Wisconsin Electric
POWER COMPANY

231 W Michigan, P.O. Box 2046, Milwaukee, WI 53201 (414) 221-2345

VPNPD-92-077 10 CFR 50.73
NRC-92-022

February 18, 1992

U.S. NUCLEAR REGULATORY COMMISSION
Document Control Desk
Mail Station P1-137
Washington, DC 20555

Gentlemen:

DOCKET 50-266
LICENSEE EVENT REPORT 92-001-00
TURBINE RUNBACK CAUSED BY
IMPROPER POST-MAINTENANCE TESTING
POINT BEACH NUCLEAR PLANT, UNIT 1

Enclosed is Licensee Event Report 92-001-00 for Point Beach Nuclear Plant, Unit 1. This report is being filed in accordance with 10 CFR 50.73(a)(2)(iv), "Any event or condition that resulted in the manual or automatic actuation of any Engineered Safety Feature (ESF), including the Reactor Protection System (RPS)" and 10 CFR 50.73(a)(2)(i)(B), "Any operation or condition prohibited by the plant's Technical Specifications." This report describes a turbine runback that occurred on January 20, 1992, as a result of improper post-maintenance testing on a 4160 volt tie breaker.

Please contact us if there are any questions.

Sincerely,

James Zach

James J. Zach
Vice President
Nuclear Power

Enclosure

Copies to NRC Regional Administrator, Region III
NRC Resident Inspector

IE22
1/1

NRC Form 366 (9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES 8/31/85

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Point Beach Nuclear Plant, Unit 1	0 5 0 0 0 2 6 6	1 OF 1 0

TITLE (4): Turbine Runback Caused by Improper Post-Maintenance Testing

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)
0 1	2 0	9 2	9 2	0 0 1	0 0	0 2	1 8	9 2		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9): N

POWER LEVEL (10): 1 0 0

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

[ ]	20.402(b)	[ ]	20.405(c)	[X]	50.73(a)(2)(iv)	[ ]	73.71(b)
[ ]	20.405(a)(1)(i)	[ ]	50.36(c)(1)	[ ]	50.73(a)(2)(v)	[ ]	73.71(c)
[ ]	20.405(a)(1)(ii)	[ ]	50.36(c)(2)	[ ]	50.73(a)(2)(vii)	[ ]	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
[ ]	20.405(a)(1)(iii)	[X]	50.73(a)(2)(i)	[ ]	50.73(a)(2)(viii)(A)		
[ ]	20.405(a)(1)(iv)	[ ]	50.73(a)(2)(ii)	[ ]	50.73(a)(2)(viii)(B)		
[ ]	20.405(a)(1)(v)	[ ]	50.73(a)(2)(iii)	[ ]	50.73(a)(2)(x)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
Norm L. Hoefert, Manager - Operations	AREA CODE 414 755-2321

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)

[ ] YES (If yes, complete EXPECTED SUBMISSION DATE) [X] NO

EXPECTED SUBMISSION DATE (15): MONTH | DAY | YEAR

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

ABSTRACT

At 1353 on January 20, 1992, with both units operating at 100% reactor power, an automatic runback of the Unit 1 turbine occurred. The turbine runback was initiated as a result of the actuation of rod bottom bistables which generated a rod bottom signal. The actuation of the bistables occurred when power was lost to the rod position indication (RPI) circuitry due to the loss of 1B03, a 480 volt safeguards bus. Actuation of the rod bottom bistables caused a turbine runback to occur. The runback also resulted in the axial flux difference being out of band for seventeen minutes by computer indication. This is a violation of Technical Specification Section 15.3.10.B.2.b. Power was restored to 1B03 at 1356 and the power increase was commenced at 1359. Full power was reached at approximately 1600.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6) YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	PAGE (3)
Point Beach Nuclear Plant, Unit 1	0 5 0 0 0 2 6 6	9 2	— 0 0 1	— 0 0	0 2 OF 1 0

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

EVENT DESCRIPTION

On January 20, 1992, with both units operating at 100% reactor power, a modification was being performed on circuit breaker 1A52-61, a 4160 volt tie breaker. This tie breaker connects 1A05 and 1A06, two safeguards equipment distribution buses. The modification was being performed in order to replace the existing non-QA control power fuse block with a QA level fuse block. The installation was successfully completed. Post-maintenance testing was delayed while the work procedure was being revised. The Duty Shift Superintendent requested a revision in order to clarify the jumpering necessary to defeat the dead bus interlock, allowing the breaker to be closed in the test position. The dead bus interlock prevents the tie breaker from being closed unless one of the two bus supply breakers is open. This interlock prevents tying together two energized, independent safeguards buses. The test position of the breaker does not tie the buses together electrically.

The procedure revision required the jumper to be installed between two terminal points in cubicle 1A00-62. However, the jumper was improperly installed between two terminals in adjacent cubicle 1A52-61. Cubicle 1A52-61 is the cubicle where the modification had been performed. When the jumper was installed, nothing happened. Had a good connection been made, the run-back would have occurred at that time. After the jumper was installed, the breaker was placed in the test position, and an attempt was made to cycle the breaker. This attempt was unsuccessful because the jumper in cubicle 1A52-61 did not defeat the dead bus interlock. However, the electricians believed that a bad electrical connection was the problem. In order to verify their assumption, the electricians metered across the terminals where the jumper was installed to check for electrical continuity. At this point, good electrical contact was made, resulting in the energization of the trip coil for breaker 1A52-58, the supply breaker from 1A05 for 4160/480 volt transformer 1X13, which supplies 1B03. This caused the supply breaker to open, deenergizing the transformer and 1B03, a 480 volt safeguards bus. This, in turn, resulted in a loss of power to 1Y06, a 120 volt instrument bus that supplies power to the rod position indication circuitry. This loss of power caused the actuation of the rod bottom bistables and the generation of a rod bottom signal.

This rod bottom signal caused a 20% turbine runback to take place at 1353. The rod bottom signal-induced runback caused reactor power to decrease at a rate sufficient to actuate the negative rate runback. The turbine runback resulted in the axial flux difference exceeding allowable limits at 1354. Technical Specifications Section 15.3.10.B.2.b requires that the axial flux difference be restored within fifteen minutes. If this is not possible, reactor power must be reduced until the axial flux difference is within limits or reactor power is less than 50%. The Technical Specification also states that the plant process computer provides the alarm to inform the operators when axial flux difference is out of band. The maximum axial flux difference reached was -16% at 80% reactor power. The Technical Specification limit for axial flux difference at 80% reactor power is -13%.

Upon hearing the announcement of the turbine runback, the electricians performing the modification realized that their actions may have caused the runback. They immediately removed the jumper from cubicle 1A52-61.

Upon the termination of the turbine runback, the control room personnel noticed that all the RPIs indicated the control rods were at zero inches (fully inserted). An indication of a loss of 1B03 was also noticed. This resulted in a loss of charging and letdown flow isolation.

Loss of 1B03 requires the operators to take action to ensure that the reactor is placed in a hot shutdown condition within three hours in accordance with Technical Specifications Section 15.3.0.A. Technical Specification Section 15.3.7.A.1 requires that both B03 and B04 are energized in order to take a reactor critical.

It was determined that the loss of 1B03 resulted in a loss of power to 1Y06, which caused the actuation of the rod bottom bistables and the resultant turbine runback. 1B03 was reenergized at 1356 and all the loads which had been lost were subsequently restored. The control room personnel then attempted to restore the axial flux difference and recover from the turbine runback.

The normal method for restoring axial flux difference to within specification is to maintain turbine loading constant and borate the RCS. This allows control rod withdrawal to maintain the reactivity worth of the core. This was attempted, but the operators found that they were unable to borate through the boric acid blender via the normal path. In an effort to determine the location of the blockage, the operators attempted to add make-up water through the blender to the RCS. This was accomplished satisfactorily, which demonstrated that the blender was not blocked. The operators then successfully transferred boric acid from the "A" Boric Acid Storage Tank to the "B" Boric Acid Storage Tank. This demonstrated that the recirculation line was also unblocked. They attempted to borate the RCS using the manual boration path. They were also unable to borate the RCS via this path.

Based on this information, the operators believed that the location of the blockage was between the flow transmitter and a check valve upstream of the blender. The temperature setpoints for heat trace circuit 93, the circuit installed on this section of piping, were raised in an attempt to restore the normal and manual boration paths. In the interim, the emergency boration flow path was available. This method of borating the RCS does not provide necessary control of the boric acid that is being added to the RCS for incremental load changes. For this reason, the Duty Shift Superintendent decided not to restore the axial flux difference by emergency borating the RCS.

Instead, the Duty Shift Superintendent directed the raising of turbine load in order to restore the axial flux difference. As turbine load is raised, control rods can be withdrawn in order to increase reactor power to match the steam demand and to raise average coolant temperature to match the required reference temperature for the actual turbine load. By using this method, the axial flux difference was restored to within limits by control board indication at 1408, fourteen minutes from the actuation of the axial flux difference alarm (1354). However, the plant process computer did not update the alarm list until 1412, stating that Delta flux was back within the band. The computer indicated that the alarm condition existed for a maximum of seventeen minutes, which is a violation of Technical Specification Section 15.3.10.B.2.b.

The ability to borate via the normal and manual paths was achieved at 1533. Full power was attained at 1600 on January 20, 1992, and the required four-hour 10 CFR 50.72(b)(2) report was made at 1702. The NRC Resident Inspector was also informed of the event.

COMPONENT AND SYSTEM DESCRIPTION

The Nuclear Instrumentation System, manufactured by Westinghouse, consists of four power range channels designated N41 through N44. Each channel has a dual section uncompensated ion chamber to monitor neutron flux in its associated quadrant of the core. This dual section configuration produces two separate detector signals. The "A" signal is proportional to the power generated in the upper half of the core, and the "B" signal is proportional to the power generated in the lower half of the core. These two detector signals are combined at the summing junction of the summing and level amplifier to produce an output DC voltage from 0 to 10 volts that is proportional to the power generated in the reactor core from 0 to 120% power. This voltage is used to provide level trip signals for reactor protection, alarms to warn of abnormal conditions, and signals for remote recording, indicating, and computing equipment.

The dropped rod (negative rate) circuit is one circuit that receives the voltage output from the summing and level amplifier. If this circuit senses a power decrease of ≥2.5% in less than five seconds, it will generate a signal that will trip the dropped rod bistable. Tripping of this bistable in any one of four power range channels will cause a turbine runback to take place. This bistable must be manually reset after it has tripped.

A turbine runback can also be initiated by a rod bottom signal. A rod bottom signal is generated whenever any of the rod bottom bistables is actuated. One of these bistables would be actuated if an actual rod was dropped or if power to the rod position indication system was lost.

A turbine runback is accomplished by two different methods. The first method is the load reference runback. When a signal is received from the dropped rod circuit or a rod bottom signal is generated, the turbine load reference is decreased at a rate of 200% per minute for six seconds (a 20% turbine runback). The second method is the load limit runback. This runback is identical in its operation to the load reference runback, except that it is also interlocked with turbine first stage pressure. This interlock will limit the runback, ensuring it stops at 80% of turbine full load.

The boron make-up system supplies the Reactor Coolant System (RCS) with a boric acid solution at the concentration required for chemical shim control and shutdown requirements. The major components of this system are the blender, boric acid tanks, and the boric acid transfer pumps. There are several methods to borate the RCS. Two of these methods are the normal flow path and the emergency flow path. The normal flow path starts at the boric acid tank. 12% boric acid solution is pumped from this tank, through a flow totalizer, to the blender by one of the boric acid transfer pumps. The blender mixes this boric acid solution with reactor make-up water. Upon exiting the blender, this solution is directed to the suction of the charging pumps, which will then pump the solution into the RCS. The emergency borate flow path also starts at the boric acid tanks, but, in this case, the boric acid transfer pump pumps the boric acid solution directly to the charging pump suction, bypassing the flow totalizer and the blender.

Electrical heat tracing is installed on the sections of piping and equipment that could contain concentrated boric acid solution. Detectors, along with the heat tracing, are installed on the piping surface under the insulation. These detectors monitor the piping surface temperature and energize and deenergize the heat tracing in order to keep the temperature within a selected band. This ensures that the boric acid stays in solution. Two circuits of heat tracing are installed on the piping and equipment. One of the circuits is for normal operations, and one is used as an installed spare.

The 4160 volt system distributes power to two non-safeguards equipment distribution buses (A01 and A02), two unit supply buses (A03 and A04), and two safeguards equipment distribution buses (A05 and A06). This double bus arrangement for each unit ensures that redundancy and independence exist within the distribution system. The two safeguards equipment distribution buses can be connected by a bus tie breaker, 1A52-61. This tie breaker can be shut to connect the two buses if the normal supply breaker to one of the distribution buses is open. This allows both buses to be powered from a single electrical source. Administrative requirements presently have this tie breaker racked out of its cubicle and stored in a different location because of single failure considerations.

1A05, one of the safeguards buses, supplies power to 1X13, a 4160/480 volt transformer. This transformer, in turn, supplies power to 1B03, a 480 volt safeguards bus. This bus supplies power to 1B32, a 480 volt ac motor control center, which supplies power to many safeguards loads including 1XY06. 1XY06 is an instrument voltage transformer that supplies power to the 120 volt instrument bus 1Y06. This bus supplies power to the 1C120 rod position indication circuitry.

CAUSE AND CORRECTIVE ACTIONS

Following the event, a thorough review was conducted. The cause of the deenergization of 1B03 and the resultant turbine runback have been attributed to the improper installation of the interlock jumper by the two personnel performing the post-maintenance testing. As a result, both of the maintenance electricians were formally counseled by the electrical maintenance supervisor. During this counseling session, proper jumpering requirements, procedural compliance, and the proper method for performing independent verification of jumper installation was discussed.

The electrical maintenance supervisor also held a meeting with all the maintenance electricians the following morning. During this meeting, he discussed the significant portions of the event and the proper maintenance practices that must be adhered to in order to prevent any future occurrences of this type. Discussions of this event and the significant concerns addressed in this report will also be performed by other plant work groups. The maintenance supervisor believed that a thorough briefing and more job supervision could have prevented this event from taking place and has, therefore, instituted these changes within his group.

A working group was also set up following the event to determine corrective measures that should be implemented to prevent recurrence of events of this type. This group is composed of personnel from electrical and mechanical maintenance and Instrumentation and Control. The group has determined that the independent verification system used by plant personnel does not adequately address all the potential situations that may arise during the performance of maintenance. There are procedural steps, if performed improperly, that could result in a reactor protection system actuation, equipment damage, or personnel injury. In these cases a different, more rigorous form of personnel verification needs to be used. The group is recommending the addition of a concurrent verification system, similar to a system discussed in the Institute of Nuclear Power Operations (INPO) Good Practices. This addition will be made to the revised Point Beach Nuclear Plant Writer's Guide for Maintenance Procedures. This revision is expected to be implemented by June 1992.

A review of the procedure used for the modification was performed. Prior to the revision made on January 20, 1992, the procedure was believed inadequate because it failed to give specific direction describing the jumpering that had to be performed to defeat the dead bus interlock. After the revision was made, the procedure was technically correct. It described the cubicle and terminal points for the jumper installation. While accurate, the procedure could have supplied more information concerning the location of the jumper installation. In order to correct this concern, the revised Writer's Guide for Maintenance Procedures will require that specific identification of the associated wires be included in the work procedure. This revision is expected to be implemented by June 1992.

Since the inability to borate the RCS impacted the recovery actions of this event, immediate actions were taken to determine the cause of the pipe blockage. A complete valve line-up of the transfer paths was performed when the inability to borate was discovered. No discrepancies were found. An inspection of the suspected area of the blockage revealed that the insulation around the flow transmitter consists of a section of removable wrap around insulation and two small sections around the flange on each side of the transmitter. The inspection revealed that the wrap-around section of insulation was loose, and gaps were present between the sections of insulation around the flow transmitter. The insulation was tightened, and the gaps were filled with KAOWOOL.

Further review found that Instrumentation and Control had earlier requested support from the insulation work crew in order to perform a maintenance work item on the flow transmitter in question. This support involved the replacement of the top, small section of permanent insulation with a removable piece in order to facilitate the maintenance. On January 17, 1992, when the insulation workers performed their work, they found that the wrap-around section of insulation was loose. In order to repair the loose insulation, the insulation workers tightened this section of insulation. To date, no information has been identified to explain why this section of insulation was found to be loose following the January 20, 1992, event.

In addition to the inspection of the insulation, the operability of the various heat trace circuits was verified. This check revealed that the secondary element for circuit 96 and both elements of circuit 98 were inoperable. Circuit 96 is located on the reactor water make-up line, and circuit 98 is located on the combined discharge of the blender. Both of these lines were verified not to be blocked during the event. Plans are currently in place to repair the secondary element of circuit 96 and both elements of circuit 98. This work will be completed by February 28, 1992.

Circuit 93, the circuit located in the area of suspected blockage was verified to be working properly during the performance of Technical Specification Test, TS-11, "Monthly Boric Acid Heat Tracing Circuits." A review of the temperature recorder printouts showed that the indicated temperature remained between 174°F and 179°F from January 14, 1992, to January 20, 1992. The temperature setpoints for both the primary and secondary element for this circuit were raised and verified subsequent to the event in the successful effort to clear the blockage.

Based on the results of all the inspections, the causes of the blockage are attributed to the presence of loose insulation in the area of the flow transmitter, the gaps present between the different sections of insulation, and the fact that circuit 93 was controlling temperature at the lower end of the allowable control band. In order to ensure that blockage of the system does not go undetected, an addition to the call-up system is being made. This call-up would require the boration flow paths to be physically verified by a periodic flow check. This call-up will be in place by May 30, 1992.

The inability to timely restore the axial flux difference to within limits is a recurring problem. This occurrence is very similar to the event discussed in LER 90-010-01, "Axial Flux Outside Technical Specification Limits." The corrective actions required training to be performed to inform the operators of the Technical Specification requirements to use the plant process computer as the primary indication. This training was performed.

The calculational techniques the computer uses to determine axial flux difference need revision. When calculating the axial flux difference, the computer takes a one-minute average of the axial flux difference for each channel. This results in a delay of about two minutes between the time the axial flux difference actually changes and the time the computer indicates the change. Therefore, the computer lags slightly behind the control board indications. This delay has been identified as the cause for exceeding the fifteen-minute time frame for returning the axial flux differences to an acceptable level. The control board indications had the axial flux difference within the required band fourteen minutes after the alarm, but the computer did not indicate a satisfactory axial flux difference for seventeen minutes.

In order to correct this problem, a modification is proposed that will update the computer software to increase the sample frequency for axial flux difference so the computer indication will not substantially lag the actual axial flux difference. A Technical Specification Change Request will be required to support this modification because the bases for Section 15.3.10 currently discusses the operation of the plant process computer. Other changes to the Technical Specifications concerning axial flux difference are also being considered.

REPORTABILITY

The loss of 1B03 caused a rod bottom turbine runback, which resulted in a negative rate turbine runback that is reportable in accordance with 10 CFR 50.73(a)(2)(iv), "Any event or condition that resulted in the manual or automatic actuation of any Engineered Safety Feature (ESF), including the Reactor Protection System (RPS)." The runback caused Unit 1 to exceed the limits for axial flux difference for a period exceeding fifteen minutes. This also necessitated the submittal of this report in accordance with 10 CFR 50.73(a)(2)(i)(B), "Any operation or condition prohibited by the plant's Technical Specifications." The four-hour notification was made to the NRC at 1702 in accordance with 10 CFR 50.72(b)(2)(ii), and the NRC Resident Inspector was informed.

SAFETY ASSESSMENT

There are no safety consequences from this event. The rod bottom and negative rate turbine runbacks and associated plant systems functioned as designed. Additionally, although the blockage in the make-up system prevented the addition of boron to the RCS via the normal or manual paths, the ability to borate the RCS still existed. If necessary, the emergency boration path could have been used. The health and safety of plant personnel and the general public were not endangered.

SIMILAR OCCURRENCES

A review of Licensee Event Reports was performed. LER 91-012-00, "NIS Turbine Runback Due to Inverter Work," describes a Unit 1 20% turbine runback that was caused by a personnel error during the performance of inverter maintenance. This report also stated that procedural inadequacies contributed to the event.

NRC FORM 366A (6-89)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104
EXPIRES: 4/30/92

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6) YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	PAGE (3)
Point Beach Nuclear Plant, Unit 1	0 5 0 0 0 2 6 6	9 2	0 0 1	0 0	1 0 OF 1 0

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

LER 91-010-01, "Axial Flux Outside Technical Specification Limits," describes a condition where the Unit 1 reactor was outside the allowable axial flux difference limits for greater than fifteen minutes following a load rejection. This LER is similar in that the operators restored axial flux difference to within limits in less than fifteen minutes by control board indication, but the plant process computer indicated that the axial flux difference was outside limits for seventeen minutes.

NRC Form 366A (6-89)