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October 21, 2002

US Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Subject: Docket No. 50-186
The Curators of the University of Missouri
License No. R-103

The attached document provides the Missouri University Research Reactor Licensee Event Report for a failure of the containment airlock door control circuit that occurred on September 24, 2002. The airlock door control circuit failure resulted in a variance from Technical Specification 3.5.a. This report is submitted in accordance with Technical Specification 6.1.h (2).

Please contact Paul Hobbs, Reactor Manager at 573-882-5264 if you have questions regarding this report.

Sincerely,

Ralph A. Butler, P.E.
Interim Director

RAB:dcp

Enc.

xc: Mr. Alexander Adams, Jr., US NRC
Mr. Craig Bassett, NRC Region II
Dr. Robert Hall, Interim Vice-Provost
Reactor Advisory Committee
Reactor Safety Subcommittee

DIANE PURCELL
Notary Public - State of Missouri
County of Boone
My Commission Expires Jan. 31, 2006

IE22
A020

Attachment
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## Event Report 02-04 – October 21, 2002
## University of Missouri Research Reactor

### Introduction

On September 24, 2002, at 1300, with the reactor operating at 10 MW, a failure of the containment personnel airlock door control circuit resulted in both the inner and outer airlock doors open at the same time. This failure was promptly reported to the reactor control room and the console operator immediately placed the rod control Master Control Switch in the "Off" position. This action immediately scrammed the reactor and placed the reactor in the secured condition. Failure of the personnel airlock doors resulted in a deviation from Technical Specification 3.5.a; one of two Limiting Conditions for Operation regarding containment integrity.

Technical Specification 3.5.a requires that containment integrity be maintained at all times except when the reactor is secured, and irradiated fuel with a decay time less than sixty days is not being handled. One of the requirements for reactor containment integrity to exist is that one of the two personnel airlock doors must be closed with its gasket inflated. The reactor operated out of compliance with this Limiting Condition for Operation for less than one minute.

### Description

The personnel airlock for the reactor containment building is part of the Containment System as described in Section 3.0 of the MURR Hazards Summary Report. The airlock consists of two electric-motor-driven horizontal sliding doors and an intervening vestibule. The inner door, designated as Door 276, and the outer door, designated as Door 277, allow the entrance of personnel from the laboratory building main corridor, through the airlock, to the second level of the containment building. The doors are constructed of steel and designed to withstand a 2.0 psig overpressure. Each door is suspended from an overhead rail by two adjustable one-ton trolleys. A 3-phase motor connected through a gear reducer to a chain drive assembly drives the door open and closed. The airlock door control circuit is designed and interlocked to ensure that one door is always closed and sealed. The interlock consists of a relay logic circuit which detects door "closed" from a separate rotary limit switch assembly for each door, as well as seal inflation pressure for each door. When the door is in the fully closed position, the rotary limit switch actuates an air supply valve, inflating a gasket mounted in the door facing, sealing the door. This logic circuit enables one door to open only if the other door indicates closed and sealed.

On Tuesday, September 24, 2002, at 1300, an operator was entering the reactor containment building through the personnel airlock. Immediately after the inner airlock door became fully opened, the outer airlock door reopened which resulted in both doors being open simultaneously. The operator immediately informed the control room of the

situation via the airlock intercom station and the reactor was shutdown and secured by 1301.

Upon investigation, it was discovered that the outer airlock door gasket was still inflated. This gasket should deflate prior to the door opening. The pressure switch that senses outer airlock door seal inflation pressure was removed and tested. It was determined that the set point had drifted from its previous setting. In this case, the pressure switch provided an erroneous input to the logic circuit signaling that the gasket remained deflated after the door had closed while in fact it did inflate. This resulted in the door control logic to become out of sequence; causing the outer airlock door to immediately reopen against its inflated gasket when the inner airlock door became fully open, thus resulting in a momentary loss of containment integrity.

**Analysis**

The basis for Technical Specification 3.5.a is to ensure that the reactor containment building can be isolated at all times except when plant conditions are such that the probability of release of radioactivity is negligible. When the personnel airlock door control circuit malfunctioned, resulting in a deviation from the Limiting Conditions for Operation, a reactor scram was immediately performed to make negligible the already low probability of release of radioactivity while operating the reactor.

The outer airlock door pressure switch was previously replaced on September 18, 2002 after the installed one began to respond sluggishly, resulting in an increase in the period of time between the closure of one door and the opening of the other door. The new pressure switch had operated properly for six days before its failure on September 24, 2002. A failure within such a short period of time cannot be detected by any preventative maintenance procedure. Additionally, the pressure switches have proven to be extremely reliable with no failures of this type ever occurring before.

We recognize that our Limiting Conditions for Operation for reactor containment integrity do not include Action requirements (similar to Specifications 3.0.2 and 3.0.3 of power plant Standard Technical Specifications) that would allow the implementation of an Action requirement (in this case, a prompt shutdown) within a specified time interval as constituting compliance with the specification. Technically, the moment a failure occurs we are in non-compliance. Section 6 of American National Standards Institute/American Nuclear Society (ANSI/ANS) 15.1, "The Development of Technical Specifications for Research Reactors," recommends the submission of a special report (Licensee Event Report) for "operation in violation of limiting conditions for operation established in the technical specifications unless prompt remedial action is taken" (6.7.2(1)(c)(ii)).

MURR staff is currently performing a safety analysis to support a request for change to Technical Specification 3.5.a in order to establish a reasonable time period in which take remedial actions and still meet compliance with the Technical Specifications. This will

alleviate the generation of a Licensee Event Report for conditions that do not represent a safety concern for the reactor or the general public.

## Corrective Actions

When the Limiting Condition for Operation regarding containment integrity was not satisfied with respect to the personnel airlock doors (Technical Specification 3.4.a), the reactor was immediately scrammed and placed in the secured condition. This is the fastest way restore Technical Specification compliance.

A new pressure switch was bench tested and installed and the airlock door open and close sequence was satisfactorily tested. The personnel airlock was placed back into service at 1538, September 24, 2002. The reactor was refueled and returned to 10 MW operation at 1946, September 24, 2002.

On the October 14, 2002, maintenance shutdown, both the inner and outer airlock door pressure switches were removed and their set points checked. Both pressure switches were verified to be correctly set at 5 psig.

This event has been entered into the MURR Corrective Action Program as CAP 02-0073 and any additional improvements or corrective actions will be considered. The implementation of a preventative maintenance procedure to periodically check the set point of the pressure switches will be considered by the engineering staff.

If additional information is desired please call me at 573-882-5264.

Paul S. Hobbs PE
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University of Missouri Research Reactor