



INDIANAPOLIS POWER & LIGHT COMPANY

STATUS REPORT IN RESPONSE TO
26 SOUTH MERIDIAN STREET NETWORK EVENT ACTION PLAN
FOR THE YEAR ENDED 2014

ISSUED

JANUARY 30, 2015

1.0 Introduction

On August 8, 2014, Indianapolis Power & Light Company (IPL) experienced a failure of a Westinghouse CM-22 480-volt network protector at 26 S. Meridian Street. The subsequent Root Cause Analysis (RCA) investigation resulted in nine recommendations that were included in the “*Root Cause Analysis Report for the 26 S. Meridian Street Network Event*” which was issued by IPL on October 3, 2014 and discussed in a public meeting with the Indiana Utility Regulatory Commission (IURC) on November 3, 2014. On December 5, 2014 IPL provided its Action Plan in response to the RCA report recommendations.

Four of the recommendations in the Action Plan require a report to be filed with the IURC by January 31, 2015 to provide updates on the progress of these recommendations.

The following table summarizes the four reporting commitments as shown in the Action Plan for the 26 S. Meriden Street RCA Report.

Recommendation	Commitment	Required Report Action
1 - Replace 480 Volt Network Protectors	Provide summary of the number of 480 volt Network Protectors that have been replaced. Quarterly reporting required through end of program in 2016	Include results in report to be filed with IURC by January 31, 2015
2 - Network Event Response Plan	Provide draft of written response plan Final version due February 28, 2015 Tabletop Drill to be conducted in April 2015	Provide access to draft copy to IURC by January 31, 2015
5 - Gateway Vault Communication Review	Issue written procedure document for responding to Telemetry Errors by December 31, 2014 Issue Annual Availability metric for 2014 in January 2015 report	Submit copy of procedure in report to be filed with IURC by January 31, 2015 Include in report to be filed with IURC by January 31, 2015
6 - Enhanced Network Protector Inspections	Complete inspection of pre-1985 Network Protectors by December 31, 2014	Submit Summary Report of results in report to be filed with IURC by January 31, 2015

For reference, the complete list of recommendations from the 26 S. Meridian Street RCA Report and the IPL commitments are included in Appendix A of this report.

2.0 Summary

In the Action Plan for 26 S. Meridian Street dated December 5, 2014 there were four items that were to be included in a report to the IURC by January 31, 2015. They were:

- Recommendation 1, report on number of 480 volt Network Protectors replaced as of December 31, 2014 (Covered in Section 3.1)
- Recommendation 2, complete draft version of the Network Event Response Plan (Covered in Section 3.2)
- Recommendation 5, report on annual availability metric for the Gateway Vault Communications and status of Operating Procedure for Telemetry Errors (Covered in Section 3.3)
- Recommendation 6, report on inspection of pre-1985 Westinghouse CM-22 480 volt network protectors and the inspection findings (Covered in Section 3.4)

3.0 Status of Open Commitments from 2014

This section will highlight each of the four open reporting commitments at the end of 2014 and provide their status as of December 31, 2014. The text of the recommendation from the RCA report is included, followed by the IPL commitment that is due by January 31, 2015, and IPL's action to date.

3.1 Recommendation #1 – 480 Volt Network Protector Replacement Program

Move forward with the program to replace all 480volt network protectors as part of the Arc Flash Mitigation Program. Verify the location of all 58 pre-1985 Westinghouse CM-22 network protectors and prioritize them in the replacement program. These pre-1985 CM-22 network protectors will be prioritized along with the network protectors identified with aluminum bus and those protectors identified as having issues with toluene out gassing. These priorities come from commitments made in IPL's 2012 response to the Independent Assessment of Indianapolis Power & Light's Underground Downtown Network, dated December 13, 2011. This recommendation will address the potential gray spool insulator issue identified in this investigation. Change-out of the network protectors would also address any concerns with the bushings discussed in the alternative scenario.

- IPL Commitments due by January 31, 2015
 - *Monitor and track the 480-volt network protector replacement program progress on a monthly basis to assure that the schedule is being met.*

IPL Actions: IPL has replaced two 480 volt network protectors out of a total of 137. IPL plans to replace 40 additional 480 volt network protectors in 2015. Weather conditions, circuit and network transformer loadings, customer cooperation for outages, and other system factors will determine when these change outs can occur during the year. IPL is currently negotiating with an outside contractor to assist with these change-outs. This would provide additional resources and allow a greater number of network protectors to be replaced in the spring and fall during lighter load conditions. The plan is to have the contractor on-site starting in March 2015.

Going forward IPL will report quarterly the current status of the 480 volt network protector change out program until all 480 volt network protectors have been replaced.

3.2 Recommendation #2 – Network Event Response Plan

Develop a formal written Network Event Response Plan. This plan should identify the key personnel, the order in which they are notified, the type of messages, and how messages are delivered. IPL will establish an on-scene incident command structure for handling the event and conduct annual tabletop drills of the plan. IPL will invite IFD to participate in the drills.

- IPL Commitments due by January 31, 2015
 - *Issue a written draft of a Downtown Underground Network Event Response Plan by January 30, 2015. This plan will provide roles and responsibilities and the notification protocols to be followed. The plan will provide the support organizational structure that will be used during a network event and will designate an on-scene IPL Incident Liaison to IFD and other public safety officials that are on-scene. The final plan will be completed by February 28, 2015.*

IPL Actions: The draft of the Network Event Response Plan has been completed. As this is a confidential document and has been marked as containing confidential operational information and potential Critical Energy Infrastructure Information, a copy of the full draft plan has not been included in this response. The Executive Summary section is being provided in Appendix B as it does not contain any confidential information. IPL will make the draft of the response plan available to the Commission for review subject to the protection of confidential information from public disclosure.

3.3 Recommendation #5 – Gateway Vault Communication Review

Conduct a review of all Gateway Vault circuits for communications stability and frequency of telemetry errors. Review the routing of Blue Network SCADA¹ communications cable in the vaults. Determine if there is a way to provide increased fire protection during an event.

- IPL Commitments due by January 31, 2015

¹ The Blue Network SCADA communication cable is the copper twisted pair cable that runs in a daisy chain pattern from the network protector relays to the Vault Guard relay. This is the cable that was damaged in the event at 26 S. Meridian Street on August 13, 2014.

- *IPL will implement a daily report that will list all downtown network equipment that is flagged to be in telemetry error. This report will be sent at 7 AM each day to key people in Engineering, Network Field Operations, Transmission Field Operations, and Customer Operations Leadership to determine actions that are required to address telemetry errors.*

IPL Actions: IPL implemented the daily network equipment status report on December 1, 2014. This report is now in place and is being issued each day at 7 AM in an email sent to several people including Network Engineering and Network Field Operations. A sample of the daily email is included in Appendix C to this report. That same information is also available on the IPL Asset Management intranet website. IPL has developed a metric that measures the availability of the Network SCADA information based on the amount of time that the data is available. This is included in a monthly report on the asset management intranet site.

- *An operating procedure will be developed and implemented that will outline how telemetry errors will be addressed will be issued by December 31, 2014.*

IPL Actions: IPL developed and issued an Operating Procedure on December 22, 2014 for addressing telemetry errors with the Gateway Vault Communication System. A copy of the Operating Guide is included as Appendix D to this report.

Due to the original design of the Central Business District (“CBD”) communication network; many of the Telemetry Alarms/Failures are troubleshot with varying degrees of success. Currently there are 13 Gateway Vaults. IPL Engineering has ordered five new Gateway Vaults and will be modifying the communication network for the CBD SCADA. By increasing the number of Gateway Vaults by 38%, on average the number of Vault Guard Relays on the copper “Blue Wire” twisted pair will reduce by 28%. The number of Vault Guard relays per Gateway Vault impacts the ability to sustain reliable communication. IPL expects that splitting the Gateway Vault circuits into small segments will improve the communications.

IPL has developed a metric to track the availability of the Gateway vault communications between the Vault Guard Relay and the individual network protector relays. The metric measures the percent of time that IPL was able to communicate with each network protector. The monthly target is 95% availability. The figure below illustrates the 2014 availability.

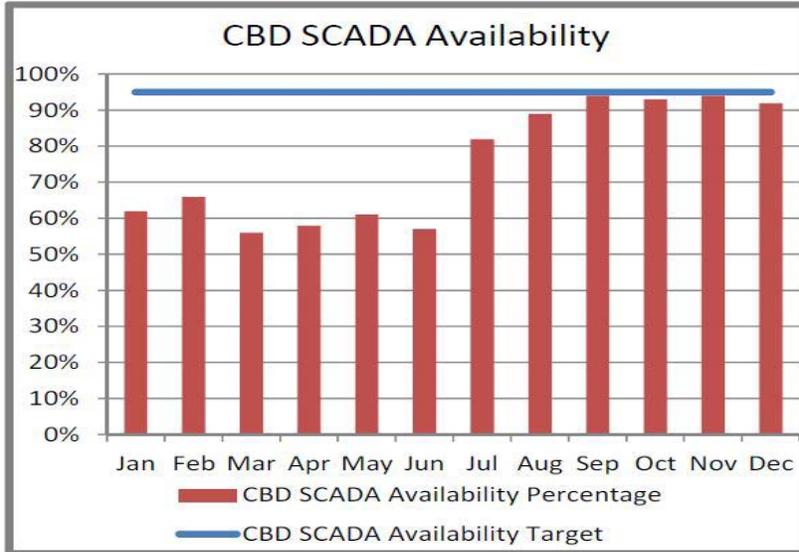


Figure 1

3.4 Recommendation #6 – Enhanced Network Protector Inspections

Enhance the network protector inspection process to ensure attention to the issues cited in this report. The enhanced inspection process should include 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 and visual inspection of the network protector bushing for signs of cracks or tracking. An example of this enhanced inspection process was the inspection of the bottom bus support insulators on the UG 661 network protector at 26 S. Meridian Street vault and 44 N. Senate Avenue vaults and obtaining pictures of this area.

- IPL Commitments due by January 31, 2015
 - *IPL will inspect all remaining 53 Westinghouse pre-1985 CM-22 network protectors to assure there is no debris in the bottom area of the bus support insulators and that there are no signs of heating or breakdown of the support insulator. These inspections will be completed no later than December 19, 2014.*
 - **IPL Actions:** IPL completed the inspection of 52 pre-1985 Westinghouse CM-22 network protectors as of December 3, 2014. The inspections did not find any signs of heating in any of the network protectors in the lower area of the transformer bus supports.

4.0 Conclusion

IPL remains committed to assuring the safe and reliable operation of the Downtown network system. IPL is working to complete implementation of all nine of the recommendations included in the Action Plan for 26 S. Meridian Street. The reporting requirements included in the Action Plan will be met through emails for the quarterly progress reports for the network protector replacement program. Those emails will continue until all 480 volt network protectors have been replaced which is scheduled to be done by December 2019. A written report will be filed in January 2016 to detail progress on the remaining recommendations.

Appendix A – 26 S. Meridian Street Action Plan Status as of December 31, 2014

Recommendation	Commitment	Report Action
1 - Replace 480 Volt Network Protectors	Provide summary of the number of 480 volt Network Protectors that have been replaced. Quarterly reporting required through end of program in 2016	Include results in report to be filed with IURC by January 31, 2015
2 - Network Event Response Plan	Submit draft of written response plan Final version due February 28, 2015 Tabletop Drill to be conducted in April 2015	Submit draft copy to IURC by January 31, 2015
3 - Meeting with Indianapolis Fire Department	Continue to meet annually with IFD	This recommendation was complete as of September 10, 2014. On-going annually meetings will be held
	Include designation of on-scene incident commander in Network Event Response Plan	Will be included in the Network Event Response Plan for Recommendation 2
4 - Mitigation Strategy to limit severity and consequences of a network transformer failure	Study relay settings on CBD network feeders to better detect a low voltage side fault	Action Plan due by March 31, 2015; include results in January 2016 report Commission
	Review options for fire detection system in 480 volt spot network vaults	Report to IPL management due by March 31, 2015; include results in January 2016 report to the Commission
	Review use of FR3 insulating fluid in main tank of network transformers	Report to IPL management due by May 1, 2015; include results in January 2016 report to the Commission
5 - Gateway Vault Communication Review	Issue written procedure document for responding to Telemetry Errors by December 31, 2014	Submit copy of procedure in report to be filed with the Commission by January 31, 2015
	Issue Annual Availability metric for 2014 in January 2015 report.	Include in report to be filed with the Commission by January 31, 2015
	Review routing of blue twisted pair communication cable	Issue report to IPL management by May 1, 2015; include results in January 2016 report to the Commission

Recommendation	Commitment	Report Action
6 - Enhanced Network Protector Inspections	Complete inspection of pre-195 Network Protectors by December 31, 2014	Submit Summary Report of results in report to be filed with IURC by January 31, 2015
7 - Succession Plan	Continue to monitor, update, and implement the Company's succession plan for key staff responsible for network operations.	Provide summary of the updated succession plan in the January 2016 report to the Commission
8 - Participation in Industry forums and Conferences	Send at least 2 people to the Eaton Electrical Network System Conference in March 2015	Include results in the January 2016 report to the Commission
	Continue participation in the Northeast Underground Committee meetings	Include results in the January 2016 report to the Commission
9 - Steps to Improve inspection and maintenance records	Conduct annual audits of work orders and inspection data for completeness	Include results in the January 2016 report to the Commission
	Develop process where audit results are reviewed by IPL Management	Include results in the January 2016 report to the Commission

Executive Summary

This response plan has been prepared to provide guidance and define the roles and responsibilities of those IPL personnel that may be called upon to assist during a network event. Like IPL's *Emergency Response Plan* for storm restoration, this *Network Event Response Plan* is structured to follow the National Incident Management Structure (NIMS). The plan defines the roles needed to address a network event and identifies the IPL company positions of people filling those roles. For purposes of this plan, a network event is defined as a manhole fire, a secondary duct line fire, or a network vault fire. Upon notification a network event as defined has occurred, the Network Event Response Team will be notified and activated. The Network Event Response Team can be activated for other situations at the discretion of the Transmission Operations Control Center. Members of the Network Event Response Team are defined in the plan.

The Incident Commander and the Liaison Officer are two key positions in this plan. The Incident Commander directs the overall response to the event. They will be on-scene of the event taking charge of the situation. The Liaison Officer provides the link to the City of Indianapolis emergency responders. In most cases this will be the Indianapolis Fire Department (IFD). The IPL Liaison Officer will remain in direct contact with the IFD Incident Commander while coordinating information exchange between IPL and IFD.

The Response Plan defines other roles that are needed to support the event response. These roles include the Public Information Officer, Operations Section Chief, Planning Section Chief, and Logistics Section Chief. The responsibilities associated with each of these roles is defined in the Response Plan along with the designation of IPL company positions of people filling those roles. All members of the Network Event Response Team receive the emergency notifications that are sent out through IPL's Emergency Notification System during a network event.

The Response Plan covers coordination with Marion County Department of Homeland Security (Marion County DHS). IPL has a history of good cooperation with Marion County DHS and a good working relationship. During a network event IPL will establish contact with the Marion County DHS Emergency Operations Center Director and respond to requests for information from them. The Response Plan also covers After Action Reporting and evidence preservation for later use in a Root Cause Analysis investigation.

No plan can cover all situations that may occur. The intent of this plan is to provide a formal documented framework and guide that will lead to a successful response to a network event or other situation where the Network Event Response Team can provide their knowledge and assistance.

Appendix C – Sample Daily Email of Gateway Vault Communication Issues

From: [Redacted]
Sent: Monday, January 19, 2015 7:10 AM
To: DT Network Alarms
Subject: Downtown Network Alerts January 19, 2015

ProtName	Time Stamp	Quality	IA	IB	IC	Protector Rating	Network Protector Relay	Breaker Fail	Breaker Pumping	Device Status	Relay Alarm	Relay Temp	VTA	VNA	VTB	VNB	VTC	VNC
GVAULT02.613-130.MON	1/14/2015 12:07:28 PM	TE	0	0	0		CLOSE	Normal	Normal	ONLINE	Normal	0	0	0	0	0	0	0
GVAULT04.611-26E.GA	1/31/2012 12:35:31 PM	TE	511	529	502		CLOSE	Normal	Normal	ONLINE	Normal	29	280	280	280	280	280	280
GVAULT04.651-25S.MRD	1/14/2015 12:07:43 PM	TE	985	992	1140	3000	CLOSE	Normal	Normal	OFF LN	Normal	30	127	127	127	116	116	
GVAULT04.661-26S.MRD	1/14/2015 12:07:43 PM	TE	0	0	0	1600	OPEN	Alarm	Normal	OFF LN	Normal	20	15	269	15	270	15	271
GVAULT06.432-37.MON	1/19/2015 7:10:08 AM	Normal	466	470	480	3000	CLOSE	Normal	Normal	ONLINE	Normal	32	28.3	28	28.1	27.8	28.1	27.8
GVAULT08.411-121E.TIP	1/14/2015 12:08:25 PM	TE	0	0	0	1600	CLOSE	Normal	Normal	ONLINE	Normal	0	0	0	0	0	0	0
GVAULT08.431-121E.TIP	1/14/2015 12:08:25 PM	TE	0	0	0	1600	CLOSE	Normal	Normal	ONLINE	Normal	0	0	0	0	0	0	0
GVAULT08.441-121E.TIP	1/14/2015 12:08:26 PM	TE	0	0	0	1600	CLOSE	Normal	Normal	ONLINE	Normal	0	0	0	0	0	0	0
GVAULT09.422-126E.MKT	1/19/2015 7:09:40 AM	Normal	0	0	0	1600	OPEN	Normal	Normal	ONLINE	Normal	30	22	124	21	124	22	124
GVAULT09.442-150E.OH	1/19/2015 7:10:10 AM	Normal	486	475	487	3000	CLOSE	Normal	Normal	ONLINE	Normal	21	273	273	256	256	288	288
GVAULT10.431-36W.VT	1/19/2015 7:09:40 AM	TE	0	0	0	1600	OPEN	Alarm	Normal	ONLINE	Alarm	34	195	125	194	123	194	125
GVAULT10.441-39W.VT	1/14/2015 12:08:38 PM	TE	0	0	0	1600	CLOSE	Normal	Normal	OFF LN	Normal	0	0	0	0	0	0	0
GVAULT12.412-110N.NJ	1/14/2015 12:08:43 PM	TE	238	181	221	3000	CLOSE	Normal	Normal	ONLINE	Normal	17	125	125	125	125	126	126
GVAULT12.442-16S.NJ	1/14/2015 12:08:44 PM	TE	477	496	406		CLOSE	Normal	Normal	ONLINE	Normal	18	125	125	125	125	125	125

Key to Report

TE – Telemetry Error, all data from this relay cannot be trusted

ALARM – Device is in an error state or abnormal state

OFF LN – Relay is off line, not communicating

ONLINE – Relay is on line and communicating

NORMAL – Relay status point is in normal operating range

Numbers in the right hand columns that are red are above or below the acceptable operating limit

Appendix D – AM-CBD-003: CBD SCADA Maintenance Priorities Procedure Document

INDIANAPOLIS POWER & LIGHT COMPANY

**CENTRAL BUSINESS DISTRICT NETWORK SYSTEM SUPERVISORY CONTROL AND DATA
ACQUISITION MAINTENANCE PRIORITIES**

Approval Date	Signature	Name	Title
12/31/2014		Barry Feldman	Director, T&D Asset Management
12/31/2014		Jim Sadtler	Director, Transmission Field Operations

Table 1-1 - Approvals

Issue Date	Revision #	Major changes
12/31/2014	0	Original Issue

Table 1-2 - Revision History

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1. Scope

This document describes the procedure for responding to abnormal readings in the IPL Central Business District (CBD) supervisory control and data acquisition (SCADA) system. This document includes the recommended responses to network protectors, relays in the protectors, communication cables, vault guards, fiber interfaces, and remote terminal units (RTUs). It does not include any responses for irregularities in the Energy Control System (ECS) or the PI Historian computer systems.

2. Purpose

The purpose of this document is to provide guidelines and priorities for addressing and responding to CBD SCADA generated abnormal readings. These readings may be unusual electric system quantities or communication errors that should be given attention.

3. Safety

Although this document is not a safety manual, inspectors are required to follow all IPL safety procedures while troubleshooting SCADA or network issues. Safe work practices for entering and working in vaults and manholes are described in the IPL Safety Manual.

4. Responsibility

IPL Asset Management working with Field Operations and Engineering is responsible to give guidance on the priorities given to CBD SCADA errors and monitor the performance of the CBD SCADA system and the timeliness of the repairs.

Substation and Network Operations is responsible to schedule and record the work done to respond to nonstandard readings. Substation and Network Operations is also responsible to provide feedback to Engineering and Asset Management that will help improve the overall system design and response process. This may include suggested design modifications, adding assets, deleting assets, changing criteria, etc.

5. CBD SCADA System Design Overview

In the downtown network the network protectors have microprocessor relays that monitor electrical quantities and status points. This information is transmitted via twist pair “blue wire” to Vault Guards located in network vaults. There are more than 300 network protectors and presently 13 Vault Guards so that each vault guard communicates with approximately 25 or so network relays via an Eaton proprietary protocol over the copper “blue wire”. The copper communication paths are radial to each network protector relay. The copper transition to fiber takes place in an H&L Instruments device associated with each of the Vault Guards. This conversion allows the fiber cable to be in a self-healing loop. Thus any single fiber cable does not result in losing communication to any relay. However, a twisted pair wire failure will result in a loss of relay communication to downstream devices and in some cases upstream if the failure results in a conductors “shorting” together.

Two RTUs, one at Gardner Lane and the other in the basement of the Electric Building Substation are used to communicate from the H&L Instruments to the ECS system. The Transmission Operating Control Center can control and monitor the network protectors via the ECS System.

All data from the network protector relays are stored in a PI Historian for historical analysis and almost real time (delays of less than a few seconds) monitoring.



The following Figure 5-1 CBD SCADA Analog and Status Points show the network protector relay analog and status points that are monitored and/or controlled via the ECS system. This example shows the network protector relay on UG 611 at 330 West Maryland.

With over 300 network protectors in service in the downtown network the CBD SCADA is controlling and/monitoring more the 6,400 points in real time.

Network SCADA Data				
Status Points	RTUNO	PNTNO	SUBNAM	PNTNAM
	34	1	GVAULT05	611-330W.MD DEVICE STATUS
	34	2	GVAULT05	611-330W.MD RELAY ALARM
	34	3	GVAULT05	611-330W.MD NWP RELAY BREAKER
	34	4	GVAULT05	611-330W.MD BREAKER FAILURE
	34	5	GVAULT05	611-330W.MD BREAKER PUMPING
	34	6	GVAULT05	611-330W.MD PUMP PROTECTION ENABLE
	34	7	GVAULT05	611-330W.MD RESET PUMP
	34	8	GVAULT05	611-330W.MD PRIMARY SWITCH
Analog Points	RTUNO	PNTNO	SUBNAM	PNTNAM
	34	1	GVAULT05	611-330W.MD IA
	34	2	GVAULT05	611-330W.MD IB
	34	3	GVAULT05	611-330W.MD IC
	34	4	GVAULT05	611-330W.MD VNA
	34	5	GVAULT05	611-330W.MD VNB
	34	6	GVAULT05	611-330W.MD VNC
	34	7	GVAULT05	611-330W.MD VTA
	34	8	GVAULT05	611-330W.MD VTB
	34	9	GVAULT05	611-330W.MD VTC
	34	10	GVAULT05	611-330W.MD KW
	34	11	GVAULT05	611-330W.MD KVAR
	34	12	GVAULT05	611-330W.MD RELAY TEMP
	34	13	GVAULT05	611-330W.MD KVA

Figure 5-1 CBD SCADA Analog and Status Points

6. PI Historian

Most of the CBD SCADA data used for analysis and troubleshooting is queried from the PI Historian. PI Process Book, MS Excel and Access, SQL via Web Pages are all methods used to retrieve the data from the PI Historian.

Figure 6-1 shows a PI Process Book one-line of UG 661 feeder from Gardner Lane Substation.

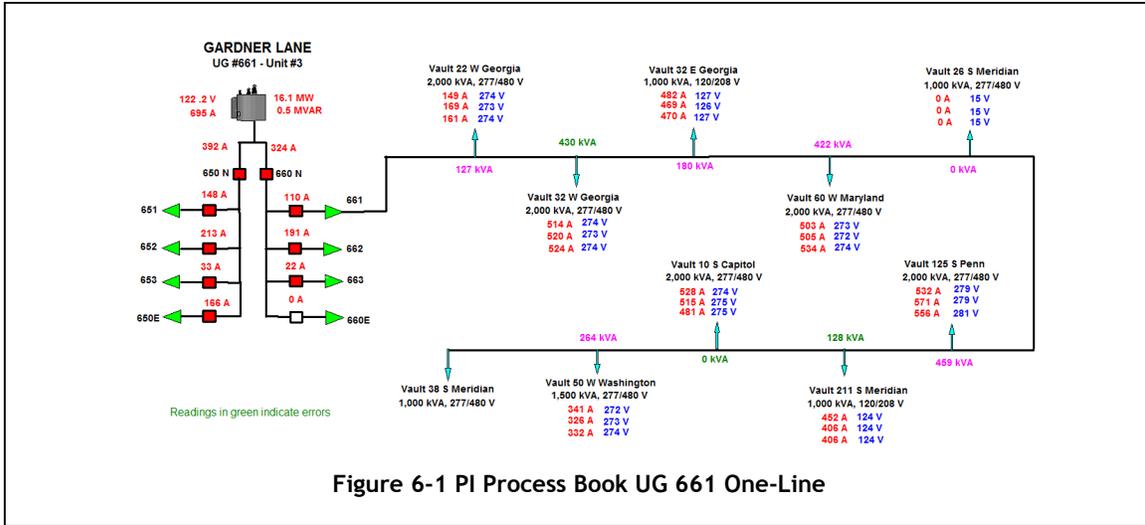


Figure 6-1 PI Process Book UG 661 One-Line

MS Excel is also used for monitoring and analysis of the CBD network. This MS Excel file shown below is available for download from the T&D Asset Management web site at <http://iplassetmgmt/Default.aspx>.

Vault	Feed	Address	Qui	Timestamp	IA	IB	IC	Phase	Normal	Norm	KVA	KW	KVAR	Relay	BKR Fa	BKR PUN	DEVICE	RLY ALAI	RLY Tem	VTA	VVA	VVB	VVBH	VTC	VVC	
25	QVAVULT01	633-	288N.PI	Normal	10/27/14 15:15:31	442	472	427	472	15.7%	3000	383	331.0	193.0	CLOSE	Normal	Normal	ONLINE	Normal	36.0	280	280	280	278	279	279
26	QVAVULT01	633-	37W.OH	Normal	10/27/14 15:10:28	284	288	277	288	18.0%	1600	230	213.0	86.0	CLOSE	Normal	Normal	ONLINE	Normal	42.0	272	272	270	270	270	270
27	QVAVULT01	652-	110W.OH	Normal	10/27/14 15:15:31	988	918	877	988	32.9%	3000	791	659.0	437.0	CLOSE	Normal	Normal	ONLINE	Normal	43.0	285	285	285	285	284	284
28	QVAVULT01	652-	115W.OH	Normal	10/27/14 15:15:29	640	593	557	620	20.7%	3000	486	286.0	239.0	CLOSE	Normal	Normal	ONLINE	Normal	42.0	277	277	276	276	275	275
29	QVAVULT01	652-	116W.OH	Normal	10/27/14 15:15:29	692	568	599	692	23.1%	3000	528	528.0	5.0	CLOSE	Normal	Normal	ONLINE	Normal	45.0	283	283	283	283	283	283
30	QVAVULT01	652-	143N.I.L	Normal	10/27/14 15:15:29	177	169	169	177	11.1%	1600	64	62.0	14.0	CLOSE	Normal	Normal	ONLINE	Normal	28.0	135	135	134	134	134	134
31	QVAVULT01	652-	288N.PI	Normal	10/27/14 15:15:31	468	422	383	468	15.6%	3000	361	346.0	103.0	CLOSE	Normal	Normal	ONLINE	Normal	43.0	278	278	278	278	279	279
32	QVAVULT01	662-	110W.OH	Normal	10/27/14 15:15:29	935	871	862	935	31.2%	3000	739	646.0	398.0	CLOSE	Normal	Normal	ONLINE	Normal	43.0	284	284	286	286	286	286
33	QVAVULT01	662-	116W.OH	Normal	10/27/14 15:15:29	709	594	601	709	23.6%	3000	538	538.0	1.0	CLOSE	Normal	Normal	ONLINE	Normal	45.0	283	283	283	283	283	283
34	QVAVULT01	662-	143N.I.L	Normal	10/27/14 15:00:30	146	156	145	156	9.8%	1600	54	52.0	15.0	CLOSE	Normal	Normal	ONLINE	Normal	37.0	124	124	124	124	123	123
35	QVAVULT01	662-	222N.PI	TE	10/22/14 12:05:11	119	131	161	161	5.4%	3000	111	106.0	-32.0	CLOSE	Normal	Normal	OFF LN	Normal	30.0	284	284	286	286	285	285
36	QVAVULT01	662-	288N.PI	Normal	10/27/14 15:15:31	442	439	402	442	14.7%	3000	373	351.0	127.0	CLOSE	Normal	Normal	ONLINE	Normal	37.0	282	282	281	279	280	280
37	QVAVULT01	662-	27W.OH	Normal	10/27/14 15:15:29	269	279	169	279	17.1%	1600	228	221.0	3.0	CLOSE	Normal	Normal	ONLINE	Normal	39.0	272	272	271	271	271	271
38	QVAVULT01	413-	22E.WB	Normal	10/27/14 15:15:31	380	386	375	386	12.9%	3000	309	280.0	-131.0	CLOSE	Normal	Normal	ONLINE	Normal	37.0	279	279	281	281	280	280
39	QVAVULT01	413-	24E.WB	Normal	10/27/14 15:10:30	745	739	688	745	24.8%	3000	595	588.0	80.0	CLOSE	Normal	Normal	ONLINE	Normal	39.0	275	275	274	274	274	274
40	QVAVULT01	423-	22E.WB	Normal	10/27/14 15:15:31	419	454	417	454	15.1%	3000	347	296.0	-181.0	CLOSE	Normal	Normal	ONLINE	Normal	36.0	278	280	279	279	277	277
41	QVAVULT01	423-	24E.WB	Normal	10/27/14 15:10:30	749	749	699	749	25.0%	3000	599	587.0	85.0	CLOSE	Normal	Normal	ONLINE	Normal	36.0	275	275	276	276	274	274
42	QVAVULT01	453-	22E.WB	Normal	10/27/14 15:15:31	413	422	400	422	14.1%	3000	333	323.0	80.0	CLOSE	Normal	Normal	ONLINE	Normal	36.0	280	279	280	280	278	278
43	QVAVULT01	453-	24E.WB	Normal	10/27/14 15:10:30	971	984	935	984	32.8%	3000	777	702.0	333.0	CLOSE	Normal	Normal	ONLINE	Normal	40.0	274	274	274	274	275	275
44	QVAVULT01	463-	22E.WB	Normal	10/27/14 15:10:30	415	413	379	415	13.8%	3000	326	317.0	77.0	CLOSE	Normal	Normal	ONLINE	Normal	36.0	280	280	281	281	278	278
45	QVAVULT01	463-	24E.WB	Normal	10/27/14 15:15:31	1599	1255	1177	1599	20.3%	3000	1345	1212.0	584.0	CLOSE	Normal	Normal	ONLINE	Normal	110.0	344	344	344	344	343	343
46	QVAVULT01	613-	120W.MK	Normal	10/27/14 15:15:31	378	400	388	400	15.3%	3000	159	150.0	0.0	OPEN	Normal	Normal	OFF LN	Normal	30.0	124	124	124	124	124	124
47	QVAVULT01	613-	130.MON	TE	10/22/14 12:05:16	0	0	0	0	0.0%	0	0	0.0	0.0	OPEN	Normal	Normal	OFF LN	Normal	30.0	13	124	12	124	11	124
48	QVAVULT01	613-	142W.MK	TE	10/22/14 12:05:13	527	579	564	579	19.3%	3000	210	189.0	92.0	CLOSE	Normal	Normal	OFF LN	Normal	30.0	128	128	127	127	128	128
49	QVAVULT01	622-	120W.MK	Normal	10/27/14 15:00:31	370	383	377	383	12.8%	3000	304	222.0	204.0	CLOSE	Normal	Normal	ONLINE	Normal	38.0	274	274	271	271	272	272
50	QVAVULT01	623-	123N.I.L	Normal	10/27/14 15:15:31	526	538	526	538	17.9%	3000	438	312.0	307.0	CLOSE	Normal	Normal	ONLINE	Normal	41.0	277	277	279	279	277	277
51	QVAVULT01	622-	130.MON	TE	10/22/14 12:05:16	426	456	404	456	15.2%	3000	157	123.0	97.0	CLOSE	Normal	Normal	OFF LN	Normal	24.0	125	125	124	124	125	125
52	QVAVULT01	622-	142W.MK	Normal	10/27/14 15:15:31	808	800	725	808	26.9%	3000	295	254.0	150.0	CLOSE	Normal	Normal	ONLINE	Normal	46.0	127	127	127	127	127	127
53	QVAVULT01	633-	120W.MK	Normal	10/27/14 15:10:30	447	422	410	447	14.9%	3000	350	317.0	148.0	CLOSE	Normal	Normal	ONLINE	Normal	39.0	272	272	271	271	272	272
54	QVAVULT01	652-	123N.I.L	Normal	10/27/14 15:15:31	479	472	478	479	16.0%	3000	395	387.0	65.0	CLOSE	Normal	Normal	ONLINE	Normal	39.0	279	279	279	279	277	277
55	QVAVULT01	652-	120W.MK	Normal	10/27/14 15:15:31	262	245	268	268	8.9%	3000	95	95.0	0.0	CLOSE	Normal	Normal	ONLINE	Normal	43.0	125	125	124	124	124	124
56	QVAVULT01	652-	130.MON	TE	10/22/14 12:05:16	433	430	401	433	14.4%	3000	157	154.0	29.0	CLOSE	Normal	Normal	OFF LN	Normal	29.0	124	124	124	124	124	124
57	QVAVULT01	652-	142W.MK	Normal	10/27/14 15:15:31	373	401	343	401	13.4%	3000	151	148.0	0.0	CLOSE	Normal	Normal	ONLINE	Normal	40.0	124	124	124	124	124	124

Figure 6-2 PI MS Excel PI Add-In of CBD Network Protectors



7. CBD SCADA E-Mail

IPL has implemented “push” and “pull” technology to help identify issues with the CBD SCADA system that may need to be addressed.

Every morning an e-mail is sent to Field Operation, Engineering, and Asset Management personnel identifying any abnormal CBD SCADA analog or status value. Figure 7-1 Daily E-mail of CBD SCADA Alarms below shows an example.

ProtName	Time Stamp	Quality	IA	IB	IC	XFMR Size	Network Protector Relay	Breaker Fail	Breaker Pumping	Device Status	Relay Alarm	Relay Temp	VTA	VNA	VTB	VNB	VTC	VNC
GVAULT02.613-130.MON	12/10/2014 1:52:58 PM	TE	0	0	0		OPEN	Normal	Normal	OFF LN	Normal	38	123.8	123.8	123.8	123.8	123.8	124
GVAULT02.622-120W.MK	12/19/2014 8:53:06 PM	Normal	0	0	0	3000	OPEN	Normal	Normal	ONLINE	Normal	20	272	272	272	272	272	272
GVAULT02.622-123N.LL	12/19/2014 8:53:06 PM	Normal	0	0	0	3000	OPEN	Normal	Normal	ONLINE	Normal	20	276	276	277	277	276	276
GVAULT02.622-130.MON	12/19/2014 8:53:06 PM	Normal	0	0	0	3000	OPEN	Normal	Normal	ONLINE	Normal	20	123	123	123	123	123	123
GVAULT02.622-142W.MK	12/19/2014 8:53:06 PM	Normal	0	0	0	3000	OPEN	Normal	Normal	ONLINE	Normal	34	126	126	126	126	126	127
GVAULT03.622-119W.MKT	12/19/2014 8:53:06 PM	Normal	0	0	0	3000	OPEN	Normal	Normal	ONLINE	Normal	23	124	124	124	124	124	124
GVAULT03.622-120W.WSH	12/22/2014 2:23:08 AM	Normal	0	0	0	3000	OPEN	Normal	Normal	ONLINE	Normal	32	283	283	282	282	283	283
GVAULT03.622-151W.CT	12/22/2014 2:08:06 AM	Normal	0	0	0	3000	OPEN	Normal	Normal	ONLINE	Normal	30	125	125	124	124	125	125
GVAULT03.622-17W.MKT	12/21/2014 2:23:06 AM	Normal	0	0	0	3000	OPEN	Normal	Normal	ONLINE	Normal	24	124	124	124	124	124	124
GVAULT03.622-40.MON	12/21/2014 2:23:06 AM	Normal	0	0	0	1875	OPEN	Normal	Normal	ONLINE	Normal	30	276	276	277	276	276	276
GVAULT04.611-26E.GA	1/31/2012 12:35:31 PM	TE	511	529	502		CLOSE	Normal	Normal	ONLINE	Normal	29	280	280	280	280	280	280
GVAULT04.661-26S.MRD	12/10/2014 1:53:14 PM	TE	0	0	0	1600	OPEN	Alarm	Normal	OFF LN	Normal	20	269	269	270	270	271	271
GVAULT06.432-37.MIA	12/22/2014 7:09:56 AM	Normal	434	438	438	3000	CLOSE	Normal	Normal	ONLINE	Normal	32	283	283	283	283	283	283
GVAULT07.412-237E.MIA	12/10/2014 1:53:53 PM	TE	322	327	326	3000	CLOSE	Normal	Normal	ONLINE	Normal	24	125	125	125	125	125	125
GVAULT07.412-326E.NY	12/10/2014 1:53:53 PM	TE	323	317	307	1600	CLOSE	Normal	Normal	ONLINE	Normal	26	125	126	125	125	125	125
GVAULT07.462-121N.EA	12/10/2014 1:53:54 PM	TE	148	157	138	1600	CLOSE	Normal	Normal	ONLINE	Normal	31	126	126	126	126	125	125
GVAULT08.411-121E.TIP	12/16/2014 11:01:23 AM	TE	0	0	0	1600	OPEN	Alarm	Normal	OFF LN	Alarm	31	272	271	271	271	271	271
GVAULT08.431-121E.TIP	12/16/2014 10:55:07 AM	TE	0	0	0	1600	OPEN	Normal	Normal	OFF LN	Normal	29	268	268	268	268	268	269
GVAULT08.441-121E.TIP	12/16/2014 10:55:23 AM	TE	0	0	0	1600	OPEN	Normal	Normal	OFF LN	Normal	24	268	268	268	268	270	270
GVAULT09.422-126E.MKT	12/22/2014 7:06:00 AM	Normal	0	0	0	1600	OPEN	Normal	Normal	ONLINE	Normal	29	124	123	123	123	123	123
GVAULT09.432-107E.OH	12/10/2014 1:54:01 PM	TE	351	377	335	3000	CLOSE	Normal	Normal	ONLINE	Normal	26	280	280	279	279	280	280
GVAULT09.442-107E.OH	12/10/2014 1:54:02 PM	TE	331	345	306	3000	CLOSE	Normal	Normal	ONLINE	Normal	24	280	280	279	279	281	281
GVAULT09.442-121.MON	12/10/2014 1:54:06 PM	TE	318	417	362	2500	CLOSE	Normal	Normal	ONLINE	Normal	30	125	125	125	125	125	125
GVAULT09.442-237N.PEN	12/10/2014 1:53:59 PM	TE	134	145	141	1600	CLOSE	Normal	Normal	ONLINE	Normal	20	126	126	125	125	126	126
GVAULT10.441-39W.VT	12/10/2014 1:54:09 PM	TE	0	0	0	1600	CLOSE	Normal	Normal	OFF LN	Normal	0	280	280	279	279	281	281
GVAULT11.611-488W.WA	12/10/2014 1:54:22 PM	TE	232	228	272	3000	CLOSE	Normal	Normal	OFF LN	Normal	43	280	280	279	279	281	281
GVAULT11.622-110N.SEN	12/22/2014 7:06:02 AM	Normal	0	0	0	3000	OPEN	Normal	Normal	ONLINE	Normal	23	284	285	285	285	283	283
GVAULT11.622-311W.OH	12/22/2014 7:06:03 AM	Normal	0	0	0	1600	OPEN	Normal	Normal	ONLINE	Normal	22	279	279	279	279	278	278
GVAULT11.622-44N.SEN	12/22/2014 7:06:02 AM	Normal	0	0	0	1600	OPEN	Normal	Normal	ONLINE	Normal	19	277	277	277	277	277	277

Figure 7-1 Daily E-mail of CBD SCADA Alarms

Any item highlighted in red shows an abnormal condition. However, it needs to be noted that when a protector is taken out of service for maintenance or another reason it will show in error because the network relay is not powered up and unable to communicate. In the example above, feeder UG 622 is out of service. This results in transformer side voltages (VTA, VTB, & VTC) being in alarm. This is a normal condition when a primary feeder is in alarm.



This same information is available on demand from an internal T&D web site. The link is:
<http://iplassetmgmt/PI/DTNetworkInteractive.aspx>

8. Priority Definitions

IPL uses a priority system of 1 through 6 to identify the urgency of follow up work. See the document AM-ALL-005 Priority Code Assignment Guidelines for more details. The table below summarizes these definitions. The next section will give examples to help in the determination of which code to choose when initiating work.

POWER DELIVERY WORK PRIORITY CODE DEFINITIONS		
PRIORITY CODE	CODE DESCRIPTION	
1	EMERGENCY	<u>Emergency Work</u> Outage/Safety Work <i>Immediately</i>
2	URGENT	<u>Urgent Work</u> Scheduled to be worked in next business day or <i>2-Days</i>
3	SEMI-URGENT	<u>Semi-Urgent Work</u> Scheduled to be worked in next <i>2-Weeks</i>
4	NORMAL	<u>Normal Scheduled Work</u> Included in normal scheduling process and within <i>9 -Months</i>
5	LOW	<u>Non-Urgent Work</u> Scheduled to be completed within <i>18 -Months</i>
6	JOB JAR	<u>First Available Coordinated Opportunity Work</u> Scheduled to be completed when other work on the asset is also being done or it is a convenient opportunity.

Figure 8-1 IPL Priority Definitions



9. CBD SCADA Troubleshooting Priority Guidelines

The table below will help guide the user in assigning priority codes. These examples are not all encompassing. There will be certain unique circumstances from time to time that will influence a change in the priority assignments. All work orders for troubleshooting will entered and tracked in EMPAC.

CBD SCADA Recommended Priority Code Assignments	
Priority Code	Examples
1	<ul style="list-style-type: none"> • Breaker (Protector) Pumping Alarm • Protector current greater than 100%
2	<ul style="list-style-type: none"> • Entire Gateway Vault communication group is not communicating • Unbalanced protector currents showing 0 on one or two phases and current on the remaining phase(s) • Relay in alarm and Quality flag is not Telemetry Error (TE) • Breaker fail is in alarm and Quality flag in not "TE" • Protector closed and no current on one or more phases
3	<ul style="list-style-type: none"> • Relay Temperature in Alarm and Quality flag in not "TE" • All protectors at a vault location are not communicating (Quality Flag is in error)
4	<ul style="list-style-type: none"> • Network relay is in Telemetry Error (TE) and protector is not out of service • Transformer or Bus Voltage is outside the normal range (+/- 5%)
5	<ul style="list-style-type: none"> • Protector current in alarm (Greater than 50% load) for more than two consecutive days
6	

Table 9-1 - CBD Priority Examples