Renewal of Critical Infrastructure and Reducing Patient Risks

Replacing Automatic Transfer Switches at The Miramichi Regional Hospital
Understanding the Risks
Understanding the Risk

• Aging infrastructure serving critical services.
Understanding the Risk

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• Understand and mitigate risk to 2 parties:
  • Patients
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  - Workers
Existing Infrastructure

• 5 Automatic Transfer Switches
• 3 being replaced

• Installed in 1992, original construction
• Open Transition
• Communication via RS-485
Two Configurations

Stand Alone Enclosure

Integrated into Unit Substation
Services affected

- Air Handling Units
- Heating Circulation Pumps
- Kitchen Refrigeration
- Server Room
- Emergency Department
- Labour and Delivery
- Neonatal Intensive Care Unit
- Critical Care Unit
- Lab
- Surgical Suite
- Elevators
- Diagnostic Imaging
Services affected
The Project
Project Requirements

- Mitigate risk to patients by replacing Automatic Transfer Switches with new Closed Transition units.
Challenges

• Bus bar and substation modifications required – longer outages
• Risk to patients increases with outage duration.
• In some cases, the risk of an outage longer than 10 seconds unacceptably high.
2 Categories of Temporary Power

- “Temporary Power”
  - Supply power to equipment and departments while automatic transfer switch is shut down and replaced.
  - Use another transfer switch as the temporary source
  - Capacity to match historical recorded max.
2 Categories of Temporary Power

• “Temporary Power”
2 Categories of Temporary Power

• “Temporary Power”
  - Requires 4 to 12 hour outage to setup.
  - Install breakers and hardware in distribution panels
  - Modify unit substations
2 Categories of Temporary Power

• “Critical Temporary Power”

• Supply power to critical departments and equipment while temporary power is setup

• Install breakers in branch panels to back-feed from temporary source.

• Disconnect and feed equipment from temporary source.
2 Categories of Temporary Power

• “Critical Temporary Power”
2 Categories of Temporary Power

- “Critical Temporary Power”
Stand-Alone Transfer Switch
Substation Integrated Transfer Switch

- Install new transfer switch next to unit substation
- Remove old transfer switch components
- Use enclosure to splice emergency feeder
- Provide separate enclosure to splice normal feeder
Lessons Learned
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• Team Approach
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  • Members of the team bring a unique perspective based on their individual experience
Lessons Learned

• Temporary Power needs to be sized for transformer in-rush
  • In one instance, temporary power was sized based on recorded maximum and did not account for transformer in-rush current.
Lessons Learned

• Existing code violations need to be corrected
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  • Emergency supply wiring and essential electrical system wiring are within the same enclosure.
  • Not permitted per CSA C22.1 24-302 (3)
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    • Minimized work on Live Equipment
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  • Workers
    • Minimized work on Live Equipment
    • Special procedures and PPE when work on live equipment was required.
Mitigating the Risk