TVA

Tennessee Valley Authority, Post Office Box 2000, Decatur, Alabama 35609

March 15, 2000

TVA-BFN-TS-401

10 CFR 50.4
10 CFR 50.90

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

Gentlemen:

In the Matter of	)	Docket Nos. 50-260
Tennessee Valley Authority	)	50-296

BROWNS FERRY NUCLEAR PLANT (BFN) - UNITS 2 AND 3 - TECHNICAL SPECIFICATIONS (TS) CHANGE 401 - CHANGES TO LIMITING CONDITION FOR OPERATION (LCO) TIME FOR CONTAINMENT ATMOSPHERE DILUTION (CAD) SUBSYSTEM INOPERABILITY

In accordance with the provisions of 10 CFR 50.4 and 50.90, TVA is submitting a request for a TS amendment (TS-401) to licenses DPR-52 and DPR-68 to revise LCO 3.6.3.1, CAD System, to provide 7 days of continued operation with two inoperable CAD subsystems.

This TS change request is consistent with the TS provisions for the CAD system in NUREG-1433, Revision 1, Improved Standard Technical Specifications for BWR/4 Plants. Regarding precedent, several other boiling water reactors, including Hatch 1, Duane Arnold, and Peach Bottom, all have TS which provide for comparable periods of continued operation with inoperable CAD subsystems.

Enclosure 1 to this letter provides the description and justification for the proposed TS change, and the significant hazards and environmental impact considerations. Enclosure 2 contains mark-up copies of the appropriate pages from the current Unit 2 and 3 TS showing the proposed revisions.

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TVA has determined that there are no significant hazards considerations associated with the proposed change and that the TS change qualifies for a categorical exclusion from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9). The BFN Plant Operations Review Committee and the Nuclear Safety Review Board have reviewed this proposed change, and determined that operation of BFN Units 2 and 3 in accordance with the proposed change will not endanger the health and safety of the public. Additionally, in accordance with 10 CFR 50.91(b)(1), TVA is sending a copy of this letter and enclosures to the Alabama State Department of Public Health.

If you have any questions, please contact me at(256)729-2636.

Sincerely,

T. E. Abney
Manager of Licensing
and Industry Affairs

Subscribed and sworn to before me
on this 15th day of March 2000.

Barbara A. Blanton
Notary Public
My Commission Expires 09/22/2002

Enclosures
cc: See page 3

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TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 2 and 3

PROPOSED TECHNICAL SPECIFICATIONS (TS) CHANGE TS-401
CHANGES TO LIMITING CONDITION FOR OPERATION (LCO) TIME FOR CONTAINMENT ATMOSPHERE DILUTION (CAD) SUBSYSTEM INOPERABILITY
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ENCLOSURE 1

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 2 and 3

PROPOSED TECHNICAL SPECIFICATIONS (TS) CHANGE TS-401
CHANGES TO LIMITING CONDITION FOR OPERATION (LCO) TIME FOR CONTAINMENT ATMOSPHERE DILUTION (CAD) SUBSYSTEM INOPERABILITY

DESCRIPTION OF PROPOSED CHANGE AND JUSTIFICATION

I. DESCRIPTION OF THE PROPOSED TS CHANGE

TVA is requesting changes to the Units 2 and 3 TS LCO 3.6.3.1, CAD System, to provide a completion time of 7 days of continued reactor operation with two CAD subsystems inoperable. This change is consistent with the BWR/4 Standard Technical Specifications (STS), NUREG-1433, Revision 1, for the CAD system. The current TS LCO requires reactor shutdown within 13 hours under LCO 3.0.3 when both CAD subsystems are inoperable.

The TS Bases are likewise being modified to match the proposed TS changes. A mark-up copy showing the proposed TS and Bases changes is provided in Enclosure 2. A change to Unit 1 TS is not being requested at this time since the CAD system connection to Unit 1 is capped off, and Unit 1 is defueled and in an extended outage.

II. REASON FOR THE PROPOSED CHANGE

BFN Units 1, 2, and 3 share a common CAD system. The system is comprised of two redundant subsystems each of which contains an external liquid nitrogen storage tank and the piping, valving, instrumentation, and controls necessary to inject nitrogen gas to the primary containment of any of the BFN units. The current TS for BFN provides for a 30-day LCO whenever one of the two redundant CAD subsystems becomes inoperable. No specific LCO is provided for the condition when both CAD subsystems are inoperable. Therefore, should both CAD subsystems become inoperable, the current TS would require that all operating units be placed in MODE 3 within 13 hours in accordance with the requirements of LCO 3.0.3.

The current TS, which requires an expedited forced shutdown of one or both BFN units because of short-term CAD system inoperability, is disproportionate with the overall safety function of the CAD system. Therefore, a relaxation to the CAD system LCO to provide a limited 7-day time period of continued operation is being proposed. This change is consistent with BWR/4 STS which already provide for a 7-day Completion Time when both CAD subsystems are inoperable if an alternate hydrogen control function is maintained. For BFN, the containment inerting system provides the alternate means of hydrogen control.

The primary objective of this proposed TS change is to reduce the likelihood of the forced shutdown of the reactor(s) resulting from short-term loss of the CAD subsystems due to unanticipated maintenance problems. This would avoid the inherent risks associated with reactor shutdown activities resulting from maintenance issues that could be corrected in a timely manner. This risk avoidance concern is exacerbated by the prospect of shutting down two units in a short time period.

Although it is not typical for both CAD systems to be inoperable, there is a reasonable probability that this situation may occur, particularly during periods when one of the CAD subsystems is out of service for scheduled testing, or corrective or preventive maintenance. For this situation with the existing TS, the invocation of LCO 3.0.3 for two inoperable CAD systems is very restrictive with regard to being able to return a subsystem to service or to perform unanticipated corrective maintenance within the 13-hour LCO. With the proposed 7-day completion time, we expect that a subsystem could be returned to service or corrective maintenance be performed to remedy any likely CAD system equipment problem prior to exceeding the LCO.

Therefore, we believe it is prudent to propose adoption of STS provisions for the CAD system to reduce the probability of a multi-unit forced shutdown and the associated risk factors.

III. DISCUSSION

CAD System Description and Design Basis

During normal power operation, the containment inerting system is used to maintain the primary containment atmosphere at less than 4.0 percent oxygen by volume, with the balance in nitrogen. Following a loss-of-coolant accident (LOCA), hydrogen is postulated to be evolved within the containment from metal-water reactions, and hydrogen and oxygen are produced by radiolysis of water. These are the only significant sources of hydrogen and oxygen. If the concentrations of hydrogen and oxygen were not controlled, a combustible gas mixture could theoretically be produced. To ensure that a combustible gas mixture does not form, the oxygen concentration is kept below 5 percent by volume, or the hydrogen concentration is kept below 4 percent by volume by operation of the CAD system.

Assuming the analytic hydrogen and oxygen generation rates as specified in Safety Guide 7, Control of Combustible Gas Concentrations in Containment Following a Loss-of-Coolant Accident, the concentration of combustible gases in containment following a LOCA is controlled by the CAD system. This is accomplished by injecting nitrogen gas into the containment from one of two redundant CAD liquid nitrogen storage tanks to dilute any oxygen generated by the LOCA and by venting the containment atmosphere as necessary through the standby gas treatment system. Refer to the 5.2-7 and 5.2-8 Figures in the Final Safety Analysis Report (FSAR) for a flow diagram of the CAD system.

This system is capable of keeping the concentration of oxygen in the containment atmosphere below 5 percent. In the event that postaccident monitoring showed that hydrogen and oxygen generation rates were substantially below those specified in the Safety Guide, the CAD system could be operated as necessary to maintain either the hydrogen concentration below 4 percent or the oxygen concentration below 5 percent. The time required to produce significant amounts of oxygen through radiolysis is lengthy and in the LOCA analysis CAD operation is not required until hours after a LOCA.

The CAD system can also be used to provide a non-safety grade, backup pneumatic supply to the drywell control air system, primarily for the purpose of increasing the availability of long-term main steam relief valve (MSRV) operation for beyond design basis events such as those associated with Appendix R. This control air backup capability is not addressed in the TS, and the Appendix R program allows the use of alternate methods and/or compensatory measures such as nitrogen bottles in instances where normal drywell control air equipment is not available. For design basis considerations, selected MSRVs are equipped with safety grade accumulators which are designed to ensure each MSRV can be opened 5 times as discussed in FSAR Section 4.4.5 on the Automatic Depressurization System description.

CAD Subsystem A provides a backup pneumatic source for operation of the Hardened Wetwell Vent valves and the torus vacuum breaker isolation valves. The current TS allows for a single CAD subsystem to be inoperable for 30 days, where, in the case of CAD Subsystem A, this backup function is not available. Therefore the requested TS LCO of allowing both CAD subsystems to be inoperable for 7-days does not extend the period that this backup function may be unavailable.

BWR OWNERS GROUP EVALUATION OF COMBUSTIBLE GAS CONTROL

The BWR Mark I Owners Group undertook a substantial study in response to the addition of the provisions in 10 CFR 50.44(c)(3) requiring recombiner capability for those light water reactors that rely upon purge/repressurization systems as a primary means of hydrogen control. This study was published as NEDO-22155, Generation and Mitigation of Combustible Mixtures in Inerted BWR Mark I Containments, June 1982. This NEDO concluded that the oxygen generation rates assumed in Safety Guide 7 (subsequently Regulatory Guide 1.7) were overly conservative and that maintaining an inerted containment during operation was sufficient to provide combustible gas control.

Following review of this study, NRC issued Generic Letter 84-09, which stated that the BWR Mark I plants affected by the recombiner rule (including BFN) did not need to rely on use of a safety grade purge/repressurization system (CAD) specified by 10 CFR 50.44(f) and (g) as a primary means of hydrogen control provided that three technical criteria were met.

These three criteria from GL 84-09 are summarized below:

1. The plant has TS LCOs requiring containment atmosphere oxygen concentration to be maintained less than 4% by volume;

2. The plant has only nitrogen or recycled containment atmosphere for use in all pneumatic control systems within containment, and;

3. There are no potential sources of oxygen in containment other than that resulting from radiolysis of the reactor coolant.

BFN is designed and operated in accordance with these criteria as follows: 1) The BFN primary containment is maintained below 4 percent oxygen by volume during normal operation in accordance with TS LCO 3.6.3.2 using nitrogen gas from the containment inerting system; 2) All pneumatic equipment located inside the primary containment utilizes recycled containment atmosphere (drywell compressor system) as its pneumatic supply. Furthermore, station control air is not used to provide the pneumatic supply to containment equipment during periods of reactor operation; 3) Pathways which could introduce oxygen into the primary containment are isolated during normal operation.

Subsequently NRC issued an SER dated July 6, 1989, which evaluated NEDO-22155. The SER concluded that, in some areas, the NEDO-22155 analysis under-predicts oxygen radiolysis generation rates. However, the SER also stated that Regulatory Guide 1.7 (which superseded Safety Guide 7) is conservative in its overall oxygen generation prediction. Therefore, a technical basis exists that the AEC Safety Guide 7 oxygen generation rates assumed in the BFN LOCA analysis are more conservative than necessary. This provides additional justification for a TS allowance for a short period of CAD system inoperability.

Adoption of STS CAD LCO

BWR/4 Standard Technical Specifications, NUREG-1433, Revision 1, provide a 7-day continued operation allowance with two CAD systems inoperable if an alternate hydrogen control system is verified available. For BFN, the normal containment inerting system provides this hydrogen control function.

The normal containment inerting system is used during the initial purging of the primary containment to establish an inerted containment, and it also provides a supply of make up nitrogen during reactor operation. The system consists of a liquid nitrogen storage tank, a purge vaporizer, a makeup vaporizer, pressure-reducing valves and controllers, and instrumentation, valves, and associated piping. Refer to the FSAR 5.2.6.a series of figures for flow diagrams of the system.

The normal inerting system supplies nitrogen from a common onsite storage tank through a common purge vaporizer or makeup vaporizer where the liquid nitrogen is converted to the gaseous state. The gaseous nitrogen then flows through the purge or make up pressure-reducing valves and flow meters into the torus or drywell.

In the event of a LOCA, the Core Standby Cooling Systems are designed to prevent significant fuel damage and the generation of significant quantities of hydrogen. Should fuel damage be postulated, and hydrogen and oxygen be generated per AEC Safety Guide 7 assumptions, the inerted primary containment atmosphere ensures that the oxygen concentration is too low to react with this hydrogen gas. Hence, any oxygen which can react must be generated from the radiolytic decomposition of water under post-LOCA conditions.

The primary containment inerting system can be used to provide nitrogen dilution in a manner analogous to the CAD system. In fact, the BFN Emergency Operating Instructions (EOIs) preferentially direct the use of the normal primary containment inerting system for purging and venting during emergency conditions. The EOI procedural policy, which is in accordance with industry emergency procedure guidelines, recognizes that the inerting system is well suited for use under emergency conditions since it is routinely used for purge and vent operations under normal operations. Under this procedural direction, CAD serves as the backup method rather than the primary means to mitigate any combustible mixture formation. Therefore, the proposed TS change is consistent with this EOI usage of the normal inerting system by requiring it to be functional as the alternate hydrogen control function during any period of reactor operation if both CAD subsystems are inoperable. This is consistent with STS provisions for CAD.

Risk Considerations

In a qualitative sense, the Browns Ferry PSA baseline CDF values for Unit 2 and Unit 3 indicate a low probability per reactor year of a core-damaging event. Since CAD's formal design function is not needed unless core damage has already occurred, and the core damage probability is low, a low probability of needing CAD for its design use can be observed directly from the baseline CDF value. Since the baseline CDF value is based on an annual time frame, and the proposed LCO under discussion is only a small part of a year, then these low probabilities can be seen to be reduced even further during an LCO period.

There are no planned maintenance or test activities which remove both CAD systems from service. Therefore, the proposed TS is requested as a contingency provision for situations when both subsystems become inoperable due to unexpected circumstances. The most likely circumstance for this situation would be an unexpected maintenance problem on a CAD subsystem while the other subsystem was out of service for preventive or corrective maintenance.

The CAD design basis oxygen control function is not required until well after a hydrogen producing LOCA event has occurred because of the time necessary for radiolysis to produce sufficient oxygen inside primary containment. Since the safety-related design function of CAD is not required prior to the occurrence of a core damaging event (the interval evaluated by the BFN Level I PSA), it follows that this CAD function cannot impact core damage frequency (CDF) values.

BFN design basis calculations indicate that the CAD function would not be needed sooner than 42 hours post-accident under anticipated containment conditions. The BFN Level II PSA evaluation for large early release frequency (LERF) is concerned with the first 24 hours post-accident, therefore, the availability of the CAD function does not affect LERF.

Also, as noted earlier, the proposed LCO will also provide that the containment inerting system be verified available if both CAD subsystems are inoperable. The containment inerting system, although not safety-grade, can provide the analogous combustible gas control function as CAD. In the BFN symptom based EOIs, it is used in several contingencies to provide containment inerting functions. The inerting system tank as well as the CAD tanks are located external to the reactor building and can be easily accessed. Therefore, it is easy to refill the inerting tank or CAD tanks using nitrogen tank trucks as contingency options.

The CAD system non-safety function of supplying backup pneumatic motive energy for long term MSRV operation has nominal relevance to PSA core damage frequency (CDF) calculations, because MSRV operation can affect CDF. However, the PSA modeling shows there is no significant change to the Unit 2 or Unit 3 CDF when the CAD backup pneumatic supply function is assumed to be either 100% available or never available (i.e., risk-reduction worth or risk-achievement worth values are not significant).

In summary, the addition of TS provisions for the 7-day CAD LCO has little impact on risk. Anticipated use of the LCO is as a contingency specification for unexpected maintenance problems on the CAD system. The CAD system is monitored under the BFN Maintenance Rule Program, and CAD subsystem unavailability is unlikely to increase as a result of issue of the proposed TS change. A longer LCO would provide an opportunity to remedy the system problem and return a subsystem to service in an orderly manner. This would avoid the inherent transition risk associated with an expedited shutdown of multiple units. Therefore, the proposed TS change is considered beneficial with regard to risk considerations.

IV. CONCLUSION

The BFN Unit 2 and Unit 3 Technical Specifications currently require a shutdown to Mode 3 under the conditions of LCO 3.0.3 if both CAD subsystems become inoperable. The low probability of a fuel-damaging accident occurring during a 7-day period, the fact that CAD is not required to be put in service immediately post-accident, and the availability of oxygen mitigation systems other than CAD which are preferred under the EOIs make the requested TS change acceptable. The proposed change is also consistent with STS. Also, previous regulatory studies (NEDO-22155) concluded that the AEC oxygen generation source terms are conservative, and that the inerted containment provides the chief protection against the creation of combustible mixtures in the primary containment atmosphere.

A review of Improved TS approved at other BWRs of similar design, such as Peach Bottom Units 2 and 3, and Hatch Unit 1, found that 7 days or greater LCO times were typical for conditions where both CAD subsystems were inoperable. The justification provided at these plants is similar to that used in this submittal, i.e., the risk of a LOCA during the LCO interval is small, CAD usage is not immediately required even should a fuel-damaging accident occur, and that alternate hydrogen control capability exists within the plant design. As noted previously, 7-days is provided in STS for plants with an alternate hydrogen control function such as Browns Ferry.

V. NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

DESCRIPTION OF PROPOSED AMENDMENT

The proposed amendment to the BFN Unit 2 and Unit 3 TS would establish an LCO time of up to 7 days with no operable CAD subsystem provided the unit's Primary Containment Inerting System is available to provide an alternate hydrogen control capability.

TVA has concluded that operation of BFN Units 2 and 3 in accordance with the proposed change to the TS does not involve a significant hazards consideration. TVA's conclusion is based on its evaluation, in accordance with 10 CFR 50.91(a)(1), of the three standards set forth in 10 CFR 50.92(c).

A. The proposed amendment does not involve a significant increase in the probability or consequences of an accident previously evaluated.

The safety-related function of the Containment Atmosphere Dilution (CAD) system is to mitigate the effects of a loss-of-coolant-accident (LOCA) by limiting the volumetric concentration of oxygen in the primary containment atmosphere. The CAD System is not an event initiator, therefore, the probability of the occurrence of an accident is not affected by this proposed Technical Specification (TS) change. Emergency procedures preferentially use the normal containment inerting system to provide post-accident vent and purge capability, with the CAD system only serving in a backup role to this system. Hence, in the event of the inoperability of both CAD subsystems, the proposed TS require the normal containment inerting system to be verified available as an alternate oxygen control means. Therefore, the proposed TS change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

B. **The proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated.**

This TS change does not result in any changes to the CAD equipment design or capabilities or to the operation of the plant. Since the change impacts only the required action completion time for periods of CAD subsystem inoperability and does not result in any change in the response of the equipment to an accident, the change does not create the possibility of a new or different kind of accident from any previously analyzed.

C. **The proposed amendment does not involve a significant reduction in a margin of safety.**

As stated in GL 84-09, a Mark I type boiling water reactor (BWR) plant is not considered to rely upon purge/repressurization systems such as CAD as its primary means of hydrogen control when the unit(s) is operated in accordance with certain technical criteria. The BFN units are operated in accordance with these criteria. The BFN Unit 2 and Unit 3 containments are inerted with nitrogen during normal operation, recycled containment atmosphere is used for pneumatically operated components inside containment, and there are no potential sources of oxygen generation inside containment other than the radiolytic decomposition of water. The system preferred by the EOIs for oxygen control post-accident is the normal primary containment inerting system. Because the probability of an accident involving hydrogen and oxygen production is small, CAD is not the primary system used to mitigate the creation of combustible containment atmosphere mixtures, and because the requested LCO where both CAD subsystems is inoperable is not long, no significant reduction in the margin of safety is associated with this proposed amendment.

VI. ENVIRONMENTAL IMPACT CONSIDERATION

The proposed change does not involve a significant hazards consideration, a change in the types of, or increase in, the amounts of any effluents that may be released off-site, or a significant increase in individual or cumulative occupational radiation exposure. Therefore, the proposed change meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), an environmental assessment of the proposed change is not required.

VII. REFERENCES

1. General Electric report, NEDO-22155, Generation and Mitigation of Combustible Mixtures in Inerted BWR Mark I Containments, June 1982

2. NRC Generic Letter 84-09, May 8, 1984, Recombiner Capability Requirements of 10 CFR 50.44(c)(3)(ii)

3. NRC SER on General Electric Company's Methodology for Determining Rates of Generation of Oxygen by Radiolytic Decomposition (NEDO 22155) - July 6, 1989

ENCLOSURE 2

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 2 and 3

PROPOSED TECHNICAL SPECIFICATIONS (TS) CHANGE TS-401
CHANGES TO LIMITING CONDITION FOR OPERATION (LCO) TIME FOR
CONTAINMENT ATMOSPHERE DILUTION (CAD) SUBSYSTEM INOPERABILITY

AFFECTED PAGE LIST

Unit 2	Unit 3
3.6-41	3.6-41
B 3.6-98	B 3.6-98

3.6 CONTAINMENT SYSTEMS

3.6.3.1 Containment Atmosphere Dilution (CAD) System

LCO 3.6.3.1 Two CAD subsystems shall be OPERABLE.

[note: new text below is shown in **bold** type in the shaded areas]

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One CAD subsystem inoperable.	--------------NOTE------------ LCO 3.0.4 is not applicable ----------------------------------	
	A.1 Restore CAD subsystem to OPERABLE status.	30 days
B. Two CAD subsystems inoperable	**B.1 Verify by administrative means that the hydrogen control function is maintained.**	**1 hour** **<u>AND</u>** **once per 12 hours thereafter**
	<u>AND</u>	
	B.2 Restore CAD subsystem nitrogen admission flowpath to OPERABLE status	**7 days**
~~B.~~ C. Required Action and associated Completion Time not met.	~~B.1~~ C.1 Be in MODE 3.	12 hours

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BASES

ACTIONS (continued)

~~B.1~~ C.1

If any Required Action cannot be met within the associated Completion Time, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours. The allowed Completion Time of 12 hours is reasonable, based on operating experience, to reach MODE 3 from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.6.3.1.1

Verifying that there is ≥ 2500 gal of liquid nitrogen supply in each nitrogen storage tank will ensure at least 7 days of post-LOCA CAD operation. This minimum volume of liquid nitrogen allows sufficient time after an accident to replenish the nitrogen supply for long term inerting. This is verified every 31 days to ensure that the system is capable of performing its intended function when required. The 31 day Frequency is based on operating experience, which has shown 31 days to be an acceptable period to verify the liquid nitrogen supply and on the availability of other hydrogen mitigating systems.

(continued)

This new text will be added to the Unit 2 TS Bases as indicated on the previous page.

B.1 and B.2

With two CAD subsystems inoperable, the ability to control the hydrogen control function via alternate capabilities must be verified by administrative means within 1 hour. The alternate hydrogen control capabilities are provided by the Primary Containment Inerting System. The 1 hour Completion Time allows a reasonable period of time to verify that a loss of hydrogen control function does not exist. In addition, the alternate hydrogen control system (Primary Containment Inerting) capability must be verified once per 12 hours thereafter to ensure its continued availability. Both the initial verification and all subsequent verifications may be performed as an administrative check by examining logs or other information to determine the availability of the alternate hydrogen control system (Primary Containment Inerting). If the ability to perform the hydrogen control function is maintained via the Primary Containment Inerting System, continued operation for up to 7 days is permitted with two CAD subsystems inoperable.

The Completion Time of 7 days is a reasonable time to allow continued reactor operation with two CAD subsystems inoperable because the hydrogen control function is maintained (via the Primary Containment Inerting System) and because of the low probability of the occurrence of a LOCA that would generate hydrogen in amounts capable of exceeding the flammability limit.

3.6 CONTAINMENT SYSTEMS

3.6.3.1 Containment Atmosphere Dilution (CAD) System

LCO 3.6.3.1 Two CAD subsystems shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

[note: new text below is shown in **bold** type in the shaded areas]

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One CAD subsystem inoperable.	---------------NOTE------------ LCO 3.0.4 is not applicable ------------------------------------	
	A.1 Restore CAD subsystem to OPERABLE status.	30 days
B. Two CAD subsystems inoperable	**B.1 Verify by administrative means that the hydrogen control function is maintained.**	**1 hour** **<u>AND</u>** **once per 12 hours thereafter**
	<u>AND</u>	
	B.2 Restore CAD subsystem nitrogen admission flowpath to OPERABLE status	**7 days**
~~B.~~ C. Required Action and associated Completion Time not met.	~~B.1~~ C.1 Be in MODE 3.	12 hours

BASES

Insert text from next page here

ACTIONS (continued)

~~B.1~~ C.1

If any Required Action cannot be met within the associated Completion Time, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours. The allowed Completion Time of 12 hours is reasonable, based on operating experience, to reach MODE 3 from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.6.3.1.1

Verifying that there is ≥ 2500 gal of liquid nitrogen supply in each nitrogen storage tank will ensure at least 7 days of post-LOCA CAD operation. This minimum volume of liquid nitrogen allows sufficient time after an accident to replenish the nitrogen supply for long term inerting. This is verified every 31 days to ensure that the system is capable of performing its intended function when required. The 31 day Frequency is based on operating experience, which has shown 31 days to be an acceptable period to verify the liquid nitrogen supply and on the availability of other hydrogen mitigating systems.

(continued)

This new text will be added to the Unit 3 TS Bases as indicated on the previous page.

<u>**B.1 and B.2**</u>

With two CAD subsystems inoperable, the ability to control the hydrogen control function via alternate capabilities must be verified by administrative means within 1 hour. The alternate hydrogen control capabilities are provided by the Primary Containment Inerting System. The 1 hour Completion Time allows a reasonable period of time to verify that a loss of hydrogen control function does not exist. In addition, the alternate hydrogen control system (Primary Containment Inerting) capability must be verified once per 12 hours thereafter to ensure its continued availability. Both the initial verification and all subsequent verifications may be performed as an administrative check by examining logs or other information to determine the availability of the alternate hydrogen control system (Primary Containment Inerting). If the ability to perform the hydrogen control function is maintained via the Primary Containment Inerting System, continued operation for up to 7 days is permitted with two CAD subsystems inoperable.

The Completion Time of 7 days is a reasonable time to allow continued reactor operation with two CAD subsystems inoperable because the hydrogen control function is maintained (via the Primary Containment Inerting System) and because of the low probability of the occurrence of a LOCA that would generate hydrogen in amounts capable of exceeding the flammability limit.