UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

April 29, 1992

Docket Nos. 50-327
and 50-328

Tennessee Valley Authority
ATTN: Dr. Mark O. Medford, Vice President
Nuclear Assurance, Licensing & Fuels
3B Lookout Place
1101 Market Street
Chattanooga, Tennessee 37402-2801

Dear Dr. Medford:

SUBJECT: PLANT VISIT TO GATHER INFORMATION CONCERNING GENERIC ISSUE 143, "AVAILABILITY OF CHILLED WATER SYSTEM AND ROOM COOLING," SEQUOYAH NUCLEAR PLANT

The purpose of this letter is to confirm a visit to the Sequoyah Nuclear Plant by NRC personnel from the Reactor and Plant Safety Issues Branch, Division of Safety Issues Resolution, Office of Research (RES) on May 27-28, 1992. The visit was discussed with Mr. James D. Smith of your office on April 17, 1992. The RES personnel will be assisted by contractor personnel from Pacific Northwest Laboratory (PNL). The team will consist of the following personnel:

Dr. Gerald Mazetis - RES, Section Leader
Mr. Vincent Leung - RES, Lead Task Manager
Mr. Philip Daling - PNL
Mr. John Friley - PNL

The purpose of the site visit is to gather information related to the subject Generic Issue, as discussed in the Enclosure. It is expected that for most of the information, it will be sufficient for a site representative to simply provide environmental qualification information, Appendix R information, system flow diagrams, and operating procedures. A brief escorted tour of the appropriate auxiliary building rooms may be necessary to gather room layout

Tennessee Valley Authority
ATTN: Dr. Mark O. Medford

cc:
Mr. John B. Waters Director
Tennessee Valley Authority
ET 12A
400 West Summit Hill Drive
Knoxville, Tennessee 37902

Mr. J. R. Bynum, Vice President
Nuclear Operations
3B Lookout Place
1101 Market Street
Chattanooga, Tennessee 37402-2801

Mr. M. J. Burzynski, Manager
Nuclear Licensing and Regulatory Affairs
Tennessee Valley Authority
5B Lookout Place
Chattanooga, Tennessee 37402-2801

Mr. Jack Wilson, Vice President
Sequoyah Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Soddy Daisy, Tennessee 37379

TVA Representative
Tennessee Valley Authority
11921 Rockville Pike
Suite 402
Rockville, Maryland 20852

Ms. Marci Cooper, Site Licensing Manager
Sequoyah Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Soddy Daisy, Tennessee 37379

Mr. Michael H. Mobley, Director
Division of Radiological Health
T.E.R.R.A. Building 6th Floor
150 9th Avenue North
Nashville, Tennessee 37219 5404

General Counsel
Tennessee Valley Authority
ET 11H
2400 West Summit Hill Drive
Knoxville Tennessee 37902

County Judge
Hamilton County Courthouse
Chattanooga, Tennessee 37402

Regional Administrator
U.S.N.R.C. Region II
101 Marietta Street, N.W.
Atlanta, Georgia 30323

Mr. William E. Holland
Senior Resident Inspector
Sequoyah Nuclear Plant
U.S.N.R.C.
2600 Igou Ferry Road
Soddy Daisy, Tennessee 37379

Enclosure

TASK ACTION DESCRIPTION

GENERIC ISSUE 143

AVAILABILITY OF CHILLED WATER SYSTEMS AND ROOM COOLING

Background

This issue is concerned with the availability of the cooling service provided by the Heating, Ventilation, and Air Conditioning (HVAC) System, chilled water system and related auxiliaries to control high temperatures in rooms with safety-related equipment. The design of these systems and service requirements vary widely between plants. In some plants, the HVAC and chilled water system serves to maintain a suitable environment for both safety and non-safety related areas. Because corrective measures are often taken once potential cooling system failures are identified, the effect of these potential failures on the operability of the safety system or components has not been reflected in many plant-specific Probabilistic Risk Assessments (PRAs). Consequently, chilled water system vulnerabilities in such PRAs may not be considered to have significant impact on plant safety. An example is one of the PWR plants analyzed in NUREG-1150. Before this PRA was completed, improvements by the licensee to here-to-fore non-existent testing of the cooling systems resulted in credit for significant risk reduction prior to completion of the NUREG-1150 program. Such an improvement cannot be assumed to exist for the rest of the plants.

Precursor events have shown that failure of the chilled water system and room cooling could have significant impact in reactor safety. During a June 27, 1986 Advisory Committee on Reactor Safeguards (ACRS) meeting, representatives of the NRC staff reported that failures of the cooling system for areas housing safety-related components in certain nuclear power plants (such as RHR pumps, switch-gear and diesel generators) would contribute significantly to the estimated core damage frequency.

Safety Significance

In recent years, several nuclear power plants have experienced problems resulting from a partial or total loss of HVAC. Operability of some safety related components is dependent upon operation of HVAC and chilled water systems to remove heat from the rooms containing the components. If cooling is unavailable to remove the heat generated, the ability of the safety equipment within the room(s) to operate as intended cannot be assured Some typical components or areas in the nuclear power plant that could be affected by the failure of cooling from HVAC or chilled water systems include (1) emergency switch gear and battery room, (2) emergency diesel generator room, and (3) pump rooms for various safety systems. The unavailability of such safety-related equipment could cause the core damage frequency to increase significantly.

Because corrective measures are often taken once the cooling system failures are identified, the impact of these failures on the proper functioning of the safety-related components has not been reflected in the final PRAs issued for the particular plants. As a result, some members of the NRC staff and some licensees whose plants have similar deficiencies may not be aware of these problems.

Some data presented in the past PRA studies on the contribution to core damage frequency due to chilled water system failures (without credit for either testing or operator recovery) varied from 3.0E-04/RY to 2.0E-02/RY. Based on these data, the ACRS recommended that HVAC and chilled water system related problems should be examined and "take any corrective actions deemed necessary."

Objectives

The basic objective of Generic Issue 143 is to evaluate the present design and reliability of the HVAC and chilled water systems installed in the nuclear power plants and the consequences of the system's failure. Specific objectives are:

1. What areas or equipment are potentially vulnerable to loss of room cooling?

2. Examine the data base to estimate the system's failure frequency that leads to loss of heat removal capability from the areas containing safety related components.

3. Evaluate the data base to determine the vulnerabilities of safety related systems and components as a result of HVAC and chilled water system failure which are reflected in actual experience.

4. Calculate the Core Damage Frequency (CDF) and the risk due to the failure of HVAC and chilled water system.

5. Develop alternative resolutions of this issue and perform value/impact analysis.

6. Proposed recommended resolution of GI-143.

The scope of this issues does not include the effects of high temperature on personnel in control rooms and other safety or non-safety areas. This issue is also limited to the concerns of cooling and ventilating service provided by the HVAC and chilled water system and related auxiliaries and does not cover air cleaning or heating.

Purpose of Visit

Collect information needed to determine the temperature rises following loss of room cooling in rooms containing safety-related equipment and sensitivity of components to failures at high temperatures.

General Information Requirements

a) Thermal loads in rooms containing safety-related equipment from operation of the equipment and, in some rooms, from piping systems containing heated water.

b) Capabilities of the safety-related equipment to withstand relatively high temperatures.

c) Possible actions that could be taken to respond to losses of room cooling, including actions to restore or supplement cooling in these rooms.

Specific Information Needed

a) Room Cooler System Design and Operation: general flow diagram for room cooler system(s), including cooling water source (e.g., cooled directly by service water or plant includes intermediate chilled water cooling loop between service water system and room coolers), list of safety-related rooms requiring room cooling, and overall system flow rates and heat removal capacity(ies), operating procedures to cope with loss of room cooling.

b) Auxiliary Building Layout Information: description and dimensions of ECCS pump rooms, control room, electrical switchgear rooms, battery rooms, and diesel generator rooms; capacities of room coolers provided in these rooms; assessments of heat generation rates from equipment and piping systems contained in these rooms.

c) Vital Equipment Information: location and equipment qualification information (Appendix R and environmental qualification) on all ECCS equipment in rooms requiring room cooling, including: pumps, valves, electrical power supplies, control circuits, electrical cabinets, etc.

data. This information will be combined with similar data from other site visits, along with other data, to analyze the concern and determine if further industry-wide action on this issue is justified.

Sincerely,

Original signed by

David E. LaBarge, Senior Project Manager
Project Directorate II-4
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosure:
GI-143 Task Action Description

cc w/enclosure:
See next page

PDII-4/LA	PDII-4/PM	RES/RPSIB	PDII-4/D		
MSanders	DLaBarge	Gwiazetis	JFHebdon		
4/23/92	4/23/92	4/20/92	4/24/92		

DISTRIBUTION

Docket File	
NRC PDR	
Local PDR	
S. Varga	14-E-4
G. Lainas	14-H-3
F. Hebdon	
B. Wilson	RII
D. LaBarge	
M. Sanders	
OGC	15-B-18
ACRS (10)	
G. Mazetis	
SQN Rdg. File	
L. Reyes	RII