

TENNESSEE VALLEY AUTHORITY

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DEC 07 1990

U.S. Nuclear Regulatory Commission  
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Gentlemen:

In the Matter of )  
Tennessee Valley Authority )

Docket No. 50-328

SEQUOYAH NUCLEAR PLANT (SQN) - UNIT 2 FINDINGS IN RESPONSE TO NRC BULLETIN NO. 89-02 - STRESS CORROSION CRACKING OF HIGH-HARDNESS TYPE 410 STAINLESS STEEL INTERNAL PRELOADED BOLTING IN ANCHOR DARLING MODEL S350W SWING CHECK VALVES OR VALVES OF SIMILAR DESIGN

- References:
1. NRC Bulletin No. 89-02 dated July 19, 1989, "Stress Corrosion Cracking of High-Hardness Type 410 Stainless Steel Internal Preloaded Bolting in Anchor Darling Model S350W Swing Check Valves or Valves of Similar Design"
  2. TVA letter to NRC dated June 13, 1990, "Sequoyah Nuclear Plant (SQN) Unit 1 - Findings In Response to NRC Bulletin No. 89-02 - Stress Corrosion Cracking Of High-Hardness Type 410 Stainless Steel Internal Preloaded Bolting In Anchor Darling Model S350W Swing Check Valves Or Valves of Similar Design"

By Reference 2, TVA submitted the response to NRC Bulletin 89-02 for SQN. Reference 2 contained TVA's evaluation of SQN's safety-related check valves for Type 410 stainless steel internal bolting. A total of twelve valves on each unit were identified. Ten valves were Anchor Darling Model S350W swing check valves located in SQN's safety injection system, and two valves were Crane-Alloyco Model 8C54 swing check valves located in SQN's residual heat removal system. Findings from the Unit 1 inspection and bolt changeout that took place during the Unit 1 Cycle 4 refueling outage (April 1990) were provided in Enclosure 1 of Reference 2. This letter provides the results of the findings on SQN Unit 2.

Twelve SQN Unit 2 valves were disassembled and visually examined during the Unit 2 Cycle 4 refueling outage (September - November 1990). Visual examination revealed that one Anchor Darling valve (63-640) had a broken retaining block stud. One Crane-Alloyco valve (74-514) experienced stud failure during removal. No broken studs or bolts were encountered on the remaining Unit 2 valves. The internal bolting material for the ten Unit 2 Anchor Darling valves was replaced with American Society of Testing Material (ASTM) A564-630-1150 stud material. The stud material for the two Unit 2 Crane-Alloyco valves was replaced with American Society of Mechanical Engineer (ASME) SA193 Grade B6 having a correlated Rockwell hardness (R<sub>c</sub>) below the maximum R<sub>c</sub> 26 value recommended by the subject bulletin.

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The enclosure contains a list of SQN's Unit 2 valves that are applicable to the subject bulletin and a description of the programmatic controls now in place at SQN to preclude the use of valves susceptible to stress corrosion cracking within the Anchor Darling valve.

This letter provides confirmation to NRC that all actions required by Bulletin 89-02 are now complete for SQN.

Please direct questions concerning this issue to Don V. Goodin at (615) 843-7734.

Very truly yours,

TENNESSEE VALLEY AUTHORITY



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Enclosure

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## ENCLOSURE

### I. Anchor Darling Valves

TVA conducted a review of SQN's check valve maintenance program database to identify Anchor Darling Model S350W swing check valves with internal bolting. From this review, ten valves per unit were identified. These valves are located in SQN's safety injection system and are listed below.

<u>Valve Identifier</u>	<u>Size (Inches)</u>	<u>Description</u>
2-VLV-63-561	10	Loop 2 CLSI <sup>1</sup>
2-VLV-63-623	10	Accumulator 2 CLSI
2-VLV-63-560	10	Loop 1 CLS.
2-VLV-63-622	10	Accumulator 1 CLSI
2-VLV-63-562	10	Loop 3 CLSI
2-VLV-63-624	10	Accumulator 3 CLSI
2-VLV-63-563	10	Loop 4 CLSI
2-VLV-63-625	10	Accumulator 4 CLSI
2-VLV-63-640	8	Loop 1 HLSI <sup>2</sup>
2-VLV-63-643	8	Loop 3 HLSI

<sup>1</sup>CLSI - Cold leg safety injection

<sup>2</sup>HLSI - Hot leg safety injection

The Unit 1 valve list is identical to the Unit 2 valve list with the exception of the unit prefix associated with the valve identifier.

### II. Other Safety-Related Check Valves of Similar Design

TVA conducted a review of SQN's vendor drawings to identify other safety-related valves similar in design to the Anchor Darling Model S350W valves. From this review, two valves per unit were identified. These valves are manufactured by Crane-Alloyco and are located in SQN's residual heat removal (RHR) system. These valves are listed below.

<u>Valve Identifier</u>	<u>Size (Inches)</u>	<u>Description</u>
2-VLV-74-514	8	RHR Pump 2A-A Discharge
2-VLV-74-515	8	RHR Pump 2B-B Discharge

The Unit 1 valve list is identical to the Unit 2 list above with the exception of the unit prefix associated with the valve identifier and RHR pump designation.

### III. SQN Action - Unit 2

Inspection and changeout of the internal bolting on the ten Anchor Darling swing check valves were accomplished under SQN Design Change Notice (DCN) 1519. This work activity occurred during the Unit 2 Cycle 4 refueling outage (October 1990). Visual examination revealed that one Anchor Darling valve (63-640) had a broken retaining block stud. No broken studs or bolts were encountered on the remaining Unit 2 Anchor Darling valves.

The internal bolting material was replaced with American Society of Testing Material (ASTM) A564-630-1150, which is a Type 17-4PH stainless steel. To provide programmatic control, vendor drawings for the Anchor Darling valves have been revised to specify ASTM A564-630-1150 material for future stud replacement.

Inspection and changeout of the internal bolting on the two Crane-Alloyco check valves were accomplished under Work Requests (WRs) B268183 and B268184. This work activity also occurred during the Unit 2 Cycle 4 refueling outage. One Crane-Alloyco valve (74-514) experienced stud failure during removal. No broken studs or bolts were encountered on the second valve (74-515). The internal bolting material was replaced with American Society of Mechanical Engineer (ASME) SA193 Grade B6 with proper heat treatment. The material test report provided by the bolt manufacturer indicated that the replacement bolts were tempered at 1100 degrees Fahrenheit for 3 hours and had a tensile strength of 115,000 pounds per square inch. This correlates to a Rockwell hardness (R<sub>c</sub>) value between R<sub>c</sub>22 and R<sub>c</sub>23 (below the maximum R<sub>c</sub>26 value recommended by Bulletin 89-02). The bolt material procurement process for this material was revised to include an evaluation of maximum allowable tensile strength during receipt inspection. Because properly heat-treated SA193 Grade B6 has a low probability for stress corrosion cracking in a borated water environment, TVA considers this material to be a suitable replacement for these valves.