Tennessee Valley Authority
1101 Market Street, LP 3R
Chattanooga, Tennessee 37402-2801

R. M. Krich
Vice President
Nuclear Licensing

August 27, 2010

10 CFR 50.90

TVA-BFN-TS-474

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Browns Ferry Nuclear Plant, Units 1, 2, and 3
Facility Operating License Nos. DPR-33, DPR-52, and DPR-68
NRC Docket Nos. 50-259, 50-260, and 50-296

Subject: **Technical Specifications Change TS-474 - Request to Add a TS 3.7.3, "Control Room Emergency Ventilation (CREV) System," Action to Address Two CREV Subsystems Inoperable Due to Inoperable CREV System High Efficiency Particulate Air (HEPA) Filter and/or Charcoal Adsorbers**

Pursuant to 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," TVA is requesting Technical Specifications (TS) changes (TS-474) to licenses DPR-33 for Browns Ferry Nuclear Plant (BFN), Unit 1, DPR-52 for BFN Unit 2, and DPR-68 for BFN, Unit 3. The TS changes propose to add a new Action to TS 3.7.3, Control Room Emergency Ventilation (CREV) System, to permit one or more CREV subsystems to be inoperable for up to 90 days when the inoperability is due to inoperable CREV System High Efficiency Particulate Air (HEPA) filter and/or charcoal adsorbers.

The proposed TS changes also include an administrative change to correct errors in Unit 2 TS page header information that occurred during issuance of TS pages for a previous amendment.

The enclosure to this letter provides the justification for this request. Attachments 1 and 2 provide marked-up pages of the affected TS and Bases pages. Attachments 3 and 4 provide re-typed pages of the affected TS and Bases pages.

D030
NRR

printed on recycled paper

TVA has determined that there are no significant hazards considerations associated with the proposed changes and that the TS changes qualify for a categorical exclusion from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9). In accordance with 10 CFR 50.91(b)(1), TVA is providing a copy of this letter and enclosure to the Alabama State Department of Public Health.

These changes are necessary to prevent a concurrent shutdown of the three BFN units resulting from either a planned preventative maintenance replacement of the CREV System HEPA filter or a potential shutdown resulting from unacceptable CREV System HEPA filter testing results. Surveillance testing of the CREV System HEPA filters in accordance with the Ventilation Filter Testing Program must be performed prior to October 21, 2010. If unacceptable results are obtained during this testing, TVA may request accelerated consideration of these TS changes.

Implementation of the revised TS will be within 14 days of NRC approval.

There are no new regulatory commitments associated with this submittal. Please direct any questions concerning this matter to Tom Matthews at (423) 751-2687.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 27th day of August, 2010.

Respectfully,

R. M. Krich

Enclosure: Evaluation of Proposed Change

Enclosure
cc (Enclosure):

NRC Regional Administrator – Region II
NRC Senior Resident Inspector – Browns Ferry Nuclear Plant
State Health Officer – Alabama Department of Public Health

ENCLOSURE

Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3
Technical Specifications (TS) Change 474

License Amendment Request to Add a TS 3.7.3, "Control Room Emergency Ventilation (CREV) System," Action to Address Inoperable CREV High Efficiency Particulate Air (HEPA) Filter and/or Charcoal Adsorbers

EVALUATION OF PROPOSED CHANGE

1. SUMMARY DESCRIPTION
2. DETAILED DESCRIPTION
3. TECHNICAL EVALUATION
4. REGULATORY EVALUATION
   - 4.1 Applicable Regulatory Requirements/Criteria
   - 4.2 Precedent
   - 4.3 Significant Hazards Consideration
   - 4.4 Conclusions
5. ENVIRONMENTAL CONSIDERATION
6. REFERENCES

ATTACHMENTS:

1. Technical Specifications Page Markups
2. Technical Specifications Bases Page Markups
3. Retyped Technical Specifications Pages
4. Retyped Technical Specifications Bases Pages

1.0 SUMMARY DESCRIPTION

Pursuant to 10 CFR 50.90, "Application for amendment of license, construction permit, or early site permit," the Tennessee Valley Authority (TVA) is requesting Technical Specifications (TS) changes (TS-474) to licenses DPR-33 for Browns Ferry Nuclear Plant (BFN) Unit 1, DPR-52 for BFN, Unit 2, and DPR-68 for BFN, Unit 3, as shown in Attachments 1 and 3.

TVA is proposing a new Action C to TS 3.7.3, "Control Room Emergency Ventilation (CREV) System," for the condition when both CREV subsystems are inoperable due to an inoperable High Efficiency Particulate Air (HEPA) filter or for the condition when one or more CREV subsystems are inoperable due to an inoperable charcoal adsorber. This new Action would allow continued operation of BFN Units 1, 2, and 3 while preventative maintenance, corrective maintenance, modifications, and post-maintenance and modification testing of the HEPA filter and charcoal adsorbers are completed. The current TS require entering Limiting Condition for Operation (LCO) 3.0.3 when both CREV subsystems are inoperable in Modes 1, 2, and 3.

The proposed TS change also includes corrections to page header errors for Unit 2 TS pages only that originated during issuance of License Amendment No. 302 (Reference 6.1). These are administrative corrections only and are not discussed in the following evaluation.

2.0 DETAILED DESCRIPTION

The proposed amendment adds new Action C to TS 3.7.3, "Control Room Emergency Ventilation (CREV) System," for the condition when both CREV subsystems are inoperable due to an inoperable HEPA filter or for the condition when one or more CREV subsystems are inoperable due to an inoperable charcoal adsorber. The associated Required Action C.1 to restore the HEPA filter and charcoal adsorber to operable status is proposed with a Completion Time of 90 days. This 90-day Completion Time is commensurate with the Completion Time for Action B, which addresses a breach of the Control Room Envelope (CRE) boundary.

Existing Actions C, D, E, and F are changed to D, E, F, and G, respectively. Existing Conditions A, C, E, and F are revised to reflect the addition of new Condition C. The Required Actions and associated Completion Times for existing Conditions A, C, E, and F are not changed.

Conforming proposed Bases changes are also provided in Attachments 2 and 4.

The BFN TS LCO for Units 1, 2, and 3, TS 3.7.3, "Control Room Emergency Ventilation (CREV) System," states that "Two CREV subsystems shall be OPERABLE." The associated surveillance SR 3.7.3.2 requires that CREV testing is performed in accordance with the Ventilation Filter Testing Program (VFTP). The VFTP includes testing to confirm HEPA filter performance, charcoal adsorber efficiency, minimum system flow rate, and the physical properties of the activated charcoal. During replacement or upon discovery of unacceptable HEPA filter and charcoal adsorber performance, the CREV subsystem(s) are considered inoperable. Each inoperable charcoal adsorber affects the operability of the associated CREV subsystem. If the common HEPA filter is inoperable, both CREV subsystems would be inoperable. With both CREV subsystems inoperable, the current TS would require entry into Condition E, "Two CREV subsystems inoperable in MODE 1, 2, or 3 for reasons than Condition B," with the associated Required Action to enter LCO 3.0.3, requiring an immediate shutdown of all operating units.

The VFTP surveillance for the HEPA filter requires that an inplace test of the HEPA filters shows a penetration and system bypass ≤ 1.0 percent and requires this demonstration 1) every 24 months, 2) after partial or complete replacement of HEPA filters, 3) after any structural maintenance on the system housing, or 4) following significant painting, fire, or chemical release in any ventilation zone communicating with the system. The second and third conditions are not able to be performed without all three units being in a shutdown condition or entering the LCO 3.0.3 immediate shutdown condition since these conditions impact operability of both CREV subsystems. The CREV System HEPA filter preventive maintenance (PM) requires the HEPA filters be replaced every 15 years. The current HEPA filters have been inservice for 18 years. Therefore, this proposed amendment is necessary to complete the HEPA replacement without requiring all three units to be shutdown. Furthermore, in the event that periodic HEPA filter penetration and system bypass testing fail the acceptance criteria, there is no allowed time to continue to operate while making repairs and performing retesting.

Likewise, each CREV subsystem contains a charcoal adsorber, which is tested in accordance with the VFTP under the same conditional frequencies as the HEPA filter testing. As such, a significant painting, fire, or chemical release affecting both charcoal adsorber beds could reflect a condition requiring both CREV subsystems to be declared inoperable and require entry into the LCO 3.0.3 immediate shutdown condition.

Therefore, TVA is proposing a new Action C to specifically address the inoperability of the HEPA filter and charcoal adsorbers to provide and appropriate time prior to requiring the LCO 3.0.3 entry. The addition of Action C would allow continued operation of BFN Units 1, 2, and 3 while preventative maintenance, corrective maintenance, modifications, and post-maintenance and modification testing of the HEPA filter and charcoal adsorbers are completed. Allowing these activities while avoiding immediate entry into LCO 3.0.3 provides the ability to perform preventive maintenance to enhance the reliability of the CREV System as well as providing appropriate operational flexibility.

3.0 TECHNICAL EVALUATION

3.1 Background

On September 27, 2004, the U.S. Nuclear Regulatory Commission (NRC) issued Amendment Nos. 251, 290, and 249 for the Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3, respectively (Reference 6.2). On November 8, 2004, the NRC issued a correction to these amendments (Reference 6.3). These amendments adopted the alternative source term (AST) methodology by revising the current accident source term and replacing it with an accident source term as prescribed in 10 CFR 50.67. The analyses supporting these Amendments did not credit CREV System charcoal filtration or iodine removal for any Design Basis Accident (DBA) analysis, and further did not credit filtration by HEPA filters in the main steam line break (MSLB), the fuel handling accident (FHA), and the control rod drop accident (CRDA). The CREV HEPA filters were credited only in the loss-of-coolant accident (LOCA).

3.2 System Description

The following Updated Final Safety Analysis Report (UFSAR) sections describe the CREV System and control room habitability:

- Section 1.5, "Principal Design Criteria,"
- Section 7.18, "Backup Control System," and
- Section 10.12, "Heating, Ventilating, and Air-Conditioning Systems."

The CREV System provides a protected environment from which operators can control the unit during airborne challenges from radioactivity during accident conditions. The CREV System is designed to maintain a habitable environment in the CRE for 30 days of continuous occupancy after a DBA without exceeding 5 rem total effective dose equivalent (TEDE). At BFN, there are two control rooms; one of which is common to Units 1 and 2 and the other dedicated to Unit 3. The CREV System is common to both control rooms. CREV System includes two air filtration subsystems for emergency treatment of outside supply air and a CRE boundary that limits the inleakage of unfiltered air. The CREV System has a HEPA filter bank in the portion of the inlet piping common to both subsystems. Each CREV subsystem consists of a motor-driven fan, an electric duct air heater, an activated charcoal adsorber section, an electric charcoal heater, and the associated ductwork, valves or dampers, doors, barriers, and instrumentation. The HEPA filter bank removes particulate matter, which may be radioactive. The charcoal adsorbers provide a holdup period for gaseous iodine, allowing time for decay; however, no credit is taken in the analyses for the charcoal adsorbers.

A single CREV subsystem operating at a flow of 3000 cfm +/- 10 percent will pressurize the CRE to about 0.125 inches water gauge to minimize infiltration of air from all surrounding areas adjacent to CRE boundary and the outdoors. CREV System operation in maintaining CRE habitability is discussed in the UFSAR, Section 10.12.

A CREV subsystem is considered operable when the associated fan, electric duct heater, ductwork, and dampers are operable, and when the HEPA filters and charcoal adsorbers are not excessively restricting flow and are capable of performing their filtration functions. Additionally, the CRE boundary must be maintained such that the CRE occupant dose from a large radioactive release does not exceed the calculated dose in the licensing basis consequences analyses for DBAs.

3.3 Safety Analyses

The following UFSAR sections provide discussions of applicable to the plant safety analyses:

- Section 14.4, "Approach to Safety Analysis,"
- Section 14.5, "Analysis of Abnormal Operational Transients - Uprated,"
- Section 14.6, "Analysis of Design Basis Accidents - Uprated," and
- Section 14.10, "Analysis of Abnormal Operational Transients Pre-Uprated."

UFSAR Chapter 14, "Plant Safety Analysis," evaluates operational transients and accidents that result in radiological releases that affect control room personnel. The four DBAs evaluated are:

- Control Rod Drop Accident (CRDA),
- Loss of Coolant Accident (LOCA),
- Main Steam Line Break (MSLB), and
- Refueling Accident (FHA).

UFSAR Section 14.6, "Analysis of Design Basis Accidents - Uprated," summarizes the evaluation of accidents that release fission products to the environment. Fission product releases to the environment affect dose to control room personnel since the control rooms receive outside air from the ventilation systems. The bounding design basis accident in determining post-accident offsite and control room personnel dose is the LOCA (UFSAR Section 14.6.3).

Supporting this proposed TS amendment, recent analyses have been completed evaluating the control room dose impact of not crediting the HEPA filter during a LOCA. These analyses utilized the same licensing basis methodology that was utilized in the original AST analyses.

Since the AST submittal, one input assumption was revised that increased the dose contribution from Engineered Safety Feature (ESF) System leakage by 300% (from 5 gpm to 20 gpm). This increase reflected less than a 10% increase in control room dose and forms the basis for the recent analysis to demonstrate resultant doses from removing credit for the HEPA filters.

The recent analyses show that the post-LOCA 30-day control room dose with no credit for either the HEPA filters or the charcoal adsorbers results in a minimal increase in dose consequences (9.5% increase), with the final dose of 1.94 rem. This remains well below the regulatory limit of 5 rem.

Air flow data and CRE pressures were reviewed from the November 2003 tracer gas test and compared to the February 2006, August 2008, and August 2010 performances of the CRE pressurization tests. The CREV units, A and B, were placed in service on a staggered test basis as specified by procedure. The air flows were within the specified acceptable range of 2700 to 3300 cfm, and the CRE pressures relative to the outdoors were well above the minimum of 0.125 inches of water pressure. There is not any indication that the CRE boundary has degraded since the 2003 inleakage test.

3.4 Evaluation of Risk Impact

The CREV system does not provide any function that is credited in preventing core damage or a large early release of radioactive to the public. Therefore, the CREV system is not modeled in the Probabilistic Risk Assessment. Extending the allowed outage time for the CREV System will not increase the risk of core damage or large early release.

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

The proposed Browns Ferry Nuclear Plant (BFN) Technical Specifications (TS) changes have been evaluated to determine whether applicable regulations and requirements continue to be met. To fully evaluate the effect of the proposed change, a deterministic risk analysis was used. TVA has determined that the proposed TS amendment does not require any exemptions or relief from regulatory requirements.

4.1.1 Regulations

10 CFR 50.36, "Technical Specifications," requires that operating licenses for nuclear reactors must include TS that specify limiting conditions for operation (LCOs) for equipment required for safe operation. The proposed change does not impact the functional capability or performance levels of equipment required for safe operation of the facility. While the high efficiency particulate air (HEPA) filter and charcoal adsorber functions are not credited for accident mitigation, they remain required by the BFN TS for compliance with the LCO 3.7.3, "Control Room Emergency Ventilation (CREV) System." Therefore, the requirement of 10 CFR 50.36 continues to be met.

10 CFR 50.67, "Accident source term," continues to be met by utilizing methods that conform to the guidance of Regulatory Guide 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors."

General Design Criteria (GDC) 19, "Control room," requires that adequate radiation protection shall be provided to ensure that radiation exposures shall not exceed 5 rem total effective dose equivalent (TEDE). TVA analysis demonstrates that these exposure levels are not exceeded with inoperable HEPA filter or inoperable charcoal adsorbers.

10 CFR 50.90, "Application for amendment of license or construction permit," addresses the requirements for a licensee desiring to amend its license and the TS incorporated therein. This license amendment request, applicable to BFN Units 1, 2, and 3 TS 3.7.3, has been prepared to meet the requirements of 10 CFR 50.90.

4.1.2 Applicable Regulatory Criteria

The proposed amendment is justified based on a deterministic risk analysis. The CREV System is not an accident initiator and is not modeled in the BFN Probabilistic Risk Assessment for the CREV System and is not included in the BFN Probabilistic Summary Document. The proposed changes to the TS 3.7.3 Action statements and Bases do not have a direct impact on the probability of the evaluated DBAs. The proposed changes do not increase the core damage frequency or the large early release frequency.

The proposed changes have been evaluated to verify that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner; (2) such activities will be conducted in compliance with NRC regulations; and (3) issuance of the amendment will not be inimical to the common defense and security.

4.2 Precedent

No similar TS amendments were identified.

4.3 Significant Hazards Consideration

1. Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No

UFSAR Chapter 14, "Plant Safety Analysis," evaluates operational transients and accidents that result in radiological releases that affect control room occupants. UFSAR section 14.6, "Analysis of Design Basis Accidents - Uprated," evaluates accidents that release fission products to the environment. The CREV System is not an accident initiator for any of the accidents described. The CREV System processes outside air needed to provide ventilation and pressurization for control room habitability to limit the control room dose during accidents evaluated in the UFSAR. Without crediting the performance of the HEPA filter or charcoal adsorbers, the analyses results concludes that the 30 day integrated post-accident doses in the control room are within the limits of 5 rem TEDE, as specified in 10 CFR 50.67 and GDC-19. The control room dose increase is less than 10 percent; leaving more than 60 percent remaining margin to the regulatory limit.

Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No

The CREV System is a ventilation system that filters outside air used to pressurize the control rooms to provide a protected environment from which operators can control the unit during airborne challenges from radioactivity during accident conditions. The CREV System does not initiate accidents. The proposed amendment allows the CREV HEPA filters and charcoal adsorbers to be repaired or replaced without shutting down the operating unit(s). No new modes of operation are introduced.

Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. Does the proposed amendment involve a significant reduction in a margin of safety?

Response: No

Analyses associated with the prior approval of Alternate Source Term methodology for design basis accident dose consequences previously did not credit the CREV System charcoal adsorbers. Recent analyses have been performed to assess the post-accident 30-day control room dose removing credit for the CREV System HEPA filter. The results indicate a minimal increase in dose consequences (9.5 percent increase) due to removing credit for the CREV System HEPA filter. Even with no credit for either the CREV System HEPA filter or CREV System charcoal filter, the resultant control room dose maintains more than 60 percent margin to the regulatory limit of 5 rem TEDE. As such there is no reduction in a margin of safety for any duration of inoperability of the CREV System HEPA filter or charcoal adsorbers. While the HEPA filter and charcoal adsorbers are not credited for accident mitigation, they remain required by the BFN TS for compliance with the LCO 3.7.3, "Control Room Emergency Ventilation (CREV) System," further minimizing any potential reduction in a margin of safety.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, TVA concludes that the proposed amendment does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

4.4 Conclusions

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

5.0 ENVIRONMENTAL CONSIDERATION

A review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

6.0 REFERENCES

6.1 NRC letter to Preston D. Swafford, "Browns Ferry Nuclear Plant, Units 1, 2, and 3 - Issuance of Amendments Regarding Control Room Envelope Habitability (TAC NOS. MD8410, MD8411, and MD8412)," dated August 18, 2009. [ML091730242]

6.2 NRC letter to Karl W. Singer, "Browns Ferry Nuclear Plant, Units 1, 2, and 3 — Issuance of Amendments Regarding Full-Scope Implementation Of Alternative Source Term (TAC NOS. MB5733, MB5734, MB5735, MC0156, MC0157 AND MC0158) (TS-405)," dated September 27, 2004. [ML042730028]

6.3 NRC letter to Karl W. Singer, "Browns Ferry Nuclear Plant, Units 1, 2, and 3 — Corrections to Amendment Concerning Alternative Source Term (TAC NOS. MB5733, MB5734, and MB5735) (TS-405)," dated November 8, 2004. [ML043100345]

Attachment 1

Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3
Technical Specifications (TS) Change 474

License Amendment Request to Add a TS 3.7.3, "Control Room Emergency Ventilation (CREV) System," Action to Address Inoperable CREV High Efficiency Particulate Air (HEPA) Filter and/or Charcoal Adsorbers

Technical Specifications Page Markups

Attachment 2

Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3
Technical Specifications (TS) Change 474

License Amendment Request to Add a TS 3.7.3, "Control Room Emergency Ventilation (CREV) System," Action to Address Inoperable CREV High Efficiency Particulate Air (HEPA) Filter and/or Charcoal Adsorbers

Technical Specifications Bases Page Markups

Attachment 3

Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3
Technical Specifications (TS) Change 474

License Amendment Request to Add a TS 3.7.3, "Control Room Emergency Ventilation (CREV) System," Action to Address Inoperable CREV High Efficiency Particulate Air (HEPA) Filter and/or Charcoal Adsorbers

Retyped Technical Specifications Pages

Attachment 4

Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3
Technical Specifications (TS) Change 474

License Amendment Request to Add a TS 3.7.3, "Control Room Emergency Ventilation (CREV) System," Action to Address Inoperable CREV High Efficiency Particulate Air (HEPA) Filter and/or Charcoal Adsorbers

Retyped Technical Specifications Bases Pages

Attachment 1

Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3
Technical Specifications (TS) Change 474

License Amendment Request to Add a TS 3.7.3, "Control Room Emergency Ventilation (CREV) System," Action to Address Inoperable CREV High Efficiency Particulate Air (HEPA) Filter and/or Charcoal Adsorbers

Technical Specifications Page Markups

3.7 PLANT SYSTEMS

3.7.3 Control Room Emergency Ventilation (CREV) System

LCO 3.7.3 Two CREV subsystems shall be OPERABLE.

----------NOTE----------
The main control room envelope (CRE) boundary may be opened intermittently under administrative control.

APPLICABILITY: MODES 1, 2, and 3, during operations with a potential for draining the reactor vessel (OPDRVs).

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
or Condition C		
A. One CREV subsystem inoperable for reasons other than Condition B.	A.1 Restore CREV subsystem to OPERABLE status.	7 days
B. One or more CREV subsystems inoperable due to inoperable CRE boundary in MODE~~S~~ 1, 2, ~~and~~ 3.	B.1 Initiate action to implement mitigating actions	Immediately
	AND	
or	B.2 Verify mitigating actions ensure CRE occupant exposures to radiological hazards will not exceed limits, and verify the CRE occupants are protected from smoke and chemical hazards.	24 hours
	AND	
	B.3 Restore CRE boundary to OPERABLE status.	90 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~C~~. Required Action and associated Completion Time of Condition ~~A or B~~ not met in MODE 1, 2, or 3.	~~C~~.1 Be in MODE 3. AND ~~C~~.2 Be in MODE 4.	12 hours 36 hours

(continued)

C. One or more CREV subsystems inoperable due to inoperable HEPA filter or charcoal adsorber(s).	C.1 Restore HEPA filter and charcoal adsorber to OPERABLE status.	90 days

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~D~~. Required Action and associated Completion Time of Condition A not met during OPDRVs.	~~D~~.1 Place OPERABLE CREV subsystem in pressurization mode. OR ~~D~~.2 Initiate action to suspend OPDRVs.	Immediately Immediately
~~E~~. Two CREV subsystems inoperable in MODE 1, 2, or 3 for reasons other than Condition B.	~~E~~.1 Enter LCO 3.0.3.	Immediately

E

F

or Condition C

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~F~~. Two CREV subsystems inoperable during OPDRVs.	~~F~~.1 Initiate action to suspend OPDRVs.	Immediately
OR		
One or more CREV subsystems inoperable due to an inoperable CRE Boundary during OPDRVs.		

G

indent

for reasons other than Condition C

insert

Required Action and associated Completion Time of Condition C not met during OPDRVs.

OR

3.7 PLANT SYSTEMS

3.7.3 Control Room Emergency Ventilation (CREV) System

LCO 3.7.3 Two CREV subsystems shall be OPERABLE.

----------NOTE----------
The main control room envelope (CRE) boundary may be opened intermittently under administrative control.

APPLICABILITY: MODES 1, 2, and 3, during operations with a potential for draining the reactor vessel (OPDRVs).

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One CREV subsystem inoperable for reasons other than Condition B.	or Condition C A.1 Restore CREV subsystem to OPERABLE status.	7 days
B. One or more CREV subsystems inoperable due to inoperable CRE boundary in MODE~~S~~ 1, 2, ~~and~~ or 3.	B.1 Initiate actions to implement mitigating actions. AND B.2 Verify mitigating actions ensure CRE occupant exposures to radiological hazards will not exceed limits, and verify the CRE occupants are protected from smoke and chemical hazards. AND B.3 Restore CRE boundary to OPERABLE status.	Immediately 24 Hours 90 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~C~~ D. Required Action and associated Completion Time of Condition ~~A or B~~ A, B, or C not met in MODE 1, 2, or 3.	~~C~~ D.1 Be in MODE 3. AND ~~C~~ D.2 Be in MODE 4.	12 hours 36 hours

(continued)

C. One or more CREV subsystems inoperable due to inoperable HEPA filter or charcoal adsorber(s).	C.1 Restore HEPA filter and charcoal adsorber to OPERABLE status.	90 days

insert

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Required Action and associated Completion Time of Condition A not met during OPDRVs.	D.1 Place OPERABLE CREV subsystem in pressurization mode.	Immediately
	OR	
	D.2 Initiate action to suspend OPDRVs.	Immediately
E. Two CREV subsystems inoperable in MODE 1, 2, or 3 for reasons other than Condition B or Condition C.	E.1 Enter LCO 3.0.3.	Immediately

(continued)

CREV System → ~~EECW System and UHS~~

3.7.~~2~~

3

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
G		
~~F.~~ Two CREV subsystems inoperable during OPDRVs.	~~F~~.1 Initiate action to suspend OPDRVs.	Immediately
OR — indent — for reasons other than Condition C		
One or more CREV subsystems inoperable due to an inoperable CRE Boundary during OPDRVs.		

insert

Required Action and associated Completion Time of Condition C not met during OPDRVs.

OR

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.3.1	Operate each CREV subsystem for ≥ 10 continuous hours with the heaters operating.	31 days
SR 3.7.3.2	Perform required CREV filter testing in accordance with the Ventilation Filter Testing Program (VFTP).	In accordance with the VFTP
SR 3.7.3.3	Verify each CREV subsystem actuates on an actual or simulated initiation signal.	24 months
SR 3.7.3.4	Perform required CRE unfiltered air inleakage testing in accordance with the Control Room Envelope Habitability Program.	In accordance with the Control Room Envelope Habitability Program

3.7 PLANT SYSTEMS

3.7.3 Control Room Emergency Ventilation (CREV) System

LCO 3.7.3 Two CREV subsystems shall be OPERABLE.

----------NOTE----------
The main control room envelope (CRE) boundary may be opened intermittently under administrative control.

APPLICABILITY: MODES 1, 2, and 3, during operations with a potential for draining the reactor vessel (OPDRVs).

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One CREV subsystem inoperable for reasons other than Condition B. or Condition C	A.1 Restore CREV subsystem to OPERABLE status.	7 days
B. One or more CREV subsystems inoperable due to inoperable CRE boundary in MODES 1, 2, ~~and~~ or 3.	B.1 Initiate actions to implement mitigating actions.	Immediately
	AND	
	B.2 Verify mitigating actions ensure CRE occupant exposures to radiological hazards will not exceed limits, and verify the CRE occupants are protected from smoke and chemical hazards.	24 hours
	AND	
	B.3 Restore CRE boundary to OPERABLE status.	90 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~C~~. Required Action and associated Completion Time of Condition ~~A or B~~ not met in MODE 1, 2, or 3.	~~C~~.1 Be in MODE 3. AND ~~C~~.2 Be in MODE 4.	12 hours 36 hours
C. One or more CREV subsystems inoperable due to inoperable HEPA filter or charcoal adsorber(s).	C.1 Restore HEPA filter and charcoal adsorber to OPERABLE status.	90 days

insert

D

A, B, or C

D

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~D~~. Required Action and associated Completion Time of Condition A not met during OPDRVs.	~~D~~.1 Place OPERABLE CREV subsystem in pressurization mode. OR ~~D~~.2 Initiate action to suspend OPDRVs.	Immediately Immediately
~~E~~. Two CREV subsystems inoperable in MODE 1, 2, or 3 for reasons other than Condition B or Condition C.	~~E~~.1 Enter LCO 3.0.3.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
~~F.~~ Two CREV subsystems inoperable during OPDRVs.	~~F~~.1 Initiate action to suspend OPDRVs.	Immediately
OR		
One or more CREV subsystems inoperable due to an inoperable CRE Boundary during OPDRVs.		

G

indent

for reasons other than Condition C

insert

Required Action and associated Completion Time of Condition C not met during OPDRVs.

OR

Attachment 2

Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3
Technical Specifications (TS) Change 474

License Amendment Request to Add a TS 3.7.3, "Control Room Emergency Ventilation (CREV) System," Action to Address Inoperable CREV High Efficiency Particulate Air (HEPA) Filter and/or Charcoal Adsorbers

Technical Specifications Bases Page Markups

B 3.7 PLANT SYSTEMS

B 3.7.3 Control Room Emergency Ventilation (CREV) System

BASES

BACKGROUND

The CREV System provides a protected environment from which occupants can control the unit following an uncontrolled release of radioactivity.

The safety related function of the CREV System includes two independent and redundant high efficiency air filtration subsystems for emergency treatment of outside supply air and a Control Room Envelope (CRE) boundary that limits the inleakage of unfiltered air. The CREV System has a high efficiency particulate air (HEPA) filter bank in the portion of the inlet piping common to both subsystems. Each CREV subsystem consists of a motor-driven fan, an electric duct air heater, an activated charcoal adsorber section, an electric charcoal heater, and the associated ductwork, valves or dampers, doors, barriers, and instrumentation. The HEPA filter bank removes particulate matter, which may be radioactive. The charcoal adsorbers provide a holdup period for gaseous iodine, allowing time for decay; however, no credit is taken in the analyses for the charcoal adsorbers.

; however, no credit is taken in the analyses for the HEPA filter.

The CRE is the area within the confines of the CRE boundary that contains the spaces that control room occupants inhabit to control the unit during normal and accident conditions. This area encompasses the control room, and may encompass other non-critical areas to which frequent personnel access or continuous occupancy is not necessary in the event of an accident. The CRE is protected during normal operation, natural event and accident conditions. The CRE boundary is the combination of walls, floor, roof, ducting, doors, penetrations and equipment that physically form the CRE. The OPERABILITY of the CRE boundary must be

(continued)

BASES

BACKGROUND (background)

maintained to ensure that the inleakage of unfiltered air into the CRE will not exceed the inleakage assumed in the licensing basis analysis of design basis accident (DBA) consequences to CRE occupants. The CRE and its boundary are defined in the Control Room Envelope Habitability Program.

Upon receipt of the initiation signal(s) (indicative of conditions that could result in radiation exposure to CRE occupants), the CREV System automatically switches to the pressurization mode of operation to minimize infiltration of contaminated air into the CRE. A system of dampers isolates the CRE. Outside air is taken in through the CREV System ventilation intake and is passed through one of the charcoal adsorber filter subsystems for removal of airborne radioactive particles.

The CREV System is designed to maintain a habitable environment in the CRE for 30 day continuous occupancy after a DBA without exceeding 5 REM total effective dose equivalent (TEDE). A single CREV subsystem operating at a flow of 3000 cfm ±10 percent will pressurize the CRE to about 0.125 inches water gauge to minimize infiltration of air from all surrounding areas adjacent to CRE boundary and the outdoors. CREV System operation in maintaining CRE habitability is discussed in the FSAR, Section 10.12 (Ref. 1).

APPLICABLE SAFETY ANALYSES

The ability of the CREV System to maintain the habitability of the CRE is an explicit assumption for the safety analyses presented in the FSAR, Chapters 10 and 14 (Refs. 2 and 3, respectively). The pressurization mode of the CREV System is assumed to operate following a DBA, as discussed in the FSAR, Section 14.6 (Ref. 4). The analyses for radiological doses to CRE occupants as a result of the various DBAs are summarized in Reference 3. No single active failure will cause the loss of filtered outside air from the CRE.

(continued)

BASES

APPLICABLE SAFETY ANALYSIS (continued)

There are no offsite or onsite hazardous chemicals that would pose a credible threat to CRE habitability (Ref 9). Consequently, engineering controls for the CRE are not required to ensure habitability against chemical threat.

The evaluation of a smoke challenge demonstrated that smoke will not result in the inability of the CRE occupants to control the reactor either from the control room or remote shutdown system (Ref 9). The assessment verified that a fire or smoke event anywhere within the plant should not simultaneously render the remote shutdown system and the CRE uninhabitable, nor would it prevent access from the CRE to the remote shutdown system in the event remote shutdown is required. No automatic CREV actuation is required for hazardous chemical releases or smoke and no Surveillance Requirements are required to verify OPERABILITY in cases of hazardous chemicals or smoke.

The CREV System satisfies Criterion 3 of the NRC Policy Statement (Ref. 6).

(continued)

BASES (continued)

LCO

Two redundant subsystems of the CREV System are required to be OPERABLE to ensure that at least one is available, if a single active failure disables the other subsystem. Total CREV System failure, such as from a loss of both ventilation subsystems or from an inoperable CRE boundary, could result in exceeding a TEDE of 5 REM to the CRE occupants in the event of a DBA.

Each CREV subsystem is considered OPERABLE when the individual components necessary to limit CRE occupant exposure are OPERABLE. A subsystem is considered OPERABLE when its associated:

a. Fan is OPERABLE;

b. HEPA filter and charcoal adsorbers are not excessively restricting flow and are capable of performing their filtration functions; and

c. The electric duct heater, ductwork, and dampers are OPERABLE.

Insert A (see next page)

In order for the CREV subsystems to be considered OPERABLE, the CRE boundary must be maintained such that the CRE occupant dose from a large radioactive release does not exceed the calculated dose in the licensing basis consequences analyses for DBAs, and that the CRE occupants are protected from hazardous chemicals and smoke.

BFN does not have automatic CREV actuations for hazardous chemicals or smoke. Current practices at BFN do not utilize chemicals of sufficient quantity to present a chemical hazard to the CRE. Smoke is not considered in the current BFN safety analysis. Therefore, BFN has no specific limits on chemical hazards or smoke.

(continued)

BASES (continued)

LOC (continued)

The LCO is modified by a Note allowing the CRE boundary to be opened intermittently under administrative controls. This Note only applies to openings in the CRE boundary that can be rapidly restored to the design condition, such as doors, hatches, floor plugs, and access panels. For entry and exit through doors the administrative control of the opening is performed by the person(s) entering or exiting the area. For other openings, these controls should be proceduralized and consist of stationing a dedicated individual at the opening who is in continuous communication with the operators in the CRE. This individual will have a method to rapidly close the opening and to restore the CRE boundary to a condition equivalent to the design condition when a need for CRE isolation is indicated.

Insert A *(previous pg)*

Charcoal adsorbers are considered OPERABLE when Ventilation Filter Testing Program (VFTP) acceptance criteria are met and the electric duct heater functions to support the charcoal adsorber function. HEPA filters are considered OPERABLE when VFTP acceptance criteria are met.

(continued)

BASES (continued)

APPLICABILITY

In MODES 1, 2, and 3, the CREV System must be OPERABLE to ensure that the CRE will remain habitable during and following a DBA, since the DBA could lead to a fission product release.

In MODES 4 and 5, the probability and consequences of a DBA are reduced because of the pressure and temperature limitations in these MODES. Therefore, maintaining the CREV System OPERABLE is not required in MODE 4 or 5, except for during operations with potential for draining the reactor vessel (OPDRVs).

ACTIONS

A.1

, inoperable HEPA filter, or inoperable charcoal adsorber

With one CREV subsystem inoperable, for reasons other than an inoperable CRE boundary, the inoperable CREV subsystem must be restored to OPERABLE status within 7 days. With the unit in this condition, the remaining OPERABLE CREV subsystem is adequate to perform the CRE occupant protection function. However, the overall reliability is reduced because a failure in the OPERABLE subsystem could result in loss of the CREV System function. The 7 day Completion Time is based on the low probability of a DBA occurring during this time period, and that the remaining subsystem can provide the required capabilities.

(continued)

BASES

ACTIONS (continued)

B.1, B2 and B3

If the unfiltered inleakage of potentially contaminated air past the CRE boundary and into the CRE can result in a CRE occupant radiological dose greater than the calculated dose of the licensing basis analyses of DBA consequences (allowed to be up to 5 REM TEDE) the CRE boundary is inoperable.

As discussed in the Applicable Safety Analysis Section, the BFN licensing bases notes that CRE inleakage limits for hazardous chemicals and smoke are not needed to protect the CRE occupants. Since the limit established for radiological events is limiting, verification of smoke and chemical hazards by administrative means is acceptable for an inoperable CRE boundary. Verification that the periodic check of onsite and offsite hazardous chemical sources has been performed within the time limit defined by the Control Room Habitability Program is an acceptable means to ensure the CRE occupants are protected from chemical hazards and smoke.

Actions must be taken to restore an OPERABLE CRE boundary within 90 days.

During the period that the CRE boundary is considered inoperable, action must be initiated to implement mitigating actions to lessen the effect on CRE occupants from the potential hazards of a radiological or chemical event or a challenge from smoke. Actions must be taken within 24 hours to verify that in the event of a DBA, the mitigating actions will ensure that CRE occupant radiological exposures will not exceed the calculated dose of the licensing basis analyses of DBA consequences and that CRE occupants are protected from hazardous chemicals and smoke. These mitigating actions (i.e., actions that are taken to offset the consequences of the inoperable CRE boundary) should be preplanned for implementation upon entry into the condition, regardless of whether entry is intentional or unintentional. The 24 hour

(continued)

BASES

ACTIONS (continued)

B.1, B2 and B3 (continued)

Completion Time is reasonable based on low probability of a DBA occurring during this time period and the use of mitigating actions. The 90 day Completion Time is reasonable based on the determination that the mitigating actions will ensure protection of CRE occupants within analyzed limits while limiting the probability that CRE occupants will have to implement protective measures that may adversely affect their ability to control the reactor and maintain it in a safe shutdown condition in the event of a DBA. In addition, the 90 day Completion Time is a reasonable time to diagnose, plan and possibly repair, and test most problems within the CRE boundary. D

~~C.1~~ and ~~C.2~~

In MODE 1, 2, or 3, if the inoperable CREV subsystem or the CRE boundary cannot be restored to OPERABLE status within the required Completion Time, the unit must be placed in a MODE that minimizes accident risk. To achieve this status, the unit must be placed in at least MODE 3 within 12 hours and in MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

C.1

With inoperable HEPA filter and/or charcoal adsorber(s), OPERABILITY must be restored within 90 days. The 90 day Completion Time is based on the analysis for radiological dose to CRE occupants (Reference 10), which has determined that the CRE 30 day dose after a DBA does not exceed 5 rem (TEDE) without credit for either the HEPA filter or the charcoal adsorbers.

(continued)

BASES

ACTIONS (continued)

E

~~D~~.1 and ~~D~~.2

During OPDRVs, if the inoperable CREV subsystem cannot be restored to OPERABLE status within the required Completion Time, the OPERABLE CREV subsystem may be placed in the pressurization mode. This action ensures that the remaining subsystem is OPERABLE, that no failures that would prevent automatic actuation will occur, and that any active failure will be readily detected.

E

An alternative to Required Action ~~D~~.1 is to immediately initiate actions to suspend OPDRVs to minimize the probability of a vessel draindown and the subsequent potential for fission product release. Actions must continue until the OPDRVs are suspended.

(continued)

BASES

ACTIONS (continued)

F

~~E.1~~

or Condition C

If both CREV subsystems are inoperable in MODE 1, 2, or 3 for reasons other than ~~an inoperable CRE (i.e.,~~ Condition B~~)~~, the CREV System may not be capable of performing the intended function and the unit is in a condition outside the accident analyses. Therefore, LCO 3.0.3 must be entered immediately.

G

~~F.1~~

a)

for reasons other than an inoperable HEPA filter or inoperable charcoal adsorber, b)

During OPDRVs, with two CREV subsystems inoperable ~~or~~ with one or more CREV subsystems inoperable due to an inoperable CRE boundary, actions must be initiated immediately to suspend OPDVRs to minimize the probability of a vessel draindown and subsequent potential for fission product release. Actions must continue until the OPDRVs are suspended.

, or c) if the HEPA filter and charcoal adsorber(s) cannot be restored to OPERABLE status within the required Completion Time,

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.7.3.1

This SR verifies that a subsystem in a standby mode starts on demand and continues to operate. Standby systems should be checked periodically to ensure that they start and function properly. As the environmental and normal operating conditions of this system are not severe, testing each subsystem once every month provides an adequate check on this system. Monthly heater operation dries out any moisture that has accumulated in the charcoal as a result of humidity in the ambient air. The CREV System must be operated for ≥ 10 continuous hours with the heaters energized to dry out any moisture and to demonstrate the function of the system. Furthermore, the 31 day Frequency is based on the known reliability of the equipment and the two subsystem redundancy available.

SR 3.7.3.2

This SR verifies that the required CREV testing is performed in accordance with the Ventilation Filter Testing Program (VFTP). The VFTP includes testing HEPA filter performance, charcoal adsorber efficiency, minimum system flow rate, and the physical properties of the activated charcoal (general use and following specific operations). Specific test frequencies and additional information are discussed in detail in the VFTP.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.7.3.3

This SR verifies that on an actual or simulated initiation signal, each CREV subsystem starts and operates. This SR includes verification that dampers necessary for proper CREV operation function as required. The LOGIC SYSTEM FUNCTIONAL TEST in SR 3.3.7.1.4 and SR 3.3.7.1.6 overlaps this SR to provide complete testing of the safety function. The Frequency of 24 months is based on BFN's normal operating cycle.

SR 3.7.3.4

This SR verifies the OPERABILITY of the CRE boundary by testing for unfiltered air inleakage past the CRE boundary and into the CRE. The details of the testing are specified in the Control Room Envelope Habitability Program.

The CRE is considered habitable when the radiological dose to CRE occupants calculated in the licensing basis analyses of DBA consequences is no more that 5 REM TEDE and the CRE occupants are protected from hazardous chemicals and smoke. There is no automatic CREV actuation for hazardous chemical releases or smoke and there are no Surveillance Requirements to verify the OPERABILITY in cases of hazardous chemicals or smoke. This SR verifies that the unfiltered air inleakage into the CRE is no greater than the flow rate assumed in the licensing basis analysis of DBA consequences. When unfiltered air inleakage is greater than the assumed flow rate, Condition B must be entered. Required Action B.3 allows time to restore the CRE boundary to OPERABLE status provided mitigating actions can ensure that the CRE remains within the licensing basis habitability limits for occupants following an accident. Compensatory measures are discussed in Regulatory Guide 1.196, Section C.2.7.3, (Ref. 6) which endorses, with exceptions, NEI 99-03, Section 8.4 and Appendix F (Ref. 7). These compensatory measures may also be used as mitigating actions as required by Required Action B.2. Temporary analytical methods may also be used as compensatory

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.7.3.4 (continued)

measures to restore OPERABILITY (Ref. 8). Options for restoring the CRE boundary to OPERABLE status include changing the licensing basis DBA consequences analysis, repairing the CRE boundary, or a combination of these actions.

Depending upon the nature of the problem and the corrective action, a full scope inleakage test may not be necessary to establish that the CRE boundary has been restored to OPERABLE status.

REFERENCES

1. FSAR, Section 10.12.
2. FSAR, Chapter 10.
3. FSAR, Chapter 14.
4. FSAR, Section 14.6.
5. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.
6. NRC Regulatory Guide 1.196, "Control Room Habitability At Light-Water Power Reactors," January 2007.
7. NEI 99-03, "Control Room Habitability Assessment," June 2001.
8. Letter from Eric J. Leeds (NRC) to James W. Davis (NEI) dated January 30, 2004, "NEI Draft White Paper, Use of Generic Letter 91-18 Process and Alternative Source Terms in the Context of Control Room Habitability," (ADAMS Accession No. ML040300694).
9. FSAR, Chapter 10.12.5.3, Toxic Gas Protection.
10. TVA Design Output Calculation NDQ0031920075, "Control Room and Offsite Doses Due to a LOCA," Revision 21.

B 3.7 PLANT SYSTEMS

B 3.7.3 Control Room Emergency Ventilation (CREV) System

BASES

BACKGROUND

The CREV System provides a protected environment from which occupants can control the unit following an uncontrolled release of radioactivity.

The safety related function of the CREV System includes two independent and redundant high efficiency air filtration subsystems for emergency treatment of outside supply air and a Control Room Envelope (CRE) boundary that limits the inleakage of unfiltered air. The CREV System has a high efficiency particulate air (HEPA) filter bank in the portion of the inlet piping common to both subsystems. Each CREV subsystem consists of a motor-driven fan, an electric duct air heater, an activated charcoal adsorber section, an electric charcoal heater, and the associated ductwork, valves or dampers, doors, barriers and instrumentation. The HEPA filter bank removes particulate matter, which may be radioactive. The charcoal adsorbers provide a holdup period for gaseous iodine, allowing time for decay; however, no credit is taken in the analyses for the charcoal adsorbers.
; however, no credit is taken in the analyses for the HEPA filter.

The CRE is the areas within the confines of the CRE boundary that contains the spaces that control room occupants inhabit to control the unit during normal and accident conditions. This area encompasses the control room, and may encompass other non-critical areas to which frequent personnel access or continuous occupancy is not necessary in the event of an accident. The CRE is protected during normal operation, natural event and accident conditions. The CRE boundary is the combination of wall, floor, root, ducting, doors, penetrations and equipment that physically form the CRE. The OPERABILITY of the CRE boundary must be maintained to ensure that the inleakage of unfiltered air in the CRE will not

(continued)

BASES

BACKGROUND (continued)

exceed the inleakage assumed in the licensing basis analysis of design basis accident (DBA) consequences to CRE occupants. The CRE and its boundary are defined in the Control Room Envelope Habitability Program.

Upon receipt of the initiation signal(s) (indicative of conditions that could result in radiation exposure to CRE occupants), the CREV System automatically switches to the pressurization mode of operation to minimize infiltration of contaminated air into the CRE. A system of dampers isolates the CRE. Outside air is taken in through the CREV System ventilation intake and is passed through one of the charcoal adsorber filter subsystems for removal of airborne radioactive particles.

The CREV System is designed to maintain a habitable environment in the CRE for a 30 day continuous occupancy after a DBA without exceeding 5 REM total effective dose equivalent (TEDE). A single CREV subsystem operating at a flow rate of 3000 CFM ± 10 percent will pressurize the CRE to about 0.125 inches water gauge to minimize infiltration of air from all surrounding areas adjacent to CRE boundary and the outdoors. CREV System operation in maintaining CRE habitability is discussed in the FSAR, Section 10.12 (Ref. 1).

(continued)

BASES (continued)

APPLICABLE SAFETY ANALYSES

The ability of the CREV System to maintain the habitability of the CRE is an explicit assumption for the safety analyses presented in the FSAR, Chapters 10 and 14 (Refs. 2 and 3, respectively). The pressurization mode of the CREV System is assumed to operate following a DBA, as discussed in the FSAR, Section 14.6 (Ref. 4). The analyses for radiological doses to CRE occupants as a result of the various DBAs are summarized in Reference 3. No single active failure will cause the loss of filtered outside air from the CRE.

There are no offsite or onsite hazardous chemicals that would pose a credible threat to CRE habitability (Ref. 9). Consequently, engineering controls for the CRE are not required to ensure habitability against chemical threat.

The evaluation of a smoke challenge demonstrated that smoke will not result in the inability of the CRE occupants to control the reactor either from the control room or remote shutdown system (Ref 9). The assessment verified that a fire or smoke event anywhere within the plant should not simultaneously render the remote shutdown system and the CRE uninhabitable, nor would it prevent access from the CRE to the remote shutdown system in the event remote shutdown is required. No automatic CREV actuation is required for hazardous chemical releases or smoke and no Surveillance Requirements are required to verify OPERABILITY in cases of hazardous chemicals or smoke.

The CREV System satisfies Criterion 3 of the NRC Policy Statement (Ref. 6).

(continued)

BASES (continued)

LCO

Two redundant subsystems of the CREV System are required to be OPERABLE to ensure that at least one is available, if a single active failure, such as from a loss of both ventilation subsystems or from an inoperable CRE boundary, disables the other subsystem. Total system failure could result in exceeding a TEDE of 5 REM to the CRE occupants in the event of a DBA.

Each CREV subsystem is considered OPERABLE when the individual components necessary to limit CRE occupant exposure are OPERABLE in both subsystems. A subsystem is considered OPERABLE when its associated:

a. Fan is OPERABLE;

b. HEPA filter and charcoal adsorbers are not excessively restricting flow and are capable of performing their filtration functions; and

c. The electric duct heater, ductwork, and dampers are OPERABLE.

Insert A (see next page)

In order for the CREV subsystem to be considered OPERABLE, the CRE boundary must be maintained such that the CRE occupant dose from a large radioactive release does not exceed the calculated dose in the licensing basis consequences analyses for DBAs, and that the CRE occupants are protected from hazardous chemicals and smoke.

BFN does not have automatic CREV actuations for hazardous chemicals or smoke. Current practices at BFN do not utilize chemicals of sufficient quantity to present a chemical hazard to the CRE. Smoke is not considered in the current BFN safety analysis. Therefore, BFN has no specific limits on chemical hazards or smoke.

(continued)

BASES (continued)

LCO (continued)

The LCO is modified by a Note allowing the CRE boundary to be opened intermittently under administrative controls. This Note only applies to openings in the CRE boundary that can be rapidly restored to the design condition, such as doors, hatches, floor plugs and access panels. For entry and exit through doors the administrative control of the opening is performed by the person(s) entering or exiting the area. For other openings, these controls should be proceduralized and consist of stationing a dedicated individual at the opening who is in continuous communication with the operators and CRE. This individual will have a method to rapidly close the opening and to restore the CRE boundary to a condition equivalent to the design condition when a need for CRE isolation is indicated.

Insert A *(previous pg)*

Charcoal adsorbers are considered OPERABLE when Ventilation Filter Testing Program (VFTP) acceptance criteria are met and the electric duct heater functions to support the charcoal adsorber function. HEPA filters are considered OPERABLE when VFTP acceptance criteria are met.

(continued)

BASES (continued)

APPLICABILITY

In MODES 1, 2, and 3, the CREV System must be OPERABLE to ensure that the CRE will remain habitable during and following a DBA, since the DBA could lead to a fission product release.

In MODES 4 and 5, the probability and consequences of a DBA are reduced because of the pressure and temperature limitations in these MODES. Therefore, maintaining the CREV System OPERABLE is not required in MODE 4 or 5, except for during operations with potential for draining the reactor vessel (OPDRVs).

ACTIONS

A.1

, inoperable HEPA filter, or inoperable charcoal adsorber

With one CREV subsystem inoperable, for reasons other than an inoperable CRE boundary, the inoperable CREV subsystem must be restored to OPERABLE status within 7 days. With the unit in this condition, the remaining OPERABLE CREV subsystem is adequate to perform the CRE occupant protection function. However, the overall reliability is reduced because a failure in the OPERABLE subsystem could result in loss of the CREV System function. The 7 day Completion Time is based on the low probability of a DBA occurring during this time period, and that the remaining subsystem can provide the required capabilities.

(continued)

BASES

ACTIONS (continued)

B.1, B.2, and B.3

If the unfiltered inleakage of potentially contaminated air past the CRE boundary and into the CRE can result in a CRE occupant radiological dose greater than the calculated dose of the licensing basis analyses of DBA consequences (allowed to be up to 5 REM TEDE) the CRE boundary is inoperable.

As discussed in the Applicable Safety Analysis Section, the BFN licensing bases notes that CRE inleakage limits for hazardous chemicals and smoke are not needed to protect the CRE occupants. Since the limit established for radiological events is limiting, verification of smoke and chemical hazards by administrative means is acceptable for an inoperable CRE boundary. Verification that the periodic check of onsite and offsite hazardous chemical sources has been performed within the time limit defined by the Control Room Habitability Program is an acceptable means to ensure the CRE occupants are protected from chemical hazards and smoke.

Actions must be taken to restore an OPERABLE CRE boundary within 90 days.

During the period that the CRE boundary is considered inoperable, action must be initiated to implement mitigating actions to lessen the effect on CRE occupants from the potential hazards of a radiological or chemical event or a challenge from smoke. Actions must be taken within 24 hours to verify that in the event of a DBA, the mitigating actions will ensure that CRE occupant radiological exposures will not exceed the calculated dose of the licensing basis analyses of DBA consequences and that CRE occupants are protected from hazardous chemicals and smoke. These mitigating actions (i.e., actions that are taken to offset the consequences of the inoperable CRE boundary) should be preplanned for implementation upon entry into the condition,

(continued)

BASES

ACTIONS (continued)

B.1, B.2, and B.3 (continued)

regardless of whether entry is intentional or unintentional. The 24 hour Completion Time is reasonable based on the low probability of a DBA occurring during this time period and the use of mitigating actions. The 90 day Completion Time is reasonable based on the determination that the mitigating actions will ensure protection of CRE occupants within analyzed limits while limiting the probability that CRE occupants will have to implement protective measures that may adversely affect their ability to control the reactor and maintain it in a safe shutdown condition in the event of a DBA. In addition, the 90 day Completion Time is a reasonable time to diagnose, plan and possibly repair, and test most problems within the CRE boundary.

D

~~C~~.1 and ~~C~~.2

In MODE 1, 2, or 3, if the inoperable CREV subsystem or the CRE boundary cannot be restored to OPERABLE status within the required Completion Time, the unit must be placed in a MODE that minimizes accident risk. To achieve this status, the unit must be placed in at least MODE 3 within 12 hours and in MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

C.1

With inoperable HEPA filter and/or charcoal adsorber(s), OPERABILITY must be restored within 90 days. The 90 day Completion Time is based on the analysis for radiological dose to CRE occupants (Reference 10), which has determined that the CRE 30 day dose after a DBA does not exceed 5 rem (TEDE) without credit for either the HEPA filter or the charcoal adsorbers.

(continued)

BASES

ACTIONS (continued)

~~D~~.1 and ~~D~~.2 E

During OPDRVs, if the inoperable CREV subsystem cannot be restored to OPERABLE status within the required Completion Time, the OPERABLE CREV subsystem may be placed in the pressurization mode. This action ensures that the remaining subsystem is OPERABLE, that no failures that would prevent automatic actuation will occur, and that any active failure will be readily detected.

An alternative to Required Action ~~D~~.1 E is to immediately initiate actions to suspend OPDRVs to minimize the probability of a vessel draindown and the subsequent potential for fission product release. Actions must continue until the OPDRVs are suspended.

(continued)

BASES

ACTIONS (continued)

F

~~E~~.1

or Condition C

If both CREV subsystems are inoperable in MODE 1, 2, or 3 for reasons other than ~~an inoperable CRE (i.e.,~~ Condition B~~)~~, the CREV System may not be capable of performing the intended function and the unit is in a condition outside the accident analyses. Therefore, LCO 3.0.3 must be entered immediately.

G

~~F~~.1

a)

for reasons other than an inoperable HEPA filter or inoperable charcoal adsorber, b)

During OPDRVs, with two CREV subsystems inoperable~~, or~~ with one or more CREV subsystems inoperable due to an inoperable CRE boundary, actions must be initiated immediately to suspend OPDVRs to minimize the probability of a vessel draindown and subsequent potential for fission product release. Actions must continue until the OPDRVs are suspended.

, or c) if the HEPA filter and charcoal adsorber(s) cannot be restored to OPERABLE status within the required Completion Time,

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.7.3.1

This SR verifies that a subsystem in a standby mode starts on demand and continues to operate. Standby systems should be checked periodically to ensure that they start and function properly. As the environmental and normal operating conditions of this system are not severe, testing each subsystem once every month provides an adequate check on this system. Monthly heater operation dries out any moisture that has accumulated in the charcoal as a result of humidity in the ambient air. The CREV System must be operated for ≥ 10 continuous hours with the heaters energized to dry out any moisture and to demonstrate the function of the system. Furthermore, the 31 day Frequency is based on the known reliability of the equipment and the two subsystem redundancy available.

SR 3.7.3.2

This SR verifies that the required CREV testing is performed in accordance with the Ventilation Filter Testing Program (VFTP). The VFTP includes testing HEPA filter performance, charcoal adsorber efficiency, minimum system flow rate, and the physical properties of the activated charcoal (general use and following specific operations). Specific test frequencies and additional information are discussed in detail in the VFTP.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.7.3.3

This SR verifies that on an actual or simulated initiation signal, each CREV subsystem starts and operates. This SR includes verification that dampers necessary for proper CREV operation function as required. The LOGIC SYSTEM FUNCTIONAL TEST in SR 3.3.7.1.4 and SR 3.3.7.1.6 overlaps this SR to provide complete testing of the safety function. The frequency of 24 months is based on BFN's normal operating time.

SR 3.7.3.4

This SR verifies the OPERABILITY of the CRE boundary by testing for unfiltered air inleakage past the CRE boundary and into the CRE. The details of the testing are specified in the Control Room Envelope Habitability Program.

The CRE is considered habitable when the radiological dose to CRE occupants calculated in the licensing basis analyses of DBA consequences is no more that 5 REM TEDE and the CRE occupants are protected from hazardous chemicals and smoke. There is no automatic CREV actuation for hazardous chemical releases or smoke and there are no Surveillance Requirements to verify the OPERABILITY in cases of hazardous chemicals or smoke. This SR verifies that the unfiltered air inleakage into the CRE is no greater than the flow rate assumed in the licensing basis analysis of DBA consequences. When unfiltered air inleakage is greater than the assumed flow rate, Condition B must be entered. Required Action B.3 allows time to restore the CRE boundary to OPERABLE status provided mitigating actions can ensure that the CRE remains within the licensing basis habitability limits for occupants following an accident. Compensatory measures are discussed in Regulatory Guide 1.196, Section C.2.7.3, (Ref. 6) which endorses, with exceptions, NEI 99-03, Section 8.4 and Appendix F (Ref. 7). These compensatory measures may also be used as mitigating actions as required by Required Action B.2. Temporary analytical methods may also be used as compensatory

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.7.3.4 (continued)

measures to restore OPERABILITY (Ref. 8). Options for restoring the CRE boundary to OPERABLE status include changing the licensing basis DBA consequences analysis, repairing the CRE boundary, or a combination of these actions.

Depending upon the nature of the problem and the corrective action, a full scope inleakage test may not be necessary to establish that the CRE boundary has been restored to OPERABLE status.

REFERENCES

1. FSAR, Section 10.12.
2. FSAR, Chapter 10.
3. FSAR, Chapter 14.
4. FSAR, Section 14.6.
5. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.
6. NRC Regulatory Guide 1.196, "Control Room Habitability At Light-Water Power Reactors," January, 2007.
7. NEI 99-03, "Control Room Habitability Assessment," June, 2001.
8. Letter from Eric J. Leeds (NRC) to James W. Davis (NEI) dated January 30, 2004, "NEI Draft White Paper, Use of Generic Letter 91-18 Process and Alternative Source Terms in the Context of Control Room Habitability," (ADAMS Accession No. ML040300694).
9. FSAR, Chapter 10.12.5.3, Toxic Gas Protection.
10. TVA Design Output Calculation NDQ0031920075, "Control Room and Offsite Doses Due to a LOCA," Revision 21.

B 3.7 PLANT SYSTEMS

B 3.7.3 Control Room Emergency Ventilation (CREV) System

BASES

BACKGROUND

The CREV System provides a protected environment from occupants can control the unit following an uncontrolled release of radioactivity.

The safety related function of the CREV System includes two independent and redundant high efficiency air filtration subsystems for emergency treatment of outside supply air and a Control Room Envelope (CRE) boundary that limits the inleakage of unfiltered air. The CREV System has a high efficiency particulate air (HEPA) filter bank in the portion of the inlet piping common to both subsystems. Each CREV subsystem consists of a motor-driven fan, an electric duct air heater, an activated charcoal adsorber section, an electric charcoal heater, and the associated ductwork, valves or dampers, doors, barriers, and instrumentation. The HEPA filter bank removes particulate matter, which may be radioactive. The charcoal adsorbers provide a holdup period for gaseous iodine, allowing time for decay; however, no credit is taken in the analyses for the charcoal adsorbers.

; however, no credit is taken in the analyses for the HEPA filter.

The CRE is the area within the confines of the CRE boundary that contains the spaces that control room occupants inhabit to control the unit during normal and accident conditions. This area encompasses the control room, and may encompass other non-critical areas to which frequent personnel access or continuous occupancy is not necessary in the event of an accident. The CRE is protected during normal operation, natural event and accident conditions. The CRE boundary is the combination of walls, floors, roof, ducting, doors, penetrations and equipment that physically form the CRE. The OPERABILITY of the CRE boundary must be maintained to ensure that the inleakage of unfiltered air into the CRE will not

(continued)

BASES

BACKGROUND (continued)

exceed the inleakage assumed in the licensing basis analysis of design basis accident (DBA) consequences to CRE occupants. The CRE and its boundary are defined in the Control Room Envelope Habitability Program.

Upon receipt of the initiation signal(s) (indicative of conditions that could result in radiation exposure to CRE occupants), the CREV System automatically switches to the pressurization mode of operation to minimize infiltration of contaminated air into the CRE. A system of dampers isolates the CRE. Outside air is taken in through the CREV System ventilation intake and is passed through one of the charcoal adsorber filter subsystems for removal of airborne radioactive particles.

The CREV System is designed to maintain a habitable environment in the CRE for a 30 day continuous occupancy after a DBA without exceeding 5 REM total effective dose equivalent (TEDE). A single CREV subsystem operating at a flow rate of 3000 cfm ± 10 percent will pressurize the CRE to about 0.125 inches water gauge to minimize infiltration of air from all surrounding areas adjacent to CRE boundary and the outdoors. CREV System operation in maintaining CRE habitability is discussed in the FSAR, Section 10.12 (Ref. 1).

(continued)

BASES

APPLICABLE SAFETY ANALYSIS

The ability of the CREV System to maintain the habitability of the CRE is an explicit assumption for the safety analyses presented in the FSAR, Chapters 10 and 14 (Refs. 2 and 3, respectively). The pressurization mode of the CREV System is assumed to operate following a DBA, as discussed in the FSAR, Section 14.6 (Ref. 4). The analyses for radiological doses to CRE occupants as a result of the various DBAs are summarized in Reference 3. No single active failure will cause the loss of filtered outside air from the CRE.

There are no offsite or onsite hazardous chemicals that would pose a credible threat to CRE habitability (Ref 9). Consequently, engineering controls for the CRE are not required to ensure habitability against chemical threat.

The evaluation of a smoke challenge demonstrated that smoke will not result in the inability of the CRE occupants to control the reactor either from the control room or remote shutdown system (Ref 9). The assessment verified that a fire or smoke event anywhere within the plant should not simultaneously render the remote shutdown system and the CRE uninhabitable, nor would it prevent access from the CRE to the remote shutdown system in the event remote shutdown is required. No automatic CREV actuation is required for hazardous chemical releases or smoke and no Surveillance Requirements are required to verify OPERABILITY in cases of hazardous chemicals or smoke.

The CREV System satisfies Criterion 3 of the NRC Policy Statement (Ref. 6).

(continued)

BASES (continued)

LCO

Two redundant subsystems of the CREV System are required to be OPERABLE to ensure that at least one is available, if a single active failure, such as from a loss of both ventilation subsystems or from an inoperable CRE boundary, disables the other subsystem. Total system failure could result in exceeding a TEDE of 5 REM to the CRE occupants in the event of a DBA.

Each CREV subsystem is considered OPERABLE when the individual components necessary to limit CRE occupant exposure are OPERABLE. A subsystem is considered OPERABLE when its associated:

a. Fan is OPERABLE;

b. HEPA filter and charcoal adsorbers are not excessively restricting flow and are capable of performing their filtration functions; and

c. The electric duct heater, ductwork, and dampers are OPERABLE.

Insert A (see next page)

In order for the CREV subsystems to be considered OPERABLE, the CRE boundary must be maintained such that the CRE occupant dose from a large radioactive release does not exceed the calculated dose in the licensing basis consequences analyses for DBAs, and that the CRE occupants are protected from hazardous chemicals and smoke.

BFN does not have automatic CREV actuations for hazardous chemicals or smoke. Current practices at BFN do not utilize chemicals or sufficient quantity to present a chemical hazard to the CRE. Smoke is not considered in the current BFN safety analysis. Therefore, BFN has no specific limits on chemical hazards or smoke.

(continued)

BASES (continued)

LCO (continued)

The LCO is modified by a Note allowing the CRE boundary to be opened intermittently under administrative controls. This Note only applies to openings in the CRE boundary that can be rapidly restored to the design condition such as doors, hatches, floor plugs, and access panels. For entry and exit through doors the administrative control of the opening is performed by the person(s) entering or exiting the area. For other openings, these controls should be proceduralized and consist of stationing a dedicated individual at the opening who is in continuous communication with the operators in the CRE. This individual will have a method to rapidly close the opening and to restore the CRE boundary to a condition equivalent to the design condition when a need for CRE isolation is indicated.

Insert A *(previous pg)*

Charcoal adsorbers are considered OPERABLE when Ventilation Filter Testing Program (VFTP) acceptance criteria are met and the electric duct heater functions to support the charcoal adsorber function. HEPA filters are considered OPERABLE when VFTP acceptance criteria are met.

(continued)

BASES (continued)

APPLICABILITY

In MODES 1, 2, and 3, the CREV System must be OPERABLE to ensure that the CRE will remain habitable during and following a DBA, since the DBA could lead to a fission product release.

In MODES 4 and 5, the probability and consequences of a DBA are reduced because of the pressure and temperature limitations in these MODES. Therefore, maintaining the CREV System OPERABLE is not required in MODE 4 or 5, except for during operations with potential for draining the reactor vessel (OPDRVs).

ACTIONS

A.1 , inoperable HEPA filter, or inoperable charcoal adsorber

With one CREV subsystem inoperable, for reasons other than an inoperable CRE boundary, the inoperable CREV subsystem must be restored to OPERABLE status within 7 days. With the unit in this condition, the remaining OPERABLE CREV subsystem is adequate to perform the CRE occupant protection function. However, the overall reliability is reduced because a failure in the OPERABLE subsystem could result in a loss of the CREV System function. The 7 day Completion Time is based on the low probability of a DBA occurring during this time period, and that the remaining subsystem can provide the required capabilities.

(continued)

BASES

ACTIONS (continued)

B.1, B.2 and B.3

If the unfiltered inleakage of potentially contaminated air past the CRE boundary and into the CRE can result in a CRE occupant radiological dose greater than the calculated dose of the licensing basis analyses of DBA consequences (allowed to be up to 5 REM TEDE) the CRE boundary is inoperable.

As discussed in the Applicable Safety Analysis Section, the BFN licensing bases notes that CRE inleakage limits for hazardous chemicals and smoke are not needed to protect the CRE occupants. Since the limit established for radiological events is limiting, verification of smoke and chemical hazards by administrative means is acceptable for an inoperable CRE boundary. Verification that the periodic check of onsite and offsite hazardous chemical sources has been performed within the time limit defined by the Control Room Habitability Program is an acceptable means to ensure the CRE occupants are protected from chemical hazards and smoke.

Actions must be taken to restore an OPERABLE CRE boundary within 90 days.

During the period that the CRE boundary is considered inoperable, action must be initiated to implement mitigating actions to lessen the effect on CRE occupants from the potential hazards of a radiological or chemical event or a challenge from smoke. Actions must be taken within 24 hours to verify that in the event of a DBA, the mitigating actions will ensure that CRE occupant radiological exposures will not exceed the calculated dose of the licensing basis analyses of DBA consequences and that CRE occupants are protected from hazardous chemicals and smoke. These mitigating actions (i.e., actions that are taken to offset the consequences of the inoperable CRE boundary) should be preplanned for implementation upon entry into the condition, regardless of whether entry is intentional or unintentional. The 24 hour

(continued)

BASES

ACTIONS (continued)

B.1, B.2 and B.3 (continued)

Completion Time is reasonable based on the low probability of a DBA occurring during this time period and the use of mitigating actions. The 90 day Completion Time is reasonable based on the determination that the mitigating actions will ensure protection of CRE occupants within analyzed limits while limiting the probability that CRE occupants will have to implement protective measures that may adversely affect their ability to control the reactor and maintain it in a safe shutdown condition in the event of a DBA. In addition, the 90 day Completion Time is a reasonable time to diagnose, plan and possibly repair, and test most problems within the CRE boundary.

D

~~C~~.1 and ~~C~~.2

In MODE 1, 2, or 3, if the inoperable CREV subsystem or the CRE cannot be restored to OPERABLE status within the required Completion Time, the unit must be placed in a MODE that minimizes accident risk. To achieve this status, the unit must be placed in at least MODE 3 within 12 hours and in MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

C.1

With inoperable HEPA filter and/or charcoal adsorber(s), OPERABILITY must be restored within 90 days. The 90 day Completion Time is based on the analysis for radiological dose to CRE occupants (Reference 10), which has determined that the CRE 30 day dose after a DBA does not exceed 5 rem (TEDE) without credit for either the HEPA filter or the charcoal adsorbers.

(continued)

BASES

ACTIONS (continued)

E

~~D~~.1 and ~~D~~.2

During OPDRVs, if the inoperable CREV subsystem cannot be restored to OPERABLE status within the required Completion Time, the OPERABLE CREV subsystem may be placed in the pressurization mode. This action ensures that the remaining subsystem is OPERABLE, that no failures that would prevent automatic actuation will occur, and that any active failure will be readily detected.

E

An alternative to Required Action ~~D~~.1 is to immediately initiate actions to suspend OPDRVs to minimize the probability of a vessel draindown and the subsequent potential for fission product release. Actions must continue until the OPDRVs are suspended.

(continued)

BASES

ACTIONS (continued)

F

~~E~~.1

or Condition C

If both CREV subsystems are inoperable in MODE 1, 2, ~~or~~ 3 for reasons other than ~~an inoperable CRE (i.e.,~~ Condition B~~)~~, the CREV System may not be capable of performing the intended function and the unit is in a condition outside the accident analyses. Therefore, LCO 3.0.3 must be entered immediately.

G

~~F~~.1

a)

for reasons other than an inoperable HEPA filter or inoperable charcoal adsorber, b)

During OPDRVs~~,~~ with two CREV subsystems inoperable ~~or~~ with one or more CREV subsystems inoperable due to an inoperable CRE boundary, actions must be initiated immediately to suspend OPDVRs to minimize the probability of a vessel draindown and subsequent potential for fission product release. Actions must continue until the OPDRVs are suspended.

, or c) if the HEPA filter and charcoal adsorber(s) cannot be restored to OPERABLE status within the required Completion Time,

(continued)

BASES (continued)

SURVEILLANCE REQUIREMENTS

SR 3.7.3.1

This SR verifies that a subsystem in a standby mode starts on demand and continues to operate. Standby systems should be checked periodically to ensure that they start and function properly. As the environmental and normal operating conditions of this system are not severe, testing each subsystem once every month provides an adequate check on this system. Monthly heater operation dries out any moisture that has accumulated in the charcoal as a result of humidity in the ambient air. The CREV System must be operated for ≥ 10 continuous hours with the heaters energized to dry out any moisture and to demonstrate the function of the system. Furthermore, the 31 day Frequency is based on the known reliability of the equipment and the two subsystem redundancy available.

SR 3.7.3.2

This SR verifies that the required CREV testing is performed in accordance with the Ventilation Filter Testing Program (VFTP). The VFTP includes testing HEPA filter performance, charcoal adsorber efficiency, minimum system flow rate, and the physical properties of the activated charcoal (general use and following specific operations). Specific test frequencies and additional information are discussed in detail in the VFTP.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.7.3.3

This SR verifies that on an actual or simulated initiation signal, each CREV subsystem starts and operates. This SR includes verification that dampers necessary for proper CREV operation function as required. The LOGIC SYSTEM FUNCTIONAL TEST in SR 3.3.7.1.4 and SR 3.3.7.1.6 overlaps this SR to provide complete testing of the safety function. The frequency of 24 months is based on BFN's normal operating cycle.

SR 3.7.3.4

This SR verifies the OPERABILITY of the CRE boundary by testing for unfiltered air inleakage past the CRE boundary and into the CRE. The details of the testing are specified in the Control Room Envelope Habitability Program.

The CRE is considered habitable when the radiological dose to CRE occupants calculated in the licensing basis analyses of DBA consequences is no more that 5 REM TEDE and the CRE occupants are protected from hazardous chemicals and smoke. There is no automatic CREV actuation for hazardous chemical releases or smoke and there are no Surveillance Requirements to verify the OPERABILITY in cases of hazardous chemicals or smoke. This SR verifies that the unfiltered air inleakage into the CRE is no greater than the flow rate assumed in the licensing basis analysis of DBA consequences. When unfiltered air inleakage is greater than the assumed flow rate, Condition B must be entered. Required Action B.3 allows time to restore the CRE boundary to OPERABLE status provided mitigating actions can ensure that the CRE remains within the licensing basis habitability limits for occupants following an accident. Compensatory measures are discussed in Regulatory Guide 1.196, Section C.2.7.3, (Ref. 6) which endorses, with exceptions, NEI 99-03, Section 8.4 and Appendix F (Ref. 7). These compensatory measures may also be used as mitigating actions as required by Required Action B.2. Temporary analytical methods may also be used as compensatory measures to restore OPERABILITY (Ref. 8). Options for restoring the CRE boundary to OPERABLE status include

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.7.3.4 (continued)

changing the licensing basis DBA consequences analysis, repairing the CRE boundary, or a combination of these actions.

Depending upon the nature of the problem and the corrective action, a full scope inleakage test may not be necessary to establish that the CRE boundary has been restored to OPERABLE status.

REFERENCES

1. FSAR, Section 10.12.
2. FSAR, Chapter 10.
3. FSAR, Chapter 14.
4. FSAR, Section 14.6.
5. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.
6. NRC Regulatory Guide 1.196, "Control Room Habitability At Light-Water Power Reactors," January 2007.
7. NEI 99-03, "Control Room Habitability Assessment," June 2001.
8. Letter from Eric J. Leeds (NRC) to James W. David (NEI) dated January 30, 2004, "NEI Draft White Paper, Use of Generic Letter 91-18 Process and Alternative Source Terms in the Context of Control Room Habitability," (ADAMS Accession No. ML040300694).
9. FSAR, Chapter 10.12.5.3, Toxic Gas Protection.
10. TVA Design Output Calculation NDQ0031920075, "Control Room and Offsite Doses Due to a LOCA," Revision 21.

Attachment 3

Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3
Technical Specifications (TS) Change 474

License Amendment Request to Add a TS 3.7.3, "Control Room Emergency Ventilation (CREV) System," Action to Address Inoperable CREV High Efficiency Particulate Air (HEPA) Filter and/or Charcoal Adsorbers

Retyped Technical Specifications Pages

3.7 PLANT SYSTEMS

3.7.3 Control Room Emergency Ventilation (CREV) System

LCO 3.7.3 Two CREV subsystems shall be OPERABLE.

---NOTE---
The main control room envelope (CRE) boundary may be opened intermittently under administrative control.

APPLICABILITY: MODES 1, 2, and 3, during operations with a potential for draining the reactor vessel (OPDRVs).

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One CREV subsystem inoperable for reasons other than Condition B or Condition C.	A.1 Restore CREV subsystem to OPERABLE status.	7 days
B. One or more CREV subsystems inoperable due to inoperable CRE boundary in MODE 1, 2, or 3.	B.1 Initiate action to implement mitigating actions	Immediately
	AND	
	B.2 Verify mitigating actions ensure CRE occupant exposures to radiological hazards will not exceed limits, and verify the CRE occupants are protected from smoke and chemical hazards.	24 hours
	AND	
	B.3 Restore CRE boundary to OPERABLE status.	90 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. One or more CREV subsystems inoperable due to inoperable HEPA filter or charcoal adsorber(s).	C.1 Restore HEPA filter and charcoal adsorber to OPERABLE status.	90 days
D. Required Action and associated Completion Time of Condition A, B, or C not met in MODE 1, 2, or 3.	D.1 Be in MODE 3. AND D.2 Be in MODE 4.	12 hours 36 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Required Action and associated Completion Time of Condition A not met during OPDRVs.	E.1 Place OPERABLE CREV subsystem in pressurization mode.	Immediately
	OR	
	E.2 Initiate action to suspend OPDRVs.	Immediately
F. Two CREV subsystems inoperable in MODE 1, 2, or 3 for reasons other than Condition B or Condition C.	F.1 Enter LCO 3.0.3.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
G. Required Action and associated Completion Time of Condition C not met during OPDRVs. OR Two CREV subsystems inoperable during OPDRVs for reasons other than Condition C. OR One or more CREV subsystems inoperable due to an inoperable CRE Boundary during OPDRVs.	G.1 Initiate action to suspend OPDRVs.	Immediately

3.7 PLANT SYSTEMS

3.7.3 Control Room Emergency Ventilation (CREV) System

LCO 3.7.3 Two CREV subsystems shall be OPERABLE.

---NOTE---
The main control room envelope (CRE) boundary may be opened intermittently under administrative control.

APPLICABILITY: MODES 1, 2, and 3, during operations with a potential for draining the reactor vessel (OPDRVs).

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One CREV subsystem inoperable for reasons other than Condition B or Condition C.	A.1 Restore CREV subsystem to OPERABLE status.	7 days
B. One or more CREV subsystems inoperable due to inoperable CRE boundary in MODE 1, 2, or 3.	B.1 Initiate actions to implement mitigating actions.	Immediately
	AND	
	B.2 Verify mitigating actions ensure CRE occupant exposures to radiological hazards will not exceed limits, and verify the CRE occupants are protected from smoke and chemical hazards.	24 Hours
	AND	
	B.3 Restore CRE boundary to OPERABLE status.	90 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. One or more CREV subsystems inoperable due to inoperable HEPA filter or charcoal adsorber(s).	C.1 Restore HEPA filter and charcoal adsorber to OPERABLE status.	90 days
D. Required Action and associated Completion Time of Condition A, B, or C not met in MODE 1, 2, or 3.	D.1 Be in MODE 3. AND D.2 Be in MODE 4.	12 hours 36 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Required Action and associated Completion Time of Condition A not met during OPDRVs.	E.1 Place OPERABLE CREV subsystem in pressurization mode.	Immediately
	OR	
	E.2 Initiate action to suspend OPDRVs.	Immediately
F. Two CREV subsystems inoperable in MODE 1, 2, or 3 for reasons other than Condition B or Condition C.	F.1 Enter LCO 3.0.3.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
G. Required Action and associated Completion Time of Condition C not met during OPDRVs. OR Two CREV subsystems inoperable during OPDRVs for reasons other than Condition C. OR One or more CREV subsystems inoperable due to an inoperable CRE Boundary during OPDRVs.	G.1 Initiate action to suspend OPDRVs.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.3.1	Operate each CREV subsystem for ≥ 10 continuous hours with the heaters operating.	31 days
SR 3.7.3.2	Perform required CREV filter testing in accordance with the Ventilation Filter Testing Program (VFTP).	In accordance with the VFTP
SR 3.7.3.3	Verify each CREV subsystem actuates on an actual or simulated initiation signal.	24 months
SR 3.7.3.4	Perform required CRE unfiltered air inleakage testing in accordance with the Control Room Envelope Habitability Program.	In accordance with the Control Room Envelope Habitability Program

3.7 PLANT SYSTEMS

3.7.3 Control Room Emergency Ventilation (CREV) System

LCO 3.7.3 Two CREV subsystems shall be OPERABLE.

---NOTE---
The main control room envelope (CRE) boundary may be opened intermittently under administrative control.

APPLICABILITY: MODES 1, 2, and 3, during operations with a potential for draining the reactor vessel (OPDRVs).

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One CREV subsystem inoperable for reasons other than Condition B or Condition C.	A.1 Restore CREV subsystem to OPERABLE status.	7 days
B. One or more CREV subsystems inoperable due to inoperable CRE boundary in MODE 1, 2, or 3.	B.1 Initiate actions to implement mitigating actions.	Immediately
	AND	
	B.2 Verify mitigating actions ensure CRE occupant exposures to radiological hazards will not exceed limits, and verify the CRE occupants are protected from smoke and chemical hazards.	24 hours
	AND	
	B.3 Restore CRE boundary to OPERABLE status.	90 days

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. One or more CREV subsystems inoperable due to inoperable HEPA filter or charcoal adsorber(s).	C.1 Restore HEPA filter and charcoal adsorber to OPERABLE status.	90 days
D. Required Action and associated Completion Time of Condition A, B, or C not met in MODE 1, 2, or 3.	D.1 Be in MODE 3. AND D.2 Be in MODE 4.	12 hours 36 hours

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Required Action and associated Completion Time of Condition A not met during OPDRVs.	E.1 Place OPERABLE CREV subsystem in pressurization mode.	Immediately
	OR	
	E.2 Initiate action to suspend OPDRVs.	Immediately
F. Two CREV subsystems inoperable in MODE 1, 2, or 3 for reasons other than Condition B or Condition C.	F.1 Enter LCO 3.0.3.	Immediately

(continued)

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
G. Required Action and associated Completion Time of Condition C not met during OPDRVs. OR Two CREV subsystems inoperable during OPDRVs for reasons other than Condition C. OR One or more CREV subsystems inoperable due to an inoperable CRE Boundary during OPDRVs.	G.1 Initiate action to suspend OPDRVs.	Immediately

Attachment 4

Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3
Technical Specifications (TS) Change 474

License Amendment Request to Add a TS 3.7.3, "Control Room Emergency Ventilation (CREV) System," Action to Address Inoperable CREV High Efficiency Particulate Air (HEPA) Filter and/or Charcoal Adsorbers

Retyped Technical Specifications Bases Pages

B 3.7 PLANT SYSTEMS

B 3.7.3 Control Room Emergency Ventilation (CREV) System

BASES

BACKGROUND

The CREV System provides a protected environment from which occupants can control the unit following an uncontrolled release of radioactivity.

The safety related function of the CREV System includes two independent and redundant high efficiency air filtration subsystems for emergency treatment of outside supply air and a Control Room Envelope (CRE) boundary that limits the inleakage of unfiltered air. The CREV System has a high efficiency particulate air (HEPA) filter bank in the portion of the inlet piping common to both subsystems. Each CREV subsystem consists of a motor-driven fan, an electric duct air heater, an activated charcoal adsorber section, an electric charcoal heater, and the associated ductwork, valves or dampers, doors, barriers, and instrumentation. The HEPA filter bank removes particulate matter, which may be radioactive; however, no credit is taken in the analyses for the HEPA filter. The charcoal adsorbers provide a holdup period for gaseous iodine, allowing time for decay; however, no credit is taken in the analyses for the charcoal adsorbers.

The CRE is the area within the confines of the CRE boundary that contains the spaces that control room occupants inhabit to control the unit during normal and accident conditions. This area encompasses the control room, and may encompass other non-critical areas to which frequent personnel access or continuous occupancy is not necessary in the event of an accident. The CRE is protected during normal operation, natural event and accident conditions. The CRE boundary is the combination of walls, floor, roof, ducting, doors, penetrations and equipment that physically form the CRE. The OPERABILITY of the CRE boundary must be

(continued)

BASES (continued)

LCO

Two redundant subsystems of the CREV System are required to be OPERABLE to ensure that at least one is available, if a single active failure disables the other subsystem. Total CREV System failure, such as from a loss of both ventilation subsystems or from an inoperable CRE boundary, could result in exceeding a TEDE of 5 REM to the CRE occupants in the event of a DBA.

Each CREV subsystem is considered OPERABLE when the individual components necessary to limit CRE occupant exposure are OPERABLE. A subsystem is considered OPERABLE when its associated:

a. Fan is OPERABLE;

b. HEPA filter and charcoal adsorbers are not excessively restricting flow and are capable of performing their filtration functions; and

c. The electric duct heater, ductwork, and dampers are OPERABLE.

Charcoal adsorbers are considered OPERABLE when Ventilation Filter Testing Program (VFTP) acceptance criteria are met and the electric duct heater functions to support the charcoal adsorber function. HEPA filters are considered OPERABLE when VFTP acceptance criteria are met.

In order for the CREV subsystems to be considered OPERABLE, the CRE boundary must be maintained such that the CRE occupant dose from a large radioactive release does not exceed the calculated dose in the licensing basis consequences analyses for DBAs, and that the CRE occupants are protected from hazardous chemicals and smoke.

(continued)

BASES (continued)

LOC (continued)

BFN does not have automatic CREV actuations for hazardous chemicals or smoke. Current practices at BFN do not utilize chemicals of sufficient quantity to present a chemical hazard to the CRE. Smoke is not considered in the current BFN safety analysis. Therefore, BFN has no specific limits on chemical hazards or smoke.

The LCO is modified by a Note allowing the CRE boundary to be opened intermittently under administrative controls. This Note only applies to openings in the CRE boundary that can be rapidly restored to the design condition, such as doors, hatches, floor plugs, and access panels. For entry and exit through doors the administrative control of the opening is performed by the person(s) entering or exiting the area. For other openings, these controls should be proceduralized and consist of stationing a dedicated individual at the opening who is in continuous communication with the operators in the CRE. This individual will have a method to rapidly close the opening and to restore the CRE boundary to a condition equivalent to the design condition when a need for CRE isolation is indicated.

(continued)

BASES (continued)

APPLICABILITY

In MODES 1, 2, and 3, the CREV System must be OPERABLE to ensure that the CRE will remain habitable during and following a DBA, since the DBA could lead to a fission product release.

In MODES 4 and 5, the probability and consequences of a DBA are reduced because of the pressure and temperature limitations in these MODES. Therefore, maintaining the CREV System OPERABLE is not required in MODE 4 or 5, except for during operations with potential for draining the reactor vessel (OPDRVs).

ACTIONS

A.1

With one CREV subsystem inoperable, for reasons other than an inoperable CRE boundary, inoperable HEPA filter, or inoperable charcoal adsorber, the inoperable CREV subsystem must be restored to OPERABLE status within 7 days. With the unit in this condition, the remaining OPERABLE CREV subsystem is adequate to perform the CRE occupant protection function. However, the overall reliability is reduced because a failure in the OPERABLE subsystem could result in loss of the CREV System function. The 7 day Completion Time is based on the low probability of a DBA occurring during this time period, and that the remaining subsystem can provide the required capabilities.

(continued)

BASES

ACTIONS (continued)

B.1, B2 and B3 (continued)

Completion Time is reasonable based on low probability of a DBA occurring during this time period and the use of mitigating actions. The 90 day Completion Time is reasonable based on the determination that the mitigating actions will ensure protection of CRE occupants within analyzed limits while limiting the probability that CRE occupants will have to implement protective measures that may adversely affect their ability to control the reactor and maintain it in a safe shutdown condition in the event of a DBA. In addition, the 90 day Completion Time is a reasonable time to diagnose, plan and possibly repair, and test most problems within the CRE boundary.

C.1

With inoperable HEPA filter and/or charcoal adsorber(s), OPERABILITY must be restored within 90 days. The 90 day Completion Time is based on the analysis for radiological dose to CRE occupants (Reference 10), which has determined that the CRE 30 day dose after a DBA does not exceed 5 REM (TEDE) without credit for either the HEPA filter or the charcoal adsorbers.

D.1 and D.2

In MODE 1, 2, or 3, if the inoperable CREV subsystem or the CRE boundary cannot be restored to OPERABLE status within the required Completion Time, the unit must be placed in a MODE that minimizes accident risk. To achieve this status, the unit must be placed in at least MODE 3 within 12 hours and in MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

(continued)

BASES

ACTIONS (continued)

E.1 and E.2

During OPDRVs, if the inoperable CREV subsystem cannot be restored to OPERABLE status within the required Completion Time, the OPERABLE CREV subsystem may be placed in the pressurization mode. This action ensures that the remaining subsystem is OPERABLE, that no failures that would prevent automatic actuation will occur, and that any active failure will be readily detected.

An alternative to Required Action E.1 is to immediately initiate actions to suspend OPDRVs to minimize the probability of a vessel draindown and the subsequent potential for fission product release. Actions must continue until the OPDRVs are suspended.

(continued)

BASES

ACTIONS (continued)

F.1

If both CREV subsystems are inoperable in MODE 1, 2, or 3 for reasons other than Condition B or Condition C, the CREV System may not be capable of performing the intended function and the unit is in a condition outside the accident analyses. Therefore, LCO 3.0.3 must be entered immediately.

G.1

During OPDRVs, a) with two CREV subsystems inoperable for reasons other than an inoperable HEPA filter or inoperable charcoal adsorber, b) with one or more CREV subsystems inoperable due to an inoperable CRE boundary, or c) if the HEPA filter and charcoal adsorber(s) cannot be restored to OPERABLE status within the required Completion Time, actions must be initiated immediately to suspend OPDVRs to minimize the probability of a vessel draindown and subsequent potential for fission product release. Actions must continue until the OPDRVs are suspended.

(continued)

REFERENCES

1. FSAR, Section 10.12.
2. FSAR, Chapter 10.
3. FSAR, Chapter 14.
4. FSAR, Section 14.6.
5. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.
6. NRC Regulatory Guide 1.196, "Control Room Habitability At Light-Water Power Reactors," January 2007.
7. NEI 99-03, "Control Room Habitability Assessment," June 2001.
8. Letter from Eric J. Leeds (NRC) to James W. Davis (NEI) dated January 30, 2004, "NEI Draft White Paper, Use of Generic Letter 91-18 Process and Alternative Source Terms in the Context of Control Room Habitability," (ADAMS Accession No. ML040300694).
9. FSAR, Chapter 10.12.5.3, Toxic Gas Protection.
10. TVA Design Output Calculation NDQ0031920075, "Control Room and Offsite Doses Due to a LOCA," Revision 21.

B 3.7 PLANT SYSTEMS

B 3.7.3 Control Room Emergency Ventilation (CREV) System

BASES

BACKGROUND

The CREV System provides a protected environment from which occupants can control the unit following an uncontrolled release of radioactivity.

The safety related function of the CREV System includes two independent and redundant high efficiency air filtration subsystems for emergency treatment of outside supply air and a Control Room Envelope (CRE) boundary that limits the inleakage of unfiltered air. The CREV System has a high efficiency particulate air (HEPA) filter bank in the portion of the inlet piping common to both subsystems. Each CREV subsystem consists of a motor-driven fan, an electric duct air heater, an activated charcoal adsorber section, an electric charcoal heater, and the associated ductwork, valves or dampers, doors, barriers and instrumentation. The HEPA filter bank removes particulate matter, which may be radioactive; however, no credit is taken in the analyses for the HEPA filter. The charcoal adsorbers provide a holdup period for gaseous iodine, allowing time for decay; however, no credit is taken in the analyses for the charcoal adsorbers.

The CRE is the areas within the confines of the CRE boundary that contains the spaces that control room occupants inhabit to control the unit during normal and accident conditions. This area encompasses the control room, and may encompass other non-critical areas to which frequent personnel access or continuous occupancy is not necessary in the event of an accident. The CRE is protected during normal operation, natural event and accident conditions. The CRE boundary is the combination of wall, floor, root, ducting, doors, penetrations and equipment that physically form the CRE. The OPERABILITY of the CRE boundary must be maintained to ensure that the inleakage of unfiltered air in the CRE will not

(continued)

BASES (continued)

LCO

Two redundant subsystems of the CREV System are required to be OPERABLE to ensure that at least one is available, if a single active failure, such as from a loss of both ventilation subsystems or from an inoperable CRE boundary, disables the other subsystem. Total system failure could result in exceeding a TEDE of 5 REM to the CRE occupants in the event of a DBA.

Each CREV subsystem is considered OPERABLE when the individual components necessary to limit CRE occupant exposure are OPERABLE in both subsystems. A subsystem is considered OPERABLE when its associated:

a. Fan is OPERABLE;

b. HEPA filter and charcoal adsorbers are not excessively restricting flow and are capable of performing their filtration functions; and

c. The electric duct heater, ductwork, and dampers are OPERABLE.

Charcoal adsorbers are considered OPERABLE when Ventilation Filter Testing Program (VFTP) acceptance criteria are met and the electric duct heater functions to support the charcoal adsorber function. HEPA filters are considered OPERABLE when VFTP acceptance criteria are met.

In order for the CREV subsystem to be considered OPERABLE, the CRE boundary must be maintained such that the CRE occupant dose from a large radioactive release does not exceed the calculated dose in the licensing basis consequences analyses for DBAs, and that the CRE occupants are protected from hazardous chemicals and smoke.

(continued)

BASES (continued)

LCO (continued)

BFN does not have automatic CREV actuations for hazardous chemicals or smoke. Current practices at BFN do not utilize chemicals of sufficient quantity to present a chemical hazard to the CRE. Smoke is not considered in the current BFN safety analysis. Therefore, BFN has no specific limits on chemical hazards or smoke.

The LCO is modified by a Note allowing the CRE boundary to be opened intermittently under administrative controls. This Note only applies to openings in the CRE boundary that can be rapidly restored to the design condition, such as doors, hatches, floor plugs and access panels. For entry and exit through doors the administrative control of the opening is performed by the person(s) entering or exiting the area. For other openings, these controls should be proceduralized and consist of stationing a dedicated individual at the opening who is in continuous communication with the operators and CRE. This individual will have a method to rapidly close the opening and to restore the CRE boundary to a condition equivalent to the design condition when a need for CRE isolation is indicated.

(continued)

BASES (continued)

APPLICABILITY

In MODES 1, 2, and 3, the CREV System must be OPERABLE to ensure that the CRE will remain habitable during and following a DBA, since the DBA could lead to a fission product release.

In MODES 4 and 5, the probability and consequences of a DBA are reduced because of the pressure and temperature limitations in these MODES. Therefore, maintaining the CREV System OPERABLE is not required in MODE 4 or 5, except for during operations with potential for draining the reactor vessel (OPDRVs).

ACTIONS

A.1

With one CREV subsystem inoperable, for reasons other than an inoperable CRE boundary, inoperable HEPA filter, or inoperable charcoal adsorber, the inoperable CREV subsystem must be restored to OPERABLE status within 7 days. With the unit in this condition, the remaining OPERABLE CREV subsystem is adequate to perform the CRE occupant protection function. However, the overall reliability is reduced because a failure in the OPERABLE subsystem could result in loss of the CREV System function. The 7 day Completion Time is based on the low probability of a DBA occurring during this time period, and that the remaining subsystem can provide the required capabilities.

(continued)

BASES

ACTIONS (continued)

B.1, B.2, and B.3 (continued)

regardless of whether entry is intentional or unintentional. The 24 hour Completion Time is reasonable based on the low probability of a DBA occurring during this time period and the use of mitigating actions. The 90 day Completion Time is reasonable based on the determination that the mitigating actions will ensure protection of CRE occupants within analyzed limits while limiting the probability that CRE occupants will have to implement protective measures that may adversely affect their ability to control the reactor and maintain it in a safe shutdown condition in the event of a DBA. In addition, the 90 day Completion Time is a reasonable time to diagnose, plan and possibly repair, and test most problems within the CRE boundary.

C.1

With inoperable HEPA filter and/or charcoal adsorber(s), OPERABILITY must be restored within 90 days. The 90 day Completion Time is based on the analysis for radiological dose to CRE occupants (Reference 10), which has determined that the CRE 30 day dose after a DBA does not exceed 5 REM (TEDE) without credit for either the HEPA filter or the charcoal adsorbers.

D.1 and D.2

In MODE 1, 2, or 3, if the inoperable CREV subsystem or the CRE boundary cannot be restored to OPERABLE status within the required Completion Time, the unit must be placed in a MODE that minimizes accident risk. To achieve this status, the unit must be placed in at least MODE 3 within 12 hours and in MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

(continued)

BASES

ACTIONS (continued)

E.1 and E.2

During OPDRVs, if the inoperable CREV subsystem cannot be restored to OPERABLE status within the required Completion Time, the OPERABLE CREV subsystem may be placed in the pressurization mode. This action ensures that the remaining subsystem is OPERABLE, that no failures that would prevent automatic actuation will occur, and that any active failure will be readily detected.

An alternative to Required Action E.1 is to immediately initiate actions to suspend OPDRVs to minimize the probability of a vessel draindown and the subsequent potential for fission product release. Actions must continue until the OPDRVs are suspended.

(continued)

BASES

ACTIONS (continued)

F.1

If both CREV subsystems are inoperable in MODE 1, 2, or 3 for reasons other than Condition B or Condition C, the CREV System may not be capable of performing the intended function and the unit is in a condition outside the accident analyses. Therefore, LCO 3.0.3 must be entered immediately.

G.1

During OPDRVs, a) with two CREV subsystems inoperable for reasons other than an inoperable HEPA filter or inoperable charcoal adsorber, b) with one or more CREV subsystems inoperable due to an inoperable CRE boundary, or c) if the HEPA filter and charcoal adsorber(s) cannot be restored to OPERABLE status within the required Completion Time, actions must be initiated immediately to suspend OPDVRs to minimize the probability of a vessel draindown and subsequent potential for fission product release. Actions must continue until the OPDRVs are suspended.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.7.3.4 (continued)

measures to restore OPERABILITY (Ref. 8). Options for restoring the CRE boundary to OPERABLE status include changing the licensing basis DBA consequences analysis, repairing the CRE boundary, or a combination of these actions.

Depending upon the nature of the problem and the corrective action, a full scope inleakage test may not be necessary to establish that the CRE boundary has been restored to OPERABLE status.

REFERENCES

1. FSAR, Section 10.12.
2. FSAR, Chapter 10.
3. FSAR, Chapter 14.
4. FSAR, Section 14.6.
5. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.
6. NRC Regulatory Guide 1.196, "Control Room Habitability At Light-Water Power Reactors," January, 2007.
7. NEI 99-03, "Control Room Habitability Assessment," June, 2001.
8. Letter from Eric J. Leeds (NRC) to James W. Davis (NEI) dated January 30, 2004, "NEI Draft White Paper, Use of Generic Letter 91-18 Process and Alternative Source Terms in the Context of Control Room Habitability," (ADAMS Accession No. ML040300694).
9. FSAR, Chapter 10.12.5.3, Toxic Gas Protection.
10. TVA Design Output Calculation NDQ0031920075, "Control Room and Offsite Doses Due to a LOCA," Revision 21.

B 3.7 PLANT SYSTEMS

B 3.7.3 Control Room Emergency Ventilation (CREV) System

BASES

BACKGROUND

The CREV System provides a protected environment from occupants can control the unit following an uncontrolled release of radioactivity.

The safety related function of the CREV System includes two independent and redundant high efficiency air filtration subsystems for emergency treatment of outside supply air and a Control Room Envelope (CRE) boundary that limits the inleakage of unfiltered air. The CREV System has a high efficiency particulate air (HEPA) filter bank in the portion of the inlet piping common to both subsystems. Each CREV subsystem consists of a motor-driven fan, an electric duct air heater, an activated charcoal adsorber section, an electric charcoal heater, and the associated ductwork, valves or dampers, doors, barriers, and instrumentation. The HEPA filter bank removes particulate matter, which may be radioactive; however, no credit is taken in the analyses for the HEPA filter. The charcoal adsorbers provide a holdup period for gaseous iodine, allowing time for decay; however, no credit is taken in the analyses for the charcoal adsorbers.

The CRE is the area within the confines of the CRE boundary that contains the spaces that control room occupants inhabit to control the unit during normal and accident conditions. This area encompasses the control room, and may encompass other non-critical areas to which frequent personnel access or continuous occupancy is not necessary in the event of an accident. The CRE is protected during normal operation, natural event and accident conditions. The CRE boundary is the combination of walls, floors, roof, ducting, doors, penetrations and equipment that physically form the CRE. The OPERABILITY of the CRE boundary must be maintained to ensure that the inleakage of unfiltered air into the CRE will not

(continued)

BASES (continued)

LCO

Two redundant subsystems of the CREV System are required to be OPERABLE to ensure that at least one is available, if a single active failure, such as from a loss of both ventilation subsystems or from an inoperable CRE boundary, disables the other subsystem. Total system failure could result in exceeding a TEDE of 5 REM to the CRE occupants in the event of a DBA.

Each CREV subsystem is considered OPERABLE when the individual components necessary to limit CRE occupant exposure are OPERABLE. A subsystem is considered OPERABLE when its associated:

a. Fan is OPERABLE;

b. HEPA filter and charcoal adsorbers are not excessively restricting flow and are capable of performing their filtration functions; and

c. The electric duct heater, ductwork, and dampers are OPERABLE.

Charcoal adsorbers are considered OPERABLE when Ventilation Filter Testing Program (VFTP) acceptance criteria are met and the electric duct heater functions to support the charcoal adsorber function. HEPA filters are considered OPERABLE when VFTP acceptance criteria are met.

In order for the CREV subsystems to be considered OPERABLE, the CRE boundary must be maintained such that the CRE occupant dose from a large radioactive release does not exceed the calculated dose in the licensing basis consequences analyses for DBAs, and that the CRE occupants are protected from hazardous chemicals and smoke.

(continued)

BASES (continued)

LCO (continued)

BFN does not have automatic CREV actuations for hazardous chemicals or smoke. Current practices at BFN do not utilize chemicals or sufficient quantity to present a chemical hazard to the CRE. Smoke is not considered in the current BFN safety analysis. Therefore, BFN has no specific limits on chemical hazards or smoke.

The LCO is modified by a Note allowing the CRE boundary to be opened intermittently under administrative controls. This Note only applies to openings in the CRE boundary that can be rapidly restored to the design condition such as doors, hatches, floor plugs, and access panels. For entry and exit through doors the administrative control of the opening is performed by the person(s) entering or exiting the area. For other openings, these controls should be proceduralized and consist of stationing a dedicated individual at the opening who is in continuous communication with the operators in the CRE. This individual will have a method to rapidly close the opening and to restore the CRE boundary to a condition equivalent to the design condition when a need for CRE isolation is indicated.

(continued)

BASES (continued)

APPLICABILITY

In MODES 1, 2, and 3, the CREV System must be OPERABLE to ensure that the CRE will remain habitable during and following a DBA, since the DBA could lead to a fission product release.

In MODES 4 and 5, the probability and consequences of a DBA are reduced because of the pressure and temperature limitations in these MODES. Therefore, maintaining the CREV System OPERABLE is not required in MODE 4 or 5, except for during operations with potential for draining the reactor vessel (OPDRVs).

ACTIONS

A.1

With one CREV subsystem inoperable, for reasons other than an inoperable CRE boundary, inoperable HEPA filter, or inoperable charcoal adsorber, the inoperable CREV subsystem must be restored to OPERABLE status within 7 days. With the unit in this condition, the remaining OPERABLE CREV subsystem is adequate to perform the CRE occupant protection function. However, the overall reliability is reduced because a failure in the OPERABLE subsystem could result in a loss of the CREV System function. The 7 day Completion Time is based on the low probability of a DBA occurring during this time period, and that the remaining subsystem can provide the required capabilities.

(continued)

BASES

ACTIONS (continued)

B.1, B.2 and B.3 (continued)

Completion Time is reasonable based on the low probability of a DBA occurring during this time period and the use of mitigating actions. The 90 day Completion Time is reasonable based on the determination that the mitigating actions will ensure protection of CRE occupants within analyzed limits while limiting the probability that CRE occupants will have to implement protective measures that may adversely affect their ability to control the reactor and maintain it in a safe shutdown condition in the event of a DBA. In addition, the 90 day Completion Time is a reasonable time to diagnose, plan and possibly repair, and test most problems within the CRE boundary.

C.1

With inoperable HEPA filter and/or charcoal adsorber(s), OPERABILITY must be restored within 90 days. The 90 day Completion Time is based on the analysis for radiological dose to CRE occupants (Reference 10), which has determined that the CRE 30 day dose after a DBA does not exceed 5 REM (TEDE) without credit for either the HEPA filter or the charcoal adsorbers.

D.1 and D.2

In MODE 1, 2, or 3, if the inoperable CREV subsystem or the CRE cannot be restored to OPERABLE status within the required Completion Time, the unit must be placed in a MODE that minimizes accident risk. To achieve this status, the unit must be placed in at least MODE 3 within 12 hours and in MODE 4 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

(continued)

BASES

ACTIONS (continued)

E.1 and E.2

During OPDRVs, if the inoperable CREV subsystem cannot be restored to OPERABLE status within the required Completion Time, the OPERABLE CREV subsystem may be placed in the pressurization mode. This action ensures that the remaining subsystem is OPERABLE, that no failures that would prevent automatic actuation will occur, and that any active failure will be readily detected.

An alternative to Required Action E.1 is to immediately initiate actions to suspend OPDRVs to minimize the probability of a vessel draindown and the subsequent potential for fission product release. Actions must continue until the OPDRVs are suspended.

(continued)

BASES

ACTIONS (continued)

F.1

If both CREV subsystems are inoperable in MODE 1, 2, or 3 for reasons other than Condition B, or Condition C, the CREV System may not be capable of performing the intended function and the unit is in a condition outside the accident analyses. Therefore, LCO 3.0.3 must be entered immediately.

G.1

During OPDRVs, a) with two CREV subsystems inoperable for reasons other than an inoperable HEPA filter or inoperable charcoal adsorber; b) with one or more CREV subsystems inoperable due to an inoperable CRE boundary, or c) if the HEPA filter and charcoal adsorber(s) cannot be restored to OPERABLE status within the required Completion Time, actions must be initiated immediately to suspend OPDVRs to minimize the probability of a vessel draindown and subsequent potential for fission product release. Actions must continue until the OPDRVs are suspended.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.7.3.4 (continued)

changing the licensing basis DBA consequences analysis, repairing the CRE boundary, or a combination of these actions.

Depending upon the nature of the problem and the corrective action, a full scope inleakage test may not be necessary to establish that the CRE boundary has been restored to OPERABLE status.

REFERENCES

1. FSAR, Section 10.12.
2. FSAR, Chapter 10.
3. FSAR, Chapter 14.
4. FSAR, Section 14.6.
5. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.
6. NRC Regulatory Guide 1.196, "Control Room Habitability At Light-Water Power Reactors," January 2007.
7. NEI 99-03, "Control Room Habitability Assessment," June 2001.
8. Letter from Eric J. Leeds (NRC) to James W. David (NEI) dated January 30, 2004, "NEI Draft White Paper, Use of Generic Letter 91-18 Process and Alternative Source Terms in the Context of Control Room Habitability," (ADAMS Accession No. ML040300694).
9. FSAR, Chapter 10.12.5.3, Toxic Gas Protection.
10. TVA Design Output Calculation NDQ0031920075, "Control Room and Offsite Doses Due to a LOCA," Revision 21.