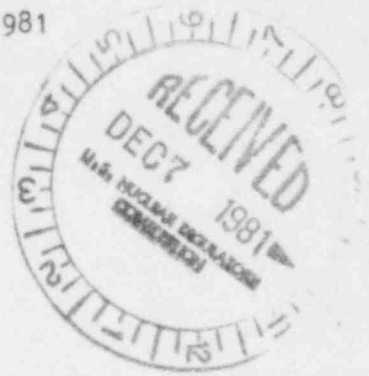
TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

December 1, 1981



Director of Nuclear Reactor Regulation
Attention: Ms. E. Adensam, Chief
Licensing Branch No. 4
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Dear Ms. Adensam:

In the Matter of the	)	Docket Nos. 50-327
Tennessee Valley Authority	)	50-328

Enclosed is our response for Sequoyah Nuclear Plant to D. G. Eisenhut's May 5, 1981 letter to All Licensees of Operating Pressurized Water Nuclear Power Reactors and Applicants for Operating Licenses regarding natural circulation cooldown (generic letter 81-21). Pursuant to your 10 CFR 50.54(f) request, and based on the enclosed response, we believe that continued operation of our Sequoyah Nuclear Plant is justified and the operating license should not be modified, suspended, or revoked.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager
Nuclear Regulation and Safety

Sworn to and subscribed before me
this 1st day of December 1981.

Paulette H. White
Notary Public

My Commission Expires 9-5-84

Enclosure

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ENCLOSURE

RESPONSE TO D. G. EISENHUT'S MAY 5, 1981 LETTER
TO ALL LICENSEES OF OPERATING PWR'S

NATURAL CIRCULATION COOLDOWN

SEQUOYAH NUCLEAR PLANT

In response to the subject letter (generic letter 81-21), we have reviewed the current plant operations and have implemented new or additional training and/or procedures to avoid or mitigate voiding in the reactor vessel head during natural circulation cooldown. As requested, our assessment included the three areas identified in the May 5, 1981 letter. The result of our assessment is provided in the following paragraphs and corresponds to the three topics listed on page 3 of the subject letter.

Item 1

Before issuance of generic letter 81-21, a series of low power natural circulation tests were conducted at Sequoyah unit 1 as part of the startup test program. During this testing, it was demonstrated that the unit could be shutdown safely in the natural circulation mode and cooled down to 450°F without void formation.

In addition, following the issuance of generic letter 81-21, the Westinghouse Owners' Group commissioned Westinghouse Electric Corporation to provide an analysis of this issue. The WFLASH code was used in the analysis. WFLASH permits a detailed spatial representation of the primary system with the system nodalized into volumes interconnected by flow paths. The transient behavior of the system is determined from conservation equations of mass, energy, and momentum applied throughout the system. The WFLASH code has two-phase capability and can track void propagation if it ocurrs.

A 4-loop plant with a core thermal power of 3411 MW is used. Since the analysis is not a design basis analysis, the transient response of the primary system is based upon the conditions more likely to occur during the event; i.e., a best estimate model is employed.

The analysis for a T_{cold} plant like Sequoyah shows that formation of a steam bubble in the upper head area is avoided when cooling down at 50°F/h because the primary system pressure is shown to remain above the upper head saturation pressure if the hot leg is maintained 100°F subcooled.

No credit is taken in the WFLASH code for the heat removal capability of the control rod drive mechanism (CRDM) fans. Further analysis by Westinghouse determined that if the CRDM fans were operable, the plant could be cooled down at a rate of 50°F/h with a subcooling margin of 50°F without void formation.

Item 2

The condensate-grade auxiliary feedwater is the preferred source of cooling water to the steam generator. The minimum reserved volume of the condensate storage tank (CST) described in Chapter 10 of the FSAR and required in technical specifications is based on reaching the RHR cut-in (350°F) within six hours after reactor trip. Because the Westinghouse natural circulation cooldown analysis allows a T_{cold} plant to cooldown at 50°F/h, Sequoyah will be able to remain at hot standby (547°F) for two hours before beginning cooldown and still meet the FSAR assumptions.

Additionally, the ERCW system is provided as the alternate source of cooling water. The ERCW is designed to deliver an essentially unlimited volume of cooling water at sufficient flow rates to the auxiliary feedwater (AFW) system, such that the AFW system can remove residual heat over the entire range of reactor operation and cool the plant to the RHR cut-in.

For these reasons, we conclude that Sequoyah may be cooled down safely in the natural circulation mode.

Item 3

Sequoyah's licensed operators have had training on natural circulation during the special startup test program, reactor operator certification training program, senior reactor operator certification program, prelicense training program, licensed operator retraining programs, and group training. The training programs include review of all IE Bulletins and Power Reactor Event reports dealing with natural circulation and reactor vessel voiding (i.e., St. Lucie Plant, Crystal River, and McGuire Nuclear Station events). As a part of this review, the Sequoyah simulator is used to demonstrate natural circulation and discussions are conducted relative to difference in temperature of the reactor coolant system (RCS) in the loops and the vessel head area. In addition, the proper selection of RCS temperature detection instrument channels is discussed (i.e., use of wide-range loop resistance thermal detectors (RTD's) and core exit thermocouples as opposed to RTD manifolds).

The provisions of our procedures include the selection of the highest temperature for considering RCS pressure reduction, monitoring the vessel head temperature by way of core exit thermocouples, cautions relative to rapid insurges to the pressurizer during RCS pressure reduction operations, and how to terminate the insurge.

The revised procedures will include the Westinghouse Owners' Group guidelines on cooldown rate, subcooling margin, and use of control rod drive mechanism coolers to minimize temperature differences between the RCS loops and the vessel head area.