IDAHO STATE UNIVERSITY

College of Engineering
Campus Box 8060
Pocatello, Idaho
83209-8060

Docket 50-284

July 16, 2004

Mr. Daniel E. Hughes, Project Manager
U.S. Nuclear Regulatory Commission
Mail Stop O12-G13
Washington, DC 20555-0001

Subject: Facility status report following the 5/04 reportable occurrence at the Idaho State University AGN-201 reactor facility.

Dear Mr. Hughes,

Here is a brief follow-up to the report submitted electronically June 8, 2004, regarding the reportable occurrence at Idaho State University AGN-201 reactor (Docket No.50-284, License No. R-110, that occurred on May 25 2004. The event involved the discovery of the failure of the cladding capsule on one of the scrammable control rods (Safety Rod No. 1, SR-1), which is considered to be an abnormal degradation of a primary fission-product barrier, since the control elements contain fuel material.

Upon discovery of the cladding breach, the ISU Technical Safety Office was contacted immediately for assistance in performing and documenting radiological surveys. Results of the radiological surveys demonstrate that doses to personnel during the discovery of the cladding failure were negligible, and essentially no different from the dose that would be received by staff during the conduct of normal control rod maintenance activities. There was no observable airborne radioactive material released as a result of the failure, and no iodine-131 was detected in air samples. External radiation doses were the same as those received during normal maintenance activities. A small amount of removable contamination was found near the areas of the cladding failure where the bare fuel material was exposed, as would be expected, but the removable contamination per 100 cm2 was less than regulatory limits, and only about 50% higher than normal background. We fully expect that personal dosimetry will not show any dose to personnel above normal levels. The Reactor Safety Committee will review the results of the radiological surveys and assessment by the Technical Safety Office.

A similar event occurred in July 1997 when the cladding failed on Safety Rod No. 2. That event was caused by a failed dashpot. As a result of that event, new dashpots were fabricated that were based on the design used in the AGN reactors at the University of New Mexico and Texas A&M University facilities, and were installed in the reactor. These dashpots have been in service since 2000 and have worked effectively and reliably.

The current event is believed to be a result of the aging of the capsule materials, in combination with fatigue resulting from the cumulative scram cycles that the safety rods have experienced during the operating life of the reactor. As in the July 1997

Phone: (208) 282-2902
Fax: (208) 282-4538
email: engineering@isu.edu

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event, the weld joining the end cap to the tube of the capsule failed, which caused the end cap to detach and allowed fuel disks to protrude through the opening. However, in the current event, the dashpot for this control rod was found to be operable and is believed to be providing sufficient shock absorption and damping to preclude damage to the capsule. It should be noted that the ISU AGN reactor, serial number 103, was one of the first AGN reactors to be fabricated in the mid 1950s. This reactor was used extensively by Aerojet General Nucleonics, Corp., for operator training and testing at their factory in San Ramon, California, until the reactor was transferred to ISU in the late 1960s. This particular reactor has, most probably, seen more operations than the other AGN reactors still in operation. Consequently, we believe that the cladding failures, which have occurred on the two safety rods, are not too surprising, given the age of the reactor. Although the event is a reportable occurrence, the radiological consequences have, in both cases, been negligible, and replacement of the failed capsule can be accomplished with relative ease, as we have two spare capsules that were obtained from Oregon State University.

Immediate actions taken so far include the following:

(1) We have notified the other AGN facilities (Univ. of New Mexico and Texas A&M Univ.) of the event. According to the facility directors, neither facility operator has experienced a similar event.

(2) We have reviewed the radiological surveys that were performed at the time of discovery and found no significant consequences.

Since the last update report was submitted on June 8th, arrangements have been made with Prof. Ronald Ballinger of the MIT Departments of Nuclear Engineering and Material Science to examine the end cap in an effort to determine the probably cause of the capsule failure. I met with Prof. Ballinger in Cambridge on June 25th to discuss the event and show him photographs of the capsule. Based on the preliminary examination of digital photographs of the end cap, he suggested that the weld failure was probably caused by fatigue at a few crack initiation sites followed by rapid crack growth leading to complete weld failure. We are currently in the process of temporarily transferring the cap to MIT under the MIT reactor license to allow Prof. Ballinger direct microscopic examination of the cap to support his proposition for the probable cause of the weld failure.

In the meantime, the reactor remains shutdown pending repair of the SR-1 control rod, which will involve replacement of the SR-1 capsule using components obtained from Oregon State University in 1997. To minimize differences in reactivity, we will load the OSU replacement capsule with fuel from the existing SR-1. Once the SR-1 control rod is repaired, we will continue with the control rod maintenance and surveillance activities, which we expect to complete by early August 2004. We will then report to the RSC the results of the repair and request authorization to resume reactor operations. At that time we will notify the NRC of our intention to resume operations. In addition, when we receive information from Prof. Ballinger as to the probable cause of the failure, we will provide this information to NRC.

Future actions will include:

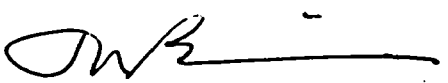
(1) We will investigate fabrication of new capsules for the scrammable rods, so that all AGN facilities will have access to spare capsules should a similar event occur at these facilities. We will collaborate with the other AGN facilities and the Department of Energy to arrange means to fabricate new capsules.

(2) We will administratively implement a more aggressive control rod capsule inspection frequency, so that the capsules are visually inspected at least once a quarter. If there are any indications of incipient failure at the end cap, we will replace the capsule with a spare unit.

(3) We will implement a new control rod drive logic circuit that will allow the safety rods to be manually withdrawn from the reactor at shutdown, instead of the current shutdown procedure, which requires that the safety rods be scrammed at the conclusion of each operation. The new circuit logic has been tested and will be implemented when the new control console is put in service, which is expected later this year. This new logic will reduce the number of scram cycles that the safety rods experience, thereby greatly reducing the mechanical stresses on the capsules.

Please do not hesitate to contact me if you have questions or require additional information.

Sincerely,



John S. Bennion, Ph.D., P.E., CHP, DEE
Reactor Supervisor/Manager

Cc: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

U.S. Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 1000
Arlington, TX 76011
Attn: Regional Administrator