Commonwealth Edison Company
Byron Generating Station
4450 North German Church Road
Byron, IL 61010-9794
Tel 815-234-5441

ComEd

DATE April 16, 1996

LTR: BYRON 96-0096
FILE: 3.03.0800 (1.10.0101)

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

Dear Sir:

The Enclosed Licensee Event Report from Byron Generating Station is being transmitted to you in accordance with the requirements of 10CFR50.73(a)(2)(i).

This report is number 96-002; Docket No. 50-454.

Sincerely,

K. L. Kofron
Station Manager
Byron Nuclear Power Station

KLK/WD/js

Enclosure: Licensee Event Report No. 96-002

cc: H. J. Miller, NRC Region III Administrator
NRC Senior Resident Inspector
INPO Record Center
CECo Distribution List

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NRC FORM 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
BYRON NUCLEAR POWER STATION	05000454	1 OF 5

TITLE (4)

CONTAINMENT SPRAY ADDITIVE FLOW OUTSIDE TECHNICAL SPECIFICATION REQUIRED RANGE DUE TO INCORRECT TESTING METHODOLOGY SPECIFIED IN PROCEDURE

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
03	21	96	96	-- 002 --	00	04	16	96	Byron	05000455
									FACILITY NAME: Braidwood U1 and U2	DOCKET NUMBER: 05000456

OPERATING MODE (9)	1
POWER LEVEL (10)	98

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

	20.2201(b)		20.2203(a)(2)(v)	X 50.73(a)(2)(i)	50.73(a)(2)(viii)
	20.2203(a)(1)		20.2203(a)(3)(i)	50.73(a)(2)(ii)	50.73(a)(2)(x)
	20.2203(a)(2)(i)		20.2203(a)(3)(ii)	50.73(a)(2)(iii)	73.71
	20.2203(a)(2)(ii)		20.2203(a)(4)	50.73(a)(2)(iv)	OTHER
	20.2203(a)(2)(iii)		50.36(c)(1)	50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A
	20.2203(a)(2)(iv)		50.36(c)(2)	50.73(a)(2)(vii)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
J. HORN, SYSTEM ENGINEERING, X-2045	815-234-5441

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
D										

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE).	X NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On 3/21/96, following a review of testing performed on the Containment Spray Additive System, Engineering determined that the Containment Spray Additive flow rate was higher than the Technical Specification required range of 55 - 60 gallons per minute.

The root cause of this event was the use of incorrect testing methodology specified in the surveillance testing procedure. The incorrect methodology had been used to perform this test on both units since preoperational testing.

Corrective actions consisted of performing the test using revised methodology and acceptance criteria provided by Engineering to reposition the Spray Additive throttle valves to provide the Technical Specification required Spray Additive flow rates. To prevent recurrence, the testing procedure will be revised to permanently incorporate the revisions specified by Engineering.

This event is reportable in accordance with 10CFR50.73(a)(2)(i) as operation prohibited by Technical Specifications.

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
BYRON NUCLEAR POWER STATION	05000454	96	-- 002 --	00	2 OF 5

TEXT *(If more space is required, use additional copies of NRC Form 366A)* (17)

A. PLANT CONDITIONS PRIOR TO EVENT:

Event Date/Time 03-21-96 / 1600

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

Unit 2 Mode 1 - Power Operation Rx Power 98% RCS [AB] Temperature/Pressure NOT/NOP

B. DESCRIPTION OF EVENT:

On 3/21/96 at approximately 10:00, Braidwood System Engineering Department (SED) notified Byron SED of concerns they had regarding the performance of _BVS 6.2.2.d-1, "Containment Spray Additive Flow Verification". This surveillance verifies that the Containment Spray (CS) system is capable of educting 55 - 60 gallons per minute (gpm) of 30 - 36 weight percent Sodium Hydroxide (NaOH) solution in accordance with Technical Specification 4.6.2.2.d.

During the verification, Primary Water (PW) is used in place of the NaOH solution to prevent introducing NaOH into the Refueling Water Storage Tank (RWST). In accordance with the Technical Specification, a flow rate of 68 - 74 gpm of PW is equivalent to the required NaOH flow rate. The flow rate for this test is read from _FI-CS015/6. This flow indicator is fed from a differential pressure (dP) transmitter scaled such that 0 - 100 inches water column dP across the flow element corresponds to a 0 - 75 gpm reading on the flow indicator.

Braidwood SED was concerned that the reading on the gauge would not be correct when measuring PW flow rate due to the difference in specific gravity between PW and NaOH solution. In effect, a reading of 68 gpm on the gauge using PW would actually result in approximately 77 gpm of PW flowing through the flow element because the density of PW is less than the density of the NaOH solution. Both Braidwood and Byron Site Engineering Departments (SEC) were requested to investigate the concern to determine if it was valid.

At approximately 16:00, both stations determined that, indeed, the indicated flow rate would not reflect the actual flow rate of PW through the flow element. Further investigation revealed that this test methodology had been in effect since preoperational testing and affected all four units.

Byron SEC performed operability assessments 96-10 and 96-11 and determined that the CS systems were operable, but the CS Spray Additive (CSAS) systems were inoperable. The appropriate Limiting Condition for Operation Action Statement (LCOAR) was entered, which required that the CSAS systems be restored to operable status within 7 days. Additionally, SEC began reviewing the design calculations, pre-operational tests and surveillance methodology for the CSAS system.

This event is reportable in accordance with 10CFR50.73(a)(2)(i) as operation prohibited by Technical Specifications.

C. CAUSE OF EVENT:

Based on the SEC review, the cause of this event was an incorrect testing methodology in the surveillance testing procedure. The testing performed on the CSAS since preoperational testing used assumptions that did not establish conditions comparable to those used in the design calculations. These assumptions include:

1. Installed flow indicators, which are scaled to indicate NaOH flow, were used to directly read PW flow.

2. Simulation of NaOH tank head pressure applied during the surveillance did not take into account the line losses of the piping between the test line (from _CS026A/B valve) and the tank.

3. The apparent minimum tank level used in the design calculation was less than that used in the surveillance, which corresponds to a lower flow rate of NaOH. Therefore, if the lower head pressure was applied to the surveillance, the flow rate would decrease.

D. SAFETY ANALYSIS:

The CS system is an emergency system designed to remove fission products from the containment atmosphere for the purpose of minimizing offsite radiological doses following a design basis Loss of Coolant Accident (LOCA). It also serves to reduce containment pressure and temperature during the injection phase of ECCS operation. To determine the correct boundary conditions for eductor performance testing per Tech Spec 4.6.2.2.d, a review of the requirements of the NaOH injection system was performed by SEC.

For the fission product removal function, the CSAS is considered a support system to the CS system in that it provides the NaOH to the CS system. The volume and concentration of the requirements of the CSAS ensures that enough NaOH is added to the CS system to ensure a pH value of 8.5 - 11.0 for the solution recirculated within containment after a LOCA. This pH band minimizes the evolution of iodine and minimizes the effect of chloride and caustic stress corrosion cracking on mechanical systems and components. An upper bound pH value of 10.5 was established for Equipment Qualification (EQ) concerns.

Removal of Iodine from the Containment atmosphere during the injection phase is dependent upon the pH of the spray solution. The partition factor is the ratio of iodine in the liquid phase to the concentration in the gas phase at equilibrium. Typically, the partition factor is the same for any NaOH solution with a pH value of 8.5 - 11. Discussion with Sargent & Lundy Chemical Engineering revealed that a pH value of 10.5 would require an NaOH flow rate of approximately 62-64 gpm. Conversely, to obtain a pH value of 8.5, an NaOH flow rate of approximately 15 - 21 gpm is required. Both of these flow rates assume worst case pump flow, RWST Boron concentration and 30% NaOH solution. A 30% NaOH solution was used since the relationship of flow for 30% NaOH and water is prescribed in Tech Spec 4.6.2.2.d. From this evaluation, the Tech Spec required flow rates of 55 - 60 gpm are associated with the near maximum allowable NaOH injection. The minimum required flow rate would be much less. Indications are that Iodine removal would be even greater with pH values above 11.

D. SAFETY ANALYSIS: (cont.)

The Tech Spec required NaOH flow rate is 55 -60 gpm during the injection phase, which should maintain the pH of the spray solution below 9.8. The as-left flow rate from the last execution of the surveillance exceeded this range (approximately 75 gpm), resulting in a spray solution pH greater than 10.5. However, the high pH value would only exist for a short time, during the initial injection phase, and would not present a long term EQ concern. Although NaOH solution flow rate is not a design constraint on the CS system, it is an acceptance criterion in Technical Specification 4.6.2.2.d for the CSAS. The required pH is achieved under worst case conditions by ensuring at least 2766 gallons of 30% NaOH solution is added to the sump. Current Operating procedures require that the CS system is run for at least 2 hours after a LOCA. This would allow the required volume of NaOH to be added at flow rates as low as 23 gpm. Thus, the concern of controlling the NaOH flow rate within the 55 - 60 gpm band becomes inconsequential to the fact of ensuring that enough NaOH is added to maintain proper pH levels inside containment.

The concern with the CSAS inability to meet the PW flow rate band specified in Technical Specification 4.6.2.2.d does not impact the total volume of NaOH that would be added to the sump by the CS system. Actually, an NaOH flow rate greater than 55 - 60 gpm would result in the pH of the sump reaching the desired range earlier in the accident. Therefore, there would have been no safety consequences impacting plant or public safety as a result of this event.

E. CORRECTIVE ACTIONS:

SEC performed an analysis to determine the test conditions and acceptance criteria required to adequately demonstrate that the CSAS met the requirements of Technical Specification 4.6.2.2.d (Reference NDIT #BYR-96-061). These criteria were incorporated into _BVS 6.2.2.d-1, "Containment Spray Additive Flow Rate Verification" via a Temporary Procedure Change. SED then performed the surveillance on both CSAS trains for both units. During the course of the surveillance, the NaOH solution flow rate was adjusted such that it was within the Technical Specification required range.

A permanent procedure change request will be initiated to incorporate these changes into the procedure permanently. This is being tracked by NTS Item #454-180-96-0002-01.

F. RECURRING EVENTS SEARCH AND ANALYSIS:

DVR #20-1-91-027 "CSAS flow rate low due to improper throttle valve position"
DVR #20-2-91-033 "CSAS flow rate low due to improper throttle valve position"
LER #89-006 "Mispositioned CSAS throttle valve"

All of these events differ from this event in that they pertained to valves that were repositioned for an Out of Service and not properly restored. This event deals with incorrect acceptance criteria in the surveillance that existed since pre-operational testing.

No similar events at other utilities were found. (Several other plants have replaced their NaOH Spray Additive system with Tri-sodium phosphate blocks suspended in the ECCS sump)

G. COMPONENT FAILURE DATA:

None. There were no component failures involved in this event.