

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

June 25, 1991

NRC INFORMATION NOTICE NO. 88-63, SUPPLEMENT 2: HIGH RADIATION HAZARDS FROM
IRRADIATED INCORE DETECTORS
AND CABLES

Addressees:

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

Purpose:

The U.S. Nuclear Regulatory Commission (NRC) issued Information Notice (IN) 88-63 on August 15, 1988, and IN 88-63, Supplement 1, on October 5, 1990, to alert addressees to uncontrolled radiation exposures experienced at the Surry Power Station, Unit 2, the Duane Arnold Energy Center, and the Brunswick Steam Electric Plant, Unit 1. These exposures resulted from irradiated incore detectors and drive cables that were not adequately evaluated. This supplement alerts addressees to a similar recent event in which a substantial potential for an overexposure occurred. 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.

Description of Circumstances:

On February 11, 1991, at the Edwin I. Hatch Nuclear Plant, Unit 1, a contract vendor operated the controls of the traversing incore probe (TIP) system without the knowledge of control room personnel and in violation of plant procedures.

While troubleshooting a problem with the process computer (PC), the reactor engineer (RE), the shift technical advisor (STA), and a contract vendor were performing TIP traces to reproduce previously observed computer problems. When these attempts failed to evoke the prescribed PC response, they temporarily halted work. They agreed that they would continue troubleshooting after lunch and verified that the TIPs were in their indexers before leaving.

Shortly thereafter, in preparing to perform a radiation contamination survey, the health physics (HP) supervisor called the control room to obtain permission for an HP technician to enter the Unit 1 TIP room. The HP supervisor asked if

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the TIPs were being moved. The Unit 1 reactor operator informed the HP supervisor that the STA had gone to lunch and that no one would be operating the TIPs.

In preparing to enter the Unit 1 TIP room, the HP technician observed a reading of 1 R/hr at the exterior of the wire mesh door leading into the TIP room (Attachment 1). The HP technician telephoned the HP supervisor to inquire about the reason for the high radiation levels. The HP supervisor then called the Unit 1 control room operator.

While the HP supervisor was on the telephone with the reactor operator, the STA arrived at the Unit 1 control room. The operator asked the STA if anyone was operating the TIPs. The STA replied that, to his knowledge, no one was operating the TIPs. The STA then asked the same question of the RE, who said that he was not operating the TIPs, but was unaware of the contract vendor's actions. The STA immediately proceeded to the TIP operating panels in back of the main control boards. When the STA arrived, he found that the contract vendor had withdrawn one TIP into the shield from the indexer and was operating another in an attempt to resolve the PC problem. The STA told the contract vendor to "hold on" and verified that HP personnel were out of the TIP room area. The STA then returned the TIPs to the indexer in the drywell. The contract vendor failed to realize that he was violating station procedures and could have overexposed personnel. As part of the licensee's evaluation of this event, the Health Physics Department processed the HP technician's thermoluminescent dosimeter and recorded a reading of 5 mrem.

The licensee and NRC regional personnel subsequently reviewed the event and identified several key factors that contributed to the incident.

1. Unauthorized operation of the TIP system by the contract vendor.

An unauthorized person operated the TIP system without the knowledge of the control room operators. Because the PC troubleshooting activities had taken several days, the contract vendor had become less sensitive to the requirements for operating the equipment. Therefore, on the day of the incident, he operated the equipment without authorization and without the

knowledge of control room personnel.

2. Poor adherence to procedural communication requirements between the operators of the TIP system and the Health Physics Department.

The procedure used to troubleshoot the problem with the PC is the same procedure used to perform the monthly surveillance required by Technical Specifications. The procedure warns that extremely high radiation levels will exist in the TIP room when the TIP probes and cables emerge from the shields or during the traverse. The procedure requires that the HP Department be notified when this procedure is performed. The NRC reviewed both the STA and the HP desk logs for the 2 months before the event and found that, of the 14 times the STA log documented TIP operation, the HP Department was notified of only 4 of these operations. The HP log also listed 6 additional TIP operations that were not reflected in the STA log.

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3. Lack of procedural control of the TIP system and of understanding who is authorized to operate the TIP system.

Because the control panel for the TIP system is located behind the main control boards, the TIP system can be operated without the knowledge of control room personnel. The control room operators believed that the procedure required the STA to be physically present for the TIPS to be operated. In fact, the procedure also allows the RE to move the TIPS. Shift personnel authorized HP technicians to enter the TIP room because the STA had gone to lunch and they believed the STA had to be present before the TIP system could be operated.

To avoid repeating this event, the licensee initiated the following corrective actions:

1. Procedural controls have been added to the HP and Chemistry Department procedure, "High Radiation Area Access Control," requiring that a danger tag be affixed to the TIP control panel when personnel are to enter the TIP room. The HP technician obtains a sub-clearance on the tagout which prevents the tagout being released before personnel exit the TIP room.
2. A positive control "key exchange program" was instituted by which the HP technician obtains the TIP control panel key from the main control room with the shift supervisor's permission and exchanges the TIP control panel key for the TIP room door key controlled by the health physics supervisor.

Similarly, the RE or STA must obtain the TIP room door key prior to operating the TIP controls.

3. The Engineering Support Department will transfer the TIP operating procedure to the Operations Department. This transfer should give the Operations Department more direct control over TIP movement.
4. The Operations Department will affix a warning placard to the TIP control panel requiring that the HP Department be notified before the TIP system is operated.
5. HP technicians will wear digital alarming dosimeters "chirpers" for entry into the TIP room and other very high radiation areas (greater than 1 R/hr at 18 inches).

The licensee is investigating the feasibility of erecting a shield at the front of the TIP room door to reduce exterior dose rates when the TIPS are activated. The licensee is considering placing a radiation monitoring device in the TIP room and other areas where very high radiation levels could exist which, at a predetermined dose rate, would activate an audible alarm and/or a flashing warning light.

Discussion:

The unauthorized movement of the TIPS by the contract vendor is a significant safety concern because it could have caused personnel to receive substantial

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exposures in excess of the limits prescribed in Part 20 of Title 10 Code of Federal Regulations (10 CFR Part 20). Further, this action indicates that the licensee failed to control the manipulation of plant equipment from the control room. The root causes of this event were an inadequate procedure that did not provide clear controls of TIP-related activities and inadequate communication between the involved personnel. It is also evident that the contract vendor had not received adequate training and instruction on the procedural controls and restrictions that apply to the manipulation of the TIPS.

If the HP technician had arrived at the TIP room earlier, he may have entered the room and completed his initial radiation survey before the unauthorized TIP movement began. He would then have proceeded with his contamination survey inside the TIP room and, not being equipped with an alarming dosimeter, could have been unaware of the subsequent TIP operations and the higher dose rates.

HP technicians may realize the radiation hazard that exists in the TIP room while the TIPS are operated, but, in this high noise area, they may not hear or associate the noise of the TIP drive mechanism with TIP operation. Site HP technicians stated that a typical TIP room survey of this type would take between 10 and 15 minutes. With all of the TIPS present and activated, general area whole body radiation levels in the TIP room could range up to several hundred R/hr. Based on these radiation levels, a dose in excess of 10 CFR Part 20 whole body limits could have been received within a few minutes.

On April 15, 1991, the NRC issued a Notice of Violation and Proposed Civil Penalty in the amount of \$50,000 for the Hatch event. The NRC issued this violation to emphasize the importance of developing and implementing adequate procedures and of communicating precisely in order to ensure positive control over the operation of plant systems, specifically the TIP system.

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate NRR project manager.

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Office of Nuclear Reactor Regulation

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Attachments:

1. Figure 1, Typical Tip Room Layout
2. List of Recently Issued NRC Information Notices