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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION  
WASHINGTON, D.C. 20555-0001

February 27, 1998

**NRC INFORMATION NOTICE 98-07: OFFSITE POWER RELIABILITY CHALLENGES FROM INDUSTRY DEREGULATION**

Addressees

All holders of operating licenses for nuclear power reactors except those who have ceased operations and have certified that fuel has been permanently removed from the vessel.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees to a potential concern relating to electric power industry deregulation that could adversely affect the reliability of offsite power sources, i.e., power from the transmission system grid to nuclear power plants. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate. However, suggestions contained in this information notice are not NRC requirements; therefore, no specific action or written response to this notice is required.

Description of Circumstances

On July 11, 1989, safety systems at Virgil C. Summer Nuclear Station experienced a sustained degraded voltage condition and as a result the safety buses were automatically transferred from the offsite power system to onsite standby diesel generators. The degraded condition was caused by a turbine trip and deficiencies in the offsite power system's transmission network equipment. The transfer of power supplies was initiated by operation of degraded voltage protective relays, as designed. Non-safety system loads remained operable while being powered for approximately 1 hour from the degraded offsite power source. (LER 50-395/89-012)

On November 5, 1991, the licensee for Arkansas Nuclear One, Units 1 and 2 reported that, had its 500kV auto-transformer been lost during summer peak conditions, the 161kV system might not have been able to maintain adequate voltages to support the operation of the safety system loads of both units. (LER 50-313/91-010)

On April 15, 1992, Northeast Nuclear Energy Company reported that under certain operating conditions of the transmission network (i.e., during heavy load conditions), a failure of transmission system equipment may cause a trip of all three Millstone units and a loss of offsite power to the station. This operating condition was precipitated by the economic displacement of oil-fired generating units by non-utility generators and by the addition of other generating capacity (Seabrook and Hydro-Quebec) to the transmission network. (LER 50-245/92-020)

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On April 14, 1993, Wisconsin Public Service Corporation reported that under certain transmission line contingencies, a potential existed for the Kewaunee Nuclear Power Plant grid to become unstable and cause all offsite power sources into the plant to trip. (Ref: LER 50-305/93-010)

On December 30, 1993, Northeast Nuclear Energy Company reported that under certain operating conditions of the transmission network (i.e., Millstone Units 2 and 3 off line), the transmission network may not have sufficient capacity to permit the continued operation of safety system loads from offsite sources following a trip of Millstone Unit 1. (LER 50-245/94-001)

On August 8, 1995, Pacific Gas and Electric Company (PG&E) reported that under certain operating conditions (i.e., a high system load with a specific 230kV transmission line out of service), the transmission network may not have sufficient capacity to permit the continued operation of the safety system loads from offsite sources following a trip of one of the two Diablo Canyon units. (Ref: LER 50-275/95-007)

On August 10, 1996, a transmission line sagged into a tree in Oregon creating a ground fault that progressed into a major fault on the western interconnection. The subsequent transient resulted in the tripping of both Diablo Canyon, Units 1 and 2 (LER 50-275/96-012) and Palo Verde, Units 1 and 3 (LER 50-528/004).

During the summer of 1997, concerns were expressed about the impact of electric peak conditions on the offsite power sources for nuclear power plants located in the Midwest and New England. In addition, the licensee for Clinton nuclear station sought an exemption from offsite power regulatory requirements because of its analysis that offsite power would become inadequate under certain summer peak conditions following the loss of the nuclear unit.

Recent NRC inspection findings and Licensee Event Reports have indicated instances when grid stability analyses had not been updated by the licensees to reflect changes in the grid power system. Office for Analysis and Evaluation of Operational Data study C97-01, "Grid Performance Factors" dated March 20, 1997, identified a "need to monitor grid conditions on a regular basis."

#### Discussion

In 1988, NRC issued the station blackout (SBO) rule. The requirements of 10 CFR 50.63, "Loss of All Alternating Current Power," specify that each light-water-cooled nuclear power plant be able to withstand and recover from an SBO (i.e., a loss of offsite and onsite emergency ac power sources) for a specified period. The NRC review of licensees' analyses to assess the vulnerability of offsite power and the time required for recovery indicated that for most nuclear power plant sites the grid was stable and reliable.

Historically, grid control is decentralized and each utility or a small group of utilities forms a control area containing customers for which it is jurisdictionally responsible. The control areas form reliability councils that establish operating standards by consensus. These agreements, in turn, became the factors that determine the reliability of the grid and the bases for the availability of the offsite power system. Although the grid operating standards that evolved in the past provided reasonable grid reliability, events like those discussed herein reveal vulnerabilities of the electrical grid either through actual challenges or through licensee's analyses to assess the adequacy of the offsite power system.



**LIST OF RECENTLY ISSUED  
 NRC INFORMATION NOTICES**

<b>Information Notice No.</b>	<b>Subject</b>	<b>Date of Issuance</b>	<b>Issued to</b>
98-06	Unauthorized Use of License to Obtain Radioactive Materials, And Its Implications Under The Expanded Title 18 of the <u>U.S. Code</u>	2/19/98	All NRC licensees authorized to possess licensed material
97-45, Supp. 1	Environmental Qualification Deficiency for Cables and Containment Penetration Pigtails	2/17/98	All holders of operating licenses for nuclear power reactors except those licensees who have permanently ceased operations and have certified that the fuel has been permanently removed from the reactor vessel
98-05	Criminal History Record Information	2/11/98	All holders of operating licenses for power reactors
98-04	1997 Enforcement Sanctions for deliberate Violations of NRC Employee Protection requirements	2/9/98	All U.S. Nuclear Regulatory Commission licensees
98-03	Inadequate Verification of Overcurrent Trip Setpoints in Metal-Clad, Low-Voltage Circuit Breakers	1/21/98	All holders of operating licenses for nuclear power reactors
98-02	Nuclear Power Plant Cold Weather Problems and Protective Measures	1/21/98	All holders of operating licenses for nuclear power reactors
98-01	Thefts of Portable Gauges	1/15/98	All portable gauge licensees
97-91	Recent Failures of Control Cables Used on Amersham Model 660 Posilock Radiography Systems	12/31/97	All industrial radiography licensees
97-90	Use of Nonconservative Acceptance Criteria in Safety-Related Pump Surveillance Tests	12/30/97	All holders of OLs for nuclear power reactors except those who have ceased operations and have certified that fuel has been permanently removed from the vessel

OL = Operating License  
 CP = Construction Permit

The present grid management may be dismantled or restructured by two factors that are emerging: non-utility generation and deregulation. It is anticipated that in the future, power suppliers, whether utilities or independent power producers, will actively compete for sales to customers who may be located anywhere on the power grid. This option creates multiple combinations of generating units going on and off the grid based on economic and performance related consequences. Regional grid control could be the responsibility of centralized independent system operators (ISOs). The responsibilities and authority of an ISO are yet to be defined, but it is expected that the ISO, or a similar entity, will be charged with maintaining grid reliability to facilitate the marketing of power. It is uncertain how the historic mechanisms for reliable operation will change under the new grid operational structure. The Department of Energy has sponsored a Task Force on Electric System Reliability to examine the implications of industry deregulation on the Nation's electric power supply.

The capacity and capability of the offsite power system for each nuclear power plant could be significantly influenced by the decisions emerging from these forthcoming changes. Since the capability of the offsite power cannot be tested except when challenged in an actual event, the design bases of the offsite power can only be assured through an enveloping analysis that accounts for the full spectrum of grid loading and transient conditions that support the operability of safety systems. The NRC Standard Review Plan Section 8.2 provides current guidance for assessing the adequacy of the offsite power system. It addresses grid analyses that demonstrate acceptable voltage and frequency when subjected to scenarios involving loss of nuclear unit generation, loss of the largest other unit, or loss of the most critical transmission line.

Although the above events discussed may not demonstrate present generic weaknesses in licensees' processes, it is vital that licensees continue to ensure that the design bases with respect to the reliability and stability of the offsite power sources do not degrade during the life of the nuclear facility. The capacity and capability of the offsite power system for nuclear power plants are important elements to be factored into the management of the changes resulting from industry deregulation.

This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

Jack W. Roe, Acting Director  
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 Office of Nuclear Reactor Regulation

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*Attachment filed in Jacket.*  
 Attachment: List of recently issued Information Notices  
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*E. Rossi*  
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