G-AMPCO-1

Reference(s):

Please explain any significant differences in the types of system renewal asset management projects and programs undertaken by each rate zone.

Response:

System renewal investments include replacing or refurbishing distribution system assets to extend the original service life. The level and nature of system renewal needs varies in each rate zone due to factors such as: volume and conditions of assets; system configuration and types of assets utilized; present state in the lifecycle of the system in each rate zone; as well as prioritization with other investment needs such as growth and development. Legacy asset management practices incorporate these factors, as appropriate, for each rate zone. Although the approach to system renewal investments is similar, there are certain specific system renewal investments that are unique to specific rate zones.

<u>Replacement of Non-fused Junctions with Switchgear</u>

A system renewal investment is required in the Hamilton Mountain area of Alectra Utilities' Horizon Rate Zone to replace non-fused junctions with distribution switchgear, to bring the underground distribution system to present day standard and provide system switching capability, which improves system restoration ability. The volume and configuration of non-fused junctions is more prominent in the Horizon Rate Zone relative to other Alectra Utilities rate zones.

<u>Replacement of Backlog of Transformers Indicating Signs of Leaking</u>

System renewal investment is required in Alectra Utilities' Enersource Rate Zone to address a backlog of leaking transformers identified through enhanced inspections. Typically, distribution transformers are run to failure due to their minor impact on system performance. However, potential oil leaks introduce significant environmental and safety risks, leading to the implementation of a proactive replacement project to remove such transformers from service.

<u>Voltage Conversion</u>

System renewal investments are required in the Brampton, Horizon and PowerStream rate zones to address the need to convert lower voltage distribution systems to higher voltage distribution systems.

Cable Rehabilitation Utilizing Cable Injection Technology

System renewal investments are required in the Brampton and PowerStream rate zones to rehabilitate underground distribution cable through the application of cable injection technology.

Storm Hardening of the Distribution System

As a result of recommendations from the review of the 2013 Ice Storm, system renewal investments are required in the PowerStream rate zone to address distribution system hardening, in order that it may withstand adverse conditions, including major weather events and storms.

Rear Lot Supply

System renewal investments are required in the PowerStream rate zone to address overhead rear lot distribution services that are: deteriorating; sub-standard; pose operational and safety risks as well as reliability concerns.

Overhead Distribution System Rebuilds

Based on increased rigor of overhead distribution asset inspections in 2014 and 2015, supplemented with information from the pole testing program, system renewal needs were identified in the Enersource rate zone to rebuild deteriorated and substandard overhead distribution systems in certain neighbourhoods.

G-AMPCO-2

Reference(s):

Please confirm the proposed 2018 capital plans and ICM requests in Brampton RZ, Enersource RZ and PowerStream RZ are intended to maintain reliability. If not, please summarize the expected reliability outcomes for each rate zone.

Response:

Alectra Utilities confirms that the 2018 capital plans and ICM requests in the Brampton RZ, Enersource RZ and PowerStream RZ are intended to maintain overall system reliability levels in each respective rate zone.

G-AMPCO-3

Reference(s):

Please explain any significant differences in the information and cost/benefit analysis provided in business cases prepared by each rate zone to support capital investment needs.

Response:

The information provided in each rate zone business case is consistent with the *Filing Requirements for Electricity Transmission and Distribution Applications - Chapter 5 Consolidated Distribution System Plan Filing Requirements* dated March 28, 2013. In all rate zones, projects are analyzed based on cost, benefit and risk evaluations, in alignment with asset management objectives. The only significant difference in approach to the cost/benefit analysis between the four rate zones is the additional application of net present project value calculation in the PowerStream rates zone, as part of the capital investment optimization completed in the CopperLeaf C55 asset investment software.

G-AMPCO-4

Reference(s):

Please explain how Alectra has achieved investment portfolio optimization across all four rate zones.

Response:

Alectra Utilities has optimized the investment portfolios in each rate zone, in accordance with the practices outlined in each rate zone DSP.

For the Brampton rate zone, the investment portfolio optimization practice is identified in Section 5.3.1.2 of the Hydro One Brampton Networks Inc. DSP (EB-2014-0083/E2/T6/Page 52). For the Horizon rate zone, the investment portfolio optimization practice is provided in Section 2.1.2 of the Horizon Utilities DSP (EB-2014-0002: Ex/E2/T6/Appendix 2-4/Page 42). For the PowerStream rate zone, the investment portfolio optimization practice is outlined in Section 5.3.1 of the PowerStream DSP (EB-2015-0003/SII/EG/T2/Page 25). For the Enersource rate zone, the investment portfolio optimization practice is outlined in Section 2.1.2.2 of the Enersource rate zone DSP (E3/T1/S1/Page 83).

G-AMPCO-5

Reference(s):

Please provide the forecast and actual capital in-service additions for the Brampton, Enersource and PowerStream rate zones for the years 2013 to 2016 and forecast for 2017.

Response:

Below are the in-service additions for the Brampton Rate Zone ("BRZ"), Enersource Rate Zone ("ERZ") and PowerStream Rate Zone ("PRZ") for 2013 – 2016, and forecast for 2017 in Table 1, below.

Table 1 – In-service Additions by Rate Zone (2013-2017)

Rate Zone	2013 Total Additions ($000)	2014 Total Additions ($000)	2015 Total Additions ($000)	2016 Total Additions ($000)	2017 Forecast Additions ($000)
BRZ	$27,264	$28,593	$33,084	$17,456	$22,761
ERZ	$42,920	$53,091	$1,307	$54,398	$112,069
PRZ	$92,675	$112,520	$116,635	$104,406	$117,742

BRZ-AMPCO-1

Reference(s): Ex 2-2-10 Page 2 Table 60

a) Please provide the forecast Capital Budget amounts by investment category and totals included in the DSP for 2016, 2017 and 2018.

Response:

a) The following forecast amounts were included in the Brampton RZ Distribution System Plan ("DSP") for 2016, 2017 and 2018.

Table 1 – BRZ DSP-related Capital Expenditure by Category ($000s)

Category	2016	2017	2018
System Access	$20,792	$15,378	$20,751
System Renewal	$8,143	$11,980	$12,855
System Service	$826	$1,812	$529
General Plant	$996	$11,048	$3,934
Total	**$30,757**	**$40,218**	**$38,069**

BRZ-AMPCO-2

Reference(s): Ex 2-2-10 Page 3 Table 61

a) Please provide the 2017 capital spend to date for each category.

b) Please provide an update to 2017 forecast Actuals for each category.

Response:

a) Table 1 below provides the 2017 capital expenditure up until August 2017 by category, in the same format as Table 61.

Table 1 – Capital Expenditure (Table 61 updated)

Category	Actual YTD August 2017 ($000s)
New Connections & Subdivisions	$2,724
Road Authority	$644
Metering	$947
Dx Expansion	$875
REGEN New Connections	$282
Other Misc.	$175
Total System Access	**$5,648**

b) Table 2 below provides the full year 2017 forecast capital expenditures by category:

Table 2 – Forecast Capital Expenditure (Full Year 2017)

Category	Full Year Forecast 2017 ($000s)
New Connections & Subdivisions	$5,880
Road Authority	$3,196
Metering	$1,422
Dx Expansion	$3,851
REGEN New Connections	$106
Other Misc.	$218
Total System Access	**$14,673**

BRZ-AMPCO-3

Reference(s): Ex 2-2-10 Page 3 Table 62

a) Please provide the 2017 capital spend to date for each category.

b) Please provide an update to 2017 forecast Actuals for each category.

c) For the years 2013 to 2016, an average of $3.732 million has been spent on UG Lines Planned Asset Replacement. Please explain the need for the significant increases in 2017 and 2018 to $5.229 million and $5.149 million, respectively, and the expected outcome.

d) Please explain why the investment in Stations/P&C – Planned Replacement is significantly lower in 2017 ($134,000) compared to previous years and 2018 ($1.677 million).

Response:

a) The 2017 August Year-to-Date ("YTD") and Year-End forecast expenditure for system renewal investments in the Brampton Rate Zone are provided in Table 1, below.

Table 1: August 2017 YTD and 2017 Year-End Expenditure Forecasts for System Renewal in the Brampton Rate Zone

Category	Actual YTD August 2017 ($000s)	FY Forecast 2017 ($000s)
Underground Lines Planned Asset Replacement	$908	$4,554
Distribution Lines - Emergency/Reactive	$1,157	$1,578
Overhead Lines Planned Asset Replacement	$1,354	$2,054
4.16kV to 27.6 kV Conversion	$156	$1,157
Stations/Protection &Control - Planned Replacement	$233	$555
Other Miscellaneous Projects	$232	$522
Metering	$1,699	$3,334
Total System Renewal	**$5,740**	**$13,755**

b) Please see Alectra Utilities' response to part a), above.

c) Please see Alectra Utilities' response to CCC-16.

d) Alectra Utilities paces and prioritizes planned replacements in Stations and Protection & Control equipment, which include renewal of major assets such as: power transformers; metalclad switchgear; and high voltage switches. Investments in station asset replacement plans are staggered, where possible, to avoid having multiple areas and stations out of service in the same year. This is necessary, in order to minimize the risk of loss of contingencies, due to more than one station being out of service at the same time.

In 2016, one power transformer and front end high voltage switches were replaced at MS14.

The 2017 forecast does not require any major station asset replacements.

In 2018, the metalclad indoor switchgear line ups are required and scheduled to be replaced at MS10 and MS14. These station replacements are coordinated and do not introduce risk of loss of contingencies.

The 2019 forecast does not require any planned major station asset replacements in the Brampton RZ.

PRZ-AMPCO-1

Reference(s): Ex 2-3-10 Page 4 Table 91

a) Please update the table to include the spending to date in 2017.

b) Please update the forecast for 2017.

Response:

a) and b) Table 1 below provides the update to Table 91 for expenditure up until August 2017 and the Q2 forecast for 2017.

Table 1 – Revised Table 91 for Expenditure to August 2017 and the 2017 Forecast as at Q2

Category	Actual 2013	Actual 2014	Actual 2015	Actual 2016	COS 2017	Forecast 2017	Actual YTD August 2017	Q2 Forecast 2017	DSP 2018	Forecast 2018	Forecast 2019	Forecast 2020
System Access	$17,030	$26,229	$25,620	$22,790	$32,024	$32,024	$23,222	$32,201	$29,561	$32,213	$30,531	$30,667
System Renewal	$22,254	$39,186	$46,997	$42,004	$41,848	$41,848	$22,854	$41,026	$51,650	$45,292	$43,320	$49,346
System Service	$34,780	$17,946	$23,542	$27,529	$30,986	$30,986	$16,531	$29,960	$30,426	$20,522	$24,448	$14,659
General Plant	$19,593	$26,148	$22,092	$8,839	$10,927	$17,500	$4,338	$18,788	$13,863	$11,747	$5,933	$15,564
Total PowerStream Rate Zone	**$93,657**	**$109,509**	**$118,251**	**$101,162**	**$115,784**	**$122,357**	**$66,945**	**$121,976**	**$125,500**	**$109,773**	**$104,231**	**$110,236**

PRZ-AMPCO-2

Reference(s): Ex 2-3-10 Page 4 Table 92

a) Please identify System Access projects in 2016 and 2017 that were deferred and did not proceed as planned and explain why.

Response:

a) In 2016, there were two System Access projects that were deferred. Both of these related to Long Term Load Transfers ("LTLT") customers. These projects were cancelled due to the OEB policy on LTLT eliminations by June 21, 2017. No System Access projects were deferred in 2017.

PRZ-AMPCO-3

Reference(s): Ex 2-3-10 Page 8 Table 93

a) Please update the table to include spending to date in 2017.

b) Please update the forecast for 2017.

Response:

a) and b) Table 1 below provides the update to Table 93 for expenditure up until August 2017 and the Q2 forecast for 2017.

Table 1 – Revised Table 93 for Expenditure to August 2017 and Q2 Forecast 2017

Category	Actual 2013	Actual 2014	Actual 2015	Actual 2016	COS 2017	Forecast 2017	Actual YTD August 2017	Q2 Forecast 2017	DSP 2018	Forecast 2018	Forecast 2019	Forecast 2020
UG Lines - Planned Asset Replacement	$7,235	$23,829	$22,467	$17,893	$16,714	$16,714	$9,619	$16,282	$23,781	$17,311	$17,561	$17,814
Overhead Lines - Planned Asset Replacement	$5,042	$5,354	$7,489	$7,733	$7,456	$7,456	$4,453	$7,807	$8,040	$8,223	$6,583	$7,074
Distribution Lines - Emergency/Reactive	$8,219	$8,700	$11,233	$8,416	$9,291	$9,291	$6,043	$9,378	$8,888	$9,524	$9,748	$9,933
Stations Replacement Project	$1,758	$1,244	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Stations/P&C - Planned and Emergency	$0	$0	$2,044	$3,655	$2,587	$2,587	$849	$2,502	$3,441	$4,435	$3,628	$8,726
Storm Hardening & Rear Lot Conversion	$0	$60	$3,276	$4,308	$5,800	$5,800	$1,890	$5,057	$7,500	$5,800	$5,800	$5,800
System Renewal Other Misc	$0	$0	$489	$0	$0	$0	$0	$0	$0	$0	$0	$0
System Renewal	**$22,254**	**$39,186**	**$46,997**	**$42,004**	**$41,848**	**$41,848**	**$22,854**	**$41,026**	**$51,650**	**$45,292**	**$43,320**	**$49,346**

PRZ-AMPCO-4

Reference(s): Ex 2-3-10 Page 9 Table 95

a) Please explain the need for advancement of the upgrade to Customer Information Systems to 2017.

Response:

a) The advancement of the Customer Information System ("CIS") upgrade to 2017 was necessary due to product support on the current version of the Oracle Utilities Customer Care and Billing ("CC&B") ending June 2018. The upgrade ensures immediate and longer term product support to 2023.

PRZ-AMPCO-5

Reference(s): Ex 2-3-10 Page 13 Table 98

a) Please provide the bill impacts for the Large User Class.

Response:

a) Please see Table 1 below which provides the bill impacts by investment driver and customer class.

Table 1: Bill Impacts for Incremental Capital Presented to Customers – PowerStream _

Monthly Bill Impacts ($)	Capital Expenditures $MM	Residential (750 kWh)	GS<50 (2000 kwh)	GS>50	Large User
System Access	$11.2	$0.11	$0.28	$4.76	$86.73
System Service	$5.2	$0.05	$0.13	$2.18	$39.72
System Renewal	$10.2	$0.10	$0.26	$4.32	$78.71
Total	**$26.6**	**$0.26**	**$0.67**	**$11.26**	**$205.16**

PRZ-AMPCO-6

Reference(s): Ex 2-3-10 Attachment #35

a) Please provide a live version of Attachment #35 in excel format that maps the 2018 projects to the spending categories in Table 93 at Ex 2-3-10 Page 8.

b) Please provide the project ID#, forecast in-service date and priority ranking for each project in the spreadsheet completed in part (a).

c) Please identify all new categories of spending under system renewal.

Response:

a) Please see attached PRZ-AMPCO-6_Attach 1

b) Table 1 below provides the in-service date by project for 2018.

Table 1 – Projects by Category and In-Service Date - 2018

Sr No	Project Name	Project ID	In service Date	Priority Ranking
	SYSTEM ACCESS			
1	New Residential Subdivision Development - North	101906	Dec 31, 2018	9
2	New Residential Subdivision Development - SOUTH	101887	Dec 31, 2018	13
3	New Subdivision Development - Secondary Service Lateral - SOUTH	101892	Dec 31, 2018	8
4	Road Authority Expenditure PS North	101762-1	Dec 31, 2018	5
5	Road Authority Expenditure PS South	101762	Dec 31, 2018	10
6	Road Authority YRRT Yonge St	101764	Dec 31, 2018	7
	Sub Total Material Projects			
	Miscellaneous Projects (under materiality threshold)			
	Total System Acesss			
	SYSTEM RENEWAL			
6	Storm damage - Replacement of distribution equipment due to storm.	101800	Dec 31, 2018	4
7	Switchgears - Unscheduled Replacement of Failed (end of useful Life) Distribution Equipment	101808	Dec 31, 2018	6
8	Unscheduled Replacement of Failed Equipment - Poles, etc	101824	Dec 31, 2018	12
9	Pole Replacement Program	100867	Dec 31, 2018	2
10	Unforeseen Projects Initiated by PowerStream	101355	Dec 31, 2018	1
11	Radial Supply Remediation/Conversion - 13.8 kV to 27.6 kV on Miller Ave	100319	Dec 31, 2018	33
12	Planned Circuit Breaker Replacement - Richmond Hill TS#1	150154	Dec 31, 2018	22
13	Station Switchgear Replacement (ACA) 8th Line MS323	102730	Dec 31, 2018	30
14	Rear Lot Supply Remediation - Royal Orchard - North	150047	Dec 31, 2018	23
15	4-Circuit Pole Storm Hardening	150113	Dec 31, 2018	3
16	Cable Replacement – (M49) - Steeles and Fairway Heights	150141	Dec 31, 2018	29
17	Cable Replacement – (V08) - Steeles Ave and New Westminster	150142	Dec 31, 2018	18
18	Cable Replacement – Left Behind Cable	150145	Dec 31, 2018	28
19	Pad Mount Transformer Replacement	101508	Dec 31, 2018	15
20	Switchgear Replacement Program	100859	Dec 31, 2018	20
	Sub-Total Material Projects			
	Miscellaneous Projects (under materiality threshold)			
	Total System Renewal			
	SYSTEM SERVICE			
21	Double Circuit existing 23M21 Circuit from Bayfield & Livingstone to Little Lake MS.	101572	Dec 31, 2018	19
22	Install two additional 27.6 kV ccts on Hwy 7 from Jane St to Weston Rd	100924	Dec 31, 2018	21
23	Build double ccts 27.6kV pole line on 19th Ave between Leslie St and Bayview Ave	101480	Dec 31, 2018	11
24	Install Two 27.6kV Ccts on 16th Ave from Hwy 404 to Woodbine Ave	103633	Dec 31, 2018	26
25	New 27.6kV Pole Line on 19th Ave from Leslie to Woodbine Ave	102545	Dec 31, 2018	25
26	Rebuild 27.6 kV pole line on Warden Ave into 4 ccts from 16th Ave to Major Mack	100229	Dec 31, 2018	17
27	Distribution Automation Switches / Reclosers	100886	Dec 31, 2018	14
28	Smart Grid	Multiple Projects	Dec 31, 2018	34
29	Stations Capacity Projects	Multiple Projects	Dec 31, 2018	24
30	Stations Reliability Projects	Multiple Projects	Dec 31, 2018	27
	Sub-Total Material Projects			
	Miscellaneous Projects (under materiality threshold)			
	Total System Service			
	GENERAL PLANT			
31	Customer Information System	Multiple Projects	Dec 31, 2018	16
32	Fleet	Multiple Projects	Dec 31, 2018	36
33	Computer Software	Multiple Projects	Dec 31, 2018	31
34	Information Communication System	Multiple Projects	Dec 31, 2018	32
35	Smart Grid	Multiple Projects	Dec 31, 2018	34
	Sub-Total Material Projects		Dec 31, 2018	
	Miscellaneous Projects (under materiality threshold)		Dec 31, 2018	
	Total System Service			
	Total 2018 Capital Projects			

c) No new categories of capital expenditure have been added to system renewal.

Project
SYSTEM ACCESS
New Residential Subdivision Development - North
New Residential Subdivision Development - South
New Subdivision Development - Secondary Service Lateral - SOUTH
Road Authority Expenditure PS North
Road Authority Expenditure PS South
Road Authority YRRT Yonge St
Sub Total Material Projects
Miscellaneous Projects (under materiality threshold)
Total System Acesss
SYSTEM RENEWAL
Storm damage - Replacement of distribution equipment due to storm.
Switchgears - Unscheduled Replacement of Failed (end of useful Life) Distribution Equipment
Unscheduled Replacement of Failed Equipment - Poles, etc
Pole Replacement Program
Unforeseen Projects Initiated by PowerStream
Radial Supply Remediation/Conversion - 13.8 kV to 27.6 kV on Miller Ave
Planned Circuit Breaker Replacement - Richmond Hill TS#1
Station Switchgear Replacement (ACA) 8th Line MS323
Rear Lot Supply Remediation - Royal Orchard - North
4-Circuit Pole Storm Hardening
Cable Replacement – (M49) - Steeles and Fairway Heights
Cable Replacement – (V08) - Steeles Ave and New Westminster
Cable Replacement – Left Behind Cable
Pad Mount Transformer Replacement
Switchgear Replacement Program
Sub-Total Material Projects
Miscellaneous Projects (under materiality threshold)
Total System Renewal
SYSTEM SERVICE
Double Circuit existing 23M21 Circuit from Bayfield & Livingstone to Little Lake MS.
Install two additional 27.6 kV ccts on Hwy 7 from Jane St to Weston Rd
Build double ccts 27.6kV pole line on 19th Ave between Leslie St and Bayview Ave
Install Two 27.6kV Ccts on 16th Ave from Hwy 404 to Woodbine Ave
New 27.6kV Pole Line on 19th Ave from Leslie to Woodbine Ave
Rebuild 27.6 kV pole line on Warden Ave into 4 ccts from 16th Ave to Major Mack
Distribution Automation Switches / Reclosers
Smart Grid
Stations Capacity Projects
Stations Reliability Projects

Sub-Total Material Projects
Miscellaneous Projects (under materiality threshold)
Total System Service
GENERAL PLANT
Customer Information System
Fleet
Computer Software
Information Communication System
Smart Grid
Sub-Total Material Projects
Miscellaneous Projects (under materiality threshold)
Total General Plant
Total 2018 Capital Projects

eam Rate Zone

Spending Categories (Table 93)	Capital Expenditure ($)
	2,392,500
	7,267,204
	1,782,375
	1,380,407
	6,751,937
	4,663,617
	24,238,040
	7,974,798
	32,212,838
Distribution Lines- Emergency Reactive	1,078,534
Distribution Lines- Emergency Reactive	1,817,116
Distribution Lines- Emergency Reactive	5,414,064
Overhead Lines- Planned Asset Replacement	4,191,000
Overhead Lines- Planned Asset Replacement	1,129,271
Overhead Lines- Planned Asset Replacement	1,628,533
stations P&C- Planned and Emergency	1,186,729
stations P&C- Planned and Emergency	1,000,687
Storm Hardening and Rear lot Conversion	1,681,034
Storm Hardening and Rear lot Conversion	1,752,471
UG Lines-Planned Asset Replacement	1,842,953
UG Lines-Planned Asset Replacement	2,637,046
UG Lines-Planned Asset Replacement	2,207,515
UG Lines-Planned Asset Replacement	1,072,243
UG Lines-Planned Asset Replacement	2,247,843
	30,887,038
	12,947,297
	43,834,334
	1,276,180
	2,950,000
	1,202,306
	1,187,653
	1,011,807
	1,372,976
	1,661,159
	1,070,000
	3,374,603
	1,444,850

	16,551,534
	3,970,356
	20,521,890
	2,969,788
	1,494,970
	1,403,578
	1,450,815
	1,337,500
	8,656,651
	3,089,855
	11,746,506
	108,315,568

PRZ-AMPCO-7

Reference(s): Ex 2-3-10 Attachment #35
EB-2015-0003 Undertaking JTC 1.5_App 2-AA 2015-2020_20150911

Cable Injection Program	4,375,771
Cable Replacement Program	14,288,297
Emerging Cable Replacement Projects	1,081,576

a) The table above from reference #2 shows the forecast 2018 budget in the PowerStream DSP for Cable injection and replacement work. Please explain any adjustments to the proposed spending in 2018 in Attachment #35 related to cables.

b) Please provide the forecast spend in 2017 for the three cable projects/programs in the above table and provide the number of units addressed under each project/program

c) Please provide the proposed number of units to be addressed under each cable project in 2018 listed in Attachment #35.

Response:

a) Alectra Utilities has provided Table 1 below to compare investments in cable injection and replacement from the PowerStream DSP (EB-2015-0003) versus Alectra Utilities' 2018 IRM/ICM Application (EB-2017-0024).

Table 1 – Cable Replacement and Injection Comparison PowerStream DSP versus 2018 ICM Application

Category	Reference #2 - DSP ($000)	2018 ICM – Attachment #35 ($000)
Cable Injection Program	$ 4,376	$ 4,376
Cable Replacement Program	$ 14,288	$ 0
Cable Replacement Projects	$ 0	$ 8,847
Emerging Cable Replacement Projects	$ 1,082	$ 541
Total	**$ 19,746**	**$ 13,404**

On August 4th 2016, Alectra Utilities' predecessor, PowerStream, received the OEB's decision on its 2016-2020 Custom IR Application. In the decision, the OEB approved the capital budget for 2017 using an "envelope" approach. However, it raised concerns about the costs of certain capital expenditures which included the underground cable replacement program. PowerStream reviewed the decision and reassessed its capital expenditures. Alectra Utilities has determined that restructuring the underground cable replacement

program to be implemented as individual projects would provide increased structure and enhanced controls in implementing this capital work.

Alectra Utilities expects to deliver the desired outcomes that benefit customers on schedule, within scope and with lower costs than it would have otherwise under a program structure. For the current application before the OEB, Alectra Utilities has reduced the capital expenditure for the cable replacement and emerging replacement projects following the OEB decision and order (EB-2015-0003, Decision and Order, p.15).

b) Table 2 below identifies the 2017 Forecast capital expenditure for each of the programs/ projects specified in Table 1, as well as the number of units.

Table 2 – 2017 Forecast Capital Expenditure and Units

Initiative	2017 Forecast Expenditure ($000)	Cable Units (m)
Cable Injection	$2,923	36,082
Cable Replacement Projects	$7,185	22,347
Emerging Cable Replacement Projects	$619	1,140

c) Alectra Utilities has provided Table 3, below, which identifies the 2018 projects for Cable Injection, Cable Replacement and Emerging Cable Replacement, as well as the number of units to be addressed for each of these in 2018.

Table 3 – 2018 Cable Injection, Replacement and Emerging Cable Replacement Projects

Project	Type of Projects	Cable Units (m)
(M27) – Kennedy – 16th – McCowan-Hwy7 (Markham)	Cable Injection	11,232
(M37) – Woodbine and 14th (Markham)	Cable Injection	11,909
(M44) – Konrad Cres Woodbine and 14th (Markham)	Cable Injection	11,039
(V01) – Young – Steeles – Bathurst – Centre(Vaughan)	Cable Injection	12,313
(V36) – Steeles and Pine Valley (Vaughan)	Cable Injection	10,675
(V37) – Langstaff and Weston (Vaughan)	Cable Injection	10,750
(M49) – Steeles and Fairway Heights(Markham)	Cable replacement	3,762
(V08) – Steeles Ave and New Westminster(Vaughan)	Cable replacement	7,050
(Barrie) – Cook St and Simcoe Terrance	Cable replacement	2,399
(Barrie) – Donald St and Simcoe Terrace	Cable replacement	1,136
(V22) – Doney Cres(Vaughan)	Cable replacement	186
Left Behind Cable Segments	Cable replacement	4,965
Emerging Cable Replacement Projects	Emerging Cable Replacement	1,000

PRZ-AMPCO-8

Reference(s): Ex 2-3-10 Attachment #35
EB-2015-0003 Undertaking JTC 1.5_App 2-AA 2015-2020_20150911

a) Please list the projects in 2018 that include pole replacements and provide the forecast number of poles to be replaced under each of the projects and the % to be replaced that are in very poor and poor condition.

b) Please provide PowerStream's Pole Reinforcement budget in 2018 and the number of poles to be addressed.

Response:

a) Alectra Utilities has provided Table 1 below, related to 2018 Pole Replacements. From the seven projects listed, the first five projects are related to system service investments, the driver for which is additional system capacity. This requires the replacement of 198 poles. The remaining 392 poles planned for replacement are a result of poles at the end of the useful life via the pole replacement program (325 poles replaced) and 4-Circuit pole storm hardening (67 poles replaced).

Alectra Utilities annually inspects and tests a portion of the pole population in the PowerStream RZ. Candidates for pole replacement and reinforcement are determined based on the combination worst condition from the following two groupings:

- Poles that have less than 60% remaining strength (as per CSA Standard C22.3 No.1-10 Clause 8.3.1.3); or
- Poles that have more than 60% remaining strength but exhibit worsening conditions such as: rot; decay; splitting; insect infestation; bending; and leaning.

Poles are prioritized based on their assessed health index, the worst being selected for replacement or reinforcement.

Table 1 – 2018 Pole Replacements in the PowerStream RZ with Poor and Very Poor Asset Condition

Project Name	Number of poles to be replaced	Poor and very poor condition
Double Circuit Existing 23M21 Circuit from Bayfield & Livingstone to Little Lake MS	52	0
Install two additional 27.6kV ccts on Hwy7 from Jane St to Weston Rd	41	1
Install two additional 27.6kV ccts on 19th Ave from Hwy 404 to Woodbine Ave	26	0
New 27kV Pole Line on 19th Ave from Leslie to Woodbine Ave	32	1
Rebuild 27kV pole line on Warden Ave into 4 ccts from 16th Ave to Major Mack	47	0
Pole Replacement Program	325	325
4-Circuit Pole Storm Hardening	67	67
Total number of poles	590	394
Percentage of poor and very poor		66.78%

b) In the PowerStream RZ, pole reinforcement is utilized in certain specific situations where the life of a pole can be extended through reinforcement rather than replacement. Although Alectra Utilities seeks to utilize pole reinforcement as an economic alternative to pole replacement, pole reinforcement is not feasible for all situations. Examples of situations where pole reinforcement is not feasible include: poles that identify poor condition in the upper portion of the poles; poles that support highway crossing; poles at intersections; poles with risers; poles with telecommunication risers; heavy loaded poles that have multiple feeders or critical assets (switches); as well as poles in close proximity to buildings and homes.

For 2018, Alectra Utilities has identified two candidate poles for pole reinforcement with a budget of $0.01MM.

PRZ-AMPCO-9

Reference(s): Ex 2-3-10 Attachment #35

a) Please provide annual historical failure data (# of failures, # customer outage minutes) for each of the years 2010 to 2017 for the following asset groups: cable, poles, switchgears and padmount transformers.

Response:

a) Alectra Utilities has provided Table 1 on Equipment Failures, as requested. Outages in the appended table indicate the number of outages (by count). Customer Minutes Interrupted ("CMI") pertains to the Customer Outage Minutes.

Equipment Failure Cause Code Analysis (2010-2017YTD)																
Cause	2010		2011		2012		2013		2014		2015		2016		2017 (YTD -Sept 21	
	Outages	CMI	Outages	CMI	Outages	CMI	Outages	CMI	Outages	CMI	Outages	CMI	Outages	CMI	Outages	CMI
Pad Mount Transformer	38	380,220	50	602,160	66	944,160	78	1,032,480	84	867,420	86	898,980	91	952,686	66	1,023,600
Primary Cable and Splice	81	1,844,580	103	3,491,160	123	3,564,960	133	11,778,780	113	3,317,640	126	3,420,240	131	3,584,292	80	1,899,840
Switching Unit	15	677,700	30	915,420	24	934,440	28	1,642,080	15	691,080	25	990,180	23	1,163,976	12	315,120

Alectra PowerStream RZ does have historical data for pole failures. A failed pole usually occurs as the result of vehicle contact, high winds, Ice storm or pole fire, and therefore the cause is captured as Foreign Interference, Adverse Weather, or Adverse Environment and not as pole failure.

PRZ-AMPCO-10

Reference(s): Ex 2-3-10 Attachment #35
EB-2015-0003 Undertaking JTC 1.5_App 2-AA 2015-2020_20150911

Switchgears - Unscheduled Replacement of Failed (end of useful Life) Distribut	1,421,218

Preamble: At reference #2, PowerStream proposed to spend $1.421 Million in 2018 on unscheduled replacement of switchgears. In Attachment #35, the forecast spend in 2018 is now $1.817, a 28% increase.

a) Please explain the need for the increase and the expected outcome.

Response:

a) Alectra Utilities' operates approximately 1,825 switchgear units in the PowerStream rate zone, of this amount approximately 1,000 units are air insulated (PMH) type. Operational concerns with air insulated units include:

- Air insulated units are rated at 25kV but are operated at 27.6kV voltage. This increases the risk of flash over, especially in the presence of contamination and moisture;
- Live-front and obsolete design (not approved for new installation). Alectra Utilities has a long-term plan to phase-out all air insulated switchgear units used on the 27.6kV system;
- Continuous need for maintenance (dry-ice cleaning);

Over the last three years, there has been an increase in number of switchgear failures which has increased the reactive replacement as presented in Table 1. Alectra Utilities' predecessor, PowerStream, had planned to replace 31-36 units per year as provided in the Section 5.4.5 of PowerStream's DSP (EB-2015-0003/SII/Exhibit G/Tab 2/Section 5.4.5/Page 12). It experienced a higher number of switchgear failures and related necessary replacements in 2015 to 2017.

Table 1 - Switchgears - Unscheduled Replacement of Failed (End of Useful Life) Distribution Equipment Capital Expenditure by Year

Category	2015 ($000)	2016 ($000)	YTD Sept 2017 ($000)
Unscheduled Replacement of Failed Switchgear	$ 2,039	$ 1,908	$ 1,928
Number of Switchgear Units Replaced	55	42	45

Due to the higher number replacement switchgear units, Alectra Utilities' has experienced increased the reactive replacement expenditure for this initiative to $2.039MM in 2015, $1.908MM in 2016 and $1.928MM year-to-date ("YTD") September 2017.

The annual budget for the investment of "Switchgears - Unscheduled Replacement of Failed (end of useful Life) Distribution Equipment" is developed based on historical capital expenditure. An increase in this system renewal investment is necessary to replace failed units in a safe, efficient and expedient manner.

The average annual capital expenditure for 2015 and 2016 is $1.973MM and the September 2017 YTD expenditure is $1.928MM. The 2018 proposed budget of $1.817MM is lower than the actual capital expenditure for both 2015 and 2016. It is also lower than the 2017 YTD capital expenditure.

The system renewal investment for unscheduled replacement of failed switchgear is prudent and required in 2018, in order to replace the failed equipment, as well as to maintain a safe and reliable distribution system.

The expected outcome of the investment is addressing the urgent need to replace failed switchgear units to restore the distribution system, as well as phase out the air insulated units to address the operational concerns identified above.

PRZ-AMPCO-11

Reference(s): Ex 2-3-10 Attachment #35
EB-2015-0003 Undertaking JTC 1.5_App 2-AA 2015-2020_20150911

Preamble: At reference #2, PowerStream's spending in 2013 and 2014 on the Radial Supply Remediation/Conversion on Miller Avenue totaled $650,000 and no subsequent spending was planned for the years 2017 to 2020.

a) Please explain the need for additional spending in 2018 of $1.628 million.

Response:

a) Customers on Miller Avenue are supplied by a 13.8kV feeder off of Woodbine Ave from Amber Municipal Station ("MS"). The feeder is radial on Woodbine Ave north of 14th Avenue. Customers on Miller Avenue have experienced a few long outages in the past due to the radial supply configuration.

Over the past three years (2014, 2015 and 2016) there were 25 outages on the 13.8kV feeder (Average 8 outages per year) and in 2017 YTD there have been 4 outages. Among the 29 outages from 2014 to 2017, seven outages were over 6 hours. The customers on Miller Avenue were subjected to an outage lasting for approximately 15 hours in 2014 and most recently in September 2017 an outage lasting for 7 hours.

Alectra Utilities' predecessor, PowerStream, had a proposed plan to build a 13.8kV circuit on Rodick Rd from Miller Ave to 14th Ave., in order to provide customers on Miller Avenue with a 13.8kV loop supply, which would enhance reliability. The cost estimate was $650,000.

The project was optimized and planned to be completed in 2015. The City of Markham informed PowerStream in 2015 that it had plans to widen Miller Avenue. In that case, all the existing 13.8kV poles would have to be relocated so the project was put on hold.

In addition, the customers on Miller Avenue are supplied by 13.8kV feeder from Amber MS which is a 1972 vintage station and has very little load (3MVA), due to the conversion of customers supplied by this MS to the present day 27.6kV standard.

Amber MS will be decommissioned, after all the customers fed from Amber MS are converted to present day 27.6KV supply standard.

Given the change in circumstances, the most cost effective option was to coordinate Alectra Utilities' distribution work with the road widening work and convert all the existing customers on Miller Avenue to the present day 27.6kV loop supply standard and then decommission Amber MS after remaining customers on Amber MS are converted as well. Consequently, the plan to build a 13.8kV supply on Rodick Rd. was not implemented.

The project now involves the conversion of the customers on Miller Avenue (total load 2MVA) to the present day 27.6kV loop supply. In addition, due to the road widening, clearance issues were identified, related to the existing transmission line. A portion of the 27.6kV feeder will have to be underground. These factors have driven the total project cost to an estimated $1.628M, as compared to the initial $0.65MM, as filed in PowerStream's Custom IR Application (EB-2015-0003).

PRZ-AMPCO-12

Reference(s): Ex 2-3-10 Attachment #35

a) Please provide the forecast spend for Rear Lot Supply Remediation in 2017.

b) Please provide the forecast spend for the 4-Circuit Pole Storm Hardening Program in 2017.

Response:

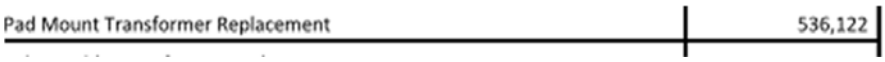
a) The forecast capital expenditure for 2017 for Rear Lot Supply Remediation is $3.385MM.

b) The forecast capital expenditure for 2017 for 4-Circuit Pole Storm Hardening Projects is $1.671MM.

PRZ-AMPCO-13

Reference(s): Ex 2-3-10 Attachment #35

EB-2015-0003 Undertaking JTC 1.5_App 2-AA 2015-2020_20150911



Preamble: At reference #2, PowerStream proposed to spend $0.536 million in 2018 on Pad Mount Transformer Replacement. In Attachment #35, the forecast spend in 2018 is $1.072 millin, double the amount. Please explain the need for the increase and the expected outcome.

Response:

a) As identified in PowerStream's Distribution System Plan ("DSP") (EB-2015-0003) in Exhibit G, Tab 2, 5.4.5 p.14 of the PowerStream Custom IR application, PowerStream operates its pole top transformers and single-phase residential padmount transformers on a run-to-failure basis (except for the assets that pose a safety or environmental risk).

As provided in Undertaking JTC 1.5_App_2-AA 2015-2020_20150911 (EB-2015-0003), Alectra Utilities' predecessor, PowerStream, proposed to replace approximately 60 pad-mount transformers per year for the period from 2015 to 2020, in order to keep up with the replacement of the failed and hazardous transformers in its distribution system.

At that time, PowerStream expected that the level of transformer replacement would be adequate to maintain the reliability and the level of employee and public safety. However, during the 2016 transformer inspections, PowerStream discovered 578 rusting and leaking transformers. This represented a 963% increase, compared to the replacement of 60 transformers that were planned and budgeted. The results of the pad-mount transformer inspection in 2016 are shown in Table 1, below.

Table 1 – Results of 2016 Pad-Mount Transformer Inspections

Pad-mount Transformer (PSRZ fleet of 37,178 units)	Units
Units Inspected in 2016	12,339
Units identified as rusting	268
Units identified as leaking oil	223
Units identified as rusing and leaking oil	87
Total Number of Units Rusting and/or Leaking Oil	**578**

Transformers are inspected on a 3-year cycle (approx.1/3 of the transformer population is inspected per year). Based on the 2016 inspection result for one third of the population, 578 transformers were identified as rusting and/or leaking oil.

It was determined that with the previous budget, only 60 units could be replaced and it would take approximately 8 years to replace the identified transformers. To address the increased need to replace transformers identified as leaking oil or rusting, which creates a safety hazard to employees and the public, Alectra Utilities has increased the transformer replacement budget to $1.07MM for the next 5 years, to accommodate a replacement of 120 units per year. Alectra Utilities will continue to inspect transformers and prioritize replacements based on addressing hazards to employee and public safety, as well as compliance to environmental regulations. The increase of the capital expenditure to $1.07MM is necessary, in order to address this issue on a timely basis, rather than over the protracted, eight-year period.

PRZ-AMPCO-14

Reference(s): Ex 2-3-10 Page 14

Preamble: The evidence states "Further, for system service and system renewal projects, customers were asked which capital investment approach they would prefer Alectra Utilities to take in 2018 for the PowerStream RZ: (i) system reliability is maintained (correlates with bill impacts identified in Table 98 above); (ii) system reliability eventually declines, calculated at 50% of the bill impacts identified in Table 98 above; and (iii) system reliability significantly declines."

a) If the Board does not approve an ICM in 2018 for the PowerStream RZ, will reliability be maintained? If not, please provide the resulting impact on reliability and show the analysis.

b) Please discuss the information provided to customers in order to respond to the above question.

c) Were customers provided with the project details in Attachments #35? If not, why not?

Response:

a) Please see Alectra Utilities' response to PRZ-Staff-5.

b) The following preamble was read to respondents prior to being asked their preferences regarding system service projects in the PowerStream RZ (see PowerStream Residential Telephone Survey, Page 10):

> *As the communities served by PowerStream continue to grow, so too does the demand for increased electricity capacity. To address these capacity needs, PowerStream is proposing to increase its investment in substations and power line infrastructure to meet existing load requirements and provide back-up in the event of a loss of power at a neighbouring substation or power line.*

The following preamble was read to respondents prior to being asked their preferences regarding system renewal projects in the PowerStream RZ (see PowerStream Residential Telephone Survey, Page 11):

> *Like many utilities across Ontario today, PowerStream faces a challenge with aging electrical distribution infrastructure. Sections of PowerStream's electrical distribution system are more than 50 years old, and are at the end-of-life.*

PowerStream is committed to extending the lifespan of its assets in order to minimize replacement costs. There comes a time when distribution infrastructure can no longer be repaired, and must be replaced. This requires investment in system renewal projects.

The following information was provided to the 7,093 PowerStream RZ customers that completed the Online Feedback Portal prior to being asked their preferences regarding system renewal projects in the PowerStream RZ (see Appendix 5.0, Page 43, Alectra Utilities Online Feedback Portal Layout):

Growth Pressures

Fueled by increased economic development and demand for new housing in York Region and Simcoe County, PowerStream adds over 8,000 new customers to its existing customer base every year.

This growth in customers and load puts increasing pressure on PowerStream's distribution system, which requires extending powerlines, upgrading capacity to existing powerlines, and adding new capacity to load constrained areas.

Growth pressures require PowerStream to invest in **system service** and **system access** projects.

Key Infrastructure Challenges	Proposed Solutions
• Requirement to relocate the distribution system to accommodate York Region Rapid Transit road works along Yonge Street.	• Underground cable relocations and overhead powerlines to be rebuilt underground as there is no room for the existing overhead pole line.

This incremental **system access** investment is non-discretionary as it is a requirement under existing legislation. It will represent an **$0.11 per month** increase in 2018 to the typical residential customer's bill in the PowerStream service territory.

Key Infrastructure Challenges	Proposed Solutions
• Lines and equipment that cannot carry the increased load and maintain the reliable service expected by customers.	• New substations, transformer stations, and powerlines where needed to increase supply capacity.
• Development of new subdivisions resulting from increased demand for new homes, which requires expansion of distribution powerlines and stations.	• Increase substation and power line capacity to meet existing load requirements and provide back-up in the event of a loss of power at a neighbouring substation.

These proposed incremental **system service** investments would maintain the current level of reliability, however as part of its planning process, PowerStream is considering a number of alternative scenarios:

- one where the level of reliability is ***maintained***;
- one where the level of reliability eventually ***declines***; and
- one where no new investments are made and reliability could ***decline significantly***.

Each scenario impacts **residential** customer distribution rates differently.

The following information was provided to the 7,093 PowerStream RZ customers that completed the Online Feedback Portal prior to being asked their preferences regarding system service projects in the PowerStream RZ (see Appendix 5.0, Page 45, Alectra Utilities Online Feedback Portal Layout):

Aging Infrastructure Pressures

Like many utilities in Ontario today, PowerStream faces a challenge with aging electrical distribution infrastructure. Sections of PowerStream's electrical distribution system are more than 50 years old, and are at the end of life.

PowerStream is committed to extending the lifespan of its assets in order to minimize the cost impact of replacement on its customers. There comes a time when distribution infrastructure can no longer be repaired, and must be replaced. This requires investment in system renewal projects.

Key Infrastructure Challenges	Proposed Solution
Underground cables are an important component of the power distribution system. Their failure causes long outages that can affect a large number of customers. Because the cables are underground, fixing them when they fail is time consuming and expensive. Cable failures are the leading cause of outages at PowerStream.	PowerStream will replace underground cables identified as a high risk of failure proactively, before they fail. Cables which are in poor condition, are unfit for rehabilitation and contribute to a high number of outages will be prioritized for replacement first. Upon replacing the cables, PowerStream will also update the affected section of the distribution system to present day standards.
There are many neighborhoods in the PowerStream service area that are supplied with electricity through overhead distribution lines and poles located in backyards. These overhead distribution lines are in poor condition and experience more frequent and longer outages as crews making repairs have difficulty in obtaining access to the equipment in backyards.	PowerStream will convert backyard overhead supply services to underground services at the front of the home as per present day standards. Neighbourhoods will be selected and prioritized for conversion based on the condition of the assets, risks related to environmental, health and safety issues as well as reliability impacts. With services located at the front of the home, ongoing maintenance will be more efficient and therefore less costly.
Electrical stations house large power transformers and main switches required to distribute electricity to where it is needed. They connect the main lines and can service up to 40,000 customers per station. Since failures at stations affect a large number of customers and have the risk of long outages, PowerStream needs to proactively replace station equipment that is in poor condition, obsolete or has a history of failure, in order to avoid negatively impacting reliability.	PowerStream will replace essential station equipment that is in poor condition, obsolete or with history of failure on a proactive basis. The priority in 2018 is replacing obsolete main switches at the Richmond Hill station that have a history of failure and obsolete main switches at a Bradford substation that are in poor condition.

c) Yes, information on an individual project basis was provided for each project category in the Online Feedback Portal. Details of these projects can be found on pages 42-45 of Appendix 5.0 – Alectra Utilities Online Feedback Portal Layout.

Additionally, in the Telephone Surveys, PowerStream RZ customers were provided the opportunity to learn more about how the request for increased rates was going to be invested. Page 18 Appendix 2.0 – PowerStream Telephone Survey Report indicates that 25% of Residential PowerStream RZ customers sought this additional information. In total, 58% of PowerStream RZ Residential customers were provided a detailed breakdown of proposed investments (See pages 21-25 of Appendix 2.0 for detailed findings).

PRZ-AMPCO-15

Reference(s): Ex 2-3-10 Page 17

a) Please provide the 0.82% growth rate calculation.

Response:

a) The growth rate calculation is identified in Exhibit 3, Tab 1, Schedule 1, Attachment 31, Tab 9. Threshold Test – ICM Model PowerStream RZ.

PRZ-AMPCO-16

Reference(s): Ex 2-3-10 Page 20

Preamble: The evidence indicates each ICM project is distinct, unrelated to a recurring annual capital project, and has been evaluated in the asset management and capital planning process as required in 2018.

a) Please explain further how each project under system unrelated to a recurring annual capital project.

Response:

a) Please see Alectra Utilities' response to CCC-19.

PRZ-AMPCO-17

Reference(s): **PRZ-Staff-7**

a) For the ICM projects that were included in the original DSP please explain the reason why any projects in 2018 were advanced from subsequent years or deferred from previous years to 2018.

Response:

a) Table 1 below provides the projects that were included in PowerStream's DSP and were advanced or deferred.

Table 1 – PowerStream DSP Project Timing and Reason for Advancement/ Deferral

Project	DSP Timing	ICM Timing	Notes
Planned Circuit Breaker Replacement - Richmond Hill (Lazenby) TS#1 - Second Bus	2019	2018	(1)
Rebuild 27.6kV Poleline on Warden Avenue into 4 Circuit from 16th to Major Mack	2017	2018	(2)
Build 2 circuit pole line on 19th Ave from Leslie St. to Bayview Ave	2017	2018	(3)
Double Circuit Existing 23M21 Circuit from Bayfield & Livingstone to Little Lake MS	2019	2018	(6)

The reasons for the advancement or deferral of each project is provided below.

(1) The start date for the circuit breaker replacement at Richmond Hill (Lazenby) TS#1 has been advanced by one year. Urgency has increased due to the failure of the M8 circuit breaker in May 2016. This failure affected 15,500 customers; the outage lasted over two hours before service could be restored to all of the customers.

(2) The project had been deferred from 2017 to 2018, based on the progress of the Markham Future Urban Area ("FUA") development. The developments have now begun with several large industrial facilities under construction. As a result, the investment is required in 2018. Please refer to Exhibit 3 Tab 1 Schedule 1 Attachment 33, p.47.

(3) The project had been deferred from 2017 to 2018 based on the progress of the Leslie North development. The development on 19th Avenue is scheduled to begin in 2018. Presently, there are no feeders on 19th Avenue, between Leslie Street and Bayview Avenue. There are planned

residential and commercial developments proposed on the north and south sections of 19th Avenue, which will require connections. This investment is required in 2018, in order to connect new service and customers. Please refer to Attachment 33, p.65-66.

(4) Following the PowerStream DSP submission, a contingency analysis of stations MS306 and MS310 was performed. It was discovered that if implementation proceeded as planned, both the stations would be on feeder 23M21, which would not provide reliable supply under contingency conditions. Further, from a customer perspective, it was best to coordinate the completion of any pole line work in front of the new substation at the same time as the new substation was being constructed (2017), rather than have crews return the following year to rebuild the newly installed riser poles and adjacent pole line. From a scheduling and resource perspective, the multi-year project was broken down to two projects, one per year.

Two phases of the multi-year project were developed; one project for 2017 and the other project for 2018. The 2017 project (Phase 1) construction was completed and energized in 2017; the 2018 project (Phase 2), east of Livingstone MS to the existing Little Lake MS306, is required in 2018.

PRZ-AMPCO-18

Reference(s): Attachment #33

a) Please complete the table at Appendix A to summarize the assets replaced in 2016, and forecast to be replaced in 2017 and 2018. Please adjust the asset categories as required.

Response:

a) Alectra Utilities has completed Appendix A, provided as PRZ-AMPCO-18_Attach 1_Asset Replacement, which summarizes the assets replaced in 2016 and forecast to be replaced in

PowerStream Rate Zone
EB-2017-0024
PRZ-AMPCO-18 Appendix A

Asset	Actual # Assets Replaced 2016	Forecast # Assets Replaced 2017	Forecast # Assset Replaced (2018 Capital Projects Excluding ICM Projects)	# Assset Replaced (ICM Projects)	TOTAL	# Replaced in 2018 in Very Poor & Poor Condition
Substation Transformers	0	0	0	0	0	0
Circuit Breakers	8	6	0	10	24	4
Pole Mounted Transformers	N/A	N/A	N/A	N/A	N/A	N/A
Pad Mounted Transformers 1 Phase	56	118	120	0	294	120
Pad Mounted Transformers 3 Phase						
Vault Transformers	0	3	0	0	3	0
Pad Mounted Switchgear	34	34	33	0	101	33
Overhead Switches 44 kV Load Break	N/A	N/A	N/A	N/A	N/A	N/A
Overhead Switches 27.6 kV Load Break	N/A	N/A	N/A	N/A	N/A	N/A
Overhead Switches Inline	N/A	N/A	N/A	N/A	N/A	N/A
Overhead Switches Motorized	5	4	5	0	14	5
UG Cables Main Feeder	32,657 m	23,487 m	8,223 m	9,164 m	73,531 m	17,387 m
UG Cables Distribution						
UG Secondary Cable	N/A	N/A	N/A	N/A	N/A	N/A
Poles Wood	338	251	392	0	914	392
Poles Concrete	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL						

The number of assets in the above table includes only Planned Asset Replacement under the Asset Renewal Category

PRZ-AMPCO-19

Reference(s): Attachment #33 Page 11 Station Switchgear Replacement – 8th Line MS323
EB-2015-0003 Ex G Tab 2 Appendix A Project #101572

Preamble: The evidence states "The most recent asset condition assessment of the low voltage (15kV) switchgear at the 8th Line MS323 has identified a system renewal investment driven by technical obsolescence, poor condition assessment and historical trend of equipment failure.

a) The confirm the date of the most recent asset condition assessment.

b) Please provide a table that sets out the number of assets to be replaced under this project by asset type, the quantity in very poor and poor condition, and the actual historical failures by asset type.

Response:

a) The business case in the PowerStream Distribution System Plan (EB-2015-0003) for 8th Line MS switchgear replacement was based on a condition assessment completed in 2014. Asset condition assessments have since been conducted annually, with the most recent having been completed in 2017. The 8th Line MS circuit breaker condition has fallen in the Poor to Very Poor category in all of these assessments.

b) Alectra Utilities assumes that the question is with reference to Project #102730, "Station Switchgear Replacement (ACA) 8th Line MS323", and not Project #101572 as indicated in the information request.

The scope of work for the 8th Line MS323 switchgear replacement involves replacing a lineup consisting of four circuit breakers as well as miscellaneous ancillary equipment. Station asset condition assessments were conducted for major assets only, not for ancillary equipment. Consequently, only circuit breakers were assessed; they have fallen into the Poor and Very Poor condition categories.

Other equipment to be replaced as part of this project includes the following:

- Five protection and control relays;
- One communication processor;
- One station service transformer;
- One communications panel;
- One relay panel;

- AC and DC panels;
- SorbWeb for one transformer;
- Cable duct banks for three feeder egress cables;
- Power cables and associated terminations for three, three-phase feeder egress circuits and for the transformer to transformer breaker circuit; and
- Miscellaneous low-voltage cabling

There is one recorded incident of the catastrophic failure of this type of breaker at another station, which resulted in damage to the switchgear assembly; it required replacement of the entire assembly. In addition, there have been numerous issues discovered during the operation and testing/maintenance of these breakers.

Other minor failures recorded for these breaker over the past number of years include:

- Burn out or open circuit Trip & Close coils;
- Trip circuit latch check switches failed. Auxiliary contacts (Normally Open & Normally Closed) not operational;
- Spring Charge motor cut-off switches broken or cracked;
- Operating mechanism cracked/shattered;
- Breaker pole unit contact resistance measured over 150 micro-ohms; and
- Pole unit SF6 gas pressure switches failure.

Failure statistics have not been collected for the ancillary equipment.

ERZ-AMPCO-1

Reference(s): Ex 2-4-11 Page 3

a) Page 3 - Please provide the list of 2018 projects in to address the negative trend in overall system performance.

b) Page 3 - Please provide the list of 2018 projects to address the negative trend in customer service quality.

c) Page 10 – Please provide a copy of the latest Kinectrics' Asset Condition Assessment report.

d) Page 10 – Please provide an overview of the outage data tracked by Alectra and the nature of the improvements made to review outage data.

e) Page 20 – Please discuss the changes in more frequent and detailed inspections and provide details of the assets impacted.

f) Page 20 – Please describe the additional analytical methods used.

Response:

a) The 2018 projects included in Alectra Utilities' Enersource Rate Zone Distribution System Plan ("DSP") to address the negative trend in overall system performance and customer service quality are identified in Table 1, below.

Table 1: List of 2018 Material System Renewal Projects to Address Negative Trend in System Performance and Service Quality

Material Project – System Renewal (2018)
Gananoque - Section 1
Boughbeeches - Section 1
Copenhagen - Section 1
Appledore - Section 1
Credit Woodlands Crt/Wiltshire
Glen Erin & Montevideo - Section 1
Tenth Line Main Feeder
Folkway & Erin Mills Main Feeder
Glen Erin & Battleford
City Centre Drive Cable Renewal
Equipment Replacement
Pole Installations
Munden/Pear Tree
Holburne/Ogden
Lake/John
Church
Courtney Park - Dixie To Ordan
Stanfield - North Service to Queensway
Southdown - ROW to Lakeshore
Underground Transformer & Equipment Renewal
Pad Mounted Switchgear Replacement
Cable & Splice Replacements

b) Please see Alectra Utilities' response to part a), above.

c) Please see Alectra Utilities' response to ERZ-SEC-16 for a copy of the latest Kinectrics' Asset Condition Assessment Report.

d) Please see DSP Sections 1.3.1.2 – System Reliability Performance Indicators (Page 50), Section 1.3.2 – Performance Trends (5.2.3.b) (Page 54) and Section 1.3.3 – Impact on the DSP due to Performance Indicator Trends (5.2.3.c) (Page 71) for detailed explanation of the outage data tracked by Alectra Utilities for the ERZ and improvements made to review the data. Please see Section 2.1.2.5 – Asset Register - Outage Management System for a detailed explanation of improvements made to attain and analyze outage data and response times.

e) In recent years, the frequency and level of detail captured in annual ERZ system inspections have been increased to improve knowledge regarding the condition of in-service distribution assets. An example in the increase in frequency is an annual inspection of distribution systems servicing larger and critical loads. Examples of the level of detail captured in ERZ system inspections are provided below. These inspections have revealed important information regarding the conditions of distribution assets and have helped to identify substandard conditions requiring follow up.

In particular, investment needs identified from improvements to asset inspections include pad-mounted equipment, such as switchgear and transformers, as well as overhead distribution system assets, such as poles, insulators, framing, and switches. Please see Alectra Utilities' response to ERZ-Staff-24 b) for improvements in transformer inspection program.

Improvements to the overhead distribution system inspections include a full inspection of overhead assets completed in 2014 and 2015, supplemented with the introduction of wood pole condition testing. For a full listing and overview of all inspection programs, please refer to Appendix D – Enersource Rate Zone Inspection and Maintenance Programs in the DSP.

f) Please refer to Alectra Utilities' response to ERZ-Staff-46 regarding Alectra Utilities' plans to enable asset analytics through the integration of information systems.

ERZ-AMPCO-2

Reference(s): Ex 2-4-11 P16

Preamble: The reactive replacement program to address substandard or failed transformers is forecast to cost $1.1MM in each year from 2017 to 2019 and $1.4MM in 2022.

a) Please identify the capital project in Attachment #49 where this cost is captured.

b) Please provide the number of failed transformers replaced for the years 2010 to 2022.

Response:

a) The $1.1MM is comprised of $0.716MM in Underground Transformer and Equipment Renewal plus $0.415MM in Overhead Transformer and Equipment Renewal, which is included in the Miscellaneous Projects amount of $1.786MM.

b) Alectra Utilities has provided the number of failed transformers replaced for the years 2013 onward, based on the availability of data, in Table 1. These transformers were removed from service due to internal faults, damaged by vehicle and corrosion, which compromised the locking mechanism.

Table 1 – Number of Failed Transformers by Year (2013-2016)

Year	# of Failed Transformers
2013	237
2014	75
2015	79
2016	45
Total	436

ERZ-AMPCO-3

Reference(s): Ex 3-1-1 Attachment #49

a) Please provide a live version of Attachment #49 in excel format that maps the 2018 projects to the spending categories in Table 133 at x 2-4-11 Page 19.

b) Please provide the project ID#, forecast in-service date and priority ranking for each project in the spreadsheet completed in part (a).

Response:

a) Alectra Utilities has provided the live version of Attachment 49 that maps the 2018 projects to the spending categories in Table 133 as ERZ-AMPCO-3_Attach 1.

b) Table 1 below provides the Project ID#, forecast in service date and priority ranking for the projects from part a), above.

Table 1 – Projects with In-Service Dates and Priority Ranking

Project ID #	SYSTEM ACCESS	$	Ranking	In-Service Dates
2018-C0531-2	Roads Project - Creditview - Britannia to Argentia	967,366	8	Q4 2018
2018-C0531-1	Roads Project - QEW - Evans To Cawthra	1,294,220	7	Q4 2018
2018-C0532-1	LRT - Underground	1,450,000	10	Q4 2022
2018-C0532-1	LRT - Overhead	1,450,000	10	Q4 2022
2018-C0541	New Subdivisions	1,000,000	1	Q4 2018
2018-C0542-1	Industrial/Commercial Services	1,300,000	2	Q4 2018
2018-C0598-1	Metering Renewal	764,000	4	Q4 2018
2018-C0598-2	New Metering Installations	620,000	5	Q4 2018
2018-C0899-1	New IMS	1,054,000	6	Q4 2018
	Sub-Total Material Projects	9,899,586		
	Miscellaneous Projects (under materiality threshold)	1,779,214	3,9	
	Total System Access	**11,678,800**		
	SYSTEM RENEWAL			
2018-C0505-7	Gananoque - Section 1	1,961,142	22	Q4 2018
2018-C0505-8	Boughbeeches - Section 1	1,238,616	33	Q4 2018
2018-C0505-9	Copenhagen - Section 1	2,374,014	21	Q4 2018
2018-C0505-10	Appledore - Section 1	1,238,616	30	Q4 2018
2018-C0505-2	Credit Woodlands Crt/Wiltshire (design complete)	1,548,270	23	Q4 2018
2018-C0505-1	Glen Erin & Montevideo - Section 1	1,961,142	20	Q4 2018
2018-C0505-3	Tenth Line Main Feeder	1,135,398	25	Q4 2018
2018-C0505-4	Folkway & Erin Mills Main Feeder	1,032,180	32	Q4 2018
2018-C0505-5	Glen Erin & Battleford	2,064,360	19	Q4 2018
2018-C0505-6	City Centre Drive Cable Renewal	1,548,270	24	Q4 2018
2018-C0561-3	Equipment Replacement	1,545,617	11	Q4 2018
2018-C0561-4	Pole Installations	1,236,494	12	Q4 2018
2018-C0561-5	Munden/Pear Tree	741,896	41	Q4 2018
2018-C0561-6	Holburne/Ogden	1,020,107	34	Q4 2018
2018-C0561-1	Lake/John	927,370	36	Q4 2018
2018-C0561-2	Church	1,020,107	35	Q4 2018
2018-C0562-1	Courtney Park - Dixie To Ordan	778,309	38	Q4 2018
2018-C0562-2	Stanfield - North Service to Queensway	1,245,294	29	Q4 2018
2018-C0562-3	Southdown - ROW to Lakeshore	1,171,237	31	Q4 2018
2018-C0563-1	Underground Transformer & Equipment Renewal	716,044	13	Q4 2018
2018-C0563-2	Transformer Replacement Project - Underground & Overhead	8,447,243	14	Q4 2018
2018-C0565-1	Pad Mounted Switchgear Replacement	1,686,335	15	Q4 2018
2018-C0565-3	Cable & Splice Replacements	2,485,399	16	Q4 2018
	Sub-Total Material Projects	39,123,459		
	Miscellaneous Projects (under materiality threshold)	1,786,335	13	
	Total System Renewal	**40,909,794**		
	SYSTEM SERVICE			
2018-C0504-2	City Centre N	1,449,332	17	Q4 2018
2018-C0504-2	Bloor MS	724,666	43	Q4 2018
2018-C0504-2	Hensall MS	828,190	39	Q4 2018
2018-C0504-2	Western MS	776,428	27	Q4 2018
2018-C0504-2	Park Royal	1,035,237	37	Q4 2018
2018-C0504-1	York MS	2,225,760	18	Q4 2018
2018-C0507-1	Churchill Meadows Feeder Egress - TS to Winston Churchill	1,040,375	40	Q4 2018
2018-C0507-3	Derry – WCB to Argentia	1,186,027	26	Q4 2018
2018-C0576-1	U/G installation of SCADA/Automation switches	716,824	45	Q4 2018
2018-C0576-2	O/H installation of SCADA/Automation switches	808,987	42	Q4 2018
2018-C0576-3	RTU System Enhancements & Equipment Upgrades	1,085,477	28	Q4 2018
2018-C0576-6	WiMAX Wireless Network Project	768,026	44	Q4 2018
	Sub-Total Material Projects	12,645,329		
	Miscellaneous Projects (under materiality threshold)	776,849		
	Total System Service	**13,422,178**		
	GENERAL PLANT			
2018-C0584-1	Program - Cars/Light Trucks/Vans	1,290,000	46	Q4 2018
2018-C0584-2	Program - Heavy Trucks/RBDs/Buckets	1,180,000	47	Q4 2018
2018-C0591-1	Project - Mavis Building Envelope	600,000	48	Q4 2018
	Other Non-Material Projects	1,025,000		
	Sub-Total Material Projects	4,095,000		
	Miscellaneous Projects (under materiality threshold)	2,577,000		
	Total General Plant	**6,672,000**		
	Total 2018 Capital Projects	**72,682,772**		

1

ERZ-AMPCO-3

Ref: Ex 3-1-1 Attachment #49

a) Please provide a live version of Attachment #49 in excel format that maps the 2018 projects to the spending categories in Table 133 at x 2-4-11 Page 19.

b) Please provide the project ID#, forecast in-service date and priority ranking for each project in the spreadsheet completed in part (a).

Response:

a) Please see below for an excel version of Attachment # 49:

2018 Capital Project Listing - Enersource Rate Zone

SYSTEM ACCESS	
Roads Project - Creditview - Britannia to Argentia	967,366
Roads Project - QEW - Evans To Cawthra	1,294,220
LRT - Underground	1,450,000
LRT - Overhead	1,450,000
New Subdivisions	1,000,000
Industrial/Commercial Services	1,300,000
Metering Renewal	764,000
New Metering Installations	620,000
New IMS	1,054,000
Sub-Total Material Projects	9,899,586
Miscellaneous Projects (under materiality threshold)	1,779,214
Total System Access	**11,678,800**
SYSTEM RENEWAL	
Gananoque - Section 1	1,961,142
Boughbeeches - Section 1	1,238,616
Copenhagen - Section 1	2,374,014
Appledore - Section 1	1,238,616
Credit Woodlands Crt/Wiltshire (design complete)	1,548,270
Glen Erin & Montevideo - Section 1	1,961,142
Tenth Line Main Feeder	1,135,398
Folkway & Erin Mills Main Feeder	1,032,180
Glen Erin & Battleford	2,064,360
City Centre Drive Cable Renewal	1,548,270
Equipment Replacement	1,545,617
Pole Installations	1,236,494
Munden/Pear Tree	741,896
Holburne/Ogden	1,020,107
Lake/John	927,370
Church	1,020,107
Courtney Park - Dixie To Ordan	778,309
Stanfield - North Service to Queensway	1,245,294
Southdown - ROW to Lakeshore	1,171,237
Underground Transformer & Equipment Renewal	716,044
Transformer Replacement Project - Underground & Overhead	8,447,243
Pad Mounted Switchgear Replacement	1,686,335
Cable & Splice Replacements	2,485,399
Sub-Total Material Projects	39,123,459
Miscellaneous Projects (under materiality threshold)	1,786,335
Total System Renewal	**40,909,794**
SYSTEM SERVICE	
City Centre N	1,449,332
Bloor MS	724,666
Hensall MS	828,190
Western MS	776,428
Park Royal	1,035,237
York MS	2,225,760
Churchill Meadows Feeder Egress - TS to Winston Churchill	1,040,375
Derry – WCB to Argentia	1,186,027
U/G installation of SCADA/Automation switches	716,824
O/H installation of SCADA/Automation switches	808,987
RTU System Enhancements & Equipment Upgrades	1,085,477
WiMAX Wireless Network Project	768,026
Sub-Total Material Projects	12,645,329
Miscellaneous Projects (under materiality threshold)	776,849
Total System Service	**13,422,178**
GENERAL PLANT	
Program - Cars/Light Trucks/Vans	1,290,000
Program - Heavy Trucks/RBDs/Buckets	1,180,000
Project - Mavis Building Envelope	600,000
Other Non-Material Projects	1,025,000
Sub-Total Material Projects	4,095,000
Miscellaneous Projects (under materiality threshold)	2,577,000
Total General Plant	**6,672,000**
Total 2018 Capital Projects	**72,682,772**

ERZ-AMPCO-4

Reference(s): Ex 3-1-1 Attachment #49
EB-2015-0065 Undertaking JT1.2

At reference # 2, the following capital project categories were included under Overhead Rebuilds in 2016.

ENERSOURCE HYDRO MISSISSAUGA
CAPITAL EXPENDITURE PROJECTS
2016 ICM

	Business Unit	Description	Submission (Dec) 2016 Budget
1	*C0561 - Overhead Rebuilds*	2016 Overhead Switch Replacement Program	$ 300,000
2	*C0561 - Overhead Rebuilds*	2016 Insulator Replacement Program	$ 300,000
3	*C0561 - Overhead Rebuilds*	2016 Stores Small Capital Material	$ 400,000
4	*C0561 - Overhead Rebuilds*	2016 Wood Pole Installations	$ 400,000
5	*C0561 - Overhead Rebuilds*	2016 Concrete Pole Installations	$ 800,000
6	*C0561 - Overhead Rebuilds*	2016 Misc Capital (FIs, Term Poles, Animal Protection, Grounding Replacments)	$ 200,000

At reference #1, the project categories have changed from JT1.2.

a) Please provide the capital projects in 2018 at reference #1 and proposed spending that correspond to the Overhead Rebuild work in the above table.

Response:

a) Alectra Utilities has provided Table 1 below which provides the 2018 capital budgets that correspond to the 2016 capital budgets for initiatives listed in JT1.2.

Table 1 – Comparison of 2018 to 2016 Budgets for Corresponding work from JT1.2

Business Unit	Description	Submission (Dec) 2016 Budget	2018 Budget
C0561 - Overhead Rebuilds	Overhead Switch Replacement Program	$300,000	$400,000
C0561 - Overhead Rebuilds	Insulator Replacement Program	$300,000	$300,000
C0561 - Overhead Rebuilds	Stores Small Capital Material	$400,000	$500,000
C0561 - Overhead Rebuilds	Wood Pole Installations	$400,000	$400,000
C0561 - Overhead Rebuilds	Concrete Pole Installations	$800,000	$800,000
C0561 - Overhead Rebuilds	Misc Capital (FIs, Term Poles, Animal Protection, Grounding Replacments)	$200,000	$300,000
		$2,400,000	**$2,700,000**

ERZ-AMPCO-5

Reference(s): Ex 3-1-1 Attachment #49
EB-2015-0065 Undertaking JT1.2

At reference # 2, the following capital project categories were included in the 2016 proposed capital budget.

ENERSOURCE HYDRO MISSISSAUGA
CAPITAL EXPENDITURE PROJECTS
2016 ICM

		Submission (Dec)	
Business Unit	**Description**		**2016 Budget**
C0562 - Subtransmission Renewal		**$**	**4,200,000**
C0563 - U/G TX/Replace/Overhaul	Underground Transformer and Equipment Renewal	$	4,125,000
C0563 - U/G TX/Replace/Overhaul		**$**	**4,125,000**
C0564 - O/H TX/Replace/Overhaul	Overhead Transformer and Equipment Renewal	$	3,000,000
C0564 - O/H TX/Replace/Overhaul		**$**	**3,000,000**
C0565 - U/G Cable Replace	Pad Mounted Switchgear Replacement	$	1,780,000
C0565 - U/G Cable Replace	Primary Distribution Equipment Replacement	$	475,000
C0565 - U/G Cable Replace	Underground Cable and Splice Replacement	$	1,400,000
C0565 - U/G Cable Replace	Secondary Cable Replacements	$	95,000
C0565 - U/G Cable Replace		**$**	**3,750,000**
C0567 - Emergency Replacements	Emergency Replacements	$	320,000

At reference #1 the budget for Underground Transformer and Equipment Renewal is $716,044. The project Overhead Transformer and Equipment Renewal is not listed. A new project Transformer Replacement Project – Underground & Overhead is listed with a budget of $8,447,243.

a) Please explain the differences in the capital projects between reference #2 and reference #1.

Response:

a) In 2016, Alectra Utilities' predecessor, Enersource Hydro Mississauga confirmed a backlog of 2244 transformers remaining in service, that were leaking and/ or contained PCBs, that posed environmental, reliability, safety, regulatory and financial risks that needed to be addressed on a timely basis.

Alectra Utilities developed a multi-year replacement project to address the remaining 2,244 transformers, in order to minimize environmental, reliability, safety, regulatory and financial risks before any major contamination and liabilities materialize. Failure to replace these transformers in a timely manner means that reactive replacements and environmental remediation would be needed, should any major spills and contamination occur. Both would carry environmental and public safety risk, and give rise to significant financial liabilities on the part of the utility. The estimated cost to complete the 2018 project is $8.447MM.

By contrast. Reference 1 in the question above refers to the annual underground and overhead transformer and equipment renewal program, which is reactive in nature and required to respond to faulted tansformers and transformers found no longer suitable for service based on public safety and/ or environmental risk.

ERZ-AMPCO-6

Reference(s):

a) Please complete Appendix B.

Response:

a) Alectra Utilities has provided the Attachment B as ERZ-AMPCO-6_Appendix B.

EB-2017-0024
Enersource Rate Zone
ERZ-AMPCO-6 Appendix B

	Capital Projects	Actual		Forecast	
		2015	2016	2017	2018
	OVERHEAD				
1	**Overhead Switch Replacement Program**	$699,652	$681,357	$415,098	$412,165
	# of Switches Replaced	151	173	96	96
2	**Insulator Replacement Program**	$286,453	$305,228	$311,323	$309,123
	# of Insulators Replaced	892	780	873	868
3	**Wood Pole Replacement**	$343,555	$275,911	$415,098	$412,165
	# of Wood Poles Replaced	22	22	29	29
4	**Concrete Pole Replacement**	$766,512	$756,147	$830,196	$824,329
	# of Concrete Poles Replaced	38	42	44	43
5	**Overhead Transformer and Equipment Renewal**	$2,173,769	$3,512,999	$4,078,337	$4,078,337
	# of O/H Transformers Replaced	223	304	382	382
	UNDERGROUND				
6	**U/G Transformer and Equipment Renewal**	$6,126,841	$5,729,997	$5,500,047	$5,500,047
	# of U/G Transformers Replaced	427	374	370	370
7	**Padmounted Switchgear Replacement**	$1,936,031	$2,207,533	$1,686,335	$1,686,335
	# of Pad Mounted Switchgear Replaced	35	33	27	27
8	**Underground Cable and Splice Replacement**	$1,152,401	$1,390,267	$2,386,813	$2,386,813
	# of km completed	6,587	7,246	13,013	13,013
9	**Secondary Cable Replacement**	$51,749	$60,609	$98,586	$98,586
	# of km completed	394	486	770	770

EB-2017-0024
Enersource Rate Zone
ERZ-AMPCO-6 Appendix B

	Capital Projects	Actual		Forecast	
		2015	2016	2017	2018
	OVERHEAD				
1	**Overhead Switch Replacement Program**	$699,652	$681,357	$415,098	$412,165
	# of Switches Replaced	151	173	96	96
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	# of Concrete Poles Replaced	38	42	44	43
5	**Overhead Transformer and Equipment Renewal**	$2,173,769	$3,512,999	$4,078,337	$4,078,337
	# of O/H Transformers Replaced	223	304	382	382
	UNDERGROUND				
6	**U/G Transformer and Equipment Renewal**	$6,126,841	$5,729,997	$5,500,047	$5,500,047
	# of U/G Transformers Replaced	427	374	370	370
7	**Padmounted Switchgear Replacement**	$1,936,031	$2,207,533	$1,686,335	$1,686,335
	# of Pad Mounted Switchgear Replaced	35	33	27	27
8	**Underground Cable and Splice Replacement**	$1,152,401	$1,390,267	$2,386,813	$2,386,813
	# of km completed	6,587	7,246	13,013	13,013
9	**Secondary Cable Replacement**	$51,749	$60,609	$98,586	$98,586
	# of km completed	394	486	770	770

ERZ-AMPCO-7

Reference(s): Ex 2-4-11 Page 20

Preamble: The evidence states "In contrast, all jacketed primary cables installed in Mississauga over the last 22 years have experienced only a 4.8% failure rate.

a) Please provide the failure rate calculation.

Response:

a) Alectra Utilities predecessor Enersource completed an analysis of 124 cable failures which occurred between January 2014 and January 2016. The analysis identified that 6 of the 124 analyzed cable failures occurred on jacketed primary cables. The 4.8% failure rate was determined by the ratio of jacketed primary cables to all cable failures analyzed during the analysis period (i.e. 6/124 = 0.048 or 4.8%).

ERZ-AMPCO-8

Reference(s): Ex 3-1-1 Attachment #50 Page 68

a) Please provide the number of interruptions by cause code for each of the years 2011 to 2015.

Response:

a) Alectra Utilities has provided the number of interruptions by cause code for each year from 2011 to 2015 for the Enersource Rate Zone in Table 1, below.

Table 1 – Number of Interruptions by Cause Code (2011-2015)

Number of Sustained Interruptions						
Cause Code		2011	2012	2013	2014	2015
000	Unknown/Other	8	49	33	26	35
100	Scheduled Outage	76	326	243	419	693
200	Loss of Supply	0	47	15	22	18
300	Tree Contacts	3	42	32	30	19
400	Lightning	4	11	8	9	3
500	Defective Equipment	57	385	398	409	450
600	Adverse Weather	2	17	36	225	58
700	Adverse Environment	1	5	0	1	5
800	Human Element	2	6	3	4	7
900	Foreign Interference	31	229	193	173	252

ERZ-AMPCO-9

Reference(s): Ex 3-1-1 Attachment #50 Page 133 Table 32

a) Please recast Table 32 to show the HI as numerical quantities instead of percentages.
b) Please provide a live excel version of the table in part (a).

c) For each asset category, please provide the Data Availability Index (DAI) for this year compared to last year.

Response:

a) Alectra Utilities has recast Table 32 to provide the Health Index in numerical quantities.

Table 1 – Table 32 Revised – Health Index based on Numerical Quantities

Asset Category		Population	Average Health Index	Health Index Distribution					Average Age
				Very Poor (< 25%)	Poor (25 - <50%)	Fair (50 - <70%)	Good (70 - <85%)	Very Good (>= 85%)	
Substation Transformers	In Service	108	87%	0	4	9	27	68	23
	Spares	12	82%	1	0	0	4	7	33
Circuit Breakers	All	432	93%	1	0	21	37	373	22
	High Voltage	56	96%	0	0	0	2	54	23
	Low Voltage	376	93%	1	0	21	35	319	21
Pole Mounted Transformers		5353	90%	168	29	274	830	4052	20
Pad Mounted Transformers	1 Phase	14261	86%	351	581	710	3577	9042	21
	3 Phase	1860	93%	33	29	34	209	1555	16
Vault Transformers		3854	84%	243	195	248	603	2565	27
Pad Mounted Switchgear		834	88%	59	5	24	16	730	15
Overhead Switches	44 kV	337	89%	0	8	17	46	266	21
	27.6 kV	206	87%	0	1	15	48	142	19
	Inline	2000	82%	0	70	201	605	1124	18
	Motorized	110	90%	0	2	10	12	86	15
Underground Cables	Main Feeder	2238	82%	221	35	134	276	1573	18
*Note that results are given in terms of conductor-km	Distribution	4076	75%	679	172	405	498	2322	21
Poles	Wood	12436	73%	1306	630	3214	2020	5266	27
	Concrete	9488	91%	326	27	1017	494	7624	20

b) Alectra Utilities has provided the live excel model as ERZ-AMPCO-9_Model.

c) The most recent Asset Condition Assessment ("ACA") data was compiled based on 2015 asset information; the previous ACA was based on 2014 asset date. Alectra Utilities has provided the Data Availability Index ("DAI") by Asset Category for 2015 vs. 2014 in Table 2, below.

Table 2 – Data Availability Index by Asset Category

Data Availability Index	2015	2014
Substation Transformers	87%	84%
Circuit Breakers	94%	71%
Pole Mounted Transformers	77%	75%
1-Ph Pad-Mounted Transformers*	70%	89%
3-Ph Pad-Mounted Transformers*	68%	70%
Vault Transformers	88%	78%
Pad-Mounted Switchgear	89%	39%
Overhead Switches	-	-
Underground Cables	100%	100%
Poles**	55%	-

* The average DAI of Pad-Mounted Transformers has dropped from 89% (in 2014) to 70% (in 2015) for 1-phase and 70% (in 2014) to 68% (in 2015) for 3-phase year. In 2014, visual inspections were limited to the external portion of the transformer. Significant improvements with respect to closing data gaps were made in 2015, such as, inspecting the internal portion of the transformer to check for oil leaks, assessing the condition of elbow connections and the addition of transformer loading data. However, less than 20% of the inspections had internal inspection data that made it into the Health Index calculations, due to the timing of the 2015 ACA. This is the reason for the drop in data availability.

**In 2013, the assessment for both Wood and Concrete poles were based on age, only. The 2013 DAIs for both wood and concrete poles was 100%, since age was known for poles.

In 2014, Enersource launched a pole inspection program wherein visual inspection information was gathered. The Health Index formulas for wood and concrete poles were revised to include inspection data. The DAI for both wood and concrete poles dropped to 55%, since less than 40% of poles were inspected. The only data gap for this asset category is pole strength.

ERZ-AMPCO-9_Model

Asset Category		Population	Average Health Index	Health Index Distribution					Average Age
				Very Poor (< 25%)	Poor (25 - <50%)	Fair (50 - <70%)	Good (70 - <85%)	Very Good (>= 85%)	
Substation Transformers	In Service	108	87%	0.00%	3.70%	8.33%	25.00%	62.96%	23
	Spares	12	82%	8.33%	0.00%	0.00%	33.33%	58.33%	33
Circuit Breakers	All	432	93%	0.23%	0.00%	4.86%	8.56%	86.34%	22
	High Voltage	56	96%	0.00%	0.00%	0.00%	3.57%	96.43%	23
	Low Voltage	376	93%	0.27%	0.00%	5.59%	9.31%	84.84%	21
Pole Mounted Transformers		5353	90%	3.14%	0.54%	5.12%	15.51%	75.70%	20
Pad Mounted Transform	1 Phase	14261	86%	2.46%	4.07%	4.98%	25.08%	63.40%	21
	3 Phase	1860	93%	1.77%	1.56%	1.83%	11.24%	83.60%	16
Vault Transformers		3854	84%	6.31%	5.06%	6.43%	15.65%	66.55%	27
Pad Mounted Switchgear		834	88%	7.07%	0.60%	2.88%	1.92%	87.53%	15
Overhead Switches	44 kV	337	89%	0.00%	2.37%	5.04%	13.65%	78.93%	21
	27.6 kV	206	87%	0.00%	0.49%	7.28%	23.30%	68.93%	19
	Inline	2000	82%	0.00%	3.50%	10.05%	30.25%	56.20%	18
	Motorized	110	90%	0.00%	1.82%	9.09%	10.91%	78.18%	15
Underground Cables *Note that results are given in terms of conductor-km	Main Feeder	2238	82%	9.87%	1.56%	5.99%	12.33%	70.29%	18
	Distribution	4076	75%	16.66%	4.22%	9.94%	12.22%	56.97%	21
Poles	Wood	12436	73%	10.50%	5.07%	25.84%	16.24%	42.34%	27
	Concrete	9488	91%	3.44%	0.28%	10.72%	5.21%	80.35%	20

ERZ-AMPCO-10

Reference(s): Ex 3-1-1 Attachment #50 Page 133 Table 32

a) Please complete Appendix C to show the quantity of assets replaced.

Response:

Alectra Utilities has completed Appendix C to show the quantity of assets replaced. The forecasted quantities in 2019 to 2022 are based on the PCB & Leaking Transformer project and Alectra Utilities renewal plan for certain major asset types as provided in Exhibit 3, Tab 1, Schedule 1, Attachment 50 – Enersource RZ DSP, Table 12, p.94.

Alectra Utilities is unable to provide the percentage of assets replaced in 2018 in very poor and poor condition. The data in the 2015 Asset Condition Asset would not provide the most accurate assessment of the condition of the assets at the time of replacement, for 2018 planned projects.

EB-2017-0024
Enersource Rate Zone
ERZ-AMPCO-10 Appendix C

	Asset	Population @ Dec 31 2015	Number of Units Replaced		Forecast Number of Units to be Replaced							TOTAL	% Assets Replaced in 2018 in very poor & poor condition
			2015	2016	2017	2018 Projects Excluding ICM	2018 ICM Projects	2019	2020	2021	2022		
1	**Substation Transformers**	108	2	3	2	0	0	0	1	2	2	7	
2	**Substation Transformer Spares**	12	0	0	0	0	0	0	0	0	0	0	
3	**Circuit Breakers**	432	30	17	15	9	4	16	25	22	20	111	
4	**Pole Mounted Transformers**	5353	223	304	382	331	238	336	336	149	149	2853	
5	**Pad Mounted Transformers 1 Phase**	14261	427	374	370	345	252	512	512	464	285	2710	
6	**Pad Mounted Transformers 3 Phase**	1860			0	0	26	58	58	33	33	76	
7	**Vault Transformers**	3854			0	0	197	337	337	337	150	758	
8	**Pad Mounted Switchgear**	834	35	33	30	30	0	30	30	30	30	180	
9	**Overhead Switches 44 kV Load Break**	337	151	173	96	94	1	94	94	94	94	568	
10	**Overhead Switches 27.6 kV Load Break**	206					1						
11	**Overhead Switches Inline**	2000			0	0	30	0	0	0	0	30	
12	**Overhead Switches Motorized**	110			0	0	0	0	0	0	0	0	
13	**UG Cables Main Feeder**	2238	7	7	13	13	21	22	22	22	22	316	
14	**UG Cables Distribution**	4076					14	42	42	42	42		
15	**Poles Wood**	12436	22	22	29	29	180	375	375	375	375	1825	
16	**Poles Concrete**	9488	38	42	44	43							
17	**TOTAL**	57605	935	975	981	894	963	2055	2065	1803	1435	9434	

Asset	Population	Condition - Quantities					%	%	%	%	%	Number of Units		Number of Units Replaced				
		Very Good	Good	Fair	Poor	Very Poor	Very Good	Good	Fair	Poor	Very Poor	2015	2016	2010	2011	2012	2013	2014
Substation Transformers	108	51	39	15	2	1	47%	36%	14.0%	2.0%	< 1%	2	4	4	1	3	4	0
Substation Transformer Spares	12	8	1	2	0	1	67%	8%	17.0%	0.0%	8.0%	N/A	N/A	0	0	0	0	0
Circuit Breakers	510	472	20	8	1	9	93%	4%	2.0%	< 1%	2.0%	33	17	28	17	16	15	13
Pole Mounted Transformers	5346	4301	606	329	26	84	80%	11%	6.0%	< 1%	2.0%	200	200	162	109	98	154	205
Pad Mounted Transformers 1 Phase	14242	8450	4091	987	621	93	59%	29%	7.0%	4.0%	< 1%	350	350	200	213	170	322	315
Pad Mounted Transformers 3 Phase	1821	1534	172	68	38	9	84%	9%	4.0%	2.0%	< 1%	70	70	37	55	48	68	65
Vault Transformers	3861	2725	504	285	280	67	71%	13%	7.0%	7.0%	2.0%	250	200	18	44	34	40	166
Pad Mounted Switchgear	862	563	167	59	25	48	65%	19%	7.0%	3.0%	6.0%	40	40	17	25	23	35	34
Overhead Switches 44 kV Load Break	338	299	20	3	16	0	88%	6%	< 1%	5.0%	0.0%	10	10	6	10	6	2	7
Overhead Switches 27.6 kV Load Break	213	199	5	6	3	0	93%	2%	3.0%	1.0%	0.0%	5	5	12	2	4	4	3
Overhead Switches Inline	2002	1715	110	83	67	27	86%	5%	4.0%	3.0%	1.0%	75	75	101	108	90	63	73
Overhead Switches Motorized	104	81	6	2	7	8	78%	6%	2.0%	7.0%	8.0%	5	5	3	2	4	4	5
UG Cables Main Feeder	2233	1628	148	0	200	258	73%	7%	0.0%	9.0%	12.0%	40	50	26	13	33	36	22
UG Cables Distribution	4038	2411	247	0	519	861	60%	6%	0.0%	13.0%	21.0%	60	70	39	59	35	52	56
Poles Wood	12917	7707	1945	935	1153	1177	60%	15%	7.0%	9.0%	9.0%	500	500	403	306	254	214	282
Poles Concrete	8966	8525	345	91	5	0	95%	4%	1.0%	< 1%	0.0%	100	100	101	77	63	53	70

ERZ-AMPCO-11

Reference(s): Ex 3-1-1 Attachment #50 Page 133 Table 33

a) Please identify and explain any changes in Alectra's maintenance analysis, strategy and frequency of maintenance since EB-2015-0065.

Response:

a) Since Alectra Utilities' predecessor Enersource's Price Cap IR Application (EB-2015-0065), none of the maintenance analysis, strategy or frequency of maintenance has changed for the items listed in Table 33.

ERZ-AMPCO-12

Reference(s): Ex 3-1-1 Attachment #50 Page 262

a) Please provide a table that sets out Kinectrics' proposed asset replacement action plan quantities compared to Alectra's proposal.

Response:

Please see Table 12 - Comparison of ACA Levelized Plan versus Alectra Utilities (Enersource RZ) Renewal Plan for Major Asset Types, on page 95 in Attachment 50.

ERZ-AMPCO-13

Reference(s): Attachment #50 Page 265 Table 55

a) Please provide a live excel version of Table 55 Material Capital Projects 2017 -2022.

Response:

a) Alectra Utilities has provided a live excel version of the Table 55 Material Capital Projects 2017-2022, as ERZ-AMPCO-13.xls

Business Unit	Description	2017	2018	2019	2020	2021	2022	TOTAL
C0531 - Roads	Other Non-Material Road Projects	$ 1,446,215	$ 323,555	$ 661,243	$ 327,838	$ 330,622	$ 351,036	$ 3,440,509
C0531 - Roads	Project - Creditview - Britannia To Argentia	$ -	$ 1,294,220	$ -	$ -	$ -	$ -	$ 1,294,220
C0531 - Roads	Project - QEW - Various Bridge Rehabilitations	$ -	$ 970,665	$ -	$ -	$ -	$ -	$ 970,665
C0531 - Roads	Project - QEW - Evans to Cawthra	$ -	$ 1,617,775	$ -	$ -	$ -	$ -	$ 1,617,775
C0531 - Roads	Project - Mavis - Courtney Park to City Limits	$ -	$ -	$ 1,322,486	$ -	$ -	$ -	$ 1,322,486
C0531 - Roads	Project - Drew - Dixie to Tomken	$ -	$ -	$ 661,243	$ -	$ -	$ -	$ 661,243
C0531 - Roads	Project - Courtney Park - Kennedy to Tomken	$ -	$ -	$ 661,243	$ -	$ -	$ -	$ 661,243
C0531 - Roads	Project - Creekbank - Matheson To Shawson	$ -	$ -	$ -	$ 1,311,351	$ -	$ -	$ 1,311,351
C0531 - Roads	Project Hwy 401 - Credit River To Hwy10	$ -	$ -	$ -	$ 1,967,026	$ -	$ -	$ 1,967,026
C0531 - Roads	Project - Ninth Line -Eglinton to Britannia	$ -	$ -	$ -	$ -	$ 1,322,486	$ -	$ 1,322,486
C0531 - Roads	Project - Ninth Line - Britannia to Derry	$ -	$ -	$ -	$ -	$ 1,653,108	$ -	$ 1,653,108
C0531 - Roads	Project - Hwy 401 - WCB to Credit River	$ -	$ -	$ -	$ -	$ -	$ 1,755,179	$ 1,755,179
C0531 - Roads		**$ 1,446,215**	**$ 4,206,215**	**$ 3,306,215**	**$ 3,606,215**	**$ 3,306,216**	**$ 2,106,215**	**$ 17,977,291**
C0532 - LRT	LRT - Underground	$ 200,000	$ 2,200,000	$ 4,600,000	$ 4,525,000	$ 4,300,000	$ 2,700,000	$ 18,525,000
C0532 - LRT	LRT - Overhead	$ 200,000	$ 2,200,000	$ 4,200,000	$ 4,025,000	$ 3,500,000	$ 2,500,000	$ 16,625,000
C0532 - LRT		**$ 400,000**	**$ 4,400,000**	**$ 8,800,000**	**$ 8,550,000**	**$ 7,800,000**	**$ 5,200,000**	**$ 35,150,000**
C0541 - New Subdivisions(OfferConne	New Subdivisions	$ 2,171,524	$ 2,171,524	$ 2,171,524	$ 2,171,524	$ 2,171,524	$ 2,171,524	$ 13,029,144
C0541 - New Subdivisions(OfferConnect)		**$ 2,171,524**	**$ 2,171,524**	**$ 2,171,524**	**$ 2,171,524**	**$ 2,171,524**	**$ 2,171,524**	**$ 13,029,144**
C0542 - Ind/Comm Services	Industrial/Commercial Services	$ 4,345,963	$ 4,345,963	$ 4,345,963	$ 4,345,963	$ 4,345,963	$ 4,345,963	$ 26,075,778
C0542 - Ind/Comm Services		**$ 4,345,963**	**$ 4,345,963**	**$ 4,345,963**	**$ 4,345,963**	**$ 4,345,963**	**$ 4,345,963**	**$ 26,075,778**
C0544 - Residential Service Upgrades	Residential Service Upgrades	$ 763,069	$ 763,069	$ 763,069	$ 763,069	$ 763,069	$ 763,069	$ 4,578,413
C0544 - Residential Service Upgrades		**$ 763,069**	**$ 763,069**	**$ 763,069**	**$ 763,069**	**$ 763,069**	**$ 763,069**	**$ 4,578,413**
C0597 - Grid Supply Point Metering	Program - TCP/IP GSP Conversion & Reseal	$ 35,000	$ 45,000	$ 35,000	$ 65,000	$ 10,000	$ 280,000	$ 470,000
C0597 - Grid Supply Point Metering	Tomken Upgrade	$ 1,100,000	$ -	$ -	$ -	$ -	$ -	$ 1,100,000
C0597 - Grid Supply Point Metering		**$ 1,135,000**	**$ 45,000**	**$ 35,000**	**$ 65,000**	**$ 10,000**	**$ 280,000**	**$ 1,570,000**
C0598 - Metering	Program - Metering Renewal	$ 806,775	$ 764,000	$ 717,200	$ 717,200	$ 717,200	$ 817,200	$ 4,539,575
C0598 - Metering	Program - New Metering Installations	$ 620,000	$ 620,000	$ 620,000	$ 620,000	$ 620,000	$ 620,000	$ 3,720,000
C0598 - Metering		**$ 1,426,775**	**$ 1,384,000**	**$ 1,337,200**	**$ 1,337,200**	**$ 1,337,200**	**$ 1,437,200**	**$ 8,259,575**
C0899 - Smart Meters - New Condos	Program - New IMS	$ 1,038,500	$ 1,054,000	$ 1,069,500	$ 1,069,500	$ 1,069,500	$ 1,069,500	$ 6,370,500
C0899 - Smart Meters - New Condos	Program - Retrofit IMS	$ 368,000	$ 372,000	$ 376,000	$ 376,000	$ 376,000	$ 376,000	$ 2,244,000
C0899 - Smart Meters - New Condos		**$ 1,406,500**	**$ 1,426,000**	**$ 1,445,500**	**$ 1,445,500**	**$ 1,445,500**	**$ 1,445,500**	**$ 8,614,500**
C0900 - Green Energy - FIT/MicroFI	FIT & MicroFIT Projects	$ 125,000	$ 95,000	$ 70,000	$ 65,000	$ 50,000	$ -	$ 405,000
C0900 - Green Energy - FIT/MicroFIT		**$ 125,000**	**$ 95,000**	**$ 70,000**	**$ 65,000**	**$ 50,000**	**$ -**	**$ 405,000**
SYSTEM ACCESS		**$ 13,220,046**	**$ 18,836,771**	**$ 22,274,471**	**$ 22,349,471**	**$ 21,229,471**	**$ 17,749,471**	**$ 115,659,701**
C0505 - Subdivision Rebuild	Project - Burningoak Cres	$ 2,490,588						$ 2,490,588
C0505 - Subdivision Rebuild	Project - Beechhollow Section 3	$ 2,490,588						$ 2,490,588
C0505 - Subdivision Rebuild	Project - Ellengale	$ 1,556,617	$ -	$ 2,059,941	$ 2,055,778	$ 1,541,834	$ 2,055,778	$ 9,269,948
C0505 - Subdivision Rebuild	Project - Clarkson	$ 2,334,926	$ -	$ 2,059,941	$ 2,312,751	$ 2,055,778	$ 2,312,751	$ 11,076,147
C0505 - Subdivision Rebuild	Project - Malton	$ 1,556,617	$ -	$ 2,317,434	$ 1,541,834	$ 2,055,778	$ 1,798,806	$ 9,270,469
C0505 - Subdivision Rebuild	Project - Truscott Plaza Area	$ 1,816,053						$ 1,816,053
C0505 - Subdivision Rebuild	Project - Maple Ridge	$ 1,556,617						$ 1,556,617
C0505 - Subdivision Rebuild	Project - Gananoque - Section 1		$ 1,961,142					$ 1,961,142
C0505 - Subdivision Rebuild	Project - Boughbeeches - Section 1		$ 1,238,616					$ 1,238,616
C0505 - Subdivision Rebuild	Project - Copenhagen - Section 1		$ 2,374,014					$ 2,374,014
C0505 - Subdivision Rebuild	Project - Appledore - Section 1		$ 1,238,616					$ 1,238,616
C0505 - Subdivision Rebuild	Project - Credit Woodlands Crt/Wiltshire (design complete)		$ 1,548,270					$ 1,548,270
C0505 - Subdivision Rebuild	Project - Glen Erin & Montevideo - Section 1		$ 1,961,142					$ 1,961,142
C0505 - Subdivision Rebuild	Project -Tenth Line Main Feeder		$ 1,135,397					$ 1,135,397
C0505 - Subdivision Rebuild	Project - Folkway & Erin Mills Main Feeder - L6259 to L6263		$ 1,032,180					$ 1,032,180
C0505 - Subdivision Rebuild	Project - Glen Erin & Battleford		$ 2,064,360	$ -	$ 2,055,778	$ 1,798,806	$ 1,798,806	$ 7,717,750
C0505 - Subdivision Rebuild	Project - City Centre Drive Cable Renewal		$ 1,548,270					$ 1,548,270
C0505 - Subdivision Rebuild	Project - Baldwin Rd/ ROW			$ 1,544,956				$ 1,544,956
C0505 - Subdivision Rebuild	Project - Golden Orchard/ Grassfire			$ 1,544,956				$ 1,544,956
C0505 - Subdivision Rebuild	Project - Cedarglen Gate - Section 1			$ 2,059,941	$ 2,312,751	$ 2,055,778	$ 2,055,778	$ 8,484,248
C0505 - Subdivision Rebuild	Project - Main Feeder renewal at Folkway Dr. from L6177 to L6405			$ 2,059,941	$ 2,312,751			$ 4,372,692

Business Unit	Description	2017	2018	2019	2020	2021	2022	TOTAL
C0505 - Subdivision Rebuild	Project - Traders - Section 3			$ 2,059,941	$ 2,312,751	$ 2,312,751	$ 2,055,778	$ 8,741,221
C0505 - Subdivision Rebuild	Project -Tamar & Copenhagen main feeder			$ 1,544,956				$ 1,544,956
C0505 - Subdivision Rebuild	Project - Forestwood/Stainton				$ 2,055,778	$ 2,055,778	$ 2,055,778	$ 6,167,334
C0505 - Subdivision Rebuild	Project - Tenth Line West main feeder				$ 1,541,834			$ 1,541,834
C0505 - Subdivision Rebuild	Project - Paisley Blvd					$ 2,312,751	$ 2,312,751	$ 4,625,503
C0505 - Subdivision Rebuild	Project - Project Rathburn					$ 2,312,751	$ 2,055,778	$ 4,368,530
C0505 - Subdivision Rebuild		**$ 13,802,006**	**$ 16,102,006**	**$ 17,252,006**	**$ 18,502,006**	**$ 18,502,006**	**$ 18,502,006**	**$ 102,662,035**
C0561 - Overhead Rebuilds	Program - Equipment Replacement	$ 1,556,617	$ 1,545,617	$ 1,542,016	$ 1,542,016	$ 1,542,016	$ 1,540,939	$ 9,269,221
C0561 - Overhead Rebuilds	Program - Pole Installations	$ 1,245,294	$ 1,236,494	$ 1,233,613	$ 1,233,613	$ 1,233,613	$ 1,232,750	$ 7,415,378
C0561 - Overhead Rebuilds	Project - Etude/Justine	$ 1,120,764						$ 1,120,764
C0561 - Overhead Rebuilds	Project - Credit Woodlands	$ 635,100		$ 2,405,545				$ 3,040,645
C0561 - Overhead Rebuilds	Project - Capricorn/Michaud	$ 709,817						$ 709,817
C0561 - Overhead Rebuilds	Project - Munden/Pear Tree		$ 741,896					$ 741,896
C0561 - Overhead Rebuilds	Project - Holburne/Ogden		$ 1,020,107					$ 1,020,107
C0561 - Overhead Rebuilds	Project - Lake/John		$ 927,370					$ 927,370
C0561 - Overhead Rebuilds	Project - Church		$ 1,020,107					$ 1,020,107
C0561 - Overhead Rebuilds	Project - Rometown			$ 1,850,419	$ 1,850,419			$ 3,700,838
C0561 - Overhead Rebuilds	Project - Northmount/Alexandra/Meredeth				$ 1,665,377			$ 1,665,377
C0561 - Overhead Rebuilds	Project - Greaves/East/Westmount				$ 740,168			$ 740,168
C0561 - Overhead Rebuilds	Project - Cliff/Burslem					$ 832,689		$ 832,689
C0561 - Overhead Rebuilds	Project - Redstone/Bonaventure					$ 925,210		$ 925,210
C0561 - Overhead Rebuilds	Project - Other Renewal					$ 370,084	$ 1,849,126	$ 2,219,210
C0561 - Overhead Rebuilds	Project - Donnelly/Glenburnie					$ 555,126		$ 555,126
C0561 - Overhead Rebuilds	Project - Dejong/Wareham/Turney					$ 925,210		$ 925,210
C0561 - Overhead Rebuilds	Project - Alexandra/Halliday					$ 647,647		$ 647,647
C0561 - Overhead Rebuilds	Project - Blanefield						$ 647,194	$ 647,194
C0561 - Overhead Rebuilds	Project - Truscott						$ 554,738	$ 554,738
C0561 - Overhead Rebuilds	Project - Lornewood/Glenhill						$ 647,194	$ 647,194
C0561 - Overhead Rebuilds	Project - Stavebank/Kenolie						$ 739,651	$ 739,651
C0561 - Overhead Rebuilds		**$ 5,267,593**	**$ 6,491,593**	**$ 7,031,593**	**$ 7,031,593**	**$ 7,031,593**	**$ 7,211,592**	**$ 40,065,556**
C0562 - Subtransmission Renewal	Project - North Sheridan Way	$ 933,970						$ 933,970
C0562 - Subtransmission Renewal	Project - Park – Section 1 - Ann to Stavebank [I	$ 996,235						$ 996,235
C0562 - Subtransmission Renewal	Project - Summerville MS - Feeder Egress & ret	$ 1,400,955						$ 1,400,955
C0562 - Subtransmission Renewal	Other Non-Material Projects	$ 404,720		$ 938,823			$ 463,150	$ 1,806,693
C0562 - Subtransmission Renewal	Project - Courtney Park - Dixie To Ordan		$ 778,309					$ 778,309
C0562 - Subtransmission Renewal	Project - Stanfield - North Service to Queensway		$ 1,245,294					$ 1,245,294
C0562 - Subtransmission Renewal	Project - Hydro One ROW - Fieldgate/Audubon		$ 541,042					$ 541,042
C0562 - Subtransmission Renewal	Project - Southdown - ROW to Lakeshore		$ 1,171,237					$ 1,171,237
C0562 - Subtransmission Renewal	Project - Dixie - Londonderry to CN Tracks			$ 1,251,764				$ 1,251,764
C0562 - Subtransmission Renewal	Project - Shawson - Dixie to Luke			$ 1,095,294				$ 1,095,294
C0562 - Subtransmission Renewal	Project - Dixie - Dundas to QEW				$ 1,561,764			$ 1,561,764
C0562 - Subtransmission Renewal	Project - Stanfield - Queensway to Dundas - Section 2				$ 780,882			$ 780,882
C0562 - Subtransmission Renewal	Project - Hydro One ROW - Cawthra to Stanfield				$ 1,093,235			$ 1,093,235
C0562 - Subtransmission Renewal	Project - Hydro One ROW - Southdown to Lorne Park					$ 1,085,228		$ 1,085,228
C0562 - Subtransmission Renewal	Project - Hydro One ROW - Lorne Park to QEW					$ 1,085,228		$ 1,085,228
C0562 - Subtransmission Renewal	Project - Hydro One ROW - Hurontario to Cawthra					$ 2,015,424		$ 2,015,424
C0562 - Subtransmission Renewal	Project - Goreway - Derry to CP Rail						$ 617,533	$ 617,533
C0562 - Subtransmission Renewal	Project -Tomken - Britannia to Courtney Park						$ 1,543,833	$ 1,543,833
C0562 - Subtransmission Renewal	Project - Hydro One ROW - Erindale TS to Mavis						$ 2,161,366	$ 2,161,366
C0562 - Subtransmission Renewal		**$ 3,735,881**	**$ 3,735,881**	**$ 3,285,881**	**$ 3,435,881**	**$ 4,185,881**	**$ 4,785,881**	**$ 23,165,285**
C0563 - U/G TX/Replace/Overhaul	Program - Underground Transformer and Equipı	$ 716,044	$ 716,044	$ 716,044	$ 716,044	$ 727,407	$ 890,047	$ 4,481,630
C0563 - U/G TX/Replace/Overhaul	PCB & Leaking Transformer Replacement Projc	$ 4,784,004	$ 4,784,004	$ 4,784,004	$ 4,784,004	$ 3,162,640	$ -	$ 22,298,654
C0563 - U/G TX/Replace/Overhaul		**$ 5,500,048**	**$ 5,500,048**	**$ 5,500,048**	**$ 5,500,048**	**$ 3,890,047**	**$ 890,047**	**$ 26,780,285**
C0564 - O/H TX/Replace/Overhaul	Program - Overhead Transformer and Equipmen	$ 415,098	$ 415,098	$ 415,098	$ 431,229	$ 442,382	$ 548,337	$ 2,667,242
C0564 - O/H TX/Replace/Overhaul	PCB & Leaking Transformer Replacement Projc	$ 3,663,239	$ 3,663,239	$ 3,663,239	$ 1,617,108	$ 1,105,955	$ -	$ 13,712,780

Business Unit	Description	2017	2018	2019	2020	2021	2022	TOTAL
C0564 - O/H TX/Replace/Overhaul		**$ 4,078,337**	**$ 4,078,337**	**$ 4,078,337**	**$ 2,048,337**	**$ 1,548,337**	**$ 548,337**	**$ 16,380,022**
C0565 - U/G Cable Replace	Program - Pad Mounted Switchgear Replacemer	$ 1,686,335	$ 1,686,335	$ 1,686,335	$ 1,686,335	$ 1,686,335	$ 1,686,335	$ 10,118,012
C0565 - U/G Cable Replace	Program - Primary Distribution Equipment Repl	$ 498,118	$ 498,118	$ 498,118	$ 498,118	$ 498,118	$ 498,118	$ 2,988,705
C0565 - U/G Cable Replace	Program - Underground Cable and Splice Repla	$ 2,485,399	$ 2,485,399	$ 2,485,399	$ 2,485,399	$ 2,485,399	$ 2,485,399	$ 14,912,393
C0565 - U/G Cable Replace		**$ 4,669,852**	**$ 4,669,852**	**$ 4,669,852**	**$ 4,669,852**	**$ 4,669,852**	**$ 4,669,852**	**$ 28,019,110**
C0567 - Emergency Replacements	Program - Emergency Replacements	$ 332,078	$ 332,078	$ 332,078	$ 332,078	$ 332,078	$ 332,078	$ 1,992,470
C0567 - Emergency Replacements		**$ 332,078**	**$ 332,078**	**$ 332,078**	**$ 332,078**	**$ 332,078**	**$ 332,078**	**$ 1,992,470**
SYSTEM RENEWAL		**$ 37,385,794**	**$ 40,909,794**	**$ 42,149,795**	**$ 41,519,795**	**$ 40,159,794**	**$ 36,939,793**	**$ 239,064,764**
C0504 - Substation Upgrade	Station Upgrades	$ 5,109,244	$ 5,176,186	$ 1,965,575	$ 5,324,164	$ 4,031,012	$ 3,459,471	$ 25,065,653
C0504 - Substation Upgrade	Webb MS	$ -		$ 2,069,026	$ 2,377,782			$ 4,446,808
C0504 - Substation Upgrade	York MS	$ 1,042,703	$ 2,225,760					$ 3,268,463
C0504 - Substation Upgrade	Rockwood MS			$ 3,517,345				$ 3,517,345
C0504 - Substation Upgrade	Mini Britannia	$ -	$ -	$ -	$ -	$ 2,583,982	$ 2,581,695	$ 5,165,677
C0504 - Substation Upgrade	Summerville MS	$ -	$ -	$ -	$ -	$ 1,136,952	$ 1,920,781	$ 3,057,733
C0504 - Substation Upgrade		**$ 6,151,947**	**$ 7,401,947**	**$ 7,551,946**	**$ 7,701,946**	**$ 7,751,946**	**$ 7,961,948**	**$ 44,521,679**
C0507 - Subtransmission Expansion	Project Southdown – South of Royal Windsor	$ 1,763,198	$ -	$ -	$ -	$ -	$ -	$ 1,763,198
C0507 - Subtransmission Expansion	Other Non-Material Projects	$ 985,316	$ 312,112	$ -	$ -	$ -	$ -	$ 1,297,428
C0507 - Subtransmission Expansion	Project - Churchill Meadows Feeder Egress - TS	$ -	$ 1,040,375	$ -	$ -	$ -	$ -	$ 1,040,375
C0507 - Subtransmission Expansion	Project - Derry – WCB to Argentia	$ -	$ 1,186,027	$ -	$ -	$ -	$ -	$ 1,186,027
C0507 - Subtransmission Expansion	Project - Centreview - Mavis to Duke	$ -	$ -	$ 1,249,257	$ -	$ -	$ -	$ 1,249,257
C0507 - Subtransmission Expansion	Project - Webb MS - Feeder Egress	$ -	$ -	$ 1,249,257	$ 1,249,257	$ -	$ -	$ 2,498,514
C0507 - Subtransmission Expansion	Project - Derry - Airport to Goreway	$ -	$ -	$ -	$ 1,249,257	$ -	$ -	$ 1,249,257
C0507 - Subtransmission Expansion	Project - Lakeshore - Clarkson to Bexhill	$ -	$ -	$ -	$ -	$ 1,249,257	$ -	$ 1,249,257
C0507 - Subtransmission Expansion	Project - Mini-Britannia TS Feeder Egress	$ -	$ -	$ -	$ -	$ 1,249,257	$ 1,249,257	$ 2,498,514
C0507 - Subtransmission Expansion	Project - Feeder Egress	$ -	$ -	$ -	$ -	$ -	$ 1,249,257	$ 1,249,257
C0507 - Subtransmission Expansion		**$ 2,748,514**	**$ 2,538,514**	**$ 2,498,514**	**$ 2,498,514**	**$ 2,498,514**	**$ 2,498,514**	**$ 15,281,084**
C0576 - Auto Switches/SCADA	Program - U/G installation of SCADA/Automati	$ 622,647	$ 716,824	$ 819,962	$ 921,411	$ 1,025,617	$ 1,125,942	$ 5,232,402
C0576 - Auto Switches/SCADA	Program - O/H installation of SCADA/Automati	$ 716,044	$ 808,987	$ 912,207	$ 1,013,552	$ 1,117,922	$ 1,228,300	$ 5,797,013
C0576 - Auto Switches/SCADA	Program - RTU System Enhancements & Equipı	$ 752,365	$ 1,085,477	$ 753,340	$ 967,481	$ 882,030	$ 946,815	$ 5,387,508
C0576 - Auto Switches/SCADA	Program - SCADA Master Upgrade	$ 103,774	$ 102,403	$ 102,495	$ 102,379	$ 102,562	$ 102,358	$ 615,972
C0576 - Auto Switches/SCADA	Project - WiMAX Wireless Network Project	$ 51,887	$ 768,026	$ 768,714	$ 511,895	$ 143,586	$ 143,302	$ 2,387,411
C0576 - Auto Switches/SCADA		**$ 2,246,718**	**$ 3,481,717**	**$ 3,356,718**	**$ 3,516,718**	**$ 3,271,717**	**$ 3,546,717**	**$ 19,420,305**
SYSTEM SERVICE		**$ 11,147,179**	**$ 13,422,178**	**$ 13,407,178**	**$ 13,717,178**	**$ 13,522,177**	**$ 14,007,179**	**$ 79,223,068**
C0581 - Engineering & Asset Systems	Program - Hardware/Software Renewal	$ 345,000	$ 345,000	$ 315,000	$ 365,000	$ 315,000	$ 315,000	$ 2,000,000
C0581 - Engineering & Asset Systems		**$ 345,000**	**$ 345,000**	**$ 315,000**	**$ 365,000**	**$ 315,000**	**$ 315,000**	**$ 2,000,000**
C0584 - Rolling Stock	Program - Cars/Light Trucks/Vans	$ 907,000	$ 1,290,000	$ 529,000	$ 571,000	$ 480,000	$ 952,000	$ 4,729,000
C0584 - Rolling Stock	Program - Heavy Trucks/RBDs/Buckets	$ 1,350,000	$ 1,180,000	$ 2,040,000	$ 1,180,000	$ 1,560,000	$ 500,000	$ 7,810,000
C0584 - Rolling Stock	Program - Other/Trailers/Lifters	$ 170,000	$ 50,000	$ 227,000	$ 1,350,000	$ 387,862	$ 435,000	$ 2,619,862
C0584 - Rolling Stock		**$ 2,427,000**	**$ 2,520,000**	**$ 2,796,000**	**$ 3,101,000**	**$ 2,427,862**	**$ 1,887,000**	**$ 15,158,862**
C0585 - Computer Equip	Various Hardware Renewal/Upgrades	$ 341,000	$ 572,000	$ 269,000	$ 580,000	$ 150,000	$ 607,000	$ 2,519,000
C0585 - Computer Equip		**$ 341,000**	**$ 572,000**	**$ 269,000**	**$ 580,000**	**$ 150,000**	**$ 607,000**	**$ 2,519,000**
C0588 - ERP System	Program - Additional software licenses/Upgrade	$ 50,000	$ 55,000	$ 55,000	$ 60,000	$ 60,000	$ 65,000	$ 345,000
C0588 - ERP System		**$ 50,000**	**$ 55,000**	**$ 55,000**	**$ 60,000**	**$ 60,000**	**$ 65,000**	**$ 345,000**
C0589 - Meter to Cash	Other Non-Material Projects	$ 580,000	$ 580,000	$ 620,000	$ 530,000	$ 550,000	$ 500,000	$ 3,360,000
C0589 - Meter to Cash		**$ 580,000**	**$ 580,000**	**$ 620,000**	**$ 530,000**	**$ 550,000**	**$ 500,000**	**$ 3,360,000**
C0591 - Grounds & Building	Project - Mavis building envelope	$ 650,000	$ 600,000	$ -	$ -	$ -	$ -	$ 1,250,000
C0591 - Grounds & Building	Project - Mavis Building Generator replacement	$ -	$ -	$ -	$ 950,000	$ -	$ -	$ 950,000
C0591 - Grounds & Building	Program - Building Upgrades - Mavis	$ 760,000	$ -	$ 1,200,000	$ 250,000	$ 1,200,000	$ 400,000	$ 3,810,000
C0591 - Grounds & Building	Program - Building Upgrades - Derry	$ 245,000	$ 275,000	$ 600,000	$ 1,050,000	$ 675,000	$ 700,000	$ 3,545,000
C0591 - Grounds & Building	Project - Derry HVAC Upgrades	$ 550,000	$ 500,000	$ -	$ -	$ -	$ -	$ 1,050,000
C0591 - Grounds & Building	Project - Derry Windows	$ -	$ -	$ 725,000	$ -	$ -	$ -	$ 725,000
C0591 - Grounds & Building	Other Non-Material Projects	$ 650,000	$ 1,025,000	$ 800,000	$ 1,325,000	$ 1,175,000	$ 1,195,000	$ 6,170,000
C0591 - Grounds & Building		**$ 2,855,000**	**$ 2,400,000**	**$ 3,325,000**	**$ 3,575,000**	**$ 3,050,000**	**$ 2,295,000**	**$ 17,500,000**
C0595 - Major Tools Constr	Major Tools	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 200,000	$ 1,200,000

Business Unit	Description	2017	2018	2019	2020	2021	2022	TOTAL
C0595 - Major Tools Constr		**$ 200,000**	**$ 200,000**	**$ 200,000**	**$ 200,000**	**$ 200,000**	**$ 200,000**	**$ 1,200,000**
GENERAL PLANT		**$ 6,798,000**	**$ 6,672,000**	**$ 7,580,000**	**$ 8,411,000**	**$ 6,752,862**	**$ 5,869,000**	**$ 42,082,862**
GROSS CAPITAL EXPENDITURES		**$ 68,551,018**	**$ 79,840,743**	**$ 85,411,443**	**$ 85,997,444**	**$ 81,664,304**	**$ 74,565,443**	**$ 476,030,395**
C0531C - CIAC - Roads		$ (534,215)	$ (1,086,215)	$ (906,215)	$ (966,215)	$ (906,215)	$ (666,215)	$ (5,065,290)
C0532C - CIAC - LRT		$ -	$ (1,500,000)	$ (3,000,000)	$ (3,000,000)	$ (3,000,000)	$ (1,700,000)	$ (12,200,000)
C0541C - CIAC - New Subdivisions (OTC)		$ (1,171,524)	$ (1,171,524)	$ (1,171,524)	$ (1,171,524)	$ (1,171,524)	$ (1,171,524)	$ (7,029,145)
C0542C - CIAC Ind/Comm Services		$ (3,045,963)	$ (3,045,963)	$ (3,045,963)	$ (3,045,963)	$ (3,045,963)	$ (3,045,963)	$ (18,275,777)
C0544C - CIAC Residential Service Upgrades		$ (354,269)	$ (354,269)	$ (354,269)	$ (354,269)	$ (354,269)	$ (354,269)	$ (2,125,613)
C0900C - CIAC -Green Energy-FIT/MicrFIT		$ -						$ -
CUSTOMER CONTRIBUTIONS		**$ (5,105,971)**	**$ (7,157,971)**	**$ (8,477,971)**	**$ (8,537,971)**	**$ (8,477,971)**	**$ (6,937,971)**	**$ (44,695,825)**
NET CAPITAL EXPENDITURES FOR DSP (EXCLUDING ALLOCAT		**$ 63,445,047**	**$ 72,682,772**	**$ 76,933,472**	**$ 77,459,473**	**$ 73,186,333**	**$ 67,627,472**	**$ 431,334,569**

ERZ-AMPCO-14

Reference(s): Attachment #50 Page 342 Table 67

a) Please provide the plan amounts compared to actuals for each category for the years 2015 and 2016.

Response:

a) Alectra Utilities provided the actual amounts compared to the budget amounts in Table 1 below by year for 2015 and 2016 for each of the renewal categories.

Table 1 – System Renewal for ERZ - Actual vs. Budget ($000s) for 2015 and 2016

Category	Actual 2015	Budget 2015	Actual 2016	Budget 2016
Subdivision Renewal Program	$13,626	$13,150	$11,389	$13,250
Overhead Distribution Renewal and Sustainment	$8,099	$5,200	$8,344	$6,090
Subtransmission Renewal	$1	$0	$2,170	$4,200
Transformer Replacement	$12,162	$5,590	$8,519	$7,125
Underground Distribution Renewal and Sustainment	$3,258	$3,500	$4,464	$3,750
Emergency Replacement Program	$325	$320	$310	$320
System Renewal	**$37,472**	**$27,760**	**$35,196**	**$34,735**

ERZ-AMPCO-15

Reference(s): Attachment #50 Page 362-364

a) Page 362: Please provide the number of cable failures for the years 2010 to 2013.

b) Page 363: Please provide the customer minutes due to cable failures for the years 2010 to 2013.

c) Page 364: The evidence indicates that average age of failed cables is approximately 40 years. Please provide this calculation.

d) Page 363: Please provide the ten years of underground cable failure history referred to.

Response:

a) Table 1 below provides the number of cable failures from 2010 to 2013.

Table 1 – ERZ Cable Failures by Year (2010-2013)

Year	Number of Cable Failures
2010	176
2011	193
2012	139
2013	133

b) Table 2 provides the customer minutes due to cable failures by year for the period 2010 to 2013 for the ERZ.

Table 2 – ERZ Customer Minutes due to Cable Failures (2010-2013)

Year	Customer Minutes due to Cable Failures
2010	2,141,769
2011	2,518,725
2012	2,727,177
2013	1,720,513

c) The process use to calculate the average age of failed cables at Alectra Utilities' predecessor, Enersource Hydro Mississauga, is as follows:

1. Collect the age data of the failed distribution and feeder cables from daily outage reports
2. Calculate the monthly average of all the cables failed in a given month
3. Calculate the annual average by taking the average of all the monthly averaged failed cable age

Values for the past 3 years provided below:

- Annual Average Failed Cable age in 2016 — 36.1 ≈ 37 years
- Annual Average Failed Cable age in 2015 — 36.2 ≈ 37 years
- Annual Average Failed Cable age in 2014 — 32.7 ≈ 33 years

d) The ten years of underground cable failure history is provided in ERZ-AMPCO-15_Attach 1_Cable Failure. In the attachment, the tracking history is for cable segments that have more multiple cable failures.

CABLE FAILURE HISTORY REPORT

ITEM #	FID #	Device 1	Device 2	Voltage	Feeder	Year Installed	Cable Size	Cable Length (m)	Event 1	Event 2
1	111893	S2517	L2179	4.16	66F4	1974	750	223	June-20-10	June-20-10
2	133428	TX7346	TX7337	13.8	38F1	1971	1/0	201	November-24-10	August-11-11
3	133113	L4864	L4119	13.8	38F5	1980	750	82	October-02-08	July-28-12
	1551112	L4864	L4119	13.8	38F5	1973	750	600	October-02-08	July-28-12
4	132989	TX7690	TX7691	13.8	39F1	1971	1/0	172	October-13-10	September-16-11
5	124956	TX9957	TX9958	13.8	13F5	1977	1/0	223	July-03-11	September-16-11
6	147070	C5726	TX9549	13.8	69F1	1985	1/0	631	May-12-12	May-23-13
	146548	C5726	TX9549	13.8	69F1	1974	1/0	123	May-12-12	May-23-13
7	146252	TX9509	B54516	13.8	69F1	1974	1/0	6	July-24-08	August-20-10
	146906	TX9509	B54516	13.8	69F1	1974	1/0	53	July-24-08	August-20-10
	146251	TX9509	B54516	13.8	69F1	1974	1/0	41	July-24-08	August-20-10
	146245	TX9509	B54516	13.8	69F1	1974	1/0	3	July-24-08	August-20-10
	146249	TX9509	B54516	13.8	69F1	1974	1/0	38	July-24-08	August-20-10
	146247	TX9509	B54516	13.8	69F1	1974	1/0	2	July-24-08	August-20-10
	146726	TX9509	B54516	13.8	69F1	1974	1/0	71	July-24-08	August-20-10
	146725	TX9509	B54516	13.8	69F1	1974	1/0	41	July-24-08	August-20-10
	146720	TX9509	B54516	13.8	69F1	1974	1/0	90	July-24-08	August-20-10
8	1169567	TX9383	C5733	13.8	61F2	1978	1/0	99	May-15-06	May-08-09
	143508	TX9383	C5733	13.8	61F2	1994	1/0	4	May-15-06	May-08-09
	143618	TX9383	C5733	13.8	61F2	1978	1/0	150	May-15-06	May-08-09
9	144390	TX8829	TX8830	13.8	71F3	1974	1/0	94	Thursday, October 2, 2008	December-08-09
10	143619	C5635	B5046	13.8	71F4	1976	1/0	409	August-30-13	September-19-13
11	139611	TX9929	TX9933	13.8	30F3	1975	1/0	186	Monday, June 26, 2006	October-04-09
12	175863	B7324	B7490	13.8	58F4	1989	1/0	468	June-19-12	January-03-13
13	171177	TX5916	TX5915	13.8	57F2	1980	1/0	87	June-23-11	October-19-12
14	169085	B7819	B7168	13.8	82F4	1981	1/0	439	December-16-10	December-16-10
15	137081	L34019	L34123	13.8	49F6	1990	750	638	January-08-09	June-15-13
16	113895	L24039	S2095	4.16	41F1	1971	350	465	January-19-10	September-15-12
17	173000	TX10779	TX8174	13.8	59F1	1994	1/0	337	June-22-12	April-03-13
18	1571111	L4609	L4608	13.8	39F2	1978	1000	667	July-23-10	June-01-14
19	146782	TX9515	TX9519	13.8	69F2	1974	1/0	320	August-28-12	May-31-14

CABLE FAILURE HISTORY REPORT

20	126707	B3737	B3676	13.8	20F4	1972	1/0	199	April-24-10	August-20-13
21	125849	TX8802	TX7601	13.8	49F5	1974	1/0	265	Sunday, December 31, 2006	Saturday, June 25, 2011
22	130638	TX2370	C4064	13.8	45F5	1968	1/0	195	May-13-13	May-24-13
	130636	TX2370	C4064	13.8	45F5	1968	1/0	4	May-13-13	May-24-13
23	125157	L1645	L1644	13.8	30F2	1979	750	1016	October-04-10	September-16-11
24	171264	TX12228	TX9362	13.8	54F2	1978	1/0	277	August-26-13	July-01-14
25	169623	L1685	L7552	13.8	57F4	1981	750	906	October-16-09	August-09-12
26	143663	L6885	L5958	13.8	61F2	1986	750	515	Monday, May 3, 2010	Wednesday, September 24, 2014
27	160560	TX9004	TX9255	13.8	50F1	1976	1/0	90	May-15-06	June-25-09
28	195848	TX11260	TX9457	13.8	21F7	1977	1/0	329	August-17-12	May-06-14
29	139260	TX9876	TX9879	13.8	30F3	1975	1/0	256	June-26-12	October-16-12
30	128919	TX7525	TX3018	13.8	19F5	5/1972 (spli	1/0	176	November-26-08	March-08-09
31	169619	L7784	L7079	13.8	88F3	1981	750	1336	August-07-07	July-12-09
32	1322343	L2024	L2254	4.16	26F1	1981	1000	211	April-23-11	June-05-13
33	1327006	TX2741	TX2740	13.8	45F5	1965	1/0	157	September-20-10	March-27-15
	131585	TX2741	TX2740	13.8	45F5	1965	1/0	8	September-20-10	March-27-15
34	193387	S7008	L7192	13.8	84F3	1973	750	637	June-21-05	August-26-14
35	1551119	S4032	L4826	13.8	47F6	1973	750	190	October-28-13	May-07-14
	133101	S4032	L4826	13.8	47F6	1983	750	74	October-28-13	May-07-14
36	125092	TX10335	TX10336	13.8	30F1	1978	1/0	226	October-05-12	May-31-15
37	143425	TX11068	B5270	13.8	71F3	1979	1/0	301	September-04-05	September-01-11
	143382	TX11068	B5270	13.8	71F3	1979	1/0	26	September-04-05	September-01-11
	143385	TX11068	B5270	13.8	71F3	1979	1/0	52	September-04-05	September-01-11
	143391	TX11068	B5270	13.8	71F3	1979	1/0	4	September-04-05	September-01-11
	143390	TX11068	B5270	13.8	71F3	1979	1/0	63	September-04-05	September-01-11
	143402	TX11068	B5270	13.8	71F3	1979	1/0	3	September-04-05	September-01-11
	143667	TX11068	B5270	13.8	71F3	1979	1/0	36	September-04-05	September-01-11
	144141	TX11068	B5270	13.8	71F3	1981	1/0	73	September-04-05	September-01-11
38	120420	TX1360	TX1359	13.8	13F3	1979	1/0	66	November-01-12	May-16-15
		B1427	TX10789	13.8	13F3	1979	1/0	66	May-07-11	July-02-14
	119931	TX1360	TX1359	13.8	13F3	1979	1/0	41	May-07-11	November-01-12
	120408	TX1360	TX1359	13.8	13F3	1979	1/0	9	May-07-11	November-01-12
39	125758	B34528	B3622	13.8	49F5	1972	1/0	228	June-28-07	August-21-09
		B3518	B3622	13.8	49F5	1972	1/0	228	May-25-15	June-18-15
	125904	B3518	B3622	13.8	49F5	1972	1/0	213	June-28-07	August-21-09
	1537222	B3518	B3622	13.8	49F5	2013	1000	224	June-28-07	August-21-09

CABLE FAILURE HISTORY REPORT

	125941	B3518	B3622	13.8	49F5	2013	1000	264	June-28-07	August-21-09
40	130407	TX2625	TX3024	13.8	45F5	1968	1/0	200	February-22-09	June-23-10
41	144138	B5271	TX5981	13.8	61F2	1981	1/0	215	June-13-15	
		B5271	TX21047	13.8	61F2	1981	1/0	215	July-15-13	July-21-14
42	171956	B7816	B7643	13.8	57F1	1985	1/0	244	July-13-12	November-05-12
43	130884	TX2621	TX2925	13.8	45F5	1968	1/0	375	October-27-07	February-22-09
	130391	TX2621	TX2925	13.8	45F5	1965	1/0	1	October-27-07	February-22-09
	130392	TX2621	TX2925	13.8	45F5	1965	1/0	6	October-27-07	February-22-09
44	139262	TX9933	TX9935	13.8	30F3	1975	1/0	109	June-26-06	June-09-10
45	143440	TX5954	TX5955	13.8	71F3	1975	1/0	183	April-10-14	July-24-14
46	171908	B100143	B7032	13.8	57F1	1980	1/0	243	June-12-09	September-01-10
	1562351	B100143	B7032	13.8	57F1	1980	1/0	18	June-12-09	September-01-10
	1567823	B100143	B7032	13.8	57F1	1980	1/0	354	June-12-09	September-01-10
47	173008	B7437	C7178	13.8	59F1	1979	1/0	267	December-01-10	October-08-14
48	1242387	L5727	L5378	13.8	69F1	1985	750	1234	March-26-09	October-02-14
49	125906	C3780	TX8813	13.8	49F4	1974	1/0	43	July-17-06	February-05-11
	125943	C3780	TX8813	13.8	49F4	1974	1/0	4		
	125907	C3780	TX8813	13.8	49F4	1974	1/0	33		
	127333	C3780	TX8813	13.8	49F4	1974	1/0	215		
50	139751	L6405	L6177	13.8	30F1	1984	750	396	May-23-14	July-24-15
51	139541	TX23158	TX9876	13.8	30F3	2001	1/0	16	September-26-06	August-05-12
	139529	TX23158	TX9876	13.8	30F3	2001	1/0	97	September-26-06	August-05-12
	139558	TX23158	TX9876	13.8	30F3	2001	1/0	2	September-26-06	August-05-12
	139511	TX23158	TX9876	13.8	30F3	2001	1/0	169	September-26-06	August-05-12
	139178	TX23158	TX9876	13.8	30F3	1975	1/0	156	September-26-06	August-05-12
52	140881	TX10375	TX12371	13.8	30F1	1978	1/0	219	October-17-08	June-25-15
53	197851	TX11131	TX11132	13.8	13F2	1979	1/1	511	Thursday, December 21st, 2006	Sunday, August 30th, 2015
55	130568	TX3478	S4393	13.8	45F5	1966	1/0	126	July-20-05	July-30-09
		TX3299	S4393	13.8	45F5		1/0			
		TX3482	S4393	13.8	45F5		1/0		May-17-15	July-28-15
56	133695	B4245	TX7478	13.8	39F2	1998	1/0	550	October-15-09	
			B41002 (L4865)	13.8	39F2	1998	1/0	550		March-09-11
			TX7428	13.8	39F2	1998	1/0	550		
57	133267	TX3703	TX3704	13.8	71F3	1967	1/0	137	February-19-09	May-22-12
	1107816					2004		208		

CABLE FAILURE HISTORY REPORT

58	126009	TX11543	TX15596	13.8	30F3	1983	1/0	63	July-04-12	September-30-12
	125993					1983		19		
	125995					1983		44		
59	144020	TX8831	TX9491	13.8	71F3	1978	1/0	358	August-11-12	June-10-13
60	195520	TX5519	TX5566	13.8	21F7	1977	1/0	169	May-12-13	November-13-15
61	171622	TX8253	TX8925	13.8	59F1	1975	1/0	250	Monday, August 1st, 2005	Wednesday, November 13th, 2012
62	173009	B7438	B7358	13.8	59F1	1996	1/0	206	Wednesday, April 23rd, 2014	Saturday, August 27th,2015
63	163647	TX9245	TX9242	13.8	50F1	1976	1/0	201	Sunday, June 23rd, 2011	Saturday, July 5th, 2014
64	192902	TX9696	TX9697	13.8	82F5	1973	1/0	138	Sunday, July 14th, 2013	Thursday, February 19th, 2015
65	118079	TX8560	TX8561	13.8	24F3	1979	1/0	164	Sunday, August 10th, 2014	Thursday, June 9th, 2016
66	133075	L4734	L4736	13.8	38F3/71F1	1983	750	426	Monday, August 1st, 2011	Tuesday, May 29th, 2012
67	147070	C5726	TX9550	13.8	69F1	1983	1/0	631	Thursday, May 23rd, 2013	Saturday, July 23rd, 2013
	146233					1983		101		
68	173399	L7147	L7496	13.8	57F1	1980	750	323	Saturday, June 8th, 2013	Monday, June 13th, 2016
69	128732	TX4209	C44145	13.8	19F4	1968	1/0	167	Sunday, July 15th, 2012	Moday, September 9th, 2013
70	172922	TX10001	TX10002	13.8	57F2	1976	1/0	160	Wednesday, October 14th, 2015	Monday, February 1st, 2016
71	117936	TX8561	TX8562	13.8	24F3	1977	1/0	222	Saturday, May 23rd, 2015	Friday, March 11th, 2016
72	101640	TX4818	TX4819	13.8	13F1	1996	1/0	165	Monday, April 22nd, 2013	Wednesday, July 17th, 2013
73	122759	C3419	B34525	13.8	14F5	1972	#2	184	Monday, August 23rd, 2010	Friday, October 24th, 2014
74	173603	L7100	L7395	13.8	57F2	1979	750 kcmil	582	Friday, January 6th, 2006	Saturday, February 28th, 2015
75	117881	TX8564	TX8565	13.8	24F3	1977	1/0	37	Thursday, May 20th, 2010	Thursday, October 2nd, 2014
76	171591	B7433	B7065	13.8	57F2	1978	1/0	687	Monday, September 23rd, 2013	Monday, July 11th, 2016
77	1518729	TX8559	C3755	13.8	24F3	2013	1/0	82	Saturday, June 16th, 2007	Tuesday, July 14th, 2009
	1501078					1977	1/0	123		
	1501051					2012	1/0	80		
	1501042					2012	1/0	5		
78	192163	TX9358	TX6	13.8	84F3	1976	1/0	164	Friday, September 20th, 2013	Friday, May 8th, 2015
79	192251	TX8440	TX8441	13.8	84F3	1976	1/0	57	November-15-14	August-30-16
	192250							147		
	192899							58		
80	1501081	TX8560	C3755	13.8	24F3	1977	1/0	153	May-30-10	April-07-12
	1501048					2012	1/0	84		
	1501042					2012	1/0	5		
90	140992	L6263	L6259	13.8	30F1	1978	750 kcmil	471	November-24-07	August-19-11
91	127665	TX4210	TX4211	13.8	19F4		1/0	45	June-29-14	July-18-14

CABLE FAILURE HISTORY REPORT

92	146239	TX9501	TX9502	13.8	69F1	1974	1/0	143	March-25-12	August-17-07
	146726					1980		71		
	146724					1974		98		
93	118084	TX5923	TX5922	13.8	24F4	1979	1/0	138	October-12-11	May-28-15
94	192247	TX9696	TX9694	13.8	82F5	1978	1/0	161	July-03-14	June-29-16
95	172469	TX10776	C7670	13.8	59F1	1996	1/0	9	September-11-08	July-08-13
	173001							240		
96	131434	B4007	S4392	13.8	45F5	1968	1/0	369	September-14-10	August-25-16
97	127098	TX8084	TX8080	13.8	20F3	1973	1/0	86	January-20-13	August-06-16
98	163466	TX9243	C6212	13.8	50F1	1976	1/0	232	September-03-10	September-19-11
99	127168	TX7658	TX7659	13.8	20F3	1972	1/0	307	Monday, May 14, 2012	Saturday, April 04, 2015
100	143342	TX9403	TX9413	13.8	61F2	1978	1/0	165	Monday, June 27th, 2011	Saturday,August 18th, 2012
101	1567823	B146303	B100143	13.8	57F1	1996	1/0	350	Tuesday, December 6th, 2016	Saturday, April 22nd, 2017
	1624936							126		
	1617085							74		
102	1691538	L5731	L5356	13.8	19F4	1993	750 kcmil	671	Friday, November 16th, 2007	Tuesday, May 10th, 2010
103	197508	TX11582	TX11463	13.8	13F2	1979	1/0	52	Tuesday, October 29th, 2013	Saturday, September 17th, 2016
	197885							116		
	196532							105		
	196520							23		
	196519							77		
	197884							79		
	197882							38		
	197877							66		
	196554							29		
	197893							204		
104	117872	C3511	TX3830	13.8	24F5	1967	1/0	50	Friday, August 1st, 2008	Friday September 11th, 2009
105	192406	TX4054	TX4055	13.8	82F5	1973	1/0	7	Sunday, Novmber 15th, 2015	Monday, August 8th, 2016
	169521							71		
106	128729	L4042	L4485	13.8	19F1	1965	4/0	184		Friday, July 21st, 2017
		S4042	L4485						Monday, November 23rd, 2009	
107	140564	TX10378	B3683	13.8	30F1	1982	1/0	6	Monday, July 18,2011	Tuesday, July 17th, 2012
	1696153							64		
	125079							210		
	125419							101		

CABLE FAILURE HISTORY REPORT

108	128731	TX4211	C4476	13.8	19F4	1968	1/0	148	Thursday, November 3rd, 2005	Monday, March 27th, 2017

CABLE FAILURE HISTORY REPORT

ITEM #	FID #	Device 1	Device 2	Voltage	Feeder	Year Installed	Cable Size	Cable Length (m)	Event 3	Event 4
1	111893	S2517	L2179	4.16	66F4	1974	750	223	June-20-10	November-21-13
2	133428	TX7346	TX7337	13.8	38F1	1971	1/0	201	August-28-11	
3	133113	L4864	L4119	13.8	38F5	1980	750	82	July-23-13	September-11-13
	1551112	L4864	L4119	13.8	38F5	1973	750	600	July-23-13	September-11-13
4	132989	TX7690	TX7691	13.8	39F1	1971	1/0	172	October-17-11	
5	124956	TX9957	TX9958	13.8	13F5	1977	1/0	223	June-07-12	
6	147070	C5726	TX9549	13.8	69F1	1985	1/0	631	July-23-13	
	146548	C5726	TX9549	13.8	69F1	1974	1/0	123	July-23-13	
7	146252	TX9509	B54516	13.8	69F1	1974	1/0	6	August-08-13	June-27-14
	146906	TX9509	B54516	13.8	69F1	1974	1/0	53	August-08-13	June-27-14
	146251	TX9509	B54516	13.8	69F1	1974	1/0	41	August-08-13	June-27-14
	146245	TX9509	B54516	13.8	69F1	1974	1/0	3	August-08-13	June-27-14
	146249	TX9509	B54516	13.8	69F1	1974	1/0	38	August-08-13	June-27-14
	146247	TX9509	B54516	13.8	69F1	1974	1/0	2	August-08-13	June-27-14
	146726	TX9509	B54516	13.8	69F1	1974	1/0	71	August-08-13	June-27-14
	146725	TX9509	B54516	13.8	69F1	1974	1/0	41	August-08-13	June-27-14
	146720	TX9509	B54516	13.8	69F1	1974	1/0	90	August-08-13	June-27-14
8	1169567	TX9383	C5733	13.8	61F2	1978	1/0	99	March-06-10	May-10-12
	143508	TX9383	C5733	13.8	61F2	1994	1/0	4	March-06-10	May-10-12
	143618	TX9383	C5733	13.8	61F2	1978	1/0	150	March-06-10	May-10-12
9	144390	TX8829	TX8830	13.8	71F3	1974	1/0	94	May-27-10	July-22-11
10	143619	C5635	B5046	13.8	71F4	1976	1/0	409	October-17-13	
11	139611	TX9929	TX9933	13.8	30F3	1975	1/0	186	Wednesday, June 9, 2010	May-21-14
12	175863	B7324	B7490	13.8	58F4	1989	1/0	468	June-28-13	August-28-14
13	171177	TX5916	TX5915	13.8	57F2	1980	1/0	87	June-10-13	
14	169085	B7819	B7168	13.8	82F4	1981	1/0	439	December-16-10	
15	137081	L34019	L34123	13.8	49F6	1990	750	638	July-18-13	
16	113895	L24039	S2095	4.16	41F1	1971	350	465	January-04-15	
17	173000	TX10779	TX8174	13.8	59F1	1994	1/0	337	August-05-14	
18	1571111	L4609	L4608	13.8	39F2	1978	1000	667	June-06-14	December-03-14
19	146782	TX9515	TX9519	13.8	69F2	1974	1/0	320	July-24-14	

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20	126707	B3737	B3676	13.8	20F4	1972	1/0	199	March-03-14	
21	125849	TX8802	TX7601	13.8	49F5	1974	1/0	265	Monday, March 31, 2014	Monday, September 1, 2014
22	130638	TX2370	C4064	13.8	45F5	1968	1/0	195	May-13-14	
	130636	TX2370	C4064	13.8	45F5	1968	1/0	4	May-13-14	
23	125157	L1645	L1644	13.8	30F2	1979	750	1016	August-08-14	August-30-14
24	171264	TX12228	TX9362	13.8	54F2	1978	1/0	277	September-30-14	
25	169623	L1685	L7552	13.8	57F4	1981	750	906	May-07-14	Tuesday, March 24, 2015
26	143663	L6885	L5958	13.8	61F2	1986	750	515	Thursday, December 18, 2014	
27	160560	TX9004	TX9255	13.8	50F1	1976	1/0	90	July-03-09	June-15-14
28	195848	TX11260	TX9457	13.8	21F7	1977	1/0	329	July-16-14	
29	139260	TX9876	TX9879	13.8	30F3	1975	1/0	256	August-11-14	
30	128919	TX7525	TX3018	13.8	19F5	5/1972 (spli	1/0	176	February-23-13	January-18-15
31	169619	L7784	L7079	13.8	88F3	1981	750	1336	February-13-15	April-23-15
32	1322343	L2024	L2254	4.16	26F1	1981	1000	211	April-30-15	June-25-15
33	1327006	TX2741	TX2740	13.8	45F5	1965	1/0	157	May-26-15	
	131585	TX2741	TX2740	13.8	45F5	1965	1/0	8	May-26-15	
34	193387	S7008	L7192	13.8	84F3	1973	750	637	May-31-15	June-11-15
35	1551119	S4032	L4826	13.8	47F6	1973	750	190	June-11-15	
	133101	S4032	L4826	13.8	47F6	1983	750	74	June-11-15	
36	125092	TX10335	TX10336	13.8	30F1	1978	1/0	226	June-30-15	
37	143425	TX11068	B5270	13.8	71F3	1979	1/0	301	August-29-12	June-30-15
	143382	TX11068	B5270	13.8	71F3	1979	1/0	26	August-29-12	June-30-15
	143385	TX11068	B5270	13.8	71F3	1979	1/0	52	August-29-12	June-30-15
	143391	TX11068	B5270	13.8	71F3	1979	1/0	4	August-29-12	June-30-15
	143390	TX11068	B5270	13.8	71F3	1979	1/0	63	August-29-12	June-30-15
	143402	TX11068	B5270	13.8	71F3	1979	1/0	3	August-29-12	June-30-15
	143667	TX11068	B5270	13.8	71F3	1979	1/0	36	August-29-12	June-30-15
	144141	TX11068	B5270	13.8	71F3	1981	1/0	73	August-29-12	June-30-15
38	120420	TX1360	TX1359	13.8	13F3	1979	1/0	66		
		B1427	TX10789	13.8	13F3	1979	1/0	66		
	119931	TX1360	TX1359	13.8	13F3	1979	1/0	41	July-02-14	May-16-15
	120408	TX1360	TX1359	13.8	13F3	1979	1/0	9	July-02-14	May-16-15
39	125758	B34528	B3622	13.8	49F5	1972	1/0	228	November-12-10	
		B3518	B3622	13.8	49F5	1972	1/0	228		
	125904	B3518	B3622	13.8	49F5	1972	1/0	213	November-12-10	May-25-15
	1537222	B3518	B3622	13.8	49F5	2013	1000	224	November-12-10	May-25-15

CABLE FAILURE HISTORY REPORT

	125941	B3518	B3622	13.8	49F5	2013	1000	264	November-12-10	May-25-15
40	130407	TX2625	TX3024	13.8	45F5	1968	1/0	200	May-02-15	
41	144138	B5271	TX5981	13.8	61F2	1981	1/0	215		
		B5271	TX21047	13.8	61F2	1981	1/0	215		
42	171956	B7816	B7643	13.8	57F1	1985	1/0	244	June-17-15	
43	130884	TX2621	TX2925	13.8	45F5	1968	1/0	375	March-10-12	July-03-15
	130391	TX2621	TX2925	13.8	45F5	1965	1/0	1	March-10-12	July-03-15
	130392	TX2621	TX2925	13.8	45F5	1965	1/0	6	March-10-12	July-03-15
44	139262	TX9933	TX9935	13.8	30F3	1975	1/0	109	July-25-15	
45	143440	TX5954	TX5955	13.8	71F3	1975	1/0	183	July-25-15	
46	171908	B100143	B7032	13.8	57F1	1980	1/0	243	July-30-15	September-02-15
	1562351	B100143	B7032	13.8	57F1	1980	1/0	18	July-30-15	September-02-15
	1567823	B100143	B7032	13.8	57F1	1980	1/0	354	July-30-15	September-02-15
47	173008	B7437	C7178	13.8	59F1	1979	1/0	267	August-05-15	
48	1242387	L5727	L5378	13.8	69F1	1985	750	1234	September-07-15	August-23-16
49	125906	C3780	TX8813	13.8	49F4	1974	1/0	43	September-16-15	September-19-16
	125943	C3780	TX8813	13.8	49F4	1974	1/0	4		
	125907	C3780	TX8813	13.8	49F4	1974	1/0	33		
	127333	C3780	TX8813	13.8	49F4	1974	1/0	215		
50	139751	L6405	L6177	13.8	30F1	1984	750	396	September-26-15	
51	139541	TX23158	TX9876	13.8	30F3	2001	1/0	16	September-26-15	Monday, August 15th, 2016
	139529	TX23158	TX9876	13.8	30F3	2001	1/0	97	September-26-15	Monday, August 15th, 2016
	139558	TX23158	TX9876	13.8	30F3	2001	1/0	2	September-26-15	Monday, August 15th, 2016
	139511	TX23158	TX9876	13.8	30F3	2001	1/0	169	September-26-15	Monday, August 15th, 2016
	139178	TX23158	TX9876	13.8	30F3	1975	1/0	156	September-26-15	Monday, August 15th, 2016
52	140881	TX10375	TX12371	13.8	30F1	1978	1/0	219	October-23-15	Wednesday, June 29th,2017
53	197851	TX11131	TX11132	13.8	13F2	1979	1/1	511	Sunday, March, 20th, 2016	
55	130568	TX3478	S4393	13.8	45F5	1966	1/0	126	September-07-16	Thursday, August 31st. 2017
		TX3299	S4393	13.8	45F5		1/0			
		TX3482	S4393	13.8	45F5		1/0			
56	133695	B4245	TX7478	13.8	39F2	1998	1/0	550		
			B41002 (L4865)	13.8	39F2	1998	1/0	550		
			TX7428	13.8	39F2	1998	1/0	550	January-15-16	
57	133267	TX3703	TX3704	13.8	71F3	1967	1/0	137	June-22-13	
	1107816					2004		208		

CABLE FAILURE HISTORY REPORT

58	126009	TX11543	TX15596	13.8	30F3	1983	1/0	63	August-29-15	
	125993					1983		19		
	125995					1983		44		
59	144020	TX8831	TX9491	13.8	71F3	1978	1/0	358	May-29-14	
60	195520	TX5519	TX5566	13.8	21F7	1977	1/0	169	April-21-16	
61	171622	TX8253	TX8925	13.8	59F1	1975	1/0	250	Wedneday, May 18th, 2016	Sunday, July 17th,2016
62	173009	B7438	B7358	13.8	59F1	1996	1/0	206	Friday, May 20th, 2016	
63	163647	TX9245	TX9242	13.8	50F1	1976	1/0	201	Monday, June 6th, 2016	Thursday. July 28th, 2016
64	192902	TX9696	TX9697	13.8	82F5	1973	1/0	138	Tuesday, June 7th, 2016	
65	118079	TX8560	TX8561	13.8	24F3	1979	1/0	164	Wednesday, June 15th, 2016	
66	133075	L4734	L4736	13.8	38F3/71F1	1983	750	426	Friday, June 24th, 2016	
67	147070	C5726	TX9550	13.8	69F1	1983	1/0	631	Friday, June 24th, 2016	
	146233					1983		101		
68	173399	L7147	L7496	13.8	57F1	1980	750	323	Monday, June 27th, 2016	Saturday,May 20th, 2017
69	128732	TX4209	C44145	13.8	19F4	1968	1/0	167	Saturday, July 16th, 2016	Friday, August 5th, 2016
70	172922	TX10001	TX10002	13.8	57F2	1976	1/0	160	Sunday, July 17th, 2016	
71	117936	TX8561	TX8562	13.8	24F3	1977	1/0	222	Monday, July 25th, 2016	Tuesday, June 13th, 2017
72	101640	TX4818	TX4819	13.8	13F1	1996	1/0	165	Monday, August 1st, 2016	
73	122759	C3419	B34525	13.8	14F5	1972	#2	184	Tuesday, August 2nd, 2016	
74	173603	L7100	L7395	13.8	57F2	1979	750 kcmil	582	Sunday, July 26th, 2015	Wednesday, August 3rd,2016
75	117881	TX8564	TX8565	13.8	24F3	1977	1/0	37	Thursday, August 4th, 2016	September-20-16
76	171591	B7433	B7065	13.8	57F2	1978	1/0	687	Tuesday, August 9th, 2016	Tuesday, August 16th, 2016
77	1518729	TX8559	C3755	13.8	24F3	2013	1/0	82	Wednesday, July 15th, 2009	Wednesday, June 2nd, 2010
	1501078					1977	1/0	123		
	1501051					2012	1/0	80		
	1501042					2012	1/0	5		
78	192163	TX9358	TX6	13.8	84F3	1976	1/0	164	Tuesday, August 16th, 2016	
79	192251	TX8440	TX8441	13.8	84F3	1976	1/0	57	September-02-16	
	192250							147		
	192899							58		
80	1501081	TX8560	C3755	13.8	24F3	1977	1/0	153	December-04-12	May-15-14
	1501048					2012	1/0	84		
	1501042					2012	1/0	5		
90	140992	L6263	L6259	13.8	30F1	1978	750 kcmil	471	August-01-12	September-02-16
91	127665	TX4210	TX4211	13.8	19F4		1/0	45	September-28-16	

CABLE FAILURE HISTORY REPORT

92	146239	TX9501	TX9502	13.8	69F1	1974	1/0	143	August-08-13	October-10-16
	146726					1980		71		
	146724					1974		98		
93	118084	TX5923	TX5922	13.8	24F4	1979	1/0	138	October-14-16	
94	192247	TX9696	TX9694	13.8	82F5	1978	1/0	161	November-25-16	
95	172469	TX10776	C7670	13.8	59F1	1996	1/0	9	December-03-16	
	173001							240		
96	131434	B4007	S4392	13.8	45F5	1968	1/0	369	September-12-16	December-26-16
97	127098	TX8084	TX8080	13.8	20F3	1973	1/0	86	January-01-17	
98	163466	TX9243	C6212	13.8	50F1	1976	1/0	232	March-07-17	
99	127168	TX7658	TX7659	13.8	20F3	1972	1/0	307	Tuesday, May 02,2017	
100	143342	TX9403	TX9413	13.8	61F2	1978	1/0	165	Tuesday, May 09,2017	
101	1567823	B146303	B100143	13.8	57F1	1996	1/0	350	Tuesday, May 16th, 2017	
	1624936							126		
	1617085							74		
102	1691538	L5731	L5356	13.8	19F4	1993	750 kcmil	671	Monday, May 22nd, 2017	
103	197508	TX11582	TX11463	13.8	13F2	1979	1/0	52	Monday May 22nd, 2017	
	197885							116		
	196532							105		
	196520							23		
	196519							77		
	197884							79		
	197882							38		
	197877							66		
	196554							29		
	197893							204		
104	117872	C3511	TX3830	13.8	24F5	1967	1/0	50	Sunday June 25th, 2017	
105	192406	TX4054	TX4055	13.8	82F5	1973	1/0	7	Wednesday, July 19th,2017	
	169521							71		
106	128729	L4042	L4485	13.8	19F1	1965	4/0	184	Monday, August 7th, 2017	
		S4042	L4485							
107	140564	TX10378	B3683	13.8	30F1	1982	1/0	6	Wednesday, August 9th, 2017	
	1696153							64		
	125079							210		
	125419							101		

CABLE FAILURE HISTORY REPORT

108	128731	TX4211	C4476	13.8	19F4	1968	1/0	148	Saturday, August 12th 2017	Tuesday, August 29th, 2017

CABLE FAILURE HISTORY REPORT

ITEM #	FID #	Device 1	Device 2	Voltage	Feeder	Year Installed	Cable Size	Cable Length (m)	Event 5	Event 6
1	111893	S2517	L2179	4.16	66F4	1974	750	223		
2	133428	TX7346	TX7337	13.8	38F1	1971	1/0	201		
3	133113	L4864	L4119	13.8	38F5	1980	750	82	April-17-15	Thursday, May 26th, 2016
	1551112	L4864	L4119	13.8	38F5	1973	750	600	April-17-15	Thursday, May 26th, 2016
4	132989	TX7690	TX7691	13.8	39F1	1971	1/0	172		
5	124956	TX9957	TX9958	13.8	13F5	1977	1/0	223		
6	147070	C5726	TX9549	13.8	69F1	1985	1/0	631		
	146548	C5726	TX9549	13.8	69F1	1974	1/0	123		
7	146252	TX9509	B54516	13.8	69F1	1974	1/0	6	Sunday, June 5, 2016	
	146906	TX9509	B54516	13.8	69F1	1974	1/0	53	Sunday, June 5, 2016	
	146251	TX9509	B54516	13.8	69F1	1974	1/0	41	Sunday, June 5, 2016	
	146245	TX9509	B54516	13.8	69F1	1974	1/0	3	Sunday, June 5, 2016	
	146249	TX9509	B54516	13.8	69F1	1974	1/0	38	Sunday, June 5, 2016	
	146247	TX9509	B54516	13.8	69F1	1974	1/0	2	Sunday, June 5, 2016	
	146726	TX9509	B54516	13.8	69F1	1974	1/0	71	Sunday, June 5, 2016	
	146725	TX9509	B54516	13.8	69F1	1974	1/0	41	Sunday, June 5, 2016	
	146720	TX9509	B54516	13.8	69F1	1974	1/0	90	Sunday, June 5, 2016	
8	1169567	TX9383	C5733	13.8	61F2	1978	1/0	99	June-13-12	July-08-15
	143508	TX9383	C5733	13.8	61F2	1994	1/0	4	June-13-12	July-08-15
	143618	TX9383	C5733	13.8	61F2	1978	1/0	150	June-13-12	July-08-15
9	144390	TX8829	TX8830	13.8	71F3	1974	1/0	94	May-30-14	
10	143619	C5635	B5046	13.8	71F4	1976	1/0	409		
11	139611	TX9929	TX9933	13.8	30F3	1975	1/0	186		
12	175863	B7324	B7490	13.8	58F4	1989	1/0	468		
13	171177	TX5916	TX5915	13.8	57F2	1980	1/0	87		
14	169085	B7819	B7168	13.8	82F4	1981	1/0	439		
15	137081	L34019	L34123	13.8	49F6	1990	750	638		
16	113895	L24039	S2095	4.16	41F1	1971	350	465		
17	173000	TX10779	TX8174	13.8	59F1	1994	1/0	337		
18	1571111	L4609	L4608	13.8	39F2	1978	1000	667		
19	146782	TX9515	TX9519	13.8	69F2	1974	1/0	320		

CABLE FAILURE HISTORY REPORT

20	126707	B3737	B3676	13.8	20F4	1972	1/0	199		
21	125849	TX8802	TX7601	13.8	49F5	1974	1/0	265	October-28-14	
22	130638	TX2370	C4064	13.8	45F5	1968	1/0	195		
	130636	TX2370	C4064	13.8	45F5	1968	1/0	4		
23	125157	L1645	L1644	13.8	30F2	1979	750	1016	Friday, May 27, 2016	December-08-16
24	171264	TX12228	TX9362	13.8	54F2	1978	1/0	277		
25	169623	L1685	L7552	13.8	57F4	1981	750	906		
26	143663	L6885	L5958	13.8	61F2	1986	750	515		
27	160560	TX9004	TX9255	13.8	50F1	1976	1/0	90		
28	195848	TX11260	TX9457	13.8	21F7	1977	1/0	329		
29	139260	TX9876	TX9879	13.8	30F3	1975	1/0	256		
30	128919	TX7525	TX3018	13.8	19F5	5/1972 (spli	1/0	176		
31	169619	L7784	L7079	13.8	88F3	1981	750	1336		
32	1322343	L2024	L2254	4.16	26F1	1981	1000	211		
33	1327006	TX2741	TX2740	13.8	45F5	1965	1/0	157		
	131585	TX2741	TX2740	13.8	45F5	1965	1/0	8		
34	193387	S7008	L7192	13.8	84F3	1973	750	637	August-11-15	October-16-16
35	1551119	S4032	L4826	13.8	47F6	1973	750	190		
	133101	S4032	L4826	13.8	47F6	1983	750	74		
36	125092	TX10335	TX10336	13.8	30F1	1978	1/0	226		
37	143425	TX11068	B5270	13.8	71F3	1979	1/0	301	September-15-15	
	143382	TX11068	B5270	13.8	71F3	1979	1/0	26	September-15-15	
	143385	TX11068	B5270	13.8	71F3	1979	1/0	52	September-15-15	
	143391	TX11068	B5270	13.8	71F3	1979	1/0	4	September-15-15	
	143390	TX11068	B5270	13.8	71F3	1979	1/0	63	September-15-15	
	143402	TX11068	B5270	13.8	71F3	1979	1/0	3	September-15-15	
	143667	TX11068	B5270	13.8	71F3	1979	1/0	36	September-15-15	
	144141	TX11068	B5270	13.8	71F3	1981	1/0	73	September-15-15	
38	120420	TX1360	TX1359	13.8	13F3	1979	1/0	66		
		B1427	TX10789	13.8	13F3	1979	1/0	66		
	119931	TX1360	TX1359	13.8	13F3	1979	1/0	41		
	120408	TX1360	TX1359	13.8	13F3	1979	1/0	9		
39	125758	B34528	B3622	13.8	49F5	1972	1/0	228		
		B3518	B3622	13.8	49F5	1972	1/0	228		
	125904	B3518	B3622	13.8	49F5	1972	1/0	213	June-18-15	
	1537222	B3518	B3622	13.8	49F5	2013	1000	224	June-18-15	

CABLE FAILURE HISTORY REPORT

	125941	B3518	B3622	13.8	49F5	2013	1000	264	June-18-15	
40	130407	TX2625	TX3024	13.8	45F5	1968	1/0	200		
41	144138	B5271	TX5981	13.8	61F2	1981	1/0	215		
		B5271	TX21047	13.8	61F2	1981	1/0	215		
42	171956	B7816	B7643	13.8	57F1	1985	1/0	244		
43	130884	TX2621	TX2925	13.8	45F5	1968	1/0	375	August-20-15	
	130391	TX2621	TX2925	13.8	45F5	1965	1/0	1	August-20-15	
	130392	TX2621	TX2925	13.8	45F5	1965	1/0	6	August-20-15	
44	139262	TX9933	TX9935	13.8	30F3	1975	1/0	109		
45	143440	TX5954	TX5955	13.8	71F3	1975	1/0	183		
46	171908	B100143	B7032	13.8	57F1	1980	1/0	243		
	1562351	B100143	B7032	13.8	57F1	1980	1/0	18		
	1567823	B100143	B7032	13.8	57F1	1980	1/0	354		
47	173008	B7437	C7178	13.8	59F1	1979	1/0	267		
48	1242387	L5727	L5378	13.8	69F1	1985	750	1234		
49	125906	C3780	TX8813	13.8	49F4	1974	1/0	43	Thursday, September 21, 2017	
	125943	C3780	TX8813	13.8	49F4	1974	1/0	4		
	125907	C3780	TX8813	13.8	49F4	1974	1/0	33		
	127333	C3780	TX8813	13.8	49F4	1974	1/0	215		
50	139751	L6405	L6177	13.8	30F1	1984	750	396		
51	139541	TX23158	TX9876	13.8	30F3	2001	1/0	16		
	139529	TX23158	TX9876	13.8	30F3	2001	1/0	97		
	139558	TX23158	TX9876	13.8	30F3	2001	1/0	2		
	139511	TX23158	TX9876	13.8	30F3	2001	1/0	169		
	139178	TX23158	TX9876	13.8	30F3	1975	1/0	156		
52	140881	TX10375	TX12371	13.8	30F1	1978	1/0	219		
53	197851	TX11131	TX11132	13.8	13F2	1979	1/1	511		
55	130568	TX3478	S4393	13.8	45F5	1966	1/0	126		
		TX3299	S4393	13.8	45F5		1/0			
		TX3482	S4393	13.8	45F5		1/0			
56	133695	B4245	TX7478	13.8	39F2	1998	1/0	550		
			B41002 (L4865)	13.8	39F2	1998	1/0	550		
			TX7428	13.8	39F2	1998	1/0	550		
57	133267	TX3703	TX3704	13.8	71F3	1967	1/0	137		
	1107816					2004		208		

CABLE FAILURE HISTORY REPORT

58	126009	TX11543	TX15596	13.8	30F3	1983	1/0	63		
	125993					1983		19		
	125995					1983		44		
59	144020	TX8831	TX9491	13.8	71F3	1978	1/0	358		
60	195520	TX5519	TX5566	13.8	21F7	1977	1/0	169		
61	171622	TX8253	TX8925	13.8	59F1	1975	1/0	250		
62	173009	B7438	B7358	13.8	59F1	1996	1/0	206		
63	163647	TX9245	TX9242	13.8	50F1	1976	1/0	201		
64	192902	TX9696	TX9697	13.8	82F5	1973	1/0	138		
65	118079	TX8560	TX8561	13.8	24F3	1979	1/0	164		
66	133075	L4734	L4736	13.8	38F3/71F1	1983	750	426		
67	147070	C5726	TX9550	13.8	69F1	1983	1/0	631		
	146233					1983		101		
68	173399	L7147	L7496	13.8	57F1	1980	750	323		
69	128732	TX4209	C44145	13.8	19F4	1968	1/0	167	Saturday, May 27th,2017	Tuesday, July 4th, 2017
70	172922	TX10001	TX10002	13.8	57F2	1976	1/0	160		
71	117936	TX8561	TX8562	13.8	24F3	1977	1/0	222	Sunday, July 23rd, 2017	
72	101640	TX4818	TX4819	13.8	13F1	1996	1/0	165		
73	122759	C3419	B34525	13.8	14F5	1972	#2	184		
74	173603	L7100	L7395	13.8	57F2	1979	750 kcmil	582		
75	117881	TX8564	TX8565	13.8	24F3	1977	1/0	37		
76	171591	B7433	B7065	13.8	57F2	1978	1/0	687	Saturday, August 12th, 2017	
77	1518729	TX8559	C3755	13.8	24F3	2013	1/0	82	Friday, August 12th, 2016	Tuesday, July 4th, 2017
	1501078					1977	1/0	123		
	1501051					2012	1/0	80		
	1501042					2012	1/0	5		
78	192163	TX9358	TX6	13.8	84F3	1976	1/0	164		
79	192251	TX8440	TX8441	13.8	84F3	1976	1/0	57		
	192250							147		
	192899							58		
80	1501081	TX8560	C3755	13.8	24F3	1977	1/0	153	September-15-16	
	1501048					2012	1/0	84		
	1501042					2012	1/0	5		
90	140992	L6263	L6259	13.8	30F1	1978	750 kcmil	471	September-22-16	
91	127665	TX4210	TX4211	13.8	19F4		1/0	45		

CABLE FAILURE HISTORY REPORT

92	146239	TX9501	TX9502	13.8	69F1	1974	1/0	143		
	146726					1980		71		
	146724					1974		98		
93	118084	TX5923	TX5922	13.8	24F4	1979	1/0	138		
94	192247	TX9696	TX9694	13.8	82F5	1978	1/0	161		
95	172469	TX10776	C7670	13.8	59F1	1996	1/0	9		
	173001							240		
96	131434	B4007	S4392	13.8	45F5	1968	1/0	369	January-22-17	
97	127098	TX8084	TX8080	13.8	20F3	1973	1/0	86		
98	163466	TX9243	C6212	13.8	50F1	1976	1/0	232		
99	127168	TX7658	TX7659	13.8	20F3	1972	1/0	307		
100	143342	TX9403	TX9413	13.8	61F2	1978	1/0	165		
101	1567823	B146303	B100143	13.8	57F1	1996	1/0	350		
	1624936							126		
	1617085							74		
102	1691538	L5731	L5356	13.8	19F4	1993	750 kcmil	671		
103	197508	TX11582	TX11463	13.8	13F2	1979	1/0	52		
	197885							116		
	196532							105		
	196520							23		
	196519							77		
	197884							79		
	197882							38		
	197877							66		
	196554							29		
	197893							204		
104	117872	C3511	TX3830	13.8	24F5	1967	1/0	50		
105	192406	TX4054	TX4055	13.8	82F5	1973	1/0	7		
	169521							71		
106	128729	L4042	L4485	13.8	19F1	1965	4/0	184		
		S4042	L4485							
107	140564	TX10378	B3683	13.8	30F1	1982	1/0	6		
	1696153							64		
	125079							210		
	125419							101		

CABLE FAILURE HISTORY REPORT

108	128731	TX4211	C4476	13.8	19F4	1968	1/0	148		

CABLE FAILURE HISTORY REPORT

ITEM #	FID #	Device 1	Device 2	Voltage	Feeder	Year Installed	Cable Size	Cable Length (m)	Event 7	Event 8
1	111893	S2517	L2179	4.16	66F4	1974	750	223		
2	133428	TX7346	TX7337	13.8	38F1	1971	1/0	201		
3	133113	L4864	L4119	13.8	38F5	1980	750	82		
	1551112	L4864	L4119	13.8	38F5	1973	750	600		
4	132989	TX7690	TX7691	13.8	39F1	1971	1/0	172		
5	124956	TX9957	TX9958	13.8	13F5	1977	1/0	223		
6	147070	C5726	TX9549	13.8	69F1	1985	1/0	631		
	146548	C5726	TX9549	13.8	69F1	1974	1/0	123		
7	146252	TX9509	B54516	13.8	69F1	1974	1/0	6		
	146906	TX9509	B54516	13.8	69F1	1974	1/0	53		
	146251	TX9509	B54516	13.8	69F1	1974	1/0	41		
	146245	TX9509	B54516	13.8	69F1	1974	1/0	3		
	146249	TX9509	B54516	13.8	69F1	1974	1/0	38		
	146247	TX9509	B54516	13.8	69F1	1974	1/0	2		
	146726	TX9509	B54516	13.8	69F1	1974	1/0	71		
	146725	TX9509	B54516	13.8	69F1	1974	1/0	41		
	146720	TX9509	B54516	13.8	69F1	1974	1/0	90		
8	1169567	TX9383	C5733	13.8	61F2	1978	1/0	99	September-27-15	April-17-16
	143508	TX9383	C5733	13.8	61F2	1994	1/0	4	September-27-15	April-17-16
	143618	TX9383	C5733	13.8	61F2	1978	1/0	150	September-27-15	April-17-16
9	144390	TX8829	TX8830	13.8	71F3	1974	1/0	94		
10	143619	C5635	B5046	13.8	71F4	1976	1/0	409		
11	139611	TX9929	TX9933	13.8	30F3	1975	1/0	186		
12	175863	B7324	B7490	13.8	58F4	1989	1/0	468		
13	171177	TX5916	TX5915	13.8	57F2	1980	1/0	87		
14	169085	B7819	B7168	13.8	82F4	1981	1/0	439		
15	137081	L34019	L34123	13.8	49F6	1990	750	638		
16	113895	L24039	S2095	4.16	41F1	1971	350	465		
17	173000	TX10779	TX8174	13.8	59F1	1994	1/0	337		
18	1571111	L4609	L4608	13.8	39F2	1978	1000	667		
19	146782	TX9515	TX9519	13.8	69F2	1974	1/0	320		

CABLE FAILURE HISTORY REPORT

20	126707	B3737	B3676	13.8	20F4	1972	1/0	199		
21	125849	TX8802	TX7601	13.8	49F5	1974	1/0	265		
22	130638	TX2370	C4064	13.8	45F5	1968	1/0	195		
	130636	TX2370	C4064	13.8	45F5	1968	1/0	4		
23	125157	L1645	L1644	13.8	30F2	1979	750	1016		
24	171264	TX12228	TX9362	13.8	54F2	1978	1/0	277		
25	169623	L1685	L7552	13.8	57F4	1981	750	906		
26	143663	L6885	L5958	13.8	61F2	1986	750	515		
27	160560	TX9004	TX9255	13.8	50F1	1976	1/0	90		
28	195848	TX11260	TX9457	13.8	21F7	1977	1/0	329		
29	139260	TX9876	TX9879	13.8	30F3	1975	1/0	256		
30	128919	TX7525	TX3018	13.8	19F5	5/1972 (spli	1/0	176		
31	169619	L7784	L7079	13.8	88F3	1981	750	1336		
32	1322343	L2024	L2254	4.16	26F1	1981	1000	211		
33	1327006	TX2741	TX2740	13.8	45F5	1965	1/0	157		
	131585	TX2741	TX2740	13.8	45F5	1965	1/0	8		
34	193387	S7008	L7192	13.8	84F3	1973	750	637		
35	1551119	S4032	L4826	13.8	47F6	1973	750	190		
	133101	S4032	L4826	13.8	47F6	1983	750	74		
36	125092	TX10335	TX10336	13.8	30F1	1978	1/0	226		
37	143425	TX11068	B5270	13.8	71F3	1979	1/0	301		
	143382	TX11068	B5270	13.8	71F3	1979	1/0	26		
	143385	TX11068	B5270	13.8	71F3	1979	1/0	52		
	143391	TX11068	B5270	13.8	71F3	1979	1/0	4		
	143390	TX11068	B5270	13.8	71F3	1979	1/0	63		
	143402	TX11068	B5270	13.8	71F3	1979	1/0	3		
	143667	TX11068	B5270	13.8	71F3	1979	1/0	36		
	144141	TX11068	B5270	13.8	71F3	1981	1/0	73		
38	120420	TX1360	TX1359	13.8	13F3	1979	1/0	66		
		B1427	TX10789	13.8	13F3	1979	1/0	66		
	119931	TX1360	TX1359	13.8	13F3	1979	1/0	41		
	120408	TX1360	TX1359	13.8	13F3	1979	1/0	9		
39	125758	B34528	B3622	13.8	49F5	1972	1/0	228		
		B3518	B3622	13.8	49F5	1972	1/0	228		
	125904	B3518	B3622	13.8	49F5	1972	1/0	213		
	1537222	B3518	B3622	13.8	49F5	2013	1000	224		

CABLE FAILURE HISTORY REPORT

	125941	B3518	B3622	13.8	49F5	2013	1000	264		
40	130407	TX2625	TX3024	13.8	45F5	1968	1/0	200		
41	144138	B5271	TX5981	13.8	61F2	1981	1/0	215		
		B5271	TX21047	13.8	61F2	1981	1/0	215		
42	171956	B7816	B7643	13.8	57F1	1985	1/0	244		
43	130884	TX2621	TX2925	13.8	45F5	1968	1/0	375		
	130391	TX2621	TX2925	13.8	45F5	1965	1/0	1		
	130392	TX2621	TX2925	13.8	45F5	1965	1/0	6		
44	139262	TX9933	TX9935	13.8	30F3	1975	1/0	109		
45	143440	TX5954	TX5955	13.8	71F3	1975	1/0	183		
46	171908	B100143	B7032	13.8	57F1	1980	1/0	243		
	1562351	B100143	B7032	13.8	57F1	1980	1/0	18		
	1567823	B100143	B7032	13.8	57F1	1980	1/0	354		
47	173008	B7437	C7178	13.8	59F1	1979	1/0	267		
48	1242387	L5727	L5378	13.8	69F1	1985	750	1234		
49	125906	C3780	TX8813	13.8	49F4	1974	1/0	43		
	125943	C3780	TX8813	13.8	49F4	1974	1/0	4		
	125907	C3780	TX8813	13.8	49F4	1974	1/0	33		
	127333	C3780	TX8813	13.8	49F4	1974	1/0	215		
50	139751	L6405	L6177	13.8	30F1	1984	750	396		
51	139541	TX23158	TX9876	13.8	30F3	2001	1/0	16		
	139529	TX23158	TX9876	13.8	30F3	2001	1/0	97		
	139558	TX23158	TX9876	13.8	30F3	2001	1/0	2		
	139511	TX23158	TX9876	13.8	30F3	2001	1/0	169		
	139178	TX23158	TX9876	13.8	30F3	1975	1/0	156		
52	140881	TX10375	TX12371	13.8	30F1	1978	1/0	219		
53	197851	TX11131	TX11132	13.8	13F2	1979	1/1	511		
55	130568	TX3478	S4393	13.8	45F5	1966	1/0	126		
		TX3299	S4393	13.8	45F5		1/0			
		TX3482	S4393	13.8	45F5		1/0			
56	133695	B4245	TX7478	13.8	39F2	1998	1/0	550		
			B41002 (L4865)	13.8	39F2	1998	1/0	550		
			TX7428	13.8	39F2	1998	1/0	550		
57	133267	TX3703	TX3704	13.8	71F3	1967	1/0	137		
	1107816					2004		208		

CABLE FAILURE HISTORY REPORT

58	126009	TX11543	TX15596	13.8	30F3	1983	1/0	63		
	125993					1983		19		
	125995					1983		44		
59	144020	TX8831	TX9491	13.8	71F3	1978	1/0	358		
60	195520	TX5519	TX5566	13.8	21F7	1977	1/0	169		
61	171622	TX8253	TX8925	13.8	59F1	1975	1/0	250		
62	173009	B7438	B7358	13.8	59F1	1996	1/0	206		
63	163647	TX9245	TX9242	13.8	50F1	1976	1/0	201		
64	192902	TX9696	TX9697	13.8	82F5	1973	1/0	138		
65	118079	TX8560	TX8561	13.8	24F3	1979	1/0	164		
66	133075	L4734	L4736	13.8	38F3/71F1	1983	750	426		
67	147070	C5726	TX9550	13.8	69F1	1983	1/0	631		
	146233					1983		101		
68	173399	L7147	L7496	13.8	57F1	1980	750	323		
69	128732	TX4209	C44145	13.8	19F4	1968	1/0	167		
70	172922	TX10001	TX10002	13.8	57F2	1976	1/0	160		
71	117936	TX8561	TX8562	13.8	24F3	1977	1/0	222		
72	101640	TX4818	TX4819	13.8	13F1	1996	1/0	165		
73	122759	C3419	B34525	13.8	14F5	1972	#2	184		
74	173603	L7100	L7395	13.8	57F2	1979	750 kcmil	582		
75	117881	TX8564	TX8565	13.8	24F3	1977	1/0	37		
76	171591	B7433	B7065	13.8	57F2	1978	1/0	687		
77	1518729	TX8559	C3755	13.8	24F3	2013	1/0	82		
	1501078					1977	1/0	123		
	1501051					2012	1/0	80		
	1501042					2012	1/0	5		
78	192163	TX9358	TX6	13.8	84F3	1976	1/0	164		
79	192251	TX8440	TX8441	13.8	84F3	1976	1/0	57		
	192250							147		
	192899							58		
80	1501081	TX8560	C3755	13.8	24F3	1977	1/0	153		
	1501048					2012	1/0	84		
	1501042					2012	1/0	5		
90	140992	L6263	L6259	13.8	30F1	1978	750 kcmil	471		
91	127665	TX4210	TX4211	13.8	19F4		1/0	45		

CABLE FAILURE HISTORY REPORT

92	146239	TX9501	TX9502	13.8	69F1	1974	1/0	143		
	146726					1980		71		
	146724					1974		98		
93	118084	TX5923	TX5922	13.8	24F4	1979	1/0	138		
94	192247	TX9696	TX9694	13.8	82F5	1978	1/0	161		
95	172469	TX10776	C7670	13.8	59F1	1996	1/0	9		
	173001							240		
96	131434	B4007	S4392	13.8	45F5	1968	1/0	369		
97	127098	TX8084	TX8080	13.8	20F3	1973	1/0	86		
98	163466	TX9243	C6212	13.8	50F1	1976	1/0	232		
99	127168	TX7658	TX7659	13.8	20F3	1972	1/0	307		
100	143342	TX9403	TX9413	13.8	61F2	1978	1/0	165		
101	1567823	B146303	B100143	13.8	57F1	1996	1/0	350		
	1624936							126		
	1617085							74		
102	1691538	L5731	L5356	13.8	19F4	1993	750 kcmil	671		
103	197508	TX11582	TX11463	13.8	13F2	1979	1/0	52		
	197885							116		
	196532							105		
	196520							23		
	196519							77		
	197884							79		
	197882							38		
	197877							66		
	196554							29		
	197893							204		
104	117872	C3511	TX3830	13.8	24F5	1967	1/0	50		
105	192406	TX4054	TX4055	13.8	82F5	1973	1/0	7		
	169521							71		
106	128729	L4042	L4485	13.8	19F1	1965	4/0	184		
		S4042	L4485							
107	140564	TX10378	B3683	13.8	30F1	1982	1/0	6		
	1696153							64		
	125079							210		
	125419							101		

CABLE FAILURE HISTORY REPORT

108	128731	TX4211	C4476	13.8	19F4	1968	1/0	148		

ERZ-AMPCO-16

Reference(s):

a) Please provide annual historical failure data (# of failures, # customer outage minutes) for each of the years 2010 to 2017 for the following asset groups: Overhead switches, insulators, wood poles, concrete poles, underground transformers, overhead transformers, padmount switchgears.

Response:

a) Alectra Utilities' predecessor, Enersource Hydro Mississauga, did not track data to the level of detail for poles, transformers, and switches. To acquire the data, a resource would need to manually review each outage to determine the failure information. For insulators and padmounted switchgears the data is provided in Table 1, below. Alectra Utilities has also provided the data for poles and overhead hardware, switches and transformers to supplement the request. The details for equipment failures is under review as part of the reliability integration plan for Alectra Utilities.

Table 1 – ERZ Historical Failure Data (2010-2017)

Asset	2010		2011		2012		2013		2014	
	Number of Interruptions	Customer Minutes	Number of Interruptions	Customer Minutes	Number of Interruptions	Customer Minutes	Number of Interruptions	Customer Minutes	Number of Interruptions	Customer Minutes
Switches	6	24,938	7	86,549	9	262,899	8	151,604	7	291,775
Insulators	4	2,687	7	42,884	6	156,102	9	301,820	11	170,207
Poles & OH Hardware	10	171,436	14	760,691	19	199,454	12	300,843	11	485,876
Transformers	46	169,398	38	192,913	67	236,178	89	292,664	64	181,559
Switchgears	8	68,884	13	421,281	5	49,230	10	221,229	23	544,465

Asset	2015		2016		2017 (Until Aug.31)	
	Number of Interruptions	Customer Minutes	Number of Interruptions	Customer Minutes	Number of Interruptions	Customer Minutes
Switches	8	13,753	5	33,698	7	73,415
Insulators	15	399,569	8	142,659	0	0
Poles & OH Hardware	22	208,503	6	21,846	5	169,881
Transformers	65	154,391	59	167,404	39	139,135
Switchgears	30	144,472	7	197,823	1	3,306

ERZ-AMPCO-17

Reference(s):

a) Please complete Appendix D.

Response:

a) Alectra Utilities has completed Appendix D, filed as ERZ-AMPCO-17_Appendix D.

EB-2017-0024
Enersource Rate Zone
ERZ-AMPCO-17 Appendix D

	Asset	Population	Failure Rate 2011	Failure Rate 2012	Failure Rate 2013	Failure Rate 2014	Failure Rate 2015	Failure Rate 2016	Failure Rate 2017	Replacement Rate 2011	Replacement Rate 2012	Replacement Rate 2013	Replacement Rate 2014	Replacement Rate 2015	Replacement Rate 2016	Replacement Rate 2017	Replacement Rate 2018
1	**Substation Transformers**	120	1	0	0	0	0	0	0	3	3	3	0	2	3	2	
3	**Circuit Breakers**	432	0	3	2	2	0	0	0	26	12	18	8	30	17	15	
4	**Pole Mounted Transformers**	5353									42	172	221	472	451	159	
5	**Pad Mounted Transformers**	16121	38	67	89	64	65	59	39		90	311	308	572	530	298	
7	**Vault Transformers**	3854									12	45	200	138	253	112	
8	**Pad Mounted Switchgear**	834	13	5	10	23	30	7	1		17	48	40	49	60	47	
9	**Overhead Switches**	2653	7	9	8	7	8	5	7		7	9	14	19	34	23	
13	**UG Cables Main Feeder in Conductor-Km**	2238	193	139	133	112	176	223	131		26	45	31	14	23	17	
14	**UG Cables Distribution in Conductor-Km**	4076									28	37	39	41	41	20	
15	**Poles Wood**	12436	14	19	12	11	22	6	5		11	304	212	330	444	528	
16	**Poles Concrete**	9488									6	109	39	151	135	76	

Note: Failure data based on asset failures resulting in customer outages
Transformer failure events not differentiated by type
cable faults

NOTE:
Population counts (column C) are based on Figure 18 of the DSP

Replacement information is coming from our GIS system, based on available "removed date" information. The accuracy of this field has been increasing as we've have been utilizing improved tools and workflows to more accurately and quickly update information

Main Feeder is defined as any primary cable with cable size other than: #1, #2, #4, #6, 1/0, 2/0, 3/0, 4/0

Distribution is defined as any primary cable with cable size indicated as: #1, #2, #4, #6, 1/0, 2/0, 3/0, 4/0

We do not have good tracking of failure rates for these assets. The information could be derived from our OMS system, but would require a labour intensive effort of reading through various comment fields.