

NRSC

**Northeast Blackout Power Outages
Study Group Report**

March 10, 2004

Study Outline

- **Team Membership**
- **Northeast Blackout Power Outage Summary**
- **4 Recommendations**

Northeast Blackout Power Outages



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Northeast Blackout Power Outages: Summary



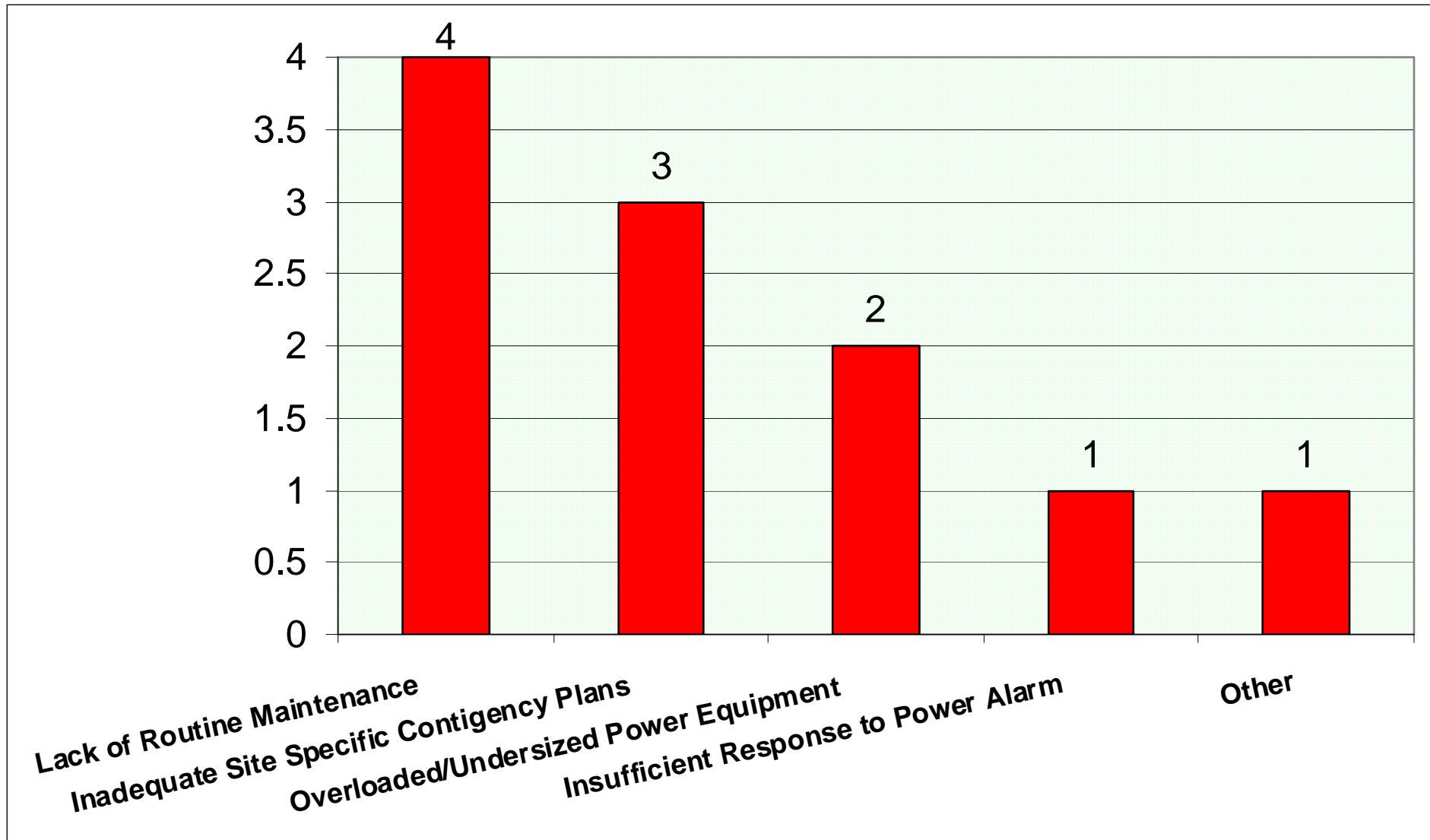
FCC #	NRSC #	Area	Failure Category/ SubCategory	Direct Cause	Root Cause/ Sub-Cause	Other Contributing Causes (from Power Team)
03-057	03-3-09	NE US	CO Power- Standby Generator	Power Failure	Procedural- Service Provider	<u>Lack of routine maintenance/testing</u>
03-058	03-3-10	NE US	CO Power- Standby Generator	Power Failure	Hardware Failure- Other	<u>Lack of routine maintenance/testing (No Spare Card)</u>
03-063	03-3-11	NE US	CO Power- Commercial	Power Failure	Power Failure- extended commercial power failure	<u>Inadequate site-specific power contingency plans (No Recovery Action Indicated)</u>
03-055	03-3-12	NE US	CO Power- Standby Generator	Power Failure	Power Failure- extended commercial power failure	<u>Lack of routine maintenance/testing (Fuel Transfer system failure) and Overloading/undersized power equipment</u>
		NE US	CO Power- Standby Generator	Power Failure	Power Failure- extended commercial power failure	<u>Overloaded/Undersized Power Equipment, Other (Non-diverse Fuel Distribution scheme, No Dual Fuel Feeds)</u>
03-059	03-3-13	NE US	CO Power- Standby Generator	Power Failure	Power Failure- extended commercial power failure	<u>Inadequate site-specific power contingency plans (Fuel Pump Failure-No portable generator)</u>
03-060	03-3-14	NE US	CO Power- Standby Generator	Power Failure	Power Failure- extended commercial power failure	<u>Insufficient Response to Power Alarm</u>
03-061	03-3-15	Mid-West	CO Power- Commercial	Power Failure	Power Failure- extended commercial power failure	<u>Inadequate site-specific power contingency plans (No Recovery Plan Stated)</u>
03-078	03-3-29	NE US	CO Power- DC Dist	Power Failure	Hardware Failure- Processor community failure	<u>Lack of Routine Maintenance/Testing</u>

Northeast Blackout Power Outages: Summary of Findings



- **8 Final Reports (affecting 9 buildings)**
 - » One Report covered 11 Switches in 2 building locations
 - Each Switch had different failure conditions
 - » Two Reports were not mandatory under Section 63.100
- **Root Causes**
 - » 5 - Power Failure - extended commercial power failure
 - » 1 – Procedural - Service Provider
 - » 1 - Hardware Failure - Processor community failure
 - » 1 - Hardware Failure - Other
- **Other Contributing Causes (additional study insights)**
 - » 4 – Lack of Routing Maintenance
 - » 3 – Inadequate Site Specific Contingency Plans
 - » 2 - Overloaded/Undersized Power Equipment
 - » 1 - Insufficient Response to Power Alarm
 - » 1 – Other
- **Summary: Substantial guidance gleaned from ‘Other Contributing Causes’**

Northeast Blackout Power Outages: Other Contributing Causes: Summary



Northeast Blackout Power Outages: 4 Recommendations (1 of 3)



- 1. Use Root Cause Sub-Categories ('Other Contributing Factors')**
- 2. NRSC Data Assembly and Analysis Teams should review its handling of reports affecting multiple network elements**
- 3. Remind Industry of 3 Power Best Practices**
 - NRSC Newsletter/Bulletin**
- 4. Adopt New Best Practice**

Northeast Blackout Power Outages:

4 Recommendations (2 of 3)



3. Remind Industry of 3 Power Best Practices

- **6-6-1028 – Routine Maintenance/Testing**
 - » Service Providers and Network Operators should engage in preventative maintenance programs for network site support systems including emergency generators, UPS, DC plant, HVAC, and fire suppression systems.
- **6-5-0662 – Full load testing needs emphasis**
 - » Service Providers should run engines for a period of at least 1 hour on a monthly basis and, at least 5 hours, with all available loads annually. Perform annual evaluation/maintenance of all power equipment. Maintain the power alarms by testing the alarms on a scheduled basis.
- **6-5-0658 Redundant Fuel Systems needs emphasis**
 - » Maintain adequate fuel on-site and have a well-defined re-supply plan. Improve fuel systems reliability by providing redundant pumps for day tanks and a manual-priming pump. Wherever possible, use dual-source generators with direct line natural gas as the primary and liquid fuel (normally diesel) as a backup to provide a long-term fuel source in times of long power outages.

Northeast Blackout Power Outages: 4 Recommendations (3 of 3)



4. Adopt New Best Practice

Service Provider, Network Operators and Property Managers with buildings serviced by more than one emergency generator, should design, install and maintain each generator as a stand alone unit that is not dependent on the operation of another generator for proper functioning, including fuel source.

Backup VGs

Power Failure – Direct Causes Sub Categories



- Inadequate/missing power alarm
- Insufficient response to power alarm
- Lack of routine maintenance/testing
- Overloaded/undersized power equipment
- Lack of power diversification
- Inadequate site-specific power contingency plans
- Extended Commercial Power Failure
- Other

Northeast Blackout Power Outages: Root Causes

