SECTION B

NEWFOUNDLAND & LABRADOR HYDRO

2004 CAPITAL BUDGET - OVERVIEW

($,000)

	Exp To 2003	2004	Future Years	Total
GENERATION	23	4,987	3,036	8,046
TRANSMISSION & RURAL OPERATIONS	111	10,251	0	10,362
GENERAL PROPERTIES	3,864	15,942	15,310	35,116
ALLOWANCE FOR UNFORSEEN EVENTS	0	1,000	0	1,000
TOTAL CAPITAL BUDGET	3,998	32,180	18,346	54,524

NEWFOUNDLAND & LABRADOR HYDRO
GENERATION
2004 CAPITAL BUDGET - PROJECTS OVER $50,000 BY CATEGORY

($,000)

PROJECT DESCRIPTION	Exp To 2003	2004	Future Years	Total	In-Ser Date	Explanation Page Ref.
Replace Unit No. 7 Exciter - Bay D'Espoir	13	757		770	Oct. 04	B-5
Replace Gate Hoist No. 2 - Ebbegunbaeg Control Structure	7	508		515	Sep. 04	B-8
Replace Unit 2 Governor Controls - Cat Arm		540		540	Oct. 04	B-10
Replace Unit 2 Exciter - Cat Arm		519		519	Nov. 04	B-12
Upgrade Controls Spherical Valve No. 3 - Bay D' Espoir		183		183	Aug. 04	B-14
Replace Loader/Backhoe - Bay D'Espoir	3	121		124	Nov. 04	B-16
Upgrade Control System - Holyrood		1,553	1,034	2,587	Aug. 05	B-17
Purch/Inst Ambient Monitoring System Enhancement		728		728	Oct. 04	B-19
Upgrade Civil Structures		78	2,002	2,080	Jul. 05	B-22
TOTAL GENERATION	23	4,987	3,036	8,046		

NEWFOUNDLAND & LABRADOR HYDRO
TRANSMISSION & RURAL OPERATIONS
2004 CAPITAL BUDGET - PROJECTS OVER $50,000 BY CATEGORY
($,000)

PROJECT DESCRIPTION	Exp To 2003	2004	Future Years	Total	In-Ser Date	Explanation Page Ref.
Upgrade TL214 - (138kV Bottom Brook - Doyles)	111	2,836		2,947	Sep. 04	B-25
Replace Insulators TL233 - (230kV Buchans - Bottom Brook)		1,055		1,055	Oct. 04	B-27
Replace Wood Poles - Transmission		325		325	Dec. 04	B-28
Upgrade 138kV and 66kV Protection - Deer Lake and Sunnyside		150		150	Dec. 04	B-29
Replace Digital Fault Recorder - Bay D'Espoir		77		77	Aug. 04	B-30
Install Motor Drive Mechanisms on Disconnect Switches - West Coast		207		207	Oct. 04	B-31
Replace Instrument Transformers		77		77	Dec. 04	B-33
Replace Surge Arrestors		70		70	Dec. 04	B-35
Replace 125V Battery Banks - Bottom Brook and Holyrood Terminal Stations		58		58	Jul. 04	B-37
Provide Service Extensions		1,558		1,558	Dec. 04	B-39
Upgrade Distribution Systems		1,471		1,471	Dec. 04	B-41
Pole Replacements		993		993	Sep. 04	B-43
Insulator Replacements		945		945	Oct. 04	B-45
Purchase and Install Recloser L6 - Bear Cove		85		85	Oct. 04	B-47
Replace Substation Transformer - Rigolet		76		76	Oct. 04	B-48
Upgrade Generator Relaying - Happy Valley North Plant		170		170	Sep. 04	B-51
Purchase Meters & Equipment - TRO System		98		98	Dec. 04	B-52
TOTAL TRANSMISSION & RURAL OPERATIONS	**111**	**10,251**	**0**	**10,362**		

NEWFOUNDLAND & LABRADOR HYDRO
GENERAL PROPERTIES
2004 CAPITAL BUDGET - PROJECTS OVER $50,000 BY CATEGORY
($,000)

PROJECT DESCRIPTION	Exp To 2003	2004	Future Years	Total	In-Ser Date	Explanation Page Ref.
Replace Energy Management System - Energy Control Centre	1,214	4,293	6,780	12,287	Oct. 06	B-53
Corporate Applications Environment		540		540	Dec. 04	B-59
Applications Enhancements		463		463	Dec. 05	B-60
Security Program - Centralized Log Monitoring & Analysis System	57	83		140	Dec. 04	B-62
Security Program - Secure Remote Access		75	76	151	Dec. 05	B-64
End User & Server Evergreen Program		2,811		2,811	Oct. 04	B-66
Peripheral Infrastructure Replacement - 2004		101		101	Dec. 04	B-69
JDE Migration Assessment Study		231		231	May. 04	B-70
Replace VHF Mobile Radio System		3,048	5,802	8,850	Dec. 05	B-71
Replace Powerline Carrier Equipment - Transmission System - West Coast	1,009	419		1,428	Dec. 04	B-73
Replace Battery System - Multiple Sites - 2004		274		274	Oct. 04	B-75
Replace Remote Terminal Unit for Hydro - Phase 5		314		314	Oct. 04	B-77
Replacement of Operational Data & Voice Network - Phase 2		971	1,247	2,218	Oct. 05	B-79
Replace Vehicles - Hydro System - 2003	1,584	1,142		2,726	Jun. 04	B-81
Replace Vehicles - Hydro System - 2004		1,081	1,181	2,262	Jun. 05	B-83
Purchase Cash Remittance Processor		60		60	Apr. 04	B-85
Electronic Metering Reading		36	224	260	Dec. 05	B-86
TOTAL GENERAL PROPERTIES	3,864	15,942	15,310	35,116		

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Unit No. 7 Exciter – Bay d'Espoir

Location: Bay d'Espoir

Division: Production

Classification: Hydro Plants

Project Description:

This project for 2004 is the continuation of a project which the Board has approved funds for 2003. The project consists of the purchase, installation and commissioning of a replacement static exciter for Unit 7 at Bay d'Espoir. The exciter will be an ABB Unitrol P similar to that used on Units 1 to 6 at Bay d'Espoir. The installation will be done during the planned maintenance outage for Unit 7 in 2004. This project is part of an ongoing replacement program started in 1995. To date, exciters have been replaced on six units at Bay d'Espoir, two units at Holyrood and most recently on Unit 1 at Cat Arm in 2002.

Project Cost: *($ x1,000)*	**2003**	**2004**	**Beyond**	**Total**
Material Supply	0.0	510.0	0.0	510.0
Labour	0.0	65.0	0.0	65.0
Engineering	12.0	63.0	0.0	75.0
Project Management	0.0	0.0	0.0	0.0
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	1.1	119.2	0.0	120.3
Total	**13.1**	**757.2**	**0.0**	**770.3**

Operating Experience:

The existing exciter is part of the original equipment installed in 1977. It has been in service for 96300 hours. The most recent repair on the exciter is a fan failure in September 2000 which resulted in a unit trip.

Project Justification:

The existing General Electric (GE) Silcomatic IV exciter is the original equipment installed in 1977. GE is no longer able to guarantee the availability of components needed to repair failed electronic cards.

A report titled "A Condition Assessment of Exciters within the Bay d'Espoir Powerhouse No.2, Hind's Lake, Upper Salmon, Cat Arm and Holyrood Generating Stations" dated March 28, 2000 was prepared by Generation Engineering and was submitted to the Board as part of Hydro's 2003 Capital Budget Application (Section G, Appendix I).

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Unit No. 7 Exciter – Bay d'Espoir **(cont'd.)**

Project Justification: (cont'd.)

This report looked at the service history of the Unit 7 exciter and the availability of technical support and spare parts from the original equipment manufacturer (General Electric).

At the time of the report, GE identified two cards that were obsolete and no longer manufactured. Hydro has one of these cards in stock but not the other. As well, GE stated that they would provide technical support for the near future but could not guarantee the repair of failed cards as the electronic components to repair the cards may not be available. If parts were to fail and spares were not available, it could result in a lengthy outage.

The report recommended the replacement of the Unit 7 exciter in 2004. The average service life of the six exciters replaced in Bay d'Espoir and two in Holyrood between 1995 and 2000 was 27 years. Based on an in service date of 1977 for the Unit 7 exciter, 2004 is an acceptable time to replace it.

The replacement of the Unit 7 exciter is a preventative measure to ensure that an exciter is in place that is fully supported by the manufacturer. The same model of exciter used at Bay d'Espoir on Units 1 - 6 is proposed for the Unit 7 replacement in 2004. The training for this type of exciter has been done and maintenance and engineering personnel will have familiarity with this model.

The loss of the exciter on Unit 7 would result in the unit (150 MW) being out of service until repairs could be made. If a working spare part is available, the outage duration would be short. If the part is not available, the outage will be lengthy while a spare is being found or a new exciter has to be purchased and commissioned. This will impact the reliability and availability of the unit and it could affect Hydro's ability to supply all of its customers. Depending on the time of year when an outage occurs, replacement capacity, if available, would have to be obtained through increased thermal production at Holyrood or gas turbine sites at significantly higher costs. The cost of replacement energy from Holyrood arising from an outage of this unit

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Unit No. 7 Exciter – Bay d'Espoir **(cont'd.)**

Project Justification: (cont'd.)

is approximately $168,000/day assuming fuel at $29.20/bbl. As well, a lengthy outage would increase the risk of spill during high inflow periods.

Future Plans:

This project will complete the exciter replacement at Bay d'Espoir.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Gate Hoist No. 2 - Ebbegunbaeg Control Structure

Location: Ebbegunbaeg Control Structure

Division: Production

Classification: Hydro Plants

Project Description:

This project for 2004 is a continuation of a project for which the Board has approved funds for 2003. The project consists of the replacement of the existing screw stem hoist mechanism on gate No. 2 at the Ebbegunbaeg Control Structure with a wire rope type hoist.

Project Cost: *($ x1,000)*	**2003**	**2004**	**Beyond**	**Total**
Material Supply	0.0	279.0	0.0	279.0
Labour	0.0	106.0	0.0	106.0
Engineering	6.0	22.0	0.0	28.0
Project Management	0.0	0.0	0.0	0.0
Inspection & Commissioning	0.0	9.0	0.0	9.0
Corp O/H, AFUDC, Esc. & Contingency	0.6	91.9	0.0	92.5
Total	**6.6**	**507.9**	**0.0**	**514.5**

Operating Experience:

The Ebbegunbaeg gates control the flow of water from Meelpaeg Lake into the Upper Salmon and Bay d'Espoir power plants and is in virtually continuous use. The structure and equipment are 35 years old. In 2000, two screw stems, drive nuts and extensions were replaced at a cost of $52,000. Engineering, delivery and installation took 5 months. Since then, slight bends have developed and drive nuts had to be replaced again.

Project Justification:

The existing screw stem hoists are 35 years old and require significant maintenance. Although screw stem gates are common across Canada, each installation is custom designed and "off the shelf" parts are not available for hoists of this age. Screw stems bend frequently, are expensive to replace and have a long lead time for manufacture. The gear boxes and other components are obsolete and replacement parts must be reverse engineered and custom manufactured. Depending on which component fails, a gate could be out of service for several months awaiting a replacement part. As the structure is remotely controlled, it is essential that the gates are capable of being operated at all times. If a screw stem were to break or brass drive nut strip during gate closure, the gate indication could be "closed" at the Energy Control Centre, while

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Gate Hoist No. 2 - Ebbegunbaeg Control Structure **(cont'd.)**

Project Justification: (cont'd.)

the gate is actually in the open position. Were such an event to occur when the unit at Upper Salmon is not available, water would have to be spilled around the Upper Salmon facility. The value of this lost production is equivalent to approximately 3,200 barrels of oil per day at Holyrood. At $29.20/barrel, this would represent a loss of $93,000 per day.

The Ebbegunbaeg gates are very important in the operation of the Bay d'Espoir reservoir system. The hoist removed will be retained to provide spare parts for the remaining two gates. For normal operation only one gate is used at Ebbegunbaeg. Gate No. 2 hoist will be replaced because, as the center gate, it is hydraulically preferred and receives the most use. Replacing the hoist mechanism with a new assembly will ensure that the most frequently operated gate has high reliability. Wire rope hoists are expected to be more reliable than screw stem hoists.

To ensure that this project will be completed at the lowest possible cost, Newfoundland and Labrador Hydro will solicit competitive bids for all materials and external labor.

Future Plans:

None.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Unit 2 Governor Controls – Cat Arm

Location: Cat Arm

Division: Production

Classification: Hydro Plants

Project Description:

This project consists of the purchase, installation and commissioning of a replacement for the controls portion of the governor on Unit 2 at Cat Arm. The installation will be done during the planned outage of the unit in 2004.

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	325.0	0.0	0.0	325.0
Labour	80.0	0.0	0.0	80.0
Engineering	50.0	0.0	0.0	50.0
Project Management	0.0	0.0	0.0	0.0
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	85.0	0.0	0.0	85.0
Total	**540.0**	**0.0**	**0.0**	**540.0**

Operating Experience:

The governor controls are the original equipment which has been in service since 1984 and has been in operation approximately 33,000 hours. The most recent card repair on Unit 2 governor was the replacement of the speed setpoint control card on July 3, 2002.

Project Justification:

The governor on Unit 2 at Cat Arm is the original equipment put into service in 1984. It serves to regulate the speed of the generating unit. The governor controls are an analog electronic type that has been manufactured since 1974. The replacement is required due to the manufacturer's decision to discontinue repair or replacement of electronic cards by the end of 2004.

A report titled "Condition Assessment of Governor Controls for Upper Salmon and Cat Arm Units" was prepared by Generation Engineering dated June 2001 and is attached to Section G, Appendix 1. This report reviewed the service history of the Cat Arm governor controls and the availability of technical support and spare parts from the original equipment manufacturer.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Unit 2 Governor Controls – Cat Arm **(cont'd.)**

Project Justification: (cont'd.)

The report recommended that the governor controls for one unit should be replaced in 2004 as a preventative measure which will ensure that a supply of spare parts is available beyond 2004 for the remaining unit.

The loss of the governor controls would result in the unit being out of service until repairs could be made. While spares are available the problem can be corrected and the unit returned to service within a reasonably short time. After 2004 a failure could result in a lengthy outage to the unit while a replacement control system is purchased and installed. A typical delivery time frame for a governor control system is 120 days.

Depending on the time of year when an outage occurs, replacement capacity, if available, would have to be obtained through increased thermal production at Holyrood or gas turbines at significantly higher costs. Replacement energy from Holyrood as a result of an outage to this unit would cost approximately $71,000/day assuming fuel at $29.20/bbl. As well, a lengthy outage would increase the risk of spill during higher inflow periods.

To ensure that the project will be completed at lowest possible cost, Hydro will solicit competitive bids for all materials and external labour.

Future Plans:

None.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Unit 2 Exciter – Cat Arm

Location: Cat Arm

Division: Production

Classification: Hydro Plants

Project Description:

The project consists of the purchase, installation and commissioning of a replacement static exciter for Unit 2 at Cat Arm. The replacement exciter will be an ABB Unitrol F model similar to that installed at Cat Arm - Unit No. 1 in 2002 and Granite Canal in 2003.

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	305.0	0.0	0.0	305.0
Labour	80.0	0.0	0.0	80.0
Engineering	50.0	0.0	0.0	50.0
Project Management	0.0	0.0	0.0	0.0
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	83.5	0.0	0.0	83.5
Total	**518.5**	**0.0**	**0.0**	**518.5**

Operating Experience:

The existing exciter is part of the original equipment in service since 1984. The unit has been in operation for 33,000 hours. The most recent problem with the exciter was in September 2001 when the field breaker repeatedly opened and closed.

Project Justification:

The existing Brown Boveri Type A 16030 exciter is the original equipment installed in 1984. Spare parts for the exciter are no longer manufactured or technically supported by the manufacturer.

A report titled “A Condition Assessment of Exciters within the Bay D’Espoir Powerhouse No. 2, Hinds Lake, Upper Salmon, Cat Arm and Holyrood Generating Stations” was prepared by Generation Engineering dated March 28, 2000. This report reviewed the service history of the Unit 2 exciter and the availability of technical support and spare parts from the original equipment manufacturer. The report was submitted to the Board as part of Hydro’s 2003 Capital Budget Application (Section G, Appendix I)

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Unit 2 Exciter – Cat Arm **(cont'd.)**

Project Justification: (cont'd.)

The manufacturer has advised that all parts are obsolete and no longer manufactured. The lack of engineering support was identified as a concern in addition to the spare parts availability. If parts were to fail and spares were not available, it could result in a lengthy outage.

Depending on the time of year when an outage occurs, replacement energy, if available, would have to be obtained through increased thermal production at Holyrood or gas turbines at significantly higher cost. Replacement energy from Holyrood as a result of an outage to this unit would cost approximately $71,000/day assuming fuel at $29.20/bbl. As well, a lengthy outage would increase the risk of spill during high inflow periods.

Training for the proposed type of exciter has been completed, spare parts are available, and maintenance and engineering personnel are familiar with the model. To-date, exciters have been replaced on six units at Bay d'Espoir, two units at Holyrood and most recently on Unit No. 1 at Cat Arm during 2002.

Future Plans:

This project will complete exciter replacements at Cat Arm.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Upgrade Controls Spherical Valve No. 3

Location: Bay d'Espoir

Division: Production

Classification: Hydro Plants

Project Description:

This project involves the upgrading of the control system for spherical valve No. 3 by replacing components, including control valves, piping, tubing, and control panel. It is a continuation of a program started in 2001 to upgrade control systems on spherical valves at Bay d'Espoir. The Board has previously approved upgrades on three of the six systems at Bay d'Espoir powerhouse No. 1. The new controls will have stainless steel mechanical components for corrosion protection and a programmable logic controller with manual overrides.

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	100.0	0.0	0.0	100.0
Labour	39.0	0.0	0.0	39.0
Engineering	6.0	0.0	0.0	6.0
Project Management	7.0	0.0	0.0	7.0
Inspection & Commissioning	2.0	0.0	0.0	2.0
Corp O/H, AFUDC, Esc. & Contingency	29.2	0.0	0.0	29.2
Total	**183.2**	**0.0**	**0.0**	**183.2**

Operating Experience:

Bay d'Espoir unit No. 3, along with the spherical valve and control system became, operational in October 1967. This generating unit typically operates for 5,500 hours each year. The spherical valve is the main shut-off valve for the turbine and also functions as an emergency shut-off device. In the last five years, there have been 28 maintenance events for this control system, which is much higher than expected. Control systems on Unit No. 4 and Unit No. 2 were upgraded in 2001 and 2002 respectively and the upgrade for Unit No. 1 is expected to be completed during 2003.

Project Justification:

The control system for spherical valve No. 3 is obsolete and unreliable. Replacement parts have to be reversed engineered and custom made. The failure of the existing control system can result in the following events:

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Upgrade Controls Spherical Valve No. 3 – Bay d'Espoir **(cont'd.)**

Project Justification: (cont'd.)

a) Single unit outage (75 MW) due to spherical valve not operating, with loss of generation and an extended outage;

b) Outage (150 MW) of two units on the same penstock and potential damage to the unit if the spherical valve stays open during a unit runaway condition and forcing the head gate closure.

c) Loss of all six units (450 MW) in powerhouse No. 1 if the spherical valve or seals fail while the turbine access door is open for maintenance resulting in the flooding of powerhouse No. 1, with the potential for loss of life.

Depending on the time of year when a failure occurs, replacement capacity and energy, if available, would have to be obtained through increased thermal production at Holyrood or gas turbine sites at significantly higher costs. As well, a lengthy outage would increase the risk of spill during high inflow periods. The cost of replacement energy from Holyrood arising from an outage of two units (150 MW) is approximately $168,000/day assuming fuel at $29.20/bbl. Given the significance of the generating capacity to the overall system, it would be unacceptable to maintain the status quo and risk the loss of capacity.

Future Plans:

It is currently planned to have control systems upgraded on two more units at Bay d'Espoir over the next two years.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Loader/Backhoe

Location: Bay d'Espoir

Division: Production

Classification: Hydro Plants

Project Description:

This project is a continuation of a project for which the Board has approved funds for 2003. The project consists of the replacement of loader/backhoe - V9770 at Bay d'Espoir.

Project Cost: *($ x1,000)*	**2003**	**2004**	**Beyond**	**Total**
Material Supply	0.0	115.0	0.0	115.0
Labour	0.0	0.0	0.0	0.0
Engineering	3.0	0.0	0.0	3.0
Project Management	0.0	0.0	0.0	0.0
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	0.1	5.6	0.0	5.7
Total	**3.1**	**120.6**	**0.0**	**123.7**

Operating Experience:

The current machine is a 1990 JCB Model 1400 loader with an attached backhoe. It is the only loader/backhoe at the Bay d'Espoir facility and it is used extensively for maintenance on dams, dykes, roads and grounds at Bay d'Espoir, Upper Salmon, Hinds Lake, Cat Arm and Paradise River. It is also used for winter road maintenance such as clearing snow and handling salt and sand. Corrective maintenance costs on this machine has been averaging $9,000 annually, excluding preventative maintenance and routine maintenance costs.

Project Justification:

This machine is critical to the maintenance programs at the hydroelectric sites. A mechanical evaluation has indicated symptoms of serious engine deterioration and the body structure is showing signs of major wear. The number of breakdowns and associated repair costs have been increasing and the machine is nearing the end of its useful life.

To ensure that this project will be completed at the lowest possible cost, Newfoundland and Labrador Hydro will solicit competitive bids for this equipment.

Future Plans:

None.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Upgrade Control System

Location: Holyrood

Division: Production

Classification: Generation - Thermal

Project Description:

This project involves the replacement of an obsolete Distributed Control System (DCS) on the three Holyrood units, which provide control for the boilers, boiler auxiliary systems, station service, burner management, turbine and generator monitoring and control for other plant systems. Replacement parts for these existing controls are no longer available from the vendor and only limited vendor support is available. It is proposed that some parts of the overall system (cabinets, I/O cards and terminations) will be reused. The unit 1 and 2 DCS will be upgraded in 2004 and Unit 3 in 2005.

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	1,000.0	790.0	0.0	1,790.0
Labour	35.0	28.0	0.0	63.0
Engineering	277.0	30.0	0.0	307.0
Project Management	0.0	0.0	0.0	0.0
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	240.6	186.1	0.0	426.7
Total	**1,552.6**	**1,034.1**	**0.0**	**2,586.7**

Operating Experience:

The existing DCS for Units No. 1 and 2 was implemented in 1988 and for Unit No. 3 in 1992. The manufacturer's commitment of support for these systems expired in January 2002 and January 2003 respectively.

Project Justification:

The manufacturer has informed Hydro that parts of the Distributed Control System (DCS) are obsolete and the system is no longer supported. Based on the spare parts available in Hydro's inventory and failure history, sufficient spare parts are available to maintain and operate the systems until 2004. Beyond this date it is expected that only used or refurbished parts would be available for some repairs, however, their availability would be uncertain. The Holyrood units cannot operate without the DCS functioning properly and a replacement is necessary to maintain plant availability and reliability. An outage to a unit (150-175 MW) could affect Hydro's ability to supply customers. Depending on the time of year, replacement capacity, if available,

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Upgrade Control System **(cont'd.)**

Project Justification: (cont'd.)

may have to be obtained from gas turbines at significantly higher costs (e.g. $400,000/day assuming fuel is at $0.333/ℓ). It is proposed that the replacement be sourced to the same vendor (Westinghouse Process Controls Inc.) as parts of the existing system can be reused at a savings compared to a full replacement with another system. Based on the information from the vendor, the new technology would have guaranteed support for ten (10) years and it is expected that with minor software upgrades it will serve the plant for the next fifteen (15) years. A cost analysis report titled "Distributed Control System Lifecycle Planning" is attached in Section G, Appendix 2.

Besides improving plant reliability the replacement system will improve boiler efficiency due to a faster control system.

Future Plans:

None.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Purchase/Install Ambient Monitoring System Enhancement

Location: Holyrood Generating Station

Division: Production

Classification: Generation - Thermal

Project Description:

This project involves the expansion of the emission measurement capabilities of the existing ambient monitoring stations to include continuous monitoring of fine particulates and NOx (nitrogen oxides). These stations currently monitor ambient SO_2. Particulate monitors will be installed at each of four remote monitoring sites and at the plant main gate and NOx monitors will be installed at each of the four remote sites, but not at the plant main gate. (NOx will not be monitored at the main gate because this location is too close to the source for gas to reach ground level.)

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	523.0	0.0	0.0	523.0
Labour	36.0	0.0	0.0	36.0
Engineering	26.0	0.0	0.0	26.0
Project Management	0.0	0.0	0.0	0.0
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	143.1	0.0	0.0	143.1
Total	**728.1**	**0.0**	**0.0**	**728.1**

Operating Experience:

The Holyrood Thermal Generating Station has been in operation since 1971. The ambient monitoring stations were placed in service in 1996.

Project Justification:

In recent years, the Holyrood plant has been called upon for increased production arising from higher customer demand and a period of lower than normal inflow at Hydro's hydroelectric facilities. This has resulted in increased scrutiny by the Provincial Department of Environment and the public, particularly those living in close proximity to the plant. Holyrood is one of the most significant sources of environmental emissions in the Province and as Hydro has made a commitment to take a proactive position with respect to environmental responsibility and stewardship, attention has been focused on quantifying these emissions with a view to identifying the most appropriate means to reducing the facilities environmental impact on the

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Purchase/Install Ambient Monitoring System Enhancement **(cont'd.)**

Project Justification: (cont'd.)

surrounding environs. Air emissions from the Holyrood plant include particulate matter, NOx, SOx, and acid aerosols. To quantify emissions at the source and as it impinges on the surrounding area, the following projects have been implemented or are in progress:

- In 1996, four permanent ambient monitoring stations were installed at locations identified through a computer dispersion model. These sites currently measure only SO2 and total suspended particulates (TSP);

- In 1999 and 2000, opacity meters were installed on the stacks to monitor visible emissions (smoke density) of the exit gases;

- In 2002, approval was received for a continuous emission monitoring (CEM) system to measure NOx, SO2, CO2, CO and O2 at the stacks and provided a means to manage emissions directly at the source through control of the combustion process. This project is expected to be completed this year: and,

- In 2002, approval was received for a mobile ambient monitoring station to monitor fine particulates, NOx and SOx at locations not covered by existing permanent monitoring stations. This was to address concerns that air quality events were occurring at locations other than the existing monitoring sites and not as predicted by dispersion models. As well, Hydro received approval for a study to investigate technologies to reduce air emissions including particulates at Holyrood.

The current proposal will enhance the permanent ambient monitoring stations by adding NOx and fine particulate monitoring capability. These stations along with the other monitoring facilities enable emission measurement at the source and in the surrounding area and where problems are identified will assist in the process of selection of the most cost effective abatement technologies from amongst the many that are available.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Purchase/Install Ambient Monitoring System Enhancement **(cont'd.)**

Project Justification: (cont'd.)

Although current emissions are by and large below the statutory limits, a health risk assessment report by Cantox in 1999 concluded that further quantification of emissions is required. This report was supplied in response to NP-104 at Hydro's 2001 Rate Application. The expansion of monitoring capability at the permanent sites will provide additional data to support dispersion modeling. As well, the Department of Environment recommends monitoring fine particulate fallout.

To ensure that this project will be completed at the lowest possible cost, Hydro will solicit competitive bids for all material and external Labour.

Future Plans:

None.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Upgrade Civil Structures – Holyrood

Location: Holyrood Generating Station

Division: Production

Classification: Generation - Thermal

Project Description:

1. Boiler Stack

   The main components of Stack #2 are: concrete shell, steel liner, stack breeching and associated utilities. The scope of work involves the replacement of the interior steel liner. The liner consists of ¼" thick steel shell and has a diameter of 13.5 ft. and height of 302 ft. It is supported at the base by 35 ft. high steel framing. A similar replacement of the stack liner on Unit No. 1 was approved by the Board in 2003.

2. CW Screen Structure

   There are four Circulating Water (CW) screen structures located in pumphouse #1 and their function is to screen the salt water required for plant cooling. Two of the structures have been approved by the Board for replacement in 2003. The scope of this proposal involves the replacement of the two remaining steel structures that support the traveling screens. Each structure is 32 ft. high and fabricated from 3/8" thick angle iron and has a foot print of 5 ft. x 7 ft.

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	0.0	0.0	0.0	0.0
Labour	0.0	1,355.0	0.0	1,355.0
Engineering	70.0	100.0	0.0	170.0
Project Management	0.0	140.0	0.0	140.0
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	8.5	406.5	0.0	415.0
Total	**78.5**	**2,001.5**	**0.0**	**2,080.0**

Operating Experience:

1. Boiler Stack

   The stack and steel liners are 34 years old and are in use whenever the unit is operating. The cost to provide inspection and emergency maintenance for the steel liner during the last 6 years was $232,300.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Upgrade Civil Structures – Holyrood **(cont'd.)**

Operating Experience: (cont'd.)

2. CW Screen Structure

   The CW Screen structures are 34 years old and are located in 20 ft. of salt water. They are in use whenever the units are operating. In 2000 the traveling screens and rollers were replaced because of increased operating and maintenance costs.

Project Justification:

1. Boiler Stack

   Regular annual inspections revealed the need for major upgrade work for Stack No. 2. Stack inspections in 2001 and 2002 identified increased metal loss and thin spots on the steel liner. The probability of liner buckling and failure continues to increase. Emergency repairs undertaken during the last several years involved covering holes with steel patches or rings. This approach is believed to be no longer sufficient to prevent buckling or to provide the level of reliability required.

   Several options to upgrade the steel liner were explored. Each of the options results in a similar overall cost to extend the life of the steel liner to 2020, however, replacement of the steel liner will provide the best reliability over the remaining plant life. The liner replacement will be done during the major outage to Unit No. 2 and therefore will have minimal impact on its availability for generation.

   Failure to replace the liner as recommended would result in continued deterioration of the steel liner until buckling occurs and then failure. This would result in costly repairs with the unit out-of-service for the duration of the repairs, which would impact the supply of power to customers.

   An analysis of the possible options report titled "Evaluation of Options to Refurbish Stack Liner #2" is attached in Section G, Appendix 3.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Upgrade Civil Structures - Holyrood **(cont'd.)**

Project Justification: (cont'd.)

2. CW Screen Structure

   Inspections done in 1999 and 2000 confirm severe corroding, metal loss and the need for planned replacements of the CW screen structures. The probability of structure failure is increasing with time, corrosion, and mechanical wear.

   The failure to replace the structures as recommended would result in continued deterioration of the structures until their failure. This would result in costly repairs and reduced unit availability for the duration of the repairs, which would impact the supply of power to the customer.

   To ensure that this project will be completed at the lowest possible cost, Hydro will solicit competitive bids for all material and external labour.

Future Plans:

Work associated with this project is expected to be completed by 2005.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Upgrade TL214 (138kV Bottom Brook - Doyles)

Location: Bottom Brook and Doyles

Division: Transmission & Rural Operations

Classification: Transmission

Project Description:

This project for 2004 is the continuation of a project which the Board has approved funds for 2003. The project involves the addition of structures, installation of counterweights and replacement of insulators, over the whole line. The proposal includes costs to provide temporary generation to serve customers during outages required to complete the upgrade.

Project Cost: *($ x1,000)*	**2003**	**2004**	**Beyond**	**Total**
Material Supply	0.0	740.0	0.0	740.0
Labour	0.0	770.0	0.0	770.0
* **Engineering**	78.0	570.0	0.0	648.0
Environment	14.0	67.0	0.0	81.0
Internal Construction	0.0	40.0	0.0	40.0
Land and Survey	10.0	0.0	0.0	10.0
Project Management	0.0	90.0	0.0	90.0
Inspection & Commissioning	0.0	25.0	0.0	25.0
Corp O/H, AFUDC, Esc. & Contingency	8.7	534.2	0.0	542.9
Total	**110.7**	**2,836.2**	**0.0**	**2,946.9**

* **Cost of Alternative Generation Included in Engineering Cost**

Operating Experience:

TL214 is a 138kV transmission line which was constructed in 1968. Outage records confirm that outages are caused mainly due to high winds, salt contamination and lightning. No major upgrades have been carried out on this line since its construction.

Project Justification:

The TL214 transient outage frequency rate is 8.31 per 100 km/year, and the sustained outage frequency is 1.90 per 100 km/year. From 1990 - 2001 there have been 46 interruptions attributed to lightning and salt contamination and 83 interruptions due to wind related causes.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Upgrade TL214 (138kV Bottom Brook - Doyles) **(cont'd.)**

Project Justification:

A condition assessment review was conducted to confirm the condition of the line and to recommend corrective action. The full report titled "TL214 Condition Assessment and Recommendations for Upgrading" was submitted to the Board as part of Hydro's 2003 Capital Budget Application (Section G, Appendix 3).

To ensure that this project will be completed at the lowest possible cost, Newfoundland and Labrador Hydro will solicit competitive bids for all materials and external labor.

Future Plans:

This is a two-year project with detailed engineering work and material ordering taking place in 2003 and the construction work taking place in 2004. There is no future work planned beyond 2004.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Insulators TL233 (230kV Buchans - Bottom Brook)

Location: Buchans and Bottom Brook

Division: Transmission & Rural Operations

Classification: Transmission

Project Description:

TL233 is a 230kV transmission line that runs from Buchans to Bottom Brook, a distance of 135 km. It is an H-Frame wooden pole line, which was constructed in 1973. This project is to replace all of the remaining Canadian Ohio Brass (COB) insulators on the line, from structure 250 to 577, inclusive.

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	500.0	0.0	0.0	500.0
Labour	236.0	0.0	0.0	236.0
Engineering	62.0	0.0	0.0	62.0
Project Management	46.0	0.0	0.0	46.0
Inspection & Commissioning	14.0	0.0	0.0	14.0
Corp O/H, AFUDC, Esc. & Contingency	196.6	0.0	0.0	196.6
Total	**1,054.6**	**0.0**	**0.0**	**1,054.6**

Operating Experience:

During the 2000 preventative maintenance program, a total of 1950 insulators were tested, with 77 insulators being found defective (i.e. 4%). During the 2001 program a total of 115 defective insulators were found (i.e.6%). Each year a significant quantity of defective COB insulators are found and defective insulators are showing up on strings that have had replacements during previous maintenance cycles (i.e. 5 years).

Project Justification:

This is the continuation of a program to replace pre-1974 vintage insulators manufactured by COB. These COB insulators are part of a group of insulators that has experienced industry-wide failures due to cement growth causing radial cracks that resulted in moisture intrusion. The section of line from structure 250 to 577 is the only section on TL233 with COB insulators in service. The insulators in the remaining section (structure 1 to 249) have been changed. Replacement is essential to maintain system security and reliability.

To ensure that the project will be completed at lowest possible cost, Hydro will solicit competitive bids for all materials and external labour.

Future Plans:

None.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Wood Poles - Transmission

Location: Various Sites

Division: Transmission & Rural Operations

Classification: Transmission

Project Description:

This project consists of the replacement of deteriorated wood poles on Hydro's bulk electrical transmission system.

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	90.0	0.0	0.0	90.0
Labour	175.0	0.0	0.0	175.0
Engineering	0.0	0.0	0.0	0.0
Project Management	0.0	0.0	0.0	0.0
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	60.9	0.0	0.0	60.9
Total	**325.9**	**0.0**	**0.0**	**325.9**

Operating Experience:

Newfoundland and Labrador Hydro operates approximately 2500 km of wood pole transmission lines at various voltage levels from 69kV to 230kV. This includes the maintenance of 26,000 transmission poles to deliver power to Hydro's terminal stations located on the Island and in Labrador. Approximately 35% of these poles are in excess of thirty-years old.

Project Justification:

Through the 2003 transmission preventative maintenance program, a number of wood poles will be identified which will require replacement in 2004 due to significant deterioration. Replacement of these poles will be essential to maintaining power system reliability.

To ensure that this project will be completed at the lowest possible cost, Hydro will solicit competitive bids for all material and external labour.

Future Plans:

None.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Upgrade 138kV and 66kV Protection

Location: Deer Lake and Sunnyside Terminal Stations

Division: Transmission & Rural Operations

Classification: System Performance & Protection

Project Description:

This project consists of the purchase and installation of microprocessor based relays to improve protection on the 138kV lines: TL239 and TL245 at Deer Lake; 100L and 109L at Sunnyside; and, 66kV lines - TL225 and TL226 at Deer Lake. The existing relays will be removed and the new equipment installed on modified protection panels.

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	80.0	0.0	0.0	80.0
Labour	31.0	0.0	0.0	31.0
Engineering	20.0	0.0	0.0	20.0
Project Management	0.0	0.0	0.0	0.0
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	19.2	0.0	0.0	19.2
Total	**150.2**	**0.0**	**0.0**	**150.2**

Operating Experience:

The existing electromechanical relays are approximately 30 years old and are difficult to maintain and calibrate. As a result, system performance levels are adversely affected.

Project Justification:

This project will improve the protection on 138kV and 66kV lines which currently have electromechanical relays for both phase and ground protection. The relays will also provide faster back-up clearing times. They will have enhanced capabilities, self-diagnostics and alarm in the event of an internal failure. These relays can be remotely interrogated thus enabling more timely analysis of problems on the lines or with the relays themselves. This is part of ongoing initiative to improve protection systems on the bulk transmission system.

To ensure that this project will be completed at the lowest possible cost, Newfoundland and Labrador Hydro will solicit competitive bids for all materials.

Future Plans:

None.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Digital Fault Recorder - Bay d'Espoir

Location: Bay d'Espoir Terminal Station

Division: Transmission & Rural Operations

Classification: System Performance & Protection

Project Description:

This project consists of the purchase, installation and commissioning of a new 16 channel Digital Fault Recorder at Bay d'Espoir Terminal Station #2 to replace the existing unit.

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	41.5	0.0	0.0	41.5
Labour	12.1	0.0	0.0	12.1
Engineering	6.6	0.0	0.0	6.6
Project Management	0.0	0.0	0.0	0.0
Inspection & Commissioning	2.2	0.0	0.0	2.2
Corp O/H, AFUDC, Esc. & Contingency	14.6	0.0	0.0	14.6
Total	**77.0**	**0.0**	**0.0**	**77.0**

Operating Experience:

The existing recorder is approximately 16 years old. The technology is outdated and there are continuing problems with the operation of the unit.

Project Justification:

Fault recorders are required to provide real time and historical information on equipment operation during faults which will be used in the identification of problems which, when corrected, will enhance performance thereby improving customer service and reliability.

To ensure that this project will be completed at the lowest possible cost, Newfoundland and Labrador Hydro will solicit competitive bids for all materials.

Future Plans:

None.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Install Motor Drive Mechanisms on Disconnect Switches - West Coast

Location: West Coast

Division: Transmission & Rural Operations

Classification: Terminals

Project Description:

This project consists of the installation of motor drive mechanisms on seven 230kV disconnect switches at Stephenville (2), Massey Drive (4), and Bottom Brook (1). This will allow the disconnects to be motor operated rather than the current manual operation.

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	51.0	0.0	0.0	51.0
Labour	58.0	0.0	0.0	58.0
Engineering	22.0	0.0	0.0	22.0
Project Management	11.0	0.0	0.0	11.0
Inspection & Commissioning	24.0	0.0	0.0	24.0
Corp O/H, AFUDC, Esc. & Contingency	41.3	0.0	0.0	41.0
Total	**207.3**	**0.0**	**0.0**	**207.3**

Operating Experience:

Disconnects are used for equipment isolations either for system operations or for regular maintenance activities. These disconnects are the original 230kV units that were installed with the stations when they were first constructed in the late 1960's. They are inspected regularly, lubricated as required and insulators are replaced when they fail in service.

Project Justification:

When originally installed, the normal design practice was that disconnects be manually operated. The only motorized disconnects provided were those used for transformer protection and isolation. However, since that time, a workplace safety concern has identified the requirement for motorized disconnects.

The arrangement of the 230kV disconnect switches is such that the operator has to stand directly under the switch to operate it. From this position, the operator does not have a full clear view of the switch and cannot observe strain or breakage on the associated station post insulators and other switch components and is therefore at risk of serious injury.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Install Motor Drive Mechanisms on Disconnect Switches - West Coast **(cont'd.)**

Project Justification: (cont'd.)

During the period from 1988 to 1999, Hydro experienced three incidents associated with the failure of station post insulators on 230kV disconnects. This resulted in regular inspections being carried out to identify faulty insulators and have them replaced prior to in-service failure. However, this practice will not completely eliminate the risks associated with manual switching.

To ensure that this project will be completed at the lowest possible cost, Newfoundland and Labrador Hydro will solicit competitive bids for all materials and external labor.

Future Plans:

This is the second year of a three-year program to install motor operators on all manual 230kV disconnects on the system.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Instrument Transformers

Location: Various Terminal Stations

Division: Transmission & Rural Operations

Classification: Terminals

Project Description:

This project involves the purchase and installation of replacement instrument transformers (potential transformers, capacitive voltage transformers and current transformers) at various terminal stations across the system.

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	60.0	0.0	0.0	60.0
Labour	3.2	0.0	0.0	3.2
Engineering	0.0	0.0	0.0	0.0
Project Management	0.0	0.0	0.0	0.0
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	13.8	0.0	0.0	13.8
Total	**77.0**	**0.0**	**0.0**	**77.0**

Operating Experience:

Instrument transformers have a typical service life of 30-40 years, depending on the service conditions. Units are inspected and tested regularly and replacements are made based on these maintenance assessments or on 'in-service' failures. The maintenance assessments for instrument transformers are visual inspection and voltage/current checks of the secondary circuits. Typically, approximately 6 instrument transformers fail or need to be replaced each year.

Project Justification:

Instrument transformers provide critical input to protection, control and metering equipment required for the reliable operation and protection of the electrical system. Instrument transformers which fail in-service can result in faults on the electrical system and outages to customers.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Instrument Transformers **(cont'd.)**

Project Justification: (cont'd.)

When these units fail, the normal utility practice is to replace, as they are not repairable and to hold a reserve inventory sufficient to replace service units based on maintenance assessments or failure.

Project estimates are based on an equal number of units in each voltage class (69kV, 138kV and 230kV) requiring replacement.

To ensure that this project will be completed at the lowest possible cost, Newfoundland and Labrador Hydro will solicit competitive bids for all materials.

Future Plans:

This is an annual allotment, which will be adjusted from year to year depending on ongoing performance.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Surge Arrestors

Location: Various Terminal Stations

Division: Transmission & Rural Operations

Classification: Terminals

Project Description:

This project involves the purchase and installation of replacement surge arrestors at various terminal stations across the system.

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	46.8	0.0	0.0	46.8
Labour	10.0	0.0	0.0	10.0
Engineering	0.0	0.0	0.0	0.0
Project Management	0.0	0.0	0.0	0.0
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	13.5	0.0	0.0	13.5
Total	**70.3**	**0.0**	**0.0**	**70.3**

Operating Experience:

Surge arrestors provide critical overvoltage protection of the power system equipment from lightning and switching surges. Throughout the regions there are surge arrestors in the 69kV, 138kV and 230kV voltage classes, in service. Replacements are typically required as a result of maintenance assessments, in-service failures, and equipment that has reached the end of its useful service life. Equipment manufacturers indicate the useful service life of surge arrestors as 20 years. Typically, 15 surge arrestors will require replacement per year across the system.

Project Justification:

In-service failures due to severe lightning strikes and switching surges are unavoidable and require immediate replacement to ensure system overvoltage protection. Replacements based on maintenance assessments and the manufacturers' recommended useful service life are required to prevent additional in-service failures. Lightning arrestors can fail catastrophically resulting in system disturbances, and high potential for damage to adjacent equipment. The timely replacement of surge arrestors prior to age or condition related in-service failures will improve system reliability.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Surge Arrestors **(cont'd.)**

Project Justification:

To ensure that this project will be completed at the lowest possible cost, Newfoundland and Labrador Hydro will solicit competitive bids for all materials.

Future Plans:

This is an annual allotment, which will be adjusted from year to year depending on ongoing performance.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace 125V Battery Banks

Location: Bottom Brook and Holyrood Terminal Stations

Division: Transmission & Rural Operations

Classification: Terminals

Project Description:

This project consists of the purchase and installation of a new 60 cell, 125 volt, and 300 ampere hour stationary battery bank for each of the terminal stations at Bottom Brook and Holyrood. Each battery will be a lead calcium flooded cell type. The new batteries will be designed to be compatible with the existing chargers at each station.

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	37.0	0.0	0.0	37.0
Labour	8.0	0.0	0.0	8.0
Engineering	6.0	0.0	0.0	6.0
Project Management	0.0	0.0	0.0	0.0
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	7.0	0.0	0.0	7.0
Total	**58.0**	**0.0**	**0.0**	**58.0**

Operating Experience:

The current station batteries were originally installed in 1984 and will be in service for 20 years by 2004. Regular maintenance work involves voltage, specific gravity and load discharge tests. For the two stations, the DC load requirements have not changed. Therefore, there is no requirement to change the capacity of the battery bank.

Project Justification:

The station battery bank provides the DC supply for the station and transmission line protection equipment, control and operation. Routine maintenance tests have confirmed a general deterioration in the battery cell conditions and a 15 to 20% reduction in battery cell capacity.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace 125V Battery Banks **(cont'd.)**

Project Justification: (cont'd.)

The batteries have shown the normal expected life deterioration until the past two years, when regular maintenance tests indicated an increased rate of growth of cell plates and a decrease in loading capability to less than 80% of the full battery rating. This increased rate of deterioration indicates that the battery is at the end of its life. The normal expected life of this type of battery is 18 to 20 years.

If the batteries are not replaced, remote control of the station from ECC will not be possible during system outages and the system protection and control equipment will not function properly and this will result in reduced system reliability.

To ensure that this project will be completed at the lowest possible cost, Newfoundland and Labrador Hydro will solicit competitive bids for all materials and external labor.

Future Plans:

None.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Service Extensions

Location: All Service Areas

Division: Transmission & Rural Operations

Classification: Distribution

Project Description:

This project is an annual allotment based on past expenditures to provide for service connections (including street lights) to new customers. This summary identifies the total budget for all regions.

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	725.0	0.0	0.0	725.0
Labour	696.0	0.0	0.0	696.0
Engineering	0.0	0.0	0.0	0.0
Project Management	0.0	0.0	0.0	0.0
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	137.0	0.0	0.0	137.0
Total	**1,558.0**	**0.0**	**0.0**	**1,558.0**

Operating Experience:

An analysis of average historical expenditure (i.e. 1998 - 2002) on new customer connections is shown in the following table. All historical dollars were converted to 2002 dollars using the GDP Implicit Price Deflator and a 5-year average calculated.

Region	**Avg. Yearly Expenditures (1998 - 2002) ($000)**
Central	$ 484
Northern	$ 447
Labrador	$ 569
Total	$ 1,500

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Service Extensions **(cont'd.)**

Project Justification:

Based on the 5-year average of service extension expenditures for the period 1998 - 2002 (in 2002 dollars) the following budget was developed assuming escalation in 2003 and 2004 of approximately 2.0%.

Region	**2004 Budget ($000)**
Central	$ 503
Northern	$ 464
Labrador	$ 591
Total	$ 1,558

To ensure that this project will be completed at the lowest possible cost, Newfoundland and Labrador Hydro will solicit competitive bids for all materials and external labor.

Future Plans:

This is an annual allotment, which will be adjusted from year to year depending on historical expenditures.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Upgrade Distribution Systems

Location: All Service Areas

Division: Transmission & Rural Operations

Classification: Distribution

Project Description:

This project is an annual allotment based on past expenditures to provide for the replacement of deteriorated poles, substandard structures, corroded and damaged conductors, rusty and overloaded transformers/street lights/reclosers and other associated equipment. This upgrading is identified through preventive maintenance inspections or damage caused by storms and adverse weather conditions and salt contamination. This summarizes the total budget for all regions.

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	773.0	0.0	0.0	773.0
Labour	560.0	0.0	0.0	560.0
Engineering	0.0	0.0	0.0	0.0
Project Management	0.0	0.0	0.0	0.0
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	138.0	0.0	0.0	138.0
Total	**1,471.0**	**0.0**	**0.0**	**1,471.0**

Operating Experience:

An analysis of historical expenditures (i.e. 1998 - 2002) on distribution upgrades is shown in the following table. All historical dollars (table below) were converted to 2002 dollars using the GDP Implicit Price Deflator and 5-year average calculated.

Region	**Avg. Yearly Expenditures (1998 - 2002) ($000)**
Central	$ 511
Northern	$ 588
Labrador	$ 316
Total	$ 1,415

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Upgrade Distribution Systems **(cont'd.)**

Project Justification: (cont'd.)

Based on this 5-year average for distribution system upgrades for the period 1998 - 2002 the following budget was developed using an escalation in 2003 and 2004 of approximately 2.0%.

Region	**2004 Budget ($000)**
Central	$ 531
Northern	$ 611
Labrador	$ 329
Total	$ 1,471

To ensure that this project will be completed at the lowest possible cost, Newfoundland and Labrador Hydro will solicit competitive bids for all materials and external labor.

Future Plans:

This is an annual allotment which will be adjusted from year to year depending on historical expenditures.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Pole Replacements

Location: Distribution Lines in Bottom Waters and St. Anthony Systems

Division: Transmission & Rural Operations

Classification: Distribution

Project Description:

This project consists of the replacement of 75 deteriorated poles on the Bottom Waters distribution system and 168 deteriorated poles on the St. Anthony system between Ship Cove and Raleigh.

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	195.0	0.0	0.0	195.0
Labour	388.0	0.0	0.0	388.0
Engineering	91.0	0.0	0.0	91.0
Project Management	35.0	0.0	0.0	35.0
Inspection & Commissioning	84.0	0.0	0.0	84.0
Corp O/H, AFUDC, Esc. & Contingency	200.2	0.0	0.0	200.2
Total	**993.2**	**0.0**	**0.0**	**993.2**

Operating Experience:

The systems are operating satisfactorily. As deteriorated poles fail, repair crews are dispatched to do the repairs. Customer outages are incurred during these repairs. Outages are extensive if the repair site is difficult to access.

Project Justification:

The Preventative Maintenance Program, identified selected poles on each system which were rated “B” condition (replace within 5 years). It is determined that a certain number of these poles must be replaced in 2004 in order to maintain service reliability. The remainder of the poles are regularly inspected to determine their deterioration rate and these will be replaced as required. A deteriorated pole represents a safety hazard to lineworkers in the event the pole has to be climbed for planned or emergency maintenance. Failure of a pole also has a significant impact on the performance for the system. This is due to the higher probability of failure under adverse weather conditions, and the length of time it takes to replace a pole, especially in the case of a remote location. Often, failures of deteriorated poles causes a domino affect resulting in more failures of consecutive poles, which might not be deteriorated.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Pole Replacements **(cont'd.)**

Project Justification: (cont'd.)

To ensure that this project will be completed at the lowest possible cost, Newfoundland and Labrador Hydro will solicit competitive bids for all materials and external labor.

Future Plans:

None.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Insulator Replacements

Location: Distribution Lines Bottom Waters, Fleur de Lys and South Brook

Division: Transmission & Rural Operations

Classification: Distribution

Project Description:

This project consists of the replacement of suspension and pin type insulators that were manufactured by Canadian Ohio Brass (COB) and Canadian Porcelain (CP) and installed on the following distribution lines:

1. Bottom Waters Line 1, which serves the communities of Paquet and Mings Bight, and the Stogger Tite Mine. This line was constructed in 1973.

2. Fleur de Lys Line 1, which serves the community of Fleur de Lys and Line 2 which serves the community of Coachman's Cove. Both lines were constructed in 1970.

3. South Brook Line 1, which serves the community of South Brook. This line was constructed in 1968.

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	250.0	0.0	0.0	250.0
Labour	363.0	0.0	0.0	363.0
Engineering	52.0	0.0	0.0	52.0
Project Management	33.0	0.0	0.0	33.0
Inspection & Commissioning	93.0	0.0	0.0	93.0
Corp O/H, AFUDC, Esc. & Contingency	153.5	0.0	0.0	153.5
Total	**944.5**	**0.0**	**0.0**	**944.5**

Operating Experience:

Bottom Waters
Line 1 has experienced 18 major outages, due to defective insulators, from September 1996 to February 2003.

Fleur de Lys
Lines 1 and 2 have experienced a total of 27 major outages, due to defective insulators, from January 1996 to February 2003.

South Brook
Line 1 has experienced 30 major outages, due to defective insulators, from December 1996 to February 2003.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Insulator Replacements **(cont'd.)**

Project Justification:

The design of the insulation system for distribution lines includes multiple suspension insulators in a string, along with pin or post-type single multi-skirt units mounted on top of the poles and cross arms. Therefore, having an individual suspension or pin-type insulator fail usually causes an immediate reliability problem.

In the 1980s, Hydro, through its transmission preventative maintenance (PM) inspections, detected an insulator problem similar to that being experienced by other utilities. It was determined that some COB suspension insulators were prematurely failing due to a cement problem. However, on Hydro's distribution systems, testing was not performed due to safety hazards associated with testing the relatively lower number of insulator units per insulator string.

This project is the continuation of the initiative to replace pre-1974 vintage COB suspension insulators. These insulators are part of a group that has experienced industry-wide failures due to cement growth causing radial cracks that resulted in moisture intrusion. Pin-type insulators, particularly double-skirt COB and CP insulators at the 12.5kV to 25kV levels, have been experiencing the same problems resulting in the tops of these insulators cracking off. Replacement of both types is essential to improve system security and reliability. A normal life expectancy for an insulator is approximately 40 years, however for these COB insulators, the life has been between 10 - 30 years.

To ensure that this project will be completed at the lowest possible cost, Newfoundland and Labrador Hydro will solicit competitive bids for all materials and external labor.

Future Plans:

None.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Install Recloser on Feeder L6 - Bear Cove
Location: Bear Cove
Division: Transmission & Rural Operations
Classification: Distribution

Project Description:

This project consists of the purchase and installation of a 3-phase recloser and associated equipment on 12.5kV feeder L6 at Bear Cove.

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	40.0	0.0	0.0	40.0
Labour	20.0	0.0	0.0	20.0
Engineering	7.0	0.0	0.0	7.0
Project Management	0.0	0.0	0.0	0.0
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	18.2	0.0	0.0	18.2
Total	**85.2**	**0.0**	**0.0**	**85.2**

Operating Experience:

A power line fault which involves some level of fault impedance is very typical for distribution systems, in particular those that are more susceptible to conductor contact and/or breakage during severe storms. Sleet storms that involve heavy ice and wind have resulted in the most severe power line damage over the last two decades, with the latest storm in Feb., 2003 causing conductor contact and breakage on overhead distribution lines throughout Northern Newfoundland.

Project Justification:

The fault protection for the 12.5kV Bear Cove distribution feeder L6 is currently provided by one 3-phase recloser at the terminal station. The addition of a new 3-phase recloser downstream of the terminal station will provide more sensitive ground protection should the conductor break and fall. It will provide the detection and isolation required for the various types of distribution system faults which are potentially harmful to the distribution system and its customers.

To ensure that this project will be completed at the lowest possible cost, Newfoundland and Labrador Hydro will solicit competitive bids for all materials and external labor.

Future Plans:

None.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Substation Transformer

Location: Rigolet

Division: Transmission & Rural Operations

Classification: Distribution

Project Description:

This project consists of the purchase and installation of a 1000kVA 600/2400V transformer bank and removal of the existing 500kVA diesel plant step-up transformer bank.

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	50.4	0.0	0.0	50.4
Labour	5.0	0.0	0.0	5.0
Engineering	3.0	0.0	0.0	3.0
Project Management	3.0	0.0	0.0	3.0
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	14.4	0.0	0.0	14.4
Total	**75.8**	**0.0**	**0.0**	**75.8**

Operating Experience:

The original 500kVA bank went into service in 1983. The existing transformers will be removed and returned to inventory.

Project Justification:

Projected load growth will result in overloading the 500kVA diesel plant substation step-up transformer bank during peak demand periods. A 1000kVA bank is sufficient to address the peak demand for the foreseeable future.

The following was derived from Hydro's latest projections as presented in Economic Analysis' Operating Load Forecast Hydro Rural Systems 2002 - 2007 (November 2002):

Year		2003	2004	2005	2006	2007
Peak Demand (kW) (Net)		512	526	539	551	564
Peak Demand (kVA@0.9pf)		569	588	599	612	627
% Overload (Existing Bank)	14%	18%	20%	22%	25%	

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Substation Transformer **(cont'd.)**

Project Justification: (cont'd.)

Other options considered:

1. The opportunity for a Demand Side Management (DSM) based capital deferral was reviewed and it was determined that DSM was not a viable alternative resource in this particular circumstance. See analysis on next page.

To ensure that this project will be completed at the lowest possible cost, Hydro will solicit competitive bids for all material and external labour.

Future Plans:

None.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Demand Side Management Analysis for Capital Budget Proposal

Project Title: Rigolet - Replace Substation Transformers
Description: replace 3 x 167 kVa with 3 x 333 kVa in 2004

Overview: NLH views DSM as an opportunity to defer or postpone capital costs. The deferral can be evaluated in economic terms as the difference in the present value of the utility revenue requirement under varying commencement years for the investment. The difference represents a DSM budget constraint and is the maximum amount of money that can be expended in order to defer the investment. The analysis proceeds by determing the necessary demand or energy savings required to defer the investment and then evaluates whether the DSM budget constraint can achieve the required saving. This DSM review represents a preliminary screening to ensure there are no obvious DSM opportunities missed.

The most economic peak demand DSM option, namely, domestic hot water (DHW) load control, is evaluated against the required demand savings with the calculated DSM budget.

Conclusion :
The DSM deferral budget does not provide sufficient funds to achieve the load deferral targets. DSM is not a viable alternative in this circumstance. The salient details of the DSM review follow below.

	2004	2005	2006	2007	
Load Forecast (HR OPLF Dec 2002)					
Peak Demand Forecast (Net kW)	526	539	551	564	
Domestic Customers	126	129	132	135	
Existing Transformer Capacity	500	kVa			
Capital Budget Proposal for Transformer Replacement	$76,000				

	1 Yr	2 Yr	3 Yr	4 Yr	
Required Demand Savings for Capital Deferral (kW)	76	89	101	114	
(Difference of forecast peak amp demand and existing rating)					
DSM Budget Calculation (Calculated assuming 2% inflation and 6.8% isolated debt cost as per 2002 COS)					
Capital Budget Deferral Factors*	4.5%	8.8%	12.9%	16.8%	20.5%
Total DSM Deferral Budget	$3,202	$6,262	$9,180	$11,955	$14,588
DSM Budget Per Required Demand Savings kW	$42	$70	$91	$105	na

* Percentage of capital cost that can be incurred to defer project for 1 to 5 years, and still be indifferent in economic terms.

DSM Supply Cost - $ per kW Achieved	$/kW*
Cooking Range Fuel Substitution	$1,294
Domestic Hot Water (DHW) Fuel Substitution	$1,290
Compact Fluorescent Lighting (CFL)	$352
Domestic Hot Water (DHW) Load Control	$344

* includes provision for distribution losses.

Maximum Achievable Winter Peak Demand Reduction	1 Yr	2 Yr	3 Yr	4 Yr	5 Yr
(Max kW reduction at lowest DSM supply cost and full DSM deferral budget)					
DHW Load Control	9	18	27	35	na
Achievable DSM Versus Required DSM Savings	(67)	(71)	(74)	(79)	na

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Upgrade Generator Relaying Happy Valley North Plant

Location: Goose Bay North Side Diesel Plant

Division: Transmission & Rural Operations

Classification: Generation

Project Description:

This project consists of the purchase and installation of new generator relaying equipment for the eight standby diesel units at the North Plant. A multi-function microprocessor relay will be installed on each unit. The existing relays will be removed.

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	110.0	0.0	0.0	110.0
Labour	25.0	0.0	0.0	25.0
Engineering	15.0	0.0	0.0	15.0
Project Management	0.0	0.0	0.0	0.0
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	20.0	0.0	0.0	20.0
Total	**170.0**	**0.0**	**0.0**	**170.0**

Operating Experience:

The existing relay equipment has been in service for 30 to 50 years. There are no technical manuals or spare parts available. Although the relays are operable, there is no way to function test them against prescribed specifications to ensure they will operate properly under fault conditions.

Project Justification:

The existing relays are antiquated. There is no overcurrent protection on three of the units; there is no differential protection on one unit. The proposed relays are required to provide adequate protection to the plant, operations and maintenance personnel and the public. This protection will continue to ensure the service reliability of the North Diesel Plant.

Future Plans:

None.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Purchase Meters & Equipment - TRO System

Location: All Service Areas

Division: Transmission & Rural Operations

Classification: General

Project Description:

This project consists of the purchase of demand/energy meters, current and potential transformers, metering cable and associated hardware for use throughout the Transmission & Rural Operations system.

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	96.0	0.0	0.0	96.0
Labour	0.0	0.0	0.0	0.0
Engineering	0.0	0.0	0.0	0.0
Project Management	0.0	0.0	0.0	0.0
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	2.1	0.0	0.0	2.1
Total	**98.1**	**0.0**	**0.0**	**98.1**

Operating Experience:

Revenue meters are required for new customer services and the replacement of old, worn, damaged or vandalized meters.

Project Justification:

As a rule, meters are expected to last a minimum of twenty years. Each is evaluated after that time for condition and either retired from service or refurbished and returned to service. Failure to supply metering equipment as required could result in customer hook-up delays of up to three months.

To ensure that this project will be completed at the lowest possible cost, Newfoundland and Labrador Hydro will solicit competitive bids for all materials.

Future Plans:

This is an annual allotment which will be adjusted from year to year depending on historical information.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Energy Management System - Energy Control Centre

Location: Hydro Place

Division: Production

Classification: Information Systems & Telecommunications

Project Description:

This project for 2004 is the second year of a four (4) year project for which the Board has approved funds for 2003. The project consists of the replacement of the existing Energy Management System (EMS) computer software and hardware infrastructure with state of the art hardware and software which provides greater flexibility for future technology changes and integration with Hydro's IT Infrastructure. The existing EMS is used by Hydro's Energy Control Centre to monitor, control and manage the power system and related water resources across the Province. The EMS is critical to the continued efficient and reliable operation of the electric power system and generation facilities owned by Hydro. The EMS is reaching the end of its projected life of 15 years with manufacturer supplied spare parts discontinued and technical support severely limited.

Project costs are based on a joint procurement with Churchill Falls (Labrador) Corporation.

Project Cost: *($ x1,000)*	**2003**	**2004**	**2005**	**Beyond**	**Total**
Material Supply	544.5	2,238.0	2,178.0	544.5	5,505.0
Labour	0.0	18.0	64.0	0.0	82.0
Engineering	453.8	1,315.2	1,326.2	115.2	3,210.4
Project Management	97.2	103.2	151.9	13.2	365.5
Inspection & Commissioning	0.0	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	118.0	618.3	1,038.5	1,349.5	3,124.3
Total	**1,213.5**	**4,292.7**	**4,758.6**	**2,022.4**	**12,287.2**

Operating Experience:

The Energy Management System was purchased from Harris Controls (now a part of General Electric) on the 15th of March 1988 and placed in service on the 20th of August 1990. It has been in continuous operation since that time. In 1993 an Information System was added to allow the export of EMS data to a server platform to make information easily accessible to internal users over the corporate Local Area Network. Used parts were purchased over a period of time and in 1999 a spare computer was obtained when another utility retired its system. There have been no other upgrades or major repairs. Our current operating status can be summarized as

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Energy Management System - Energy Control Centre **(cont'd.)**

Operating Experience: (cont'd.)

(1) System Availability has averaged 99.985% over the system's lifetime; (2) there are no functional deficiencies; (3) there is no vendor support available; and (4) new spare parts are not available.

Project Justification:

Please refer to the documents Energy Management System Replacement Project Justification on the following pages and a report by KEMA titled "Newfoundland and Labrador Hydro Energy Management System Assessment" which was filed with the Board as part of Hydro's 2003 Capital Budget Application (Section G, Appendix 5).

Future Plans:

The KEMA report in Section 7.11 outlines the "Life Cycle Management" of the EMS. The new EMS will be using "non-proprietary" hardware and therefore will offer more flexibility for maintenance, upgrading and replacement. However, this type of equipment quickly becomes obsolete as vendors of computer hardware upgrade their systems. Therefore the EMS hardware will require an "Evergreening Program" similar to other IT Infrastructure. KEMA recommends that 20 to 33% of the base hardware costs be budgeted each year to keep hardware current. This is forecast to be $350,000 per year beginning in the third year following the system commissioning.

Similarly software upgrades will be required periodically. This cost will depend on the frequency of vendor software upgrades. KEMA are suggesting this will amount to approximately $700,000 every 3 years following project in service.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

ENERGY MANAGEMENT SYSTEM REPLACEMENT

PROJECT JUSTIFICATION

August, 2002

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Introduction

An assessment of Hydro's EMS was conducted by KEMA Consulting, an industry leader in studying and assisting utilities in their EMS and SCADA projects. The results of the study are provided in the attached report entitled "Newfoundland and Labrador Hydro Energy Management System Assessment". This report makes a strong recommendation to begin the process of replacement immediately because of the high risk of a failure of the EMS as the age of its electronic components is beyond their design life. Concurrent with the study on Hydro's EMS, KEMA performed a similar assessment for Churchill Falls (Labrador) Corporation (CF(L)Co) on their Supervisory Control and Data Acquisition (SCADA) system. This system was also identified to require replacement in the next several years.

Alternatives for this project were identified and discussed in Section 5 of the KEMA report. These are as follows:

1. Maintain Existing Systems and Process
2. Implement New EMS Independent of CF(L)Co
3. Implement New EMS Together with CF(L)Co
4. Purchase a Turnkey System implemented by the Vendor.

Cost of EMS Failure

In addition to the discussion in the KEMA report on the advantages and disadvantages of each of the alternatives the following highlights the critical nature of the EMS and the costs of a major failure of the EMS.

The EMS provides a mission critical function for Hydro and the operation of the Interconnected Power System. If this system failed for an extended period of time while a replacement was procured the reliability of the power system and electrical service to all of Hydro's customer would fall to unacceptable levels. Remote control of any station would be impossible and therefore all major stations would have to be staffed. There are eight stations that would have to be staffed 24 hours per day with 16 others having to be staffed for varying

durations depending on the system condition. The eight stations alone would cost, provided staff are available, approximately $41,000 per week in overtime. This will result in a significant reduction in maintenance activity, as the staff performing monitor and control functions normally performs maintenance. In order to continue with routine maintenance additional staff would have to be hired and trained to replace those assigned to operating duties. This could add an additional $32,000 per week, while repairs or replacement are being done. If the failure was catastrophic and full replacement was the only option the cost of the foregoing could be as high as $3.8M per year.

In addition to the wage costs there would be a cost of lost efficiency due to the loss of economic dispatch functionality. At $28 per barrel this can quickly add a significant expense to the loss of the EMS. Economic Dispatch balances the load between all generating units so that the water at each plant is used as efficiently as possible with consideration to electrical losses from the plant to customer loads. Without Economic Dispatch this balancing between plants would be very difficult and ineffective resulting in loss of efficiency.

There would also be a severe loss in reliability. During the last major outage to the Avalon Peninsula in October 1998, customers were restored between 8 and 53 minutes using the EMS. Without the EMS this can be estimated to take at least two to three times longer if all stations on the Avalon Peninsula were staffed. If some stations were not staffed outages would extend for several hours allowing for contact and for travel. This would result in an intolerable level of service. Similar and more severe service deterioration would occur throughout the system particularly in remote areas and during poor weather conditions.

A delay in approving the project increases the probability of failure because as the electronic components age the likelihood of failure increases. A decision to delay is a risk assessment on how long the EMS could perform at an acceptable level. The failure rate cannot be estimated by KEMA as it does not have data on EMS systems failures because most other similar EMS computer systems have already been removed from service and replaced before this point in their service life. While we have done well to-date without major problems, KEMA have suggested in the report that this risk of failure is high, and we should not delay replacing the existing GE/Harris EMS system.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

The alternatives mentioned above are highlighted in the KEMA report. The report clearly identifies the least cost option is alternative 3 which is to procure the system at the same time as CF(L)Co. In addition to the savings in system procurement costs identified by KEMA there are internal engineering and project management cost savings of $560,000 and corporate overhead, AFUDC, Escalation and Contingency savings of $390,000. Therefore the total savings for a joint procurement are approximately $1,500,000. Hydro has obtained a commitment by CF(L)Co for joint procurement and therefore the cost estimate has been prepared on that basis.

Operator Training Simulator

There is an option mentioned in the KEMA report that may be included in the EMS replacement depending on the purchase, implementation and operating cost. It is an Operator Training Simulator (OTS). An OTS is a power system simulator used to train power system operators. It is used by setting up scenarios on the EMS to train operators how to respond to certain incidents or conditions on the power system, similar to a flight simulator used by aircraft pilots. These scenarios would include replaying disturbances on the power system for staff that were not working at the time of the disturbance. In this way operator response to these incidents will be enhanced and customer service restoration improved during real situations.

The need for an OTS has increased with recent retirements of experienced staff. Many of the staff have not experienced black-outs to major portions of the power system such as the entire east or west coast because of reliability improvements and cooperative weather, however they must be ready at all times for such circumstance. An OTS would simulate these incidents and help train the operators for the appropriate response.

Safety Issues

There are no direct safety issues that require the EMS to be replaced. Safety issues may arise if there was a failure of the EMS. The EMS provides methods for the system operators to track workers on transmission lines for contact if any incident should arise. This functionality would be lost. However, a paper tracking system could be implemented to ensure safety. The impact would then be reflected in loss of work time and slower maintenance activities.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Corporate Applications Environment

Location: St. John's

Division: Production

Classification: Information Systems & Telecommunications

Project Description:

This project includes labour to apply modifications and test the applications affected by the vendor upgrade. Software requiring upgrades are:

a) JDEdwards;

b) Showcase Strategy ;

c) Lotus Notes; and,

d) AS400 O/S.

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	0.0	0.0	0.0	0.0
Labour	30.0	0.0	0.0	30.0
Engineering	352.0	0.0	0.0	352.0
Project Management	132.0	0.0	0.0	132.0
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	26.0	0.0	0.0	26.0
Total	**540.0**	**0.0**	**0.0**	**540.0**

Operating Experience:

N/A

Project Justification:

This project includes upgrades to currently held software application products. Software must be regularly upgraded to maintain the benefits of vendor advancements in system functionality. As well, this provides continued vendor support of applications and a stable application environment for Hydro's key business functions. Out-dated and non-maintained software would lead to breakdowns in business functions that would ultimately yield higher costs.

Future Plans:

Software vendor maintenance and upgrades is an on-going occurrence.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Applications Enhancements

Location: Hydro Place

Division: Production

Classification: Information Systems & Telecommunications

Project Description:

The application enhancement project provides for:

(1) The unforeseen modification, enhancements & additions to software to address the required changes to business processes initiated by Customers, Stakeholders & Regulators or to provide efficiencies to existing processes.

(2) The continuing design, build and implementation of enhancements to Hydro's Internet/Intranet.

(3) An Enterprise Project Management Software Application.

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	113.0	0.0	0.0	113.0
Labour	70.5	0.0	0.0	70.5
Engineering	190.0	0.0	0.0	190.0
Project Management	44.0	0.0	0.0	44.0
Inspection & Commissioning	27.0	0.0	0.0	27.0
Corp O/H, AFUDC, Esc. & Contingency	18.7	0.0	0.0	18.7
Total	**463.2**	**0.0**	**0.0**	**463.2**

Operating Experience:

N/A

Project Justification:

This project involves:

a) Various Minor Enhancements:

It is imperative that Hydro be able to react to requests to provide enhancements to software applications in response to unforeseen requirements, such as legislative and compliance changes; vendor driven changes, and enhancements designed to improve customer service or staff productivity. Previous changes have included changes initiated by Canada Post, changes to income tax calculations, providing equal billing to customers, and other enhancements to provide environmental & operational processes.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Applications Enhancements **(cont'd.)**

b) Internet/Intranet:

This involves the design, build and implementation of enhancements to Hydro's external Web site to improve access to information to our customers and stakeholders. Additions and enhancements to Hydro's Intranet will allow staff and customers access to information. This will improve information flow, eliminate redundant processes and reduce the manual effort associated with distributing information and provide an enhanced level of customer service.

c) Enterprise Project Management software:

In order to ensure that better real time decisions regarding resource needs and the portfolio of projects can be made, a tool is needed to improve the project management process and resource utilization. To ensure efficiencies in the completion of multi department and external projects, this tool will provide integrated collaboration between the different projects and to automate skillset and resource management. This software tool will be introduced to the IS&T department and then rolled out to other groups within Hydro.

Future Plans:

Application enhancements are a continuing requirement.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Security Program Centralized Log Monitoring & Analysis System

Location: Hydro Place

Division: Production

Classification: Information Systems & Telecommunications

Project Description:

This project for 2004 is the continuation of a project which the Board has approved funds for 2003. The scope of this project is to purchase and implement a server and associated software to centralize reporting and presentation of security data gathered from distributed operating systems. This project will provide a central mechanism to gather security log information from the various systems, enhance analysis and reporting capabilities, and address due diligence and audit responsibilities as required by management.

Project Cost: *($ x1,000)*	**2003**	**2004**	**Beyond**	**Total**
Material Supply	30.0	35.0	0.0	65.0
Labour	0.0	0.0	0.0	0.0
Engineering	24.0	26.4	0.0	50.4
Project Management	0.0	0.0	0.0	0.0
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	3.3	21.7	0.0	25.0
Total	**57.3**	**83.1**	**0.0**	**140.4**

Operating Experience:

N/A

Project Justification:

A key to an effective security program is the ability to detect any suspicious activity. There are numerous system and application logs that keep track of any user activity within the Hydro Group's networks. Disseminating the volume of information generated by these logs is not easily done yet, however, reviewing these logs on a timely basis and taking appropriate action is mandated by our internal and external audit departments. Centralizing all logging activity and producing meaningful reports from this information is the key goal of this project.

Two of the main goals of IT security deal with integrity and the confidentiality of information. Users have the right to expect that the data they work with on a daily basis is not disclosed to unauthorized individuals and not destroyed or modified - either intentionally or accidentally. Having a centralized log monitoring and analysis system in place will provide these assurances.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Security Program Centralized Log Monitoring & Analysis System **(cont'd.)**

Project Justification: (cont'd.)

To ensure that this project will be completed at the lowest possible cost, Newfoundland and Labrador Hydro will solicit competitive bids for all materials and external labour.

Future Plans:

None.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Security Program - Secure Remote Access

Location: Hydro Place

Division: Production

Classification: Information Systems & Telecommunications

Project Description:

The scope of this project focuses on the evaluation, design and implementation of a product(s) that will ensure a secure method of accessing corporate Information Technology resources from multiple locations. The product chosen will have to meet industry standards, address the inter-operability of existing and future applications, and incorporate existing in-house technology where possible. The chosen product must address both internal (employees accessing the company network) and external (vendors connecting to the Hydro Group's network for different transactions) concerns.

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	35.0	35.0	0.0	70.0
Labour	0.0	0.0	0.0	0.0
Engineering	30.0	30.0	0.0	60.0
Project Management	3.0	3.0	0.0	6.0
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	7.1	8.1	0.0	15.2
Total	**75.1**	**76.1**	**0.0**	**151.2**

Operating Experience:

N/A

Project Justification:

Secure remote access involves development of a solution for Hydro Group employees and vendors. This project will include recommendations and implementation of the most economical and secure solution for the Hydro Group. The solution may include one method of access or an effective combination to meet all corporate needs and will attempt to incorporate the Hydro Group’s existing investment in both RSA’s Secure ID technology and Virtual Private Network (VPN) technology where applicable.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Security Program - Secure Access **(cont'd.)**

Project Justification: (cont'd.)

Access to computer based information in a timely manner from a mobile workforce is essential for business. Hydro Group employees benefit from the ability to access computer resources quickly and efficiently. Properly securing this remote access is essential to ensure that this access is granted to the employees and vendors who are authorized and all other invalid attempts to access the information are denied.

To ensure that this project will be completed at the lowest possible cost, Newfoundland and Labrador Hydro will solicit competitive bids for all materials and external labour.

Future Plans:

None.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: End User & Server Evergreen Program

Location: St. John's

Division: Production

Classification: Information Systems & Telecommunications

Project Description:

This is the second year of a five (5) year program. This evergreen program will refresh the end user workstation, servers, operating systems and office productivity programs on a 3-5 year life cycle. The consolidation of servers is also part of the server refresh & upgrade program. Server refresh will be on 4-5 year cycle based on industry standards and application demands. This will allow for reduced costs over the long term and improve efficiency through standardization and reduced support needs.

End User workstations will be refreshed based on industry standard lifecycles and the device (thin client, desktop, laptop), will be determined by an analysis of the work needs of each user.

Based on industry standards and the age of existing servers, each year an appropriate number of servers will be refreshed and the latest version of the server operating system will be applied. This year will allow for the planning and migration to Microsoft's new operating system (Windows 2000.NET).

The enterprise server and operating system has a longer refresh cycle and is based more on application demands and capacity. (Storage needs will be handled through the enterprise storage (SAN) project).

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	2,404.2	0.0	0.0	2,404.2
Labour	0.0	0.0	0.0	0.0
Engineering	262.0	0.0	0.0	262.0
Project Management	5.2	0.0	0.0	5.2
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	140.0	0.0	0.0	140.0
Total	**2,811.4**	**0.0**	**0.0**	**2,811.4**

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: End User & Server Evergreen Program 2004 **(cont'd.)**

Operating Experience:

Industry standards indicate that end user devices have a useful life of between 3-5 years and beyond this timeframe reliability and support become issues. Hardware vendors offer new models about twice a year which offer more functionality and performance. The useful life cycle for these devices is based on the type of device. Thin client devices can be expected to provide effective service for up to 5 years. Desktops are now expected to last 4 years, while laptops have a life expectancy of 3 years. This refresh cycle is based on industry standards and the equipment has little value at the end of their useful life.

The operating system and office productivity programs for these devices follows a similar life cycle and as well as offering new functionality, these systems will take advantage of the improved features in the newer hardware devices. Tying the end user hardware, operating systems and office productivity programs together in a planned upgrade program, allows Hydro to exploit the enhancements of each.

Project Justification:

This evergreen program will allow Hydro to take advantage of new functionality offered in new end user and server hardware models, and in new releases of the operating system and office productivity programs. This keeps the end user component of the infrastructure in line with the technologies in the server infrastructure being deployed.

The rational for moving to a thin client environment and server refresh, is supported by the IT Technical Architecture Strategy report filed with the Board on February 28, 2002 as #U - Hydro - 37. By maximizing the deployment of thin client devices, Hydro can achieve lower total cost of ownership over the life cycle of these devices and improved efficiency through standardization and reduced support needs.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: End User & Server Evergreen Program 2004 **(cont'd.)**

Project Justification: (cont'd.)

The consolidation of the server infrastructure is also part of the program. This will allow for a reduction of maintenance costs and system administration work load. The existing systems have been in production since 1997 and an increase in computer capacity plus new technology to support enhanced applications is needed.

The replacement of these servers will allow for the new server to attach to a Storage Area Network which will allow for greater control of disk space across all computer platforms. The risk of not doing this upgrade will result in greater administration workload, reduced application growth and poor performance of applications.

There is no opportunity to share this infrastructure with Newfoundland Power or any other organization. The intent of the refresh program is to prevent excessive maintenance to end user devices, servers and office tools. As reliability and performance become issues, the cost to maintain these devices and products becomes extremely high. Thus, as per industry experience, it becomes cheaper to replace than to maintain.

To ensure that this project will be completed at the lowest possible cost, Newfoundland and Labrador Hydro will solicit competitive bids for all materials and external labour.

Future Plans:

This will be an on-going refresh program. The cycle will be over 3 - 5 years based on the device.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Peripheral Infrastructure Replacement

Location: Hydro System

Division: Production

Classification: Information Systems & Telecommunications

Project Description:

This project consists of the replacement of peripherals such as printers, projectors, scanners in area offices and Hydro Place .

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	73.0	0.0	0.0	73.0
Labour	10.0	0.0	0.0	10.0
Engineering	0.0	0.0	0.0	0.0
Project Management	0.0	0.0	0.0	0.0
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	17.9	0.0	0.0	17.9
Total	**100.9**	**0.0**	**0.0**	**100.9**

Operating Experience:

As the age of the peripherals increase so does the operating and maintenance expenses.

Project Justification:

A five-year replacement program for peripheral equipment is in place. This project is to allow for the refresh of peripheral equipment.

To ensure that this project will be completed at the lowest possible cost, Newfoundland & Labrador Hydro will solicit bids for all materials and external labour.

Future Plans:

None.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: JDE Migration Assessment Study

Location: St. John's

Division: Production

Classification: Information Systems & Telecommunications

Project Description:

The scope of this project will be an assessment study of the business and technology issues that need to be addressed to support the migration of Hydro's existing JDE's World Vision implementation to JDE's One World implementation. The study will provide a migration strategy which will address the business and technology requirements of the migration as well as identifying the opportunities to leverage the technology to further improve the business processes. The study will also provide an implementation plan which will identify the timing and sequencing of the various JDE modules as well as identifying the resource requirements to support the migration.

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	0.0	0.0	0.0	0.0
Labour	0.0	0.0	0.0	0.0
Engineering	190.0	0.0	0.0	190.0
Project Management	0.0	0.0	0.0	0.0
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	41.2	0.0	0.0	41.2
Total	**231.2**	**0.0**	**0.0**	**231.2**

Operating Experience:

N/A

Project Justification:

The JDE World Vision financial suite was implemented in 1999. One World, a business process based implementation has been released to replace the World Vision. This study will identify the business and technology issues associated with this migration. This assessment will enable Hydro to properly identify the costs and risks associated with this migration.

One World has functionality which will enable and enhance workflow capability and functionality in areas like depreciation calculations which will better support the cost of service model.

Future Plans:

Future plans for the JDE financial suite will be determined by this project.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace VHF Mobile Radio System

Location: Various

Division: Production

Classification: Information Systems & Telecommunications

Project Description:

This project involves the replacement of the Corporation's existing VHF mobile radio system with a trunked radio system. The replacement of the existing system involves replacing the equipment at 29 repeater sites, as well as the replacement of a central switch located in Gander, approximately 250 mobile and base station radios, and approximately 100 portable radios. The proposed system will provide additional coverage to meet the Corporation's requirements.

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	25.0	105.0	0.0	130.0
Labour	2,520.0	3,840.0	0.0	6,360.0
Engineering	175.0	200.0	0.0	375.0
Project Management	0.0	0.0	0.0	0.0
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	328.0	1,657.0	0.0	1,985.0
Total	**3,048.0**	**5,802.0**	**0.0**	**8,850.0**

Operating Experience:

The existing system was purchased in 1989 and is obsolete. The failure statistics for the VHF have increased considerably over the past year. There are no longer trained resources at Aliant knowledgeable about the VHF switch which also puts the system at risk.

VHF Failure Statistics

Year	Facility	Repeater	Switch	Other
1998	14	6	0	9
1999	3	4	1	5
2000	6	4	0	5
2001	4	4	1	1
2002	5	7	5	0
2003*	9	4	19	3
* Represents 2 months (January & February)				

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace VHF Mobile Radio System **(cont'd.)**

Project Justification:

The proposed replacement system is a standards-based trunked mobile radio system. By purchasing a standards-based system, the Corporation's investment is protected in the long-term, as the system is not tied to a single manufacturer. A trunked system permits the deployment of additional users or applications seamlessly and without the need for large scale changes to the system.

The business case analysis is attached to Section G, Appendix 4.

Future Plans:

None.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Powerline Carrier Equipment Transmission System - West Coast

Location: Various

Division: Production

Classification: Information Systems & Telecommunications

Project Description:

This project for 2004 is the continuation of a project which the Board approved funds for 2003. In 2004, this Project requires the purchase, installation and commissioning of new Power Line Carrier (PLC) to replace the existing PLC's on TL247. Associated PLC equipment, including wavetraps, line matching units, teleprotection and high voltage coupling equipment will be replaced in a phase-to-phase arrangement.

Project Cost: *($ x1,000)*	**2003**	**2004**	**Beyond**	**Total**
Material Supply	757.0	269.0	0.0	1,026.0
Labour	33.7	39.2	0.0	72.9
Engineering	28.2	22.0	0.0	50.2
Project Management	6.3	5.0	0.0	11.3
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	183.8	83.8	0.0	267.6
Total	**1,009.0**	**419.0**	**0.0**	**1,428.0**

Operating Experience:

The equipment proposed for replacement was installed during the power system generation additions in the early 1980's at Hinds Lake, Upper Salmon and Cat Arm. During the 20+ year operating life of this equipment, there have been many requirements for corrective maintenance and upgrades. With each additional year of operation, the inventory of spare modules decreases due to increased equipment failures, and the in-house expertise for corrective maintenance and, when possible, the repair of modules is dwindling due to technical personnel retirements.

Project Justification:

Most of the equipment slated for replacement has been in service for over 20 years and is now obsolete. The manufacturer no longer supports the product, and has discontinued the manufacture and sale of replacement components. In addition, there is no known third party that provides repair services for defective modules. Continued utilization of this equipment poses the risk of failure and hence loss of communications required for the protection and control of the power system.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Powerline Carrier Equipment Transmission System - West Coast **(cont'd.)**

Project Justification: (cont'd.)

Hydro has standardized on ABB PLC radio equipment. As such, Hydro will sole source this equipment to ABB. This allows Hydro to minimize its spares inventory and standardize on training, documentation and maintenance practices, thus reducing costs.

Future Plans:

There are no plans for any major replacements, upgrades or repairs to this plan expected to be undertaken within the next three years.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Battery System - Multiple Sites - 2004

Location: Bottom Brook, Hardwoods, Holyrood, Massey Drive & Stephenville

Division: Production

Classification: Information Systems & Telecommunications

Project Description:

This project consists of the supply and installation of five (5) 48 VDC battery systems at the Bottom Brook Terminal Station, Hardwoods Terminal Station, Holyrood Terminal Station, Massey Drive Terminal Station and the Stephenville Gas Turbine Station. This includes all 240 VAC to 48 VDC rectifiers, rectifier control panels, battery banks and associated cabling.

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	161.2	0.0	0.0	161.2
Labour	36.4	0.0	0.0	36.4
Engineering	22.1	0.0	0.0	22.1
Project Management	0.0	0.0	0.0	0.0
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	54.5	0.0	0.0	54.5
Total	**274.2**	**0.0**	**0.0**	**274.2**

Operating Experience:

There have been no failures to date for the battery banks, primarily due to a rigorous preventative maintenance program and the nature of flooded cell technology. Annual maintenance costs is about $800 per battery per year consisting of two procedures per year including capacity testing and conductance measurements. All test results confirm the natural expected degradation with time for these type of batteries. It should be noted that the maintenance procedures and their costs will not be affected by the installation of new battery banks which require an equal amount of maintenance.

Project Justification:

The equipment has been in operation for 20+ years which has exceeded the 20 year design life and proven industry standard life expectancy of large stationary batteries of the flooded cell type. In some sites cell plates are warping and showing signs of deterioration. In some sites there is significant corrosion of battery terminals. The capacitors in some older types of rectifiers are deteriorating. This replacement is necessary to provide emergency power to equipment necessary for the remote control and monitoring of Hydro's transmission and

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Battery System - Multiple Sites **(cont'd.)**

Project Justification: (cont'd.)

generation system and is justified by reliability considerations. Failure to replace this equipment will result in a battery bank failure or reduced reliability which will extend or cause customer outages. An unacceptable failure probably will occur after the battery design life is exceeded.

To ensure that this project will be completed at the lowest possible cost, Newfoundland and Labrador Hydro will solicit competitive bids for all materials and external labour.

Future Plans:

None. While this is part of a multi-year plan to replace battery systems, this budget does not include any future commitments to replace battery systems in other years.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Remote Terminal Units for Hydro - Phase 5

Location: Cat Arm, Hinds Lake, Long Harbour and Happy Valley

Division: Production

Classification: Information Systems & Telecommunications

Project Description:

This project consists of the replacement of three (3) Quindar Remote Terminal Units (RTUs) and one (1) Westronic M4 Remote Terminal Unit used for remote monitoring and control of plants and terminal stations from the Energy Control Center. The sites are: Cat Arm Plant, Hinds Lake Plant, Long Harbour Terminal Station and Happy Valley terminal station. This is phase five of a nine-phase plan to replace all obsolete RTUs. The de-commissioned equipment has no value and will be scrapped.

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	148.1	0.0	0.0	148.1
Labour	70.2	0.0	0.0	70.2
Engineering	33.4	0.0	0.0	33.4
Project Management	0.0	0.0	0.0	0.0
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	62.1	0.0	0.0	62.1
Total	**313.8**	**0.0**	**0.0**	**313.8**

Operating Experience:

There have been few failures of this equipment to date. The average mean time between failures experienced in the last few years is approximately seven years with an estimated repair cost of $1800 dominated by circuit board repair costs.

Project Justification:

The equipment has been in operation for over 20 years and is nearing the end of its useful life. It is no longer supported by the equipment manufacturer, and spares are no longer available for these systems. Third party spares and repair services are not available. This is a replacement necessary to maintain reliability of equipment for the control and monitoring of Hydro's transmission and generation system. Failure to replace this equipment could result in reduced reliability which would extend or cause customer outages. The replacement RTUs will support additional functionability such as newer protocols and polling of Intelligent Electronic Devices (IEDs). The replacement of the Hinds Lake RTU will allow the obsolete binary coded decimal analogs in the plant control cubicle to be upgraded.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Remote Terminal Unit for Hydro - Phase 5 **(cont'd.)**

Project Justification: (cont'd.)

Hydro has standardized on the General Electric (GE) line of Remote Terminal Units. As such, Hydro will sole source this equipment to the manufacturer, GE. This allows Hydro to minimize its spares inventory and standardize on training, documentation and maintenance practices.

Future Plans:

None.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replacement of Operational Data & Voice Network - Phase 2

Location: St. John's

Division: Production

Classification: Information Systems & Telecommunications

Project Description:

This is phase 2 of a two-year program to plan, design and install a wide area network (WAN) communications infrastructure to replace the existing operational data (SCADA) and operational voice network currently using General DataComm (GDC) infrastructure. This will provide an architecture that can support the operational data, administrative data and voice traffic over a standard network infrastructure.

Project Cost: *($ x1,000)*	**2004**	**2005**	**2006**	**Beyond**	**Total**
Material Supply	512.0	503.0	0.0	0.0	1,015.0
Labour	180.0	228.0	0.0	0.0	408.0
Engineering	199.0	199.0	0.0	0.0	398.0
Project Management	33.0	37.8	0.0	0.0	70.8
Inspection & Commissioning	0.0	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	47.0	279.0	0.0	0.0	326.0
Total	**971.0**	**1,246.8**	**0.0**	**0.0**	**2,217.8**

Operating Experience:

The existing operational data network supporting SCADA traffic was installed in 1988, and is now 15 year-old technology. It is a Time Division Multiplex architecture with General DataComm (GDC) equipment designed to carry the SCADA traffic between remote RTU's and the energy management system (Harris) at Hydro Place, and operational voice traffic between the sub-stations & plants and the energy control centre (ECC).

The GDC equipment is at the end of its useful life. GDC will soon discontinue support and thus problems will no longer be investigated and resolved. The following table gives the number of incidents recorded over the past 8 years and this year to-date.

	1995	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
Incidents Reported	**4**	**10**	**6**	**23**	**11**	**11**	**15**	**19**	**16**

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replacement of Operational Data & Voice Network - Phase 2 **(cont'd.)**

Project Justification:

GDC is no longer in the transport market segment but have focused their strategic direction elsewhere. Table 5, page 19, of the Telecommunications Plan, which was submitted to the Board as part of Hydro's 2003 Capital Budget Application (Section H), indicates that the GDC equipment that Hydro has installed over the past 15 years is no longer under development and many components have been manufacturer discontinued for a number of years.

The operational, administrative and voice traffic currently run on separate communications equipment and standards. This upgrade would combine these services into one communications system with common equipment and standards. This would decrease the demands on staff to be trained to support different communications protocols and equipment.

This upgraded communications network will support all applications and devices that have a standard protocol (IP centric). All existing administrative applications support this protocol and the upgrade to the Energy Management System will have this as a requirement. All new RTU devices will have IP as a communications protocol. This new technology will provide added functionality, reliability and manageability.

Integrating all applications and devices, including SCADA, onto a single communications platform will streamline operational activities and improve overall management and control of the WAN. The improved reliability will benefit the power grid management, provide better control and reduce operational costs.

To ensure that the project will be completed at the lowest possible cost, Newfoundland and Labrador Hydro will solicit competitive bids for all materials and external labour.

Future Plans:

There are no further plans under consideration at this time.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Vehicles - 2003

Location: System Wide

Division: Transmission & Rural Operations

Classification: Administrative

Project Description:

This project for 2004 is the continuation of a project given approval by the Board in 2003. The project involves replacing 28 light vehicles (cars, pick-ups and vans) and 17 medium/heavy vehicles (line trucks and boom trucks).

Project Cost: *($ x1,000)*	**2003**	**2004**	**Beyond**	**Total**
Material Supply	1,520.0	844.0	0.0	2,364.0
Labour	0.0	0.0	0.0	0.0
Engineering	10.0	10.0	0.0	20.0
Project Management	0.0	0.0	0.0	0.0
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	53.7	288.2	0.0	341.9
Total	**1,583.7**	**1,142.2**	**0.0**	**2,725.9**

Operating Experience:

It has been our experience that vehicles experience increased downtime and decreased reliability as they reach the replacement criteria outlined below.

REPLACEMENT CRITERIA

VEHICLES

Category	**Description**	**REPLACEMENT CRITERIA**	
		Age	**Other**
1000	Cars/Mini-vans	5-7 yrs.	>150,000 kms, maintenance cost, condition
2000	Pick-ups/Service Vans	5-7 yrs.	>150,000 kms, maintenance cost, condition
3000	Light Trucks	6-8 yrs.	>180,000 kms, maintenance cost, condition
4000	Medium/Heavy Trucks	7-9 yrs.	>200,000 kms, maintenance cost, condition

Category 1000 and 2000 vehicles being replaced will have an average age of six years and 150,000 km, while category 3000 will have an average age of eleven years and 100,000 km and category 4000 will have an average age of 10 years and 200,000 km.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Vehicles - Hydro System - 2003 **(cont'd.)**

Project Justification:

New vehicles are required in order to ensure maximum reliability with minimum equipment downtime. Having work crews equipped with reliable and technologically current work vehicles, ensures their safety while at the same time enhancing efficient delivery of services. Operating vehicles beyond their economical life cycle will result in delays to work crews and have a negative impact on customer service.

Vehicles are screened against a replacement criteria before being evaluated for replacement. When a unit has met the age or kilometer criteria, the unit is further evaluated for its condition and maintenance history.

The budget for each class of vehicle is shown below.

Vehicle Class	**Budget Amount**
1000 (Cars/Mini-vans)	$ 250,600
2000 (Pick-up/ Service Vans)	497,700
3000 (Light Trucks)	78,400
4000 (Medium/Heavy Trucks)	1,557,300
Contingency	341,900
Total	**$ 2,725,900**

New vehicles are acquired through competitive tendering with a lease/purchase analysis used to determine the least cost alternative.

Future Plans:

Categories 1000, 2000, and 3000 vehicles will be purchased in 2003, however due to long delivery schedules of category 4000 vehicles, these vehicles will not be delivered until 2004.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Vehicles - 2004

Location: System Wide

Division: Transmission & Rural Operations

Classification: Administrative

Project Description:

This project involves replacing 33 light vehicles (cars, pick-ups and vans) and 11 medium/heavy vehicles (line trucks and boom trucks).

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	1,020.0	912.0	0.0	1,932.0
Labour	0.0	0.0	0.0	0.0
Engineering	10.0	10.0	0.0	20.0
Project Management	0.0	0.0	0.0	0.0
Inspection & Commissioning	0.0	10.0	0.0	10.0
Corp O/H, AFUDC, Esc. & Contingency	51.2	259.2	0.0	310.4
Total	**1,081.0**	**1,181.2**	**0.0**	**2,262.4**

Operating Experience:

It has been our experience that vehicles experience increased downtime and decreased reliability as they reach the replacement criteria outlined below.

REPLACEMENT CRITERIA

VEHICLES

Category	**Description**	**REPLACEMENT CRITERIA**	
		Age	**Other**
1000	Cars/Mini-vans	5-7 yrs.	>150,000 kms, maintenance cost, condition
2000	Pick-ups/Service Vans	5-7 yrs.	>150,000 kms, maintenance cost, condition
3000	Light Trucks	6-8 yrs.	>180,000 kms, maintenance cost, condition
4000	Medium/Heavy Trucks	7-9 yrs.	>200,000 kms, maintenance cost, condition

Category 1000 and 2000 vehicles being replaced will have an average age of seven years and 165,000 km, while category 3000 will have an average age of seven years and 220,000 km and category 4000 will have an average age of 10 years and 200,000 km.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Replace Vehicles - Hydro System - 2004 **(cont'd.)**

Project Justification:

New vehicles are required in order to ensure maximum reliability with minimum equipment downtime. Having work crews equipped with reliable and technologically current work vehicles, ensures their safety while at the same time enhancing efficient delivery of services. Operating vehicles beyond their economical life cycle will result in delays to work crews and have a negative impact on customer service.

Vehicles are screened against a replacement criteria before being evaluated for replacement. When a unit has met the age or kilometer criteria, the unit is further evaluated for its condition and maintenance history.

The budget for each class of vehicle is shown below.

Vehicle Class	**Budget Amount**
1000 (Cars/Mini-vans)	$ 250,000
2000 (Pick-up/ Service Vans)	530,000
3000 (Light Trucks)	200,000
4000 (Medium/Heavy Trucks)	972,000
Contingency	310,400
Total	**2,262,400**

New vehicles are acquired through competitive tendering with a lease/purchase analysis used to determine the least cost alternative.

Future Plans:

Categories 1000, 2000, and 3000 vehicles will be purchased in 2004, however due to long delivery schedules of category 4000 vehicles, these vehicles will not be delivered until 2005.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Purchase Cash Remittance Processor

Location: Hydro Place

Division: Finance

Classification: Administrative

Project Description:

This project consists of the replacement of the existing cash remittance processor which processes mail-in customer payments.

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	57.7	0.0	0.0	57.7
Labour	0.0	0.0	0.0	0.0
Engineering	0.0	0.0	0.0	0.0
Project Management	0.0	0.0	0.0	0.0
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	2.3	0.0	0.0	2.3
Total	**60.0**	**0.0**	**0.0**	**60.0**

Operating Experience:

The existing equipment was acquired in 1999.

Project Justification:

The current processor was acquired when Hydro ceased to use Newfoundland Power to manage its customer billings and payments processes and implemented the Utility Customer Information System (UCIS) and will reach its projected useful life of five-years in 2004. The equipment provides for electronic capture and storage of customer payment data, which would be much more labour-intensive and costly using manual processes.

Future Plans:

None.

2004 CAPITAL PROJECTS OVER $50,000
EXPLANATIONS

Project Title: Electronic Metering Reading

Location: Hydro Place

Division: Finance

Classification: Administrative

Project Description:

This project consists of a study to provide recommendations on a replacement system for the Radix FW200 in 2004 and to purchase equipment and install the system in 2005.

Project Cost: *($ x1,000)*	**2004**	**2005**	**Beyond**	**Total**
Material Supply	0.0	180.0	0.0	180.0
Labour	35.0	35.0	0.0	70.0
Engineering	0.0	0.0	0.0	0.0
Project Management	0.0	0.0	0.0	0.0
Inspection & Commissioning	0.0	0.0	0.0	0.0
Corp O/H, AFUDC, Esc. & Contingency	0.8	8.5	0.0	9.3
Total	**35.8**	**223.5**	**0.0**	**259.3**

Operating Experience:

N/A

Project Justification:

The handheld meter-reading units facilitate meter reading and billing processes and it is essential that a source is available for equipment maintenance and support.

Hydro has been notified by the Radix Corporation that the FW200 handheld meter-reading unit presently being used by Hydro is being phased out in 2003 and they will support Hydro's system through 2005. The equipment estimate used for this budget is based on prices provided by the Radix Corporation to upgrade to the FW300 handheld model but other suppliers will also be evaluated.

Future Plans:

None.