent channel would indicate greater than 9.4 E^2 uCi/sec if the Containment was breached and the RCS leak rate exceeded 40 gpm. Included in the assumption is that the activity mixes with the Containment Atmosphere and is diluted further by the normal flow up the plant vent stack.

41. RAB NORMAL OR EMERG EXH RAD MON EFFL CHNL LESS THAN 1.0 E^4 uCi/SEC?

EXPLANATION

If the RCS were to breach outside of the Containment structure (RHR), then this level of activity could be expected if the RCS activity levels were within the normal range of operation, and the leak rate exceeded 40 gpm. Also taken into consideration is the dilution of the RAB exhaust system.

42. SG PRESS LESS THAN 1230 PSIG?

EXPLANATION

If SG pressure is below 1230 PSIG, then the SG's are acting as a normal heat sink. Following a Reactor trip, the SG pressure rapidly decreases to less than 1100 PSIG. If it increases above this, the PORV's and Safeties lift to restore the pressure. If the pressure cannot be maintained below 1230 PSIG, then an SG tube rupture has occurred.

43. SG LEVEL LESS THAN 82.4%?

EXPLANATION

If SG pressure is greater than 1230 PSIG and the affected Steam Generator does not have a tube rupture, then the SG level will be less than 82.4%. This is a final check to see if the SG has ruptured or is just trying to control Tavg.

44. CSF-5 YELLOW OR GREEN?

EXPLANATION

47. CSF-5 is the Containment CSF. If it is not Yellow or Green, then the Containment is in jeopardy of breaching. This is indicated on the EAL's, if this is the case.

EXAMPLE INITIATING CONDITIONS: NOTIFICATIONS OF UNUSUAL EVENT

Unusual Events are declared when conditions warrant and a higher level declaration is not needed. Once the flowpath is completed, if a declaration of an Alert, Site Emergency, or General Emergency is not needed, the Site Emergency Coordinator is directed to evaluate against the Unusual Event Matrix. This Matrix is located at the bottom of the flowpath.

If a higher level classification is in effect, the Unusual Event Matrix is not examined in order to expedite initiation of the actions required by the higher level declaration.

NOUE = Notification of Unusual Event as defined in NUREG-0654.

SHNPP Flowpath Step K-1	NUREG-0654 EAL NOUE ITEM 1
K-1 UNPLANNED ECCS DISCHARGE TO VESSEL	Emergency Core Cooling System (ECCS) initiated and discharge to vessel.

EXPLANATION

Technical Specification Surveillance Requirements demand periodic testing of the ECCS which include flowing to the vessel in order to test the pumps and valves (ASME Boiler and Pressure Vessel Code, Section XI). If a planned initiation occurs, it should not result in an Unusual Event declaration. Therefore, we added "Unplanned" for clarity and to avoid unnecessary declarations.

SHNPP Flowpath Step A-1	NUREG-0654 EAL NOUE ITEM 2
A-1 VALID HIGH ALARM OCCURS ON ANY OF THE MONITORS IN EAL TABLE 5.	Radiological effluent technical specification limits exceeded.

EXPLANATION

Table 5 lists the plant effluent monitors. The alarm setpoints for these monitors are set below the T.S. effluent limit. If the alarm setpoint is exceeded, a T.S. Limit is being approached and an Unusual Event is declared.

SHNPP Flowpath Step NONE	NUREG-0654 EAL NOUE ITEM 3a
	Fuel damage indication. Examples: a. High off gas at BWR air ejector monitor (greater than 500,555 uCi/sec; corresponding to 16 isotopes decayed to 30 minutes; or an increase of 100,000 uCi/sec within a 30 minute timer period).

EXPLANATION

SHNPP is a PWR.

SHNPP Flowpath Step B-2	NUREG-0654 EAL NOUE ITEM 3b
B-2 RCS SPECIFIC ACTIVITY EXCEEDS TECHNICAL SPECIFICATION 3.4.8	Fuel damage indication. Examples: b. High coolant activity sample (e.g., exceeding coolant technical specifications for iodine spike)

EXPLANATION

This item complies with the NUREG without further explanation.

SHNPP Flowpath Step B-1	NUREG-0654 EAL NOUE ITEM 3c
B-1 GROSS FAILED FUEL DETECTOR INDICATES AN INCREASE GREATER THAN 2 E^4 CPM WITHIN 30 MINUTES.	Fuel damage indication. Examples: c. Failed fuel monitor (PWR) indicates increase greater than 0.1% equivalent fuel failures within 30 minutes.

EXPLANATION

An increase of 2 x 10^4 CPM within thirty minutes in the reading of the Gross Failed Fuel Detector is indication that fuel is starting to fail. Westinghouse provided this set point along with a higher set point which is used for the Alert Classification.

SHNPP Flowpath Step K-2	NUREG-0654 EAL NOUE ITEM 4
K-2 INITIATION OF ANY SHUTDOWN REQUIRED BY TECHNICAL SPECIFICATIONS	Abnormal coolant temperature and/or pressure or abnormal fuel temperatures outside of technical specification limits.

EXPLANATION

Abnormal coolant temperature and/or pressure or abnormal fuel temperature would require a plant shutdown due to Tech. Specs.

SHNPP Flowpath Step D-2	NUREG-0654 EAL NOUE ITEM 5
D-2 LOSS OF REACTOR COOLANT OR PRIMARY TO SECONDARY SYSTEM LEAKAGE IN EXCESS OF TECHNICAL SPECIFICATION 3.4.6.2.	Exceeding either primary/secondary leak rate technical specification or primary system leak rate technical specification.

EXPLANATION

Technical Specification 3.4.6.2 addresses both Unidentified RCS leakage and RCS identified leakage that is going into the steam generator(s). If this Specification is exceeded, then an Unusual Event is declared.

SHNPP Flowpath Step C-3, D-1	NUREG-0654 EAL NOUE ITEM 6
C-3 FAILURE OF AN SG SAFETY OR PORV TO RESET AFTER OPERATION. D-1 FAILURE OF A PRESSURIZER SAFETY OR RELIEF VALVE TO CLOSE FOLLOWING REDUCTION OF APPLICABLE PRESSURE.	Failure of a safety or relief valve in a safety related system to close following reduction of applicable pressure.

EXPLANATION

At SHNPP, the valves of concern are the Safety and Relief valves on the Steam Generator or Pressurizer. Any other relief valve that could malfunction is easily isolable and discharges to a closed system. However, the above listed valves (addressed in C-3 and D-1) could result in a challenge to the plant safety systems and require notification of an Unusual Event.

SHNPP Flowpath Step E-1, E-2	NUREG-0654 EAL NOUE ITEM 7
E-1 LOSS OF OFFSITE POWER, OR E-2 LOSS OF BOTH EMERGENCY DIESEL GENERATORS.	Loss of offsite power or loss of onsite AC power capability.

EXPLANATION

The loss of offsite power capability is straight forward. The loss of normal onsite power (Main Generator) is covered under Item K-4, if it was unplanned. The loss of both Emergency Diesel Generators, is the onsite power of concern. Loss of only one Diesel Generator is covered by the Tech. Spec. Action statement. Therefore, if both Diesel Generators are lost, an Unusual Event is declared regardless of the status of the Main Generator.

SHNPP Flowpath Step K-2	NUREG-0654 EAL NOUE ITEM 8
K-2 INITIATION OF ANY SHUTDOWN REQUIRED BY TECHNICAL SPECIFICATIONS.	Loss of containment integrity requiring shutdown by Technical Specifications.

EXPLANATION

This complies with the NUREG item. It also covers any other Tech. Spec. shutdown requirements.

SHNPP Flowpath Step K-2	NUREG-0654 EAL NOUE ITEM 9
K-2 INITIATION OF ANY SHUTDOWN REQUIRED BY TECHNICAL SPECIFICATIONS.	Loss of engineered safety feature or fire protection system function requiring shutdown by Technical Specifications (e.g., because of malfunction, personnel error, or procedural inadequacy).

EXPLANATION

Step K-2 requires the declaration of an Unusual Event for any plant shutdown that is required by Technical Specifications. This includes loss of an ECCS component or any other safety related component or system, regardless of the reason for the loss.

SHNPP Flowpath Step G-1	NUREG-0654 EAL NOUE ITEM 10
G-1 FIRE LASTING MORE THAN 10 MINUTES WITHIN THE PROTECTED AREA.	Fire within the plant lasting more than 10 minutes.

EXPLANATION

This complies with the NUREG item without further explanation.

SHNPP Flowpath Step F-1 - F-3	NUREG-0654 EAL NOUE ITEM 11
F-1 LOSS OF ALL REPRESENTATIVE METEOROLOGICAL DATA. F-2 INABILITY OF ERFIS TO PERFORM ITS INTENDED FUNCTION FOR A CONTINUOUS PERIOD OF 60 MINUTES WHILE IN MODES 1, 2, 3, OR 4 AS DEFINED BY: A. FAILURE OF BOTH CPU's. B. FAILURE OF BOTH DATA CONCENTRATORS. C. FAILURE OF BOTH DATA DISCS. D. INABILITY TO DISPLAY SPDS IN THE CONTROL ROOM. E. INABILITY TO UPDATE CURRENT DATA DISPLAYS IN THE CONTROL ROOM. (THIS IS NOT TO BE CONSTRUED AS A FAILURE OF A SINGLE VARIABLE OR SMALL SUBSET OF DATA). F-3 FAILURE OF BOTH SITE TELEPHONE AND EMERGENCY TELEPHONE SWITCHES.	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 (e.g., plant computer, Safety Parameter Display System, all meteorological instrumentation).

EXPLANATION

The loss of Process or Effluent parameters that are important to safety are listed in the Tech. Spec. 3.3. Loss of these items would require the declaration of an Unusual Event due to Item K-2. All of the other items addressed by the NUREG item, are listed above.

SHNPP Flowpath Step H-1	NUREG-0654 EAL NOUE ITEM 12
H-1 A SECURITY ALERT HAS BEEN DECLARED AS DEFINED IN THE SECURITY PLAN.	Security threat or attempted entry or attempted sabotage.

EXPLANATION

The Security Plan for the plant addresses the security alert condition. This complies with the NUREG item.

SHNPP Flowpath Step I-1, I-2, I-8	NUREG-0654 EAL NOUE ITEM 13
I-1 INDICATION OF ANY TWO SEISMIC SYMPTOMS LISTED ON EAL TABLE 4. I-2 HURRICANE OR TORNADO CROSSING EAB. I-8 WATER LEVELS IN THE MAIN AND AUXILIARY RESERVOIRS >240.2 FT. AND 257.7 FT. RESPECTFULLY, OR WATER LEVEL < 205.7 FT. IN THE MAIN RESERVOIR.	Natural phenomenon being experienced or projected beyond usual levels a. Any earthquake felt in-plant or detected on station seismic instrumentation. b. 50 year flood or low water, tsunami, hurricane surge, seiche. c. Any tornado on site. d. Any hurricane.

EXPLANATION

Symptoms of any earthquake occurring are listed on EAL Table 3. Indication of tornado or hurricane is addressed. The low water levels are the levels that would require a plant shutdown. Tsunami, hurricane surge, and seiche are not applicable to the site beyond the extent addressed in the FSAR. The FSAR states that the lake levels for Safe Shutdown will bound the probability of damage to the plant from these type of events. The levels used, in the FSAR, ensure a safe shutdown margin. The levels used in the EAL Network are the same, or more conservative, than those used in the FSAR.

SHNPP Flowpath Step I-3, I-4, I-5, I-6, I-7	NUREG-0654 EAL NOUE ITEM 14
I-3 AIRCRAFT CRASH WITHIN EAB OR UNUSUAL AIRCRAFT ACTIVITY OVER FACILITY I-4 TRAIN DERAILMENT WITHIN EAB I-5 UNPLANNED EXPLOSION WITHIN EAB I-6 UNPLANNED TOXIC OR FLAMMABLE GAS RELEASE GREATER THAN 10 POUNDS WITHIN EAB I-7 TURBINE ROTATING COMPONENT FAILURE RESULTING IN A REACTOR TRIP	Other hazards being experienced or projected: a. Aircraft crash on-site or unusual aircraft activity over facility. b. Train derailment on-site. c. Near or onsite explosion. d. Near or onsite toxic or flammable gas release. e. Turbine rotating component failure causing rapid plant shutdown.

EXPLANATION

The plant-specific step was modified to include the word "Unplanned." This was done because periodically planned explosions occur which would result in an Unusual Event declaration when one was not warranted (Ex. Plugging SG tubes with explosive plugs).

At times, planned releases of toxic or flammable gases occur. These are controlled releases and must be done to continue safe and efficient plant operations. SHNPP does not consider that this type of release should require an Unusual Event declaration because it is done on purpose and in a controlled manner.

The ten pound threshold on the release of toxic or flammable gas is determined based upon the requirements to report to the local authorities. Release levels less than ten pounds do not require notification.

Events occurring outside of the Exclusion Area Boundary do not require Notification of an Unusual Event if they are not part of the site, as defined in the FSAR, and do not directly affect plant operations. This is the reason that the above statements include the qualification that the event must have occurred inside of the EAB (Exclusion Area Boundary).

SHNPP Flowpath Step J-1, K-4	NUREG-0654 EAL NOUE ITEM 15
J-1 OTHER PLANT CONDITIONS EXIST THAT WARRANT INCREASED AWARENESS ON THE PART OF THE PLANT OPERATING STAFF CHATHAM, HARNETT, LEE, AND WAKE COUNTIES AND THE STATE OF NORTH CAROLINA. K-4 OTHER PLANT CONDITIONS EXIST THAT INVOLVE OTHER THAN A NORMAL CONTROLLED SHUTDOWN (E.G., COOLDOWN RATE EXCEEDING TECHNICAL SPECIFICATION LIMITS, PIPE CRACKING FOUND DURING OPERATION).	Other plant conditions exist that warrant increased awareness on the part of a plant operating staff or state and/or local offsite authorities or require plant shutdown under technical specification requirements or involve other than normal controlled shutdown (e.g., cooldown rate exceeding Technical Specification limits, pipe cracking found during operation).

EXPLANATION

The above items comply with the NUREG requirements.

SHNPP Flowpath Step K-3	NUREG-0654 EAL NOUE ITEM 16
K-3 CONTAMINATED OR POTENTIALLY CONTAMINATED INJURED INDIVIDUAL REQUIRING OFFSITE MEDICAL TREATMENT.	Transportation of contaminated injured individual from site to offsite hospital.

EXPLANATION

This item complies with the required NUREG item and includes consideration of individuals who are, or may be, contaminated.

SHNPP Flowpath Step C-1, C-4	NUREG-0654 EAL NOUE ITEM 17
C-1 RAPID DEPRESSURIZATION OF SECONDARY SIDE. C-2 MAIN STEAM OR FEEDWATER BREAK. C-4 SG BLOWDOWN LINE BREAK (MODES 1, 2, & 3).	Rapid depressurization of PWR secondary side.

EXPLANATION

This item complies with the NUREG. SHNPP added the rupture of a blowdown line as a specific method of secondary plant depressurization that would not result in an Alert, but would require notification of an Unusual Event.

ALERT
CLASSIFICATION

EXAMPLE INITIATING CONDITIONS: ALERT

SHNPP Flowpath Step NONE	NUREG-0654 EAL ALERT ITEM 1a
	Severe loss of fuel cladding. a. High off gas at BWR air ejector monitor (greater than 5 Ci/sec; corresponding to 16 isotopes decayed 30 minutes).

EXPLANATION

SHNPP is a PWR.

SHNPP Flowpath Step 47	NUREG-0654 EAL ALERT ITEM 1b
47. 1 FPB BREACHED/JEOPARDIZED?	Severe loss of fuel cladding b. Very high coolant activity sample (e.g., 300 uCi/cc equivalent of I-131).

EXPLANATION

Refer to the Fission Product Barrier Analysis, especially SHNPP Step 11. Step 11 asks if RCS dose equivalent I-131 activity is less than 300 uCi/cc. If the answer is NO, then one Fission Product Barrier is declared to be breached. In addition, the radiation monitors addressed in Steps 3 thru 10 assume that this activity level exists in the RCS.

SHNPP Flowpath Step 47	NUREG-0654 EAL ALERT ITEM 1c
47. 1 FPB BREACHED/JEOPARDIZED?	Severe loss of fuel cladding c. Failed fuel monitor (PWR) indicates greater than 1% fuel failures within 30 minutes or 5% total fuel failures.

EXPLANATION

Refer to the Fission Product Barrier Analysis. The Gross Failed Fuel Detector is used to determine if the integrity of the fuel is in jeopardy. The low set point is used for the Unusual Event declaration and the other is used for determination that the fuel FPB is in jeopardy or breached. The values used were supplied by Westinghouse.

SHNPP Flowpath Step 47	NUREG-0654 EAL ALERT ITEM 2
47. 1 FPB BREACHED/JEOPARDIZED?	Rapid gross failure of one steam generator tube with loss of offsite power.

EXPLANATION

Refer to the Fission Product Barrier Analysis. Several of the RCS Fission Product Barrier questions would result in declaration of the RCS breached if a Steam Generator tube leak occurred. This would happen with a leak rate much less than the design leakage associated with the failure of one tube. A leak rate in excess of 50 gpm would result in the declaration of an Alert condition. This is done whether or not offsite power is available.

SHNPP Flowpath Step 47	NUREG-0654 EAL ALERT ITEM 3
47. 1 FPB BREACHED/JEOPARDIZED?	Rapid failure of steam generator tubes (e.g., several hundred gpm primary to secondary leak rate)

EXPLANATION

Refer to the Fission Product Barrier Analysis. Several of the RCS Fission Product Barrier questions would result in declaration of the RCS breached if a Steam Generator tube leak occurred. This would happen with a leak rate much less than the design leakage associated with the failure of one tube. A leak rate in excess of 50 gpm would result in the declaration of an Alert condition.

SHNPP Flowpath Step 47	NUREG-0654 EAL ALERT ITEM 4
47. 1 FPB BREACHED/JEOPARDIZED?	Steam line break with significant (e.g., greater than 10 gpm primary to secondary leak rate (PWR) or MSIV malfunction causing leakage (BWR).

EXPLANATION

Refer to the Fission Product Barrier Analysis. When judging the integrity of each Fission Product Barrier, we look for steam and feedline breaks, high radiation in the secondary plant, and SG tube leaks. Any one of these conditions would result in the declaration of an Alert condition.

SHNPP Flowpath Step 47	NUREG-0654 EAL ALERT ITEM 5
47. 1 FPB BREACHED/JEOPARDIZED?	Primary coolant leak rate greater than 50 gpm.

EXPLANATION

Refer to the Fission Product Barrier Analysis. The RCS barrier specifically asks if the RCS unidentified leakage is greater than 50 gpm. It also refers to other plant indications that would indicate a breach of the RCS barrier. If any indicator shows that the RCS is breached or in jeopardy, an Alert is declared unless a higher level declaration is warranted.

The 50 gpm leak rate is based on the requirements of NUREG-0654.

SHNPP Flowpath Step 47	NUREG-0654 EAL ALERT ITEM 6
47. 1 FPB BREACHED/JEOPARDIZED?	Radiation levels or airborne contamination which indicate a severe degradation in the control of radioactive materials (e.g., increase of factor of 1000 in direct radiation readings within facility).

EXPLANATION

Refer to the Fission Product Barrier Analysis. Throughout the examination of each of the Fission Product Barriers, SHNPP looks for radiation level increases, above normal. Instead of one "Generic" check, the plant has identified those indicators that would provide an early indication of a degradation in the control of radioactive materials. Also see the response to Alert Item 19.

SHNPP Flowpath Step 54 - 58	NUREG-0654 EAL ALERT ITEM 7
54. LOSS OF POWER? 55. 1A-SA OR 1B-SB ENERGIZED? 56. LESS THAN 222.5 KPPH FEED FLOW AVAILABLE? 57. FULL RANGE RVLIS LEVEL LESS THAN 62%? 58. 1A-SA AND 1B-SB LOST FOR GREATER THAN 15 MINS?	Loss of offsite power and loss of all onsite AC power (see Site Area Emergency for extended loss).

EXPLANATION

If question 54 can be answered NO, or 55 is YES, then the remaining questions are bypassed. If 54 is answered YES and question 55 is answered NO, then question 56 is asked. If the answer is YES and the answer to Question 57 is YES, then a General Emergency is declared due to a loss of heat sink and imminent core recovery. If Question 56 or 57 can be answered NO, then the amount of time that AC power has been lost is used to determine whether to declare an Alert or a Site Emergency. Question 58 determines which declaration is appropriate.

SHNPP Flowpath Step 59, 60	NUREG-0654 EAL ALERT ITEM 8
59. LOSS OF ALL ON-SITE ESF DC BUSSES (125VDC 1ASA, 1BSB, 1A: 250VDC STATION BATTERIES) 60. ALL ON-SITE ESF DC LOST FOR LESS THAN 15 MINS?	Loss of all onsite DC power (see Site Area Emergency for extended loss).

EXPLANATION

ESF DC power is the vital DC power supply. If it is lost, then an Alert is declared. If the loss extends for greater than 15 minutes, the Alert is upgraded to a Site Emergency (If Question 60 is answered YES, an ALERT is declared; if answered NO, then a Site Emergency is declared).

SHNPP Flowpath Step 47	NUREG-0654 EAL ALERT ITEM 9
47. ONE FPB BREACHED/JEOPARDIZED?	Coolant pump seizure leading to fuel failure.

EXPLANATION

A coolant pump seizure is one possible way to incur core damage. But so are other methods of loss of flow, loss of coolant and core power excursions, just to name a few examples. The point of this item is to declare an Alert condition if a fuel failure has occurred or is imminent. The Fission Product Barrier analysis looks at the integrity of the fuel instead of trying to list all possible events that could lead to fuel failure.

SHNPP Flowpath Step 63, 64, 65	NUREG-0654 EAL ALERT ITEM 10
63. COMPLETE LOSS OF ANY FUNCTION LISTED ON EAL TABLE 1? 64. LOST FUNCTION REQUIRED FOR MODE 3? 65. LOST FUNCTION REQUIRED FOR MODE 4 OR 5?	Complete loss of any function needed for plant cold shutdown.

EXPLANATION

If the answer to question 63 is YES, the only item left to determine is whether to declare a Site Emergency or an Alert. If question 64 is answered YES, a Site Emergency is declared, otherwise an Alert is declared.

SHNPP Flowpath Step 48, 49	NUREG-0654 EAL ALERT ITEM 11
48. ATWS? 49. MANUAL REACTOR TRIP SUCCESSFUL.	Failure of the reactor protection system to initiate and complete a scram which brings the reactor subcritical.

EXPLANATION

If an ATWS event has occurred and the manual reactor trip was successful, an Alert is declared. If the manual reactor trip was not successful, the event is upgraded to a Site or General Emergency depending on the status of the Fuel Fission Product Barrier.

SHNPP Flowpath Step 70, 71, 74, 75, 76	NUREG-0654 EAL ALERT ITEM 12
70. ALL SPENT FUEL POOL AREA RAD MON LESS THAN 100 mR/HR? 71. ALL SPENT FUEL POOL AREA RAD MON LESS THAN 700 mR/HR? 74. PLANT IS IN MODE 6? 75. VALID CNMT VENT ISOL ACTUATION? 76. ALL CNMT HI RANGE ACCIDENT MON LESS THAN 6.5 E^3 mR/HR?	Fuel damage accident with release of radioactivity to containment or fuel handling building.

EXPLANATION

If Question 70 is answered NO and 71 is answered YES, then an Alert is declared due to suspected fuel damage in the spent fuel pool. If both questions are answered NO, then the condition is upgraded to a Site Emergency.

The 100 mR/HR set point is based on dropping one spent fuel assembly and is used to actuate the FHB emergency ventilation system. The 700 mR/HR limit is based on the expected dose rate from dropping two spent fuel assemblies. These readings are projected to exist at the Radiation Monitor closest to the dropped assemblies. Questions 74, 75, and 76 examine the possibility of fuel damage inside of the Containment. This could only occur during Mode 6 (Refueling), so the sequence is bypassed if the plant is not in Mode 6. If fuel was damaged during refueling, a minor release would result in a Containment Ventilation Isolation and evacuation of Containment. If the damage was severe enough to warrant an Alert, the Containment Hi Range Monitors would increase to greater than 6.5 E^3 mR/HR.

The Containment Ventilation Actuation signal is established based on the activity release that would occur if one spent fuel assembly was dropped after removal from the core. The 6.5 E^3 mR/HR reading is based on the expected reading from the radiation monitors due to dropping two spent fuel assemblies that have just been removed from the core.

SHNPP Flowpath Step 51, 52, 53	NUREG-0654 EAL ALERT ITEM 13
51. FIRE? 52. FIRE MAY AFFECT SAFETY RELATED (ESF) EQUIPMENT? 53. COMPLETE LOSS OF ANY SAFETY RELATED (ESF) FUNCTION DUE TO FIRE?	Fire potentially affecting safety systems.

EXPLANATION

If a fire has not occurred, then this sequence is bypassed. If one has occurred but it has not caused a loss of any safety related equipment, but has the potential to do so, an Alert condition is declared. A Site Emergency would be declared if the fire has caused the loss of any safety related function (ESF) to the point that a complete loss has occurred.

SHNPP Flowpath Step 61, 62	NUREG-0654 EAL ALERT ITEM 14
61. LOSS OF LESS THAN 50% OF MCB ANNUNCIATOR's (ALB's)? 62. EOP PATH 1 HAS BEEN ENTERED?	Most or all alarms (annunciators) lost.

EXPLANATION

Entry into EOP Path 1 is indication that a Plant Transient has been initiated or is in progress. If this is not the case, then the loss of greater than fifty percent of the Main Control Board (MCB) annunciators will result in an Alert classification. If Path 1 has been entered, the classification is upgraded to a Site Emergency.

SHNPP Flowpath Step 99	NUREG-0654 EAL ALERT . ITEM 15
99. MONITOR IN EAL TABLE 5 READING LESS THAN 10 TIMES THE ALARM SETPOINT?	Radiological effluents greater than 10 times technical specification instantaneous limits (an instantaneous rate which, if continued over 1 hour, would result in about 1 MR at the site boundary under average meteorological conditions).

EXPLANATION

EAL Table 5 lists the plant effluent radiation montiors. The setpoints for these monitors is less than the Tech Spec instantaneous limits. An Alert is declared if any of these monitors exceeds its alarm setpoints by a factor of ten, which is below the level required by Item 15.

SHNPP Flowpath Step 66, 67, 68, 69	NUREG-0654 EAL ALERT ITEM 16
66. SECURITY EMERGENCY AS DEFINED BY THE SECURITY PLAN? 67. LOSS OF PHYSICAL CONTROL OF THE PLANT? 68. SUCCESSFUL PENETRATION OF VITAL AREAS? 69. ACTUAL OR IMMINENT POTENTIAL FOR OFFSITE RAD RELEASE?	Ongoing security compromise.

EXPLANATION

If the answer to Question 66 is YES, then an Alert will be declared unless a higher level declaration is warranted. If Question 67 is answered YES, then a General Emergency is declared and if Questions 68 and 69 are answered YES, then a Site Emergency is declared.

SHNPP Flowpath Step 100, 101, 102	NUREG-0654 EAL ALERT ITEM 17a.
100. ANY TWO INDICATIONS OF A SEISMIC EVENT LISTED ON EAL TABLE 4? 101. ANY YELLOW LIGHT ON TRIAXIAL RESPONSE SPECTRUM ANNNUNCIATOR LIT? 102. ANY RED LIGHT ON TRIAXIAL RESPONSE SPECTRUM ANNUNCIATOR LIT?	Severe natural phenomena being experienced or projected. a. Earthquake greater than OBE levels.

EXPLANATION

EAL Table 4 lists all available plant indications of a seismic event including indication of tremors or vibration. If any two of these indications are positive the operators determine if an OBE or SSE has occurred. A yellow light on the Triaxial Response Spectrum Annunciator indicates that the event has exceeded 70% of the OBE level, a Red annunciator indicates that the event has exceeded the OBE level. If a Yellow annunciator is lit, but not a Red one, then an Alert is declared. If a Red annunciator is lit, then the OBE level has been reached or exceeded and we must assume that an SSE has occurred. This is conservative, but appropriate, based on the current indications available at SHNPP.

SHNPP Flowpath Step 103, 104, 105, 106	NUREG-0654 EAL ALERT ITEM 17c & d
103. ADVERSE WEATHER? 104. TORNADO HAS HIT THE POWER BLOCK? 105. WIND SPEEDS AT 10 METERS LESS THAN 90 MPH? 106. WIND SPEEDS AT 10 METERS LESS THAN 100 MPH?	c. Any tornado striking facility. d. Hurricane winds near design basis level.

EXPLANATION

If Adverse weather occurs and wind speeds exceed 90 MPH, but not 100 MPH (Site Emergency level), then an Alert is declared. The 90 MPH windspeed is based on the 100 year reoccurrence described in the FSAR. The 100 MPH wind speed is based on the maximum design of the annemometer used at the metrological tower. A tornado could conceivably strike the power block without registering wind speeds of greater than 90 MPH, at the Met. Tower, so a specific question is asked concerning the chance of tornado.

SHNPP Flowpath Step 107, 108, 109	NUREG-0654 EAL ALERT ITEM 18a, b, c
107. AIRCRAFT CRASH, MISSILE IMPACT OR UNPLANNED EXPLOSION INSIDE PA? 108. PLANT IN COLD SHUTDOWN? 109. SAFETY RELATED EQUIP. OR STRUCTURE AFFECTED?	Other hazards being experienced or projected a. Aircraft crash on facility b. Missile impacts from whatever source on facility c. Known explosion damage to facility affecting plant operation.

EXPLANATION

If Question 107 is answered YES, then an Alert condition is declared unless a Site Emergency is required. Questions 108 and 109 determine whether the declaration should be an Alert or a Site Emergency.

SHNPP Flowpath Step 110, 111, 112	NUREG-0654 EAL ALERT ITEM 18d
110. UNCONTROLLED OR UNPLANNED RELEASE OF TOXIC OR FLAMMABLE GAS INTO PA? 111. RELEASE ENDANGERING PERSONNEL OR OPERABILITY OF ESF EQUIP? 112. PLANT IN COLD SHUTDOWN?	Other hazards being experienced or projected d. Entry into facility environs of uncontrolled toxic or flammable gases

EXPLANATION

If Question 110 is answered YES, an Alert is declared unless the answer to Questions 111 and 112 determine that a Site Emergency should be declared instead.

SHNPP Flowpath Step 113	NUREG-0654 EAL ALERT ITEM 18e
113. TURBINE FAILURE RESULTING IN CASING PENETRATION?	Other hazards being experienced or projected e. Turbine failure causing casing penetration.

EXPLANATION

If the answer to Question 113 is YES, then an Alert is declared.

SHNPP Flowpath Step 117, 118, 119, 123, 124	NUREG-0654 EAL ALERT ITEM 19
117. MALFUNCTION RESULTING IN UNCONTROLLABLE BORON DILUTION? 118. IN MODES 6 LASTING LESS THAN 45 MINS? 119. IN MODES 1-5 LASTING LESS THAN 15 MINS? 123. AIRBORNE RAD LEVELS INDICATE SEVERE DEGRADATION IN RADIOACTIVE MATERIAL CONTROL? 124. ANY PLANT CONDITION EXISTS THAT WARRANTS PRECAUTIONARY ACTIVATION OF TSC AND PLACING EOF AND KEY PERSONNEL ON STANDBY?	Other plant conditions exist that warrant precautionary activation of Technical Support Center and placing near-site Emergency Operations Facility and other key emergency personnel on standby.

EXPLANATION

Boron dilution accident in Modes 1 thru 5 will cause the declaration of an Alert if it lasts for greater than fifteen minutes. The dilution in Mode 6 will require a Site Emergency Declaration. This was added by SHNPP because it is early indication of the potential loss of plant shutdown margin which could result in an unplanned criticality, as described in the FSAR Chapter 15.4.6.

Alert Item 6 addressed specific radiation levels for which an Alert should be declared. SHNPP Step 123 was added to give the Site Emergency Coordinator the discretion to declare an Alert even if specific levels have not been exceeded.

Step 124 allows the Site Emergency Coordinator to declare an Alert when, in his judgment, conditions exist that justify the Alert declaration. This must be done because all possible types of events that should lead to an Alert classification cannot be addressed.

SHNPP Flowpath Step 114, 115, 116	NUREG-0654 EAL ALERT ITEM 20
114. CONTROL ROOM EVAC REQUIRED OR ANTICIPATED? 115. AUX CONTROL PANEL (ACP) OPERATIONAL? 116. CONTROL ROOM EVACUATED FOR LESS THAN 15 MINS?	Evacuation of Control Room anticipated or required with control of shutdown systems established from local stations.

EXPLANATION

If a Control Room evacuation is required or anticipated, an Alert is declared unless a Site Emergency is necessary. If Question 114 is answered YES and 115 is answered YES, or 116 is answered YES, then an Alert is declared. If the evacuation is required (or anticipated) and the Auxiliary Shutdown Panel is not operational within 15 minutes, the Alert is upgraded to a Site Emergency.

SITE EMERGENCY
CLASSIFICATION

EXAMPLE INITIATING CONDITIONS: SITE AREA EMERGENCY

NUREG-0654 APPENDIX 1

SHNPP Flowpath Step 46	NUREG-0654 EAL SITE EMERGENCY ITEM 1
46. 2 FPB's BREACHED/JEOPARDIZED?	Known loss of coolant accident greater than makeup pump capacity.

EXPLANATION

If a loss of coolant accident (LOCA) occurs, that exceeds the makeup capability of the CSIP's, the RCS would indicate BREACHED/JEOPARDIZED and the Containment would indicate a potential loss of integrity, because Containment pressure would rapidly increase to greater than three psig. This would result in two FPB's BREACHED/JEOPARDIZED. The result would be a declaration of a Site Emergency.

SHNPP Flowpath Step 46	NUREG-0654 EAL SITE EMERGENCY ITEM 2
46. 2 FPB's BREACHED/JEOPARDIZED?	Degraded core with possible loss of coolable geometry (indicators should include instrumentation to detect inadequate core cooling, coolant activity and/or containment radioactivity levels).

EXPLANATION

The Fission Product Barrier Analysis shows that each fission product barrier is analyzed to determine if it is breached or in jeopardy. This includes examining proper instrumentation to detect inadequate core cooling, increasing coolant and/or containment radioactivity levels, as well as other symptoms of core degradation.

SHNPP Flowpath Step 46	NUREG-0654 EAL SITE EMERGENCY ITEM 3
46. 2 FPB's BREACHED/JEOPARDIZED?	Rapid failure of steam generator tubes (several hundred gpm leakage) with loss of offsite power.

EXPLANATION

RCS unidentified leakage in excess of 50 gpm would require that the RCS be declared to be breached. In addition, if the SG tube leak was "several hundred gpm", the Containment would indicate breached due to the high SG press (1230 PSIG) coupled with the high SG level (82.4%). This would show two FPB's breached and warrant a Site Emergency declaration.

SHNPP Flowpath Step 58	NUREG-0654 EAL SITE EMERGENCY ITEM 6
58. 1A-SA AND 1B-SB LOST FOR LESS THAN 15 MIN?	Loss of offsite power and loss of onsite AC power for more than 15 minutes.

EXPLANATION

The 6.9 KV Emergency Busses, 1A-SA and 1B-SB are normally powered by the Main Generator or by off-site power. If normal power is lost, these busses are powered directly by the Emergency Diesel Generators. Therefore, if 1A-SA and 1B-SB are lost, all on-site and offsite AC power has been lost.

SHNPP Flowpath Step 59, 60	NUREG-0654 EAL SITE EMERGENCY ITEM 7
59. LOSS OF ALL ON-SITE ESF DC BUSSES (125VDC 1ASA, 1BSB, 1A: 250VDC STATION BATTERIES) 63. ON-SITE ESF DC LOST FOR LESS THAN 15 MINS?	Loss of all vital onsite DC power for more than 15 minutes.

EXPLANATION

ESF (Engineered Safety Features) DC is the plant-specific name for vital on-site DC power. If this DC power supply is lost for greater than fifteen minutes, a Site Emergency is declared.

SHNPP Flowpath Step 63, 64	NUREG-0654 EAL SITE EMERGENCY ITEM 8
63. COMPLETE LOSS OF ANY FUNCTION LISTED ON EAL TABLE 1? 64. LOST FUNCTION REQUIRED FOR MODE 3?	Complete loss of any function needed for plant hot shutdown.

EXPLANATION

EAL Table 1 is a listing of the plant functions required for hot or cold shutdown. Mode 3 is "Hot Standby" which is the plant condition where RCS temperature is greater than 350°F and the Reactor is subcritical. This equates to the NUREG term "HOT SHUTDOWN." Mode 4 (Hot Shutdown) or Mode 5 (Cold Shutdown) are the plant conditions where the RCS is below 350°F and less than 400 PSIG which equates to the NUREG recommendation concerning Cold Shutdown. These events result in an Alert classification as the same equipment is affected resulting in the same concerns.

SHNPP Flowpath Step 48, 49, 50	NUREG-0654 EAL SITE EMERGENCY ITEM 9
48. ATWS? 49. MANUAL REACTOR TRIP SUCCESSFUL? 50. FUEL FPB BREACHED?	Transient requiring operation of shutdown systems with failure to scram (continued power generation but no core damage immediately evident).

EXPLANATION

If the Question "ATWS" is answered YES, the next question is "Manual Reactor Trip Successful?" If the answer to this question is YES, an Alert is declared. If the answer is NO, then a Site Emergency is declared unless the Fuel FPB is breached which requires a General Emergency. The note following the declaration explains that the Site Emergency exists only as long as the rods remain out of the core (i.e., until the Reactor Trip is successfully executed, or the rods are fully inserted by other means).

SHNPP Flowpath Step 70 - 76	NUREG-0654 EAL SITE EMERGENCY ITEM 10
70. ALL SPENT FUEL POOL AREA RAD MON LESS THAN 100 MR/HR? 71. ALL SPENT FUEL POOL AREA RAD MON LESS THAN 700 MR/HR? 72. SPENT FUEL POOL LEVEL LESS THAN 1 FT ABOVE TOP OF FUEL? 73. SPENT FUEL STORED IN SPENT FUEL POOL REQUIRING WET STORAGE? 74. PLANT IS IN MODE 6? 75. VALID CNMT VENT ISOL ACTUATION? 76. ALL CNMT HI RANGE ACCIDENT MON LESS THAN 6.5 E^3 mR/HR?	Major damage to spent fuel in containment or fuel handling building (e.g., large objects damages fuel or water loss below fuel level).

EXPLANATION

If the spent fuel pool area rad monitors are all below 100 MR/HR, then you skip Step 71 (the setpoint is based on the SFP ventilation actuation signal which is based on dropping one spent fuel assembly). This helps to expedite getting through the flowpath. If the rad. levels are less than 100 MR/HR, then they are obviously less than 700 MR/HR.

If Question 70 is answered YES, then Question 71 is asked. If it is answered NO, a Site Emergency is declared. If the Radiation levels in the spent fuel pool exceed 700 MR/HR, then two assemblies in the spent fuel pool have been damaged, for some reason. When declaring this emergency, the cause of the damage (large objects, dropped assembly, etc.) is not an immediate concern. Declaring the emergency and getting the necessary assistance is the immediate concern because the damage is done.

After Question 71 has been addressed (or bypassed) and the appropriate declaration made, Question 72 is addressed. Therefore, if the level is less than one foot above the spent fuel assemblies, the spent fuel is about to become uncovered. If the answer to Question 72 is NO, then Question 73 is bypassed; otherwise, Question 73 is asked.

Question 73 asks if any spent fuel is stored in the spent fuel pool, requiring wet storage. If no fuel is in the pool, then the pool level is irrelevant. If spent fuel requiring wet storage is in the pool, a Site Emergency is declared. The term "Requiring wet storage" is applicable, because SHNPP may store spent fuel that does not require wet storage because it was removed from the reactor several years ago.

Question 74 asks if the plant is in the refueling mode. If the plant is not in the refueling mode, then damage to spent fuel inside of the containment is not possible. All spent fuel is stored in the spent fuel pool. If the plant is in Mode 6, then Question 75 is asked.

(CONTINUED ON NEXT PAGE)

SHNPP Flowpath Step 70 - 76	NUREG-0654 EAL SITE EMERGENCY ITEM 10

(continued)

If a valid containment ventilation isolation signal has not been received, then a spent fuel assembly has not been dropped (or was dropped and was not damaged) in containment. The containment ventilation isolation setpoints are sufficiently low that the signal will actuate with minor damage to the spent fuel.

If the answer to Question 75 is YES, then we ask Question 76. If the Accident monitors are reading greater than 6.5 E^3 mR/HR, we have indication of damage to two spent fuel assemblies, inside of the containment and declare a Site Emergency. If not, then we continue on through the flowpath after declaring an Alert condition.

SHNPP Flowpath Step 51, 52, 53	NUREG-0654 EAL SITE EMERGENCY ITEM 11
51. FIRE? 52. FIRE MAY AFFECT SAFETY RELATED (ESF) EQUIPMENT? 53. COMPLETE LOSS OF ANY SAFETY RELATED (ESF) FUNCTION DUE TO FIRE?	Fire compromising the functions of safety systems.

EXPLANATION

If the answer to the above questions is YES, then a Site Emergency is declared. ESF is an abbreviation for "Engineered Safety Features."

SHNPP Flowpath Step 61, 62	NUREG-0654 EAL SITE EMERGENCY ITEM 12
61. LOSS OF LESS THAN 50% OF MCB ANNUNCIATORS (ALBs)? 62. EOP PATH 1 HAS BEEN ENTERED?	Most or all alarms (annunciators) lost and plant transient initiated or in progress.

EXPLANATION

The Main Control Board (MCB) annunciators are referred to as ALB's (Annunciator Light Boxes). If greater than fifty percent of these are lost, the question becomes "Has PATH-1 been entered?" Path 1 is entered any time that a Reactor Trip has been received or should be received. This is a simple method used to determine if a plant transient has been initiated or is in progress.

SHNPP Flowpath Step 84, 85, 86, 87, 88, 89	NUREG-0654 EAL SITE EMERGENCY ITEM 13a
84. PROJECTED DOSE RATE LESS THAN 50 mrem/HR (WB) AT EAB. 85. PROJECTED DOSE RATE LESS THAN 250 mrem/HR (THYROID) AT EAB. 86. ESTIMATED DURATION OF RELEASE LESS THAN 30 MINS? 87. PROJECTED DOSE RATE LESS THAN 250 mrem/HR (WB) AT EAB. 88. PROJECTED DOSE RATE LESS THAN 2.5 REM/HR (THYROID) AT EB AB. 89. ESTIMATED DURATION OF RELEASE LESS THAN 2 MINS?	Effluent monitors detect levels corresponding to greater than 50 MR/HR for 1/2 hour or greater than 500 MR/HR W.B. for two minutes (or five times these levels to the thyroid) at the site boundary for adverse meteorology.

EXPLANATION

The statement just prior to the sequence of these questions tells the Site Emergency Coordinator to "USE ADVERSE MET ASSUMPTION (CHI/Q = .000617 SEC/M^3) FOR DETERMINING PROJECTED DOSE RATES." From a Human Factor standpoint, as well as a spacing standpoint, this is preferable to repeating the same statement four times in order to answer four successive questions.

If the answer to Question 84 or 85 is NO, then Question 86 is asked. If the answer to 86 is NO, a Site Emergency is declared. If the answer is YES, then the process is repeated for Questions 87, 88, and 89. all of the Action values agree with the NUREG recommendation except for the value in Question 87. This value is fifty percent of the recommended value. The Projected Dose Rates are Dose Rate projections at the Exclusion Area Boundary.

SHNPP Flowpath Step 93 THRU 98	NUREG-0654 EAL SITE EMERGENCY ITEM 13b
93. MEASURED WHOLE BODY DOSE RATE LESS THAN 50 mr/HR AT EAB? 94. MEASURED I-131 EQUIVALENT CONCENTRATION LESS THAN 7.31 E-^{8}uCi/cc AT EAB? 95. MEASURED LEVEL HAS EXISTED FOR LESS THAN 30 MINS? 96. MEASURED WHOLE BODY DOSE RATE LESS THAN 500 mr/HR AT EAB? 97. MEASURED I-131 EQUIVALENT CONCENTRATION LESS THAN 7.31 E-^{7}uCi/cc AT EAB? 98. MEASURED LEVEL HAS EXISTED FOR LESS THAN 2 MINS?	These dose rates (listed in 13a) are projected on other plant parameters (e.g., radiation level in containment with leak rate appropriate for existing containment pressure) or are measured in the environs.

EXPLANATION

If Question 93 or 94 is answered NO, then Question 95 is asked. If the answer to Question 95 is NO, then a Site Emergency is declared. If the answer is YES, then the process is repeated for Questions 96, 97, and 98. The measured values are consistent with the recommendations stated in the NUREG. The Thyroid dose limits are listed in Equivalent I-131 concentration in order to speed up the reporting process which will speed up the evaluation and declaration process.

SHNPP Flowpath Step 82, 83	NUREG-0654 EAL SITE EMERGENCY ITEM 13c
82. PROJECTED DOSE LESS THAN 1 REM (WB) AT EAB? 83. PROJECTED DOSE LESS THAN 5 REM (THYROID) AT EAB?	EPA Protective Action Guidelines are projected to be exceeded outside the site boundary.

EXPLANATION

If either of the dose levels are exceeded, protective action should be initiated, regardless of the dose rate. If either of the projected dose levels are exceeded, a Site Emergency is declared.

SHNPP Flowpath Step 66, 67, 68, 69	NUREG-0654 EAL SITE EMERGENCY ITEM 14
66. SECURITY EMERGENCY AS DEFINED BY THE SECURITY PLAN? 67. LOSS OF PHYSICAL CONTROL OF THE PLANT? 68. SUCCESSFUL PENETRATION OF VITAL AREAS? 69. ACTUAL OR IMMINENT POTENTIAL FOR OFFSITE RAD RELEASE?	Imminent loss of physical control of the plant.

EXPLANATION

If a Security Emergency has been declared and has resulted in a loss of physical control of the plant, then a General Emergency is declared. If loss of physical control of the plant has not occurred, then Questions 68 and 69 are asked. If the answer to either of these questions is NO, a Site Emergency is not warranted and an Alert is declared. If Vital Areas have been penetrated and this could result in an offsite radiation release, then a Site Emergency declaration is in order. This sequence of events meets the intent of the NUREG item.

SHNPP Flowpath Step 100, 101, 102	NUREG-0654 EAL SITE EMERGENCY ITEM 15a
100. ANY TWO INDICATIONS OF A SEISMIC EVENT LISTED ON EAL TABLE 4? 101. ANY YELLOW LIGHT ON TRIAXIAL RESPONSE SPECTRUM ANNUNCIATOR LIT? 102. ANY RED LIGHT ON TRIAXIAL RESPONSE SPECTRUM ANNUNCIATOR GREATER THAN LIT?	Severe natural phenomena being experienced or projected with plant not in cold shutdown. a. Earthquake greater than SSE levels.

EXPLANATION

If the answer to Question 100 is NO, a Seismic event has not occurred and the other two questions are unnecessary nad therefore bypassed. The EAL table lists the possible alarms which would alert the staff to a Seismic event and also lists "noticeable tremors or vibration." A yellow annunciator indicates that the plant has experienced 70% of an OBE and a red annunciator indicates that the design OBE has been exceeded. An SSE cannot be readily evaluated, based on current plant instrumentation, so the maximum reliable instrumentation reading (equal to an OBE) was used to declare an SSE.

If any indication has been received, then the Site Emergency Coordinator must determine if the event was of sufficient magnitude to warrant an Alert or Site Emergency declaration. If the answer to Question 101 is NO, then a declaration is not warranted. If the answer is YES, but the answer to Question 102 is NO, an Alert is declared. If the answer to Question 102 is YES, a Site Emergency is declared.

SHNPP Flowpath Step NONE	NUREG-0654 EAL SITE EMERGENCY ITEM 15b
	Severe natural phenomena being experienced or projected with the plant not in cold shutdown. b. Flood, low water, tsunami, hurricane surge, seiche greater than design levels, or failure of protection of vital equipment at lower levels.

EXPLANATION

The location of SHNPP makes the possibility of these events essentially zero except for a Seiche which could occur during an earthquake. This item is covered in response to item 15a. The other items are potential hazards to a facility that is located on the ocean. All of these items are analyzed in the SHNPP FSAR.

SHNPP Flowpath Step 103, 104, 105, 106	NUREG-0654 EAL SITE EMERGENCY ITEM 15c
103. ADVERSE WEATHER? 104. TORNADO HAS HIT THE POWER BLOCK? 105. WIND SPEEDS AT 10 METERS LESS THAN 90 MPH? 106. WIND SPEEDS AT 10 METERS LESS THAN 100 MPH?	Severe natural phenomena being experienced or projected with plant not in cold shutdown. c. Sustained winds or tornadoes in excess of design levels.

EXPLANATION

During adverse weather, sustained wind speeds of greater than 100 MPH warrant declaration of a Site Emergency. If the levels are less than 100 MPH but greater than 90 MPH, an Alert is declared. The plant has been designed to withstand 100 MPH winds, but, an Alert is declared at 90 MPH to add conservatism to the existing instrumentation. A Site Emergency declaration at wind speeds in excess 100 MPH is conservative and is based on the maximum reliable reading from the Annemometer located at the plant meteorologicial station. The tornado query is to determine if an Alert condition should be declared. If wind speeds exceed 90 MPH due to a tornado, then the tornado will cause an Alert declaration. If a tornado were to hit the power block at the same time that a hurricane with wind speeds exceeding 90 MPH were to occur, an Alert would be declared due to either the tornado or the hurricane. The occurrence of either, or both conditions warrants the declaration of an Alert.

SHNPP Flowpath Stop 107, 108, 109	NUREG-0654 EAL SITE EMERGENCY ITEM 16a, 16b
107. AIRCRAFT CRASH, MISSILE IMPACT OR UNPLANNED EXPLOSION INSIDE PA? 108. PLANT IN COLD SHUTDOWN? 109. SAFETY RELATED EQUIP OR STRUCTURE AFFECTED?	Other hazards being experienced or projected with plant not in cold shutdown. a. Aircraft crash affecting vital structures by impact or fire. b. Severe damage to safe shutdown equipment from missiles or explosion.

EXPLANATION

If an aircraft crash, missile impact or an unplanned explosion inside of the Protected Area (PA) occurs which affects safety related equipment, and the plant is not in cold shutdown, a Site Emergency is declared. This is done regardless of how the safety related equipment is affected (fire, explosion, etc.). This is in keeping with the intent of the NUREG items being addressed.

SHNPP Flowpath Step 110, 111, 112	NUREG-0654 EAL SITE EMERGENCY ITEM 16c
110. UNCONTROLLED OR UNPLANNED RELEASE OF TOXIC OR FLAMMABLE GAS INTO PA? 111. RELEASE ENDANGERING PERSONNEL OR OPERABILITY OF ESF EQUIP? 112. PLANT IN COLD SHUTDOWN?	Other hazards being experienced or projected with plant not in cold shutdown. c. Entry of uncontrolled flammable gases into vital areas. Entry of uncontrolled toxic gases into vital areas where lack of access to the area constitutes a safety problem.

EXPLANATION

If any flammable or toxic gas is released into the Protected Area which would endanger personnel (this would inhibit operation of the facility in a controlled manner) or which would affect any safety related equipment, then a Site Emergency is declared if the plant is NOT in cold shutdown.

SHNPP Flowpath Step 117, 118, 121, 122	NUREG-0654 EAL SITE EMERGENCY ITEM 17
117. MALFUNCTION RESULTING IN UNCONTROLLABLE BORON DILUTION? 118. IN MODE 6 LASTING LESS THAN 45 MINS? 121. ANY PLANT CONDITION WARRANTS ACTIVATION OF OFFSITE EMERG. CENTERS AND MONITORING TEAMS? 122. ANY PLANT CONDITION WARRANTS PRECAUTIONARY NOTIFICATION TO THE PUBLIC.	Other plant conditions exist that warrant activation of emergency centers and monitoring teams or a precautionary notification to the public near the site.

EXPLANATION

SHNPP has determined, by reviewing the FSAR, that a malfunction which results in boron dilution during refueling and lasts for greater than 47 minutes could result in an unplanned and uncontrolled criticality (45 minutes was chosen due to human factor concerns). This was added to the EAL Network in addition to the major damage to fuel listed under item 10. This event could result in fuel damage, with the Reactor Vessel head removed, resulting radioactive release in the long term and warrants an early declaration of a Site Emergency.

Step 121 and 122 allow the Site Emergency Coordinator to declare a Site Emergency when he feels that it is warranted, based on his judgment. This is done because every conceivable set of circumstances, that would warrant a Site Emergency, cannot be predicted.

SHNPP Flowpath Step 114, 115, 116	NUREG-0654 EAL SITE EMERGENCY ITEM 18
114. CONTROL ROOM EVAC REQUIRED OR ANTICIPATED? 115. AUX CONTROL PANEL (ACP) OPERATIONAL? 116. CONTROL ROOM EVACUATED FOR LESS THAN 15 MINUTES?	Evacuation of Control Room and control of shutdown systems not established from local stations in 15 minutes.

EXPLANATION

If the Control Room must be evacuated, control is shifted to the Auxiliary Control panel (ACP) which contains all of the controls needed to maintain the plant in Hot Shutdown or to conduct a controlled cooldown to Cold Shutdown. If the Control Room is evacuated and the Auxiliary Control panel is not in operation within 15 minutes, a Site Emergency is declared.

GENERAL EMERGENCY
CLASSIFICATION

EXAMPLE INITIATING CONDITIONS: GENERAL EMERGENCY

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SHNPP Flowpath Step 91, 92	NUREG-0654 EAL GENERAL EMERGENCY ITEM 1a
91. MEASURED WHOLE BODY DOSE RATE LESS THAN 1 R/HR AT EAB (EXCLUSION AREA BOUNDARY). 92. I-131 EQUIV CONC LESS THAN 1.46 E^{-6} uCi/cc AT EAB.	Effluent monitors detect levels corresponding to 1 rem/HR W.B. or 5 rem/HR thyroid at the site boundary under actual metrological conditions.

EXPLANATION

If either of the above levels are exceeded, a General Emergency is declared.

A measurement of 1.46 E^{-6} uCi/cc at the Exclusion Area Boundary is the equivalent of a dose rate, to the thyroid of 5 rem/HR. The information is provided in this manner because it does not require conversion and can quickly be reported to the Site Emergency Coordinator, in this form.

SHNPP Flowpath Step 80, 81	NUREG-0654 EAL GENERAL EMERGENCY ITEM 1b
80. PROJECTED DOSE RATE LESS THAN 1 REM/HR (WB) AT EAB? 81. PROJECTED DOSE RATE LESS THAN 5 REM/HR (THYROID) AT EAB?	These dose rates are projected based on other plant parameters (e.g., radiation levels in containment with leak rate appropriate for existing containment pressure with some confirmation from effluent monitors) or are measured in the environs.

EXPLANATION

Projected Dose Calculations are performed in accordance with PEP-343 or PEP-341. If the levels of 1 REM/HR (WB) or 5 REM/HR (Thyroid) are exceeded, a General Emergency is declared.

SHNPP Flowpath Step 45	NUREG-0654 EAL GENERAL EMERGENCY ITEM 2
45. 3 FPB's (FISSION PRODUCT BARRIERS) BREACHED/JEOPARDIZED?	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).

EXPLANATION

Refer to the analysis of the Fission Product Barriers for a detailed analysis of each barrier. the NUREG requires that if two barriers are breached and a potential exists for a loss of the third fission product barrier, a General Emergency should be declared. The plant has taken the position that if all three barriers are intact, but the potential exists for all of them to breach, a General Emergency Classification is warranted. Therefore, SHNPP considers a jeopardized (not yet breached) barrier as being in the same category as a breached barrier for emergency classification purposes. At the other end of the spectrum, if all barriers are breached, a General Emergency classification is obviously warranted.

SHNPP Flowpath Step 66, 67	NUREG-0654 EAL GENERAL EMERGENCY ITEM 3
66. SECURITY EMERGENCY AS DEFINED BY THE SECURITY PLAN? 67. LOSS OF PHYSICAL CONTROL OF THE PLANT?	Loss of physical control of the facility.

EXPLANATION

Complies with NUREG 0654.
If the answer to Question 66 is YES, then proceed to Step 67. If the answer is NO, you skip to Step 70. If Question 67 is answered as YES, then declare a General Emergency. If the response if NO, then Question 68 is evaluated for declaration of Alert or Site Emergency.

SHNPP Flowpath Step NONE

NUREG-0654 EAL GENERAL EMERGENCY ITEM 4

Other plant conditions exist, from whatever source, that make release of large amounts of radioactivity in a short period possible, e.g., any core melt situation. See the specific PWR and BWR sequences below. [PWR sequences, only, apply to SHNPP].

NOTES:

a. For core melt sequences where significant releases from containment are not yet taking place and large amounts of fission products are not yet in the containment atmosphere, consider 2 mile precautionary evacuation. Consider 5 mile downwind evacuation (45° to 90° sector) if large amounts of fission products (greater than gap activity) are in the containment atmosphere. Recommend sheltering in other parts of the plume exposure Emergency Planning Zone under this circumstance.

b. For core melt sequences where significant releases from containment are not yet taking place and containment failure leading to a direct atmospheric release is likely in the sequence but not imminent and large amounts of fission products in addition to noble gases are in the containment atmosphere, consider precautionary evacuation to 5 miles and 10 mile downwind evacuation (45° to 90° sector).

c. For core melt sequences where large amounts of fission products other than noble gases are in the containment atmosphere and containment failure is judged imminent, recommend shelter for those areas where evacuation cannot be completed before transport of activity to that location.

SHNPP Flowpath Step NONE	NUREG-0654 EAL GENERAL EMERGENCY ITEM 4
(continued)	d. As release information becomes available, adjust these actions in accordance with dose projections, time available to evacuate and estimated evacuation times given current conditions.

EXPLANATION

Notes a, b, and c refer to core melt situations (Generic). Note d is general information and applies to any classification.

The notes are addressed by the Analysis of Fission Product Barriers. If a core melt situation exists, it will be addressed by the Fission Product Barrier analysis, at the beginning of the Flow Chart (Steps 1 thru 47).

In the Emergency Action Level Network, a potential loss of any of the fission product barriers (jeopardized) is treated the same as a breached fission product barrier. for the purposes of Emergency Classification, this is an appropriate and conservative treatment of fission product barrier breaches.

SHNPP Flowpath Step 45	NUREG-0654 EAL GENERAL EMERGENCY ITEM 5a
45. 3 FPB's BREACHED/JEOPARDIZED?	Example PWR Sequences: a. Small and large LOCA's with failure of ECCS to perform leading to severe core degradation or melt in from minutes to hours. Ultimate failure of containment likely for melt sequences. (Several hours likely to be available to complete protective actions unless containment is not isolated).

EXPLANATION

The Fission Product Barrier Analysis explains the reasoning used to determine if a loss of one or more barriers. This would be the case if a LOCA occurred with the RCS activity at 300 uCi/cc which would indicate fuel damage, or the CSFST's indicated a fuel breach/jeopardy event. Containment would indicate breach/jeopardy event. Containment would indicate breach/jeopardy if the pressure reached 3 PSIG which would occur if the LOCA exceeded the capacity of the CSIP's. The containment sump would also indicate a LOCA of this level because it will start to increase once 25,000 gals. enter the sump. This would occur in short order if a LOCA occurred that exceeded the capacity of the charging pumps. Therefore, early into the event, all three FPB's would indicate breached/jeopardy.

SHNPP Flowpath Step 54, 55, 56, 57	NUREG-0654 EAL GENERAL EMERGENCY ITEM 5b
54. LOSS OF POWER? 55. 1A-SA OR 1B-SB ENERGIZED? 56. LESS THAN 222.5 KPPH FEED FLOW AVAILABLE? 57. FULL RANGE RVLIS LEVEL LESS THAN 62%?	Example PWR Sequences: b. Transient initiated by loss of feedwater and condensate systems (principal heat removal system) followed by failure of emergency feedwater system for extended period. Core melting possible in several hours. Ultimate failure of containment likely if core melts.

EXPLANATION

The Fission Product Barrier portion of the flow paths looks at a loss of Heat Sink which would result in a core melt situation. To incorporate the specific event of a complete and sustained loss of feedwater supply to the Steam Generators, the above steps were added.

Under normal and Tech. Spec. LCO conditions, the only way to incur a complete and sustained loss of all available feedwater flow, to the Steam Generators, is to lose the Steam Driven AFW pump and lose electrical power at the same time. This series of decision blocks checks to see if AC power is available. If AC power is not available, (1A-SA and 1B-SB Emergency Busses are deenergized) then the possibility of a total loss of feedwater exists. The question then becomes "IS A TOTAL OF 222.5 KPPH OF FEED FLOW AVAILABLE?" If the answer is YES, then a total loss of feed flow has not occurred because the EOP Setpoint Study has calculated (under the guidance of the Westinghouse Owners Group) that this is sufficient flow to ensure that a heat sink exists.

If this flow does not exist, then a General Emergency is declared as soon as RVLIS indicates that the Fuel FPB is in jeopardy. In a situation where a total loss of AC power is coupled with a total loss of feedwater flow, this will happen quickly and can only be mitigated by a restoration of feedwater flow and AC power.

SHNPP Flowpath Step 48, 49, 50	NUREG-0654 EAL GENERAL EMERGENCY ITEM 5c
48. ATWS? 49. MANUAL REACTOR TRIP SUCCESSFUL? 50. FUEL FPB BREACHED?	c. Transient requiring operation of shutdown systems with failure to scram which results in core damage or additional failure of core cooling and makeup systems (which could lead to core melt).

EXPLANATION

If an ATWS occurs and a Manual Reactor Trip is unsuccessful, then the question becomes whether or not the core has been damaged. This is handled by asking if the Fuel FPB has been breached. If the answer is YES, then a General Emergency is declared.

SHNPP Flowpath Step 54, 55, 56, 57	NUREG-0654 EAL GENERAL EMERGENCY ITEM 5d
54. LOSS OF POWER? 55. 1A-SA OR 1B-SB ENERGIZED? 56. LESS THAN 222.5 KPPH FEED FLOW AVAILABLE? 57. FULL RANGE RVLIS LEVEL LESS THAN 62%?	Example PWR Sequences: c. Failure of offsite and onsite power along with total loss of emergency feedwater makeup capability for several hours. Would lead to eventual core melt and likely failure of containment.

EXPLANATION

The Fission Product Barrier portion of the flow paths looks at a loss of Heat Sink which would result in a core melt situation. To incorporate the specific event of a complete and sustained loss of all electrical power along with loss of feedwater, the above steps were added.

Under normal and Tech. Spec. LCO conditions, the only way to incur a complete and sustained loss of all available feedwater flow to the Steam Generators, is to lose the Steam Driven AFW pump and lose electrical power at the same time. This series of decision blocks checks to see if AC power is available. If AC power is not available (1A-SA and 1B-SB Emergency Busses are deenergized) then the possibility of a total loss of feedwater exists.

The Question then becomes "IS A TOTAL OF 222.5 KPPH OF FEED FLOW AVAILABLE?" If the answer is YES, then a total loss of feed flow has not occurred because the EOP Setpoint Study has calculated (under the guidance of the Westinghouse Owners Group) that this is sufficient flow to ensure that a heat sink exists.

If this flow does not exist and RVLIS indicates the start of core uncovery, then a General Emergency is declared. The amount of time that all feed flow is lost is not specifically addressed, because, in the plants opinion the event of a total loss of feedwater warrants a General Emergency declaration as soon as RCS inventory is depleted to the point that core uncovery is imminent.

SHNPP Flowpath Step 1, 15, 29	NUREG-0654 EAL GENERAL EMERGENCY ITEM 5e
1. WAS ENTRY POINT AT T? 15. WAS ENTRY POINT AT U? 29. WAS ENTRY POINT AT V?	Example PWR Sequences: e. Small LOCA and initially successful ECCS. Subsequent failure of containment heat removal systems over several hours could lead to core melt and likely failure of containment.

EXPLANATION

Entry Points T, U, and V are EOP Network entry points. If plant conditions degrade during an off-normal event, the EOP Network directs entry into the EAL Network to reevaluate the current Emergency Classification. This is done regardless of the initiating event or the initial performance of ECCS.

Therefore, an initially successful ECCS performance and subsequent loss of control of the event would cause a reevaluation of the Fission Product Barrier status as well as the rest of the EAL Network.

The EOP's direct an entry into the EAL Network any time that a loss of: 1) the FUEL FPB; 2) the RCS FPB; or 3) the containment FPB is anticipated. By integrating the EOP's in this fashion, a slow degradation of the Fission Product Barriers can be anticipated resulting in a new evaluation of the Emergency Action Level.

SHNPP Flowpath Step 120	NUREG-0654 EAL GENERAL EMERGENCY ITEM NONE
120. ANY CONDITION WARRANTING RECOMMENDATION TO EVACUATE OR SHELTER THE PUBLIC?	

EXPLANATION

If all else fails, the Site Emergency Coordinator can declare a General Emergency if he feels that it is warranted. This option is added because no one can predict all possible sequence of events that would call for a General Emergency Declaration. The Site Emergency Coordinator must have the flexibility to make this declaration, if he feels that it is warranted. It is always better to be safe than sorry. This statement gives him the necessary flexibility.

ATTACHMENT 2
SUMMARY OF CONTENT CHANGES
TO EMERGENCY ACTION LEVELS

This revision to the Emergency Action Levels is essentially a revision in format and presentation of the existing emergency action levels. However, some content differences exist, and they are discussed below.

1. The emergency action levels for the condenser vacuum pump effluent treatment system radiation monitor and turbine building stack monitor were deleted. This emergency action level corresponded to a steam generator tube leak and normal activity in the RCS. The reason that this emergency action level was deleted is that it is too complicated and time consuming to determine whether the level is exceeded and is redundant to the existing emergency action level of a steam generator pressure greater than 1230 psig and a steam generator level greater than 82.4%. In order to properly establish an emergency action level based upon a turbine vent stack monitor reading, the current RCS activity must be known since the turbine stack monitor reading is a function of two variables, RCS activity and steam generator tube leakage rate. While the leak rate can be established into the action level, the activity in the secondary side can only be determined as a function of primary activity. Further, because the wide range turbine building stack monitor responds only to noble gas activity, a noble gas equivalent to the normally reported I-131 activity is needed, which is multiplied by 1500 to determine the actual emergency action level. The noble gas equivalent to an iodine activity is not calculated on a routine basis and in the event of a tube break would result in an event classification long after the steam generator level and pressure showed that a tube leak has occurred.

2. "Redundant containment isolation valves verified not closed after a containment isolation signal and manual valves or blind flange have not been used to isolate the penetration" has been changed to "containment penetrations isolable per Tech Specs" with a further clarification that containment isolation signals or other barrier breaches have occurred. The purpose of this change is to more closely agree with NUREG-0654, Appendix 1, which states that a loss of containment integrity alone is an Unusual Event. However, if a containment isolation signal is generated in response to an event, or a breach of another fission product barrier has occurred, a loss of containment integrity is a very serious condition and warrants consideration of the containment barrier as breached, and warrants a higher emergency classification than would otherwise occur. The net effect of this change is to avoid an unnecessary declaration of an Alert due entirely of a temporary loss of containment

ATTACHMENT 2
SUMMARY OF CONTENT CHANGES
TO EMERGENCY ACTION LEVELS
(continued)

integrity in the absence of any accident sequence occurring. PEP-100 contains a definition of containment integrity to include failures of redundant containment isolation valves and other failures in the containment boundary.

3. The following emergency action levels have been removed as redundant to "Initiation of any plant shutdown required by Technical Specification," which remains:

   - Loss of Containment Integrity requiring shutdown by the SHNPP Technical Specification 3.6.

   - Loss of ESF requiring shutdown by the SHNPP Technical Specification; (e.g., because of malfunction, personnel error, or procedural inadequacy).

   - Loss of Fire Protection System function requiring shutdown by the SHNPP Technical Specification 3.7.10.

   - Other plant conditions exist that . . . require plant shutdown under SHNPP Technical Specification.

   - Loss of inputs from instrumentation included in the SHNPP Technical Specification 3.3 "Instrumentation to an extent requiring plant shutdown.

   The deleted emergency action levels are entirely encompassed by the "initiation of a shutdown" emergency action level which is based upon 10CFR50.72 wording and invokes an Unusual Event declaration regardless of cause. The operating staff is taught to declare the Unusual Event when power begins to be reduced in response to any LCO requiring shutdown. While it is true that NUREG-0654 requires only a subset of Technical Specification shutdowns be declared as Unusual Events, the plant prefers the simplicity of declaring any such event. Further, the simplification of the Unusual Event matrix in this area will reduce confusion in interpretation inevitably caused by addressing the same issue six different ways. Also Technical Specification 3.7.10 no longer exists and all references to the Fire Protection and Detection Systems have been removed from the Technical Specifications.

4. The site emergency action level for fuel handling accidents in the Fuel Handling Building has been reduced from 723 mR/HR to a conservative value of 700 mR/HR to improve human factors considerations.

ATTACHMENT 2
SUMMARY OF CONTENT CHANGES
TO EMERGENCY ACTION LEVELS
(continued)

5. The earthquake emergency action levels have been more specifically defined to be consistent with current abnormal operating procedures.

6. An additional question has been added to evaluate tornados on site.

7. The fuel handling accident action level in the old flow chart was combined with the old Attachment 3 values.

8. Specific values have been inserted for the "top of irradiated fuel," "all on-site ESF DC," environmental monitoring iodine levels, and "most/all" control board alarms.

9. The alert level for effluent release was clarified to be ten times specific effluent alarm setpoints since those setpoints are based on ODCM calculations to be the maximum allowable Technical Specifications release rate.

10. Changes were made to the functions required for shutdown table as follows:

    a. The capability to maintain ambient air temperature < 120°F in required equipment areas was deleted. The ambient air temperature in shutdown areas is a Technical Specifications operability consideration. Only if the functional capability of the systems in this table is lost should an emergency be declared based on a loss of shutdown function. If a system is declared inoperable due to high air temperature, an Unusual Event will be declared if shutdown of the plant begins.

    b. The control room panel or auxiliary control panel was deleted as redundant to all other systems in the table. The control room and auxiliary control panel are used to control these same systems. If both are lost, then so are the systems. Further, this is redundant to the control room evacuation action levels.

    c. Steam dump or PORV capability was more broadly defined as secondary heat sink capability.

    d. Normal or emergency lighting was redefined as lighting in areas required for shutdown.

    e. Pressurizer heaters were redefined as RCS pressure control capability.

    f. Accumulator isolation valves were redefined as accumulator isolation capability.

ATTACHMENT 2
SUMMARY OF CONTENT CHANGES
TO EMERGENCY ACTION LEVELS
(continued)

11. The Unusual Event, "Failure to Comply with the SHNPP Technical Specifications Instantaneous Limits in 3.11 for Gaseous Effluents or Liquid Effluents" has been changed to a valid high alarm received on plant effluent monitors. These alarm setpoints are determined to avoid exceeding Technical Specifications. The identity of the monitors are specifically defined in EAL Table 5.

12. The Unusual Event, "Main Steam or Feedwater Break: 1) Inside Containment, 2) Outside Containment ..." has been condensed to "Main Steam or Feedwater Break."

13. The fire emergency action levels have been more clearly defined to state "ESF" equipment, changing "potentially affecting" to "may affect," and changing "loss" to "complete loss."

14. Under the old "loss of power," it was unclear as to whether the "Greater than 15 minutes" pertained to "Loss of AFW" or "Either Emergency Bus Energized." This has been clarified in the new logic. Further, "Loss of AFW" was changed to the generic "less than 222.5 KPPH Feed Flow Available."

15. "Other condition warranting recommendation of evacuation or sheltering to be taken by the public" has been clarified to "Other radiological condition..." to avoid declaring a general emergency based on nonradiological events already covered elsewhere in the emergency action levels. For example, a nonradiological transportation accident on the public road near the plant would routinely be handled by the County authorities and would possibly be declared an Unusual Event if within the EAB.

16. The Unusual Event, "In excess of the SHNPP Technical Specifications 3.4.6," and "Primary to Secondary System Leakage in excess of the SHNPP Technical Specification 3.4.6" was changed to "Loss of Reactor Coolant or Primary to Secondary System Leakage in excess of Technical Specification 3.4.6.2."

17. "CSF-3 Red" has been removed as an RCS Jeopardy determination for three reasons:

    a. The third critical Safety Function Tree (CSF-3) gives a red output when less than 222.5 KPPH feed flow is available to the steam generators. This condition alone is not a jeopardy to the reactor coolant system.

ATTACHMENT 2
SUMMARY OF CONTENT CHANGES
TO EMERGENCY ACTION LEVELS
(continued)

b. The lack of 222.5 KPPH feed flow is already covered under loss of a function required for Modes 3, 4, and 5 and would be declared an Alert or Site Emergency based on plant conditions.

c. The lack of 222.5 KPPH feed flow is covered again under "1A-SA or 1B-SB Energized."

18. In the translation of the old PEP-101, Attachment 3 from tabular format to flow chart format, the question of steam pressure being greater than 980 psig when the main steam line monitors are reading 20 mR/hr or greater is relevant only to fuel breach. If the steam pressure is less than 980 psig, the activity is concentrating in the steam generators and only an RCS breach can be determined for certain. If the steam pressure is greater than 980 psig, then there is steam flow, and a fuel breach can be assumed as well. Also, the main steam pressure was lowered from 985 psig to 980 psig to improve human factors considerations.