

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION  
WASHINGTON D.C. 20555

January 26, 1989

NRC INFORMATION NOTICE NO. 89-09: CREDIT FOR CONTROL RODS WITHOUT SCRAM  
CAPABILITY IN THE CALCULATION OF THE  
SHUTDOWN MARGIN

Addressees:

All holders of operating licenses or construction permits for test and research reactors.

Purpose:

This information notice is being provided to alert addressees to potential problems from allowing credit to be taken for the reactivity worth of control rod(s) that do not have scram capability in the calculation of the shutdown margin. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this information notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Background:

An NRC inspection at a non-power reactor facility identified a situation in which a shutdown margin less than that required by the licensee's technical specification was possible. The reactor involved has two types of control rods: shim rods, which are magnetically coupled to their drive motors and which are decoupled and rapidly inserted into the reactor core upon receipt of a scram signal, and a regulating rod, which is fixed to its drive motor and drives into the core upon receipt of a scram signal. The regulating rod was used by the licensee, in addition to the shim rods, to demonstrate compliance with the technical specification for the shutdown margin.

Discussion:

The shutdown margin is a measure of the reactivity necessary to provide confidence that a reactor can be made subcritical by a predetermined amount by means of the control and safety systems, starting from any permissible operating condition. In the calculation of the shutdown margin, it is assumed that the most reactive control device (i.e., the highest worth rod) is in its most reactive condition and that the reactor will remain subcritical without further operator action. The shutdown margin should also be essentially instantaneously available (within the technical specification limit on rod drop time) upon receipt of a reactor scram signal. If the shutdown-initiating event is a loss of facility electrical power, the non-scramming control rod(s) which are fixed to their drive motors would not drive into the reactor core.


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Therefore, if the reactivity worth of the non-scramming control rods(s) is required to be instantaneously available to meet the shutdown margin technical specification requirement, it may not be possible to make the reactor subcritical in a controlled, safe manner.

Subsequent calculations have shown that the licensee did not need to include the regulating rod in the calculations to meet the technical specification requirement for shutdown margin. However, to ensure that the non-scrammable control rod is not used in the calculation of the shutdown margin (the technical specification would have allowed this), an amendment to the facility operating license was requested by the licensee and approved by the NRC. The technical specification states that the shutdown margin is based on scrammable control rods only.

No specific action or written response is required by this information notice. If you have any questions about this matter, please contact one of the technical contacts listed below or the Regional Administrator of the appropriate regional office.

  
Charles E. Rossi, Director  
Division of Operational Events Assessment  
Office of Nuclear Reactor Regulation

Technical Contacts: John Thompson, NRR  
(301) 492-1175

Al Adams, NRR  
(301) 492-1121

Attachment: List of Recently Issued NRC Information Notices

Therefore, if the reactivity worth of the non-scramming control rods(s) is required to be instantaneously available to meet the shutdown margin technical specification requirement, it may not be possible to make the reactor subcritical in a controlled, safe manner.

Subsequent calculations have shown that the licensee did not need to include the regulating rod in the calculations to meet the technical specification requirement for shutdown margin. However, to ensure that the non-scrammable control rod is not used in the calculation of the shutdown margin (the technical specification would have allowed this), an amendment to the facility operating license was requested by the licensee and approved by the NRC. The technical specification states that the shutdown margin is based on scrammable control rods only.

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*Changes made herein are approved as written by all  
concurrent parties. JLT 02-19-89*

\*SEE PREVIOUS PAGE FOR CONCURRENCE

*EAB:NRR	*NRR:PDSNP	*NRR:PDSNP	*EAB:NRR	*C:EAB:NRR	*C:OGCB:NRR
JThompson:db	AAdams	CMiller	RLobel	WLanning	CHBerlinger
12/19/88	12/19/88	12/19/88	1/13/89	1/18/89	1/19/89

~~D:DOEA-NRR~~  
CERD:ST  
1/19/89

Therefore, if the core is designed such that the reactivity worth of the non-scramming control rod(s) is required to be instantaneously available to meet the shutdown margin technical specification requirement, it may not be possible to make the reactor subcritical in a controlled, safe manner.

Subsequent calculations have shown that the licensee did not need to include the regulating rod in the calculations to meet the technical specification requirement for shutdown margin. However, to ensure that the non-scrammable control rod is not used in the calculation of the shutdown margin (the technical specification would have allowed this), an amendment to the facility operating license was requested by the licensee and approved by the NRC that states the shutdown margin is based on scrammable control rods only.

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*EAB:NRR JThompson:db 12/19/88	* NRR:PDSNP AAdams 12/19/88	*NRR:PDSNP CMiller 12/19/88	RL EAB:NRR RLobel 1/13/89	C:EAB/NRR Wanning 1/18/89	NPK C:OGCB:NRR CHBerlinger 1/19/89
D:DOEA:NRR CERossi 1/188	* Tech. Ed B. Cabene 1/4/89				

is required to be instantaneously available to meet the shutdown margin T/S requirement, a possible violation of the T/S may result in addition to the possible inability to bring the reactor subcritical in a controlled, safe manner.

Subsequent calculations have shown that the licensee did not need to include the regulating rod in their calculations to meet the T/S requirement for shutdown margin. However, to insure that the non-scrammable control rod is not used in the calculation of the shutdown margin (the T/S would have allowed this), an amendment to the Facility Operating License was requested by the licensee and approved by the NRC that states the shutdown margin is based on scrammable control rods only.

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<sup>cm</sup>  
NRR:PDSNP  
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NRR:PDSNP  
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EAB:NRR  
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