November 3, 2014

ROOT CAUSE ANALYSIS REPORT
Downtown Underground Network Event on August 13, 2014
AGENDA

1. Introductions & Overview
2. Root Cause Analysis Review
3. O’Neill Management Consultants Review
4. IPL Action Plan
5. Response to IURC Data Requests
6. Q&A
INTRODUCTIONS

• Kelly Huntington
  – President & CEO

• Joe Bentley
  – Senior Vice President, Customer Operations

• Mike Holtsclaw
  – Director, T&D Engineering

• Jim Sadtler
  – Director, Transmission Field Operations

• Kelly Millhouse
  – Director, Substations and AC Networks
Root Cause Analysis Review
IPL OPERATORS RESPONDED QUICKLY TO SAFELY RESOLVE EVENT WITHIN 15 MINUTES

<table>
<thead>
<tr>
<th>Time</th>
<th>Occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:25p</td>
<td>Conflicting 911 calls reporting smoke and loud banging noise from underground structure and smoke from manholes at 100 S Meridian Street</td>
</tr>
<tr>
<td>1:31p</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; IFD units on scene</td>
</tr>
<tr>
<td>1:33p</td>
<td>IPL Team Leader Field Service on scene</td>
</tr>
<tr>
<td>1:40p</td>
<td>IPL Transmission Operations Control Center operator opens Gardner Lane UG 651 feeder breaker</td>
</tr>
<tr>
<td></td>
<td>Event ends</td>
</tr>
</tbody>
</table>
IPL IMMEDIATELY CONDUCTED ITS INVESTIGATION AND INITIATED A ROOT CAUSE ANALYSIS PROCESS

• Evidence preservation began immediately
• Assembled In-house team
• Contacted Eaton Corporation the next day
• Gathered Data
  – YouTube Videos & Security Video
  – IFD information
  – Maintenance & Inspection Records
  – Network Protector Information
  – PI Historian data (Network SCADA & ECS SCADA)
• Analyzed Data
• Developed Conclusions & Action Plans
26 S MERIDIAN STREET
480-VOLT SPOT NETWORK VAULT

LARGE SERVICE

South Bay

Middle-South Bay

Middle-North Bay

North Bay

UG 621

UG 631

UG 651

UG 661

C-Phase

Fault

OPENED
UG 651
IPL’S ROOT CAUSE ANALYSIS IDENTIFIED THE TWO POSSIBLE EVENT SCENARIOS
THE EVENT WAS COMPLETELY CONTAINED IN THE NETWORK PROTECTOR

- The Network Protector door remained closed which reduced damage to other vault equipment
O’Neill Management Consultants Review
IPL Action Plan
IPL has a thorough plan to optimize downtown network operations

<table>
<thead>
<tr>
<th>Action Plan</th>
<th>Timing</th>
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<tbody>
<tr>
<td>1 Replace all 480-Volt Network Protectors</td>
<td>12/31/2018</td>
</tr>
<tr>
<td>2 Document Network Event Response Plan</td>
<td>3/31/2015</td>
</tr>
<tr>
<td>3 Meet with Indianapolis Fire Department</td>
<td>9/10/2014</td>
</tr>
<tr>
<td>4 Develop Mitigation Strategy</td>
<td>3/31/2015</td>
</tr>
<tr>
<td>5 Conduct Review of Gateway Vault Communications</td>
<td>3/31/2015</td>
</tr>
<tr>
<td>6 Enhance Network Protector Inspection Process</td>
<td>11/1/2014</td>
</tr>
<tr>
<td>7 Update Succession Plans</td>
<td>June 1st Annually</td>
</tr>
<tr>
<td>8 Conduct Staff Training</td>
<td>June 1st Annually</td>
</tr>
<tr>
<td>9 Enhance Audit Maintenance &amp; Inspection Records Process</td>
<td>3/31/2015</td>
</tr>
</tbody>
</table>
• Replace **ALL** 480-Volt Network Protectors  
  – Will replace all 480-Volt network protectors  
    • 137 protectors in 44 vaults  
    – Developed a five year program to replace approximately 30 per year  
    – Estimated capital cost of $15M

• Verify the location of all 58 pre-1985 Westinghouse CM-22 network protectors - **COMPLETE**

• Re-prioritize the replacement program sequence  **COMPLETE**
- Complete change outs by December 31, 2018

- Timetable allows for minimizing customer outages during the change-out and reduces reliability risks for the downtown network

- Responsible Party: Director, Transmission Field Operations
IPL’s Root Cause Analysis Identified the Two Possible Event Scenarios

26 S Meridian Street 480-Volt Spot Network Vault

IPL’s action plan addresses both possible event scenarios
• Document a formal written Network Event Response and Test Plan including:
  – Identification of key personnel
  – Event notification
  – Incident command structure for handling network events
  – Identification of on-scene IPL incident commander
  – Annual tabletop drill of the plan

• Complete Plan by **March 31, 2015**

• Responsible Party: Director, T&D Engineering
• Schedule meeting with the Indianapolis Fire Department - **COMPLETE**
  – Review the response for a network event
  – Discuss coordination with IPL
  – Discuss lessons learned from August 13\textsuperscript{th} event
  – Meeting was held on 9/10/14 and feedback will be incorporated in Network Event Response Plan (Recommendation #2)

• **Meeting was held on September 10, 2014**

• **Responsible Party: Director, T&D Engineering**
• Develop a mitigation strategy that limits severity and consequences of a network transformer or network protector failure
  – Better information at the substation level

• Complete Action Plan, including identification of major milestones for selected strategy by March 31, 2015

• Responsible Party: Director, Asset Management
• Conduct a review of all Gateway Vault circuits for communications stability and frequency of telemetry errors
  – Determine frequency of communication errors
  – Review response process for Network SCADA communication errors and who is notified
  – Review the routing of Blue Network SCADA communications cable in the vaults. Determine if there is a way to provide increased fire protection during an event.

• Complete Review and Develop Action Plan, including major milestones by **March 31, 2015**

• Responsible Party: Director, Transmission Field Operations
• Enhance the network protector inspection process
  – Add visual inspection of the bottom area around the transformer bus in the network protector for debris or evidence of tracking on the bus support insulators - **Added to tablet electronic inspection form**
  – Add visual inspection of the network protector bushing for signs of cracks or tracking - **Added to tablet electronic inspection form**

• Complete Changes to tablet software by **November 1, 2014**

• Responsible Party: Director, Asset Management
• **Update Staffing Plans**
  
  – **Ensure no critical loss of institutional knowledge**
    
    • Continue to monitor, update, and implement the Company’s succession plan for key staff responsible for network operations and emergency response
    
    • Includes control room staff, first responders, engineering support, and those responsible for public and customer communications

• **Complete by June 1\(^{st}\) annually**

• **Responsible Party: Customer Operations Leadership**
• **Staff Training**
  – Actively participate in industry forums and conferences where other companies that operate secondary network systems also participate
    • Example: 2015 Eaton Electrical Network Systems Conference
  – Annual funding for travel and memberships is included in O&M budget

• **Complete by June 1\(^{st}\) annually**

• **Responsible Party: Customer Operations Leadership**
IPL ACTION PLAN | #9

• Network Inspection Process Audit
  – Implement process to verify inspection data from tablets is downloaded properly to on-line systems - COMPLETE
  – Implement periodic auditing of maintenance and inspection records for completeness
  – Conduct audit of back office process to improve and assure the retrieval and completeness of inspection and maintenance records in master database

• Complete Process Audit and develop Action Plan to address any gaps identified by March 31, 2015

• Responsible Party: Director, Asset Management
Responses to IURC Data Requests
IPL ENGAGES IN SUCCESSION PLANNING

- **Long-Term Succession Planning**
  - Downtown Network is supported by an organization of 72 people and IPL regularly reviews scheduled work activities to optimize this number.
  - The downtown network has an integrated web of leadership that is not dependent on any one individual.
  - IPL’s Power Delivery Staffing Study analyzes specific workforce and future needs to help support the succession plan process.
  - IPL leverages this information to identify and develop individuals for all positions.
IPL IS COMMITTED TO MAINTAINING A SKILLED WORKFORCE

- Multi-faceted approach to succession planning
  - Hiring the right people
  - Job rotations
  - On-the-job training
  - External formal training and conferences
  - System and Technical enhancements
  - Coaching and mentoring of young professionals
IPL HAS STRENGTHENED THE RIGOR OF POWER DELIVERY ASSET MANAGEMENT

• Asset Management Framework
  – Maintenance/Inspection and capital investment
  – Asset replacement programs for downtown network
  – Systematic approach using performance indicators

• Power Delivery Organization integrated with DP&L as part of the new Customer Operations Organization
  – Ensures continued high reliability provided in an efficient and effective manner
  – Provides additional people resources and increased opportunities to share best practices and knowledge
IPL’S COMMITMENT

• IPL’s downtown network system is safe and reliable

• IPL is committed to taking the necessary actions to assure the continued safe and reliable operation of its downtown network

• IPL continues to take actions to reduce the likelihood and impact of any future occurrences within its downtown network system
Questions
November 3, 2014

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Appendix
APPENDIX: POST EVENT UG 651
NETWORK PROTECTOR
APPENDIX: ORGANIZATIONAL CHARTS

Customer Operations Organization Attachment

Legend
Green-Key Positions @ IPL
Yellow-Backup Positions @ IPL
Blue-Mutual Assistance/Supplemental to Key Positions located @ DPL
APPENDIX: ORGANIZATIONAL CHARTS

Design Engineering Group Attachment

Legend
Green-Key Positions @ IPL
Yellow-Backup Positions @ IPL
Blue-Mutual Assistance/Supplemental to Key Positions located @ DPL

*Team Leader Major Underground Projects Engineering
APPENDIX: ORGANIZATIONAL CHARTS

IPL Major Underground Projects Engineering Group Attachment

Legend
- Green: Key Positions @ IPL
- Yellow: Backup Positions @ IPL
- Blue: Mutual Assistance/Supplemental to Key Positions located @ DPL

*Team Leader Major Underground Projects Engineering
APPENDIX: ORGANIZATIONAL CHARTS

IPL Substation and Network Field Operations Group Attachment

Legend
Green-Key Positions @ IPL
Yellow-Backup Positions @ IPL
Blue-Mutual Assistance/Supplemental to Key Positions located @ DPL

IPL
James Page
Manager
Substation and Network Field Operations

IPL
Timothy Gentry
Team Leader

IPL
Charles Brown
Team Leader

IPL
David Leonard
Team Leader

IPL
Michael Lee
Team Leader

IPL
Tom Edwards
General Engineer
Work Schedulers
Jonathan Stevenson
Karen Long

IPL
Randy Dittmeyer
Team Leader

IPL
Sub Mech Ldrs
John Burgess
Rick Church
Michael Cochran
Cesar Dryfe
Eric Peterson

IPL
Sub Mechanics
Larry Abel
Barry Bolin
Marc Brethauer
James Burdige
Rex Cloud
Omar El-Abad
John Hamilton
Ricky Harris
Ron Jacobs
Ricky Johnson
Chaucsey Romine
William Toom
Robert Townsend

IPL
Sub Mechanics
Todd Bennett
Sergio Chaparro
Larry Davis
Dean Hacker
Harrison Hubbard
Kevin Leonard
Jacob MacPhee
Warren Remick
Bill Rankel
Scott Smith
John Stephenson
Eric White

IPL Sub/Network
All Seniors
Dan Anderson
William Jones
James Marriman

IPL Sub Mechanics
Crew Leaders
Leonard Fulkerson
Mike Hittle
David Holt
James Parker
Aaron Reitzel
David Shaw
Norm Stout
Michael Thomas
Phil Woolvin
DPL Substations and AC Network Team Attachment (Continued)