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BETHESDA, MARYLAND 20889-5145

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United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC. 20555

Please find enclosed Licensee Event Report (LER) for a reported event that originally occurred 4 September 1992 which was investigated and verified on 9 September. Corrective action was completed on 25 September 1992. For information, the point of contact is the Reactor Facility Director, Mr. Mark Moore at 301-295-1290.

Sincerely,

C. R. Alley (acting)
for ROBERT L. BUMGARNER
Captain, MC, USN
Director

Enclosure:
Licensee Event Report for the AFRRI TRIGA Reactor Facility

Copy Furn:

United States Nuclear Regulatory Commission
Region 1
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King of Prussia, PA. 19406-1415
Attn: Mr Thomas Dragoun

United States Nuclear Regulatory Commission

Attn: Mr Marvin Mendonca, Mail Stop 11H10
Washington DC. 20555

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Licensee Event Report

for the

AFRRI TRIGA Reactor Facility

Prepared By:

Mr. Mark L. Moore
Mr. Robert George
Mr. Stephen Miller

Approved:

Mr. M. L. Moore
Reactor Facility Director

Approved for Release:

ROBERT L. BUMGARNER
Captain, MC, USN
Director

Abstract

A reactor operating anomaly was discovered in the AFRRI Triga reactor. The anomaly discovered allows the reactor to automatically pull a control rod out of the core in pulse mode. Accidental reoccurrence of this anomaly was prevented by an administrative order and the installation of a temporary additional switch into the pulse and square wave mode circuit. The switch was replaced by a permanent change of the software interlock system designed and programmed by the console manufacturer.

Narrative Description of Event

On 4 September 1992 during the daily startup checklist a reactor trainee discovered an operating anomaly on the console in which a rod would drive out of the core in pulse mode. With a shutdown core the trainee was asked to repeat the steps he had performed to cause the event to occur. The trainee then pressed the PULSE mode

button while pressing a rod drive UP button to show that the event was repeatable. The Senior Reactor Operator on console notified the Reactor Facility Director and demonstrated the situation to the RFD. The RFD directed the operator to call the supplier of the console for further information on the problem and to determine the parameters of the problem through cautious experimentation with the system.

During further testing it was discovered that rods would drive out of the core if the Square wave button was pressed while pressing a rod drive UP button. Also discovered was that the event does not occur if the AUTO button is pressed while pressing a rod drive UP button.

The Reactor Facility Director notified the NRC on 9 September 1992. The NRC Region One was notified telephonically as per NRC regulations and a call was received from the NRC Non-Power Reactor (NPR) staff at NRC Headquarters shortly thereafter. The telephone call was followed by a visit by from the Headquarters Non-Power Reactor Decomissioning and Environmental Project Directorate where the anomaly was demonstrated as well as the function of a temporary additional key switch to prevent accident reoccurrence.

Assessment of Safety Consequences

The event was discovered during a checkout mode. Each time the event was tested it occurred with a fully scrammed shutdown reactor. The shutdown margin with the most reactive control rod (Transient Rod) fully removed is $ 2.65. The transient rod was never removed during these tests. With the most reactive standard control rod removed by the anomaly the reactor would be safely shutdown by $ 4.03. The reactor is considered shutdown if it is subcritical by at least $ .50. The reactor power did not increase from source level during these tests and at no time did it approach critical.

This event would not normally occur when the reactor is preparing for a pulse. When the reactor is critical and an operator is preparing for a pulse, the operator would not be raising a control rod while entering pulse mode. Doing so would change the computed insertion above critical.

Description of Corrective Actions

Until the permanent software fix by General Atomics, the console manufacturer, was installed, an administrative directive not to press a rod up button and either the pulse or square wave button at the same time was implemented. A second switch was installed in series with both the pulse and square wave buttons. The new switch causes the operator to be required to use two hands for entering pulse or square wave mode. With both hands being used to enter the non-reactor mode the operator can not press an UP button at the

same time as he presses a mode button. A permanent corrective action which required a software correction was implemented on 25 Sept. Testing verified the corrective software fixed the anomaly. Upon successful testing of the permanent software fix the temporary preventive actions were removed. In addition a complete checkout of all identifiable interlock combinations will be performed in October 1992 during the annual maintenance shutdown.

Reference to any previous similar events

During an earlier console checkout a similar occurrence resulted in an unsolved single occurrence during prestarts. The anomaly may or may not have been caused by this sequence of events. Extensive testing at that time failed to cause a reoccurrence.

Point of Contact for any Questions

Points of contact for further information are Mr. Mark L. Moore, Reactor Facility Director, or Mr Robert George, Senior Reactor Operator. Telephone 301-295-1290