Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381

APR 2 9 1998

TVA-WBN-TS-98-011 10 CFR 50.90

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

Gentlemen:

In the Matter of) Docket No. 50-390
Tennessee Valley Authority)

WATTS BAR NUCLEAR PLANT (WBN) UNIT 1 - REQUEST FOR TECHNICAL SPECIFICATION (TS) AMENDMENT FOR TS 3.6.8 - HYDROGEN MITIGATION SYSTEM (HMS) (TS 98-011)

In accordance with 10 CFR 50.90, TVA requests that Appendix A of the Facility Operating License NPF-90, WBN Unit 1 Technical Specifications, be temporarily amended to revise limiting condition of operation (LCO) 3.6.8 (Hydrogen Mitigation System) to address a condition at WBN involving two Train A containment hydrogen ignitors that are presently out of service. The temporary specification would expire at WBN's next entry into MODE 3.

During routine surveillance testing on April 3, 1998, WBN discovered two hydrogen ignitors in Train A inoperable, which by definition in the WBN TS Bases renders HMS Train A inoperable. The affected ignitors are located in a very high radiation and temperature area of lower containment and cannot be repaired until the reactor is taken offline.

1/1
D030

TVA issued a potential discretionary enforcement information letter to NRC on April 9, 1998, prior to scheduled surveillance testing for the 1B-B emergency diesel generator (EDG). An unlikely failure during this surveillance testing of EDG 1B-B could result in loss of emergency power to the Train B ignitors, rendering both trains of the HMS inoperable. This condition (or similar situation involving loss of normal power to Train B ignitors) would require WBN to enter LCO 3.0.3 with an unnecessary shutdown of the plant required with no corresponding benefit to the public health and safety. The surveillance requirement for EDG 1B-B is required every 31 days; therefore, to prevent recurrence of this condition, TVA is requesting a temporary TS amendment until the next WBN entry into Mode 3 following which time ignitor repair(s) could be made to restore the HMS to an operable status. WBN's next two monthly surveillances for EDG 1B-B are scheduled for May 14 and June 2, 1998. Therefore, TVA is requesting NRC's prompt review and approval of the enclosed proposed temporary amendment in order to avoid a potential plant shutdown due to two inoperable ignitors.

TVA has determined that there are no significant hazards considerations associated with the proposed change and that the change is exempt from environmental review pursuant to the provisions of 10 CFR 51.22(c)(9). The WBN Plant Operations Review Committee and the WBN Nuclear Safety Review Board have reviewed this proposed change and determined that operation of WBN Unit 1 in accordance with the proposed change will not endanger the health and safety of the public.

Enclosure 1 to this letter provides the description and evaluation of the proposed change including TVA's determination that the proposed change does not involve a significant hazards consideration and is exempt from environmental review. Enclosure 2 contains copies of the appropriate TS pages from Unit 1 marked-up to show the proposed change. Enclosure 3 forwards the revised TS pages for Unit 1 which incorporates the proposed change.

In accordance with 10 CFR 50.91(b)(1), a copy of this proposed license amendment is being forwarded to the State of Tennessee.

APR 2 9 1998

If you should have any questions, please contact me at (423) 365-1824.

Sincerely,

P. L. Pace
Licensing Manager

Enclosures
cc: See page 3

Subscribed and sworn to before me
on this 24th day of April, 1998.

E. Jeannette Long
Notary Public

My Commission
Expires June 27, 2001

APR 2 9 1998

cc (Enclosure):
NRC Resident Inspector
Watts Bar Nuclear Plant
1260 Nuclear Plant Road
Spring City, Tennessee 37381

Mr. Robert E. Martin, Senior Project Manager
U.S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, Maryland 20852

U.S. Nuclear Regulatory Commission
Region II
Atlanta Federal Center
61 Forsyth St., SW, Suite 23T85
Atlanta, Georgia 30303

Mr. Michael H. Mobley, Director
Division of Radiological Health
3rd Floor
L & C Annex
401 Church Street
Nashville, Tennessee 37243

APR 2 9 1998

PLP:CWT
cc (Enclosure):
J. S. Adams, BR 3H-C
R. J. Akers, ADM 1V-WBN
J. A. Bailey, LP 6A-C
R. R. Baron, BR 4J-C
M. J. Burzynski, BR 4J-C
E. S. Christenbury, ET 10A-K
R. D. Greer, EQB 2V-WBN
K. N. Harris, LP 3B-C
D. V. Kehoe, EQB 2V-WBN
W. R. Lagergren, MOB 2R-WBN
J. E. Maddox, EQB 1A-WBN
NSRB Support BR 4J-C
L. V. Parscale, ADM 1B-WBN
J. A. Scalice, LP 6A-C
Sequoyah Licensing Files, OPS 4C-SQN
R. J. Vander Grift, EQB 2W-WBN
EDMS, WT 3B-K

S:\lmaster\SUBMIT\TS HMS EXIGENT-CWT.DOC

ENCLOSURE 1

PROPOSED LICENSE AMENDMENT
HYDROGEN MITIGATION SYSTEM

I. DESCRIPTION OF PROPOSED LICENSE AMENDMENT

The proposed temporary license amendment would revise Technical Specification (TS) LCO 3.6.8 (Hydrogen Mitigation System) to provide temporary requirements for hydrogen ignitors to address two Train A ignitors which are currently out of service. The temporary specification would apply until the next shutdown to MODE 3 following which time ignitor repair(s) would be performed to restore the HMS to an OPERABLE status. Specifically, LCO 3.6.8 would be revised with temporary notes which:

(1) Define HMS Train A as OPERABLE with 32 of 34 ignitors OPERABLE, instead of 33 of 34.

(2) Address a condition and required action for two specific containment regions (Reactor Cavity and Steam Generator No. 4 Enclosure Lower Compartment) simultaneously having no OPERABLE ignitors. At least one ignitor in each region would require restoration within 72 hours.

(3) Provide for an increased surveillance frequency from 92 days to 46 days for HMS Train A.

The TS Bases for LCO 3.6.8 would be revised accordingly.

II. CIRCUMSTANCES RLEATED TO REQUEST FOR PROMPT REVIEW

As discussed herein and in TVA's letter to the staff dated April 9, 1998 (Potential Request for Discretionary Enforcement), WBN currently has two Train A containment hydrogen ignitors that are inoperable due to an apparent fault in the common circuit supplying these ignitors. This condition renders Train A of the WBN HMS inoperable in accordance with TS LCO 3.6.8. The condition was discovered during routine surveillance testing of the Train A ignitors on April 3, 1998, at which time WBN entered CONDITION A of LCO 3.6.8. The ignitors are located in a very high radiation and temperature area of lower containment and cannot be repaired until the reactor is taken offline. WBN's next scheduled outage is for refueling in February 1999.

With the two Train A ignitors out of service, the HMS is still capable of adequately performing its intended design function in the event of a severe accident with the remaining 32 of 34 ignitors. However, an unlikely failure during WBN's required monthly surveillance testing of the EDG 1B-B, or loss of normal power, could render power to the Train B ignitors unavailable. This condition would require an unnecessary plant shutdown in accordance with TS LCO 3.0.3 with no corresponding benefit to the public health and safety. The need for this temporary

amendment to the WBN TS could not have been anticipated prior to the date of discovery of the affected ignitors.

WBN's next two monthly surveillances for EDG 1B-B are scheduled for May 14 and June 2, 1998. Therefore, TVA is requesting NRC's prompt review and approval of the enclosed proposed temporary amendment in order to avoid a potential plant shutdown due to two inoperable ignitors. Alternatively, WBN would formally request a notice of enforcement discretion (NOED) for this issue in the unlikely event Train B power is lost to the ignitors during surveillance testing of EDG 1B-B.

III. REASON FOR THE PROPOSED CHANGE

On April 3, 1998, at 0130 hours, TVA entered TS 3.6.8, Condition A (one HMS train inoperable) due to the failure of two hydrogen ignitors to energize during the surveillance testing required by Technical Specification Surveillance Requirement (SR) 3.6.8.1. Both ignitors are located in separate areas of lower containment and are fed by the same common circuit which has an apparent fault. These ignitors are located in very high radiation and temperature areas that presents a concern for personnel safety to perform repairs while at power; therefore, repairs cannot be made until the reactor is taken offline to allow access to that area. Although the HMS would be capable of adequately performing its intended design function under the existing conditions, a failure of Train B emergency power during required monthly testing of the EDGs, if not restored within 4 hours, (or a loss of normal Train B power) would require a plant shutdown with no corresponding benefit to the public health and safety. The proposed temporary change to the TS addresses this issue. The attached annotated Updated Final Safety Analysis Report (UFSAR) Figure 6.2.5A-2 illustrates the location of the inoperable ignitors.

There are a total of 68 ignitors in the HMS. The 68 ignitors are divided equally into two separate trains for redundancy and receive emergency power from two of the four EDGs. Train A ignitors are powered from EDG 1A-A and the Train B ignitors are powered from EDG 1B-B. Technical Specification Bases 3.6.8 defines an OPERABLE HMS train as 33 of 34 OPERABLE ignitors. During testing on April 3, only 32 of 34 ignitors were found operable; therefore, HMS Train A has been declared inoperable by definition.

WBN is required by TS to perform several monthly surveillance requirements for each of the four EDGs and related auxiliary equipment. If EDG 1B-B which supplies the Train B ignitors were to experience an unlikely failure to meet its surveillance requirements, TS 3.8.1, Action B.2 would require that feature(s) supported by the inoperable diesel generator (Train B ignitors) be declared inoperable within 4 hours when its required redundant feature(s) (Train A ignitors) is inoperable and return the diesel generator to service within 72 hours. Since HMS Train A is currently inoperable, a loss of normal or emergency power to the Train B ignitors would place both trains of the HMS in an inoperable status. With no Action statement available for

two inoperable trains of HMS, WBN would be required to enter LCO 3.0.3 which initiates a shutdown of the plant. The loss of Train-B ignitor power would also result in two containment ignitor regions (the reactor cavity and SG No. 4 Enclosure) having no OPERABLE ignitor. This condition is not allowed by the current TS and although not hazardous for the current Train A ignitor situation, would also require entry into LCO 3.0.3 and a plant shutdown. Therefore, the proposed TS change addresses a temporary condition for the specific inoperable ignitors and thereby avoids an undesirable transient that would result from compliance with these current TS requirements. Thus the potential safety consequences and operational risks of shutdown are minimized with no adverse impact on the public health and safety.

Under the proposed TS change, HMS Train A would be considered OPERABLE with the two specific ignitors (30A and 31A) out of service, provided the remaining 32 of 34 ignitors continue to be OPERABLE. These 32 Train A ignitors are currently OPERABLE and would adequately accomplish the intended design function of the HMS during the highly unlikely event of a degraded core accident. During a loss of Train B power, the proposed TS would permit the reactor cavity and SG No. 4 lower compartment enclosure regions to have no OPERABLE ignitors for a very limited duration of 72 hours during which time power must be restored or a plant shutdown to MODE 3 achieved within the following 6 hours. The cause of failure for the two Train A ignitors is considered isolated to their circuitry due to an apparent fault in wiring common to those ignitors. However, because HMS Train A is experiencing non-optimum conditions, increased surveillance testing in accordance with SR 3.6.8.1 will be performed for HMS Train A with an increased frequency of 46 days instead of the currently required 92 days.

IV. SAFETY ANALYSIS

The HMS consists of two groups of 34 redundant hydrogen ignitors distributed throughout various areas of the WBN containment that are designed to burn hydrogen in a controlled manner at the lower flammability concentration following a degraded core accident. The HMS must be capable of handling an amount of hydrogen equivalent to that generated from a metal water reaction involving 75% of the fuel cladding surrounding the active fuel region. An ignitor train is currently considered OPERABLE with at least 33 of 34 ignitors in service and each containment region having at least one OPERABLE ignitor.

The HMS was originally designed, procured, and installed with the attributes of a safety-related system that was redundant, Seismic Category I, designed to maintain functional capability under post accident conditions, and Class 1E (except for the ignitor coil). However, the HMS was installed for beyond design basis events, and thus, is not identified or analyzed as safety-related equipment at WBN. The system conforms to the requirements of 10 CFR 50.44(c)(3)(iv), (v), (vi), and (vii).

To assure that hydrogen released during degraded core accidents similar to or of about the same probability as the Three Mile Island (TMI) event, will be burned at low concentrations, durable thermal ignitors developed by Tayco Engineering operating at 120V ac at the ignitor and capable of maintaining a surface temperature of 1700^{o}F are used in the HMS. To assure adequate spatial coverage to prevent pockets of high concentrations of hydrogen, a total of 68 ignitors (34 per train) are distributed throughout the various regions of the containment in which hydrogen could be released or to which it could flow in significant quantities.

There are at least two ignitors, controlled and powered redundantly, located in each of these regions. Spray shields provide protection from the containment spray system on those ignitors exposed to the spray. The HMS is currently considered operational if upon completion of required tests, there are 33 of 34 ignitors operating in each train provided that the failed ignitors do not render a containment region inoperable. Currently, HMS Train A has 2 of 34 ignitors that are not functional. HMS Train A has been declared inoperable by definition. As required by LCO 3.6.8, ACTION A.1, plant operation may continue provided that WBN tests the OPERABLE train ignitors once per seven days until the inoperable train is restored to operable status. Ignitor 31A is located on Elevation 754 above reactor coolant pump 4 at the lower edge of the steam generator No. 4 enclosure and ignitor 30A is located on Elevation 753 above the reactor vessel in the reactor cavity.

Although the existing condition with a coincident power loss on the opposite train could result in the loss of ignitors in two regions of lower containment, this condition is consistent with the existing TS Bases for LCO 3.6.8, Condition B.1, for one region. The safety consideration of that specification is to ensure that there would always be ignition capability in the adjacent regions to provide redundant capability by flame propagation to the region with no operable ignitors. Because the inoperable Train A ignitors are not in adjacent regions, this capability is retained by the existing condition.

With the two ignitors out of service, 32 of 34 ignitors would provide the ability to burn hydrogen such that the concentration of hydrogen in containment remains low. Tests that were performed at the Pacific Northwest Laboratory showed that containment air mixing is very good, that the maximum hydrogen concentration difference between regions at any time during the release in the lower compartment was 2 - 3 volume percent, and that no potential existed for pocketing of rich mixtures. Additionally, the Tayco ignitors are sufficiently durable to provide controlled ignition in a degraded core accident. These tests were based on small-break loss-of-coolant-accident (LOCA) with failure of safety injection because it is similar to the TMI-2 type of accident and the transient typically results in more hydrogen generation prior to core slump than produced in other scenarios.

The Probabilistic Safety Assessment (PSA) establishes that there is low probability (4.4×10^{-5} events/reactor year) of the occurrence of a degraded core event. Accidents that would generate hydrogen in amounts equivalent to a metal water reaction of 75 percent of the core cladding are even more remote. PSA Level 2 analysis models the following regions: reactor cavity, lower compartment, ice condenser compartment, upper plenum compartment, upper compartment, and dead ended compartments using the Modular Accident Analysis Program (MAAP). The MAAP model was based on deflagration occurring in the regions if flammability criteria are met and an ignition source is present. The number of ignitors was not explicitly modeled. However, the presence of ignitors is credited for burn initiation in compartments where the ignitors exist. Since the air return fans (ARFs) start within approximately nine minutes after a Phase B containment isolation signal to provide forced circulation, sufficient containment air mixing is provided to allow deflagration of the hydrogen with the remaining ignitors thus preventing hydrogen from concentrating in these locations. In addition, the air return system contains hydrogen collection headers that provide adequate air exchange from the upper regions of the steam generator and pressurizer enclosures, the reactor cavity, from the containment dome, and other containment locations.

In summary, although the possibility of a degraded core event that would generate a significant concentration of hydrogen is remote, the HMS is still capable of adequately performing its intended design function with the two specific ignitors out of service using the remaining 32 of 34 ignitors. WBN has safety related, redundant ARFs that actuate within approximately nine minutes of a Phase B containment isolation signal that provide added assurance that lower and upper compartment air is thoroughly mixed. The ARFs, which include hydrogen collection, will provide sufficient air mixing for the area on Elevations 753 and 754 where the two non-functional ignitors are located to prevent hydrogen buildup. The hydrogen will be burned by other ignitors in the lower compartment or in the ice condenser upper plenum. The air mixing ensures that the potential does not exist for a hydrogen buildup to excessive concentrations beyond those considered for WBN. Thus, the failure of these two ignitors should not result in any change to the hydrogen burn profiles. Since the hydrogen concentration remains low and pocketing which could lead to rapid burns and challenge containment is unlikely, the original design continues to be met. Thus, the probability of a containment failure and associated radiological release is insignificantly altered with respect to maintaining hydrogen concentrations low following a degraded core accident.

V. NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

TVA has concluded that operation of WBN 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 proposed temporary technical specification would permit two specific Train A ignitors (30A and 31A) in non-adjacent regions to be out of service until the next WBN entry into MODE 3. In this condition, the remaining 32 of 34 ignitors, in combination with thorough containment air mixing and with the hydrogen collection function of the air return system, will maintain the ability to burn hydrogen such that containment hydrogen remains low following a degraded core accident. Thus, the design basis of the HMS will be maintained such that a controlled hydrogen burn may occur at the lower flammability concentration following a degraded core accident. In addition, although a loss of Train B power could result in loss of ignitors in two regions of lower containment, the short duration allowed by the proposed amendment for this condition (not to exceed 72 hours) minimizes the likelihood of a concurrent accident requiring the ignitors. The WBN PSA establishes a probability of 3.6×10^{-7} events per reactor-year of a degraded core event based on 72 hours, with the probability more remote for an accident that would generate hydrogen in amounts equivalent to a metal-water reaction of 75% of core cladding for which the HMS is intended. Additionally, sufficient ignition capability in adjacent regions combined with containment air mixing would provide capability by flame propagation to the regions with no operable ignitors. Thus the failure of the two specific ignitors should not result in any change to the post-accident hydrogen burn profiles. Since the hydrogen concentration would remain low and pocketing which could lead to rapid burns and challenge containment is unlikely, the original design continues to be met. Thus the probability of a containment failure and associated radiological release is insignificantly altered. Because the containment response will not change, the proposed TS will not result in an increase in the probability or consequences of any accident previously evaluated in the WBN FSAR.

(B) Operation of the facility in accordance with the proposed amendment would not create the possibility of a new or different kind of accident from any accident previously evaluated.

As discussed above, with the two Train A ignitors out of service, the remaining 32 of 34 ignitors in combination with containment air mixing will maintain the design basis of the HMS such that a controlled hydrogen burn may be accomplished following a degraded core accident, including a short time period of 72 hours for which a loss of Train B power could result in loss of ignitors in two regions of lower containment. Since the failure of the ignitors should not result in any change to the post-accident hydrogen burn profiles and because the containment response will not change, the proposed TS will not result in any new or different kind of accident from any accident previously evaluated.

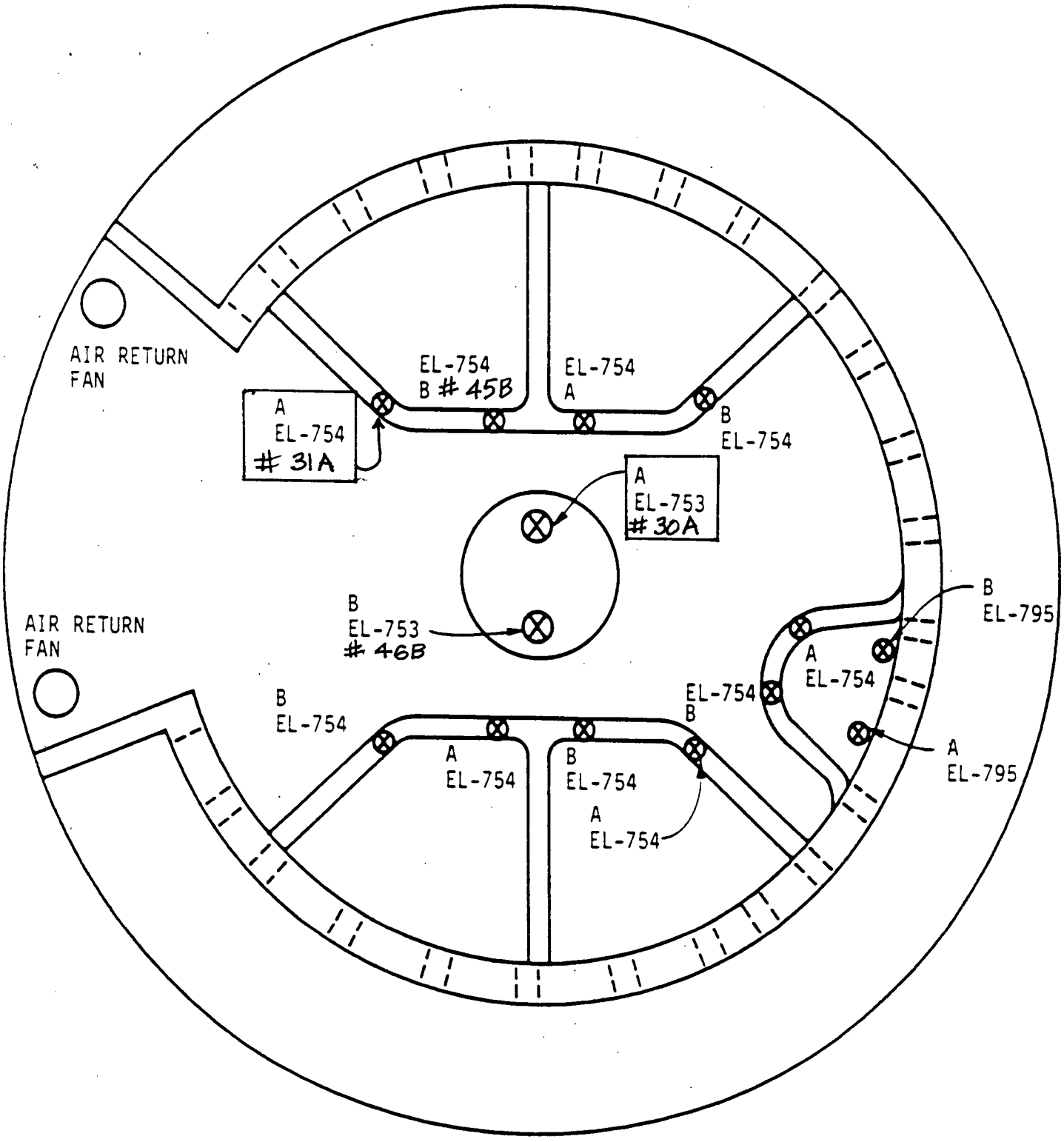
(C) Operation of the facility in accordance with the proposed amendment would not involve a significant reduction in margin of safety.

Although the HMS is not provided for a design basis accident (DBA), the Bases of the WBN TS define the design function of the HMS as having the capability to burn hydrogen in a controlled manner at the lower flammability concentration following a degraded core accident. An ignitor train is currently considered OPERABLE with at least 33 of 34 ignitors in service and each containment region having at least one operable ignitor. Although the proposed TS change would allow two specific Train A ignitors to be out of service and their associated containment regions to be without any ignitors for a short duration (72 hours), the remaining 32 of 34 ignitors will maintain the design basis of the HMS such that a controlled hydrogen burn may be accomplished following a degraded core accident. Although small increases in the hydrogen flammability concentration may occur, deflagration would still be expected to occur in a controlled manner and prior to a high hydrogen concentration. As stated earlier, failure of the two ignitors should not result in any change to the post-accident hydrogen burn profiles or containment response. Therefore, the proposed TS change will not involve a significant reduction in the margin of safety.

VI. ENVIRONMENTAL CONSIDERATION

The proposed change does not involve a significant hazards consideration, a significant change in the types of or significant increase in the amounts of any effluents that may be released offsite, 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). Pursuant to 10 CFR 51.22(b), an environmental assessment of the proposed change is not required.

ATTACHMENT



WATTS BAR NUCLEAR PLANT
FINAL SAFETY
ANALYSIS REPORT

IGNITER LOCATIONS -
LOWER COMPARTMENTS
FIGURE 6.2.5A-2