UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET, SW, SUITE 23T85
ATLANTA, GEORGIA 30303-8931

July 30, 2007

South Carolina Electric & Gas Company
ATTN: Mr. Jeffrey B. Archie
Vice President, Nuclear Operations
Virgil C. Summer Nuclear Station
P. O. Box 88
Jenkinsville, SC 29065

SUBJECT: PUBLIC MEETING SUMMARY - VIRGIL C. SUMMER NUCLEAR STATION - DOCKET NO. 50-395

Dear Mr. Archie:

This refers to the meeting conducted at your staff's request at the Region II Office in Atlanta, Georgia on July 16, 2007, at 10:30 a.m. The purpose of the meeting was to discuss the significance of the Apparent Violation (AV) documented in Inspection Report No. 50-395/2007-502. The AV involved changes made to your emergency plan that may have decreased the effectiveness of the plan and failed to maintain a standard emergency classification scheme.

Your presentation at the meeting (Enclosure 2) included a general discussion of the changes made to your emergency plan over the last 26 years; a discussion of the elements of a NUREG-0654 standard emergency classification scheme; a discussion of the decrease in effectiveness portion of the AV for three emergency action levels (EAL) identified in the inspection report; and a discussion of the EAL added to your emergency plan to address reduced inventory events. As you presented at the meeting, you concluded that the standard NUREG-0654 EAL scheme was not affected by your revisions to the detection methods for EALs 301, 401, and 411. You agreed that the addition of EAL 397 created a non- standard scheme. You also concluded that the changes to the EALs cited in the inspection report did not decrease the effectiveness of your emergency plan. You also committed to provide us with a corrective action plan by August 17, 2007. The information you presented at the meeting will be considered in making a decision. On July 24, 2007, you submitted decrease in effectiveness reviews for the EALs discussed during the meeting (Enclosure 3).

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS).

ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Brian R. Bonser, Chief
Plant Support Branch 1
Division of Reactor Safety

Docket No.: 50-395
License No.: NPF-12

Enclosures:
1. List of Attendees
2. Meeting Presentation - EAL Apparent Violation
3. Decrease In Effectiveness Reviews

cc w/encl:
R. J. White
Nuclear Coordinator Mail Code 802
S.C. Public Service Authority
Virgil C. Summer Nuclear Station
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David A. Lavigne, General Manager
Organization Development
South Carolina Electric & Gas Company
Vigil C. Summer Nuclear Station
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LIST OF ATTENDEES

South Carolina Electric & Gas Company - Virgil C. Summer Nuclear Station

J. Archie, Vice President, Nuclear Operations
R. Fowlkes, General Manager, Engineering Services
D. Gatlin, General Manager, Nuclear Plant Operations
D. Goldston, Operations Administrative Supervisor
B. Thompson, Manager Nuclear Licensing
R. Williamson, Supervisor, Emergency Services
S. Zarandi, General Manager, Nuclear Support Services
A. Cribb, Nuclear Licensing Supervisor *
J. Knox, Emergency Planning Specialist *
R. White, S.C. Public Service Authority Nuclear Coordinator *

Nuclear Regulatory Commission

W. Travers, Regional Administrator, Region II
K. Kennedy, Deputy Director, Division of Reactor Safety (DRS), RII
J. Olmstead, Acting Regional Counsel and Enforcement Officer, RII
B. Bonser, Chief, Plant Support Branch 1, RII
L. Miller, Senior Emergency Preparedness Inspector, RII
J. Kreh, Emergency Preparedness Inspector, RII
R. Trojanowski, Senior Regional Government Liaison Officer, RII
S. Sparks, Senior Enforcement Specialist, RII
John Zeiler, Summer NRC Senior Resident Inspector *
R. Kahler, NSIR *
M. Norris, NSIR *
D. Johnson, NSIR *
R. Schmitt, NSIR *

Members Of The Public

Larry Garner

* Participated by telephone

EAL Apparent Violation

NRC Inspection Report
395/2007502

AGENDA

- Opening Remarks
- Discussion of Apparent Violation
- Standard EAL Schemes
- Decrease in Effectiveness Discussion
- Closing Remarks

Opening Remarks

Dan Gatlin

Plant Manager

Opening Remarks

- **SCE&G has made significant improvements to the Emergency Plan over the years**
  - Most changes were made to detection methods to assure timely recognition and classification of emergency situations
  - Changes were based on simulator experience, improved instrumentation, and improved understanding of accident progression (48 revisions in 26 years, currently on Rev 53)
  - Numerous NRC-SCE&G Interactions

Opening Remarks

- **SCE&G review of "change of standard scheme", and NRC DIE examples**
  - Standard scheme was changed as cited in one example, with the <u>addition</u> of reduced inventory initiating condition, but with good intentions!
  - SCE&G agrees with violation on basis of non-standard scheme
  - Detection Method Changes do not result in a decrease in effectiveness (DIE) for the examples cited

Opening Remarks

- **SCE&G Corrective Actions**
  - Extensive review of all changes back to Rev. 5 in accordance with RIS 2007-01 with results entered into our corrective action program
  - Interim Revision of the Emergency Plan will address our review results and the observations listed in attachment 2 of the inspection report
    - References to EOP steps and transitions will be removed
  - Conversion to NEI 99-01 in progress with submittal planed for third quarter

Apparent Violation

- Two GE and Two SAE EAL changes that:
  - Resulted in a Failure to Maintain a Standard EAL Scheme and/or
  - Decreased the Effectiveness of the Emergency Plan
- Four EAL initiating conditions were cited:

EAL	Scheme Change	DIE
SAE 397	X	
SAE 301	X	X
GE 401	X	X
GE 411	X	X

Standard EAL Schemes

- Three Standard EAL Schemes have been approved by the NRC:
  - NUREG-0654,
  - NUMARC/NESP-007
  - NEI 99-01
- Our Scheme is based on NUREG-0654

Standard EAL Schemes

- Elements of a NUREG-0654 Standard Scheme
  - Emergency classification and action level scheme as set forth in Appendix 1 of NUREG-0654
  - Initiating conditions shall include examples found in Appendix 1
- Detection Methods are not identified in NUREG-0654 as a factor for determining a Standard EAL Scheme (is referenced in NEI 99-01)

Standard EAL Schemes

- NUREG-0654 requires specific instruments, parameters or equipment status shall be shown for each emergency class, in the plant specific emergency procedure
  - Our detection methods (DMs) identify the specific instruments, parameters or equipment status for each emergency class
  - Our DMs have been further enhanced by incorporating instruments, parameters or equipment status as referenced in Emergency Operating Procedures (EOPs)

Standard EAL Schemes

- It is SCE&Gs position that the regulatory requirement to maintain a NUREG-0654 standard scheme is based on maintaining the initiating conditions incorporated in the Emergency Plan approved by the NRC
  - Changes to the Detection methods that ensure the initiating condition is recognized in a timely manner does not create a non-standard scheme
- The standard EAL Scheme has not been affected by revisions to the detection methods of EAL 301, 401 and 411

EAL 397

- Addition to the Standard Scheme
  - SCE&G added two Initiating Conditions to address loss of inventory events during shutdown conditions
  - The NRC cited the addition of EAL 397 as an EAL that was not consistent with the standard EAL schemes, resulting in a non-standard EAL

EAL 397

- Loss Of Residual Heat Removal Flow For More Than 40 Minutes During Half-pipe Operations With Vessel Head Installed And High Head Safety Injection/Charging Unavailable

NRC Basis for AV

- This EAL is not Consistent with the Standard EAL schemes resulting in a Non-Standard EAL

History of EAL 397

- This initiating condition was added as a result of NUREG-1269
  - This Initiating Condition was added as an ALERT by revision 23.
- It was first communicated to the NRC in VCS response to question 9 of Generic Letter 87-12 on September 18, 1987
  - Where VCS committed to clarifying the initiating criteria for the emergency classifications for loss of RHR.

History of EAL 397

- Two initiating conditions were added in revision 23 :
  - NOUE: Loss of RHR flow for more than twenty minutes during half pipe operation with the reactor vessel head installed
  - Alert: Loss of RHR flow for more than forty minutes during half pipe operation with the reactor vessel head installed

History of EAL 397

- During a review of revision 26, the NRC stated that the initiating condition: Loss of RHR flow for more than twenty minutes NOUE met the requirement of an ALERT rather than an NOUE. (Ref: NRC letter dated May 16, 1990 from Douglas M. Collins, Chief Emergency Preparedness and Radiological Protection Branch Division of Radiation Safety and Safeguards)
- As a Result, the NOUE and this ALERT were shifted to an ALERT and a SAE in Revision 27.

History of EAL 397

- The NRC documented their review of Revision 27 and concluded that the changes met the planning standards of 10 CFR 50.47 (b) and the requirements of Appendix E to 10 CFR 50
  - (Ref: NRC letter dated August 29, 1990 from Douglas M. Collins, Chief Emergency Preparedness and Radiological Protection Branch Division of Radiation Safety and Safeguards).
- This EAL is similar to EAL CS2 SAE in NEI-99-01

Standard EAL Schemes

Summary:

- The standard EAL Scheme has not been affected by revisions to the detection methods of EAL 301, 401 and 411
- EAL 397 was added as an enhancement to address PWR reduced inventory events
- SCE&G agrees that the addition of EAL 397 created a non-standard scheme

Decrease in Effectiveness

- We will discuss the decrease in effectiveness portion of the apparent violation in the following order:
  - EAL 301
  - EAL 401
  - EAL 411

Decrease in Effectiveness

- A change in an emergency preparedness requirement that results in the degradation or loss:
  - of the capability to perform a function or
  - perform a function in a timely manner, as contained in the emergency plan.

EAL 301

- Known LOSS-OF-COOLANT ACCIDENT (LOCA) Greater than Charging Pump Capacity

  As the NRC stated this initiating condition remained essentially the same between revisions 5 and 53.

- This EAL maintains a Standard scheme.

NRC Basis for AV

- The changes to the EAL may increase the number of classifiable SAE events.
- The detection methods which are reliant on an EOP transition point or entry point could result in a delay in making the SAE declaration

301 - Known LOSS-OF-COOLANT ACCIDENT (LOCA) Greater than Charging Pump Capacity Detection Methods

Rev. 5

Pressurizer low pressure reactor trip; and

Pressurizer low pressure safety injection signal, and RM-A2 high alarm; and

High Reactor Building Sump level; and

High Reactor Building humidity; and

High Reactor Building pressure.

Rev. 53

ANY of the following indications (1 OR 2 OR 3 OR 4):

1) Evaluate the following indications to determine if a LOCA condition exists (similar to EOP-1.0):
   a. Pressurizer low pressure reactor trip.
   b. Pressurizer low pressure safety injection.
   c. Reactor Building pressure ≥ 1.5 psig,
   d. Abnormal Reactor Building sump level,
   e. RBCU Drain Flow High,
   f. Abnormal radiation levels on RM-A2 or RM-G7, or RM-G18.

301 - Known LOSS-OF-COOLANT ACCIDENT (LOCA) Greater than Charging Pump Capacity Detection Methods

Rev. 53

- - - - - - - - - - - OR - - - - - - - - - - - -

2. Direct Entry into EOP-2.0 from EOP-1.0 due to the RCS NOT Being Intact.

- - - - - - - - - - - - OR - - - - - - - - - - - -

3. Stuck Open and Unisolable Pressurizer PORV or Safety Valve Leading to Pressurizer Relief Tank Rupture.

- - - - - - - - - - - - OR - - - - - - - - - - - -

4. Initiating Bleed and Feed per EOP-15.0. (Refer to Initiating Condition 411 for possible escalation.)

301 - Known LOSS-OF-COOLANT ACCIDENT (LOCA) Greater than Charging Pump Capacity

- The DM changes do not cause an increase in the number of classifications:
  - DM in Rev 5 and in the current 1ST DM are essentially the same, yet have been enhanced as follows:
    - Additional Radiation Monitors were added to allow diversity since RM-A2 isolates on an SI
    - Abnormal RM indications versus High alarm was added since a small break LOCA may not cause the RM to reach alarm setpoint
    - RB pressure ≥1.5 psig was added to provide a quantitative value for high RB pressure (above Tech Spec limit)
    - RBCU drain Flow High provides the indication of humidity in the Reactor Building.
- These additions clarify the DM without causing additional inappropriate classifications

301 - Known LOSS-OF-COOLANT ACCIDENT (LOCA) Greater than Charging Pump Capacity

- EOP transitions do not delay the classification:
  - If the indications in DM 1 are met, the classification is made without "delay"
  - Detection Methods 2, 3, and 4 are "**OR**" DMs that provide additional guidance.
    - DM 2 is the EOP transition from 1.0 to 2.0 due to a LOCA. This transition occurs within 10 minutes of the SI
    - DM 3 and 4 remind the operator that a stuck open safety or PORV is a LOCA greater than charging pump capacity
  - DM 2, 3, and 4 do not delay the classification

301 - Known LOSS-OF-COOLANT ACCIDENT (LOCA) Greater than Charging Pump Capacity

Conclusion:

- SCE&G maintains that the current wording in EAL 301 has not caused a decrease in effectiveness of the plan
  - This Initiating Condition was run on the simulator 44 times with 44 timely and accurate classifications in the last three years

EAL 401

- Small And Large LOCAs With Failure Of ECCS To Perform Leading To Severe Core Degradation Or Melt
  - As the NRC stated this initiating condition remained essentially the same between revisions 5 and 53.
- This EAL maintains a Standard scheme.

NRC Basis for AV

- The revised EAL applied more restrictive criteria to when the EAL would be met and:
  - could reduce the number of classifiable events <u>or</u>
  - could delay the GE declaration

401 - Small And Large LOCAs With Failure Of ECCS To Perform Leading To Severe Core Degradation Or Melt

Detection Methods

Rev 5

Safety injection signal with reactor trip; and

1) Status lamps indicate safety injection system and RHR pumps not running: or
2) Flow indicators for Safety Injection Systems read zero; and
RMG-5, RMG-7, RMG-I8, high alarm; and RM-A2 high alarm

Rev 53

Failure of **BOTH** of the following after depressurizing the RCS to < 140 psig per EOP-14.0.

Failure of (1 AND 2):

- -

1. High Head Injection Flow
   AND
2. Low Head Injection Flow

EAL 401 Background

- The current DMs focus control room personnel to the Failure of the High head and Low Head SI
- EOP-14.0 for inadequate core cooling would be in progress
  - Entry conditions for EOP-14 are precursors for core damage and high RB radiation
- Low head Injection will inject only after RCS has been depressurized below 140 psig

EAL 401

- The DM changes do not reduce the number of classifiable events:
  - Our detection methods ensure the initiating condition of loss of high head and low head SI are determined prior to the declaration
- The DM changes do not delay the declaration:
  - The dynamics of a SBLOCA and a LBLOCA are not the same, therefore the declaration time will be different.
    - The RHR pump status during a LBLOCA will be readily determined because the RCS will be depressurized
    - During a SBLOCA the RCS must be depressurized to determine the RHR pump status
    - This results in a timely and accurate classification

EAL 401

- Conclusions:
  - SCE&G maintains that the current wording for the DM in EAL 401 has not caused a decrease in effectiveness of the plan

EAL 411

- 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.
  - As the NRC stated the Initiating Condition for EAL number 411 remained essentially the same between Revisions 5 and 53
- This EAL maintains a Standard scheme.

NRC Basis for AV

- The revised EAL applied more restrictive criteria to when the EAL would be met and could:
  - reduce the number of classifiable events

    <u>or</u>
  - could delay the GE declaration

411 - Transient Initiated by Loss of Feedwater and Condensate Systems followed by Failure of Emergency Feedwater System for extended period. Core melting possible in several hours.

Rev 5

Reactor trip on low feedwater flow; and Decreasing wide-range steam generator levels toward off-scale low on all steam generators; and

1) Emergency feedwater flow indicators indicate zero flow 2 min. after required; or
2) Status lamps indicate emergency feedwater pumps not running 2 min. after required; and Emergency feedwater cannot be restored within 30 min.

Rev 53

ALL of the following exists (1 AND 2):

- -

1. Inability to Establish Bleed and Feed Cooling when required per EOP-15.0

- - - - - - - - - - AND - - - - - - - - - - - -

2. Core Exit Temperatures > 700°F.

411 - Transient Initiated by Loss of Feedwater and Condensate Systems followed by Failure of Emergency Feedwater System for extended period. Core melting possible in several hours.

- The original detection method was based on time EFW was not available
- It did not take into consideration actions in EOP-15.0 for:
  - restoring feedwater and condensate system flow to the S/Gs or
  - Establishing bleed and feed core cooling to prevent possible core melting in several hours

411 - Transient Initiated by Loss of Feedwater and Condensate Systems followed by Failure of Emergency Feedwater System for extended period. Core melting possible in several hours.

- Changes to the DMs did not reduce the number of classifiable events or delay the GE declaration
  - The changes ensured the initiating condition was met prior to the classification

EAL 411

- Conclusions:
  - SCE&G maintains that the current wording in EAL 411 has not caused a decrease in effectiveness of the plan

Summary

- Changes were made focused on improving the emergency plan, and therefore public health and safety
- Detection methods were changed to allow timely and accurate classifications of the NUREG 0654 initiating conditions
- The effectiveness of the emergency plan has been demonstrated through 26 yrs of successful exercises
- Questions

Closing Remarks

Jeff Archie

Vice President

Nuclear Plant Operations

Closing Remarks

- Continuous Improvement has been a cornerstone of VCSNS Success
- Changes to detection methods were enhancements as a result of:
  - Industry and internal lessons learned
  - Technology Improvements
  - Issues identified during simulator exercises

Closing Remarks

- With the exception of the addition of EAL 397, we have maintained a standard scheme consistent with the regulatory requirements of NUREG-0654 for the examples cited
- Our evaluation of each of the cited examples have determined that the examples do not decrease the effectiveness of the plan.
- We do not dispute the violation related to EAL 397

Short Term Corrective Actions

- SCE&G is addressing the underlying issues in RIS 2007-01
  - Each condition identified during our review comparing REV 5 to our current EALs will be dispositioned in accordance with RIS 2007-01
  - Each observation identified in attachment 2 of the inspection report will be dispositioned
  - Reference to specific EOP steps and transitions will be deleted
- SCE&G is requesting enforcement discretion until December 1st 2007, to complete the above proposed corrective actions
  - A corrective action plan will be provided by 8/15/2007

Corrective Actions to Prevent Recurrence

- The station is in the process of transitioning to NEI 99-01
  - Contracted with a recognized industry expert in EAL conversions
  - Draft EALs and bases have been developed and are currently being verified and validated
  - The NEI 99-01 scheme is scheduled to be submitted to the NRC in the 3rd Quarter 2007

VCSNS
50.54(q)

EAL 397
EAL 301
EAL 401
EAL 411

DETERMINATION OF A DECREASE IN THE EFFECTIVENESS OF THE RADIATION EMERGENCY PLAN IN ACCORDANCE WITH 10CFR50.54(q)

DOCUMENT EP-100 REVISION ____ CHANGE ____ DATE 7/13/2007

TITLE: EAL 397 - LOSS OF RESIDUAL HEAT REMOVAL FLOW FOR MORE THAN 40 MINUTES DURING HALF-PIPE OPERATIONS WITH VESSEL HEAD INSTALLED AND HIGH HEAD SAFETY INJECTION/CHARGING UNAVAILABLE.

DIRECTIONS FOR COMPLETING THIS ATTACHMENT:

1. Review all statements in subsections 1.1 and 1.2 and check applicable boxes if the statement applies. Circle DOES or DOES NOT as appropriate.
2. Complete one subsection of section 2.0 for each box checked in sub-section 1.1 or 1.2. (Additional copies of page 3 may be used, if necessary).
3. Complete section 3.0. Provide amplifying information in section 4.0.
4. Answer the questions in section 5.0. Sign and date the form on line 5.4 and attach completed form to Procedure Package prior to forwarding package to the Manager, Nuclear Protection Services for signature.
5. PSRC review is required for the Radiation Emergency Plan prior to approval of the revision.

1.0 Effect of the Change on the Radiation Emergency Plan:

1.1 This change (DOES/DOES NOT) affect SECTIONS under 10CFR50.47(b). The following subject areas of 10CFR50.47(b) have been affected:

- ☐ (1) Assignment of Emergency Response Organization responsibilities.
- ☐ (2) Assignment of onshift Emergency Response Organization personnel.
- ☐ (3) Arrangements for utilizing State or Local resources and staff.
- ☒ (4) Emergency Classification and Action Levels, including facility system, and effluent parameters.
- ☐ (5) Notification of State and Local agencies, the Emergency Response Organizations, and the public.
- ☐ (6) Communications between State and Local agencies, the Emergency Response Organizations, and the public.
- ☐ (7) Coordination with the public through periodic dissemination of information.
- ☐ (8) Adequacy of emergency facilities and equipment.
- ☐ (9) Adequate methods, systems, and equipment for offsite response to a radiological emergency.

- ☐ (10)Plume exposure pathway EPZ protective actions.
- ☐ (11) Emergency worker's radiological exposure.
- ☐ (12) Medical services for contaminated injured individuals.
- ☐ (13) Reentry and Recovery plans.
- ☐ (14) Emergency response periodic exercises.
- ☐ (15) Radiological emergency response training.
- ☐ (16) Plan development, review, and distribution.

1.2 This change (DOES/DOES NOT) affect sections under 10CFR50, Appendix E. The following subject areas of 10CFR50, Appendix E, have been affected:

- ☐ (I), (II), (III) Radiation Emergency Plans as described in the FSAR.
- ☐ (IV)A Organization for coping with radiological emergencies.
- ☐ (IV)B Release of radioactive materials (assessment).
- ☒ (IV)C Activation of Emergency Classification and Action Levels and activation of the Emergency Response Organization.
- ☐ (IV)D Notification of Federal, State and Local agencies, and the public.
- ☐ (IV)E Emergency Facilities and Equipment including communication systems.
- ☐ (IV)F Training on and exercising the Radiation Emergency Plan.
- ☐ (IV)G Maintaining Radiation Emergency Plan and procedures, and the surveillance of equipment and supplies.
- ☐ (IV)H Reentry of facility and recovery following an accident.

2.0 Basis for Determination per 10CFR50.54(q):

For applicable item 10CFR50.47(b) of Section 1.0 above, this change (DOES/DOES NOT) decrease the effectiveness of the Radiation Emergency Plan. This change (DOES/DOES NOT) result in information presented in the Radiation Emergency Plan being no longer true or accurate.
Basis for answer: See attached

For applicable item 10CFR50.Appendix E of Section 1.0 above, this change (DOES/DOES NOT) decrease the effectiveness of the Radiation Emergency Plan. This change (DOES/DOES NOT) result in information presented in the Radiation Emergency Plan being no longer true or accurate.
Basis for answer: See attached

_____

_____

For applicable item 10CFR50.(_____) of Section 1.0 above, this change (DOES/DOES NOT) decrease the effectiveness of the Radiation Emergency Plan. This change (DOES/DOES NOT) result in information presented in the Radiation Emergency Plan being no longer true or accurate.
Basis for answer:_____

_____

_____

_____

For applicable item 10CFR50.(_____) of Section 1.0 above, this change (DOES/DOES NOT) decrease the effectiveness of the Radiation Emergency Plan. This change (DOES/DOES NOT) result in information presented in the Radiation Emergency Plan being no longer true or accurate.
Basis for answer:_____

_____

_____

_____

(Attach additional sheets for Section 2.0, as necessary)

3.0 Determination/Action per 10CFR50.54(q):

3.1 This change (DOES/DOES NOT) decrease the effectiveness of the Radiation Emergency Plan. (If the change does decrease the effectiveness of the Radiation Emergency Plan, then the change shall not be implemented without prior NRC approval).

3.2 This change (DOES/DOES NOT) require a further revision to the Radiation Emergency Plan or the Implementing Procedures. (10CFR50, Appendix E, does NOT require that the NRC be notified of changes to the Radiation Emergency Plan that do not decrease the effectiveness of the Plan prior to implementation).

3.2.1 List any additional Emergency Plan Procedures, forms, or supporting procedures requiring revision as a result of this revision: _____

_____

4.0 Assessment Actions:

4.1 YES ☐ NO ☒ Is the Emergency Action Level scheme changing to another EAL scheme? (If yes submit to NRC for prior approval.)

4.2 YES ☐ NO ☒ Is this an alternate method of complying with the regulations? (If yes submit to NRC for prior approval.)

5.0 Comments:

5.0 Review and Approval:

5.1 YES ☐ NO ☒ Decrease the effectiveness of the Radiation Emergency Plan?

5.2 YES ☐ NO ☒ NRC approval of document required prior to implementing?

5.3 YES ☐ NO ☒ Is a change required to Radiation Emergency Plan or other procedures? (If yes, see Section 3.2.1 above for details.)

5.4 Review completed by: _____ Date: 07/13/07

5.5 Approved by: _____ Date: 7/13/07
Manager, Nuclear Protection Services

EP-100
Revision, 53
Attachment to SAP-0127, Attachment II, Determination of a Decrease in the Effectiveness of the Radiation Emergency Plan in Accordance with 10CFR50.54.q

Description: Comparison of revised detection methods from VC Summer Radiation Emergency Plan Revision 5 to Revision 53.
Reason for Change: To clarify Detection Methods to allow for accurate classification of the Emergency Action Level
Effect of the Changes: This change does affect sections in 10CFR50.47 and 10CFR50, Appendix E.
Basis for the Determination per 10CFR50.54.q:
The purpose of the RHR System in MODE 6 is to remove decay heat and sensible heat from the Reactor Coolant System (RCS), as required by GDC 34, to provide mixing of borated coolant, and to prevent boron stratification. Heat is removed from the RCS by circulating reactor coolant through the RHR heat exchangers where the heat is transferred to the Component Cooling Water System. The coolant is then returned to the RCS via the RCS cold leg(s). Operation of the RHR System for normal cooldown decay heat removal is manually accomplished from the control room. The heat removal rate is adjusted by controlling the flow of reactor coolant through the RHR heat exchanger(s) and the bypass lines. Mixing of the reactor coolant is maintained by this continuous circulation of reactor coolant through the RHR System.

If the reactor coolant temperature is not maintained below 200°F, boiling of the reactor coolant could result. This could lead to a loss of coolant in the reactor vessel. Additionally, boiling of the reactor coolant could lead to a reduction in boron concentration in the coolant due to the boron plating out on components near the areas of the boiling activity. The loss of reactor coolant and the reduction of boron concentration in the reactor coolant will eventually challenge the integrity of the fuel cladding, which is a fission product barrier. Two trains of the RHR System are required to be OPERABLE by VC Summer Technical Specifications, and one train in operation, in order to prevent this challenge with water level less than 23 feet above the reactor vessel flange.

With RHR loop requirements not met, the potential exists for the coolant to boil and release radioactive gas to the containment atmosphere. Technical Specifications require that with no RHR loop in operation, that all operations involving a reduction in Reactor Coolant System boron concentration be suspended. In addition, all Containment penetrations providing direct access from the containment atmosphere to the outside atmosphere are closed within four hours. Performing the actions stated above ensures that all containment penetrations are either closed or can be closed so that the dose limits are not exceeded.

The NRC has endorsed NEI 99-01 Revision 4, *Methodology for Development of Emergency Action Levels*, Recognition Category C, Cold Shutdown/ Refueling System Malfunction, contains symptoms that requires declaration of an Alert or Site Area Emergency following loss of ability to maintain the plant in cold shutdown which could escalate into core uncovery. EAL CA4 directs declaration of an Alert following operation at reduced inventory when an unplanned event results in RCS temperature exceeding the Technical Specification cold shutdown temperature limit for greater than 20 minutes. The bases for this EAL states the following:"For PWR's, this IC and its associated EAL's are based on concerns raised in Generic Letter 88-17, "Loss of

Decay Heat Removal." A number of phenomena such as pressurization, vortexing, steam generator U-tube draining, RCS level differences when operating at mid-loop condition, decay heat removal system design, and level instrumentation problems can lead to conditions where decay heat removal is lost and core uncovery can occur. NRC analyses show that sequences that can cause core uncovery in 15 to 20 minutes and severe core damage within an hour after decay heat removal is lost."

This methodology also requires escalation to a Site Area Emergency following RPV inventory less than the top of active fuel with Containment Closure established or RPV inventory 6' below the bottom ID of the RCS loop with Containment Closure not established via EAL CS2. The bases for these EAL's states: "These example EALs are based on concerns raised by Generic Letter 88-17, *Loss of Decay Heat Removal*, SECY 91-283, *Evaluation of Shutdown and Low Power Risk Issues*, NUREG-1449, *Shutdown and Low-Power Operation at Commercial Nuclear Power Plants in the United States*, and, NUMARC 91-06, *Guidelines for Industry Actions to Assess Shutdown Management.* A number of variables, (BWRs - e.g., such as initial vessel level, or shutdown heat removal system design) (PWRs - e.g., mid-loop, reduced level/flange level, head in place, or cavity flooded, RCS venting strategy, decay heat removal system design, vortexing pre-disposition, steam generator Utube draining) can have a significant impact on heat removal capability challenging the fuel clad barrier. Analysis in the above references indicates that core damage may occur within an hour following continued core uncovery therefore, conservatively, 30 minutes was chosen."

When operating at reduced coolant inventory (i.e. mid-loop operation), VC Summer site specific calculations estimate, that with a loss of RHR system flow, the Reactor Coolant System will begin to boil in as little as 4.8 minutes. Furthermore, site calculations also show that core uncovery can occur approximately 46 minutes following a loss of RHR flow. VC Summer EAL 397, Loss of Residual Heat Removal Flow for more than 40 minutes during half-pipe operations with vessel head installed and high head safety injection/charging unavailable is indicative of NUREG -0654 EAL IC #8, Complete loss of any function needed for plant hot shutdown, and is similar in scope to other NRC approved methodologies. Incorporation of this EAL does not t decrease the effectiveness of the emergency plan, but instead provided scientifically backed method that would allow an Emergency Director to appropriately declare an event when normal indications may be unreliable, but conditions would require escalation in emergency class. The history of this EAL is included below.

Introduced in Revision 27 (April 1990)

This initiating condition was added as a result of NUREG-1269 and IN 87-23. This emergency classification concept was first communicated to the NRC in VCS response to question 9 of Generic Letter 87-12 on September 18, 1987 (Letter to Frank J. Miraglia from D. A. Nauman dated September 18, 1987), where VCS committed to clarifying the initiating criteria for the emergency classifications for loss of RHR.

Two initiating conditions were created:

- NUOE: Loss of RHR flow for more than twenty minutes during half pipe operation with the reactor vessel head installed
- Alert: Loss of RHR flow for more than forty minutes during half pipe operation with the reactor vessel head installed

During a review of revision 26 to the VCS Radiation Emergency Plan, the NRC stated in a letter dated May 16, 1990 (from Douglas M. Collins, Chief Emergency Preparedness and Radiological Protection Branch Division of Radiation Safety and Safeguards) that the initiating condition - Loss of RHR flow for more than twenty minutes during half pipe operation with the reactor vessel head installed, NUOE met the requirement of an alert rather than an NUOE. The letter went on to say that the initiating condition was not changed in the revision but the initiating condition met the requirements of NERUG-0654, Appendix 1 item 10 for an alert, and that the licensee has committed to changing the initiating condition from a NOUE to an Alert.

In revision 27 to the VCS Radiation Emergency Plan, the NOUE and Alert were shifted to an Alert and an SAE. The NRC documented their review in letter dated August 29, 1990 (from Douglas M. Collins, Chief Emergency Preparedness and Radiological Protection Branch Division of Radiation Safety and Safeguards).

DETERMINATION OF A DECREASE IN THE EFFECTIVENESS OF THE RADIATION EMERGENCY PLAN IN ACCORDANCE WITH 10CFR50.54(q)

DOCUMENT EP-100 REVISION ____ CHANGE ____ DATE 7/13/07

TITLE: EAL-301 KNOWN LOSS-OF-COOLANT ACCIDENT GREATER THAN CHARGING PUMP CAPACITY

DIRECTIONS FOR COMPLETING THIS ATTACHMENT:

1. Review all statements in subsections 1.1 and 1.2 and check applicable boxes if the statement applies. Circle DOES or DOES NOT as appropriate.
2. Complete one subsection of section 2.0 for each box checked in sub-section 1.1 or 1.2. (Additional copies of page 3 may be used, if necessary).
3. Complete section 3.0. Provide amplifying information in section 4.0.
4. Answer the questions in section 5.0. Sign and date the form on line 5.4 and attach completed form to Procedure Package prior to forwarding package to the Manager, Nuclear Protection Services for signature.
5. PSRC review is required for the Radiation Emergency Plan prior to approval of the revision.

1.0 Effect of the Change on the Radiation Emergency Plan:

1.1 This change (DOES/DOES NOT) affect SECTIONS under 10CFR50.47(b). The following subject areas of 10CFR50.47(b) have been affected:

- ☐ (1) Assignment of Emergency Response Organization responsibilities.
- ☐ (2) Assignment of onshift Emergency Response Organization personnel.
- ☐ (3) Arrangements for utilizing State or Local resources and staff.
- ☒ (4) Emergency Classification and Action Levels, including facility system, and effluent parameters.
- ☐ (5) Notification of State and Local agencies, the Emergency Response Organizations, and the public.
- ☐ (6) Communications between State and Local agencies, the Emergency Response Organizations, and the public.
- ☐ (7) Coordination with the public through periodic dissemination of information.
- ☐ (8) Adequacy of emergency facilities and equipment.
- ☐ (9) Adequate methods, systems, and equipment for offsite response to a radiological emergency.

- ☐ (10)Plume exposure pathway EPZ protective actions.
- ☐ (11) Emergency worker's radiological exposure.
- ☐ (12) Medical services for contaminated injured individuals.
- ☐ (13) Reentry and Recovery plans.
- ☐ (14) Emergency response periodic exercises.
- ☐ (15) Radiological emergency response training.
- ☐ (16) Plan development, review, and distribution.

1.2 This change (DOES/DOES NOT) affect sections under 10CFR50, Appendix E. The following subject areas of 10CFR50, Appendix E, have been affected:

- ☐ (I), (II), (III) Radiation Emergency Plans as described in the FSAR.
- ☐ (IV)A Organization for coping with radiological emergencies.
- ☐ (IV)B Release of radioactive materials (assessment).
- ☒ (IV)C Activation of Emergency Classification and Action Levels and activation of the Emergency Response Organization.
- ☐ (IV)D Notification of Federal, State and Local agencies, and the public.
- ☐ (IV)E Emergency Facilities and Equipment including communication systems.
- ☐ (IV)F Training on and exercising the Radiation Emergency Plan.
- ☐ (IV)G Maintaining Radiation Emergency Plan and procedures, and the surveillance of equipment and supplies.
- ☐ (IV)H Reentry of facility and recovery following an accident.

2.0 Basis for Determination per 10CFR50.54(q):

For applicable item 10CFR50.47(b) of Section 1.0 above, this change (DOES/DOES NOT) decrease the effectiveness of the Radiation Emergency Plan. This change (DOES/DOES NOT) result in information presented in the Radiation Emergency Plan being no longer true or accurate.
Basis for answer: See attached

For applicable item 10CFR50.Appendix E of Section 1.0 above, this change (DOES/DOES NOT) decrease the effectiveness of the Radiation Emergency Plan. This change (DOES/DOES NOT) result in information presented in the Radiation Emergency Plan being no longer true or accurate.
Basis for answer: See attached

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For applicable item 10CFR50.(_____) of Section 1.0 above, this change (DOES/DOES NOT) decrease the effectiveness of the Radiation Emergency Plan. This change (DOES/DOES NOT) result in information presented in the Radiation Emergency Plan being no longer true or accurate.
Basis for answer:_____

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For applicable item 10CFR50.(_____) of Section 1.0 above, this change (DOES/DOES NOT) decrease the effectiveness of the Radiation Emergency Plan. This change (DOES/DOES NOT) result in information presented in the Radiation Emergency Plan being no longer true or accurate.
Basis for answer:_____

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(Attach additional sheets for Section 2.0, as necessary)

3.0 Determination/Action per 10CFR50.54(q):

3.1 This change (DOES/DOES NOT) decrease the effectiveness of the Radiation Emergency Plan. (If the change does decrease the effectiveness of the Radiation Emergency Plan, then the change shall not be implemented without prior NRC approval).

3.2 This change (DOES/DOES NOT) require a further revision to the Radiation Emergency ~~Plan or the~~ Implementing Procedures. (10CFR50, Appendix E, does NOT require that the NRC be notified of changes to the Radiation Emergency Plan that do not decrease the effectiveness of the Plan prior to implementation).

3.2.1 List any additional Emergency Plan Procedures, forms, or supporting procedures requiring revision as a result of this revision: _____

_____

4.0 Assessment Actions:

4.1 YES ☐ NO ☒ Is the Emergency Action Level scheme changing to another EAL scheme? (If yes submit to NRC for prior approval.)

4.2 YES ☐ NO ☒ Is this an alternate method of complying with the regulations? (If yes submit to NRC for prior approval.)

5.0 Comments:

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5.0 Review and Approval:

5.1 YES ☐ NO ☒ Decrease the effectiveness of the Radiation Emergency Plan?

5.2 YES ☐ NO ☒ NRC approval of document required prior to implementing?

5.3 YES ☐ NO ☒ Is a change required to Radiation Emergency Plan or other procedures? (If yes, see Section 3.2.1 above for details.)

5.4 Review completed by: [signature] Date: 07/13/07

5.5 Approved by: [signature] Date: 7/13/07
Manager, Nuclear Protection Services

Description: Comparison of revised detection methods from VC Summer Radiation Emergency Plan Revision 5 to Revision 53.
Reason for Change: To clarify Detection Methods to allow for accurate classification of the Emergency Action Level
Effect of the Changes: This change does affect sections in 10CFR50.47 and 10CFR50, Appendix E.

Basis for the Determination per 10CFR50.54.q: By changing the detection methods to reflect actions taken within the WOG ERG's, there has been no decrease in effectiveness of this EAL. Both VC Summer Radiation Emergency Plan Revision 5 and Revision 53 EAL detection methods for this event contain the following commonalities in detection method #1: Pressurizer low pressure reactor trip, Pressurizer low pressure safety injection signal, RM-A2 high alarm, High Reactor Building Sump level, and High Reactor Building pressure. High Reactor Building humidity cannot be measured with the current plant configuration. This indication has been replaced with RBCU Drain Flow High which provides additional indication of a potential leak in the Containment. Substitution of this detection method does not decrease the effectiveness of the Radiation Emergency Plan, but provides a reasonable substitute for a condition that cannot be determined. Also, the detection method "Abnormal radiation levels on RM-A2 or RM-G7, or RM-G18" added RM-G7 and RM-G18 to provide addition radiation information to the Emergency Director to aid in classifying the event.

Later revisions to the Radiation Emergency Plan added three additional detection methods for conditions that are indicative of a loss of coolant accident greater than charging pump capacity, but may not be easily classifiable with the existing detection methods. These conditions are equivalent to the threat to public health and safety, but may be missed by the Emergency Director. Adding these three conditions does not decrease the effectiveness of the Radiation Emergency Plan, but adds additional guidance in correctly classifying conditions that may require protective actions for the public.

The addition of detection method #2, Direct Entry into EOP-2.0 from EOP-1.0 due to the RCS <u>NOT</u> Being Intact, provides a readily available reference for the Emergency Director to discriminate between a LOCA greater than make-up capability or not. During a loss of coolant event, the operator will transition from AOP 101.1, "Loss of Reactor Coolant not requiring SI", at Step 2.0, trip the reactor, and enter EOP 1.0 "Reactor Trip/ Safety Injection Actuation." EOP 1.0 will direct the operator to initiate Safety Injection at Step 5, if it has not already initiated. At Step 14.0, the operator is given a set of conditions similar to detection method #1 to determine that the RCS is not intact. If the RCS is not intact, the operator is directed to enter EOP 2.0 "Loss of Reactor or Secondary Coolant". This is detection method #2, as listed in this EAL. These conditions meet the requirement for declaring a Site Area Emergency and do not decrease the effectiveness of the Radiation Emergency Plan.

The addition of detection method #3, Stuck Open and Unisolable Pressurizer PORV or Safety Valve Leading to Pressurizer Relief Tank Rupture, is the creation of a loss of coolant accident that provides all of the indications that are located in detection method #1. This added detection method was created to provide clarification to the Emergency Director on a condition that results in a LOCA greater than make-up capability, but the source may not be easily recognized. These conditions meet the requirement for declaring a Site Area Emergency and do not decrease the effectiveness of the Radiation Emergency Plan.

The addition of detection method #4, Initiating Bleed and Feed per EOP-15.0, results in a self-induced LOCA due to a loss of heat sink. For example, while in EOP 1.0 the operator may be directed to EOP 1.1, Reactor Trip Recovery. While in this procedure, the operator receives a Critical Safety Function Status Tree Red Path for a Loss of Heat Sink. The operator would enter EOP 15.0, Response to Loss of Secondary Heat Sunk which directs the creation of a RCS leakage path to provide core cooling. This added detection method was created to provide clarification to the Emergency Director on a condition that results in a LOCA greater than make-up capability, but the source may not be easily recognized. These conditions meet the requirement for declaring a Site Area Emergency and do not decrease the effectiveness of the Radiation Emergency Plan.

DETERMINATION OF A DECREASE IN THE EFFECTIVENESS OF THE RADIATION EMERGENCY PLAN IN ACCORDANCE WITH 10CFR50.54(q)

DOCUMENT EP-100 REVISION ____ CHANGE ____ DATE 7/13/2007

TITLE: EAL 401 - SMALL AND LARGE LOCA'S WITH FAILURE OF ECCS TO PERFORM LEADING TO SEVERE CORE DEGRADATION OR MELT. ULTIMATE FAILURE OF REACTOR BUILDING POSSIBLE FOR MELTDOWN SEQUENCES.

DIRECTIONS FOR COMPLETING THIS ATTACHMENT:

1. Review all statements in subsections 1.1 and 1.2 and check applicable boxes if the statement applies. Circle DOES or DOES NOT as appropriate.
2. Complete one subsection of section 2.0 for each box checked in sub-section 1.1 or 1.2. (Additional copies of page 3 may be used, if necessary).
3. Complete section 3.0. Provide amplifying information in section 4.0.
4. Answer the questions in section 5.0. Sign and date the form on line 5.4 and attach completed form to Procedure Package prior to forwarding package to the Manager, Nuclear Protection Services for signature.
5. PSRC review is required for the Radiation Emergency Plan prior to approval of the revision.

1.0 Effect of the Change on the Radiation Emergency Plan:

1.1 This change (DOES/DOES NOT) affect SECTIONS under 10CFR50.47(b). The following subject areas of 10CFR50.47(b) have been affected:

- ☐ (1) Assignment of Emergency Response Organization responsibilities.
- ☐ (2) Assignment of onshift Emergency Response Organization personnel.
- ☐ (3) Arrangements for utilizing State or Local resources and staff.
- ☒ (4) Emergency Classification and Action Levels, including facility system, and effluent parameters.
- ☐ (5) Notification of State and Local agencies, the Emergency Response Organizations, and the public.
- ☐ (6) Communications between State and Local agencies, the Emergency Response Organizations, and the public.
- ☐ (7) Coordination with the public through periodic dissemination of information.
- ☐ (8) Adequacy of emergency facilities and equipment.
- ☐ (9) Adequate methods, systems, and equipment for offsite response to a radiological emergency.

- ☐ (10)Plume exposure pathway EPZ protective actions.
- ☐ (11) Emergency worker's radiological exposure.
- ☐ (12) Medical services for contaminated injured individuals.
- ☐ (13) Reentry and Recovery plans.
- ☐ (14) Emergency response periodic exercises.
- ☐ (15) Radiological emergency response training.
- ☐ (16) Plan development, review, and distribution.

1.2 This change (DOES/DOES NOT) affect sections under 10CFR50, Appendix E. The following subject areas of 10CFR50, Appendix E, have been affected:

- ☐ (I), (II), (III) Radiation Emergency Plans as described in the FSAR.
- ☐ (IV)A Organization for coping with radiological emergencies.
- ☐ (IV)B Release of radioactive materials (assessment).
- ☒ (IV)C Activation of Emergency Classification and Action Levels and activation of the Emergency Response Organization.
- ☐ (IV)D Notification of Federal, State and Local agencies, and the public.
- ☐ (IV)E Emergency Facilities and Equipment including communication systems.
- ☐ (IV)F Training on and exercising the Radiation Emergency Plan.
- ☐ (IV)G Maintaining Radiation Emergency Plan and procedures, and the surveillance of equipment and supplies.
- ☐ (IV)H Reentry of facility and recovery following an accident.

2.0 Basis for Determination per 10CFR50.54(q):

For applicable item 10CFR50.47(b) of Section 1.0 above, this change (DOES/DOES NOT) decrease the effectiveness of the Radiation Emergency Plan. This change (DOES/DOES NOT) result in information presented in the Radiation Emergency Plan being no longer true or accurate.
Basis for answer: See attached

For applicable item 10CFR50.Appendix E of Section 1.0 above, this change (DOES/DOES NOT) decrease the effectiveness of the Radiation Emergency Plan. This change (DOES/DOES NOT) result in information presented in the Radiation Emergency Plan being no longer true or accurate.
Basis for answer: See attached

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_____

For applicable item 10CFR50.(_____) of Section 1.0 above, this change (DOES/DOES NOT) decrease the effectiveness of the Radiation Emergency Plan. This change (DOES/DOES NOT) result in information presented in the Radiation Emergency Plan being no longer true or accurate.
Basis for answer:_____

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For applicable item 10CFR50.(_____) of Section 1.0 above, this change (DOES/DOES NOT) decrease the effectiveness of the Radiation Emergency Plan. This change (DOES/DOES NOT) result in information presented in the Radiation Emergency Plan being no longer true or accurate.
Basis for answer:_____

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(Attach additional sheets for Section 2.0, as necessary)

3.0 Determination/Action per 10CFR50.54(q):

3.1 This change (DOES/DOES NOT) decrease the effectiveness of the Radiation Emergency Plan. (If the change does decrease the effectiveness of the Radiation Emergency Plan, then the change shall not be implemented without prior NRC approval).

3.2 This change (DOES/DOES NOT) require a further revision to the Radiation Emergency Plan or the Implementing Procedures. (10CFR50, Appendix E, does NOT require that the NRC be notified of changes to the Radiation Emergency Plan that do not decrease the effectiveness of the Plan prior to implementation).

3.2.1 List any additional Emergency Plan Procedures, forms, or supporting procedures requiring revision as a result of this revision: _____

_____

4.0 Assessment Actions:

4.1 YES ☐ NO ☒ Is the Emergency Action Level scheme changing to another EAL scheme? (If yes submit to NRC for prior approval.)

4.2 YES ☐ NO ☒ Is this an alternate method of complying with the regulations? (If yes submit to NRC for prior approval.)

5.0 Comments:

5.0 Review and Approval:

5.1 YES ☐ NO ☒ Decrease the effectiveness of the Radiation Emergency Plan?

5.2 YES ☐ NO ☒ NRC approval of document required prior to implementing?

5.3 YES ☐ NO ☒ Is a change required to Radiation Emergency Plan or other procedures? (If yes, see Section 3.2.1 above for details.)

5.4 Review completed by: _____ Date: 07/13/07

5.5 Approved by: _____ Date: 7/13/07
Manager, Nuclear Protection Services

EP-100
Revision, 53
Attachment to SAP-0127, Attachment II, Determination of a Decrease in the Effectiveness of the Radiation Emergency Plan in Accordance with 10CFR50.54.q

Description: Comparison of revised detection methods from VC Summer Radiation Emergency Plan Revision 5 to Revision 53.
Reason for Change: To clarify Detection Methods to allow for accurate classification of the Emergency Action Level
Effect of the Changes: This change does affect sections in 10CFR50.47 and 10CFR50, Appendix E.

Basis for the Determination per 10CFR50.54.q: By changing the detection methods to reflect actions taken within the WOG ERG's, there has been no decrease in effectiveness of this EAL. Both VC Summer Radiation Emergency Plan Revision 5 and Revision 53 EAL detection methods for this event contain the following common attributes: Reactor trip required, Safety Injection signal required, zero injection flow from the Charging Pumps, zero injection flow from the RHR pumps, onset of clad damage, as measured by RMG-7 and RMG -18 in Revision 5 or Core Exit Thermocouples in Revision 53 in accordance with EOP 14.0.

Entry into EOP 1.0 is required upon a reactor trip and/or a safety injection signal. The EAL discusses a LOCA event which will initiate a reactor trip at less than 1870 psig and will be followed by a safety injection actuation at less than 1850 psig. The operator will transition into EOP 2.0 once he has determined that the RCS is not intact. At that time the operator will begin monitoring EOP 12.0 Monitoring of Critical Safety Functions. EOP 1.0 and 2.0 have the operator verify and/or initiate SI if required by plant conditions. A Loss of Coolant Accident Greater than Charging Pump Capacity will require the Emergency Director to declare a Site Area Emergency in accordance with EAL 301. Based on the conditions of the EAL, neither Charging Pumps nor RHR Pumps are available. As the RCS continues to depressurize, the ECCS Accumulators will inject at approximately 656 psig. After the Accumulators inject, the core will continue to uncover and heat-up. As the core heats up to 700°F, RVLIS level lowers to less than 40%, and RCS subcooling is less than 30°F the operator will have a Red path into EOP 14.0, Response to Inadequate Core Cooling. The operator has additional entry into EOP14.0 with core exit thermocouples of greater than 1200°F if the other criteria are not met. Actions with EOP14.0 direct the operator to restore charging flow and RHR flow if these are not available. In addition, the operator is directed to lower RCS pressure less than 140 psig, which is the shut-off head for the VC Summer RHR pumps. If the LOCA was of sufficient size, the operator action to depressurize the RCS would not be required. At this time, based on the current VCS EAL (401) the Shift Supervisor would declare a General Emergency.

The NRC endorsed EAL and detection method in Revision 5 of the VC Summer requires several conditions that are verified during the use of EOP's. First, that Charging and RHR pumps are not running or their flow indicators read zero. Multiple times within the EOP's the operator is directed to start safety injection pumps, both charging pumps and RHR pumps. Due to the design of the RHR system, the pumps will not begin to inject until RCS pressure lowers to less than approximately 140 psig, so this detection method would not be valid until the RCS is depressurized less than approximately 140 psig. The detection method is also using radiation monitors to verify the status of the core. The Revision 5 detection method requires 4 separate radiation monitor alarms to meet the requirements of the General Emergency. RMA-2, Reactor

Building Air Monitor, is required to be in high alarm. Unfortunately, this monitor isolates on a Safety Injection signal and will not be available to the operator. RMG-5, Reactor Building Personnel Hatch, monitor has a setpoint of 100 mr/hr and will alarm early in the event. The Reactor Building High Range Monitors, RMG-7 and RMG-18, are the only useful indication of core status to determine the requirements of a General Emergency. Based on the NRC endorsed guidance in WCAP-14696-A, Westinghouse Owners Group Core Damage Assessment Guidance, release of fission products from the fuel rod cladding (gap release) does not begin to occur until 1200°F with the RCS depressurized less than 1600 psig and 1400°F with the RCS pressurized greater than 1600 psig. WCAP-14696-A further states that, at Technical Specification levels, the release of 100% of the reactor coolant system inventory of noble gases, iodines and cesiums to the containment would result in a radiation level of about 1 rad/hr, less than the setpoint on the containment high range monitors, RMG -7 and RMG-18. With the detection method set at the RMG-7 and RMG-18 Hi alarm setpoint, it is reasonable to conclude that core damage must have begun to occur in order to reach this detection method. As the reactor core must be above 1200°F for this damage to start, entry into and actions within EOP14.0 adequately allow the operator to make a timely and accurate classification of this event.

DETERMINATION OF A DECREASE IN THE EFFECTIVENESS OF THE RADIATION EMERGENCY PLAN IN ACCORDANCE WITH 10CFR50.54(q)

DOCUMENT EP-100 REVISION_____ CHANGE_____ DATE 7/13/2007

TITLE: EAL 411 - TRANSIENT INITIATED BY LOSS OF FEEDWATER AND CONDENSATE SYSTEMS (PRINCIPAL HEAT REMOVAL SYSTEM) FOLLOWED BY FAILURE OF EMERGENCY F'EEDWATER SYSTEM FOR EXTENDED PERIOD. CORE MELTING POSSIBLE IN SEVERAL HOURS. ULTIMATE FAILURE OF REACTOR BUILDING POSSIBLE IF CORE MELTS.

DIRECTIONS FOR COMPLETING THIS ATTACHMENT:

1. Review all statements in subsections 1.1 and 1.2 and check applicable boxes if the statement applies. Circle DOES or DOES NOT as appropriate.
2. Complete one subsection of section 2.0 for each box checked in sub-section 1.1 or 1.2. (Additional copies of page 3 may be used, if necessary).
3. Complete section 3.0. Provide amplifying information in section 4.0.
4. Answer the questions in section 5.0. Sign and date the form on line 5.4 and attach completed form to Procedure Package prior to forwarding package to the Manager, Nuclear Protection Services for signature.
5. PSRC review is required for the Radiation Emergency Plan prior to approval of the revision.

1.0 Effect of the Change on the Radiation Emergency Plan:

1.1 This change (DOES/DOES NOT) affect SECTIONS under 10CFR50.47(b). The following subject areas of 10CFR50.47(b) have been affected:

- ☐ (1) Assignment of Emergency Response Organization responsibilities.
- ☐ (2) Assignment of onshift Emergency Response Organization personnel.
- ☐ (3) Arrangements for utilizing State or Local resources and staff.
- ☒ (4) Emergency Classification and Action Levels, including facility system, and effluent parameters.
- ☐ (5) Notification of State and Local agencies, the Emergency Response Organizations, and the public.
- ☐ (6) Communications between State and Local agencies, the Emergency Response Organizations, and the public.
- ☐ (7) Coordination with the public through periodic dissemination of information.
- ☐ (8) Adequacy of emergency facilities and equipment.

- ☐ (9) Adequate methods, systems, and equipment for offsite response to a radiological emergency.
- ☐ (10) Plume exposure pathway EPZ protective actions.
- ☐ (11) Emergency worker's radiological exposure.
- ☐ (12) Medical services for contaminated injured individuals.
- ☐ (13) Reentry and Recovery plans.
- ☐ (14) Emergency response periodic exercises.
- ☐ (15) Radiological emergency response training.
- ☐ (16) Plan development, review, and distribution.

1.2 This change (DOES/DOES NOT) affect sections under 10CFR50, Appendix E. The following subject areas of 10CFR50, Appendix E, have been affected:

- ☐ (I), (II), (III) Radiation Emergency Plans as described in the FSAR.
- ☐ (IV)A Organization for coping with radiological emergencies.
- ☐ (IV)B Release of radioactive materials (assessment).
- ☒ (IV)C Activation of Emergency Classification and Action Levels and activation of the Emergency Response Organization.
- ☐ (IV)D Notification of Federal, State and Local agencies, and the public.
- ☐ (IV)E Emergency Facilities and Equipment including communication systems.
- ☐ (IV)F Training on and exercising the Radiation Emergency Plan.
- ☐ (IV)G Maintaining Radiation Emergency Plan and procedures, and the surveillance of equipment and supplies.
- ☐ (IV)H Reentry of facility and recovery following an accident.

2.0 Basis for Determination per 10CFR50.54(q):

For applicable item 10CFR50.47(b) of Section 1.0 above, this change (DOES/DOES NOT) decrease the effectiveness of the Radiation Emergency Plan. This change (DOES/DOES NOT) result in information presented in the Radiation Emergency Plan being no longer true or accurate.
Basis for answer: See attached

For applicable item 10CFR50.Appendix E of Section 1.0 above, this change (DOES/DOES NOT) decrease the effectiveness of the Radiation Emergency Plan. This change (DOES/DOES NOT) result in information presented in the Radiation Emergency Plan being no longer true or accurate.
Basis for answer: See attached

_____

_____

For applicable item 10CFR50.(_____) of Section 1.0 above, this change (DOES/DOES NOT) decrease the effectiveness of the Radiation Emergency Plan. This change (DOES/DOES NOT) result in information presented in the Radiation Emergency Plan being no longer true or accurate.
Basis for answer:_____

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For applicable item 10CFR50.(_____) of Section 1.0 above, this change (DOES/DOES NOT) decrease the effectiveness of the Radiation Emergency Plan. This change (DOES/DOES NOT) result in information presented in the Radiation Emergency Plan being no longer true or accurate.
Basis for answer:_____

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(Attach additional sheets for Section 2.0, as necessary)

3.0 Determination/Action per 10CFR50.54(q):

3.1 This change (DOES/DOES NOT) decrease the effectiveness of the Radiation Emergency Plan. (If the change does decrease the effectiveness of the Radiation Emergency Plan, then the change shall not be implemented without prior NRC approval).

3.2 This change (DOES/DOES NOT) require a further revision to the Radiation Emergency Plan or the Implementing Procedures. (10CFR50, Appendix E, does NOT require that the NRC be notified of changes to the Radiation Emergency Plan that do not decrease the effectiveness of the Plan prior to implementation).

3.2.1 List any additional Emergency Plan Procedures, forms, or supporting procedures requiring revision as a result of this revision: _____

_____

4.0 Assessment Actions:

4.1 YES ☐ NO ☒ Is the Emergency Action Level scheme changing to another EAL scheme? (If yes submit to NRC for prior approval.)

4.2 YES ☐ NO ☒ Is this an alternate method of complying with the regulations? (If yes submit to NRC for prior approval.)

5.0 Comments:

5.0 Review and Approval:

5.1 YES ☐ NO ☒ Decrease the effectiveness of the Radiation Emergency Plan?

5.2 YES ☐ NO ☒ NRC approval of document required prior to implementing?

5.3 YES ☐ NO ☒ Is a change required to Radiation Emergency Plan or other procedures? (If yes, see Section 3.2.1 above for details.)

5.4 Review completed by: _____ Date: 07/13/07

5.5 Approved by: _____ Date: 7/13/07
Manager, Nuclear Protection Services

EP-100
Revision, 53
Attachment to SAP-0127, Attachment II, Determination of a Decrease in the Effectiveness of the Radiation Emergency Plan in Accordance with 10CFR50.54.q

Description: Comparison of revised detection methods from VC Summer Radiation Emergency Plan Revision 5 to Revision 53.
Reason for Change: To clarify Detection Methods to allow for accurate classification of the Emergency Action Level
Effect of the Changes: This change does affect sections in 10CFR50.47 and 10CFR50, Appendix E.
Basis for the Determination per 10CFR50.54.q:

The original emergency action level is based on detection methods that do not exist as the VC Summer Nuclear Station as the station is configured. One of the original detection methods "reactor trip on low feedwater flow" lists a condition that was not part of the original station design. It is unclear why this detection method was created in the approved Emergency Plan. As such, it would be possible for an Emergency Director to never declare this event if he/she were to use the exact wording of the detection method. This detection method was revised to provide unambiguous plant symptoms that correspond to the loss of all feed and condensate followed by an extended loss of emergency feedwater event that eventually leads to a core melt condition.

EOP 15.0, Response to Loss of Secondary Heat Sink, is entered from EOP 12.0, Monitoring of Critical Safety Functions. EOP 1.0, RX Trip/ Safety Injection, Step 20.0, directs Operators to begin monitoring the Critical Safety Functions and the status trees of EOP 12.0. A HEAT SINK red path is reached in EOP 12.0 based on two conditions – narrow range steam generator level in all steam generators less than thirty percent narrow range indication and total feedwater flow is less than 450 gallons per minute. These conditions indicate an extreme challenge to the reactor heat sink.

The NRC endorsed EAL and detection method in Revision 5 of the VC Summer requires several conditions that are verified during the use of the VC Summer Emergency Operating Procedures. These include a Reactor Trip, which would come from steam generator low-low level signal of less than or equal to thirty-five percent narrow range steam generator level, vice "low feedwater flow." EOP 15.0 requires the operator to establish emergency feedwater flow to at least one steam generator at Step 5.0, either in the Control Room or via local operator action. EOP 15.0 then allows the operator to attempt to restore steam generator water level utilizing main feedwater or condensate pumps. If successful, this action would restore steam generator level and preclude declaration of a General Emergency. If unsuccessful, and a total loss of secondary heat removal occurs (steam generator level less than fifteen percent wide range or pressurizer pressure greater than 2335 psig), the operator will initiate RCS bleed and feed in order to minimize core uncovery. This steam generator water level is similar to the detection method utilized in Revision 5 of the VC Summer Radiation Emergency Plan "decreasing wide range steam generator level towards off-scale low on all steam generators."

Westinghouse Owners Group (WOG) Emergency Response Guidelines have been implemented at VC Summer as required by various Nuclear Regulatory Commission documents, including NUREG-0737, Item I.C.1. WOG Emergency Response Guideline FR– H.1, Response to Loss of Secondary Heat Sink, was written to provide symptom

based responses for conditions contained in this emergency action level. Section 2.1, Loss of All Feedwater Event from a Power Condition without Operator Action, describes the conditions necessary for an event of this magnitude to be reached. If the operators are successful in establishing a secondary heat sink or core cooling mechanism, then the requirements of a General Emergency will not be reached, and no such event will be declared. The analysis utilized in this section of the procedure was conducted with the LOFTRAN code. This analysis shows that RCS pressure undergoes a rapid pressure increase at 1900 seconds (32 minutes) following S/G dryout, which culminates at 2148 seconds (36 minutes) when RCS pressure reaches 2335 psig (659°F, saturation temperature), causing an opening of the pressurizer PORV's. The revision 5 detection method required S/G dryout and emergency feedwater unable to be restored within 30 minutes. The current emergency plan allows operators to restore core cooling utilizing RCS Bleed and Feed. At this point in the Emergency Operating Procedure, a Site Area Emergency will be declared by the Emergency Director, and the necessary actions will be taken by the offsite authorities. Should implementation of Bleed and Feed be unsuccessful and Core exit thermocouples reach 700°F [a temperature of 670°F (plus uncertainty)], the Emergency Director is required to declare a General Emergency. With the described plant conditions, the conditions described in the Revision 53 detection method are equivalent to the conditions listed in the Revision 5 detection method. Elevated core exit thermocouples indicate degraded core cooling and core melting could be possible in the foreseeable future. The combination of these conditions meet the General Emergency criteria specified in the SER IC.

Revision of this EAL did not decrease the effectiveness of the emergency plan, but instead provided concise symptoms that allow an Emergency Director to appropriately declare an event when conditions require declaration of a General Emergency.