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SUBJECT: Provides evaluation of epoxy coating on stainless steel components inside BFN Unit 2 suppression chamber.

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TVA

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

November 10, 1994

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

Gentlemen:

In the Matter of) Docket No. 50-260
Tennessee Valley Authority)

BROWNS FERRY NUCLEAR PLANT (BFN) - EVALUATION OF EPOXY COATING ON STAINLESS STEEL COMPONENTS INSIDE THE UNIT 2 SUPPRESSION CHAMBER

This letter provides an evaluation of an epoxy coating on stainless steel components inside the BFN Unit 2 suppression chamber. By letter dated July 17, 1994, TVA committed to remove the Unit 2 T-quencher coating during the Cycle 7 refueling outage. TVA also committed to sample other stainless steel components within the Unit 2 primary containment and take appropriate action to ensure that other similar unanalyzed coating conditions do not exist.

TVA was unsuccessful in effectively removing the coating from the submerged Unit 2 T-quenchers using a roto-peening device in a time frame that supported the Cycle 7 refueling outage. In addition, hydro-lazing was only moderately successful at pressures up to 30,000 psi. In early October, during the early stages of the Unit 2 Cycle 7 refueling outage, an initial sample walkdown of the primary containment did not identify any other coated stainless steel components. However, just prior to the scheduled end of the Unit 2 Cycle 7 refueling outage, TVA identified other coated stainless steel components located inside the suppression chamber and above the normal suppression pool water level (i.e., the bellows of the main vent, catwalk support plates, conduits, junction boxes, small piping, valve bodies, and miscellaneous other small components).

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An Incident Investigation has been initiated to address the failure to identify these components during the October sample walkdown. Preliminary indications are that miscommunication with the walkdown personnel regarding the scope of the task and a failure to provide written instructions were contributing factors in the failure of the October sample walkdown to identify coated stainless steel components. A follow-up Quality Control inspection, using a written procedure, was performed to identify the coated stainless steel components inside primary containment.

TVA fully understands the importance to plant safety of the Emergency Core Cooling System (ECCS) suction strainer blockage issue. The coating applied to the stainless steel components inside the suppression chamber is Valspar 78, which is qualified for design basis accident conditions when applied to carbon steel surfaces. However, the stainless steel components were sandblasted and coated by qualified individuals using approved procedures for the surface preparation and application of this coating on carbon steel.

As described in Enclosure 1 of this letter, TVA has reviewed the physical and environmental challenges to the coatings on stainless steel components inside the suppression chamber from design basis accidents, transients, and other events. Based on the qualification of the Valspar 78 coating, the controlled surface preparation and application of the coating on the stainless steel components by qualified individuals, the in-place adhesion testing of the coating, and the degree of resiliency exhibited by the coating to different removal methods, TVA has concluded that Valspar 78 will behave the same on stainless steel as it will on carbon steel when applied properly. Therefore, no disbonding of the coating is expected during design basis accident conditions. However, if disbonding did occur, it would produce a fine powder, similar to the effect produced by hydro-lazing, which does not pose a threat to suction strainer blockage or to the ECCS equipment downstream of the strainers. Therefore, TVA has updated its uncontrolled coating log to list the quantity of Valspar 78 coating on the stainless steel components as being unqualified but not contributing to ECCS suction strainer blockage.

TVA will pursue the qualification of the Valspar 78 coating system on stainless steel components prior to the end of the next operating cycle (Unit 2 Cycle 8). Based on the above, TVA withdraws the commitment to remove the coating from the Unit 2 T-quenchers. In addition, this letter provides notification that the commitment to ensure that other similar unanalyzed conditions do not exist on Unit 2 has been satisfied.

A summary of the commitment contained in this letter is provided as Enclosure 2. If you have any questions, please contact me at (205) 729-2636.

Sincerely,

Pedro Salas
Manager of Site Licensing

Enclosures
cc: see page 4

cc (Enclosures):

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ENCLOSURE 1

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 2

EVALUATION OF EPOXY COATING ON STAINLESS STEEL COMPONENTS INSIDE THE UNIT 2 SUPPRESSION CHAMBER

INDEX

FIGURES

I. BACKGROUND

During the mid-1980's, concerns were raised regarding the performance of the coating on the Units 2 and 3 suppression chambers. As a corrective action, the coating was removed by sandblasting of the interior of the suppression chambers (including the stainless steel components). The interior of the suppression chambers was then re-coated with Valspar 78 by qualified individuals using approved procedures for the surface preparation and application of this coating on carbon steel. Valspar 78 is an epoxy coating that is currently qualified only for use on carbon steel immersion surfaces.

In October 1988, TVA committed in Revision 2 to the Browns Ferry Nuclear Performance Plan (Reference 1) to perform walkdown inspections of unqualified coating on components installed inside primary containment. The walkdown was performed on Unit 2 to baseline the uncontrolled coating log and assess the general condition of the existing qualified coating. An analysis was performed to determine the maximum allowable quantity of coating debris which could be transported to the suction strainers without affecting the ability of the Emergency Core Cooling System (ECCS) pumps to perform their post-Loss of Coolant Accident (LOCA) function.

The results of this walkdown and evaluation were provided to NRC by letter on October 4, 1989 (Reference 2). In summary, TVA determined that the existing amount of unqualified coating within the primary containment is less than the amount which would adversely affect ECCS pump performance in a post-LOCA condition. In addition, corrective actions were taken to ensure that the addition of unqualified coating quantities is maintained below the maximum allowable quantity. TVA has committed to implement the containment coating program on Units 1 and 3 in accordance with the Unit 2 precedent prior to the restart of these units (Reference 3).

NRC's review of the containment coating evaluation is documented in Section 3.7 of NUREG-1232, Volume 3, Supplement 2 (Reference 4). It states that coatings, which did not meet the requirements of Regulatory Guide 1.54, were assumed to form solid debris under LOCA conditions. Only those coatings that were too thin (i.e., less than 3 mils dry film thickness), covered by insulation, shielded from the LOCA environment, or subsequently qualified by vendors were assumed not to contribute to strainer blockage. The staff reviewed TVA's analysis and considered it acceptable and conservative as no credit was taken for debris settling in the drywell.

In mid-April 1994, photographs of the inside of the Unit 1 suppression chamber were being reviewed in preparation for Unit 2 outage work. Disbonding of the coating in the area of the Unit 1 T-quencher holes was observed. In addition, further investigations identified a November 1986 report of an underwater inspection of the Unit 1 suppression chamber, which noted degraded coatings on the Unit 1 T-quenchers and stated that a similar condition existed on Unit 2. Inspections of the Unit 3 suppression chamber also verified the presence of coating on the T-quenchers.

Valspar 78 is not currently qualified for applications on a stainless steel substrate. The application of unqualified coatings inside the primary containment (drywell and suppression chamber) have the potential to become disbonded, because of adverse environmental conditions that would accompany an accident or transient. The resulting coating chips could then be transported to the suction strainers for the ECCS and induce debris clogging of the strainers.

On June 6, 1994, NRC issued Inspection Report 94-09 (Reference 5) that identified an apparent violation relating to corrective action for a misapplied coating on the suppression chamber T-quenchers. NRC concerns relative to the inspection findings were also discussed in an Enforcement Conference held on June 14, 1994. On June 23, 1994, NRC documented the Enforcement Conference and issued a Notice of Violation for the misapplication of protective coatings on BFN Unit 2 (Reference 6).

As part of the July 17, 1994, reply to the Notice of Violation (Reference 7), TVA committed to remove the misapplied coating from the T-quenchers inside the Unit 2 suppression chamber prior to restart from the Cycle 7 refueling outage. TVA also committed to sample other stainless steel components within the Unit 2 primary containment and take appropriate action to ensure that other similar unanalyzed coating conditions do not exist.

In the early stages of the Unit 2 Cycle 7 refueling outage (early October 1994), an initial walkdown of the primary containment did not identify any other coated stainless steel components. However, just prior to the scheduled end of the Unit 2 Cycle 7 refueling outage, TVA identified other coated stainless steel components located inside the suppression chamber and above the normal suppression pool water level.

An Incident Investigation has been initiated to address the failure to identify these components during the October sample walkdown. Preliminary indications are that miscommunication with the walkdown personnel regarding the scope of the task and a failure to provide written instructions were contributing factors in the failure of the October sample walkdown to identify coated stainless steel components. A follow-up Quality Control inspection, using a written procedure, was performed to identify the coated stainless steel components inside primary containment.

II. DESCRIPTION OF ECCS DESIGN AND THE SUPPRESSION CHAMBER

Each BFN unit employs a pressure suppression containment system which houses the reactor vessel, the reactor coolant recirculation loops, and other branch connections of the Reactor Primary System. The pressure suppression system consists of a drywell, a pressure suppression chamber (alternatively referred to as the torus or wetwell) which stores a large volume of water, a connecting vent system between the drywell and the suppression chamber, isolation valves, containment cooling systems, equipment for establishing and maintaining a pressure differential between the drywell and pressure suppression chamber, and other service equipment.

The drywell is a steel pressure vessel with a spherical lower portion 67 feet in diameter, and a cylindrical upper portion 38 feet 6 inches in diameter. The overall height is approximately 115 feet. In the event of a process system piping failure within the drywell, reactor water and steam would be released into the drywell air space. The resulting increased drywell pressure would then force a mixture of air, steam, and water through the vents into the pool of water which is stored in the suppression chamber. The steam would condense rapidly and completely in the suppression chamber, resulting in rapid pressure reduction in the drywell. Air that is transferred to the suppression chamber pressurizes the chamber and is subsequently vented to the drywell to equalize the pressure between the two vessels.

The pressure suppression chamber is a steel pressure vessel in the shape of a torus below and encircling the drywell, with a centerline diameter of approximately 111 feet and a cross-sectional diameter of 31 feet. Large vent pipes form a connection between the drywell and the pressure suppression chamber. A total of eight circular vent pipes are provided, each having a diameter of 6.75 feet. Jet deflectors are provided in the drywell at the entrance of each vent pipe to prevent possible damage to the vent pipes from jet forces which might accompany a pipe break in the drywell. The eight main vent pipes incorporate stainless steel bellows and are connected to a 4-foot, 9-inch diameter vent header, which is contained in the airspace of the suppression chamber.

The bellows are flexible expansion joints that allow movement of the main vent pipes through the torus wall, while maintaining the required pressure boundary. Sketches of the drywell vent pipe expansion bellows are provided in Figure 1 (Please note that the cover plates shown on the sketches were for the purposes of leak rate testing and were removed prior to installation). The movement of these bellows was previously analyzed as part of the Long Term Torus Integrity Program (Reference 8), which was performed in order to resolve Generic Technical Activity A-7 (NUREG-0661).

Projecting downward from the vent header are 96 downcomer pipes, 24 inches in diameter, and terminating approximately 3 feet below the water surface of the pool. Each BFN unit is equipped with 13 Main Steam Relief Valves (MSRVs). Each valve discharges into the torus through a perforated sparger called a T-quencher discharge device. Each T-quencher is made of 12-inch diameter schedule 80 stainless steel pipe and consists of two arms, which contain numerous perforations to allow the controlled discharge from the MSRVs to the suppression chamber. Figure 2 provides a cross-section of the suppression chamber and shows the relative locations of these components.

The T-quenchers are normally submerged in the suppression chamber. The other coated stainless steel components inside the suppression chamber (i.e., the bellows of the main vent, catwalk support plates, conduits, junction boxes, small piping, valve bodies, and miscellaneous other small components) are all located above the normal suppression pool water level.

A 30-inch diameter ECCS suction header circumscribes the suppression chamber. Four 30-inch diameter tees are used to connect the suction header to the suppression chamber. Four strainers (approximately ⅛ inch mesh) on connecting lines between the suction header and the suppression chamber have been provided. Each of the four suction strainers has a surface area of just slightly over 10 square feet. The suction lines from the Residual Heat Removal (RHR), High Pressure Coolant Injection (HPCI), Core Spray (CS) and Reactor Core Isolation Cooling (RCIC) systems are supplied from this header.

III. EVALUATION OF COATING ON STAINLESS STEEL COMPONENTS INSIDE THE SUPPRESSION CHAMBER

Prior to the Unit 2 Cycle 7 refueling outage, divers "practiced" removing the coating underwater on the Unit 1 T-quenchers. The coating was found to be easily removed using a roto-peening device. However, during the Unit 2 Cycle 7 refueling outage, the coating on the Unit 2 T-quenchers proved to be highly resistant to removal using this technique and it was determined that continuing to remove the coating using the roto-peening device was impractical. Hydro-lazing was then attempted. Hydro-lazing of the T-quenchers at 10,000 psi did not remove the coating and this method was only moderately successful at pressures up to 30,000 psi. The hydro-lazing reduced the coating on the Unit 2 T-quencher to powder, which does not pose a threat to suction strainer blockage or to the ECCS equipment downstream of the strainers. Divers, who were Level II and III qualified coating inspectors, observed a good surface profile (estimated to exceed 1½ mils) after T-quencher hydro-lazing. Desludging of the suppression chamber was performed after the hydro-lazing to maximize the as-left cleanliness of the suppression chamber.

The total surface area of the T-quenchers is approximately 730 ft^2. During the Unit 2 Cycle 7 refueling outage, approximately 70 ft^2 of coating was removed from the T-quenchers. TVA has estimated that the other stainless steel components inside the suppression chamber are also covered with approximately 1,500 ft^2 of Valspar 78.

In order to evaluate the acceptability of withdrawing the commitment for the removal of the remaining coating on the Unit 2 T-quenchers and leaving the coating on the other stainless steel components inside the suppression chamber, TVA reviewed the BFN design basis accidents, which are described in Section 14.6 of the Updated Final Safety Analysis Report (UFSAR). The most severe design basis accident which could challenge the coating on the T-quenchers and requires the use of the ECCS suction through the strainers is an intermediate break LOCA. The most severe design basis accident which could challenge the coating on the other stainless steel components inside the suppression chamber and requires the use of the ECCS suction through the strainers is a large break LOCA (rupture of one recirculation loop). Since different mechanisms from different design basis accidents or transients could challenge the coating on different stainless steel components, the following limiting cases were evaluated:

1. The coating on the T-quenchers could be challenged by the steam from the main steam relief valves being released through the holes in the T-quenchers. The turbulence from the steam exiting the holes could induce stripping or the steam could cause degradation due to temperature transients.

2. The coating on the bellows of the main vent could be challenged by the pressure and temperature of the drywell and vent system, which rapidly increases immediately following a large break LOCA. Mechanical, thermal, seismic, and hydrodynamic loads are subsequently induced on, and dampened by, the bellows of the main vent. The resultant mechanical flexing of the bellows could challenge the coating.

All of the coating on stainless steel components inside the suppression chamber could be challenged by the following mechanisms:

3. Adhesion degradation due to post-accident or transient increases in radiation exposure, temperature and pressure extremes, and

4. Stripping due to the force of the blowdown from the drywell.

Each of these mechanisms is discussed in greater detail below:

1. Main Steam Relief Valve Stripping Force and Temperature Induced Degradation of the T-Quencher Coating

    A. Main Steam Relief Valve Stripping Force

    A 100 percent reactor power Anticipated Transient Without Scram (ATWS) or a 10 CFR 50, Appendix R fire, which involved the closure of the MSIVs, would produce the greatest blowdown forces and involve the largest number of T-quenchers for this type of event. Prior to the actuation of the MSRVs, the discharge line contains air at atmospheric pressure and suppression chamber water in the submerged portion of the piping and the T-quenchers. Following a valve actuation, steam enters the MSRV discharge line, compressing the air and expelling the water through the T-quenchers and into the suppression chamber. After the water clears, the compressed air and steam enter the pool in the form of high pressure bubbles. Pressure oscillation and pool water movement causes substantial localized turbulence around the holes of the T-quenchers.

    As previously discussed, the Unit 1 T-quenchers showed disbonding in the area around the holes. TVA postulated that the coating in the area of the T-quencher holes on the Unit 1 T-quenchers was stripped from the stainless steel surface due to the force of the steam from MSRV lifts during operation. The resulting uneven edge allowed the steam and localized turbulence to get under the edge of the coating around the holes, causing further stripping of the surface of the T-quenchers around the holes.

The differences in adhesion characteristics between the coating on the Unit 1 and Unit 2 T-quenchers is attributed to the surface preparation (i.e., sandblasting) of the stainless steel on the Unit 2 T-quenchers prior to the re-application of the coating. The rougher surface on the Unit 2 T-quenchers provided a significantly greater surface area that permitted a greater degree of adhesion between the Valspar 78 coating and the stainless steel surface. The in-situ adhesion of the Valspar 78 to dry Unit 2 junction boxes and dry Unit 3 and underwater Unit 2 T-quenchers was evaluated by the performance of several adhesion tests. Each test showed adhesion of the coating between two and a half times and four times the post-design basis accident requirements. Comparable results were obtained from the testing of coated carbon steel components in the suppression chamber.

Hydro-lazing of the T-quenchers at 10,000 psi did not remove the coating. Hydro-lazing was only moderately successful at pressures up to 30,000 psi. The turbulence produced in the area of the T-quencher coating during an MSRV blowdown is similar to, but much less severe than, the effect of the hydro-lazing. Therefore, the adhesion of the T-quencher coating will not degrade due to the stripping force of the steam released from the MSRVs.

B. Temperature Effects

During a transient involving the lifting of the MSRVs, the T-quencher coating is exposed to temperature transients and extremes. Steam enters the MSRV discharge line and is discharged through the T-quenchers and into the suppression chamber. The temperature of the steam exiting the MSRVs is 562°F, which is above the post-design basis accident temperature of the suppression chamber.

The Unit 2 T-quencher coating has been exposed to the temperature extremes that would occur during a design basis accident and has not shown any degradation. During the last two Unit 2 operating cycles, two scrams lifted several of the MSRVs from full reactor power. In addition, during startup of each unit from each outage, Technical Specification Surveillance Requirement 4.6.D.2 requires that each MSRV be manually opened. This occurs at 250 ± 10 psig and approximately 400°F, which is less severe than the lifting of the MSRVs during a design basis accident.

The coating on the T-quenchers has been exposed to, and shown no degradation from, the temperature extremes that would occur during a design basis accident. Therefore, the adhesion of the T-quencher coating will not significantly degrade due to temperature transients.

2. Mechanical Flexing of the Bellows of the Main Vent

As previously discussed, the movement of these bellows during a design basis accident large break LOCA scenario was analyzed. The dynamic and static stresses were determined not to be significant. Fatigue life was the dominant concern. A fatigue evaluation showed thermal stresses to be the most significant. The combined axial displacement of the bellows and the suppression chamber was calculated to be 1.16 inches and the combined lateral displacement was 0.48 inches. The deflection of the bellows due to these analyzed thermal stresses is concentrated on the twelve "peaks" and eight "valleys" of the bellows. The maximum deflections are distributed equally across the entire surface area of all the peaks and valleys by the rounded shape of the bellows. The maximum movement at any of these peaks and valleys is well within the flexural resistance of the coating.

TVA has determined, based on engineering judgement, that when this type of epoxy coating is exposed to flexural stresses, the typical failure mode is cracking of the coating to the extent necessary to relieve the stresses. Should disbonding develop, it typically occurs only at the cracks. The coating that disbonds at the cracks is typically in the form of very small flakes (less than ⅛" diameter) and powder-like particles, which do not pose a threat to suction strainer blockage or to the ECCS equipment downstream of the strainers.

3. Challenges to Adhesion

The adhesion of the coating on the stainless steel components within the suppression chamber could be challenged by post-accident or transient increases in radiation exposure, temperature and pressure extremes. The in-situ adhesion of the Valspar 78 to dry Unit 2 junction boxes and dry Unit 3 and underwater Unit 2 T-quenchers was demonstrated by performing several adhesion tests. Each test showed adhesion of the coating between two and a half times and four times the post-design basis accident requirements. Comparable results were obtained from the testing of coated carbon steel components in the suppression chamber.

The post-design basis accident radiation environment both above and below the surface of the suppression pool water level is 2.8×10^7 Rads. Valspar 78 has been qualified for carbon steel applications up to 1×10^9 Rads. Radiation effects on the adhesion properties between Valspar 78 on carbon steel are not expected to be different from the adhesion properties between Valspar 78 and the sandblasted surface of the stainless steel components.

Similarly, the post-design basis accident temperature and pressure both above and below the surface of the suppression pool water level is 180°F and 28.5 psig. Valspar 78 has been qualified for carbon steel applications at temperatures up to 340°F and pressures up to 70 psig. As previously discussed, the coating on the Unit 2 T-quenchers has been exposed to temperature transients in excess of the post-design basis accident temperature inside the suppression chamber and has shown no evidence of degradation.

Therefore, post-design basis accident radiation, pressure and temperature effects on the adhesion properties between Valspar 78 on carbon steel are not expected to be different from the adhesion properties between Valspar 78 and a sandblasted stainless steel surface.

4. Drywell Blowdown Force

During the large break LOCA scenario, water, air and steam are released from the drywell atmosphere. The resulting primary containment pressure response is shown in Figure 3. The peak drywell pressure of approximately 50 psig forces the water, air and steam through the 96 downcomers to the suppression chamber water. The downcomers are over 6 feet away, and offset from, the submerged T-quenchers. The bellows of the main vent, catwalk support plates, conduits, junction boxes, small piping, valve bodies, and miscellaneous other small components are all located above the normal suppression pool water level and would only experience occasional and short-lived dousing by pool swell.

The suppression chamber pressure builds gradually to a peak of approximately 28 psig. The downward force on the T-quencher coating from the blowdown force and the subsequent turbulence around the T-quenchers due to the hydro-dynamic effects of the blowdown are significantly less severe than the forces produced during the MSRV blowdown, which was previously discussed. The occasional and short-lived dousing by pool swell on the other coated stainless steel components are also expected to be less severe than the forces produced on the T-quenchers during the MSRV blowdown.

Therefore, the adhesion of the coating on the stainless steel components inside the suppression chamber will not significantly degrade from the stripping action of the drywell blowdown force.

IV. CONCLUSION

TVA fully understands the importance to plant safety of the ECCS suction strainer blockage issue. The coating applied to the stainless steel components inside the suppression chamber is Valspar 78, which is qualified for design basis accident conditions when applied to carbon steel surfaces. The stainless steel components were surface prepared and coated by qualified individuals using procedures for the application of this coating on carbon steel.

TVA has reviewed the physical and environmental challenges to the coatings on stainless steel components inside the suppression chamber from design basis accidents, transients, and other events. Based on the qualification of the Valspar 78 coating, the controlled surface preparation and application of the coating on the stainless steel components by qualified individuals, the in-place adhesion testing of the coating, and the degree of resiliency exhibited by the coating to different removal methods, TVA has concluded that Valspar 78 will behave the same on stainless steel as it will on carbon steel when applied properly. Therefore, no disbonding of the coating is expected during design basis accident conditions. However, if disbonding did occur, it would produce a fine powder, similar to the effect produced by hydro-lazing, which does not pose a threat to suction strainer blockage or to the ECCS equipment downstream of the strainers. Therefore, TVA has updated its uncontrolled coating log to list the quantity of Valspar 78 coating on the stainless steel components as being unqualified but not contributing to ECCS suction strainer blockage.

TVA will pursue the qualification of the Valspar 78 coating system on stainless steel components prior to the end of the next operating cycle (Unit 2 Cycle 8). Based on the above, TVA withdraws the commitment to remove the coating from the Unit 2 T-quenchers. In addition, this letter satisfies the commitment to ensure that other similar unanalyzed conditions do not exist on Unit 2.

V. REFERENCES

1. TVA letter to NRC, dated October 24, 1988, Browns Ferry Nuclear Plant (BFN) - Nuclear Performance Plan, Revision 2
2. TVA letter to NRC, dated October 4, 1989, Containment Coatings
3. TVA letter to NRC, dated July 10, 1991, Regulatory Framework for the Restart of Units 1 and 3
4. NRC letter to TVA, dated January 23, 1991, NUREG-1232, Volume 3, Supplement 2 - Browns Ferry, Unit 2
5. NRC letter to TVA, dated June 6, 1994, Notice of Violation (NRC Inspection Report Nos. 50-259/94-09, 50-260/94-09, and 50-296/94-09)
6. NRC letter to TVA, dated June 23, 1994, Notice of Violation (NRC Inspection Report No. 50-260/94-09)
7. TVA letter to NRC, dated July 17, 1994, Reply to Notice of Violation (NOV) Regarding Inappropriate T-Quencher Coating (NRC Inspection Report 50-260/94-09)
8. TVA letter to NRC, dated January 25, 1985, in regards to the Browns Ferry Torus Integrity Long-Term Program Plant Unique Analysis Report

FIGURE 1
DRYWELL VENT PIPE EXPANSION BELLOWS

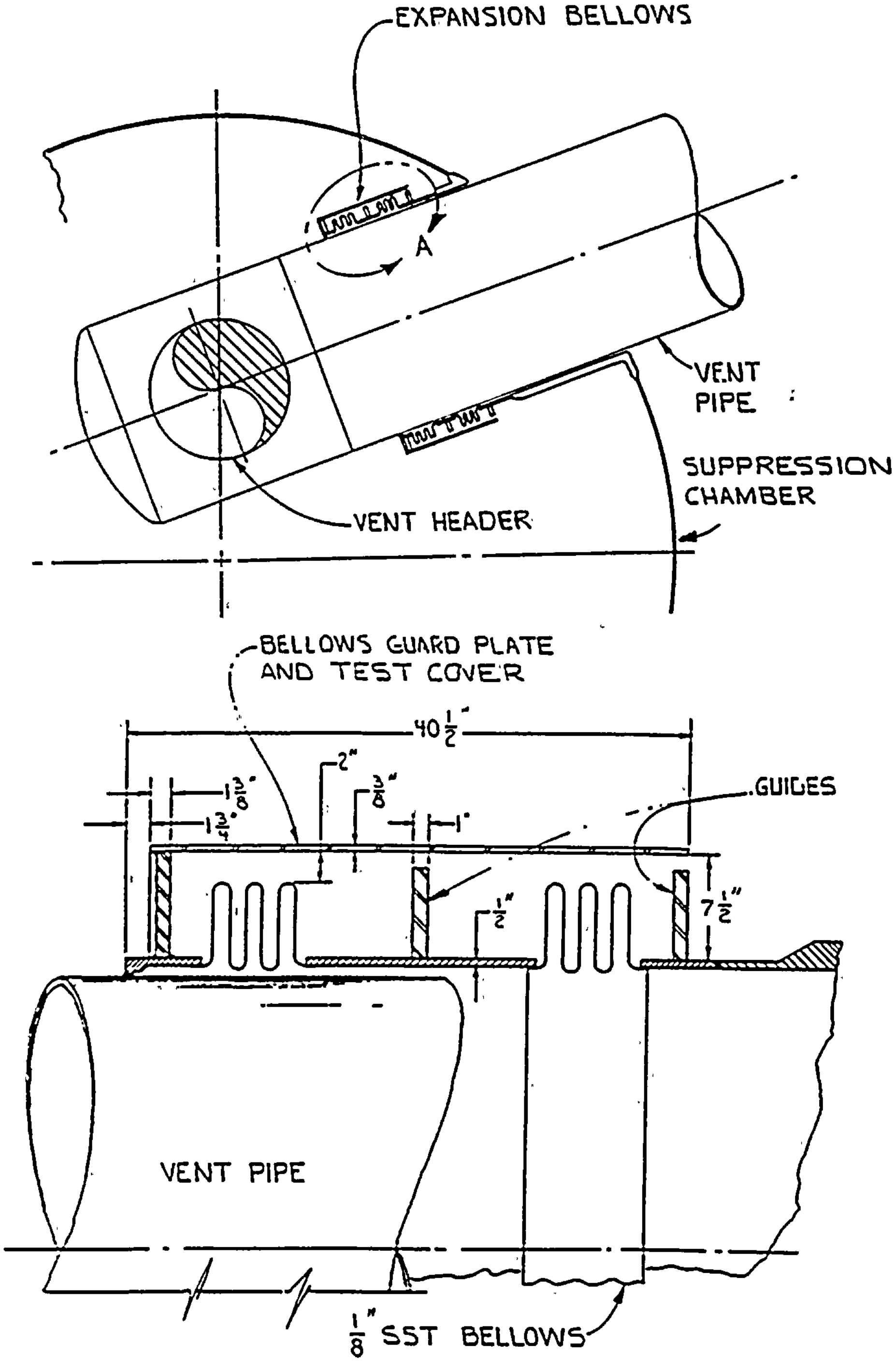


FIGURE 2
CROSS-SECTION OF THE SUPPRESSION CHAMBER

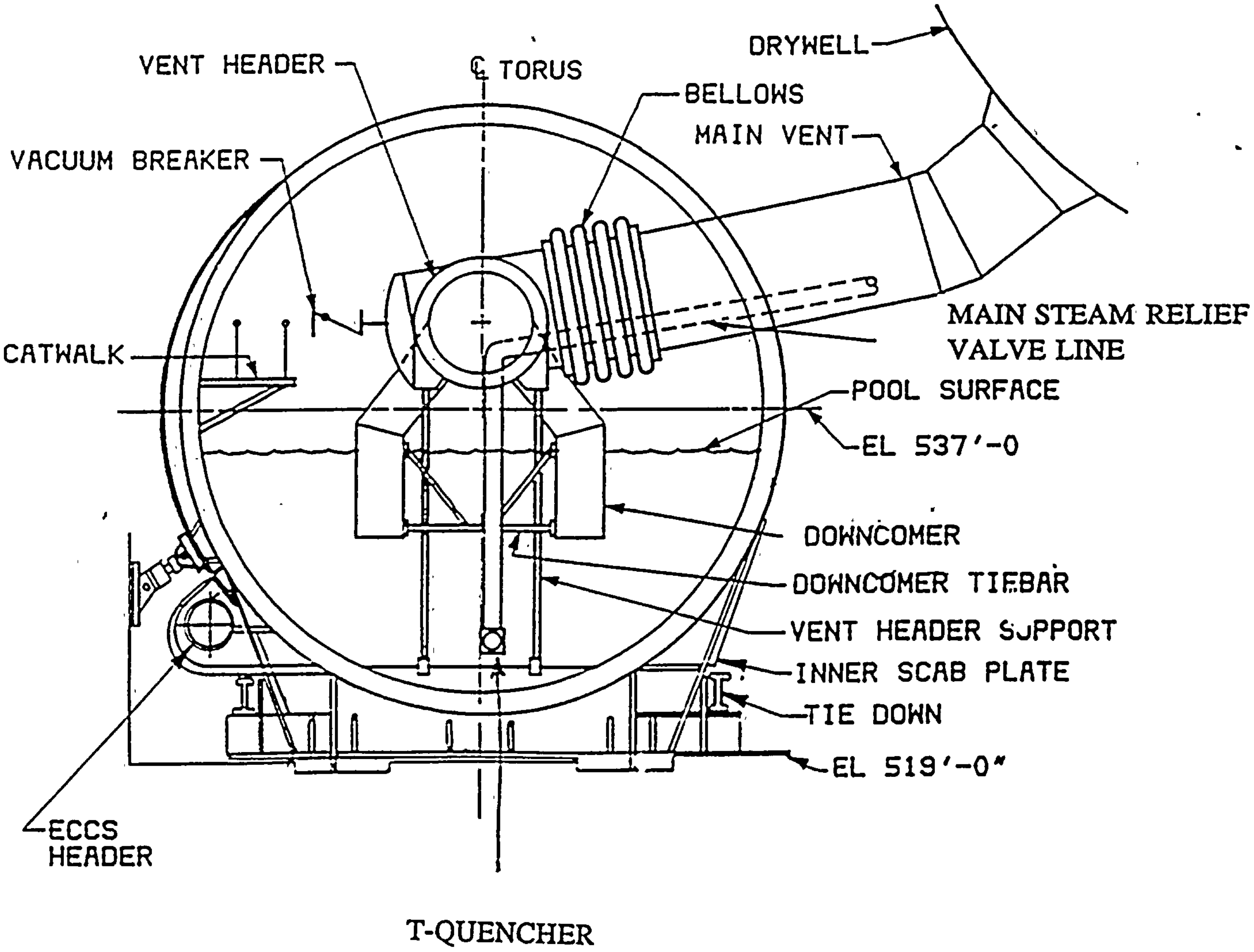
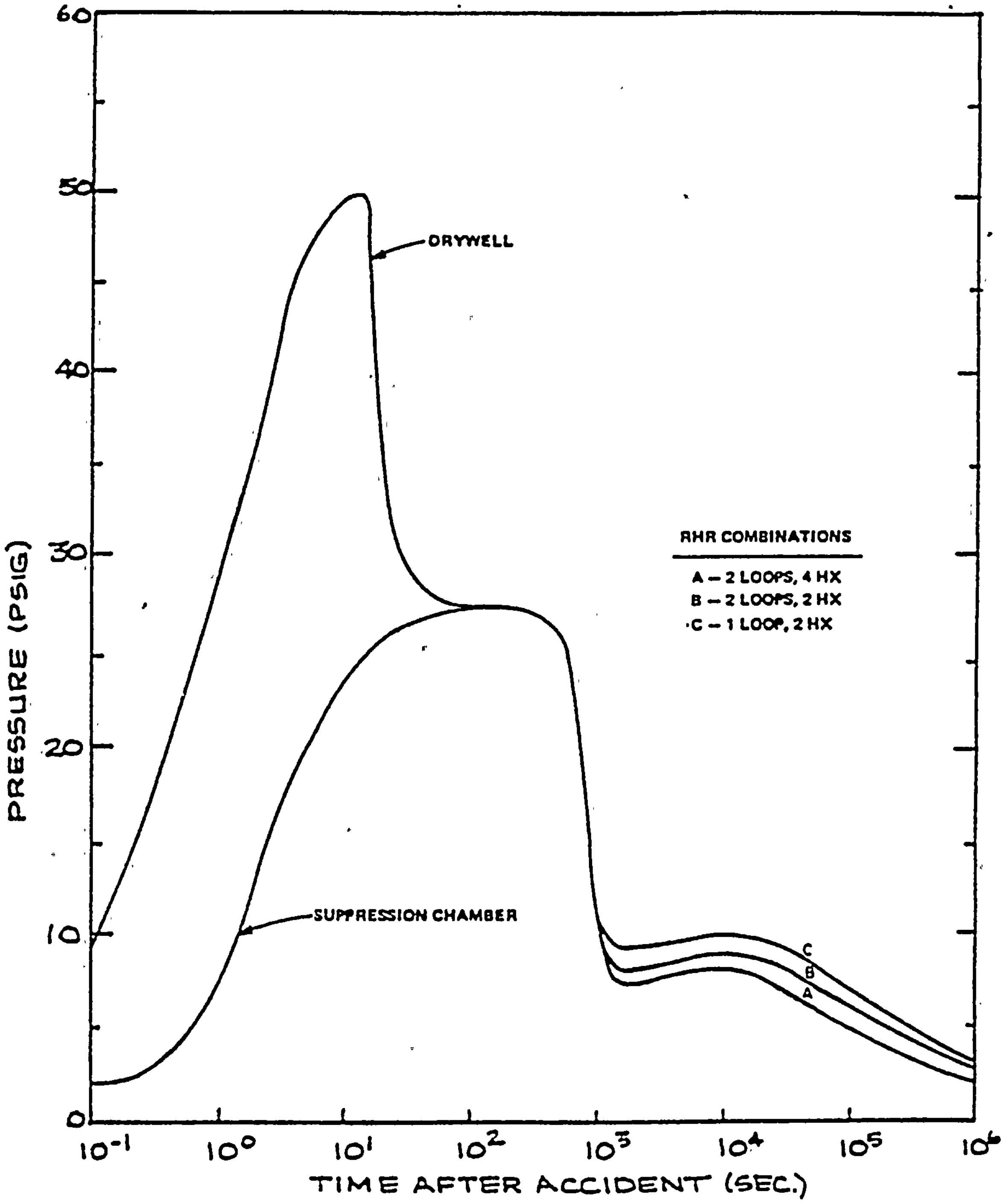


FIGURE 3
PRIMARY CONTAINMENT PRESSURE RESPONSE AFTER A LOSS OF COOLANT ACCIDENT



ENCLOSURE 2
TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 2

SUMMARY OF COMMITMENT

TVA will pursue the qualification of the Valspar 78 coating system on stainless steel components prior to the end of the next operating cycle (Unit 2 Cycle 8).