Network Reliability Steering Committee

NRSC

Northeast Blackout Power Outages Study Group Report

March 10, 2004

Study Outline

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

Task Group Members

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Northeast Blackout Power Outages: Summary

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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	Lack of routine maintenance/testing
03-058	03-3-10	NE US	CO Power- Standby Generator	Power Failure	Hardware Failure- Other	Lack of routine maintenance/testing (No Spare Card)
03-063	03-3-11	NE US	CO Power- Commercial	Power Failure	Power Failure- extended commercial power failure	Inadequate site-specific power contingency plans (No Recovery Action Indicated)
03-055	03-3-12	NE US	CO Power- Standby Generator	Power Failure	Power Failure- extended commercial power failure	Lack of routine maintenance/testing (Fuel Transfer system failure) and Overloading/undersized power equipment
		NE US	CO Power- Standby Generator	Power Failure	Power Failure- extended commercial power failure	Overloaded/Undersized Power Equipment, Other (Non-diverse Fuel Distribution scheme, No Dual Fuel Feeds)
03-059	03-3-13	NE US	CO Power- Standby Generator	Power Failure	Power Failure- extended commercial power failure	Inadequate site-specific power contingency plans (Fuel Pump Failure-No portable generator)
03-060	03-3-14	NE US	CO Power- Standby Generator	Power Failure	Power Failure- extended commercial power failure	Insufficient Response to Power Alarm
03-061	03-3-15	Mid-West	CO Power- Commercial	Power Failure	Power Failure- extended commercial power failure	Inadequate site-specific power contingency plans (No Recovery Plan Stated)
03-078	03-3-29	NE US	CO Power- DC Dist	Power Failure	Hardware Failure- Processor community failure	Lack of Routine Maintenance/Testing

Northeast Blackout Power Outages: Summary of Findings

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- **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

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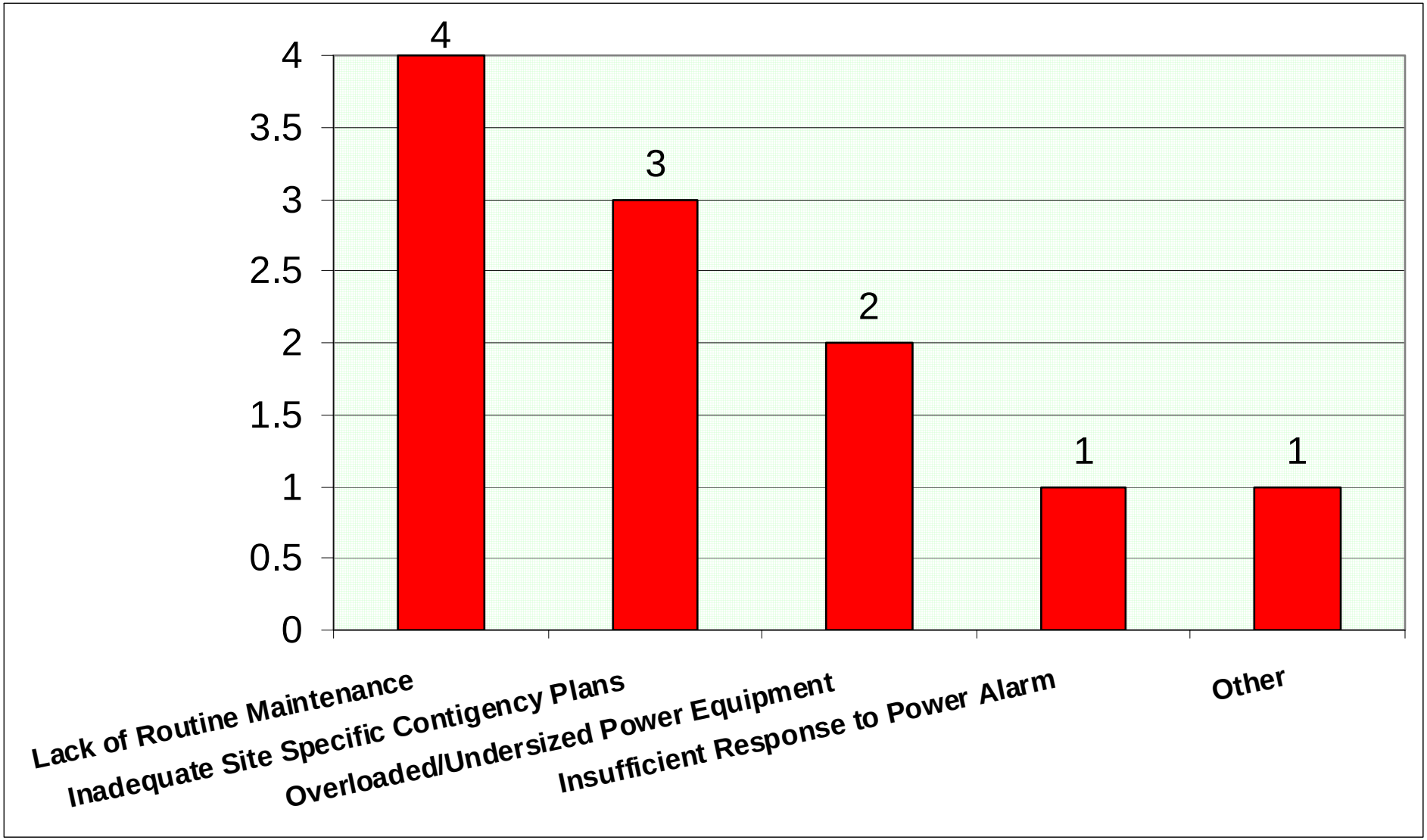

Northeast Blackout Power Outages: 4 Recommendations (1 of 3)

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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)

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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)

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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

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- 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

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