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

MAY 24 1982

MEMORANDUM FOR: Gus C. Lainas, Assistant Director for Safety Assessment, DL

FROM: L. S. Rubenstein, Assistant Director for Core & Plant Systems, DSI

SUBJECT: GENERIC RECOMMENDATIONS RESULTING FROM GINNA STEAM GENERATOR TUBE RUPTURE EVENT

In response to Mr. Denton's memo of May 3, 1982, the Core Performance Branch and the Auxiliary Systems Branch of the Division of Systems Integration have prepared the enclosed generic recommendations based on the review of the Ginna steam generator tube rupture event.

L. S. Rubenstein, Assistant Director
for Core & Plant Systems
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ENCLOSURE

Core Performance Branch

Generic Recommendations Based on Ginna
S.G. Tube Rupture Incident

3. Plant System Response:

3.2 Description of the nine phases of the event:

Recommendation:

The transient that resulted at Ginna should be carefully evaluated to ensure that no new aspects have occurred that are outside of the bounds of the analyses that are now reviewed (by RSB).

Reason:

The Ginna event is categorized into nine phases, i.e., steady state operation, tube rupture and initial depressurization, natural circulation and RCS repressurization, PORV operation, prolonged safety injection, I termination and leakage reduction, RC pump restart, leaking steam generator safety valve, and leak termination and cooldown. For these transient phases, automatic plant safety systems have been activated and manual operator actions have been taken. The scenerio and consequences of these actions provide data for staff understanding of the event and safety evaluation. The RSB should have the vendor or its technical consultant analyze these data to determine if there is any new aspects that are outside the bounds of safety analyses currently required and reviewed by the RSB.

3.3 System Description:

Recommendations:

(1) All plants should be required to install a reactor vessel inventory tracking system capable of detecting steam bubbles in the primary system.

Reasons:

The primary system depressurization in the Ginna event resulted in steam formation in the relatively hot and stagnant areas of the reactor vessel upper head region and in the U-bend region of the tube bundle of the faulted steam generator. Steam bubbles or non-condensable gases in the primary coolant system can retard natural circulation as well as core cooling. Automatic safety injection was actuated to inject water into the reactor coolant system, increasing the water volume and system pressure. It appears that there was operator uncertainty concerning the appropriate time for termination of safety injection to minimize primary to secondary leakage. No signals were available (except for pressurizer level) to indicate when coolant inventory was being depleted and when it was being replenished. By installing a reactor vessel inventory tracking system, sufficient information could be provided to the operators regarding reactor coolant system inventory and bubble formation in the upper head region so that proper emergency procedures can be followed to restore normal coolant inventory.

Recommendation:

(2) All plants should be required to install a loose parts monitoring system (LPMS) conforming to Regulatory Guide 1.133. Sufficient sensors should be provided in acoustically coupled regions of the steam generator to assure adequate LPMS sensitivity for detection of loose parts in the secondary side.

Reason:

During Ginna post-event activity, a number of foreign objects have been found in the secondary side of the faulted steam generator. The largest object has the same appearance and metallic characteristics as part of the steam generator downcomer flow resistance orifice plate. This piece had been cut in pieces and reportedly removed during a steam generator modification in 1975. In addition some previously plugged tubes display evidence of gross mechanical damage, and at least two of these tubes are fractured and found skewed between the tube bundle and the steam generator shell. Some foreign objects have also been found in the A steam generator.

It is understood that the Ginna plant previously had a loose parts monitoring system which was later removed due to frequent false alarms which resulted in a loss of confidence in the LPMS by Ginna. If the LPMS had remained operable, the foreign objects might have been detected and removed and thus averted the tube rupture event.

Regulatory Guide 1.133 provides guidelines regarding the LPMS system sensitivity and operating procedures. If proper LPMS system calibration and alert level setting are performed by taking into

account the background noises, false alarms can be minimized. The accelerometer sensors located in a steam generator in conformance with the guidelines of the Regulatory Guide are capable of detecting loose parts in both the primary and secondary sides of the steam generator. A sufficient number of sensors placed on the acoustically coupled regions to provide broad coverage could increase the system sensitivity in detecting loose parts in the secondary side. We therefore recommend that all plants be required to installand operate LPMS in accordance with the provisions of Regulatory Guide 1.133.

Auxiliary Systems Branch

Generic Recommendations Based on the Ginna
Steam Generator Tube Rupture Incident

Plant System Response

(1) During the steam generator tube rupture event at Ginna, an automatic safety injection actuation signal was received following a reactor trip. The safety injection actuation initiated a containment isolation. During the course of the event, safety injection was reset after which the containment isolation was also reset in order to restore instrument air. The containment isolation, and subsequent reset of containment isolation and restoration of the instrument air system resulted in a letdown system valve alignment that would allow the letdown relief valve to lift, if pressurizer water level was above a low-level setpoint. The letdown relief valve relieves to the pressurizer relief tank. The letdown relief line was the major contributor to the inventory additions to the pressurizer relief tank which ruptured and released 1320 gallons of water to the containment sump.

The above sequence of events indicates that undesirable system response may result from containment isolation and subsequent reset and restoration of isolated systems. Thus, all plants should review and evaluate system alignments and responses resulting from reset of containment isolation and restoration of isolated systems such as instrument air, to assure proper system performance. Additionally, all plants should verify that the containment isolation system is consistent with the guidelines of Sections 6.2.4, "Containment Isolation System," of NUREG-0800.

Radiological Consequences

(1) During the course of events following the steam generator tube rupture event, the auxiliary building ventilation radiation monitors alarmed. These alarms resulted from the ventilation system drawing outside air into the building following releases from the steam generator safety valves. The radiation monitors are located in the exhaust duct of the auxiliary building ventilation system. The ventilation intake is located below the vent for the steam generator safety valves.

The arrangement of the ventilation system may subject operating personnel to the radiation released by the safety relief valves or atmospheric dump valves for the steam generator following a steam generator tube rupture. All plants should review the ventilation system intakes to determine the potential for drawing in outside air from areas around the safety relief valves or the atmospheric dump valves for the steam generator and propose modifications if needed.

TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401
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October 13, 1981

DOCKET NUMBER
PROPOSED RULE PR - Misc Notice
(Reg Guide)

Secretary of the Commision
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Attention: Docketing and Service Branch

Dear Sir:

In accordance with provisions for public review and comment indicated in the Federal Register on January 17, 1979, the Tennesse Valley Authority (TVA) is pleased to provide comments on regulatory guide:

Regulatory Guide 1.133
Revision 1

"Loose-Parts Detection Program for the Primary System of Light-Water-Cooled Reactors"

System Characteristics

1b. System Sensitivity

We believe system sensitivity should be defined with respect to normal power operating conditions (i.e., operating temperature and pressure with all reactor coolant pumps running). We suggest in lieu of this sensitivity should be defined in terms of percent over background since actual sensitivity varies as a function of changing background noise during heatup.

1e. Alert Level

We suggest alert level should be defined in terms of percent over background for use in sections 3.2.a and 3.2.e.

Secretary of the Commission October 13, 1981

Since the content and interpretation of regulatory guides have a large impact on TVA's extensive nuclear commitment, we welcome the opportunity for review and comment. TVA comments on additional regulatory guides will be forthcoming as a part of a continuing program.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

for L. M. Mills, Manager
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cc: Executive Secretary
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