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ComEd

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U.S. Nuclear Regulatory Commission
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Dear Sir:

The Enclosed Licensee Event Report from Byron Generating Station is a Supplement to report number 96-001.

This report is number 96-001 Supplement 1; Docket No. 50-454.

Sincerely,

M. Snow for
K. L. Kofron
Station Manager
Byron Nuclear Power Station

KLK/WD/js

Enclosure: Licensee Event Report No. 96-001 Supplement 1

cc: H. J. Miller, NRC Region III Administrator
NRC Senior Resident Inspector
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ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

The root cause of the first event was Change Management due to omission of potential effects upon the system, resulting from changing a filter with the higher differential pressure. The Root Cause of the second event was Ineffective Corrective Actions that followed the first event, which failed to address the concern for the associated Tech Spec requirements.

This is a condition prohibited by Byron's Technical Specifications and therefore, is a reportable event per 10CFR 50.73(a)(2)(i)(B).

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A. PLANT CONDITIONS PRIOR TO EVENT:

Event Date/Time 03-13-96 / 1008

Unit 1 Mode 1 - PWR Ops Rx Power 98% RCS [AB] Temperature/Pressure NOT/NOP

Unit 1 Mode 1 - PWR Ops Rx Power 100% RCS [AB] Temperature/Pressure NOT/NOP

B. DESCRIPTION OF EVENT:BACKGROUND:

Technical Specifications require that total controlled leakage flow to the Reactor Coolant Pump (RCP) seals be equal to or less than 40 gpm at a Reactor Coolant System (RCS) pressure of 2235 psig +/- 20 psig with the 1CV121, CV Pump Discharge Header Flow Control Valve, in the full open position. Tech Spec compliance is demonstrated at power every thirty days by performing 1BOS 4.6.2.1.c-1, RCS Controlled Leakage Monthly Surveillance. This surveillance places the 1CV121 in the full open position and throttles open the 1CV182, Charging Header Back Pressure Control Valve. If the 1CV182 reaches full open and seal flow still exceeds 40 gpm, then the 1CV8369 A,B,C,&D, 1A,B,C,&D RCP Seal Water Injection Flow Control Valves, must be throttled to maintain less than 40 gpm total seal flow. This surveillance is done to ensure that under Safety Injection conditions sufficient flow would be delivered to the Reactor Coolant System.

After the surveillance is completed, the system is returned to normal operating alignment by placing the 1CV121 in Auto to maintain Pressurizer level and throttling the 1CV182 to maintain individual RCP seal flows in the 8 to 13 gpm tolerance range. There are many factors which affect the flow rate the Nuclear Station Operator (NSO) normally sees at the gauges in the Main Control Room (See Attachment A, Seal Injection Parameters). These include an allowed RCS operating pressure band of 40 psig, a difference in pressure/flow characteristics between the 1A and 1B CV Pumps, relative positions of the 1CV121 and 1CV182, the current differential pressure across the Seal Water Injection Filter, and the current positions of each of the Seal Water Injection Flow Control Valves. Once the Seal Injection System is realigned to the normal operating configuration with the 1CV8369A,B,C,&D valves set, the 1CV121 in Auto, and the 1CV182 throttled, there is no clear indication of compliance with Tech Spec Acceptance Criteria.

In the past, the RCS Controlled Leakage Monthly Surveillance has been performed upon starting up after a refueling outage. The Operator adjusted the Seal Water Injection Flow Control Valves such that the 40 gpm Tech Spec limit was satisfied, and also such that, with the 1CV182 valve adjusted to provide 8-13 gpm to each RCP seal, the 1CV121 valve was positioned near the 50% open range. This is the most linear range where 1CV121's best performance has been obtained. With the lower allowable differential pressure requirement in place at that time, the filter differential pressure never reached a value such that the seal injection flow decreased to the point that the operator needed to readjust the Seal Water Injection Flow Control Valves during subsequent performances of the RCS Controlled Leakage Monthly Surveillance. Therefore, the unit was able to operate through a complete fuel cycle without adjusting the Seal Water Injection Flow Control Valves again.

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B. DESCRIPTION OF EVENT: (cont.)

History:

Due to ALARA and economic considerations, the maximum allowable differential pressure limit on the Reactor Coolant Pump Seal Injection Filters was raised from 20 to 40 psid in December of 1995. Upon increasing the filter maximum allowable differential pressure, the effect on the system was such that the Seal Water Injection Flow Control Valves had to be adjusted during the next performance of the RCS Controlled Leakage Monthly Surveillance. Subsequently, when the filter was next changed, the increased reduction in overall differential pressure caused the seal injection flow to unknowingly increase beyond the Tech Spec allowable value. This affect on the system was not recognized by the people involved in the evaluation of the filter differential pressure change. Their evaluation of this change focused on the effects upon the Seal Injection System resulting from the reduced flow due to allowing the filter to operate until the differential pressure reached the new, higher setpoint. The evaluation concluded that minimum flow requirements could be met with the higher differential pressure limit. The evaluation failed to recognize that the higher filter differential pressure might require repositioning the Seal Water Injection Flow Control Valves and that a subsequent decrease in overall differential pressure due to changing out the filter would cause seal injection flow to increase, possibly more than the Tech Spec limit.

When this change was implemented, corresponding changes were made to BOP 199-EA A1 and BOP 199-EA A2 (Auxiliary Operator rounds), and BOP CV-10, CV Filters - Isolation And Return To Service (the procedure that directs operational alignment of the filters), and a setpoint scaling change request was submitted to change the alarm setting.

Event #1: 01/25/96

Due to elevated 1B Seal Water Injection Filter differential pressure, at 2205 hrs on 01/24/96 Operating placed the 1A Seal Water Injection Filter on line and isolated the 1B Seal Water Injection Filter. The duty Unit 1 NSO (RO licensed) reviewed the procedure, BOP CV-10, CV Filters - Isolation And Return To Service. All steps in the procedure described actions to be taken locally at the filter. This manual evolution was assigned to and performed locally by an Auxiliary Operator (non licensed) using BOP CV-10 and was performed without incident. This was the first filter swap under the new higher differential pressure limits. With the new filter on line and all flows within the 8 to 13 gpm tolerance range, the NSO in the Main Control Room did not recognize any reason for concern.

On the next shift, the oncoming Unit 1 NSO (RO licensed) noticed that, even though still within the tolerance range, Seal Injection flows were a bit higher than normal. The NSO brought this to the attention of the Station Control Room Engineer (SCRE)(SRO Licensed). The SCRE initiated 1BOS 4.6.2.1.c-1, the Controlled Leakage Surveillance, which was completed at 0705 hrs on 01/25/96. The Controlled Leakage determined did not meet Tech Spec limits. Tech Spec 3/4.4.6.2 allows 4 hours from time of discovery to reduce the flows to less than or equal to 40 gpm before actions must be taken to initiate a controlled shutdown. LCOAR 1BOS 4.6.2-1a was immediately entered to track these actions. Flows were returned to within Tech Spec required flow rates and 1BOS 4.6.2-1a was exited at 0815 hrs. Further investigation initiated as a result of this event and documented in Byron Cause Determination Evaluation (CDE) #454-201-96-0143 identified that changeout of the filter, and the associated change to the system's overall flow characteristics, could have made a significant contribution to the event.

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B. DESCRIPTION OF EVENT: (cont.)

No manual or automatic safety system actuations occurred as a result of this event. Stable plant conditions were maintained at all times.

The Root Cause of this event was ineffective Change Management associated with increasing the maximum allowable RCP Seal Injection Filter differential pressure. As differential pressure across the filter increased over the life of the filter element, certain operating adjustments had been made to maintain RCP seal flow requirements. The effect on system flow resulting from valving in a clean standby filter after having adjusted the system was not addressed during the original evaluation. None of the original changes dealt with ensuring Tech Spec requirements would be met when a filter realignment was implemented.

Corrective Action taken as a result of the event investigation was to revise BOP CV-10, CV Filters - Isolation And Return To Service. A note on the possible need to adjust the 1/2CV182 to maintain Seal Injection flows at 8 to 10 gpm was moved from the end of the procedure to the beginning of the section for the Seal Injection Filters. However, the revision did not address the concern of the Tech Spec Controlled Leakage limits. This revision, BOP CV-10, rev 4, was approved for use on 02/05/96.

Using time of discovery, 0705 hrs, as the Limiting Condition for Operating Action entry time and LCOAR exit at 0815 hrs, the Tech Spec requirements of returning Controlled Leakage Flow to under 40 gpm within 4 hours had been met. It was not recognized at that time that a Licensee Event Report was required. However, with the filter having been changed at 2205 hrs, and the LCOAR exited at 0815 hrs, actual time flow rates exceeded Technical Specification requirements was 10 hrs and 10 minutes.

This is a condition prohibited by Byron's Technical Specifications and therefore, is a reportable event per 10CFR 50.73(a)(2)(i)(B).

EVENT #2: 03/13/96

On 03/13/96, the Unit 1 Main Control Room "RCP Seal Water Injection Filter DP Hi" alarm annunciated due to elevated 1A Seal Water Injection Filter differential pressure. The 1B filter element was in standby reserve. When the "RCP Seal Water Injection Filter DP Hi" alarm came in, Operating initiated placing the 1B filter in service and isolation of the 1A filter. After procedure review by the Unit 1 NSO (RO licensed), this evolution was assigned to and performed locally by an Auxiliary Operator (non licensed) using the revised BOP CV-10, and was again performed without incident. This was completed at 1008 hrs. The NSO checked the seal flows. Although somewhat higher than before the filter swap, all were indicating around 10 gpm on the Main Control Room gauges, well within the tolerance range. The NSO did not recognize any reason for concern. He notified the SCRE that the filter swap was complete and continued with his other duties.

When the next shift came in, the oncoming Unit 1 NSO (RO licensed) was the NSO who had been the duty NSO at Unit 1 when the filter had been changed on 01/24/96. Having a heightened level of awareness from his involvement with the previous event, he noticed that, even though they were still within the tolerance range, Seal Injection flows were a bit higher than normal. The NSO throttled the 1CV182 to full open, but the flows remained high. The NSO immediately notified the duty SCRE (SRO Licensed).

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B. DESCRIPTION OF EVENT: (cont.)

The SCRE initiated 1BOS 4.6.2.1.c-1, the Controlled Leakage surveillance, which was completed at 1957 hrs on 03/13/96. The Controlled Leakage, determined by the performance of the surveillance, did not meet Tech Spec limits. LCOAR 1BOS 4.6.2-1a was immediately entered to track compliance with Tech Spec 4.6.2. Flows were returned to within Tech Spec required rates and 1BOS 4.6.2-1a was exited at 2042 hrs.

No manual or automatic safety system actuations occurred as a result of this event. Stable plant conditions were maintained at all times.

The root cause of this event was the ineffective corrective actions that followed the 01/25/96 event, carried out in the revision to BOP CV-10, which failed to address the concern for the associated Tech Spec requirements, in that it failed to recognize the relationship between the filter differential pressure and the Seal Water Injection Flow Control Valve Position.

Corrective Actions taken as a result of this second event included issuing a Daily Order for the Operators, highlighting information about the new, higher differential pressures being allowed and of the need to perform the Controlled Leakage surveillance any time a change is made that could alter the flow characteristics of the Seal Injection Water System. Also, to prevent recurrence, main body steps were added to BOP CV-10, (CV Filters - Isolation And Return To Service) and to BAR 1-7-A2 and BAR 2-7-A2, (the alarm response procedures for both units) instructing the Operator to notify the Station Control Room Engineer to initiate performance of 1/2 BOS 4.6.2.1.c-1, Reactor Coolant System Monthly Controlled Leakage Surveillance when a realignment of the filters is performed. This caution, to initiate 1/2 BOS 4.6.2.1.c-1 when a filter is removed from or returned to service, was also included in the Standard Out of Services that are used for changing the filter cartridge on all four Seal Injection Water Filters.

With the filter having been changed at 1008 hrs, and the LCOAR exited at 2042 hrs, actual time flowrates exceeded Technical Specification requirements was 10 hrs and 34 minutes.

This is a condition prohibited by Byron's Technical Specifications and therefore, is a reportable event per 10CFR 50.73(a)(2)(i)(B).

C. CAUSE OF EVENT:

The Root Cause of the 01/25/96 event was Change Management due to omission from the initial evaluation of the potential effects upon the system resulting from changing a filter with the higher differential pressure. The Root Cause of the 03/13/96 event was Ineffective Corrective Actions that followed the 01/25/96 event, which failed to address the concern for the associated Tech Spec requirements, in that it failed to recognize the relationship between the filter differential pressure and the Seal Water Injection Flow Control Valve position.

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D. SAFETY ANALYSIS:

There were no safety consequences impacting plant or public safety as a result of this event.

Actual Controlled Leakage rate during the first event was determined to be 43.2 gpm. Actual Controlled Leakage rate during the second event was determined to be 41.9 gpm. Both of these controlled leakage values exceeded the Technical Specification limit of 40 gpm. In support of Byron Station's Technical Specification conversion to Improved Technical Specifications (ITS), Engineering has performed calculations involving Seal Injection flowrates with respect to the minimum allowable charging flow during various accident scenarios. As part of the ITS submittal, the Controlled Leakage Limiting Condition for Operation has been changed from a set 40 gpm to a variable flow related to the difference between charging header and RCS pressures. Using this relationship, it has been found that during the time that Controlled Leakage was greater than 40 gpm, the ITS allowable Controlled Leakage would have been 47.9 gpm (RCS pressure approx. 2255 psig, Charging Header pressure approx. 2395 psig). Since the proposed ITS limits satisfy all accident analysis assumptions, it can be concluded that had this event occurred during any analyzed accident condition, there would have been no safety consequences impacting plant or public safety.

E. CORRECTIVE ACTIONS:

The Immediate Corrective Action taken for both events was to throttle the 1CV8369A,B,C,&D, Seal Injection Water Flow Control Valves, to reduce controlled leakage to below 40 gpm.

To prevent any further recurrence, the following actions have been, or are planned to be taken:

A Daily Order was issued on 03/14/96, highlighting information for the Operators of the new, higher differential pressures being allowed and of the need to perform the Controlled Leakage surveillance any time a change is made that could alter the flow characteristics of the Seal Injection System.

Main body steps have been added to BOP CV-10, (CV Filters - Isolation And Return To Service), to BAR 1-7-A2 and BAR 2-7-A2, (the alarm response procedures for both units), and the Standard Out of Services used for changing the filter cartridges on all four Seal Injection Water Filters. Those steps instruct the Operator to notify the Station Control Room Engineer to initiate performance of 1/2 BOS 4.6.2.1.c-1, Reactor Coolant System Monthly Controlled Leakage Surveillance after any system alteration is performed. Those revisions were approved for use on 03/15/96.

A discussion of this event, focusing on the need to initiate the performance of a surveillance any time the flow characteristics of the Seal Injection System are changed, will be included in the training program for all Licensed Operators. Completion of this item will be tracked by NTS #454-180-96-0001-01.

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E. CORRECTIVE ACTIONS: (cont.)

A discussion of this event, focusing on the deficient initial evaluation for the Filter Setpoint Change which resulted in this event, will be included in the training program for System Engineers. Completion of this item will be tracked by NTS #454-180-96-0001-02.

With the broader picture in mind, placards were placed on both units, at the inlet and outlet valve for each filter, at the filter bypass valve, and at each of the four Seal Injection Water Flow Control Valves that direct the Operator to contact the Station Control Room Engineer to initiate 1/2 BOS 4.6.2.1 c-1 when any realignment is undertaken. This action was completed on 03/14/96.

F. RECURRING EVENTS SEARCH AND ANALYSIS:

An Industry Event search was performed and one event was found to be applicable. That event, CDE 454-201-96-0143, titled "Low Seal Injection Flows", documents the initial investigation that was performed on the event listed in this report as Event #1. Analysis of the relationship of the event documented by CDE 454-201-96-0143 to the event listed as Event #2 is integrated into the Event Description section of this report. No other applicable events were found.

G. COMPONENT FAILURE DATA:

None.

Attachment A: Seal Injection Parameters

