Q. **Impacts re: Interconnections of Isolated Rural Systems to Island Interconnected System**

1. Provide a table indicating for each year from 1992 to 2002 inclusive the following information related to interconnections of Isolated Rural Systems to the Island Interconnected System that has been undertaken during this period (based on H.G Budgell, pages 13 and 14, these include the interconnection of the Petite Forte community in 1993, St. Anthony-Roddickton System in 1996, the community of Westport in 1996, the community of South East Bight in 1998, and the community of LaPoile in 1999):

   (a) Indicate for each year the operating load (actual or forecast) applicable if the community or system is on the Isolated Rural System (for years after interconnection, this load is to be estimated); indicate sales separate from distribution losses.

   (b) Based on (a), indicate for each year the net reduction in Isolated Rural System load due to interconnections to date.

   (c) Based on (a) and (b), estimate for each year the change in Isolated Diesel System revenue requirement costs of service and contribution to the Rural Deficit due to interconnections to date.

   (d) For each year starting with interconnection, indicate the new operating load contributed to the Island Interconnected System by these each interconnection (indicate sales separately for Hydro Rural Interconnected and NP, and also indicate transmission losses separately).

(e) Based on (d), indicate for each year the net increase in Island Interconnected System load due to interconnections to date.

(f) Based on (d) and (e), estimate for each year the change in Island Interconnected System revenue requirement costs of service and contribution to the Rural Deficit due to interconnections to date.

(g) Based on (c) and (f) above, indicate for each year the net change in the Rural Deficit for that year, and (separately) any net change in the RSP for that year, due to interconnections to date.

2. Based on the information developed in response to (1) above, compare COSS estimates (including Rural Deficit) as presented in Schedule 1.2 of Exhibit JAB-1, page 3 of 94 for the 2002 test year with estimated COSS (and Rural Deficit) that would apply if none of the interconnections set out in (1) above had taken place to date. Provide all supporting schedules for the new COSS estimate.

3. Provide a COSS analysis for the Island Interconnected System for test year 2002 assuming that the Great Northern Peninsula system 138 kV and 66 kV transmission lines and associated terminal station equipment connecting the Hawkes Bay Diesel Plant, St. Anthony Diesel Plant and Roddickton generation plant to the main gird are assigned to Hydro Rural Sub-transmission rather than to Common.

4. Adjust the COSS in (3) above to assume that the generation assets in the Great Northern Peninsula system are also assigned to the rural system.

5. Provide a copy of all studies conducted by Hydro evaluating the cost effectiveness of each of the interconnections in (1) above, either before or after each interconnection.

6. In 1995, the Board recommended "that the prudence of costs associated with the St. Anthony/Roddickton interconnection be reviewed at the next Hydro rate referral, following the interconnection, for the purpose of determining recoverable costs." Provide all evidence available to Hydro as to why this interconnection was undertaken, and that the costs were prudently incurred and in the best interest of customers on the Island Interconnected System.

A. 1. (a) See IC 203A on attached table.

(b) See IC 203B on attached table.

(c) Subsequent to interconnection, costs on a hypothetical non-interconnected or isolated basis are no longer tracked, as they no longer reflect the operations nor financial situation of the company. It would not be possible to complete the requested information, as significant material data is unavailable. Moreover, the information requested is unnecessary for a satisfactory understanding of the matters regarding Hydro's application before the Board.

(d) See IC 203D on attached table.

(e) See IC 203E on attached table

(f) Please refer to the response to 1(c) above.

(g) Please refer to the response to 1(c) above.

1. Please refer to the response IC-203 1(c) above.

2. Please refer to the response to IC-180.

3. Please refer to the response to IC-87.

4. See attached Interconnection Studies as requested.

6. See IC-203(6) Revised.

**Referenced Table for Responses to IC 203 A,B,D,&E**

| | | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | Forecast |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **IC 203A** | System & Interconnection Year | MWh | MWh | MWh | MWh | MWh | MWh | MWh | MWh | MWh | MWh | MWh | Year |
| | | | | | | | | | | | | | (Diesel) |
| | Petite Forte 1993 | 352 | 382 | 394 | 405 | 416 | 428 | 439 | 451 | 463 | 475 | 487 | 1991 |
| | St. Anthony Roddickton 1996 | 40411 | 40123 | 39819 | 39667 | 41417 | 41820 | 42224 | 42599 | 42974 | 43368 | 43762 | 1994 |
| | Westport 1996 | 1294 | 1329 | 1318 | 1314 | 1326 | 1336 | 1343 | 1350 | 1354 | 1358 | 1362 | 1996 |
| | South East Bight 1998 | 345 | 363 | 376 | 394 | 412 | 437 | 430 | 437 | 443 | 450 | 457 | 1996 |
| | LaPoile 1999 | 452 | 435 | 446 | 452 | 472 | 529 | 528 | 525 | 521 | 517 | 509 | 1998 |
| | Total Sales | 42854 | 42632 | 42353 | 42232 | 44043 | 44550 | 44964 | 45362 | 45755 | 46168 | 46577 | |
| | Distribution Losses | 4607 | 5189 | 4601 | 4217 | 4771 | 4760 | 4837 | 4918 | 4961 | 5097 | 5141 | |
| | Total Load | 47461 | 47821 | 46954 | 46449 | 48814 | 49310 | 49801 | 50280 | 50716 | 51265 | 51718 | |
| **IC 203B** | **Net Reduction in load** | | 407 | 420 | 431 | 47873 | 48344 | 49273 | 50280 | 50716 | 51265 | 51718 | |

| | | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **IC 203D** | System & Interconnection Year | MWh | MWh | MWh | MWh | MWh | MWh | MWh | MWh | MWh | MWh |
| | Petite Forte 1993 | 128 | 436 | 456 | 458 | 452 | 455 | 460 | 462 | 479 | 479 |
| | St. Anthony Roddickton 1996 | | | | 14451 | 42870 | 45203 | 46997 | 50478 | 51452 | 51983 |
| | Westport 1996 | | | | 264 | 1404 | 1417 | 1453 | 1494 | 1532 | 1548 |
| | South East Bight 1998 1 | | | | | | 358 | 518 | 527 | 535 | 540 |
| | LaPoile 1999 2 | | | | | | | 533 | 567 | 667 | 680 |
| | Additional Sales | 128 | 436 | 456 | 15173 | 44726 | 47433 | 49961 | 53528 | 54665 | 55230 |
| | Distribution Losses | 21 | 38 | 36 | 950 | 3226 | 2707 | 3451 | 2829 | 3486 | 3527 |
| | Additional Load | 149 | 474 | 492 | 16123 | 47952 | 50140 | 53412 | 56357 | 58151 | 58757 |
| | Transmission Losses 3 | 6 | 20 | 18 | 571 | 1688 | 2002 | 2104 | 2074 | 2122 | 2258 |
| **IC 203E** | **Additional Load on Island Interconnected System** | 155 | 494 | 510 | 16694 | 49640 | 52142 | 55516 | 58431 | 60273 | 61015 |

1. South East Bight is metered with Monkstown. Distribution losses are estimated
2. LaPoile is metered with Grand Bruit & Hope Brook. Distribution losses are estimated

Q. **Impacts re: Interconnections of Isolated Rural Systems to Island Interconnected System**

6. In 1995, the Board recommended "that the prudence of costs associated with the St. Anthony/Roddickton interconnection be reviewed at the next Hydro rate referral, following the interconnection, for the purpose of determining recoverable costs." Provide all evidence available to Hydro as to why this interconnection was undertaken, and that the costs were prudently incurred and in the best interest of customers on the Island Interconnected System.

A. 6. The report entitled "Great Northern Peninsula Interconnection Study" dated October 18, 1993 (attached to IC-203(5)) reviewed several interconnection alternatives. The report determined that while technically viable, the interconnection did not meet the minimum economic guideline applied by Hydro Management when approving interconnection projects.

However, early in 1994 the Canada/Newfoundland Infrastructure Initiative was announced and Hydro applied for and was granted $5.0 million to be applied toward the interconnection of St. Anthony/Roddickton system. Analysis indicated that this funding improved the economics of the proposed interconnection and a decision was made to proceed.

The interconnection scheme approved was very similar to interconnection alternative #4 – 138 kV Bear Cove to St. Anthony Airport as outlined in the October 18, 1993 report, with the following changes:

The in-service date had been moved from 1998 to 1996 in order to take advantage of funding under the Infrastructure Agreement;

- The Hawke's Bay diesels were to be relocated to the Roddickton Woodchip Plant;
- The Roddickton woodchip fired thermal generating station was to be modified to burn #2 fuel oil and placed on standby; and
- Switched shunt reactors and capacitors were to be used for voltage control instead of static var compensators.

Subsequent to project approval, the following changes were made to the interconnection concept:

- It was decided to leave the diesel units at Hawke's Bay and not relocate them to Roddickton; and
- It was decided not to convert the Roddickton Woodchip Plant to an oil fired operation.

The interconnection alternative approved had an estimated capital cost of $38.4 million or a net cost of $33.4 million including the $5.0 million Infrastructure grant. A cost effectiveness analysis, which incorporated the Infrastructure grant as well as revised load forecasts, was completed. The revised load forecasts, fuel series and Holyrood incremental energy rates are shown in Schedule 1-3 respectively. The following table summarizes the results of the analysis and copies of the complete cost effectiveness analysis are attached.

| SUMMARY OF COST EFFECTIVE ANALYSIS (1993$ X 1000) | | | |
|---|---|---|---|
| Cumulative Present Worth to 2022 | | Present Worth Difference at 2011 | Payback Period Years |
| Isolated Alternative | Interconnected Alternative | | |
| 88001 | 73769 | -4020 | 12 |

Given that the payback period is less than Hydro's minimum economic guideline that interconnection projects must have payback periods not exceeding 15 years, the decision was made to proceed with the project. The project, when completed, cost approximately $31.4 million and with the $5.0 million infrastructure grant resulted in a net cost of $26.4 million.

# SCHEDULE 1
# GNP INTERCONNECTION ANALYSIS
# LOAD FORECASTS

## REVISED MAY 1994

| Year | St. Anthony/Roddickton System | | | | Existing GNP System Forecast | |
|---|---|---|---|---|---|---|
| | Isolated Forecast | | Interconnected Forecast | | | |
| | (kW) | (MWh) | (kW) | (MWh) | (kW) | (MWh) |
| 1994 | 11263 | 51412 | - | - | 26791 | 112545 |
| 1995 | 11539 | 51922 | - | - | 27999 | 117812 |
| 1996 | 11640 | 52360 | - | - | 28586 | 120272 |
| 1997 | 11742 | 52808 | 11348 | 49209 | 29149 | 122624 |
| 1998 | 11845 | 53257 | 12676 | 54687 | 29696 | 124920 |
| 1999 | 11941 | 53673 | 13535 | 58097 | 30249 | 127234 |
| 2000 | 12037 | 54090 | 14064 | 60370 | 30740 | 129295 |
| 2001 | 12140 | 56222 | 14596 | 63930 | 31208 | 131260 |
| 2002 | 12257 | 56751 | 15050 | 65920 | 31689 | 133279 |
| 2003 | 12371 | 57267 | 15399 | 67447 | 32159 | 135255 |
| 2004 | 12517 | 57926 | 15705 | 68786 | 32605 | 137131 |
| 2005 | 12665 | 58591 | 16016 | 70152 | 32986 | 138735 |
| 2006 | 12832 | 59348 | 16285 | 71328 | 33365 | 140342 |
| 2007 | 13002 | 60112 | 16555 | 72513 | 33705 | 141780 |
| 2008 | 13163 | 60838 | 16790 | 73540 | 34008 | 143055 |
| 2009 | 13295 | 61432 | 17002 | 74471 | 34339 | 144452 |
| 2010 | 13438 | 62078 | 17225 | 75446 | 34682 | 145898 |
| 2011 | 13590 | 62767 | 17457 | 76460 | 35004 | 147259 |
| 2012 | 13739 | 63436 | 17678 | 77430 | 35296 | 148496 |
| 2013 | 13871 | 64033 | 17877 | 78299 | 35581 | 149696 |
| 2014 | 13971 | 64484 | 18058 | 79092 | 35866 | 150901 |
| 2015 | 14082 | 64984 | 18244 | 79908 | 36132 | 152021 |
| 2016 | 14203 | 65532 | 18436 | 80751 | 36398 | 153138 |
| 2017 | 14309 | 66010 | 18604 | 81483 | 36673 | 154300 |
| 2018 | 14400 | 66419 | 18747 | 82111 | 36938 | 155418 |
| 2019 | 14497 | 66855 | 18901 | 82784 | 37177 | 156423 |
| 2020 | 14603 | 67334 | 19059 | 83480 | 37404 | 157378 |
| 2021 | 14697 | 67760 | 19200 | 84096 | 37642 | 158384 |
| 2022 | 14777 | 68119 | 19319 | 84617 | 37882 | 159394 |

Note: Existing GNP system forecasts include existing loads from Bonne Bay to the Flower's Cove area.

**SCHEDULE 2**
**GNP INTERCONNECTION ANALYSIS**
**FUEL SERIES**

**REVISED APRIL 1994**

| Year | Residual Fuel $/BBL | Diesel Fuel $/L | Wood Fuel $/Tonne |
|---|---|---|---|
| 1993 | 15.4 | 0.198 | 29.21 |
| 1994 | 13.8 | 0.190 | 29.21 |
| 1995 | 14.0 | 0.201 | 29.21 |
| 1996 | 15.2 | 0.216 | 29.21 |
| 1997 | 16.4 | 0.232 | 32.11 |
| 1998 | 17.6 | 0.247 | 32.11 |
| 1999 | 18.9 | 0.262 | 32.11 |
| 2000 | 20.2 | 0.278 | 32.11 |
| 2001 | 21.8 | 0.298 | 36.12 |
| 2002 | 22.5 | 0.304 | 36.12 |
| 2003 | 23.1 | 0.308 | 36.12 |
| 2004 | 23.9 | 0.315 | 36.12 |
| 2005 | 24.3 | 0.322 | 40.36 |
| 2006 | 24.8 | 0.328 | 40.36 |
| 2007 | 25.3 | 0.335 | 40.36 |
| 2008 | 25.8 | 0.342 | 40.36 |
| 2009 | 26.3 | 0.348 | 45.04 |
| 2010 | 26.9 | 0.355 | 45.04 |
| 2011 | 27.4 | 0.363 | 45.04 |
| 2012 | 28.2 | 0.369 | 45.04 |
| 2013 | 29.8 | 0.376 | 49.58 |
| 2014 | 30.6 | 0.384 | 49.58 |
| 2015 | 31.6 | 0.392 | 49.58 |
| 2016 | 32.5 | 0.400 | 49.58 |
| 2017 | 33.5 | 0.408 | 54.55 |
| 2018 | 34.4 | 0.416 | 54.55 |
| 2019 | 35.3 | 0.423 | 54.55 |
| 2020 | 36.3 | 0.432 | 54.55 |
| 2021 | 37.2 | 0.440 | 60.01 |
| 2022 | 38.2 | 0.449 | 60.01 |

**SCHEDULE 3**
**GNP INTERCONNECTION ANALYSIS**
**HOLYROOD INCREMENTAL ENERGY RATES**

**REVISED APRIL 1994**

| Year | Energy Rate $/kWh |
|---|---|
| 1997 | 0.0271 |
| 1998 | 0.0291 |
| 1999 | 0.0312 |
| 2000 | 0.0334 |
| 2001 | 0.0360 |
| 2002 | 0.0372 |
| 2003 | 0.0382 |
| 2004 | 0.0395 |
| 2005 | 0.0402 |
| 2006 | 0.0410 |
| 2007 | 0.0418 |
| 2008 | 0.0426 |
| 2009 | 0.0435 |
| 2010 | 0.0445 |
| 2011 | 0.0453 |
| 2012 | 0.0466 |
| 2013 | 0.0493 |
| 2014 | 0.0506 |
| 2015 | 0.0522 |
| 2016 | 0.0537 |
| 2017 | 0.0554 |
| 2018 | 0.0569 |
| 2019 | 0.0583 |
| 2020 | 0.0600 |
| 2021 | 0.0615 |
| 2022 | 0.0631 |

Note: Assumes a Holyrood efficiency of 605 kWh/Barrel