

NOVA SCOTIA UTILITY AND REVIEW BOARD

IN THE MATTER OF THE PUBLIC UTILITIES ACT

- and -

**IN THE MATTER OF a Public Review of the Power Outages resulting from the Storm
of November 13 and 14, 2004**

BEFORE: Margaret A. M. Shears, Vice-chair
Kulvinder S. Dhillon, P. Eng., Member
John A. Morash, C.A., Member

COUNSEL: **NOVA SCOTIA POWER INCORPORATED**
James L. Connors, Q.C.

**CANADIAN MANUFACTURERS & EXPORTERS,
NOVA SCOTIA DIVISION**
Robert Patzelt

**ELECTRICITY CONSUMERS ALLIANCE
OF NOVA SCOTIA**
John Woods, P. Eng.

GASWORKS ENERGY CORP.
John Reynolds, P. Eng.

HALIFAX REGIONAL MUNICIPALITY
Mary Ellen Donovan

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Howard Epstein

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Michel Samson
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**PROVINCE OF NOVA SCOTIA/DEPARTMENT
OF ENERGY/EMERGENCY MEASURES ORGANIZATION**
Stephen T. McGrath
Jonathan Kenyon

HEARING DATES: April 18-20, 2005; April 26-28, 2005; May 5 and 16, 2005

FINAL SUBMISSIONS: June 9, 2005

LIST OF WITNESSES: Appendix - A

LIST OF INTERVENORS: Appendix - B

BOARD COUNSEL: S. Bruce Outhouse, Q.C.

**BOARD COUNSEL'S
CONSULTANTS:** John Sherrod, Power System Outage Response, LLC
Robert Stright, The Liberty Consulting Group
Christine Kozlosky, The Liberty Consulting Group
Dr. John Stutz, Vice President, Tellus Institute

DECISION DATE: August 5, 2005

DECISION: Outages caused by storm; state of transmission and distribution systems generally adequate; communication system failed; independent experts' recommendations for improvement accepted; further action directed

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1.0 INTRODUCTION

[1] This decision is further to a public review conducted by the Nova Scotia Utility and Review Board (the "Board") beginning on April 18, 2005, concerning Nova Scotia Power Incorporated's ("NSPI") preparation for and response to an early winter storm on November 13 and 14, 2004, which resulted in power outages affecting over 160,000 customers of NSPI. The maximum number of customers without power was in excess of 160,000 by noon on November 14th. By the evening of November 14th, power outages still affected 100,000 customers. Restoration of service to most affected customers was completed by November 20, 2004.

[2] By letter dated November 16, 2004, Premier John Hamm made the following request to the Nova Scotia Utility and Review Board:

The Government of Nova Scotia believes that the public interest would be served if the Utility & Review Board conducted an independent review. I therefore request that the Utility & Review Board, under the powers of the Public Utilities Act, begin a public review of the Company's state of preparedness for, and response to, last weekend's storm.

This review should provide valuable insights into improvements which can be made to the overall restoration program in preparation for future outages.

(Exhibit N-20)

[3] In a response dated November 17, 2004, the Board agreed to conduct such a review. In addition, in order for the Board to properly assess NSPI's performance before, during and after the storm, independent experts were retained. These experts were the Liberty Consulting Group ("Liberty") of Quentin, Pennsylvania, independent consultants with expertise in communications and transmission and distribution system design, operations and maintenance; and Power System Outage Response, LLC of Jackson, Mississippi

(PSOR, John Sherrod) with expertise in electricity distribution system design, operations and maintenance and emergency preparedness. These consultants prepared and filed reports which were made available to the public and to NSPI prior to the public hearing. In addition, Dr. John Stutz, Vice President of the Tellus Institute, provided assistance to the Board during the review and attended the formal hearings. The Board also directed NSPI to provide it with a comprehensive report on the outages, restoration efforts and related communications issues.

[4] Robert Stright, a senior consultant with Liberty, headed a team of four Liberty associates who were asked to examine NSPI's performance during and after the storm, and various issues related to the overhead transmission system. The transmission system consists of the network of poles, towers, conductors and associated hardware which carries electricity from the generating plant (or a purchased power source such as New Brunswick) to the distribution system. The transmission system in Nova Scotia operates at high voltage levels - 69,000 Volts, 138,000 Volts, 230,000 Volts and 345,000 Volts.

[5] John Sherrod, who was previously engaged by the Board to examine NSPI's state of preparedness for and response to Hurricane Juan in September of 2003, was asked to assess NSPI's distribution system. This part of NSPI's system, which is visible outside residences and businesses, is the network of poles, conductors and hardware which transports electricity from the transmission system to the customer's meter. Voltage levels on this part of the system, which is mainly comprised of wood poles, are lower than those on the transmission system - 25,000 Volts, 12,500 Volts and 4,000 Volts.

[6] Christine Kozlosky, associated with Liberty during this review, and an expert in customer service operations, performance management, and information-systems management, assessed the internal and external communications issues relating to the storm.

[7] NSPI, the principal operating subsidiary of Emera Inc., generates, transmits and distributes approximately 95% of the electricity in the Province of Nova Scotia. It is an investor-owned electric utility serving 464,000 customers, with assets of \$3.0 billion and with electricity revenues of \$927 million in 2004. The Board is the regulator of public utilities in Nova Scotia. Ralph Tedesco, Chief Operating Officer of NSPI, and Nancy Tower, then Vice President of Customer Operations of NSPI, were witnesses during the hearing.

[8] The **Public Utilities Act** confers general authority to the Board with respect to public utilities. **Section 52** of the **Act** states:

52 Every public utility is required to furnish service and facilities reasonably safe and adequate and in all respects just and reasonable. R.S., c. 380, s. 52.

It is under this general authority that the Board has undertaken the present review.

[9] The Board's review centres on three basic questions:

1. Was NSPI's transmission system adequately designed and maintained and were NSPI's efforts to manage and repair the system during and after the storm satisfactory?
2. Was NSPI's distribution system adequately designed and maintained and were NSPI's efforts to manage and repair the system during and after the storm satisfactory?
3. Was NSPI's preparation for and implementation of communications with customers, emergency officials, media and others during and after the storm satisfactory?

[10] The Board will deal with each of these questions in greater detail in this decision but, generally, the Board believes the answer to Questions 1 and 2 is “yes”, subject to certain recommendations for improvement and further study. NSPI’s performance in these areas is positive and the Board commends NSPI for this result. However, in the Board’s view, the answer to Question 3 is ‘no’ and, in the section of the decision on communications issues, directives which will hopefully improve NSPI’s communications system and processes are set out.

[11] The main issue raised by speakers at the public sessions involved NSPI’s communications system and its performance during the outage. The Board has found that NSPI’s communications with media, government agencies and EMOs during the November 2004 storm was inadequate. With respect to NSPI’s communications with its customers, the Board considers NSPI’s performance to be a very serious and totally unacceptable failure. The Board has directed that NSPI go further than it has proposed in order to test and improve its communications system during outages. NSPI has stated that it has made improvements to its system already and it has cautioned that additional improvements to its system may not be possible and/or may be extremely expensive. However, for reasons set out in this decision, the Board believes an additional supervised review of NSPI’s system and identification of a range of possible improvements and associated costs of same is not only reasonable but necessary.

[12] This finding is based on the experience of the public in dealing with NSPI’s communications system during the November outage. Although improvements were announced by NSPI following the storm, when subsequent outages occurred customers

continued to experience difficulties, both in communicating with NSPI and obtaining information regarding the outage and restoration times. NSPI's credibility with respect to reliability of service has been significantly damaged by these problems. In the Board's view, this is an intangible but very important component of NSPI's business. All possible and reasonable steps should be taken in order to repair the public perception of NSPI's reliability and its credibility with its customers.

[13] The review process was conducted in two phases. The first phase (the "Formal Hearing") was held in Halifax and involved the presentation of evidence by NSPI, the independent consultants engaged by Board Counsel and submissions from intervenors. The second phase of the process (the "Informal Hearings") involved public meetings held at various locations in the Province where the Board received requests to attend from the community. At these meetings, which were held in Dartmouth, Truro, Chester and Digby, members of the public were given the opportunity to pose questions to NSPI representatives and to make informal submissions to the Board.

[14] Intervenors in the Formal Hearing phase of the public review included the Department of Energy and the Emergency Measures Organization of Nova Scotia (referred to jointly as the "Province"; "EMO"); Halifax Regional Municipality ("HRM"); Electricity Consumers Alliance of Nova Scotia ("ECANS"); Canadian Manufacturers & Exporters ("CME-NS"); GasWorks Energy Corp. ("GasWorks"); Nova Scotia Liberal Caucus; New Democratic Party Caucus office ("NDP"); Town of Lunenburg; Canadian Broadcasting Corporation ("CBC"); and EastLink. CBC and EastLink subsequently withdrew as formal intervenors but filed submissions as informal intervenors. At the Informal Hearings, a

number of witnesses (identified in Appendix A, attached) made submissions to the Board. The Board also received thirty-four written submissions from interested members of the public.

[15] The Board wishes to express its appreciation to NSPI, the formal and informal intervenors and the general public for their helpful efforts in assisting the Board in reaching its conclusions in this matter. The purpose of this review, and the Board's findings, are to assist NSPI in improving its performance when storm-related outages occur in future. NSPI's performance in building and maintaining its transmission and distribution systems has been found to be acceptable by the independent experts who have reviewed and analyzed the facts surrounding the storm and its impact. NSPI's performance in the restoration of electric service has also been positively reviewed by the experts. The Board accepts this evidence and commends NSPI for its performance in these areas. The suggestions for improvement in NSPI's transmission and distribution system policies which the Board has adopted, are useful and, for the most part, have been accepted by NSPI.

[16] The failure of aspects of NSPI's communications system is significant and the Board has directed NSPI to take a number of steps to improve the present system to the extent possible. It may be, in the future, that NSPI will have to undertake more significant and expensive changes to ensure the communications system works well and reasonably addresses customer needs. While everyone's goal is to reduce the frequency and duration of power outages, the practical reality is that major storms and resultant power outages will occur in the future. Ideally, the recommendations adopted by the Board will contribute to

a less frustrating, difficult and potentially dangerous experience for customers and NSPI during such outages.

2.0 THE STORM

[17] A combination of wind, rain and snow fell on parts of Nova Scotia beginning on Saturday, November 13, 2004, and continued through the next day. NSPI lost parts of its transmission and distribution systems, with more than 160,000 customers being without service by noon on November 14, 2004. Following the storm, restoration took place over a six day period, with power restored to most customers by November 20, 2004.

[18] NSPI described the November 2004 storm as a combination of rain, ice pellets, light freezing drizzle, and wet, sticky snow accompanied by strong winds gusting to 75 km/h.¹ The storm affected certain areas of the Province, in varying levels of magnitude, and caused numerous outages across both the transmission and distribution systems, primarily in central and western Nova Scotia.

[19] In Exhibit N-1, NSPI noted that the regions most affected by the storm were the Annapolis Valley, the Halifax region and Northeastern Nova Scotia, between Truro and the Canso Causeway. Cape Breton and portions of Guysborough County were not affected by this weather event. NSPI summarizes the extent of the damage incurred as follows:

Between 12:00 a.m. and 5:00 p.m. on Sunday, NSPI's transmission plant experienced numerous outages across the 69 kV, 138 kV, 230 kV and 345 kV transmission systems. Some of these transmission lines automatically returned to service (transient outages) while others experienced sustained outages (attempts to automatically re-energize the line failed). The majority of sustained transmission outages were a result of snow and ice accretion on transmission structures, conductors, sky wires (i.e., overhead ground wires) and trees. The

¹Exhibit N-1, p. 3

snow and ice accretion on transmission structures coupled with strong wind resulted in downed structures on four 138 kV transmission lines and broken sky wires on seven (two 345 kV and five 138 kV) transmission lines which fell into the energized conductors below. In addition to the physical damage, snow and ice accretion on the 345 kV, 230 kV and 138 kV transmission line sky wires caused the sky wires to sag into energized conductors below. The majority of the 69 kV transmission line outages were a result of snow and ice accretion on trees along the right-of-way which leaned into the energized conductors.

(Exhibit N-1, p. 8)

[20] Liberty observed that the weather system had stalled over Nova Scotia and deposited 15 cm of weighty snow on wires and towers, with temperatures and humidity remaining constant at 0 degrees celsius and 100% respectively.²

[21] John Sherrod noted that:

There is a widely held opinion that the winter storm of November 13/14 was no different than the "normal" Nova Scotia snow storm and should not have caused the amount of damage and power outages it did. Consultant does not share this view. The weather data on snow and ice accretion and wind gust velocity present a picture of conditions that normally cause significant damage and outages on a utility's distribution facilities.

(Exhibit N-18, p. 5)

[22] Environment Canada described the storm as follows:

In the recently released Environment Canada "Top Ten Canadian Weather Stories for 2004" this November winter storm is ranked as #8 in the Country. The Environment Canada information specifically references the following:

The storm was interesting in many ways. For example, it was the heaviest dump of snow on record so early in the season. At Shearwater, there have been six huge two-day snowfalls with snow accumulations of over 50 cm in the past 60 years. Two of those six occurred in 2004. And never has a 50+cm snowfall over two days occurred before February 2-3 until this year. For a single-day snowfall accumulation over 35 cm, there have been 14 such events, but, again, none as early as November 13. Yarmouth had a whopping 53.4 cm in one day - only the second time that station has ever recorded a snowfall above 50 cm. The last time was on March 10, 1964 when 50.8 cm of snow fell.

Of more significance was the character of the snow and accompanying winds. The heavy snow was especially wet and sticky, with probably twice

² Exhibit N-19, p.5

the adhesion of the snow from White Juan. Adding in rain, light freezing drizzle and ice pellets, along with close air and dew-point temperatures, created weighty snow accretion on wires and towers of 10 to 15 cm thickness. But that's not all! Push those thick sheaths of snow with strong gusty winds at 75 km/h and you get an enormous stress load on trees, power lines, and transmission towers.

(Exhibit N-1, pp. 3-4)

[23] The storm was not consistent in terms of its impact across different areas of the Province. This has caused considerable confusion as many customers did not experience a serious and unusual storm and, therefore, found the damage to NSPI's system and the resulting outages to be both unexpected and inexplicable.

[24] However, most of the intervenors, as well as many members of the public who appeared at the informal sessions, did acknowledge that the storm was unusual and severe. The Board finds there is no question, based on Environment Canada's report and the views of experts and NSPI, that this storm was very severe in a number of areas of the Province and, as a result, considerable damage was done to NSPI's transmission and distribution systems. This damage, unfortunately, resulted in serious and lengthy outages for thousands of NSPI customers. While the Board fully appreciates the negative impact these outages had on customers, clearly NSPI had no control over the scale of the storm. The Board does note that Mr. Sherrod, in his report, recommended that NSPI add a private weather service provider, as he did in his report on Hurricane Juan:

Attached to this report as Appendix B is a recommendation matrix, detailing the status just prior to the November 13/14 winter storm of the NSPI response to each of the 49 recommendations in the Hurricane Juan report, and how these recommendations were put to use in the NSPI response to the November storm. In July, 2004 Consultant met with NSPI and reviewed each of the recommendations, reaching a resolution on how each one would be addressed. Of the 49 recommendations, only three were resolved in a manner that differed significantly from Consultant's original intent.

Recommendation 3 “NSPI should contract with a private weather service provider, to be used in conjunction with their present arrangement with Environment Canada.” Consultant agreed with NSPI to continue utilizing Environment Canada as the sole provider until more experience could be gained. NSPI experienced difficulty finding a private provider for their area.

...

Of these three recommendations, two of them – Recommendations 3 and 28 – were areas of concern in the November 13/14 storm, and should receive further consideration for needed action as a result of this most recent experience.

(Exhibit N-18, pp. 8-9)

Recommendation 28 relates to call processing and is referred to in the communications section of the decision.

[25] The Board believes it is essential for NSPI to gather as much useful information as possible regarding anticipated weather conditions. The Board is pleased that NSPI has agreed with this recommendation. This was confirmed by Ms. Tower at the hearing. In its Closing Submission, NSPI stated that:

With respect to additional weather forecasting services, NSPI confirmed intent to follow Mr. Sherrod’s recommendation during the hearing. NSPI Vice-President Customer Operations, Nancy Tower in response to a question from John Woods of ECANS, provided the following.

“A. (Tower) It’s been recommended twice now by John Sherrod that we – in addition to Environment Canada, that we employ the services of a private weather forecaster to give us additional weather information, and so that’s certainly what we’re looking at.

162. Q. And how many private weather forecasters or service providers are in Canada or in the local marketplace?

A. (Tower) I think we – in response to our request for proposal, we received in the order of, you know, 10 to 15 responses from weather forecasters both local and into the United States. Local Canadian and United States.

163. Q. Can you share with us the sort of magnitude of cost of such a service on an annual basis?

A. (Tower) We haven’t awarded the bid and so talking about costing information is somewhat sensitive, but it would be, you know, fifty to a hundred thousand dollars (\$50,000-\$100,000) is the range.”

NSPI’s decision to proceed to engage an additional weather service provider is explicitly endorsed in the Closing Submission of the Province and ECANS.

Accordingly, the Board directs NSPI to forthwith engage the services of an additional weather information provider to be used in conjunction with Environment Canada.

3.0 TRANSMISSION SYSTEM

3.1 Submission - NSPI

[26] In Exhibit N-1, filed January 18, 2005, NSPI identified the damage to its transmission system as a result of the storm as follows:

<u>Transmission Structures</u>	
Steel Structures Downed	7
Wood Structures Downed	19
Steel Structures Damaged	4
Wood Structures Damaged	12
Broken Overhead Guy Wires (OHGW)	20 spans ³

[27] NSPI outlined the design of its transmission system in its extensive report on the storm event in Exhibit N-1, stating that the design follows the Canadian Standards Association (“CSA”) design criteria and is based on a deterministic-design method. In that design criteria, Nova Scotia is designated as a “heavy loading” area. This means that towers and lines are to be designed for conditions of heavy ice loading. NSPI also indicated that it is a member of the Northeast Power Coordinating Council (NPCC), a group comprising most utilities in New England and eastern Canada. The transmission network is described as:

³Exhibit N-1, p. 35

... Those portions of Nova Scotia Power's bulk transmission network wherein a single contingency (i.e. failure of a single system component) can potentially adversely affect the interconnected NPCC system are designed and operated in accordance with the NPCC "Basic Criteria for Design and Operation of Interconnected Power Systems". Through its committees and task forces, the Council conducts regional and interregional studies and assesses and monitors Control Area studies and operations to ensure conformance to the criteria. The transmission design criteria is used in the planning of the bulk power system of each of the NPCC member systems and each NPCC area, and in the reliability testing at the member system, area and regional levels.

(Exhibit N-1, pp. 62-63)

[28] In its report on Transmission Design and Maintenance, NSPI pointed out that:

Nova Scotia Power records every forced outage to any transmission component at voltage level 69kV, 230kV, and 345kV.

Forced outage (as opposed to a planned outage) to any transmission component is defined as the automatic or emergency removal of the component directly caused by defective equipment, adverse weather, adverse environment, system condition, human element, or foreign interference. The forced outage performance of transmission equipment includes momentary (transient) outages (outage equal to or less than 1 minute) such as a lightning strike on a transmission line. Indices (SAIFI and SAIDI) on customer quality of supply do not include outages of less than 1 minute in duration, but do include planned outages.

The data collection and reporting of reliability and outage statistics is consistent with the methodology of the Canadian Electricity Association (CEA) Equipment Reliability Information System (ERIS).

Analysis on the total number of forced transmission outages at Nova Scotia Power for the last 12 years (from 1993 to 2004 inclusive) shows that the performance of the transmission system is consistent for the last 12 years ...

(Exhibit N-1, pp. 63-64)

[29] NSPI also stated that:

The leading cause of outages on transmission lines is lightning, accounting for 34%. The active months for lightning typically are June to September.

The effect of lightning is reflected in the peak years of 1997, 2002 and 2003, where the majority of the outages occurred in the months of June, July, August, and September.

Nova Scotia Power uses Overhead Ground Wire (OHGW, sky wire) to shield the transmission lines from lightning strikes as well as lightning arresters in substations to protect substation equipment from lightning surges.

Most outages caused by lightning are transient (i.e., momentary) in nature. Wide use of automatic reclosing on transmission lines avoids longer duration outages. Wide use of fault location relays also helps to identify the locations of permanent faults more readily for quicker restoration and for later inspection of the structure for transient faults.

The total number of forced transmission outages has remained steady in the last 12 years. However, the number of forced transmission outages, which have affected customers has been declining ...

(Exhibit N-1, p. 65)

[30] NSPI noted that it experienced "... very few multiple structure transmission line damage events"⁴ prior to the November, 2004 storm. It explained its maintenance practices for transmission lines to be routine inspections annually by foot patrol or by helicopter.⁵ Inspections are also carried out when transmission lines are exposed to faults or adverse weather.

[31] Problems are documented through inspection reports and are prioritized as follows:

... The inspectors prioritize the deficiency based on their experience and defined criteria. These are categorized for follow-up action according to the following:

- Immediate (less than one month to repair)
- This year (1-6 months)
- Next year (6-18 months)
- Greater than 2 years (information only)

The 'next year' category is used to identify items that are not urgent but should be addressed before the next planned detailed inspection, generally scheduled in two years. 'Information only' is used to note a deficiency, which should be evaluated further during the next inspection.

(Exhibit N-1, pp. 68-69)

[32] NSPI indicated that while its practices are consistent with industry practices, it also engaged outside expert consultants to independently review the impact of the storm and the cause of the damage by reviewing NSPI's "... transmission line construction and failure analysis to perform a root cause analysis."⁶ NSPI filed the interim report and the

⁴Exhibit N-1, p. 67

⁵Exhibit N-1, p. 68

⁶Exhibit N-1, p. 77

final report of the consultants, Samtech and Havard Engineering. These reports were produced by Dr. S.G. Krishnasamy, P. Eng., and Dr. D.G. Havard, P. Eng., and were filed in response to Liberty IR-2, Exhibit N-13. In the final report, the consultants state that:

The study is reported in six parts:

- In the first part, a visit was made to the site of the failures about one week after the event to inspect the sites, take photographs of the failed structures, and gather first hand data on the conditions of the lines.
- In the second part, an interim analytical study was done to determine under what load conditions selected steel structure and wood-pole structures would have failed during the storm. The effect of failed adjacent structures was not considered in the analysis.

The analysis confirmed that the selected tangent steel structure from Burnside Industrial Park was found to have failed as a result of the winter storm causing radial wet- snow accretion of about 3.0 in. (7.6 cm) on the conductors and wind gusting at about 40 mph (64 km/hr), a loading combination which exceeds the loads for which the structure was designed according to the CSA standard of 0.5 in. (1.3 cm) of glaze ice plus 8 psf (400 Newtons per square meter) of wind pressure.

The selected 3-wood pole dead-end structure from Hammonds Plains was found to have failed during the winter storm when the radial wet snow accretion reached about 1.76 in (4.5 cm) and the gust wind speed was about 43.5-mph. (70 km/hr). This exceeds the CSA standard design load as mentioned in the above paragraph.

- The structures at Burnside Industrial Park, Hammonds Plains and Panuke Lake Crossing were studied in detail in the third, fourth and fifth parts, respectively, to determine the sequences of line failures.

The five steel structures at Burnside Industrial Park failed as a result of a winter storm causing equivalent radial wet-snow accretion of about 3 in. (7.6 cm) on the conductors and wind gusting at about 40-mph (64 km/hr), which was significantly more severe than the CSA standard loads for which the structures were originally designed.

The nineteen wood pole structures at Hammonds Plains failed due to a cascading process initiated by a combination of 1.8 in. (4.5 cm) radial snow accretion and 43.5-mph (70 km/hr) wind gust, exceeding the CSA design loads.

The two steel structures at Panuke Lake crossing failed due to a cascading process initiated by the failure of an adjacent 3-wood pole dead end structure under the combined wind and wet snow loads, exceeding the design loads.

- In the sixth part, nine samples of overhead ground wires taken from the failed lines, were evaluated in laboratory tests to determine their overall condition and remaining mechanical strength. No information about the location of the tested samples on the spans was available.

Seven of these samples exhibited strengths above the rated tensile strength, while the remaining two samples had strengths of 91.6 and 94.5 percent of rated tensile strength. Canadian utilities limit design loadings such that they do not exceed about

80% of the conductor's rated tensile strength, and these samples are capable of carrying that loading. These test results do not clarify how the overhead ground wire failures occurred.

However, without the details of the location of the samples, the failures of the overhead ground wires in the field cannot be explained by properties of the samples tested.

In conclusion, the failure of steel and wood pole transmission structures on 14th of November 2004 in the Province of Nova Scotia, were due to a combination of wind gusting up to 46 mph and wet snow accumulation of up to about 2.7-2.9 in. (6.8-7.3 cm) of radial deposit, exceeding the original design loads. Failures of the overhead ground wires cannot be explained by properties of the samples tested. Other factors, such local corrosion, fatigue damage or burns due to contact with phase conductors, may have further weakened them so they could not carry the heavy wet snow and wind loads.

(Exhibit N-13, Liberty IR-2, pp. 3-4)

[33] NSPI addressed the reference to "other factors" in relation to the sky wire failures when questioned by Board Counsel on this issue:

134. Q. And as I understand the root cause analysis, there's nothing really that they were able to do to explain the cause of those failures. They couldn't replicate those failures like they could for the towers, for example, that essentially, they're unexplained failures.
A. (Tedesco) If you can give us a moment.
135. Q. Sure. There's a reference to it in the last paragraph on page 4 of the Executive Summary. You may want to go further into the report, but there is a reference there.
A.. (Tedesco) Yes, I see what you're pointing to where it indicates that the failure could not be explained by properties of the samples tested.
136. Q. And they then speculate that other factors may have been involved, but essentially, unlike the tower failures, both steel and wood, the experts couldn't replicate the failure of the sky wires and say that they accumulated snow and ice beyond their load limits.
A. (Tedesco) No, I think the -- yeah, they tested for tensile strength, and I think the hypothesis that was put forth is that the towers -- the wires, rather, stretched perhaps to an extent that they came in contact with the live conductor and perhaps with the arcing burned those wires.
A. (Tower) So I think it's really due to the nature of what we asked them to do and the fact that we took samples and then were unable to say exactly where they came from.
137. Q. Yes.
A. (Tower) So we simply asked for a tensile strength test, which is what they did.

(Transcript, April 18, 2005, pp.188-189)

3.2 Submission - Consultants and Intervenors

[34] Liberty was engaged to conduct a field inspection of NSPI's transmission system to review the adequacy of structure design criteria; the adequacy of the overall transmission system design and maintenance; and the condition of the fallen (as well as remaining) steel towers and wood pole structures, not only in the area affected by the weather event of November 13 and November 14, but also in the eastern part of the Province, between Antigonish and Sydney.

[35] Liberty was also asked to address the reason why the collapse of a relatively small number of transmission structures affected such a significant number of customers in the Province.

[36] With regard to the maintenance and design of NSPI's transmission structures, Liberty essentially found no areas of concern:

Liberty assessed NSPI's design of the failed transmission structures and sky wires and found them in accordance with the appropriate standards. The wind and ice conditions in the November storm created loadings on the structures and sky wires that exceeded design loadings by at least 200 percent. Liberty also found that NSPI's transmission inspection program complies with good utility practices and that transmission maintenance substantially complies with good utility practices. Neither transmission system inspections nor maintenance contributed to the effects of the November storm. Liberty concluded that although tree contact caused some storm transmission outages, NSPI's transmission vegetation management program is substantially consistent with good utility practices. NSPI needs to complete its program to widen and side-cut transmission system right-of-ways.

(Exhibit N-19, p. 4)

[37] Liberty found that NSPI's efforts in this regard conformed with North American utility practice. It also stated:

Liberty found no evidence that NSPI's staffing, maintenance, or inventory practices had any appreciable effect on the severity of the outages caused by the November storm.

(Exhibit N-19, p. 15)

[38] Liberty commented on system damage and reported that all of the downed transmission line structures were 138 kV⁷. Seven of these were steel structures - five were located in Burnside Industrial Park and two were at Panuke Lake.

[39] Liberty's conclusions with respect to the transmission system were summarized in Exhibits N-27 and N-28 as follows:

NSPI's load forecasting is adequate for transmission system planning but has internal inconsistencies.

NSPI's transmission planning studies are adequate and did not contribute to the effects of the November storm.

NSPI's transmission system design criteria are adequate but could be improved.

NSPI's transmission component rating methods are consistent with good utility practice and are conservative when compared with other utilities.

NSPI made the correct initial response level prediction according to its ESRP [Emergency Services Restoration Plan] and the available weather information.

NSPI's system operators acted properly and professionally throughout the November storm.

NSPI's transmission system has adequate fault location and SCADA installation.

The failure of transmission structures caused only about 13 percent of the customer interruptions during the November storm.

NSPI designed its transmission structures and sky wires according to CSA deterministic methods and in conformance to good utility practice. Wind and ice conditions in the November storm created loadings on the structures and sky wires that exceeded design by 200 percent.

NSPI's transmission inspection program complies with good North American utility practices, and it appropriately monitors the condition of NSPI's transmission system.

NSPI's transmission maintenance practices substantially comply with good North American utility practices and are appropriate for maintaining the condition of the transmission system. Maintenance practices did not contribute to structure failures or outages occurring during the November 13-14 storm.

NSPI should reassess two of its transmission system maintenance practices.

Although tree contact caused some storm transmission outages, NSPI's transmission vegetation management program is substantially consistent with good utility practice.

⁷ Exhibit N-19, p.5

However, NSPI needs to complete its program to clear, widen, and side-cut its transmission system right-of-ways. It should also verify that its vegetation management program uses full operating ratings of all lines.

(Exhibits N-27 and N-28)

[40] Liberty's recommendations for changes focus on possible improvements to NSPI's design criteria (design methodology, reliability-based methodology, looping, load shedding policy, equipment ratings and sky wire size); improvements to load forecasting; a review of two maintenance practices (pole treatment and testing and relay testing); and completion of right-of-way (ROW) clearance of the transmission system. These recommendations are more fully described below.

[41] With respect to the issue of sky wires, Liberty noted that they are non-energized lines installed on the top and either side of NSPI's 345 kV, 230 kV, and 138 kV towers. Sky wires are used to protect the energized power lines from lightning strikes. Liberty pointed out that an unknown number of sky wires sagged, presumably under the weight of snow and/or ice, and came into contact with the energized power lines resulting in a fault. In addition, the sky wires broke on two 345 kV lines and on five 138 kV lines.⁸

[42] Liberty acknowledged that NSPI's transmission structures, including sky wires, were designed and constructed in compliance with CSA deterministic methodology. However, Liberty recommended that for future transmission structures and sky wires, particularly in critical locations, NSPI should utilize the more recently established reliability-based methodology. Liberty also recommended that NSPI consider upgrading sky wires

⁸Exhibit N-19, p. 7

from 3/8 inch to 7/16 inch or thicker on new transmission lines or at locations, for example critical lines, where icing may likely occur.⁹

[43] In addition, Liberty recommended that NSPI reassess two of its transmission system maintenance practices—the pole treatment and testing program and the relay testing program—as follows:

NSPI should re-instate soon its contractor pole treatment and test program because it extends the life of the transmission poles, and it provides a more thorough means (boring rather than just sounding) to appraise poles for shell thickness. NSPI indicated that it would re-instate this program in 2006. Liberty does not believe that the five-year pause in the program has been detrimental to the system's condition in the long run. A pole treatment and testing program on a 10-year cycle is good utility practice.

NSPI should re-evaluate its practice of testing 69 kV and 138 kV protective relays only after misoperations. It tests its 230 kV and 345 kV relays on a 2-year cycle. Most electric utilities inspect, clean, and test 69 kV and 138 kV electro-mechanical transmission relays on a 3-6 year cycle. Because NSPI reported that relay scheme malfunctions are rare, Liberty is not suggesting that NSPI must perform relay testing, only that it would be prudent to review cost-benefits of this practice.

(Exhibit N–19, p. 15)

[44] During its inspection of the transmission system, Liberty made observations on ROW clearance and, in its report, stated that:

Liberty observed that NSPI has numerous right-of-way issues to address, especially on its 69 kV lines. During its aerial assessment of the NSPI transmission system, Liberty observed that about 10 km of 69 kV line L-5532 from Digby to Big Falls routes along the road. Side clearances on this section appeared to be less than the 10 m required for its 69 kV lines located on right-of ways. A tree caused an outage on this line during the November storm, and was the fifth and last interrupted transmission path to Annapolis Valley. This caused the interruption of all remaining load and hydro generation in the valley. In addition, Liberty observed other locations, particularly in the western part of the province, where NSPI had not yet trimmed the 69 kV and 138 kV right-of-ways to full width.

(Exhibit N–19, p. 18)

[45] Liberty concluded that NSPI's load forecasting techniques did not affect the outages experienced during the November 2004 storm, since loads were less than those

⁹Exhibit N-19, p. 8

encountered during the system peak. Nevertheless, Liberty did conclude that while NSPI's forecasting approach is adequate for transmission system planning, there were internal inconsistencies:

NSPI's econometric forecasting model produces a load forecast for corporate purposes that it bases on average economic and weather conditions. In other words, the forecasted load has an equal likelihood of being too high or too low. While this probability of exceeding the forecast is adequate for corporate forecasting, it does not supply the planners with a consistent reference load needed for system design. Planners do consider actual loads and adjust for minimum expected temperature based on the probability of exceeding the forecast. However, each planner could use a different probability of exceeding the estimate.

(Exhibit N-19, p. 22)

[46] Liberty recommended that NSPI adopt a load forecasting approach which could be used consistently by all planners:

The forecasting methods used by planners to forecast real and reactive loads for feeder studies and area studies are reasonable. However, planners do not have or use a forecast that has a consistent probability of being exceeded, *i.e.*, a consistent level of conservatism. Liberty recommends that NSPI's corporate load forecasters prepare a forecast that is appropriate for all planners to use directly. Liberty also recommends that the forecast include a variance from average economic conditions.

(Exhibit N-19, p. 22)

[47] In its examination of NSPI's planning studies, Liberty noted that NSPI models the Nova Scotia and New Brunswick systems in full detail, including transmission line mutual coupling. Fault simulations take into account circuit breaker duties, voltage flicker, relay settings and single pole reclosing. Liberty noted that the system representation is the same as that used by all NPCC members. Liberty concluded that NSPI's transmission planning studies are adequate and did not contribute to the November 2004 storm outages.¹⁰

¹⁰Exhibit N-19, pp. 22-25

[48] Liberty reviewed NSPI's transmission planning criteria and noted that NSPI utilizes two design criteria as well as a special condition on the New Brunswick tie. These include NPCC criteria for its bulk system and its own criteria for its secondary transmission system (i.e., that portion of the network deemed to not be part of the bulk system). NSPI has determined that its bulk system includes its 345 kV transmission system, the 230 kV transmission system except for the 230 kV facilities west of Halifax, and those portions of the 138 kV system that connect generation to the transmission system. The role of NSPI within the NPCC and the North American Reliability Council (NERC) was described by Liberty as follows:

First, the North American Reliability Council (NERC) established minimum transmission system design criteria for members to use in the design of power systems throughout North America. NERC simply requires that utilities design the power system to lose an element without the loss of load. This criterion does not apply to radial portions of the system. NERC delegates the supervision of transmission system design to its regions or reliability councils. The Northeast Power Coordinating Council (NPCC) is such a region and it covers the Northeastern portion of North America. Specifically, NPCC members are New York, New England, Ontario, Quebec, and the Maritime Power Pool. NPCC established its own transmission system design criteria that are more stringent than that of NERC. NPCC requires that its members use its "Basic Criteria for Design and Operations of Interconnected Power Systems" in the design and operation of their Bulk Power Systems. The NPCC criteria include requirements for the design and operation of Special Protection Systems (SPSs).

(Exhibit N-19, pp. 25-26)

[49] Liberty outlined the requirements of the NPCC as they apply to NSPI's bulk system:

... NPCC requires that design studies consider maintenance, forced outages, stressed generation conditions, stressed transfer conditions, and transmission line reclosing. Under these conditions, the system must be able to withstand representative faults and disturbances. Such disturbances could take the form of the loss of an element in normal clearing time, delayed clearing, faults on circuit breakers, and circuit breaker failure associated with an SPS. The system must remain within applicable thermal and voltage limits. NSPI uses 95 percent to 105 percent of system nominal voltage as its acceptable voltages range. NPCC also requires that the system restore to a secure state (the ability to

withstand the next most severe contingency) within 30 minutes even if the system operator is required to intentionally shed firm load to do so.

(Exhibit N-19, p. 26)

[50] By way of comparison, Liberty described the design criteria used by NSPI for its secondary transmission system:

... It designs the Secondary Transmission system to withstand the loss of a single element without cascading loss of load. Voltages must remain within the range of 90 percent to 110 percent of system nominal values and equipment must remain within applicable ratings. Most of the Electrically Remote transmission system is radial, and therefore NSPI cannot design it to lose elements without the loss of load. NSPI has no formal policy on when it should loop the load served by radial transmission but recently performed system alterations that reduced a 70 MW radial load to 50 MW.

(Exhibit N-19, p. 27)

[51] During cross examination by Board Counsel, the NSPI panel was questioned on the issue of looping as it applies to transmission system design:

Q. Turn to page 27 of the Liberty report. Under the heading "Conclusions and Recommendations" it says: "NSPI's transmission system design criteria are adequate but could be improved." And you've already discussed the first one that deals with the looping policy. Now, I'm a bit puzzled because I understood from the Liberty report that NSPI doesn't have a formal transmission looping policy but yet I've heard here today that anything over 25 MW on 69 kV is looped, so that sounds like a looping policy to me. Is that correct?

A. (Tedesco) It's not that formal, and to be very precise I believe there is a single line that exceeds that – subject to check, a single line that exceeds that criteria. It's more a function of the very rural nature of our province that we have these radial feeds, and I think that the design that we use is again consistent with good practice given the load that those feeds carry.

Q. The suggestion here was that there be a formal policy which would incorporate, of course, economics as compared to other alternative measures of ensuring better reliability in these rural areas. What is the problem with having a formal policy on looping so that you know what the criteria are and they get applied?

A. (Tedesco) There is absolutely no problem with that, and we would be pleased to put it in print.

(Transcript, April 18/05, pp. 196-197)

[52] Liberty stated that the special condition criteria related to the New Brunswick tie permits a higher level of import but is accompanied by a risk of the loss of up to 125,000 customers if a fault were to occur:

... NSPI has installed a third level of under-frequency relaying to permit the import of additional power. NSPI indicated that activation of this third-level protection could interrupt up to 125,000 customers if a fault on the New Brunswick 345 kV tie line were to occur and importing amounts were above the amount protected by the SPS. This SPS has not operated under these conditions in the last five years. NSPI also stated that the NPCC accepts this practice because the layout separates Nova Scotia electrically from the remainder of the North American grid for this condition and is then not required to be in conformance with their design and operating criteria.

(Exhibit N-19, p. 26)

[53] Liberty recommended that NSPI design and operate its bulk power system, including the New Brunswick tie, to NPCC criteria unless specifically authorized by the Board to do otherwise. In addition, Liberty recommended that NSPI change its maximum high voltage design criteria for its secondary transmission system from 110% to 105%, which, it states, is the maximum design limit used by most manufacturers¹¹.

[54] Board Counsel reviewed this issue during his questioning of the NSPI panel:

- Q. And then the last item on this page starts:
 "NSPI's application of a third level of under-frequency protection on the New Brunswick tie permits a higher level of import but would interrupt many customers if activated."
- Liberty goes on to conclude at the end of that paragraph that:
 "Liberty understands that operation of the NSPI system in this manner for this one contingency potentially translates to significant savings for NSPI's customers. However, Liberty recommends that NSPI design and operate its bulk power system to NPCC criteria unless specifically authorized by the Board to do otherwise."
- A. (Tedesco) This particular one may be a little bit of chicken or the egg. The reality is that under circumstances were we to lose the tie to New Brunswick, Nova Scotia is in effect islanded, and as a result NPCC criteria no longer apply because the system is islanded.
- Q. Apart from the circular argument, Liberty's recommendation is that you operate to the NPCC criteria which you currently do not -- at least this protective device, as I understand it, would put you outside that. Am I interpreting it incorrectly?
- A. (Tedesco) I don't believe that is correct other than under the circumstance I described.
- Q. At which point you would be, as you called it, islanded.
- A. (Tedesco) Islanded, yes. In other words, if we were to lose that tie there is no other tie to any other electrical system. The NPCC standards, as was discussed earlier,

¹¹Exhibit N-19, p.27

are basically to make sure we are not affecting another system. At the point we are islanded there is no impact on another electric system.

...

- A. (Tedesco) Mr. Outhouse, at the expense of prolonging discussion with regard to the NB tie, I should also mention that part of the way that we manage that risk is we back down the load on the tie when severe weather events are expected.
- Q. You mean rather than risk having that protective device tripped.
- A. (Tedesco) Well, rather than causing -- yes, sure.
- A. (Tower) And maybe to add one final piece of context, it would have been operated in the way that they talk about, about .7 percent of the time in 2004.
- Q. Point 7 percent?
- A. (Tower) Point 7 percent of the time.

(Transcript, April 18/05, pp. 199-202)

[55] Liberty examined the ratings of the various components of the system including temperature and sag of line conductors, current ratings for circuit breakers, disconnect switches and other components. It was noted that NSPI assumes that associated equipment such as splices, jumper loops, connectors and clamps have equivalent current carrying capacity. While concluding that NSPI's transmission system component ratings were conservative and consistent with good utility practice, Liberty did recommend:

... that NSPI review its thermally limited transmission system on a priority basis to ensure itself that associated equipment cannot act as fused links and fail.

(Exhibit N-19, p. 29)

[56] NSPI confirmed that it agreed with this recommendation under questioning by Board Counsel:

- Q. Turn to page 29 if you would under "Conclusions and Recommendations" it says:
 "Liberty is concerned with the NSPI assumption that all transmission line associated equipment such as splices, jumper loops, connectors and clamps, have equivalent or greater current-carrying capacity. Although NSPI matches the current carrying capability of this associated equipment for new construction, such an assumption may not be valid with older lines. In addition, undocumented system

element changes may have taken place regardless of the age of the transmission line. Liberty does not believe that any of this associated transmission equipment contributed to the outages that occurred during the November 13th/14th, 2004. However, Liberty recommends that NSPI review its...limited transmission system on a priority basis to ensure itself that associated equipment cannot act as fused links and fail." So the recommendation is that NSPI review its system, transmission system on a priority basis to ensure that the associated equipment won't fail.

- A. (Tower) Yes, certainly it's something that we can do.

(Transcript, April 18/05, pp. 200-202)

[57] Most of the intervenors agreed with the evaluation and recommendations of NSPI's transmission system by the experts. ECANS, the Province and HRM all agreed with Liberty's suggestion that for future transmission structures and sky wires, NSPI should consider using reliability-based methods rather than the deterministic-method previously used. CME did not object to the recommendation but indicated that the new method only be used where appropriate. Intervenors also agreed that upgrading of the sky wire size should be considered. HRM stated that:

Therefore HRM agrees that a reliability-based methodology should at least be considered by NSPI as was recommended by Liberty.

- (c) Other Transmission System Improvements

Liberty has also suggested, some relatively modest cost transmission system improvements be considered, including extending the locations where NSPI employ a more robust sky wire. HRM recommends that this advice be considered and the recommendations implemented where economically feasible, taking into account the impact on the community of related outages.

(HRM, Final Submission, p. 7)

[58] In its Final Submission, HRM refers to the Hydro Quebec report dealing with the 1998 Ice Storm, pointing out that neither NSPI, nor the Board's consultants appeared to have reviewed this report. HRM recommended that NSPI should take advantage of the

review of the Hydro Quebec system, particularly with regard to issues involving standards.

Specific recommendations from that report, as cited by HRM, are as follows:

- The events of January 1998 are proof of the urgency for Hydro-Québec, to update its structural design parameters for ice and wind loading, which are established according to the risks of placing the line in a specific location and this line's importance.
- The maximum ice loading case must be modified to include the effects of the wind during and after ice build-up on the cables. The maximum ice loading case should also take into account the interactions between various phenomena and, more specifically, drag coefficients and actual diameters of ice deposits.
- There should be greater ice accretion levels for overhead ground wires than those established for conductors. This will take into account the fact that ground wires rotate more freely and accumulate ice on their entire circumference. They also accumulate more ice than in-service conductors, which are slightly heated by the electrical current that passes through them.
- Cases involving unbalanced residual loads – longitudinal, transversal and torsional – which represent various scenarios of loaded and partially loaded spans, must be more stringent so that they can cover cases where one span may be fully loaded with ice and an adjacent span has a lesser amount. All these loading cases must fully include a moderate wind.
- The January 1998 ice storm makes it necessary to review the design loading scenarios to be considered for the calculation of the electrical clearances required between the overhead ground wires and conductors.
- Strain angle towers and their hardware should be designed to resist loads corresponding to the full tensile strength of the conductors so that they can withstand a cascading effect.

(HRM Final Submission, p. 4)

[59] HRM also noted that NSPI continues to use CSA standards, despite the fact

that these standards are considered to be a minimum standard to be followed:

A classification of loading shall be based on local experiences and weather records. The maps shown in Appendix C are included as a guide, and the loads for the areas shown are considered the minimum. (CSA C22.3 No.1-01, s. 6.2)

(HRM Final Submission, p. 4)

3.3 Findings

[60] The Board is satisfied with the results of the independent expert's review of the adequacy and condition of NSPI's transmission system. In the Board's view, NSPI should be commended for its design, construction and maintenance practices on the transmission infrastructure. The Board also commends NSPI for its willing acceptance, set out in NSPI's Closing Submission, of many of the recommendations of Liberty, including the move to reliability-based methodology for future transmission structures; upgrading the size of sky wires as suggested; and implementation of a pole treatment program in 2006. The Board agrees with all of Liberty's recommendations and directs NSPI to adopt these changes as soon as possible as outlined by the Board.

[61] The Board notes that, in its Closing Submission, NSPI expressed doubt with respect to one of Liberty's recommendations:

The analysis of the relay-testing program has been completed and is presented in Undertaking U-4. The analysis indicates the cost to conduct this testing would amount to \$250,000, while experience suggests that the 69 kV and 138 kV relay failures resulting in outages are very rare and short in duration. The analysis concludes that the cost to introduce this program would exceed the benefits. This review meets the consultant's recommendation that NSPI re-evaluate this program.

(NSPI, Closing Submission, p. 31)

[62] While the Board understands NSPI's reservations in this regard, it considers the question of relay testing to be an important one. Accordingly, the Board will refer NSPI's analysis of this matter and its conclusions to Liberty for further review and recommendation as to whether additional action is warranted.

[63] With respect to HRM's suggestion of reviewing the Hydro Quebec Ice Storm Report, while that storm was far more devastating than the November 2004 storm in Nova

Scotia, the Board acknowledges that much may be gained from the Quebec experience. Accordingly, NSPI is directed to review relevant portions of the Hydro Quebec Ice Storm Report and file a discussion brief commenting on possible changes which could be made to improve reliability during severe storm events. This brief should be filed by November 30, 2005.

[64] Finally, the Board notes Liberty's comments regarding the completion of ROW clearance relating to certain transmission lines, particularly in the western part of the Province. Liberty stated that:

In some locations, NSPI's 69 kV and 138 kV lines do not center in the right-of-ways. In 2004, NSPI started widening right-of-ways up to 10 feet on its 69 kV system, with permission, to provide the standard clearance from the lines to the right-of-way edges. It expended about \$146,000 in 2004 for 69 kV right-of-way widening. It plans to spend about \$350,000 in 2005 for right-of-way widening on radial 69 kV lines, those that most affect customer [sic] service.
(Exhibit N-19, p. 18)

[65] Accordingly, the Board directs NSPI to file an assessment report, by November 30, 2005, describing the work that has been or will be performed to implement the completion of the transmission ROW clearance, and giving a timetable and estimated cost assessment.

[66] The Board observes that while NSPI did not explicitly endorse all of Liberty's recommendations, including those related to looping, load shedding and equipment ratings, it generally agreed with Liberty's transmission design recommendations. Both Mr. Tedesco and Ms. Tower noted NSPI's position regarding these points at the hearing:

- Q. Yes. Again, when you go back to the recommendation by Liberty which we see on page 8, in terms of the upgrading of the gauge of those sky wires, I'm just wondering whether NSPI has looked at that seriously since this event or not because, as I say, it does appear a lot of the outages were caused by the failure of the sky wires, dropping on the lines, which would, in effect, trip the system out.
- A. (Tower) So one of the things that we will do as a result of the information that we have, so there was a suggestion around, as Mr. Tedesco said, wires into the

conductor and burning and such. Through our surveys, through our transmission plant surveys, we will look for tension and we will look for sagging and to the extent that that is not as it should be we will make those repairs.

Q. If you go to page 15, and about two-thirds of the way down the page, that's page 15 of the Liberty report, under the bold "NSPI should reassess two of its transmission system maintenance practices", the first one relates to the reinstatement of the contractor pole treatment and test programme. My understanding from what was said today is that that's going to be reinstated next year.

A. (Tower) So yes, what I said was we would put a capital item forward to the Board in the 2006 plan.

Q. But the company's intention is to reinstate it next year. Fair enough. The second item in the final paragraph talks about re-evaluating the practice of testing 69 kV and 138 kV protective relays only after mis-operation, and Liberty goes on to suggest that a 3-6 year cycle is something that most utilities do. And it concludes this way:

"Because NSPI reported that relay scheme malfunctions are rare, Liberty is not suggesting that NSPI must perform relay testing, only that it would be prudent to review cost benefits of this practice."

Has that been done?

A. (Tedesco) As I mentioned earlier, we've estimated that the annual OM&G costs of instituting this practice is about a quarter million dollars (\$250,000.00) and we believe, as the text indicates, that the benefits would be minimal.

Q. Okay. So it's a quarter million in OM&G.

A. (Tedesco) Annually.

Q. Annually. So as I understand it, then, NSPI would not -- it feels it's done the cost benefit analysis and it would not be in favour of implementing this recommendation.

A. (Tedesco) That is correct.

Q. Would you file the analysis which you have done which demonstrates that cost?

A. (Tedesco) Sure.

The Board

That will be undertaking U-4.

Q. Now, if you would, turn to page 19 of the Liberty report, and I was going to go through the bold, I won't do that now. If you go down to the two bullets about two-thirds of the way down the page where it says:

"Liberty identified these specific concerns."

And the first one deals with conductor sag, and Liberty expresses a concern that:

"NSPI may be operating lines rated at 100 degrees Centigrade at its full rating."

Then it says:

"NSPI should modify its vegetation management or operations ratings tables to prevent tree contact on lines operated at high temperatures."

And I gather the higher the temperature of the line, the more it will sag, and therefore it has some impact on your vegetation management guidelines. I have a note here from this morning I believe Mr. Tedesco where you said this was a mis-communication, you already do this, or words to that effect?

A. (Tedesco) It's less that we do it, we do not exceed the design criteria of a particular line, and I think that's what was misunderstood, which is to say that if a line is designed to operate at 60 degrees C, it is not operated past that point. There is an alarm in the control centre that would address that, and I think some sort of communication was misunderstood.

Q. The last bullet there, second bullet, says:

"There are numerous locations on NSPI's 69 kV and 138 kV right-of-ways that need trimming to full width and in some cases past full width to provide good reliability. NSPI should verify that it is providing sufficient funding to ensure that it addresses timely right-of-way vegetation issues, and prioritizes its right-of-way clearing, widening and side cutting work based on effect to customer service's reliability.

First of all, just explain side cutting.

A. (Tedesco) In simple terms, if you think about, say, a hedgerow and if you took a device that you would trim your hedges with and you went down the side of the hedgerow, very similar to that.

Q. Yes.

A. (Tedesco) So if you're driving on the 103 or the 102 and you look along where our distribution line is, and if you're going around a curve and you look down you'll see that the trees are trimmed some distance from the line. That would be so-called side cutting.

Q. Okay. And I take it it means anything that's within that vertical line, whether it's -- it's not just the trunk of the tree, it's limbs, everything goes within that line, is that what it refers to?

A. (Tedesco) Correct, as though you had a hedge trimmer.

Q. All right. And with respect to this particular recommendation, what is NSPI's position?

A. (Tedesco) Well, our position is as stated in the conclusion in the bold part that indicates:

"For transmission our vegetation management programme is substantially consistent with good utility practice."

And the only difference is this option I had mentioned earlier -- and this is very important because one of the concerns that the company has is that coming out of these hearings customers will have an expectation for improved reliability -- the only way reliability will improve is with additional investment. So, if there is a desire to improve reliability as I said earlier we have put forth a variety of options, the largest one and the most significant one of which, which in our judgment could improve reliability 20 percent or so, would be widening rights-of-way on distribution. Now again we're not suggesting we do that. It's more what is the expectation that has been set as part of this review.

Q. You mentioned a figure of 20 percent?

A. (Tedesco) About 20 percent on distribution I think is a reasonable result, yes. Yes, and Ms. Tower just reminded me to be perfectly accurate over some number of years. It's not -- it wouldn't be an instantaneous thing but you would see that number drop down as the programme got under way.

...

Q. Why isn't there one [looping policy] now, just because there was no perceived need for it?

A. (Tedesco) These lines are built on a case-by-case basis, and there is a cost evaluation every time a radial feed is put in place. Or, as load on the line grows, and we need to do something to enhance the service of that line or the load-carrying capability, this is something that we would look at as a matter of routine. It simply isn't formally captured as a standard.

Q. Okay. And the company has no problem doing that, however, I gather.

A. (Tedesco) Not at all.

Q. The second item there is that:

“NSPI's two transmission design and operating criteria are adequate for the design and operation of a reliable power system except for the use of 110 percent high voltage for the design of the secondary transmission system. Most manufacturers design their equipment to operate at no higher than 105 percent of nominal values. Liberty recommends that NSPI use the manufacturer's high voltage design limit unless it has specific analyses that supports the use of a higher value.”

What do you say about that particular conclusion or recommendation by Liberty?

- A. (Tower) Again, I think this was a misunderstanding by Liberty. We do not continually operate at 110 percent. If it occurs, it would occur for a very short time, that being minutes, and then we'd bring the voltage back to within the 105 percent. So we do, in fact, operate as Liberty suggests we should.
- Q. So you're saying it would be abnormal, exceptional ---
- A. (Tower) Yes, abnormal and exceptional.
- Q. Short duration.
- A. (Tower) Short durations would be alarmed, and then we would bring it back to the proper voltage.

...

(Transcript, April 18/05, pp. 199-202)

[67] The Board agrees with Liberty's recommendation that NSPI develop a formal transmission looping policy, as outlined by Liberty, and file this policy with the Board by November 30, 2005. Similarly, the Board directs NSPI to comply with Liberty's recommendation to use the manufacturer's high voltage design limit or file a specific analysis which supports a higher voltage operation. The Board also directs NSPI to follow Liberty's recommendation concerning load shedding or, in the alternative, satisfy the Board as to why the current policy is justified.

[68] The Board notes that the Province made the following comments regarding Liberty's views on line operating temperature:

Liberty noted that power lines will sag more or less depending upon line operating temperatures. Higher operating temperatures result in greater conductor sag. Liberty thought that there may be a disconnect between NSPI's line operating temperatures and its vegetation management practices. While noting that there may some miscommunication between its agents and those of NSPI, Liberty indicated that it understood that NSPI's vegetation management practices called for lines to be cleared assuming operating temperatures of 60°C, but that NSPI had some lines that might operate at 100°C. This would result in greater sag than the area had been cleared to accommodate.

There does indeed appear to be some confusion on this issue. When this recommendation was put to the NSPI panel, NSPI's response seemed to relate more to the possibility of operating lines beyond design temperatures, rather than with the connection between the amount of conductor sag at various operating temperatures and vegetation clearances. **The Province does not believe that this point has been sufficiently clarified on the record. The Board should request that NSPI file information to clarify its practice in this area.**

(Province, Closing Submission, pp. 17-18, emphasis in original)

[69] The Board agrees with this assessment and adopts the Province's suggestion. NSPI is directed to file information with the Board to clarify its practice in this regard by November 30, 2005. The Board will refer NSPI's filing to Liberty for review and advice with respect to whether further action is required.

4.0 DISTRIBUTION SYSTEM

4.1 Submission - NSPI

[70] NSPI outlined the physical damage to the distribution system during the storm as follows:

<u>Distribution System</u>	
Broken Poles	155
Transformers	27
Broken/Downed Spans of Wire	1200 ¹²

[71] NSPI explained the design of its distribution system as follows:

Nova Scotia Power designs and constructs its distribution system to meet or exceed CSA 22.3 "Overhead Systems", and is consistent with industry practice. The Company continuously monitors the performance of its distribution power system to assess reliability and identify work to be undertaken. In localities where conditions are harsher than generally experienced in the Province, modifications to standards are made. These modifications can include greater clearances and extra insulation in high salt contamination regions, additional

¹²Exhibit N-1, p. 36

reinforcement in areas of higher than average wind and icing conditions, and the installation of lightning arresting technology in high lightning activity areas.

(Exhibit N-1, p. 72)

[72] NSPI also indicated that the performance of its distribution system in the past 15 years reflects “significant improvement.”¹³ NSPI referred to three methods of monitoring system performance which are used by members of the Canadian Electricity Association. These are System Average Interruption Frequency Index (SAIFI), System Average Interruption Duration Index (SAIDI) and Customer Average Interruption Duration Index (CAIDI). Under these measurement methods, according to NSPI, its service reliability has improved.

[73] NSPI pointed out that:

Actual failures of the distribution power infrastructure attributable to wind, rain, and snow are not significant. Most outages are attributed to foreign objects such as trees contacting and damaging distribution power lines. In November 2004 the NSPI system experienced a severe storm. Up to twenty (20) centimeters of ice and frozen snow built up on the lines and equipment. This resulted in structural failures in areas affected by this weather. These buildups were well beyond those we would typically experience in Nova Scotia. NSPI is evaluating what, if any, additional design modifications may be warranted.

(Exhibit N-1, p. 75)

[74] NSPI, as a practice, inspects distribution feeders once every two years. NSPI has a “due diligence” inspection process which, it indicates, is consistent with industry standards. Examples of such due diligence inspections relate to “... identification of safety related issues, environmental issues, obvious defective equipment or immediate reliability risks.”¹⁴ If certain feeder sections have poor performance, a more detailed inspection is carried out.

¹³Exhibit N-1, p. 72

¹⁴Exhibit N-1, p. 75

[75] As is NSPI's practice with the transmission system, inspection of the distribution system determines the condition of the system and establishes the priority of any required changes. These inspections, according to NSPI "... identify deficiencies related to equipment and right-of-way...". The process for maintenance activity is described as:

When a deficiency is identified the inspector predicts, based on experience and training, when the defect will fail or cause other issues with our distribution plant. The time-based judgments are categorized into the following frames:

- Immediate (less than a month to repair)
- This year (1 - 6 month)
- Next year (6 - 18 month)
- Greater than 2 years

All work identified in the immediate, 1-6 month and 6-18 month timeframes have work orders created to address the identified deficiency. Work identified in the current year's inspection program as immediate or 1-6 month work is incorporated within the established annual work plan.

(Exhibit N-1, p. 77)

[76] In its Closing Submission, NSPI refers to the opinions of both Liberty and Mr. Sherrod as supporting its contention that the distribution system, as well as the transmission system, is well-maintained and well-managed¹⁵. However, NSPI does take issue with Mr. Sherrod's recommendation to review NSPI's reduction, over the last number of years, in the number of Power Line Technicians ("PLTs") it employs and the possible impact of this reduction on the duration of average power outages. NSPI takes the position that this concern has been satisfactorily addressed:

As can be seen from Appendix C of Mr. Sherrod's report, only one recommendation is provided which relates to distribution operating and maintenance practices. This involves a review of the effect of permanent PLT reductions on average outage duration. Mr. Sherrod's

¹⁵NSPI, Closing Submission, p. 30

recommendation has been replied to by NSPI in Undertaking U-7 as discussed earlier in this submission. The Board should now consider that the matter has been resolved.

(NSPI, Closing Submission, p. 30)

[77] NSPI also expressed its opinion that vegetation management of both transmission and distribution systems is a critical component to improve reliability. In her opening statement, Ms. Tower pointed out that:

... With regard to our transmission and distribution system, extra measures can be taken to further storm proof our system against extreme weather. Our system includes some 30,000 kilometres of lines. Much of these traverse rural areas of the province. The single largest cause of outages during severe weather is interference from trees: branches touching the line and shorting out service or trees falling into the system, tearing down lines and breaking poles. We believe that if customers desire a higher level of system reliability, the best investment would be to increase the width of distribution rights-of-way and increase tree trimming. In this hearing, we seek a meaningful discussion on these topics. We are here to provide information and assist in the process. Then we urge moving to the next step: determining whether extra investments should be made and determining the priorities of our customers. ...

(Transcript, April 18/05, pp. 24-25)

In its Closing Submission, NSPI refers to this again:

The most cost-effective approach to improved reliability is to expand vegetation management programs. Consultants have indicated that NSPI vegetation management is conducted in a responsible manner that takes municipal interests fully into consideration and is consistent with good utility practice.

Most intervenors and customers have advised they are not prepared to assume the increased costs associated with placing distribution systems underground.

(NSPI, Closing Submission, p. 38)

4.2. Submission - Consultants and Intervenors

[78] In his report on NSPI's distribution system, John Sherrod of PSOR summarized his findings as follows:

1. The weather conditions associated with the subject storm could be reasonably expected to cause damages and outages to the extent experienced on NSPI distribution facilities.

2. The results of the advance weather monitoring and alert processes indicate that it would be advisable for NSPI to seek a contract with a private weather provider to be used in conjunction with Environment Canada.
3. The damages caused to NSPI distribution facilities by the subject storm are consistent with what would be expected with facilities in normal condition subjected to such weather factors.
4. The NSPI distribution inspection processes, both routine and post-event, appear adequate and appropriate to good asset management.
5. The damages resulting from the subject storm were not a result of any deficiency in NSPI inspection and maintenance processes.
6. The staffing levels of NSPI power line technicians (PLTs) as maintained for the past ten years and available at the time of the subject storm are within customary limits in the industry and did not have a negative impact on maintenance of NSPI distribution facilities or on storm outage response.
7. The NSPI Customer Average Interruption Duration Index (CAIDI) has increased over the past ten years coincident with the PLT staffing level reduction, and this issue should be addressed.
8. NSPI has made a sincere and effective effort to respond to the recommendations of Consultant's April 8, 2004 Hurricane Juan report, has in fact implemented to some extent all of the recommendations, and put these to good use in its response to the subject storm.
9. The NSPI response to the subject storm was effective and utilized an appropriate amount of workers to complete the restoration in an amount of time well within acceptable limits in the industry.
10. The NSPI response to the subject storm revealed that there are still some significant opportunities for improvement in their communications processes.
(Exhibit N-18, p. 4)

[79] In his review, Mr. Sherrod examined samples of the 155 broken wood poles in order to determine possible reasons for their collapse. In addition, he was asked to examine the wood poles adjacent to the broken ones to determine if any were in imminent danger and to investigate the condition of poles in areas not affected by the November 14th storm. The inspection of equipment not subjected to the storm was intended to enhance his overall assessment of the general state of NSPI's distribution system and field inspections of various feeders in Cape Breton were carried out for this purpose.

[80] Mr. Sherrod found that the “breaking point” of the poles was not indicative of defective poles but, rather, of poles being subject to a high level of stress:

The field inspection conducted by Consultant confirms that the damage experienced to NSPI wood distribution poles is consistent with what would be expected with facilities in normal condition subjected to such weather factors. A number of wood poles which were broken during the storm failed at the point of the telephone and cable television attachments – a typical point of stress some fifteen feet or higher above the ground. A visual examination of the broken segment still at the site reveals that the wood was still sound. Rather, the break occurred where the stress was greatest and the pole had been drilled for the cable attachments. Had the pole been defective and subjected to this type stress, it is much more likely that the pole would have failed at ground level.

(Exhibit N–18, p. 6)

[81] In his report, Mr. Sherrod also endorsed the frequency of NSPI’s distribution system inspection and the adequacy of NSPI’s inspection and maintenance of its distribution system.

[82] Overall, Mr. Sherrod identified only three issues which he believed warranted further attention. Two of these—additional weather information and communication process problems—are dealt with in other sections of this decision. His concern regarding the number of PLTs employed by NSPI is set out below.

[83] Mr. Sherrod noted that NSPI’s PLT staffing levels fell from 287 to 221 over the ten year period from 1994 to 2004. He did not believe that this reduction had a negative impact on NSPI’s ability to carry out an adequate level of inspection and maintenance of its distribution system facilities, based on his inspection of NSPI’s distribution facilities and his observations that the facilities are in good condition. Mr. Sherrod also agreed with NSPI that SAIDI data supports the conclusion that staffing level reductions have not negatively affected inspection and maintenance activities.¹⁶

¹⁶Exhibit 18, p. 6-7

[84] Mr. Sherrod's concern about the reduction in the number of PTLs centres on NSPI's ability to respond to "routine" power outages rather than large and unusual storm-related outages. Utilities do not normally employ a sufficient number of PTLs to respond to large and infrequent outages. In these cases, utilities often must import assistance from private contractors and utilities in other jurisdictions. In more "routine" outage situations, however, the utility's own staff is employed to restore electricity service. Mr. Sherrod found that there appeared to have been a deterioration in NSPI's performance over the time period which coincides with the reduction in PLT staffing:

In the area of response to routine outages, there appears to be some evidence that the NSPI performance in this area has deteriorated slightly in the past ten years, coincident with the period of PLT staffing reduction. A review of the Customer Average Interruption Duration Index (CAIDI) indicates that NSPI's customer average interruption duration has increased over the past ten years. In comparison to the Canadian Electricity Association (CEA) average – factoring out the two years 1999 and 2003 which reflect major outage events for CEA and NSPI respectively – the NSPI customer average interruption duration has moved from a relative position of equal to or less than the CEA average to a position of equal to or greater than the CEA average during the past ten years. It is possible that these changes are the result of other factors than the reduction of PLT staffing, but since they have occurred coincident with those reductions, the effect must be considered.

(Exhibit N-18, p. 7)

Mr. Sherrod recommended that NSPI should address this question.

[85] Most intervenors did not challenge the basic findings of PSOR on the state of NSPI's distribution system.

[86] CME, in its Final Submission, stated that:

CME acknowledges that Nova Scotia has come to bear the effect of a number of statistically rare and extraordinary climatic episodes in the last two years. This hearing inquired into the November 13-14, 2004 outage and the response of NSPI specifically, as per a request from the Government of Nova Scotia. The reports of the NSUARB's two consultants – Liberty Consulting Group and Power System Outage Response have contributed to the understanding of the storm's impact, without completely exonerating NSPI. However, CME still acknowledges that one cannot substantially mitigate for these "one-time storms of the century" in a fiscally prudent and operationally sensible manner by spending more money, hiring more linesman, etc. NSPI may have to be more vigilant and more pro-active in the face of future climatic outbursts and their related unpredictability but the NSUARB and NSPI must only address such issues in a manner that does so without unduly increasing costs to

consumers beyond tolerable limits and properly taking into regard the relative benefits gained by those expenditures.

(CME, Closing Submission, p. 8)

[87] The Province noted, generally, that Mr. Sherrod found NSPI's distribution system to be adequate and acceptable:

As for NSPI's distribution system, Mr. Sherrod found that NSPI's inspection processes were in keeping with industry practice and good asset management strategy. Mr. Sherrod found no evidence that NSPI failed to address items found in its inspection process. In short, he concluded that the damage to NSPI's distribution system as a result of the November storm could not be attributed to any deficiency in the NSPI inspection and maintenance program. In fact, in Mr. Sherrod's opening statement, he advised:

I do not believe that the damages experienced on the NSPI distribution system from this storm are the result of any deficiencies in the NSPI design, instruction, inspection or maintenance of their facilities. The NSPI inspection processes, both routine and post-event, appear adequate and appropriate to good asset management. It is my opinion, based upon a three-day riding inspection of NSPI distribution facilities in areas not impacted by the storm, that the overall state of these facilities is very good - in fact better than most of the distribution systems with which I am familiar.

The Province submits that based upon the evidence presented during this hearing, two things should be concluded. First, NSPI's inspection and maintenance programs are consistent with good utility practice. Second, the damage to NSPI's facilities as a result of the November storm cannot be attributed to any defect in NSPI's inspection or maintenance programs. Notwithstanding the foregoing, the consultants did make some recommendations to NSPI.

(Province, Closing Submission, pp. 13-14, emphasis in original)

[88] On the PLT question, the Province stated that:

In his report, Mr. Sherrod specifically considered whether a connection existed between NSPI's decision to reduce permanent staffing levels by eliminating power line technician positions over the past several years and its response to power outages. Mr. Sherrod noted that responding to major storm related outages was more dependent on contracting for external assistance, than it was addressed by permanent staffing. Mr. Sherrod felt that NSPI's rapid recruitment and deployment of outside resources was an appropriate response to the November storm and noted that the response was even better than NSPI's response to Hurricane Juan.

Mr. Sherrod was, however, somewhat concerned about an increase in the Customer Average Interruption Duration Index ('CAIDI') corresponding with NSPI's 23% reduction in power line technicians over the past ten years [sic]. Mr. Sherrod noted that the CAIDI increase may mean that routine outages are lasting longer because of the reduction in permanent staffing, but he could not be conclusive. According to NSPI's response to Undertaking U-7, when the influence of major storms is removed from CAIDI, the length of outages experienced by customers is actually getting shorter. It is not clear, however, what criteria NSPI applied when

removing certain storms from the CAIDI calculation. This should be clarified to accurately understand NSPI's position.

Notwithstanding this request for clarification, the Province does not believe that strong evidence has been presented during the hearing to suggest that NSPI's reduction in staffing has affected its response to power outages. However, Mr. Sherrod noted that less than optimal staffing levels will result less efficient responses to routine outages.

Experience teaches me that you can reach a level of staffing out there in the field where, just because of engagements on other storms, people off on vacation, people are ill, out-of-pocket for whatever reason, at some point in time that does begin [in] impact you in your response to routine outages.

NSPI's CAIDI rating should be monitored by the Board to ensure that reduced staffing levels do not become a problem.

(Province, Closing Submission, pp. 21-22, emphasis in original)

[89] HRM agreed with Mr. Sherrod's recommendation to review PLT staffing levels.¹⁷

[90] While Mr. Sherrod's report did not address the issue of vegetation management, HRM, in particular, took issue with NSPI's plan to improve vegetation management in order to improve the reliability of electricity service. HRM distinguishes between vegetation management for the transmission system and vegetation management for the distribution system. Vegetation management relative to the distribution system is not a straightforward matter as it impacts the trees lining streets and near houses in urban centres. With respect to vegetation management relating to the transmission system, HRM states:

HRM supports the Liberty recommendations in respect of vegetation management that "to obtain fully the reliability benefits of the program, it will have to continue annual monitoring of vegetation growth system-wide".

Stright testified that such monitoring could largely be accomplished relatively inexpensively through helicopter monitoring. Liberty noted that there were some inadequacies in the

¹⁷HRM, Final Submission, p. 8

clearance practices, particularly in the western region as a result of marginal clearances of the transmission lines. To achieve what is required in respect of vegetation management of the transmission system is simply a matter of implementing NSPI's existing program, the cost of which is presumably included in the current budget and requires no changes in the vegetation management program.

(HRM, Final Submission, p. 8, emphasis in original)

[91] However, HRM has a different view with respect to the distribution system:

What HRM does not support is NSPI's suggestion that the best investment to achieve a higher level of system reliability would be to increase the width of distribution right of ways referenced in Ms. Tower's Opening Statement. The Board expert, John Sherrod, did not include a recommendation to increase the width of distribution corridors as a means of improving system reliability.

Ms. Tower's Opening Statement was buttressed by Ralph Tedesco when he testified that

The only way reliability will improve is with additional investment. So, if there is a desire to improve reliability as I said earlier we have put forth a variety of options, the largest one and most significant one of which, which in our judgment could improve reliability 20 percent or so, would be widening rights-of-way on distribution. Now we're not suggesting that we do that. It's more what is the expectation that has been set as part of this review.

Given that outages caused by vegetation issues only represent 12.6% of the total number of outages (22% of customer interruptions/28.3% of customer hours of interruption), it is unclear how an improved vegetation management program could achieve a 20% increase in distribution reliability unless the effect of the proposed vegetation management program is to eliminate virtually all prospect of vegetation related outages. Presumably this is not what is intended by NSPI given the resultant desecration of the landscape together with the negative impact to the environment, quality of life of the community and the economic impact through the impact on tourism.

Given that vegetation management issues are the subject of the upcoming vegetation management hearing, HRM recommends that these issues be addressed at that time.

(HRM, Final Submission, pp. 8-9, emphasis in original)

[92] One informal intervenor, EastLink, did not share Mr. Sherrod's view regarding the "...adequate and appropriate..." state of NSPI's distribution system. Eastlink submitted that:

EastLink's interests in this proceeding are relevant primarily as a local telephone service provider that provides the connection to customers' homes and businesses for local telephone and essential 911 emergency services. Like all telephone service providers, the provision of power is necessary to maintain not only the primary service to the customer's home, but also to maintain the operating and business systems to serve its customers. While companies that provide telephone service maintain backup power sources to address outage

situations, this backup power is intended to withstand temporary power disruptions and not extensive outages of the duration that occurred during the November storm.

...

The cause of the outages and the ability to repair them are the primary issues that should be considered in this review. While effective customer communication is very important when any essential service company is faced with outages similar to those experienced by NSP during this storm, these issues are secondary to the issue of how these outages arose and how NSP can be better prepared for future events.

The Sherrod report seems to suggest that NSP's practices were sufficient and the outages were beyond NSP's control due to the severity of the storm. Sherrod suggests that if any improvements were to occur, they should be directed at the Customer Communication issues. EastLink notes that Mr. Sherrod was hired to analyze the NSP response to Hurricane Juan and he was instrumental in developing NSP's Emergency Service Restoration plan (ESRP). Mr. Sherrod was also involved in the training and follow-up work related to NSP's implementation of the recommendations flowing from Hurricane Juan. Mr. Sherrod's report concludes that NSP did a good job in responding to the storm and it is noted in the report that Mr. Sherrod worked very closely with NSP staff during this process. In EastLink's view, this report adds little to the overall assessment of the outage due to Mr. Sherrod's involvement in creating ESRP and the related implementation of that ESRP and also because it does not provide as much detail concerning the underlying system analysis.

The Liberty report provides a comprehensive explanation of the analysis performed, with detail on the transmission system, the distribution system, maintenance issues as well as the call centre and communications efforts. While Liberty's conclusion seems to indicate that NSP's transmission system was with standards, it is notable that Liberty does suggest areas for improvement of the system. Liberty reveals areas where NSP could improve upon its system in the future. Liberty also recognizes at page 65 of his report that **“the most important goal for any electric utility regarding outages is to avoid them to the extent possible. Second, when outages do occur, it is important to restore service to customers as soon as possible.”** While Liberty also recognizes the importance of communication as the third goal, the primary goals of this review should be limiting future outages and repair times.

(EastLink Submission, pp. 1-2, emphasis in original)

[93] EastLink also stated that:

EastLink maintains its position that directing investment to the distribution system in order to prevent future outages and reduce repair times should be a key priority. EastLink also agrees that some investment directed to reasonable amounts of tree trimming, balancing the interests of all stakeholders involved, may have positive impacts in terms of reducing the amount and duration of power outages in the future. EastLink is generally supportive of any operational investments that will have the effect of limiting power outages.

(EastLink, Closing Submission, p. 2)

[94] In its Final Submission, HRM raised the possibility that distribution system damage could have been exacerbated due to the stress levels associated with telecommunications attachments:

The Sherrod Report points out that the typical point of failure for the distribution poles is at 15 feet or higher measured from ground level which tends to suggest that loading from the telecommunications cables is a significant contributor to stresses on the distribution system and not vegetation management.

(HRM, Final Submission, p. 8)

[95] HRM further noted that:

What was not canvassed by either NSPI or the Board experts was whether the CSA standards to which the current system is designed, should be modified due to changing weather patterns, or, as Dave Barrett of Barrett Lumber suggested, as a result of additional loading and impacts on poles arising from the increasing use of poles by telecommunications carriers.

(HRM, Final Submission, p. 3)

[96] As pointed out by the Province, certain members of the public appearing at the informal hearings noted what they observed to be deficiencies in the state of NSPI's distribution system. Their perceptions conflict with the views of the experts in this regard. The Board will deal with the issue of the public's comments on the condition of NSPI's distribution system in the section of this decision concerning the informal public hearings.

4.3 Findings

[97] The Board is satisfied with Mr. Sherrod's positive assessment of the condition of NSPI's distribution system and commends NSPI for its efforts in constructing, inspecting and maintaining this system. Given the evidence before the Board on this issue, there are relatively few items to address in this section. While the Board realizes that EastLink's

submission suggests a need for improvement, the expert evidence before the Board does not reflect a deterioration in the distribution system or inadequate inspection or maintenance of the system. Therefore, the Board does not find that EastLink's suggestion to direct investment to the distribution system is supported by the evidence.

[98] Mr. Sherrod and intervenors focused on two separate areas where problems may exist in the distribution system. Mr. Sherrod referred to NSPI's ability to respond quickly to routine power outages (CAIDI data) given the declining number of PLTs, and HRM identified the potential negative impact of communications attachments on NSPI's wooden distribution poles.

[99] The Board has carefully considered NSPI's response to the issue of CAIDI and the number of PLTs in Undertaking U-7. NSPI addressed this question in its Closing Submission as well:

The NSPI CAIDI analysis was filed in Undertaking U-7. Included in the response was the following:

Attachment 1 shows the annual measure of NSPI's overall CAIDI between 1999 and 2002, with storms excluded from the calculation. For the approximate 357 days of the year when this measure is applied, the CAIDI index declined from 1.59 hours in 1999 to 1.50 hours in 2004.

During the same period, the total number of PLTs employed directly by NSPI, excluding contractors, and available for day-to-day response, decreased from 233 to 155.

This CAIDI improvement is coincident with a move to extend the shift coverage of PLTs. Instead of eight-hour shifts from Monday to Friday with standby in the off hours, PLTs are now deployed in 12-hour shifts on

weekdays, in addition to 10-hour shifts on weekends, thereby improving response times. ...

...

What is not evident from the reliability charts is performance across and within NSPI operating regions. Reflecting differing population densities and operating environments in Nova Scotia (e.g., age of distribution structures, vegetation, terrain), individual customer reliability will vary from the average.

(NSPI, Closing Submission, pp. 14-15)

[100] The Board notes that in Undertaking U-7, the CAIDI index for 1999, with storms removed, is 1.59. However, Attachment 2 shows a CAIDI of 1.52 for 1999 which, perhaps, indicates a better CAIDI when storms are included. The Board also notes that for 1988, 1989 and 1990, CAIDI levels, with storms included, were 1.08, 0.94 and 1.13, respectively. This appears to be better than the recent levels of 1.50 in 2002 and 2004 with storms removed. The Board finds this data to be somewhat confusing. It is also troubling, given the various complaints experienced by customers, who speak of prolonged outages in certain areas.

[101] While there is no clear evidence that NSPI has too few PLTs, and the expert evidence reflects an adequately maintained distribution system, the Board is not convinced that this question has been satisfactorily addressed. After careful consideration, the Board finds that further review should be carried out to determine the adequacy of the number and location of PLTs; the annual operations and maintenance expenditures per customer; and an accurate reflection of what the CAIDI statistics represent. The Board will engage Dr. John Stutz to review the data filed by NSPI and to recommend whether further action on the PLT issue is warranted.

[102] The Board has also noted the position of HRM that the increasing weight of pole attachments, i.e., telecommunications equipment, could possibly contribute to the failure of poles during storm events. The Board intends to refer this question to Liberty for further review and advice.

[103] With regard to the issue of vegetation management and the distribution system, NSPI refers to the viewpoints stated by some of the intervenors:

These views support an expansion of NSPI's Integrated Vegetation Management program on the transmission and distribution systems. NSPI proposes to pursue this. The increased incremental operating cost of this strategy is expected to equal \$5 million in 2006.
(NSPI, Closing Submission, p.38)

[104] The Board recognizes the importance of tree trimming and maintenance of a suitable ROW in and around the distribution system. However, this is also an issue that is of considerable concern, especially in urban areas. Ideally, NSPI and interested stakeholders and municipalities could develop a mutually acceptable resolution to this problem and establish a reasonable balance between reliability of service and the protection of beautiful and environmentally important trees. Unfortunately, to date, no such resolution has been achieved and the Board is aware of difficulties between municipalities and NSPI on this issue. HRM has filed a formal complaint on the vegetation management issue with the Board and a hearing has been set down for December of this year. Since HRM has requested that this question be deferred until that hearing, it would not be appropriate, under the circumstances, for the Board to address this issue at this time. Accordingly, this question will be deferred.

5.0 COMMUNICATIONS

[105] For purposes of this decision, the issue of communications will be divided into two sections - communications with external agencies and communications with customers. Communications with external agencies includes communications with the Emergency Measures Organization; the media; the various levels of government; and other groups. Communications with NSPI's customers will primarily focus on the call centre and its adequacy in satisfying the needs of large numbers of customers.

5.1 Communications With External Agencies

5.1.1 Submission - NSPI

[106] In its direct evidence, NSPI reported that it activated its Emergency Operations Centre at 6:30 a.m. Sunday, November 14, 2004 after it determined that a Level 3 event was in progress. A Level 3 event is one where less than 50,000 customers are anticipated to be without power for up to 72 hours. Members of NSPI's Command Team were told to report to the Emergency Operations Centre (EOC) by 9:00 a.m. on Sunday, November 14, 2004. When the extent of transmission damage was determined, the EOC was then staffed in accordance with a Level 4 event. A Level 4 event is one where more than 50,000 customers are anticipated to be without power for greater than 72 hours. Mobilization of external resources began at this time which also coincided with the activation of the Provincial Emergency Measures Organization (EMO). NSPI advised that it had already alerted its internal and external resources on Friday afternoon. External

resources include both out of province utilities and contractors as well as Nova Scotia contractors.¹⁸

[107] NSPI discussed the important role of its Outage Management System (OMS) in the restoration process:

During Level 3 or 4 outage events the Outage Management System plays a significant role in the restoration of electrical service to customers and enhances NSPI's ability to manage the outage in a controlled and predictable fashion. The role of OMS in a Level 3 or 4 event is focused on the following priority areas:

- Maintaining integrity of electrical connectivity model;
- Provide official reliability statistics;
- Dispatch of emergency response/911 crews;
- Coordination of major switching and permits; and
- Providing outage information to the planning teams for detailed work package preparation.

(Exhibit N-1, pp. 38-39)

[108] NSPI stated that it utilized its corporate communications plan to ensure liaison with the EOC and to provide consistent messages to both its own staff as well as its customers. The storm web site was set up by noon on Sunday, November 14, 2004 and was continuously updated.¹⁹

[109] NSPI described its communications with government agencies as follows:

Government Relations activity commenced on Sunday at 11:00 a.m. with calls to senior provincial and municipal officials. Calls were made late Sunday afternoon to Halifax Regional Municipality (HRM) councillors, affected area MLA's and municipal leaders. This was continued throughout the week by Government Relations staff and Customer Service Managers.

Government Relations attended the Provincial EMO roundtable meetings on November 15th and 16th.

(Exhibit N-1, p. 26)

¹⁸Exhibit N-1, pp. 12-19

¹⁹Exhibit N-1, pp. 25-26

[110] NSPI described its media utilization which began on Sunday November 14, 2004 at 8:00 a.m.:

Media call-outs to provincial radio and radio wire services (Broadcast News and Canadian Press) were conducted starting at 8:00 a.m. on Sunday November 14th. The first of 11 news releases was issued at 11:45 a.m., supported by outbound calls to local and provincial media. There was initial difficulty in reaching some radio stations due to loss of station phone and fax systems or because some stations are not staffed on Sundays.

Media relations occupied the bulk of the communications resources during the week, as regular, outbound calls were made to media between news releases. NSPI External Relations, supplemented by several key executives, Control Centre staff and line technicians conducted an average of 75 interviews each day from November 15th-17th. Media relations continued operation through November 19th with efforts focused on issues raised by the public and media as well as providing outage and restoration information.

The storm website page was up before noon on Sunday, and was continuously updated with news releases throughout the event.

Paid advertising ran in provincial newspapers on Monday, November 15th with four additional ads run from November 16th to November 20th.

(Exhibit N-1, pp. 25-26)

[111] In its Closing Submission, NSPI stated that:

During major storm events NSPI is also focused on expanding the distribution of community-based outage information through media outlets. In addition to other channels, NSPI will provide the media with internet access to community area summaries, which will provide more detailed information about areas affected by the outages and restoration times.

(NSPI, Closing Submission, p. 20)

[112] NSPI also discussed, in its Closing Submission, a coordinated approach with the EMO:

Across Nova Scotia municipal emergency measures organizations are responsible for responding to crisis events. Nova Scotia Power works closely with these organizations during emergencies to manage its safe and timely restoration of electrical power to NSPI customers.

Nova Scotia Power understands the value of developing relationships and information sharing protocols with the provincial and municipal level emergency measures organizations. Effective coordination between the utility and the appropriate EMOs during power restoration activities will ensure safe and effective response by all affected organizations.

Immediately following Hurricane Juan, Nova Scotia Power embarked on a project to refine its Emergency Services Restoration Plan and develop stronger relationships with the Provincial Emergency Measures Organization (NS EMO). The outage responses achieved

during White Juan and the November, 2004 storms were better coordinated with the NS EMO as a result of this.

In 2004, Nova Scotia Power completed the training of key operational personnel in the provincial Basic Emergency Management and Emergency Operations Centre courses and reviewed the ESRP with the provincial EMO Zone Controllers prior to finalizing the operational version used during the November 13/14, 2004 response. Following the November storm NSPI concluded that additional attention was required in building effective relationships with emergency response organizations. NSPI focused on the municipal level EMOs to further promote integrated and effective outage restoration following extended power outages. Since January 2005, Nova Scotia Power has:

- Met with several municipal Emergency Measure Coordinators (“EMC”);
- Become an active provincial Department Emergency Planning Officer (“DEPO”) (i.e., NSPI established as a distinct point of contact within the overall EMO organization structure);
- Become a member of the newly established EMC Executive Committee, the committee which is responsible for identifying and resolving municipal level EMO issues and concerns; and
- Presented the ESRP at the annual EMC conference in Antigonish on May 19.

NSPI’s commitment to actively participate in the ongoing DEPO and Executive EMC Committee will result in a more effective and integrated effort among emergency response organizations. NSPI notes that while the Province put forward a number of recommendations involving communications with the public in its closing submission, the relationship between NSPI and the Provincial EMO is not raised in its final submission.

(NSPI, Closing Submission, pp. 20-22)

5.1.2 Submission - Consultants and Intervenors

[113] Mr. Sherrod reviewed his earlier work for the Board following Hurricane Juan and the presentation of his 49 recommendations in a report dated April 4, 2004. He recalled meeting with NSPI in July 2004 and, at that time, all but three recommendations had been resolved. Of these three recommendations, two were considered to be areas of concern in the November 13 - 14, 2004 storm. One dealt with the call centre which is addressed later in this decision. The other was a recommendation that NSPI utilize a private weather service provider in conjunction with Environment Canada and that

recommendation was repeated in Mr. Sherrod's evidence in this hearing.²⁰ As noted in the storm section of this decision, NSPI has now indicated it intends to engage an additional weather service provider and the Board has directed it to do so.

[114] Mr. Sherrod concluded that NSPI's preparation for and response to the November storm were better than for Hurricane Juan, but that NSPI had communication problems with its customers and other key constituents:

In summary, it is Consultant's opinion that NSPI did a good job in responding to this outage event. Their performance was impacted by the fact that they did not get a weather forecast that accurately predicted the actual conditions that were experienced. Beyond that, the biggest problem areas lie not in NSPI's actual performance, but in its communications with its customers and other key constituents.

(Exhibit N-18, p .18)

[115] With respect to communications with external agencies, Mr. Sherrod said:

... Good progress has been made, but there is still more that needs to be done. Feedback received from this effort during the November 13/14 storm indicates there were some deficiencies in the quality and quantity of information available to the EMO EOCs through the NSPI Liaison Officer. Information such as specific outage data, restoration activities and estimated times of restoration for specific areas, restoration priorities, etc. was often not available when needed by the EMO EOC. ...

NSPI should aggressively pursue the completion of the work it has begun in developing coordination processes with the EMOs.

(Exhibit N-18, p. 17, emphasis in original)

[116] With respect to NSPI's OMS, Mr. Sherrod stated that:

... The overall performance and utilization of OMS was much improved from the experience in Hurricane Juan. ...

(Exhibit N-18, p. 11)

[117] Liberty also reported on the role of NSPI's OMS and its performance during the storm:

²⁰Exhibit N-18, p. 10

As described in NSPI's January 18, 2005, Report to the UARB, NSPI's Outage Management System (OMS) works with other NSPI systems to identify outage locations, determine or predict the outage impact, support restoration, and facilitate outage notification and communication. NSPI "went live" with CES International's Centricity Operations Resource Management software in April 2002 (CES is now owned and supported by SPLWorldGroup, Inc.).

The OMS receives outage-event information from NSPI Dispatchers, its SCADA system, Service Sentry devices, IVR, and call center representatives (through the OCE system). OMS analyzes outage event information, employing NSPI's GIS distribution system electrical model, to identify common interrupting devices, generate an outage incident, and notify dispatch so that it can appropriately dispatch crews to restore service.

Traditionally, utilities have relied upon customers to determine the location and extent of an outage—customers call the utility when the power is interrupted and by sorting and analyzing the outage "tickets," management can determine and dispatch the appropriate resources. Outage Management Systems have automated the analytical process, helping utilities more quickly identify outages and begin restoration. Customers continue to play an important role, by reporting their individual outage, in determining the extent and location of an outage, and will until distribution automation can be deployed at the meter.

(Exhibit N-19, p. 66)

[118] Liberty concluded that NSPI's OMS adequately supported restoration and that the OMS is comparable to that of other North American utilities:

A review of the OMS operation during the November and subsequent storms reveals that the system operated as expected. It adequately supported the storm restoration effort and outage communications. The system was available to call center agents and dispatchers throughout the storm. It readily accepted outage reports from call center agents, dispatchers, the IVR, and sentry devices.

(Exhibit N-19, p. 66)

[119] With respect to communications with key emergency planning personnel, Liberty said the following:

It is clear that NSPI customers, the public, the media, and government officials were frustrated with the communications failures of the November storm. The technology failures and the extent of the storm created a communications breakdown. While it appears the Emergency Service Restoration Plan (ESRP) was instrumental in the coordination and guidance of restoration efforts, the lack of communications frustrated and stressed many directly or indirectly involved. Follow-up meetings and reviews highlighted the need to strengthen communications with emergency coordinators, public safety organizations, and government officials.

While NSPI finalized its ESRP in August, it has not communicated it properly to all key constituents. NSPI should make the plan available to key emergency planning personnel, public safety organizations, and governmental officials, and keep these groups updated as it updates or revises the plan. In addition, NSPI should:

- Communicate with key emergency personnel before winter and summer storm seasons, to review the ESRP and to confirm that all critical infrastructures are known
- Ensure that elected officials in all areas of its service territory have direct access to information regarding storm preparedness and restoration
- Promote outage information phone number and outage reporting service to set customer expectations.

(Exhibit N-19, pp. 64-65)

[120] In its Closing Submission, ECANS expressed the view that NSPI's role in emergency planning is and should be limited:

In our opinion, the Emergency Measures Organization (EMO) has **the** responsibility and accountability in predicting, warning and preparing Nova Scotians for the consequences of severe weather events. NSPI should not (and must not) be held responsible for coordinating these functions. They rightfully belong to the EMO and Nova Scotia taxpayers – and not electricity ratepayers. Fairness in the system means restricting NSPI's role to:

- Estimating the extent of system damage, to the best of the company's ability
- Estimating restoration times to the best of the company's ability, and immediately implementing the emergency preparedness plan.
- Informing all other emergency response agencies on a timely basis.

To expect any more would be going beyond its mandate, unfairly treating both NSPI ratepayers and shareholders.

In a correct alignment of responsibilities, we see the EMO taking the lead on:

- Developing a proactive master plan that assumes a large scale loss of electricity – an essential service. (Thumping on the desk and demanding service restoration only compounds the problem and serves no purpose).
- Educating and better preparing the public for loss of electricity supply.

(ECANS, Closing Submission, p. 3, emphasis in original)

[121] In its Final Submission, HRM addressed the relationship of NSPI with its emergency service responders and the media:

Ms. Kozlosky reported that government officials were "frustrated with the communications failures of the November storm." (Liberty Report, P.64) NSPI acknowledged that the issues included

- lack of access to outage information by police
- lack of access to restoration information by Fire and Emergency Services
- lack of information to HRM EMO through the NSPI liaison
- lack of access to information by the NSPI liaison

There appeared to be a consensus among NSPI, Board expert Ms. Kozlosky and Board expert John Sherrod, that there would be minimal cost associated with resolving these issues, and they should be resolvable within a relatively short 6 month time frame.

In light of this consensus, **HRM asks that the Board urge NSPI to devote the resources necessary to ensure that its ESRP is adjusted to ensure that local emergency service responders such as EMO, Police, 911, and Fire have satisfactory access to the required outage and restoration information within a more timely timeframe commensurate with the public safety responsibilities of those services and that an amended ESRP be filed with the Board by December 31, 2005.**

... HRM recommends that the four recommendations put forward by the CBC be adopted and incorporated into a revised ESRP.

(HRM, Final Submission, pp. 13-14, emphasis in original)

[122] In its Submission dated March 18, 2005, the CBC, an informal intervenor, expressed the opinion that both it and other media have the ability to reach large numbers of NSPI customers and that, consequently, pressure on NSPI's call centre could be lessened. In addition, it stated that customers want information, either good or bad. CBC offered the following suggestions regarding NSPI's media efforts:

- A NSP Communications Contact available to CBC Newsrooms, prior to and during significant power outages.
 - o Once a storm has been forecast or has hit a level 3 or 4, we request 24/7 access to a spokesperson who has the latest information on outages, areas [a]ffected, estimates of restoration times, and any other pertinent information.
 - o We need the ability to do hourly LIVE updates/interviews with an NSP spokesperson, 24/7 in times of crisis- leading up to and during power outages.
- CBC requires updates on the half hour on the NSP website with timely, accurate information that we can pull and use in our regular and special news updates
 - o Note the difference between the NB information and NS information in the attached news story dated 27-12-04) (**See Appendix #4: News Story**)
- CBC needs to receive frequent faxed or emailed press releases.
 - o Faxes are valuable if they contain specific information. Broad descriptions of obvious situations are of little use to the listener who comes to us for more specific information.

- Please note that no CBC Location across the country carries pre-taped information in these situations. Pre- taped messages are not acceptable for CBC because :
 - o There is too much to risk around dated, or wrong tape deliveries.
 - o Journalistic organizations set context for listeners, we don't simply broadcast what organizations give us.
 - o Our license demands that CBC be accountable for the information on our airwaves.
(Submission of the Canadian Broadcasting Corporation, March 18, 2005, Section 3, emphasis in original)

5.1.3 Findings

[123] The Board notes the positive comments of Mr. Sherrod relating to NSPI's overall response and Liberty's conclusion that NSPI's OMS performed well, adequately supported the restoration effort, and is comparable to that of other North American utilities.

[124] The Board is pleased that a significant number of Mr. Sherrod's recommendations regarding NSPI's emergency response process have been accepted and implemented since Hurricane Juan. The Board also notes from NSPI's Closing Submission that it intends to significantly increase its resources earlier when a storm is forecast, plans to engage an additional weather service provider and will continue to develop effective relationships with Provincial and Municipal EMO's.

[125] In the Board's view, however, the communications between NSPI and the various EMOs, government agencies, and the media, were inadequate during the storm. The Board considers such communications to be of vital importance. These stakeholders, besides providing comfort to the affected population, can be invaluable in carrying

messages from the utility to the customer. At the very least, this can translate into fewer calls to NSPI's call centre as well as other agencies.

[126] The Board directs NSPI to prepare a report detailing the changes made and proposed to be made with regard to communications with external agencies and the media in the wake of the November 13 - 14, 2004 storm and describing the current arrangements in place. This report should be filed with the Board by October 31, 2005, and circulated to the external agencies and media. These stakeholders should be invited by NSPI to comment on the report by November 30, 2005. NSPI is then directed to finalize the report and file it with the Board by December 30, 2005. These changes concerning the external agencies and media should be reflected in a revised ESRP, as recommended by HRM, and also filed with the Board by December 30, 2005. The Board intends to engage a consultant to assist NSPI in preparing the initial report, in revising the report based on the input from the stakeholders, and in making revisions to the ESRP as a result of this process.

5.2 Communications with Customers

[127] During the November 2004 storm, NSPI's call centre was overwhelmed with callers who were not able to get through. The Board's communications consultant, Christine Kozlosky of Liberty was asked by the Board to examine amongst other things, NSPI's call centre, its staffing, and its capability to respond to a large number of customers in order to recommend improvements, if any, that could be undertaken.

5.2.1 Submission - NSPI

[128] NSPI reviewed its overall communications operation and performance in its pre-filed report (Exhibit N-1). It referred to the Ice Storm of 1997 when the vast majority of over 75,000 callers received a busy signal. Today, NSPI utilizes a technology solution to provide key information to its customers:

NSPI's chosen approach to address this situation has been to use technology solutions to provide the key information customers want and provide it to the high volumes of callers who phone for it. By satisfying most customers with that information via technology (versus through a customer service representative), telephone lines to service representatives are available for those customers who need to report an emergency or some specific information about the cause or location of equipment damage.

NSPI's system for accomplishing this is described in the following sections. It has and continues to perform very well when ETRs [Estimated Time of Restoration] are available shortly following the outages. As mentioned previously, this is the case in all but the largest outages, and NSPI continues to work on methods to allow early communication of accurate ETRs in these events as well.

(Exhibit N-1, pp. 51-52)

[129] NSPI acknowledged that its high volume call answering (HVCA) system did not perform well on November 14:

NSPI's phone system is designed to satisfy a high percentage of callers with the message on the High Volume Call Answering system (HVCA). This strategy leaves lines open for people reporting emergencies or who need to talk to service representatives. This system did not perform as designed on Sunday, November 14th for the reason outlined below:

- NSPI's HVCA system is leased from Aliant and directly connects to the Aliant Public Switched Telephone Network (PSTN). The configuration of the link to the Aliant PSTN includes limits on the call volume that can be delivered to the HVCA system. These limits were in place to ensure the volume of calls to the HVCA did not cause problems on Aliant's PSTN. During the November 2004 storm NSPI received a record volume of calls. As a result of this extreme call volume these PSTN limits were exceeded. The result was approximately 20% of callers did not get the outage message NSPI had placed on the HVCA system.
- Whether because customers didn't receive the HVCA message, or because the information in the message did not satisfy them, large numbers of callers stayed on the line to try to reach a service representative. The volume of calls which can be handled by service representatives is a small percentage of what can be handled by the HVCA technology. As a result, most of these callers did not get through, and either received a message stating the system was full and to call again at a later time, or an automatic system hang-up occurred.

As NSPI's supplier of the HVCA and IVR [Interactive Voice Response] telephone systems, Aliant has been actively engaged in identifying and correcting the root causes of the telephone issues experienced during this event. Good progress has been made on most issues and the work continues to ensure that NSPI customers' needs are met during future outages.

(Exhibit N-1, pp. 58-59)

[130] Additional problems were encountered on November 14 which affected NSPI's telephone systems. These were described by NSPI as follows:

- It has been confirmed by Aliant that there were periods over the course of the entire outage event when, due to high volumes on the PSTN, a number of Nova Scotians in certain areas of the province would have received a fast busy signal, or no dial tone, when trying to make any out-going calls. This meant attempted calls to NSPI could not reach NSPI. Aliant has indicated these problems were the result of call volume and/or power supply/ back-up supply issues.
- It has been confirmed by Eastlink, that some of their customers would also have been unable to reach NSPI, because of power supply/back-up supply issues.
- A number of customers phoned NSPI's customer service line rather than the Outage line during this outage. Some of those customers would likely have received a busy signal.
- Three technical or software problems occurred with NSPI's IVR system. All were experienced during the morning of November 14th. The first resulted in some customers experiencing a time delay when depressing options in the IVR System. The second resulted in incorrect routing of calls between the IVR and agents, causing customers longer waits for Customer Service Representatives. The third was an inability to upload the HVCA message from the IVR system. This resulted in some customers not receiving the intended HVCA message.

(Exhibit N-1, pp. 59-60)

[131] NSPI compared the magnitude of call volumes during regular business versus those encountered during a power outage. During regular business, the call centre receives from 300 to 800 calls per hour. The latter would be typical of an extreme time such as when students are departing or returning and requesting connection or disconnection. During a power outage, the call centre would receive between 400 to

40,000 calls per hour. The latter is representative of the level encountered during the November 2004 storm.²¹

[132] NSPI addressed its perception of customer expectations, including the perception that the customer wants confirmation that NSPI knows his/her power is out; wants to know when the power will be restored; and wants to know the cause of the outage. Prediction of the time of restoration can be challenging. NSPI stated that it was faced with a situation where an Estimated Time of Restoration (ETR) was not known. Estimating ETR's before completion of damage assessment would have resulted in the customer getting incorrect information. On the other hand, waiting until more information became available would result in a delay for the customer making key business decisions.²²

[133] NSPI claimed that it did not have time to give its customers a pre-storm message because the storm developed quickly, in a manner which had not been forecasted by meteorologists, and the effects of the storm impacted the majority of mainland Nova Scotia. When customers awoke on November 14 they could not understand why there was a power outage since most of the damaged poles were not visible. These factors resulted in what NSPI describes as the "...highest ever hourly peak call volume to NSPI between 8:00 a.m. and 5:00 p.m. on Sunday, when over 700 people per minute (over 40,000 per hour) called NSPI."²³

²¹Exhibit N-1, p. 50

²²Exhibit N-1, pp. 49-51

²³Exhibit N-1, pp. 55-57

[134] NSPI stated that because of the heavy volume of calls on November 14, it became necessary to try to reduce congestion by publicly requesting that only customers experiencing an emergency should call. Since then, Aliant has removed the “chokes” on calls to the HVCA, a limitation about which NSPI was not apparently aware. In addition, permanent solutions to the Interactive Voice Response (IVR) issues have been implemented by NSPI and Aliant, and NSPI indicated that these solutions have been successfully tested.²⁴

[135] With regard to call centre staffing, NSPI noted that trained volunteers and third party contacts were utilized, with the number of representatives remaining high through the period November 14 - November 19.

[136] During questioning by the Board, Mr. Tedesco indicated that the cost of developing a new call centre would be approximately \$40 million:

Q. The -- if the view of the weather experts is that these types of events are now going to be normal or more normal, how would you answer my question, then, about the adequacy of the existing system?

A (Tedesco) Ultimately, it's a question of the service level that we would be asked to design to. With the changes we're making today, we believe we could handle the volume of calls in the HVCA, but not in the IVR because of limitations in the number of trunks coming in as well as physical limitations of the system as built. So if that were to be acceptable, then I would answer your question no need to change the system. That may mean some calls get dropped. We may say as a service standard that we will agree that if no more than 10 percent of calls -- just to invent a number -- I'm not suggesting that number -- get dropped, that that is an acceptable level of service. If there is a different standard that, for example, said we would prefer no calls get dropped, we would prefer every customer be able to speak to an agent if desired, that's a very, very different situation. So I think, ultimately, it's a question of the design standard that is put forth.

Q. Is that more or less similar to whether or not it's practical to -- for NSPI to build a Cadillac system, quote unquote, in other words, a system that basically -- whether it be above ground or under ground, a system that basically has very few outages? Is it the same sort of consideration, in your view?

²⁴Exhibit N-1, pp. 60-61

- A. (Tedesco) It well could be. In this case, the difference -- the consideration is similar. The dollars are vastly different. So to underground the system, we'd probably be talking about hundreds of millions of dollars, if not approaching billions. In the case of a call centre, we're talking about about forty million dollars.
(Transcript, April 19, 2005, pp. 351-352)

[137] NSPI indicated that customers do not support major capital expenditures to improve reliability:

Customers and other stakeholders do not support large-scale capital expenditures to reinforce the power system and communications systems to withstand rare, extreme weather events as experienced in 2003 during Hurricane Juan and in 2004 during the November storm; ...

(NSPI, Closing Submission, p. 2)

[138] In its Closing Submission, NSPI addressed some of the problems of the existing communications system, and set out a number of changes it has made and is proposing to make:

Communication during major power outages is a significant challenge for all power companies.

Ms. Kozlosky mentioned in her evidence, three basic levels of outage communication approaches are being followed by utilities today.

1. Block calls (busy signal to customers) to a manageable level (within the capacity of your Call Centre staff and/or IVR technology).
2. Provide an outage "message" to many callers; immediately terminate the call or let queue limitations in the IVR or agent queue force callers to "choose" to abandon if hold times become too long.
3. Let as many customers as possible notify the company of an emergency, report an outage or inquire about the status, with the help of technology.

Each of these approaches offers a different level of service to customers and comes with a different cost.

Prior to the introduction of HVCA in 1999, NSPI followed a level one approach. For example, over 70,000 calls were blocked during the 1997 ice storm outage.

Mr. Kozlosky indicates that today, working properly, NSPI follows a level two approach, better than many, but not the best in class.

NSPI agrees with Ms. Kozlosky that NSPI's systems did not provide level two service to customers during the peak calling periods of the November storm.

Working with the telephony system supplier, Aliant, NSPI has addressed the root causes of the technology malfunctions in the following ways:

- The limit or "choke" placed on the calls going to the HVCA system was removed by Aliant in January, 2005. In November, this choke resulted in approximately 20 percent of callers not receiving the HVCA message.
- The software problems with the IVR system have been fixed. In November, these problems caused:
 - time delays when pressing options to IVR;
 - incorrect routing of calls between IVR and agents; and
 - garbled messaging uploaded to HVCA.

NSPI is in the process of developing a methodology to provide high volume testing of its HVCA and IVR systems. Aliant has indicated it is not possible to conduct a test that would prove the capacity of the Public Service Telephone Network to deliver calls to the HVCA system. They have indicated that theoretically, between 200,000 and 250,000 calls per hour could be delivered to NSPI's HVCA system. This represents 5 to 6 times the record volume experienced in November's storm and about 25 percent of the design capacity of the HVCA itself. For details provided by Aliant, please refer to Appendix B.

NSPI has also made other significant improvements:

- An early ETR process has been developed and implemented which allows early communication of estimated restoration times during large scale outages.

NSPI's experience has been that most customers can be satisfied with a 30 second message, as long as it contains a description sufficient to identify them as part of a known outage, and a specific ETR.
- NSPI has improved its staffing approach for the Call Centre, and now, based on forecasts, brings in representatives to hotels adjoining the Call Center location in advance of the actual storms. This eliminates issues with transporting employees to the Call Center during storm conditions.

While these changes will significantly improve service during future large scale outages, it will still be a level two approach, or to quote Ms. Tower, NSPI will still be "driving an older car".

For example, during the outages of early March, all callers received the intended HVCA message (describing largest feeder outage and ETR), and there were no IVR malfunctions. Still, during the highest volume periods some callers (<10 percent) were unsuccessful in trying to reach IVR or agents and had to call back later in the day.

Moving to a level three approach would require major upgrades to NSPI's systems, at a cost of approximately \$40 million. It is important to consider the improvements in service that could be realized with such an investment.

With respect to accessibility, it is very important to note that a level three system does not mean that all customers who want to, can talk to a live agent. Even in level three systems,

if after interacting with the telephone technology, more callers wish to speak to agents than the Call Centre can handle, customers receive busy signals.

In Nova Scotia Power's current level two system, customers in the same situation receive a brief message indicating the lines are full, are asked to call back later, and are then disconnected.

Neither of these is a positive experience for a customer who wants to speak to an agent, but given the volume of calls, there is no other practical solution but for the customer to call back when lines are less busy. No utility or its customers could afford to employ the thousands of call centre representatives that would be required to allow every customer inquiring about an outage to speak with an agent.

A level three communications system also does not improve the accuracy of estimated restoration times. Customers may still experience frustration with estimates that change as more detailed damage assessment and restoration plans are available, or with the actual time of restoration being somewhat different from the estimate, either earlier or later than communicated.

Finally, level three communications systems do not reduce or prevent outages. A number of intervenors have made this point.

What the level three communications systems does provide is the ability for high volumes of customers to report their outage, and get outage information using IVR technology. The information can also be more specific to the individual customer circumstance; ETRs at the street level for example.

In Nova Scotia Power's level two system, high volumes of calls receive a 30 second message, and the messages speak only to the largest feeder outage in a given telephone calling area. Once again, during the peak calling hours of a large outage event, customers who are not part of the largest feeder, or who want to make sure their particular outage is acknowledged by NSPI, may try, but be unable to reach the IVR system or an agent, and may be forced to call back.

A very key point here is that with a level two system customers do get through once the call volumes subside. Therefore, what one would really get with a level three system is a service level where all customers are able to report outages and receive information on their outage, all the time, even during the highest volume periods of the worst outages.

Almost all intervenors have made the point that benefits must be weighed against costs, and that ultimately increasing costs mean increasing customer rates, something which is also a concern to customers.

...

Based on these submissions, the Board should conclude it is not in the public interest to overhaul the Call Centre network to facilitate response to relatively infrequent extreme weather events. NSPI agrees that the current level two system should be optimized and that the gains in service from a level three system do not justify the \$40 million expenditure.

NSPI continues to refine the existing Call Centre processes and assets. This will allow us to respond to customer calls more effectively than was the case in the November storm.

The Company is developing a communications plan and associated materials for late summer 2005, to be delivered to customers in advance of the fall/winter storm season. Communications will include:

- Helpful advice on how to prepare for the potential loss of power (e.g. important items to have on hand such as flashlights and battery operated radios);
- What to do to keep safe in various situations related to loss of power (e.g., safety advice regarding back-up generators or downed wires); and
- A summary of information Nova Scotia Power can be expected to provide to customers during major outages.

Nova Scotia Power's communications channels will also be reinforced (e.g., updated phone numbers), setting expectations concerning the limitations of the systems during high volume events (e.g., "You may have to call back to speak to an agent if the lines are completely full"). This part of the plan will include working with the Provincial EMO and other organizations to establish the most effective way to ensure emergency calls related to downed power lines get through to NSPI and are addressed immediately.

(NSPI, Closing Submission, pp. 23-28)

5.2.2 Submission - Consultants and Intervenors

[139] Christine Kozlosky, of Liberty, testified as to her conclusions and recommendations arising from her review of NSPI's communications and outage response.

[140] In her opening statement, Ms. Kozlosky states:

I conducted my evaluation during the period from mid-January through the end of February 2005. I received the information needed for this engagement from written and oral information from NSPI, interviews with other interested parties, and inspections of and visits to NSPI's call center and training facility.

With respect to the widespread service interruptions that occurred in Nova Scotia last November, I found that NSPI failed to communicate effectively with its customers. Many customers lost power in the early hours of November 14, resulting in unusually high call volumes that day and for several days following. It was extremely difficult to communicate with NSPI during the storm. Out of 300,000 calls to NSPI that Sunday, only 7,585 callers reached a "live person". Even worse, the majority of callers were disconnected (71 percent) due to technology design capacity limitations. Callers wishing to report an emergency situation had no special priority in the queue and were subject to the same capacity limitations. Additionally, various technology failures inhibited call flow and corrupted the information delivered to callers. While NSPI worked quickly to institute patches and resolve some of the problems, the damage was done to the caller experience and customer satisfaction. In addition, the timing and limitations in the level of detail provided about the

storm and the restoration progress frustrated customers, the media, emergency and public safety coordinators, and government officials.

(Exhibit N-32, p. 1)

[141] Liberty pointed out that many customers lost power in the early hours of November 14, 2004. This resulted in large numbers of calls to NSPI's call centre. The peak one hour period occurred between 8:00 a.m. and 9:00 a.m. on Sunday, November 14 when 43,639 calls were made. In total, the call centre received some 300,000 calls that day. Liberty noted that only about 2.5% of the callers were able to reach a live agent. About 71% of the callers were disconnected on November 14 as a result of technology design capacity limitations.²⁵

[142] A separate summary of Liberty's conclusions and of its recommendations concerning the call centre are set out below. While the format has been slightly changed, this information is based on the information set out in Exhibit N-25. The reference page indicated refers to the specific page in Liberty's prefiled evidence (Exhibit N-19) where the summary statement appears.

I Summary of Liberty's Conclusions Concerning NSPI's Call Centre

Reference Page in Exhibit N-19	Liberty's Conclusions
43	NSPI experienced significant failure in its Call Center telephony during the November storm.
47	The NSPI Call Center was unable to ramp up staffing as quickly as needed to respond to customer calls.
48	Third-Party agents had no access to NSPI systems.
48	Due to heavy call volumes and staffing constraints, e-mail response was inconsistent.

²⁵Exhibit N-19, p. 43

- 49 The NSPI Call Center response was inadequate. NSPI was unable to respond to the majority of its customers that called the company during the November storm.
- 52 NSPI's customers experienced similar problems during the Boxing Day storm.
- 53 It is likely that some of NSPI's customers will continue to experience difficulties during another large or concentrated outage.
- 54 NSPI's Call Center is appropriately sized and managed to deliver adequate customer service during normal business hours.
- 55 Considering the technology and communications failures experienced early during the November storm, NSPI's Call Center was not initially staffed to handle the volume of callers wanting to hold on the line for an agent.
- 56 NSPI's overall Call Center performance is average as compared to other electric utilities.

II Summary of Liberty's Recommendations Concerning NSPI's Call Centre

Reference Page in Exhibit N-19	Liberty's Recommendations
56	NSPI should conduct further customer research to understand better customer expectations as well as the current customer experience.
58	<p>NSPI should redesign its Call Center technology to improve communications with customers during a large outage or storm.</p> <ul style="list-style-type: none"> • NSPI must make it easier and quicker for callers to report an emergency, especially during large outages. • NSPI should alleviate the telephony capacity restraints so callers are no longer disconnected, either politely or impolitely. • NSPI should alleviate the telephone capacity restraints so more customers can report outages sooner. • NSPI should eliminate all blocked calls on its Customer Service Line.
61	NSPI should rigorously test call-handling technology to ensure it operates to expectations and specifications.
62	NSPI should examine why customers are contacting the company and NSPI's customer service response to determine if more calls can be resolved on the first contact, thereby increasing customer satisfaction.

- 62 NSPI should continue staging Call Center agents in nearby hotels in preparation for a Level 3 or Level 4 storm, especially one that makes travel to the center difficult or unsafe.
- 63 NSPI should incorporate e-mail response in the customer contact plan.
- 63 NSPI should provide additional channels of communications between the customer and the Company.
- 64 NSPI should take whatever steps necessary to communicate its Emergency Service Restoration Plan and event-specific priorities to key emergency planning personnel, elected officials, and the public.
- 65 NSPI should develop specific, measurable goals and objectives for improving the accuracy and timeliness of outage related information provided to its constituents.

(Exhibit N-25)

[143] Many of Liberty's conclusions and recommendations were expanded upon in Liberty's report (Exhibit N-19) and are discussed below.

[144] NSPI experienced significant failure in its Call Centre telephony during the November storm.²⁶ Liberty identified four types of technology problems:

- a) HVCA and IVR delivered garbled output messages to callers;
- b) HVCA disconnected callers due to capacity limitations;
- c) Call Centre network unavailable due to power interruptions;
- d) IVR operating very slowly while agents were sitting idle.

[145] Staffing levels in the Call Centre were at their lowest levels at 6:00 a.m. on Sunday, November 14 which coincided with 100,000 customers being without power at the same time. Thus, the peak calling period occurred at a time when staffing was at a minimum. Staffing later peaked that afternoon at 4:00 p.m. In addition, NSPI arranged for the transfer of overflow calls to Aliant's call centre in Newfoundland. However, it appears

²⁶Exhibit N-19, p. 43

that there was a lack of information provided by NSPI to Aliant. The Newfoundland agents were not able to access account information, verify addresses or enter outage information.²⁷

[146] Liberty described the types of problems NSPI's customers experienced when attempting to call NSPI during and after the November 2004 storm as follows:

Customers attempting to contact the NSPI Outage Line or Customer Service Line could have experienced the following:

1. Could not reach the NSPI Customer Service Line or Power Outage Line. They may have received a busy signal when trying to call NSPI's Customer Service Line. They may have received no dial tone or fast busy signals while trying to dial into NSPI Power Outage or Customer Service Lines.
2. Reached the Power Outage Line and experienced one or several of the following:
 - Heard a garbled message concerning the storm
 - Heard a message concerning the storm and told to remain on the line to "report an emergency situation"
 - Got disconnected without hearing any message about the storm
 - Got disconnected after hearing the message about the storm, while wishing to remain on hold to report an emergency situation
 - Told to call back at a later time and disconnected
 - May or may not have heard the storm message; also heard ringing or busy signal.
3. Reached the Interactive Voice Response (IVR) and experienced:
 - An excessively long wait time to the IVR's automated service to hear status on outage in caller's area and to report the outage
 - The inability to report an outage through the IVR's automated service—incoming phone number did not match NSPI's database and customer was not able to enter account number when prompted in outage reporting application
 - Experienced long pauses or delay in between messages and prompts.
4. Got to a "live person" and experienced:
 - An excessively long wait time to an agent—the average wait time was 8 to 10 minutes at peak
 - An excessively long wait time to a third-party agent who had no ability to reference customer account information and a limited ability to relay status about the outage or restoration efforts
 - An excessively long wait time to a company agent who had no ability to reference customer account information and a limited ability to relay status about the outage or restoration efforts.
5. Hung up while waiting
 - Caller terminates or abandons call at any point before reaching agent.

²⁷Exhibit N-19, pp. 47-48

Outage information delivered in the November storm did not satisfy callers. Because of the size of the outage and the large number of customers that lost power simultaneously, NSPI received a flood of calls. The HVCA system, at the time, could only deliver a message to 30 simultaneous callers within an area, such as Halifax. All others went into overflow, causing unexpected disconnection or polite disconnection. Callers lucky enough to make it into the IVR queue overflowed the IVR, causing several problems, including a delay in responsiveness of the IVR prompts and menu options and agents sitting idle while callers were locked up in the IVR. Not only did callers not get an appropriate message delivering expected restoration times, they were unable to report that their power was out—the top two reasons that customers call the company in the first place.

During the November storm (all days):

- 18 percent of all callers did not receive the HVCA message due to telephony capacity restraints
- 17 percent of all callers were “politely disconnected” from the HVCA
- 27 percent of all callers were disconnected without any warning or message
- 20 percent of callers abandoned while waiting for an agent
- 10 percent actually ended up speaking with a live person.

The Boxing Day storm was slightly more successful:

- Very few (49 callers) did not receive the HVCA message (of 55,173 total HVCA calls)
- 6 percent were disconnected by the HVCA without any message or warning
- 29 percent of callers abandoned while waiting to speak with an agent
- 15 percent of total callers ended up speaking with a live person.

Politely disconnecting (“we’re too busy, call back at a later time”) is effectively no better than presenting a busy signal. Some might argue it is actually worse. By accepting the call initially, you build the expectation that the caller has gotten through to the company. A busy signal lets the callers surmise that you are too busy. In either case, the caller cannot resolve their issue and must call back to attempt resolution, or give up. Disconnecting without any warning or message is inexcusable and just plain poor customer service.

NSPI’s HVCA design cannot guarantee it will not disconnect callers, whether politely or impolitely. It also cannot guarantee the same level of service to all callers. More callers from one area at the same time increase the probability that the system will deliver different levels of service. When many customers are calling from many areas at the same time, the entire system will become overloaded.

For a system that should deliver high volume call answering, there is no guarantee that it will work adequately under high volumes, much less deliver the desired level of service that customers expect. Because it does not have the capacity to interact with individual callers, nor deliver an individual “message,” it forces the callers to accept a more generic message, or a regional message, as their information. The fact that customers have to wait to report an outage effectively acts as a disincentive to report the emergency or outage or causes caller dissatisfaction.

While the HVCA might work well in smaller outages that affect fewer customers, it does not work effectively, nor deliver an adequate level of service during a large outage, such as the Boxing Day or the November storm. Moreover, its poor performance has exacerbated public opinion about NSPI and its ability to respond appropriately to large power outages.

To make matters worse, during the November storm, management chose not to provide estimated restoration information to callers or the public until “damage assessment” was complete (not until Tuesday morning). Regardless of the difficulties in getting out into the affected areas to assess the damage, customers without power since Saturday, could not get any idea from the company how long they would be without power, for at least two days. This was frustrating to customers and the public, causing abnormally heavy call volume into the Power Outage and Customer Service Lines through Tuesday. Aside from the fact that customers could not get through to NSPI, post storm customer research confirms that the next two biggest reasons for dissatisfaction, as shown on the chart below, were that the company was unable to tell customers when the power would be restored and that callers could not get any or enough information about the outage.

(Exhibit N-19, pp. 49-52)

[147] According to Liberty, notwithstanding reconfiguration of its system in January, 2005, “It is likely that some of NSPI’s customers will continue to experience difficulties during another large or concentrated outage.”²⁸ It is also significant, in Liberty’s view, that there will continue to be many customers who want to report an outage, or a safety issue, but who will not be able to do so because they have to wait in queue along with all other customers:

After its reconfiguration in January, the HVCA system will now deliver a “message” to 255 simultaneous callers within a certain geographic area, Halifax for instance. More than 255 simultaneous callers in any one of 31 predefined geographic areas will cause the system to go into overflow, with the excess callers not getting to hear the “message” but still having a chance of getting into one of 320 spots in a queue that funnels into 94 trunks that feed into 44 ports in the IVR. Also competing for these 94 trunks are calls arriving into NSPI’s Customer Service Line. When these 94 trunks are full, callers to the Customer Service Line will receive a “busy” signal. While the HVCA theoretically can accept 7,905 simultaneous callers, those calls must be equally distributed throughout NSPI’s 31 service areas. When the 255 slots in a specific area are full, additional calls from that area cannot spill over into the other 30 x 255 slots, even if they are not being used at all. Instead, all overflow goes into a three-stage loop that attempts to place the overflow callers in a queue before the system has to disconnect the caller. If at any point, there is no more waiting room in any of the stages, the call must be terminated. Additionally, if the system has more than 255 callers in any stage that it cannot place in a queue, it will terminate the call without any message.

...

NSPI must be able to accommodate the large influx of calls during a large outage. The HVCA system does not satisfy their customers’ basic needs. If NSPI can develop and deliver a “timely and accurate” message of expected restoration and size/cause of storm, NSPI still

²⁸Exhibit N-19, p. 53

cannot accommodate the 55 percent of callers (NSPI Customer Research finding) that still want to report the outage. Even more important, the 6 to 8 percent (NSPI Customer Research finding) calling to report a safety issue or emergency, such as a downed line or fire, cannot get through to the IVR or the call center agents because they are waiting, along with other customers who would like to report their outage.

As configured, the HVCA is also not interactive. As a result, callers have to wait in queue to get to the IVR or the call center agent. There are 94 lines into the IVR and the call center. This means that once callers receive the “message” at the HVCA level, they then have to hope they get into the queue for the IVR or the call center without disconnection by the HVCA, and then be subject potentially to long wait times in the queue.

(Exhibit N-19, pp. 53-54)

[148] Liberty stated that:

Sixty-three percent of affected customers surveyed after the Boxing Day storm reported calling NSPI’s Outage Line at some point during the storm. In fact, many customers reported calling many times during both storms ... On average, during the November storm, customers reported calling NSPI five times during the storm to obtain outage information. ...

(Exhibit N-19, p. 58)

[149] Liberty is of the view that a common problem for all electric utilities is how to effectively respond to large outages. It asserts that there are three basic “peak” call handling approaches:

1. Block calls (busy signal to customers) to a manageable level (within the capacity of your call centre staff and/or IVR technology).
2. Provide an outage “message” to many callers; immediately terminate the call or let queue limitations in the IVR or agent queue force callers to “choose” to abandon if hold times become too long.
3. Let as many customers as possible notify the company of an emergency, report an outage or inquire about the status, with the help of technology.

The industry best practice is option 3—let as many callers as necessary into your system to accept their outage reports and to deliver customized messaging about how the outage affects that caller. It is cost prohibitive to configure an IVR system big enough to handle the biggest spike in your call volume. Another more economical approach is to outsource or offload overflow to a third-party IVR when call volumes exceed your capacity—effectively renting the capacity when you need it. Many large investor-owned electric utilities in the U.S. have adopted this approach, renting a high volume outage handling IVR service, when necessary, to handle overflow.

NSPI evolved its technology strategy from option 1 to option 2, after its experiences with outages in the late nineties—it has chosen to deliver a somewhat customized “message” hoping that most callers will be satisfied and hang up after hearing the message. NSPI’s

HVCA can handle 500 or so simultaneous calls from each of 31 geographic areas, effectively delivering the “message” to many people at the same time, as long as call volume does not exceed this level in each geographic area. While NSPI’s IVR is equipped to accept outage reports and to deliver outage status, it will become overloaded if more than 1,400 callers per hour decide to stay on the line after hearing the message. Even if NSPI can increase its capacity limitations to avoid disconnecting callers, callers will ultimately be subject to long hold times waiting for the IVR or an agent.

...

NSPI should redesign its call center handling technology to deliver the best possible service to customers by moving to option 3 described above. Not only is this a “best practice” that has been deployed by many electric utilities in the U.S. and several in Canada, it also enables NSPI to provide the best possible service to all affected NSPI customers in a Level 3 or 4 outage. It also lets NSPI configure an interactive menu that will give top priority to emergency calls. ...

NSPI should also reroute calls from its Customer Service Line, when necessary, into this overflow solution so as not to block any callers, especially during a large or concentrated outage. ...

(Exhibit N-19, pp. 59-60)

[150] Liberty recommended that NSPI should redesign its call centre technology in order to improve communications with its customers during a large outage or storm.²⁹ As discussed earlier, this recommendation was interpreted by NSPI as requiring a \$40 million solution.

[151] Ms. Kozlosky was asked by Board Counsel if she intended to recommend that NSPI pay \$40 million for a new customer information system:

Q. And what's your reaction to that?

A. Well, it wasn't my recommendation to implement a new customer information system. I think there's some enhancements or some changes that can be made to the current technology to alleviate the capacity issues without adding -- necessarily adding a new system.

Q. And what would those be?

A. Well, I was speaking in my recommendation on -- I guess it's page 59 and 60, that there are a couple of different ways of handling high volume peak calling situations. One is to give out a busy signal and tell customers to try again because they're getting a busy signal. We're already past that. The second is to give out a message and hope that the message is sufficient enough that customers will be satisfied or call back later, and that's what NSPI does currently. The third is to be more

²⁹Exhibit N-19, p. 58

interactive with callers so that you can attempt to resolve their issues the first time that they call and alleviate the need for them to call back. And in that situation, I recommend that NSPI investigate the option of sort of an overflow management service. Where call volumes get too high for the capacity of their system, they can sort of flip a switch and have those calls routed to a third party that specializes in handling outage calls. There's a company that pretty much has the market share in the United States and serves about 70 utilities, and they are available at anytime to answer calls in a high volume situation. And it's not -- the calls are not answered with a person. It is being answered by technology through an IVR, and the IVR can be configured to look exactly like your IVR, the company's IVR, so that the customer doesn't know that they've been routed to a third party, and the IVR can provide the same information that the company's IVR provides. It could let customers enter an outage ticket to tell the company that they have lost power. It could be designed to relay status information about the outage in that area. It could also be designed so that if there's an emergency, the caller could just press a one, for instance, and be routed immediately back to the company to speak with a live person. And I guess the key is that it can handle any number of calls. I think the capacity could easily handle 200,000 calls an hour, several million calls a day. So there won't be any limitations on how many calls can come in at the same time. It can be ramped up immediately so that when you need it, it's there; when you don't, you don't use it. And you basically pay for what you use on that service. And I think that solution would be something that would be something that could be integrated with the technology that NSPI has, so it is to supplement the HBCA in the situations where it looks like it can't handle the volume of calls coming in.

- Q. Can you comment on the cost of that system, the cost of the third party provider?
 A. Okay. I did some preliminary investigation of this one company, and I talked to the Sales Vice-President and asked for sort of a rough estimate of what it would cost for a company that has 500,000 or so customers, and she indicated that it's probably going to be in the neighbourhood of four thousand dollars (\$4,000) a month to have use of the system, somewhere in the neighbourhood of a sixty thousand dollar setup fee, one-time fee, and then you pay for the calls that are handled by this technology. So when you use it, you pay sort of a usage charge on each call. If you use it, you pay. If you don't, you don't have to pay.
- Q. Are those U.S. funds?
 A. Yes. U.S. dollars. And this particular company handles companies – utilities as small as 16,000 customers to as big as 5,000,000 customers and anywhere in between, and they also, I guess, handled – successfully handled the hurricanes last year. All of the Florida utilities take advantage of this service, so they had concurrent high volume calling situations for all the utilities in Florida, and this one company handled it.

(Transcript, April 26, 2005, pp. 559-562)

[152] Liberty observed that NSPI's HVCA might be adequate for smaller outages but that its capability is not adequate for larger outages. It was acknowledged that changes in the technology and communications strategy were made after the November 13 -14

storm; however it was also observed that problems continued to be experienced in the subsequent Boxing Day storm.³⁰

[153] Liberty noted that NSPI had recently replaced several key components of its call centre support systems including switching and queue management, call routing, the IVR, staffing, scheduling and call monitoring shortly before the November 14 storm. These were implemented through Aliant. Several of the failures encountered during the November storm were related to these areas. Liberty stated that NSPI did not rigorously test the new technology prior to acceptance. Further, NSPI did not have a contingency plan in place to address problems with its HVCA system. Liberty recommended that NSPI should rigorously test its call handling technology. Liberty described this testing as extending into a complete system analysis:

As part of this testing, NSPI should complete a complete analysis of the systems and technologies supporting outage response to identify hardware/software risks, optimum redundancy, back-up strategies, and future utilization. It should document all interrelated business processes and interdependencies so that it knows and understands the implications of failure of various components. NSPI should make sure it has the appropriate contingencies in place to deal with the implications of power failures in its storm response and call centers, network downtime, and failures of any of the systems or technologies supporting storm response and communication. This includes establishing back-up power, redundant systems and databases, spare parts and equipment, on-call or on-site support, as well as manual business continuity plans.

(Exhibit N-19, p. 61)

[154] During cross-examination, Ms. Kozlosky was asked by the Board to elaborate on the testing of call centre components and their costs:

- Q. Okay. Now, we heard also last week that -- and I think it's in your report -- that when the company did the improvements to the high volume call system and IVR there was no testing done or something like that to that system before it took over?
- A. Right. It's my understanding that the stress testing did not happen.
- Q. Is that normal for any company to take over system without testing?

³⁰Exhibit N-19, p. 53

- A. Well, I think it's -- typically when you install new technology, you do acceptance testing and stress testing, and I guess it's a matter of what extent of the stress testing was done, how far did they go.
- Q. Would you recommend one? Like, we heard that NSPI has now made improvements to their system, high volume call system, IVR and other technologies and functionalities and we heard also last week that the cost of testing this new setup, if I call it, is about two hundred fifty thousand dollars (\$250,000). Would you -- and we heard also that NSPI does not think it's -- that if they haven't included it in their budget and they are not prepared to go there unless the Board kind of orders them to do, would you have any recommendation based on the improvements they have done you're aware of and the cost is about two hundred and fifty thousand dollars (\$250,000) and -- do you have any recommendation for the Board?
- A. Well, I put in my report that whatever solution NSPI pursues, I think it's critical that they do test the solution, stress test it. If they make enhancements or have made enhancements to their system, I think it should be tested to make sure that it's working as designed because it obviously did not work as designed in the past. So if they choose to go with a third party, I think that should be tested as well. It's just good practice.
- Q. Two hundred fifty thousand is not an unreasonable cost?
- A. I can't really comment on the cost of the testing. I know there are companies that do that as their business, but I don't know the cost.
- Q. Is there more than one company who does the testing? Are you aware?
- A. I know of one. I'm sure there's probably others out there.
- (Transcript, April 26, 2005, pp. 584-586)

[155] Liberty recognized that, since the November and Boxing Day storms, NSPI has developed a pre-storm staging strategy for its call centre agents. The strategy involves the staging of agents in nearby hotels and provision of meals. This enables all call centre positions to be filled by the time maximum outages and calls are experienced. Liberty recommended the continuance of this strategy for all future Level 3 and Level 4 storm events, when travel from home to the call centre is expected to be difficult.³¹

[156] Liberty commented that e-mail response to customer queries was inconsistent and that NSPI has no predefined process for handling e-mails during a Level 3 or Level 4

³¹Exhibit N-19, pp. 62-63

event.³² It recommended that NSPI provide the necessary resources in order to effectively respond to customers' e-mail inquiries.

[157] NSPI's web site was reviewed by Liberty and it observed that the site did not permit the customer to report an interruption or to obtain restoration status information. Liberty recommended that, as part of expanding the channels of communications with customers, NSPI should investigate the enabling of its web site to accept customer reporting of outages.³³

[158] The opportunities that web sites and new communications technologies make available to utilities in outage situations were discussed by Liberty:

This is an opportunity for NSPI. Many electric utilities across North America are providing some level of outage information on the web site, from listings of affected areas and numbers out to specific restoration status and estimated restoration times. Several utilities have also established self-service outage reporting through the corporate web site, providing yet another way for customers to let the company know they are without power. While the number using these services is much smaller than those calling in, it does open another channel of communication.

This is becoming more and more important with the growing popularity of web-capable cell phone technology, public Wi-Fi networks, PDAs that enable mobile internet access, e-mail, and instant messaging. While individual residences may be without power, businesses and public areas may have power, giving the public better access to the Internet, even during an outage.

(Exhibit N-19, p. 64)

[159] In her opening statement, Ms. Kozlosky addressed damage done to the caller experience and to customer satisfaction arising from various technology failures which inhibited the call flow and corrupted the information delivered to the callers.³⁴ During

³²Exhibit N-19, p. 49

³³Exhibit N-19, p. 64

³⁴Exhibit N-32

questioning by the Board, she elaborated upon the need for further customer surveying as a way to design a system that would reduce customer dissatisfaction:

- Q. And I just had one or two questions, Ms. Kozlosky, and it refers to the idea of customer service and bench marking that I know you've done in other areas of your practice from your CV. What is the impact? What is the danger for a utility if when customers are annoyed or upset anyway because they've lost power, they're unable to get through and communicate with a call centre?
- A. Well, obviously if there are emergencies, it's a big exposure. You would like your customers experiencing emergency or wires down or a fire to be able to get through, so that should be a number one priority. Otherwise, I mean, the first reaction when your power goes out if you're a customer is in most cases to pick up the phone and make sure your utility company knows that you do not have power. And if you cannot get through, you're not reassured, first of all, and you'll probably continue to try to get through. And if that continues to be a problem, I think you'll lose a little bit of faith in your utility company. In a lot of cases, normal business, most customers interact with the company through the bill, paying the bill each month. They may never call the call centre. When there's an outage, that is usually the situation where customers pick up the phone and call. So it may be their only point of contact that they've had with the utility other than paying the bill. And if their only point of contact is a bad experience, then obviously it's going to affect their perception of the company.
- Q. And in your experience, is the good performance of a call centre in emergency situations or storm situations -- is that a high priority for other utilities?
- A. Yes, I think so. I'm from the southeast United States where we have ice storms, if we have anything, or hurricanes, and over the years, we've had quite a few. And it's really very reassuring when you can pick up the phone and call your utility and they tell you that "We're aware of the outage at your location and it'll take six hours to fix it." I mean, that's exactly what a customer would like to hear. And I think that companies that do that very well, I think have -- it's a tremendous impact on customer satisfaction.

(Transcript, April 26, 2005, pp. 593-595)

[160] Liberty expressed the importance of developing goals and objectives relating to communications before, during and after storm events. Liberty suggested that this can be achieved by being proactive in providing more information before the storm, improving ETRs during the event, and by conducting meetings and debriefing sessions after the event.³⁵

³⁵Exhibit N-19, p. 65

[161] John Sherrod, in Exhibit N-18, indicated that a significant action was taken by NSPI during the November 14, 2004 storm when it requested that customers only call the outage line to report emergencies and downed power lines. He stated that the problem encountered by NSPI was caused by restrictions on the input capacity of the call system, whereby NSPI was not able to receive all the calls which were being made.

[162] Mr. Sherrod expressed some concern about the message itself, and indicated that, in his view, NSPI ran the message too long and it would have been better delivered as a separate message, apart from the general news release concerning the storm. He stated that, while the decision to ask customers to delay calling in their outages was the right one, there was a lack of understanding by NSPI's customers as to the reason for the request.³⁶

[163] Mr. Sherrod made the following observations:

- NSPI missed a good opportunity to tell a very good story of the progress they were making in restoring power. As has been pointed out earlier in this report, NSPI's restoration rate was very good, comparing favorably to the industry performance for outage events of this magnitude. Yet the messages that NSPI put out in the first days of the storm did not mention the progress that was being made. This would have been very encouraging to customers, and should be the lead-in statement on most messages.
- In the Tuesday, November 16 news release reference was made to restoring 25,000 customers. This figure does not agree with the figures in the NSPI report to the Board. Also, the peak number of outages reported in news releases does not agree with the peak outages reported to the Board in the January 18, 2005 report.
- The general tone of the messages appeared to Consultant to be negative, emphasizing too much of the problems being faced and not stressing the actions taken and progress being made. The result was that the messages could be perceived as "We are overwhelmed!" There was a good bit said about progress in assessing damage, but very little said about progress in restoring power. For example, in a newspaper ad on Tuesday, November 16, NSPI stated that Monday was spent assessing damage and "We can now effectively deploy" the work crews. Taken literally, this is telling the customers that three days into the restoration effort,

³⁶Exhibit N-18, p. 13

NSPI was only now able to effectively deploy its resources! This was obviously not the case, as by this time almost 85% of the customers had been restored.

(Exhibit N-18, pp. 15-16)

[164] Mr. Sherrod had two specific recommendations concerning these matters as follows:

RECOMMENDATION 3

Corporation Communications and the Regional Operations Coordinator should review the process for establishing restoration estimates with the goal of developing more specific estimates and communicating them externally within the first 24 hours of the onset of the storm.

RECOMMENDATION 4

NSPI should engage an outside communications consultant to review the communications during the November 13/14 storm and provide the training and direction to assist NSPI to improve the quality of their customer messages.

(Exhibit N-18, p. 16, emphasis in original)

[165] The call processing system was also mentioned by Mr. Sherrod as one of his Hurricane Juan recommendations which was still causing concern during the November 2004 storm. He had originally recommended improvement in that system in order to eliminate the necessity of a customer taking action to remain in the queue and to reduce calls being dropped through outsourcing. Mr. Sherrod noted that this matter needs attention as a result of the experience in the November storm.³⁷

[166] The idea of spending \$40 million on a new call centre was rejected by intervenors CME, ECANS, and HRM in favour of a less expensive solution. ECANS articulated a common theme of these three intervenors regarding a major capital expenditure:

³⁷Exhibit N-18, p. 9

Where we do not want to go is in the direction suggested by Ms. Christine Kozlosky that NSPI engage the services of a third party service provider such as 21st Century Communications. Mr. Connors cross-examination of Ms. Kozlosky was helpful in pointing out the magnitude and implication of her recommendation. NSPI's Undertaking U-8 transforms MS. Kozlosky's words into a \$40 million capital cost along with a \$5.1 million annual operating expense. These levels of expenditures would be better applied to increasing the robustness of the wires systems and better vegetation management.

(ECANS Final Submission, p. 15)

[167] The Province expressed support for alternative sources of information:

If NSPI does not believe that it is necessary to ask customers to refrain from calling, in light of the improvements to its telephone systems, then NSPI still needs to manage customer expectations by advising them of the limitations of their telephone systems. Once again, customers should be advised about alternative sources of information and the specific information that will be available from those sources, so they have something specific to turn to in the event that the promoted power outage line is unavailable or overwhelmed. In short, if customers are better advised by NSPI about what to expect and how to react, there should be less likelihood that they will become as frustrated as in November 2004.

(Province, Closing Submission, pp. 32-33)

[168] The Province is supportive of NSPI's initiative to provide ETRs. It stated that:

NSPI is in a difficult position when it is called upon to provide information on restoration times that is both quick and reliable. NSPI has noted that the new process, to some extent, trades off accuracy for speed. Based upon NSPI's responses and testimony, the Province believes that NSPI is taking earnest steps to refine its processes to provide information that is both early and accurate.

Inevitably, even the best of efforts to provide estimated restoration times on an early and accurate basis will fail. **It will be important for NSPI to manage its customers expectations by educating them about the nature of the estimated restoration time process. NSPI will also need to ensure that corrected information is relayed along to customers as quickly and efficiently as possible when NSPI becomes aware of a circumstance that would render its early estimate of a restoration time inaccurate.**

(Province, Closing Submission, p. 24, emphasis in original)

[169] The Province commented on the changes necessary to improve NSPI's call answering technology as follows:

In its Opening Statement, NSPI noted that it had taken a number of steps to improve the performance of its telephone systems. These included having the "chokes" removed by Aliant and making improvements to its software to address the garbling of HVCA messages and the slowness of the IVR. NSPI also advised that, for an estimated cost of approximately \$500,000, it may be possible to increase the number of trunks into the IVR and create a

larger “waiting room”. This could permit more customers to obtain information from the IVR, but might also result in extraordinary wait times. NSPI was still assessing whether its software could accommodate this and, at this point, the answer to that question is unknown. (Province, Closing Submission, pp. 25-26)

[170] The Province added that:

Even with such improvements, NSPI describes the system it would then have as an older car:

Pending discussion during these hearings, we are considering seeking authorization to expand Nova Scotia Power’s capacity to handle more calls from our customers wishing to report outages. That will improve our capacity and will push our current technology pretty well to its limits. But to use an analogy, we will still be driving an older car, not one that just rolled off the lot. ...

(Province, Closing Submission, p. 26)

[171] The Province referred to the steps already taken by NSPI, as outlined in its Opening Statement,³⁸ to improve the performance of its telephone system, including having Aliant remove the “chokes” on the system, and improving its software to deal with the garbling of the messages on the HVCA and the slowness of the IVR.

[172] The Province agreed with NSPI that in major power outage situations there would still be customers who will not be able to get through, or who will be hung up on.³⁹

It went on to suggest that:

... **NSPI needs to fully assess, and manage the expectations of its customers.** A customer who knows what to expect and the limitations of NSPI’s call answering technology may be prepared to accept those limitations rather than increasing the cost of service and resulting in a possible increase in rates relating to the significant capital expenditures to provide an all access, all the time, system. The Province submits that, thus far, NSPI has done a poor job of informing its customers on these issues.

(Province, Closing Submission, p. 28, emphasis in original)

³⁸Exhibit N-21

³⁹Province, Closing Submission, p. 28

[173] With respect to the stress testing of the revised system, which was estimated by NSPI to cost \$250,000, the Province expressed the view that, while the cost is not insignificant, it is relatively minor compared with NSPI's annual cost of service and the testing should be carried out so that:

... NSPI, and everybody else, understand the limits of NSPI's call answering systems, and know that what NSPI has will work.

(Province, Closing Submission, p. 29, emphasis in original)

[174] The Province agreed with Liberty that it is unacceptable that callers wishing to report an emergency situation or safety concerns have no special priority, and have to wait in line along with everyone else:

Whatever NSPI does to ensure that emergency calls are, in fact, handled on a priority basis, it should involve an educational campaign for its customers on what is properly an emergency call. If, for example, NSPI were to set up a dedicated line for emergencies, proper customer education would presumably eliminate some of the non emergency calls. If non emergency calls on such a line were a problem, it may be that a punitive charge levied against customers who improperly use this line would lessen the problem. The Province is not suggesting that a dedicated emergency line should be imposed upon NSPI at this point, or even whether a dedicated line is a workable solution. **The Province is suggesting that because of the nature of this issue, NSPI should be required to put forward a plan for something that is better than what exists now.**

(Province, Closing Submission, p. 30, emphasis in original)

5.2.3 Findings

[175] After reviewing the evidence in this hearing, it is clear to the Board that it was not the condition of the transmission and distribution system which caused the massive power outage in the November storm. Both Liberty and Mr. Sherrod found that the transmission and distribution systems, respectively, were well maintained and in good condition. The reasons why customers lost power were primarily related to the severity of the November storm, and are set out in detail in this decision.

[176] The major problem resulting from this significant power failure was the inability of NSPI's customers to advise NSPI that they had no power, to inquire what the problem was and to determine how long they would be without power. A careful review of the evidence can only lead to one conclusion—that communications between NSPI and its customers was a very serious and totally unacceptable failure.

[177] Such failure was not just one dimensional. There were many aspects to it, including the “chokes” which Aliant had placed on the system which resulted in many callers being unable to get into NSPI's HVCA system; the inability of NSPI's system to accept calls from such a large number of customers at one time; the inability of NSPI's IVR system to readily handle those calls which did get into the IVR system from the HVCA system. There were other failures, such as the Aliant agents in Newfoundland not being given sufficient information to enable them to efficiently process the outage information which they received, and the rapid onset of the storm which prevented the staff from getting to NSPI's call centre in a timely manner, with the result that when the most customers were without power, the call centre did not have sufficient agents on hand to answer those customers who were able to get through.

[178] It would not be completely fair to assign all blame for these problems to NSPI. Most would agree that, since 2003, Nova Scotia has experienced a significant increase in adverse weather conditions. The Province was hit with “Hurricane Juan”, “White Juan”, and in November 2004, a very severe winter storm. Storms of this magnitude will inevitably cause power outages. It is not possible to storm-proof a system to avoid outages in such

conditions unless the entire network is built underground, and that would not appear to be financially feasible.

[179] That having been said, it is now time to move ahead and make the necessary changes to ensure that, in future storms, there will be a significant improvement in the ability of customers to communicate with NSPI.

[180] Based on the evidence before it, the Board believes that the necessary improvements in communications will require changes in a number of different areas.

[181] It is important to note that, notwithstanding the type of telephone system NSPI has in place, if every customer decides to call NSPI at the same time there will be a very large bottleneck resulting in many customers being unable to contact an agent. There is no way to avoid this unless NSPI were to establish a call centre with sufficient numbers of agents, having sufficient numbers of telephone lines such that every customer could dial in and immediately speak to an agent. Obviously, the cost of such a system would be completely prohibitive and impractical.

[182] Liberty has stated that there are three basic “peak” call handling approaches. Its preferred option is what it describes as the “industry best practice option”. This will ...“let as many callers as necessary into your system to accept their outage reports and to deliver customized messaging about how the outage affects that caller. It is cost prohibitive to configure an IVR system big enough to handle the biggest spike in your call volume. Another more economical approach is to outsource or offload overflow to a third-party IVR when call volumes exceed your capacity—effectively renting the capacity when you need

it. Many large investor-owned electric utilities in the U.S. have adopted this approach, renting a high volume outage handling IVR service, when necessary, to handle overflow.”⁴⁰

[183] The Board notes that NSPI has suggested that the improvements which Liberty recommended would cost \$40 million in capital, and an increase in annual operating costs of an additional \$5.1 million. Included in these additional operating costs is an estimated \$1.6 million in outsourcing costs which NSPI would have to incur to rent the “overflow capacity” recommended above by Liberty.⁴¹ NSPI, in Undertaking U-11, indicated that, without making the bulk of the capital improvements set out in Undertaking U-8, it would not be able to rent the “overflow capacity” as recommended by Liberty.

[184] In its Closing Submission, NSPI stated that:

... NSPI agrees that the current level two system should be optimized and that the gains in service from a level three system do not justify the \$40 million expenditure.

NSPI continues to refine the existing Call Centre processes and assets. This will allow us to respond to customer calls more effectively than was the case with the November storm.
(NSPI, Closing Submission, p. 28)

[185] A number of the intervenors have expressed the view that it would be cost prohibitive for NSPI to incur such a significant increase in capital and operating costs at this time. The Board concurs. Before considering such significant levels of expenditure, the Board must be convinced that the existing call answering technology cannot operate at an acceptable level, and that there is no other alternative.

[186] The Board notes that NSPI has stated in its Closing Submission that it “... continues to refine the existing call centre processes and assets. This will allow us to

⁴⁰Exhibit N-19, pp. 59-60

⁴¹Undertakings U-8 and U-11

respond to customer calls more effectively than was the case with the November storm.”⁴²

The Board considers such refinement to be urgent and it should be a priority item.

[187] Accordingly, the Board directs NSPI to implement the necessary modifications to the present system so as to maximize its functionality. This should include considering an increase in the number of trunks into the IVR system. The Board will appoint Liberty to monitor NSPI’s efforts in this regard, and to provide a report to the Board with respect thereto.

[188] While timing is of the essence, the Board recognizes that improvements to the system should be effected prior to the performance of the stress test noted below, and the Board directs that NSPI, after consulting with Liberty, prepare a timetable to complete these items and file it with the Board for approval no later than September 30, 2005. This timetable should set out the objectives of the improvements to the technology, what improvements are expected to occur; and the estimated costs thereof. It should also contain an assessment of the options considered by NSPI and the conclusions drawn therefrom.

[189] In addition, the Board directs that NSPI conduct a stress test, as recommended by Liberty, designed in such a way that the results will clearly indicate whether NSPI’s system is working in an acceptable manner. The Board will also appoint Liberty to monitor the stress test and to provide a report to the Board with respect thereto. The Board directs that the stress test be conducted as soon as practically possible

⁴²NSPI, Closing Submission, p. 28

following the filing, and Board approval, of the timetable referred to above and the completion of the system improvements.

[190] Upon completion of the stress test, NSPI is directed to file a report with the Board, within 30 days, which will contain the results of the stress test and NSPI's recommendations with respect thereto. Upon receipt of this report, the Board will consider whether or not an additional major upgrade is necessary.

[191] The Board finds the concept of a call overflow system utilizing a private vendor to be worth pursuing. The Board recognizes that the public telephone network, as well as NSPI's existing telephone system, may impose limitations on the effectiveness of this option. However, the Board believes that the potential advantages warrant further investigation. NSPI is directed to carry out preliminary investigations, in consultation with Liberty, to arrive at a conclusion as to the appropriateness of this approach.

[192] Based on the evidence presented during the hearing, the Board believes that much more attention has to be given to providing a means whereby customers who need to report an emergency situation to NSPI are able to get through. The Province suggested in its Closing Submission that "...because of the nature of this issue, NSPI should be required to put forward a plan for something that is better than what exists now."⁴³ The Board directs that this issue be considered as part of the telephone system upgrade.

[193] It is the Board's view that both the "call overflow system" and improving the ability of customers to report an emergency situation should be included as part of the timetable to be filed with the Board on September 30, 2005. Ideally, NSPI will be able to

⁴³Province, Closing Submission, p. 31

complete its preliminary investigation into each of these systems prior to September 30, 2005, so that the timetable will set out NSPI's recommended plan for improving the telephone system.

[194] With respect to the specific messages which should be communicated to NSPI's customers, both prior to and during a major power outage, the Board believes that this is a very important element in the communications between NSPI and its customers.

[195] The Board notes that NSPI, in its Closing Submission, indicated that it is developing a communications plan for late summer 2005 to be delivered to customers in advance of the fall/winter season.

[196] The Province, in its Closing Submission, states that "... NSPI needs to fully assess, and manage the expectations of its customers."⁴⁴

[197] Mr. Sherrod stated in his evidence that "... NSPI should engage an outside communication consultant to review the communications during the November 13/14 storm and provide the training and direction to assist NSPI to improve the quality of their customer messages."⁴⁵

[198] The Board directs that NSPI prepare and file with the Board a Communications Plan which will encompass the items set out above. The Communications Plan should provide a means to educate NSPI's customers about the limitations of the telephone system and that, in a major power outage situation, customers cannot expect to

⁴⁴NSPI, Closing Submission, p. 28

⁴⁵Exhibit N-18, p. 16

immediately speak to an agent, but may have to wait in order to report their outage or make their inquiry.

[199] The Board directs that the Communications Plan be filed with the Board by September 30, 2005.

[200] Further, the Board believes that NSPI should utilize other means for communicating with its customers on an inter-active basis using e-mail and the web site. NSPI is directed to develop such a plan and incorporate it as part of the Communications Plan to be filed by September 30, 2005. The Board also approves of NSPI's plan to provide estimated ETRs to customers and notes that the Province has stated in its Closing Submission that NSPI must "... ensure that corrected information is relayed along to customers as quickly and efficiently as possible when NSPI becomes aware of a circumstance that would render its early estimate of a restoration plan inaccurate."⁴⁶ The Board directs that NSPI incorporate this recommendation into its ETR plan.

[201] While the Board has set out directives for improvements to the communications system, with dates set for filings and changes to take place, it recognizes the potential for a severe storm and resulting outage to occur before improvements are completed. NSPI should be prepared to make emergency improvements under such circumstances to ensure customers experience a better communications system that that which existed in November of 2004.

⁴⁶Province, Closing Submissions, p. 24

6.0 INFORMAL PUBLIC HEARINGS

6.1 Public Comment

[202] In the public notice of the power outage review, the Board advised that:

INFORMAL HEARINGS - SECOND PHASE - If sufficient interest is expressed the Board is prepared to convene, as the second phase of the hearing, informal hearings at various locations around the Province. The Board will only hold these sessions to hear comments from the general public if sufficient interest is expressed. Persons who want to participate in the second phase informal hearings should notify the Board on or before March 15, 2005, at the above address, phone, fax or email address.

(Exhibit N-3(a), pp. 1-2)

[203] In response to this notice, the Board received requests from elected officials and residents of four communities to hold informal sessions. As a result, the Board held public meetings on April 27, 2005 in Dartmouth; April 28, 2005 in Truro; May 5, 2005 in Chester; and May 16, 2005 in Digby. These sessions began with NSPI providing an overview of its system, the storm and its subsequent actions, followed by public comments and questions.

[204] The session in Dartmouth was attended by a number of residents of Cole Harbour as well as Darrell Dexter, Leader of the Opposition and Member of the Legislative Assembly (MLA) for the Cole Harbour area. Other residents of HRM also attended and made presentations, as did Michel Samson, the MLA for Richmond, who appeared on behalf of the Liberal party. Both Mr. Dexter and Mr. Samson outlined the issues raised by constituents to MLAs concerning the power outage during the November storm and the lack of communication and information from NSPI which was experienced by customers. Mr. Dexter also referred to additional unexplained power outages (unrelated to the November storm) experienced by his constituents. A number of Cole Harbour residents

confirmed Mr. Dexter's comments with respect to the outages in their area and expressed considerable frustration with both the outages and the failure of NSPI's communications system during these times. The Municipal Councillor for the area, Harry McInroy, also confirmed these concerns in his comments to the Board.

[205] Individuals appeared from other parts of HRM to comment on their experiences with the power outage and NSPI. Leanne Hachey, Director of Provincial Affairs for the Canadian Federation of Independent Business ("CFIB"), made a presentation outlining the impact of outages on business and the concern which members of the provincial CFIB have regarding the outages which they have experienced.

[206] Residents of Truro and the surrounding area, as well as residents of Pictou County, appeared at the public session in Truro on April 28, 2005. Mayor W. R. Mills explained that he requested the Board to hold a meeting in Truro based on the contact Council had with area residents regarding the November storm and power outages. Mayor Mills particularly stressed the problems customers experienced with NSPI's communications system and the lack of accurate information available to customers from NSPI. While Mayor Mills acknowledged that the storm was severe, he questioned whether NSPI employs a sufficient number of line workers to ensure regular maintenance of the system is performed. For the most part, the concerns of customers centred on the frustrations experienced in attempting to get information from NSPI's call centre on the actual power outage and the expected restoration time. Others noted that rural customers are particularly disrupted by outages and seem to face longer wait times than urban

customers for restoration of service. Adequate maintenance of the distribution system in rural areas was also raised as a concern.

[207] At the public meeting in Chester, both customers and municipal officials also focused on communications and information problems experienced during and after the November storm. Questions about the number of line workers and where they are located in the Province were also raised, as was a suggestion that retired employees could be used as a valuable resource during power outages. Several speakers outlined their experience in reporting outages and their frustration with the wait for restoration. Richard Hattin, a resident of rural HRM, confirmed that he had purchased a generator to avoid a similar outage in future. Municipal Councillors Gail Smith and Cheryl Scott both appeared and outlined problems experienced by area residents during the November outage.

[208] Harold Theriault, the MLA for Digby - Annapolis, requested that the Board hold a public session in Digby as did a number of area residents. At the session, Diane Theriault spoke on behalf of the MLA and commented on the impact of the outages on residents and businesses in the area. Barry Kendall, President of the Digby and Area Board of Trade, spoke on behalf of the organization's members with respect to the concerns experienced with an increasing number of power outages generally and the impact of the November storm in particular. Joe Murrell, a resident of Cornwallis Park, described several lengthy power outages, including that experienced during the November storm, and questioned the condition of the system. He also emphasized the particular frustration and concern involving the need to keep essential medication in proper supply and storage during lengthy outages. His views were reiterated by Richard Holt, Chair of

the Cornwallis Park Community Association. Other speakers commented on what they believe to be the deteriorated state of NSPI's system in certain rural areas and suggested that improvements in NSPI's maintenance of rural infrastructure, customer service and communications are necessary.

6.2 Submission - NSPI

[209] NSPI addressed what it referred to as "Local Concerns" in its Closing Submission. NSPI pointed out that despite wide publication of the outage review, only four communities requested informal sessions and, at those sessions, a total of thirty presentations were made which NSPI considered to be "... a very low number of customers ...".⁴⁷

[210] NSPI identified the main concerns to be:

... In general, concerns expressed focused on frustration with NSPI Call Centre processes, a perception NSPI service reliability has declined in recent years (which NSPI has shown not to be the case) and the view that local vegetation management was inadequate. These issues have been discussed previously in this document.

(NSPI, Closing Submission, p. 41)

[211] NSPI also noted that speakers referred to the use of line workers, particularly those from outside the local area, when restoration is done following a severe storm. NSPI defended this practice, indicating that:

NSPI's access to contractor PLTs and PLTs from other utilities, as enabled by mutual assistance agreements, is an essential element of NSPI's ESRP. This is both typical and an accepted practice in the electricity industry. The alternative, to maintain, permanent full-time resources in sufficient number to meet peak activity cannot be economically justified.

(NSPI, Closing Submission, p. 41)

⁴⁷NSPI, Closing Submission, p. 40

[212] NSPI also addressed restoration issues raised by the public, namely:

1. Local, extended outages which occurred while surrounding neighbourhoods continued to have power;
 2. Lengthy delays experienced during the November storm apparently attributable to causes which were easily corrected once addressed by NSPI; and
 3. Outages which appeared to involve multiple trips by PLTs to correct.
- (NSPI, Closing Submission, p. 43)

[213] According to NSPI, these concerns are not unusual and result from the effort to restore power, following a large outage, being subject to appropriate prioritization. This is not uncommon in the electric utility industry. NSPI explains that:

Because distribution circuits are primarily radial in nature, adjoining neighbourhoods are often served from separate feeders. This can cause the situation where a circuit which has been returned to service or which did not experience an interruption provides electric power to one street while the next street must wait until the outage cause on that feeder is addressed.

The process for inspecting feeders before re-energizing the lines must also be considered. Before a distribution circuit can be re-energized following a fault, it must be inspected to determine the cause. To do otherwise would be unsafe, as the cause of the fault, if unaddressed, could remain a risk to the public and to employees and contractors.

This process may require a number of hours, in particular if the cause of the outage is no longer apparent (e.g., In a case where due to high winds a tree which leans into a line, subsequently returns to a more vertical position relieving the fault, the fault will not be evident to PLTs and the entire line must be inspected). In this case the restoration technique might be quite straightforward. However the time-consuming process necessary to ensure this is done safely and effectively may not be apparent to residents.

(NSPI, Closing Submission, p. 44)

6.3 Findings

[214] The Board has reviewed the comments of the public at the informal sessions and has found them to be instructive and helpful. Given the passage of time between the November 2004 storm and the informal sessions, which was unavoidable, the Board is pleased that a significant number of people took the time to attend the meetings and share their views and concerns with the Board.

[215] Generally, the public sessions did not identify concerns with NSPI's transmission system. A few speakers did comment on what they considered to be problems with the condition of the distribution system in certain rural areas. While this was not reflected in the expert evidence before the Board, it is also true that the distribution expert engaged by the Board did not inspect every area of the Province. Specific problem areas referred to include certain parts of Digby County, a portion of rural Colchester County, a portion of Queens County and the Cole Harbour area.

[216] The Board recognizes it is entirely possible that NSPI's distribution system in these areas is adequate as not all poles are part of NSPI's distribution system. Some, for example, are telecommunications poles which are the property of Aliant Inc. This distinction may not be obvious to an observer. On the other hand, other than Liberty's reference to vegetation management issues on NSPI's transmission system in the Digby County area and western part of the Province, the distribution system in these areas was not specifically inspected. Accordingly, the Board will engage Liberty to inspect the areas referred to by speakers at the informal hearings and members of the public in written submissions and report their findings on the condition of NSPI's system to the Board by November 30, 2005.

7.0 OTHER

7.1 Critical Care Customers

[217] The issue of identifying critical care customers was raised by a number of parties during the hearing. In particular, Mr. Dexter voiced his concern with respect to the

331 customers identified by NSPI as critical care customers. In Mr. Dexter's view, this list is inadequate. Concerns were expressed that NSPI does not have an adequate list of those customers who are particularly impacted by power outages. NSPI described its efforts relating to critical care customers as follows:

Regional Customer Leads directed the implementation of the critical care customer contact as well as escalated customer issue management. Contact with critical care customers was a priority in the early hours of the outage with NSPI staff making contact with all customers on the existing list with the exception of twelve households. Through NSPI's Provincial EMO Coordinator, EMO assistance was requested to ensure these people were contacted. EMO arranged for medical staff from Emergency Health Services to be dispatched directly to those homes and all remaining critical care customers were reached on Monday, November 15th.

The Community Liaison Program was initiated on Monday, in coordination with municipal EMOs. Six Liaison Officers were assigned to EMO established "Comfort Centres" as they were activated by municipal EMOs to provide shelter and food to local residents in outage affected communities.

The integration of Key Account Staff into the customer response plan enabled NSPI staff to work directly with the large customers in affected areas...

(Exhibit N-1, pp. 21-22)

[218] Along with Mr. Dexter's comments, the NDP, in its Closing Submission, noted that NSPI's critical care list shows only 331 people in need of proactive attention. It stated that:

In fact, through Information Request NDP-IR-3, we were made aware that NSPI's Critical Care Customer list was established in 2001. Since that time, through supposed on-going maintenance of that list, there have been only 331 customers identified as in need of proactive attention by the Power company in the event of an extended power outage.

This is extremely difficult to understand when one considers that Nova Scotia Power has over 440,000 metres installed, and that there are some 950,000 people in the province. We have a population which is aging quickly, and therefore have a large number of seniors in the province. There are a great number of Nova Scotians of all ages who have medical conditions that require them to have a reliable power supply to stay healthy, and in some cases, to stay alive.

We respectfully suggest to the Board, as we have done directly to Executives of Nova Scotia Power, that the company needs to do more - to be more proactive - when it comes to identifying customers who need this kind of proactive contact and assistance.

The Board has a role to play in mandating more specific guidelines around how NSPI identifies and solicits customers to be on this list. For example, ***the Board could offer***

detailed advice to NSPI on the establishment of a working group, composed of representatives of the company, local non-profit community groups, health officials, government and emergency measures officials. Such a group could meet regularly to review the guidelines around the list. They could also, individually and collectively, suggest and implement strategies for identifying and soliciting customers for the list.

(NDP, Closing Submission, p. 2, emphasis in original)

[219] ECANS, in its Closing Submission, took the view that it is the role of the EMO, not NSPI, to maintain a database of critical care customers and cautioned the Board not to extend NSPI's mandate to include the provision of emergency services during extended power outages.⁴⁸

[220] NSPI addressed the issue of the "critical care" list, agreeing that critical care customers require "special attention", but noting that:

Nova Scotia Power agrees that critical care customers need special attention. The communications plan will address the issue of how people who rely on power for life supporting systems become aware of the program and register. As well, specifics on what the program does and does not provide will be clearly established (e.g., Inclusion on the Critical Care List does not mean you get power on faster, only that you are contacted directly by NSPI with ETR information).

With respect, instructions from the Utility and Review Board on the management of this function are not required.

(NSPI, Closing Submission, p. 46)

[221] The Board has carefully considered the matter of critical care customers and their increased need for reliable electricity, such as the need to refrigerate medications and for heat and mobility. While this issue represents a responsibility shared by a number of agencies, the Board is of the opinion that NSPI is principally responsible for maintaining a list of such customers. NSPI has, in the past, accepted this role as evidenced by its current list of 331 critical care customers. The Board understands that while EMO identifies critical

⁴⁸ECANS, Closing Submission, p. 6

care customers by address, NSPI identifies these individuals based on the numerically identified feeder, an electrical supply line used to provide service to them. In NSPI's system, this feeder number is a key piece of information needed for an accurate critical care customer list. From time to time, NSPI feeder configurations can change and, under such circumstances, the Board does not consider it reasonable to expect NSPI or EMO alone to maintain an up to date critical care customer list. It is essential for all agencies involved, including NSPI, to ensure that all customers who have critical health needs are appropriately accounted for.

[222] The Board considers the recommendation of the NDP to be a reasonable approach to this issue. Accordingly, the Board directs NSPI to carry out meetings with community, government and health groups, as well as EMO officials, with the goal of establishing and maintaining a more accurate list of critical care customers. NSPI is directed to report to the Board on a semi-annual basis as to the progress made in this effort.

7.2 Use of Retired Employees

[223] The suggestion was made during the informal sessions in Chester that NSPI should maintain a list of retired employees who could be called upon during emergencies. NSPI stated in its Closing Submission that it does maintain such a list as a "key and valued part of our emergency response plan".⁴⁹ The Board supports NSPI's use of this valuable resource in emergency situations.

⁴⁹NSPI, Closing Submission, Appendix A

8.0 SUMMARY OF FINDINGS

8.1 The Storm

[224] After reviewing the evidence in this hearing, it is clear to the Board that it was not the condition of the transmission and distribution system which caused the massive power outage in the November storm. Both Liberty and Mr. Sherrod found that the transmission and distribution systems, respectively, were well maintained and in good condition. The reasons why customers lost power were primarily related to the severity of the November storm. The Board directs NSPI to forthwith engage the services of an additional weather information provider to be used in conjunction with Environment Canada.

8.2 Transmission System

[225] The Board commends NSPI for its willing acceptance of many of the recommendations of Liberty, including the move to reliability-based methodology for future transmission structures; upgrading the size of sky wires as suggested; and implementation of a pole treatment program in 2006. The Board agrees with all of Liberty's findings and directs NSPI to adopt these changes as soon as possible as outlined by the Board.

[226] The Board refers NSPI's analysis of Liberty's relay testing recommendation to Liberty for further review and recommendation.

[227] NSPI is directed to review relevant portions of the Hydro Quebec Ice Storm Report and file a discussion brief commenting on possible improvements which could be

made to improve reliability during severe storm events. This brief should be filed by November 30, 2005.

[228] The Board directs NSPI to file an assessment report on the completion of ROW clearance of transmission lines by November 30, 2005. That report shall describe the work that has been or will be performed to implement Liberty's recommendation, and set out a timetable and estimated cost assessment.

[229] The Board directs that NSPI develop a formal transmission looping policy, as outlined by Liberty, and file this policy with the Board by November 30, 2005. The Board directs NSPI to comply with Liberty's recommendation to use the manufacturer's high voltage design limit or file a specific analysis which supports a higher voltage operation. The Board also directs NSPI to follow Liberty's recommendation concerning load shedding or, in the alternative, satisfy the Board as to why the current policy is justified.

[230] The Board agrees with the Province's suggestion regarding line operating temperatures. NSPI is directed to file information with the Board to clarify its practice in this matter by November 30, 2005. The Board will refer NSPI's filing to Liberty for review and advice with respect to whether further action is required.

8.3 Distribution System

[231] While there is no clear evidence that NSPI has too few PLTs, and the expert evidence reflects an adequately maintained distribution system, the Board is not convinced that this question has been satisfactorily addressed. The Board finds that further review should be carried out to determine the adequacy of the number and location of PLTs; the

annual operations and maintenance expenditures per customer; and an accurate reflection of what the CAIDI statistics represents. The Board will engage Dr. John Stutz to review the data filed by NSPI and to recommend whether further action on the PLT issue is warranted.

[232] The Board intends to refer the question of whether the increasing weight of pole attachments, i.e., telecommunications equipment, could contribute to the failure of poles during storm events to Liberty for further review and advice.

[233] Since HRM has a formal complaint and pending hearing on the issue of vegetation management in and around the distribution system and has asked that this issue be deferred, the Board agrees it would not be appropriate to deal with this issue at this time.

[234] The Board recognizes that certain customers' complaints about the condition of NSPI's distribution system is not reflected in the expert evidence and it is entirely possible that NSPI's distribution system in these areas is adequate. Since the experts did not specifically inspect areas referred to, the Board will engage Liberty to inspect the areas referred to by speakers at the informal hearings and by members of the public in written submissions and report their findings on the condition of NSPI's system to the Board before November 30, 2005.

8.4 Communications

[235] Communications between NSPI and the various EMOs, government agencies, and the media, were inadequate during the storm. The Board directs NSPI to prepare a report detailing the changes made and proposed to be made with regard to

communications with external agencies and the media in the wake of the November 13 -14, 2004 storm and describing the current arrangements in place. This report should be filed with the Board by October 31, 2005, and circulated to the external agencies and media. These stakeholders should be invited by NSPI to comment on the report by November 30, 2005. NSPI is then directed to finalize the report and file it with the Board by December 30, 2005. These changes concerning the external agencies and media should be reflected in a revised ESRP, as recommended by HRM, and also filed with the Board by December 30, 2005.

[236] The major problem resulting from this significant power failure was the inability of NSPI's customers to advise NSPI that they had no power, to inquire what the problem was and to determine how long they would be without power. A careful review of the evidence can only lead to one conclusion—that communications between NSPI and its customers was a very serious and totally unacceptable failure.

[237] The Board agrees that a \$40 million cost to improve NSPI's call system is not warranted at this time. Before such an expenditure is justified, the Board must be convinced that existing call centre technology cannot operate at an acceptable level and there is no alternative. The Board directs NSPI to implement the necessary modifications to the present system to maximize its functionality. Liberty will be appointed to monitor NSPI's efforts and to file a report with the Board.

[238] The Board directs NSPI to carry out a stress test on its telephone system to reflect whether the system works in an acceptable manner and, after consulting with

Liberty, to prepare a timetable to complete improvements and file the timetable with the Board no later than September 30, 2005.

[239] NSPI is directed to carry out preliminary investigations on the concept of a call overflow management system utilizing a private vendor, in conjunction with Liberty, to arrive at a conclusion as to the appropriateness of this approach.

[240] The Board directs that NSPI prepare and file with the Board a Communications Plan by September 30, 2005. The Communications Plan should provide a means to educate NSPI's customers about the limitations of the telephone system and that, in a major power outage situation, customers cannot expect to immediately speak to an agent, but may have to wait in order to report their outage or make their inquiry.

[241] The Board believes that NSPI should utilize other means for communicating with its customers on an inter-active basis using e-mail and the web site. NSPI is directed to develop such a plan and incorporate it as part of the Communications Plan to be filed by September 30, 2005. The Board also directs that NSPI incorporate the Province's ETR recommendation into its plan.

[242] While the Board has set out directives for improvements to the communications system, with dates set for filings and changes to take place, it recognizes the potential for a severe storm and resulting outage to occur before improvements are completed. NSPI should be prepared to make emergency improvements under such circumstances to ensure customers, and others, experience a better communications system than that which existed in November of 2004.

8.5 Critical Care Customers

[243] The Board considers the recommendation of the NDP in the matter of critical care customers to be a reasonable approach and directs NSPI to carry out meetings with community, government and health groups, as well as EMO officials, with the goal of establishing and maintaining a more accurate list of critical care customers. NSPI is directed to report to the Board on a semi-annual basis as to the progress made in this effort.

An Order will issue accordingly.

DATED at Halifax, Nova Scotia, this 5th day of August, 2005.

Margaret A. M. Shears, Vice-chair

Kulvinder S. Dhillon, Member

John A. Morash, Member

APPENDIX - A

List of Witnesses

On behalf of

NSPI

Ralph Tedesco
Nancy Tower

BOARD COUNSEL

John Sherrod
Robert Stright
Christine K. Kozlosky

EVENING SESSION (Halifax)

Michel Samson, MLA - Liberal Caucus Office
Darrell Dexter, Leader of the Opposition and
MLA - NDP Caucus Office
Robert Wornell, Cole Harbour
David Barrett, Beaverbank
John Gratwick, Halifax
Wade Everett, Hunt's Point
Harry McInroy, Municipal Councillor
Leanne Hachey, Canadian Federation of
Independent Business
Debra Nowlan, Cole Harbour
Robert O'Halloran, Cole Harbour
Mike O'Halloran, Cole Harbour

EVENING SESSION (Truro)

Mayor W. R. Mills
Christopher Martell, Hants County
David Thompson, Pictou County
Jeff Cotton, Inglewood Farms
Ian MacDonald, Truro

EVENING SESSION (Chester)

Harold Selig, Bridgewater
Richard Hattin, Seabright
Gail Smith, Municipal Councillor
Cheryl Scott, Municipal Councillor
Wally MacDonald, Chester
David Foster, Chester

EVENING SESSION (Digby)

Diane Theriault on behalf of Harold Theriault,
MLA for Digby-Annapolis
Barry Kendall, President, Digby and Area Board
of Trade
Joe Murrell, Cornwallis Park
Jay Stone, Bear River
Richard Holt, Cornwallis Park Community
Association
Lawrence Outhouse, Tiverton
Elsie Thibodeau, Digby
George Duncan, Digby

APPENDIX - B

List of Formal Intervenors

Canadian Manufacturers & Exporters	J. D. R. (Dick) Smyth, P.Eng. Robert Patzelt
Electricity Consumers Alliance of Nova Scotia	John Woods, P.Eng.
GasWorks Energy Corp.	Dwight Jeans, President John H. Reynolds, P. Eng.
Halifax Regional Municipality	Mary Ellen Donovan, Cathie O'Toole Barry Manuel
Town of Lunenburg	N.A. (Norman) Mossman
New Democratic Party Caucus Office (NDP)	Paul Black
Nova Scotia Liberal Caucus	Michel Samson Jim Murphy
Province of Nova Scotia - Department of Energy Emergency Measures Organization	Stephen T. McGrath Jonathan Kenyon Allan L. Crandlemire Scott McCoombs M. R. Lester

Informal Intervenors

Canadian Broadcasting Corporation	Susan Mitton
EastLink	Natalie MacDonald