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June 2, 1982

Regional Administrator
Region III
U S Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, IL 60137

MONTICELLO NUCLEAR GENERATING PLANT
Docket No. 50-263 License No. DPR-22

Supplemental Information on Event Involving Loss of
Instrument Air Compressor and Subsequent Events

At the NRC/NSP meeting on Octobe 8, 1981 covering the Systematic Assessment of Licensee Performance, NSP re esentatives discussed the above event. It was further agreed that NSP would provide Region III with a written summary of the event when the investigation had been completed, since the event was ultimately classified as non-reportable under the Monticello Technical Specifications.

Attached is a report that has been prepared for your information. A complete package containing all details of the investigation is available at the site for further review by NRC personnel.

David Musolf
Acting Head-Nuclear Support Services

DMM/bd

Attachment

cc: Resident Inspector, NRC
NRR Project Manager, NRC
G Charnoff

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ATTACHMENT TO LETTER DATED JUNE 2, 1982 TO RO-III

Supplemental Information On Event Involving Loss of Instrument Air Compressor and Subsequent Events

1. Occurrence Date: February 24, 1981

2. Identification of the Occurrence:

Failure of a discharge check valve on an instrument and service air compressor resulted in the loss of instrument air system pressure, which led to a plant scram.

3. Conditions Prior to Occurrence:

Steady-State Power - Plant operating at 99% power.

4. Method of Discovery:

Operational Event - Failure of the check valve was discovered upon shutdown of #13 air compressor. The subsequent drop in instrument air pressure due to the leakage of air from the intake of the #13 air compressor indicated that the check valve had failed to function properly.

5. Description of Occurrence:

The #12 compressor was taken out of service for maintenance on February 23, 1981. This left two compressors (#11 & 13) available for supplying the air requirements of the plant. Immediately preceding the loss of air pressure the operators noticed that the #13 air compressor was running hot and was noisy, so the #11 compressor was started up and the #13 compressor was shut down in preparation for maintenance of this unit. The failure of the discharge check valve (AS-1-3) on #13 compressor, coupled with the failure of the channel valves (reed type) located in the compressor head, provided a direct path for bleed-down of the air system. Plant air pressure commenced to drop immediately following shutdown of #13 compressor.

The following is a chronological listing of the sequence of events immediately following this equipment failure.

Time	
043144	Instrument air header alarmed low at 85 psig.
043305	Condensate Demin System trouble alarmed. This resulted from high system dp caused by the effluent valves

failing closed due to non-essential instrument air isolation at 80 psig.

Time	
043315	Both feedwater pumps tripped on low suction pressure. A low suction pressure trip occurs at 85 psig and would result from closure of the condensate demin effluent valves.
043326	The reactor scramed from low water level (+10").
043417	Low-low reactor level (-48") interlocks properly tripped the reactor recirc pumps and started RCIC and the emergency diesel generators (HPCI was being started manually at the time this trip occurred). The MSIV's also properly closed to less than 90% open at this time.
043447 to 043450	The four low-low water level switches reset as water level inventory recovered. A graphical analysis (Attachment 1) indicates that the water level didn't drop much below the low-low water level trip setpoint. This occurred due to the manual initiation of HPCI concurrent with low-low level trip. This would indicate that the lowest water level during the scram was 6'-6" above the top of the core.
043753	The low level switches reset.
043858	The operators manually transferred power and tripped the turbine.

A chart of the instrument air pressure (Attachment 2) shows that the pressure dropped to as low as 18 psig before recovery occurred. Recovery was brought about by the isolation of the #13 compressor. Normal instrument air pressure was restored approximately 20 minutes after the initial blowdown occurred.

6. Description of Apparent Cause of the Occurrence:

Procedure - Although this event was initiated by a component failure, there are procedural changes which could have eliminated the scram. If the operators would have immediately closed the manual discharge valve when the compressor was taken out of service, the air system would not have bled down through the defective check valve and the scram would not have occurred. This isolation valve would have been shut in the normal course of events - a WRA (Work Request Authorization) would have been issued and the compressor would have been isolated in accordance with the appropriate OCD (Operations Controlling Document). This process does not provide for the immediate isolation of the compressor, however, as was required in this situation. Also, these check valves are not inspected on a regular

basis. Routine inspection of these check valves will detect signs of degradation which could lead to eventual failure.

Component Failure - The check valves failed when one of the butterfly flappers of the valve broke. The apparent cause of failure was fatigue of this component due to the many cycles this valve was subject to over the history of the plant.

The channel valves failed due to wear and fatigue. The reeds in these valves are flexed with each cycle of the air compressor - which is 450 rpm.

7. Analysis of Occurrence:

The instrument air system is not safety-related and the operation of this system is not required for the safe shutdown of the plant. All air-operated safety-related valves are designed for proper operation on loss of air.

These valves all operated properly during this event, and as a result, this event had no effect on the health or safety of the public.

A similar incident, where the loss of instrument air resulted in a plant scram, occurred on February 21, 1973 (Unusual Occurrence Report No. 39). The cause of the instrument air loss was different, however - the failure of the #12 compressor in conjunction with the inadvertent isolation of the #11 compressor resulted in this particular occurrence (the plant had only two air compressors at that time).

8. Corrective Action:

The failed check valve was replaced with a similar unit. The reed valves on the #13 air compressor were repaired and the compressor was placed back in service. The procedure for shutdown of the air compressors (located in the Instrument and Service Air Operations Manual B.8.4.1) was modified to add a step which requires the closure of the manual discharge valve on the compressor to be taken out of service.

9. Failure Data:

The check valve that failed was a 3" Mission Duo Check Valve Figure K-15-SMF, Model A, 285 psi rating.

The channel valves that failed are the A-43 type supplied with the Ingersoll-Rand Model ESV-NL compressor part assembly Number 13172-D1.

10. License Considerations:

There were no violations of any federal or state regulations as a result of the failure of the instrument air system which is not a safety-related system. There are no Technical Specifications which apply to the instrument air system.

This event was reported (by phone) to the NRC Operations Center as an NRC Significant Event in accordance with 10CFR50.72. The resident NRC inspector was also notified immediately. This item was not reported to the NRC as a Reportable Occurrence.

10CFR21 Reporting Status

Reporting pursuant to 10CFR21 is not required because the occurrence does not involve a Defect or Failure to Comply.

11. Operational Considerations:

Following the scram, the recirculation pump discharge valves were left closed, with the result that they thermally clamped and could not be re-opened. The primary containment had to be de-inerted to provide access to the valves so that they could be opened manually. Recommended fixes to prevent this thermal clamping are discussed in General Electric SIL #368, dated December, 1981. Recommendations in the SIL are being pursued via the SIL followup process. Another item of operational concern is the fact that the recirculation pumps were not restarted as soon as possible following the scram, to prevent temperature stratification. Operations Manual Section C.4 was revised to assure the recirc pumps are restarted as soon as possible to avoid temperature stratification and to assure that valves are opened as soon as possible to prevent thermal clamping.

Following the scram, a recirc loop temperature transient occurred when placing the shutdown cooling system in operation. This portion of the incident is being investigated as a seperate event.

12. Recommendation for Prevention of Similar Occurrences:

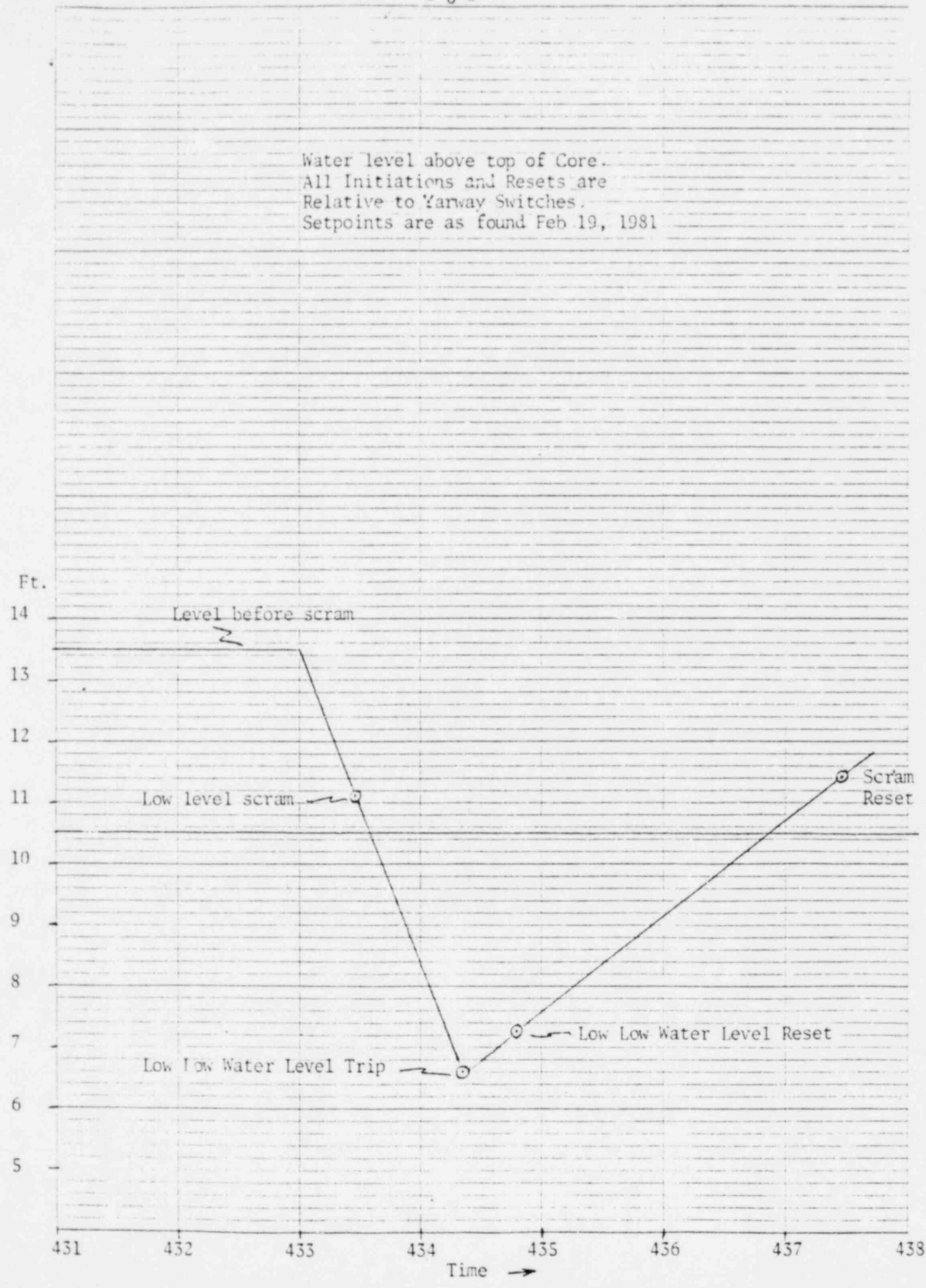
In addition to the procedure revisions already made (Operations Manual B.8.4.1, Instrument Air, and C.4, Abnormal Procedures), the event investigator further recommended that the P.M. procedure for the air compressors (PM-4160) be modified to require the inspection of the discharge check valves whenever maintenance is performed on the associated air compressor.

The event investigator also recommended that a check valve manufactured by a different company be considered for replacement of the existing units. Center Line, a unit of Mark Controls Corporation, manufactures a butterfly check valve which has a resilient lined insert which prevents the metal-to-metal contact between the valve body and the two hinged plates. The metal-to-metal contact between these items is suspected as having lead to the failure of the check valve discussed in this report. Prairie Island uses this type of check valve in their systems and highly recommends their use.

The use of two check valves in series could be considered, but the event investigator feels that with the replacement of this check valve with a more reliable unit, along with the procedural changes previously recommended, that this would not be required at this time.

The present P.M. schedule calls for an annual overhaul of the plant's air compressors. The Ingersoll-Rand Manufacturer Representative recommends

that this maintenance be performed on a 6-month basis for compressors that operate continuously. The last time this P.M. had been performed on #13 compressor (preceding this incident) was May 14, 1980, so there was approximately 9 months operating time on #13 compressor preceding the channel (reed) valve failure. Since the #13 compressor is used on an almost continuous basis and the #11 and #12 compressors are used much less, the event investigator also recommended that the frequency of the P.M. for all compressors be increased to a 6-month schedule and that the units receive a complete overhaul, including the channel valves, when six months operating time has expired since the last overhaul (hour meters are already installed on these compressors).

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