Q. Provide details of and any reports on pension plan expense for Hydro for the years 1992 to 2000 and forecast for 2001 and 2002.

A. Hydro permanent full-time employees are participants in the Provincial Government's Public Service Pension Plan and all Hydro permanent part-time employees are participants in the Provincial Government's Money Purchase Plan. No specific reports are prepared for Hydro's pension plan expenses.

Actual expenses for the years 1992 to 2000 and the forecast for 2001 and 2002 are as follows:

1992	$2,355,095
1993	2,384,900
1994	2,372,257
1995	2,276,056
1996	2,240,689
1997	2,238,807
1998	2,326,209
1999	2,481,504
2000	2,733,272
2001	2,887,000
2002	2,950,000

Q. (a) Provide details of productivity and efficiency improvements implemented from 1992 to present in Transmission and Rural Operations (DWR, pages 6-9).

(b) Quantify the annual savings to date and forecast for 2001 and 2002 of these productivity and efficiency improvements.

A. (a) Productivity and efficiency improvements resulted in the following initiatives:

In 1995 a review of line workers resulted in the elimination of 6 FTE.

In 1996, the Transmission and Rural Operations (TRO) changed from six regions to three regions - Central, Northern, and Labrador. The regional offices are located at Bishop's Falls, Port Saunders, and Happy Valley. In this initiative, flattening of the organization eliminated three managers' positions, and one level of supervision in most areas. In addition, maintenance coordination was centralized to the regional offices, and transmission and distribution line workers were combined under a common lines supervisor. The initiative resulted in the elimination of 19 FTE.

In 1998, TRO decided to introduce a new multi-skilled classification in its isolated diesel systems. This new classification, Diesel System Representative (DSR), in addition to the traditional operators' duties will also carry out minor maintenance, meter reading, limited line duty, and other customer services tasks. This approach to operating and maintaining the isolated diesel systems was identified as a way to reduce our costs (primary travel) as well as improve customer service.

With the training nearing completion we will implement this new classification in 2001.

In 1999, TRO started a review of line worker coverage on the Island and in Labrador. The objective was to identify the number and location of line workers necessary to maintain the system without compromising our ability to respond to major storms as experienced in the past. This initiative resulted in the elimination of 17.5 FTE line worker positions in 2001. In addition to this, some positions were relocated to achieve more effective coverage.

(b) The following table shows an estimate of the initiatives savings starting with the first full year after implementation. An average of the annual salary/hourly rates was used to generate these estimates:

Years	Estimate Annual Savings	Estimated Cumulative Total Savings
1996	$242,000	$242,000
1997	$942,000	$1,184,000
1998	$942,000	$2,126,000
1999	$942,000	$3,068,000
2000	$942,000	$4,010,000
2001	$942,000	$4,952,000
2002	$1,996,000	$6,948,000

Q. (a) Provide the annual expenditures on environmental initiatives for the years 1997 to 2000 and forecast for 2001 and 2002 (JCR, Schedule 1).

(b) Provide details on the quantities, concentration levels and location of any PCB's remaining in service or in storage.

(c) Provide a summary of oil spills, identifying PCB contaminated spills separately, for the period 1992 to 2001.

(d) Provide any reports on environmental performances for the period 1992 to 2001.

A. (a) The cost of involvement of internal staff in environmental initiatives is not specifically tracked, since environmental activities are an integral part of normal business. The following table summarizes, however, actual, external expenditures on environmental initiatives from 1997 – 2000, and estimates for 2001 and 2002.

Initiative	**1997** *($000)*	**1998** *($000)*	**1999** *($000)*	**2000** *($000)*	**2001** *($000)*	**2002** *($000)*
Reporting	0	11	10	10	50	50
EMS development and maintenance	0	152	70	69	85	85
Effects monitoring and auditing	263	544	386	233	196	145
Site assessment and remediation	1	11	403	853	273	220
Capital initiative and upgrades	129	1,641	1,628	86	117	891
Construction monitoring	283	335	146	201	750	750
Miscellaneous	10	27	15	30	40	40
Grand Total	686	2,721	2,658	1,482	1,511	2,181

(b) Hydro undertook initiatives in the 1980's and 1990's to significantly reduce risks associated with equipment containing PCBs including:

- the replacement or decontamination of all equipment manufactured as PCB equipment, such as terminal station capacitors and exciter transformers in generating stations;
- the decontamination of oil filled equipment in the transmission system with oil of 450 litres or greater and PCB concentrations of 50 parts per million or greater; and,
- the decontamination and destruction of all PCB held in our government approved storage facilities to the end of 1998.

PCB material remaining throughout our system is limited to:

- some components of older equipment and fluorescent light ballast capacitors; and
- some smaller oil filled equipment containing low concentrations of PCB from cross contamination events.

The numbers and location of this equipment is not certain. We have policies in place to test suspect equipment when servicing is required to ensure that all PCB is captured for safe storage and disposal.

Currently, there are 67.2 tonnes of material contaminated with PCB located in our only remaining PCB storage facility located at Bishop's Falls. The inventory consists mostly of contaminated soil removed during site remediation at two terminal stations.

There are 762 kg. of high-level (> 10,000 parts per million) PCB material located at Bishop's Falls PCB storage facility. Approximately, 200 kg. is solid waste, and the remainder is oil.

(c) The following table summarizes all documented oil spills that have occurred from 1992 to the present.

Year	Number of Spills	PCB Spills
1992	8	0
1993	7	0
1994	3	0
1995	6	0
1996	3	0
1997	8	0
1998	8	0
1999	8	1
2000	9	0
2001	5	0
TOTAL	65	1

(d) The following is a list of reports pertaining to Hydro's environmental performance for the period 1992 – 2001:

- Environmental Performance Report (2000) (attached);
- Annual Air Emissions Report to the Department of Environment (DOE) (1995 – 2000) (attached);
- Monthly reports to DOE pertaining to the operation of the Waste Water Treatment Plant (WWTP) Holyrood, and monitoring of ground level concentrations of atmospheric emissions (1992 – present) (attached); from December 1992 through 1994 a separate

report on operation of the WWTP was submitted during each month of WWTP operation; from June 1992 through 1994 a separate report on operation of the ambient air monitoring program was submitted in each month; in January 1995 the two separate reports were combined and one combined report was submitted in each month through June 2001; no reports on WWTP operation were submitted for November 1992 and July and August 1994 as the facility did not operate in these months; reports for December 1994, October 1998 and November 1998 are not available.

- Hydro submitted an electronic data report as per National Pollution Release Inventory (NPRI) requirements for the years 1998, 1999 and 2000. This information is available on NPRI's web page www.ec.gc.ca/pdb/npri/npri_home_e.cfm;
- Voluntary Challenge and Registry Inc. (1995, 1998) (attached).

Q. Compare the depreciation expense for the years 1998 to 2002 using the current depreciation methodology and the proposed depreciation methodology.

A. The depreciation expense for the years 1998 to 2001 would be the same using both the current methodology and the proposed methodology because the current rate application includes the changes in service lives to be effective January 1, 2002.

The effect on the year 2002 is outlined below.

Year	Current Methodology ($000)	Proposed Methodology ($000)	Expense Reduction ($000)
2002	34,932	31,790	(3,142)

1 Q. Complete the following table for each year from 1992 to 2000 and forecast for
2 2001 and 2002:

Newfoundland Hydro
Calculation of Plant Investment and Rate Base
1992 – 2002
(000s)

		Balance Dec. 31 1992	Balance Dec. 31 1993	....	Balance Dec. 31 2001	Balance Dec. 31 2002
Plant Investment						
1	Power Generation:	$ -	$ -		$ -	$ -
2	- Thermal	$ -	$ -		$ -	$ -
3	- Hydro	$ -	$ -		$ -	$ -
4	- Diesel	$ -	$ -		$ -	$ -
5	- Gas Turbine	$ -	$ -		$ -	$ -
6	Total	$ -	$ -		$ -	$ -
7						
8	Substations	$ -	$ -		$ -	$ -
9	Transmission	$ -	$ -		$ -	$ -
10	Distribution	$ -	$ -		$ -	$ -
11	General Properties	$ -	$ -		$ -	$ -
12	Transportation	$ -	$ -		$ -	$ -
13	Communications	$ -	$ -		$ -	$ -
14	Computer Software	$ -	$ -		$ -	$ -
15	Computer Hardware	$ -	$ -		$ -	$ -
16	Customer Contributions	$ -	$ -		$ -	$ -
17	Government Contributions	$ -	$ -		$ -	$ -
18						
19	Total Depreciable Plant [Line 6 + Lines 8 to17]	$ -	$ -		$ -	$ -
20						

	Non-Depreciable					
21	Land/Plant		$ -	$ -	$ -	$ -
22						
23	Total Plant	[Line 19 + Line 21]	$ -	$ -	$ -	$ -
24						
	Construction Work In					
25	Progress	[CWIP]	$ -	$ -	$ -	$ -
26						
27	Total Plant Investment	[Line 23 + Line 25]	$ -	$ -	$ -	$ -

1 A. The completed table for each year from 1992 to 2002 is attached.

NEWFOUNDLAND AND LABRADOR HYDRO
CALCULATION OF PLANT INVESTMENT and RATE BASE
1992-2002
($000)

		1992	1993	1994	1995	1996	1997	1998	1999	2000	Estimate 2001	Forecast 2002
	PLANT INVESTMENT											
1	**Power Generation**											
2	**-Thermal**	185,287	189,098	192,660	193,608	194,722	199,366	199,634	177,187	177,463	181,330	182,357
3	**-Hydro**	705,416	707,792	710,537	713,977	715,934	716,706	717,314	717,574	718,326	719,997	724,463
4	**-Diesel**	37,719	36,930	41,572	44,072	45,430	48,410	50,990	52,569	53,610	62,860	65,516
5	**-Gas Turbine**	43,390	43,495	43,491	43,546	43,607	44,529	44,640	45,336	45,665	45,793	45,793
6	**Total**	971,812	977,315	988,260	995,203	999,693	1,009,011	1,012,578	992,666	995,064	1,009,980	1,018,129
7												
8	**Substations**	127,729	132,295	135,875	145,735	153,191	155,446	159,601	159,742	162,260	164,381	164,884
9	**Transmission**	205,026	207,225	214,643	221,421	232,263	233,221	237,896	239,908	262,951	282,684	297,774
10	**Distribution**	89,849	94,438	92,789	97,843	103,744	107,162	111,659	114,932	119,281	123,155	127,164
11	**General Properties**	63,550	64,513	65,170	66,881	68,405	69,448	68,460	70,687	71,246	78,363	82,749
12	**Transportation**	7,262	7,380	7,577	8,437	8,544	9,393	9,883	9,692	11,554	11,916	12,138
13	**Communications**	20,783	21,201	21,508	23,232	24,761	25,241	26,611	28,709	31,882	43,631	53,437
14	**Computer Software**	770	594	1,219	874	566	173	239	11,855	12,741	14,080	14,700
15	**Computer Hardware**	4,861	5,603	6,242	6,183	5,846	6,346	9,456	9,276	8,106	8,184	8,293
16												
17	**Total Depreciable Plant**	1,491,642	1,510,564	1,533,283	1,565,809	1,597,013	1,615,441	1,636,383	1,637,467	1,675,085	1,736,374	1,779,268
18												
19	**Non-Depreciable Land/Plant**	3,148	3,150	3,227	3,443	3,457	3,487	3,487	3,487	3,496	3,505	3,505
20												
21	**Total Plant**	1,494,790	1,513,714	1,536,510	1,569,252	1,600,470	1,618,928	1,639,870	1,640,954	1,678,581	1,739,879	1,782,773
22												
23	**Construction Work In Progress**	7,947	8,280	7,359	8,795	3,721	10,032	16,249	41,621	45,517	76,666	147,280
24												
25	**Total Plant Investment**	1,502,737	1,521,994	1,543,869	1,578,047	1,604,191	1,628,960	1,656,119	1,682,575	1,724,098	1,816,545	1,930,053

NEWFOUNDLAND AND LABRADOR HYDRO
CALCULATION OF PLANT INVESTMENT and RATE BASE
1992-2002
($000)

		1992	1993	1994	1995	1996	1997	1998	1999	2000	Estimate 2001	Forecast 2002
	Rate Base Calculation											
26	**Plant Investment Less CWIP**	1,494,790	1,513,714	1,536,510	1,569,252	1,600,470	1,618,928	1,639,870	1,640,954	1,678,581	1,739,879	1,782,773
27												
28	**Deduct:**											
29	**Accumulated Depreciation**	174,195	197,302	220,935	246,112	271,995	299,901	328,458	349,883	378,732	408,741	437,630
30	**Customer Contributions**	7,820	8,473	10,309	10,308	10,589	10,614	11,074	11,170	12,048	12,048	12,048
31	**Government Contributions**	76,891	75,567	75,049	77,602	79,809	78,835	79,417	78,618	76,919	76,811	75,157
32	**Add/Deduct Other Items**	2,131	2,131	2,191	2,191	2,020	2,020	2,012	2,278	2,139	2,010	2,010
33		261,037	283,473	308,484	336,213	364,413	391,370	420,961	441,949	469,838	499,610	526,845
34												
35	**Net Plant Investment**	1,233,753	1,230,241	1,228,026	1,233,039	1,236,057	1,227,558	1,218,909	1,199,005	1,208,743	1,240,269	1,255,928
36												
37	**Deferred Realized Foreign Exchange Loss (net of provision)**						90,278	89,278	88,278	87,278	86,278	84,121
38	**Cash Working Capital Allowance - 3%**	2,418	2,476	2,521	2,424	2,494	2,375	2,682	2,940	2,947	3,211	3,096
39	**Inventories**	30,116	28,152	31,055	36,031	39,388	36,851	30,967	43,113	41,951	40,652	40,429
40												
41	**Rate Base at Year End**	1,266,287	1,260,869	1,261,602	1,271,494	1,277,939	1,357,062	1,341,836	1,333,336	1,340,919	1,370,410	1,383,574

Notes:
1. Working capital allowance of 3% of Operating, maintenance and power purchases was developed based on lead/lag study performed relative to 2001 and 2002 expenses.
2. Hydro will be using 13 month averages for inventory balances for rate base purposes, not the year-end balances requested above.

Q. With respect to the replacement of manufacturer non-supported equipment, answer the following questions or provide the information appropriate on each budget item identified below:

Budget Item	Amount	Description
B-8	$863,000	Replace Exciter Unit 1 – Cat Arm (installed 1984)
B-11	$606,000	Replacement of Governor Control – Upper Salmon (installed 1982)
B-13	$153,000	Upgrade Controls on Spherical Valve#5 – Bay d'Espoir
B-65	$2,379,000	Replace Power Line Carrier Equipment – Transmission System – West Coast.
B-66	$8,373,000	Replace VHF Mobile Radio System (installed 1989 – not supported by mfg. since 1991).
B-67	$58,000	Replace Tele-protection – Stony Brook – Grand Falls Frequency Converter.
B-68	$556,000	Replace UHF Radio – Upper Salmon (20 years old)
B-70	$311,000	Replace Remote Terminal Unit for Hydro – Phase 3
B-73	$52,000	Replace Telephone Isolation Equipment – Sunnyside & Western Avalon
Total	$13,351,000	

(a) Provide failure statistics for the equipment over the past 5 years.

(b) What spares were purchased initially for this equipment?

(c) What spares were purchased as Hydro became aware that spares were no longer going to be supplied by the Manufacturer?

(d) Provide details on the spare parts currently in inventory.

(e) What is Hydro's practice with respect to spares on equipment once that equipment is no longer supported by the manufacturer?

(f) As one system, or part of a system is retired, can the parts from that system be used as spares and otherwise to support extending the life of another system for another number of years? Provide details of situations where this approach has been utilized in the past.

(g) What are the benefits and costs of training an employee or contracting others to maintain a supply of spares through replacement of components and rebuilding boards given the capital costs associated with the replacement of equipment for such purposes in 2001 and 2002?

(h) Given the substantial costs of replacing such equipment for lack of spares, has Hydro changed its practices with respect to purchasing spares, both in the initial purchase and as manufacturers remove support for such equipment?

A. B-8 – Replace Exciter Unit 1 – Cat Arm (installed 1984)

a) There has been 2 forced outages requiring one card to be replaced during the period 1996 - 2001. Some card components were replaced in 1999 at the recommendation of the manufacturer.

(b) All spares recommended by the manufacturer were purchased with the initial purchase of the excitation system.

(c) Considering the cost of spares and spares available in Hydro's inventory, Hydro decided not to purchase additional spares when the manufacturer gave notice that the equipment would no longer be supported.

(d) The Cat Arm exciter spare parts list as of 2001/07/11 is:

Part # Description	**Available**
58602818 Breaker, ABB M611 FAN 0.25-0.4A	1
58602819 Breaker, ABB M611 FAN 1.6-2.5A	1
58602794 Card, ABB Voltage Relay UNS00106-P	2
58602796 Card, ABB Supply KX9170A	2
58602854 Contact, Main 1500A, 600V	1
58602857 Switch Air Flow	2
58602815 Thyristor ABBC5411-20	3
58602808 Card, ABB UN0016A-P	1
58602795 Card, ABB UN0026A-P	1
58602807 Card, ABB UN0027A-P	1
58602799 Card, ABB UN0031A-P	1
58602791 Card, ABB UN004A-P	1
58602810 Card, ABB UN0079A-P	1
58602812 Card, ABB UN0083A-P	2
58602798 Card, ABB UN0089A-P	1
58602813 Card, ABB UN0091A-P	1

58602814 Card, ABB UN0093A-P	1
58602801 Card, ABB UN0503A-P	1
58602821 Coil, ABB NEF 73220	2
58602822 Coil, ABB NEF 75420	1
58602824 Coil, ABB NEF 77875	1
58602802 Card, ABB UN0901B-P	1
58602806 Card, ABB UN1001C-P	1
58602792 Card, ABB UN1004A-P	1
58602804 Card, ABB UN1004A-P	1
58602805 Card, ABB UN1024C-P	1
58602803 Card, ABB UN2010B-P	1
58602820 Card, ABB 1WX 174-2	1
58602797 Card, ABB UN0077A-P	1
58601573 Card, ABB UN2001F-P	2

These spare parts are used for both exciters at Cat Arm (Units 1 & 2). There is no spare conduction-monitoring card (Part # 58602811, Card, ABB UN0025A-P) available in inventory. This spare card was used during a failure on 2001-06-15.

(e) Hydro's practice is to check with other utilities using similar equipment in an attempt to obtain spares. Also, contact is made with other manufacturers for supply and repair of the failed electronic cards.

(f) Yes, when a system is retired, its parts can be used as spares for other identical systems in service in the overall Hydro system. For example, when an exciter of a generator is replaced, its parts are used as spares for identical exciters for a limited period only to maintain equipment compatibility and maintenance/ technical support. This approach was used at Bay d'Espoir during the replacement of the exciters on Units 1 – 6. The first exciter was replaced in 1995 and the

last one in 1999. A similar approach is also being used at Holyrood where electrohydraulic controls for Unit 2 were replaced in 1999 and Unit 1 control replacement is planned for 2003. In the meantime, parts from Unit 2 are kept as spares for Unit 1.

(g) In most cases original manufacturers do not provide detailed drawings for the electronic cards, as these are considered proprietary. Also, considering that Hydro has only a limited number of such systems in service it is not practical to train an employee to the level required for troubleshooting and repair of these complex electronic cards. In the industry, card repairs are usually performed by the original manufacturers who have the detailed drawings and level of expertise required for such repairs. Due to the lack of detailed drawings no other manufacturer can perform and guarantee the repairs of these electronic cards.

(h) When purchasing equipment, Hydro requests a list of recommended spare parts from the manufacturer. The recommendations are reviewed and an appropriate quantity of spare parts is purchased. When Hydro becomes aware that equipment is about to become obsolete (when we become aware that a manufacturer will cease to manufacture replacement spare parts, or will no longer provide technical support) an assessment is made as to when the equipment should be replaced based on the spare parts in inventory and the length of time until the manufacturer ceases providing the spare parts. There is no change in Hydro's current practice.

A. B-11 – Replacement of Governor Control – Upper Salmon (installed 1982)

(a) There have been 6 failures on the Upper Salmon governor controls between 1996 – 2001.

(b) All spares recommended by the manufacturer were purchased with the initial purchase of the governor system.

(c) Considering the cost of spares and spares available in Hydro's inventory, Hydro decided not to purchase additional spares when the manufacturer gave notice that the equipment would no longer be supported.

(d) The Upper Salmon governor controls spare parts list as of 2001/07/11 is:

Part # Description	Available
58602417 Amplifier Assembly, 6960-048	2
58602493 Board Assembly, WW5430-544D	1
58602492 Board Assembly, WW5431-128A	2
58603004 Board Assembly, WW5431-216	1
58602405 Coil, WW1324-136	2
58602404 Element Strainer	8
58603006 Gasket, Woodward 206611	1
58602431 Gasket, Woodward 3051-558	1
58602438 Gasket, Woodward 3052-17	1
58603008 Gasket, Woodward 206517	2
58602429 Module Assembly, Amplifier 5438-116	2
58602423 Module Assembly, Derivative 5438-228	2
58602428 Module Assembly, Integrator 5432-048	2
58602420 Module Assembly, Linear & Pulse Driver 5438-244	2
58602421 Module Assembly, Power Amplifier 5438-234	2
58602424 Module Assembly, Proportional 5438-226	2

58602422 Module Assembly, Rotation no Creep 548-232	2
58602425 Module Assembly, Speed Switch 1500 Hz 5432-028	2
58602427 Module Assembly, Digital Speed 5438-336	1
58602419 Potentiometer, WW1658-244	1
81000987 Power Card Board, 5431-276A	2
58602496 Transducer, C/W oil motor 5800-511	2
58602484 Valve-Skinner, 1714562	1
58602505 Valve-Skinner, A356B12002	1

(e) Hydro's practice is to check with other utilities using similar equipment in an attempt to obtain spares. Also, contact is made with other manufacturers for supply and repair of the failed electronic cards.

(f) Yes, when a system is retired, its parts can be used as spares for other identical systems in service in the overall Hydro system. However, Upper Salmon Powerhouse is a single unit plant and its governor controls are one of a kind in the Hydro system and hence its parts cannot be used anywhere else in the Hydro system.

(g) In most cases original manufacturers do not provide detailed drawings for the electronic cards, as these are considered proprietary. Also, considering that Hydro has only a limited number of such systems in service, it is not practical and cost effective to train an employee to the level required for troubleshooting and repair of these complex electronic cards. In the industry card repairs are usually performed by the original manufacturers who have the detailed drawings and level of expertise required for such repairs. Due to the lack of detailed drawings no other manufacturer can perform and guarantee the repairs of these electronic cards.

(h) When purchasing equipment, Hydro requests a list of recommended spare parts from the manufacturer. The recommendations are reviewed and an appropriate quantity of spare parts is purchased. When Hydro becomes aware that equipment is about to become obsolete (when we become aware that a manufacturer will cease to manufacture replacement spare parts, or will no longer provide technical support) an assessment is made as to when the equipment should be replaced based on the spare parts in inventory and the length of time until the manufacturer ceases providing the spare parts. There is no change in Hydro's current practice.

A. B-13 – Upgrade Controls on Spherical Valve #5 – Bay d'Espoir

(a) Failure Statistics for the equipment over the past 5 years:

Event	Date	Description
1	96-02-18	Solenoid valve # 1 would not operate due to misalignment of the solenoid contacts, caused by service wear
2	96-03-15	Solenoid valve # 1 would not operate due to misalignment of the solenoid contacts, caused by service wear
3	96-11-18	Downstream seal failed to release due to failure of pressure switch, preventing unit from starting
4	97-01-03	Downstream seal failed to release due to failure of pressure switch, preventing unit from starting
5	97-10-14	Valve solenoid failed to operate due to solenoid contact problem
6	98-06-15	Duplex water filters, seized preventing the changing of filters
7	00-07-14	Pipe leaks at solenoid valve
8	00-09-15	Pipe leaks on the downstream side of the spherical valve, preventing the operation of this valve
9	00-12-12	Spherical valve failed to close on unit shutdown due to switch contact problem

(b) One solenoid valve, one limit switch, one pressure switch, lamp holders, and one relay for each type of solenoid.

(c) Hydro identified similar controls from other manufacturers, which can be substituted with some modification. No source for replacement solenoid valves and water-operated valves has been identified.

(d) Substituted pressure and limit switches and two relays for the control of the solenoid valves.

(e) Hydro's practice is to check the inventories of other utilities using similar equipment in an attempt to obtain spares. Other manufacturers of similar equipment are contacted.

(f) Parts from retired systems are kept to use for similar systems to maintain plant reliability, until all such systems are retired. Hydro's practice has been to replace obsolete equipment to avoid having several generations of similar (but not interchangeable) equipment on units that are otherwise identical. The spherical valve is a critical component, which isolates the unit during emergency shutdown. To protect the unit, other property and to ensure the safety of personnel, very reliable controls are required.

(g) The components which have become obsolete and for which direct replacements cannot be obtained are control valves, of 1950's vintage design, many of which were manufactured by casting. It is more cost effective to replace the equipment with that of modern design than to reverse engineer parts and try to locate a manufacturer that can produce the components.

(h) When purchasing equipment, Hydro requests a list of recommended spare parts from the manufacturer. The recommendations are reviewed and an appropriate quantity of spare parts is purchased. When Hydro becomes aware that equipment is about to become obsolete (when we become aware that a manufacturer will cease to manufacture replacement spare parts, or will no longer provide technical support) an assessment is made as to whether it is more cost effective to purchase a stock of spare parts or to replace the equipment. There is no change in Hydro's current practice.

A. B-65 – Replace Power Line Carrier Equipment – Transmission System – West Coast.

(a) The following are the failure statistics over the past five (5) years:

EVENT	YEAR	NO. OF TICKETS ISSUED	% OF EQUIP. FAILURES AFFECTING SERVICE	REMARKS
1	1996	21	100%	Total number of equipment failures over the 5-year period is 100.
2	1997	19	100%	
3	1998	27	100%	
4	1999	20	100%	
5	2000	13	100%	

(b) One complete set of spare modules was initially purchased for this equipment, based on the manufacturer's recommendations. Typical manufacturer recommendations will address the number of systems in service, service locations and meantime between failure (MTBF) and meantime to repair (MTTR) to provide the reliability needed. Spare racks and chassis are not normally purchased.

(c) No additional spares were purchased when Hydro was notified that the manufacturer was going to discontinue the product. The manufacturer's recommended service life for the equipment is fifteen (15) years. The existing spares plus those removed from de-commissioned systems allowed Hydro to extend the life of the equipment by an average ten (10) years. The equipment's physical condition has now deteriorated to a point where spares will no longer extend its life.

(d) Our current inventory consists of three (3) sets of spare modules, the original set plus two (2) sets from retired system as noted in part (f).

(e) On a case-by-case basis and when a decision is made to purchase additional spares on discontinued equipment, Hydro's practice is to source the spares from the following sources:

1. original manufacturers
2. used equipment vendors
3. other utilities that are discontinuing use

(f) Spare parts from retired systems can be used to extend the life of another system. In the case of the PLC systems, two (2) extra sets of spares were obtained from decommissioned equipment.

(g) It is not practical to maintain spares through either employee training or contracting others because:

1. many of the discrete components have been discontinued by the manufacturer and
2. economy of scale in the limited number of installations to be supported. In the case of the PLC systems, ABB is the only known source of repair and component supply.

(h) No, Hydro has not changed its practices with respect to purchasing spares. Hydro ensures that adequate spares are provided to meet or exceed the service life of the equipment at the time of original purchase, through the use of parts from other retired similar systems, and by the purchase of additional spares from a variety of sources.

A. B-66 – Replace VHF Mobile Radio System (installed 1989 – not supported by mfg. Since 1991).

(a) The following are the failure statistics over the past five (5) years:

EVENT	YEAR	NO. OF TICKETS ISSUED	% OF EQUIP. FAILURES AFFECTING SERVICE	REMARKS
1	1996	46	75%	Total number of equipment failures over the 5-year period is 161.
2	1997	35	80%	
3	1998	36	80%	
4	1999	25	90%	
5	2000	19	70%	

(b) Hydro purchased the manufacturer's recommended spares consisting of switch modules, a spare site controller and several spare mobile and portable radios. Typical manufacturer's recommendations will address the number of systems in service, service locations and meantime between failure (MTBF) and meantime to repair (MTTR) to provide the reliability needed. Spare racks and chassis are not normally purchased.

(c) When Hydro became aware that the manufacturer was to cease support of the product, some additional spares were purchased. Because the manufacturer only produced four (4) systems, a limited number of spares were available. Hydro was not able to purchase spares for the switch. When spares from a de-commissioned system became available three (3) years ago, Hydro purchased site controller spares but was not able to get spares for the switch.

(d) The spare parts currently in inventory include mobile and portable radios, a set of site controller spares and a partial set of switch spares.

(e) Hydro's practice is to source additional spares on discontinued equipment from the following sources:

1. original manufacturers

2. used equipment vendors
3. other utilities that are discontinuing use

(f) In this instance, parts removed from this system could be used in a number of ways:

1. Mobile radios could be re-used in isolated locations which do not have system coverage, such as coastal Labrador. This has been done on occasion.
2. Repeater transmitters could be used as spare parts for paging system transmitters.
3. Mobile radios which have defective Automatic Number Indication (ANI) components, making them unusable on the Island system, have been re-deployed in Labrador where the ANI feature is not required. This has been done on occasion.
4. Spare site controller modules have been purchased from another utility when their system was de-commissioned.

(g) It is not practical to maintain spares through either employee training or contracting with others. Manufacturing techniques such as surface mount and ASIC technology make maintenance of many components of systems of this nature expensive or impossible for anyone but the original equipment manufacturer. Software maintenance is also required which would entail the procurement of tools, hardware, and training which are not available due to the age of the equipment. Hydro investigated procurement for a software development system from the manufacturer 5 years ago but it would cost $300,000 just for the manufacturer to prepare to investigate the requirements. Hydro has contracted the repair of modules and maintenance for all parts of the VHF mobile radio system.

(h) No, Hydro has not changed its practices with respect to purchasing spares. Hydro ensures that adequate spares are provided to meet or

exceed the service life of the equipment at the time of original purchase, through the use of parts from other retired similar systems, and by the purchase of additional spares from a variety of sources.

A. B-67 – Replace Tele-protection – Stony Brook – Grand Falls Frequency Converter.

(a) The failure statistics are not available. The data is recorded as part of general teleprotection failures and is not available for this particular unit.

(b) One complete set of spares was purchased based on the manufacturer's recommendations. Typical manufacturer 's recommendations will address the number of systems in service, service locations and meantime between failure (MTBF) and meantime to repair (MTTR) to provide the reliability needed. Spare racks and chassis are not normally purchased.

(c) The original equipment manufacturer was bought out and the product line was dropped. Hydro was not notified of this but rather found out a year later when spares were returned for repair. Attempts to purchase additional spare units was not successful.

(d) One complete set of spares is currently in inventory.

(e) Hydro's practice is to source additional spares on discontinued equipment from the following sources:

1. original manufacturers
2. used equipment vendors
3. other utilities that are discontinuing use

(f) The teleprotection unit being replaced is the only one of its kind installed by Hydro.

(g) This is not practical for this level of technology for only one system.

(h) No, Hydro has not changed its practices with respect to purchasing spares. Hydro ensures that adequate spares are provided to meet or exceed the service life of the equipment at the time of original purchase, through the use of parts from other retired similar systems, and by the purchase of additional spares from a variety of sources.

A. B-68 – Replace UHF Radio – Upper Salmon (20 years old)

(a) The following are the failure statistics over the past five (5) years:

EVENT	YEAR	NO. OF TICKETS ISSUED	% OF EQUIP. FAILURES AFFECTING SERVICE	REMARKS
1	1996	2	100%	Total number of equipment failures over the 5-year period is 16.
2	1997	5	100%	
3	1998	4	100%	
4	1999	3	100%	
5	2000	2	100%	

(b) Initially one complete set of spares was purchased based on the manufacturer's recommendations. Typical manufacturer 's recommendations will address the number of systems in service, service locations and meantime between failure (MTBF) and meantime to repair (MTTR) to provide the reliability needed. Spare racks and chassis are not normally purchased.

(c) No additional spares were purchased when support for this equipment was discontinued by the manufacturer because the equipment had already exceeded its designed service life.

(d) At present an incomplete set of spares are in inventory. Some spare modules were installed in the system and some damaged modules could not be repaired.

(e) Hydro's practice is to source additional spares on discontinued equipment from the following sources:

1. original manufacturers
2. used equipment vendors
3. other utilities that are discontinuing use

(f) This is the only system with this type of radio equipment; therefore the de-commissioned equipment cannot be used for spares for other

systems. When the equipment at the Hinds Lake Plant was removed, its spares were used to support another UHF link.

(g) It is not practical to maintain spares through either employee training or contracting other for this level of technology and a limited set of radios. Contact with the original equipment manufacturer Harris/Farinon confirms that the equipment is discontinued by the manufacturer and spares are no longer available.

(h) No, Hydro has not changed its practices with respect to purchasing spares. Hydro ensures that adequate spares are provided to meet or exceed the service life of the equipment at the time of original purchase, through the use of parts from other retired similar systems, and by the purchase of additional spares from a variety of sources.

A. B-70 – Replace Remote Terminal Unit for Hydro – Phase 3

(a) The following are the failure statistics over the past five (5) years:

EVENT	YEAR	NO. OF TICKETS ISSUED	% OF EQUIP. FAILURES AFFECTING SERVICE	REMARKS
1	1996	72	100%	Total number of equipment failures over the 5-year period is 272.
2	1997	54	100%	
3	1998	56	100%	
4	1999	48	100%	
5	2000	42	100%	

(b) Two sets of spares were initially purchased for this type of RTU. Typical manufacturer's recommendations will address the number of systems in service, service locations and meantime between failure (MTBF) and meantime to repair (MTTR) to provide the reliability needed. Spare racks and chassis are not normally purchased.

(c) Additional spares were purchased when support by the manufacturer was discontinued in 1990. The manufacturer's recommended operating life for this equipment has been exceeded. It should be noted that these RTU's have been upgraded twice to replace obsolete components and to provide additional functionality.

(d) Three sets of spares are now currently in inventory. Additional spares were obtained from decommissioned equipment.

(e) Hydro's practice is to source additional spares on discontinued equipment from the following sources:

1. original manufacturers
2. used equipment vendors
3. other utilities that are discontinuing use

(f) Yes. The spares are being used to maintain the other systems until they are replaced.

(g) We currently use trained employees to maintain the spares.

(h) No, Hydro has not changed its practices with respect to purchasing spares. Hydro ensures that adequate spares are provided to meet or exceed the service life of the equipment at the time of original purchase, through the use of parts from other retired similar systems, and by the purchase of additional spares from a variety of sources.

A. B-73 – Replace Telephone Isolation Equipment – Sunnyside & Western Avalon

(a) There have been no failures of this equipment at these stations for the past five (5) years. This equipment is not being replaced due to obsolescence or lack of spares. The original equipment installed required a large physical clearance to adjacent equipment to maintain safety standards and with the addition of other equipment in the station over the past years clearances have been compromised. The fibre cable technology will provide greater safety, reliability and bandwidth while eliminating the requirement for physical separation. The equipment removed will be used as spares to support other sites.

(b) Initially one (1) set of spares was purchased to maintain the equipment.

(c) Not applicable.

(d) Presently there are two (2) sets of spares in inventory to support the telephone isolation equipment which is still supported by the manufacturer.

(e) Not applicable.

(f) The modules removed from these sites will be placed in inventory to support the other sites.

(g) The manufacturer provides support for all equipment repairs. The telephone isolation equipment at Sunnyside and Western Avalon is not being removed because of obsolescence or lack of spare, see part (a) for details.

(h) No, Hydro has not changed its practices with respect to purchasing spares. Hydro ensures that adequate spares are provided to meet or exceed the service life of the equipment at the time of original

purchase, through the use of parts from other retired similar systems, and by the purchase of additional spares from a variety of sources.

Q. The system identified below was purchased in 1989 and manufacturer support terminated in 1991. Answer the following questions or provide the information as appropriate:

Budget Item	Amount	Description
B-66	$8,373,000	Replace VHF Mobile Radio System

(a) Provide a copy of the cost benefit analysis conducted, if any, when purchasing the existing system.

(b) Provide details on the impact of deferring the purchase of this item one, two or five years.

(c) Can components of the system be replaced to defer the need for the bulk of the capital expenditure to a future time? If not, why not? If so, provide details on the cost of replacing components.

(d) Other communication service providers offer cell phones, paging and VHF/UHF/twisted pair/microwave/fibre services. Can the purchase of communications services from others help defer or lower the cost of providing these services? Has Hydro considered using such services?

A. (a) A cost benefit analysis was not completed at the time of purchase in 1989.

(b) Deferring the purchase of this item could jeopardize the Corporation's ability to provide VHF mobile radio service required to ensure the safety of personnel and efficient operation of the power system. A reasonable life expectancy for a system of this nature is 10-12 years.

The manufacturer has not supported the system for over ten (10) years, refer to NP-98 item B-66 for additional information. Any failure of a major component of the system would render some or all of the system inoperable. Due to the highly specialized nature of mobile radio systems, if a failure were to render the system inoperable, an emergency replacement of the system would take 12-18 months including the design, procurement, installation and training for the replacement system. By proactively replacing the system before a serious outage has occurred the Corporation is ensuring that the integrity of its mobile communications system is maintained.

(c) There are several equipment replacement options. In summary, the switch and site controllers have to be replaced. Depending on the technology selected, the mobile radios and portable radios may be re-useable. However, the radios would require ongoing replacement as the majority will be fifteen (15) years old by 2003 and are beginning to reach the end of their useful life. This would decrease the overall reliability of the system and increase maintenance costs. As well, the replacement as planned includes the provision of repeaters to provide improved system coverage in selected areas. It is felt that replacing the system piecemeal maybe a less than optimal solution. In 2002 the repeater equipment will be fourteen (14) years old and this is the only portion of the system that maybe able to be retained apart from the radios. This is still being assessed by the repeater manufacturer, Motorola.

(d) Hydro has spent a significant amount of time with Aliant over the past three (3) years in assessing the viability of a province wide VHF mobile radio infrastructure. The current trend points to a continuation

of large users such as NP, Coast Guard, RCMP and RNC operating their own infrastructure.

There are no service providers for mobile services in many areas of the province where the Corporation requires these services. Cellular telephone, while available in a large proportion of the Island, does not provide the features or coverage of a mobile radio, infrastructure. Paging is primarily limited to urban areas.

Hydro, working with a satellite services provider, explored interfacing VHF mobile radio equipment with portable satellite systems. However, the systems could not be interfaced properly. Hydro has purchased portable satellite phones to provide services in remote areas. The functionality and per unit air time costs do not make the satellite alternative viable. Satellite services have traditionally been used to fill very specific and limited needs in the remote communication field.

Q. File Hydro's response to Request for Information NP-1 posed at Hydro's 2001 Capital Expenditure Hearing, and correspondence dated December 13, 2000 and March 07, 2001 related to meetings on the Hydro Digital Microwave System.

A. Attached are:

i) Hydro's response to Request for Information NP-1 posed at Hydro's 2001 Capital Expenditure Hearing.

ii) Correspondence dated December 13, 2000 (Letter from Don Bragg to Mr. Eric Downton)

iii) Correspondence dated March 07, 2001 (Letter from Eric Downton to Mr. Geoff Emberley)