SSINS No.: 6835
IN 85-28

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, DC 20555

April 9, 1985

IE INFORMATION NOTICE NO. 85-28: PARTIAL LOSS OF AC POWER AND DIESEL GENERATOR DEGRADATION

Addressees:

All nuclear power reactor facilities holding an operating license (OL) or a construction permit (CP).

Purpose:

This notice is provided to inform recipients of a potential problem with diesel generator voltage regulation that might prevent the diesel generators from loading on to their safety buses. It is expected that recipients will review the information for applicability to their facilities and consider actions, if appropriate, to preclude a similar problem occurring at their facilities. However, suggestions contained in this information notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

On January 31, 1985, WNP 2 was at 100 percent power when a lockout relay, used in the offsite power supply fast transfer logic, spuriously tripped. This was an abnormal partial actuation that caused the 500 kV generator output breaker to open and the circuit breakers from the startup transformer to close on the plant buses even though the normal auxiliary transformers were not disconnected from the same plant buses. The opening of the 500 kV output breaker initiated the digital-electrohydraulic control system overspeed protection circuit which closed the turbine control valves. The turbine control valve fast closure caused a reactor scram as designed.

As a result of this abnormal condition, the generator remained connected to the 230 kV grid via the auxiliary and startup transformers. (See attached simplified diagram illustrating abnormal breaker alignment during the first seconds of this transient.) After 4 seconds, a breaker in the 230 kV line to the startup transformer opened, leaving the plant without non-safety-related power. Two of the buses without power, SM-1 and SM-3, ordinarily feed safety-related buses SM-7 and SM-8. As a result of losing power to two safety-related buses, the backup transformer, which is powered by a 115 kV line, was automatically connected to the safety-related buses and the diesel generators for these buses started, but were not required to assume load.

In the control room, there were false indications such as high containment pressure and valid indications of vessel low level (level 2, -50 inches). The high pressure core spray (HPCS) and reactor core isolation cooling system (RCIC) started on the low level signal.

Eventually, the main generator's protective circuits actuated the balance of the fast transfer logic, causing the auxiliary transformer to separate from the plant buses.

Discussion:

After the event, it was found that the output voltage had been set incorrectly on diesel generators DG-1 and DG-2. If the backup transformer or its supply had failed, the diesel generators would not have loaded on the safety buses because the voltage regulators were set at their lowest voltage set point. The safety buses have protective relaying that prevents the diesel generators from loading on the safety-related buses if their output voltage deviates too much from nominal. There was no control room alarm indicating the diesel generator output voltage was too low to permit loading diesel generators on their safety-related buses.

The condition was caused during troubleshooting of the voltage regulators for DG-1 and DG-2. These voltage regulators have a manual "raise/lower" handle in the control room which permitted their output voltage to be adjusted even though the diesel was not running. If the diesels were not running, as was the case during the troubleshooting, there was no indication of the generator output voltage and, thus, no indication of the voltage setting of the voltage regulator. The type of voltage regulator used on DG-1 and DG-2 allowed for inadvertent degradation without indication or alarm in the control room. This situation did not exist on DG-3, which is dedicated solely for the HPCS and has an automatic voltage set point reset upon start of the diesel generator.

A number of corrective measures have been or will be taken as a result of this event. The licensee has modified the voltage regulators for DG-1 and DG-2 so that the output voltage of the diesel generators can be adjusted only while the diesels are running. The licensee is pursuing an automatic voltage set point reset feature for these diesel generators. The licensee will evaluate the efficacy of control room annunciation for high/low diesel generator output voltage. The licensee also has modified the offsite power supply fast transfer logic so that if a partial spurious actuation occurs again, then the balance of the logic will actuate. The licensee has modified procedures and training to reflect the lessons learned from this event.

No specific action or written response is required by this information notice. If you have any questions about this matter, please contact the Regional Administrator of the appropriate NRC regional office or this office.

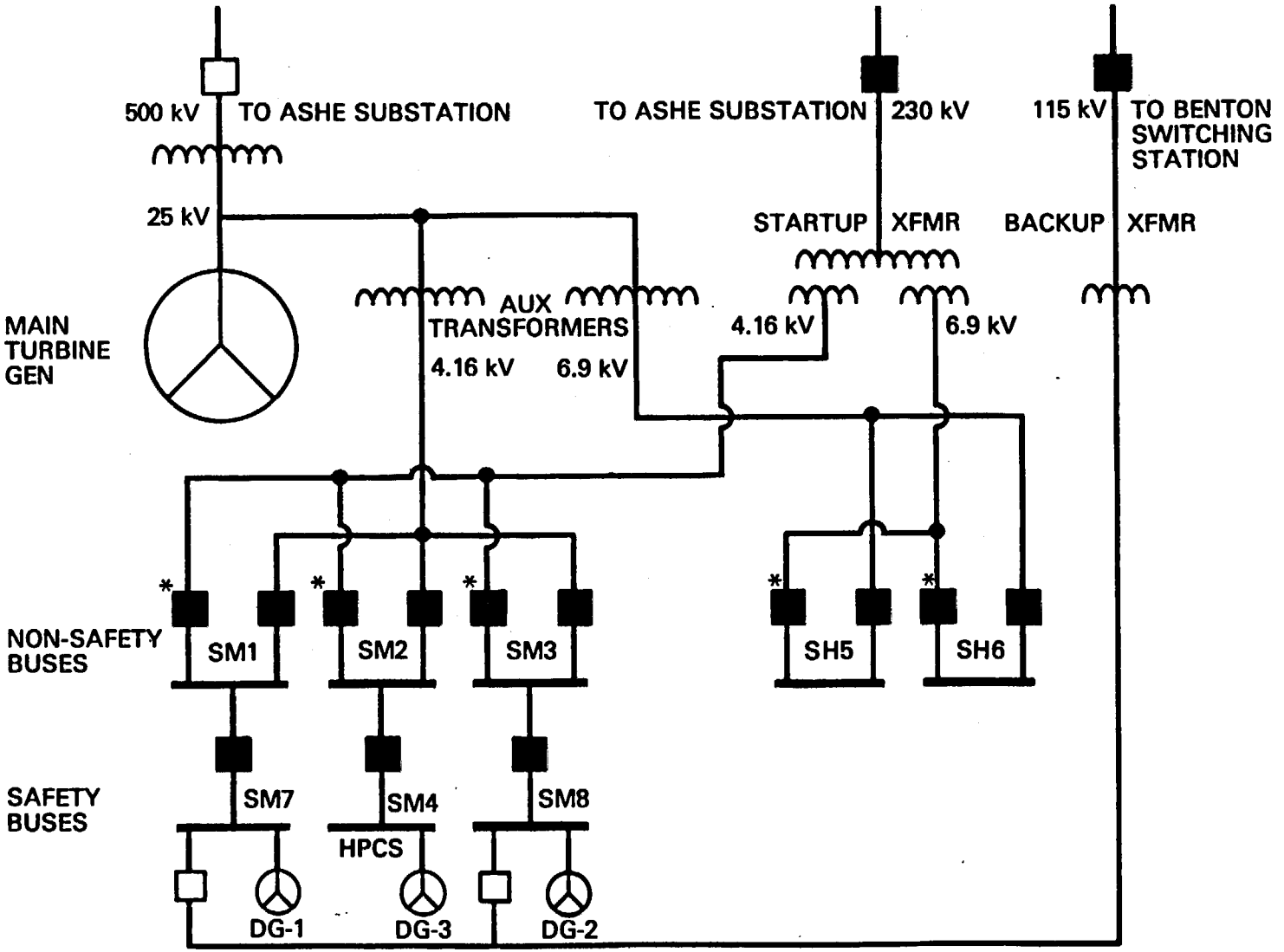
Edward L. Jordan, Director
Division of Emergency Preparedness
and Engineering Response
Office of Inspection and Enforcement

Technical Contact: Eric W. Weiss, IE
(301) 492-9005

Attachments:
1. Simplified Diagram Illustrating Abnormal Breaker Alignment
2. List of Recently Issued IE Information Notices

WNP-2*

(SIMPLIFIED ONE LINE DIAGRAM)



* Abnormal breaker alignment caused by partial spurious actuation of the Offsite Power Supply Fast Transfer Logic

LEGEND:
■ = CLOSED
□ = OPEN

Attachment 1
IN 85-28
April 9, 1985

LIST OF RECENTLY ISSUED
IE INFORMATION NOTICES

Information Notice No.	Subject	Date of Issue	Issued to
85-27	Notifications To The NRC Operations Center And Reporting Events In Licensee Event Reports	4/3/85	All power reactor facilities holding an OL or CP
85-26	Vacuum Relief System For Boiling Water Reactor Mark I And Mark II Containments	4/2/85	All BWR facilities having a Mark I or Mark II containment and holding an OL or CP
85-25	Consideration Of Thermal Conditions In The Design And Installation Of Supports For Diesel Generator Exhaust Silencers	4/2/85	All power reactor facilities holding an OL or CP
85-24	Failures Of Protective Coatings In Pipes And Heat Exchangers	3/26/85	All power reactor facilities holding an OL or CP
85-23	Inadequate Surveillance And Postmaintenance And Post-modification System Testing	3/22/85	All power reactor facilities holding an OL or CP
85-22	Failure Of Limitorque Motor-Operated Valves Resulting From Incorrect Installation Of Pinon Gear	3/21/85	All power reactor facilities holding an OL or CP
85-21	Main Steam Isolation Valve Closure Logic	3/18/85	All PWR facilities holding an OL or CP
85-20	Motor-Operated Valve Failures Due To Hammering Effect	3/12/85	All power reactor facilities holding an OL or CP
85-19	Alleged Falsification Of Certifications And Alteration Of Markings On Piping, Valves And Fittings	3/11/85	All power reactor facilities holding an OL or CP

OL = Operating License
CP = Construction Permit