



Commonwealth Edison
Byron Nuclear Station
4450 North German Church Road
Byron, Illinois 61010

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March 26, 1990

LTR: BYRON 90-0322
FILE: 2.07.0400

Mr. A. Bert Davis
Regional Administrator
Region III
U. S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Subject: Byron Unit 1 Operating License NPF-37, Docket No. 50-454,
Reporting of Emergency Diesel Generator Failures

Dear Mr. Davis:

This report is submitted in accordance with Byron Station Unit 1 Operating License NPF-37 Appendix A, Technical Specification 4.8.1.1.3, reporting of Diesel Generator Failures.

This report addresses two valid tests and failures and two invalid failures experienced on the 1A Diesel Generator (DG). The criteria to determine valid and nonvalid tests and failures is in accordance with Section C.2.e of Regulatory Guide 1.108.

Deviation Investigation Report DIR 06-01-90-021 is a summary of the two valid failures. The failures resulted from cracked fuel injection pump discharge fittings and the seizure of fuel injection pump internals. The failures occurred during surveillance testing following a scheduled teardown and inspection.

DIR 06-01-90-022 is a summary of invalid tests and failures resulting from spurious overspeed trip signals. All of the trips occurred during maintenance and troubleshooting runs. The problem was corrected prior to declaring the Diesel Generator operable.

DIR 06-01-89-141 is a summary of invalid tests and failures resulting from spurious engine vibration trip signals. The trips occurred after all testing requirements were met.

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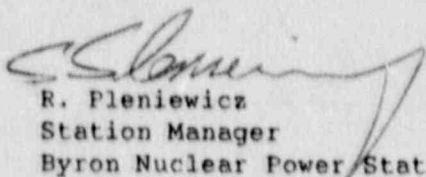
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The 1A DG was not required for operation at the time of the injection pump and overspeed failures, and operability was not affected by the vibration trips. Therefore, the diesel generator was not considered to be unavailable at any time. The valid failures were the first and second failures within the previous twenty valid tests for the 1A DG. Per Technical Specification Table 4.8-1, the 1A DG was placed on a weekly testing frequency.

Sincerely,



R. Pleniewicz
Station Manager
Byron Nuclear Power Station

RP/TGB/bf

Attachments

cc: Byron Station NRC Senior Resident Inspector
U.S. NRC Document Control Desk, Washington, D.C.
INPO Record Center
CECo Distribution List

DEVIATION REPORT

DVR NO.

6 - 1 - 90 - 021
STA UNIT YEAR NO.

Form Rev. 2.1

ART 1 | TITLE OF DEVIATION 1A Diesel Generator Failed Fuel
Injection Pumps Due to Overtorquing and Foreign MaterialOCCURRED 1/25-31/90
DATE TIME

SYSTEM AFFECTED

PLANT STATUS AT TIME OF EVENT

DG

MODE 6 POWER(%) 0

WORK REQUEST NO.

TESTING

X YES NO

DESCRIPTION OF EVENT

Event 1: Between 1/25/90 and 1/31/90, during post maintenance testing and surveillances several injection pumps were found with cracked heads. The initial investigation into this problem indicates that the cause was a deficient installation procedure.

Event 2: On 2/17/90, during a maintenance test of the 1A Diesel Generator, it was noted that after loading the diesel to 5500 kW that the 2R cylinder temperature was about 300°F instead of the normal 750-800°F. The 2R fuel injection pump was seized.

POTENTIALLY SIGNIFICANT EVENT PER NSD DIRECTIVE A-07

X YES NO

10CFR50.72 NRC RED PHONE X 1 HOUR

NOTIFICATION MADE X 4 HOUR TIME X NO

D. Brindle
RESPONSIBLE SUPERVISOR1/31/90
DATE

PART 2 | OPERATING ENGINEER'S COMMENTS

All pumps replaced.

X NON REPORTABLE EVENT

30 DAY REPORTABLE/10CFR

5 DAY REPORT PER 10CFR21

ANNUAL/SPECIAL REPORT REQUIRED

A.I.R. #

L.E.R. #

NOTIFICATION

REGION III

DATE

TIME

Office of T. Maiman
NSD1/31/90
DATE1240
TIMECECO CORPORATE NOTIFICATION MADE
IF ABOVE NOTIFICATION IS PER 10CFR21

TELECOPY

CECO CORPORATE OFFICER

DATE

TIME

PRELIMINARY REPORT

COMPLETED AND REVIEWED

D. Brindle

1/31/90

OPERATING ENGINEER

DATE

INVESTIGATION REPORT & RESOLUTION
ACCEPTED BY STATION REVIEW

2/26/90

2/28/90

RESOLUTION APPROVED AND
AUTHORIZED FOR DISTRIBUTION

2/28/90

STATION MANAGER

DATE

B6-5176 (Form 15-52-1) 11-20-85

DOCUMENT ID

(0525R/0064R)

DEVIATION INVESTIGATION REPORT (DIR)

Form Rev 2.0

Facility Name
Byron Nuclear Power Station

PAGE
1 OF 0 4

Title

1A Diesel Generator Failed Fuel Injection Pumps Due to Overtorquing and Foreign Material

EVENT DATE			DIR NUMBER			REPORT DATE			OPERATING MODE		
MONTH	DAY	YEAR	STA	UNIT	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	
01	25	90	06	01	90	021	0	02	28	90	5

CONTACT FOR THIS DIR

NAME

TELEPHONE NUMBER

AREA CODE

R. Flahive, Technical Staff Supervisor Ext. 2243

815 234 - 5441

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS
X	E K	I I P	C 6 3 4	Y						

SUPPLEMENTAL REPORT EXPECTED

EXPECTED SUBMISSION DATE

MONTH DAY YEAR

X | YES (if yes, complete EXPECTED SUBMISSION DATE)

NO

050190

TEXT Energy Industry Identification System (EIIIS) codes are identified in the text as (XX)

A. PLANT CONDITIONS PRIOR TO EVENT:

Event Date/Time 1/25/90 / ---

Unit 1 MODE 6 - Refueling Outage Rx Power 0% RCS (AB) Temperature/Pressure 110°F/ 0 psi

Unit 2 MODE 1 - Power Operation Rx Power 98% RCS (AB) Temperature/Pressure Normal Operating

B. DESCRIPTION OF EVENT:

From January 25 through January 30, 1990, a total of ten fuel injection pumps (jerk pumps) on the 1A Diesel Generator (DG) [EK] cracked at the discharge fittings. The failures occurred as follows:

- 1/25/90 Cracked fitting at pump 4R
- 1/26/90 Cracked fitting at pump 10L
- 1/29/90 Cracked fitting at pump 4R
- 1/30/90 Cracked fittings at pumps 7L and 8L; Non Destructive Examination showed cracking at 5L, 6L, 9L, 9R; 3L fitting cracked during line reinstallation.

Also, two injection pumps failed as follows:

- 1/31/90 Injection pump 3L seized, preventing proper fuel flow to the affected cylinder.
- 2/17/90 Injection pump 2R seized, after having been replaced for minor leakage.

These failures occurred during various maintenance verification runs and surveillance testing following the scheduled five-year teardown and inspection of this Diesel Generator. The 1A Diesel Generator had been taken Out-of-Service for the inspection and maintenance activities, and was not operable at the time of the failures. No safety system actuations occurred.

DEVIATION INVESTIGATION REPORT TEXT CONTINUATION

Form Rev 2.0

FACILITY NAME	DIR NUMBER						PAGE	
				SEQUENTIAL		REVISION		
	STA	UNIT	YEAR	NUMBER		NUMBER		
Byron Nuclear Power Station	016	011	910	01211		010	2	OF 014
TEXT	Energy Industry Identification System (EIIS) codes are identified in the text as [XX]							

C. CAUSE OF EVENT:

It has been determined that the cause of the cracking was overtightening of the fuel lines to the injection pumps. The root cause of the overtightening was a procedural inadequacy. In 1989, as a result of previous overtightening failures, Byron Station implemented procedures for torquing fuel line fittings developed at an EPRI Diesel Generator Conference. The procedure, BMP 310B-11, Replacement of Fuel Injection Pump(s) or Adjusting Shims to Meet Required Peak Firing Pressures on Diesel Generator, directed the high pressure fuel line nuts to be torqued to 15 ± 2 foot-pounds (ft-lbs), followed by an additional full turn for new nuts, or an additional 1/4 turn for existing nuts.

During the five year inspection, all twenty fuel injection pumps were replaced with new pumps. Maintenance personnel believed that, due to the installation of the new pumps, a full turn was required after the initial 15 ft-lbs torque. Because the fuel lines were not replaced, the actual requirement was only an additional 1/4 turn. Five fuel leaks developed at different times due to the overtightening. Four pumps showed indications of cracking during non destructive examinations (NDE). One pump fitting cracked during reassembly after the NDE.

After conversations with the Diesel Generator vendor and pump manufacturer, the most probable cause of the failure for the seized fuel pumps was the presence of foreign material in the pump. Tolerances are very tight in this type of pump, and even slight contamination can cause pump seizure. The fuel system lines are disassembled during the five year inspection. Although high standards of cleanliness are maintained, it is possible that a small amount of contamination was introduced to the system.

The seized pumps were of similar serial numbers, (891217 and 891223), indicating that they were manufactured from the same lot. The failed pumps are being sent to the System Materials Analysis Department for a more detailed failure analysis. This report will be supplemented based on the results of the failure analysis. Because of the common mode failure implications, a Potential Part 21 Notification has been filed with Corporate Engineering for review of Part 21 applicability.

D. SAFETY ANALYSIS:

There were no safety consequences of this event. All of the failures occurred during a refueling outage. In Modes 5 and 6, only one Emergency Diesel Generator is required per the plant's Technical Specifications. The 1B Diesel Generator was available and operable throughout the event. Since the failures can be attributed to activities during the refueling outage, the 1A Diesel Generator would have performed its intended safety function if required prior to the refueling outage. All of the failures were corrected prior to declaring the 1A Diesel Generator operable.

The injection pump seizures are attributed to problems encountered during installation and did not effect previous operability. The failures each occurred after only several hours of run time, approximately 10 hours and 2 hours respectively for the pumps. All other pumps installed on the 1A Diesel Generator have experienced at least 40 hours of full load run time, and are not considered likely to fail in a similar manner.

DEVIATION INVESTIGATION REPORT TEXT CONTINUATION

Form Rev 2.0

FACILITY NAME	DIR NUMBER										PAGE	
	STA	UNIT	YEAR		SEQUENTIAL NUMBER		REVISION NUMBER					
	016	011	910		01211		010					

Byron Nuclear Power Station

TEXT Energy Industry Identification System (EIIIS) codes are identified in the text as [XX]

E. CORRECTIVE ACTIONS:

All of the injection pump discharge fittings have been non destructively examined by magnetic particle testing. All of the pumps which had either leakage or indications of cracking have been replaced. The maintenance procedures will be revised to read:

- Tighten the nuts until they are snug (metal to metal contact between the ferrule and seat).
- Tighten nuts approximately 1/4 turn more.

The procedures will include a note which will allow the nuts to be tightened additionally if leakage exists during the maintenance run of the engine. AIR 454-225-90-04900 is tracking this procedure change.

The injection pumps which seized have been replaced. The first replacement pump was subjected to a 24 hour run after installation. The second pump to be replaced was subjected to 8 hours of run time prior to being declared operable. All other spare injection pumps in storage at Byron Station with serial numbers similar to the failed pumps have been placed on hold pending results from the failure analysis and Potential Part 21 Notification.

F. RECURRING EVENTS SEARCH AND ANALYSIS:

a) EVENT SEARCH (DIR, LER)

DIR	TITLE
06-01-84-032	1B Diesel Generator Fuel Oil Leak
06-01-87-121	1A Diesel Generator Jerk Pump Failure

In addition, several fuel oil leak failures occurred on the 1A Diesel Generator during October of 1984. Braidwood DVR 20-2-89-044 documents a similar event.

b) INDUSTRY SEARCH (OPEX's NPRDS)

A search through the NPRDS Data Base revealed eleven reported failures of Cooper Bessemer Diesel Generator fuel injection pumps, due to leakage at the pump discharges. Several of these included overtightening as potential causes. The corrective actions for these cases involved revising the installation procedures.

c) NWR

Five nuclear Work Requests (NWRs) were identified for maintenance history on the Byron Station Diesel Generator fuel injection pumps.

NWR		
B49354	09-25-87	Replaced jerk pump due to fuel oil leak
B55313	05-25-88	Replaced jerk pump due to fuel oil leak
B55314	05-25-88	Replaced jerk pump due to fuel oil leak
B61445	10-19-88	replaced jerk pump and injection line
B63773	02-10-89	Replaced jerk pump

DEVIATION INVESTIGATION REPORT TEXT CONTINUATION

Form Rev 2.0

FACILITY NAME	DIR NUMBER										PAGE	
	STA	UNIT	YEAR		SEQUENTIAL NUMBER		REVISION NUMBER					
Byron Nuclear Power Station	01	5	01	1	91	0	0	2	1	0	0	
TEXT Energy Industry Identification System (EIIS) codes are identified in the text as [XX]										4	OF 014	

F. RECURRING EVENTS SEARCH AND ANALYSIS: (Continued)

d) ANALYSIS

The work history was reviewed and no common mode failure was identified.

G. COMPONENT FAILURE DATA:

<u>MANUFACTURER</u>	<u>NOMENCLATURE</u>	<u>MODEL NUMBER</u>	<u>MFG PART NUMBER</u>
Bendix Corp. (OEM)	Type FDX-22 Inj Pump	10-73422-57	- - -
Cooper-Bessemer(SPLR)	Fuel Injection Pump	2-50F-030-001	- - -

H. OTHER RELATED DOCUMENTS:

None.

I. EFFECTIVENESS REVIEW:

Not required.

J. ADDITIONAL DATA:

- a) Affected Technical Specification: 3/4.8.1.1.2
- b) Procedures: BMP 3108-11, Replacement of Fuel Injection Pump(s) or Adjusting Shims to Meet Required Peak Firing Pressures on Diesel Generator
- c) Cause Code: DI3PM, XPMMB
- d) Equipment Involved: 1DG01KA
- e) Other: Fuel Injection Pump

DEVIATION REPORT

DVR NO.

06 - 01 - 90 - 022

STA UNIT YEAR NO.

Form Rev 2.0

PART 1 TITLE OF DEVIATION		1A Diesel Generator Overspeed Trips Due to a Misaligned Butterfly Valve		OCCURRED		1/25-27/90		--	
				DATE		TIME			
SYSTEM AFFECTED		PLANT STATUS AT TIME OF EVENT				TESTING			
DG		MODE 6 POWER(%) 0		WORK REQUEST NO.		X YES		NO	

DESCRIPTION OF EVENT

During post maintenance testing the 1A DG tripped on overspeed several times. Since the DG was connected to the grid at the time, and no actual overspeed is possible, these trips were classified as spurious. The cause has been determined to be air flow over the butterfly valve causing it to move, and initiating a trip signal.

POTENTIALLY SIGNIFICANT EVENT PER NSD DIRECTIVE A-07		YES		X NO	
10CFR50.72 NRC RED PHONE	1 HOUR				
NOTIFICATION MADE	4 HOUR	X NO		D. Brindle	
	TIME			RESPONSIBLE SUPERVISOR	
				1/31/90	
				DATE	

PART 2 | OPERATING ENGINEER'S COMMENTS

None.

NON REPORTABLE EVENT		X		NOTIFICATION		REGION III		DATE		TIME	
30 DAY REPORTABLE/10CFR				Office of T. Maiman		1/31/90		1240			
5 DAY REPORT PER 10CFR21				NSD		DATE		TIME			
ANNUAL/SPECIAL REPORT REQUIRED				CECO CORPORATE NOTIFICATION MADE		IF ABOVE NOTIFICATION IS PER 10CFR21					
A.I.R. #				TELECOPY		CECO CORPORATE OFFICER		DATE		TIME	
L.E.R. #											

PRELIMINARY REPORT		D. Brindle		1/31/90	
COMPLETED AND REVIEWED		OPERATING ENGINEER		DATE	
INVESTIGATION REPORT & RESOLUTION		3-7-90		3-8-90	
ACCEPTED BY STATION REVIEW		3-9-90		3/12/90	
RESOLUTION APPROVED AND		STATION MANAGER		DATE	
AUTHORIZED FOR DISTRIBUTION					

86-5176 (Form 15-52-1) 11-20-85

DOCUMENT ID

(0532R/0066R)

DEVIATION INVESTIGATION REPORT (DIR)

Form Rev 2.0

Facility Name
Byron Nuclear Power Station

PAGE
1 OF 0 4

Title
1A Diesel Generator Overspeed Trips Due to a Misaligned Butterfly Valve

EVENT DATE			DIR NUMBER				REPORT DATE			OPERATING MODE																	
MONTH	DAY	YEAR	STA	UNIT	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	POWER LEVEL																
0	1	2	5	9	10	0	6	0	1	9	10	0	2	2	0	1	0	0	3	1	2	9	10	6	1	1	0

CONTACT FOR THIS DIR

NAME		TELEPHONE NUMBER	
		AREA CODE	
P. O'Neill, Assistant Technical Staff Supervisor Ext. 2244		8	1
		5	2
		3	4
		-	5
		4	4
		1	1

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS											
X	E	K	I	S		C	V	C	6	3	14	Y									

SUPPLEMENTAL REPORT EXPECTED

EXPECTED SUBMISSION DATE		MONTH	DAY	YEAR
<input type="checkbox"/> YES (if yes, complete EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO				

TEXT Energy Industry Identification System (EII5) codes are identified in the text as [XX]

A. PLANT CONDITIONS PRIOR TO EVENT:

Event Date/Time 1/25/90 / - - -

Unit 1 MODE 6 - Refueling Rx Power 0% RCS [AB] Temperature/Pressure 120°F/Atmospheric

Unit 2 MODE 1 - Power Operation Rx Power 98% RCS [AB] Temperature/Pressure Normal Operating

B. DESCRIPTION OF EVENT:

From January 25 through January 27, 1990, the 1A Diesel Generator (DG) [EK] experienced two independent problems with the engine overspeed trip system. These problems were discovered during maintenance or troubleshooting runs of the Diesel Generator following a scheduled five year teardown and inspection.

Following the five year inspection, the 1A Diesel Generator tripped 5 times due to spurious engine overspeed trip signals. Four of the trips occurred during maintenance or troubleshooting runs. One trip occurred during surveillance testing, after all testing requirements had been met. In all cases, the DG was synchronized with offsite power at the time of the trip signals. In a synchronized condition, an actual engine overspeed is not possible, and did not occur. The engine speed sensing circuitry did not show any unusual transients.

It was determined that the cause of the spurious overspeed trip signals was movement of the turbocharger inlet butterfly valve away from its normally open position. This movement was in the direction of further opening the valve. The movement caused the valve's position sensing limit switches to actuate. The engine trip circuitry sensed this actuation as an engine overspeed trip.

The butterfly valve normally closes automatically when the engine experiences an actual overspeed trip. The limit switches cause a redundant electronic engine overspeed trip signal when the butterfly valve moves away from its normally open position.

DEVIATION INVESTIGATION REPORT TEXT CONTINUATION

Form Rev 2.0

FACILITY NAME	DIR NUMBER										PAGE		
	STA		UNIT		YEAR		SEQUENTIAL NUMBER		REVISION NUMBER				
Byron Nuclear Power Station	0	6	0	1	9	0	0	2	2	0	0	2	OF 0

TEXT Energy Industry Identification System (EIIS) codes are identified in the text as [XX]

B. DESCRIPTION OF EVENT: (Continued)

After the spurious trip signal problem was resolved, an actual overspeed trip test was performed. During this test the engine tripped at the correct speed, however, the inlet butterfly valve did not auto-close as designed. The fuel supply to the engine isolated as designed, causing the engine to shutdown. The cause of the failure was determined to be binding between the butterfly valve shaft and the remote reset mechanism. The problem was corrected, and the overspeed trip was satisfactorily retested.

The 1A Diesel Generator had not yet been declared operable following the five year teardown and inspection. The Unit remained stable throughout this event. No safety system actuations occurred. Operator actions did not impact this event.

C. CAUSE OF EVENT:

The cause of the spurious engine overspeed trip signals was movement of the inlet butterfly valve away from its normally open position. The butterfly valve is normally in a horizontal position. When the engine overspeed governor is actuated, the valve latching mechanism is released and a spring closes the valve. Valve limit switches detect valve movement, and give the engine a redundant trip signal. For the spurious trips experienced, air flow over the valve disk caused it to move slightly in the direction opposite of normal closure. This movement was enough to release the valve limit switches, giving the engine an electronic trip signal. All of the trips occurred when the engine was at full load, when the intake air flow is maximized.

Prior to these occurrences, the valve did not experience this problem. Work performed during the five year teardown and inspection may have affected either the air flow rate at the turbocharger inlet, or the inlet butterfly valve's orientation and linkage, although an exact cause cannot be positively identified.

The failure of the inlet butterfly valve to close during actual engine overspeed testing was caused by mechanical binding between the valve shaft and the remote reset mechanism. The remote reset mechanism consists of a pneumatic cylinder and linkage connected to the valve shaft. The linkage normally slides in a slot to reposition the valve after an autoclosure. This slotted connection had bound, preventing movement of the valve in the closed direction. It cannot be determined if this condition existed prior to the engine teardown, or was the result of maintenance activities during the teardown. The remote reset mechanism is not normally used at Byron Station.

D. SAFETY ANALYSIS:

There were no safety consequences resulting from the spurious engine trips or the failure of the inlet butterfly valve to close on a actual engine overspeed. The redundant electronic engine trip resulting from the butterfly valve limit switches is bypassed when the Diesel Generator is operating in emergency mode. The butterfly valve was not moving enough from its normal position to affect air intake flow beyond the engine's intake requirements.

The failure of the butterfly valve to close on an actual overspeed condition did not prevent the engine from tripping when required. The overspeed governor actuates both an isolation of fuel and intake air to the engine. In case of failure of the butterfly valve actuation, the isolation of the fuel supply is sufficient to shutdown the engine. There is a possibility that the engine would continue to run on a mixture of lube oil and air. In this case, the air intake butterfly valve could be manually tripped closed.

Because the events occurred during maintenance and troubleshooting runs of the Diesel Generator, these are considered to be invalid failures per Regulatory Guide 1.10B.

DEVIATION INVESTIGATION REPORT TEXT CONTINUATION

Form Rev 2.0

FACILITY NAME	DIR NUMBER										PAGE		
	STA			UNIT			YEAR			SEQUENTIAL NUMBER		REVISION NUMBER	
	0 6 0 1 9 0			—			0 2 2			—		0 0	
Byron Nuclear Power Station												3 OF 0 4	
TEXT Energy Industry Identification System (EIS) codes are identified in the text as [XX]													

E. CORRECTIVE ACTIONS:

To correct the problem of butterfly valve disk movement caused by air flow, the valve disk was rotated on its shaft until the disk was tilted 3° off horizontal towards the closed direction when the valve is latched in its normally open position. This is in accordance with installation instructions provided on the vendor assembly drawing for the valve. This prevents the valve from being forced off of its limit switches under high air flow conditions. This condition has not been experienced on the other Diesel Generators.

To correct and prevent recurrence of the mechanical binding of the reset mechanism, the linkage connecting the pneumatic cylinder to the valve shaft was removed under Minor Change M6-1-90-616. The linkage has also been removed on the 1B Diesel Generator. Action Item Record 455-225-90-0047 tracks the removal of the linkage on the Unit 2 Diesel Generators.

F. RECURRING EVENTS SEARCH AND ANALYSIS:

a) EVENT SEARCH (DIR, LER)

No previous DVRs have been written due to problems with the Diesel Generator overspeed trip systems.

b) INDUSTRY SEARCH (OPEX's NPRDS)

No similar failures were identified in the NPRDS search.

c) NWR

Similar problems occurred with the 1A DG overspeed reset linkage in 1985 and 1988. At those times, the reset linkage was cleaned, lubricated and adjusted to eliminate the binding. Previous Nuclear Work Request (NWR) numbers are B24330, B61411 and B61519.

d) ANALYSIS

No adverse trend identified.

G. COMPONENT FAILURE DATA:

MANUFACTURER	NOMENCLATURE	MODEL NUMBER	MFG PART NUMBER
Cooper-Bessemer	Overspeed Butterfly Vlv	- - -	KSV-72-10

H. OTHER RELATED DOCUMENTS:

None.

DEVIATION INVESTIGATION REPORT TEXT CONTINUATION

Form Rev 2.0

FACILITY NAME

DIR NUMBER

PAGE

Byron Nuclear Power Station

STA	UNIT	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER				
016	011	910	01212	010	4	OF	014	

TEXT Energy Industry Identification System (EIS) codes are identified in the text as [XX]

1. EFFECTIVENESS REVIEW:

None required.

3. ADDITIONAL DATA:

- a) Affected Technical Specification: 3/4.8.1.2
- b) Procedures: None.
- c) Cause Code: XCMUK, XCMH9
- d) Equipment Involved: 1DG01KA
- e) Other: Overspeed Trip

DEVIATION REPORT

DVR NO.

06 - 01 - 89 - 141

STA UNIT YEAR NO.

Form Rev 2.0

PART 1 | TITLE OF DEVIATION

OCCURRED

11/9/89

1814

DATE

TIME

SPURIOUS VIBRATION TRIP OF 1A DIESEL GENERATOR

SYSTEM AFFECTED

PLANT STATUS AT TIME OF EVENT

B71327

TESTING

WORK REQUEST NO.

YES ☒ NO ☐

DG

MODE 1 POWER(%) 100

DESCRIPTION OF EVENT

The 1A D/G tripped following completion of monthly BOS while unloading the generator. The unit tripped from approximately 2000 KW. Tech Staff is present to investigate the problem.

POTENTIALLY SIGNIFICANT EVENT PER MSD DIRECTIVE A-07

YES ☐ NO ☒10CFR50.72 NRC RED PHONE ☐ 1 HOUR

NOTIFICATION MADE

☐ 4 HOUR ☒ NO

TIME

D. Farr
RESPONSIBLE SUPERVISOR11/9/89
DATE

PART 2 | OPERATING ENGINEER'S COMMENTS

☒ NON REPORTABLE EVENT☐ 30 DAY REPORTABLE/10CFR☐ 5 DAY REPORT PER 10CFR21☐ ANNUAL/SPECIAL REPORT REQUIRED

A.I.R. #

L.E.R. #

NOTIFICATION

REGION III

DATE

TIME

Office of T. Maiman

11/15/89

0830

NSD

DATE

TIME

☐ CECO CORPORATE NOTIFICATION MADE
IF ABOVE NOTIFICATION IS PER 10CFR21

TELECOPY

CECO CORPORATE OFFICER

DATE

TIME

PRELIMINARY REPORT

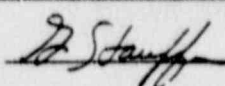
COMPLETED AND REVIEWED

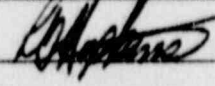
R. Hopkins

11/13/89

OPERATING ENGINEER

DATE

INVESTIGATION REPORT & RESOLUTION
ACCEPTED BY STATION REVIEW
 12-15-89

 12/19/89
RESOLUTION APPROVED AND
AUTHORIZED FOR DISTRIBUTION


STATION MANAGER

DATE

12/19/89

-5176 (Form 15-52-1) 11-20-85

DOCUMENT ID

(0477R/0060R)

SUPPLEMENT TO DVR

DVR NO.

D- 06 - 01 - 89 - 141
STA UNIT YEAR NO.

PART 1 TITLE OF EVENT

OCCURRED

Spurious Vibration Trip of 1A Diesel Generator
Due to Faulty Vibration Trip Switch

11/09/89

1814

DATE

TIME

REASON FOR SUPPLEMENTAL REPORT

Revise cause of event and safety analysis.

PART 2

ACCEPTANCE BY STATION REVIEW

D. Skiff

[Signature]

DATE

3-14-90

3/19/90

SUPPLEMENTAL REPORT APPROVED
AND AUTHORIZED FOR
DISTRIBUTION

[Signature]

STATION MANAGER

3/20/90

DATE

DEVIATION INVESTIGATION REPORT (DIR)

Form Rev 2.0

Facility Name

Byron Nuclear Power Station

PAGE

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Title

SPURIOUS VIBRATION TRIP OF 1A DIESEL GENERATOR DUE TO FAULTY VIBRATION TRIP SWITCH

EVENT DATE			DIR NUMBER				REPORT DATE			OPERATING MODE												
MONTH	DAY	YEAR	STA	UNIT	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	POWER LEVEL											
1	1	0	16	0	1	8	19	1	4	1	0	1	0	3	2	0	9	0	1	0	0	

CONTACT FOR THIS DIR

NAME	TELEPHONE NUMBER
J. Schrock, Operating Engineer	Ext. 2216
	AREA CODE
	8 1 5 2 3 4 - 5 4 4 1

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

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

SUPPLEMENTAL REPORT EXPECTED

EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
YES (if yes, complete EXPECTED SUBMISSION DATE)			
X NO			

TEXT Energy Industry Identification System (EIIS) codes are identified in the text as [XX]

A. PLANT CONDITIONS PRIOR TO EVENT:

Event Date/Time 11/9/89 / 1814

Unit 1 MODE 1 - Power Operation Rx Power 100% RCS [AB] Temperature/Pressure Normal Operating

Unit 2 MODE 1 - Power Operation Rx Power 100% RCS [AB] Temperature/Pressure Normal Operating

B. DESCRIPTION OF EVENT:

On 9/13/89, while unloading the 1A Diesel Generator (DG) [EK] following completion of the Monthly Operability Surveillance (IBOS 8.1.1.2.a-1), the engine tripped from approximately 2300 kW. The cause of the trip was a spurious actuation of the engine high vibration switch. The engine was restarted, fully loaded, and then unloaded. No vibration problems were observed. The following day, the engine vibration trip switch was recalibrated, and the Operability Surveillance was reperformed. A vibration analyzer was attached next to the trip switch, and the analysis showed no indication of a vibration problem at full load, during unloading, or during engine cooldown.

On 10/12/89, with the engine running unloaded during the cooldown cycle following the Monthly Operability Surveillance, the 1A DG tripped due to another spurious actuation of the engine vibration switch. The following day, another vibration analysis was performed. The engine once again tripped due to the vibration trip switch, although no vibration problem was indicated.

On 11/9/89, prior to the Monthly Operability Surveillance, the vibration trip switch was recalibrated to a slightly lower sensitivity. While unloading the 1A DG following completion of the Monthly Operability Surveillance, the engine once again tripped from approximately 2000 kW, due to the vibration trip switch. Since no actual vibration problem existed, and the engine vibration trip is bypassed during emergency mode operations, the 1A DG was declared operable per On Site Review OSR 89-256. The engine vibration trip switch was then adjusted to its lowest sensitivity. Another vibration analysis was performed.

No components were inoperable prior to the engine trips, and no Safety System Actuations occurred.

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C. CAUSE OF EVENT:

The cause of the engine trips was a faulty vibration trip switch. Examination of the failed switch showed no visible abnormalities. The switch could not, however, be calibrated with repeatable results. The root cause of the switch failure remains indeterminate.

D. SAFETY ANALYSIS:

There were no safety consequences resulting from the engine trip, or from the failure of the engine vibration trip switch. There was no vibration problem with the Diesel Generator. The vibration trip is bypassed during emergency mode operations, and does not affect Diesel Generator operability or reliability. This is considered an invalid failure, per Regulatory Guide 1.108.

E. CORRECTIVE ACTIONS:

The engine vibration trip switch for the 1A Diesel Generator will be replaced and properly adjusted under NWR B71327. Action Item Record (AIR) 454-225-89-30200 will track the completion of the switch replacement. Based on the Diesel Generator manufacturer, the engine vibration trip is designed for catastrophic failures. As such, the vibration switch sensitivity may be decreased further if the problem persists.

F. RECURRING EVENTS SEARCH AND ANALYSIS:

a) EVENT SEARCH (DIR, LER)

DVR 6-2-87-114 2A Diesel Generator Failed Due to High Vibration Alarm

DVR 6-1-88-160 1B Diesel Generator Trip on Spurious Actuation of Vibration Instrumentation

There have been other spurious actuations of the DG engine vibration trip switches, which did not result in testing failures.

b) INDUSTRY SEARCH (OPEX's NPRDS)

Four similar occurrences were found in the NPRDS search.

c) NWR

Due to previous problems with the vibration trip sensitivity, the switches had been disabled from 1984 to 1988. Work history shows a number of calibrations for these switches.

d) ANALYSIS

Trend 89-015 was initiated on 10/16/89.

H. OTHER RELATED DOCUMENTS:

None.

DEVIATION INVESTIGATION REPORT TEXT CONTINUATION

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1. EFFECTIVENESS REVIEW:

Not required.

2. ADDITIONAL DATA:

- a) Affected Technical Specification: None
- b) Procedures: None
- c) Cause Code: XCEUK
- d) Equipment Involved: 1PS-DG106A, 1DG5216A
- e) Other: Vibration Trip Switch