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US Nuclear Regulatory Commission
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SUBJECT: Technical Specification Violation on Operability of the Radiation
Monitoring System Recorder

Technical Specification Violation

A violation of Technical Specifications occurred and is being reported in writing by this letter. Specifically, Technical Specification 3.5.c was violated on 31 October 2000.

On 19 April 2002, as part of the review following a similar violation of Technical Specification 3.5.c that was reported in writing on 15 March 2002, it was discovered that the radiation monitoring system recorder was on but failed to record data from 7:07 AM 31 Oct 2000 to 9:08 AM 2 Nov 2000. The reactor was operated on 31 Oct 2000 from 7:35 AM to 2:22 PM. Technical Specification 3.5.c requires that the radiation monitoring system recorder be operable or that readings be recorded manually every 30 minutes if the recorder is not operable. Radiation monitor readings were recorded manually every hour as required by the PULSTAR Operations Manual on 31 Oct 2000. As a result, Technical Specification 3.5.c was not met on 31 Oct 2000.

This event was reported to the US Nuclear Regulatory Commission within 24 hours of discovery by telephone on 19 April 2002 as required by Technical Specification 6.7.1.

Description of Circumstances

The radiation monitoring system recorder was on but failed to record data from 7:07 AM 31 Oct 2000 to 9:08 AM 2 Nov 2000. The recorder was operable at 7:06 AM on 31 Oct 2000 during performance of the reactor start up checklist. The cause of the recorder failure could not be determined or duplicated. The reactor was operated on 31 Oct 2000 from 7:35 AM to 2:22 PM. Failure to recognize that the radiation monitoring system recorder had stopped recording was due to a lack of attention to detail created by logistical factors, recorder operating characteristics, and the lack of a check item in the Operation Log.

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The radiation monitoring system recorder is located above the radiation monitoring channel ratemeters at head height and on the left side of the operating console. Radiation recordings are updated approximately every three minutes at a chart speed of 2 inches per hour on the recorder. The radiation monitoring system recorder is left on for continuous recording. The radiation monitoring system recorder is required for operation and is checked prior to operation for trending and agreement of the recorded values with the ratemeter values. If the radiation monitoring recorder is not operable, then readings are to be taken every 30 minutes during reactor operation.

Other recorders include two power and one water temperature recorders which are operated from reactor start up to reactor shut down. The power and water temperature recorders are located at eye level on the reactor console and have continuous stylus movement with chart speeds of approximately 30 cm per hour. The power and water temperature recorders are considered to be part of the measuring channels per Technical Specifications 1.1 and 3.3 and are therefore required to be operable for reactor operation.

All recorders are expected to be checked for operation by the Reactor Operator assigned to the console while the reactor is being operated. Because of their location, recording motion and chart speed, and the fact that they are turned on and off for reactor operations, the power and water temperature recorders are more noticeable to the reactor operator than the radiation monitoring system recorder. Radiation monitoring system data was recorded from the instrument displays rather than the recorders on an Operation Log form each hour. As a result, the Limiting Condition for Operation for operation of the radiation monitoring system recorder was not checked or noticed after reactor start up.

As a result of the failure to notice that the radiation monitoring system recorder was not operating on 31 Oct 2000, the requirement to report a violation of a Limiting Condition for Operation under Technical Specification 6.7.1 was missed. On 2 Nov 2000, the requirement to report a violation of a Limiting Condition for Operation under Technical Specification 6.7.1 was not recognized due to a lack of attention to detail caused by a lack of managerial oversight. On 2 Nov 2000, recorder operation was restored and an inadequate review on the event occurred. The event on 31 Oct 2000 was not discovered until 19 April 2002 when a follow up review of a similar event that occurred on 21 Feb 2002 was conducted. Since the event was reported to the US Nuclear Regulatory Commission by telephone within 24 hours of discovery and in writing by this report within 14 days of discovery, a violation of Technical Specification 6.7.1 is not considered to have occurred. However, it is recognized that the event that occurred on 31 Oct 2000 should have been noticed, more thoroughly investigated, and reported sooner. The lack of a formal procedure to aid in the evaluation of the consequences and reporting requirements for such events contributed to the untimely discovery.

Safety Assessment and Consequences

Radiation monitoring channel annunciation, confinement system actuation, and building evacuation horns signals are generated by the ratemeters, not the recorder. The recorder is a peripheral output device and provides a complete documented record of the radiation monitoring channel readings when operable. Thus, no alarms or protective actions were lost by the inoperability of the radiation monitoring system recorder.

The manually recorded readings of the radiation monitoring channel ratemeters taken every hour indicated normal operational radiation levels. Experiments performed on 31 Oct 2000 used the rotating exposure ports at a steady state power of 900 kW for neutron activation analysis and transmutation doping. Two surveillances were performed on 31 Oct 2000 as well. Procedure PS 1-02-4A:S1 was performed to calibrate the Log and

Linear Channel. Procedure PS 6-13-1 was performed to determine the sodium and chlorine level in the primary coolant by neutron activation analysis. As a result, the Pneumatic Transfer System was used for 13 minutes for the irradiation of the primary coolant and a standard solution during performance of PS 6-13-1. Because of the Pneumatic Transfer System operation, approximately 5 mCi of Ar-41 was produced and released to the environment based on the manually recorded radiation monitoring system readings. All of the irradiated samples in the rotating exposure ports were relocated within the reactor pool after reactor shutdown to a secure location for decay. None of the radiation monitoring annunciators were activated, nor was the confinement and evacuation system activated during the period from 31 Oct 2000 through 2 Nov 2000. Based on the experiments performed, the lack of any alarms or protective actions, and hourly recordings taken on 31 Oct 2000, it is concluded that 10 CFR 20 limits on effluent concentration and the constraint dose for airborne effluent were met and it is unlikely that any elevated external dose occurred. The additional 5 mCi of Ar-41 released gives an effluent concentration averaged over the calendar year of $5.84 \text{ E-}9 \text{ } \mu\text{Ci/ml}$, an annual release activity was 1.95 Ci, and a calculated dose of 3.95 mrem for calendar year 2000 using procedure PS 6-13-1. Procedure PS 6-13-1 uses calculation methods consistent with US NRC Regulatory Guide 4.20.

Although the safety impact caused by inoperability of the radiation monitoring system recorder was concluded to be well within regulatory limits, it is recognized that this may not always be the case. It is also recognized that frequent recording of the radiation monitoring system data is necessary for adequate assessment of radiation levels within the facility and radioactive effluent.

Corrective Actions and Notifications

Actions taken on 2 Nov 2000 included restart of the trending mode of the radiation monitoring system recorder.

Corrective actions for the previously reported violation of Technical Specification 3.5.c that occurred on 21 Feb 2002 included a change to an Operation Log form for recording readings from the radiation monitoring system and a check on the operation of all recorders every 30 minutes while the reactor is not shut down. This corrective action was implemented on 13 March 2002 and is expected to heighten awareness and prevent recurrence of a similar Technical Specification violation. Specifically, Technical Specifications 3.3 and 3.5.c are the Limiting Conditions for Operation addressed by this action. Also, starting on 13 March 2002, Technical Specification 3.5.c was reviewed with all Reactor Operators.

Corrective actions for the previously reported violation of Technical Specification 6.7.1 that occurred on 21 Feb 2002 include preparation of procedure change(s) on evaluation of reportable events. The procedure change(s) will be considered by the Reactor Safety and Audit Committee (RSAC) and the University Radiation Safety Committee (RSC) at their next scheduled meetings.

On 19 April 2002, the violation of Technical Specification 3.5.c was reported by telephone to the US Nuclear Regulatory Commission. Additionally, the Director, Nuclear Reactor Program and Head, Department of Nuclear Engineering were informed about this Technical Specification violation on 19 April 2002.

On 1 May 2002, a new paperless recorder was purchased and received. The new recorder will be installed in place of the current recorder by 30 June 2002. The new recorder has the capability of providing trend data and log data for 16 channels using a color monitor display and electronic files. Six radiation monitoring channels are required by Technical Specifications. A total of eleven channels make up the current radiation monitoring system. The 30 June 2002 date will allow for the preparation and approval of necessary design and procedure changes.

This violation of Technical Specification 3.5.c will be discussed with the Reactor Safety and Audit Committee (RSAC) and with the University Radiation Safety Committee (RSC) at their next scheduled meetings. The discussions will include the circumstances, actions taken to date, and procedure change(s).

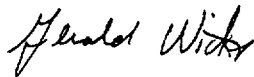
As a result of this violation of Technical Specification 3.5.c, an airborne release of Ar-41 was not reported. The annual report required by Technical Specification 6.7.4 for the year 1 Jul 2000 through 30 June 2001 will have to be corrected and submitted to the US Nuclear Regulatory Commission. Also, procedure PS 6-16-1 will have to be corrected for evaluation of airborne effluent for this same period.

Closing Comments

This violation of Technical Specifications should not have occurred and is regrettable. By completion of the corrective actions identified above, it is believed that similar violations will be prevented.

I declare under penalty of perjury that the foregoing is true and correct. Executed on 2 May 2002.

Sincerely,



Gerald D. Wicks, CHP
Acting Associate Director, Nuclear Reactor Program

cc: Alexander Adams Jr.
US Nuclear Regulatory Commission