

Indian Point 3
Nuclear Power Plant
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**New York Power
Authority**

William A. Josiger
Resident Manager

April 5, 1993
IPN-93-018

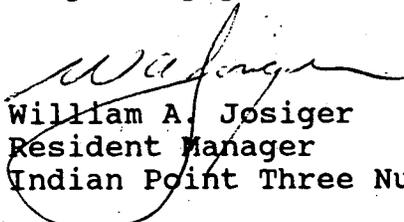
Docket No. 50-286
License No. DPR-64

Document Control Desk
Mail Station PI-137
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Sir:

The attached Licensee Event Report LER 93-005-01 is hereby submitted in accordance with the requirements of 10CFR50.73. This event is of the type defined in the requirements per 10CFR50.73 (a)(2)(ii)(B). The commitments made by the Authority are listed in Attachment 1.

Very truly yours,


William A. Josiger
Resident Manager
Indian Point Three Nuclear Power Plant

waj/fp
Attachments

cc: Mr. Thomas T. Martin
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LIST OF COMMITMENTS MADE IN LETTER IPN-93-018

<u>COMMITMENT #</u>	<u>DESCRIPTION</u>	<u>DATE DUE</u>
IPN-93-018-1	The I&C department will revise Administrative Directive IC-AD-8, "Work Processing" to require that all vendor performed work is properly documented.	4/15/93
IPN-93-018-2	A cautionary note will be included in AMSAC surveillance test 3PT-SA-31 which will require the user to retest the system if any repair or modification to the AMSAC logic or hard drive is required.	4/16/93
IPN-93-018-3	Dynamic testing of the AMSAC system will be included in surveillance test 3PT-SA31 to assure that this test is performed twice a year.	4/16/93
IPN-93-018-4	The FSAR will be revised to reflect that portions of the AMSAC system are classified as Category M. The FSAR will be revised in the 1993 FSAR update.	7/22/93
IPN-93-018-5	An administrative operational specification that will provide reportability guidance and limiting conditions for operation, in the event AMSAC is found inoperable in the future, will be approved for use.	4/15/93
IPN-93-018-6	Prior to the plant achieving criticality the AMSAC system will be restored to full compliance with our commitments to 10 CFR 50.62.	Mid-May

LIST OF COMMITMENTS MADE IN LETTER IPN-93-018

<u>COMMITMENT #</u>	<u>DESCRIPTION</u>	<u>DATE DUE</u>
IPN-93-018-7	Revision 3 to this LER (LER 93-005) will be submitted. This revision is required to include a completed safety significance study. The study will be developed to determine the safety significance of the misplaced 40 second time delay event in conjunction with the actuation timer deficiency. The study will also consider the safety significance of the time period in which only one of the motor driven ABFPs was considered operable.	6/15/93

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Indian Point Unit 3	DOCKET NUMBER (2) 0 5 0 0 0 2 8 6 1	PAGE (3) 1 OF 0 9
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TITLE (4)
Missed Periodic Inservice Tests and Faults in AMSAC System Logic, Due to Personnel Error, Bring Into Question the Operability of the AMSAC System

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 NAMES			DOCKET NUMBER(S)											
1	2	3	1	9	2	9	3	0	0	0	5	0	1	0	4	0	5	9	3				0 5 0 0 0

OPERATING MODE (9) **N**

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

POWER LEVEL (10) 1 0 0	20.402(b)	20.406(e)	60.73(a)(2)(iv)	73.71(b)
	20.406(a)(1)(i)	60.36(c)(1)	60.73(a)(2)(v)	73.71(c)
	20.406(a)(1)(ii)	60.36(c)(2)	60.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
	20.406(a)(1)(iii)	60.73(a)(2)(iii)	60.73(a)(2)(viii)(A)	
	20.406(a)(1)(iv)	<input checked="" type="checkbox"/> 60.73(a)(2)(ii)	60.73(a)(2)(viii)(B)	
	20.406(a)(1)(v)	60.73(a)(2)(iii)	60.73(a)(2)(a)	

LICENSEE CONTACT FOR THIS LER (12)

NAME Federico Perdomo, Licensing Engineer	TELEPHONE NUMBER 9 1 4 7 3 6 8 0 2 9
AREA CODE	

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDOS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPDOS

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE) NO

EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single space typewritten lines) (16)

On December 31, 1992, with the reactor at 100 percent power, a time delay in the Anticipated Transient Without Scram (ATWS) Mitigation System Actuation Circuitry (AMSAC) logic failed to operate during the performance of a surveillance test. Due to the 40 second time delay event, the AMSAC system did not meet the requirements of the ATWS rule (10 CFR 50.62) from August 3, 1992 through January 12, 1993. During the investigation of the time delay event, on February 26, 1993, with the reactor at 97 percent power, the Authority reported that certain AMSAC system periodic inservice tests had not been performed for the last two refueling outages. A unit shutdown was initiated the same day (February 26, 1993) to correct the periodic inservice test issue. Subsequently, on March 5, 1993, with the reactor at hot shutdown, the I&C department discovered that the AMSAC actuation timer did not lock in the power level from which it was activated. A safety significance study will be provided in a revision to this LER which will serve to determine if the actuation timer design deficiency entailed non-compliance with the ATWS rule. The cause of these separate events is attributed to human error. Various corrective action steps have been developed to address the human error causal factor. Prior to the plant achieving criticality the AMSAC system will be restored to full compliance with our commitments to 10 CFR 50.62.

FACILITY NAME (1) Indian Point Unit 3	DOCKET NUMBER (2) 0 5 0 0 0 2 8 6	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		9 3	0 0 5	0 1	0 2	OF	0 9

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

DESCRIPTION OF THE EVENT

On December 31, 1992, with the reactor at 100 percent power, a 40 second time delay in the Anticipated Transient Without Scram (ATWS) Mitigation System Actuation Circuitry (AMSAC) (JG) logic failed to operate during a semi-annual surveillance test being performed by an I&C technician. This time delay fault could have prevented the automatic start of the motor driven AFW pumps during an ATWS event. On January 12, 1993 I&C Engineering and Foxboro (vender for AMSAC) field personnel determined that this failure was caused by AMSAC system software manipulations which took place during corrective maintenance on July 8, 1992 (corrective maintenance consisted of performing troubleshooting activities using surveillance test 3PT-SA31). A Foxboro field engineer inadvertently misplaced the subject 40 second time delay in the software logic during the July 8, 1992 corrective maintenance. The misplaced time delay went undetected until the December 31, 1992 surveillance test was performed. On January 12, 1993, the 40 second time delay was placed in the appropriate software location, the system was tested satisfactorily, and declared operable.

At 2250 hours on February 26, 1993, in response to the NRC Resident's questions, and with the reactor at 97 percent power, the Authority reported that certain AMSAC system periodic inservice tests had not been performed in accordance with the required frequency. A unit shutdown was initiated at 2300 hours on February 26, 1993 to correct these findings. As a result of the Authority's extensive review of the AMSAC system design during this shutdown, the I&C department discovered a design deficiency with the actuation timer. At 1233 hours on March 5, 1993, with the reactor at hot shutdown and during dynamic testing, the I&C department discovered that the AMSAC actuation timer did not lock in the power level from which it was activated.

INVESTIGATION OF THE EVENT

On May 12, 1992, semi-annual surveillance test 3PT-SA31 failed due to an AMSAC system hard drive failure and the hard drive was subsequently returned to Foxboro for repair. Along with the defective hard drive, a Foxboro field technician sent an uncontrolled configuration diskette ("save all disk") that was loaded onto the hard drive once it was repaired. The uncontrolled "save all disk" contained software logic which caused the system to reboot (load logic from hard drive to active memory) improperly during the performance of the July 8, 1992 corrective maintenance.

FACILITY NAME (1) Indian Point Unit 3	DOCKET NUMBER (2) 0 5 0 0 0 2 8 6	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		9 3	0 0 5	0 1	0 3	OF	0 9

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

The July 8, 1992 corrective maintenance results were satisfactory until the performance of a step which verifies that AMSAC will reboot properly and not send a trip signal when power is turned off and restored. When this step was performed, AMSAC did not reboot properly and sent a trip signal when power was restored to it. In order to remedy this situation, the Foxboro field engineer manipulated the AMSAC system software so that the system would reboot properly. This manipulation was successful and the test was continued with no further complications. During this software manipulation the 40 second time delay was inadvertently misplaced in the software logic. Subsequently, on August 3, 1992, at the end of the 8/9 refueling outage, the unit went critical. According to plant operating procedures, the AMSAC system is required to be ready for service prior to criticality.

The event date is December 31, 1992 when a time delay in the AMSAC logic failed to operate during the performance of a surveillance test. On January 12, 1993 I&C Engineering and Foxboro field personnel determined the cause of failure. However, it was on January 26, 1993 that licensing personnel determined that the failure was reportable. Licensing determined that because the AMSAC system was in a state of degraded operability from August 3, 1992 through January 12, 1993 it did not meet the reliability requirements of the ATWS rule (10 CFR 50.62) during this time period. This was reported to the Commission pursuant to 10 CFR 50.72(b)(1)(ii)(B).

The AMSAC system is non-safety related but portions are classified as Category M because a commitment has been made to the Commission that AMSAC equipment will be treated under a Quality Assurance (QA) program that is consistent with and satisfies the guidance contained in Generic Letter 85-06. Investigation of this event revealed that the Final Safety Analysis Report (FSAR) and the Plant Equipment Data Base (PEDB) do not reflect that portions of AMSAC are classified as Category M. This condition was not a direct contributor to the occurrence of this event. However, these documents will be updated as indicated in the corrective actions.

In response to the NRC Resident Inspector's questions, the Authority began a review to determine if all periodic inservice test commitments were being addressed. Subsequently, on February 26, 1993 the Authority reported that certain AMSAC system periodic inservice tests had not been performed in accordance with the required frequency. Based on these findings a unit shutdown was commenced the same day. A verification that the final output devices have received an AMSAC output signal in response to a simulated AMSAC initiation signal, and calibration of narrow range feed flow and select turbine first stage pressure instrumentation, had not been performed every refueling outage as required.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1) Indian Point Unit 3	DOCKET NUMBER (2) 05000286	LER NUMBER (6)			PAGE (3)	
		YEAR 93	SEQUENTIAL NUMBER 005	REVISION NUMBER 01		

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

During the unit shutdown, the Authority conducted an extensive review of the AMSAC system design. The results of this review revealed a design deficiency with the actuation timer. The I&C department, during dynamic testing of the AMSAC software on March 5, 1993, discovered that the AMSAC actuation timer did not lock in the power level from which it was activated.

The I&C department has indicated that dynamic testing was not included in the modification acceptance testing at the time the AMSAC system was installed. Subsequent surveillance tests performed only static input changes to the system in order to derive the required system outputs. The typical static test involves adjusting input test voltages to derive a required output. The results of both the static and dynamic tests should be approximately the same for the AMSAC system. However, dynamic test results indicated that the actuation timer deficiency caused AMSAC output to be initiated after a time delay of 166 seconds at 100 percent power. The time delay is supposed to vary from 300 seconds at 40 percent power to 25 seconds at 100 percent power.

Prior to the plant achieving criticality, the AMSAC system will be restored to full compliance with our commitments to 10 CFR 50.62.

CAUSE OF THE EVENT

The cause of the misplaced 40 second time delay event was human error in that the July 8, 1992 corrective maintenance activities were improperly performed and documented. Improper documentation of the troubleshooting activities which took place led reviewers, of the corrective maintenance, to believe that the AMSAC system was operable. During the performance of the corrective maintenance (utilizing 3PT-SA31) a feature of the system failed to function as required. Software manipulations were made in order to correct the cause of failure and 3PT-SA31 was continued. The July 8, 1992 corrective maintenance activities should have been documented in detail sufficient for reviewers of the work to conclude that the system required a retest to demonstrate AMSAC operability. The results of a new retest would have served to test the AMSAC system logic and would have indicated a problem with the 40 second time delay.

A contributing factor to the misplaced time delay event was inadequate document control in that a controlled "save all disk" was not maintained for the AMSAC system. Because of this, an uncontrolled version of the disk containing faulty software logic was loaded.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1) Indian Point Unit 3	DOCKET NUMBER (2) 0 5 0 0 0 2 8 6	LER NUMBER (8)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
		9 3	0 0 5	0 1	0 5	OF 0 9

TEXT (If more space is required, use additional NRC Form 368A's) (17)

The missed periodic inservice tests were not performed according to the required frequency as a result of personnel error in that the AMSAC modification package did not adequately document the inservice testing that had been committed to in previous correspondence to the Commission.

The Authority has concluded that, as the result of personnel error, the design specifications that were provided to Foxboro did not clearly detail the specific features which the Authority required of the system. Therefore, the AMSAC actuation timer design deficiency has existed since the AMSAC system was placed in service.

CORRECTIVE ACTIONS

The following corrective actions serve to prevent recurrence of the event:

1. In addition to the existing administrative requirement that vendors/contractors perform all work in accordance with plant approved procedures, the I&C department will revise Administrative Directive IC-AD-8, "Work Processing" by April 15, 1993 to require that all vendor performed work is properly documented. The I&C department shall ensure that vendors document their actions on the notes page of work requests (WRs) prior to WR submittal for retest requirements.
2. A cautionary note will be included in the AMSAC surveillance test which will require the user to retest the system if any repair or modification to the AMSAC logic or hard drive is required. Surveillance test 3PT-SA31 will be revised before the next semi-annual surveillance test is required.
3. Administrative direction has been given to all departments that will ensure that all commitments made in correspondence with the Commission are adequately addressed, tracked, and implemented. This "directive" serves to prevent recurrence of an event such as the missed AMSAC system periodic inservice tests. The commitment had been made in previous correspondence to the Commission that we would perform the subject inservice tests. However, the AMSAC installation modification did not capture this commitment. The subject administrative direction will assure that such commitments are appropriately addressed in the future.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1) Indian Point Unit 3	DOCKET NUMBER (2) 0 5 0 0 0 2 8 6	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		9 3	0 0 5	0 1	0 6	OF	0 9

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

4. On March 25, 1993 the I&C department resubmitted the original design specifications to the Foxboro company along with clarifications detailing the specific features which the Authority requires of the AMSAC system. This action will serve to address the actuation timer design deficiency and will also establish the final design of the system.
5. Dynamic testing of the AMSAC system will be included in surveillance test 3PT-SA31 to assure that this test is performed twice a year. The surveillance test will be approved for use by April 16, 1993.

The following corrective actions do not prevent recurrence but are required:

1. The AMSAC system software is now currently being maintained as controlled "documents".
2. The FSAR will be revised to reflect that portions of the AMSAC system are classified as Category M. The FSAR will be revised in the 1993 FSAR update which is due July 22, 1993. Also, the Plant Equipment Database has been updated to reflect the proper QA classification of all related AMSAC system components.
3. An administrative operational specification that will provide reportability guidance and limiting conditions for operation, in the event AMSAC is found inoperable in the future, will be approved for use by April 15, 1993.
4. Surveillance Test 3PT-R145, "AMSAC System Functional Test" was written to ensure that: the AMSAC logic will generate a trip signal to all applicable final actuation devices; all instruments providing inputs to AMSAC have been calibrated; and signals from these instruments are provided to the AMSAC cabinet. This test was successfully performed on 2/28/93 indicating that all tested functions are operable.

ANALYSIS OF THE EVENT

Due to the misplaced time delay discrepancy the AMSAC system was in a state of degraded operability from August 3, 1992 through January 12, 1993. The AMSAC system did not fully meet the requirements of the ATWS rule during this specified time period. This event is reportable under 10 CFR 50.73 (a)(2)(ii)(B) because the degraded operability of the AMSAC system placed the plant outside its design basis.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1) Indian Point Unit 3	DOCKET NUMBER (2) 0 5 0 0 0 2 8 6	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
		9 3	— 0 0 5	— 0 1	0 7	OF	0 9

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

The additional deficiencies which were identified during the investigation of the misplaced time delay event are also reportable pursuant to 10 CFR 50.73 (a)(2)(ii)(B). Due to the missed periodic inservice tests the AMSAC system was inoperable since the end of the 7/8 refueling outage (12/23/90). The actuation timer design deficiency indicates that the function of the AMSAC system is in question since the system was placed in service (June 12, 1989). A safety significance study will be provided in a revision to this LER which will serve to determine if the actuation timer design deficiency entailed non-compliance with the ATWS rule.

SAFETY SIGNIFICANCE

The AMSAC system provides an alternate means of tripping the turbine and actuating auxiliary feedwater (AFW) flow apart from the reactor protection system (RPS). The RPS has been operable for the entire time period in which the AMSAC has been placed in service.

The misplaced time delay may have prevented the automatic initiation of the motor driven AFW pumps during an ATWS event. However, AMSAC would have provided the required alarms and performed all other automatic functions including tripping the main turbine generator, isolating the steam generator blowdown and sample valves, and providing a start signal to the turbine driven auxiliary feedwater pump (with manual throttling).

In the unlikely event that both trains of RPS had failed and AMSAC activation had been called upon, the combination of the AMSAC alarm and the guidance in Emergency Operating Procedure (EOP) FR-S.1, "Response to Nuclear Power Generation/ATWS" would ensure that the operators manually started the AFW pumps. One of the immediate action steps mandated by this EOP is to check that both motor driven auxiliary feedwater pumps are running. The immediate action step also requires the operator to manually start the steam driven Auxiliary Boiler Feedwater Pump (ABFP) if either motor driven pump will not start.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1) Indian Point Unit 3	DOCKET NUMBER (2) 0 5 0 0 0 2 8 6	LER NUMBER (6)			PAGE (3)	
		YEAR 9 3	SEQUENTIAL NUMBER 0 0 5	REVISION NUMBER 0 1	0 8	OF 0 9

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

As reported in LER 93-004, the steam driven ABFP (800 gallon per minute capacity) was inoperable from December 3, 1992 through December 29, 1992. The LER also reported that the cumulative time a second ABFP (motor driven) was considered inoperable was 71 hours and 22 minutes. For the majority of this time (71 hours and 15 minutes) the second ABFP was considered solely inoperable because its emergency power source was considered inoperable due to testing. Had an ATWS occurred during this time frame, it would have been possible to power the motor driven ABFP using offsite power. However, offsite power would not have been available if the ATWS event was originally a loss of offsite power that was accompanied by failure of the reactor trip system to shut down the reactor. Therefore, if an ATWS involving loss of offsite power would have occurred from December 3, 1992 through December 29, 1992 only one motor driven auxiliary feedwater pump would have been operable with a capacity for delivering 400 gallons per minute. For the worst case ATWS event the requirement is to provide 680 gallons per minute of auxiliary feedwater.

The safety significance of having missed certain periodic inservice tests is that certain AMSAC functions and instrument calibrations have not been verified for the last two refueling outages. A verification that the final output devices have received an AMSAC output signal in response to a simulated AMSAC initiation signal, and calibration of narrow range feed flow and select turbine first stage pressure instrumentation, has not been performed for the last two refueling outages. As indicated in the corrective actions, surveillance test 3PT-R145 was developed and performed successfully indicating that the subject AMSAC functions were operable and instrument calibrations were properly calibrated. The calibration of the feedwater flow and first stage turbine pressure transmitters revealed that three out of the four flow transmitters and both of the pressure transmitters were within calibration requirements.

The safety significance of the misplaced time delay in conjunction with the actuation timer deficiency is being developed by the Authority and will be provided to the Commission by June 15, 1993 in a revision to this LER. This safety significance study will also consider the safety significance of the operability issue with the ABFPs mentioned above.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1) Indian Point Unit 3	DOCKET NUMBER (2) 0 5 0 0 0 2 8 6	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
		9 3	— 0 0 5	— 0 1	0 9	OF 0 9

TEXT (If more space is required, use additional NRC Form 306A's) (17)

SECURING FROM THE EVENT

On January 12, 1993, the 40 second time delay was placed in the appropriate software location, the system was tested satisfactorily, and had been declared operable. However, during the investigation and design review of this event, the Authority concluded that certain AMSAC system periodic inservice tests had not been performed and also discovered a design deficiency with the AMSAC actuation timer. Due to this situation the AMSAC system has not yet been declared operable. The AMSAC system will be verified operable prior to the plant achieving criticality.