SECTION H
Tab 4

A Performance Target Methodology for the Distribution Feeders of the Newfoundland and Labrador Hydro Electrical System

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Introduction

A review of the Newfoundland and Labrador Hydro (NLH) isolated and interconnected distribution feeders was compiled in order to identify areas of the electrical system which should be targeted for reliability improvement, and to prioritize and justify capital spending beginning in 2006.

This review of system performance, using the Canadian Electricity Association (CEA) defined indices SAIFI and SAIDI, focused on the feeders of both the interconnected and isolated systems of NLH.

The evaluation identifies poor performers by analyzing the 5-year trends for the feeders in question with reference to the 5-year average performance of the NLH system. Minimum performance benchmarks or targets for the identified poor performers were developed using the outlined methodology.

An extensive compilation of performance indices (SAIFI, SAIDI) for all feeders was completed and served as the foundation for all further analysis. Included in this compilation is the decomposition of all indices into their components (defective equipment, adverse weather, etc) using both five-year averages and specific years of interest.

Performance Analysis Methodology

One of the objectives of the system review was to improve system performance for the greatest number of customers and therefore, a SAIFI index normalized to 500 customers was used for the calculation of feeder rankings. The effect of the normalization is to skew the index towards those feeders with a greater number of customers and is intended to quantify continuity of electrical service. This normalization was used only for the purposes of generating feeder rankings and all other references to a SAIFI or SAIDI index refer to indices calculated in the conventional fashion. The worst performing feeders were then analyzed further for outage trends using conventional indices.

The determination of what constitutes a poorly performing feeder was made through a consideration of the SAIFI index and continuity of electrical service. Although the SAIDI index was not used explicitly in the determination of worst performers, it was considered implicitly, and a ranking using the SAIDI index would have given similar results with respect to the identification of the worst performing feeders.

The SAIFI and SAIDI indices were decomposed into their constituents: Defective Equipment, Loss of Supply, Adverse Weather, Adverse Environment, Other, Planned, Foreign Interference, Lightning, and Human Error. This breakdown was done to facilitate a thorough investigation of feeder performance based on all aspects of the performance indicators reported to the CEA. Any component of the SAIFI or SAIDI index that was anomalous, that is, an unusually high index value for a specific cause (i.e. defective equipment), would then be examined further to identify possible performance improvement strategies.

In general, the failure modes of the feeders were distinctive and could not be identified through use of a composite SAIFI and SAIDI. One such anomaly is the Bear Cove system that has a high outage incidence due to adverse weather. For example, the five year average (1999 to 2003) SAIDI for Bear Cove (line 4) was 9.24 and 5.84 was attributed to adverse weather (approximately 63%). Investigation of a composite index would not have revealed this trend.

Feeder performance indices vary annually in accordance with weather conditions or other factors. This variability makes the data derived from the 5-year averages useful in that it is representative of a feeder's performance over time and will reveal the "character of the feeder", that is, proximity to salt water, typical weather conditions, or common failure modes. For example, poor performance based on weather related causes does not necessarily indicate a below standard feeder since either a new feeder or an old feeder will likely respond in a similar manner to heavy salt contamination or a lightning storm. This is the primary reason for using 5-year averages in the derivation of the performance targets since they are not subject to the same variability as indices based on a single year.

The calculation of the projections for a specific year include a consideration of whether or not there has been maintenance planned for a feeder in either of the years under consideration and for which projections have been constructed (2004, 2005, or 2006). For example, if it is intended to replace 500 insulators on a given line and there are 2000 insulators on that line, then clearly 25% of the insulators are new and free from defect. This being the case, it is reasonable that the performance of the line will improve and outages due to defective equipment related to insulators on the line in question should also decrease. The assumption would then be to decrease the SAIFI and SAIDI defective equipment component by a corresponding 25%. Similarly, there will also be an increase in the planned portion of the index for the year under consideration. These adjustments are approximations and are subject to a margin of error although every effort was made to make reasonable predictions.

It has been assumed that in the quantification of feeder performance, the only equipment on the distribution feeder contributing to failure are the insulators. This is provisionally true as there are also other components (i.e. distribution transformers, poles, cutouts, conductors, etc.), which may contribute to a feeder failure. However, in general, failures to insulators have the potential to cause an outage to an entire line and will affect more customers than failures to the other types of equipment mentioned. Since the objective is to attempt to quantify the performance of the distribution line, it is reasonable to assume that outages (to the line) caused by defective equipment are primarily related to insulator failure, even though, this is an approximation it is considered to be correct for a high percentage of cases.

Conclusion

The performance indices for all feeders comprising the NLH system were examined and the worst performers identified through consideration of a ranking based on the SAIFI index. Performance targets for the identified poor performers were then established based upon 5 – year averages for the individual feeder and the NLH system indices while also giving due consideration to the length of a particular feeder.

The identification and improvement of the least acceptable performers through the establishment of performance benchmarks will, in addition to improving the feeder in question, also improve the system performance. This analysis is an iterative process, which is expected to be repeated in subsequent years and will identify and minimize the effects of poor performers on the system indices.

The SAIFI and SAIDI indices, although indicative of feeder performance, should not be used to impose minimum levels of performance on a given feeder without due consideration for factors external to the actual condition of the equipment involved. Other issues, such as recent or planned maintenance, sleet storms or operational histories are also considered when determining which areas will derive the maximum benefit from any new capital expenditure.

Although the performance indices are the measures used to compare feeders, they are not the only indicator of the condition of a feeder. Therefore, prior to designating a new capital improvement initiative for a specific feeder, all factors affecting system performance should be assessed in conjunction with the performance indicators. Such factors would include and consider the experience of line personnel with first hand experience of the condition of the line. This experience would lead to replacement of only those components that have exhibited operational problems.

The Program

Subsequent to the analysis of feeder performance, the feeder rankings may determine when, in the 5-year plan, the upgrades will be executed. The timing and scheduling of the work is developed with due consideration to whether or not a group of feeders occupy a similar geographical area and are all poor performers. In this case, the selected feeders will be grouped together in the interests of economy and be upgraded at the same time. The rationale is that it is more cost effective to perform maintenance on a group of feeders that are in close geographical proximity, if they are scheduled for maintenance based on their performance, than a grouping of feeders that is widely dispersed.

The bar charts in Appendices 1 and 2 show the performance ranking of the feeders for the interconnected and isolated systems respectively and indicate, with an asterisk, the feeders targeted for upgrades in 2006. The feeders selected for upgrades need not necessarily be at the lower end of the performance spectrum with respect to the evaluation in Appendices 1 and 2. For example, the two worst performing feeders (i.e. EHW1 and HVY7), have both received extensive maintenance over the past few years and it is expected that their respective rankings will improve as the effect of this maintenance manifests itself with improved performance in the calculation of the five-year averages. The feeders selected for maintenance are relatively poor performers and will benefit from the upgrade.

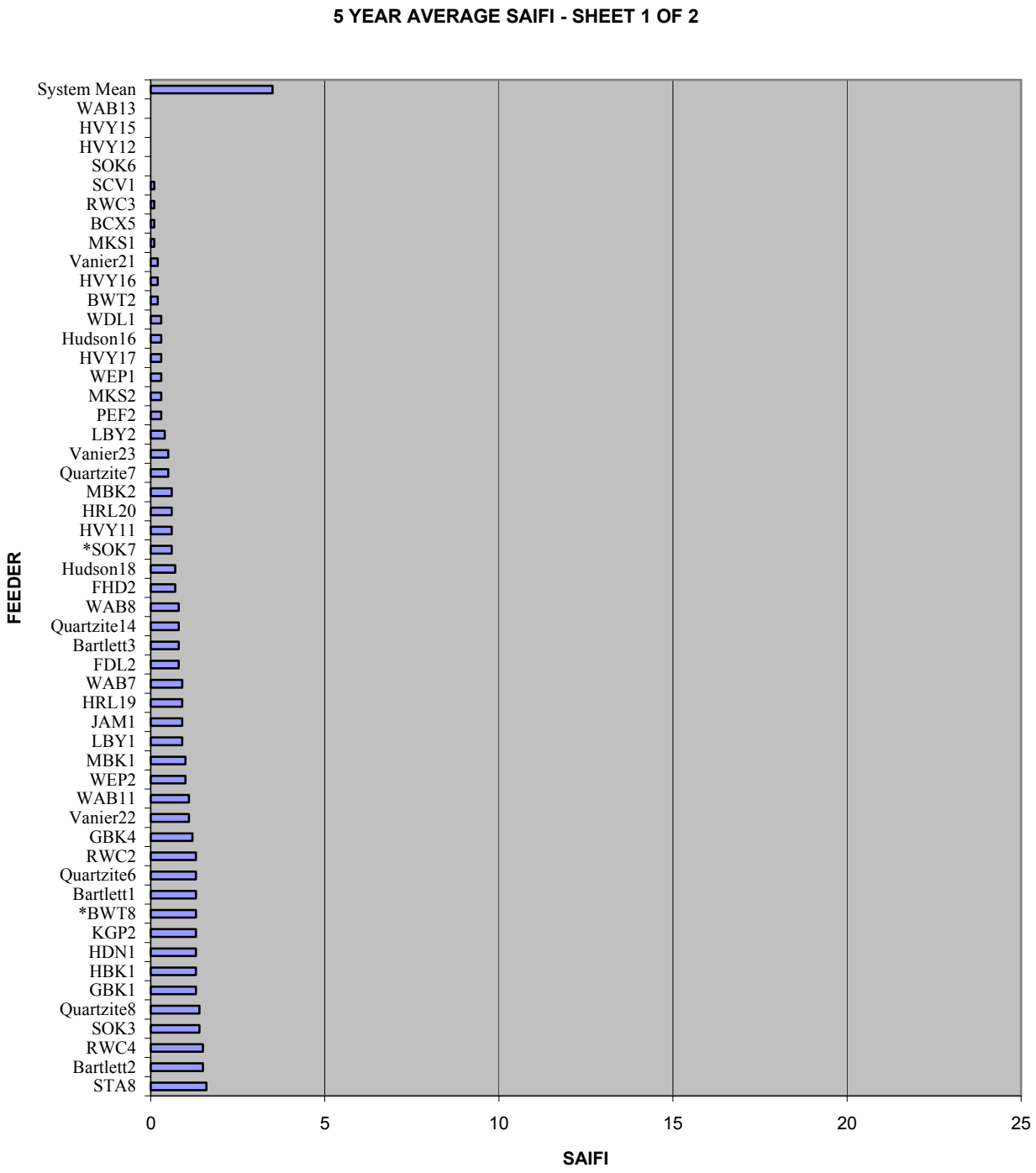
Appendix 3 shows the SAIFI and SAIDI statistics for the individual feeders chosen for upgrades in 2006. The choice of whether or not to perform maintenance on a given feeder may be based on past feeder performance but may also be justified by known operational issues. Notice that in some cases, the 5-year average index may be less than the target developed for the chosen feeder; an example of this can be seen in the statistics for Hawke's Bay Feeder (#20101). The procedure for generating the feeder targets is based upon projections using 5-year averages and comparisons with the performance indices of the NLH electrical system. This methodology is a long-term strategy for system improvement and will admit some variation in results when the performance of a specific feeder is close to that of the system or vice versa. Ultimately, the generation of feeder targets are mechanisms which will respond to the areas of optimum system performance and will be required to decrease to better that performance and thereby that of the system. This phenomenon should be kept in mind when studying these statistics.

Appendix 4 shows the proposed plan for distribution upgrades for the next five years. Associated with this performance upgrade plan, is the routine pole replacement program. The timing of pole replacements is adjusted and aligned with the performance upgrades to take full advantage of contract packaging and construction logistic opportunities. Note that the order and scheduling for these upgrades may change from year to year as the indices are updated and re-evaluated on an annual basis.

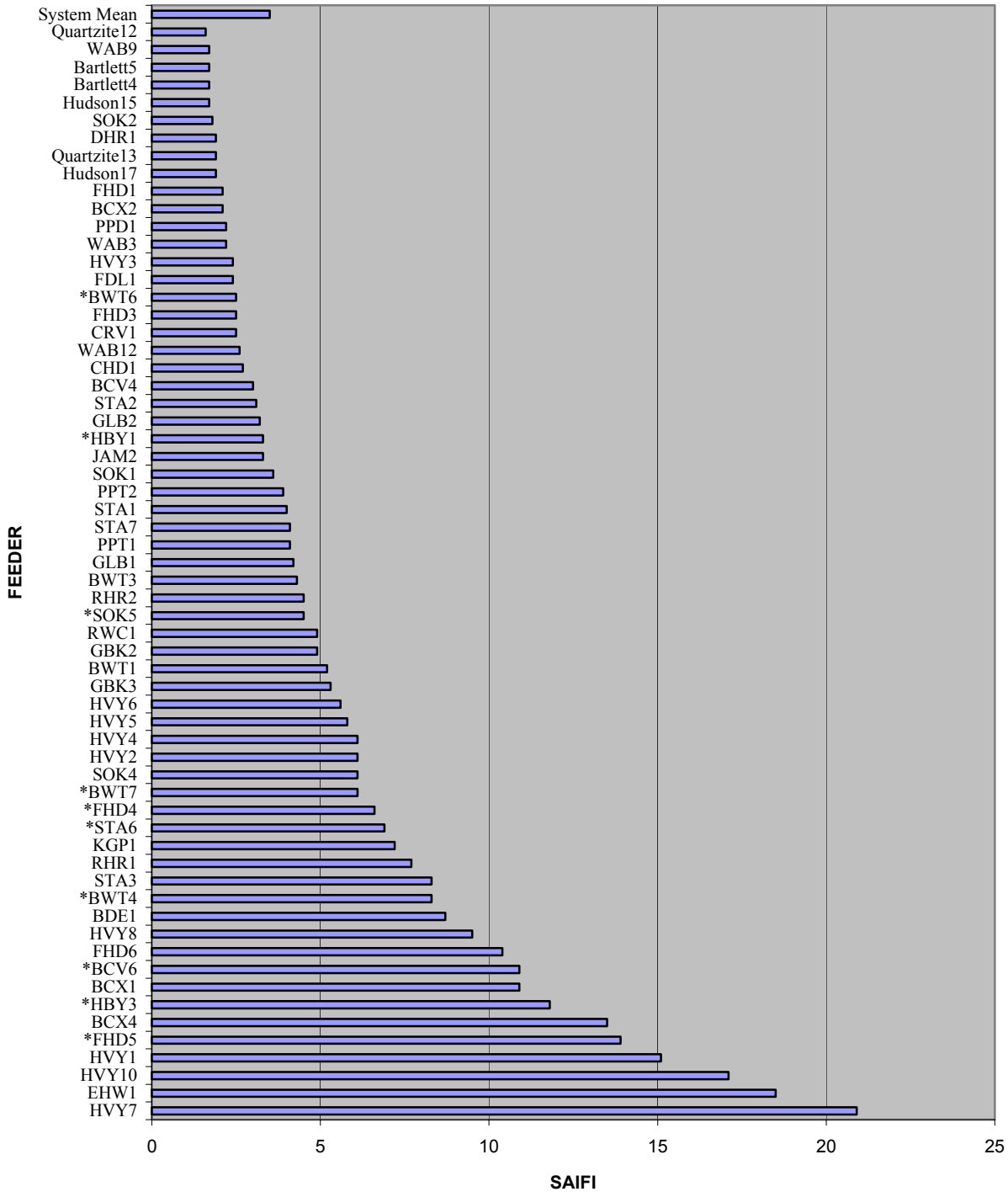
Appendix 1

Appendix 1

5-Year Average Normalized SAIFI (1999 to 2003) – Interconnected Systems



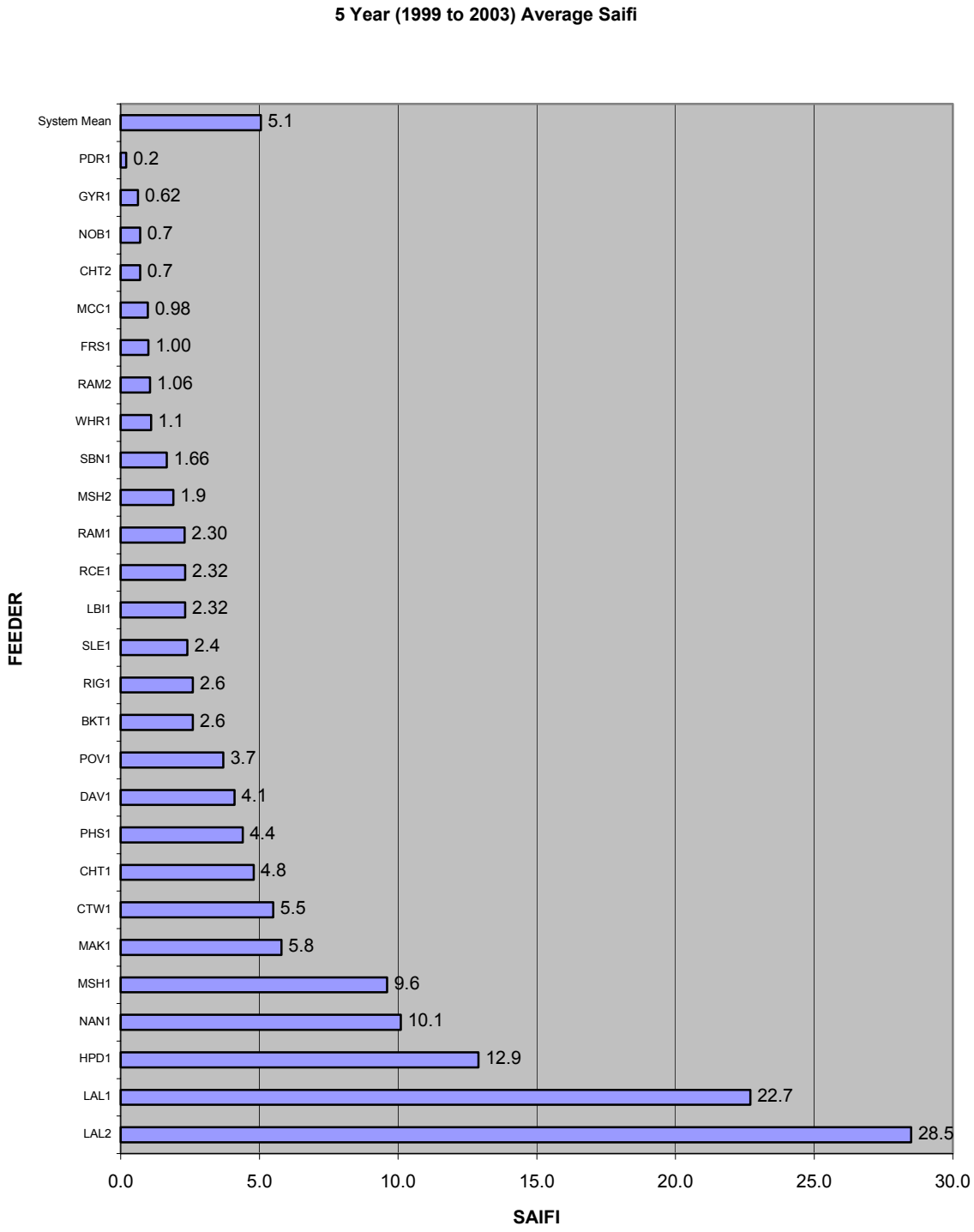
5 YEAR AVERAGE SAIFI - SHEET 2 OF 2



Appendix 2

Appendix 2

5-Year Average Normalized SAIFI (1999 to 2003) – Isolated Systems



Appendix 3

Appendix 3

The following is a tabular compilation of SAIFI and SAIDI data for the feeders proposed in the 2006 capital budget. (All indices are current as of December 31, 2004).

SAIFI Feeder Performance Targets for 2006									
	St. Anthony Feeder: 30106					NLH and CEA			
CAUSE	5 Year Average 2000 to 2004	2004	2005 Projection	2006 Projection	Future Target	NLH 5 year Average 1999 to 2003	NLH 2003	CEA 5 Year Average 1999 to 2003	CEA 2003
Unknown	0.16	0.01	0.16	0.19	0.19	0.52	0.33	0.23	0.26
Planned	2.00	2.81	2.25	2.05	1.54	1.54	1.49	0.35	0.25
Loss of Supply	1.25	0.00	1.25	1.28	1.28	2.69	2.61	0.67	0.84
Tree Contact	0.60	0.00	0.60	0.72	0.05	0.05	0.03	0.26	0.30
Lightning	0.02	0.00	0.02	0.01	0.01	0.53	0.82	0.15	0.08
Defective Equipment	1.35	0.21	2.85	1.27	1.27	1.12	1.49	0.50	0.54
Adverse Weather	1.33	0.04	1.33	0.97	0.78	0.78	0.75	0.26	0.37
Adverse Environment	0.17	0.51	0.17	0.20	0.14	0.14	0.18	0.08	0.10
Human Error	0.22	0.00	0.22	0.26	0.11	0.11	0.10	0.06	0.10
Foreign Interference	0.03	0.00	0.03	0.01	0.01	0.13	0.08	0.19	0.22
Total	7.13	3.58	8.88	6.96	5.37	7.58	7.86	2.47	2.67

SAIDI Feeder Performance Targets for 2006									
	St. Anthony Feeder: 30106					NLH and CEA			
CAUSE	5 Year Average 2000 to 2004	2004	2005 Projection	2006 Projection	Future Target	NLH 5 year Average 1999 to 2003	NLH 2003	CEA 5 Year Average 1999 to 2003	CEA 2003
Unknown	0.26	0.02	0.26	0.28	0.28	0.73	0.68	0.24	0.34
Planned	3.15	2.25	3.94	3.22	3.06	3.16	2.60	0.48	0.53
Loss of Supply	0.30	0.00	0.30	0.24	0.24	2.65	2.87	1.40	4.99
Tree Contact	2.15	0.00	2.15	2.57	0.12	0.12	0.05	0.86	1.24
Lightning	0.23	0.00	0.23	0.10	0.10	0.38	0.25	0.29	0.16
Defective Equipment	4.07	0.47	2.85	3.28	2.03	2.03	2.85	0.72	0.81
Adverse Weather	4.22	0.40	4.22	3.57	2.23	2.23	1.97	1.07	2.47
Adverse Environment	1.54	6.22	1.54	1.85	0.48	0.48	0.47	0.11	0.14
Human Error	0.06	0.00	0.06	0.07	0.07	0.08	0.03	0.04	0.07
Foreign Interference	0.03	0.00	0.03	0.01	0.01	0.24	0.14	0.27	0.34
Total	16.01	9.35	15.58	15.20	8.62	12.09	11.91	5.18	10.65

SAIFI Feeder Performance Targets for 2006									
	Bear Cove Feeder: 20806					NLH and CEA			
CAUSE	5 Year Average 2000 to 2004	2004	2005 Projection	2006 Projection	Future Target	NLH 5 year Average 1999 to 2003	NLH 2003	CEA 5 Year Average 1999 to 2003	CEA 2003
Unknown	0.83	0.02	0.83	0.99	0.52	0.52	0.33	0.23	0.26
Planned	1.11	0.50	1.11	0.90	0.90	1.54	1.49	0.35	0.25
Loss of Supply	1.20	0.00	1.20	1.24	1.24	2.69	2.61	0.67	0.84
Tree Contact	0.00	0.00	0.00	0.00	0.05	0.05	0.03	0.26	0.30
Lightning	0.14	0.00	0.14	0.03	0.03	0.53	0.82	0.15	0.08
Defective Equipment	0.62	1.05	0.62	0.69	0.69	1.12	1.49	0.50	0.54
Adverse Weather	4.02	2.97	4.02	4.47	0.78	0.78	0.75	0.26	0.37
Adverse Environment	0.44	1.02	0.44	0.52	0.14	0.14	0.18	0.08	0.10
Human Error	0.00	0.00	0.00	0.00	0.11	0.11	0.10	0.06	0.10
Foreign Interference	0.20	0.00	0.20	0.24	0.13	0.13	0.08	0.19	0.22
Total	8.56	5.56	8.56	9.08	4.59	7.58	7.86	2.47	2.67

	Bear Cove Feeder: 20806					NLH and CEA			
CAUSE	5 Year Average 2000 to 2004	2004	2005 Projection	2006 Projection	Future Target	NLH 5 year Average 1999 to 2003	NLH 2003	CEA 5 Year Average 1999 to 2003	CEA 2003
Unknown	1.34	0.03	1.34	1.60	0.73	0.73	0.68	0.24	0.34
Planned	2.11	0.52	2.11	1.38	1.38	3.16	2.60	0.48	0.53
Loss of Supply	0.85	0.00	0.85	0.91	0.91	2.65	2.87	1.40	4.99
Tree Contact	0.00	0.00	0.00	0.00	0.12	0.12	0.05	0.86	1.24
Lightning	0.26	0.00	0.26	0.08	0.08	0.38	0.25	0.29	0.16
Defective Equipment	1.14	1.45	1.14	1.25	1.25	2.03	2.85	0.72	0.81
Adverse Weather	7.99	9.71	7.99	9.35	2.23	2.23	1.97	1.07	2.47
Adverse Environment	0.50	1.82	0.50	0.58	0.48	0.48	0.47	0.11	0.14
Human Error	0.01	0.00	0.01	0.01	0.01	0.08	0.03	0.04	0.07
Foreign Interference	0.07	0.00	0.07	0.09	0.09	0.24	0.14	0.27	0.34
Total	14.27	13.54	14.27	15.25	7.28	12.09	11.91	5.18	10.65

SAIFI Feeder Performance Targets for 2006									
	Hawke's Bay Feeder: 20101					NLH and CEA			
CAUSE	5 Year Average 2000 to 2004	2004	2005 Projection	2006 Projection	Future Target	NLH 5 year Average 1999 to 2003	NLH 2003	CEA 5 Year Average 1999 to 2003	CEA 2003
Unknown	0.01	0.02	0.01	0.01	0.01	0.52	0.33	0.23	0.26
Planned	0.32	0.27	0.32	0.38	0.38	1.54	1.49	0.35	0.25
Loss of Supply	1.19	0.00	1.19	1.24	1.24	2.69	2.61	0.67	0.84
Tree Contact	0.00	0.00	0.00	0.00	0.05	0.05	0.03	0.26	0.30
Lightning	0.28	0.00	0.28	0.33	0.33	0.53	0.82	0.15	0.08
Defective Equipment	0.60	0.00	0.60	0.71	0.71	1.12	1.49	0.50	0.54
Adverse Weather	0.04	0.01	0.04	0.03	0.03	0.78	0.75	0.26	0.37
Adverse Environment	0.01	0.00	0.01	0.01	0.01	0.14	0.18	0.08	0.10
Human Error	0.20	0.00	0.20	0.24	0.11	0.11	0.10	0.06	0.10
Foreign Interference	0.03	0.15	0.03	0.04	0.04	0.13	0.08	0.19	0.22
Total	2.68	0.46	2.68	2.99	2.91	7.58	7.86	2.47	2.67

SAIDI Feeder Performance Targets for 2006									
	Hawke's Bay Feeder: 20101					NLH and CEA			
CAUSE	5 Year Average 2000 to 2004	2004	2005 Projection	2006 Projection	Future Target	NLH 5 year Average 1999 to 2003	NLH 2003	CEA 5 Year Average 1999 to 2003	CEA 2003
Unknown	0.06	0.03	0.06	0.03	0.03	0.73	0.68	0.24	0.34
Planned	1.08	0.22	1.08	1.30	1.30	3.16	2.60	0.48	0.53
Loss of Supply	1.02	0.00	1.02	1.12	1.12	2.65	2.87	1.40	4.99
Tree Contact	0.00	0.00	0.00	0.00	0.12	0.12	0.05	0.86	1.24
Lightning	0.84	0.00	0.84	0.94	0.38	0.38	0.25	0.29	0.16
Defective Equipment	1.49	0.00	1.49	1.79	1.79	2.03	2.85	0.72	0.81
Adverse Weather	0.07	0.01	0.07	0.04	0.04	2.23	1.97	1.07	2.47
Adverse Environment	0.06	0.00	0.06	0.04	0.04	0.48	0.47	0.11	0.14
Human Error	0.03	0.00	0.03	0.03	0.03	0.08	0.03	0.04	0.07
Foreign Interference	0.09	0.45	0.09	0.11	0.11	0.24	0.14	0.27	0.34
Total	4.74	0.71	4.74	5.39	4.96	12.09	11.91	5.18	10.65

SAIFI Feeder Performance Targets for 2006									
	Hawke's Bay Feeder: 20103					NLH and CEA			
CAUSE	5 Year Average 2000 to 2004	2004	2005 Projection	2006 Projection	Future Target	NLH 5 year Average 1999 to 2003	NLH 2003	CEA 5 Year Average 1999 to 2003	CEA 2003
Unknown	0.46	0.01	0.46	0.33	0.33	0.52	0.33	0.23	0.26
Planned	0.97	0.10	1.46	1.14	1.14	1.54	1.49	0.35	0.25
Loss of Supply	1.20	0.00	1.20	1.24	1.24	2.69	2.61	0.67	0.84
Tree Contact	0.00	0.00	0.00	0.00	0.05	0.05	0.03	0.26	0.30
Lightning	0.26	0.00	0.26	0.30	0.30	0.53	0.82	0.15	0.08
Defective Equipment	1.89	0.01	1.89	2.07	1.12	1.12	1.49	0.50	0.54
Adverse Weather	0.40	0.01	0.40	0.34	0.34	0.78	0.75	0.26	0.37
Adverse Environment	0.04	0.07	0.04	0.04	0.04	0.14	0.18	0.08	0.10
Human Error	0.20	0.00	0.20	0.24	0.11	0.11	0.10	0.06	0.10
Foreign Interference	0.33	0.00	0.33	0.07	0.07	0.13	0.08	0.19	0.22
Total	5.75	0.20	6.24	5.76	4.73	7.58	7.86	2.47	2.67

SAIDI Feeder Performance Targets for 2006									
	Hawke's Bay Feeder: 20103					NLH and CEA			
CAUSE	5 Year Average 2000 to 2004	2004	2005 Projection	2006 Projection	Future Target	NLH 5 year Average 1999 to 2003	NLH 2003	CEA 5 Year Average 1999 to 2003	CEA 2003
Unknown	1.00	0.03	1.34	1.60	0.73	0.73	0.68	0.24	0.34
Planned	2.49	0.18	3.74	2.91	2.91	3.16	2.60	0.48	0.53
Loss of Supply	0.80	0.00	0.80	0.85	0.85	2.65	2.87	1.40	4.99
Tree Contact	0.00	0.00	0.00	0.00	0.12	0.12	0.05	0.86	1.24
Lightning	0.37	0.00	0.37	0.36	0.36	0.38	0.25	0.29	0.16
Defective Equipment	3.46	0.01	2.60	3.53	2.03	2.03	2.85	0.72	0.81
Adverse Weather	0.66	0.01	0.66	0.67	0.67	2.23	1.97	1.07	2.47
Adverse Environment	0.07	0.12	0.05	0.06	0.06	0.48	0.47	0.11	0.14
Human Error	0.02	0.00	0.02	0.02	0.02	0.08	0.03	0.04	0.07
Foreign Interference	0.64	0.01	0.64	0.13	0.13	0.24	0.14	0.27	0.34
Total	9.51	0.36	10.22	10.13	7.88	12.09	11.91	5.18	10.65

SAIFI Feeder Performance Targets for 2006									
	South Brook Feeder: 10105					NLH and CEA			
CAUSE	5 Year Average 2000 to 2004	2004	2005 Projection	2006 Projection	Future Target	NLH 5 year Average 1999 to 2003	NLH 2003	CEA 5 Year Average 1999 to 2003	CEA 2003
Unknown	0.25	0.20	0.25	0.29	0.29	0.52	0.33	0.23	0.26
Planned	1.23	0.00	1.23	1.38	1.38	1.54	1.49	0.35	0.25
Loss of Supply	0.96	0.00	0.96	1.16	1.16	2.69	2.61	0.67	0.84
Tree Contact	0.35	1.74	0.35	0.42	0.05	0.05	0.03	0.26	0.30
Lightning	0.00	0.00	0.00	0.01	0.01	0.53	0.82	0.15	0.08
Defective Equipment	0.33	0.19	0.33	0.39	0.39	1.12	1.49	0.50	0.54
Adverse Weather	0.35	0.74	0.35	0.37	0.37	0.78	0.75	0.26	0.37
Adverse Environment	0.11	0.09	0.11	0.13	0.13	0.14	0.18	0.08	0.10
Human Error	0.00	0.00	0.00	0.00	0.11	0.11	0.10	0.06	0.10
Foreign Interference	0.01	0.02	0.01	0.01	0.01	0.13	0.08	0.19	0.22
Total	3.59	2.96	3.59	4.16	3.90	7.58	7.86	2.47	2.67

SAIDI Feeder Performance Targets for 2006									
	South Brook Feeder: 10105					NLH and CEA			
CAUSE	5 Year Average 2000 to 2004	2004	2005 Projection	2006 Projection	Future Target	NLH 5 year Average 1999 to 2003	NLH 2003	CEA 5 Year Average 1999 to 2003	CEA 2003
Unknown	0.39	0.21	0.39	0.45	0.45	0.73	0.68	0.24	0.34
Planned	3.20	0.00	3.20	3.66	3.16	3.16	2.60	0.48	0.53
Loss of Supply	2.31	0.00	2.31	2.78	2.65	2.65	2.87	1.40	4.99
Tree Contact	0.37	1.86	0.37	0.45	0.12	0.12	0.05	0.86	1.24
Lightning	0.02	0.00	0.02	0.03	0.03	0.38	0.25	0.29	0.16
Defective Equipment	2.51	1.02	2.51	3.00	2.03	2.03	2.85	0.72	0.81
Adverse Weather	2.17	1.84	2.17	1.95	1.95	2.23	1.97	1.07	2.47
Adverse Environment	0.15	0.08	0.15	0.17	0.17	0.48	0.47	0.11	0.14
Human Error	0.00	0.00	0.00	0.00	0.08	0.08	0.03	0.04	0.07
Foreign Interference	0.03	0.13	0.03	0.04	0.04	0.24	0.14	0.27	0.34
Total	11.15	5.14	11.15	12.51	10.67	12.09	11.91	5.18	10.65

SAIFI Feeder Performance Targets for 2006									
	South Brook Feeder: 10107					NLH and CEA			
CAUSE	5 Year Average 2000 to 2004	2004	2005 Projection	2006 Projection	Future Target	NLH 5 year Average 1999 to 2003	NLH 2003	CEA 5 Year Average 1999 to 2003	CEA 2003
Unknown	0.25	0.02	0.25	0.29	0.29	0.52	0.33	0.23	0.26
Planned	1.21	0.00	1.21	1.04	1.04	1.54	1.49	0.35	0.25
Loss of Supply	0.46	0.00	0.46	0.55	0.55	2.69	2.61	0.67	0.84
Tree Contact	0.20	1.01	0.20	0.24	0.05	0.05	0.03	0.26	0.30
Lightning	0.01	0.01	0.01	0.02	0.02	0.53	0.82	0.15	0.08
Defective Equipment	0.45	1.00	0.45	0.54	0.54	1.12	1.49	0.50	0.54
Adverse Weather	0.00	0.00	0.00	0.00	0.78	0.78	0.75	0.26	0.37
Adverse Environment	0.00	0.00	0.00	0.00	0.14	0.14	0.18	0.08	0.10
Human Error	0.43	0.00	0.43	0.31	0.11	0.11	0.10	0.06	0.10
Foreign Interference	0.00	0.01	0.00	0.00	0.13	0.13	0.08	0.19	0.22
Total	3.02	2.06	3.02	2.99	3.64	7.58	7.86	2.47	2.67

SAIDI Feeder Performance Targets for 2006									
	South Brook Feeder: 10107					NLH and CEA			
CAUSE	5 Year Average 2000 to 2004	2004	2005 Projection	2006 Projection	Future Target	NLH 5 year Average 1999 to 2003	NLH 2003	CEA 5 Year Average 1999 to 2003	CEA 2003
Unknown	0.46	0.05	0.46	0.51	0.51	0.73	0.68	0.24	0.34
Planned	3.14	0.00	3.14	2.33	2.33	3.16	2.60	0.48	0.53
Loss of Supply	2.75	0.00	2.75	3.30	2.65	2.65	2.87	1.40	4.99
Tree Contact	0.34	1.69	0.34	0.40	0.12	0.12	0.05	0.86	1.24
Lightning	0.08	0.02	0.08	0.08	0.08	0.38	0.25	0.29	0.16
Defective Equipment	1.41	2.08	1.41	1.69	1.69	2.03	2.85	0.72	0.81
Adverse Weather	0.00	0.00	0.00	0.00	2.23	2.23	1.97	1.07	2.47
Adverse Environment	0.00	0.00	0.00	0.00	0.48	0.48	0.47	0.11	0.14
Human Error	0.13	0.00	0.13	0.04	0.04	0.08	0.03	0.04	0.07
Foreign Interference	0.00	0.02	0.00	0.00	0.24	0.24	0.14	0.27	0.34
Total	8.32	3.86	8.32	8.37	10.38	12.09	11.91	5.18	10.65

SAIFI Feeder Performance Targets for 2006									
	Farewell Head Feeder: 11004					NLH and CEA			
CAUSE	5 Year Average 2000 to 2004	2004	2005 Projection	2006 Projection	Future Target	NLH 5 year Average 1999 to 2003	NLH 2003	CEA 5 Year Average 1999 to 2003	CEA 2003
Unknown	0.02	0.00	0.02	0.02	0.02	0.52	0.33	0.23	0.26
Planned	1.51	1.01	1.51	1.08	1.08	1.54	1.49	0.35	0.25
Loss of Supply	2.86	2.00	2.86	2.17	2.17	2.69	2.61	0.67	0.84
Tree Contact	0.00	0.00	0.00	0.00	0.05	0.05	0.03	0.26	0.30
Lightning	0.21	0.00	0.21	0.25	0.25	0.53	0.82	0.15	0.08
Defective Equipment	1.54	0.02	1.54	1.12	1.12	1.12	1.49	0.50	0.54
Adverse Weather	1.07	1.04	1.07	1.28	0.78	0.78	0.75	0.26	0.37
Adverse Environment	0.26	0.03	0.26	0.27	0.14	0.14	0.18	0.08	0.10
Human Error	0.00	0.00	0.00	0.00	0.11	0.11	0.10	0.06	0.10
Foreign Interference	0.38	0.00	0.38	0.28	0.13	0.13	0.08	0.19	0.22
Total	7.86	4.11	7.86	6.47	5.85	7.58	7.86	2.47	2.67

SAIDI Feeder Performance Targets for 2006									
	Farewell Head Feeder: 11004					NLH and CEA			
CAUSE	5 Year Average 2000 to 2004	2004	2005 Projection	2006 Projection	Future Target	NLH 5 year Average 1999 to 2003	NLH 2003	CEA 5 Year Average 1999 to 2003	CEA 2003
Unknown	0.02	0.00	1.34	1.60	0.73	0.73	0.68	0.24	0.34
Planned	4.44	2.69	5.78	3.32	3.16	3.16	2.60	0.48	0.53
Loss of Supply	6.14	4.09	6.14	3.62	2.65	2.65	2.87	1.40	4.99
Tree Contact	0.00	0.00	0.00	0.00	0.12	0.12	0.05	0.86	1.24
Lightning	0.21	0.00	0.21	0.25	0.25	0.38	0.25	0.29	0.16
Defective Equipment	7.23	0.01	3.30	3.84	2.03	2.03	2.85	0.72	0.81
Adverse Weather	6.34	4.80	6.34	7.41	2.23	2.23	1.97	1.07	2.47
Adverse Environment	0.70	0.02	0.87	0.63	0.48	0.48	0.47	0.11	0.14
Human Error	0.00	0.00	0.00	0.00	0.08	0.08	0.03	0.04	0.07
Foreign Interference	0.21	0.00	0.21	0.16	0.16	0.24	0.14	0.27	0.34
Total	25.29	11.61	24.19	20.83	11.89	12.09	11.91	5.18	10.65

SAIFI Feeder Performance Targets for 2006									
	Farewell Head Feeder: 11005					NLH and CEA			
CAUSE	5 Year Average 2000 to 2004	2004	2005 Projection	2006 Projection	Future Target	NLH 5 year Average 1999 to 2003	NLH 2003	CEA 5 Year Average 1999 to 2003	CEA 2003
Unknown	0.24	0.00	0.24	0.29	0.29	0.52	0.33	0.23	0.26
Planned	1.67	1.18	1.67	1.20	1.20	1.54	1.49	0.35	0.25
Loss of Supply	3.40	2.00	3.40	2.28	2.28	2.69	2.61	0.67	0.84
Tree Contact	0.00	0.00	0.00	0.00	0.05	0.05	0.03	0.26	0.30
Lightning	0.41	0.00	0.41	0.29	0.29	0.53	0.82	0.15	0.08
Defective Equipment	1.55	1.24	1.55	1.61	1.12	1.12	1.49	0.50	0.54
Adverse Weather	2.73	1.80	2.73	2.85	0.78	0.78	0.75	0.26	0.37
Adverse Environment	0.67	1.00	0.67	0.80	0.14	0.14	0.18	0.08	0.10
Human Error	0.20	0.00	0.20	0.24	0.11	0.11	0.10	0.06	0.10
Foreign Interference	0.40	0.00	0.40	0.28	0.13	0.13	0.08	0.19	0.22
Total	11.27	7.23	11.27	9.84	6.38	7.58	7.86	2.47	2.67

SAIDI Feeder Performance Targets for 2006									
	Farewell Head Feeder: 11005					NLH and CEA			
CAUSE	5 Year Average 2000 to 2004	2004	2005 Projection	2006 Projection	Future Target	NLH 5 year Average 1999 to 2003	NLH 2003	CEA 5 Year Average 1999 to 2003	CEA 2003
Unknown	1.34	0.03	1.34	1.60	0.73	0.73	0.68	0.24	0.34
Planned	3.85	4.23	5.78	3.05	3.05	3.16	2.60	0.48	0.53
Loss of Supply	8.18	4.07	8.18	4.02	2.65	2.65	2.87	1.40	4.99
Tree Contact	0.00	0.00	0.00	0.00	0.12	0.12	0.05	0.86	1.24
Lightning	0.49	0.00	0.49	0.38	0.38	0.38	0.25	0.29	0.16
Defective Equipment	4.18	2.52	3.30	4.57	2.03	2.03	2.85	0.72	0.81
Adverse Weather	10.89	7.12	10.89	11.87	2.23	2.23	1.97	1.07	2.47
Adverse Environment	1.10	0.76	0.87	1.12	0.48	0.48	0.47	0.11	0.14
Human Error	0.42	0.00	0.42	0.51	0.08	0.08	0.03	0.04	0.07
Foreign Interference	0.64	0.00	0.64	0.49	0.24	0.24	0.14	0.27	0.34
Total	31.09	18.73	31.91	27.60	11.99	12.09	11.91	5.18	10.65

SAIFI Feeder Performance Targets for 2006									
	Bottom Waters Feeder: 10204					NLH and CEA			
CAUSE	5 Year Average 2000 to 2004	2004	2005 Projection	2006 Projection	Future Target	NLH 5 year Average 1999 to 2003	NLH 2003	CEA 5 Year Average 1999 to 2003	CEA 2003
Unknown	0.69	1.36	0.69	0.62	0.52	0.52	0.33	0.23	0.26
Planned	3.79	1.05	3.79	3.74	1.54	1.54	1.49	0.35	0.25
Loss of Supply	1.21	0.00	1.21	0.85	0.85	2.69	2.61	0.67	0.84
Tree Contact	0.00	0.00	0.00	0.00	0.05	0.05	0.03	0.26	0.30
Lightning	0.02	0.00	0.02	0.02	0.02	0.53	0.82	0.15	0.08
Defective Equipment	2.32	0.00	2.32	2.58	1.12	1.12	1.49	0.50	0.54
Adverse Weather	0.40	1.00	0.40	0.28	0.28	0.78	0.75	0.26	0.37
Adverse Environment	0.00	0.00	0.00	0.00	0.14	0.14	0.18	0.08	0.10
Human Error	0.00	0.00	0.00	0.00	0.11	0.11	0.10	0.06	0.10
Foreign Interference	0.01	0.00	0.01	0.01	0.01	0.13	0.08	0.19	0.22
Total	8.43	3.41	8.43	8.11	4.64	7.58	7.86	2.47	2.67

SAIDI Feeder Performance Targets for 2006									
	Bottom Waters Feeder: 10204					NLH and CEA			
CAUSE	5 Year Average 2000 to 2004	2004	2005 Projection	2006 Projection	Future Target	NLH 5 year Average 1999 to 2003	NLH 2003	CEA 5 Year Average 1999 to 2003	CEA 2003
Unknown	0.84	1.27	0.84	0.74	0.73	0.73	0.68	0.24	0.34
Planned	11.45	4.08	11.45	11.67	3.16	3.16	2.60	0.48	0.53
Loss of Supply	2.78	0.00	2.78	2.32	2.32	2.65	2.87	1.40	4.99
Tree Contact	0.00	0.00	0.00	0.00	0.12	0.12	0.05	0.86	1.24
Lightning	0.14	0.00	0.14	0.17	0.17	0.38	0.25	0.29	0.16
Defective Equipment	4.93	0.00	4.93	5.25	2.03	2.03	2.85	0.72	0.81
Adverse Weather	4.20	1.00	4.20	1.04	1.04	2.23	1.97	1.07	2.47
Adverse Environment	0.00	0.00	0.00	0.00	0.48	0.48	0.47	0.11	0.14
Human Error	0.00	0.00	0.00	0.00	0.08	0.08	0.03	0.04	0.07
Foreign Interference	0.03	0.00	0.03	0.04	0.04	0.24	0.14	0.27	0.34
Total	24.38	6.35	24.38	21.22	10.17	12.09	11.91	5.18	10.65

SAIFI Feeder Performance Targets for 2006									
	Bottom Waters Feeder: 10206					NLH and CEA			
CAUSE	5 Year Average 2000 to 2004	2004	2005 Projection	2006 Projection	Future Target	NLH 5 year Average 1999 to 2003	NLH 2003	CEA 5 Year Average 1999 to 2003	CEA 2003
Unknown	0.45	1.02	0.45	0.53	0.52	0.52	0.33	0.23	0.26
Planned	2.45	3.99	2.45	2.24	1.54	1.54	1.49	0.35	0.25
Loss of Supply	1.00	0.00	1.00	0.60	0.60	2.69	2.61	0.67	0.84
Tree Contact	0.00	0.00	0.00	0.00	0.05	0.05	0.03	0.26	0.30
Lightning	0.00	0.00	0.00	0.00	0.53	0.53	0.82	0.15	0.08
Defective Equipment	2.07	2.28	2.07	2.37	1.12	1.12	1.49	0.50	0.54
Adverse Weather	1.24	1.01	1.24	1.49	0.78	0.78	0.75	0.26	0.37
Adverse Environment	0.41	2.02	0.41	0.49	0.14	0.14	0.18	0.08	0.10
Human Error	0.00	0.00	0.00	0.00	0.11	0.11	0.10	0.06	0.10
Foreign Interference	0.40	1.00	0.40	0.48	0.13	0.13	0.08	0.19	0.22
Total	8.03	11.33	8.03	8.21	5.52	7.58	7.86	2.47	2.67

SAIDI Feeder Performance Targets for 2006									
	Bottom Waters Feeder: 10206					NLH and CEA			
CAUSE	5 Year Average 2000 to 2004	2004	2005 Projection	2006 Projection	Future Target	NLH 5 year Average 1999 to 2003	NLH 2003	CEA 5 Year Average 1999 to 2003	CEA 2003
Unknown	0.51	1.03	0.51	0.60	0.60	0.73	0.68	0.24	0.34
Planned	5.68	11.06	5.68	4.54	3.16	3.16	2.60	0.48	0.53
Loss of Supply	3.47	0.00	3.47	2.24	2.24	2.65	2.87	1.40	4.99
Tree Contact	0.00	0.00	0.00	0.00	0.12	0.12	0.05	0.86	1.24
Lightning	0.00	0.00	0.00	0.00	0.38	0.38	0.25	0.29	0.16
Defective Equipment	3.67	2.49	3.67	4.03	2.03	2.03	2.85	0.72	0.81
Adverse Weather	3.63	4.66	3.63	4.36	2.23	2.23	1.97	1.07	2.47
Adverse Environment	0.38	1.80	0.38	0.44	0.44	0.48	0.47	0.11	0.14
Human Error	0.00	0.00	0.00	0.00	0.08	0.08	0.03	0.04	0.07
Foreign Interference	1.46	7.00	1.46	1.75	0.24	0.24	0.14	0.27	0.34
Total	18.80	28.03	18.80	17.96	11.52	12.09	11.91	5.18	10.65

SAIFI Feeder Performance Targets for 2006									
	Bottom Waters Feeder: 10207					NLH and CEA			
CAUSE	5 Year Average 2000 to 2004	2004	2005 Projection	2006 Projection	Future Target	NLH 5 year Average 1999 to 2003	NLH 2003	CEA 5 Year Average 1999 to 2003	CEA 2003
Unknown	0.61	2.03	0.61	0.74	0.52	0.52	0.33	0.23	0.26
Planned	2.61	2.08	2.61	2.91	1.54	1.54	1.49	0.35	0.25
Loss of Supply	1.40	0.00	1.40	0.69	0.69	2.69	2.61	0.67	0.84
Tree Contact	0.01	0.00	0.01	0.00	0.05	0.05	0.03	0.26	0.30
Lightning	0.00	0.00	0.00	0.00	0.53	0.53	0.82	0.15	0.08
Defective Equipment	1.05	1.23	1.05	1.26	1.12	1.12	1.49	0.50	0.54
Adverse Weather	1.11	0.00	1.11	1.30	0.78	0.78	0.75	0.26	0.37
Adverse Environment	0.41	2.03	0.41	0.49	0.14	0.14	0.18	0.08	0.10
Human Error	0.00	0.00	0.00	0.00	0.11	0.11	0.10	0.06	0.10
Foreign Interference	0.41	1.02	0.41	0.49	0.13	0.13	0.08	0.19	0.22
Total	7.62	8.39	7.62	7.89	5.61	7.58	7.86	2.47	2.67

SAIDI Feeder Performance Targets for 2006									
	Bottom Waters Feeder: 10207					NLH and CEA			
CAUSE	5 Year Average 2000 to 2004	2004	2005 Projection	2006 Projection	Future Target	NLH 5 year Average 1999 to 2003	NLH 2003	CEA 5 Year Average 1999 to 2003	CEA 2003
Unknown	1.08	4.31	1.08	1.30	0.73	0.73	0.68	0.24	0.34
Planned	3.35	5.78	3.35	3.32	3.16	3.16	2.60	0.48	0.53
Loss of Supply	4.51	0.00	4.51	2.46	2.46	2.65	2.87	1.40	4.99
Tree Contact	0.00	0.00	0.00	0.00	0.12	0.12	0.05	0.86	1.24
Lightning	0.00	0.00	0.00	0.00	0.38	0.38	0.25	0.29	0.16
Defective Equipment	2.34	2.39	2.34	2.81	2.03	2.03	2.85	0.72	0.81
Adverse Weather	3.03	0.00	3.03	3.58	2.23	2.23	1.97	1.07	2.47
Adverse Environment	0.37	1.80	0.37	0.44	0.44	0.48	0.47	0.11	0.14
Human Error	0.00	0.00	0.00	0.00	0.08	0.08	0.03	0.04	0.07
Foreign Interference	1.47	7.02	1.47	1.76	0.24	0.24	0.14	0.27	0.34
Total	16.17	21.31	16.17	15.66	11.87	12.09	11.91	5.18	10.65

SAIFI Feeder Performance Targets for 2006									
	Bottom Waters Feeder: 10208					NLH and CEA			
CAUSE	5 Year Average 2000 to 2004	2004	2005 Projection	2006 Projection	Future Target	NLH 5 year Average 1999 to 2003	NLH 2003	CEA 5 Year Average 1999 to 2003	CEA 2003
Unknown	0.28	0.05	0.28	0.33	0.33	0.52	0.33	0.23	0.26
Planned	2.53	1.14	2.53	2.56	1.54	1.54	1.49	0.35	0.25
Loss of Supply	1.60	0.00	1.60	0.93	0.93	2.69	2.61	0.67	0.84
Tree Contact	0.00	0.00	0.00	0.00	0.05	0.05	0.03	0.26	0.30
Lightning	0.00	0.00	0.00	0.00	0.53	0.53	0.82	0.15	0.08
Defective Equipment	1.98	0.12	1.98	2.17	1.12	1.12	1.49	0.50	0.54
Adverse Weather	0.54	0.33	0.54	0.18	0.18	0.78	0.75	0.26	0.37
Adverse Environment	0.00	0.00	0.00	0.00	0.14	0.14	0.18	0.08	0.10
Human Error	0.20	0.00	0.20	0.25	0.11	0.11	0.10	0.06	0.10
Foreign Interference	0.02	0.05	0.02	0.02	0.02	0.13	0.08	0.19	0.22
Total	7.15	1.70	7.15	6.44	4.95	7.58	7.86	2.47	2.67

SAIDI Feeder Performance Targets for 2006									
	Bottom Waters Feeder: 10208					NLH and CEA			
CAUSE	5 Year Average 2000 to 2004	2004	2005 Projection	2006 Projection	Future Target	NLH 5 year Average 1999 to 2003	NLH 2003	CEA 5 Year Average 1999 to 2003	CEA 2003
Unknown	0.34	0.10	0.34	0.40	0.40	0.73	0.68	0.24	0.34
Planned	7.49	4.35	7.49	7.26	3.16	3.16	2.60	0.48	0.53
Loss of Supply	4.66	0.00	4.66	2.67	2.65	2.65	2.87	1.40	4.99
Tree Contact	0.00	0.00	0.00	0.00	0.12	0.12	0.05	0.86	1.24
Lightning	0.00	0.00	0.00	0.00	0.38	0.38	0.25	0.29	0.16
Defective Equipment	4.91	0.74	4.91	5.23	2.03	2.03	2.85	0.72	0.81
Adverse Weather	1.34	0.89	1.34	0.47	0.47	2.23	1.97	1.07	2.47
Adverse Environment	0.00	0.00	0.00	0.00	0.48	0.48	0.47	0.11	0.14
Human Error	0.09	0.00	0.09	0.11	0.08	0.08	0.03	0.04	0.07
Foreign Interference	0.17	0.28	0.17	0.21	0.21	0.24	0.14	0.27	0.34
Total	19.01	6.36	19.01	16.35	9.98	12.09	11.91	5.18	10.65

Appendix 4

Appendix 4

RURAL SYSTEMS
2006 CAPITAL BUDGET & 5 YEAR PLAN – DISTRIBUTION FEEDER UPGRADES
($,000)

PROJECT DESCRIPTION	2006	2007	2008	2009	2010	Total
CENTRAL REGION - DISTRIBUTION						
Replace Insulators - South Brook Distribution System	441					441
Replace Insulators - L4 & L5 - Farewell Head Distribution System	261					261
Replace Insulators - L4 & L6 Bottom Waters Distribution System	198					198
Replace Poles L1- Bottom Waters Distribution System	152					152
Replace Insulators - L7 & L8 Bottom Waters Distribution System	121					121
Replace Distribution Line - Seal Cove to Pass Island		536				536
Upgrade Distribution System - L2 & L3 Farewell Head		277				277
Replace Poles - Barachoix Distribution System		225				225
Replace Poles L2 & L3 - Farewell Head Distribution System		225				225
Replace Distribution Line - Brighton		189				189
Replace Poles - St. Brendan's Distribution System		156				156
Replace Insulators - L4 Barachoix Distribution System		117				117
Replace Insulators - L1 & L2 Jacksons Arm - L1 Hampden			496			496
Replace Poles - South Brook Distribution System			324			324
Replace Poles - Bay D'Espoir Distribution System			229			229
Install Remote Control Unit - Change Islands			217			217
Replace Insulators - L2 Westport Distribution System			82			82
Replace Insulators - Upper Salmon Distribution System				229		229
Replace Insulators - L1 Hind's Lake				167		167
Replace Insulators - Coney Arm Distribution System				119		119
Replace Insulators - L2 Little Bay Distribution System				83		83
NORTHERN REGION - DISTRIBUTION						
Upgrade Distribution System - L6 St. Anthony	778					778
Upgrade Distribution System - L6 Bear Cove	578					578
Upgrade Distribution System - L1 & L3 Hawkes Bay	380					380
Install Substation P.T. - Mary's Harbour	19					19
Upgrade Distribution System - L1 & L2 Rocky Harbour		514				514
Upgrade Distribution System - L1 & L2 St. Anthony		364				364
Upgrade Distribution System - Mary's Harbour			227			227
Upgrade Distribution System - Port Hope Simpson			176			176
Upgrade Distribution System - L4 Bear Cove			143			143
Upgrade Distribution System - L7 St. Anthony				400		400
Upgrade Distribution System - L1 Cow Head				362		362
Upgrade Distribution System - L1 Parson's Pond				251		251
Upgrade Distribution System - Charlottetown				174		174
Upgrade Distribution System - L1 Glenburnie				496		496
Upgrade Distribution System - L1 Plum Point				896		896
Upgrade Distribution System - L2 Glenburnie					711	711
Upgrade Distribution System - L2 Plum Point					913	913
LABRADOR REGION - DISTRIBUTION						
Purchase and Install Voltage Regulator L7 - Happy Valley	122					122
Rebuild Distribution System - Black Tickle	282					282
Replace Poles (Hebron Section) - Nain	179					179
Upgrade Distribution Line - Aliant VOR Site - Wabush			96			96
TOTAL	**3,511**	**2,603**	**1,990**	**3,177**	**1,624**	**12,905**