

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

**ComEd**

June 26, 1997

LTR: BYRON 97-0154  
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 97-011; Docket No. 50-454.

Sincerely,



K. L. Kofron  
Station Manager  
Byron Nuclear Power Station

KLK/MS/js

Enclosure: Licensee Event Report No. 97-011

cc: A. B. Beach, NRC Region III Administrator  
NRC Senior Resident Inspector  
INPO Record Center  
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NRC FORM 366, (4-95)			U.S. NUCLEAR REGULATORY COMMISSION			APPROVED BY OMB NO. 3150-0104 EXPIRES 04/30/98 <small>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.</small>					
<b>LICENSEE EVENT REPORT (LER)</b> (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 9				
TITLE (4)											
Missing Support on Oil Cooler Caused SI Pump to be Inoperable Due to Work Process Deficiency											
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	27	97	97	-- 011	-- 00	06	26	97	N/A		
									FACILITY NAME		DOCKET NUMBER
									N/A		
OPERATING MODE (9)		1		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more) (11)							
				20.2201(b)		20.2203(a)(2)(v)		<input checked="" type="checkbox"/>		50.73(a)(2)(i)	
				20.2203(a)(1)		20.2203(a)(3)(i)		<input checked="" type="checkbox"/>		50.73(a)(2)(ii)	
POWER LEVEL (10)		097		20.2203(a)(2)(i)		20.2203(a)(3)(ii)				50.73(a)(2)(iii)	
				20.2203(a)(2)(ii)		20.2203(a)(4)				50.73(a)(2)(iv)	
				20.2203(a)(2)(iii)		50.36(c)(1)				50.73(a)(2)(v)	
				20.2203(a)(2)(iv)		50.36(c)(2)				50.73(a)(2)(vii)	
										OTHER	
										Specify in Abstract below or in NRC Form 366A	
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 NPROS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPROS		
D											
SUPPLEMENTAL REPORT EXPECTED (14)											
YES (If yes, complete EXPECTED SUBMISSION DATE).					X NO		EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR

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

Unit 1 was at ninety-seven (97) per cent Reactor [RCT] power. The Nuclear Regulatory Commission (NRC) was reviewing a Safety Injection (SI)[BQ] Pump venting concern. During a walk down of the 1B SI pump room on 05/27/97, a NRC inspector identified a missing support bracket on the 1B SI Pump Lube Oil Cooler [CLR].

On 05/27/97, the station verified the support bracket was missing rather than permanently removed. The Shift Manager (Licensed Senior Reactor Operator) (SRO) consulted the Station Support Engineering Supervisor and requested an operability assessment for the 1B SI pump. On 05/29/97, Operability Assessment 97-038 conservatively determined the 1B SI pump was inoperable, the 1B SI pump was declared inoperable and Limiting Condition for Operation Action Requirement (LCOAR) 1BOS 5.2-1a was entered. On 06/01/97, the Unit 1B SI pump lube oil cooler support bracket was replaced and the work request, 970060301-01, was completed.

The root cause of this event is unknown, although several work process deficiencies were identified that most probably contributed to the support bracket not being installed. The model work request will be revised to direct and document the removal and installation of support brackets. Post maintenance verifications will be added to the model work requests to provide clear inspection criteria to ensure the equipment meets the installation requirements.

There were no adverse consequences to the health and safety of the general public or plant personnel as a result of this event. This event is reportable per 10CFR50.73(a)(2)(ii)(B)- any condition that was outside the design basis of the plant and per 10CFR50.73(a)(2)(i)(B) - any operation or condition prohibited by the plant's Technical Specification.

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

A. PLANT CONDITIONS PRIOR TO EVENT:

Event Date/Time 05-27-97 / 1742

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

Unit 2 Mode - Rx Power RCS [AB] Temperature/Pressure

B. DESCRIPTION OF EVENT:

On 05/27/97, Unit 1 was in mode 1 at ninety-seven (97) per cent reactor power. The NRC was reviewing a Safety Injection (SI)[BQ] Pump venting concern and was performing walk downs of the SI pump rooms to determine the scope of the concern. During a walk down of the 1B Safety Injection (SI)[BQ] pump room, a NRC inspector identified a support bracket that appeared to be missing from the 1B SI Pump Lube Oil Cooler. The Resident NRC Inspector notified the System Engineering Department (SED) Assistant Supervisor regarding the suspected deficiency. The missing support bracket concern for the 1B SI pump lube oil cooler was at once assigned to the SED Primary Systems Group Leader, who immediately verified the support bracket was missing rather than permanently removed. A meeting was held between the SED Assistant Supervisor, SED Primary Systems Group Leader and Unit 1 Operating Engineer (Licensed Senior Reactor Operator)(SRO) to determine if there were any immediate operability concerns due to the missing support bracket. The Primary Systems Group Leader concluded that there did not appear to be an immediate operability concern with the oil cooler and associated cooling water piping. The inlet and outlet cooling water piping that was connected to the lube oil cooler was supporting the end of the cooler that was missing the support bracket, through a piping support bracket within 18 inches of the cooler.

Problem Identification Form (PIF) B1997-01851 was initiated on 05/27/97, at 17:42 notifying the Shift Manager (SM) of the missing Lube Oil Cooler Support Bracket on the 1B SI Pump. Work request 970060301-01 was initiated at that time to replace the missing support bracket on the 1B SI Pump Lube Oil Cooler.

On 05/27/97, at 22:00, after the Shift Manager (Licensed Senior Reactor Operator) (SRO) reviewed PIF B1997-01851, he notified the Station Manager of the concern that the 1B SI Pump Lube Oil Cooler was missing a seismic support bracket. The SM additionally notified Site Engineering (SEC) and requested an Operability Assessment on the 1B SI pump. The Shift Manager consulted the SEC Station Support Engineering Supervisor on 05/27/97, at 23:03, regarding the configuration discrepancy for the lube oil cooler. After reviewing the installation, the SEC Station Support Engineering Supervisors conclusion was that the present configuration of the lube oil cooler was adequate for interim operation. The SEC Station Support Engineering Supervisors judgement was based on the fact the cooler was supported by the essential service water (SX) [BI] piping bracket and appeared to be adequately supported, for safe operation of the plant pending further analysis by the operability assessment.

Operability Assessment 97-038 was completed on 05/29/97, and conservatively determined that the 1B SI pump should be declared inoperable because the 1B SI pump lube oil cooler did not meet the Seismic design requirements due to the missing support bracket under the cooler end bell. On 05/29/97, at 14:30, immediately following completion of operability Assessment 97-038, the SM declared the 1B SI pump inoperable and entered Limiting Condition for Operation Action Requirement (LCOAR) 1BOS 5.2-1a due to the operability assessment recommendation that the pump be declared inoperable. Due to the lube oil cooler missing the support bracket, the installed configuration did not meet its seismic design requirements. This event is reportable per 10CFR50.73(a)(2)(iii)(B)- any condition that was outside the design basis of the plant.

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

**B. DESCRIPTION OF EVENT (cont.)**

On 05/31/97, at 22:29, Unit 1 was shutdown and entered mode 4 due to unrelated problems with Main Steam Isolation Valve (MSIV) 1A. LCOAR 1BOS 5.2-1a on the 1B SI pump was exited because Unit 1 was no longer in a mode of operation requiring the LCOAR on the 1B SI pump.

On 06/01/97, the 1B SI pump lube oil cooler support bracket was replaced and work request 970060301-01 was completed, while unit 1 was shut down for repairs on the 1A MSIV.

During the investigation, it was determined that Limiting Condition for Operation (LCO) 3.4-10.c, the Technical Specification covering the structural integrity of ASME code class 3 components was applicable, but the action requirement LCOAR 1BOS 4.4-10.c was not entered. The action requirement states to restore the structural integrity of the affected component to within its limit or isolate the affected components from service. The component was not isolated from service as directed by the action statement and restoration of the component, the support bracket, did not occur until three days after the condition had been identified. The recommendation from Operability Assessment 97-038 was to declare the 1B SI pump inoperable. After reviewing the Operability Assessment with the SEC Station Support Engineer, the Shift Manager declared the 1B SI pump inoperable based on the recommendation of the Operability Assessment. This event is reportable per 10CFR50.73 (a)(2)(i)(B) - any operation or condition prohibited by the plant's Technical Specification.

A review of historical work packages and work history for the 1B SI pump lube oil cooler (1SI01SB) identified five (5) occasions where work had been performed on the lube oil cooler. The work history identified one (1) occasion where a high probability exists that the support brackets could have been removed. The work history and work packages did not reveal any documented removals or installations of the lube oil cooler support brackets and bolting. The last work request, 960103424-01, which was used to perform work on the lube oil cooler, was completed on 02/25/97. Work request 960103424-01 was the only work request where the revised work instruction makes any mention of re-bolting the cooler to the support base. The work instructions were revised for the installation of the support bracket on the opposite end bell of the cooler. Interviews with the lead worker and job supervisor determined that the missing lube oil cooler support bracket was not removed during the work performed on the lube oil cooler under work request 960103424-01. The basis for this conclusion is the mechanics detailed memory of the job and the fact that the scope of the work did not include or require the removal of the support bracket to disassemble, inspect and reassemble the lube oil cooler. Additionally, the inlet and outlet end bell was not moved or disconnected from the SX cooling water piping.

The next previous work request 950104787-01, for work on the 1B SI pump lube oil cooler did not mention the removal or installation of the support brackets. Because the inlet and outlet end bell was not moved or disconnected from the SX cooling water piping, a high probability exists that the support bracket was not removed during the performance of work request 950104787-01 on 03/19/96. The basis for this determination was the support bracket is bolted to the bottom of the end bell. The support bracket is somewhat difficult to remove, is out of the way of the work and would have been outside of the scope of work needed to disassemble, inspect and reassemble the lube oil cooler. The probability that the lube oil cooler support bracket was removed during the performance of the work performed on work request 950104787-01 is very low.



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**B. DESCRIPTION OF EVENT (cont.)**

The highest probability exists that the missing support bracket was not reinstalled during preventive maintenance on the lube oil cooler on 05/19/94. Historical work request 930019915-01 indicates that the complete lube oil cooler was removed for cleaning and later installed. Complete removal of the cooler would have required the unbolting of the lube oil cooler support brackets from the end bells. The possibility exists that the support brackets were unbolted from the floor and taken with the lube oil cooler back to a cleaning area and then unbolted from the end bells. Additionally, when the lube oil cooler was reinstalled, the support bracket under the inlet and outlet end bell may not have been reinstalled. If the piping flanges had been connected first, the cooler would have appeared correctly positioned and the support bracket may have been overlooked. The historical information does not document the removal or installation of the support brackets, but interviews with the lead worker determined this suggested sequence could have occurred.

The next two (2) previous historical work requests, 930015591-01 performed on 06/15/93, and 900021343-01 performed on 07/02/91, indicate that the inlet and outlet end bell was not removed or unbolted from the essential service water piping. The reason for not unbolting the end bell from the essential service water piping was the support u-bolts were welded. By not removing the inlet and outlet end bell from the essential service water piping, the removal of the support bracket would not have been required or within the scope of the work. No documentation exists in the work packages that would indicate the support bracket had been removed or installed. Interviews with the lead workers did not provide any information that the support was left off during the performance of either of the work requests. Due to the extensive amount of time that has elapsed since the work was performed, workers were not able to recall the jobs with any certain detail. Based on the fact that the removal of the support bracket would have been outside the scope of the work and would have required considerable additional effort to remove, there is some probability that the support bracket was removed and not reinstalled during work performed on work requests 930015591-01 and 900021343-01.

A process analysis was performed to evaluate the maintenance procedures and processes used during repair and preventive maintenance of the 1B SI pump lube oil coolers. The analysis identified three significant maintenance work process deficiencies that most probably contributed to the lube oil cooler support bracket missing. The failure to document the removal and installation of the lube oil cooler support brackets was the most significant process deficiency that would have contributed to the event. By not documenting the removal and installation of the support brackets, no tracking mechanism exists to refer to or check that all removals were reinstalled. The second most significant process deficiency identified was the lack of post maintenance walk down and inspection criteria. The post maintenance verifications that were performed, only ensured no water leaks from the cooler. Post maintenance inspections and verifications did not identify the missing support bracket. Inspection and verification criteria did not include verifying all parts and equipment had been properly installed prior to placing the equipment back into operation. The third process deficiency that was identified was that no direction had been provided to maintenance personnel for the removal and installation of the lube oil cooler support brackets. The work instruction did not address or direct the removal and installation of support brackets. The removal and installation of equipment support brackets should be directed, even though the work is considered craft capability. By directing the removal and reinstallation of related equipment, a clearer scope of the job is presented and the boundaries of the job are better defined for testing, inspections and future reference.

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B. DESCRIPTION OF EVENT (cont.)

A task analysis was performed and determined the jobs had not been adequately prepared and planned. All the jobs required some degree of work instruction revision even though the work activity was preventive maintenance type work and had been previously performed. Three (3) of the five (5) jobs required work stoppages and work instruction revisions to delete the removal of the essential service water piping flanges and to leave the inlet and outlet end bell in place rather than unbolt and move the end bell. The fact the work could not be performed without revising the work instruction validates the fact the work instruction was inadequate for performing the work. Additionally, the work stoppages and delays that occurred due to the need to revise the work instruction strongly suggests some worker distraction most probably existed during the course of the jobs and that the work instruction was not adequately reviewed by the job supervisors.

Interviews conducted with the workers indicated the jobs had not been adequately planned, that confusion had existed as to the actual scope of the work. Additionally, the scope of the jobs had changed while the work was in progress, which was evident by the revised work packages. The interviews with the workers validated the inadequacies identified in the work package preparation and job planning could have also contributed to the missing lube oil pump support bracket.

The results from event and causal factor charting were used to additionally validate the sequence of events from the historical information obtained from the work request history. The conclusion drawn from the event and causal factor charting was work request 930019915-01 completed on 05/19/94 had the highest probability of removing and not installing the missing 1B SI pump lube oil cooler support bracket. The determining factor for this conclusion was based on the sequence of steps that would have been required for the complete removal of the lube oil cooler. Work requests 960103424-01, 950104787-01, 930015591-01 and 900021343-01 did not require the lube oil cooler end bell to be moved or unbolted from the support bracket and would not have had the needed sequence of steps to remove the support bracket. Work request 93001915-01 removed the complete lube oil cooler and would have most probably contained the needed steps to remove the lube oil cooler support bracket. The complete lube oil cooler removal provided the opportunity to leave off the support bracket.

Interviews conducted with the Mechanical Maintenance Supervision and workers, and review of historical work packages for Safety Related lube oil cooler preventive maintenance, provided insight used to further validate the following process deficiencies. Work instruction and maintenance procedures used to direct the work activities for disassembly, cleaning and re-assembly of lube oil coolers do not address the removal and installation of support brackets. Removal and installation of the lube oil cooler support brackets is considered a craft skill activity by maintenance supervision, which lead them to be of the opinion that direction to perform the activity and documentation of the activity were not required. Therefore maintenance supervision has not required documentation of the removal and installation of the cooler support brackets. Work request post maintenance verifications for lube oil cooler preventive maintenance historically have not included adequate inspection criteria to verify the oil cooler installations met all the requirements at the completion of the work.

(4-95)

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## B. DESCRIPTION OF EVENT (cont.)

The area where the missing support bracket once rested on the pump bed plate was painted differently than the surrounding area, indicating the bracket had been removed since the last time the equipment and area had been painted. A review of historical data did not identify any documentation that would provide the time frame when the equipment or area was last painted. Interviews with the painting supervisors determined that only touchup painting activities have been performed in the 1B SI pump room for approximately five to six years. Information from the Station painting supervisors additionally validates and supports the probability the missing support bracket was inadvertently not reinstalled during preventive maintenance on the lube oil cooler on 05/19/94 on work request 930019915-01. The difference in the paint validates the support bracket had been originally installed. Additionally, information from the painting supervisors helped validate the probability as being slight that the support bracket most probably was missing after work was performed on work requests 930015591-01 and 900021343-01, because the room most likely had been painted after that time frame.

The event was analyzed for human performance issues that may have contributed to the support bracket not being reinstalled. Except for the fact that the support bracket obviously was not reinstalled after it had been removed, no worker human performance inappropriate actions were identified as probable contributing causes. The investigation did not determine why the workers did not recognize the missing support bracket while reassembling the cooler since the work is considered craft capability. Additionally, the investigation did not identify why the missing support bracket was not identified by the workers as missing during the two work requests that were completed after the support bracket was postulated to not have been reinstalled. Worker training records and qualifications were reviewed and it was determined that the lead workers who had been assigned to worked on the 1B SI pump lube oil cooler did meet the training requirements and were considered to be fully qualified prior to performing work on the cooler. Procedures and work instruction that were used to perform the work appeared to have been followed as written. The analysis determined that three inappropriate management actions were apparent throughout the investigation. The first inappropriate action was overconfidence. Overconfidence was evident in all five of the related work requests when management did not provide for or require documenting the removal and installation of the cooler support brackets and did not provide specific post maintenance verification inspection requirements. Management felt overly confident that due to the simplicity of the work documenting the support bracket removals was not required. The second inappropriate management action was tunnel vision. Tunnel vision was apparent throughout the investigation when management presumed that since the removal and installation of the support brackets was considered craft capability, that there was no need to provide work instruction directing the activity. Additionally, management presumed that since the work was simple in nature that specific post maintenance verification inspection criteria was not required to ensure the lube oil coolers were properly installed. The third inappropriate management action was on the job distractions. On the job distractions occurred each time the jobs were stopped for work instruction revisions and a change in the scope of the jobs. Management did not ensure the jobs were adequately planned and repeated the same errors in work package development and planning for three of the five times the 1B SI pump lube oil cooler was worked on.

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**B. DESCRIPTION OF EVENT (cont.)**

Due to the lack of documentation related to the removal and installation of the lube oil cooler support brackets the actual time of the event when the support bracket was removed and not reinstalled could not be unequivocally determined. However, through the use of task analysis, cause and effects analysis, events and causal factor charting, interviewing and by using the highest probability of when the event occurred a reasonable conclusion has been determined. This investigation has concluded the 1B SI Pump Lube Oil Cooler Support Bracket, most probably was not installed during preventive maintenance on the cooler under work request 930019915-01 on 05/19/94. Based on the conclusion of this investigation, that the 1B SI pump lube oil cooler bracket has been missing since 05/19/94, the B train 1B SI pump is considered to have been inoperable between 05/19/94 and 05/29/97. Additionally, the A train 1A SI pump was inoperable eleven (11) times for a total duration of 2.56 days during the period between 05/19/94 and 05/29/97. This event is reportable per 10CFR50.73 (a)(2)(i)(B) - any operation or condition prohibited by the plant's Technical Specification. Due to the lack of specific historical information available related to the missing support bracket and extensive analysis that was required to arrive at a reasonable determination for the causes of this event, it is the stations opinion that further investigative efforts would not provide any benefit. Therefore, no further action is planned to determine the root cause of this event beyond those causes that were concluded by this investigation.

**C. CAUSE OF EVENT:**

The cause of this event is unknown, but based on the results of this investigation; several maintenance work process deficiencies were identified that most probably contributed to the 1B SI Pump Lube Oil Cooler Support Bracket not being installed. Additionally, three underlying management human performance deficiencies were identified that most probably contributed to the maintenance work process deficiencies. The lack of documentation for the removal and installation of the Lube Oil Cooler Support Brackets was identified as a major process deficiency. The lack of post maintenance verification and inspection criteria was an identified deficiency. A lack of written instruction to the workers performing the removal and installation of the Lube Oil Cooler Support Brackets was an identified process deficiency. Inadequate planning and workability reviews prior to starting work were also identified as contributing process deficiencies.

The management human performance deficiencies identified as the most probable underlying causes for the maintenance process deficiencies were overconfidence, tunnel vision and on-the-job distraction.

The cause of the missed LCOAR entry on the structural integrity Technical Specification was a human performance error described as tunnel vision occurred at this point between the Shift Manager and the SEC Station Support Engineer. The Shift Manager and the SEC Station Support Engineer both recognized the fact that a structural support bracket was missing, but did not perceive the applicability of LCO 3.4-10.c due to the specific recommendation that was identified by the Operability Assessment.



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**D. SAFETY ANALYSIS:**

With the 1B safety injection pump lube oil cooler support bracket missing from the inlet and outlet end of the cooler, the connected essential service water (SX)[BI] piping was required to support the one end of the cooler. This configuration did not meet the seismic design requirement for the lube oil cooler. In the case of a seismic event, the probability existed that the SX piping supporting the lube oil cooler would have broken and failed, causing a loss of cooling water to the 1B SI pump lube oil cooler. If the 1B SI pump was required to operate and the SX piping had failed, the resultant loss of cooling water to the lube oil cooler would have caused the 1B SI pump bearing lube oil temperature to elevate. The continued rise in the 1B SI pump bearing lube oil temperature would have caused the failure of the B train 1B SI pump bearings and pump. Except for eleven (11) occasions when the A train 1A SI pump was inoperable between 04/19/94 and 05/29/97, for a total duration of 2.56 days, the A train 1A SI pump would have been available to provide core cooling in the event of an accident requiring a Safety Injection. In addition, the Residual Heat Removal [BP] and Chemical Volume Control [CB] pumps would also have been available. No significant seismic activity occurred at Byron Station during the period of time the support bracket is assumed to be missing. However, the calculated loss of Essential Service Water that would have occurred due to the failure of the SX piping connected to the lube oil cooler following a seismic event was approximately 125 GPM. It is assumed that operators would have taken action in a reasonable amount of time (30 minutes) to isolate flow to the 1A SI pump lube oil cooler prior to a significant degradation of the SX system inventory.

No equipment failure resulted from this event. This event did not adversely affect any other system nor the operator's ability to maintain safe reactor plant conditions. Therefore, there were no adverse consequences to the health and safety of the general public or plant personnel as a result of this event.

**E. CORRECTIVE ACTIONS:**

- 1.) The model work requests for all oil cooler cleaning, inspection and preventive maintenance will be revised to provide necessary direction. The work requests will also provide documentation for the removal and installation of support brackets. The revised work instruction will ensure anytime support brackets are removed, the removal and reinstallation is documented on the work request. Additionally, the revised work instruction will provide the worker with a better scope of the work to be performed and the reviewers with a better scope of what the work included. NTS 454-180-97-SCAQ00011-01 will track the revision of the model work requests.
- 2.) The model work requests for all oil cooler cleaning, inspection and preventive maintenance will be revised to include post maintenance verification (PMV) criteria to inspect the equipment worked on for completeness of installation. This additional post maintenance verification inspection will provide the maintenance supervisors with the direction to inspect completed work for completeness of installation. (NTS 454-180-97-SCAQ00011-02)
- 3.) The Maintenance Superintendents will review this report with their respective maintenance departments. The Maintenance Superintendents will emphasize the human performance deficiencies that were identified as contributing to this event, during the review of the event with their departments. The event review should be performed to strengthen the supervisors and workers level of comprehension in identifying human performance deficiencies as the underlying causes for the existence of the process deficiencies. (NTS 454-180-97-SCAQ00011-03, 04 and 05)

NRC FORM 360A. (4-95)		U.S. NUCLEAR REGULATORY COMMISSION	
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TEXT (If more space is required, use additional copies of NRC Form 360A) (17)

E. CORRECTIVE ACTIONS (cont.)

- 4.) A new five-week work process was implemented independently from this event on 05/27/97. The work control process procedure BAP 1750-7 has been revised to include the new five-week work process and now requires pre-job planning and a job workability review three (3) weeks prior to the performance of a job. The job supervisor and/or the lead worker that are scheduled for assignment of the work now perform the workability reviews 3 weeks prior to the start of the work. The pre-job planning and workability reviews are designed to identify inconsistencies between the proposed scope of the work and what is actually required to perform the work. Work packages are then revised accordingly prior to the jobs being issued to the workers. The five week work process will significantly reduce work stoppages, reduce confusion concerning the scope of the jobs and will improve work continuity, which were also considered to be contributing causes for this event.
- 5) This event will be reviewed during SRO re-qualification training to emphasize the applicability of related Technical Specifications when determining equipment operability due to structural component deficiencies. (NTS 454-180-97-SCAQ00011-06)

F. RECURRING EVENTS SEARCH AND ANALYSIS:

Data base searches for industry events were performed using the key words "cooler", "support" and "bracket". There were no occurrences identified of missing cooler support brackets.

A search was performed using the "ALRA" data base, the key words "support and bracket and missing" were used, 59 documents were identified. One other occurrence was identified where a support bracket on a diesel engine jacket water cooler was found missing, at another COMED Nuclear Generating Station in 1996. The event could have provided an opportunity to identify the missing support bracket on the 1B SI pump lube oil cooler, if an inspection would have been performed on all the Safety Related coolers in the plant for missing support brackets. No action was taken to institute a inspection of that magnitude due to the resource requirements and the low probability that a similar situation would be found at Byron Station.

An additional search was performed using the "ALRA" data base and the key words "cooler and support and missing" were used, 19 documents were identified. No events were identified where cooler support brackets were found missing.

G. COMPONENT FAILURE DATA:

No component failure occurred.