

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555

October 28, 1991

NRC INFORMATION NOTICE 91-68: CAREFUL PLANNING SIGNIFICANTLY REDUCES THE POTENTIAL ADVERSE IMPACTS OF LOSS OF OFFSITE POWER EVENTS DURING SHUTDOWN

Addressees

All holders of operating licenses or construction permits for nuclear power reactors.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to describe the positive benefits that were derived by two licensees when their outage activities were carefully planned, scheduled, and performed. These licensees did not rely solely on technical specifications to identify the minimum equipment that should be available under various shutdown configurations. Rather, these licensees made additional equipment available and developed special procedures, as appropriate, to mitigate the consequences that could result from forced equipment outages. It is expected that recipients will review the information for applicability to their facilities and consider appropriate actions. However, suggestions contained in this information notice are not NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances

In November 1990, the licensee for the Turkey Point Plant began an 11-month dual unit outage to conduct a major electrical system upgrade including installing two additional emergency diesel generators (EDGs). On March 13, 1991, while both units were defueled and the safety-related EDGs were inoperable, offsite power for Unit 4 was being provided through the startup transformer. Spent fuel pool cooling pumps were being powered from the "C" load center which was being supplied by the "A" vital bus. Electrical power for the component cooling water (CCW) pumps and the intake cooling water (ICW) pumps was being provided from vital bus "A". At the time, spent fuel pool cooling was the most significant nuclear safety function.

An alternate source of power supply to the CCW, ICW, and spent fuel pool cooling pumps was available from four, non-safety-related (black start) diesel generators. Other backup sources of power to the pumps included interconnection with the Unit 3 startup transformer and transfer to another Unit 4 transformer (after defeating circuit breaker interlocks). An alternate method of

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spent fuel pool cooling, which was available, involved the use of a trailer-mounted diesel generator and a diesel powered fire pump or a non-safety grade screen wash pump. Detailed procedures for use of the alternative cooling methods were available.

At 3:30 p.m., a lockout occurred on the Unit 4 startup transformer resulting in a total loss of all vital AC power to Unit 4. A notification of an unusual event (NOUE) was declared as a result of the loss of vital offsite power. The licensee manually started, but did not load, two of the black start diesel generators. The other black start diesel generators were not started. All of these sources were available to supply power to the cooling pumps for the spent fuel pool if the startup transformer could not be returned to service.

The licensee inspected the startup transformer and associated circuit breakers and found no electrical fault indications. At 4:35 p.m., the licensee energized the startup transformer. At 5:27 p.m., power was restored to the CCW, ICW and spent fuel pool cooling pumps and forced cooling to the spent fuel pool was resumed. The NOUE was then terminated. The temperature of the spent fuel pool had increased from 84°F to 87°F during the 2-hour duration of the event.

On March 20, 1991, another event of interest occurred at the Indian Point Station. Before the event, Indian Point, Unit 2, (IP2) was in cold shutdown with all fuel removed from the vessel and stored in the spent fuel pit. Indian Point, Unit 3, (IP3) was operating at 100 percent power in a normal plant configuration. At 7:15 p.m., a potential transformer on a 345kV bus section at a remote substation failed catastrophically, creating a ground fault on the 345kV system. Fault isolation circuitry opened the main generator output breaker for IP3, which initiated a reactor trip. The reactor trip was uncomplicated and offsite power to IP3 vital buses was not interrupted.

However, an explosion and subsequent fire in the substation caused circuit breakers to electrically isolate the 138kV feeder circuit supplying offsite power to the IP2 6.9kV buses. As a result, the 6.9kV non-vital and 480V vital buses that were in service were deenergized. EDG 23 started automatically on bus undervoltage. At the time, the other two IP2 EDGs were tagged out of service for maintenance. As designed, EDG 23 did not load to the buses because all logic requirements for automatic loading were not satisfied. EDG 23 was manually loaded to two vital 480V buses. This action allowed a service water pump and a component cooling water pump to be started, a battery charger to be placed in service, and lighting to the auxiliary and containment buildings to be restored.

At the time of the event, offsite power to some vital loads was being supplied directly from temporary connections from an Indian Point Unit 1 feeder bus as opposed to being supplied from normal sources. These loads included the spent fuel pit cooling pump, the auxiliary building exhaust fan, and a battery charger. The licensee established these temporary connections to mitigate the consequences of a potential loss of the normal offsite source.

Since two EDGs were out of service, a temporary EDG was started as a precaution. However, the unit was not needed during the event. The licensee had

imported this temporary EDG unit to the site specifically for use as an alternate onsite source of emergency power during the shutdown in view of the significant number of planned equipment outages. The licensee provided this unit even though there were three gas turbines and a second 138kV feeder that were available from off site and that could have been manually aligned to energize the IP2 vital buses.

The licensee restored normal offsite power to IP2 within 30 minutes. During the event, component cooling water and service water were lost for only 2 minutes limiting the interruption to spent fuel cooling.

Discussion

These events illustrate the benefits of carefully planning equipment outages during shutdown. Before each event, the licensees had made additional power sources available to augment normal supplies. Furthermore, the licensees had developed written procedures to address anticipated equipment failures. These efforts allowed operating personnel to have adequate time to perform deliberate, well informed actions and minimized the safety concerns associated with each event. If the licensees had been less careful in their planning, these events could have been more significant. The technical specifications allow licensees considerable flexibility in removing equipment from service and altering normal system lineups during shutdown.

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Charles E. Rossi
Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

Technical contact: N. Fields, NRR
(301) 492-1173

Attachment: List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
90-51, Supp. 1	Failures of Voltage-Dropping Resistors in the Power Supply Circuitry of Electric Governor Systems	10/24/91	All holders of OLs or CPs for nuclear power reactors.
91-67	Problems With the Reliable Detection of Intergranular Attack (IGA) of Steam Generator Tubing	10/21/91	All holders of OLs or CPs for pressurized-water reactors.
91-66	(1) Erroneous Data in "Nuclear Safety Guide, TID-7016, Revision 2," (NUREG/CR-0095, ORNL/NUREG/CSD-6 (1978)) and (2) Thermal Scattering Data Limitation in the Cross-Section Sets Provided with the KENO and SCALE Codes	10/18/91	All fuel cycle licensees, critical mass licensees, interim spent fuel storage licensees, and all holders of operating licenses or construction permits for test, research, and nuclear power reactors.
91-65	Emergency Access to Low-Level Radioactive Waste Disposal Facilities	10/16/91	All NRC licensees.
91-64	Site Area Emergency Resulting From a Loss of Non-Class 1E Uninterruptible Power Supplies	10/09/91	All holders of OLs or CPs for nuclear power reactors.
91-63	Natural Gas Hazards at Fort St. Vrain Nuclear Generating Station	10/03/91	All holders of OLs or CPs for nuclear power reactors.
91-62	Diesel Engine Damage Caused by Hydraulic Lockup Resulting from Fluid Leakage into Cylinders	09/30/91	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License
CP = Construction Permit

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