EB-2008-0235

IN THE MATTER OF the *Ontario Energy Board Act, 1998*, S.O. 1998, c. 15, (Schedule B);

AND IN THE MATTER OF an application by London Hydro Inc. for an order approving just and reasonable rates and other charges for electricity distribution to be effective May 1, 2009.

London Hydro Inc. ("London Hydro") Responses to Ontario Energy Board Staff Interrogatories

Filed: March 20, 2009

Rate Base

1. Ref: Exhibit 2 – Rate Base

Please provide information for the period 2006 to 2009 in the following table format:

***RESPONSE*:**

Please see the completed table on the following page.

Board Staff Interrogatories
Ref: Exhibit 2- Rate Base

	2006 Actual	2007 Actual	2008 Bridge	2009 Test	REF
Allowed Return on Equity (%) on the regulated ratebase	9.00%	9.00%	9.00%	8.57%	1
Actual Return on Equity (%) on the regulated rate base	6.30%	7.30%	6.77%	8.57%	2
Regulated net earnings	$ 5,801,000	$ 6,832,000	$ 6,093,000	$ 7,714,642	2
Retained Earnings (regulated)	$ 30,832,000	$ 35,664,000	$ 39,757,000	$ 43,678,000	2
Dividends paid to shareholder	$ 2,000,000	$ 2,000,000	$ 2,000,000	$ 2,000,000	2
Sustaining capital expenditures (excluding smart meters) (i)	$ 5,831,693	$ 11,030,115	$ 13,100,000	$ 11,100,000	3
Development capital expenditures (excluding smart meters) (ii)	$ 8,347,646	$ 7,332,121	$ 5,762,000	$ 5,683,000	3
Operations capital expenditures (info systems and office equip)	$ 587,114	$ 1,035,996	$ 1,402,000	$ 970,000	3
Smart Meter capital expenditures (iii)	$ 293,831	$ 22,639	$ 2,385	$ 17,000,000	3
Other capital expenditures	$ 3,301,615	$ 5,867,864	$ 8,730,000	$ 6,938,000	3
Total capital expenditures (including smart meter)	$ 18,361,899	$ 25,288,735	$ 28,996,385	$ 41,691,000	
Total capital expenditures (excluding smart meters)	$ 18,068,068	$ 25,266,096	$ 28,994,000	$ 24,691,000	
Depreciation expense	$ 13,351,523	$ 14,075,541	$ 16,015,000	$ 15,919,000	4
Construction WIP	$ 4,090,482	$ 7,179,144	$ 10,578,766	$ 4,233,861	5
Rate Base	$204,628,402	$207,907,401	$211,766,221	$225,126,695	6
Number of Customers Additions (total)					
Residential	1,878	2,071	1,658	1,691	7
General Service < 50 kW	63	33	28	409	7
General Service > 50 kW, Intermediate and Large User	19	(5)	9	(15)	7
Number of Customers (total- December 31)					7
Residential	126,516	128,587	130,245	131,936	7
General Service < 50 kW	11,879	11,912	11,940	12,349	7
General Service > 50 kW, Intermediate and Large User	1,612	1,607	1,616	1,601	7

(i) Sustaining Capital Expenditures considered Infrastructure Related Projects that result from Engineered and planning studies
(ii) Development Capital Expenditures considered both Developer and City Work Projects
(iii) No Smart Capital Expenditures Filed in 2009 Cost of Service Rate Application

Information References

Board approved ROE amounts	1
Rate Application Ex 1 pg 98 to 103	2
2006 Summary Financial Report December 31, 2006 (LH internal doc)	3
2007 Summary Financial Report December 31, 2007 (LH internal doc)	
2008 Rate Application Ex 2 pg 80 Table 21 2008-2010 Capital Summary	
2009 Rate Application Ex 2 pg 80 Table 21 2008-2010 Capital Summary	
There are no smart meter capital expenditures submitted in this application	
Rate Application Exhibit 4 page 2 table 1	4
Rate Application Exhibit 2 pages 52 to 55	5
Rate Application Exhibit 2 page 1 table 1	6
Customers numbers for 2006 to 2008 are actuals	7
Customer numbers for 2009 are as per Exh 3 page 23	

Capital Expenditures

2. Ref: Exhibit 2 / p. 133 – Three-year Gross Capital Expenditure Plan

In this exhibit, London Hydro provides its 3-year capital plan, including 2008 budget and projections. The table is reproduced below.

3 Year Gross Capital Expenditure Plan **Exhibit 2 / Appendix A / page 133**

	2008 Budget	2008 Projected	2009 Budget	2010 Budget	2011 Budget	Total
Substation Rebuilds - A	$ 2,140,000	$ 2,140,000	$ 3,110,000	$ 500,000	$ 500,000	*$ 4,110,000*
Substation Rebuilds - B	$ 2,300,000	$ 2,300,000	$ 1,825,000	$ 2,500,000	$ 2,500,000	*$ 6,825,000*
Main Feeders - C	$ 4,100,000	$ 4,100,000	$ 1,050,000	$ 2,000,000	$ 1,000,000	*$ 4,050,000*
Projects Resulting from City Works - D	$ 1,000,000	$ 1,000,000	$ 750,000	$ 1,000,000	$ 1,000,000	*$ 2,750,000*
Projects Resulting from Developer Works - E	$ 5,690,000	$ 5,690,000	$ 7,900,000	$ 5,600,000	$ 5,600,000	*$ 19,100,000*
Networks - F	$ 1,410,000	$ 1,410,000	$ 1,250,000	$ 2,000,000	$ 2,000,000	*$ 5,250,000*
Overhead Line Works - G	$ 2,700,000	$ 2,700,000	$ 3,455,000	$ 3,500,000	$ 3,500,000	*$ 10,455,000*
Automation - H	$ 450,000	$ 450,000	$ 610,000	$ 400,000	$ 400,000	*$ 1,410,000*
Total Projected Capital spending	***$ 19,790,000***	***$ 19,790,000***	***$ 19,950,000***	***$ 17,500,000***	***$ 16,500,000***	**$ 53,950,000**
Total Engineered Projects	$ 3,100,000	$ 13,100,000	$ 11,300,000	$ 10,900,000	$ 9,900,000	$ 32,100,000

For "Projects Resulting from Developer Works – E", 2009 is shown to be significantly higher than 2008 or 2010 or 2011. Please provide further explanation for the higher capital expenditures in 2009 for this project category, relative to past or short-term forecast.

***RESPONSE*:**

Please refer to the 2009 Asset Management Plan, at Exhibit 2, Appendix A, pp. 167-168. The explanation for the increase in the total from Developers Works - E for 2009 can be found within Project Number 9E1 - Expansions and Relocations. This project includes a 27.6 kV line extension to service the significant new industrial development in the new "Innovation Park" in London. This expansion is estimated at $2,300,000 of the total $2,780,000 budgeted for this project, and requires both overhead and underground plant to be extended.

This additional project is the primary reason for the higher capital expenditures in 2009 for this project category.

3. Ref: Exhibit 2 / p. 141 – Project Number 9A1- Substation Rebuilds

The project title for project number 9A1 is "Downtown Network Supply Upgrade". In the description of the project, it states: "London Hydro has previously identified the need to make alterations and improvements to the 13.8kV network. This work was scheduled over 2 years (2008-2009). In 2008 the detailed engineering was completed, transformers and switchgear procured and a portion of the civil works was installed. This work will continue in 2009."

Based on the project details, the cost of this project is estimated at $3,000,000 in 2009. Please provide the cost of the project in 2008.

***RESPONSE*:**

Please refer to the Capital Works Program for 2008, at Exhibit 2, Appendix C. More particularly, see the capital works document for Project Number 8A1, at p. 389, which explains the 2008 work related to this project. . The total budgeted spending for 2008 was $1,860,000. Actual capital spending in 2008 was $2,286,300. For a full breakdown of elements of the 2008 capital spending please refer to London Hydro's response to CCC Question 9.

4. Ref: Exhibit 2 / p. 69 – Vehicles & Major Equipment

On p.69, London Hydro states: "…..$1,778,000 has been allocated in 2009 for the replacement of 3 bucket trucks, 1 knuckle boom flat crane deck, 5 pickup trucks, 2 vans, 2 compact hybrid SUVs and a brush chipper. Money has also been allocated in the budget to purchase an additional 11 pre-owned vehicles."

Please provide the amount budgeted for the additional 11 pre-owned vehicles and the purpose(s) of these vehicles.

***RESPONSE*:**

The total amount budgeted for the 11 pre-owned vehicles is $53,000. These vans and pickup trucks with low mileage will be used as transport vehicles in various departments including overhead line, sub station maintenance, instrumentation and control, and construction.

5. Ref: Exhibit 2 / pp. 18-19 – Information Technology

On pp.18-19, it states: "London Hydro has completed a number of upgrades to its existing corporate software applications over the past five years including a major initiative to replace its existing Customer Information System ("CIS"), Geographic Information System ("GIS"), Document Management System, and an Enterprise Resource Planning ("ERP") solution."

a) What cost savings or productivity improvements (i.e. process improvements) has London Hydro projected as a result of the upgrades? How have these been factored into operating and capital expenditures during 2009 and factored into London Hydro's proposed distribution rates? If available, please provide the details of the cost savings on an annual basis.

b) Are there any features or parts of the new CIS system which are dedicated to the water and sewer billing that London Hydro provides on behalf of the City of London? If so, please describe and quantify the costs of these features and components.

c) Please describe how any directly assigned, or allocated, costs specific to features or components of the new CIS system used for sewer and water billing are accounted for.

***RESPONSE*:**

a) Process and productivity improvements achieved and/or expected for each of the above mentioned applications are outlined below:

CIS

The new CIS will allow London Hydro to further integrate a number of our business processes, as well as improve business process workflows. The system provides a well-defined technical architecture and development platform to allow creation of enhanced systems, processes and composite applications. It also supports detailed security access controls and process auditing to ensure security and integrity of data within the CIS. Administration and performance tools to allow a consolidated system administration interface for the analysis of process efficiency and resource utilization at both the software and hardware level.

GIS

The GIS project further leveraged and enhanced the installed technologies at London Hydro which were a Survalent SCADA system and a new Mitsubishi/Imtech video wall. Installation of a new GIS system provided an integrated corporate resource, which

provided London Hydro with greater capabilities and higher efficiency in the creation and administration of its utility services. Additionally, without a new GIS system, London Hydro would not be in a position to fully integrate with an outage and mobile workforce management technology in a single application environment. By integrating our customer and distribution network information onto a common platform, London Hydro will be able to explore dramatic process re-engineering opportunities.

Document Management System

DocuShare CPX offers advanced enterprise content management (ECM) functionality required for integrating and automating content, sophisticated collaborations, and business process management around specific operational tasks. This particular suite of ECM tools allowed London Hydro to immediately engage in more efficient, more accountable, and more secure, document and content management.

ERP

During phase one of the ERP project, London Hydro reviewed our business processes for process improvements to ensure we optimally took advantage of the latest functionality offerings from the newest version, with the insight of live experience to make the most intelligent choices in fine-tuning. Utilizing the new functionality in conjunction with process improvements, allowed London Hydro to optimize and fine-tune the new operating environment for maximum efficiency, as well as customize the security, desktop access, and reporting.

During phase two we implemented the identified business process improvements as well as configured additional modules from our JD Edwards ERP suite that addressed the needs of the Operations & Engineering group in regard to the management of London Hydro's asset infrastructure. The workflow enhancements have resulted in improved efficiencies in the processing of work orders, primarily for the Finance & Engineering departments.

Investments in new technology, billing systems and other information management systems are driven primarily by the need to comply with the regulatory requirements associated with the complex time of use billing environment that will exist under smart meters, the need to maintain minimum standards for customer service, the need to manage distribution assets and functionality to minimum standards and the need to comply with all information reporting needs.

While certain cost savings or productivity improvements are expected to flow from these investments in the form of productivity gains, they are not specifically quantifiable in the test year forecasts.

b) There are no new features within the new CIS which are dedicated to the water and sewer billing that London Hydro provides on behalf of the City of London. We have

replicated the current functionality for the water and sewer billing in the new system. The existing system performs the water and sewer billing without issue and was not a driving force in replacing the CIS.

c) Not applicable.

Service Quality and Reliability

6. Ref: Exhibit 1 / p. 42 / Table 1 – Service Quality Indicators

a) Please provide London Hydro's performance on the established service quality indicators per the following table format:

SQI	Label	Standard	2005	2006	2007	2008
1A	Connection of New Services - Low Voltage	90% or better	100%	100%	100%	100%
1B	Connection of New Services - High Voltage	90% or better	100%	100%	None	None
2	Underground Cable Locates	90% or better	94.23%	96.73%	94.09%	94.20%
3	Telephone Accessibility	65% or better	73.63%	69.81%	69.74%	75.98%
4	Appointments Met	90% or better	100%	100%	n/a	100%
5	Written Response to Enquiries	80% or better	100%	100%	99.77%	100%
6A	Emergency Response - Urban	80% or better	97.85%	97.94%	98.85%	98.17%
6B	Emergency Response - Rural	80% or better	n/a	n/a	n/a	n/a

b) For any annual result where performance is below the standard, please provide an explanation for the reason for deteriorated performance, London Hydro's efforts to address the matter and, if available, the impacts of service improvement efforts.

***RESPONSE*:**

a) See Table above

b) All performance met or exceeded the Board's standards. In addition to the information provided in the table above, please see London Hydro's response to VECC Question 1 for a discussion on appointments met in 2007.

7. Ref: Exhibit 1 / p. 43 – Reliability Indicators

a) Please provide London Hydro's historical reliability performance per the following table format:

Reliability Indicator		Year			
		2005	2006	2007	2008
System Average Interruption Duration Index (SAIDI)	All outages	1.15	1.43	1.69	2.29
	Excluding Loss of Supply (Cause Code 2)	1.04	1.23	1.62	1.91
System Average Interruption Frequency Index (SAIFI)	All outages	1.65	2.23	2.46	2.39
	Excluding Loss of Supply (Cause Code 2)	1.58	2.11	2.03	2.07
Customer Average Interruption Duration Index (CAIDI)	All outages	0.70	0.64	0.69	0.96
	Excluding Loss of Supply (Cause Code 2)	0.66	0.58	0.80	0.93

b) For any annual result where performance is outside (higher than) the range of the previous three years' performance, please provide an explanation for the reason for deteriorated performance, London Hydro's efforts to address the matter and, if available, the impacts of service improvement efforts.

***RESPONSE*:**

a) See the completed table above.

b) London Hydro has an internal process for reviewing every outage on its system that results in more than 25,000 customer outage minutes. For each outage, the root cause is investigated, a report is prepared and, where appropriate, action plans are developed to prevent similar outages in the future. For example, for the year 2008, 56 separate investigations were completed.

The main reason London Hydro missed its reliability targets in 2008 related to a snow storm that occurred in October while leaves were still on trees. This caused branches to break and uprooted trees throughout the city resulting in the loss of power to 56,000 customers. This event alone contributed .68 to SAIDI and .40 to

SAIFI for the year.

In 2007 the main events related to heavy lightning in July (that accounted for 18% of London Hydro's SAIDI and SAIFI statistics for the year) and the failure of a Firon in-line switch while two feeders were tied together. The single incident involving the Firon switch failure contributed .12 to London Hydro's SAIDI and .08 to SAIFI. After consulting with the manufacturer, a major program was immediately instituted to locate and test every Firon switch on London Hydro's system that was susceptible to a similar failure. London Hydro has also engaged the services of Kinectrics Inc. in 2009 to provide assistance in investigating and mitigating reliability issues related to lightning.

A more detailed explanation for each year can be found in the Quality of Supply Reports for 2006 and 2007, and the 12 monthly reports for 2008. Please see Appendix OEB 7 – Quality of Supply Reports. These documents describe in detail London Hydro's reliability performance in each of those years and the efforts taken to improve performance. The Quality of Supply Report for 2008 has not yet been completed; the 12 monthly reports summarize the 56 major outages described above that London Hydro experienced in 2008.

Smart Meters

8. Ref: Exhibit 9 / pp. 14-15 – Smart Meter Rate Adder Proposal

London Hydro has provided documentation in support of the proposal to increase the smart meter funding adder to $1.00, but states that the cost per installed meter may vary between $150 to $200, depending on the exchange rate. As a result, estimated capital costs for 2009 may vary between $12 million to $16 million.

This is a fairly wide range. Recognizing that smart meter costs will be tracked in the established deferral accounts for review and disposition in a later application, does London Hydro have, since the filing of its application on December 8, 2008, more recent estimates of the per meter and aggregate capital costs for smart meters planned to be deployed in 2009? If so, please provide.

***RESPONSE*:**

No, London Hydro does not have any recent updated estimates at this time. The potential range of costs used in the Application was simply to illustrate the fact that the anticipated expenditures for smart meters would be significantly in excess of the $1.00 rate rider funding being requested for this purpose.

London Hydro understands that smart meter costs will be tracked in the established deferral accounts for review and disposition in a later application, and that all costs will be subject to a hearing process to determine prudence and whether or not those costs are permissible under the OEB spending guidelines. Detailed spending and implementation costs will be provided when London Hydro submits its application for actual smart meter spending approvals. For the purposes of this 2009 Cost of Service Rate Application, the information that London Hydro has submitted is as directed by the OEB Guideline G-2008-0002, issued on October 22, 2008.

Load and Customer Forecasting

9. Ref: Exhibit 3 / p. 11 – Load Forecasting Model

a) Please provide statistics for London Hydro's estimated forecasting model, including model specification, functional form, coefficient estimates and associated t-statistics, F-statistic, Durbin-Watson statistic, R^2 and adjusted R^2.

b) London Hydro states "The process of developing a model of energy usage involves estimating multifactor models using different input variables to determine the best fit. Using stepwise regression techniques different explanatory variables were tested with the ultimate model being determined both by model statistics and by forecast accuracy." Please provide further explanation of the econometric model estimation approach used by London Hydro, describing what alternative models were examined and the criteria used for selecting the preferred load forecasting equation documented on the bottom of p. 11.

***RESPONSE*:**

a) The following outlines the statistical information provided by the "Regression" function available in Excel. This information supports the prediction model used by London Hydro to forecast 2008 and 2009 purchases. It appears to London Hydro that the Durbin-Watson statistic is not provided as an output in the Excel Regression function.

SUMMARY OUTPUT				
Regression Statistics				
Multiple R	0.974652069			
R Square	0.949946655			
Adjusted R Square	0.94737038			
Standard Error	6064482.278			
Observations	144			
ANOVA				
	df	*SS*	*MS*	*F*
Regression	7	9.49276E+16	1.35611E+16	368.7287323
Residual	136	5.0018E+15	3.67779E+13	
Total	143	9.99294E+16		
	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	(107,256,299)	20841723.91	(5.1462)	9.09863E-07
Heating Degree Days	54,859	3300.634123	16.6207	1.4782E-34
Cooling Degree Days	574,782	26494.54702	21.6943	5.36665E-46
Ontario Real GDP Monthly %	1,149,337	36384.86649	31.5883	1.71112E-64

Number of Peak Hours	76,403	33598.64078	2.2740	0.02453177
Number of Days in Month	6,208,119	661327.476	9.3874	1.90534E-16
Blackout Flag	(13,061,951)	6210174.394	(2.1033)	0.037280098
Spring Fall Flag	(8,756,678)	1378574.49	(6.3520)	2.96565E-09

b) London Hydro examined alternative models that excluded the Spring Fall Flag and the Aug 03 Blackout Flag input variables together and the Aug 03 Blackout Flag separately. In addition, London Hydro reviewed the possibility of replacing the Number of Peak Hours and the Number of Days in the Month with % Peak Hours and Square of Days in Month, respectively. London Hydro also investigated including the Number of Customers as another input variable to the equation shown in Exhibit 3, p. 11 of the Application. In all cases, the Multiple R, R^2 and Adjusted R^2 values were less than values resulting from the preferred load forecasting equation documented on the bottom of p. 11.

10. Ref: Exhibit 3 / p. 13 – Weather Normalization

On Exhibit 3 / p. 13, London Hydro states: "The forecasted weather normalized amount for 2008 and 2009 is determined by using a forecast of the dependent variables in the predication formula on a monthly basis. In order to incorporate weather normal conditions, the average monthly heating degree days and cooling degree days which has occurred from 1996 to 2007 is applied in the prediction formula."

Using the similar method to develop the weather normalized forecast of total system purchases for 2009, please provide the following scenario. Instead of using the average monthly heating degree days (HDD) and cooling degree days (CDD) from 1996 to 2007, please develop the weather normalized forecast of total system purchases for 2009 by using a **trend** of monthly HDD and CDD from 1988 to 2007. Please calculate the variance and percent variance of 2009 proposed weather normalized forecast of total system purchases between this methodology compared with that employed by London Hydro in its Application.

***RESPONSE*:**

The weather normalized forecast of total system purchases for 2009 using a **trend** of monthly HDD and CDD from 1988 to 2007 is 3,573,542,289 kWh. This is an increase of 10,509,097 kWh or 0.3% higher than the weather normalized forecast of total system purchases of 3,563,033,193 kWh proposed by London Hydro in its Application.

11. Ref: Exhibit 3 / p. 16 – Customer Count

On p.16, it states: "In most cases where the geometric mean is determined, the resulting geometric mean is applied to the 2007 customer/connection numbers to determine the forecast of customer/connections in 2008 and 2009."

Please prepare a 2009 test year customer forecast using a linear trend method applied to historical customer data from 1996 to 2007. Please also provide the impact on the proposed test year (Billed kWh) load and revenue forecast if this alternate customer forecast were used.

***RESPONSE*:**

The table on the following page provides the results of a 2009 test year customer forecast using a linear trend method applied to historical customer data from 1996 to 2007. The impact on the proposed test year (Billed kWh) load is also provided. The 2009 revenue requirement would not change under this scenario.

	2009 Weather Normal Application	2009 Weather Normal Alternative	Difference
Actual kWh Purchases			
Predicted kWh Purchases	3,563,033,193	3,563,033,193	0
% Difference			
Billed kWh	3,431,680,138	3,431,680,138	0
By Class			
Residential			
Customers	131,936	130,668	(1,268)
kWh	1,084,746,791	1,194,410,949	109,664,158
General Service < 50 kW			
Customers	12,349	12,765	416
kWh	419,590,459	482,206,886	62,616,427
General Service > 50			
Customers	1,595	1,334	(261)
kWh	1,654,665,168	1,482,061,822	(172,603,346)
kW	4,102,788	3,674,813	(427,975)
Large User			
Customers	3	3	0
kWh	205,146,878	205,146,878	0
kW	392,686	392,686	0
Cogeneration			
Customers	3	3	0
kWh	37,425,572	37,425,572	0
kW - standby	154,800	154,800	0
kW - incremental	48,946	48,946	0
Streetlights			
Connections	34,187	33,593	(594)
kWh	23,921,899	23,506,153	(415,746)
kW	67,170	66,002	(1,167)
Sentinel Lights			
Connections	734	742	8
kWh	856,841	866,017	9,176
kW	2,342	2,367	25
Unmetered Loads			
Connections	1,581	1,798	217
kWh	5,326,529	6,055,860	729,331
Total			
Customer/Connections	182,389	180,906	(1,483)
kWh	3,431,680,138	3,431,680,138	0
kW from applicable classes	4,613,932	4,184,814	(429,117)

12. Ref: Exhibit 3 / p. 22 – kW Load Forecasting

On p. 22, it states: "For the Cogeneration class, the average ratio did not appear to be reasonable but the 2007 value appeared to be more reasonable based on recent experience with Cogeneration class in the London Hydro service area. Consumption values for the Cogeneration class are heavily influenced by their decision to self-generate or purchase from London Hydro based upon financial factors such as the price of natural gas."

Please provide more details to support the conclusion that the 2007 value of the kW/kWh ratio for the Cogeneration customer class is reasonable.

***RESPONSE*:**

When the kW/kWh ratio from 2000 to 2007 for the Cogeneration class was reviewed by London Hydro it was observed there was clearly a downward trend. London Hydro believed that using a average ratio of 0.7633% would be unreasonable for purposes of forecasting load for the Cogeneration class. The declining pattern suggested that a ratio lower than 0.5444% could be used but London Hydro did not have any evidence, other than the pattern itself, to suggest the ratio would fall below the 2007 actual ratio of 0.5444%. As a result, the 2007 actual ratio was maintained for the forecast period.

Other Revenues

13. Ref: Exhibit 3 / p. 27 / ll. 6-8 – Other Revenues

London Hydro notes that its 2006 EDR application omitted revenues from Bell Canada billings for pole attachments due to manual billing.

a) Please provide pole attachment rentals received from Bell Canada for each of 2006 actual, 2007 actual and 2008 bridge (or actual, if available).

b) When did London Hydro become aware of this omission?

c) Please indicate what steps London Hydro has instituted, or plans to institute, to avoid such omissions on a going forward basis.

***RESPONSE*:**

a) Pole rentals from Bell Canada

2005 Actual billing	$	73,330	- 3281 poles * $22.35 - billed Aug 22, 2006
2006 Actual billing	$	72,861	- 3260 poles * $22.35 - billed Aug 28, 2007
2007 Actual billing	$	72,168	- 3229 poles * $22.35 - billed Nov 18, 2008
2008 accrued	$	73,200	

b) The omission in the 2006 EDR application was found in early 2008 during the process of putting together the historic revenue comparison data for this Application.

c) The omission occurred as result of human error in not reconciling the statistics used in the 2006 EDR to the actual revenues received. For this Application and future rate applications, staff have been trained and instructed to ensure the statistics correspond to the actual revenues received, to ensure this type of error will not reoccur.

14. Ref: Exhibit 3 / p. 24 – Revenue Offsets

London Hydro forecasts revenue offsets to be $3.7M for the 2009 test year, down about 15% from 2007.

a) Please provide a brief narrative description of why revenue from duct rental (a component of account 4210 as discussed on Exhibit 3 / p. 27) is forecast to decline from $35K in 2008 to $24K in 2009.

b) Please confirm that the revenue from Occupancy Charges in the 2009 test year (a component of account 4235, as discussed on Exhibit 3 / p. 29) should be $675K rather than $660K, as a result of multiplying the specific service charge times the forecasted number of transactions.

c) Please explain whether Non-refundable Customer Credits (a component of account 4390, as discussed in Exhibit 3 / p. 32) was at a normal level in 2008, or higher than normal. If the 2008 amount is higher than normal, please explain why the 2009 amount should not be $70K instead of $40K.

d) Please explain why interest on deferral and variance accounts (a component of account 4405, as discussed in Exhibit 3 / p. 32) is included as a negative amount in London Hydro's revenue accounts instead of being posted in a deferral or variance account.

***RESPONSE*:**

a) The line item referred, and as described on the schedule includes revenue from duct rentals plus miscellaneous revenues. The miscellaneous revenue portion of this account includes an annual true-up between forecast and actual common costs related to space rental and setting of square footage rates with respect to the administrative building space rental with the City of London. The fluctuation in this account from year to year is related to the differences in these true up amounts from year to year.

b) Multiplying the quantities times the rate will produce a revenue of $675 K versus the forecast amount of $660 K. In developing the initial forecasts, it appears that the projection was developed in reference to the Bridge amount actual dollars of $663 K.

c) The reference to normalized level is not related only to the dollar amount that passes through this account. It is also related to ensuring that the customer credits be dealt with in a timely manner. As stated in the Application in exhibit 3, page 32, lines 7 to 9, in 2006 and 2007 limitations were uncovered within the customer billing system that had delayed the recognition of this revenue and this caused the revenue to be

higher than it normally would be in 2006 and 2007. The forecast amount for 2008 reflects an additional anticipated flow through effect resulting from the delays in processing of non-refundable customer credits in the system. The forecast value for 2009 is based upon the actual amount for 2006 which is anticipated to be closer to a normal level of activity than any of the other years indicated. On a dollar basis, we believe the $40 K is closer to a normal level of activity.

d) Interest on Retail Settlement Variance Accounts is recorded in account 4405 in accordance with the Board's accounting guidelines specified in Article 490 of the Accounting Procedures Handbook. When RSVA balances are in a significant credit position, as are London Hydro's, the account entry is a credit to RSVA accounts and a debit to account 4405. Interest on the Smart Meter deferral and variance accounts is to be recorded in the deferral accounts 1555 and 1556. While in practice, London Hydro follows the correct accounting for interest on smart meters, in the process of developing the forecast 2009 interest in account 4405, the smart meter interest has been incorrectly incorporated into that projection as described in Exhibit 3, page 33, lines 25 and 26. The forecast interest on the RSVA accounts shown as a negative $19,000, should be revised to a negative amount of $350,000.

Operating Expenses

15. Ref: Exhibit 4 – OM&A Expenses

Board staff have compiled the figures in the table below from the public information filing in the Reporting and Record-keeping Requirements ("RRR") initiative of the OEB. The figures are available on the OEB's public website. Please confirm agreement with the numbers, or provide corrections, for OM&A expenses, summarized in the table below.

	2002	2003	2004	2005
Operation	$4,500,844	$4,682,233	$5,619,125	$5,718,414
Maintenance	$5,088,321	$5,298,303	$5,279,935	$5,303,212
Billing and Collection	$5,513,905	$4,364,865	$3,549,415	$4,545,440
Community Relations	$23,577	$354,571	$432,000	$1,310,483
Administrative and General Expenses	$6,141,351	$6,445,290	$6,304,345	$5,569,730
Total OM&A Expenses	**$ 21,267,998**	**$ 21,145,262**	**$ 21,184,819**	**$ 22,447,280**

***RESPONSE*:**

London Hydro is in agreement with the OM&A expenses for the years 2002 – 2005 as shown above.

London Hydro has also confirmed that the values for 2002, 2003 and 2004 agree to the 2006 EDR rate application filed by London Hydro with the Board (ED-2002-0557).

London Hydro has also confirmed the above data to be the same as the OEB data from the PEG report "Comparison of Ontario Electricity Distributors Costs (EB-2006-0268) available from the OEB's website at:

http://www.oeb.gov.on.ca/OEB/_Documents/EB-2006-0268/Comparison_of_Distributors_20081203.xls

16. Ref: Exhibit 1 / pp. 1-4

Please identify the inflation rate used for the forecasted OM&A for the 2008 Bridge and 2009 Test years. Please identify the source document for the inflation assumptions used by London Hydro.

***RESPONSE*:**

Please refer to Appendix CCC 10 – Budget Docs Provided to LH BOD. This budget document contains all key assumptions used in the budget development. Wage increases were forecast at 3.25% as per the collective agreement and material price increases ranged from 3% to 12% depending on the commodity and the supplier.

The detailed element of cost breakdown for the 2009 Test Year budget which is provided in Exhibit 4, pages 10 to 65 outlines the cost increases year over year at a detailed level and provides the source the of the various cost increase forecasts that have been used.

The following is a listing of certain material price increase projections based on discussions with suppliers:

COMMODITY	INCREASE 2009
Ashpalt	8%
Cable	4%
Clothing	2%
Electrical Materials	4%
Electric Meters	2%
Furniture	3%
Gasoline	10%
Granulars, Gravel	6%
Lamps	2%
Line Materials	4%
Lumber	4%
Paint	3%
Postage	2%
Readymix Concrete	5%
Stationary	2%
Steel	12%
Switchgear	6%
Telephone	2%
Transformers	8%
Trucking - rentals	10%
Wire	4%
Wood Poles	5%

17. Ref: Exhibit 4 / pp. 11-17

London Hydro indicates that it is addressing the challenges of an aging workforce by developing a succession plan. Plan implementation began in 2007 with the hiring of 4 overhead line apprentices. London Hydro documents that the plan, in 2009, calls for the hiring of 6 apprentices.

a) Please confirm the approximate dollar amount in the 2009 OM&A forecast related to these 10 additions to staff.

b) In which year(s), after 2009, does London Hydro consider that any overlap between these apprentices and existing staff will no longer be required (i.e., the staffing complement will decrease to a "normal" level).

***RESPONSE*:**

a) The additional apprentices are being deployed to capital activities and as a result are not part of OM&A expense. The total allocation of labour to capital has increased from $4.4 million in 2006 to $5.8 million in 2009 for this reason.

Please refer to London Hydro's response to SEC Question 8, for more discussion on the deployment of resources at London Hydro.

b) London Hydro anticipates that as the new apprentices become fully qualified, and as the existing staff enters retirement the overall headcount will decline. Apprentices hired in 2007 are expected to become fully qualified by the end of 2011. Apprentices hired in 2009 are expected to become fully qualified by the end of 2013. The total expected decline in skilled trade headcount post-2013 could be between 5 to 10 full time equivalents depending on the actual retirements that occur. These forecasts exclude factors such as customer growth, mergers or acquisitions, and new regulatory requirements, among others.

18. Ref: Exhibit 2 / p. 3

Board staff observes that the corporate objectives listed as underpinning London Hydro's budget do not appear to explicitly include efficiency improvements.

a) Are there any cost efficiency programs (e.g. investing in a technology or new program today that will reduce operating costs over, say, the next 5 years) at the utility that are in place now or contemplated in the 2009 test year?

b) If so, please describe the programs and include any cost/benefit analysis that London Hydro has prepared or had prepared for it.

***RESPONSE*:**

a) Please refer to London Hydro's response to Board Staff Question #5.

As a result of investment in new technologies, London Hydro would anticipate efficiencies will accrue in the form of employee productivity which over the next 5 years should allow for reduced demands for staffing level increases. It is not possible to accurately quantify what those productivity gains or cost savings might be at this point in time, as the majority of these investments are driven by the regulatory environment which is likely to continue changing over that time period.

b) A new SAP system is expected to allow efficiency improvements in respect of "move in/move out" and other ongoing business applications and to improve customer service levels by providing certain self-service applications. Over time, and dependent upon the degree to which customers use this facility, these may reduce staffing level requirements in the customer call centre area.

Additionally, the proposed IVR enhancements are expected to improve the effectiveness of customer contacts – both during and after business hours.

19. Ref: Exhibit 4 / p. 63 – Smart Meter-related Staffing

London Hydro explains that its OM&A Meter Reading Expenses have increased in part due to labour costs and that its labour costs have been impacted by the addition of new positions, i.e. Smart Meter Coordinator for $80.9K in costs and a Meter Technology Manager for $126.3K in costs. London Hydro also states that all incremental cost related to smart meters have been excluded from OM&A and are allocated to a Deferral/Variance account for future recovery.

Please confirm whether or not the associated costs for the two new positions mentioned above are included in London Hydro's forecasted OM&A for the 2009 test year.

***RESPONSE*:**

The two positions mentioned above are included in the OM&A forecasts for 2009.

The introduction of smart meters, and other operational changes in recent years, have resulted in the reorganization of some existing positions. Both of the positions referred to above were transferred from other departments or functions. Redundant positions were deleted. There is no incremental headcount increase associated with this reorganization.

The reorganization of existing positions has allowed London Hydro to respond to new operating needs and at the same time avoid increases in its headcount wherever possible. Although they are involved in smart meter activity, London Hydro does not consider the cost of the positions referred to above as new incremental. Higher costs for meter reading expense are offset with cost savings in other areas. An example of this is the decrease in costs related to Wholesale settlement, where automation has reduced resource requirements.

The 2009 Test Year does include new incremental headcount (both permanent and temporary) related to the smart meter program. These labour costs have been excluded from OM&A. Increases in the total salaries, wages and benefits in 2009 related to this incremental headcount, as shown in Exhibit 4, p. 12, Table 9, however, are offset with higher allocation to the smart meter deferral account (1556). This increased allocation is shown in the Allocation to Capital, Billable, and Other line of the table.

20. Ref: Exhibit 4 / p. 2 – Bad Debt Expense

The evidence indicates the following expenditure patterns for Bad Debt Expense:

2006 EDR Approved $591,096
2006 Actual $545,728
2007 Actual $534,840
2008 Bridge $525,000
2009 Test $535,000

Please provide London Hydro's actual bad debt expenses for 2002, 2003, 2004 and 2005.

***RESPONSE*:**

Bad Debt Expense - Historical Comparision	
2002 Actual	1,359,537
2003 Actual	1,349,038
2004 Actual	259,361
2005 Actual	493,607
2006 EDR Approved	591,096
2006 Actual	545,728
2007 Actual	534,840
2008 Actual	524,950
2008 Bridge	525,000
2009 Test	535,000

21. Ref: Exhibit 4 / p. 2 – Charitable Contributions

Please confirm that the $50,000 amount in the donations account 6205 for 2008 Bridge and 2009 Test is solely for a Winter Warmth program or other bill-payment assistance to low income customers.

***RESPONSE*:**

London Hydro confirms that the $50,000 amounts for the 2008 Bridge and 2009 Test years, in the Donations account (No. 6205), are solely for a Winter Warmth program, that provides assistance to customers in paying their electricity bills.

THAW - London Heat and Warmth program assists customers in financial difficulties that cannot pay their electricity bills. The donation is administered by a community organization ensuring customers meet the criteria. Currently this program is administered by the Salvation Army of London.

The actual donation made in 2008 was $100,000

22. Ref: Exhibit 4 / p. 15

London Hydro indicates that the addition of new positions account for $1.485 million of the increase in labour costs in OM&A between 2006 Board Approved and 2009 Test Year. Please provide the number of new positions, on an FTE basis, that account for the $1.485 million increase.

***RESPONSE*:**

There are 26.2 FTE new positions related to the $1.485 million increase in base labour as shown in Exhibit 4, p. 15, Table 11.

This increase is partially offset with 8.5 FTE in deleted positions (reducing base labour by $431k).

The net increase in FTE between the 2006 Board Approved and 2009 Test Year is 17.7 FTE as shown in Exhibit 4, p. 17, Table 13.

23. Ref: Exhibit 4 / p. 15 / Tables 9, 10 and 11 – Wages and Salaries

London Hydro indicates that cumulative wage increases of about 3% per year (shown in table 10) account for about $2.350 million (shown in table 11) of the increase in base labour costs between 2006 Board Approved and 2009 Test Year. Base labour in 2006 Board Approved is $15.2 million (shown in table 9).

Applying wage increases of 3% per year (for 2007, 2008, 2009) would account for about $1.4 million. Please identify, with explanation, what factors are driving the wage increases from 2006 to 2009 of $2.350 million.

***RESPONSE*:**

Table 9, p.12 shows the 2006 Board Approved Base Labour as $15.2 million. The 2006 Board Approved figure is actually equal to 2004 Actual base labour costs. No provision was added during the 2006 EDR process to reflect wage increases between the years 2004 - 2006.

This means that the change in base labour is not for the period 2006 to 2009, but in fact is related to the period 2004 to 2009 or five years.

Since 2004, there has been a cumulative wage increase of 16.2% as shown in Table 10, p. 15.

The following summarized calculation is provided to show the estimated wage increase subsequent to 2004 related to reported wage increases. London Hydro's actual calculation of the change in base labour due to cumulative wage increases has been calculated at the detailed employee level for improved accuracy.

Base Year (in $000's)	2004
Base Salary, see Table 9, p. 12	15,236
Accumulative Wage Increase, see Table 10, p. 15	16.20%
Estimated Impact of Wage Increases (2004-2009)	2,468
VERSUS	
Actual Impact of Wage Increase (2004-2009) as reported in RA	**2,350**
Difference	(118)

The rate application shows $2,350 due to wage increases and is supported by a detailed calculation by employee.

24. Ref: Exhibit 4 / p. 12 / Tables 9 and Exhibit 4 / p. 23 / Table 17

a) Please explain why the Totals for Benefits costs for 2007, 2008 and 2009, shown in table 9, are about $2 to $3 million higher than the Benefits cost Totals indicated in table 17.

b) Please provide FTE totals for 2004 actual, 2005 actual and 2006 actual, broken out into the same categories shown in table 17.

***RESPONSE*:**

a) Table 9, p.12 reports the total benefit cost, the elements of which are detailed in Table 14, p.19. Total benefit cost includes statutory benefits, employee future benefit costs, and benefit costs directly related to the compensation packages for London Hydro's active employees.

In Table 17, the benefits by group and average benefits amounts reported are based on the benefit costs related of London Hydro's active employees' compensation packages. Government mandated programs such as CPP, EI, EHT, and WSIB are excluded. Costs related to retirees are also removed.

b) Please see Appendix SEC 7 – Table 17 for FTE totals for 2004 actual, 2005 actual and 2006 actual.

25. Ref: Exhibit 4 / p. 23 / Table 17

Please provide the base salary percentage increases budgeted for 2008 bridge and 2009 test years, broken down by the major employee grouping shown in Table 17.

***RESPONSE*:**

Please see the following table:

MAJOR EMPLOYEE GROUP	2008 Budgeted Base Salary Increases	2009 Budgeted Base Salary Increases
Executive	2.50%	3.90%
Director	3.00%	3.25%
Middle Management - supervisory	3.00%	3.25%
Non Union - non-supervisory	3.00%	3.25%
Union	3.00%	3.25%

26. Ref. Exhibit 4 / p. 18 – Performance-based Compensation

London Hydro indicates that it has a performance based compensation system and that the source of funding for the pay-out under this plan is restricted to savings that can be achieved through efficiency, productivity and cost avoidance measures. London Hydro notes that this element of total compensation (non-union group) is not included in OM&A for rate making purposes.

Given the source of funding for the compensation system, please explain what steps London Hydro takes to ensure that managers do not withhold efficiency and productivity savings in their 2009 Test Year budgets. In your answer please elaborate the measures, if any, taken during budget preparation for review and approval for the 2009 Test Year in this regard.

***RESPONSE*:**

There are no specific steps taken to ensure that managers do not withhold efficiency and productivity savings in their 2009 Test Year budgets since it is assumed that all management of London Hydro have a sufficient degree of integrity that they would not be inclined to do that.

As indicated in Appendix CCC 10 – Budget Docs Provided to LH BOD, budgets are prepared and presented to the Board of Directors at a significant level of detail, which would make withholding of savings or efficiencies very difficult for anyone who may be inclined to do so.

In 2009, London Hydro management would be required to achieve costs savings and efficiencies of approximately 1% of total OM&A costs in order to qualify for performance based compensation. This is not an unreasonable expectation for any organization and in fact is lower than the productivity factor that the OEB would apply to London Hydro in 3rd Generation IRM. For example savings might be achieved through supplier contract renegotiations or discounting, realignment of job functions to reduce staff levels or defer staffing increases, outsourcing certain activities or development of in-house expertise to avoid or reduce external consulting costs. Many of these cost savings measures are not predictable or quantifiable at the time of budget preparation and thus surface as cost savings measures that were not incorporated in the budget at the time of budget preparation.

27. Ref. Exhibit 4 / p. 43 / Table 25 – Software OM&A

The evidence indicates that Software Expense is increasing from $458,853 in 2007 actual to $770,600 in 2009 Test Year OM&A.

a) Please provide a listing of the specific software expenses (indicating the item and the dollar amount) that account for this increase of $311 K or 67% increase from 2007 actual.

b) Please confirm whether or not any of the costs in the 2009 Test Year will not recur in either in 2010, 2011 or 2012. If there are non-recurring items, please identify the amount.

***RESPONSE*:**

a) See the table provided below listing the significant software expenses that account for the increase of $311k over the 2007 actual results. The main contributors are related to the new software maintenance costs for the new SAP Customer Information System ($249,200), the new Voice over Internet Protocol - VoIP ($15,000), and the new Geographic Information System installed late in 2007 ($20,200).

SOFTWARE O&M

ITEM	2007 ACTUAL	2009 TEST	CHANGE	EXPLANATION FOR CHANGE
Customer Information System - SAP	-	249,240	249,240	SAP - new CIS system - system developed to allow for future enhancements within the industry
Geographical Information Sysem - Intergraph	18,160	38,400	20,240	ESRI in 07, Intergraph in 09 - More complete and taylored system to the needs of LH. In 2007 the ESRI payment was made to fulfill our maintenance contractual agreement in order to use the system until the new GIS software from Intergraph was developed and ready for use. Intergraph is higher because it is a more complete custom package
Voice Over Internet Protocol (VoIP) - Bell	-	15,000	15,000	The VoIP Manager Service offering from Bell includes eight main components: advanced surveillance (for detecting and prioritizing incidents), incident management (for detecting and restoring VoIP devices), problem management (advanced investigation of recurring incidents), change management (auto-submits changes to the service desk), release management (for deficiency analysis, implementation and reporting), configuration management (periodic verification and backup), reporting (electronically distributed), and 24/7 bilingual service desk.
Vmware (Virtual System Mtce)	12,395	20,600	8,205	Was started in 2007 on some of the servers, has been expanded because of the success
Saltspring - Microsoft	89,882	79,360	(10,522)	New Contract for Microsoft license - renewed at a slightly lower rate for first year 2009 is the first year of a three year contract that increases each year then reconciles at the end of the contract period. 2007 was the second year of the previous 3 year contract. The value is expected to increase by 10% in 2010 and another 5% in 2011, at which time a reconciliation will take place to close the contract. In 2008 the reconciliation for the prior 3 years amounted to an additional $30,000 to be paid for the use of Microsoft licenses over the three period
Itron	38,021	47,000	8,979	MV90 / Mwweb SW/phone annual support, xi-comm sw - MV 90XI is a proven solution for invterval data collection, management and analysis from commercial and industrial(C&I) metering devices. It can be used as a data collection engine that interfaces to existing data management and analysis tools, or as an end to end interval data management solution The product is used for communication with our large customers (>200 kW), whereas smartmetering will be communication with our residential and smaller customers (<50kW)
Oracle - JDEdwards and The GL Company	82,120	87,600	5,480	JDEdwards support, Enterprise GLCompany support / licences
ADP Canada	7,906	9,200	1,294	HR Resource Partner
Xerox	17,332	21,300	3,968	Docushare, LDAP connector, licenses, scan to desktop
Oracle	44,775	47,600	2,825	Webserver applications and reporting tools (Oracle internet application server std ed etc)
Other Miscellaneous	148,263	155,300	7,037	
	458,853	770,600	311,747	

b) There are no non-recurring items in the table above, however, new technology changes in 2010, 2011 and 2012 could impact the actual expense in those years.

28. Ref. Exhibit 4 / p. 48 – Training Expenses

London Hydro states that Corporate training costs have increased significantly due to the apprenticeship program and other development programs. Table 27 indicates that employee development training increases from $312,000 in 2007 to $510,000 in 2009. Please indicate how much of this increase is due to apprenticeship training. In London Hydro's response, please note the number of apprentices that will be trained in 2009.

***RESPONSE*:**

The total estimated cost of the apprenticeship training will be $80,000 in 2009. As part of the succession plan, London Hydro has 10 new additional positions for apprentices, and currently has 6 other positions that are filled with learners or apprentices. There will be a total of 16 employees in 2009 being trained as an apprentice or learner at an approximate cost of $5,000 per employee.

29. Ref: Exhibit 2 / p. 6 – Capitalization Policy

London Hydro indicates that it does not capitalize, through internal cost allocations, any indirect support costs such as Finance, Human Resources, Corporate Services or Facilities

a) In preparing its 2009 Test year budget, did London Hydro consider changing its capitalization policy concerning the capitalization of indirect costs?

b) Please confirm that London Hydro does not intend to change, except for conformance with IFRS, its capitalization policy underpinning its 2009 rates, including the aforementioned treatment of indirect support costs, during period from 2009 to 2012 inclusive.

***RESPONSE*:**

a) London Hydro did not consider changing its capitalization policy concerning the capitalization of indirect costs in the preparation of its 2009 Test Year. Given the pending implementation of IFRS, in which companies will not be allowed to allocate administration and other general overhead costs it did not appear reasonable to London Hydro to consider such a change.

See Appendix OEB 29 for IFRS IAS 16-19, and also an excerpt from the OEB IFRS consultation document provided to LDCs in August 2008 provided for your convenience.

b) At this time, London Hydro does not intend to change the capitalization policy underpinning its rates during the period 2009 to 2012 inclusive, unless as required by OEB directive. It appears, at this time, that London Hydro's existing capitalization policy is consistent with the requirements under IFRS.

30. Ref: Exhibit 4 / p.39 / ll. 1-7

London Hydro states that it implemented an approach to capitalizing betterments made to buildings that is more conservative than was previously used. Using this approach, London Hydro has also expensed minor renovation and replacement costs. When did London Hydro start to use this more conservative approach to capitalizing betterments to buildings? What is the approximate dollar value of the annual costs (for the 2009 test year) which are now expensed as a result of this change?

***RESPONSE*:**

A more conservative approach to capitalizing betterments to buildings followed the independent evaluation of the market value of London Hydro's administrative and operations facilities completed in 2005. Commencing in 2006, minor building renovations were no longer capitalized.

The dollar value of the annual costs which are now expensed as a result of this change is approximately $190k in the 2009 Test Year. This includes, among others, an ongoing carpet replacement program; the reconfiguration of shop areas for the construction department and instrumentation and control; minor paving projects; office redesigns; and various electrical, plumbing, lighting and duct work modifications.

31. Ref: Exhibit 4 / p. 93 – Regulatory Expenses

The pro forma account (Account 5655 – Regulatory Expenses) for provides for the following amounts.

2006 Actual:	$351.6 K
2007 Actual:	$537.9 K
2008 Bridge:	$458.0 K
2009 Test:	$468.6 K

a) Please provide a list of the items or services that comprise the amounts for shown for 2007, 2008 and 2009.

b) Are the cost amounts identified above full year costs, or do they reflect some form of amortization of regulatory costs?

c) Please indicate what portion of the 2009 amount is related to expected costs for this current rate application being considered under file number EB-2008-0235.

d) Are other regulatory-type costs recorded in any other accounts in for 2007, 2008 and 2009? If so please indicate the account(s) involved and the amount(s) recorded in each affected account.

***RESPONSE*:**

a) The table below details the cost components included in OEB account 5655 – Regulatory Expenses for 2007, 2008, and 2009.

Regulatory Expense (OEB 5655)				
	2007 ACTUAL	2008 ACTUAL	2008 BRIDGE	2009 TEST
OEB Regulatory Expense	485,101	342,642	360,000	367,200
OEB Hearing Expense	-	87,818	70,000	221,400
IMO Prudential Fees	52,800	28,485	28,000	28,600
TOTAL LH ACTUAL/BUDGET	537,901	458,945	458,000	617,200
Adjustment for 2009 RA				(148,600)
TOTAL INCLUDED IN RA (OEB 5655)				**468,600**

Description of Cost Components:

Regulatory Expense
includes:
- Quarterly Assessments under Ontario Regulation 16/08
- Sec 30 Cost Awards
- Annual Registration Fees
- One time writeoff of unrecoverable CDM program costs (2007 = $142k LH will not pursue recovery) (see E4, Page 51, Line 19)

OEB Hearing Expense
includes:
- Legal and consulting services required in the preparation of a rate application or other formal cases before the Board or other regulatory body
- Communication costs incurred to notify public of rate application
- Printing and courier costs related to the preparation of rate application, interrogatory responses, and hearing attendance
- Incremental accomodation, meals etc incurred during a rate application proceedings

NOTE: Allocation of internal resources is NOT included. These costs remain part of various OEB General and Admin Expense group (ie 5610 - Management Salaries and Exp, 5615 - General and Administrative Salaries & Exp etc)

IESO Prudential Fees
includes:
- Fees paid to CIBC for the bank standby letter of credit provided in the amount of $6.6 mil to the IESO

NOTE: The amount of the prudential decreased in 2008 from the previously required amount of $13.2 mil

b) The amounts presented by the Board are full year costs for 2007 and 2008. The amount shown for 2009, namely $468.6K, reflects a four year amortization of the total expected costs related to this current rate Application.

c) Included in the regulatory expense for 2009 is $72,850 related to the expected costs for this Application. London Hydro recognizes the Board's desire to amortize the cost of this rate application over a period of four years. Please refer to Exhibit 4, p. 51, line 24. Please note that there is an error in the commentary on page 51 of

Exhibit 4. A late adjustment to the amount was made once London Hydro became aware that the hearing expense should be spread over 4 years and not 3 as was originally thought. The amount in OEB account 5655 was adjusted downward for this purpose; however, the commentary was not fully changed to reflect the change in the amount. The commentary on line 27 should correctly read: *The total expense is anticipated to be $291,400, however, the amount included in the proposed 2009 Test Year is only $72,850, or one-fourth of the total cost.* London Hydro regrets any inconvenience this error may have caused.

The following details the calculation of the amortized amount.

	TOTAL	Over 4 YRS	Over 3 YRS
Hearing Expense Estimated for 2008	70,000	17,500	23,333
Hearing Expense Estimated for 2009	221,400	55,350	73,800
TOTAL Hearing Expense	291,400	72,850	97,133
Remove 3/4 of total Expense	(218,550)		
Hearing Expense in the 2009 RA	72,850		
2009 Test Year Before Adjustment		221,400	221,400
Less Adjustment for LH budget for RA		(148,550)	(124,267)
Amount in RA		72,850	97,133

d) There are no other regulatory-type costs recorded in any other accounts.

32. Ref: Exhibit 4 / p.9, pp. 57-58 and p. 67 – Shared Services

London Hydro indicates that its OM&A are net of cost recoveries, most of which are for services provided to the City of London, its affiliate/owner. The offsets, ranging between $4.2 and $3.7 million includes fees for monthly water billing, customer inquiry and receivables, collection of overdue customer account fees. London Hydro notes that these are costed at market rates. The table below provides a history of cost recoveries.

(in thousands)		2006 EDR	2006 Actual	2007 Actual	2008 bridge	2009 Test			
Cost Recoverables		$ (4,176)	$ (3,623)	$ (3,643)	$ (3,605)	$ (3,658)			
Year-on year change	$	na	$ 552.40	$ (19.60)	$ 37.90	$ (53.00)			
	%	na	-13.2%	0.5%	-1.0%	1.5%			
Cost Recoverables Components							Account	Account	Account
monthly water billing									
customer inquiry/receivables collection									
collection of over due customer account fees									
aprrenticeship training tax credits									
plant locate services for city									
Total		$ (4,176)	$ (3,623)	$ (3,643)	$ (3,605)	$ (3,658)			

a) Please complete the table by breaking out the Cost Recoverable total into its components.

b) For each component please identify 4 digit account which records the recovery for the 2009 Test Year OM&A.

c) The evidence states that $.45 million reduction in recoveries between 2006 Board-approved and 2007 actual reflects a reduction in the fee paid by the City of London for monthly water billing and related services. London Hydro states that a survey had indicated that, on an average monthly per customer basis, the previous fee was about double what other municipalities were paying for similar services. Also, the Application indicates that the 2006 actual reflects the discontinuation of cable locate services to the City of London. Please indicate the extent to which the drop in recoveries was offset by a decrease in the costs to provide these services.

***RESPONSE*:**

a) and b)

Please see the chart below for a break out of the Cost Recoveries and the OEB accounts which reflects these credits.

(in thousands)		2006 Board Approved	2006 Actual	2007 Actual	2008 Bridge	2009 Test
Cost Recoverables		**$ (4,176)**	**$ (3,623)**	**$ (3,643)**	**$ (3,605)**	**$ (3,658)**
Year on Year Change	$	na	$ 553.0	$ (20.0)	$ 38.0	$ (53.0)
	%	na	-13.2%	0.6%	-1.0%	1.5%

Cost Recoverables Components	**2006 Board Approved**	**2006 Actual**	**2007 Actual**	**2008 Bridge**	**2009 Test**	**OEB Account**
Water Billing						
Supervision	(47,745)	(43,566)	(46,333)	(48,075)	(47,372)	5305
Meter Reading Expenses	(894,458)	(923,259)	(941,872)	(889,255)	(875,306)	5310
Customer Billing	(1,309,282)	(1,053,162)	(1,024,273)	(1,073,216)	(1,103,849)	5315
Collecting	(828,519)	(620,013)	(627,522)	(651,455)	(657,473)	5320
Management Salaries and Expenses				(60,281)	(76,890)	5610
General and Admin Salaries & Expense	(364,960)	(310,616)	(317,727)	(204,356)	(177,153)	5615
Office Supplies & Expense	(55,040)	(49,384)	(42,273)	(42,737)	(38,561)	5620
Outside Services Employed				(55,625)	(73,396)	5630
Sub Total Recovery related to Water Billing	(3,500,004)	(3,000,000)	(3,000,000)	(3,025,000)	(3,050,000)	
Other						
Apprenticeship Training Tax Credit	-	(19,803)	(12,986)	(15,000)	(28,000)	5120/5045/5055
Plant Locate Service for City	(139,992)	-	-	-	-	5085
Control Room Services	(10,000)	(10,000)	(10,000)	(10,000)	(10,000)	5010
Collection of Overdue Customer Account Fees	(478,815)	(527,054)	(585,550)	(535,000)	(550,000)	5330
Other Miscellaneous Cost Recoveries	(46,930)	(66,427)	(34,354)	(20,000)	(20,000)	various
TOTAL	**(4,175,742)**	**(3,623,284)**	**(3,642,889)**	**(3,605,000)**	**(3,658,000)**	

c) As a result of the consultants study that indicated the water billing fees being charged to the City of London were substantially in excess of the going market rates, London Hydro performed a more detailed review of the associated costs and the relative portions related to the water billing function. Prior to that, costs being recovered were based upon a simplified and outdated general allocation of total costs that did not fully exclude certain cost elements that did not relate to the water billing activities.

As a result of this analysis, total costs remained the same, but the amounts allocated to the water billing function were reduced.

The work load reductions that resulted from the discontinuance of locate services to the City were offset with significant increases in the levels of locates required for distribution infrastructure since 2005. As discussed in Exhibit 4, pp. 60 – 61, and shown in Chart 3 at page 61, this increase in work load resulted in higher costs for outsourced locate services.

33. Ref: Exhibit 4 – Non-recurring Items

a) Please identify any non-recurring expenditure items (in excess of $ 50,000) that are included on the 2009 OM&A forecast.

b) Do the 2008 bridge or the 2009 test year OM&A forecasts include costs for the change to International Financial Reporting Standards? If so, please indicate the amount and the account.

***RESPONSE*:**

a) The 2009 OM&A forecast includes only a single non-recurring item (in excess of $50,000) related to the 2009 regulatory hearing expense in the amount of $72,850. Please refer to London Hydro's response to Board Staff Question 31 for a related discussion.

b) Included in the 2009 Test Year is $25,000 in OEB account 5630 for the estimated costs of consulting services required during 2009 to assist London Hydro in the transition to IFRS. London Hydro is now forecasting that expenditures required during 2009 will range between $50,000 - $75,000 and additional funding with be required in 2010 that will likely be higher than the current 2009 forecast.

CDM

34. Ref: Exhibit 1 / p. 44 – LRAM / SSM

London Hydro states that it "has elected not to file an application for a CDM-related lost revenue adjustment ("LRAM") or shared savings mechanism ("SSM") with this Application." Board staff recognizes that application for LRAM or SSM disposition is at the discretion of the distributor. However, significant build-up of a surplus or deficiency could be of concern if unaddressed.

Please indicate London Hydro's balances for LRAM and/or SSM as of December 31, 2008. Please separately identify principal and carrying charges.

***RESPONSE*:**

As Board Staff have acknowledged, the decision to file an application for LRAM or SSM disposition is at the discretion of the distributor. Similarly, London Hydro is not aware of any Board Directive or accounting policy that requires a distributor to track and maintain accounting records for an LRAM or SSM that they have elected not to file for disposition.

Based upon the information London Hydro has filed under the Board's Requirements for Annual Reporting of CDM Initiatives, London Hydro has estimated that the value of an LRAM claim, if London Hydro were to file one, would be approximately $617,000 for the period 2005 to 2007.

Our estimate of a potential LRAM claim if we were to submit one, is as illustrated in the following table. We have not prepared any estimated calculations with respect to an SSM claim.

Estimate Lost Revenue Calculations

	2005	2006	2007	Cummulative
Energy Saved				
Residential Kwhs	1,489,352	19,170,528	18,019,872	38,679,752
Commercial Kwh's	305,292	475,406	10,014,887	10,795,585
Traffic signals Kwh's	289,504	134,009	136,129	559,641
Streetlight Kwh's	3,735,900	3,891,395	3,889,275	11,516,571
Demand Saved				
Residential Kw's	170	836	2,817	3,823
Commercial Kw's	58	90	2,782	2,930
Traffic signals Kw's	33	15	31	80
Streetlight Kw's	427	445	889	1,760
Distribution Rates - Energy				
Residential	$ 0.0110	$ 0.0130	$ 0.0131	
Commercial	$ 0.0083	$ 0.0097	$ 0.0098	
Traffic signals	$ 0.0083	$ 0.0085	$ 0.0086	
Streetlight	n/a	n/a	n/a	
Distribution Rates - Demand				
Residential	n/a	n/a	n/a	
Commercial	$ 1.0952	$ 1.2894	$ 1.2977	
Traffic signals Kw's	n/a	n/a	n/a	
Streetlight Kw's	$ 1.1951	$ 1.4144	$ 1.4235	
Lost Revenue - Energy				
Residential	$ 16,383	$ 249,217	$ 236,060	$ 501,660
Commercial	$ 2,534	$ 4,611	$ 98,146	$ 105,291
Traffic signals	$ 2,403	$ 1,139	$ 1,171	$ 4,713
Streetlight	$ -	$ -	$ -	$ -
	$ 21,320	$ 254,967	$ 335,377	$ 611,664
Lost Revenue - Demand				
Residential	$ -	$ -	$ -	$ -
Commercial	$ 64	$ 116	$ 3,610	$ 3,790
Traffic signals	$ -	$ -	$ -	$ -
Streetlight	$ 510	$ 629	$ 1,265	$ 2,405
				$ -
	$ 574	$ 745	$ 4,876	$ 6,194
Total Lost Revenue	$ 21,893	$ 255,712	$ 340,252	
Cumulative Lost Revenue		$ 277,606	$ 617,858	$ 617,858

Lost Revenue - By Customer Class	2005	2006	2007	Cummulative
Residential	$ 16,383	$ 249,217	$ 236,060	$ 501,660
Commercial	$ 2,597	$ 4,727	$ 101,756	$ 109,081
Traffic signals	$ 2,403	$ 1,139	$ 1,171	$ 4,713
Streetlight	$ 510	$ 629	$ 1,265	$ 2,405
	$ 21,893	$ 255,712	$ 340,252	$ 617,858

35. Ref: Exhibit 4 / p. 91 - CDM

The 2009 Test Year budget provides for an estimate of $134,300 in account 5415 (Energy Management). Please describe the program(s) funded by account 5415 for the 2009 test year.

***RESPONSE*:**

This budget covers general energy conservation items that are not funded by OPA programs. Programs include those that are promoted through the "Mayor's Sustainable Energy Council" and programs with the University of Western Ontario and Fanshawe College.

London Hydro is continuously looking for opportunities to promote energy conservation and does not focus only on whether it is covered by the OPA program, but rather on merit and value for London Hydro's customers.

This program allows London Hydro to dialogue directly with its customers on how to effectively manage their electrical usage.

Labour and incremental costs related to programs initiated under OPA programs are excluded from OM&A.

Deferral and Variance Accounts

36. Ref: Exhibit 1 / pp. 77-78; Exhibit 5 / pp. 4-5 – Deferral and Variance Accounts

London Hydro has provided the audited amounts of Regulatory Assets and Liabilities in Exhibit 1, and the balances and transactions by account, starting at December 31, 2007 in Exhibit 5.

a) Please show how the long-term regulatory liability item $3,817k (Exhibit 1 / p. 77) is derived from the applicable amounts in individual accounts (Exhibit 5 / Tables 1 and/or 2).

b) Please use the attached spreadsheet to provide a continuity schedule for the period from January 1, 2005 up to December 31, 2007.

c) Please confirm that those accounts that appear on the spreadsheet provided but are not included in London Hydro's pre-filed evidence (e.g., account 2425) would be zero. If not zero, please fill in those accounts in the spreadsheet.

***RESPONSE*:**

a) Item $3,817k (Exhibit 1/p. 77) is the non-commodity RSVA balance as at Dec 31, 2007. Values from Exhibit 5 Tables 1 and 2 that comprise this number are:

Table 1 a/c 1582	$344,694;
Table 1 a/c 1584	$2,076,193;
Table 1 a/c 1586	$(61,787); and
Table 2 a/c 1580	$(6,176,472).

These 4 non-commodity RSVA accounts total $(3,817,372) which is expressed in thousands as $3,817 in Exhibit 1 page 77.

b) Please refer to Appendix OEB 36 – Deferral Accounts (excel spreadsheet)

c) London Hydro confirms that those accounts that appear on the spreadsheet provided but are not included in London Hydro's pre-filed evidence (e.g., account 2425) are zero.

37. Ref: Exhibit 5 / p. 7 – Regulatory Asset Recovery Rate Riders

a) Please provide the derivation of the proposed rate riders, showing how each of the accounts that is being disposed of is allocated to the respective rate classes, and showing the forecasted billing quantities (either those starting at May 2009 or September 2009).

b) Please calculate an alternative set of rate riders that would dispose of the net balance of accounts 1518, 1548, 1550 and 1582, in addition to the accounts covered in part a), based on the projected balances at April 30, 2009 and assuming that the recovery would begin at May 1, 2009.

c) Please calculate an alternative set of rate riders that would dispose of the net balance of all deferral and variance accounts, except those having to do with Smart Meters and PILs, based on the projected balances at April 30, 2009 and assuming that the recovery would begin at May 1, 2009.

***RESPONSE*:**

a) Please refer to Appendix OEB 37 a – Deferral Accounts

b) Please refer to Appendix OEB 37 b – Deferral Accounts

c) Please refer to Appendix OEB 37 c – Deferral Accounts

Loss Factors

38. Ref: Exhibit 4 / pp. 76-77 – Total Loss Factors

a) The first row in Table 35 is not equal to either row in Table 36. Please confirm that the difference is due to Embedded Generation serviced by London Hydro.

b) Please explain whether the amount of Embedded Generation is added to the IESO amount adjusted or not adjusted for Supply Facility Losses.

c) Please confirm that the amount in Table 35 row 1 for 2006 is an error, being lower than either of the corresponding amounts in Table 36. If possible, provide the correct amount.

***RESPONSE*:**

a) The first row in table 35 includes embedded generation purchases plus amounts purchased from Hydro One Networks to supply London Hydro customers being served through long-term load transfers.

b) The amount of Embedded Generation is added to the IESO amount not adjusted for Supply Facility Losses.

c) Yes, the amount in Table 35 row 1 is incorrect. In the process of responding to this interrogatory, London Hydro has discovered a formula error that is restricted to the calculations that were made in tables 35 and 36. This formula error has been corrected and revised tables 35 and 36 are presented in Appendix OEB 38 – Loss Factors.

39. Ref: Exhibit 4 / p. 76 and Exhibit 9 / p. 22 – Total Loss Factor

London Hydro has provided the background that would support a Total Loss Factor of 1.0368, but is applying for approval of a TLF of 1.0419. Please provide further explanation for this apparent difference.

***RESPONSE*:**

As London Hydro has advised in its response to OEB Question 38, the values in exhibit 4 page 76 have been corrected for a formula error that was discovered. London Hydro's revised calculations now indicate that the Total Loss Factor is 4.11% . The value of 4.11% is the average value for all customer classes of London Hydro, whereas the value of 1.0419 indicated above is the specific value related to Secondary Metered Customers <5000 kW.

Retail Transmission Service Rates

40. Ref: Exhibit 9 / p. 13 – Retail Transmission Service Rates

For Retail Transmission Service Rates ("RTSRs"), London Hydro proposes to increase Network rates for all customer classes by 11.3%, and Connection rates by 5.5% above the currently approved rates. These are the same percentages as the increases in the Uniform Transmission Rates that came into effect on January 1, 2009.

Please provide monthly revenue and cost data for as many months as possible since May 2008, i.e. the period during which the previous wholesale rates and the current retail rates were in effect. Please provide any analysis that might be helpful in understanding any sizeable disparities between Retail Transmission Services costs and recoveries that may have occurred during that time period.

***RESPONSE*:**

The analysis on the following page provides the purchase and billing information for May 2008 to January 2009.

	Network			
Month	**Purchases**	**Billings**	**Variance**	**Var %**
May-08	$ 1,031,114	$ (1,396,972)	$ (365,859)	-35%
Jun-08	1,072,203	(1,224,313)	(152,110)	-14%
Jul-08	1,515,236	(1,407,731)	107,505	7%
Aug-08	1,521,152	(1,389,931)	131,221	9%
Sep-08	1,383,638	(1,424,415)	(40,776)	-3%
Oct-08	1,425,582	(1,303,940)	121,642	9%
Nov-08	1,041,444	(1,153,343)	(111,899)	-11%
Dec-08	1,216,948	(1,263,206)	(46,258)	-4%
Jan-09	1,243,775	(1,377,448)	(133,672)	-11%
	$ 11,451,093	$ (11,941,299)	$ (490,205)	-4%
Var Jul to Jan	**$ 9,347,777**	**$ (9,320,013)**	**$ 27,764**	**0%**

	Connection			
Month	**Purchases**	**Billings**	**Variance**	**Var %**
May-08	$ 1,006,580	$ (1,256,375)	$ (249,794)	-25%
Jun-08	1,042,371	(1,209,596)	(167,226)	-16%
Jul-08	1,458,785	(1,402,024)	56,761	4%
Aug-08	1,473,778	(1,379,921)	93,857	6%
Sep-08	1,417,433	(1,421,635)	(4,202)	0%
Oct-08	1,365,930	(1,302,904)	63,027	5%
Nov-08	1,041,204	(1,167,519)	(126,315)	-12%
Dec-08	1,212,840	(1,250,088)	(37,247)	-3%
Jan-09	1,227,618	(1,358,325)	(130,708)	-11%
	$ 11,246,539	$ (11,748,388)	$ (501,848)	-4%
Var Jul to Jan	**$ 9,197,588**	**$ (9,282,416)**	**$ (84,828)**	**-1%**

Monthly Trending Since May 1/08 Rate Adjustment

	Combined Network & Connection			
Month	**Purchases**	**Billings**	**Variance**	**Var %**
May-08	$ 2,037,694	$ (2,653,347)	$ (615,653)	-30%
Jun-08	2,114,574	(2,433,910)	(319,336)	-15%
Jul-08	2,974,021	(2,809,755)	164,266	6%
Aug-08	2,994,930	(2,769,852)	225,078	8%
Sep-08	2,801,072	(2,846,050)	(44,978)	-2%
Oct-08	2,791,513	(2,606,844)	184,669	7%
Nov-08	2,082,648	(2,320,862)	(238,214)	-11%
Dec-08	2,429,789	(2,513,294)	(83,505)	-3%
Jan-09	2,471,393	(2,735,773)	(264,380)	-11%
	$ 22,697,632	$ (23,689,686)	$ (992,054)	-4%
Var Jul to Jan	**$ 18,545,365**	**$ (18,602,429)**	**$ (57,065)**	**0%**

This analysis indicates that for the period from July 2008 to January 2009 the revenues and costs for network and connection charges are fairly evenly matched and are not creating any significant variance account accumulations.

The significant variances shown for May and June 2008 result from the fact that rate changes which occurred on May 1, 2008 were not fully reflected in the above analysis until approximately July 2008 due to the flow through of unbilled consumption at April 30, 2008 being billed at previous rates during May and June 2008.

Other month to month variances occur as a result of variances in billing cycles and customer consumption patterns from month to month.

41. Ref: Exhibit 9 / p. 20

The proposal is to continue with RTSRs that are higher for customers in GS 50 – 4999 kW class that are interval-metered, amounting to more than $1 per kW higher compared to customers that are not interval-metered.

a) Is there a cost basis for the distinction between interval- and non-interval-metered customers? If so, please explain.

b) What is the intent as Smart Meters are installed throughout the class – to move all customers to the interval-metered rate, or to develop a rate that is the (weighted) average of the two rates now proposed? Please explain the rationale underlying London Hydro's response.

***RESPONSE*:**

a) The interval metered customer consumption characteristics tend to be very coincident with (mirror) the aggregated London Hydro energy profile and therefore have a greater contribution to a distributor's demand requirements. In addition, the interval-metered customer class measured interval demand variables are more accurate for rate design activities than non-interval, requiring less estimation and fewer assumptions regarding allocation of energy to be made.

b) London Hydro has a policy of only installing interval meters (5 or 15 minute) in the demand rate class identified as General Service 50 to 4,999 kW. Therefore, any customer that has an interval meter installed would be moved to the interval meter rate. Please note that London Hydro has the authority to define the mandatory interval meter threshold within the DSC, which is currently set at 200 kW of average peak billed demand. The number of customers between 50 and 4,999 kW is quite small in relation to the total customer base.

42. Ref: Exhibit 9 / p. 21

The proposal is to continue with the same format and wording as in the current tariff, including interval metering distinguished in the Cogeneration and Large User classes. In the interests of simplicity:

a) Can two lines be dropped from the Cogeneration tariff by eliminating the metering distinction?

b) Can the description of the metering be dropped from the Large User tariff?

***RESPONSE*:**

a) Yes.

b) Yes.

Cost Allocation

43. Ref: Exhibit 8 / p. 7 – Cost Allocation Informational Filing

a) Please provide, for the record of this Application, an electronic copy of London Hydro's cost allocation study EB-2007-0002 (rolled-up Informational Filing). Provide either Run 1 or Run 2, whichever is more relevant to this Application.

b) If the revenue-to-cost ratios in worksheet O1 of the Informational Filing do not match the ratios in the third column of Table 4, please provide an explanation of any variance(s).

RESPONSE

a) Please refer to Appendix OEB 43a – Cost Allocation Filing

b) The revenue to cost ratios in worksheet O1 differ slightly from those in the third column of Table 4 due to a correction that has been made for the manner in which Stand-By revenues where treated in the original filing. The differences are shown in the following table. The impact of adjustment on other classes is minimal due to the fact that the revenue requirement for Standby Power is only 0.7% of the total revenue requirement. Details of the adjustments are provided in Appendix OEB - 43b.

Customer Class	Adjusted London Hydro CA Results	Original London Hydro CA Results	Adjustments Made
Residential	108.6%	109.2%	-0.5%
GS <50 kW	126.3%	126.8%	-0.5%
GS 50 to 4,999 kW	75.9%	76.2%	-0.3%
GS 50 to 4,999 kW (Co-Generation)	247.0%	247.1%	-0.2%
Standby Power	84.8%	2.3%	82.5%
Large Use >5MW	80.8%	80.9%	-0.1%
Street Light	16.7%	16.9%	-0.2%
Sentinel	14.2%	14.4%	-0.2%
Unmetered Scattered Load	56.6%	56.9%	-0.4%

Rate Design

44. Ref: Exhibit 9 / p.6 / Table 7 and Exhibit 9 / p. 32 – Unmetered Scattered Load

For Unmetered Scattered Load, London Hydro proposes to increase the Monthly Service Charge from $0.42 to $1.20 per connection, with the effect of increasing the fixed:variable split from 15:85 to 30:70.

a) Please give the rationale for increasing the fixed:variable split for this class while maintaining a constant split for all other classes.

b) The illustrative bill impact calculation for USL shows a bill where the split is closer to 70:30. Please confirm that the intended split is 30:70 and provide a brief explanation for what seems to be an inconsistency between the two references.

***RESPONSE*:**

a) As indicated in Exhibit 9/ p.6 / Table 7, the existing fixed revenue portion of 15% for this class is out of line with all other classes and significantly below the average fixed revenue split of 55%. This proposed adjustment is to move the fixed revenue portion for this class to be more reflective of the fixed portion assigned to the other classes.

b) The illustrative bill impact referred to in the Question (at Exhibit 9 / p.32) shows that fixed distribution revenue is $12.01 and variable distribution revenue is $28.00 for a total revenue of $40.01 before other charges and rate riders. This is a fixed /variable split of 30:70.

Transformer Ownership Allowance

45. Exhibit 1 / pp. 212-213 and Exhibit 9 / p. 22 – Transformer Ownership Allowance Credit

Under London Hydro's proposal, Large Users will no longer be eligible to receive the transformer ownership allowance, because no transformer costs are allocated to that class. London Hydro's Conditions of Service currently do not appear to specify that a customer in the Large User class must supply its own transformer. Is it possible that a Large Use customer might receive transformer service from London Hydro while paying a rate that has the transformer ownership allowance credit effectively built into it?

***RESPONSE*:**

London Hydro's existing Conditions of Service do not provide for the provision of transformation services at the large use (5 MW and above) level . If a customer at that level were to request London Hydro to provide transformation services, then the customer would be requested to pay the full cost of providing that service which is currently not included in London Hydro's Conditions of Service.

To date, London Hydro has not had any requests of this nature, and does not anticipate any in the foreseeable future.

PILs

46. Ref: Exhibit 4 / pp. 79-80 – PILs

London Hydro proposes to amortize the CCA for the new CIS placed in service in 2009 over four years for regulatory purposes, in order to smooth the PILs allowance recovered in rates. London Hydro states that the accelerated CCA of class 12 computer equipment and software would result in CCA allowances of $3,369,937 in each of 2009 and 2010, and $0 in each of 2011 and 2012. CCA Class 12 expenditures are eligible for 100% deduction after applying the half-year rule. London Hydro advises that while the application of the CCA rates in accordance with tax law requirements will result in a reasonable recovery of PILs in 2009 rates, absent a specific regulatory adjustment there will be an under-recovery in 2011 and 2012, when London Hydro would be under IRM rate adjustments, unless London continued to spend similar amounts on computers in those years. Since the capital plans of these future periods are not subject to scrutiny under 2009 EDR, it is not clear that the requested amortization is necessary.

a) Please provide summaries of Tax (PILs) Calculations as shown in Table 37 in Exhibit 4 / p. 81 and Table 40 in Exhibit 4 / p. 84 applying the accelerated CCA in accordance with tax law.

b) On January 27, 2009, the Federal Government introduced its 2009 Budget, which was subsequently passed by Parliament. The 2009 Budget provided for further accelerated write-off (100% with no half-year rule) of certain computer equipment acquisitions made after January 26, 2009.

i) Please indicate what, if any, impacts the most recent Federal Budget would have on London Hydro's estimate of its PILs allowance for 2009.

ii) If there is any material impact, please provide summary tax calculations as shown in Tables 37 and 40 reflecting all known tax changes.

c) The Board's general practice has been that a utility should manage its tax exposure so as to reasonably minimize its tax expense in the current period, by taking advantage of, for example, available loss carry-forwards or other eligible strategies. London Hydro's proposal goes contrary to general Board practice for setting 2009 electricity rates. Please identify, and file available information, on any precedents that London is aware of and/or relying on where amortization of tax allowances is smoothed over a period of time.

***RESPONSE*:**

a) Please refer to Appendix OEB 46 - PILs

b)
i) Please refer to Appendix OEB 46 – PILs and London Hydro's response to LPMA Question 43

ii) Please refer to Appendix OEB 46 - PILs

c) London Hydro has taken advantage of all available tax planning strategies with respect to its PILs calculation, but unfortunately the factors that are driving the matter to which London Hydro is seeking relief are beyond its control.

London Hydro has a non-recurring computer software expenditure of $6,739,874 which will not be reoccurring in 2011 or 2012. Due to the tax laws which London Hydro cannot control and the CCA rates which London Hydro cannot control, there will occur significant CCA deductions in 2009 and 2010 which will not reoccur in either 2011 or 2012. Without any normalization adjustment in 2009 to the PILs component that will be recovered through rates for 2011 and 2012, London Hydro will incur a significant under-recovery through rates for the PILs component of $1,659,820 during 2011 and 2012.

Capital additions and investments in new technology are driven by the operational needs of the organization, and not by tax planning strategies, which are secondary considerations in these circumstances. As explained in Exhibit 2, Appendix B, the expenditures required on new technology were necessary and the timing of these expenditures is driven by the operational requirements of the utility.

As London Hydro has stated in its response to LPMA Question 42a, normalization of costs is a standard Board practice as can be evidenced in virtually every Decision the Board has issued in the 2008 Cost of Service rate applications with respect to the regulatory hearing costs associated with these applications and any similar non-recurring expenses.

London Hydro suggests that the principle to be addressed here is not whether the Board has approved the "normalization" of CCA deductions for income tax purposes, but whether or not normalization of any rate component is a standard practice used by the Board. As evidenced in many Decisions issued by the Board, normalization of costs is a common practice.

Of greater relevance here is the basic principle of fair treatment. There is little doubt in this specific instance, that London Hydro will incur significant financial penalties due to no fault of its own, as result of the unique characteristics of our tax

laws. London Hydro seeks nothing more than the recovery through rates of the PILs that it will pay.

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Appendix OEB 7 – Quality of Supply Reports

January 2008
Reliability Incident Summary

Action Items

Incident 2: Doug Tevlin – to develop a plan for annual inspection of automated switches for battery check.

Incident 8: Same as above.

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1. **Date**: Wednesday, January 9th **Outage ID**: 08-20

Category: Defective Equipment **Cause**: Elbow Failure

Cust-Min: 56,550 **Cust-Aff**: 435

SAIDI contribution: 0.007 **SAIFI contribution**: 0.003

Description:

An elbow inside TE 3158 was found to be defective. The outage took place in the Grenfell North Park subdivision where portions of the electrical plant are over 30 years old.

Action Plan:

- The downtime from the failure of the transformer elbow will be considered in the SPOORE analysis in future years, to prioritize rebuild of aging infrastructure. No further action required.

2. **Date**: Friday, January 11th **Outage ID**: 08-27

Category: Loss of Supply **Cause**: HONI Problem

Cust-Min: 2,616,385 **Cust-Aff**: 19,616

SAIDI contribution: 0.307 **SAIFI contribution**: 0.138

Description:

Two breakers operated at Talbot TS, the 26M55 and 26M56. The 26M55 had a hold-off in place at the time and did not reclose. However, upon releasing the H/O state, the breaker did not 'engage' properly and could not be closed back in; it had to be swapped with a spare breaker. Due to the wide-spread power outage in the north-west of the city (the 'blackout"), and the temporary load transfers to allow construction, the power restoration process was extremely difficult. Slow traffic and two inoperable automated switches including a newly installed recloser (T51R-3) contributed to the extremely long outage duration.

Action Plan:

- The extent of the outage made it qualify for a Major Event Day (MED) according to the IEEE 2.5 Beta Method. HONI is investigating the cause of the breaker failure.

- Action – **Doug Tevlin** to develop a plan to visit each automated switching device once a year and confirm/ensure battery operation. Currently, batteries are changed every four years. No further action required.

3. **Date**: Monday, January 14th **Outage ID**: 08-20

Category: Defective Equipment **Cause**: Defective Transformer

Cust-Min: 40,120 **Cust-Aff**: 180

SAIDI contribution: 0.005 **SAIFI contribution**: 0.001

Description:

Another defective transformer affected the upper White Hills area and had to be changed out. According to the on-call supervisor, the transformer may have suffered an internal fault; both bushings (-1 and -2) were completely dislodged. The Underground Electric Dept. staff pulled out the bayonet fuse which was no longer submersed in oil; it is possible the unit had been leaking for a while and had lost most of its oil.

Action Plan:

- This subdivision was determined to be the most unreliable one in the 2007 SPOORE analysis. It is being rebuilt in two phases (in 2008 and 2009). No further action required.

4. **Date**: Tuesday, January 22nd **Outage ID**: 08-49

Category: Human Element **Cause**: Incorrect Construction

Cust-Min: 205,120 **Cust-Aff**: 5,074

SAIDI contribution: 0.024 **SAIFI contribution**: 0.036

Description:

While a H/O was in place on the 19M26 feeder, the breaker at the TS operated. After one unsuccessful attempt to close the breaker, an automated switch was used to restore most of the customers. The Line department inspected the overhead lines back to the station and found a cable fault at the riser on the red phase. The termination was replaced. Approximately 150,000 customer minutes of interruption were saved using the automated switch.

Figure 1, Cable fault on the 19M25 (2007)

Figure 2, Cable fault on the 19M26 (2008)

Action Plan:

This failure occurred in a similar manner to the one from last August[1] on the 19M25 riser. The cable failed below the termination under the 3M mounting bracket, which inadvertently contacted the concentrics that were tied together underneath the bracket. This arrangement was identified to have been done incorrectly since it creates multi-point bonding of the concentrics: one at the TS and one at the riser due to contact with the bracket which is grounded. The similarity of the two failures can be easily seen in the two photos above. The existing installations that were completed incorrectly were identified and are in the process of being redone by isolating from ground the CN at the riser. No further action required.

5. **Date**: Monday, January 28th **Outage ID**: 08-57

Category: Defective Equipment **Cause**: Cable Fault

Cust-Min: 30,660 **Cust-Aff**: 192

SAIDI contribution: 0.004 **SAIFI contribution**: 0.001

Description:

A cable fault was found in Pond Mills subdivision east of Glenroy Rd, between TE 4396 and TE 1996. The cable was 1/0 Al, 28 kV XLPE installed in 1988.

Action Plan:

- This subdivision is already being monitored for its performance. The electrical infrastructure in general is over 30 years of age. The first cable fault happened last year. There are several live-front transformers supplying the area and switching can present safety concerns. The cable fault location was added to the database. No further action required.

6. **Date**: Wednesday, January 30th **Outage ID**: 5 outages

Category: Adverse Weather **Cause**: Various

Cust-Min: 89,505 **Cust-Aff**: 6,350

SAIDI contribution: 0.010 **SAIFI contribution**: 0.045

Description:

Five outages were counted in this category the same day when a winter storm accompanied by blowing snow caused damage to the infrastructure (a set of broken taps, 2 broken poles, etc.) One outage resulted from a breaker operation on the 19M28 but lasted only five minutes.

Action Plan:

- No action is required.

[1] Distribution Reliability Incident Report – August 2007, Incident 6 (August 29th, 2007)

7. **Date**: Wednesday, January 30th **Outage ID**: 08-63

Category: Tree Contacts **Cause**: Limb on Line

Cust-Min: 170,688 **Cust-Aff**: 672

SAIDI contribution: 0.020 **SAIFI contribution**: 0.005

Description:

During the same snowy day, a tree took down the primary conductor on Central Ave. west of Richmond St. and resulted in a breaker operation on the 8K4. The power was restored after more than four hours only after cleaning up the area, since there are no means of sectionalizing this 13.8 kV feeder.

Action Plan:

- The downtown area has not been trimmed in the last several years. As stated in many previous reports though, the tree trimming program cannot prevent broken limbs from falling off trees during storms. No action is required.

8. **Date**: Thursday, January 31st **Outage ID**: 08-76

Category: Loss of Supply **Cause**: HONI Problem

Cust-Min: 297,558 **Cust-Aff**: 3,384

SAIDI contribution: 0.035 **SAIFI contribution**: 0.024

Description:

A breaker operation on the M7 feeder at Wonderland TS resulted in a large power outage; the breaker would not close back in upon opening up. HONI came on site and carried out some quick repairs on the closing coil after which the breaker was functional. The customers were picked up in stages after the feeder had been sectionalized due to fault indicators that showed up on some automated switches. No failure was found on the system after the Line Dept. patrolled the whole feeder.

Action Plan:

- The P53A-6 failed to operate in order to restore the power. The battery was found to be low; the I&C staff replaced it several days later. See action item under Incident #2. No further action required.

* * *

Prepared by: Cristina Terek, P.Eng.
Distribution Reliability Engineer

February 2008
Reliability Incident Summary

No Action Items

1. **Date**: Friday, February 8th **Outage ID**: 08-93

Category: Human Element **Cause**: Incorrect Use of Equipment

Cust-Min: 50,787 **Cust-Aff**: 4,617

SAIDI contribution: 0.006 **SAIFI contribution**: 0.032

Description:

The riser switch on the 19M29 feeder was inadvertently opened when the crews were carrying out repairs on adjacent poles. Power was restored on the feeder after approximately 10 minutes.

Action Plan:

- No action is required.

2. **Date**: Wednesday, February 13th **Outage ID**: 08-103

Category: Defective Equipment **Cause**: Defective Switch

Cust-Min: 130,732 **Cust-Aff**: 9,338

SAIDI contribution: 0.015 **SAIFI contribution**: 0.066

Description:

The 32M5 feeder was de-energized in order to carry out repairs on a red phase splice, which was found damaged during a manhole inspection at the station – yet, it did not create an outage. While a hold-off was in effect on the 32M4 feeder (supplying the load on 32M5 as well), the 32M5CA-1 flashed over when closed in causing the breaker on the 32M4 to open up. Unfortunately, this feeder was carrying the load of 32M5 and part of the 26M54 at the time, so almost 10,000 customers experienced an outage.

Action Plan:

- The defective 3M splice was sent for analysis. Investigation is underway to determine if the LC grounding connector could have been the cause of the defective splice. No further action required.

* * *

Prepared by: Cristina Terek, P.Eng.
Distribution Reliability Engineer

March 2008
Reliability Incident Summary

Action Items

Incident 1 – Doug Tevlin to develop a new maintenance plan for the automated switches and reclosers (see Action Items in January 2008 report)

Incident 2 – Cristina Terek to monitor monthly contribution of LOS related outages to unreliability

1. **Date**: Friday, March 14th **Outage ID**: 08-157

Category: Defective Equipment **Cause**: Defective Switch

Cust-Min: 41,980 **Cust-Aff**: 474

SAIDI contribution: 0.005 **SAIFI contribution**: 0.003

Description:

A new Viper recloser (M49R-3), which had been installed as a replacement for a failed SCADAMATE switch a month ago, operated on the 19M28 but with no fault indication. It could not be closed back in by the operators. Two automated switches were used (M49A-6 and M50A-2) to partially restore the power – the second one requiring manual operation – saving approximately 600 customer minutes.

Action Plan:

- The I&C department was notified that the recloser appeared defective and that there were problems with the automated switch.
- It was found (and confirmed by Schweitzer Labs) that the recloser opened up with the trip alarm set on a *"low level"* providing no audible sound to the operators; however, no cause justified tripping of the unit. Aside from some re-wiring in the control cabinet, the recloser was manually tested in the field using the handles (closed-opened-closed), and also remotely from the Control Room. Since March 26th it was left in the closed position but as an open point, to test if it would malfunction again but avoiding an outage.
- The automated switch M50A-2 that also failed to operate remotely will have its batteries replaced. A large stock of replacement batteries was ordered and half have already been delivered. Action – **Doug Tevlin** to develop, co-ordinate and implement a cyclical testing program in conjunction with problems discovered throughout an audit of all the automated switches. This will hopefully prevent or reduce the number of instances when automated switches do not respond remotely. No further action required.

2. **Date**: Tuesday, March 18th **Outage ID**: 08-161

Category: Loss of Supply **Cause**: HONI

Cust-Min: 133,893 **Cust-Aff**: 4,617

SAIDI contribution: 0.016 **SAIFI contribution**: 0.032

Description:

The breaker on the M29 feeder at Buchanan TS operated. HONI was unable to reclose the breaker and had to send P&C personnel to investigate potential problems with the breaker. Power was restored after half an hour for more than 4,000 customers supplied from this feeder.

Action Plan:

- HONI had to address a relay problem at the TS in order to restore the breaker status. The monthly reliability statistics are now reported two ways: with and without loss of supply. Since Loss of Supply (LOS) is becoming a highly contributing cause to reliability, consideration may be given to request an incident report from HONI for the larger outages. Action – **Cristina Terek** to monitor the monthly contribution of LOS related outages. No further action required.

3. **Date**: Thursday, March 20th **Outage ID**: 08-173

Category: Adverse Environment **Cause**: Flashover

Cust-Min: 68,960 **Cust-Aff**: 251

SAIDI contribution: 0.008 **SAIFI contribution**: 0.002

Description:

The East Section of the Pond Mills subdivision was once again affected by a large outage. This time it was a flashover inside TE 1989 which lead to several fuses upstream operating due to mis-coordination. This pattern has been recognized in the past where fuses of the same size are utilized in series. After being cleaned up by the Underground Electric Service Dept., the transformer was restored to normal. However, the outage was extremely long (3 to 7 hours for some customers).

Action Plan:

- This subdivision, over 30 years old, is being analysed in SPOORE due to the poor performance of the cables. With the addition of the defective transformers as a new variable in the analysis, it is expected that this year's analysis will bring it into the top three subdivisions recommended for rebuild. The protection issues would be addressed through elimination or replacement of live-front enclosures at the time of rebuild. No further action required.

4. **Date**: Tuesday, March 25th **Outage ID**: 08-176

Category: Adverse Environment **Cause**: Flashover

Cust-Min: 124,768 **Cust-Aff**: 4,741

SAIDI contribution: 0.015 **SAIFI contribution**: 0.033

Description:

At SUB-35, a porcelain insulator on the middle phase of the gang operated switch 35T1-L flashed over and was completely destroyed, according to staff on duty that day. In an attempt to backfeed 35F1 by using the adjacent feeder 93F1, the breaker at SUB-93 opened up. The substation had to be isolated because of the single-phasing condition. Afterwards, all three feeders at SUB-35 were picked up. The station was restored after eight hours while the Line Department reconstructed the phase that had blown, replacing one of the large stand-off insulators of an old, horizontally-mounted load-break switch (as illustrated below).

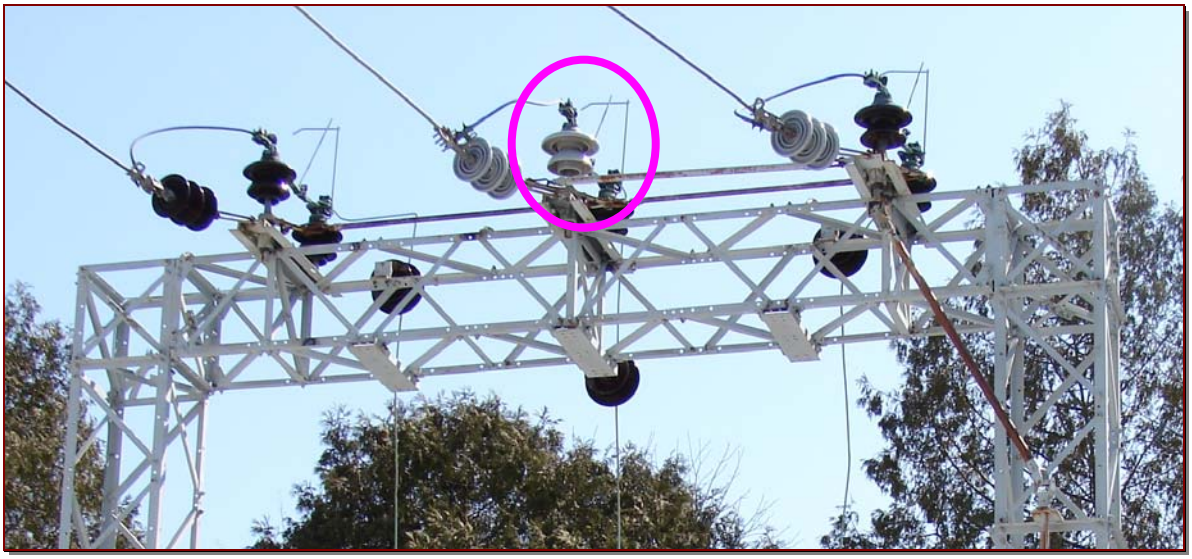


Figure 1, Gang operated switch 35T1-L

Action Plan:

- SUB-35 has experienced numerous outages of prolonged duration. Any time repairs are needed after an outage takes place, it is difficult to pick up its load without causing low voltage problems. Also, the majority of the outages seem to be due to the station's outdoor tower-structure design which is prone to flashovers, animal contacts, etc. There are no plans for total conversion of the station at this time but measures are being taken to reduce its exposure. This year, a portion of the load in Park Lane Estates is being converted to 27.6 kV. Also, wildlife protection will be implemented on the exposed live secondary bus. No further action required.

* * *

Prepared by: Cristina Terek, P.Eng.
Distribution Reliability Engineer

April 2008
Reliability Incident Summary

No Action Items

1. **Date**: Tuesday, April 1st **Outage ID**: 08-183

Category: Defective Equipment **Cause**: Mid Span Tap

Cust-Min: 76,500 **Cust-Aff**: 3,000

SAIDI contribution: 0.009 **SAIFI contribution**: 0.021

Description:

After customers had phoned in to report the power was out, the line crews determined the cause of the outage to be a mid span tap that had burnt off at the intersection of Bradley Ave. and Adelaide St. Two automated switches were used for power restoration saving approximately 67,500 customer minutes. However, the M23 breaker had to be opened at the station for the repairs to take place, again interrupting the power.

Action Plan:

- No action is required.

2. **Date**: Thursday, April 3rd **Outage ID**: 08-192

Category: Foreign Interference **Cause**: Vehicle Accident

Cust-Min: 50,040 **Cust-Aff**: 405

SAIDI contribution: 0.006 **SAIFI contribution**: 0.003

Description:

The breaker on the F2 feeder at SUB-9 tripped. Upon ensuring crews working outside of the station were safe, the breaker was tried but with no success. A car accident had taken down a pole at the intersection of Connaught and Glasgow St. which had to be replaced. While isolating the area and picking up the rest of the customers from the station, an in-line switch flashed over and the breaker had to be opened again to install some jumpers.

Action Plan:

- The driver is being charged for the damage. No further action required.

* * *

Prepared by: Cristina Terek, P.Eng.
Distribution Reliability Engineer

May 2008
Reliability Incident Summary

Action Items

Incident 2 – Rod Doyle to review relay settings at SUB-93.

1. **Date**: Thursday, May 22nd **Outage ID**: 08-312

Category: Foreign Interference **Cause**: Dig-in

Cust-Min: 705,052 **Cust-Aff**: 7,336

SAIDI contribution: 0.083 **SAIFI contribution**: 0.052

Description:

A contractor was digging in the Pond Mills East subdivision near the intersection of Deveron and Glenroy Rd, and caused a cable failure. The damage to the infrastructure was not limited to the cable. A series of incidents followed during the power restoration process that lasted from early afternoon until late in the night (i.e. 200 customers had no power for over 16 hours). The sequence of main events that contributed to this large power outage follows:

- The faulted cable between TE 4144 and SE 1982 caused the unnecessary operation of three more upstream fuses on the red phase: at SE 1982, at SE 2298 and at the riser SW 0190 (all sized 200K as confirmed by one of the standby supervisors);
- In addition to the dig in, a broken switch (SW 0192) and two blown elbows – one at TE 2433 and another at TE 2432 – were discovered during the restoration phase;
- After the repairs the switch on the red phase was refused and closed in for the fourth time; however, this time it caused it to flashover to the other two phases; due to the hold-off on the 19M28 feeder, the breaker at the station opened up causing a power interruption for more than 5,000 customers this time.

Action Plan:

- The isolated cable from the riser 0190 was tested on June 4th; a stress cone was found to be defective at the live-front transformer TE 1762. The Underground Residential Services department completed the repairs.
- Electrical Safety Authority (ESA) was on-site at London Hydro inspecting this incident in regards to the transformer that blew the door open under the fault condition. Normally, a transformer cannot be locked unless the penta-head locking mechanism is secured in place.
- Due to the age of the underground primary conductor and the faults experienced in this subdivision, the area is being monitored in the SPOORE analysis, ranking fairly high as a candidate for cable rebuild in the future. Operability and safety will also be important determining factors. Mis-coordination is also addressed during an underground rebuild project. No further action required.

2. **Date**: Wednesday, May 28th **Outage ID**: 08-329

Category: Foreign Interference **Cause**: Dig-in

Cust-Min:	89,561	**Cust-Aff**:	927
SAIDI contribution:	0.011	**SAIFI contribution**:	0.007

Description:

A contractor cut the underground conductor on the white phase using outdated locates. It happened in the Berkshire subdivision between TE 1128 and SE 972. Instead of the riser fuse clearing the fault, the breaker 93F3 at the municipal substation opened up. Switching was performed to isolate the damaged cable for repairs and power was restored to all customers.

Action Plan:

- The standby supervisor made note of the fact that the relays on the 93F3 breaker[1] did not seem to coordinate with the riser fuse; the high set instantaneous had been set too low (2,300 amps). Investigation of the relay settings is underway – for comparison, similar substations have the high-set instantaneous element set at about 8,000 amps. Action – **Rod Doyle** to review the relay settings at SUB-93 and ensure coordination with lateral fuses.
- The contractor was billed for the damage. No further action required.

3. **Date**: Saturday, May 31st **Outage ID**: 08-343

Category: Tree Contacts **Cause**: Limb on Line

Cust-Min:	36,750	**Cust-Aff**:	175
SAIDI contribution:	0.004	**SAIFI contribution**:	0.001

Description:

A large tree came down during a storm at the intersection of Chippendale and King Edward causing damage to the overhead lines. The lateral fused switch 902 on the 15F3 circuit cleared the fault.

Action Plan:

- The area is due for tree trimming this year. As has been mentioned in many reports, this cyclic program is intended to maintain clearances between bare conductors and the surrounding growing vegetation. No measure can prevent trees from breaking during severe storms. No action is required.

* * *

Prepared by: Cristina Terek, P.Eng.
Distribution Reliability Engineer

[1] The breakers at SUB-93 were re-equipped with new SEL-351S electronic relays in 2003 when the station was re-constructed.

June 2008
Reliability Incident Summary

No Action Items

1. **Date**: Friday, June 6th **Outage ID**: 08-369

Category: Adverse Weather **Cause**: High Loads

Cust-Min: 38,500 **Cust-Aff**: 350

SAIDI contribution: 0.005 **SAIFI contribution**: 0.002

Description:

The fused switch on one phase of the south leg of the feeder at SUB-43 operated due to high loads. The customers were backfed using the 93F1 feeder.

Action Plan:

- This municipal substation is not equipped with any protective devices. A Viper horizontal recloser is scheduled to be installed this year on the 4 kV feeder at the station riser, which will protect against temporary faults.
- The feeder is split – going north and south – using fused switches of non-standard type: 300K expulsion links. These have operated often in the past under high load conditions. Upon the installation of the recloser the fused switches 1966 and 1967 will be replaced by solid-blade switches. No further action required.

2. **Date**: Saturday, June 7th **Outage ID**: 08-372

Category: Foreign Interference **Cause**: Vehicle Accident

Cust-Min: 57,855 **Cust-Aff**: 435

SAIDI contribution: 0.007 **SAIFI contribution**: 0.003

Description:

A contractor working for CN Rail hit a pole at the intersection of Riverside Dr. and Beaverbrook Ave. causing the breaker on the 38F2 feeder to operate. The Line Department had to reposition the primary conductor in order to close the breaker and pick up the customers. The pole was repaired at a later date.

Action Plan:

- CN Rail was billed for the damage. No further action required.

3. **Date**: Saturday, June 7th **Outage ID**: 08-373

Category: Defective Equipment **Cause**: Elbow Failure

Cust-Min: 45,495 **Cust-Aff**: 360

SAIDI contribution: 0.005 **SAIFI contribution**: 0.003

Description:

A failed elbow caused the transformer door to blow open at TE 3753 (in the Lockwood Park subdivision, between Commissioners and Southdale Rd). Switching was performed using the dual load break switch transformers in the area in order to isolate and change out the unit.

Action Plan:

- Defective transformers continue to be monitored in conjunction with subdivisions where the cable is 25 years of age or older. No further action required.

4. **Date**: Saturday, June 7th **Outage ID**: 08-374

Category: Defective Equipment **Cause**: Defective Arrester

Cust-Min: 42,920 **Cust-Aff**: 145

SAIDI contribution: 0.005 **SAIFI contribution**: 0.001

Description:

A defective arrester was found on the blue phase at riser SW 0920; this is a radial supply. As a result of the failed arrester, a lead was found burnt and the fuse operated; the termination was also damaged. The customers were off for the entire duration of the repairs.

Action Plan:

- There are plans to supply a new community centre in the nearby area using a separate riser and potentially tying into the existing supply to form a loop. This will create an opportunity to backfeed during outages. No further action required.

5. **Date**: Sunday, June 8th **Outage ID**: 11 outages

Category: Lightning **Cause**: Various

Cust-Min: 247,188 **Cust-Aff**: 2,132

SAIDI contribution: 0.029 **SAIFI contribution**: 0.015

Description:

A variety of equipment (fuses, conductors, drop leads, transformers and elbows) was affected by a storm on the overhead and underground systems, on both 27.6kV and 4 kV systems. The cumulative downtime in a single day was quite large due to a longer response time (approximately 2 hours) as a result of most outages that day happening within one hour.

Action Plan:

- No action is required.

6. **Date**: Sunday, June 8th **Outage ID**: 08-378, 08-384

Category: Tree Contacts **Cause**: Limb on Line

Cust-Min: 149,868 **Cust-Aff**: 703

SAIDI contribution: 0.018 **SAIFI contribution**: 0.005

Description:

The storm system passing through London during the course of June 8th and June 9th caused approximately 25 outages in total (storm related, including the events related to in the above incident). Of those 25, two larger ones fell in the tree contacts category. A 4 kV line on 35F2 was taken down by a tree on Boler Rd in Byron, between Baseline and Commissioners Rd. The second incident affected customers on the 32M5 feeder, also in Byron at the sky hill, when trees contacted an overhead line at a riser near a piece of switchgear.

Action Plan:

- Trees were trimmed at the second location before power was restored. Tree trimming was completed early last year at both locations where these outages occurred. No further action required.

7. **Date**: Sunday, June 22nd **Outage ID**: 08-453

Category: Foreign Interference **Cause**: Vehicle Accident

Cust-Min: 300,604 **Cust-Aff**: 3,601

SAIDI contribution: 0.035 **SAIFI contribution**: 0.025

Description:

The recloser at Q46R-6 opened up when a truck hit a pole at the intersection of Brydges and Childers St. The feeder breaker (19M29) auto-reclosed at the same time. A portion of the circuit was isolated in order to replace the pole and then most of the customers restored.

Action Plan:

- The contractor will be charged for the damage. No further action required.

8. **Date**: Thursday, June 26th **Outage ID**: 08-471

Category: Lightning **Cause**: Defective Pothead

Cust-Min: 51,093 **Cust-Aff**: 317

SAIDI contribution: 0.006 **SAIFI contribution**: 0.002

Description:

During another very stormy day, several breakers opened up on the 13.8 kV system: 13M15 at Nelson, 1K1 at SUB-1 and the and the 518 feeder at SUB-8. After isolating certain sections, the 13M15 circuit was picked up. However, when trying to reclose the 1K1, its breaker opened up again. A cable fault was suspected between 1E4-1 inside the oil switch and the

riser SW 5048. Later, it was discovered that the riser pole had been damaged by lightning and the terminator was affected; both need to be changed out.

Action Plan:

- No action is required.

9. **Date**: Thursday, June 26th **Outage ID**: 25 outages

Category: Lightning **Cause**: Various

Cust-Min:	746,326	**Cust-Aff**:	8,841
SAIDI contribution:	0.088	**SAIFI contribution**:	0.062

Description:

This was the second day in the month of June that lightning accounted for so many outages in one day. All three voltage systems were affected; most outages were concentrated in the late afternoon.

Action Plan:

- The response time averaged one and a half hours, slightly better than during the first storm, on June 8th. No action is required.

* * *

Prepared by: Cristina Terek, P.Eng.
Distribution Reliability Engineer

July 2008
Reliability Incident Summary

Action Item: Incident 1 – Bill Milroy to analyze protection at 13.8kV SUBs

1. **Date**: Tuesday, July 8th **Outage ID**: 08-526

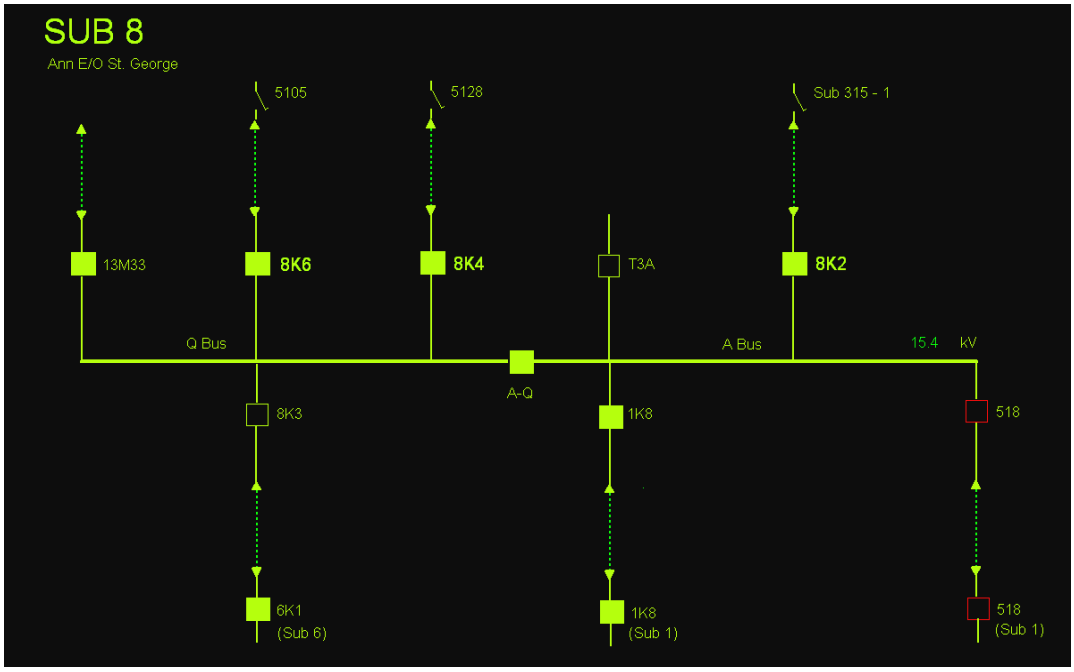
Category: Human Element **Cause**: Incorrect Protection Settings

Cust-Min: 57,561 **Cust-Aff**: 4,739

SAIDI contribution: 0.007 **SAIFI contribution**: 0.033

Description:

A series of unwarranted breaker operations on the 13.8 kV system resulted in many customer interruptions. The sequence of main events is presented below:



1) 6K1 breaker trips while temporarily feeding SUB-8;
2) SUB-8 isolated by opening 8K3 breaker and picked up by closing 1K8 at SUB-8;
3) 1K8 breaker at SUB-1 trips afterwards;
4) 1K8 breaker is closed at SUB-1 to restore SUB-8;
5) The A-Q tie at SUB-8 is opened to reduce the load on 1K8;
6) 6K1 trips losing the Q Bus at SUB-8;
7) Load is restored using the 13M33 feeder from Nelson and closing the A-Q tie;
8) All breakers' status is being restored after customers picked up.

Action Plan:

- No fault condition was found at any of the substations during the troubleshooting process and the restoration steps. It is presumed that the protection relays at many of these breakers have incorrect ground settings or, an excessive load unbalance is present triggering these cascade breaker operations in the loop configured system. Action item – **Bill Milroy** to investigate the protection scheme of the breakers between all 13.8 kV looped substations (SUB-1, SUB-6, SUB-8) and determine whether changes are required or whether it is better to wait until the network system is reconfigured. No further action required.

2. **Date**: Wednesday, July 9th **Outage ID**: 08-531

Category: Tree Contacts **Cause**: Limb on Line

Cust-Min:	122,152	**Cust-Aff**:	5,095
SAIDI contribution:	0.014	**SAIFI contribution**:	0.036

Description:

A tree limb that fell across the electric lines on Pall Mall W/O Waterloo St. caused two breaker operations and a power interruption on each circuit; 26M53 – which had a hold-off at the time and the underbuild 8K6 from SUB-8. An automated switch on the 27.6 kV system (Q50A-1) saved approximately 58,000 customer minutes of interruption.

Action Plan:

- The area of the city's downtown where this tree contact occurred has not been covered by the tree trimming program in a long time. The entire area should be trimmed as part of the 5-year plan especially if recurrent outages happen. No further action required.

3. **Date**: Saturday, July 19th **Outage ID**: 08-559

Category: Tree Contacts **Cause**: Limb on Line

Cust-Min:	67,057	**Cust-Aff**:	1,950
SAIDI contribution:	0.008	**SAIFI contribution**:	0.014

Description:

The 4M17 breaker opened up and was tried once without success. An automated switch that indicated the fault was downstream was used to restore power to part of the feeder saving approximately 47,000 customer minutes. While patrolling the overhead lines, some burnt branches were found and required isolation of General Dynamics (SUB-232). Temporary openers were used on Clarke Side Rd N/O the river and the customer was picked up using the 70M6 at Q44-5.

Action Plan:

- The tree trimming program covered only the south part of the Q45 grid where this contact occurred. This was completed in 2004. Same action as above applies.

4. **Date**: Saturday, July 26th **Outage ID**: 08-582

Category: Loss of Supply **Cause**: Raccoon

Cust-Min: 38,793 **Cust-Aff**: 12,931

SAIDI contribution: 0.005 **SAIFI contribution**: 0.091

Description:

HONI had a bus breaker (T5-B) trip at Wonderland TS losing supply on M1, M3, M5 and M7. A large number of customers were interrupted but only for a very short duration. Confirmed by HONI afterwards, a raccoon entered the station and made contact.

Action Plan:

- No action is required.

5. **Date**: Tuesday, July 29th **Outage ID**: 08-596

Category: Foreign Interference **Cause**: Vehicle Accidents

Cust-Min: 50,650 **Cust-Aff**: 240

SAIDI contribution: 0.006 **SAIFI contribution**: 0.0102

Description:

A pole was taken down by a vehicle causing 2 phases at the recloser 3108R to open, as well as the recloser on one phase of the F2 feeder at SUB-97. The response time for the incident was extremely high (3.5 hours), as it took time to troubleshoot the long rural feeder serviced by SUB-97. The switch 3107 on Glanworth Road was opened for the repairs.

Action Plan:

- The F2 feeder is being outfitted with remote fault indicator signals back to SCADA. If the project is successful, this technology will help reduce the outage time by quicker troubleshooting. No further action required.
- The contractor is being charged for the damage.

6. **Date**: Wednesday, July 30th **Outage ID**: 08-598

Category: Lightning/Loss of Supply **Cause**: Defective Fuse

Cust-Min: 132,706 **Cust-Aff**: 4,203

SAIDI contribution: 0.016 **SAIFI contribution**: 0.030

Description:

A fuse operated under lightning conditions at SW 02166 interrupting the power at Sun Canada Pipeline. At the same time the breaker on the 70M7 feeder opened up at Clarke TS. The combination of the events contributing to this outage led to classifying it under two causes: lightning and loss of supply. Once the breaker opened at the station, HONI was unable to close it back (due to a blown fuse in the closing circuit). One automated switch did not

operate remotely (R47A-7) but a second one that helped restore the power (R47A-4) saved approximately 61,500 customer minutes in the restoration process.

Action Plan:

- The status of the automated switch R47A-7 is to be determined. A copy of the incident report will be forwarded to HONI. No further action required.

7. **Date**: Wed, July 30th-July 31st **Outage ID**: 08-605

Category: Defective Equipment **Cause**: Cable Fault

Cust-Min:	26,825	**Cust-Aff**:	135
SAIDI contribution:	0.003	**SAIFI contribution**:	0.001

Description:

A cable fault occurred in the Westminster Park East subdivision. The cable on the white phase was found faulted between TE 3064 and TE 2168 - it was 1/C #1/0 Al, XLPE installed in 1979.

Action Plan:

- Westminster subdivision has been under observation because of the failure frequency on cable that is either approaching or has reached 30 years of age. Based on the results of the SPOORE analysis, selective areas were rebuilt last year. A much larger remaining portion of the subdivision (where this failure occurred) is continuing to be monitored for trends. No further action required.

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Prepared by: Cristina Terek, P.Eng.
Distribution Reliability Engineer

August 2008
Reliability Incident Summary

No Action Items

1. **Date**: Friday, August 1st **Outage ID**: 08-611

Category: Lightning **Cause**: Conductor

Cust-Min: 115,736 **Cust-Aff**: 3,068

SAIDI contribution: 0.014 **SAIFI contribution**: 0.022

Description:

During an evening dominated by lightning, a lead burnt off at recloser R50-6 (at Grosvenor and Waterloo St.) and interrupted the supply downstream on the red phase. The breaker at Talbot TS (26M47) had to be opened for the Line Departments to make the repairs.

Action Plan:

- No action is required.

2. **Date**: Friday, August 1st **Outage ID**: 08-613

Category: Tree Contacts **Cause**: Limb on Line

Cust-Min: 46,560 **Cust-Aff**: 97

SAIDI contribution: 0.005 **SAIFI contribution**: 0.001

Description:

A large tree fell on the lines taking down the conductors at English and Princess St. The fuse at SW 02343 – a single phase lateral – opened up clearing the fault. Although the outage lasted all night, it had minimal impact on SAIFI .

Action Plan:

- The area has not been trimmed recently (grid Q-48). It will be covered during the 6-year cycle of tree trimming, in approximately 2-3 years. No further action required.

3. **Date**: Saturday, August 2nd **Outage ID**: 11 outages

Category: Lightning **Cause**: Various

Cust-Min: 94,269 **Cust-Aff**: 6,310

SAIDI contribution: 0.011 **SAIFI contribution**: 0.044

Description:

A variety of equipment was affected by lightning causing 11 outages on the same day. A substantial number of customer minutes (30%) are from events that occurred on the 8 kV rural system. Particularly, customers supplied by SUB-97 were affected at three locations. Again, the overall response time for the outages at this station was close to five hours.

Action Plan:

- A pilot project at SUB-97 to automate fault detection and communication back to the SCADA master system was attempted this year without success – the communication between fault indicators installed at various locations and the wireless transmitters failed to be established. The fault indicators will be used for easier troubleshooting on this extremely long feeder. Several other types of equipment for protection are available on the market: a *trip* saver from S&C and/or an electronic sectionalizer in conjunction with a *Versa-Tech* recloser from Hubbell are under consideration at this time. No further action required.

4. **Date**: Sunday, August 17th **Outage ID**: 08-681

Category: Defective Equipment **Cause**: Cable Fault

Cust-Min: 111,267 **Cust-Aff**: 3,404

SAIDI contribution: 0.013 **SAIFI contribution**: 0.024

Description:

A lead cable failed at the train overpass on Wonderland Rd just south of Oxford St. The breaker at Wonderland TS (32M7) opened up and could not be closed back in. HONI dispatched personnel who made the breaker available again. While attempting to transfer the load on the 32M8, the breaker experienced an auto-reclosure while the Q53R-5 tripped. The recloser failed to close in as well, while attempting to pick up the remaining load. The fault was discovered and isolated at the two risers. The restoration was also delayed by a vehicle colliding with the service truck. The cable was replaced at a later date.

Action Plan:

- The lead cable that failed was installed in the 1970's. Lead cable is normally expected to have a much longer life span. Its replacement with XLPE insulated cable eliminates the lead potheads that are no longer a standard at London Hydro. No further action is required.

5. **Date**: Thursday, August 21st **Outage ID**: 08-704

Category: Foreign Interference **Cause**: Vehicle Accidents

Cust-Min: 59,681 **Cust-Aff**: 886

SAIDI contribution: 0.007 **SAIFI contribution**: 0.006

Description:

A car struck a pole at the intersection of Trafalgar and Adelaide St. The breaker 13M15 at Nelson TS operated. While trying to isolate a section of the feeder and pick up customers, the

breaker opened up again. After the Line Department patrolled the feeder, the customers were picked up with no further incident.

Action Plan:

- The pole had to be changed out. The driver was charged for the damage. No further action required.

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Prepared by: Cristina Terek, P.Eng.
Distribution Reliability Engineer

September 2008
Reliability Incident Summary

No Action Items

1. **Date**: Sunday, September 14th **Outage ID**: 08-776

Category: Tree Contacts **Cause**: Limb on Line

Cust-Min: 439,162 **Cust-Aff**: 4,024

SAIDI contribution: 0.052 **SAIFI contribution**: 0.028

Description:

Several breaker operations were experienced on the 26M13 due to a tree limb that fell across the lines at Oxford and Sanatorium Road. Three attempts to close the breaker back in were unsuccessful as well as trying recloser (Q54R-1) that had also tripped; the batteries had failed on two automated switches on this feeder (Q55A-2 and Q55A-4) and as such, they did not provide any fault indication. After patrolling the line, the location where the tree contact occurred was cleared off and power restored.

Action Plan:

- There is a possibility that the two automated switches (Q55A-2 and Q55A-4) experienced a communication problem at the time of the outage; however, the I & C department checked their status and currently they are fully functional. No further action required.

2. **Date**: Sunday, September 14th **Outage ID**: 08-777

Category: Adverse Weather **Cause**: Broken Pole

Cust-Min: 92,795 **Cust-Aff**: 759

SAIDI contribution: 0.011 **SAIFI contribution**: 0.005

Description:

A pole came down in a backyard pulling the 4 kV circuit to the ground during adverse weather. Customers on two feeders were affected (51F2 and 39F2) as they were carried by the same breaker at SUB-51. Lines were isolated to replace the broken pole; a subset of customers experienced an interruption of very long duration.

Action Plan:

- No action is required.

3. **Date**: Thursday, September 25th **Outage ID**: 08-800

Category: Adverse Environment **Cause**: Flashover

Cust-Min: 31,650 **Cust-Aff**: 230

SAIDI contribution: 0.004 **SAIFI contribution**: 0.002

Description:

The Westminster North subdivision has experienced numerous faults in the past, the majority due to defective equipment (i.e. cable faults, transformer failures), or flashovers in air-insulated gear. A single-phase switchgear SE 2138 flashed over and was replaced with a new, solid dielectric enclosure several days after the incident. The fault interrupter at the upstream enclosure LC 1738 (which has an instantaneous element active) tripped to interrupt the fault; no auto-reclosure was experienced at the breaker eliminating the flicker nuisance characteristic generated by the operation of a fuse.

Action Plan:

- Switching in this subdivision is often of very long duration due to backyard construction and several old single-phase enclosures that sometimes have inoperable fuses. The subdivision has decreased in reliability in the last several years. Although a small portion of it (the north-west corner of Westminster East) had the cable replaced, outages continue to occur in the remainder of the subdivision. The area will continue to be monitored for reconstruction and advanced in priority if there is evidence of an increasing failure trend.
- Flashovers inside air-insulated switchgear have diminished in number substantially. This is the first flashover experienced this year. The unit that failed was a single-phase enclosure, which are now also being replaced by single-phase solid dielectric units upon failure. No further action required.

* * *

Prepared by: Cristina Terek, P.Eng.
Distribution Reliability Engineer

October 2008
Reliability Incident Summary

Action Items:
Incident 1 – Allan Van Damme to review subdivision supply layout

1. **Date**: Saturday, October 11th **Outage ID**: 08-836

Category: Defective Equipment **Cause**: Cable Fault

Cust-Min: 36,155 **Cust-Aff**: 229

SAIDI contribution: 0.004 **SAIFI contribution**: 0.002

Description:

A cable fault in Westminster subdivision (between TE 3061 and LC 2138 – a new single-phase solid dielectric enclosure) caused the fault interrupter on the red phase in LC 1738 to operate. As expected, due to the instantaneous nature of the interrupting element (4-5 cycles?), the feeder did not experience an A/R as happens when a fuse or a recloser operates. The conductor was #1/0 AL, 28 kV, XLPE installed in 1979.

Action Plan:

- This is the fifth cable fault in this part of the subdivision in the last five years. The subdivision is known to exhibit very poor reliability, mostly due to defective equipment[1]. It is also due to congested and poorly designed configurations which make switching/isolation a very cumbersome task. Because of the increase in the frequency of failures, the area will be re-examined in the SPOORE analysis for rebuild sooner if it outweighs other subdivisions previously ranked higher (i.e., White Hills – Phase 2). The cable fault was added to the database.
- Issues like switching difficulty and long outages in this subdivision have surfaced several times. Two bays at LC 1738 are backed up to each other, thus offering no reliable feedback (in case the LC is out of service). There are two risers feeding into the subdivision supplying thousands of customers. Action item – **Allan Van Damme** to review the subdivision layout and consider installing additional underground supply to LC 1738.

2. **Date**: Saturday, October 11th **Outage ID**: 08-838

Category: Defective Equipment **Cause**: Cable Fault

Cust-Min: 177,135 **Cust-Aff**: 8,485

SAIDI contribution: 0.021 **SAIFI contribution**: 0.060

[1] LC 2138 had been changed out a few weeks previously after a flashover that occurred inside the existing air-insulated unit - SE 2138 (see *Report for September*).

Description:

During the same night, a second cable fault was experienced in Gainsborough Meadows, a large and older subdivision (south of White Hills). Several elements contributed to a very large spread outage which started around midnight on Saturday and lasted, for more than a hundred customers, until early Sunday morning. A brief series of events is presented below:

- A stress cone had been found defective at TE 1850 originally;
- Two feeders (26M42 and 26M55) were paralleled to complete switching, to maintain supply to a three-phase transformer (TE 4946) from the same bus at Talbot TS;
- A fused switch was closed in to pick up the load after isolation of the presumed fault location causing both feeders to trip;
- Hi-potting the cable did not provide any indication; the fault was an 'open-circuit' rather than short-circuit (the conductor completely vaporized – see Figure 1 below);
- Picking up segments of circuit in incremental steps eventually led to the fault location but only after the 26M55 tripped one more time;
- Fuses were found blown in four switching enclosures that chain through the subdivision, including LC 4267 – one of the original solid-dielectric units – which is only programmable with fuse dials.

The cable was #1/0 AL, 28 kV XLPE installed in 1973.

Figure 1, Aluminium core melted from failure

Action Plan:

- This subdivision counts three cable faults in total, the oldest dating from 2001. The average cable age at failure is 28 years old. The cable fault was added to the database. The subdivision will continue to be monitored annually in the SPOORE analysis. No further action required.

3. **Date**: Monday, October 20th **Outage ID**: 08-868

Category: Defective Equipment **Cause**: Bundled Primary

Cust-Min:	53,760	**Cust-Aff**:	112
SAIDI contribution:	0.006	**SAIFI contribution**:	0.001

Description:

Some bundled primary conductor along Langton Ave. caused the fuse on one phase at SW 785 to operate as well as the fuse of a single-phase transformer (T 94). An unsuccessful attempt to re-fuse and pick up the transformer revealed the problem; power was restored after making repairs.

Action Plan:

- No action is required.

4. **Date**: Wednesday, October 29th **Outage ID**: 08-927

Category: Defective Equipment **Cause**: Elbow Failure

Cust-Min: 37,440 **Cust-Aff**: 192

SAIDI contribution: 0.004 **SAIFI contribution**: 0.001

Description:

An elbow failed inside TE 3276 triggering the operation of an upstream fault interrupter on the blue phase inside LC 3503. The instantaneous operation of the fault interrupter eliminated the A/R on the feeder (32M8). Another fuse at SE 3308 could have cleared the fault and restrict the outage to a smaller area – however, the fault interrupter inside LC 3503 upstream operated in milliseconds. This outage is included in the reliability numbers of the storm day (Oct 29th).

Action Plan:

- No action is required.

5. **Date**: Wed - Thu, Oct 29th - 30th **Outage ID**: 100 outages

Category: Tree Contacts **Cause**: Limb on Line

Cust-Min: 5,815,927 **Cust-Aff**: 56,251

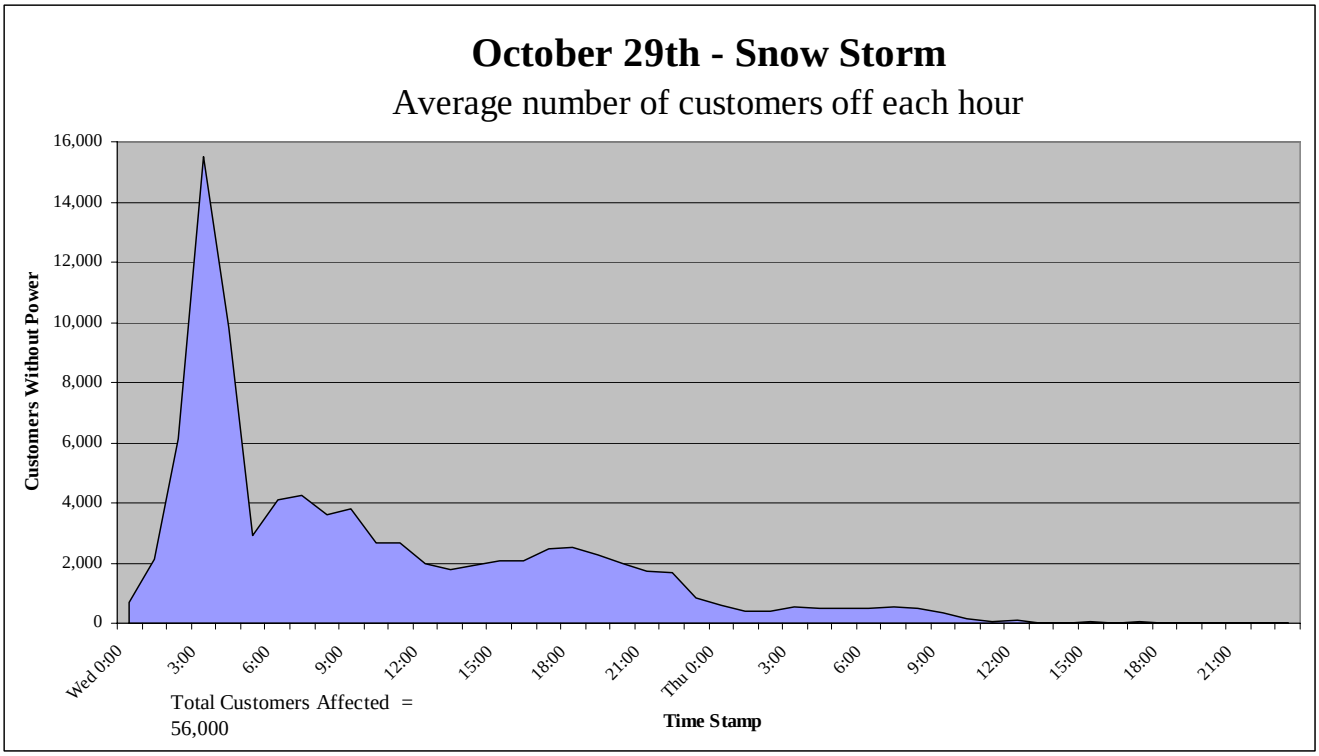
SAIDI contribution: 0.682 **SAIFI contribution**: 0.396

Description:

An extremely destructive snow storm affected London beginning at midnight on October 29th with large areas remaining in the dark for long durations. Many broken tree limbs fell over the electric lines cutting the service to both primary and secondary supply. The effects of this abnormal storm were evident throughout the entire day and into the following day as well; the crews worked around the clock to restore the power. The cumulative duration of outages in customer minutes easily qualifies the day as a **M**ajor **E**vent **D**ay (MED).

Action Plan:

- London has not seen such a severe storm since April 2003 (when a devastating ice storm also had serious effects on the overhead infrastructure). The graph below depicts the average number of customers who were without power during the storm per hour. Restoration took place until well into the second day following the storm. The storm data will be included in the annual OEB reporting on reliability. No action is required.



* * *

Prepared by: Cristina Terek, P.Eng.
Distribution Reliability Engineer

November 2008
Reliability Incident Summary

Action Items:

Incident 3 – Jagoda Borovickic to budget for completing a loop for transformers supplied from SW 0463

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1. **Date**: Monday, November 3rd **Outage ID**: 08-1009

Category: Defective Equipment **Cause**: Cable Fault

Cust-Min: 36,680 **Cust-Aff**: 192

SAIDI contribution: 0.004 **SAIFI contribution**: 0.001

Description:

A fuse operated at SW 0280 (on the white phase) in White Hills due to a cable fault between TE 2230 and TE 2225. Since this subdivision was undergoing re-construction, additional switching was necessary because several open points had been established temporarily in order to carry out the current cable replacement. The cable was #1/0 AL, 28 kV XLPE installed in 1976.

Action Plan:

- The portion of the subdivision in which the cable fault occurred was slotted for cable replacement and work was in progress at the time of failure. Unfortunately, the cable replacement had not yet been completed, which could have avoided the failure. On the other hand, as in the past, targeted subdivisions for cable replacement have proven to be well chosen. The upgrade of the White Hills subdivision (which is over 30 years old) will be completed in Phase 2 through 2009. No further action required.

2. **Date**: Monday, November 3rd **Outage ID**: 08-1011

Category: Foreign Interference **Cause**: Vehicle Accidents

Cust-Min:	65,340	**Cust-Aff**:	3,817
SAIDI contribution:	0.008	**SAIFI contribution**:	0.027

Description:

Following a breaker operation on the 70M3 (which was tried after a minute but did not hold), a police report announced the collision of a transport truck with the electrical infrastructure. The accident happened at the intersection of Highbury and Dundas. An automated switch helped restore some of the customers. Because of contact with the 4 kV underbuild, the 29F2 breaker also had to be opened to clear off the conductors touching. It turned out that the transport truck was moving forward with the box up and made contact between one phase and the neutral on the tap supplying T 8111. The lines were repaired later and the entire feeder restored.

Action Plan:

- London Hydro's Health and Safety Manager was on site to investigate the facts. The Ministry of Labour was involved and London Hydro provided them with the necessary information regarding the accident. The party responsible for the damage was charged for the repairs.

3. **Date**: Sunday, November 9th **Outage ID**: 08-1038

Category: Defective Equipment **Cause**: Defective Transformer

Cust-Min:	43,680	**Cust-Aff**:	182
SAIDI contribution:	0.005	**SAIFI contribution**:	0.001

Description:

A defective transformer that needed to be changed out (TE 3093) caused a lengthy outage in Byron, since it was a radial run with 10 other padmounted units.

Action Plan:

- There is a switchgear at the end of the radial run (SE 5296) with an unoccupied fused position on the black phase. Action – **Jagoda Borovickic** to budget for system re-configuration for back up supply to the existing radial run originating at single-phase SE 3091. No further action required.

4. **Date**: Saturday, November 15th **Outage ID**: 08-1058

Category: Defective Equipment **Cause**: Broken Drop Lead

Cust-Min:	58,437	**Cust-Aff**:	4,496
SAIDI contribution:	0.007	**SAIFI contribution**:	0.032

Description:

Another outage happened in Byron due to a loose lead at SW 0108. After repairs were made, the switch was closed in but it tripped the 32M5 breaker. It was closed successfully within a few minutes.

Action Plan:

- The SAIFI coefficient was affected greatly due to the high number of customers on the feeder. There are plans to reconfigure the Wonderland feeders 32M5 and 32M8 – this may help to balance the customer numbers on feeders reducing the impact of breaker operations. No further action required.

5. **Date**: Sunday, November 16th **Outage ID**: 08-1061

Category: Defective Equipment **Cause**: Cable Fault

Cust-Min:	87,859	**Cust-Aff**:	7,881
SAIDI contribution:	0.010	**SAIFI contribution**:	0.055

Description:

An unusual series of events led to an outage that affected a large number of customers. The key points describing the failure are outlined below:

- Following a blown fuse at riser SW 0483, a cable fault was suspected between TE 3139 and TE 3140 (there are no fault indicators on this run);
- The riser cable (0483) had to be spliced out as the termination was being moved to another pole;
- The feeder 32M8 opened up when closing in SW 0491 to backfeed the load, while a hold-off on the feeder was in effect;
- A transformer was found to be defective (TE 3405);
- A second breaker operation led to the discovery of a true cable fault on the same run, between TE 3131 and TE 3140 – the first stretch of cable hipotted correctly the second time (it is possible the transformer failure led to the cable failure if its insulation was weakened).

The cable serving the are was installed in 1979 and is #1/0 Al, 28 kV XLPE.

Action Plan:

- This is the second cable fault experienced on the same cable run (TE 3131 to TE 3040); the first one happened in 2004. At the time, the cable was barely 25 years old so it may have not made the criteria for the SPOORE analysis; it will be added to the next cable replacement analysis. No further action is required.

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Prepared by: Cristina Terek, P.Eng.
Distribution Reliability Engineer

December 2008
Reliability Incident Summary

Action Items: No action items

1. **Date**: Sunday, December 21st **Outage ID**: 08-1163

Category: Foreign Interference **Cause**: Vehicle Accident

Cust-Min: 30,120 **Cust-Aff**: 753

SAIDI contribution: 0.004 **SAIFI contribution**: 0.005

Description:

A car struck a pole at the intersection of Bradley and Newbold St. The 19M28 feeder had to be opened so that a service vehicle could support the pole, however, a large outage was avoided by transferring majority of the feeder customers using automated switches

Action Plan:

- The driver of the car will be charged for the damage to the infrastructure. No further action required.

2. **Date**: **Sunday, December 28th** **Outage ID**: 27 outages

Category: Adverse Weather/ Tree Contacts **Cause**: Various

Cust-Min: 1,086,664 **Cust-Aff**: 7,971

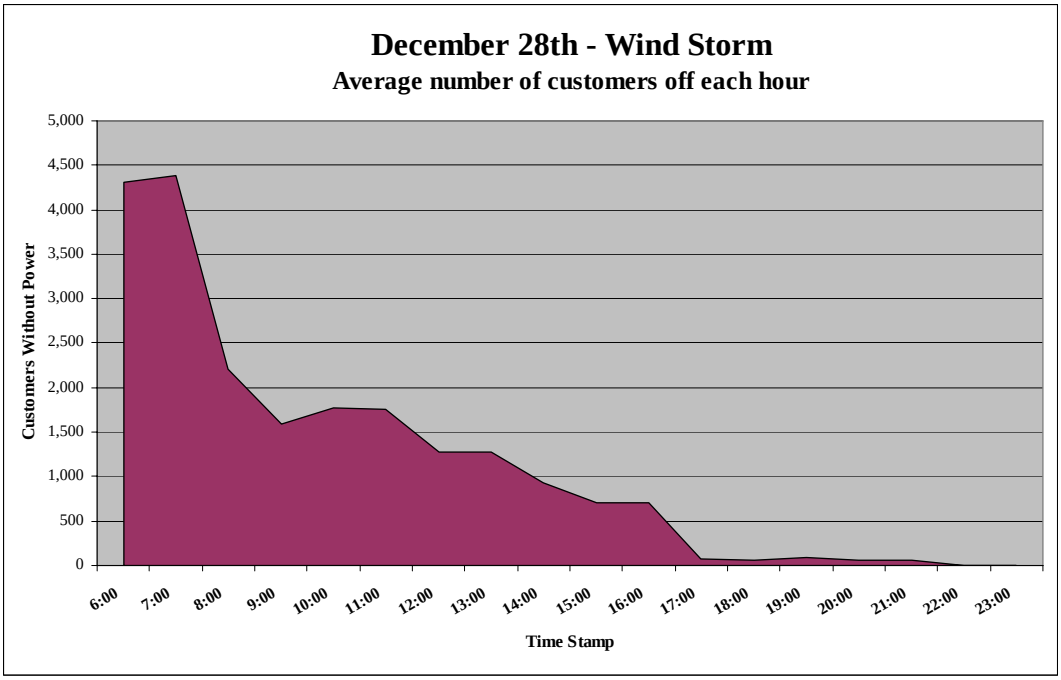
SAIDI contribution: 0.127 **SAIFI contribution**: 0.056

Description:

A very unusual early morning wind storm following abundant rain overnight caused some infrastructure damage. High winds resulted in many broken tree limbs and various other equipment failures. The large number of customers that lost power were gradually restored during the day; this is illustrated in the following graph.

Action Plan:

- The numerous outages that resulted from the storm contributed to the year-end reliability indices significantly. Although December 28th accounted for over a million customer minutes in outage duration, the storm does not qualify as a Major Event Day. No action is required.



3. **Date**: Sunday, December 28th **Outage ID**: 08-1191

Category: Adverse Environment **Cause**: Flashover

Cust-Min: 71,400 **Cust-Aff**: 230

SAIDI contribution: 0.008 **SAIFI contribution**: 0.002

Description:

A live-front transformer (TE 1993) flashed over in the Pond Mills area, which is a subdivision that is visibly aging; the transformer itself is over 35-years old. Several fuses operated in single-phase and three-phase enclosures to interrupt the fault. The transformer was repaired and power restored.

Action Plan:

- This subdivision is a candidate for future rebuild due to equipment age and experienced failures (both on cables and transformers). The SPOORE analysis this year will determine how it ranks on the priority list against other subdivisions with a previously higher ranking. No further action required.

* * *

Prepared by: Cristina Terek, P.Eng.
Distribution Reliability Engineer

Quality of Supply Report

January 2006 to December 2006

Prepared by:

Cristina Terek, P. Eng.
Distribution Reliability Engineer

Greg Sheil, P. Eng.
Distribution Operations Engineer

This report was also reviewed by Ed Jambor, P.Eng. – Director of Operations, whose input remains invaluable.

Table of Contents

1 Introduction

The format of this report has changed significantly; the focus has shifted from a general audience to more precise information directed towards the Engineering and Operations Departments. It details our year-end performance and progress in specific targeted areas. We, as a utility corporation, are continuously striving to meet and/or exceed the Ontario Energy Board (OEB) performance targets; the expectation is that the reliability of the current year is better than the worst of the three preceding years. Even though year 2006 overshot the target slightly in terms of outage frequency, London Hydro's system reliability continued to improve overall (i.e., the average duration of outages was much closer to its target).

There are two parts to this report presenting different aspects as outlined below.

- The body of the report contains a synopsis of the performance measures at the end of the year, the old and new programs aiming to improve reliability in general, and specific tasks that were accomplished during the reporting year, as well as projections for 2007.
- A series of appendices contain a detailed reliability analysis of the system performance.

2 Distribution System Overview

The majority of customers within London Hydro's distribution service territory are supplied at low voltage. There are several commercial and industrial load facilities that are supplied at one of the medium voltage levels for practical reasons or, when their load requirements exceed the standard transformation size London Hydro has in stock.

Table 1 illustrates some of the statistics related to the distribution system and the customer base at the end of 2006. Both the length of the entire circuitry and the number of customers have been steadily increasing over the years, which is a strong indicator of the system expansion required in order to meet the increasing load growth and the dynamic changes in the infrastructure.

	Low Voltage	2.4/4.16Y kV	4.8/8.32Y kV	8/13.8Y kV	16/27.6Y kV	Total
Number of Customers	139,841	9	--	30	127	**140,007**
Total Length of Circuits (km)		495	197	139	1,737	**2,568**
% Underground		30%	3%	75%	60%	**50%**

Table 1, Magnitude of London Hydro's Distribution System

3 Classification of Interruptions by Cause

A customer interruption is defined in terms of the primary cause of the power outage. These causes have been assigned to 11 codes; they are as follows:

I. Adverse Environment

Customer interruptions due to equipment being subjected to abnormal environment such as salt spray, industrial contamination, humidity (flashovers), corrosion, vibration, fire or flooding.

II. Adverse Weather

Customer interruptions resulting from rain, ice storms, snow, winds, extreme ambient temperatures, freezing fog or frost.

III. Animals

Customer interruptions caused by creatures such as birds, squirrels, raccoons.

IV. Defective Equipment

Customer interruptions resulting from equipment failures such as deterioration due to age, incorrect maintenance or imminent failures detected by maintenance.

V. Foreign Interference

Customer interruptions beyond the control of the utility such as vehicle accidents, dig-ins and foreign objects.

VI. Human Element

Customer Interruptions due to the interface of utility staff with the system such as incorrect records, incorrect use of equipment, incorrect construction or installation, incorrect protection settings, switching errors.

VII. Lightning

Customer interruptions due to lightning striking the distribution system resulting in an insulation breakdown and/or flashovers.

VIII. Loss of Supply

Customer interruptions due to problems in the bulk electricity supply such as under frequency load shedding, transmission system transients, or system frequency excursions**.**

IX. Scheduled Outages

Customer interruptions due to the disconnection at a selected time for the purpose of construction or preventive maintenance.

X. Tree Contacts

Customer interruptions caused by faults due to trees or tree limbs contacting energized circuits.

XI. Unknown/Other

Customer interruptions with no apparent cause or reason which could have contributed to the outage.

4 Summary of 2006 Performance

4.1 Quality of Supply Measures

To define the performance measures of the reliability of a distribution system, the following acronyms which are referenced to throughout the rest of the document are listed below.

- **SAIDI** Average customer interruption[1] duration (in hours) per year. (*Unavailability of Supply*)
- **SAIFI** Average number of interruptions[1] per customer per year. (*Security of Supply*)
- **CAIDI** Average customer interruption duration (in hours) per interruption. *(Outage Restoration Time)*

4.2 Measured 2006 Performance

4.2.1 SAIDI Performance

The IEEE 1366-2003[2] reliability guidelines provide a method for utility engineers to normalize their outage data and focus on normal trends; these guidelines were adopted by London Hydro several years ago to prevent us from focusing only on low-probability, high-impact outages. These rare events are still analyzed but they are put in their proper perspective.

Year 2006 experienced such an incident and therefore, the occurrence was declared a Major Event Day (MED) and removed from the statistics. The incident was caused by a loss of supply event at Nelson TS where two (2) power transformers supplying the same bus failed in-service, resulting in a power outage for approximately 13,000 customers. Appendix 8 contains an Incident Report for this event.

As indicated in Section 4.1, the "unavailability" industry standard is measured by the System Average Interruption Duration Index (SAIDI). Year 2006 came in lower than the average of the previous five years, ending at 1.25 (1.43 including the MED incident); however, it was higher than the 2005 year-end value of 1.15. Previous reports have discussed that fluctuations based on a "natural volatility" will occur from year to year. However, as shown in Appendix 5, London Hydro's SAIDI has been improving over the last 13 years.

[1] An interruption is any disruption in service that causes customers to lose their supply for more than one minute.
[2] IEEE Standard 1366-2003, *IEEE Guide on Power Distribution Reliability Indices*

The 11 outage cause categories described in Section 3 are further divided into controllable and uncontrollable categories in order to track down system deficiencies where improvement is deemed possible. The historical SAIDI values for the last 13 years are presented by cause in Appendix 5; the trend lines indicate the overall change. The same scale on the Y axis was used in all the graphs in order to emphasize which cause categories contribute the most to the overall total.

Lightning has been a significant contributor among the controllable causes but it has gradually improved over time. Another large contributing category is *defective equipment*. The overall trend is improving; however, the graph shows that it is very volatile year after year, in spite of our targeted improvement programs. As the infrastructure ages and other areas begin to require attention, there is an increasing need for additional capital spending.

London Hydro continues to exclude outages lasting less than one minute, according to the industry norm. Since precise SCADA information is available down to the second, the exact outage duration can be calculated. We believe that many LDCs do not look at the one minute criteria very closely – as long as they were successful in reclosing a feeder they don't count it as an outage, even if it took longer than a minute. Many of London Hydro's outages are falling outside the one minute window due to the communication delays with HONI's control centre in Barrie. There have been numerous discussions to try and determine if London Hydro can be permitted access to operate the breakers at a TS, but they have never yielded positive results. Consequently, we are still relying on HONI for trying to get a breaker reclosed in less than one minute during windy or storm conditions.

There are also on-going discussions with ESA and London Hydro's Risk Management group in Finance regarding the *10-minute* rule versus the *1-minute* rule applied to the re-closing of a breaker that has locked out. London Hydro continues to remain on the conservative front and waits 10 minutes before re-energization of an interrupted feeder. These operating practices and the fact that we do not have access to the TS breakers continue to be obstacles in reducing SAIDI and SAIFI.

SAIDI: **1.25 HOURS PER CUSTOMER PER YEAR**

The chart in Figure 1 illustrates London Hydro's SAIDI performance compared with the national average[3] of other urban utilities over the last five years. After a sudden reduction in the CEA benchmark in 2004 (Hydro Quebec withdrew their participation), in the following year, the national average worsened by 25%. Although London Hydro is 9% higher than the year before, we managed to stay close to the most recently published CEA urban utility average. The CEA statistics for 2006 will not be available until later on in the year.

[3] Canadian Electrical Association Report: 2005 *Annual Service Continuity Report on Distribution System Performance in Electrical Utilities* (Confidential Participant Version), September 2006.

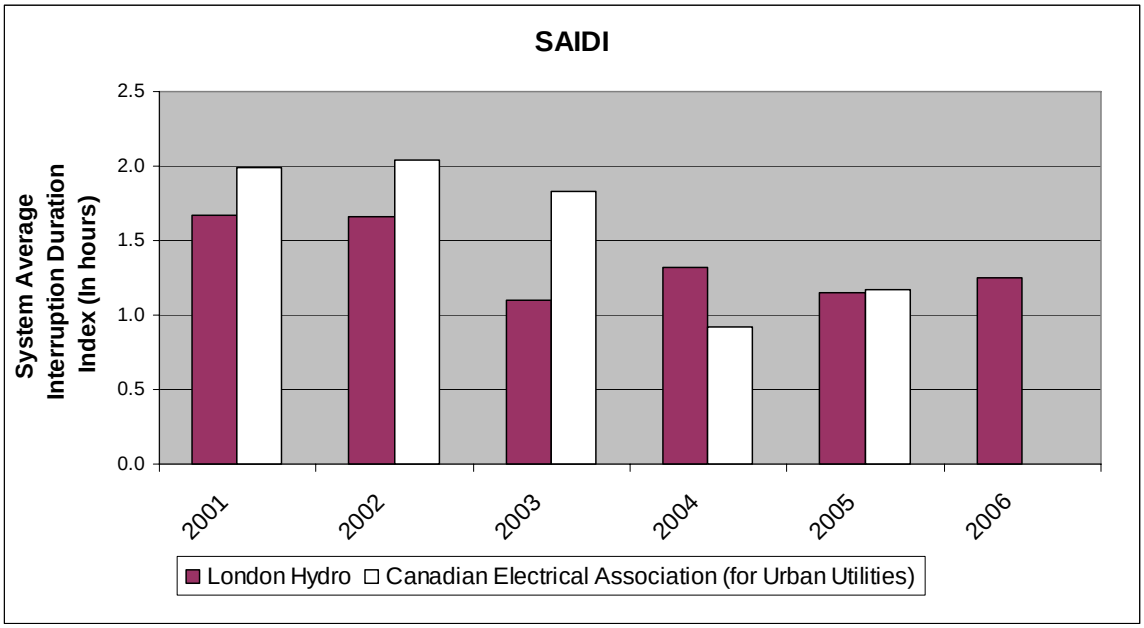


Figure 1, SAIDI Performance – London Hydro vs. Other Urban Utilities

The following chart compares London Hydro's SAIDI to the Large Southern LDC cohort group that the OEB proposed in early 2007.

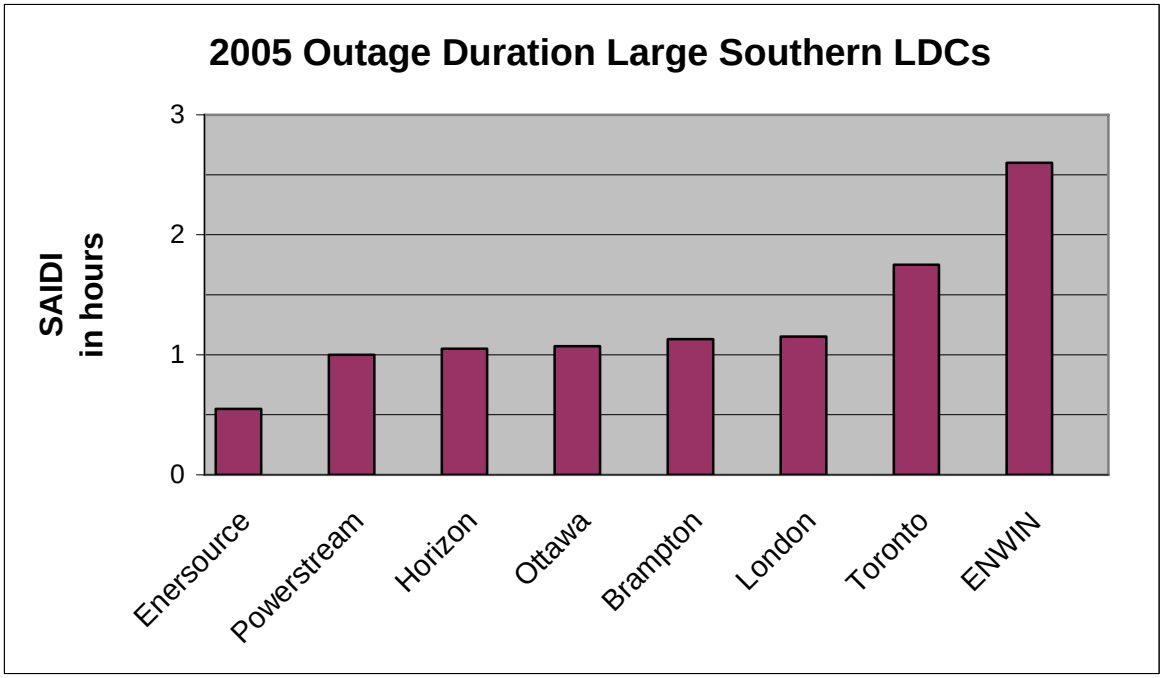


Figure 2, SAIDI Performance – London Hydro vs. large southern LDCs

Note: The OEB has proposed that Veridian be a member of this cohort group but they did not have reliability data available.

Improvement in SAIDI was attained in 2006 in several categories; they are as follows:

- the *adverse weather* category was down to less than half of the previous five-year average in interruption time; there were 10 incidents during the course of the year;
- the *animal contacts* performance has improved over the five-year average (30% reduction);
- *foreign interference* as well was at about 50% of the previous five-year average, so again a significant improvement for this year;
- *human element* – although this is a minor contributor, it has also improved, measuring only 80% of the five-year average;
- *loss of supply* saw a substantial improvement versus the average five year (75% decrease for 2006);
- *tree contacts* were almost at 70% of the five-year average – many events occurred on the 4 kV system;
- the *unknown* category improved significantly over the five-year average: 50% reduction.

Several other categories did not show any improvement. The greatest degradation in performance was in the *defective equipment* category*:* outage time increased by almost 30% over the five-year average. However, a single large event was responsible for a significant portion and was due to a failed lead pothead at Wonderland TS; this is being addressed in 2007 (see Section 8.2). *Adverse Environment and Lightning* were fairly similar in performance and closer to the five-year average (20% above).

4.2.2 SAIFI Performance

The industry standard index for expressing "security" of the power supply is System Average Interruption Frequency Index (SAIFI). In terms of interruption frequency, 2006 was 30% above last year, with 2.14 recorded service interruptions per customer on average, compared to 1.65 in 2005. It is the highest value in the last three years.

Appendix 6 contains the history of SAIFI yearly values since 1994; the cause categories are grouped into controllable and uncontrollable contributors, similar to the graphs illustrating the SAIDI index. The scales on the Y axis are kept the same to be able to determine each category's individual contribution to the overall total. The categories with the highest impact (i.e., defective equipment, lightning) both increased in contribution in 2006, affecting the overall value negatively. However, as the trend lines indicate, over the past 13 years most categories have shown an improvement. This emphasizes the fact that defective equipment continues to require the most attention in order to improve London Hydro's reliability.

SAIFI: 2.14 INTERRUPTIONS PER CUSTOMER PER YEAR

Figure 3 shows our performance compared to the national average of other local distribution utilities over recent years. The national average in SAIFI has always been better than ours, so it is expected that in 2006 our decreased performance will still lag behind the number published by CEA.

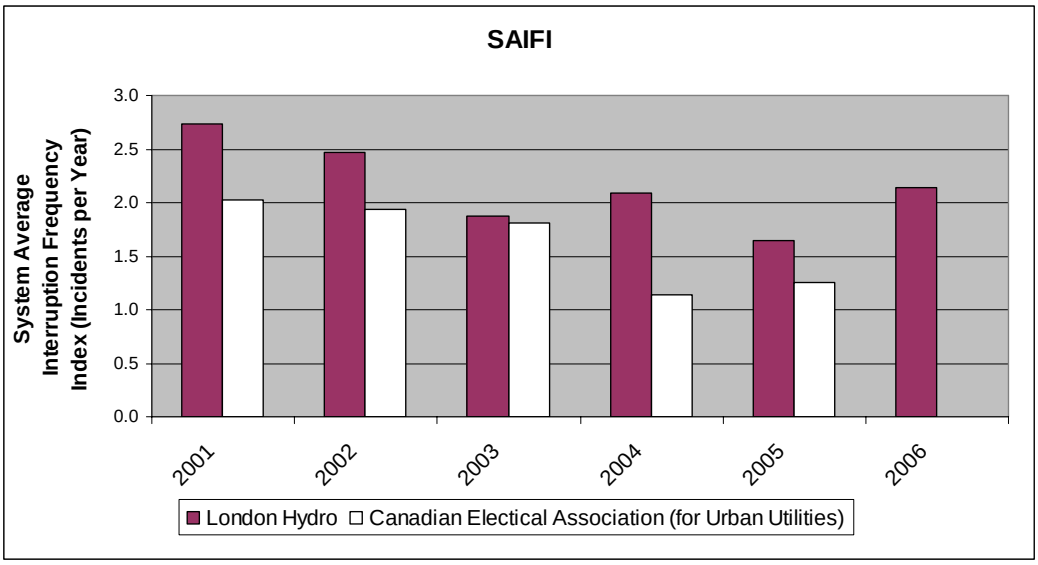


Figure 3, SAIFI Performance – London Hydro vs. Other Urban Utilities

The following chart compares London Hydro's SAIFI to the Large Southern LDC cohort group that the OEB proposed in early 2007.

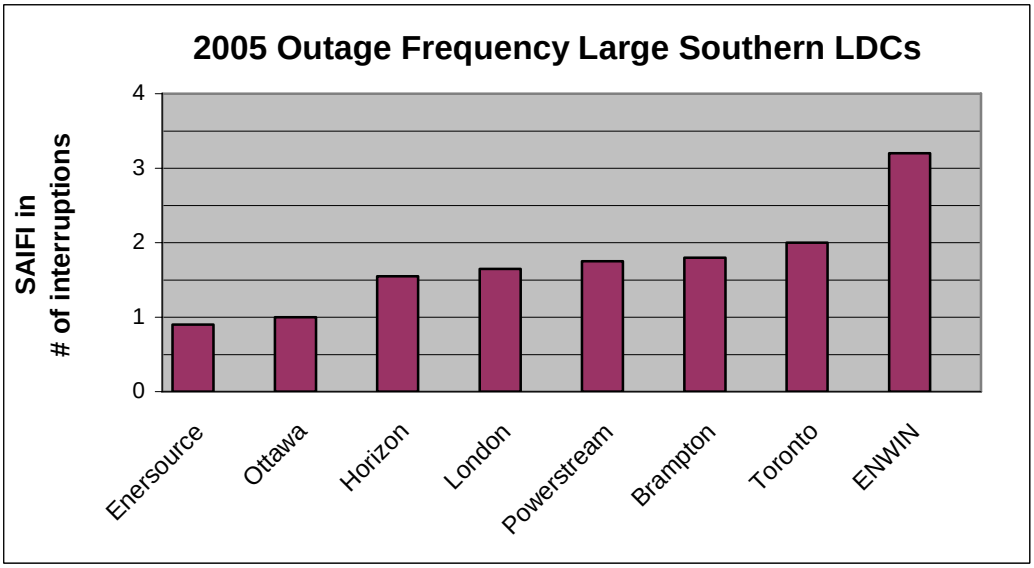


Figure 4, SAIFI Performance – London Hydro vs. large southern LDCs

Note: the OEB has proposed that Veridian be a member of this cohort group but they did not have reliability data available.

For many years now, London Hydro has been introducing automation to help with quicker power restoration. This has had an impact on SAIDI but more work needs to be done to reduce the number of customers affected by each outage. New feeders are being built in 2007 and 2008 and this will reduce the average number of customers on each feeder. As well, reclosers are starting to be installed on main feeders in 2007. These activities should help improve London Hydro's SAIFI performance[4].

Year-end SAIFI for 2006 did not improve compared to 2005. Several categories reported under the five-year average but their contribution is not too large.

- *adverse weather* performed extremely well, similar to SAIDI; its contribution to SAIFI decreased by 75% from the five-year average;
- *animal contacts* interruptions were also lower than the five-year average (40% reduction).
- *foreign interference,* a non-controllable category, performed better than the five-year average, decreasing by 30%;
- excluding the MED event at Nelson TS, *loss of supply* went down by 80%;
- *tree contacts* saw a fairly large reduction (approx 70% less);
- the *unknown* category as well saw a decline of 30% from the five-year average.

The four categories that worsened in performance affecting the overall SAIFI represented a substantial fraction of the customers interrupted (75%). They are:

- *adverse environment* contribution had an increase of 25% over the five-year average; numerous failures of air-insulated enclosures were the main factor;
- similar to SAIDI, *defective equipment* saw a 20% increase in SAIFI over the five-year average (cable faults and broken insulators were the largest contributors);
- *human element* finished at 70% higher than the five-year average;
- *lightning,* unfortunately, created a large number of interruptions, twice as much as the five-year average of customers interrupted (more details on this can be found in Section 7.2.1).

[4] If one recloser was installed on each 27.6 kV main feeder, considering an average of 50-60 breaker operations during one year, and assuming that 25% of the times the feeder breaker tripped for a permanent fault downstream of the recloser, then approximately 15 breaker operations could be saved which would equate to an estimated reduction of 0.15 in SAIFI (it is assumed that there would be at least 1,500 customers upstream of each recloser who would not be interrupted anymore, on each of the 15 feeders).

4.2.3 CAIDI Performance

The industry standard index for expressing "outage duration" is Customer Average Interruption Duration Index (CAIDI). Year 2006 finished with an excellent response time of only 35 minutes average outage time per incident (i.e., 0.59 hours per incident). Our high SAIFI number indicates that on average London Hydro customers experience more outages (SAIFI) but of shorter duration (CAIDI) than in the comparison group.

RESPONSE TIME: 35 MINUTES PER INCIDENT

As it can be seen in Figure 5, our performance versus the national average of comparable local distribution utilities over the last five years has always been better.

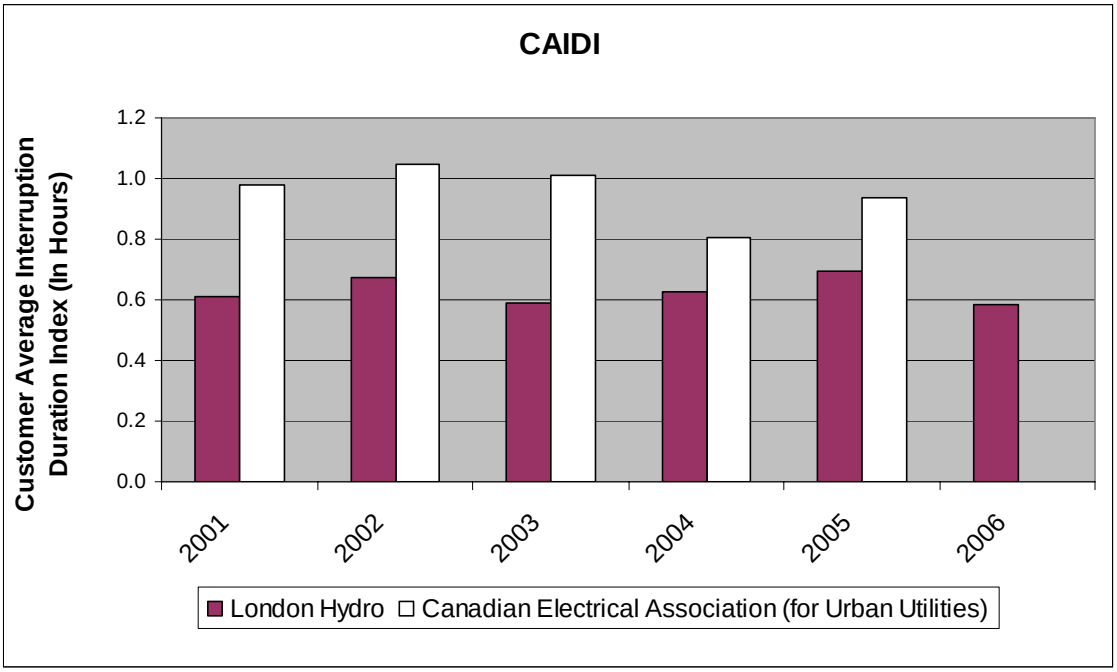


Figure 5, CAIDI Performance – London Hydro vs. Other Urban Utilities

5 Distribution Automation Targets

As indicated in Section 4.2.2, more methods of automation on our distribution system are needed in order to further reduce the duration of outages, especially the number customers interrupted. While the 80 automated switches currently installed on the main 27.6 kV backbone system are continuing to help in quick restoration of unfaulted segments of a circuit after an outage takes place, the number of customers interrupted cannot be reduced any further unless breaker operations are avoided.

In 2006, 24 automated switches were used for power restoration during outages and 154 were used for load transfers during scheduled outages. The shortened outages reduced SAIDI by 0.23. Comparable savings would be anticipated for SAIFI during the course of one year if the feeders were equipped with midstream reclosers.

When a permanent outage occurs downstream of a recloser on any main overhead line, the recloser would open, de-energize the faulted section and the breaker would not operate at the TS (except for an A/R). This could reduce the number of customers interrupted by half for example, if the recloser was located in the middle of a feeder. A midstream recloser would also reduce SAIDI since a subset of customers would no longer experience a sustained interruption.

6 Analyzing outage data

For many years now, one method utilized in the reliability analysis was to segment the outage duration and frequency according to voltage class, planned outages and loss of supply events. Figure 6 and Figure 7 clearly indicate that the 27.6 kV system should continue to remain the primary focus of reliability improvement measures. Since the majority of customers are being fed by this system, outages have more implications at this voltage level.

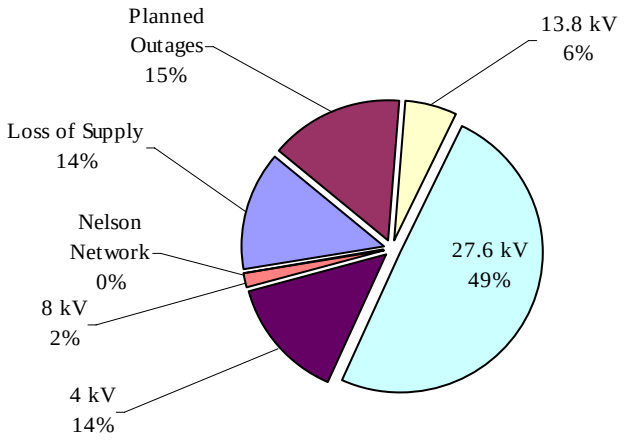


Figure 6, Interruption Duration (SAIDI) by Distribution Voltage

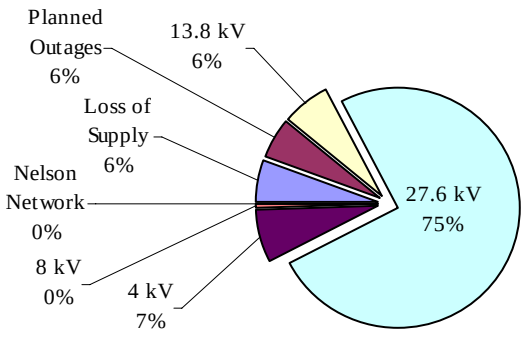


Figure 7, Interruption Frequency (SAIFI) by Distribution Voltage

In 2006, the largest number of customer minutes of interruption (SAIDI), as shown in Figure 8, was due to failure of in-service system components (d*efective equipment*). Unfortunately, this category continues to be the leading contributor to outage duration, regardless of its improving trend over the last decade. Compared to other causes, outages in this category tend to be more prolonged since equipment needs to be replaced in the field or isolated before power can be restored. The next two largest categories were *lightning* and *adverse environment.* Both of these will be discussed in more details in Sections 7.2.1 and 7.1.2 respectively.

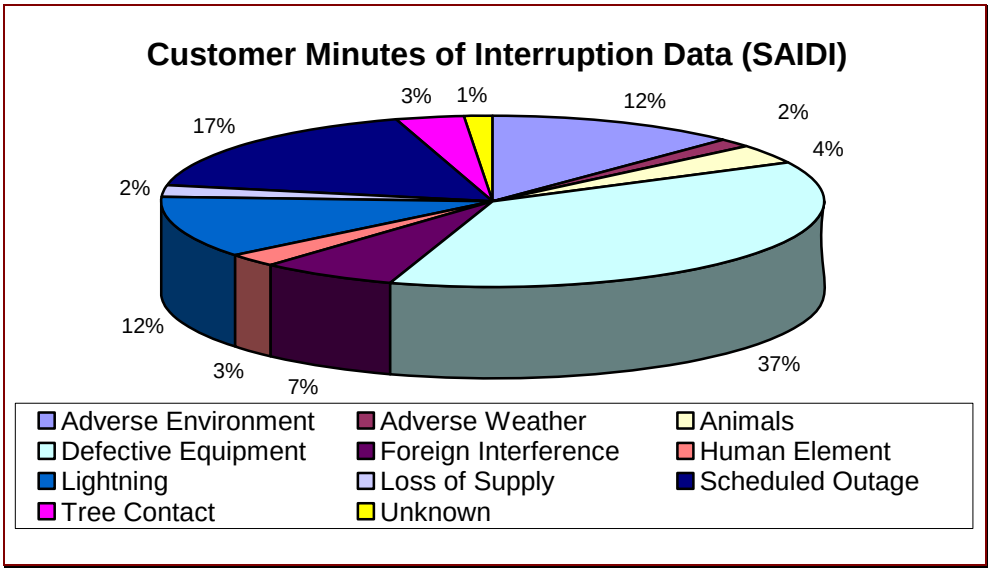


Figure 8, Customer Minutes of Interruption by Cause (SAIDI)

Similar to outage duration, *defective equipment* had the same weight in terms of SAIFI. The breakdown of the number of customers affected (SAIFI) is illustrated in Figure 9. *Lightning* was the second worst category; the major events are discussed later.

Adverse environment created numerous interruptions due to the increased number of flashovers in air-insulated equipment.

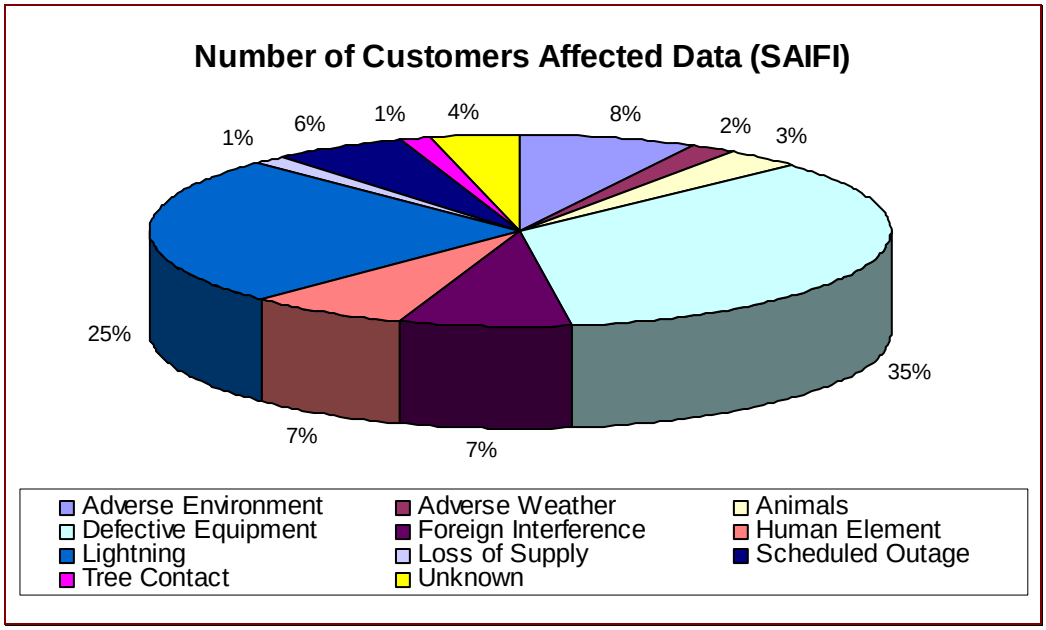


Figure 9, Number of Customers Affected by Cause (SAIFI)

In Figure 10, the total outage time accumulated from two categories, namely a*dverse environment* and *defective equipment,* is broken down by apparatus and voltage level. This has been a helpful tool in recognizing the type of equipment that is more problematic, and re-directing the efforts to take action before the same type of failure occurs again. It is, however, hard to stay "on top" since once the trends are recognized, the corrective works sometimes do not take place until after outages of the same nature are experienced. As well, depending on the scope, projects need to be budgeted over several years. Sometimes the trend drops off and the failures become less prominent and then, another problematic type of equipment with poor performance takes the spotlight.

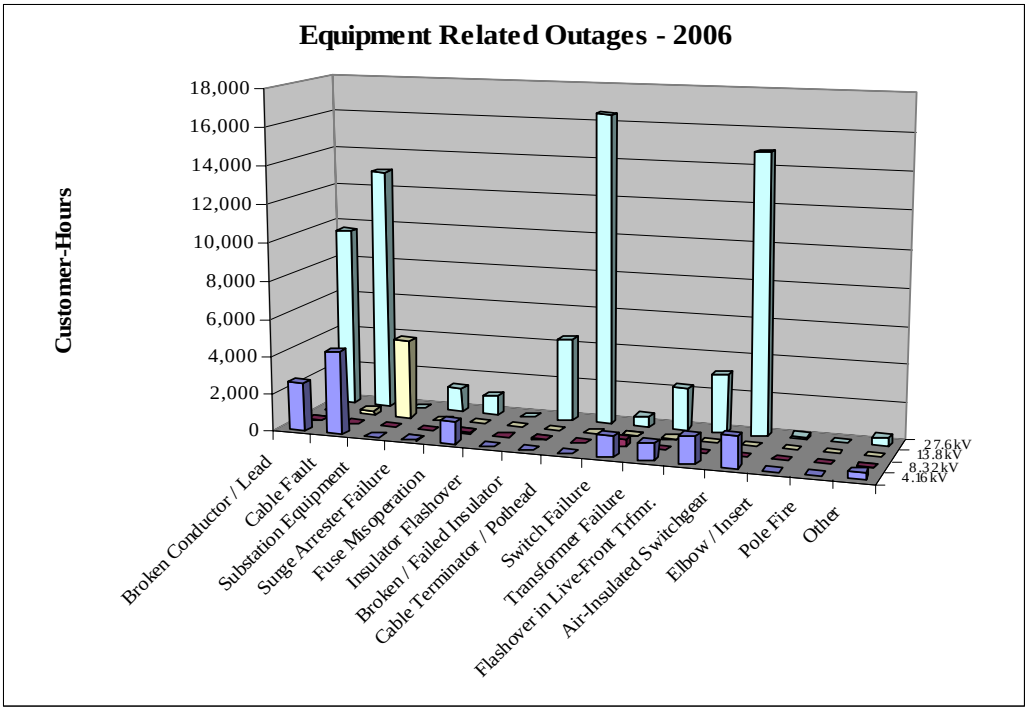


Figure 10, Customer Hours of Interruption by Equipment Type (SAIDI)

A defective lead cable terminator on an egress cable at Wonderland TS, a very rare but high-impact event last year, resulted in a large "black-out" – as described by media[5]. Alone, this one event exceeded all other category totals in terms of duration. This incident is being addressed this year by replacing the last sections of lead egress cable at the transformer station with new polymeric cable.

Switching enclosures (SE's) and cable faults continued to have a fairly large impact on outage duration in 2006; they were the two largest contributors in 2005. In 2006, they represented approximately 40% of the equipment related outage time. Nine (9) more flashovers were experienced in air-insulated switching enclosures (after 12 in 2005 and 6 in 2004); also, a total of 25 cable faults were experienced (15 on the 27.6 kV system), after only 15 occurrences in 2005 and 18 in 2004.

The ***SPOORE*** analysis[6] developed by London Hydro has proved to be effective in targeting areas where rehabilitation of the underground plant is needed. Many kilometers of medium-voltage cable have been replaced since 2000 (approx. 80 km) with much more left to do. At the current pace of replacement the amount of cable older than 25 years of age is increasing. At the end of 2006, it was established that the average age before failing for cables rated 28 kV is around 23 years (similar to last year), and for cables rated 5 kV, the average age is 29 years before failing.

[5] *"Power out for 8,000"* – London Free Press, May 30, 2006.
[6] The SPOORE acronym reflects the following factors utilized in the analysis: *Safety, Performance, Outage, Operability, Risk, Environment.*

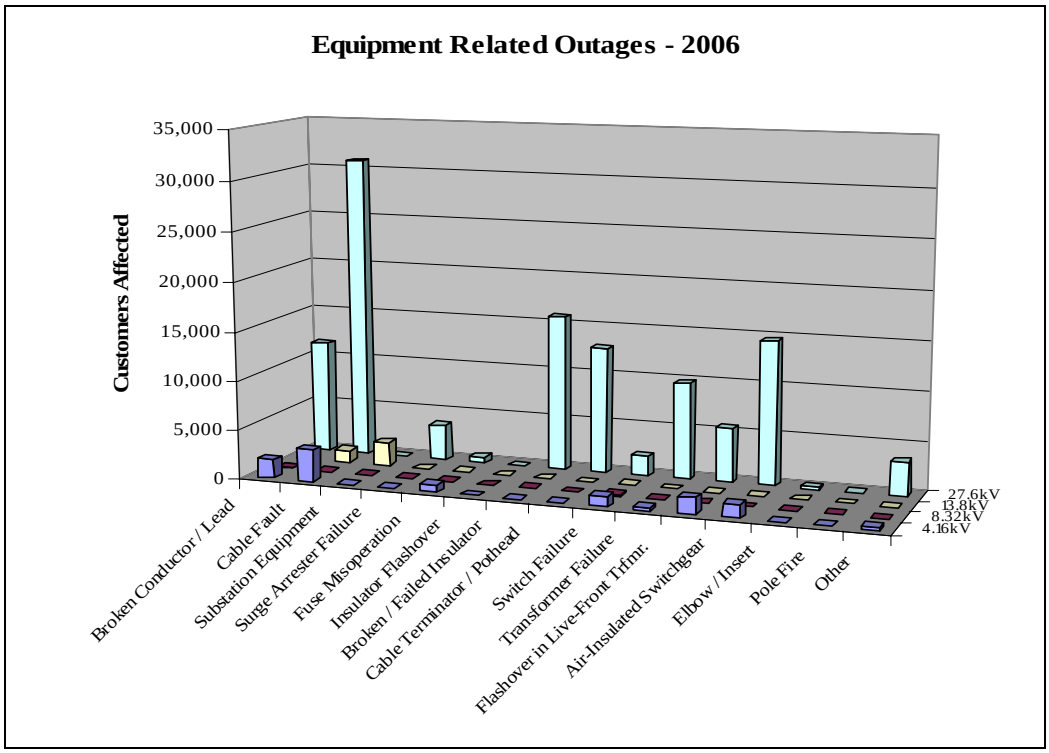


Figure 11, Customers Affected by Equipment Type (SAIFI)

Equipment related outages were responsible for 40% of SAIFI in 2006 compared to 33% last year. Not for the first time and not unexpectedly, the largest sub-cause was *cable faults*; numerous failures were experienced with 13 out of 25 resulting in breaker operations. Also, of the 13, four incidents occurred due to failures of station egress cable (both polymeric and lead).

SAIFI was also affected by *broken insulators* and failures of *air-insulated enclosures;* Switching enclosures have proven to be a great concern due to the frequency of failures, sometimes at the same location. An aggressive replacement/elimination program that began in 2006 is expected to slow down, if not completely eliminate these failures, as we take a progressive approach to tackle the most susceptible units on the system, following the recommendation of last year's report[7].

Given the population base of these two types of equipment (insulators and air-insulated gear), the history built on the failures experienced has become a strong indicator of decreased equipment performance. The programs in place will address the remaining susceptible population, hopefully before many more failures occur. It's important to continue funding porcelain insulator and SE replacement programs to manage reliability in this area.

[7] Distribution Reliability Report, *Performance Review and a New Perspective for In-service 27.6 kV Three-Phase Air Insulated Sectionalizing Enclosures*, May 2006.

In the overall picture, the 27.6 kV system has a much greater impact on SAIFI than the other voltage levels (i.e., the 4.16 kV system's overall impact was only 9%).

7 Reliability Improvement Measures

London Hydro is committed to on-going programs designed to enhance reliability, such as: tree trimming, overhead infrared inspections, inspections of transformers and substations, pole inspections, etc. There are several areas where the improvement is also reliability driven, but the focus can change from year to year based on the observations and performance in the previous year. Work is being done in an attempt to reduce the magnitude of the outages that are the result of a controllable cause. Some of the methods that were applied in 2006 together with the performance measured at the end of the year are described in greater detail in the following sections.

7.1 Improving the U/G System Reliability

7.1.1 Residential Underground Primary Distribution Plant

For the past six years London Hydro has been replacing underground primary distribution cables, pad-mounted distribution transformers and secondary service cables within residential subdivisions, as part of an extensive rehabilitation program[8]. A method to prioritize the work was developed using multiple criteria to determine which residential underground areas are contributing the most to unreliability. Safety (physical condition of the exposed equipment), environmental considerations (leaking transformers), and operability are also determining factors.

In 2006, only two of the three proposed subdivisions were rebuilt: in Berkshire and Norton Estates the transformers and some selected switchgear were replaced. Westminster Park East subdivision (the North-West section) was postponed for 2007 because of financial constraints (construction of new feeders to solve capacity shortage problems was considered a higher priority).

7.1.2 Padmounted Sectionalizing Switchgear

Air-insulated switching enclosures (SE's) continued to perform poorly in 2006. Dry-ice cleaning to prevent flashovers provided inconsistent results with some SE's failing only months after a thorough cleaning. As a result, a detailed study[9] was completed in May 2006 and it concluded that air-insulated enclosures should no longer be used on our 27.6 kV system and should in fact be considered obsolete.

[8] London Hydro Engineering Report 2000-01, *Multi-year Rehabilitation Plan for Aging Underground Distribution Systems*; November, 2000.
[9] Distribution Reliability Report, *Performance Review and a New Perspective for In-service 27.6 kV Three-Phase Air Insulated Sectionalizing Enclosures*, May 2006.

The report recommended the gradual replacement of existing critical units with new, non-air insulated enclosures, designated as load centres (LC's), that utilize solid dielectric as an insulating medium. Air insulated switchgear will no longer be purchased and over time the entire population will be eliminated.

The first stage of the program implementation was completed with the following outcome: 14 SE's were eliminated from the system (the adjacent circuitry was redesigned in many areas), and nine SE's were replaced by the new load centres (two units were replaced due to safety concerns or maintenance). The money spent (over a half a million) exceeded the original budget due to the fact that elimination of some units made the removal of others feasible, for a reasonable incremental cost.

In spite of all the efforts to carry out the work on all 15 "high-risk" units assessed in 2006, nine outages still occurred; five of these nine SE's failed while they were in the design stage. Three other LC's were installed at new sites as part of new capital works.

Evaluation using corona measurement, which is now part of London Hydro's OEB annual inspection, will continue to determine the subset of units to be dealt with in subsequent years. The chart in Appendix 7 illustrates the contribution from failures of air-insulated enclosures to SAIDI and SAIFI over the past five years.

7.1.3 Modernizing the Downtown Network

London Hydro's network system servicing the downtown core is aging. Although many transformers have been changed out in recent years, many older units continue to remain in service. Sometimes, when network transformers are being replaced, additional civil work is required due to the deteriorated condition of the vault that houses them. The current practice is to have a civil engineer carry out a detailed examination of the vaults that are assessed as being the worst during the annual OEB audit; this helps in prioritizing the remedial works.

Another enhancement to the system is the introduction of cable limiters on polymeric secondary cable; this will hopefully prevent catastrophic failures that can also create unnecessary outages. Spot networks are also being modernized through the introduction of automation/SCADA communication from and to the transformer protectors, enabling a faster response to alarms that indicate high loading or other abnormal transformer conditions. At the end of 2006, 50% of this work was completed. The following locations were outfitted with data communication hardware: the London Life on Queens St., the John Labatt's Centre, City Hall, Centennial House and the Court House.

7.2 Protecting the Overhead System

7.2.1 Reliability in the "lightning capital of Canada"

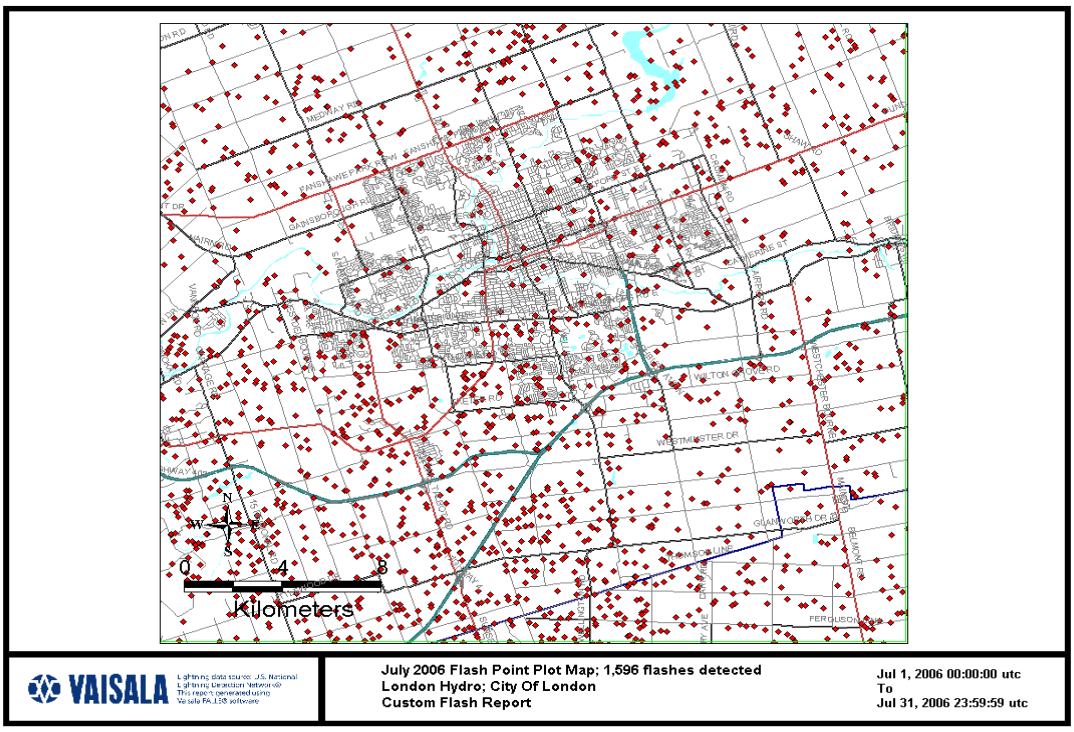


Figure 12, Flash Plot for the month of July

London Hydro obtains lightning data from Vaisala Inc. (formerly Global Atmospherics Inc.) annually.

During 2006 London Hydro experienced 115 lighting related outages (compared to 81 in 2005). As per the 2006 report received from Vaisala, 3,540 lightning strikes occurred in the London area, the largest number ever since London Hydro started recording these numbers in 1995. The amount of lightning strikes has been increasing over the last five years. A total of 23 breaker operations were responsible for the interruptions. It is worth mentioning here that 70% of the customer interruptions happened during the month of July (see the flash plot in Figure 12) and two days in August, when severe lightning activity was experienced in the London area.

To demonstrate the robustness of the infrastructure during extreme weather conditions, a simple calculation indicates that a lightning related outage was created for every 30 strikes that occurred throughout the year. Figure 13 depicts the correlation between lightning related interruptions and annual number of strikes. The year 2006 was no exception in how well the system responded to lightning activity; the response was excellent in the preceding years as well.

London Hydro continues to adhere to the practice of most urban utilities of installing arresters at locations such as transformers, switches or overhead to underground transitions.

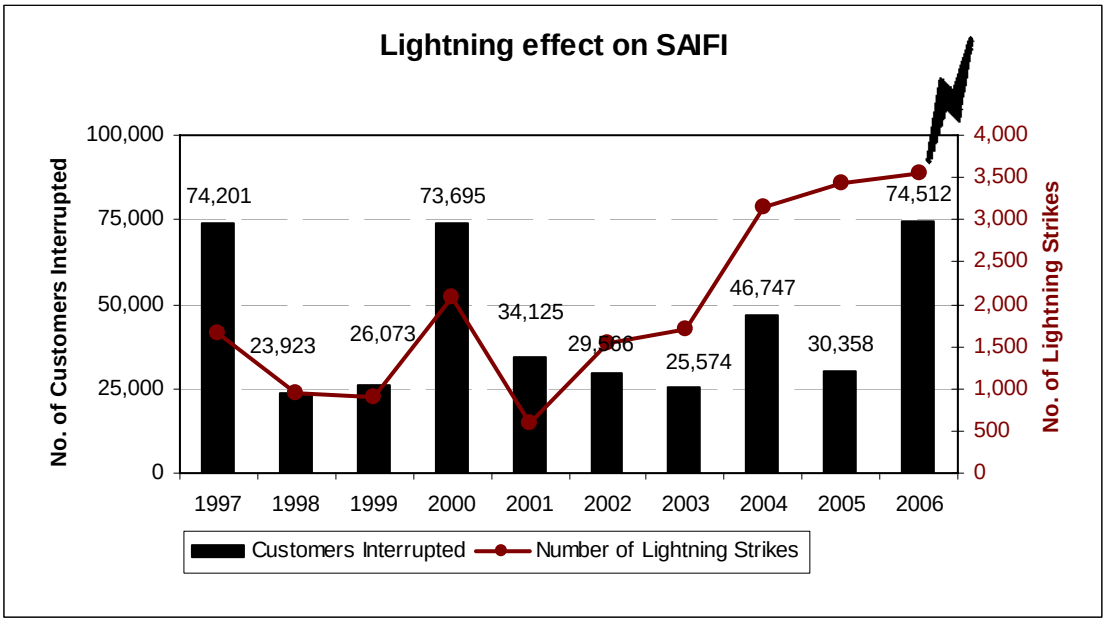


Figure 13, Correlation between no. of strikes and interrupted customers

7.2.2 Maintaining Poles

Thousands of treated wood poles have been tested over the last couple of years. Approximately 2,850 more poles were re-tested in 2006; these poles were tested in 1999 and were recommended for re-testing after 4-8 years. Poles that test poorly are placed on a list and are included in the capital budget for replacement the following year.

London Hydro continuously monitors the market place for alternative products like fiberglass composite poles; we are in contact with a manufacturer and have requested test results on the product. A pilot project is planned for 2008. Presently there isn't much field experience in south-western Ontario regarding the use of these poles.

7.2.3 Replacing Porcelain Insulators

No porcelain insulator replacements were budgeted for 2006. After the extensive work that began in 2001 in order to eliminate the most susceptible styles and vintages that have affected the reliability of the system, the number of failures has diminished. Despite the success of this program, three failures were experienced in 2006, all along Huron Street; this section of road (between Clarke Side Rd. and Highbury Ave.) had previously been identified as a low priority re-construction area

where brown Ohio Brass insulators were installed. The line was redesigned towards the end of 2006 and new polymer insulators were installed. Presently, 900 more suspect insulators still need to be replaced (17% of the initial 5,300 identified poor insulators were left to replace by the end of 2006 including the brown Ohio Brass).

7.2.4 Reducing the Number of Animal Contacts

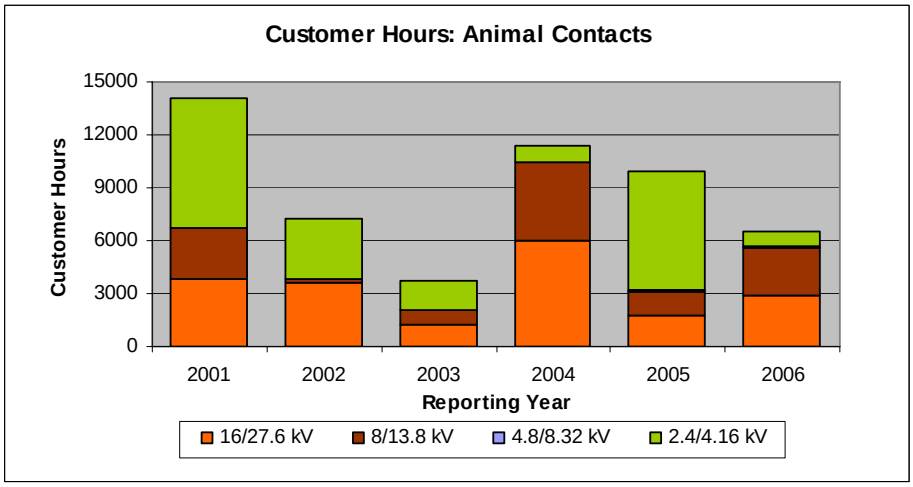


Figure 14, Animal-Caused Service Interruptions by Distribution Voltage Class

Two municipal substations had the largest animal related interruptions in 2001 (SUB-93) and 2005 (SUB-33). After remedies were implemented at both substations, the outage contribution on the 4 kV system is minimal compared to the 27.6 kV and the 13.8 kV systems, where the interruptions account for many more hours. Similar to 2004, in 2006 the majority of outage time on the 13.8 kV system was attributed to the 2K2 feeder, where non-insulated brackets are still present (see Figure 15 and 16). With no auto-reclosing function at the breakers on the 13.8 kV system, any animal contact has a higher probability to create a permanent outage. Nevertheless, there has been an overall decline in animal contact outages since 2004.

Figure 15, Non-insulated bracket at 5093 (2K2)

Figure 16, Insulated bracket at 5103 (2K2)

Bushing guards combined with insulated high-voltage cutout brackets continue to be the standard construction for any new installation at 27.6 kV and 13.8 kV. SAIFI is expected to naturally improve, since increased clearances should prevent animal contacts, thus avoiding breaker operations. The total number of animal contacts experienced in 2006 was in line with the five-year average of 70-75 incidents.

7.2.5 Reducing Susceptibility to Pole Fires

No pole fires occurred in 2006. Figure 17 provides some insight into the frequency and impact of pole fires on London Hydro's distribution system over the past five years. It is evident from the graph that the early pole fire replacement program yielded good results; the remaining part of the program will be carried out according to resource availability.

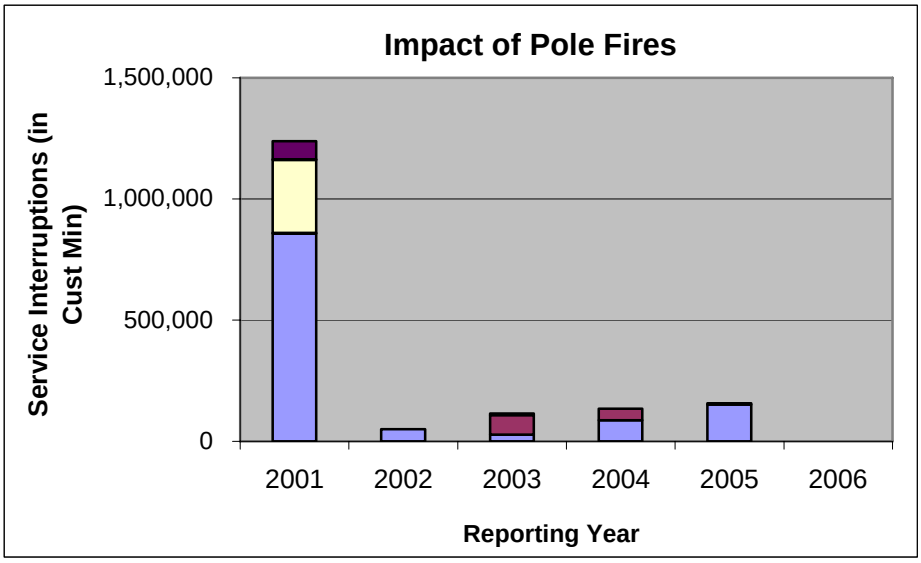


Figure 17, Service Interruptions Due to Pole Fires

8 Reliability driven capital projects

8.1 Summary of 2006 Work Completed

The following projects proposed in 2005 meant to improve reliability, which were completed in 2006, are summarized below.

- **Replacing Aging Underground Infrastructure**

  The scope of this project covered three areas where the cables and/or transformers were in need of replacement due to aging. Unfortunately, a budget shortage required part of the work to be deferred to 2007:

- Norton Estates and Berkshire Subdivision had the transformers replaced as they were approximately 45 years old and were posing environmental and safety issues (i.e., leaking oil, rust, etc).

- Westminster Park East, although serviced by infrastructure 30 years old, was put on hold until the following year; many cable failures have occurred and based on the history of recurrent incidents it was placed on the priority list for 2007.

At the end of 2006, out of 1,285 kilometers of underground subdivision cable on the system, approximately 267 kilometers of cable (21%) are over 25 years old.

- **Elimination of High-Risk Air-Insulated Gear at 27.6 kV**

The scope of this project, initially limited to 15 units identified as posing a "high-risk" of failure, was extended to a total of 23. By the end of the year, more SE's were removed from the system or replaced with non-air insulated gear (LC's) since the system redesign sometimes made it feasible to expand the works to the adjacent units for a justifiable incremental cost. The accelerated plan for elimination of air-insulated gear will continue every year until all the remaining units identified initially as having a "medium-risk" of failure (approximately 60% of the total population at 27.6 kV) are either replaced with LC's or eliminated completely.

- **Construction of New 27.6 kV Feeders**

London Hydro has been overloading the system during summer peak times in the last couple of years, creating the risk of rotational load shedding during double contingency failures. Load growth due to new developments (both residential and industrial) had to be supported by new infrastructure, as the existing feeders were limited in capacity and topography.

Of the three new feeders proposed for construction in 2006, to accommodate additional load; the 19M22 was completed and the other two delayed into 2007:

- 19M22 breaker from Buchanan TS was made available to London Hydro, to extend Buchanan' service territory to the west, providing relief to Wonderland TS;
- 70M1 from Clarke TS will accommodate load in the north-east part of the city;
- 4M13 from Highbury TS will serve industrial customers currently being fed by both Clarke and Highbury TS, both overloaded stations as well.

It is anticipated that the addition of new feeders will improve the reliability numbers as there will be fewer customers on any given feeder during a possible outage.

- **Network Plant Reinforced**

  A number of concrete manhole roof slabs and vaults were rebuilt in 2006 in the downtown area, based on recommendations from a structural engineer. Regular OEB inspections will continue to highlight any safety and reliability issues.

  As of the end of 2006, out of 92 network transformers on the system, 21 transformers (23%) are over 40 years old; the average age of the network transformers on the system is 19 years. One NT was replaced in 2006.

- **Cable Limiters and MH Covers**

  In 2006, London Hydro installed approximately 1,000 more cable limiters and 50 slotted manhole covers in the downtown network system, to prevent catastrophic electrical failures in the duct and manhole system. Almost 70% of the cable limiters project is now complete; more slotted manhole covers are planned to be installed on pedestrian walkways.

- **Pole Fire Replacement**

  Two sections of pole line along Clark Side Road between Dundas Street and Gore Road were reconstructed in 2006. The inherited design deficiencies and age of the plant made it prone to pole fires. Approximately 56% of the identified poles susceptible to pole fires have been rebuilt to-date.

- **Replacement of Unreliable Poles**

  Of the 70 remaining depreciated poles, eight were replaced in 2006 and several others on capital projects. Replacement of the unreliable poles will continue in accordance with the re-testing program results.

- **OMS/GIS Systems**

  A new state-of-the-art GIS system (Intergraph) was acquired and will gradually be introduced at London Hydro. The conversion of the existing data to the new platform will take some time, but it will facilitate the future purchase of an Outage Management System. These new state-of-the-art technologies can enable the use of computerized maps to view, trace and change the status of circuits and switches in real time. The GIS project completion is targeted for October 1st, 2007.

8.2 Summary of 2007 Work Planned

This section identifies some of the more important projects scheduled for 2007 which will contribute to the system's reliability improvement.

- **Replacing Aging Underground Infrastructure**

  The scope of this project covers two areas where the performance of the aging cables has visibly deteriorated; both areas have been deferred from previous years when they were originally budgeted for cable replacement.

  - Westminster Park East was ranked as the least reliable subdivision in 2006; the project will include replacement of the cables and selected transformers. At the same time, some depreciated single-phase SE's will be considered for decommissioning.
  - White Oaks subdivision Phase II has experienced an accelerated number of cable faults in the last three years. The SPOORE analysis in 2006 indicated that replacement of cable in this area should be completed without delay.

- **Conversion of 27.6 kV Air-Insulated Gear to Load Centres**

  This project began last year to eliminate or replace the "high-risk" 27.6 kV SE's with non-air insulated gear (load centres). Of the total of approximately 100 units posing a high or medium risk of failure, 12 more units will be addressed in 2007. At the current pace, it will take approximately five more years to eliminate the originally identified high and medium risk units.

- **New 27.6 kV Capacity**

  - Four new breaker positions become available at Buchanan TS at the end of 2006. The new feeders that will emanate from the station (19M29, 19M30, 19M38 and 19M39) will provide load relief to east London, currently supplied by Highbury TS and Clarke TS. Five existing feeders will be reconfigured once the new Buchanan feeders are energized. This is the first step in increasing London Hydro's capacity of supply.
  - Talbot TS will be expanded through the construction of a second DESN station at the existing site. This work should be completed by HONI by October 2007. London Hydro will begin the "make ready work" by rebuilding some existing duct and installing new egress cable. Separation of the two feeders (26M43-1 and 26M43-2) fed by the 26M43 breaker position will be completed after Talbot TS #2 is finished. The new Talbot TS will provide relief in the north-west of the City, and will enhance system reliability by lowering the average number of customers affected by feeder faults.

- **PILC egress cable replacement on the 32M6 at Wonderland TS**

  The terminator failure on the egress of the 32M6 in May 2006 prompted a plan to replace the entire lead cable from the station to the riser in 2007. This cable is over 40 years old and its failure had a high impact on reliability in 2006.

- **Cable Limiters and MH Covers**

  Approximately 500 more cable limiters will be installed, together with 50 more slotted manhole covers. They both serve the purpose of avoiding catastrophic failures from the high-energy faults characteristic to a network system.

- **New Automation of selected 27.6 kV feeders**

  Two large customers (Accuride and Kelloggs) have been experiencing down-time and production loss as the nature of their operations makes them sensitive to outages. Reclosers were budgeted to be installed on their supply feeders which will reduce the exposure and number of customers with permanent interruptions. The two large customers will however continue to be exposed to auto-reclosures.

- **Replacement of Unreliable Plant**

  - London Hydro scheduled approximately 50 depreciated poles for replacement in 2007 according to previous test data. Also, based on previous recommendations 2,850 poles were re-tested in 2006. The testing results may reveal that more poles will require replacement in the near future.

  - Grey Munsell poles were identified to pose a safety hazard due to their poor construction which used paint that inadvertently seals moisture inside, contributing to significant interior decay. Seven poles will be replaced in 2007; this leaves 60 more poles to be done.

  - Many broken insulators have resulted in large outages on the 27.6 kV system. The failed specimens were catalogued by vintage and manufacturer. Based on the available information London Hydro began replacing the most vulnerable groups. Approximately 4,400 insulators have been changed out so far; 150 more are planned for 2007.

- **Improving SCADA functionality**

  - This project will explore a new automation scheme known as "automated loop switching", by which automated switches would detect a fault and the SCADA master system would use this information to automatically change the status of switches, to isolate and restore power to the majority of customers without human intervention. A pilot project will be initiated in this regard.
  - More telemetry functions will be implemented on spot networks, and new electronic relays will be installed at sub-stations; as well the first phase of the upgrade of the Radio/SCADA Communication systems will also be completed in 2007.

All these projects described above should, in general, reduce the impact of outages for our customers. Some will assist by speeding up the restoration process, or by protecting customers from unnecessary interruptions, and others will facilitate operators' responses to system disruptions, inherently improving the reliability numbers overall. The infrastructure should also be more robust to withstand natural challenges.

9 Under-Performing Distribution Circuits Analysis

The analysis of circuit performance continued in 2006. For many years, the ten worst under-performing circuits have been identified annually, using the criteria of both frequency and duration impact of outages on specific feeder customers. SAIDI and SAIFI indices are determined by reporting the outage duration and frequency for each individual feeder, resulting in FAIDI (*Feeder Average Interruption Duration Index*) and FAIFI (*Feeder Average Interruption Frequency Index*). The circuits which experienced the highest values in the year analyzed are considered to be the most unreliable. For example, a 4 kV feeder with a small number of customers that does not have a large impact on the system may, in fact, have an extremely poor performance for the customers supplied from it. This way, such circuits are reviewed to see if any work can be proposed to improve their reliability.

Appendices 2 – 4 of this report contain three tabulations showing the circuits London Hydro identified in 2006, 2005 and outstanding tasks that have not been completed for other circuits that were identified earlier.

In 2006, the performance of one feeder (1K4 at SUB-1) fell behind all the others by far; however, a closer look at the very high FAIFI and FAIDI for this feeder, indicated that one fault on the feeder affected the 13.8 kV system as well, therefore resulting in an extremely high value for the 'frequency' of interruption. Since the customers affected on the 13.8 kV circuit were counted in the analysis of this outage as well, it is misleading to say that the customers on the 1K4 feeder alone have a highly unreliable performance due to this one, low-probability, high-impact event. A

decision was made to put off any repairs at SUB-1 after this failure, as the substation is planned for decommissioning in the near future.

Four circuits in the top ten worst performing feeders have been ranked more than once over the last five years; this is illustrated in Table 2.

35F2	97F2	26M56	23F2
2X	2X	2X	2X

Table 2, Repetitive worst performing circuits

Appendix 1

ANNUAL PERFORMANCE DATA 2006

The table below shows London Hydro's performance for the last 3 years in terms of reliability indices and number of outages; also, a comparison between 2006 and 2005 is presented in the last column. In general, the reliability measures worsened as the customer base increased by almost 3%; the number of planned outages decreased substantially (by almost 30%) compared to 2005.

Distribution System Supply Reliability					
		2004	**2005**	**2006**	**2006 vs. 2005**
Customer Base		**134,400**	**136,487**	**140,007**	**+2.6%**
Customer-hours off supply	Unplanned	150,625	131,356	143,190	9.0%
	Planned	26,120	25,885	29,905	16.0%
	Total	**176,745**	**157,241**	**173,095**	**10.0%**
Customer Interruption Frequency (SAIFI)		2.09 /yr	1.65 /yr	2.14 /yr	30.0%
Average Interruption Duration (SAIDI)		1.32 hrs	1.15 hrs	1.25 hrs	8.7%
Number of Outages	Unplanned	571	410	594	44.8%
	Planned	485	574	404	-29.6%
	Total	**1,056**	**984**	**998**	**1.4%**

Appendix 2

2006 WORST PERFORMING CIRCUITS

The following circuits have been evaluated as the top ten worst performing at the end of 2006. The ranking is performed by applying a 50% weight to both FAIFI and FAIDI. It is interesting to observe from the analysis results that in 2006 the majority of the least reliable feeders were serviced by the 4.16 kV system. One circuit (operating at 27.6 kV) is supplied by Talbot TS, which is being reconfigured with the addition of several new breaker positions.

These ten feeders represent 23% of all the customer minutes of interruption and 16% of all customers affected during unplanned outages; also, 12% of the unplanned interruptions are attributed to these feeders as well.

❶

Supply Station:	**SUB-33**	**Feeder Circuit Designation:**	**33F1**
Location: Sandford Rd. S/O Huron St.			
Number of Customers on Feeder:	**320**	Feeder Circuit Length (km):	**3.2**
Position in 2005:	**81**	Unplanned Customer-Minutes of Interruption:	**143,515**
Average position since 2001:	**91**		
FAIFI:	**3.50**	FAIDI:	**7.47**
Explanation of Planned Action:			
The high ranking of this 4 kV feeder in 2006 is attributed to lengthy outages created mainly by one tree contact (80%), which operated the breaker twice. This feeder took over customers that were originally fed from 83F1 before SUB-33 was constructed. The feeder is currently protected by a recloser installed at the station. Its reliability depends however on many overhead components. The area has not been tree trimmed recently and is not due for another two years; the cyclical tree trimming program should help with tree contact related outages but not likely during heavy storms or other inclement weather conditions. No remedial work is planned for this feeder at this time.			

❷

Supply Station:	**SUB-35**	**Feeder Circuit Designation:**	**35F2**
Location: Base Line Rd. E/O Boler Rd.			
Number of Customers on Feeder:	**588**	Feeder Circuit Length (km):	**3.8**
Position in 2005:	**6**	Unplanned Customer-Minutes of Interruption:	**191,591**
Average position since 2001:	**69**		
FAIFI:	**4.81**	FAIDI:	**5.43**
Explanation of Planned Action:			
The poor performance of this feeder was due entirely to defective equipment: one broken drop lead and two cable faults on radial distribution feeds ranked this feeder high. Five breaker operations were counted due to these three incidents. The cable faults happened in Park Lane Estates (Byron). Engineering is considering a conversion in the north side of the subdivision (fed by 35F2) in 2008, due to the poor ranking in the SPOORE analysis. The 2008 budget has not been finalized yet. Last year's poor performance of this feeder was due entirely to animal contacts which has not been addressed yet.			

❸

Supply Station:	SUB-44	Feeder Circuit Designation:	44F1
Location: Riverside Dr. E/O Hyde Park Rd.			
Number of Customers on Feeder:	**481**	Feeder Circuit Length (km):	**4.8**
Position in 2005:	**44**	Unplanned Customer-Minutes of Interruption:	**165,350**
Average position since 2001:	**64**		
FAIFI:	**3.23**	FAIDI:	**5.73**

Explanation of Planned Action:

SUB-44 has only one feeder which is heavily loaded (and unbalanced); it can be backfed by two other municipal substations. High loads during adverse weather and several tree contacts created the majority of the outages in 2006 (accounting for 82% of the customer minutes). The feeder was protected by an old style, non-standard, Dominion cutout with EPF 300X expulsion links. Towards the end of 2006, a refurbished hydraulic recloser was installed at the station. The reliability is expected to improve by preventing the temporary outages from becoming permanent.

❹

Supply Station:	SUB-97	Feeder Circuit Designation:	97F2
Location: Colonel Talbot Rd. S/0 Hwy. 402			
Number of Customers on Feeder:	**139**	Feeder Circuit Length (km):	**44.4**
Position in 2005:	**17**	Unplanned Customer-Minutes of Interruption:	**51,831**
Average position since 2001:	**57**		
FAIFI:	**2.71**	FAIDI:	**6.21**

Explanation of Planned Action:

Ten outages of a total of 19 on the 97F2 were due to defective equipment. They also accounted for 52% of the outage time. One vehicle accident in the foreign interference category accounted for an additional 26%. Although the feeder is equipped with single-phase reclosers, most outages were localized (a transformer or a switch) and lasted sometimes as long as half a day or a full day. This 8 kV feeder has ranked poorly before – the third least reliable feeder at the end of 2003, mainly from foreign interference; in other years the causes were various, therefore no trend was discovered. SUB-97 is a radial station, distributing power at a different voltage level than the rest of the system. Several years ago, a stand-by power transformer was added on site for emergency operation as the existing two power transformers are very old. There are no protective or sectionalizing devices on this extremely long feeder to reduce the duration of an outage or the troubleshooting time. Several devices are available from manufacturers like *resettable sectionalizers* or *drop-out reclosers* suitable for existing cut-out mounts. These are currently being considered for application on the long rural feeders at SUB-97 (this feeder is slated for a pilot project in 2007 and the other two will be considered later if the project is successful).

❺

Supply Station:	SUB-9	Feeder Circuit Designation:	9F2
Location: McCormick Blvd. S/O the CPR			
Number of Customers on Feeder:	**264**	Feeder Circuit Length (km):	**2.7**
Position in 2005:	**58**	Unplanned Customer-Minutes of Interruption:	**81,110**
Average position since 2001:	**87**		
FAIFI:	**3.66**	FAIDI:	**5.12**
Explanation of Planned Action:			
One single event – a cable failure on the PILC feeder egress caused high FAIFI and FAIDI for the 9F2. In general lead cables can last anywhere from 40-60 years; this cable was more than 50 years old. A capital project number for proactive replacement of older PILC egress cables has been re-instated in 2007, after many years of absence. PILC egress faults are still being monitored for trends.			

❻

Supply Station:	SUB-55	Feeder Circuit Designation:	55F1
Location: White Oaks Rd. S/O Southdale Rd.			
Number of Customers on Feeder:	**391**	Feeder Circuit Length (km):	**2.8**
Position in 2005:	**109**	Unplanned Customer-Minutes of Interruption:	**108,194**
Average position since 2001:	**63**		
FAIFI:	**3.71**	FAIDI:	**4.61**
Explanation of Planned Action:			
High loads (in the human element category) on this 4 kV feeder contributed almost 40% to the outage duration; defective equipment added another 32%. SUB-55 has only one feeder which was retrofitted in 2004 with a pole-mounted recloser that provides momentary outage functionality. The several occurrences that ranked this feeder high in 2006 do not substantiate a general poor performance based on its previous ranking; this year's performance is seen as an anomaly and therefore, no work is planned for this feeder.			

❼

Supply Station:	Talbot	Feeder Circuit Designation:	26M56
Location: Talbot St. and Ann St.			
Number of Customers on Feeder:	**3,223**	Feeder Circuit Length (km):	**24.7**
Position in 2005:	**33**	Unplanned Customer-Minutes of Interruption:	**331,312**
Average position since 2001:	**16**		
FAIFI:	**6.54**	FAIDI:	**1.71**
Explanation of Planned Action:			
This feeder has performed extremely poor for many years; defective equipment was responsible for the majority of the outage duration over the last couple of years. Although measures were taken to reduce outages and down time through the installation of two electronic reclosers, their controls have never been programmed. Also, the feeder was re-configured, which resulted in one of the reclosers providing automation to a new feeder. The one remaining recloser on this feeder should be programmed since it would reduce the overall exposure and its susceptibility to lightning. More than 75% of the interruptions that contributed to the high FAIFI on 26M56 were created by four breaker operations all due to lightning. A failure of a termination on this feeder created a large outage on the 26M43 as well; this in turn increased FAIFI even more.			

❽

Supply Station:	Wonderland	Feeder Circuit Designation:	32M6
Location: Southdale W/O Wellington Rd.			
Number of Customers on Feeder:	**3,620**	Feeder Circuit Length (km):	**12.8**
Position in 2005:	**74**	Unplanned Customer-Minutes of Interruption:	**803,105**
Average position since 2001:	**69**		
FAIFI:	**4.15**	FAIDI:	**3.7**

Explanation of Planned Action:

The majority of the downtime created by the outages on this feeder happened when the lead pothead failed on the egress cable (94%). This is the last 27.6 kV lead egress cable left on the system; its replacement was proposed and budgeted for 2007. This should remedy the situation.

❾

Supply Station:	SUB-23	Feeder Circuit Designation:	23F2
Location: Southdale Rd. W/O Wellington Rd.			
Number of Customers on Feeder:	**150**	Feeder Circuit Length (km):	**3.9**
Position in 2005:	**122**	Unplanned Customer-Minutes of Interruption:	**42,059**
Average position since 2001:	**64**		
FAIFI:	**2.93**	FAIDI:	**4.67**

Explanation of Planned Action:

Three quarters of the total downtime on this feeder was attributed to one vehicle accident which resulted in a breaker operation as well. Vehicle accidents are considered external, uncontrollable causes since they are independent of London Hydro's design and operating practices, reinvestment in infrastructure renewal, or maintenance programs. Another breaker operation was caused by lightning during a second outage which is responsible for the remaining time when the power was out. The 23F2 appeared at the top of the scale as a bad performing feeder in 2003; as a result, a portion of the underground plant was converted in 2004 addressing the age related failures experienced in 2003. The majority of the remaining circuit is overhead construction which continues to create exposure to causes similar to the ones listed above.

❿

Supply Station:	SUB-98	Feeder Circuit Designation:	98F1
Location: Dingmand Dr. W/O Wellington Rd.			
Number of Customers on Feeder:	**113**	Feeder Circuit Length (km):	**10.4**
Position in 2005:	**61**	Unplanned Customer-Minutes of Interruption:	**33,915**
Average position since 2001:	**89**		
FAIFI:	**1.81**	FAIDI:	**5.0**

Explanation of Planned Action:

Almost 80% of the outage time on the 98F1 was due to one vehicle accident creating an extremely long outage. Otherwise, this feeder would not have been in such a high position. There is no need for a remedy at this time.

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Appendix 3

UPDATE ON 2005 WORST PERFORMING CIRCUITS

The ten worst performing feeders for 2005 were reviewed in detail. Described below are actions considered to improve performance where it was found to be justified.

Circuit (Position in 2005)	Proposed Work	Status	Ranking in 2006
35F1	Animal contacts were responsible for almost all of the outage time, ranking this feeder the worst in 2005. The overhead secondary bus within the station is exposed and as a result, squirrels managed to create three separate outages at the station throughout the year. Insulating tape was used to partly cover the secondary bus bars. More work is planned to re-route the secondary cables directly onto the available internal side bushings of the transformer to reduce the exposure; also, cover ups will be mounted on the primary bushings. SUB-35 cannot be isolated unless a mobile transformer is brought on site to support the load that adjacent substations cannot otherwise supply.	Outstanding	114
6K4	Animal contacts also continued to affect this feeder but to a less extent than in 2005. Last year, after a continuous poor performance related to this cause for two years in a row, it was recommended that with any new failure at a transformer or switch location, it is ensured that standard animal protection devices are in place. An audit planned for 2008 will highlight non-compliant locations.	Deferred to 2008	56
19M27	This feeder demonstrated poor performance for two years in a row (2004 and 2005). Cable faults responsible for most of the high reliability numbers in 2005 continued in 2006 as well. Phase I of the cable replacement in the White Oaks Subdivision (serviced mainly by 19M27) was completed in 2005. The remaining portion (Phase 2) will be completed by the end of 2007.	In progress	23
13M15	It was recommended in the QSR 2005 that this feeder be audited after it indicated poor reliability also for two years in a row. An inspection of the overhead lines may reveal design deficiencies that could have contributed to past failures and inherently, breaker operations.	Deferred to 2008	14
35F3	The action plan for the 35F1 covers the improvement measures for this feeder as well.	Outstanding	Not listed
35F2	Although the same improvement measures applied at the station should increase this feeder's reliability, its repetitive poor performance was driven by other factors in 2006 (see Apendix 2). The action plan will still be carried out to prevent more animal contacts.	Outstanding	2

26M55	The loss of supply related outages that affected this feeder in the past are hopefully being dealt with, as HONI have improved their maintenance schedule at all the TS's.	Completed	85
19M21	The majority of London Hydro customers were moved from the 19M21 to 19M27, making them immune to the incidents occurring on the HONI's feeder outside of London Hydro's service territory. The remaining London Hydro customers on the 19M21 are at the mercy of HONI since London Hydro cannot maintain and repair / restore power to these customers. Since this feeder's reliability has improved substantially due to the changes implemented in 2006, this feeder work is considered completed. However, we will continue to monitor 19M21 and take appropriate steps with HONI, should their reliability deteriorate.	Completed	46
92F1	No action was planned for this feeder's reliability improvement and its current performance is not requiring urgent attention.	N/A	17
70M4	The cause categories that ranked this feeder high in 2005 have not re-appeared. No action plan was deemed necessary since most of the outage duration was due to an uncontrollable cause (vehicle accidents). Clarke TS will also be reconfigured with the construction of new feeders so the future performance of 70M4 may change.	N/A	30

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Appendix 4

UPDATE ON OUTSTANDING WORK ON PRIOR WORST PERFORMING CIRCUITS

Described below are the actions proposed in the past in order to improve performance and the current status of the proposed work.

Year	Circuit	Proposed Work	Status	Ranking in 2006
2004	**50F1**	The area and infrastructure serviced by this feeder is relatively small and old; many of the interruptions were due to defective equipment. If the station – currently situated on the premises of Wonderland TS will have to be relocated at HONI's request the load will be converted to 27.6 kV.	Will be scheduled in collaboration with HONI	81
2004	**2K2**	A total of four animal contacts have happened at the same riser (SW 5093) including one that occurred in 2006; insulated mounting brackets will be installed. The Guthrie guards installed in 2001 on this feeder should be replaced with bushing guards.	Outstanding (High Priority)	11
2003	**2K2**	Previous recommendations from a consultant suggested that the protection coordination should be reviewed. The current plans for reconstruction / conversion of Nelson TS to 27.6 kV (as indicated by HONI) make this recommendation not applicable anymore.	N/A	11
2001	**19M21/22**	The majority of the customers on this feeder were transferred onto the 19M27. London Hydro also gained a new breaker position at Buchanan TS.	Completed	46
2000	**13M33**	Previous recommendations from a consultant suggested that the protection coordination should be reviewed. The current plans for the reconstruction / conversion of Nelson TS to 27.6 kV (as HONI has indicated) make this recommendation not applicable anymore.	N/A	Not listed
1998	**25F2**	The SUB-25 service territory was scheduled for voltage conversion but it was deferred indefinitely. System Planning is re-evaluating the advantages of conversion of municipal substations through a thorough inspection program.	Deferred Indefinitely	Not listed
1998	**37F2**	Voltage conversions originally scheduled for 2003 have been deferred indefinitely. System Planning is re-evaluating the advantages of conversion of municipal substations through a thorough inspection program.	Deferred Indefinitely	111

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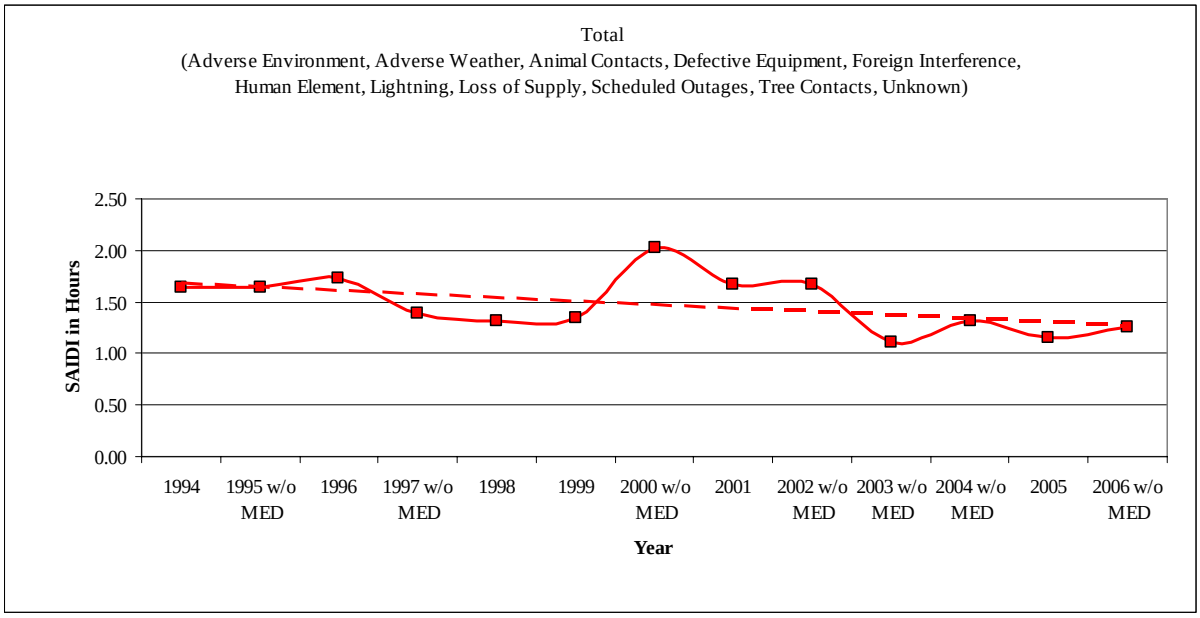
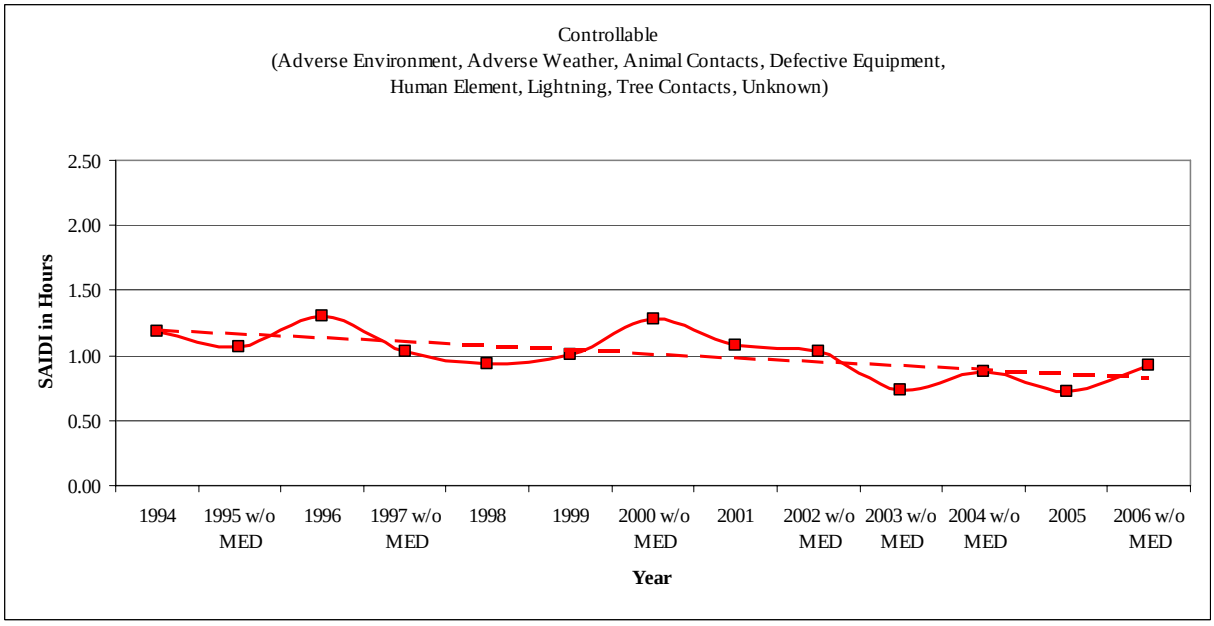
Appendix 5

SAIDI





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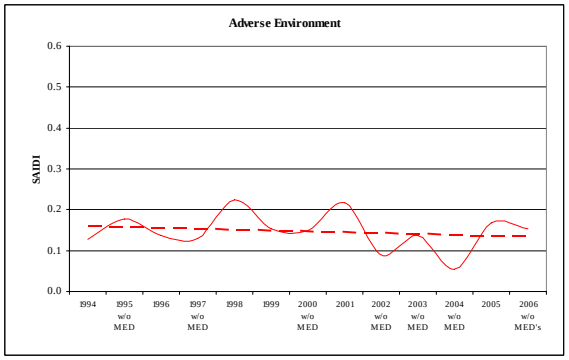

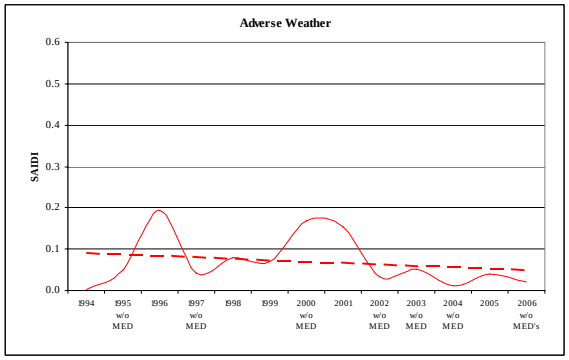

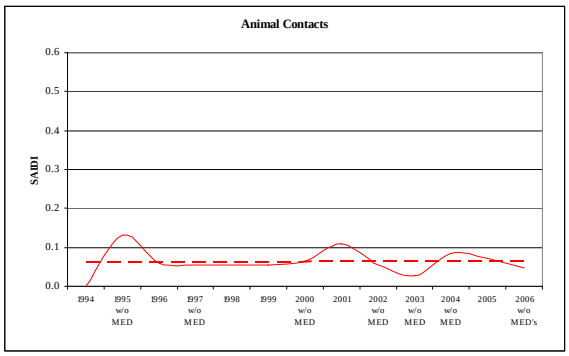

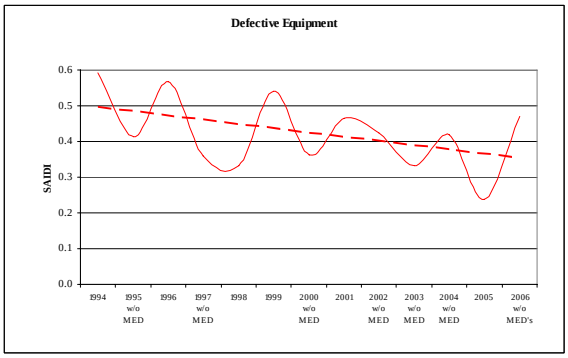

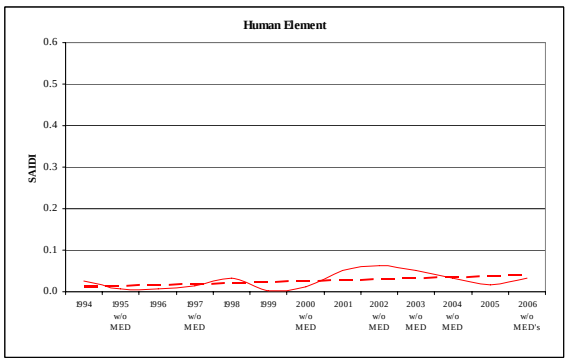

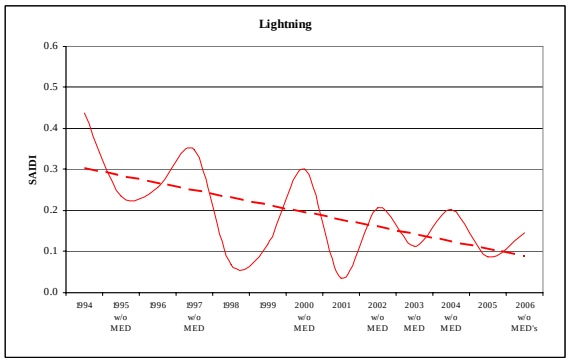

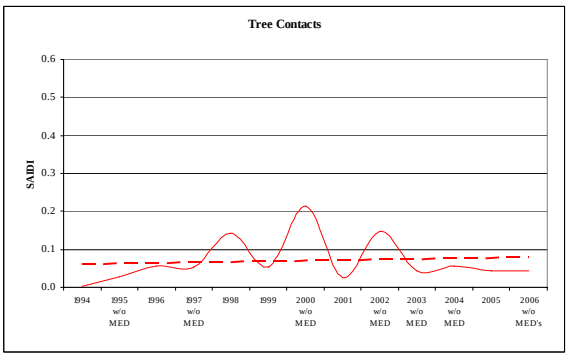

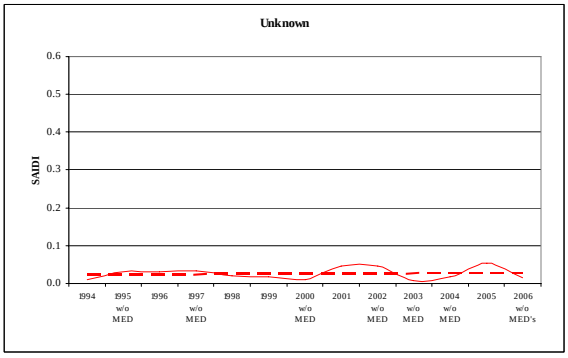

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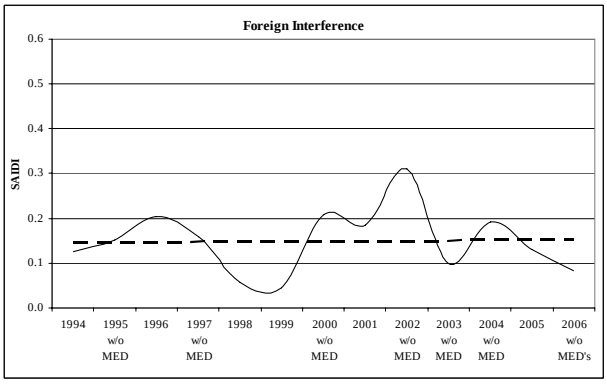
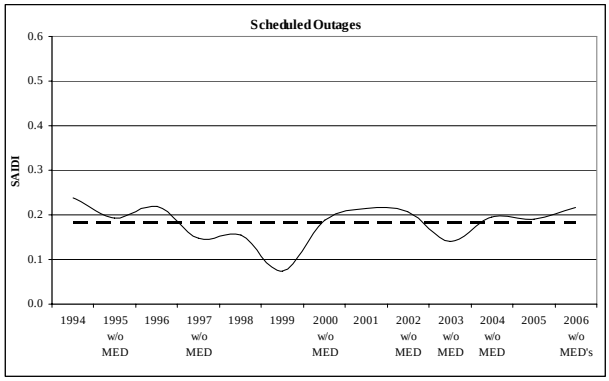
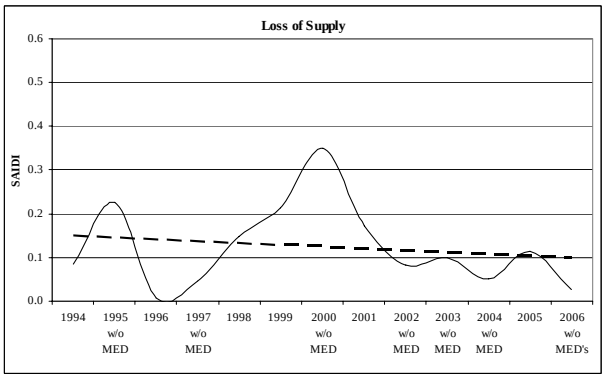
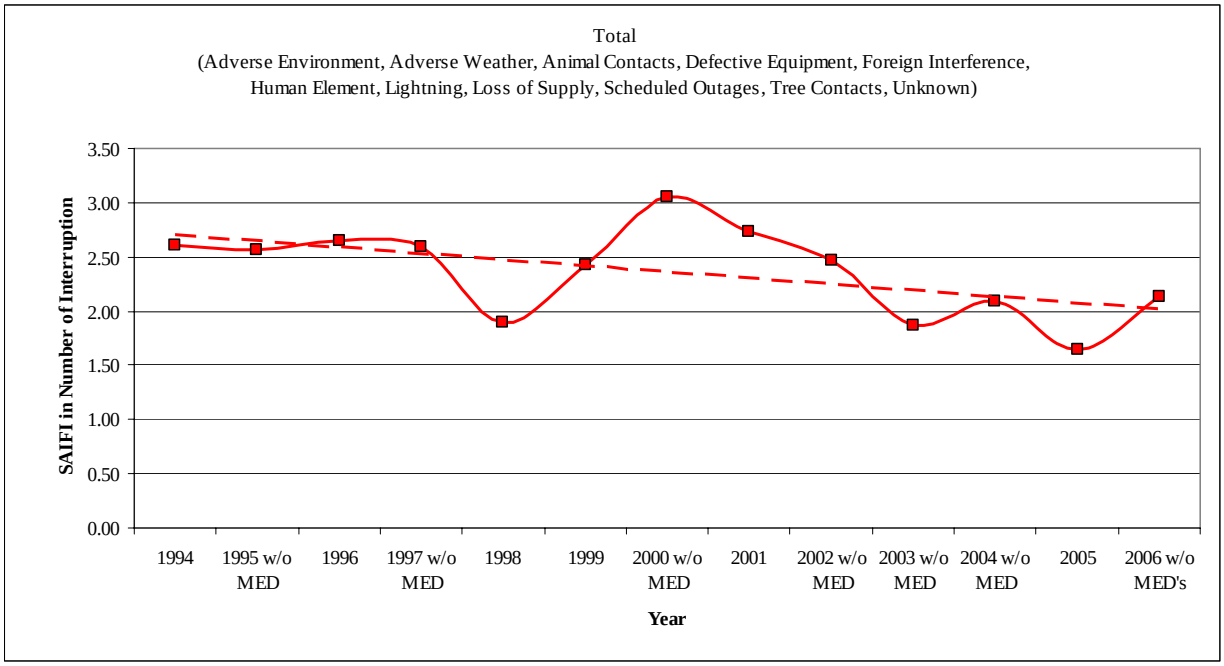


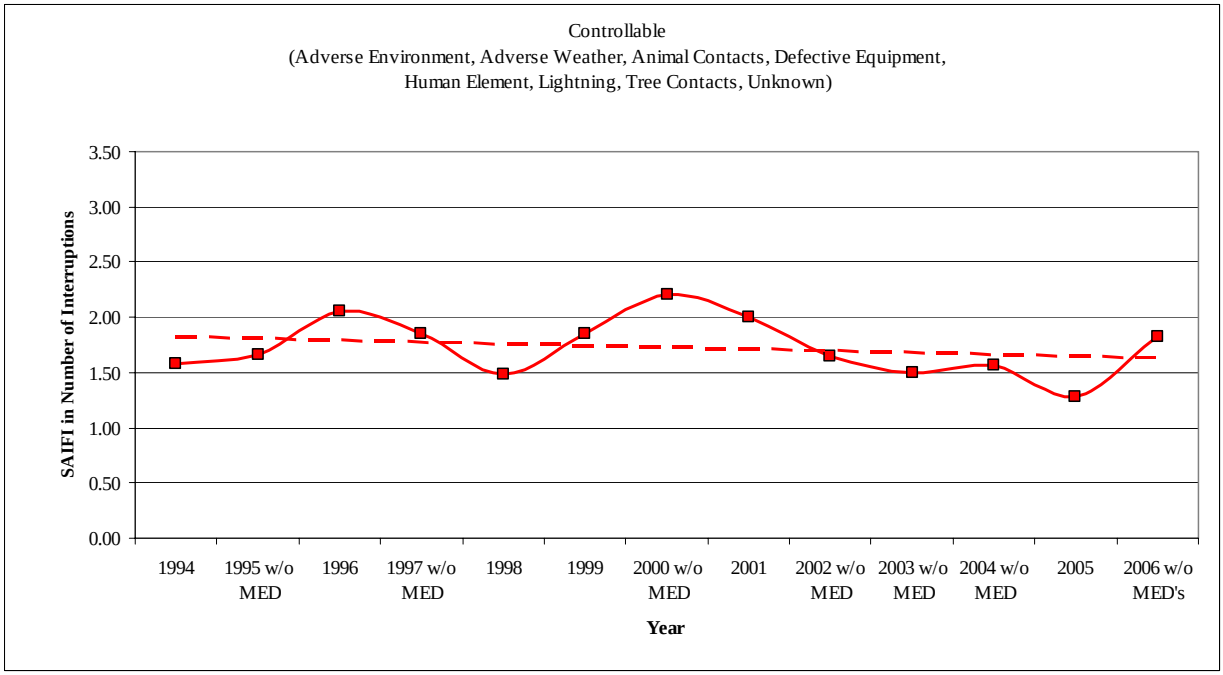




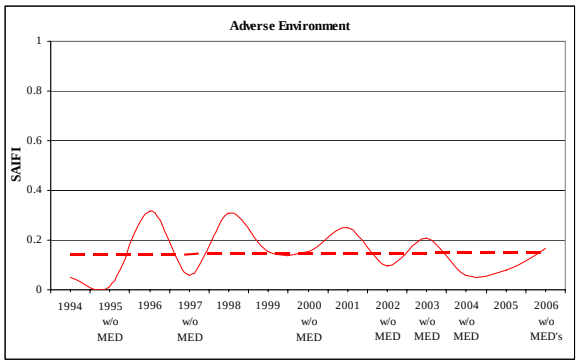
Appendix 6

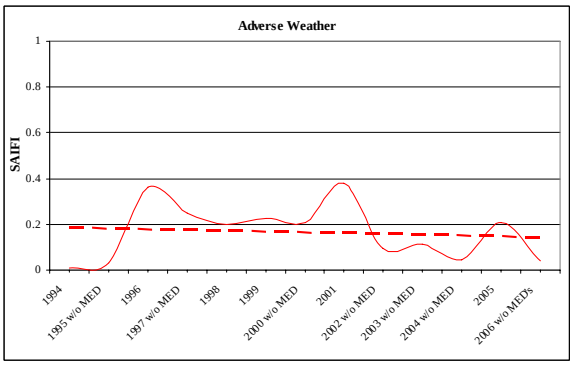
SAIFI

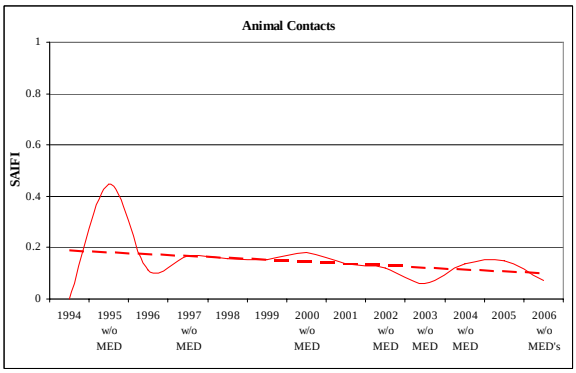


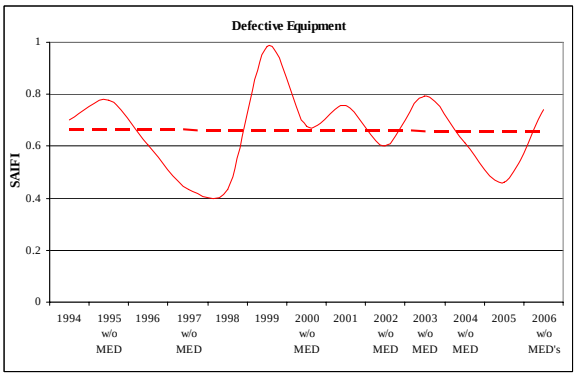


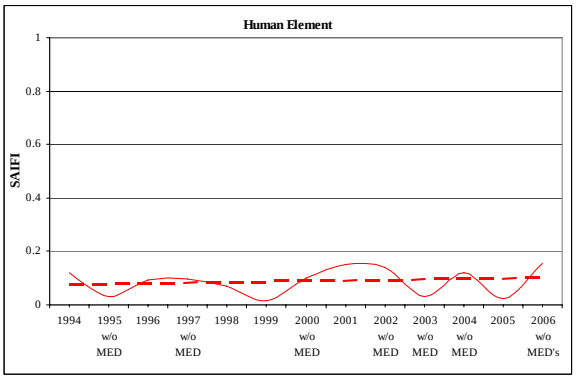
SAIFI (Controllable)

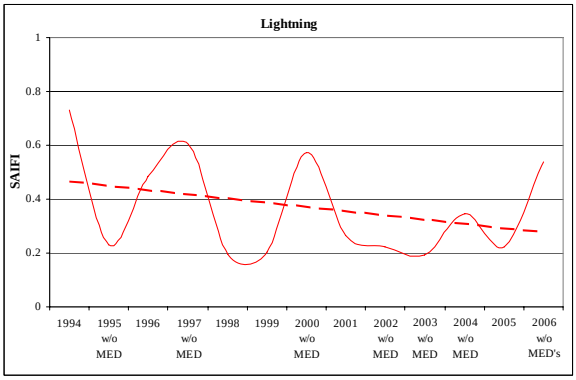


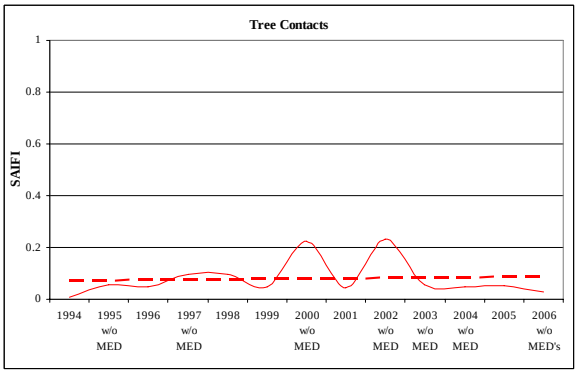


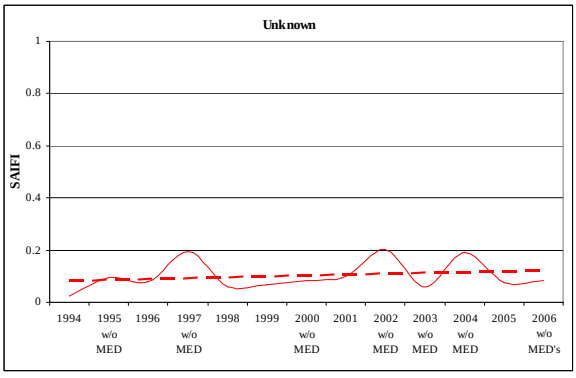




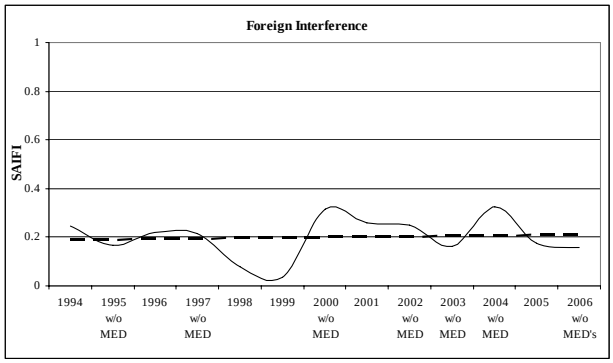


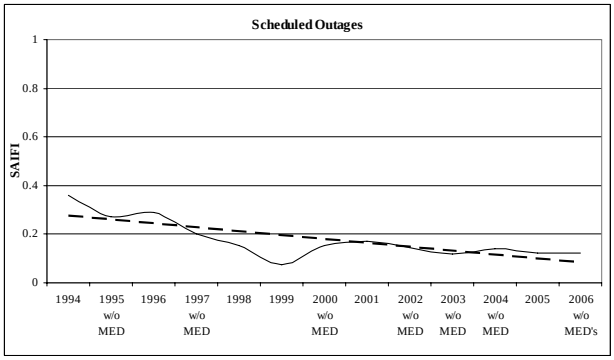


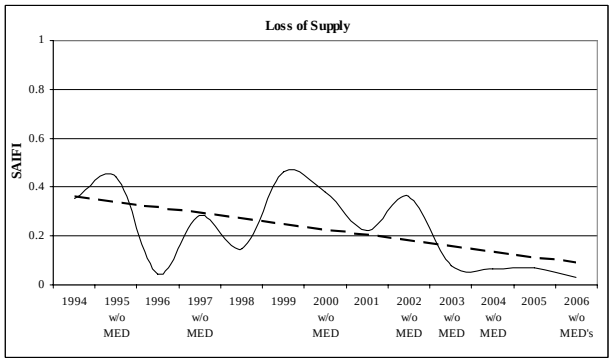




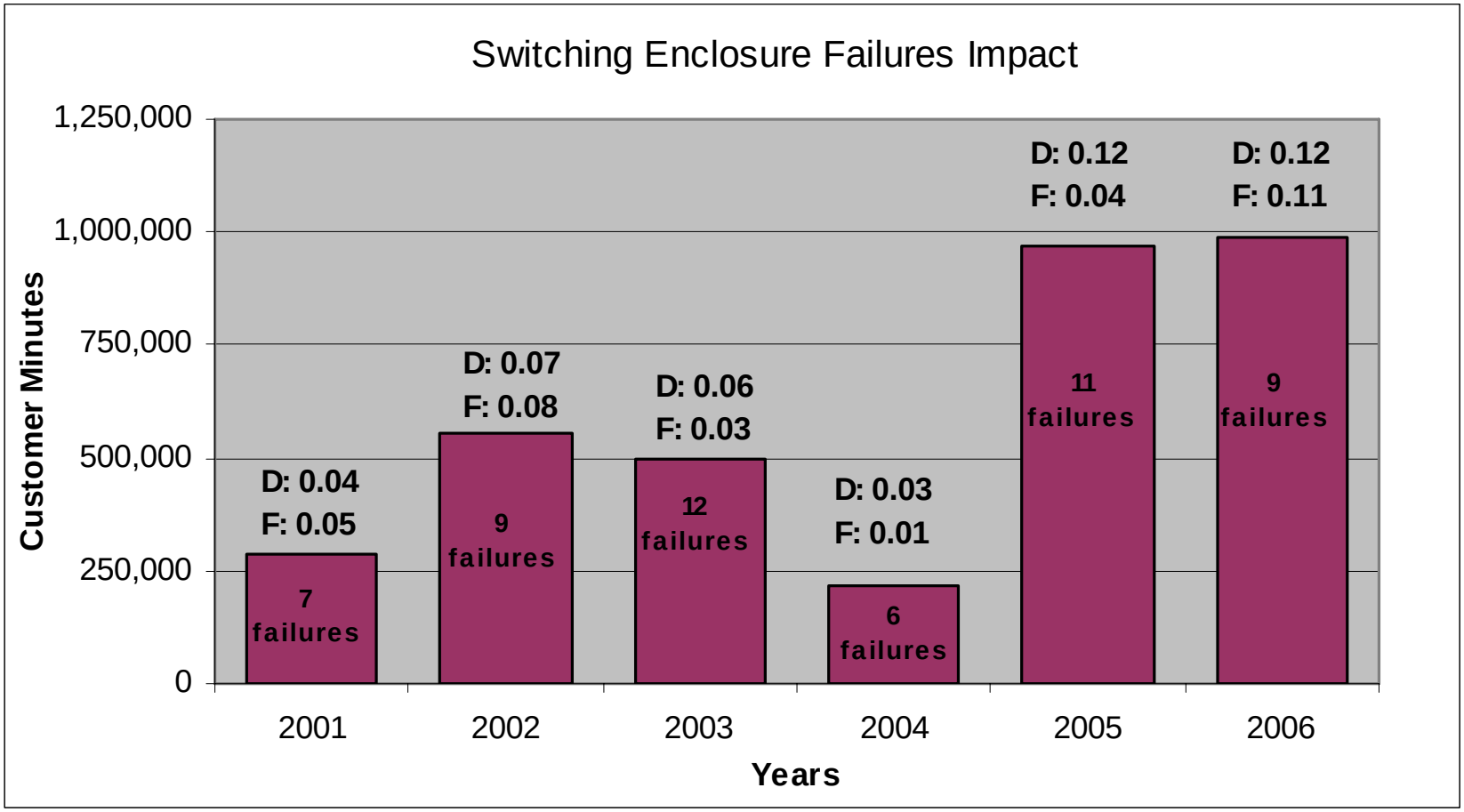
SAIFI (Uncontrollable)







Appendix 7



D: System Average Interruption Duration Index (SAIDI)
F: System Average Interruption Frequency Index (SAIFI)

Appendix 8

Nelson TS Loss of Supply

Reliability Incident Report

Saturday, October 14th, 2006

A. Background

Nelson TS is one of the six (6) transformer stations (depicted by yellow stars in the picture below) that supply London Hydro's medium voltage distribution system in London. The station receives power via two transmission circuits designated as W5N and W6NL energized at 115 kV. Four power transformers (T1, T2, T3 and T4) step down the voltage to 13.8 kV supplying three separate buses: the "J-Y" bus, the "K-P" bus and the "B-Q" bus, the latter servicing the network system downtown. Only the first two buses are currently inter-tied.

As the picture below illustrates, Nelson TS is not exactly in the "heart of the city", but it is surrounded by all the other transformer stations which, ironically, cannot provide any backup supply due to the fact they are at a different voltage level. The original design of the station providing supply at 13.8 kV may have had benefits associated with creating a loop system in the downtown core, using network transformers and primary lead cable inside congested duct systems.

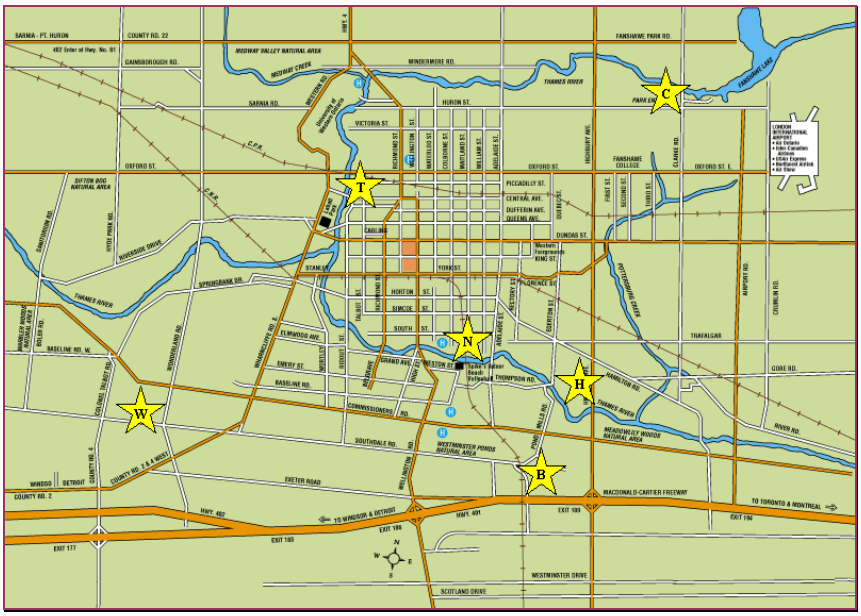


Fig 1, Transformer Stations in London supplying power to the service area

The design of the station has inherent reliability in a single contingency (i.e., unavailability of one transmission circuit or failure of one power transformer). However, as the event described in this report demonstrates, there can be rare instances when failure of one system element may trigger unintentional operation of another element resulting in large power outages. The loss of supply at Nelson TS on October 14th, 2006 was such one.

B. Incident Overview

On Sunday, October 14th, 2006 at midnight, the T4 power transformer failed internally; at the same time its high gas alarm triggered the bus potential relay to trip off the T3 transformer as well. As a result, both "J-Y" and "K-P" buses supplied from the two transformers lost power. London Hydro had no ability to provide back up supply to the station during the course of the outage.

Approximately 13,000 customers experienced an outage that lasted over two hours for some of them; over 1.4 million customer minutes of interruption were associated with this outage. An estimated load of 34 MVA was lost in the system. The IEEE 2.5 Beta Method, according to IEEE Std. 1366-2003, allows utilities to consider large outages **Major Event Days (MEDs)** and eliminate them from the reliability reporting data in order to normalize the data. Fortunately, the loss of supply incident at Nelson that day qualified as **MED** and was removed from the statistics. Its contribution would have been 0.07 in SAIFI and 0.14 in SAIDI. Year-end values were thus reported 5% lower for SAIFI and 15% lower for SAIDI.

Upon HONI intervention, power was restored by re-energizing the T3 transformer. Both buses that were affected had to rely on one power transformer until T4 was replaced.

C. Action Implemented and Station Status Update

A contingency plan was immediately developed prior to the T4 replacement by HONI (i.e., 2 X 15MVA mobile transformers on site, re-instating a tie between "B-Q" and "J-Y"/"Q-P" buses). However, there was no need to implement any of the solutions; a new power transformer was successfully installed in place of T4 on October 29th, 2006. Pictures from the scene attest the complexity of the work. T4 was back in service by the end of November 2006.

Fig 2 – Truck delivering new transformer

Fig 3 – New power transformer on site

Fig 4 – Separation wall affected by the failure of T4

There are strong indications from Hydro One Network Inc. that Nelson TS needs reconstruction on the high voltage side, which is planned to happen within the next five years. London Hydro is seriously considering a plant upgrade on the distribution side (including egress circuitry) and potential conversion of the BQ station supply from 13.8 kV to 27.6 kV.

♦ - ♦ - ♦

Quality of Supply Report

January to December 2007

Prepared by:

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This report was also reviewed by Ed Jambor, P.Eng. – Director of Operations, whose input remains invaluable. Many thanks go to Doug Tevlin who contributed to the graphs and tabulations in this report.

Table of Contents

1 Introduction

This report provides an overview of London Hydro's system reliability performance for 2007. It also compares the corporate reliability indices to the performance targets as established by the Ontario Energy Board (OEB).

2007 is considered to be an abnormal year, characterized by several events with a low probability of occurrence but with a high impact on reliability. Among these events, extreme lightning in June accounted for a significant increase in both the outage duration (SAIDI) and the outage frequency (SAIFI) statistics. As a result of these events, the 2007 targets were exceeded for both SAIDI and SAIFI. London Hydro did however perform satisfactorily with respect to the third reliability metric, CAIDI[1]. The response time was 46 minutes (0.77 hours), just slightly higher than in 2006.

London Hydro's reliability continues to improve at all levels through a variety of efforts including such initiatives as distribution automation and the introduction of state-of-the-art reclosures and electronic relay technology.

This report is divided into two sections as outlined below:

- The main body of the report - containing a synopsis of the performance measures, programs aiming to improve the system's reliability, and specific tasks accomplished in 2007, as well as projects proposed for 2008, and
- A series of appendices - containing detailed reliability analysis of the system performance using historic outage data.

2 Distribution System Overview

London Hydro supplies the majority of its customers at low voltage, i.e. <1,000V. Several commercial and industrial load facilities (including generator facilities) are supplied at higher distribution voltage levels for practical and economical reasons.

The length of circuits[2] are as follows:

	Low Voltage	2.4/4.16Y kV	4.8/8.32Y kV	8/13.8Y kV	16/27.6Y kV	Total
Number of Customers	141,942	8	--	29	127	**142,106**
Length of Circuits (km)		484	199	138	1,760	**2,581**
Change from 2006 (%)		-2%	+1%	No change	+1.3%	**+0.5%**

Table 1, Size of London Hydro's Distribution System

[1] CAIDI – Customer Average Interruption Duration Index – is a measure that provides an indicator of how quickly the power is restored for the average customer affected by any given outage. It is measured in hours per interruption.

[2] The length of the circuits has been derived from London Hydro's GIS

3 Classification of Interruptions by Cause

A customer interruption is defined in terms of the primary cause of the power outage. These causes have been assigned to 11 codes; they are as follows:

I. Adverse Environment

Customer interruptions due to equipment being subjected to abnormal environment such as salt spray, industrial contamination, humidity (flashovers), corrosion, vibration, fire or flooding.

II. Adverse Weather

Customer interruptions resulting from rain, ice storms, snow, winds, extreme ambient temperatures, freezing fog or frost.

III. Animals

Customer interruptions caused by creatures such as birds, squirrels, raccoons.

IV. Defective Equipment

Customer interruptions resulting from equipment failures such as deterioration due to age, incorrect maintenance or imminent failures detected by maintenance.

V. Foreign Interference

Customer interruptions beyond the control of the utility such as vehicle accidents, dig-ins and foreign objects.

VI. Human Element

Customer Interruptions due to the interface of utility staff with the system such as incorrect records, incorrect use of equipment, incorrect construction or installation, incorrect protection settings, switching errors.

VII. Lightning

Customer interruptions due to lightning striking the distribution system resulting in an insulation breakdown and/or flashovers.

VIII. Loss of Supply

Customer interruptions due to problems in the bulk electricity supply such as under frequency load shedding, transmission system transients, or system frequency excursions**.**

IX. Scheduled Outages

Customer interruptions due to the disconnection at a selected time for the purpose of construction or preventive maintenance.

X. Tree Contacts

Customer interruptions caused by faults due to trees or tree limbs contacting energized circuits.

XI. Unknown/Other

Customer interruptions with no apparent cause or reason which could have contributed to the outage.

4 Summary of 2007 Performance

4.1 Quality of Supply Measures

The performance measures of a distribution system, which are referenced throughout the rest of the document, and their respective acronyms, are defined below:

- **SAIDI** Average customer interruption[3] duration (in hours) per year. (***Unavailability of Supply***)
- **SAIFI** Average number of interruptions[1] per customer per year. (***Security of Supply***)
- **CAIDI** Average customer interruption duration (in hours) per interruption. ***(Outage Restoration Time)***

4.2 Measured 2007 Performance

The reliability guidelines spelled out in the IEEE Standard 1366-2003[4] provide a method for utility engineers to normalize outage data, by separating high-impact, low-probability events from the reportable statistics. These guidelines were adopted by London Hydro and serve to focus on normal trends instead of rare events; those uncommon occurrences are still analyzed but they are put in a different perspective.

A severe event occurred in November 2007 when an entire transformer station (Talbot TS) experienced an outage due to a loss in the bulk electricity supply. The occurrence, classified as a Loss of Supply event, resulted in a power outage for over 35,000 customers and this had enough of an impact on SAIFI to be declared a Major Event Day (MED).

4.2.1 SAIDI Performance

London Hydro's SAIDI performance for 2007 exceeded the average of the previous five years by almost 30%, finishing at 1.67 (1.69 including the MED incident); it was also higher than the 2006 year-end value of 1.25.

As illustrated in Appendix 5 of this report, the trend observed over the last 12 years indicates an overall improvement in SAIDI. In addition, a linear regression analysis[5]

[3] An interruption is any disruption in service that causes customers to lose their supply for more than one minute.
[4] IEEE Standard 1366-2003, *IEEE Guide on Power Distribution Reliability Indices*
[5] Linear regression is a statistical technique for finding the best fit linear relationship between two sets of numerical variables. In its simplest form it is meant to predict one set of variables (SAIDI future values) given a known set of variables (following years).

using historic data (which excludes MEDs) and forecasting until year 2010 confirms the same positive trend in SAIDI (an overall reduction of 15%).

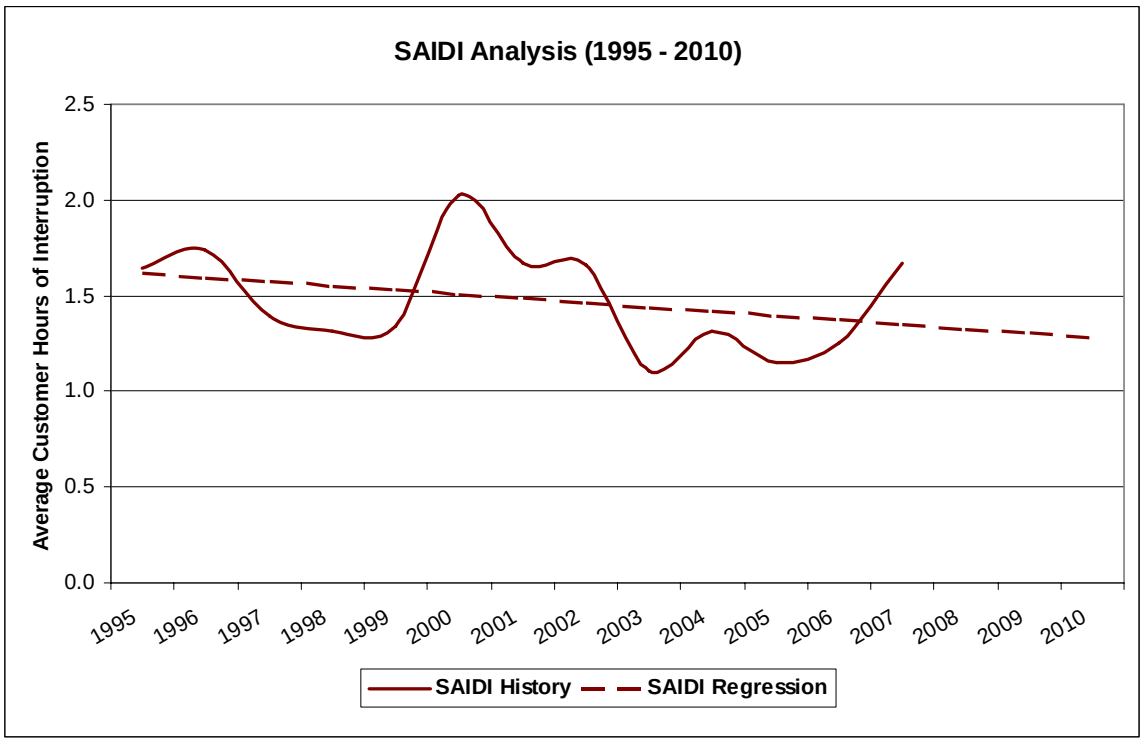

Figure 1, Linear Regression on SAIDI History

The eleven cause categories are further grouped into controllable and uncontrollable categories, and are graphed accordingly in Appendix 5; this is done in order to identify system deficiencies that are within the utility's control. Historical values for SAIDI (1995 to 2006) are plotted by cause in Appendix 5. The same scale in hours of interruption is used in all the graphs to better illustrate the categories with the highest contribution to the overall total.

In the past, two of the eleven controllable cause categories, *defective equipment* and *lightning,* have dominated SAIDI. However, infrastructure improvements that have been completed over the past ten years are having a positive effect and performance in these two areas has shown improvement. The volatility of yearly values indicates that even targeted improvement programs cannot show immediate or consistent results. As the infrastructure ages, additional capital spending will be required to maintain the integrity and hence, the performance of the system.

SAIDI: **1.67 HOURS PER CUSTOMER PER YEAR**

Only two of the controllable categories saw a significant improvement in SAIDI in 2007 (*adverse environment* and *tree contacts)*, compared to the average of the previous five years. For two other categories (*animal contacts* and *unknown*), SAIDI

was approximately the same. The remaining categories did not improve. The largest performance degradation was visible in one particular category: *adverse weather* where the outage duration increased almost six-fold (three large storms accounted for this). In the case of *human element* and *lightning* categories, the contribution to the total outage time doubled. Of the uncontrollable categories, only *loss of supply* improved compared to the average of the previous five years.

Figure 2 compares London Hydro's SAIDI performance for each of the last five years to the average value of a select group of larger Ontario utilities[6], and to the average of all Ontario LDCs over the same time period.

As the chart clearly shows, London Hydro has demonstrated strong year-end SAIDI indices since 2002 in comparison to the provincial average and to equivalent peers.

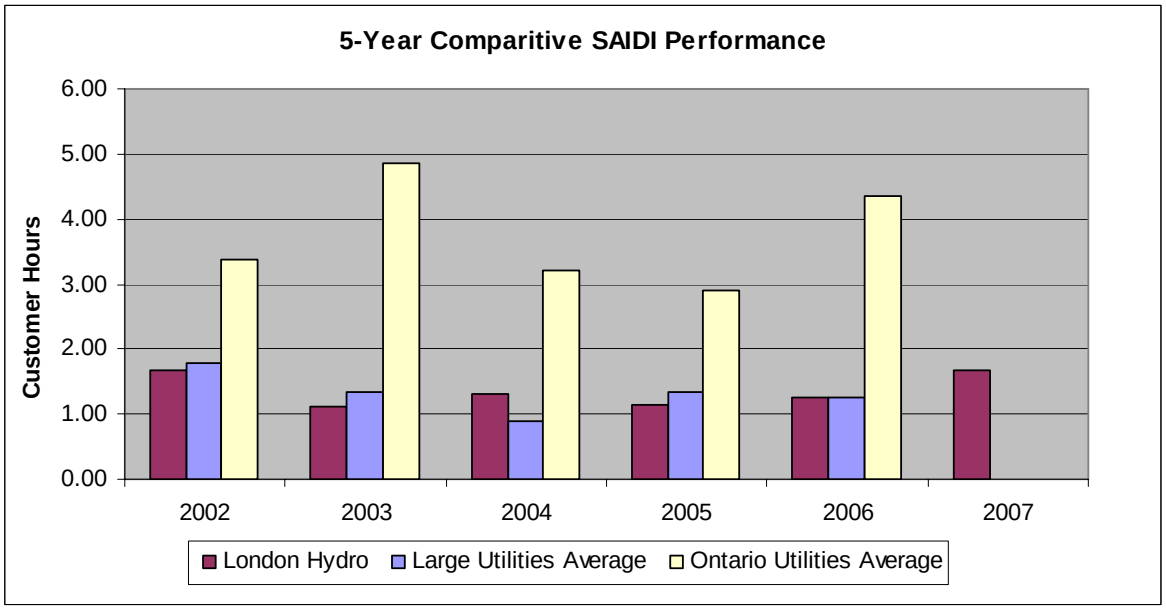

Figure 2, SAIDI Performance – London Hydro vs. other LDCs

4.2.2 SAIFI Performance

London Hydro's performance for SAIFI also exceeded the average of the last five years. The year-end recorded 2.18 service interruptions per customer on average (2.46 including the MED), compared to 2.16 in 2006. With a year-end value of 2.18, SAIFI in 2007 is the largest compared to the last five years.

Appendix 6 contains the history of the controllable and uncontrollable SAIFI categories since 1995. The contribution of each of the eleven cause categories is also illustrated individually. The same scale for the frequency of interruptions is

[6] Eight large utilities are considered for separate benchmarking: Enersource, Brampton, Powerstream, Horizon, ENWIN, Ottawa, Toronto and Veridian.

maintained in all the graphs to be able to determine each category's contribution to the overall total. As the trend lines indicate, over the past 12 years almost all the categories have shown improvement. It should be emphasized that *defective equipment* continues to contribute the most to the unreliability of the system. Again, linear regression analysis using historic data forecasts a 20% decline in the SAIFI trend value by year 2010.

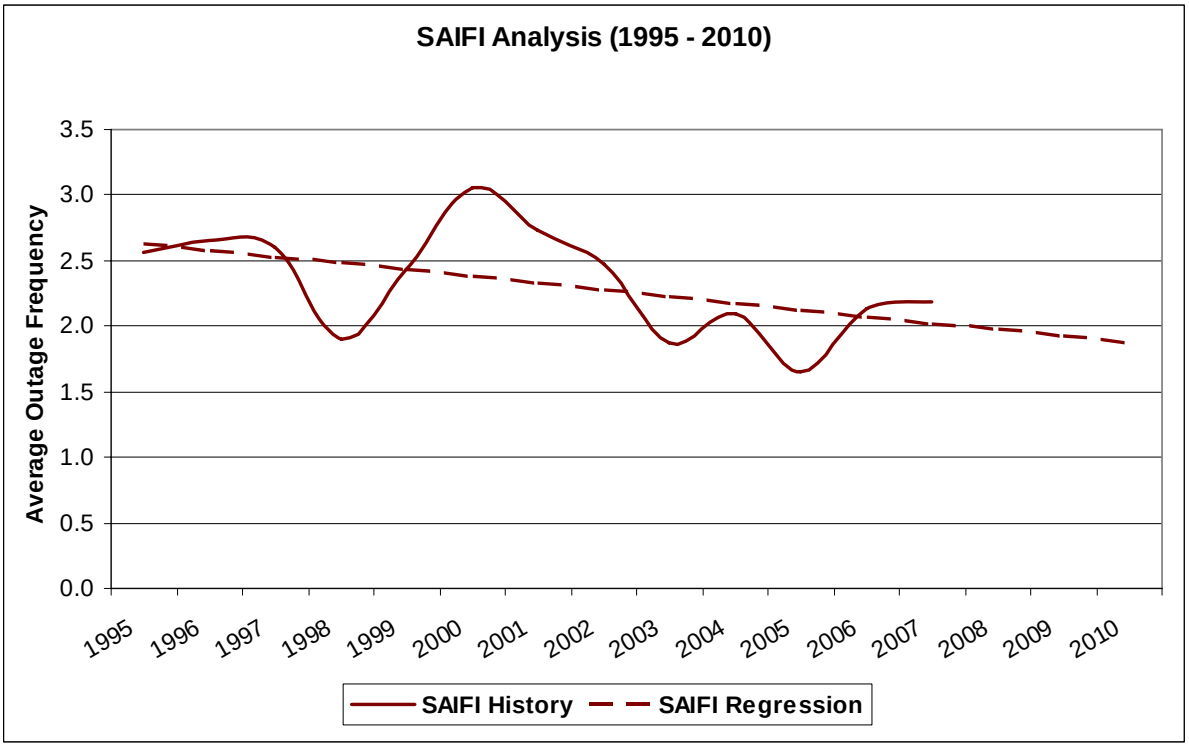

Figure 3, Linear Regression on SAIFI History

SAIFI: 2.18 INTERRUPTIONS PER CUSTOMER PER YEAR

Similar to SAIDI, there was a significant improvement in *adverse environment* and *tree contacts*, while *defective equipment* also showed a slightly better performance. The remaining controllable categories had a moderate decline in performance. Of the three uncontrollable categories, only *foreign interference* performed somewhat better.

The following chart compares London Hydro's SAIFI performance for the last five years to the average values of the same eight larger utilities used in the SAIDI comparison, as well as the average of all Ontario LDCs indices since 2002.

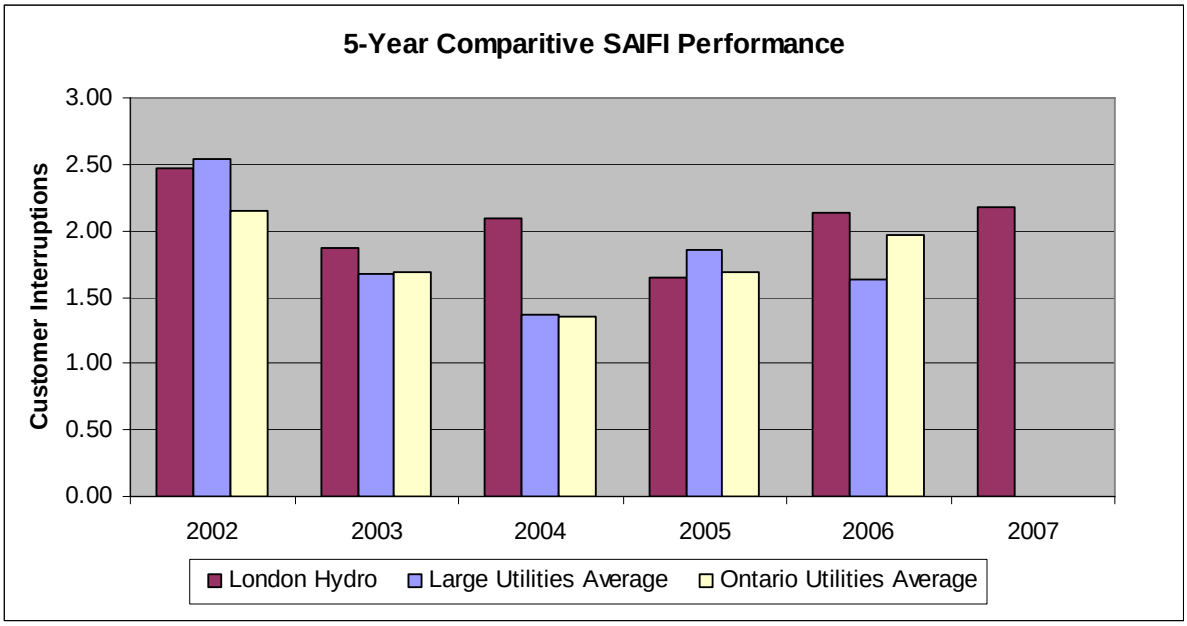

Figure 4, SAIFI Performance – London Hydro vs. Other LDCs

4.2.3 CAIDI Performance

Also known as "response time", London Hydro's CAIDI finished with only 46 minutes average outage time per incident (i.e. 0.77 hours per incident) in 2007. This is an indication that even though the system is experiencing a large number of outages during the course of a year, the duration (CAIDI) is shorter than in comparison to other utilities.

RESPONSE TIME: 46 MINUTES PER INCIDENT

Figure 5 illustrates London Hydro's CAIDI performance compared to the average of the other larger utilities and the annual average of all the LDCs in Ontario over the course of the past five years. London Hydro has maintained a satisfactory response time since 2002, in line with comparable peer utilities.

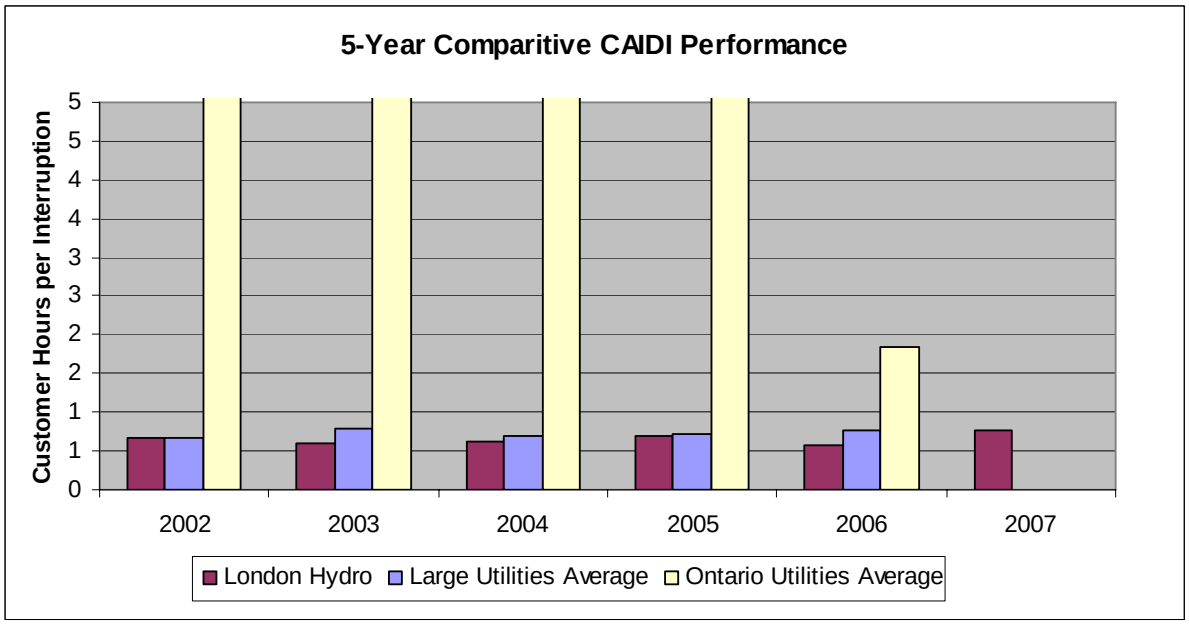

Figure 5, CAIDI Performance vs. other Ontario LDCs

5 Distribution Automation Targets

London Hydro's automated switches continue to aid in quicker power restoration, which improves SAIDI significantly. Last year, 103 load transfers were performed using the remotely controlled switches. As well, 12 switches were used for power restoration during outages saving almost 1,000,000 customer minutes (equivalent to a saving in SAIDI of 0.12).

The focus at London Hydro continues to be achieving quicker power restoration during any outage, as well as reducing the number of customers interrupted by an outage. In 2007, system automation was taken to a higher level, when London Hydro began a concerted program to install overhead reclosers. Now that a vacuum recloser in a vertical overhead configuration is available at a competitive price, a corporate decision was made that any new feeder requiring automation will be equipped with reclosers. When a permanent outage occurs downstream of a recloser on any main overhead line, the recloser would open, de-energize the faulted section and protect the upstream customers from a sustained outage. A midstream recloser can reduce both SAIDI and SAIFI.

Three of a total of thirteen reclosers purchased were installed in 2007; the remaining ones will go in the field in 2008. Long-term, it is hoped that by populating the overhead backbone system with reclosers (as opposed to automated switches), the system will experience a lower frequency of interruptions, hence fewer customers affected by each outage. SAIFI performance should naturally improve over time.

6 Traditional outage data analysis

One reliability analysis approach that has aided in the targeting of investment over the years has been to segment the outage duration and frequency according to voltage class, planned outages and loss of supply events. As in previous years, the 27.6 kV system continues to remain the primary focus of reliability improvement measures, due to its size and its impact on the lower voltages. Figure 6 and Figure 7 indicate in which proportion each of the above components contributed to unreliability during 2007.

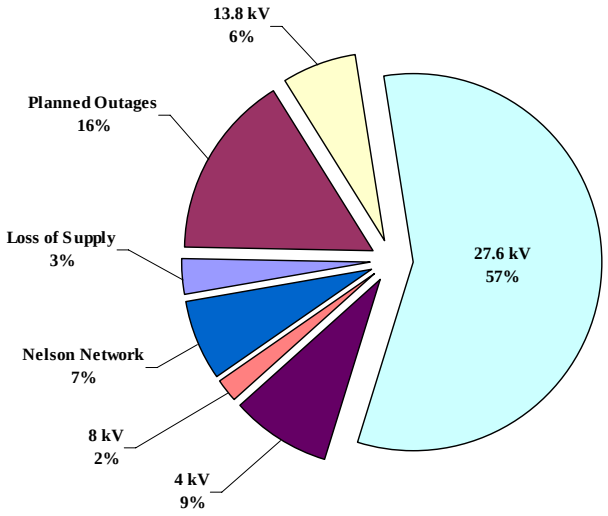

Figure 6, Interruption Duration (SAIDI) breakdown by Distribution Voltage

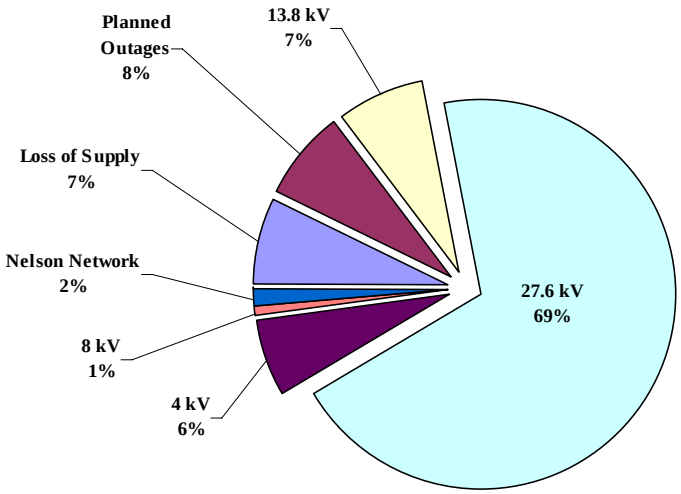

Figure 7, Interruption Frequency (SAIFI) breakdown by Distribution Voltage

In terms of outage duration, *defective equipment* contributed to unreliability with the largest number of customer minutes of interruption, as indicated in Figure 8. In spite of the improving trend over the past decade, failures of in-service system components continue to be the leading cause contributing to outage duration. Compared to other causes, outages in this category tend to be of longer duration, as the equipment often needs to be replaced before power is restored. *Lightning* and *scheduled outages* were the second and third largest contributors to SAIDI. Lightning-related outages and their effects are discussed in greater detail in Section 8.2.1.

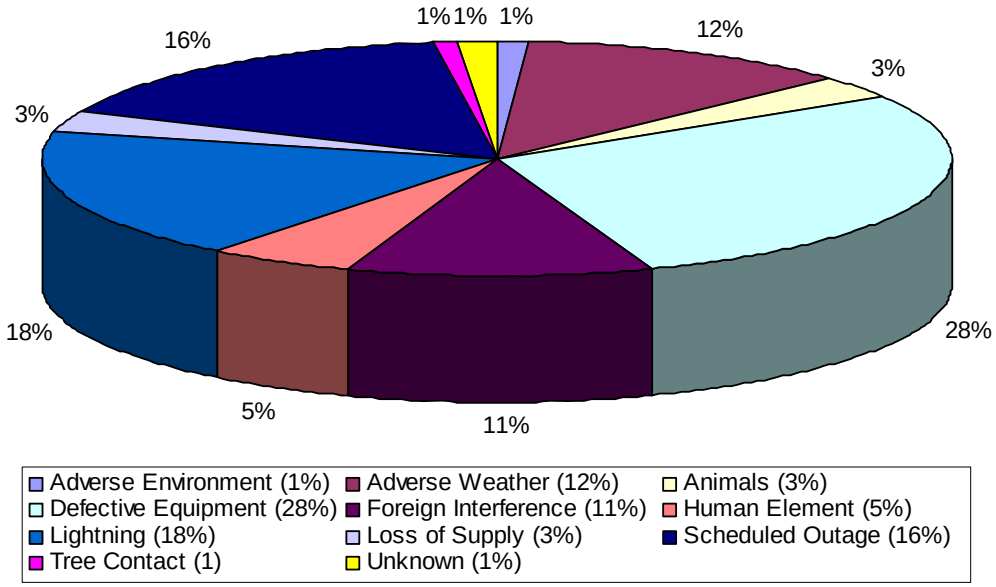

Figure 8, Proportion of Customer Minutes of Interruption (SAIDI) by Cause

Defective equipment was also the largest category responsible for the frequency of the interruptions. Figure 9 illustrates the proportion of the number of customers affected in each category. *Lightning* and *adverse weather* were the second and third largest contributors to SAIFI. Many outages were caused by two severe storms during the month of June 2007, especially in the lightning category.

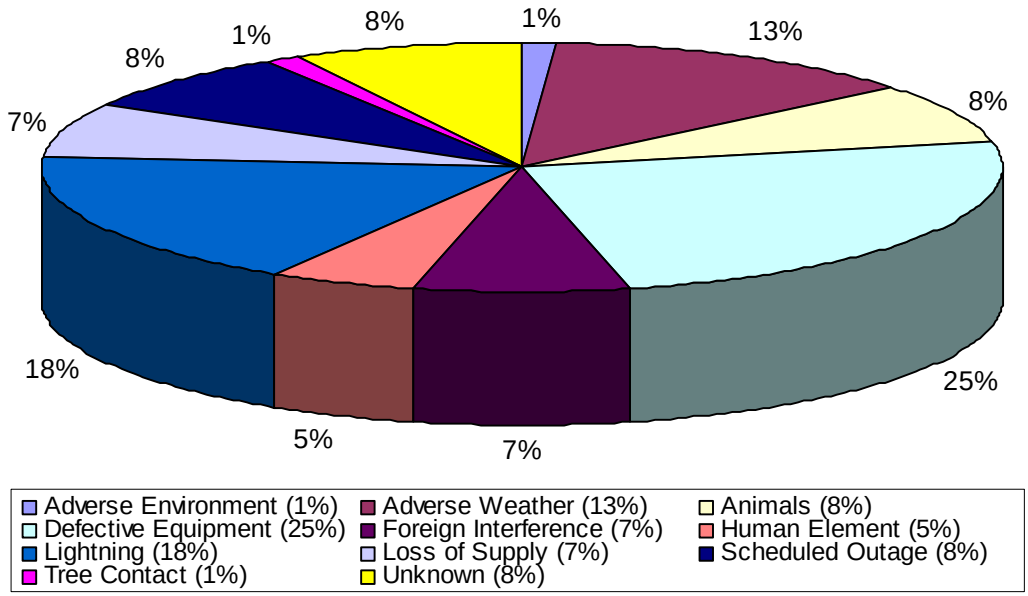

Figure 9, Proportion of Number of Customers Affected (SAIFI) by Cause

Equipment-related outages caused by *adverse environment* and *defective equipment* can be further broken down by apparatus and voltage, as illustrated in Figure 10.

This analysis has proven helpful in identifying the type of equipment that consistently has poor reliability over the years, and also in separating low-probability, high-impact events that can skew the analysis results. However, despite certain trends being recognized (i.e. flashover risk in the air-insulated switchgear), failures still occur in those areas since projects generally need to be budgeted over several years. Over time, the trend drops off for certain equipment that has improved in performance and another problematic type of equipment with poor performance becomes the new focus.

Equipment-related outages contributed 30% of the total outage time in 2007.

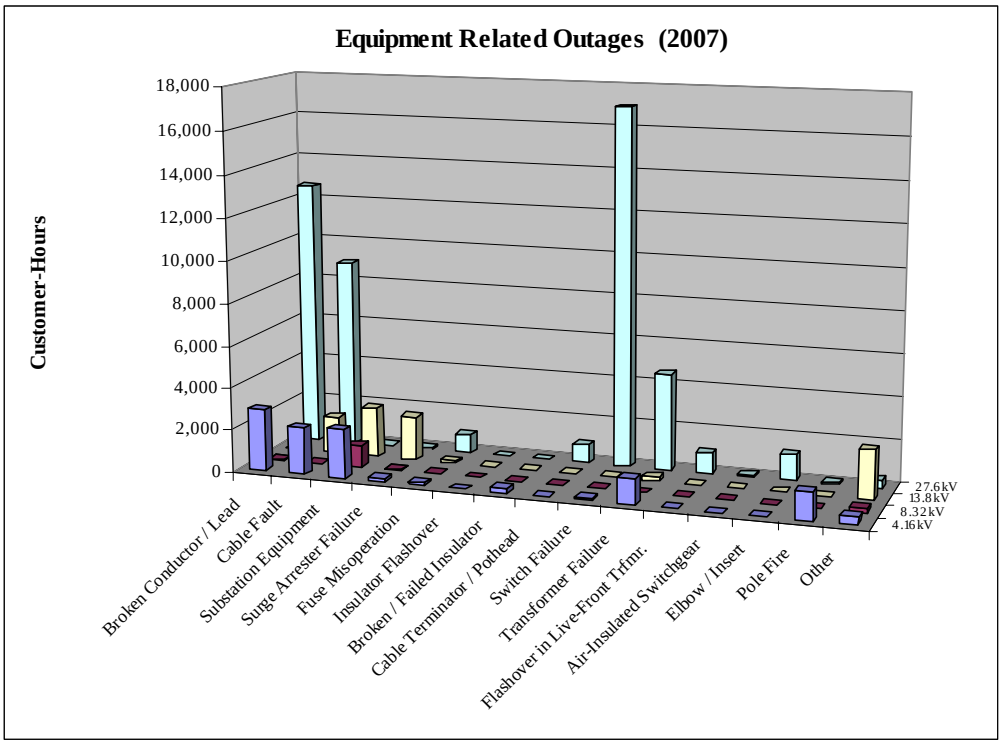

Figure 10, Customer Hours of Interruption by Voltage and Equipment Type (SAIDI)

Year 2007 experienced a high-impact event that again affected Wonderland TS[7] and some Talbot TS feeders. A Firon in-line *switch failure* affected thousands of customers which in turn resulted in almost 17,000 customer hours of interruption. This event alone exceeded all other equipment-related totals in terms of duration as shown in Figure 10. A recommendation was listed in the 2008 capital budget to resolve the issue in accordance with the failure report received from the manufacturer (a copy is found in Appendix 8).

Broken conductors had a fairly high impact as well, with only one incident contributing to the majority of the outage time (over 12,000 customer hours of interruption). Not unexpectedly, *cable faults* continue to be a significant contributor to SAIDI every year; a total of 25 incidents occurred on the system (17 on polymeric cable), compared to 25 occurrences in 2006 and 15 in 2005. The trend in the number of cable faults is increasing despite the annual program of subdivision cable rebuilds. The SPOORE analysis[8] has targeted areas where rehabilitation of the underground plant was most needed. Between the years 2000 and 2007, approximately 90 km of polymeric cable has been replaced for an estimated investment of 10.5 million dollars.

[7] In 2006, a defective terminator on an egress cable at Wonderland TS had resulted in a wide-spread outage.
[8] The *SPOORE* acronym reflects the following factors utilized in the analysis: *Safety, Performance, Outage, Operability, Risk, Environment.*

At the current pace of replacement, the amount of cable older than 25 years is actually increasing every year. Cables continue to fail at an average age of 23 years for those rated 28 kV, while for cables rated 5 kV, the average age is 29 years before failing.

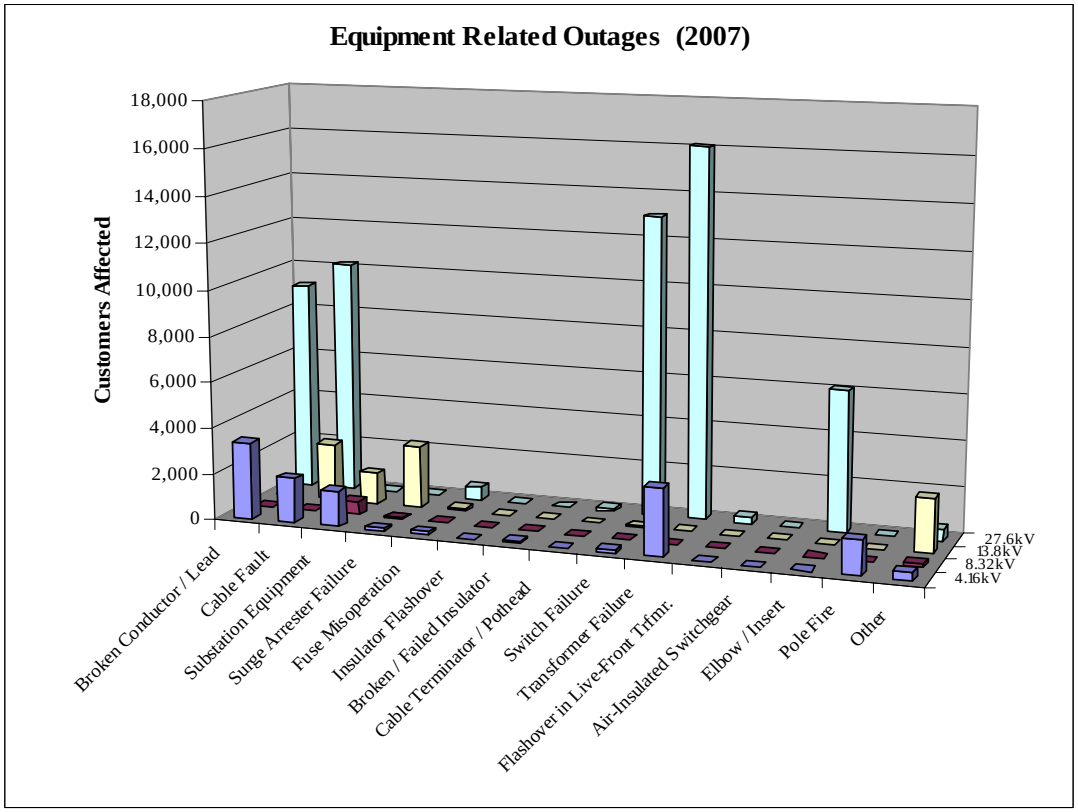

Figure 11, Customers Affected by Voltage and Equipment Type (SAIFI)

Equipment-related outages were responsible for 25% of SAIFI in 2007 compared to 40% in the previous year. Surprisingly, *defective transformers* was the sub-category with the largest contribution to the number of interruptions. Seven breaker operations were counted with outages caused by the failure of transformers, either due to a hold-off on a feeder, or mis-coordination between the transformer fuse and the station breaker. Breaker operations accounted for 88% of the interruptions in the sub-category. The isolated incident of the Firon *switch failure* had huge implications on SAIFI related to equipment outages as well, causing a power interruption for over 12,000 customers.

The third largest sub-cause was *cable faults*; numerous failures were experienced with 14 out of 25 resulting in breaker operations. Also, four incidents occurred due to failures of station egress cable (both polymeric and lead).

7 Innovative Reliability Analysis

A more effective way of benchmarking the system's reliability was recently developed by concentrating on controllable cause categories which affect the intrinsic reliability of the system. It is believed that core system performance is not characterized by all eleven cause categories; rather, it is the combination of the elements that affect performance as a result of how the system is engineered, its robustness, component redundancies and other built-in parameters directly related to the design of the system. The elements that were selected are listed below:

- Adverse Environment
- Adverse Weather
- Animals
- Defective Equipment
- Lightning
- Tree Contacts

This re-defined benchmarking approach has taken reliability analysis to a higher level; some causes that affect the overall system performance are purposely set aside in order to provide a more focused engineering analysis that can be used to support future capital project budget proposals. A new reliability measuring tool was derived: *Equipment and Design Related Outages* analysis (EDRO). The scope of EDRO analysis[9] is to combine the outage elements (weather, animals, vegetation, humidity, and last but not least, component failures) that are most affected by system design. Thus, outages related to specific causes within the control of the utility can be examined constructively to improve the design of the system. Future investments can then be targeted to the areas best expected to improve long term reliability.

[9] *EDRO – An Innovative Approach in Performance Benchmarking for Better Asset Management*, May 2008.

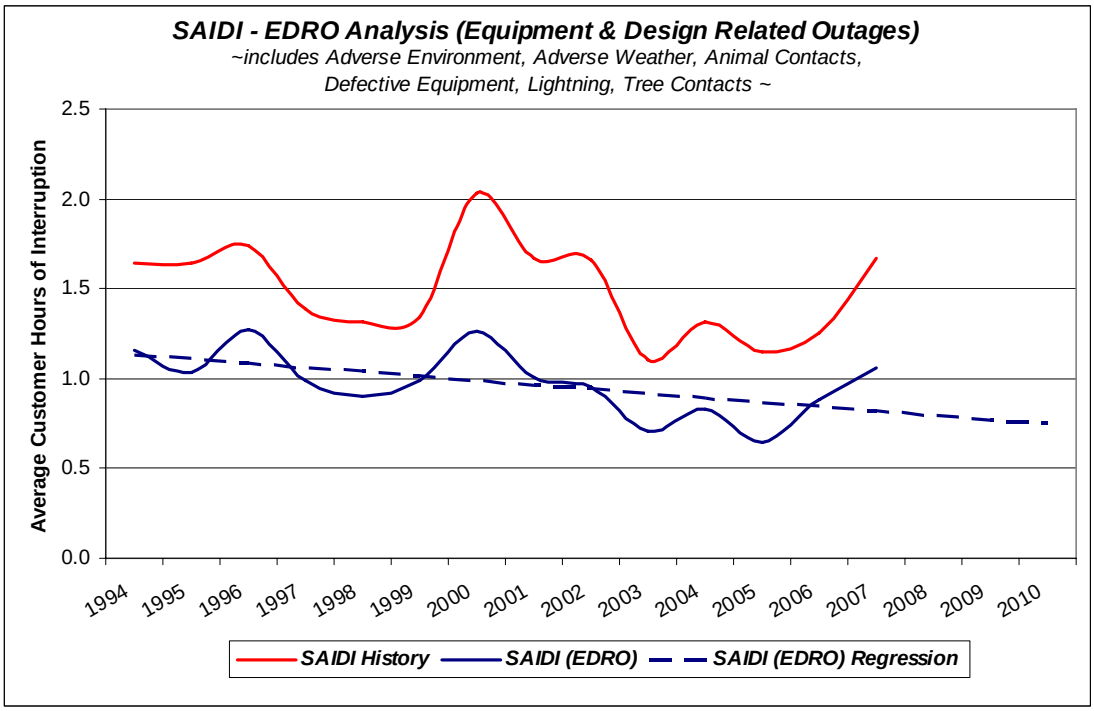

Figure 12, Regression Analysis for SAIDI using EDRO

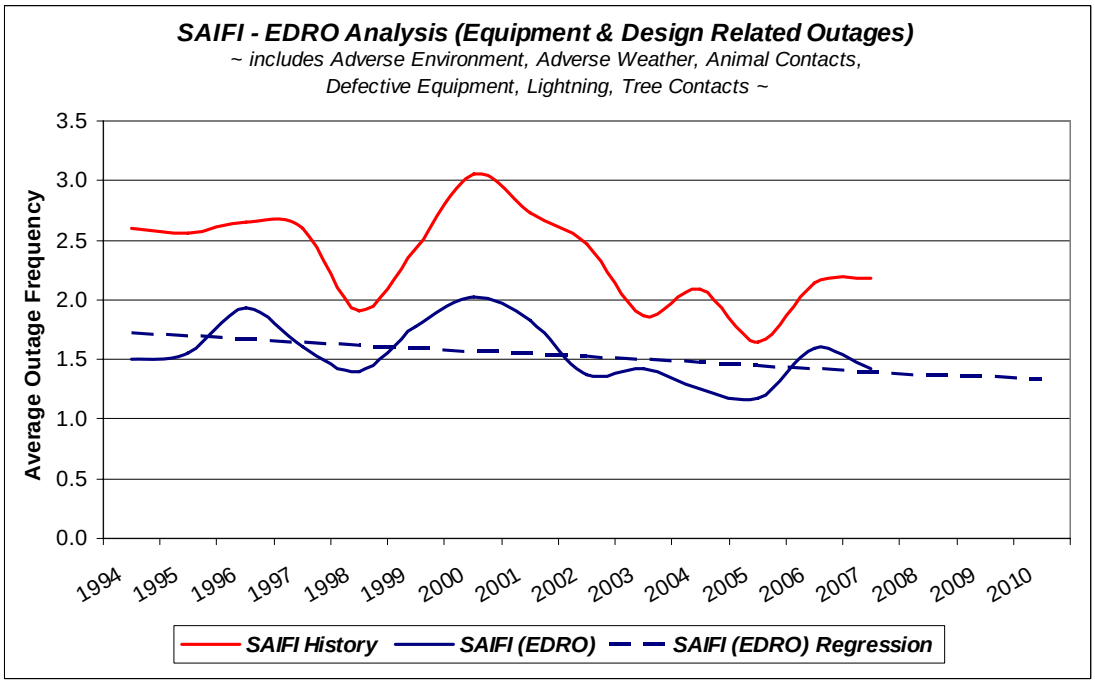

Figure 13, Regression Analysis for SAIFI using EDRO

Historic profiles using targeted data for the EDRO analysis are plotted in Figure 12 and Figure 13 together with the traditional graphs for both SAIDI and SAIFI[10]. It is immediately evident in both cases that yearly variations using EDRO are narrower than when using all eleven cause categories. This less volatile, quasi-steady profile derived from the EDRO analysis reflects the fact that improved service and reliability are directly related to targeted capital work investment.

8 Reliability Improvement Measures

Many of the programs London Hydro is committed to are oriented towards improving reliability, i.e., they were recommended based on reliability data and analysis as the best way to improve system performance.

The following sections describe in greater detail the most important programs implemented throughout 2007.

8.1 Improving the U/G System Reliability

8.1.1 Residential Underground Primary Distribution Plant

Since 2001, London Hydro has been replacing underground primary distribution cables annually within residential subdivisions as part of an extensive rehabilitation program[11]. Prioritizing of the work has been based on a ranking of the residential underground areas that contribute the most to unreliability.

The North-West section of Westminster Park East subdivision (postponed from 2006) and Phase 2 of White Oaks subdivision were completed in 2007. Two more cable faults took place in White Oaks on cable over 30 years old, prior to its reconstruction.

8.1.2 Pad-mounted Sectionalizing Switchgear

The performance of air-insulated switching enclosures (SEs) in 2007 was impeccable. Only two consecutive failures happened on the same unit (SE 3022) as opposed to seven failures in 2006 with a far more severe impact. The detailed report on air-insulated switchgear[12], which recommended that all air-insulated switchgear become obsolete, continues to be the basis for the annual replacement/removal program. The report recommended a gradual replacement of existing critical units with new, non-air insulated enclosures (LCs) that utilize solid

[10] MEDs have been eliminated in both cases for consistency.
[11] London Hydro Engineering Report 2000-01, *Multi-year Rehabilitation Plan for Aging Underground Distribution Systems*; November, 2000.
[12] Distribution Reliability Report, *Performance Review and a New Perspective for In-service 27.6 kV Three-Phase Air Insulated Sectionalizing Enclosures*, May 2006.

dielectric as the insulating medium. Air-insulated switchgear is no longer being purchased.

The first year of the program implementation (2006) resulted in the elimination of a total of 23 SEs from the system (some removed, some replaced by non air-insulated gear), for a total spending of over a half–million dollars. Year 2007 targeted work on 12 more units based on the assessment carried out in 2006 and annual OEB audits. By the end of 2007, 16 more units were eliminated – 10 through removal and six by replacement – for an estimated $485K.

Evaluation using corona measurement, which is now part of London Hydro's annual inspection, will continue to determine the subset of units to be dealt with in subsequent years. The chart in Appendix 7 illustrates the contribution to SAIDI from outages that were caused by failures of air-insulated enclosures since 2001.

8.1.3 Modernizing the Downtown Network

London Hydro's downtown core is primarily serviced by an aging network system. In recent years, dozens of network transformers have been changed out but many older units continue in service. Sometimes, vaults also require reconstruction due to their deteriorated condition and/or confined working space. The current practice of scheduling remedial work includes prioritizing the vaults during the annual OEB audits and then having them examined by a civil engineer.

The introduction of cable limiters and the replacement of lead secondary cables represent another enhancement to the network system; these projects are intended to prevent catastrophic failures that can also create unnecessary outages. Spot networks are also being modernized through the introduction of automation/SCADA communication from and to the transformer protectors, enabling a faster response to alarms that indicate high loading or other abnormal transformer conditions.

At the end of 2007, all but two of the spot networks (London Free Press and London Life) are now communicating with our control room.

8.2 Protecting the Overhead System

8.2.1 Reliability in the "lightning capital of Canada"

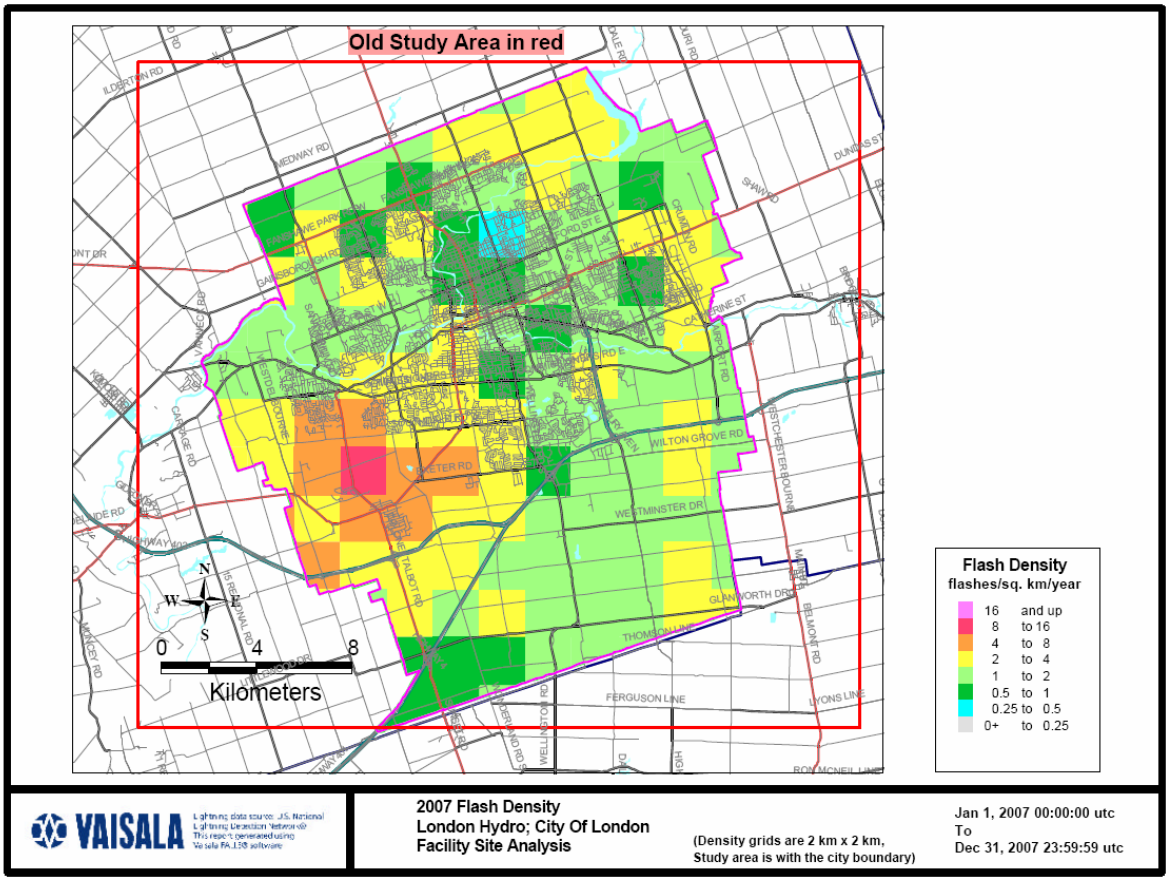

Figure 14, Old vs. New Study Area

London Hydro obtains lightning data annually from Vaisala Inc. In the past, due to the lack of a more accurate coordinate system, the boundaries for the delivery of flash distribution were defined by an approximate square contour that geographically covered the system territory. With the introduction of the new GIS system, the precise boundaries became available and the study has now been performed using the new area.

It is quite apparent from Figure 14 above that the old study area was almost twice the size of the new one – hence the previous flash counts are now irrelevant as a comparative measure. The numbers have been adjusted by Vaisala retroactively to 2003. Year 2007, for example, counted 1,810 flashes based on the old study area and only 900 within the new boundaries (see Figure 15).

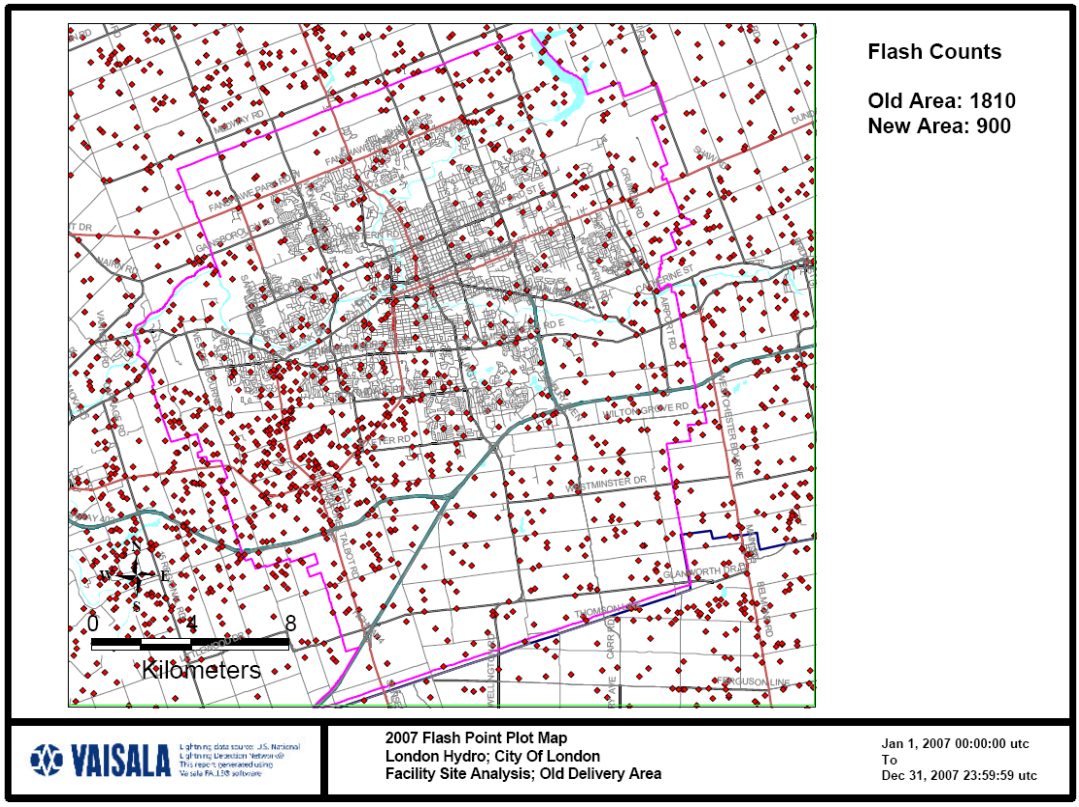

Figure 15, Flash Plot for 2007 (Original and Revised Flash Counts)

The correlation between interrupted customers within London's territory and the new annual number of strikes will continue to be the measure for future comparison (see Figure 16).

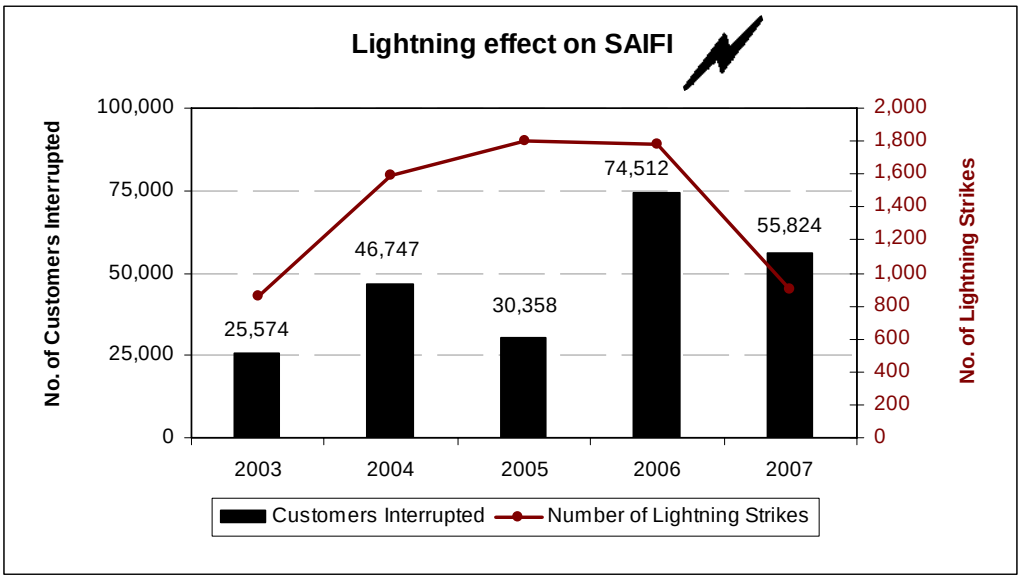

Figure 16, Correlation between Adjusted Lightning Strikes and Interrupted Customers

During 2007, London Hydro experienced 74 lightning-related outages (compared to 115 in 2006). The number of lightning strikes has fallen significantly from the previous year.

8.2.2 Maintaining Poles

London Hydro continues a yearly program to systematically test its wood poles. Using the test data, the appropriate poles are proposed for replacement in the capital budget in following years. Also, Grey Munsell poles continue to be eliminated from the system; the aesthetic grey coating makes them prone to rot prematurely, leading to failures.

Figure 17, Pole decay in Grey Munsell Poles

In 2007, London Hydro was approached by RS Technologies to investigate a new product – composite poles. A few utilities in SW Ontario have implemented this state-of-the-art technology in pilot projects. London Hydro is also considering the purchase and installation of up to ten composite poles in 2008 for a small project on the 4 kV system.

8.2.3 Replacing Porcelain Insulators

No broken insulators were experienced on the 27.6 kV system in 2007. A program to replace porcelain insulators began in 2001. After eliminating the most susceptible styles and vintages that affected the reliability of the system, the number of failures has diminished substantially. Currently only 550 more suspect insulators (of an original count of 5,300) still need to be replaced (including brown Ohio Brass insulators).

8.2.4 Reducing the Number of Animal Contacts

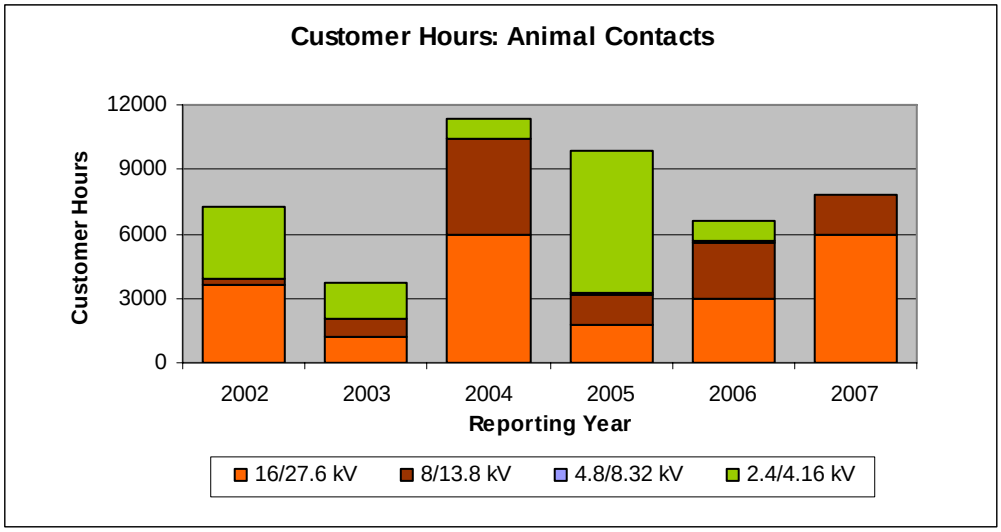

Figure 18, Animal-Caused Service Interruptions by Distribution Voltage Class

In 2005, one municipal substation alone (SUB-35) had three high-impact animal-related outages. Remedies to the exposure of the secondary live bus are being implemented in 2008. As the above chart indicates, the outage contribution on the 4 kV system continues to be minimal in recent years compared to the 27.6 kV and the 13.8 kV systems, where the interruptions account for many more hours. Year 2007 experienced a total of 105 animal contacts – higher than the five-year average. A special focus may be placed in the near future on animal protection if certain areas continue to develop a higher frequency of animal contacts.

8.2.5 Reducing Susceptibility to Pole Fires

One pole fire occurred in 2007 on the 4 kV system but it affected the 27.6 kV system as well. The failure mechanism was not identified to be specific to the framing or the insulators that are used in certain construction types that can make a wood pole prone to a pole fire. July's reliability report[13] describes the incident in detail.

Figure 19 depicts an old construction style commonly referred to as "Christmas tree" construction because of its triangular shape. The damage normally occurs at the top of the pole where leakage can be present across insulators, initiating charring that can further set the pole on fire. All "Christmas tree" configurations have been identified and eliminated from the system. However, there remain other types of pole line construction (i.e., using pin-type insulators) that are also posing a risk of pole fires.

[13] *Reliability Incident Summary, July 2007*

Figure 19, Pole Fire Damage

Figure 20 illustrates the improved performance with respect to pole fires on London Hydro's distribution system since 2001.

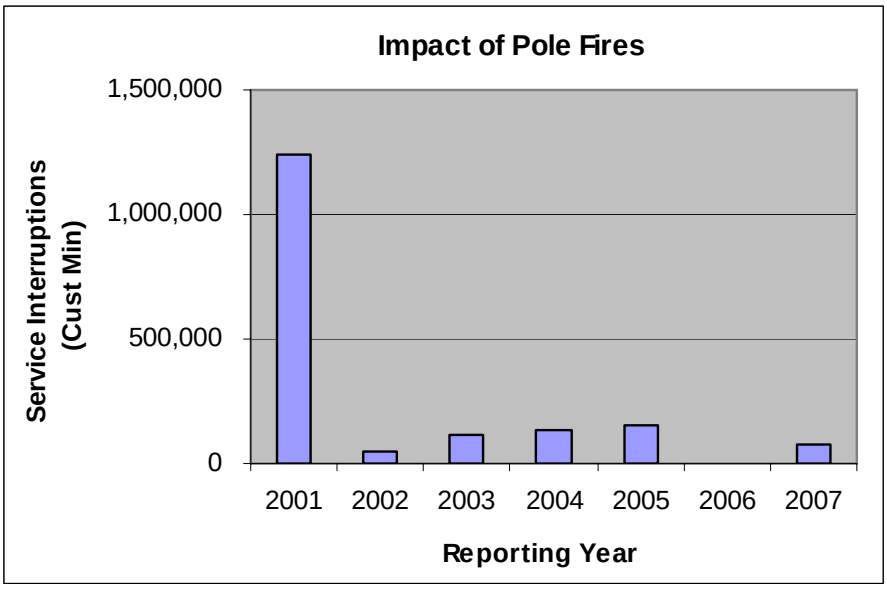

Figure 20, Service Interruptions Due to Pole Fires

9 Reliability-driven capital projects

9.1 Summary of 2007 Work Completed

- **Replacing Aging Underground Infrastructure**

  Two main areas were proposed for reconstruction of the underground plant in 2007. In both cases, the performance had visibly deteriorated; both areas had been deferred from previous years when they were originally budgeted for cable replacement.

  - Westminster Park East ranked as the least reliable subdivision in 2006; the project included replacement of the cables and selected transformers. At the same time, some depreciated single-phase SEs were addressed.
  - White Oaks subdivision Phase II had also been experiencing an accelerated number of cable faults in the last three years. The SPOORE analysis in 2006 indicated that replacement of cable in this area should be completed without delay.

  At the end of 2007, out of 1,210 kilometers of underground subdivision cable on the system, approximately 282 kilometers of cable (23%) were over 25 years old.

- **Elimination of High-Risk Air-Insulated Gear at 27.6 kV**

  This project was initiated in 2006 with the scope of eliminating or replacing the SEs deployed on the 27.6 kV system with non air-insulated switchgear. Of a total of approximately 100 units that were determined to be prone to failure with various degrees of risk, 16 units were addressed in 2007. There are approximately 60 more units still in service that were originally identified to have a higher failure risk; it is estimated that these will be eliminated by the end of 2012 if at least 15 are addressed yearly.

- **Construction of New 27.6 kV Feeders**

  - Four new breaker positions became available at Buchanan TS in 2007. These new feeders (19M29, 19M30, 19M37 and 19M38) will provide load relief to east London, currently supplied by Highbury TS and Clarke TS. This is one important step in increasing London Hydro's capacity of supply.
  - Talbot TS was expanded through the construction of a second DESN station at the existing site. HONI completed the "make ready works" in 2007 in parallel with London Hydro who started rebuilding some existing duct and installing new egress cable (26M54 and 26M55). Four new breaker positions (26M12, 26M13, 26M14 and 26M21) were made

available at Talbot TS but will be energized in 2008. The new feeders will provide relief in the north-west of the City, and will enhance system reliability by lowering the average number of customers affected by feeder outages.

- **PILC egress cable replacement on the 32M6 at Wonderland TS**

A terminator failure on the egress of the 32M6 in May 2006 led to the decision to replace all the remaining 27.6 kV PILC cable from the station to the risers. This was completed in 2007.

- **Cable Limiters and MH Covers**

Approximately 150 cable limiters were installed and 750 meters of lead secondary mains replaced; also 36 more solid manhole covers were replaced by slotted manhole lids. Altogether, the cost for these projects was in the range of $175K. It is estimated that 80% of the cable limiters project is completed. These measures are meant to prevent catastrophic failures that can occur in the network system due to high-energy faults.

- **Network Plant Reinforced**

All but two spot networks now have SCADA communication. London Life was scheduled for 2007, however this was postponed to 2008 at the customer's request. Now that it has been confirmed that the London Free Press is not moving to Toronto, SCADA communication at this site will be done in 2008 if budget money becomes available.

In 2007, NT16 at the northeast corner of Dundas St and Wellington St was replaced for $95K. More civil work was done based on the recommendations of a structural engineering consultant.

- Replaced roof slabs on five manholes;
- Replaced a roof slab on one NT vault;
- The intersection at Dundas St and Wellington St had to be rebuilt due to the sinkhole; this was an unplanned project.

- **Replacement of Unreliable Plant**

- In 2007 London Hydro replaced approximately 55 depreciated poles according to previous test data. Future pole testing may continue to reveal more poles that require replacement.

- Grey Munsell poles were identified as posing a safety hazard due to their poor construction which used a cementitious coating that that sealed moisture inside, contributing to significant interior decay. Seven poles were replaced in 2007; this leaves 60 more poles to be addressed.

- Many broken insulators have resulted in large outages on the 27.6 kV system. Based on research and available information, London Hydro began replacing the most vulnerable groups based on age, make and vintage. Approximately 4,600 insulators have been changed in the past six years; an additional 150 were completed in 2007.

9.2 Summary of 2008 Work Planned

This section identifies some of the more important projects scheduled for 2008 which should contribute to the system's overall reliability improvement.

- **Replacing Aging Underground Infrastructure**

  Three main areas where the performance of the aging cables has visibly deteriorated were proposed for reconstruction in 2008:

  - Whitehills Phase 1 covering the west side of the subdivision, bounded by Gainsborough St to the south and Fanshawe Park Road to the north. This is one of the subdivisions which has ranked high in SPOORE for several years.
  - Westminster Park East covering a single-phase run of transformers which supply a townhouse complex experienced a high density of cable faults for a very contained area. It was therefore added to the capital budget plan for rebuild in 2008 as Phase 2 of the Westminster Park East subdivision rebuild.
  - Park Lane Estates (Byron) subdivision was also determined to be highly unreliable based on the number of cable faults and the inherent design of the power supply. Phase 1 proposed for 2008 will address approximately half of the supply area, including some radial supplies.

- **Conversion of 27.6 kV Air-Insulated Gear to Load Centres**

  A total of 15 more units are proposed to be addressed throughout year 2008. The program is into its third year and the results are evident judging by the improved performance in 2007.

- **New 27.6 kV Capacity**

  - HONI entered into an agreement with London Hydro to provide support for London's load growth. As such, eight new breaker positions were scheduled to be installed at the second DESN station at Talbot TS. Due to delays during the construction of Talbot TS #2 in 2007, four feeders (26M12, 26M13, 26M14 and 26M21) should be energized by London Hydro in the first quarter of 2008. Two more feeders at Talbot TS #2 will be built in the second half of 2008 to provide load relief to Wonderland TS (which runs over its 10-day LTR limit). This will increase the reliability of supply during single or multiple contingencies.

- **Network Rebuilds**

  As part of reconstructing the downtown network system, the condition of vaults and manhole slabs is assessed annually. Priorities for replacements are assigned to the locations that pose the highest safety and reliability risks.

- **New Automation on the System**

  - SCADA communication will be installed at London Life during 2008 as well as London Free Press, if budgets permit; this will address the last customers on the spot networks.

  - As part of the larger automation plans for the 27.6 kV distribution system, five Viper reclosers will be installed in 2008 on feeders that presently have no automation; this will be in addition to the reclosers installed as part of the feeder builds planned for 2008 (up to eight units).

- **Reinforcing the Overhead System**

  For a few years now, several programs have been in place to replace equipment determined to be prone to failure on the overhead system.

  - All the depreciated poles that were recommended for replacement prior to the 2006 pole testing are scheduled to be replaced. London Hydro will replace 50 more poles in 2008 based on the results of the testing performed in 2006.

  - In 2004 London Hydro identified 182 Grey Munsell poles that pose a safety hazard due to their poor construction and painting technique which results in pole decay. Of the 60 poles remaining to be replaced, 25 are scheduled for 2008.

  - Broken porcelain insulators have been the cause of many large outages on the 27.6 kV system. The most vulnerable makes and vintages started to be targeted for replacement in 2001. Of the 5,400 identified since then, approximately 4,350 insulators have been changed out; 450 more are planned for 2008.

  - Mitigation of pole fires has been a strong objective at London Hydro since 2001. After completing many projects, the number of pole fires has dropped significantly. Year 2008 will address the reconstruction of the pole line on Wavell Street between Clarke Side Road and Saskatoon Street (replacing approximately 32 poles).

- **PILC Replacement Prototype**

  The disposal of lead cable (PILC) may become an environmental issue over time due to regulations surrounding the use and handling of lead. Money was budgeted for 2008 to investigate options to replace PILC cable with a 3/C equivalent polymeric cable in existing duct structures. One prototype is under evaluation – a General Cable product, *PowerPak*.

The projects described above should, in general, reduce the impact of outages for our customers, speed up the restoration process, or avoid unnecessary interruptions. The reliability numbers should inherently improve overall. Also, the infrastructure should become more robust to better withstand natural disturbances.

10 Under-Performing Feeder Analysis

At the end of every year, each individual feeder's performance is assessed using both duration and frequency of outages calculated based on the specific number of customers on the feeder. SAIDI and SAIFI indices are determined by reporting the outage duration and frequency for each individual feeder circuit, resulting in FAIDI (*Feeder Average Interruption Duration Index*) and FAIFI (*Feeder Average Interruption Frequency Index*), as reliability measurement indicators per specific circuits. The circuits which experienced the highest values in the year analyzed are considered to be the most unreliable. For many years now, London Hydro has analyzed and reported on the ten worst performing feeders and action plans have been proposed where deemed necessary for improvement.

In 2007, the performance of the five network feeders was extremely poor. This can be explained by the fact that two major incidents, both caused by a third party (which fell in the category of Foreign Interference), resulted in shutting down the entire network – a phenomenon experienced on London Hydro's system very rarely. In May 2007, a fire at the London Life customer owned substation (supplied by three of our network feeders) posed a high-degree safety risk and resulted in interrupting the power to the whole downtown. The second large-scale event was the sinkhole that happened in October when a watermain pipe broke and flooded the intersection of Dundas and Wellington, causing the electrical infrastructure to collapse.

It is in London Hydro's 5-year plan to partly reconstruct the network system. By the end of 2008, the oil switches that sectionalize the five feeders M1 to M5 into ten will all be replaced with modernized solid-dielectric switching enclosures from Elastimold. These will have the ability to provide fault indication and current readings back to the SCADA master system. The motorized switches will also permit remote operation from the Control Room.

The feeder analysis this year revealed several circuits that have had multiple appearances among the worst ten feeders in the last five years, as illustrated in Table 2. The details of their performance indicators and the explanations of some important events leading to action plans are detailed in Appendix 2. Appendices 3 and 4 further indicate outstanding tasks for circuits identified previously for poor performance.

19M21	8K6	32M1	19M22
3X	2X	2X	2X

Table 2, Repetitive Worst Performing Circuits

Appendix 1

ANNUAL PERFORMANCE DATA 2007

The table below shows London Hydro's performance for the last 3 years in terms of reliability indices and number of outages; also, a comparison between 2007 and 2006 is presented in the last column. In general, the reliability measures worsened while the customer base increased by 1.5%. The number of planned outages also increased slightly compared to 2006.

Distribution System Supply Reliability					
		2005	**2006**	**2007**	**2007 vs. 2006**
Customer Base		**136,487**	**140,007**	**142,106**	**1.5%**
Customer-hours off supply	Unplanned	131,356	143,190	196,650	37.3%
	Planned	25,885	29,905	37,373	24.9%
	Total	**157,241**	**173,095**	**234,023**	**35.2%**
Customer Interruption Frequency (SAIFI)		1.65 /yr	2.14 /yr	2.18 /yr	**1.0%**
Average Interruption Duration (SAIDI)		1.15 hrs	1.25 hrs	1.67 hrs	**1.3%**
Number of Outages	Unplanned	410	594	578	-2.7%
	Planned	574	404	430	6.4%
	Total	**984**	**998**	**1,008**	**1.0%**

Appendix 2

2007 WORST PERFORMING CIRCUITS

In 2007, the feeder analysis saw a shift in terms of the ten worst performing circuits. In the past, the majority of the feeders ranking in the top ten were on the 27.6 kV and the 4 kV systems. In 2007, several feeders on the 13.8 kV system now scored poor reliability indices on a per feeder basis. As in the past, ranking was based on applying an equal weight to both FAIFI and FAIDI. These indices are calculated by using the duration and frequency of outages on each feeder, with respect to customers on that feeder only. Approximately 17% of all the customer minutes of interruption (SAIDI) are attributed to these ten feeders, while the customers affected on these feeders (SAIFI) represent 14% of the total interruption during unplanned outages. Also, one hundred out of a total of 578 unplanned interruptions are attributed to these feeders.

1.

Supply Station:	**SUB-97**	**Feeder Circuit Designation:**	**97F3**
Location: Colonel Talbot Rd. S/O Hwy 402			
Number of Customers on Feeder:	**164**	Position in 2006: Average position in the last 5 yrs:	**61** **45**
Customers Affected:	**3,214**	Unplanned Customer-Minutes of Interruption:	**81,439**
FAIFI:	**19.60**	FAIDI:	**8.28**

Explanation of Planned Action:

The majority of outage time on this feeder was due to only two events which were related to adverse weather and both affected the entire station; one event also caused tripping of its supply feeder 32M1 affecting an additional 2,700 customers. SUB-97, known as Scottsville, has generally shown poor reliability over the last few years. Some of the major contributing factors are: extremely long, radial feeders (97F3 is estimated to stretch out 14 km of overhead conductor), increased exposure to the elements, inability to determine faulted sections which increased patrolling time and lastly, lack of automation (no input for SCADA relating to transformer loading, fault indication, etc.).

In 2008, several sets of fault indicators from Fisher Pierce are being installed on every phase of one of the feeders (97F2), each set spaced approximately 5 km apart. This is a pilot project to send fault signals back to SCADA. Provided this solution is economical and feasible, it is expected that it will help restore power by a quicker identification and isolation of the fault. The other two feeders, 97F3 and 97F1 will be targeted for automation using the same technology at a later date.

Another protection element called a *trip saver* is available from S&C, which operates like a recloser but is mounted in an SMU-20 cut out. This technology will be investigated as an additional means of improving the reliability of the long SUB-97 feeders.

2.

Supply Station:	SUB-8	Feeder Circuit Designation:	8K4
Location: Ann St. and Richmond St.			
Number of Customers on Feeder:	**672**	Position in 2006:	**54**
		Average position in the last 5 yrs:	**51**
Customers Affected:	**4,731**	Unplanned Customer-Minutes of Interruption:	**328,527**
FAIFI:	**7.04**	FAIDI:	**8.15**
Explanation of Planned Action:			
This feeder from SUB-8 experienced 15 outages throughout the course of last year: of these, 10 were caused by animal contacts. Also, a single outage initially attributed to some defective arrestors caused the breaker to operate three times. The relays on the breakers were investigated and the neutral relay was found defective and replaced. New electronic relays are budgeted in 2008 to retrofit the old breakers. Due to the high density of animal contacts in the downtown area, the feeders from SUB-8 should be subjected to an audit to ensure proper animal protection guards are in place, i.e. transformers and risers.			

3.

Supply Station:	Buchanan	Feeder Circuit Designation:	19M21
Location: Pond Mills Rd. and Bradley Ave.			
Number of Customers on Feeder:	**226**	Position in 2006:	**45**
		Average position in the last 5 yrs:	**32**
Customers Affected:	**1,585**	Unplanned Customer-Minutes of Interruption:	**89,941**
FAIFI:	**7.01**	FAIDI:	**6.63**
Explanation of Planned Action:			
Of a total of seven incidents on this feeder, three were due to loss of supply from HONI, accounting for 99% of the down time. London Hydro separated from HONI's 19M21 feeder and now owns a new breaker position (19M22); however the reliability for the remaining load transfer customers on 19M21 along Wilton Grove still depends heavily on Hydro One's continuity of supply. With the load development in the Airport Road Industrial Park, London Hydro will be extending the 19M27 feeder acquiring all the load transfer customers in Buchanan's service territory.			

4.

Supply Station:	Wonderland	Feeder Circuit Designation:	32M2
Location: Southdale Rd. W/O Wonderland Rd.			
Number of Customers on Feeder:	**21**	Position in 2006:	**102**
		Average position in the last 5 yrs:	**52**
Customers Affected:	**107**	Unplanned Customer-Minutes of Interruption:	**9,427**
FAIFI:	**5.10**	FAIDI:	**7.48**
Explanation of Planned Action:			
This feeder supplied from a breaker position owned by HONI has been on the books previously for poor reliability. The number of London Hydro customers supplied by this feeder is very small. Similar to the 19M21, most of the outage time (97%) on 32M2 is due to loss of supply. Loss of supply is used because London Hydro cannot maintain or repair any equipment along this feeder; hence, any outage is attributed to HONI. London Hydro will contact HONI to inquire information about the reliability on this feeder and whether or not any work is planned for improvement.			

5.

Supply Station:	Buchanan	Feeder Circuit Designation:	19M22
Location: Pond Mills Rd. and Bradley Ave.			
Number of Customers on Feeder:	**598**	Position in 2006:	**47**
		Average position in the last 5 yrs:	**33**
Customers Affected:	**5,417**	Unplanned Customer-Minutes of Interruption:	**117,119**
FAIFI:	**9.06**	FAIDI:	**3.26**
Explanation of Planned Action:			
The predominant cause for unplanned outages on this feeder was defective equipment (seven out of 13). One cable fault alone which happened in April was responsible for half of the total outage duration. The area was reconstructed as part of Phase 2 of the White Oaks subdivision rebuild, but not until the second half of 2007. Also, four breaker operations were experienced due to various causes: human element, animals, foreign interference and unknown. This in turn affected FAIFI, ranking this feeder in the ten worst performing feeders.			

6.

Supply Station:	SUB-97	Feeder Circuit Designation:	97F1
Location: Colonel Talbot Rd. S/O Hwy 402			
Number of Customers on Feeder:	**199**	Position in 2006:	**53**
		Average position in the last 5 yrs:	**55**
Customers Affected:	**771**	Unplanned Customer-Minutes of Interruption:	**99,149**
FAIFI:	**3.87**	FAIDI:	**8.30**
Explanation of Planned Action:			
The same two outages that are mentioned in item 1 related to the 97F3 caused power interruptions of extended duration on this feeder as well, accounting for 75% of the total outage time. The action plan described for feeder 97F3 applies to this feeder as well.			

7.

Supply Station:	SUB-8	Feeder Circuit Designation:	8K6
Location: Ann St. and Richmond St.			
Number of Customers on Feeder:	**1,358**	Position in 2006:	**25**
		Average position in the last 5 yrs:	**45**
Customers Affected:	**9,167**	Unplanned Customer-Minutes of Interruption:	**311,787**
FAIFI:	**6.75**	FAIDI:	**3.83**
Explanation of Planned Action:			
The largest outage on this 13.8 kV feeder was caused by some conductors that came down under adverse weather conditions, while 8K6 was carrying a portion of the 6K4 customers. Also, five interruptions out of nine in total (including one due to animal contacts) caused the breaker to trip. This is very characteristic of the 13.8 kV system since the breakers do not have the reclosing function implemented; therefore, any temporary fault can result in a permanent outage. Due to the high density of animal contacts in the downtown area, the feeders from SUB-8 should be subjected to an audit to ensure proper animal protection guards are in place, both at transformers and at riser brackets.			

8.

Supply Station:	Edgeware	Feeder Circuit Designation:	M2
Location:			
Number of Customers on Feeder:	**39**	Position in 2006: Average position in the last 5 yrs:	**32** **68**
Customers Affected:	**85**	Unplanned Customer-Minutes of Interruption:	**18,838**
FAIFI:	**2.18**	FAIDI:	**8.05**
Explanation of Planned Action:			
It is the first time that the HONI feeder originating from St. Thomas and supplying several load transfer customers in London Hydro service territory ranks as highly unreliable. Hydro One is mostly responsible for the outages since the largest down time was due to loss of supply (reflected in a very high FAIDI). So far, the circuit supplying these customers is very remote from our infrastructure (i.e. SUB-97) and is unlikely to undergo any change in the near future. The same action for feeder 32M2 applies here.			

9.

Supply Station:	Wonderland	Feeder Circuit Designation:	32M1
Location: Southdale Rd. W/O Wonderland Rd.			
Number of Customers on Feeder:	**2,717**	Position in 2006: Average position in the last 5 yrs:	**37** **21**
Customers Affected:	**14,794**	Unplanned Customer-Minutes of Interruption:	**669,372**
FAIFI:	**5.44**	FAIDI:	**4.11**
Explanation of Planned Action:			
Almost 98% of the total unplanned interruption time and 11 of 22 outages on the 32M1 were caused by lightning. The feeder is extremely long and exposed, serving a large rural area, including Lambeth and SUB-97. This feeder has been problematic in the past and very few issues have been addressed. The new load forecast plan, in conjunction with the efforts to reduce the load at Wonderland TS will facilitate other feeders taking over a portion of this circuit, reducing both the load and the number of customers. Also, a feeder tie with the 32M5 and a conductor upgrade from #3/0 ACSR to 556kcmil AL in Lambeth are planned. Lightning has had a significantly increasing contribution to outage duration on this feeder over the last couple of years. Protecta-Lite arresters made by Hubbell are being considered for a pilot project next year to diminish the effect of lightning strikes in the large, exposed territory supplied by 32M1. These cumulative measures should enhance the feeder's performance.			

10.

Supply Station:	SUB-29	Feeder Circuit Designation:	29F4
Location: Dundas and Second St.			
Number of Customers on Feeder:	**326**	Position in 2006: Average position in the last 5 yrs:	**87** **21**
Customers Affected:	**1,538**	Unplanned Customer-Minutes of Interruption:	**81,570**
FAIFI:	**4.72**	FAIDI:	**4.17**
Explanation of Planned Action:			
Of the total outage time on this feeder, 95% was due to one pole fire; it is believed that it was not caused by specific constructions that pose a risk to pole fires; it also happened on the 4.16 kV system. This incident is considered a unique occurrence and does not require an action plan.			

Appendix 3

UPDATE ON 2006 WORST PERFORMING CIRCUITS

The ten worst performing feeders for 2006 were reviewed in detail. Described below are actions considered to improve performance where it was found to be justified.

Circuit (Position in 2006)	Proposed Work	Status	Ranking in 2007
33F1	Tree contacts created two outages which operated the breaker. This feeder is currently protected by a recloser installed at the station but its reliability depends on many overhead components. The area is not due for trimming for another one-to-two years. If outages continue to occur due to tree contacts, a remedial work proposal will be passed onto the Forestry Supervisor.	N/A	89
35F2	Major cable faults in Park Lane Estates (Byron) affected the reliability of this feeder in 2006. Part of this subdivision is being converted to 27.6 kV as Phase 1 of its reconstruction. Poor performance in previous years was due entirely to animal contacts which is also being addressed in 2008.	In Progress	60
44F1	SUB-44 has only one feeder which was equipped with a refurbished hydraulic recloser at the end of 2006. The reliability is expected to improve by preventing the temporary outages from becoming permanent.	Completed	43
97F2	This 8 kV feeder has ranked poorly before, i.e. the third least reliable feeder at the end of 2003, mainly from foreign interference. In other years, there were various causes, therefore no trend was discovered. SUB-97 is a radial station, distributing power at a different voltage level than the rest of the system. In 2008 fault indicators are being installed on all 3 phases of the 97F2. This will help to restore power by identifying and isolating the fault more rapidly.	In Progress	12
9F2	One single event – a cable failure on the PILC feeder egress caused high FAIFI and FAIDI for this feeder. New PILC cable was replaced from the manhole in front of the station to the riser.	Completed	58
55F1	SUB-55 has only one feeder which was retrofitted with a pole-mounted recloser in 2004. The numerous occurrences that ranked this feeder high in 2006 do not support a generally poor performance based on its previous ranking; thus, no work was planned for this feeder.	N/A	115
26M56	This feeder has performed extremely poorly for many years. In more recent years it was re-configured and only one of the two originally installed reclosers is still on this feeder. However, the full benefit of the recloser has not been attained as its control settings were never programmed. By implementing the protection function, overall feeder exposure and its susceptibility to lightning would decrease.	**Outstanding**	57
32M6	The majority of the downtime created by the outages on this feeder happened due to the failure of a lead pothead. All the remaining PILC egress cable at the station was replaced in 2007.	Completed	61

Appendix 4

UPDATE ON OUTSTANDING WORK ON PRIOR WORST PERFORMING CIRCUITS

Described below are actions proposed in the past in order to improve performance and the current status of the proposed work.

Year	Circuit	Proposed Work	Status	Ranking in 2007
2005	**35F1**	Animal contacts protection is being purchased and installed this year to eliminate the exposure of the live secondary bus which created numerous outages in the past.	In Progress	Not listed
2005	**35F2**	Same as above.	In Progress	60
2005	**35F3**	Same as above.	In Progress	Not listed
2005	**6K4**	An audit was planned for this feeder to highlight non-compliant locations with respect to animal guards (Guthrie guards are to be replaced with our standard bushing guards).	**Outstanding**	20
2005	**13M15**	An audit of the overhead lines was proposed in 2005 to reveal potential deficiencies leading to failures on this feeder.	**Outstanding**	52
2004	**50F1**	The area and infrastructure serviced by this feeder is relatively small and old; many of the interruptions were due to defective equipment. The station currently on the premises of Wonderland TS may have to be relocated at HONI's request; if so, its load will be converted to 27.6 kV.	Deferred Indefinitely	101
2004	**2K2**	A total of four animal contacts have happened at the same riser (SW 5093) including one that occurred in 2006; insulated mounting brackets will be installed. The Guthrie guards installed in 2001 on this feeder should be replaced with bushing guards.	**Outstanding** (High Priority)	34

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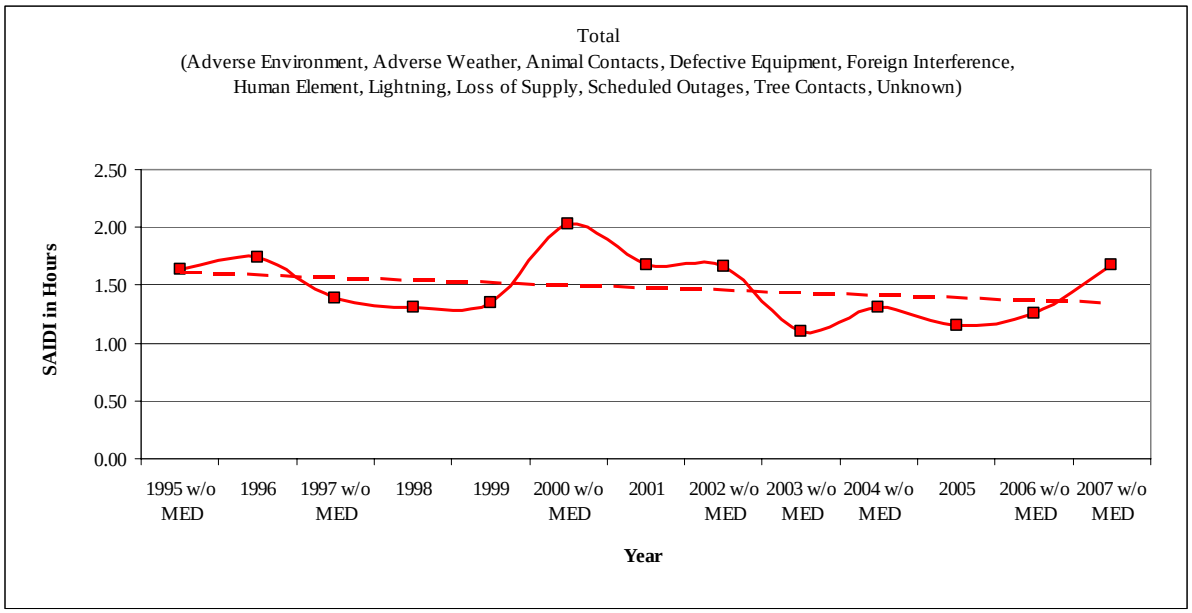
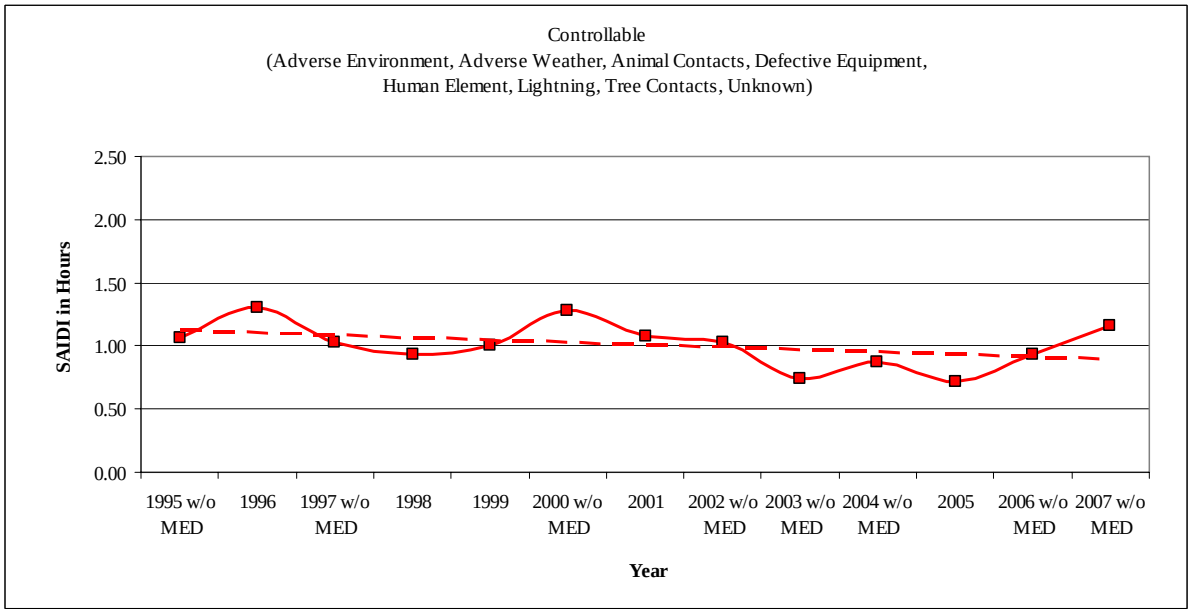
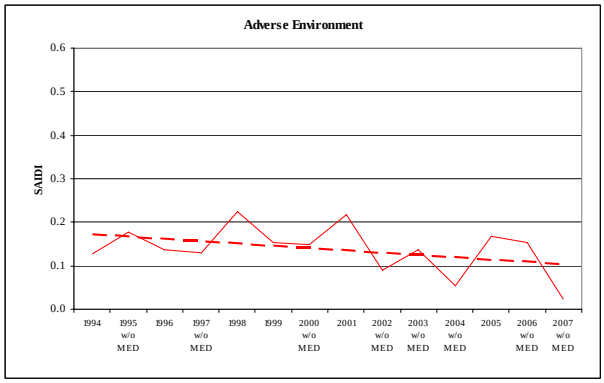
Appendix 5

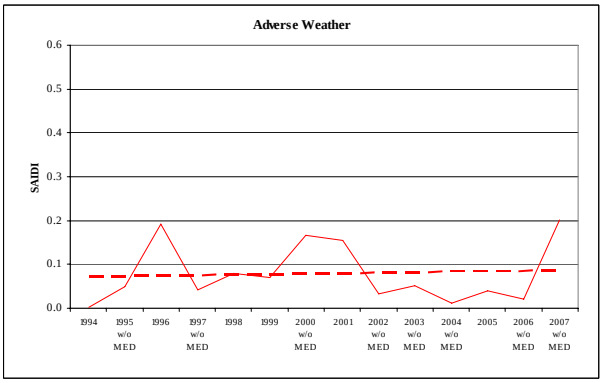
SAIDI

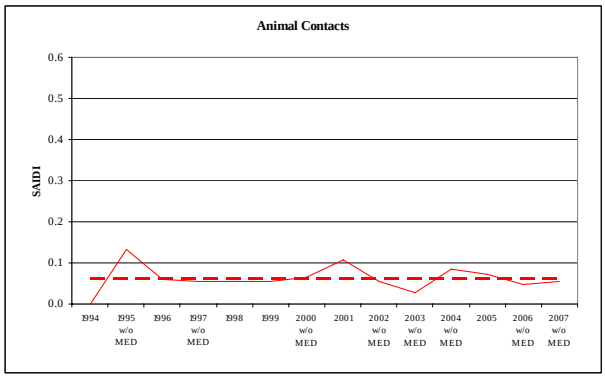


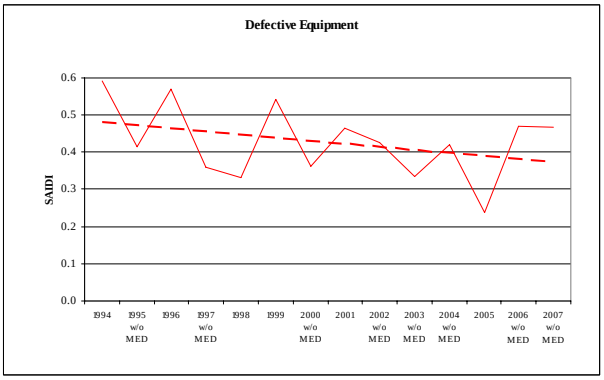


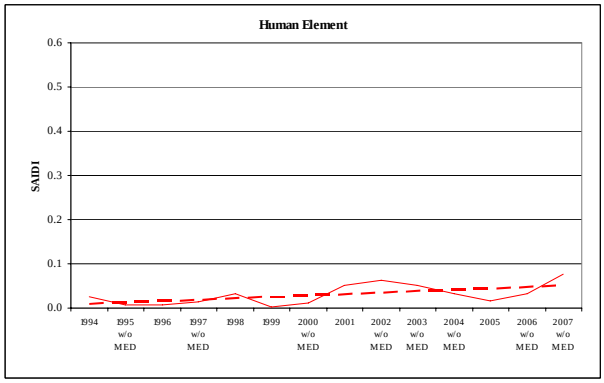
SAIDI (Controllable)

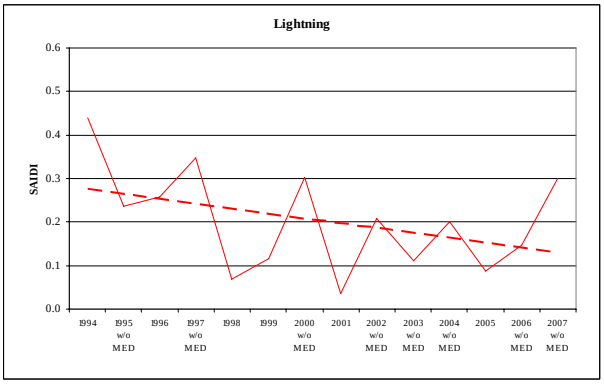


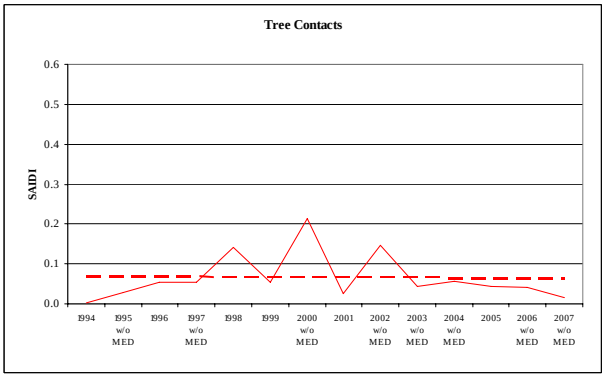


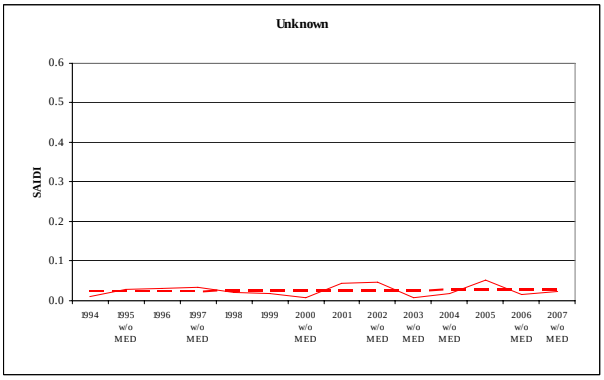












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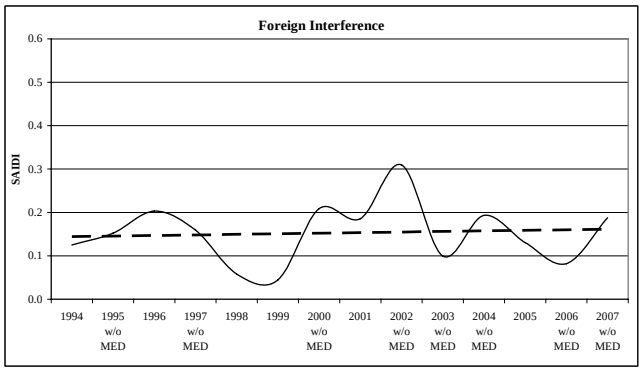

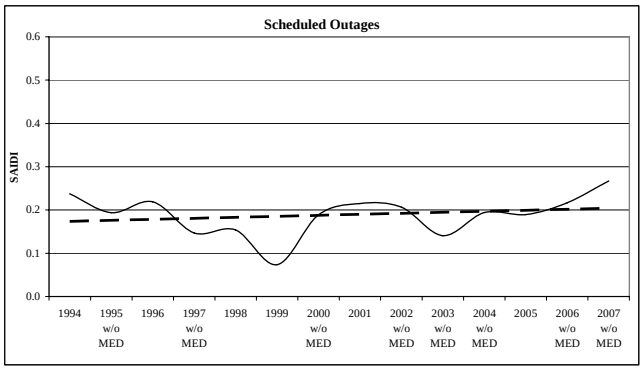

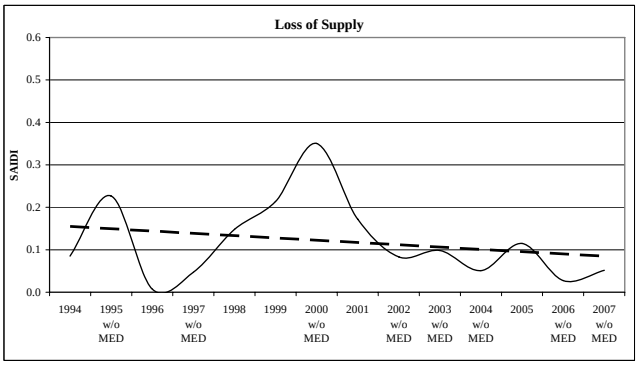

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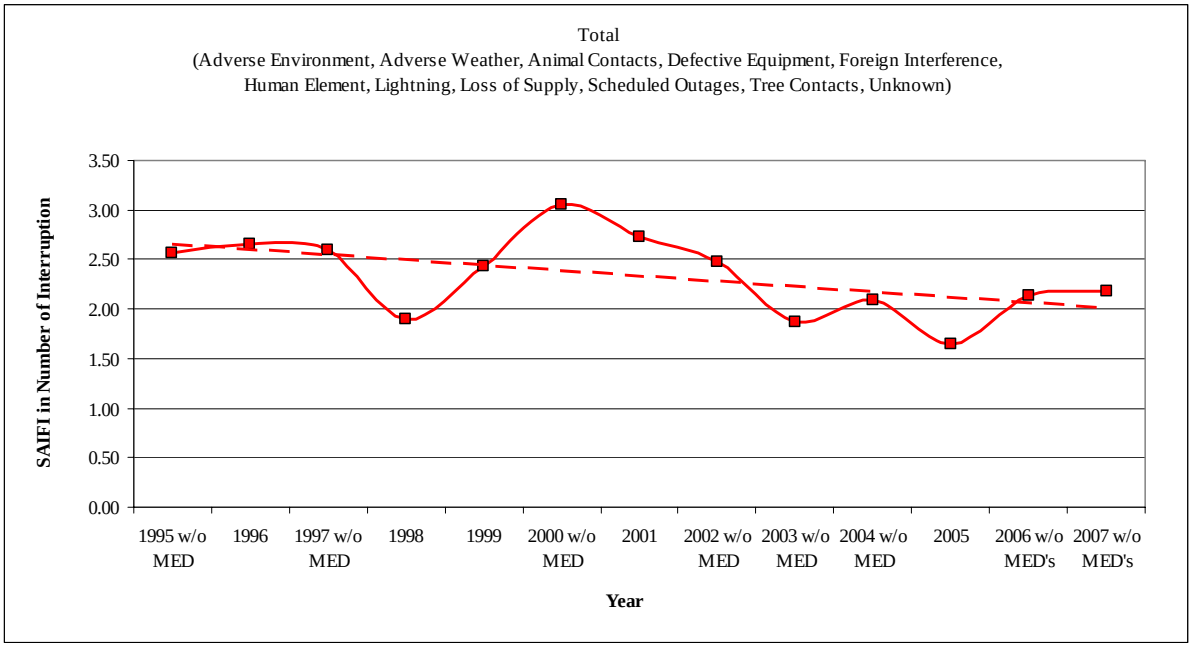
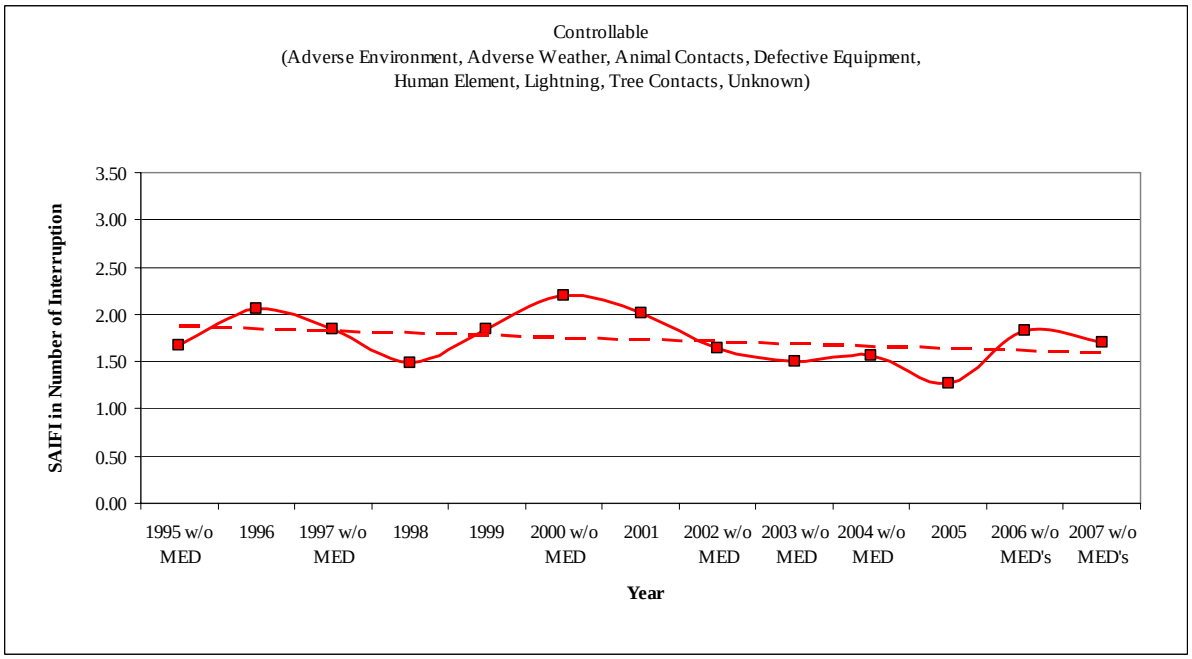
Appendix 6

SAIFI





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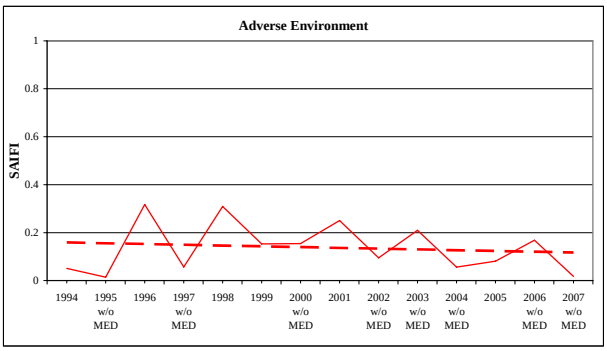

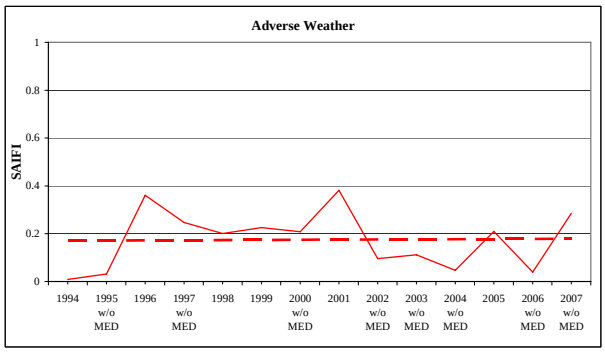

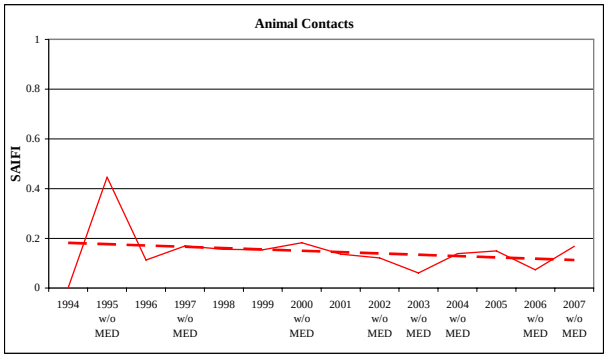

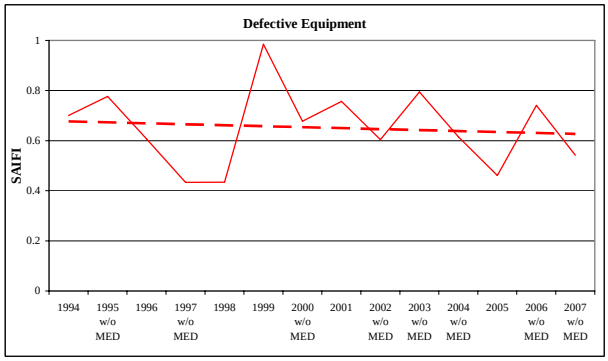

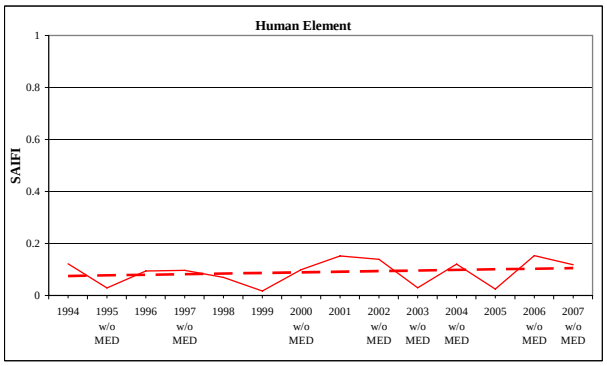

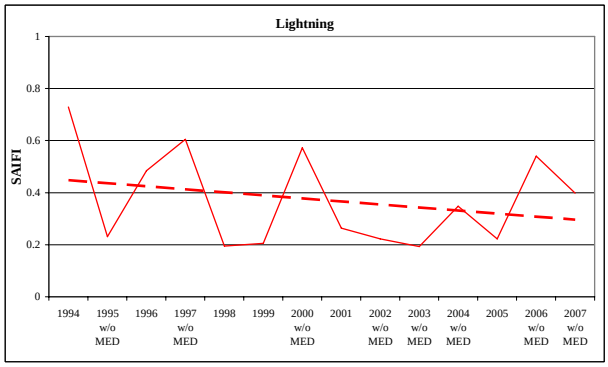

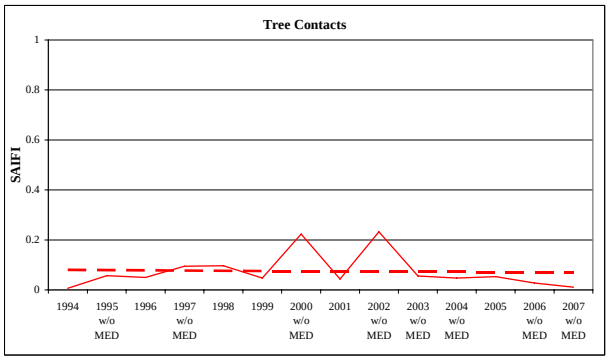

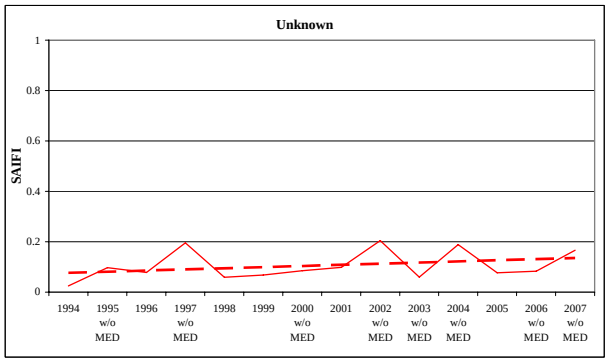

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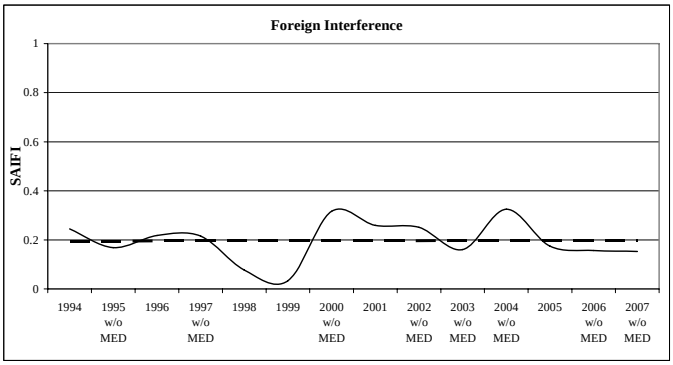
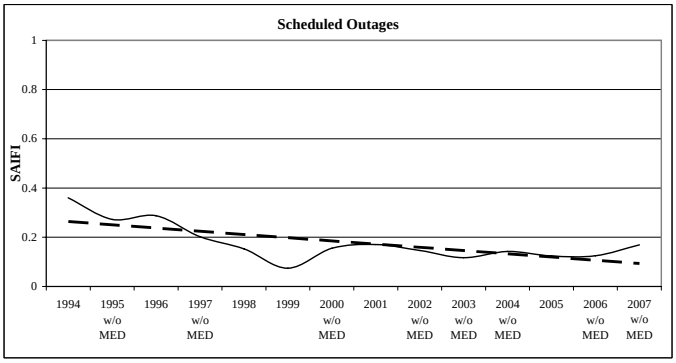
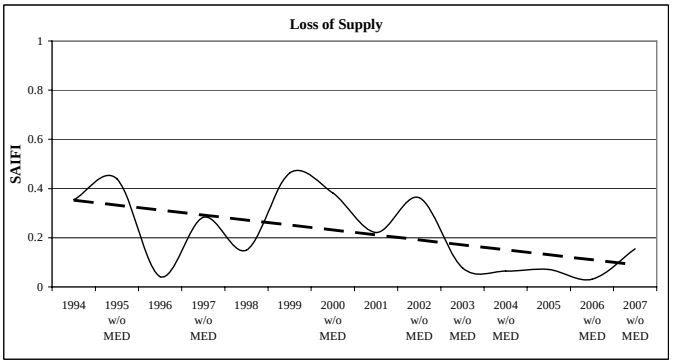
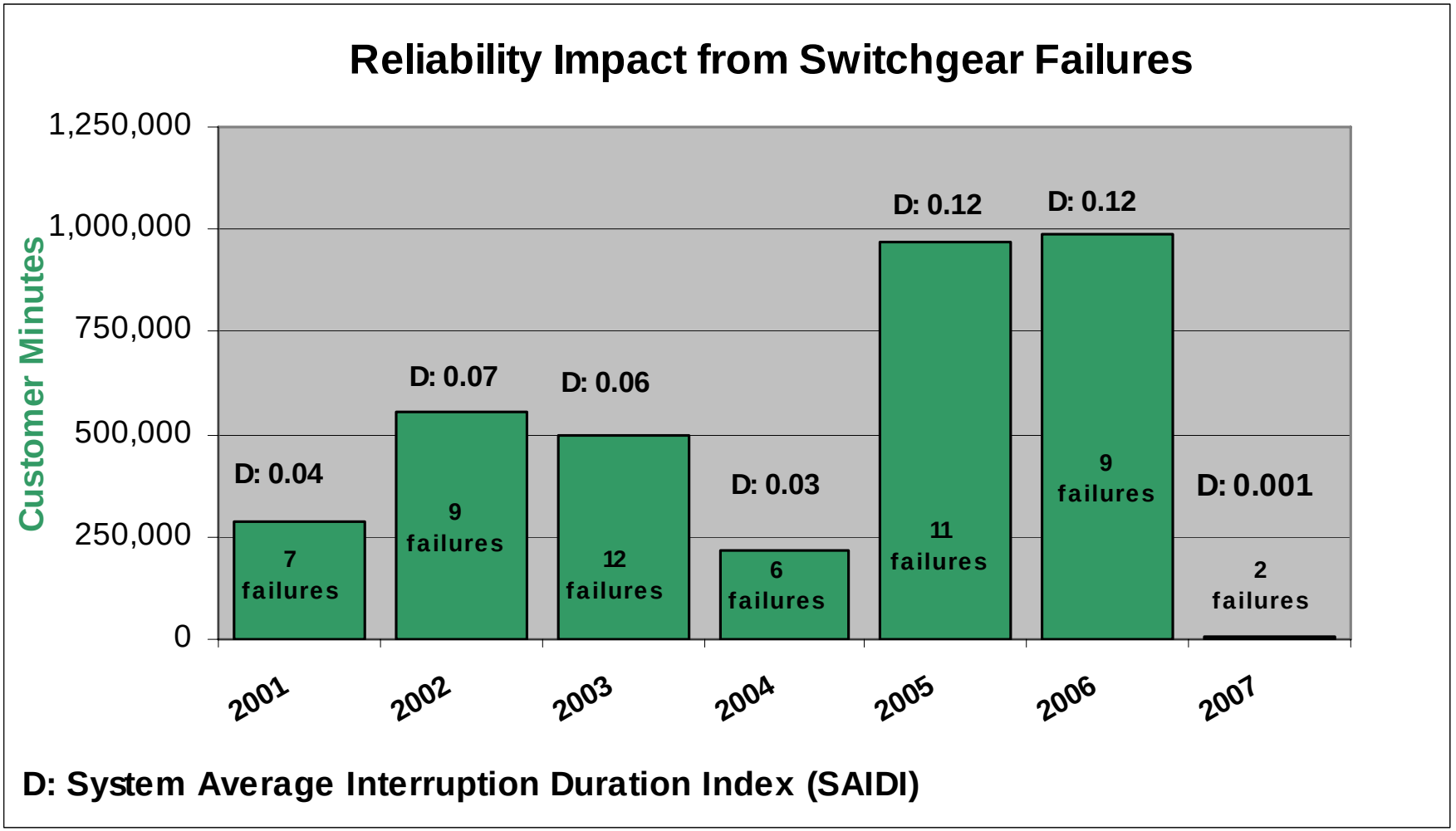






Appendix 7


Reliability Impact from Switchgear Failures
Customer Minutes
1,250,000
1,000,000
750,000
500,000
250,000
0
D: 0.04
7 failures
D: 0.07
9 failures
D: 0.06
12 failures
D: 0.03
6 failures
D: 0.12
11 failures
D: 0.12
9 failures
D: 0.001
2 failures
2001
2002
2003
2004
2005
2006
2007
D: System Average Interruption Duration Index (SAIDI)

Appendix 8

Report received from Firon Industries after investigating the failure of a in-line switch.

FIRON INDUSTRIES LTD.
MANUFACTURER OF QUALITY ELECTRICAL PRODUCTS
1350 BIRCHMOUNT ROAD, SCARBOROUGH, ON. M1P 2E4
FAX: 416-757-9595 TEL: 416-757-2277

Aug 24, 2007

London Hydro
111 Horton Street
London, ON
N6A 4H6

Attn: Greg Sheil, Distribution Reliability Engineer
Operations Department

Re: RMA 2986, TW28900S, Switch Failure

One TW28900S, switch was returned for analysis. The switch insulator had a separation of the aluminum end fitting from the fiberglass rod. No other information on the incident was provided.

A visual inspection of the switch was performed. It was manufactured approximately Sept 2000. The separation of the end fitting occurred at the jaw end of the switch. The separated end fitting had burn marks near the 11/16" dia. clevis hole and the exposed fiberglass rod was discoloured. The pull ring of the switch blade and contacts of the jaw terminal pad, both showed signs of arcing damage. The two-hole connector on the hinge end terminal pad had a longitudinal crack.

The insulator end fitting was sent to Bodycote for hardness checks. Nine readings were taken in ½ inch increments along the length of the part. The results (see attachment) indicate that the aluminum end fitting had a hardness of 15.0 (HREw), at a location near the 11/16" dia. clevis hole. A hardness reading taken at the opposite end of the same fitting produced 81.3 (HREw). Material specification for this aluminum alloy is approximately 83-88 (HREw).

During the insulator manufacturing process, the aluminum end fitting is crimped onto the fiberglass rod and each insulator is pull-tested to 45 kN. If the end fitting separates from the fiberglass rod after installation, it is the result of overheating of the switch. The end fitting is made from a wrought aluminum alloy and the alloy anneals if exposed to excessive heat for a prolonged period of time. As a result of the annealing process, the end fitting separates from the fiberglass rod. The burn marks on the 11/16" dia clevis hole of the end fitting indicate that the heating occurred at this location. Burn marks should also appear on the clevis pin, but it was not returned for inspection. The dark brown discolouration of the exposed fiberglass rod also indicates overheating occurred on the insulator end fitting.

A factor which may also contribute to the overheating of the switch, is a compromised jumper lead. The two-hole connector on the hinge end terminal pad was damaged, likely from over-torquing during the switch installation process. This may compromise the jumper connections and contribute to the overheating of the switch by increasing the load current in the insulator end fitting. It is probable the connector on the jaw end terminal pad had similar damage, but it was not returned for inspection.

The arcing damage on the pull ring of the switch blade and jaw contacts likely occurred during the separation of the end fitting and fiberglass rod, at the time the switch dropped.

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FIRON INDUSTRIES LTD.
MANUFACTURER OF QUALITY ELECTRICAL PRODUCTS
1350 BIRCHMOUNT ROAD, SCARBOROUGH, ON. M1P 2E4
FAX: 416-757-9595 TEL: 416-757-2277

Previous experience has shown that in normal installations, the load current carried by the insulator end fitting can be as high as 20-35% of the total load without causing any significant heating of the end fittings. Current share values of 20-35% typically result in a switch operating at a temperatures less than 50°C (above ambient) and are acceptable. Current share values greater than 40% in the insulator end fitting may cause overheating of the switch, if combined with other factors such as arcing and/or fault currents. This may eventually result in the switch end fitting separating from the insulator, if the higher temperatures are sustained for a prolonged period of time.

Since this incident is similar to a switch incident from RMA 2725 from Jan 2005, the recommendations are the same. The recommended course of action is to monitor all switches which show a current share value greater than 40% in the insulator end and exhibit temperatures greater than 50°C, above ambient. These switches are likely to have seen a fault current and exhibit some signs of arcing and are at higher risk to see this type of failure. It is also recommended that the jumper lead be inspected. A compromised jumper lead connection will contribute to the heating of the insulator end fitting.

Paul Louie
Assistant Manager of Engineering

cc. D. Schmidt, Bel Volt Sales
D. Tynan, Bel Volt Sales

APPENDIX A: PHOTOS

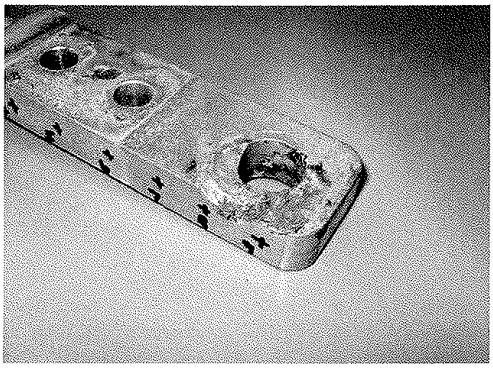

Photo #1: End fitting from switch.

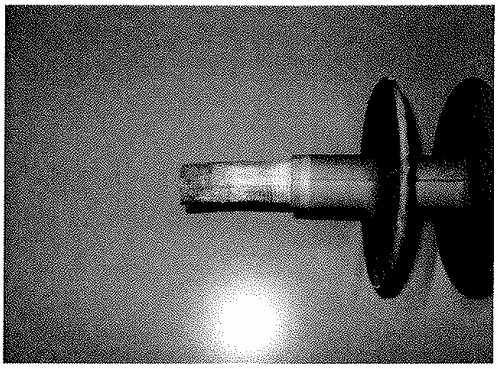

Photo #2: Discolouration of the fiberglass rod.

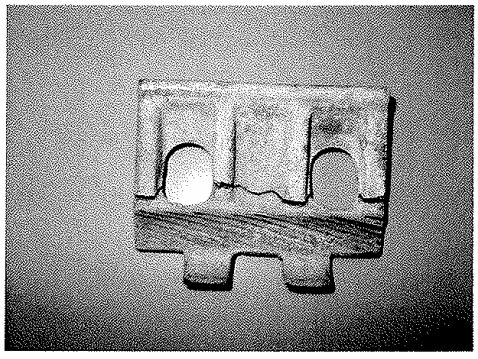

Photo #3: Crack in two-hole connector.

Bodycote

TESTING GROUP
www.bodycote.com
www.bodycotetesting.com

Test Certificate

Firon Industries Limited
1350 Birchmount Road
Scarborough, Ontario
M1P 2E4

REF No G707635 : Issue 1
Ord No 005970

Date Tested 08/15/07
Date Reported 08/15/07

Attn: Paul Louie

Item - Ref: Aluminum Sample

Specification - Not Specified

Hardness Test - ASTM E 18-05

	Method	Load	Results	Comments
001:Parent Hardness	Rockwell EW	100kgf	-	See Below
Item 01: See Chart Below				

Certificate Comments

Hardness Test Results

Location #	Rockwell "Ew" Hardness
1	81.3
2	78.9
3	77.1
4	57.8
5	59.5
6	46.0
7	38.4
8	27.8
9	15.0

The sample was tested as received. Hardness results at the hollow end (locations #1-3) may be marginally lower than the actual value.

Tested by John Andrews

For and on behalf of
BODYCOTE TESTING GROUP

Bodycote Testing Group
15 High Ridge Court • Cambridge • Ontario • Canada • N1R 7L3 • Tel: +1 (519) 621-8191 • Fax: +1 (519) 621-7700

Page 1 of 1

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Remainder of Appendices for Responses to Board Staff Interrogatories

consumables, and may include the cost of small parts. The purpose of these expenditures is often described as for the 'repairs and maintenance' of the item of property, plant and equipment.

13 Parts of some items of property, plant and equipment may require replacement at regular intervals. For example, a furnace may require relining after a specified number of hours of use, or aircraft interiors such as seats and galleys may require replacement several times during the life of the airframe. Items of property, plant and equipment may also be acquired to make a less frequently recurring replacement, such as replacing the interior walls of a building, or to make a nonrecurring replacement. Under the recognition principle in paragraph 7, an entity recognises in the carrying amount of an item of property, plant and equipment the cost of replacing part of such an item when that cost is incurred if the recognition criteria are met. The carrying amount of those parts that are replaced is derecognised in accordance with the derecognition provisions of this Standard (see paragraphs 67–72).

14 A condition of continuing to operate an item of property, plant and equipment (for example, an aircraft) may be performing regular major inspections for faults regardless of whether parts of the item are replaced. When each major inspection is performed, its cost is recognised in the carrying amount of the item of property, plant and equipment as a replacement if the recognition criteria are satisfied. Any remaining carrying amount of the cost of the previous inspection (as distinct from physical parts) is derecognised. This occurs regardless of whether the cost of the previous inspection was identified in the transaction in which the item was acquired or constructed. If necessary, the estimated cost of a future similar inspection may be used as an indication of what the cost of the existing inspection component was when the item was acquired or constructed.

Measurement at recognition

15 **An item of property, plant and equipment that qualifies for recognition as an asset shall be measured at its cost.**

Elements of cost

16 The cost of an item of property, plant and equipment comprises:

(a) its purchase price, including import duties and non-refundable purchase taxes, after deducting trade discounts and rebates.

(b) any costs directly attributable to bringing the asset to the location and condition necessary for it to be capable of operating in the manner intended by management.

(c) the initial estimate of the costs of dismantling and removing the item and restoring the site on which it is located, the obligation for which an entity incurs either when the item is acquired or as a consequence of having used the item during a particular period for purposes other than to produce inventories during that period.

17 Examples of directly attributable costs are:

(a) costs of employee benefits (as defined in IAS 19 *Employee Benefits*) arising directly from the construction or acquisition of the item of property, plant and equipment;

(b) costs of site preparation;

(c) initial delivery and handling costs;

(d) installation and assembly costs;

(e) costs of testing whether the asset is functioning properly, after deducting the net proceeds from selling any items produced while bringing the asset to that location and condition (such as samples produced when testing equipment); and

(f) professional fees.

18 An entity applies IAS 2 *Inventories* to the costs of obligations for dismantling, removing and restoring the site on which an item is located that are incurred during a particular period as a consequence of having used the item to produce inventories during that period. The obligations for costs accounted for in accordance with IAS 2 or IAS 16 are recognised and measured in accordance with IAS 37 *Provisions, Contingent Liabilities and Contingent Assets*.

19 Examples of costs that are not costs of an item of property, plant and equipment are:

(a) costs of opening a new facility;

(b) costs of introducing a new product or service (including costs of advertising and promotional activities);

(c) costs of conducting business in a new location or with a new class of customer (including costs of staff training); and

(d) administration and other general overhead costs.

20 Recognition of costs in the carrying amount of an item of property, plant and equipment ceases when the item is in the location and condition necessary for it to be capable of operating in the manner intended by management. Therefore, costs incurred in using or redeploying an item are not included in the carrying amount of that item. For example, the following costs are not included in the carrying amount of an item of property, plant and equipment:

(a) costs incurred while an item capable of operating in the manner intended by management has yet to be brought into use or is operated at less than full capacity;

(b) initial operating losses, such as those incurred while demand for the item's output builds up; and

(c) costs of relocating or reorganising part or all of an entity's operations.

Ontario Energy Board
Commission de l'énergie de l'Ontario

IFRS Consultation

Key Differences – IFRS versus Canadian GAAP

Board Staff - Regulatory Audit
August 22, 2008

Property, Plant, and Equipment (IAS 16, 23, 36)

- Administration and general overhead not permitted to be capitalized
- Capitalized carrying charges limited to actual interest charges incurred (IAS 23)
- Significant components of assets capitalized and depreciated accordingly to each component
- Fair value option subsequent to initial recognition
- Impairment (IAS 36) – discounted cash flows; reversal if circumstances have changed
- Capital Contributions – IFRIC draft D24 – liability versus contra-account to Property, Plant, and Equipment

NAME OF UTILITY	London Hydro Inc.
LICENCE NUMBER	ED-2002-0557
BOARD FILE NUMBER	EB-2008-0235
NAME OF CONTACT	D. Williamson
PHONE NUMBER	519-661-5800 ext 5745
E-mail Address	williamd@londonhydro.com

Sheet 1 - Deferral and Variance Account Allocation Factors

Allocation of Balances to Customer Classes

Account Description	Account Number	Projected Balances as at April 30,2009	Projected Balances as at August 31,2009
Other Regulatory Assets - Sub-account OEB Cost Assessments	1508	$ 461,595	$ 462,918
Other Regulatory Assets - Sub-account Pension Contributions	1508	1,710,520	1,715,533
Miscellaneous Deferred Debits - Payments to Customers	1525	30,810	30,810
RSVA - Wholesale Market Service Charges	1580	(6,462,131)	(6,482,495)
Total claim		**$ (4,259,206)**	**$ (4,273,234)**

Allocation Data By Customer Class	2009 kWs Billed	2009 kWhs Billed	2009 kWhs Allocator %	2009 Gross Dx Revenue	2009 Gross Dx Revenue Allocator %
RESIDENTIAL CLASS		1,084,746,791	31.61%	$ 36,969,041	60.26%
GENERAL SERVICE <50 KW plus Unmetered Loads		424,916,988	12.38%	9,710,990	15.83%
GENERAL SERVICE >50 KW to 4,999 KW	4,102,788	1,654,665,168	48.22%	11,946,886	19.48%
GENERAL SERVICE >50 KW to 4,999 KW (CoGeneration)	203,746	37,425,572	1.09%	721,947	1.18%
LARGE USER	392,686	205,146,878	5.98%	1,272,939	2.08%
SENTINEL LIGHTS	2,342	856,841	0.02%	31,925	0.05%
STREET LIGHTING	67,170	23,921,899	0.70%	690,641	1.13%
Totals	4,768,732	3,431,680,138	100.00%	$ 61,344,371	100.00%

NAME OF UTILITY	London Hydro Inc.
LICENCE NUMBER	ED-2002-0557
BOARD FILE NUMBER	EB-2008-0235
NAME OF CONTACT	D. Williamson
PHONE NUMBER	519-661-5800 ext 5745
E-mail Address	williamd@londonhydro.com

Sheet 2 - Disposition of Deferral Account Balances and Rate Rider Calculations As At April 30,2009

Allocation of Balances to Customer Classes

Method of Allocation	Account	Total allocation	Customer Classes						
			Res.	GS <50KW + Unmetered	GS >50KW	Cogeneration	Large User	Sentinel	Streetlighting
2009 Gross distribution revenue requirement percentages by class	**1508 - OEB Cost Assessments**	100.00%	60.26%	15.83%	19.48%	1.18%	2.08%	0.05%	1.13%
2009 Gross distribution revenue requirement percentages by class	**1508 - Pension Contributions**	100.00%	60.26%	15.83%	19.48%	1.18%	2.08%	0.05%	1.13%
Allocated 100% to residential customer class - OPC rebate cheques	**1525 Miscellaneous Deferred Debits**	100.00%	100.00%						
Allocated based on energy consumption	**1580 RSVA - Wholesale Market Service Charges**	100.00%	31.61%	12.38%	48.22%	1.09%	5.98%	0.02%	0.70%
Allocation of Revised Account Balances to Rate Classes	**Account**	**Projected Balance April 30,2009**							
OEB Cost Assessments	1508	$ 461,595	$ 278,179	$ 73,072	$ 89,896	$ 5,432	$ 9,578	$ 240	$ 5,197
Pension Contributions	1508	$ 1,710,520	1,030,841	270,780	333,126	20,131	35,495	890	19,258
Miscellaneous Deferred Debits	1525	$ 30,810	30,810	-	-	-	-	-	-
RSVA - Wholesale Market Service Charges	1580	$ (6,462,131)	(2,042,666)	(800,153)	(3,115,868)	(70,475)	(386,308)	(1,614)	(45,047)
Total Allocated for Recovery		**$ (4,259,206)**	**$ (702,836)**	**$ (456,301)**	**$ (2,692,846)**	**$ (44,912)**	**$ (341,235)**	**$ (483)**	**$ (20,592)**
Forecast 2009 Energy Usage by Customer Class - Kwh's		**3,431,680,138**	**1,084,746,791**	**424,916,988**	**1,654,665,168**	**37,425,572**	**205,146,878**	**856,841**	**23,921,899**
Forecast 2009 Demand By Customer Class - Kw's		**4,768,732**	**-**	**-**	**4,102,788**	**203,746**	**392,686**	**2,342**	**67,170**
Forecast 2009 Energy Usage by Customer Class - Kwh's	**multiplied by 24/12**	**6,863,360,275**	**2,169,493,582**	**849,833,975**	**3,309,330,337**	**74,851,145**	**410,293,756**	**1,713,682**	**47,843,798**
Forecast 2009 Demand By Customer Class - Kw's	**multiplied by 24/12**	**9,537,463**	**-**	**-**	**8,205,576**	**407,491**	**785,373**	**4,685**	**134,339**
Rate Rider Per Kwh for Customers Billed on Kwh's	**for 24 month recovery to Apr 30/11**		**$ (0.0003)**	**$ (0.0005)**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Rate Rider Per Kw for Demand Customers Billed on Kw's	**for 24 month recovery to Apr 30/11**		**$ -**	**$ -**	**$ (0.3282)**	**$ (0.1102)**	**$ (0.4345)**	**$ (0.1031)**	**$ (0.1533)**

PROPOSED RATES

Rate Class	Billing Parameter	Proposed Rate - Sept 1/09 to Apr 30/11	Proposed Rate - May 1/09 to Apr 30/11
Residential	Kwh's	$ (0.0004)	$ (0.0003)
GS<50 kW	Kwh's	$ (0.0006)	$ (0.0005)
GS>50 kW	Kw's	$ (0.3951)	$ (0.3282)
GS>50 kW (CoGen)	Kw's	$ (0.1327)	$ (0.1102)
Large User	Kw's	$ (0.5230)	$ (0.4345)
Unmetered Scattered Load	Kwh's	$ (0.0006)	$ (0.0005)
Sentinel Lighting	Kw's	$ (0.1242)	$ (0.1031)
Street Lighting	Kw's	$ (0.1846)	$ (0.1533)

NAME OF UTILITY	London Hydro Inc.
LICENCE NUMBER	ED-2002-0557
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NAME OF CONTACT	D. Williamson
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E-mail Address	williamd@londonhydro.com

Sheet 2 - Disposition of Deferral Account Balances and Rate Rider Calculations As At September 1,2009

Allocation of Balances to Customer Classes

Method of Allocation	Account	Total allocation	Customer Classes						
			Res.	GS <50KW + Unmetered	GS >50KW	Cogeneration	Large User	Sentinel	Streetlighting
2009 Gross distribution revenue requirement percentages by class	**1508 - OEB Cost Assessments**	100.00%	60.26%	15.83%	19.48%	1.18%	2.08%	0.05%	1.13%
2009 Gross distribution revenue requirement percentages by class	**1508 - Pension Contributions**	100.00%	60.26%	15.83%	19.48%	1.18%	2.08%	0.05%	1.13%
Allocated 100% to residential customer class - OPC rebate cheques	**1525 Miscellaneous Deferred Debits**	100.00%	100.00%						
Allocated based on energy consumption	**1580 RSVA - Wholesale Market Service Charges**	100.00%	31.61%	12.38%	48.22%	1.09%	5.98%	0.02%	0.70%

Allocation of Revised Account Balances to Rate Classes	Account	Projected Balance August 31,2009							
OEB Cost Assessments	1508	$ 462,918	$ 278,977	$ 73,281	$ 90,154	$ 5,448	$ 9,606	$ 241	$ 5,212
Pension Contributions	1508	$ 1,715,533	1,033,862	271,574	334,102	20,190	35,599	893	19,314
Miscellaneous Deferred Debits	1525	$ 30,810	30,810	-	-	-	-	-	-
RSVA - Wholesale Market Service Charges	1580	$ (6,482,495)	(2,049,103)	(802,675)	(3,125,687)	(70,697)	(387,526)	(1,619)	(45,189)
Total Allocated for Recovery		**$ (4,273,234)**	**$ (705,454)**	**$ (457,819)**	**$ (2,701,432)**	**$ (45,060)**	**$ (342,321)**	**$ (485)**	**$ (20,663)**
Forecast 2009 Energy Usage by Customer Class - Kwh's		**3,431,680,138**	**1,084,746,791**	**424,916,988**	**1,654,665,168**	**37,425,572**	**205,146,878**	**856,841**	**23,921,899**
Forecast 2009 Demand By Customer Class - Kw's		**4,768,732**	**-**	**-**	**4,102,788**	**203,746**	**392,686**	**2,342**	**67,170**
Forecast 2009 Energy Usage by Customer Class - Kwh's	**multiplied by 20/12**	**5,719,466,896**	**1,807,911,319**	**708,194,979**	**2,757,775,281**	**62,375,954**	**341,911,464**	**1,428,068**	**39,869,832**
Forecast 2009 Demand By Customer Class - Kw's	**multiplied by 20/12**	**7,947,886**	**-**	**-**	**6,837,980**	**339,576**	**654,477**	**3,904**	**111,949**

Rate Rider Per Kwh for Customers Billed on Kwh's	**for 20 month recovery to Apr 30/11**	**$ (0.0004)**	**$ (0.0006)**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Rate Rider Per Kw for Demand Customers Billed on Kw's	**for 20 month recovery to Apr 30/11**	**$ -**	**$ -**	**$ (0.3951)**	**$ (0.1327)**	**$ (0.5230)**	**$ (0.1242)**	**$ (0.1846)**

PROPOSED RATES

Rate Class	Billing Parameter	Proposed Rate - Sept 1/09 to Apr 30/11
Residential	Kwh's	$ (0.0004)
GS<50 kW	Kwh's	$ (0.0006)
GS>50 kW	Kw's	$ (0.3951)
GS>50 kW (CoGen)	Kw's	$ (0.1327)
Large User	Kw's	$ (0.5230)
Unmetered Scattered Load	Kwh's	$ (0.0006)
Sentinel Lighting	Kw's	$ (0.1242)
Street Lighting	Kw's	$ (0.1846)

NAME OF UTILITY London Hydro Inc.
LICENCE NUMBER ED-2002-0557
BOARD FILE NUMBER EB-2008-0235
NAME OF CONTACT D. Williamson
PHONE NUMBER 519-661-5800 ext 5745
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Sheet 4 - Deferral and Variance Accounts Submitted for Recovery

Calculation of Deferral Account Balances

Accounts for which a disposition request is being made in this application.

Accounts for Which A Disposition Request is Included This Application		1508 Other Regulatory Assets - Sub-account OEB Cost Assessments	1508 Other Regulatory Assets - Sub-account Pension Contributions	1525 Miscellaneous Deferred Debits	1580 RSVA - Wholesale Market Service Charges	Total
Utility Deferral Accounts						
Net Accruals / Variances		$ 392,670	$ 1,491,745	$ 30,810	$ (6,109,269)	$ (4,194,044)
Recoveries / Adjustments						0
Carrying Charges		50,615	149,218		(67,203)	132,630
Ending Balance - December 31,2007		443,285	1,640,962	30,810	(6,176,472)	(4,061,415)
January 1 to March 31,2008						
	Net Accruals / Variances					
	Recoveries / Adjustments					-
	Carrying Charges - 5.14%	5,018	19,064	-	(78,504)	(54,422)
		448,304	1,660,026	30,810	(6,254,976)	(4,115,836)
April 1 to June 30,2008						
	Net Accruals / Variances					
	Recoveries / Adjustments					-
	Carrying Charges - 4.08%	3,983	15,133	-	(62,315)	(43,199)
		452,287	1,675,159	30,810	(6,317,291)	(4,159,035)
July 1, 2008 to April 30,2009						
	Net Accruals / Variances					
	Recoveries / Adjustments					-
Carrying Charges - 3.35%	to Dec 31/08	6,613	25,123	-	(102,330)	(70,594)
Carrying Charges - 2.45%	Jan 1/09 to Mar 31/09	2,372	9,012		(37,419)	(26,035)
Carrying Charges - 1.0%	Apr 30/09	323	1,226		(5,091)	(3,542)
Forecast Balance at April 30,2009		**$ 461,595**	**$ 1,710,520**	**$ 30,810**	**$ (6,462,131)**	**$ (4,259,206)**
May 1,2009 to August 31,2009						
	Net Accruals / Variances					
	Recoveries / Adjustments					-
	Carrying Charges - 1.0%	1,323	5,013	-	(20,364)	(14,028)
Forecast Balance at August 31,2009		**$ 462,918**	**$ 1,715,533**	**$ 30,810**	**$ (6,482,495)**	**$ (4,273,234)**

Notes:

1508 Other Regulatory Assets - Sub-account OEB Cost Assessments
Variances are for the period Jan 1/04 to Apr 30/06
Simple interest allowed for period Jan 1/04 to Apr 30/06 is deemed debt rate for period of 7%
Actual interest claimed is for period Aug 1/04 to Apr 30/06 at 5.75%
Simple interest allowed and claimed for period after May 1/06 is OEB quarterly posted rate for regulatory accounts.

1508 Other Regulatory Assets - Sub-account Pension Contributions
Variances are for the period Jan 1/05 to Apr 30/06
Simple interest allowed and claimed for period Jan 1/05 to Apr 30/06 is 3.88%
Simple interest allowed and claimed for period after May 1/06 is OEB quarterly posted rate for regulatory accounts.

1525 Miscellaneous Deferred Debits
Variances are for period June 06 to Dec 06 for the cost of issuing refund cheques to electricity consumers with respect to the Ontario Price Credit [OPC] rebate cheque program as required by government legislation
Interest has not be applied to this account due to uncertainty of applicability.

NAME OF UTILITY	London Hydro Inc.
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E-mail Address	williamd@londonhydro.com

Sheet 1 - Deferral and Variance Account Allocation Factors

Allocation of Balances to Customer Classes

Account Description	Account Number	Projected Balances as at April 30,2009	Projected Balances as at August 31,2009
Other Regulatory Assets - Sub-account OEB Cost Assessments	1508	$ 461,595	$ 462,918
Other Regulatory Assets - Sub-account Pension Contributions	1508	1,710,520	1,715,533
Miscellaneous Deferred Debits - Payments to Customers	1525	30,810	30,810
RSVA - Wholesale Market Service Charges	1580	(6,462,131)	(6,482,495)
Retail Cost Variance Account - Retail	1518	(151,635)	(152,101)
Retail Cost Variance Account - STR	1548	105,853	106,153
Low Voltage Variance Account	1550	6,525	6,545
RSVA - One-time Wholesale Market Service	1582	358,860	359,870
Total claim		**$ (3,939,604)**	**$ (3,952,768)**

Allocation Data By Customer Class	2009 kWs Billed	2009 kWhs Billed	2009 kWhs Allocator %	2009 Gross Dx Revenue	2009 Gross Dx Revenue Allocator %
RESIDENTIAL CLASS		1,084,746,791	31.61%	$ 36,969,041	60.26%
GENERAL SERVICE <50 KW plus Unmetered Loads		424,916,988	12.38%	9,710,990	15.83%
GENERAL SERVICE >50 KW to 4,999 KW	4,102,788	1,654,665,168	48.22%	11,946,886	19.48%
GENERAL SERVICE >50 KW to 4,999 KW (CoGeneration)	203,746	37,425,572	1.09%	721,947	1.18%
LARGE USER	392,686	205,146,878	5.98%	1,272,939	2.08%
SENTINEL LIGHTS	2,342	856,841	0.02%	31,925	0.05%
STREET LIGHTING	67,170	23,921,899	0.70%	690,641	1.13%
Totals	4,768,732	3,431,680,138	100.00%	$ 61,344,371	100.00%

NAME OF UTILITY	London Hydro Inc.
LICENCE NUMBER	ED-2002-0557
BOARD FILE NUMBER	EB-2008-0235
NAME OF CONTACT	D. Williamson
PHONE NUMBER	519-661-5800 ext 5745
E-mail Address	williamd@londonhydro.com

Sheet 2 - Disposition of Deferral Account Balances and Rate Rider Calculations As At April 30,2009

Allocation of Balances to Customer Classes

Method of Allocation	Account	Total allocation	Customer Classes: Res.	GS <50KW + Unmetered	GS >50KW	Cogeneration	Large User	Sentinel	Streetlighting
2009 Gross distribution revenue requirement percentages by class	1508 - OEB Cost Assessments	100.00%	60.26%	15.83%	19.48%	1.18%	2.08%	0.05%	1.13%
2009 Gross distribution revenue requirement percentages by class	1508 - Pension Contributions	100.00%	60.26%	15.83%	19.48%	1.18%	2.08%	0.05%	1.13%
Allocated 100% to residential customer class - OPC rebate cheques	1525 Miscellaneous Deferred Debits	100.00%	100.00%						
Allocated based on energy consumption	1580 RSVA - Wholesale Market Service Charges	100.00%	31.61%	12.38%	48.22%	1.09%	5.98%	0.02%	0.70%
2009 Gross distribution revenue requirement percentages by class	1518 Retail Cost Variance Account - Retail	100.00%	60.26%	15.83%	19.48%	1.18%	2.08%	0.05%	1.13%
2009 Gross distribution revenue requirement percentages by class	1548 Retail Cost Variance Account - STR	100.00%	60.26%	15.83%	19.48%	1.18%	2.08%	0.05%	1.13%
Allocated based on energy consumption	1550 Low Voltage Variance Account	100.00%	31.61%	12.38%	48.22%	1.09%	5.98%	0.02%	0.70%
Allocated based on energy consumption	1582 RSVA - One-time Wholesale Market Service	100.00%	31.61%	12.38%	48.22%	1.09%	5.98%	0.02%	0.70%

Allocation of Revised Account Balances to Rate Classes	Account	Projected Balance April 30,2009	Res.	GS <50KW + Unmetered	GS >50KW	Cogeneration	Large User	Sentinel	Streetlighting
OEB Cost Assessments	1508	$ 461,595	$ 278,179	$ 73,072	$ 89,896	$ 5,432	$ 9,578	$ 240	$ 5,197
Pension Contributions	1508	$ 1,710,520	1,030,841	270,780	333,126	20,131	35,495	890	19,258
Miscellaneous Deferred Debits	1525	$ 30,810	30,810	-	-	-	-	-	-
RSVA - Wholesale Market Service Charges	1580	$ (6,462,131)	(2,042,666)	(800,153)	(3,115,868)	(70,475)	(386,308)	(1,614)	(45,047)
Retail Cost Variance Account - Retail	1518	$ (151,635)	(91,382)	(24,004)	(29,531)	(1,785)	(3,147)	(79)	(1,707)
Retail Cost Variance Account - STR	1548	$ 105,853	63,792	16,757	20,615	1,246	2,197	55	1,192
Low Voltage Variance Account	1550	$ 6,525	2,063	808	3,146	71	390	2	45
RSVA - One-time Wholesale Market Service	1582	$ 358,860	113,435	44,435	173,033	3,914	21,453	90	2,502
Total Allocated for Recovery		**$ (3,939,604)**	**$ (614,929)**	**$ (418,306)**	**$ (2,525,584)**	**$ (41,466)**	**$ (320,342)**	**$ (416)**	**$ (18,561)**
Forecast 2009 Energy Usage by Customer Class - Kwh's		**3,431,680,138**	**1,084,746,791**	**424,916,988**	**1,654,665,168**	**37,425,572**	**205,146,878**	**856,841**	**23,921,899**
Forecast 2009 Demand By Customer Class - Kw's		**4,768,732**	**-**	**-**	**4,102,788**	**203,746**	**392,686**	**2,342**	**67,170**
Forecast 2009 Energy Usage by Customer Class - Kwh's	**multiplied by 24/12**	**6,863,360,275**	**2,169,493,582**	**849,833,975**	**3,309,330,337**	**74,851,145**	**410,293,756**	**1,713,682**	**47,843,798**
Forecast 2009 Demand By Customer Class - Kw's	**multiplied by 24/12**	**9,537,463**	**-**	**-**	**8,205,576**	**407,491**	**785,373**	**4,685**	**134,339**
Rate Rider Per Kwh for Customers Billed on Kwh's	**for 24 month recovery to Apr 30/11**		**$ (0.0003)**	**$ (0.0005)**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Rate Rider Per Kw for Demand Customers Billed on Kw's	**for 24 month recovery to Apr 30/11**		**$ -**	**$ -**	**$ (0.3078)**	**$ (0.1018)**	**$ (0.4079)**	**$ (0.0887)**	**$ (0.1382)**

PROPOSED RATES

Rate Class	Billing Parameter	Proposed Rate - Sept 1/09 to Apr 30/11	Proposed Rate - May 1/09 to Apr 30/11
Residential	Kwh's	$ (0.0003)	$ (0.0003)
GS<50 kW	Kwh's	$ (0.0006)	$ (0.0005)
GS>50 kW	Kw's	$ (0.3705)	$ (0.3078)
GS>50 kW (CoGen)	Kw's	$ (0.1225)	$ (0.1018)
Large User	Kw's	$ (0.4910)	$ (0.4079)
Unmetered Scattered Load	Kwh's	$ (0.0006)	$ (0.0005)
Sentinel Lighting	Kw's	$ (0.1069)	$ (0.0887)
Street Lighting	Kw's	$ (0.1664)	$ (0.1382)

NAME OF UTILITY	London Hydro Inc.
LICENCE NUMBER	ED-2002-0557
BOARD FILE NUMBER	EB-2008-0235
NAME OF CONTACT	D. Williamson
PHONE NUMBER	519-661-5800 ext 5745
E-mail Address	williamd@londonhydro.com

Sheet 2 - Disposition of Deferral Account Balances and Rate Rider Calculations As At September 1,2009

Allocation of Balances to Customer Classes

			Customer Classes						
Method of Allocation	**Account**	**Total allocation**	**Res.**	**GS <50KW + Unmetered**	**GS >50KW**	**Cogeneration**	**Large User**	**Sentinel**	**Streetlighting**
2009 Gross distribution revenue requirement percentages by class	**1508 - OEB Cost Assessments**	100.00%	60.26%	15.83%	19.48%	1.18%	2.08%	0.05%	1.13%
2009 Gross distribution revenue requirement percentages by class	**1508 - Pension Contributions**	100.00%	60.26%	15.83%	19.48%	1.18%	2.08%	0.05%	1.13%
Allocated 100% to residential customer class - OPC rebate cheques	**1525 Miscellaneous Deferred Debits**	100.00%	100.00%						
Allocated based on energy consumption	**1580 RSVA - Wholesale Market Service Charges**	100.00%	31.61%	12.38%	48.22%	1.09%	5.98%	0.02%	0.70%
2009 Gross distribution revenue requirement percentages by class	**1518 Retail Cost Variance Account - Retail**	100.00%	60.26%	15.83%	19.48%	1.18%	2.08%	0.05%	1.13%
2009 Gross distribution revenue requirement percentages by class	**1548 Retail Cost Variance Account - STR**	100.00%	60.26%	15.83%	19.48%	1.18%	2.08%	0.05%	1.13%
Allocated based on energy consumption	**1550 Low Voltage Variance Account**	100.00%	31.61%	12.38%	48.22%	1.09%	5.98%	0.02%	0.70%
Allocated based on energy consumption	**1582 RSVA - One-time Wholesale Market Service**	100.00%	31.61%	12.38%	48.22%	1.09%	5.98%	0.02%	0.70%

Allocation of Revised Account Balances to Rate Classes	**Account**	**Projected Balance August 31,2009**							
OEB Cost Assessments	1508	$ 462,918	$ 278,977	$ 73,281	$ 90,154	$ 5,448	$ 9,606	$ 241	$ 5,212
Pension Contributions	1508	$ 1,715,533	1,033,862	271,574	334,102	20,190	35,599	893	19,314
Miscellaneous Deferred Debits	1525	$ 30,810	30,810	-	-	-	-	-	-
RSVA - Wholesale Market Service Charges	1580	$ (6,482,495)	(2,049,103)	(802,675)	(3,125,687)	(70,697)	(387,526)	(1,619)	(45,189)
Retail Cost Variance Account - Retail	1518	$ (152,101)	(91,664)	(24,078)	(29,622)	(1,790)	(3,156)	(79)	(1,712)
Retail Cost Variance Account - STR	1548	$ 106,153	63,973	16,804	20,673	1,249	2,203	55	1,195
Low Voltage Variance Account	1550	$ 6,545	2,069	810	3,156	71	391	2	46
RSVA - One-time Wholesale Market Service	1582	$ 359,870	113,754	44,560	173,520	3,925	21,513	90	2,509
Total Allocated for Recovery		**$ (3,952,768)**	**$ (617,322)**	**$ (419,723)**	**$ (2,533,705)**	**$ (41,604)**	**$ (321,370)**	**$ (417)**	**$ (18,626)**
Forecast 2009 Energy Usage by Customer Class - Kwh's		**3,431,680,138**	**1,084,746,791**	**424,916,988**	**1,654,665,168**	**37,425,572**	**205,146,878**	**856,841**	**23,921,899**
Forecast 2009 Demand By Customer Class - Kw's		**4,768,732**	**-**	**-**	**4,102,788**	**203,746**	**392,686**	**2,342**	**67,170**
Forecast 2009 Energy Usage by Customer Class - Kwh's	**multiplied by 20/12**	**5,719,466,896**	**1,807,911,319**	**708,194,979**	**2,757,775,281**	**62,375,954**	**341,911,464**	**1,428,068**	**39,869,832**
Forecast 2009 Demand By Customer Class - Kw's	**multiplied by 20/12**	**7,947,886**	**-**	**-**	**6,837,980**	**339,576**	**654,477**	**3,904**	**111,949**
Rate Rider Per Kwh for Customers Billed on Kwh's	**for 20 month recovery to Apr 30/11**		**$ (0.0003)**	**$ (0.0006)**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Rate Rider Per Kw for Demand Customers Billed on Kw's	**for 20 month recovery to Apr 30/11**		**$ -**	**$ -**	**$ (0.3705)**	**$ (0.1225)**	**$ (0.4910)**	**$ (0.1069)**	**$ (0.1664)**

PROPOSED RATES

Rate Class	Billing Parameter	Proposed Rate - Sept 1/09 to Apr 30/11
Residential	Kwh's	$ (0.0003)
GS<50 kW	Kwh's	$ (0.0006)
GS>50 kW	Kw's	$ (0.3705)
GS>50 kW (CoGen)	Kw's	$ (0.1225)
Large User	Kw's	$ (0.4910)
Unmetered Scattered Load	Kwh's	$ (0.0006)
Sentinel Lighting	Kw's	$ (0.1069)
Street Lighting	Kw's	$ (0.1664)

NAME OF UTILITY London Hydro Inc.
LICENCE NUMBER ED-2002-0557
BOARD FILE NUMBER EB-2008-0235
NAME OF CONTACT D. Williamson
PHONE NUMBER 519-661-5800 ext 5745
E-mail Address williamd@londonhydro.com

Sheet 4 - Deferral and Variance Accounts Submitted for Recovery

Calculation of Deferral Account Balances

Accounts for which a disposition request is being made in this application.

Accounts for Which A Disposition Request is Included This Application		1508 Other Regulatory Assets - Sub-account OEB Cost Assessments	1508 Other Regulatory Assets - Sub-account Pension Contributions	1525 Miscellaneous Deferred Debits	1580 RSVA - Wholesale Market Service Charges	Total
Utility Deferral Accounts						
Net Accruals / Variances		$ 392,670	$ 1,491,745	$ 30,810	$ (6,109,269)	$ (4,194,044)
Recoveries / Adjustments						0
Carrying Charges		50,615	149,218		(67,203)	132,630
Ending Balance - December 31,2007		443,285	1,640,962	30,810	(6,176,472)	(4,061,415)
January 1 to March 31,2008						
	Net Accruals / Variances					
	Recoveries / Adjustments					-
	Carrying Charges - 5.14%	5,018	19,064	-	(78,504)	(54,422)
		448,304	1,660,026	30,810	(6,254,976)	(4,115,836)
April 1 to June 30,2008						
	Net Accruals / Variances					
	Recoveries / Adjustments					-
	Carrying Charges - 4.08%	3,983	15,133	-	(62,315)	(43,199)
		452,287	1,675,159	30,810	(6,317,291)	(4,159,035)
July 1, 2008 to April 30,2009						
	Net Accruals / Variances					
	Recoveries / Adjustments					-
Carrying Charges - 3.35%	to Dec 31/08	6,613	25,123	-	(102,330)	(70,594)
Carrying Charges - 2.45%	Jan 1/09 to Mar 31/09	2,372	9,012		(37,419)	(26,035)
Carrying Charges - 1.0%	Apr 30/09	323	1,226		(5,091)	(3,542)
Forecast Balance at April 30,2009		**$ 461,595**	**$ 1,710,520**	**$ 30,810**	**$ (6,462,131)**	**$ (4,259,206)**
May 1,2009 to August 31,2009						
	Net Accruals / Variances					
	Recoveries / Adjustments					-
	Carrying Charges - 1.%	1,323	5,013	-	(20,364)	(14,028)
Forecast Balance at August 31,2009		**$ 462,918**	**$ 1,715,533**	**$ 30,810**	**$ (6,482,495)**	**$ (4,273,234)**

Notes:

1508 Other Regulatory Assets - Sub-account OEB Cost Assessments
Variances are for the period Jan 1/04 to Apr 30/06
Simple interest allowed for period Jan 1/04 to Apr 30/06 is deemed debt rate for period of 7%
Actual interest claimed is for period Aug 1/04 to Apr 30/06 at 5.75%
Simple interest allowed and claimed for period after May 1/06 is OEB quarterly posted rate for regulatory accounts.

1508 Other Regulatory Assets - Sub-account Pension Contributions
Variances are for the period Jan 1/05 to Apr 30/06
Simple interest allowed and claimed for period Jan 1/05 to Apr 30/06 is 3.88%
Simple interest allowed and claimed for period after May 1/06 is OEB quarterly posted rate for regulatory accounts.

1525 Miscellaneous Deferred Debits
Variances are for period June 06 to Dec 06 for the cost of issuing refund cheques to electricity consumers with respect to the Ontario Price Credit [OPC] rebate cheque program as required by government legislation
Interest has not be applied to this account due to uncertainty of applicability.

NAME OF UTILITY	London Hydro Inc.
LICENCE NUMBER	ED-2002-0557
BOARD FILE NUMBER	EB-2008-0235
NAME OF CONTACT	D. Williamson
PHONE NUMBER	519-661-5800 ext 5745
E-mail Address	williamd@londonhydro.com

Sheet 9 - Table 1 - Deferral and Variance Accounts NOT Submitted for Recovery With This Application

Calculation of Deferral Account Balances

Accounts for Which No Disposition is Requested in This Application	Net Accruals / Variances	Carrying Charges	Ending Balances at Dec. 31,2007	Recoveries / Adjustments to April 30,2009	Carrying Charges Jan 1 to Mar 31/08 - 5.14%	Carrying Charges Apr 1 to June 30/08 - 4.08%	Carrying Charges July 1/08 to Dec 31/08 - 3.35%	Carrying Charges Jan 1/09 to Mar 31/09 - 2.45%	Carrying Charges Apr /09 - 1.0%	Projected Balances as at April 30,2009
Commodity accounts are classified as follows:										
1588 RSVA - Power	$ (2,194,146)	$ (334,681)	$ (2,528,827)	$ -	$ (28,195)	$ (22,380)	$ (36,752)	$ (13,439)	$ (1,828)	$ (2,631,422)
1588 RSVA Power - Sub-account Global Adjustments	886,228	(59,957)	826,271	-	11,388	9,040	14,844	5,428	739	867,710
										-
Non-commodity accounts are classified in two categories as follows:										-
Wholesale and Retail Market Variance Accounts										-
1518 Retail Cost Variance Account - Retail	(140,003)	(5,086)	(145,089)		(1,799)	(1,428)	(2,345)	(858)	(117)	(151,635)
1548 Retail Cost Variance Account - STR	89,966	11,680	101,646		1,156	918	1,507	551	75	105,853
1550 Low Voltage Variance Account	6,027	216	6,243		77	61	101	37	5	6,525
1582 RSVA - One-time Wholesale Market Service	302,951	41,743	344,694		3,893	3,090	5,074	1,856	252	358,860
1584 RSVA - Retail Transmission Network Charges	1,907,695	168,498	2,076,193		24,514	19,458	31,954	11,685	1,590	2,165,393
1586 RSVA - Retail Transmission Connection Charges	(28,115)	(33,672)	(61,787)		(361)	(287)	(471)	(172)	(23)	(63,101)
Utility Deferral Accounts - Smart meters and Pils						-	-	-	-	-
1555 Smart Meter Capital Variance Account	(432,090)	(5,516)	(437,606)		(5,552)	(4,407)	(7,238)	(2,647)	(360)	(457,810)
1556 Smart Meter OM&A Variance Account	37,649	1,158	38,807		484	384	631	231	31	40,568
1562 Deferred Payments in Lieu of Taxes	125,017	542,188	667,205	-	1,606	1,275	2,094	766	104	673,050
1590 Recovery of Transitional Regulatory Asset Costs	2,111,380	1,157,306	3,268,686	(2,599,741)	13,917	864				683,727
1592 PIL's and Tax Variances for 2006 and Subsequent Years	(130,133)	(6,909)	(137,042)	-	(1,672)	(1,327)	(2,180)	(797)	(108)	(143,127)
	$ 2,542,427	$ 1,476,968	$ 4,019,395	$ (2,599,741)	$ 19,456	$ 5,261	$ 7,220	$ 2,640	$ 359	$ 1,454,591

Comments:

Accounts 1518, 1548, 1550, 1582, 1584, 1586, 1588 - Commodity and Non-Commodity Wholesale and Retail Variances

On February 19, 2008 the Board announced an initiative for the review and disposition of certain commodity and non-commodity variance accounts, and in subsequent Decisions issued by the Board, further direction and clarification has been provided as to the specific accounts that will be reviewed or disposed of through this new initiative.

In accordance with the Board's stated initiative and subsequent direction provided by the Board in recent Board Decisions, accounts 1518, 1548, 1550, 1582, 1584, ,1586, and 1588 have not been submitted for disposition with this application.

Account 1580 - RSVA Wholesale Market Service Charge Variances

Due to the fact that London Hydro has a significant credit balance in account 1580 that should be returned to the ratepayers as early as possible, and due to the fact that the OEB has yet to establish a date for disposition of these balances, London Hydro has requested disposition of this account in this application.

Accounts 1562 and 1592 - PIL's Variances

March 3, 2008 the Board announced that it would initiate a combined proceeding involving seven distributors that have filed cost of service applications to-date, to determine the accuracy and consistency of approach by distributors in recording balances to this account. The Board has not approved the request for disposition of account 1562 for these 7 utilities pending the outcome of this proceed.

It is anticipated that the Board will not approved any dispositions of accounts 1562 or 1592 until such time as these combined proceedings have been completed. For these reasons, a request for disposition of balances in 1562 and 1592 has not been made in this application.

Accounts 1555 and 1556 - Smart Spending Variances

The balances in deferral accounts 1555 and 1556 will be incorporated into London Hydro's calculation of a revised Smart Meter rate adder when a submission is made of the forecast smart meter spending and implementation plans for 2009 - 2011.

Account 1590

In accordance with directions provided by the Board in Decisions issued on the 2008 applications submitted, this account is not being submitted for recovery at this time as it includes a a principal balance that has not been audited by the company's auditors. London Hydro will seek recovery of this balance through a future proceeding.

NAME OF UTILITY	London Hydro Inc.
LICENCE NUMBER	ED-2002-0557
BOARD FILE NUMBER	EB-2008-0235
NAME OF CONTACT	D. Williamson
PHONE NUMBER	519-661-5800 ext 5745
E-mail Address	williamd@londonhydro.com

Sheet 1 - Deferral and Variance Account Allocation Factors

Allocation of Balances to Customer Classes

Account Description	Account Number	Projected Balances as at April 30,2009	Projected Balances as at August 31,2009
Other Regulatory Assets - Sub-account OEB Cost Assessments	1508	$ 461,595	$ 462,918
Other Regulatory Assets - Sub-account Pension Contributions	1508	1,710,520	1,715,533
Miscellaneous Deferred Debits - Payments to Customers	1525	30,810	30,810
RSVA - Wholesale Market Service Charges	1580	(6,462,131)	(6,482,495)
Retail Cost Variance Account - Retail	1518	(151,635)	(152,101)
Retail Cost Variance Account - STR	1548	105,853	106,153
Low Voltage Variance Account	1550	6,525	6,545
RSVA - One-time Wholesale Market Service	1582	358,860	359,870
RSVA - Power (including Global Adjustments)	1588	(1,763,712)	(1,768,072)
Recovery of Transitional Regulatory Asset Costs	1590	683,727	683,727
Total claim		**$ (5,019,589)**	**$ (5,037,113)**

Allocation Data By Customer Class	2009 kWs Billed	2009 kWhs Billed	2009 kWhs Allocator %	2009 Gross Dx Revenue	2009 Gross Dx Revenue Allocator %
RESIDENTIAL CLASS		1,084,746,791	31.61%	$ 36,969,041	60.26%
GENERAL SERVICE <50 KW plus Unmetered Loads		424,916,988	12.38%	9,710,990	15.83%
GENERAL SERVICE >50 KW to 4,999 KW	4,102,788	1,654,665,168	48.22%	11,946,886	19.48%
GENERAL SERVICE >50 KW to 4,999 KW (CoGeneration)	203,746	37,425,572	1.09%	721,947	1.18%
LARGE USER	392,686	205,146,878	5.98%	1,272,939	2.08%
SENTINEL LIGHTS	2,342	856,841	0.02%	31,925	0.05%
STREET LIGHTING	67,170	23,921,899	0.70%	690,641	1.13%
Totals	4,768,732	3,431,680,138	100.00%	$ 61,344,371	100.00%

NAME OF UTILITY	London Hydro Inc.
LICENCE NUMBER	ED-2002-0557
BOARD FILE NUMBER	EB-2008-0235
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PHONE NUMBER	519-661-5800 ext 5745
E-mail Address	williamd@londonhydro.com

Sheet 2 - Disposition of Deferral Account Balances and Rate Rider Calculations As At April 30,2009

Allocation of Balances to Customer Classes

Method of Allocation	Account	Total allocation	Customer Classes: Res.	GS <50KW + Unmetered	GS >50KW	Cogeneration	Large User	Sentinel	Streetlighting
2009 Gross distribution revenue requirement percentages by class	1508 - OEB Cost Assessments	100.00%	60.26%	15.83%	19.48%	1.18%	2.08%	0.05%	1.13%
2009 Gross distribution revenue requirement percentages by class	1508 - Pension Contributions	100.00%	60.26%	15.83%	19.48%	1.18%	2.08%	0.05%	1.13%
Allocated 100% to residential customer class - OPC rebate cheques	1525 Miscellaneous Deferred Debits	100.00%	100.00%						
Allocated based on energy consumption	1580 RSVA - Wholesale Market Service Charges	100.00%	31.61%	12.38%	48.22%	1.09%	5.98%	0.02%	0.70%
2009 Gross distribution revenue requirement percentages by class	1518 Retail Cost Variance Account - Retail	100.00%	60.26%	15.83%	19.48%	1.18%	2.08%	0.05%	1.13%
2009 Gross distribution revenue requirement percentages by class	1548 Retail Cost Variance Account - STR	100.00%	60.26%	15.83%	19.48%	1.18%	2.08%	0.05%	1.13%
Allocated based on energy consumption	1550 Low Voltage Variance Account	100.00%	31.61%	12.38%	48.22%	1.09%	5.98%	0.02%	0.70%
Allocated based on energy consumption	1582 RSVA - One-time Wholesale Market Service	100.00%	31.61%	12.38%	48.22%	1.09%	5.98%	0.02%	0.70%
Allocated based on energy consumption	1588 RSVA - Power (including Global Adjustments)	100.00%	31.61%	12.38%	48.22%	1.09%	5.98%	0.02%	0.70%
Allocated using 2004 Transitional cost rate hearing Decision amounts	1590 Transitional cost recoveries	100.00%	55.89%	12.85%	28.19%	0.31%	2.48%	0.02%	0.25%

Allocation of Revised Account Balances to Rate Classes	Account	Projected Balance April 30,2009	Res.	GS <50KW + Unmetered	GS >50KW	Cogeneration	Large User	Sentinel	Streetlighting
OEB Cost Assessments	1508	$ 461,595	$ 278,179	$ 73,072	$ 89,896	$ 5,432	$ 9,578	$ 240	$ 5,197
Pension Contributions	1508	$ 1,710,520	1,030,841	270,780	333,126	20,131	35,495	890	19,258
Miscellaneous Deferred Debits	1525	$ 30,810	30,810	-	-	-	-	-	-
RSVA - Wholesale Market Service Charges	1580	$ (6,462,131)	(2,042,666)	(800,153)	(3,115,868)	(70,475)	(386,308)	(1,614)	(45,047)
Retail Cost Variance Account - Retail	1518	$ (151,635)	(91,382)	(24,004)	(29,531)	(1,785)	(3,147)	(79)	(1,707)
Retail Cost Variance Account - STR	1548	$ 105,853	63,792	16,757	20,615	1,246	2,197	55	1,192
Low Voltage Variance Account	1550	$ 6,525	2,063	808	3,146	71	390	2	45
RSVA - One-time Wholesale Market Service	1582	$ 358,860	113,435	44,435	173,033	3,914	21,453	90	2,502
RSVA - Power (including Global Adjustments)	1588	$ (1,763,712)	(557,506)	(218,386)	(850,415)	(19,235)	(105,435)	(440)	(12,295)
Recovery of Transitional Regulatory Asset Costs	1590	$ 683,727	382,125	87,853	192,761	2,112	16,983	155	1,738
Total Allocated for Recovery		**$ (5,019,589)**	**$ (790,310)**	**$ (548,839)**	**$ (3,183,237)**	**$ (58,589)**	**$ (408,795)**	**$ (701)**	**$ (29,118)**
Forecast 2009 Energy Usage by Customer Class - Kwh's		**3,431,680,138**	**1,084,746,791**	**424,916,988**	**1,654,665,168**	**37,425,572**	**205,146,878**	**856,841**	**23,921,899**
Forecast 2009 Demand By Customer Class - Kw's		**4,768,732**	**-**	**-**	**4,102,788**	**203,746**	**392,686**	**2,342**	**67,170**
Forecast 2009 Energy Usage by Customer Class - Kwh's	**multiplied by 24/12**	**6,863,360,275**	**2,169,493,582**	**849,833,975**	**3,309,330,337**	**74,851,145**	**410,293,756**	**1,713,682**	**47,843,798**
Forecast 2009 Demand By Customer Class - Kw's	**multiplied by 24/12**	**9,537,463**	**-**	**-**	**8,205,576**	**407,491**	**785,373**	**4,685**	**134,339**
Rate Rider Per Kwh for Customers Billed on Kwh's	**for 24 month recovery to Apr 30/11**		**$ (0.0004)**	**$ (0.0006)**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Rate Rider Per Kw for Demand Customers Billed on Kw's	**for 24 month recovery to Apr 30/11**		**$ -**	**$ -**	**$ (0.3879)**	**$ (0.1438)**	**$ (0.5205)**	**$ (0.1495)**	**$ (0.2167)**

PROPOSED RATES

Rate Class	Billing Parameter	Proposed Rate - Sept 1/09 to Apr 30/11	Proposed Rate - May 1/09 to Apr 30/11
Residential	Kwh's	$ (0.0007)	$ (0.0004)
GS<50 kW	Kwh's	$ (0.0008)	$ (0.0006)
GS>50 kW	Kw's	$ (0.4152)	$ (0.3879)
GS>50 kW (CoGen)	Kw's	$ (0.1324)	$ (0.1438)
Large User	Kw's	$ (0.5322)	$ (0.5205)
Unmetered Scattered Load	Kwh's	$ (0.0008)	$ (0.0006)
Sentinel Lighting	Kw's	$ (0.1701)	$ (0.1495)
Street Lighting	Kw's	$ (0.1910)	$ (0.2167)

NAME OF UTILITY	London Hydro Inc.
LICENCE NUMBER	ED-2002-0557
BOARD FILE NUMBER	EB-2008-0235
NAME OF CONTACT	D. Williamson
PHONE NUMBER	519-661-5800 ext 5745
E-mail Address	williamd@londonhydro.com

Sheet 2 - Disposition of Deferral Account Balances and Rate Rider Calculations As At September 1,2009

Allocation of Balances to Customer Classes

Method of Allocation	Account	Total allocation	Customer Classes						
			Res.	GS <50KW + Unmetered	GS >50KW	Cogeneration	Large User	Sentinel	Streetlighting
2009 Gross distribution revenue requirement percentages by class	1508 - OEB Cost Assessments	100.00%	60.26%	15.83%	19.48%	1.18%	2.08%	0.05%	1.13%
2009 Gross distribution revenue requirement percentages by class	1508 - Pension Contributions	100.00%	60.26%	15.83%	19.48%	1.18%	2.08%	0.05%	1.13%
Allocated 100% to residential customer class - OPC rebate cheques	1525 Miscellaneous Deferred Debits	100.00%	100.00%						
Allocated based on energy consumption	1580 RSVA - Wholesale Market Service Charges	100.00%	31.61%	12.38%	48.22%	1.09%	5.98%	0.02%	0.70%
2009 Gross distribution revenue requirement percentages by class	1518 Retail Cost Variance Account - Retail	100.00%	60.26%	15.83%	19.48%	1.18%	2.08%	0.05%	1.13%
2009 Gross distribution revenue requirement percentages by class	1548 Retail Cost Variance Account - STR	100.00%	60.26%	15.83%	19.48%	1.18%	2.08%	0.05%	1.13%
Allocated based on energy consumption	1550 Low Voltage Variance Account	100.00%	31.61%	12.38%	48.22%	1.09%	5.98%	0.02%	0.70%
Allocated based on energy consumption	1582 RSVA - One-time Wholesale Market Service	100.00%	31.61%	12.38%	48.22%	1.09%	5.98%	0.02%	0.70%
Allocated based on energy consumption	1588 RSVA - Power (including Global Adjustments)	100.00%	31.61%	12.38%	48.22%	1.09%	5.98%	0.02%	0.70%
Allocated using 2004 Transitional cost rate hearing Decision amounts	1590 Transitional cost recoveries	100.00%	55.89%	12.85%	28.19%	0.31%	2.48%	0.02%	0.25%

Allocation of Revised Account Balances to Rate Classes	Account	Projected Balance August 31,2009							
OEB Cost Assessments	1508	$ 462,918	$ 278,977	$ 73,281	$ 90,154	$ 5,448	$ 9,606	$ 241	$ 5,212
Pension Contributions	1508	$ 1,715,533	1,033,862	271,574	334,102	20,190	35,599	893	19,314
Miscellaneous Deferred Debits	1525	$ 30,810	30,810	-	-	-	-	-	-
RSVA - Wholesale Market Service Charges	1580	$ (6,482,495)	(2,049,103)	(802,675)	(3,125,687)	(70,697)	(387,526)	(1,619)	(45,189)
Retail Cost Variance Account - Retail	1518	$ (152,101)	(91,664)	(24,078)	(29,622)	(1,790)	(3,156)	(79)	(1,712)
Retail Cost Variance Account - STR	1548	$ 106,153	63,973	16,804	20,673	1,249	2,203	55	1,195
Low Voltage Variance Account	1550	$ 6,545	2,069	810	3,156	71	391	2	46
RSVA - One-time Wholesale Market Service	1582	$ 359,870	113,754	44,560	173,520	3,925	21,513	90	2,509
RSVA - Power (including Global Adjustments)	1588	$ (1,768,072)	(988,148)	(227,182)	(498,468)	(5,462)	(43,916)	(402)	(4,493)
Recovery of Transitional Regulatory Asset Costs	1590	$ 683,727	382,125	87,853	192,761	2,112	16,983	155	1,738
Total Allocated for Recovery		**$ (5,037,113)**	**$ (1,223,346)**	**$ (559,052)**	**$ (2,839,411)**	**$ (44,954)**	**$ (348,304)**	**$ (664)**	**$ (21,382)**
Forecast 2009 Energy Usage by Customer Class - Kwh's		**3,431,680,138**	**1,084,746,791**	**424,916,988**	**1,654,665,168**	**37,425,572**	**205,146,878**	**856,841**	**23,921,899**
Forecast 2009 Demand By Customer Class - Kw's		**4,768,732**	**-**	**-**	**4,102,788**	**203,746**	**392,686**	**2,342**	**67,170**
Forecast 2009 Energy Usage by Customer Class - Kwh's	**multiplied by 20/12**	**5,719,466,896**	**1,807,911,319**	**708,194,979**	**2,757,775,281**	**62,375,954**	**341,911,464**	**1,428,068**	**39,869,832**
Forecast 2009 Demand By Customer Class - Kw's	**multiplied by 20/12**	**7,947,886**	**-**	**-**	**6,837,980**	**339,576**	**654,477**	**3,904**	**111,949**
Rate Rider Per Kwh for Customers Billed on Kwh's	**for 20 month recovery to Apr 30/11**		**$ (0.0007)**	**$ (0.0008)**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Rate Rider Per Kw for Demand Customers Billed on Kw's	**for 20 month recovery to Apr 30/11**		**$ -**	**$ -**	**$ (0.4152)**	**$ (0.1324)**	**$ (0.5322)**	**$ (0.1701)**	**$ (0.1910)**

PROPOSED RATES

Rate Class	Billing Parameter	Proposed Rate - Sept 1/09 to Apr 30/11
Residential	Kwh's	$ (0.0007)
GS<50 kW	Kwh's	$ (0.0008)
GS>50 kW	Kw's	$ (0.4152)
GS>50 kW (CoGen)	Kw's	$ (0.1324)
Large User	Kw's	$ (0.5322)
Unmetered Scattered Load	Kwh's	$ (0.0008)
Sentinel Lighting	Kw's	$ (0.1701)
Street Lighting	Kw's	$ (0.1910)

NAME OF UTILITY London Hydro Inc.
LICENCE NUMBER ED-2002-0557
BOARD FILE NUMBER EB-2008-0235
NAME OF CONTACT D. Williamson
PHONE NUMBER 519-661-5800 ext 5745
E-mail Address williamd@londonhydro.com

Sheet 4 - Deferral and Variance Accounts Submitted for Recovery

Calculation of Deferral Account Balances

Accounts for which a disposition request is being made in this application.

Accounts for Which A Disposition Request is Included This Application		1508 Other Regulatory Assets - Sub-account OEB Cost Assessments	1508 Other Regulatory Assets - Sub-account Pension Contributions	1525 Miscellaneous Deferred Debits	1580 RSVA - Wholesale Market Service Charges	Total
Utility Deferral Accounts						
Net Accruals / Variances		$ 392,670	$ 1,491,745	$ 30,810	$ (6,109,269)	$ (4,194,044)
Recoveries / Adjustments						0
Carrying Charges		50,615	149,218		(67,203)	132,630
Ending Balance - December 31,2007		443,285	1,640,962	30,810	(6,176,472)	(4,061,415)
January 1 to March 31,2008						
	Net Accruals / Variances					
	Recoveries / Adjustments					-
	Carrying Charges - 5.14%	5,018	19,064	-	(78,504)	(54,422)
		448,304	1,660,026	30,810	(6,254,976)	(4,115,836)
April 1 to June 30,2008						
	Net Accruals / Variances					
	Recoveries / Adjustments					-
	Carrying Charges - 4.08%	3,983	15,133	-	(62,315)	(43,199)
		452,287	1,675,159	30,810	(6,317,291)	(4,159,035)
July 1, 2008 to April 30,2009						
	Net Accruals / Variances					
	Recoveries / Adjustments					-
Carrying Charges - 3.35%	to Dec 31/08	6,613	25,123	-	(102,330)	(70,594)
Carrying Charges - 2.45%	Jan 1/09 to Mar 31/09	2,372	9,012		(37,419)	(26,035)
Carrying Charges - 1.0%	Apr 30/09	323	1,226		(5,091)	(3,542)
Forecast Balance at April 30,2009		**$ 461,595**	**$ 1,710,520**	**$ 30,810**	**$ (6,462,131)**	**$ (4,259,206)**
May 1,2009 to August 31,2009						
	Net Accruals / Variances					
	Recoveries / Adjustments					-
	Carrying Charges - 1.%	1,323	5,013	-	(20,364)	(14,028)
Forecast Balance at August 31,2009		**$ 462,918**	**$ 1,715,533**	**$ 30,810**	**$ (6,482,495)**	**$ (4,273,234)**

Notes:

1508 Other Regulatory Assets - Sub-account OEB Cost Assessments
Variances are for the period Jan 1/04 to Apr 30/06
Simple interest allowed for period Jan 1/04 to Apr 30/06 is deemed debt rate for period of 7%
Actual interest claimed is for period Aug 1/04 to Apr 30/06 at 5.75%
Simple interest allowed and claimed for period after May 1/06 is OEB quarterly posted rate for regulatory accounts.

1508 Other Regulatory Assets - Sub-account Pension Contributions
Variances are for the period Jan 1/05 to Apr 30/06
Simple interest allowed and claimed for period Jan 1/05 to Apr 30/06 is 3.88%
Simple interest allowed and claimed for period after May 1/06 is OEB quarterly posted rate for regulatory accounts.

1525 Miscellaneous Deferred Debits
Variances are for period June 06 to Dec 06 for the cost of issuing refund cheques to electricity consumers with respect to the Ontario Price Credit [OPC] rebate cheque program as required by government legislation
Interest has not be applied to this account due to uncertainty of applicability.

NAME OF UTILITY	London Hydro Inc.
LICENCE NUMBER	ED-2002-0557
BOARD FILE NUMBER	EB-2008-0235
NAME OF CONTACT	D. Williamson
PHONE NUMBER	519-661-5800 ext 5745
E-mail Address	williamd@londonhydro.com

Sheet 9 - Table 1 - Deferral and Variance Accounts NOT Submitted for Recovery With This Application

Calculation of Deferral Account Balances

Accounts for Which No Disposition is Requested in This Application	Net Accruals / Variances	Carrying Charges	Ending Balances at Dec. 31,2007	Recoveries / Adjustments to April 30,2009	Carrying Charges Jan 1 to Mar 31/08 - 5.14%	Carrying Charges Apr 1 to June 30/08 - 4.08%	Carrying Charges July 1/08 to Dec 31/08 - 3.35%	Carrying Charges Jan 1/09 to Mar 31/09 - 2.45%	Carrying Charges Apr /09 - 1.0%	Projected Balances as at April 30,2009
Commodity accounts are classified as follows:										
1588 RSVA - Power	$ (2,194,146)	$ (334,681)	$ (2,528,827)	$ -	$ (28,195)	$ (22,380)	$ (36,752)	$ (13,439)	$ (1,828)	$ (2,631,422)
1588 RSVA Power - Sub-account Global Adjustments	886,228	(59,957)	826,271	-	11,388	9,040	14,844	5,428	739	867,710
										-
Non-commodity accounts are classified in two categories as follows:										-
Wholesale and Retail Market Variance Accounts										-
1518 Retail Cost Variance Account - Retail	(140,003)	(5,086)	(145,089)		(1,799)	(1,428)	(2,345)	(858)	(117)	(151,635)
1548 Retail Cost Variance Account - STR	89,966	11,680	101,646		1,156	918	1,507	551	75	105,853
1550 Low Voltage Variance Account	6,027	216	6,243		77	61	101	37	5	6,525
1582 RSVA - One-time Wholesale Market Service	302,951	41,743	344,694		3,893	3,090	5,074	1,856	252	358,860
1584 RSVA - Retail Transmission Network Charges	1,907,695	168,498	2,076,193		24,514	19,458	31,954	11,685	1,590	2,165,393
1586 RSVA - Retail Transmission Connection Charges	(28,115)	(33,672)	(61,787)		(361)	(287)	(471)	(172)	(23)	(63,101)
Utility Deferral Accounts - Smart meters and Pils						-	-	-	-	-
1555 Smart Meter Capital Variance Account	(432,090)	(5,516)	(437,606)		(5,552)	(4,407)	(7,238)	(2,647)	(360)	(457,810)
1556 Smart Meter OM&A Variance Account	37,649	1,158	38,807		484	384	631	231	31	40,568
1562 Deferred Payments in Lieu of Taxes	125,017	542,188	667,205	-	1,606	1,275	2,094	766	104	673,050
1590 Recovery of Transitional Regulatory Asset Costs	2,111,380	1,157,306	3,268,686	(2,599,741)	13,917	864				683,727
1592 PIL's and Tax Variances for 2006 and Subsequent Years	(130,133)	(6,909)	(137,042)	-	(1,672)	(1,327)	(2,180)	(797)	(108)	(143,127)
	$ 2,542,427	$ 1,476,968	$ 4,019,395	$ (2,599,741)	$ 19,456	$ 5,261	$ 7,220	$ 2,640	$ 359	$ 1,454,591

Comments:

Accounts 1518, 1548, 1550, 1582, 1584, 1586, 1588 - Commodity and Non-Commodity Wholesale and Retail Variances

On February 19, 2008 the Board announced an initiative for the review and disposition of certain commodity and non-commodity variance accounts, and in subsequent Decisions issued by the Board, further direction and clarification has been provided as to the specific accounts that will be reviewed or disposed of through this new initiative.

In accordance with the Board's stated initiative and subsequent direction provided by the Board in recent Board Decisions, accounts 1518, 1548, 1550, 1582, 1584, ,1586, and 1588 have not been submitted for disposition with this application.

Account 1580 - RSVA Wholesale Market Service Charge Variances

Due to the fact that London Hydro has a significant credit balance in account 1580 that should be returned to the ratepayers as early as possible, and due to the fact that the OEB has yet to establish a date for disposition of these balances, London Hydro has requested disposition of this account in this application.

Accounts 1562 and 1592 - PIL's Variances

March 3, 2008 the Board announced that it would initiate a combined proceeding involving seven distributors that have filed cost of service applications to-date, to determine the accuracy and consistency of approach by distributors in recording balances to this account. The Board has not approved the request for disposition of account 1562 for these 7 utilities pending the outcome of this proceed.

It is anticipated that the Board will not approved any dispositions of accounts 1562 or 1592 until such time as these combined proceedings have been completed. For these reasons, a request for disposition of balances in 1562 and 1592 has not been made in this application.

Accounts 1555 and 1556 - Smart Spending Variances

The balances in deferral accounts 1555 and 1556 will be incorporated into London Hydro's calculation of a revised Smart Meter rate adder when a submission is made of the forecast smart meter spending and implementation plans for 2009 - 2011.

Account 1590

In accordance with directions provided by the Board in Decisions issued on the 2008 applications submitted, this account is not being submitted for recovery at this time as it includes a a principal balance that has not been audited by the company's auditors. London Hydro will seek recovery of this balance through a future proceeding.

Exhibit 4 - Operating Costs - Table 35

Total Loss Factor Calculations	2003	2004	2005	2006	2007	TOTAL
1 "Wholesale" kWh IESO plus Embedded Generation	3,339,281,164	3,384,229,604	3,559,556,957	3,463,554,919	3,513,738,064	17,260,360,709
2 "Wholesale" kWh for Large Use Customers	213,845,828	222,204,044	232,663,210	229,529,109	207,198,347	1,105,440,540
3 Net "Wholesale" kWh (1 - 2)	3,125,435,336	3,162,025,560	3,326,893,747	3,234,025,810	3,306,539,717	16,154,920,169
4 "Retail" kWh (Distributor)	3,243,113,573	3,254,806,464	3,426,780,716	3,365,222,318	3,387,692,155	16,677,615,225
5 "Retail" kWh for Large Use Customers	211,728,543	220,004,004	230,359,614	227,256,544	205,146,878	1,094,495,584
6 Net "Retail" kWh (4 - 5)	3,031,385,030	3,034,802,460	3,196,421,102	3,137,965,774	3,182,545,277	15,583,119,642
7 Loss Factor (3 / 6)	3.10%	4.19%	4.08%	3.06%	3.90%	3.67%
Distribution System Loss Adjustment Factor (5 year avg.)						**3.67%**
Supply Facility Loss Factor	0.34%	0.43%	0.48%	0.42%	0.41%	0.42%
Supply Facility Loss Factor Adjustment (3 year avg) (a 3 year average has been chosen due to the abnormal 2004 results)						**0.44%**
Total Loss Factor						**4.11%**

Note:
London Hydro has used the default large use Distribution Loss Factor (DLF) of 1% as the loss factor for Large Use Customers. London Hydro's Large Use customers are primary metered and the default loss for primary metered customers with demands >5000 kW is 1.0000 excluding supply facility losses.

Exhibit 4 - Operating Costs - Table 36

Supply Facility Loss Factor	2003	2004	2005	2006	2007	TOTAL
"Wholesale" kWh IESO Adjusted for Supply Facility Losses	3,312,990,976	3,360,017,241	3,540,138,470	3,451,376,082	3,502,498,962	17,167,021,731
"Wholesale" kWh IESO not adjusted for Supply Facility Losses	3,301,836,751	3,345,645,231	3,523,196,683	3,436,871,884	3,488,082,788	17,095,633,338
Supply Facility Losses	11,154,225	14,372,010	16,941,787	14,504,198	14,416,174	71,388,393
Supply Facility Loss Factor	0.0034	0.0043	0.0048	0.0042	0.0041	0.0042

Sheet 7- Cost Allocation Adjustments

2006 Cost Allocation Information Filing

CLASS REVENUE COST ANALYSIS - 2006 INFORMATION FILING

	Total	1 Residential	2 GS less than 50	3 GS > 50 (blended TOU and Non-TOU)	6 Large User	7 Street Light	8 Sentinel Light	9 Unmetered Load	11 Stand-By	12 GS 50 to 4,999 kW (Co-Generation)
Distribution Revenue - before transformer discounts	$ 51,354,868	$ 32,141,159	$ 8,270,897	$ 9,314,837	$ 1,079,822	$ 194,739	$ 8,336	$ 94,370	$ -	$ 250,708
Distribution standby revenue included in revenue offsets	339,049								339,049	
Total distribution revenue before transformer discounts	51,693,917	32,141,159	8,270,897	9,314,837	1,079,822	194,739	8,336	94,370	339,049	250,708
Distribution standby revenue included in revenue offsets	(247,191)	(166,477)	(35,719)	(39,535)	(1,929)	(2,116)	(135)	(674)	(439)	(166)
Total revenue offsets	4,090,796	2,755,046	591,125	654,265	31,925	35,017	2,237	11,160	7,270	2,750
Net revenue offset amounts - excluding standby	3,843,605	2,588,569	555,406	614,730	29,996	32,901	2,102	10,486	6,831	2,584
Total Revenue - revised for standby revenues	**$ 55,537,522**	**$ 34,729,728**	**$ 8,826,303**	**$ 9,929,567**	**$ 1,109,818**	**$ 227,640**	**$ 10,438**	**$ 104,856**	**$ 345,880**	**$ 253,292**
Revenue Requirement - per CA filing	**$ 55,537,520**	$ 31,968,343	$ 6,986,570	$ 13,078,343	$ 1,373,528	$ 1,361,665	$ 73,400	$ 185,360	$ 407,752	$ 102,560
Revenue to Cost Ratios - revised		108.6%	126.3%	75.9%	80.8%	16.7%	14.2%	56.6%	84.8%	247.0%

Comments
The above analysis has been modified to properly account for Standby-Revenues which were not properly accounted for in the Cost Allocation filing

EXHIBIT 4 - TABLE 36 TAX CALCULATIONS

Tax Calculations					
Description	**2006 Board Approved**	**2006**	**2007**	**2008 Bridge**	**2009 Test**
Determination of Regulatory Taxable Income					
Deemed utility net income	**8,090,399**	**8,287,450**	**8,420,250**	**8,100,058**	**7,714,642**
Book to Tax Adjustments					
Additions to Accounting Income:					
Depreciation and amortization	12,135,496	13,351,000	14,076,000	16,015,000	15,919,000
Employee Benefit Plans - accrued, not paid	-				
Meals & entertainment / Mileage	25,600	28,693	31,214	30,000	30,000
Non-deductible club fees and dues	4,605		-		-
Non-deductible company pension plans	74,000	459,000	452,000	421,404	495,000
Taxable Capital Gains	-	33,808			-
Tax reserves beginning of year	-				-
Charitable Donations	46,058		-		
Regulatory asset write-downs and recoveries	-				
Ontario Specified Tax Credits			16,274	17,000	17,000
Total Additions	**12,285,759**	**13,872,501**	**14,575,488**	**16,483,404**	**16,461,000**
Deductions from Accounting Income:					
Capital Cost Allowance	10,978,862	12,336,370	13,398,885	13,431,379	16,277,453
Gain on disposal of assets per financial statements	19,013	67,000	37,000	85,000	49,300
Cumulative eligible capital deduction	-				
Tax reserves end of year	-				
Charitable Donations	50,000		-		
Advertising expense disallowed	35,895				
Total Deductions	**11,083,770**	**12,403,370**	**13,435,885**	**13,516,379**	**16,326,753**
Total tax adjustments to accounting income	**1,201,989**	**1,469,131**	**1,139,603**	**2,967,025**	**134,247**
Taxable Income Prior to Adjusting Revenue to PILs	**9,292,388**	**9,756,581**	**9,559,853**	**11,067,083**	**7,848,889**
Corporate Income Tax Rate	36.12%	36.12%	36.12%	33.50%	33.00%
Total PILs before gross up and tax credits	3,356,411	3,524,077	3,453,019	3,707,473	2,590,133
Tax credits (SRED)	-	-	-	(58,000)	(58,000)
Total PILs before gross up	**3,356,411**	**3,524,077**	**3,453,019**	**3,649,473**	**2,532,133**
Calculation of Utility Income Taxes					
Income Taxes (grossed-up)	5,254,243	5,516,714	5,405,477	5,487,929	3,779,303
Large Corporation Tax (grossed up)	130,133	-	-	-	-
Ontario Capital Tax	569,289	583,885	556,911	442,724	472,785
Total Taxes (PIL's) for rate recovery	**5,953,665**	**6,100,600**	**5,962,388**	**5,930,653**	**4,252,088**
Tax Rates					
Federal Tax	22.12%	22.12%	22.12%	19.50%	19.00%
Federal Surtax	1.12%	1.12%	1.12%	0.00%	0.00%
Provincial Tax	14.00%	14.00%	14.00%	14.00%	14.00%
Total Tax Rate	**37.24%**	**37.24%**	**37.24%**	**33.50%**	**33.00%**
Calculation of Large Corporation Tax					
Total Rate Base	199,762,942	-	-	-	-
Less: Exemption	50,000,000				
Taxable Capital	**149,762,942**	**-**	**-**	**-**	**-**
LCT Rate	0.1250%	0.0000%	0.0000%	0.0000%	0.0000%
Subtotal	187,204	-	-	-	-
Federal Surtax	104,075			-	-
Large Corporation Tax	**83,129**	-	-	**-**	**-**
Calculation of Ontario Capital Tax					
Total Rate Base	199,762,942	204,628,402	207,907,401	211,766,221	225,126,695
Less Exemption	10,000,000	10,000,000	12,500,000	15,000,000	15,000,000
Taxable Capital / Deemed taxable capital	**189,762,942**	**194,628,402**	**195,407,401**	**196,766,221**	**210,126,695**
OCT Rate	0.3000%	0.3000%	0.2850%	0.2250%	0.2250%
Ontario Capital Tax	**569,289**	**583,885**	**556,911**	**442,724**	**472,785**

Revisions required by London Hydro to CCA schedules for 2008 and 2009

Original Tables from Rate Application Exhibit 4 pages 83 and 84 Tables 39 and 40

CCA Continuity Schedule (2008)

Class	Class Description	UCC Prior Year Ending Balance	Additions	Dispositions	UCC Before 1/2 Yr Adjustment	1/2 Year Rule {1/2 Additions Less Disposals}	Reduced UCC	Rate %	CCA	UCC Ending Balance
1	Distribution System - 1988 to 22-Feb-2005	97,137,388	-	-	97,137,388	-	97,137,388	4%	3,885,496	93,251,892
2	Distribution System - pre 1988	46,204,539	-	-	46,204,539	-	46,204,539	6%	2,772,272	43,432,267
1	Buildings	5,845,783	-	-	5,845,783	-	5,845,783	4%	233,831	5,611,952
8	General Office/Stores Equip	3,753,061	709,300	-	4,462,361	354,650	4,107,711	20%	821,542	3,640,819
10	Computer Hardware/ Vehicles	2,469,989	1,430,000	-	3,899,989	715,000	3,184,989	30%	955,497	2,944,492
10.1	Certain Automobiles	-	-	-	-	-	-	30%	-	-
12	Computer Software	1,201,996	460,078	-	1,662,074	230,039	1,432,035	100%	1,432,035	230,039
13 1	Lease # 1		-	-	-	-	-	20%	-	-
13 2	Lease #2		-	-	-	-	-		-	-
50	Computers & Systems Hardware acq'd post Mar 19/07	381,969	92,000	-	473,969	46,000	427,969	55%	235,383	238,586
46	Data Network Infrastructure Equipment (acq'd post Mar 22/04)		-	-	-	-	-	30%	-	-
47	Distribution System - post 22-Feb-2005	29,667,155	17,840,881	-	47,508,036	8,920,441	38,587,596	8%	3,087,008	44,421,028
	SUB-TOTAL - UCC	**186,661,880**	**20,532,259**	**-**	**207,194,139**	**10,266,130**	**196,928,010**		**13,423,064**	**193,771,075**

CCA Continuity Schedule (2009)

Class	Class Description	UCC Prior Year Ending Balance	Additions	Dispositions	UCC Before 1/2 Yr Adjustment	1/2 Year Rule {1/2 Additions Less Disposals}	Reduced UCC	Rate %	CCA	UCC Ending Balance
1	**Distribution System - 1988 to 22-Feb-2005**	93,251,892	-	-	93,251,892	-	93,251,892	4%	3,730,076	89,521,817
2	**Distribution System - pre 1988**	43,432,267	-	-	43,432,267	-	43,432,267	6%	2,605,936	40,826,331
1	**Buildings**	5,611,952	-	-	5,611,952	-	5,611,952	4%	224,478	5,387,474
8	**General Office/Stores Equip**	3,284,149	1,024,500	-	4,308,649	512,250	3,796,399	20%	759,280	3,549,369
10	**Computer Hardware/ Vehicles**	2,944,492	1,728,000	-	4,672,492	864,000	3,808,492	30%	1,142,548	3,529,945
10.1	**Certain Automobiles**	-	-	-	-	-	-	30%	-	-
12	**Computer Software**	230,039	9,279,905	-	9,509,944	4,639,953	4,869,992	100%	4,869,992	4,639,953
12	**Computer Software - CCA normalization adjustment for calc of regulatory PILs**	-	-	-	-	-	-	100%	(1,684,969)	-
13 1	**Lease # 1**	-	-	-	-	-	-	20%	-	-
13 2	**Lease #2**	-	-	-	-	-	-		-	-
50	**Computers & Systems Hardware acq'd post Mar 19/07**	525,904	-	-	525,904	-	525,904	55%	289,247	236,657
50	**Computers & Systems Hardware acq'd post Jan 27/09**	-	47,500	-	47,500	-	47,500	100%	47,500	-
46	**Data Network Infrastructure Equipment (acq'd post Mar 22/04)**	-	-	-	-	-	-	30%	-	-
47	**Distribution System - post 22-Feb-2005**	44,421,028	18,492,100	-	62,913,128	9,246,050	53,667,078	8%	4,293,366	58,619,762
	SUB-TOTAL - UCC	**193,701,723**	**30,572,005**	**-**	**224,273,728**	**15,262,253**	**209,011,475**		**16,277,453**	**206,311,306**

Summary of Revisions	From Class 10	To Class 8	To Class 50	Reference
Capital additons for 2008	$ 488,300	$ 396,300	$ 92,000	Exh 2, pge 100 - desktop solutions
Capital additons for 2009	$ 767,000	$ 719,500	$ 47,500	Exh 2, pge 71 - desktop solutions

Summary of Impact on Revenue Requirement

Total CCA deduction for 2009 as filed	$ 16,202,860
Revised CCA deduction	$ 16,277,453
Base Revenue Requirement Before Adj	$ 60,401,505
Base Revenue Requirement After Adj	$ 60,364,765
Total reduction in revenue requirement	**$ (36,740)**