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

ComEd

June 20, 1997

LTR: BYRON 97-144
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)(ii).

This report is number 97-013; Docket No. 50-454.

Sincerely,

K. L. Kofron
Station Manager
Byron Nuclear Power Station

KLK/MS/js

Enclosure: Licensee Event Report No. 97-013

cc: A. B. Beach, NRC Region III Administrator
NRC Senior Resident Inspector
INPO Record Center
ComEd 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, UNIT 1	05000454	1 OF 6

TITLE (4)

VALVE MISTAKENLY OPENED CAUSES POST-LOCA LEAKAGE TO EXCEED LIMIT

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
05	22	97	97	-- 013 --	00	06	20	97	NONE	
									FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	1
POWER LEVEL (10)	097

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

	20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)
	20.2203(a)(1)		20.2203(a)(3)(i)	X	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)
Jerry Horn, System Engineer	815-234-5441 X2045

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

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)

The 1B Safety Injection pump suction vent valve was found open on operator rounds and was promptly closed. Difficulties had occurred with pump venting on the previous day. The last time the valve was known to have been operated was 20 hours earlier to support troubleshooting. Had a design LOCA occurred with the vent open, the non-seismic piping downstream of the vent is assumed to fail. The resulting leakage of contaminated sump water could cause offsite doses to substantially exceed regulatory limits. This exceedance would occur during recirculation when the Residual Heat Removal pump pumps containment sump water to the Safety Injection pump suction.

The cause of the valve being open is unknown. Work activities in the area were reviewed and none were found that manipulated the valve. An evaluation will be done to increase awareness/strengthen controls on components that could increase post-LOCA ECCS leakage.

Based on evaluations of pump operability by the vendor, flooding impact, effects on ECCS flow and realistic dose estimates, this event did not pose a threat to the health and safety of the public or plant personnel. This event is reportable under 10 CFR 50.73(a)(2)(ii)(B), Operation Outside the Design Basis.

A. PLANT CONDITIONS PRIOR TO EVENT:

Event Date/Time 05-22-97 / 1600

Unit 1 Mode 1 - Power Operation Rx Power 97% RCS [AB] Temperature/Pressure NOT/NOP

Unit 2 Mode 1 - Power Operation Rx Power 100% RCS [AB] Temperature/Pressure NOT/NOP

B. DESCRIPTION OF EVENT:

On 5-21-97 at 0545 an Equipment Attendant (non-licensed) was performing surveillance 1BOS 5.2.b-1 (ECCS Venting and Valve Alignment Monthly Surveillance). This Technical Specification surveillance directs the Equipment Attendant to cycle valves to verify that the equipment is properly vented. The Equipment Attendant could not verify the 1B Safety Injection [BQ] (SI) Pump was vented because of a dirty sightglass.

The 1B SI pump vent valve (1SI040B) ties into the Filtered Vent [VL] (VF) system. Immediately downstream of the pump vent valve is a vent header drain valve (1VF017). By opening the pump vent valve and then opening the vent header drain valve the pump was be vented. On 5-21-97 at 1112, a second Equipment Attendant successfully vented the 1B SI pump using this flowpath and the surveillance was completed.

On 5-21-97, at 2000, the Equipment Attendant who tried to vent the 1B SI pump the previous night and the Shift Manager (SRO licensed) examined the Unit 1 and 2, Train A and B, SI pump configurations.

The Equipment Attendant asked the Shift Manager if he wanted the 1A and 1B pumps vented to see the difference between venting the pumps by the normal method and by venting the pumps via the VF header drain valve. Both the 1A and the 1B SI pumps were then vented by cracking the pump vent valve open. They did not see flow through the sightglass on the 1B SI pump, but when they opened the vent header drain valve there was a steady stream of water noted.

The Equipment Attendant and the Shift Manager completed their investigation at 2025 on 5/21/97.

On dayshift, 5-22-97, work continued to vent the Unit 2 SI pumps.

On 5-22-97 at 1600, a third Equipment Attendant found the 1SI040B full open while doing rounds. He immediately closed the valve and notified the In-Plant Shift Supervisor.

The open SI pump vent valve caused the plant to be outside the design basis due to a large potential increase in the amount of post-LOCA leakage from ESF equipment. The increased leakage above the assumed leakage rate could have caused the on-site and off-site doses to be in excess of the regulatory requirements.

This event is reportable under 10CFR50.73(a)(2)(ii)(B), Operation Outside the Design Basis.

C. CAUSE OF EVENT:

The cause of the 1B SI pump vent valve being open is unknown. The full open position the valve was found in is inconsistent with the normal practice of cracking open vent valves. The Equipment Attendant stated that he only opened the vent valve less than 1 turn. The Shift Manager and Equipment Attendant stated that they strongly believed that the vent valve was closed when they were done troubleshooting.

C. CAUSE OF EVENT (cont.)

Activities in the 1B SI pump room during the time the valve was open were reviewed. The SI System Engineer's log and work request history showed no activities in the 1B SI pump room that could account for the open valve.

D. SAFETY ANALYSIS:

The accident of concern is a Large Break LOCA and subsequent operation on cold-leg recirculation. When the plant is on cold-leg recirculation, water is pumped from the containment sump with the Residual Heat Removal [BP] (RH) pumps and then to the suction of the Chemical Volume Control [CB] (CV) and SI pumps. The open vent valve was on the suction of the SI pump. Immediately downstream of the vent valve is the non-safety, non-seismic vent header piping. This piping is postulated to fail causing a leak in the 1B SI pump room through the open vent valve.

The SI pump vent valve was last known to be closed at 2000 on 5/21/97 and was found open at 1600 on 5/22/97, a total of 20 hours. The following were evaluated for safety significance:

- SI pump operability
- Emergency Core Cooling System (ECCS) design
- Flooding/spray effects
- Radiological dose calculations

The leakage out of the vent line is a function of the SI pump suction pressure, and was conservatively determined assuming the following:

- The non-safety, non-seismic piping downstream of the vent valve is postulated to fail,
- ECCS is aligned for recirculation with values of RH [BP] pump pressure appropriate for Large Break LOCAs (LBLOCA) and Small Break LOCAs (SBLOCA).
- The low-head RH pump supplies a single SI and CV [CB] pump, which are operating at their design flows.

Based on the above, the SI pump vent flows are calculated to be 41 gpm (LBLOCA) and 52 gpm (SBLOCA). These flows did not pose a threat to the health and safety of the public or plant personnel for the following reasons:

SI pump operability:

The vendor was contacted to determine whether the open vent valve could affect pump operation. The vendor verified that the pump will not have problems related to hydraulic performance, axial thrust balance or mechanical seals. Therefore, the pump was operable with the open vent valve.

ECCS design:

The pump vendor confirmed that the postulated leakage is at the pump suction. Therefore, the SI pump discharge flows assumed in the accident analysis remain unaffected by the open vent valve. The flow out the vent line is from the RH pump. During cold-leg recirculation, the diversion of 41 gpm is not significant with respect to core cooling.

D. SAFETY ANALYSIS (cont.)

Flooding/spray effects:

UFSAR 6.3 identifies the largest leak of Engineered Safeguards (ESF) equipment as the failure of a pump shaft seal, with resulting leakage of 50 gpm. The UFSAR also states that the design of the Auxiliary Building is based on handling leaks up to 50 gpm and detecting and isolating such leaks within 30 minutes. The vent leak rate for a SBLOCA is 52 gpm, slightly in excess of the UFSAR assumption. The 1B SI pump room has a floor drain which is capable of handling at least 90 gpm.

The postulated leak location is near the 1B SI pump motor and could cause a pump trip. The 1A SI pump is assumed to remain available since the Standard Review Plan does not require postulation of an active failure concurrent with the effects of a passive failure (i.e. a leak).

The 1B SI pump room contains a ground level access hatch that leads directly to the outside atmosphere. This hatch is located approximately 30 feet horizontally from the assumed leak location, so direct spray is not a concern. During normal operation, air flows into the SI pump room from the hatch under the influence of the [VF] VA system. The VA system is tested to maintain a negative pressure of 1/4" water under post-LOCA conditions. The water inflow rate (52 gpm) is sufficiently small compared to the ventilation outflow (750 scfm) such that pressurization of the room will not cause leakage through the hatch.

However, leak isolation within 30 minutes is not assured for this condition. Isolation would be directed by Emergency Operating Procedure, 1BEP-1, "Loss of Reactor or Secondary Coolant". 1BEP-1 checks Aux Building radiation monitors and directs that leakage be located and isolated; however specific instructions are not provided. Local isolation of the leak is not probable due to water spray and associated dose, but the leak could be isolated by stopping the 1B SI pump and closing the motor operated valves on the suction of the pump. These motor-operated valves are assumed to be available since they are not in the direct spray path of the leak. A conservative estimate of 3 hours after event initiation to locate and isolate the leak was used for analysis.

There are two consequences of the failure to isolate the leak within 30 minutes. The first is that water is being removed from the containment sump causing a drop in containment water level. Over 3 hours, about 10,000 gallons would be lost from the sump. This would not impact the minimum water level available for the RH pump suction from the sump due to the substantial amount of water in containment after a large break LOCA. The second consequence is the addition of 10,000 gallons of water to radwaste. The radwaste system is capable of handling this amount of water.

D. SAFETY ANALYSIS (cont.)

Radiological doses:

Design radiological doses are based on ECCS leakage external to containment of 3910 cc/hr or 0.0172 gpm. There are two doses of concern, whole body due to gamma and dose to the thyroid from inhalation. Based on the very small ECCS leakage contribution to the whole body gamma dose, the potential increase in ECCS leakage did not increase the whole body gamma dose above the 10CFR100 and 10CFR50 limits. The ECCS leakage contribution to thyroid dose could have caused the regulatory limits to be exceeded. The leakage of 52 gpm represents a factor of 3,000 increase (52 gpm/0.0172 gpm) in leakage over that assumed in the design basis analysis. The resulting doses are substantially higher than the 10CFR100 and 10CFR50 limits.

The doses were estimated using methods from the Standard Review Plan (SRP) 15.6.5 Appendix B. The SRP method includes substantial conservatisms, notably:

- 50% of the equilibrium radio-Iodine core activity is assumed to be instantaneously released,
- No radioactive decay is assumed from the release point,
- Worst case meteorological conditions.

For the Low Population Zone (LPZ) and Exclusion Area Boundary (EAB), the Byron UFSAR also contains realistic dose calculations based on a lower source term and realistic iodine partitioning. The lower source term results from improved operation of the ECCS resulting in less core damage. For example, UFSAR Table 15.6-14 shows amounts of I-131 of 5.38E-7 Curies for the realistic case and 1.77E0 Curies for the design basis case. The doses from the increased ECCS leakage for a realistic set of assumptions are substantially lower than the SRP method and within the 10CFR100 limits.

A more realistic analysis shows that, even with the increased leakage from the open SI pump vent valve, substantial margin (approximately 4 orders of magnitude) exists between the realistic calculated dose for this configuration with the open pump vent and the regulatory dose limits.

Based on judgement, the 30 day dose to Control Room personnel would be substantially lower for the following reasons:

- Sufficient numbers of qualified personnel exist to allow rotation for dose reduction over a 30 day period.

- A thyroid Iodine blocking agent is available onsite.

- Redundant, safety-related Control Room radiation monitors are available to warn control room personnel of the high activity.

- On a high radiation signal, the Control Room air supply shifts to the Turbine Building. The low air flow relative to the large Turbine Building volume would allow large amounts of iodine plateout before reaching the control room air intakes.

D. SAFETY ANALYSIS (cont.)

- The limiting Control Room dose is to the thyroid and is an inhalation concern. A 1-hour supply of breathing air for the Control Room crew is required to meet 10 CFR 50 Appendix R requirements. Additionally, since 10 CFR 50 Appendix R states that a fire need not be postulated concurrent with a design basis accident, the air bottles for the Fire Brigade could also be used. Last, the air bottles are commercially available and arrangements could have been made to bring in extra bottles.

Based on evaluations of SI pump operability, flooding impact, effects on ECCS flow and realistic dose estimates, this event did not pose a threat to the health and safety of the public or plant personnel.

E. CORRECTIVE ACTIONS:

The sensitivity of the plant's design basis to ECCS leakage outside containment was highlighted by this event. The licensee will:

- Identify affected systems,
- Identify procedures that vent or open affected systems,
- Identify processes and practices that could increase leakage (for example, chemistry sample purges),
- Review BVP 200-7, "Conduct of Pressure Testing Activities", which implements the NUREG 0737 III.D.1.1 Leak Test Program.

Based on the above comprehensive review, appropriate controls will be put in place to maintain post-LOCA ECCS leakage within design values. (NTS Item: 454-180-97-SCAQ-00013-01)

The licensee routinely trains on LERs as part of Continuing Training. This event will be covered in 1997 Continuing Training. (NTS Item: 454-180-97-SCAQ-00013-02)

F. RECURRING EVENTS SEARCH AND ANALYSIS:

There are no previous occurrences of LERs related to ECCS leakage outside containment.

Searched Byron Regulatory Assurance database "RABY" using key words "misposition" and mis-position". Found three events in the last two years where valves were mispositioned, but the root causes were unknown or would not have prevented this event.

G. COMPONENT FAILURE DATA:

There were no component failures during this event.