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DUKE POWER

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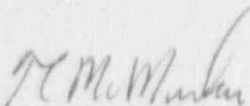
U.S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, D.C. 20555

Subject: McGuire Nuclear Station  
Inplant Review Number 92-10

Gentlemen:

Inplant Review 92-10 is being submitted to the NRC as a voluntary special report. This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

  
T.C. McMeekin

TLP/bcb

Attachment.

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McGUIRE SAFETY REVIEW GROUP

INPLANT REVIEW REPORT

1. REPORT NUMBER: 92-10
2. DATE OF REVIEW: June 12, 1992 Through July 9, 1992
3. SUBJECT DESCRIPTION: This Inplant Review is being submitted to the NRC as a voluntary special report of the circumstances relating to the incident described on Problem Investigation Report (PIR) 1-M92-0104, Inadequate Vent Path For The Reactor Coolant (NC) System While At Midloop Operation. The specific purpose of the review was to determine the cause of the incident and possible solutions to prevent further problems of the type described by the PIR.
4. EVALUATION AND COMMENT: PIR 1-M92-0104 documented an incident in which there was not an adequate vent path for the NC system as specified by Generic Letter 88-17.

4.1 Background

Generic Letter 88-17 discusses the loss of decay heat removal during nonpower operation and the consequences of such a loss. One of the recommended actions included in this letter is as follows:

" Applicable to Westinghouse and Combustion Engineering Nuclear Steam Supply System (NSSS) designs, implement procedures and administrative controls that reasonably assure that all hot legs are not blocked simultaneously by nozzle dams unless a vent path is provided that is large enough to prevent pressurization of the upper plenum of the Reactor vessel."

The concern stated by the letter is that a pressurization of the NC system can occur as a result of conditions unique to operation with a reduced NC system inventory and all hot leg nozzle dams installed. Such a pressure increase could lead to Reactor core voiding and thereby seriously affect plant safety. As a result of the recommendations made by the letter the following procedure changes have been made to insure that the vent path is maintained during conditions of reduced NC system inventory at McGuire.

These changes included the addition of appropriate steps and cautions to Operations Management Procedure 2-2, Shift Turnover, and Mechanical Maintenance procedures MP/1/A/7150/42 and MP/2/A/7150/57, Reactor Vessel Head Removal And Replacement. These additions concerned interface between the Control Room Senior Reactor Operator (SRO) and Mechanical Maintenance personnel regarding the vent path as well as tracking of changes in NC system vent status. The changes were documented under McGuire Action Directory (MAD) item 1805-017Q, completed in July, 1989.

#### 4.2 Description Of Event

Prior to the start of the Unit 1 Steam Generator (SG) Tube Inspection Outage, in May of 1992, McGuire Management personnel made a decision to establish a vent path through the Hot Leg of SG 1B to avoid having to remove the Reactor Vessel head during the outage. (Reference the attached NC system drawing page 9.) Discussion of the consequences of this decision was held between Work Control, Operations, and Component Engineering personnel. However, even though the vent path was discussed prior to the start of the outage and current vent path status covered during daily outage and SG status meetings, no changes to the existing administrative and procedural controls were made to ensure this new vent path configuration would be properly maintained.

On June 10, 1992, Unit 1 was in midloop operation. The Component Engineer in charge of work then in progress on the Unit 1 SGs made a work list for the SG crews coming in that night. Included on the list were directions to close the Cold Leg Manway on SG 1B. The Component Engineer stated that the list was extensive and that he did not expect the SG crews to complete all of the items listed that night. No mention was made of the vent path through SG 1B on the list .

At approximately 1730, the Component Engineer performed the daily turnover with the Maintenance Engineering Support Technician serving as single point contact for the SG crews. During the course of the turnover, the Component Engineer received a telephone call notifying him of a personal emergency. Due to this distraction the turnover was cut short and no mention was made of

maintaining the vent path during the turnover. The Maintenance Engineering Support Technician stated that he was aware of the vent path and had intended to ask about it during the turnover but did not do so due to distractions and the turnover being cut short.

There was no further interface between the Component Engineer and the SG crews that night. Contrary to the expectations of the Component Engineer, all items on the work list were completed that night including replacement of the manway cover for SG 1B. The Maintenance Support Technician stated that he was aware of the vent path being through SG 1B, but concluded that the Component Engineer must have made appropriate interface with Operations personnel. This same conclusion was voiced by the Maintenance personnel who performed the SG manway installation. All work involving installation of the SG manway cover was performed according to written direction of the Component Engineer and approved station procedures.

At approximately 0100 on the morning of June 11, 1992, Maintenance personnel installed the diaphragm for the manway on SG 1B. This effectively blocked the VC system vent path. At approximately 0530 the Component Engineer arrived on site. Upon arrival he proceeded to contact the Maintenance personnel involved and discovered that the vent path had been closed. At approximately 0630 he verified that the manway had been installed. Concurrently, the Shift Manager and Unit 1 Operations Engineer contacted him with the same conclusion concerning the vent path. Immediate action was then taken to begin removal of the Hot Leg nozzle dam on SG 1A and thereby reestablish the vent path. The vent path was reestablished at approximately 1100 on June 11, 1992.

#### 4.3 Conclusion

This incident is assigned a cause of Management Deficiency due to lack of an adequate policy or procedure to govern control of the vent path.

Prior to the start of the Unit 1 S3 Tube Inspection Outage, a

decision was made to establish a vent path through the Hot Leg of SG 1B. However, even though the status of the vent path was covered during daily outage and SG status meetings, there was no procedural provision made to insure that control was maintained when the vent path was changed during the outage when the SG manways were reinstalled. The only procedure sign off for the vent path was included in vendor procedure 80A9520, SG Nozzle Dam Installation And Removal (Horizontal Support Frame). No mention was made of the vent path in station procedure MP/O/A/7650/97, SG Primary Manway Removal And Installation Using A Multi-Stud Tensioner. Therefore, when the vent path was closed off by Maintenance personnel, no method was in place to inform Operations personnel of the change in configuration.

A cause of Inappropriate Action is also assigned because of Deficient Communication. The only direction given to the Maintenance personnel by the Component Engineer concerning the vent path was to install the manways on SG 1B. This was in part due to the ambitious work list generated by the Component Engineer on that particular night. The Component Engineer stated that he did not expect that the SG crews would finish the work list but felt that part of it would be carried to the next day when he would be present. Because of the personal emergency that night, the turnover was not completed properly. No communication took place during the turnover about the vent path. Also, although the Maintenance personnel involved knew that the vent path existed, there was not a good understanding of the purpose or safety significance of the vent path. All SG crew personnel interviewed, stated they knew the vent path was being closed when the SG 1B manways were installed but felt the Component Engineer had handled any necessary interface with Operations personnel. Since no procedural or other written guidance existed they depended on the Component Engineer solely to handle such an interface.

A meeting was held on June 15, 1992, to discuss the incident and to establish a course of action for implementing controls to insure an adequate vent path is maintained at all times when the NC system is at reduced inventory and hot leg nozzle dams are installed. Included in the meeting were representatives from the Operations, Safety Review, Work Control, Nuclear Services, and

Component Engineering groups as well as the Station Manager. The outcome of this meeting was a commitment to incorporate procedural sign offs for Control Room SRO concurrence when the vent path is changed. These sign offs will be incorporated in all procedures governing SG manway removal and installation as well as the procedures governing removal and installation of nozzle dams. The Component Engineering group also agreed to establish a written turnover sheet to document the existing vent path to keep the SG crew personnel informed of vent path status. Operations personnel present agreed to insure that adequate turnover of the current vent path was taking place on each Operations shift change. Operations personnel present also agreed that an evaluation of the use of a graphic representation in the Control Room to display current vent status as an aid to Control Room Operators would be performed.

All of the procedure changes and the written turnover sheet were to be in effect prior to moving any Unit 2 nozzle dams or SG manways since Unit 2 was in a position to begin closing of the SGs. These controls were put into place on June 17, 1992. The evaluation of graphic representation of the vent path in the Control Room is still underway by Operations personnel. In addition to these corrective actions, Selected Licensee Commitment (SLC) 16.5.1, Reduced Inventory Operation With Irradiated Fuel In Core, is currently under review for incorporation in the SLC Manual for McGuire. This SLC commitment states that prior to reducing NC system level to less than 60 inches Wide Range, if SG nozzle dams are in use, at least one Hot Leg vent path shall remain open whenever the Reactor vessel head is in place. This SLC will provide appropriate guidance for Operations Control Room personnel regarding the vent path. As soon as the SLC commitment is officially incorporated in the McGuire SLC Manual, procedures MP/1/A/7150/42 and MP/2/A/7150/57 (Reactor Vessel Head Removal And Replacement), MP/0/A/7650/97 (Steam Generator Primary Manway Removal And Installation Using A Multi-Stud Tensioner), and 80A9520 and 80A9526 (Steam Generator Nozzle Dam Installation And Removal Procedure) will be changed to incorporate a reference to the SLC commitment. The procedure changes, turnover sheet, graphic representation, and SLC commitment will provide appropriate guidance for all personnel involved with regard to the

vent path and should prevent recurrence of similar incidents.

PIR 92-104 was written to record a problem with inadequate vent path control while in midloop operations with respect to Generic Letter 88-17. During this investigation, it was noted that Generic Letter 88-17 states that all Hot Legs should not be blocked simultaneously by nozzle dams unless a vent path is provided that is large enough to prevent pressurization of the upper plenum of the Reactor vessel. The concern as stated is to prevent a condition in which all Hot Legs are blocked by nozzle dams and a subsequent loss of ND results in boiling of the reactor coolant. Once boiling is initiated, steam would begin to collect in the upper plenum of the Reactor vessel and pressure would begin to increase. As pressure increased the coolant in the Reactor vessel would be displaced to the Cold Legs of the SGs out of the core resulting in uncovering of the core. At no time during this incident were all SG Hot Legs blocked by nozzle dams. Since three of the four SGs had their nozzle dams removed and manway covers installed, the wording of Generic Letter 88-17 was not violated. However, the scenario described in Generic Letter 88-17 does not address the possibility that loss of ND with no vent path supplied for the NC system and one or more nozzle dams installed could lead to a scenario in which a build up of pressure could cause one of the nozzle dams to blow out. This would lead to the Reactor coolant then flashing to steam and rapid uncovering of the Reactor core. Therefore, this incident did serve to point out a weakness in control of the vent path while nozzle dams are installed, and the corrective actions implemented should prevent recurrence of similar incidents that could have safety significant implications.

#### 4.4 Safety Evaluation

During the time period the vent path was closed, there were no emergencies or perturbations to the NC system or to the other systems that are necessary to maintain the NC system in a stable and controlled condition during reduced inventory conditions. No abnormal level or temperature changes took place. All instrumentation and alarms associated with monitoring of the NC system were operable. Operations personnel in the Control Room were continuously monitoring parameters associated with the NC

... at that time and would have been able to take appropriate action to mitigate any transient associated with the NC system.

In the event of a loss of ND system flow, Operations personnel would have been able to utilize procedure AP/1/A/5500/19, Loss Of Heat Removal Or Delay Heat Removal System Leakage. This procedure would have directed Operations personnel in the event of a loss of ND system flow or establishment of alternate cooling means to prevent Reactor Core damage. This procedure also insures that Containment Closure requirements are met to prevent release of radioactive material to the environment in the event any Reactor Core damage should occur. The health and safety of the public and on-site personnel were not affected by this incident.

5. CORRECTIVE ACTIONS :

Immediate: 1) SG Crew personnel began action to remove the Hot Leg nozzle dam from SG 1A.

Subsequent: 1) Component Engineering personnel incorporated procedural sign offs for Control Room SRO concurrence whenever the vent path is changed in procedures governing SG manway removal and installation as well as procedures governing removal and installation of nozzle dams.

2) Component Engineering personnel established a written turnover sheet to document the existing vent path to keep SG Crew personnel informed of the vent path status.

3) Operations personnel verified adequate turnover of the vent path status was being performed by Operations Shift personnel.

Committed: 1) Operations personnel will evaluate the use of a graphic representation in the Control Room to display current vent path status as an aid to Control Room



Operations personnel.

- 2) Regulatory Compliance Group personnel will ensure that SLC 16.5.1, Reduced Inventory Operation With Irradiated Fuel In Core, is incorporated into the McGuire SLC Manual.
- 3) Component Engineering personnel will change all procedures governing reactor vessel head removal and replacement, SG primary manway removal and replacement, and SG nozzle dam installation and removal to incorporate a reference to SLC 16.5.1.
- 4) The McGuire Human Performance Enhancement Systems (HPES) Coordinator in conjunction with McGuire Management personnel will evaluate the use of Human Factors training for McGuire Staff personnel to aid in the decision making process used during development of policies and procedures used at McGuire involving safe operating practices.

# REACTOR COOLANT SYSTEM

"A", "C", AND "D" STEAM GENERATORS HAVE NOZZLE DAMS INSTALLED IN BOTH THE HOT LEG AND THE COLD LEG FOR WORKING.

NOTE: The represented S/G has HOT LEG nozzle dam left out. It's COLD LEG nozzle dam is installed. The other three S/Gs have both nozzle dams installed. This allows NC System level to be raised as indicated such that Mid-Loop operation is not necessary. The required Hot Leg vent path is through the U-tubes of the represented S/G and out it's removed Cold Leg side manway.

