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Richard T. Purcell
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APR 0 9 1998

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

Gentlemen:

In the Matter of)
Tennessee Valley Authority)

Docket Nos. 50-390

WATTS BAR NUCLEAR PLANT (WBN) UNIT 1 - POTENTIAL REQUEST FOR DISCRETIONARY ENFORCEMENT FOR TECHNICAL SPECIFICATION 3.6.8 - HYDROGEN MITIGATION SYSTEM

This letter is provided as background information for a potential TVA request for a Notice of Enforcement Discretion (NOED) for WBN Unit 1 Technical Specification (TS) 3.6.8, Hydrogen Mitigation System (HMS).

On April 3, 1998 at 0130 hours, TVA entered TS 3.6.8, Action Condition A due to the failure of two hydrogen igniters to energize during the surveillance testing required by technical specification surveillance requirement (SR) 3.6.8.1. Both igniters which are located in separate areas of lower containment, are fed by the same circuit. These igniters are located in high temperature and high radiation areas which presents a concern for personnel safety to perform repairs while at power. Therefore, the igniters can not be repaired until the next outage of sufficient duration to allow access to that area.

There are a total of 68 igniters in the HMS. The 68 igniters are divided equally into two separate trains for redundancy. Technical Specification Bases 3.6.8 defines an operable train as 33 of 34 operable igniters. During the above testing, 32 of 34 igniters were found operable. However, by definition, the train is inoperable, thus, WBN entered LCO 3.6.8, Action Condition A. As required by Condition A, plant operation may continue provided WBN tests the operable train once per seven days until the inoperable train is restored to operable status.

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WBN is scheduled to perform TS surveillance requirements on the 1B-B diesel generator by April 18, 1998. It is anticipated that the diesel generator will perform upon demand, however, if the diesel generator were to fail to meet the surveillance requirements, TS 3.8.1, Action Condition B.2 requires feature(s) supported by the inoperable diesel generator to be declared inoperable within 4 hours when its required redundant feature(s) is inoperable and return the diesel generator to service within 72 hours.

Since the HMS Train A has been declared legally inoperable due to the loss of 2 of 34 igniters, a loss of power to the Train B igniters, 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 an orderly shutdown of the plant. Although the HMS would be legally inoperable, 32 of the 34 Train A igniters remain operable and would be expected to perform their intended function during the highly unlikely event of a degraded core accident. Compliance with the technical specification would require an unnecessary forced shutdown with no corresponding benefit to the public health and safety.

Therefore, in the event of a loss of power to the HMS Train B, WBN would request a 72 hour discretionary period for both trains of the HMS to be considered inoperable, to allow sufficient time to return the Train B power to service. As stated previously, the HMS Train A igniters would still be functionally capable of performing their intended design function.

TVA recognizes that the Region II staff cannot approve discretion without knowing the exact equipment condition at the time the discretion is needed. Accordingly, TVA requests that the enclosed information be reviewed by the Region II staff prior to Tuesday, April 14, 1998. Any questions regarding the enclosed technical information should be resolved prior to that time between the TVA and NRC staffs. TVA will make its staff available to respond to any staff questions as needed.

TVA plans to perform the diesel generator 1B surveillance during day shift on Tuesday April 14, 1998. Should there be a problem with the diesel generator surveillance, TVA will promptly contact the Region II staff, if appropriate, with a description and confirmation that the problem can be restored to operable status within the time allowed

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by the technical specification. At that time, TVA would make a verbal request for an NOED to address TS 3.6.8 referencing this submittal. A period of four hours would be available from the time of declaring the inoperable Train B power supply until a decision would be needed regarding the NOED.

If you should have any questions, please contact W. R. Lagergren at (423) 365-8204.

Sincerely,

W. R. Lagergren

for R. T. Purcell

Enclosure
cc (Enclosure):

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1. **The TS or other license conditions that will be violated.**

On April 3, 1998, at 0130 hours, WBN entered Limiting Condition for Operation (LCO) 3.6.8, Condition A for one hydrogen mitigation system (HMS) train being inoperable. WBN was performing the surveillance requirement SR 3.6.8.1 on HMS Train A when Igniters # 30 and # 31 failed to energize during the test. During the performance of the test, 32 of the 34 igniters in Train A were found to be operable. However, this is one less than required by SR 3.6.8.1, which by definition in the TS Bases 3.6.8, (33 of 34 igniters per train), the train is considered inoperable. Therefore, WBN entered LCO 3.6.8 with actions to restore the train to operable status within 7 days or perform SR 3.6.8.1 on the operable train once per 7 days.

These igniters are located in a high radiation and a high temperature area of lower containment, and cannot be repaired at operating conditions. WBN chose to perform SR 3.6.8.1 on the Operable train once per 7 days until the next available outage of sufficient duration that would allow access to the area where the igniters are located. The next scheduled outage is in February 1999.

WBN is scheduled to perform TS surveillance requirements (SRs) 3.3.4.1, 3.8.1.2, 3.8.1.3, 3.8.1.4, 3.8.1.5, 3.8.1.6, 3.8.3.1, 3.8.3.2, and 3.8.3.4, on Train B diesel generator on Tuesday, April 14, 1998. The frequency of the SRs is 31 days. It is anticipated that the diesel generator will perform upon demand. However if the diesel generator fails to meet the surveillance requirements, TS 3.8.1, Action Condition B.2 requires feature(s) supported by the inoperable DG(s) to be declared inoperable within 4 hours when its required redundant feature(s) is inoperable and return the diesel generator to service within 72 hours.

Since the HMS Train A has been declared inoperable and cannot be repaired until an outage occurs, failure of Train B power supply, would place two 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 an orderly shutdown of the plant. Although the HMS Train A would be legally inoperable, the 32 of 34 igniters are functional and would still be expected to mitigate hydrogen in containment during the highly unlikely event of a degraded core accident. Compliance with the Technical Specification would be considered an unnecessary forced shutdown with no corresponding significant benefit to the public health and safety.

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2. **The circumstances surrounding the situation, including root causes, the need for prompt action and identification of any relevant historical events.**

As discussed above on April 3, 1998, at 0130 hours, WBN entered LCO 3.6.8, Action Condition A due to one inoperable train of HMS. WBN was performing surveillance instruction (SI) 1-SI-268-1-A, "92 Day Permanent Hydrogen Mitigation System Train A Igniter Availability Test," to satisfy Technical Specification SR 3.6.8.1, when one of the two conductors on Circuit 10 grounded and opened. This circuit feeds Igniters # 30A and # 31A which are located in separate areas within the lower containment region. Igniter # 31A is located on Elevation 754 above the reactor coolant pump # 4 at the lower edge of the steam generator housing and Igniter # 30A is located on Elevation 753 above the reactor vessel in the cavity.

TVA began troubleshooting the circuit by utilizing a Time Domain Reflectometer (TDR) that was available onsite. The TDR indicated that the ground and fault were located inside the polar crane wall. In order to identify the exact location of the fault, a vendor was contracted to troubleshoot the circuit using equipment of later technology. On April 8, 1998, the vendor confirmed that the fault was located 320 feet from the breaker and appeared to be in the junction box at Igniter # 31A. At the present time, TVA considers the "0" current reading to be a failure in the cable feed or splice and not the igniter itself.

The only other problems with the HMS igniters at WBN occurred on May 2, 1997 when Train A Igniter # 2A failed the testing due to a low current reading and on September 29, 1997, when Train B Igniter # 67B failed the testing due to a low current reading. Both were repaired during the first refueling outage. At no time during the operating history of WBN have two igniters on the same train been inoperable at the same time.

3. **The safety basis for the request, including an evaluation of the safety significance and potential consequences of the proposed course of action. This evaluation should include at least a qualitative risk assessment derived from the licensee's PRA.**

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 igniter coil).

However, the HMS was installed for beyond design basis events, and thus, is not identified and handled as safety-related equipment at WBN. The system conforms to the requirements of 10 CFR 50.44(c),(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 Islant (TMI) event, will be burned at low concentrations, durable thermal igniters developed by Tayco Engineering, operating at a minimum 120V ac and a maximum 135V ac at the igniter and capable of maintaining a surface temperature of 1700°F are used in the HMS. To assure adequate spatial coverage to prevent pockets of high concentrations of hydrogen, a total of 68 igniters (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 igniters, controlled and powered redundantly, located in each of these regions. Spray shields provide protection from the containment spray system on those igniters exposed to the spray. The HMS is considered operational if upon completion of required tests, there are 33 of 34 igniters operating in each train, provided that the failed igniter in each train is not located in the same containment region.

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

The HMS Train A has two igniters (leaving 32 of 34 functional) that are currently not functional. This renders one igniter train inoperable and WBN has entered LCO 3.6.8.A. The action being performed is LCO 3.6.8.A.2 (once per seven days). Igniter # 31A is located on Elevation 754 above the reactor coolant pump # 4 at the lower edge of the steam generator housing and Igniter # 30A is located on Elevation 753 above the reactor vessel in the cavity (see the attached annotated Updated Final Safety Analysis Report (UFSAR) Figure 6.2.5A-2). The HMS Train B is operable with 34 of 34 igniters functional. Note: the reactor cavity igniters have been deleted at Catawba Nuclear Station based on a letter from NRC dated October 30, 1995, "Issuance of Amendments - Catawba Nuclear Station, Units 1 and 2 Hydrogen Igniters (TAC NOS. M92087 and M92088)."

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The scenario that is being evaluated is that Train A is legally inoperable but with 32 of 34 igniters functional, and Train B becomes inoperable as a result of an opposite train power failure during periodic testing.

These 32 of 34 igniters should 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, even without forced circulation by the air return fans (ARF), that the maximum hydrogen concentration difference at any time during the release in the lower compartment was 2 - 3 volume percent (without ARF), and that no potential existed for pocketing of rich mixtures (without ARF). Additionally, the Tayco igniters 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 results in more than twice as much hydrogen generation prior to core slump as was found in the 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 compartment 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 igniters was not explicitly modeled. However, the presence of igniters is credited for burn initiation in compartments where the igniters exist. Since the ARF start within approximately nine minutes after a Phase B signal to provide forced circulation, sufficient containment air mixing is provided to allow deflagration of the hydrogen with remaining igniters thus preventing hydrogen from concentrating in these locations. In addition, the ARF system contains hydrogen collection headers that provide adequate air exchange from the upper regions of the steam generator and pressurizer housing, and from the containment dome. Therefore, there is neither a safety significance or potential consequences as a result of this Notice of Enforcement Discretion (NOED) since (1) Train B will be inoperable for a short duration until Train B power is returned, (2) PSA establishes a low probability for the short duration (3.6×10^{-7} events/reactor year of a core damage event based on 72 hours), (3) the igniters are designed and tested for accident conditions, (4) containment air would be thoroughly mixed and (5) the remaining functional igniters (32 of 34) should combust the hydrogen

produced. Since the hydrogen concentration remains low and pocketing which could lead to rapid burns and challenge containment is not likely, the original design continues to be met. Thus the probability of a containment failure and associated radiological release is insignificant altered with respect to maintaining hydrogen concentrations low during post event.

Preliminary review of the analysis submitted by Catawba indicates that a similar bases may be applied to WBN for a future TS change.

4. **The basis for the licensee's conclusion that the noncompliance will not be of potential detriment to the public health and safety and that neither an unreviewed safety question nor a significant hazard consideration is involved.**

Train A is inoperable, and Train B becomes inoperable as a result of an opposite train power failure during periodic testing. LCO 3.0.3 is entered which requires that WBN be in Mode 3 within 7 hours, Mode 4 within 13 hours, and Mode 5 within 37 hours. There will be 32 of 34 igniters functional for Train A, and Train B would be operable when the opposite Train B power is returned. The HMS is required to assure that any hydrogen released during a degraded core accident will be ignited at any containment location as soon as the flammability criteria are met. The possibility of a degraded core event that would generate significant concentration of hydrogen is remote. WBN has safety related, redundant ARF that actuate within approximately nine minutes of a Phase B signal to ensure that lower and upper compartment air is thoroughly mixed. The ARF will provide sufficient air flow from the area on Elevations 753 and 754, where the two non-functional igniters are located to prevent hydrogen from collecting. The hydrogen will be burned by other igniters in the lower compartment or in the ice condenser upper plenum. The air flow ensures that the potential does not exist for a hydrogen buildup to flammable limits above those considered in the hydrogen burn analyses for WBN. The failure of these two igniters is not expected to result in any change to the hydrogen burn profiles. Because the containment response will not change, the consequences of an accident previously evaluated have not increased. Thus this change does not create a new accident, change the probability of an accident, or decrease the margin of safety with respect to containment overpressure as defined in the basis of the WBN Technical Specifications. The proposed change does not result in changes related to equipment malfunctions. Therefore, this proposed change is not detrimental to the public heath and safety, since this would only be required for a short duration until opposite Train B power is returned. It is concluded that an unreviewed safety question (USQ) does not exist.

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5. **The basis for the licensee's conclusion that the noncompliance will not involve adverse consequences to the environment.**

This proposed change has been reviewed in accordance the NUREG-0498, Supplement No. 1, April 1995, "Final Environmental Statement," Section 5.5, "Radiological Impacts." The NOED does not involve a significant hazards consideration, a change in the types of or an increase in the amounts of any effluents that may be released offsite, or an increase in individual or cumulative occupational radiation exposure or result in a radioactive release because Train A operable igniters will perform their intended function of preventing hydrogen buildup with the associated risk of a containment rupture. This is based on (1) Train B will be inoperable for a short duration until Train B power is returned, (2) the igniters are designed and tested for accident conditions, (3) containment air would be thoroughly mixed and (4) the remaining functional igniters (32 of 34) should combust the hydrogen produced. Therefore, the proposed change has no impact on the WBN Final Environment Statement and has no adverse environmental impact.

6. **Any proposed compensatory measure(s).**

Following the return to service of the applicable Train B power supply and, subsequently, Train B of the HMS, WBN will energize Train B HMS power supply breaker and verify that the required number of igniters are energized once every 7 days until Train A is repaired and returned to service. This action is required by LCO 3.6.8, Action Condition A. Although not required by TS, TVA will continue to test the functional Train A igniters in accordance with their surveillance frequency.

7. **The justification for the duration of the noncompliance.**

In the event of a loss of power to the HMS Train B, WBN would request up to a 72 hour discretionary period for both trains of the HMS to be legally considered inoperable, to allow sufficient time for the repair of the Train B power supply. As stated previously, the HMS Train A igniters would still be functionally capable of performing their intended design function except for the two impacted by the failed circuit.

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8. **A statement that the request has been approved by the facility organization that normally reviews safety issues (Plant Onsite Review Committee, or its equivalent).**

   This submittal has been approved by the WBN Plant Operations Review Committee on April 9, 1998.

9. **The request must specifically address how one of the NOED criteria for appropriate plant conditions specified in Section B is satisfied.**

   The request would be made under Section B.1.a in order to avoid a undesirable transients as a result of forcing compliance with the technical specification and, thus minimize potential safety consequences and operational risks.

10. **If a follow-up license amendment is required, the NOED request must include marked-up TS pages showing the proposed TS changes. The actual license amendment request must follow within 48 hours.**

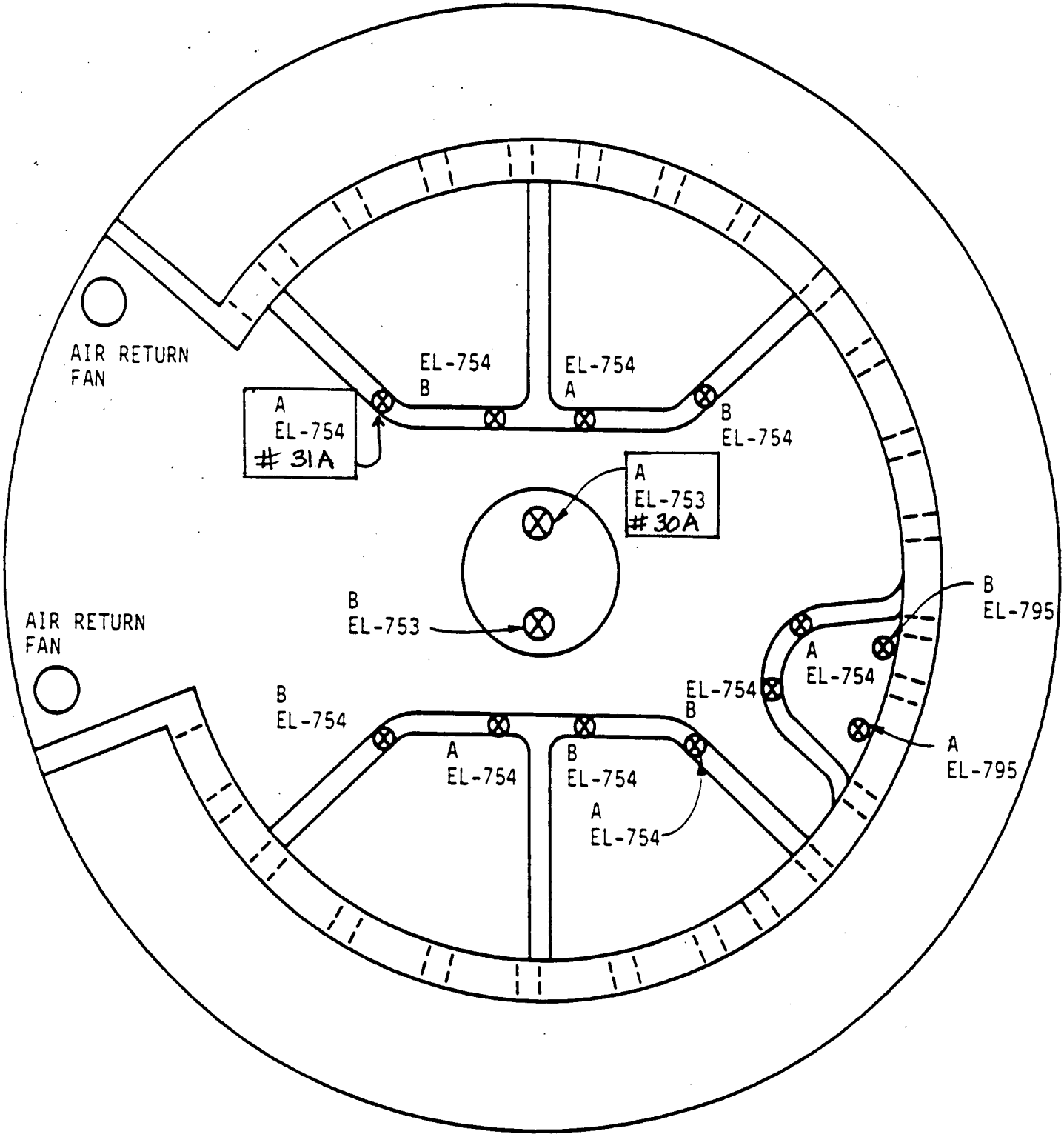
    No license amendment is required. However, TVA is considering a future request for a license amendment to change the number of required igniters in one train to be considered an operable train. At this time, analysis have not been completed to pursue this request.

11. **A statement that prior adoption of approved line-item improvements to the TS or the ITS would not have obviated the need for the NOED request.**

    WBN was licensed with improved Technical Specifications (Merits) which incorporated line-item improvements.

12. **Any other information the NRC staff deems necessary before making a decision to exercise enforcement discretion.**

    None at this time.



WATTS BAR NUCLEAR PLANT
FINAL SAFETY
ANALYSIS REPORT

IGNITER LOCATIONS -
LOWER COMPARTMENTS
FIGURE 6.2.5A-2