Q. Please file a copy of Hydro's emergency preparedness and system restoration plans.

A. We have interpreted this question to request a copy of Hydro's emergency preparedness plans maintained by Hydro's Energy Control Centre. The full set of emergency preparedness plans pertaining to every aspect of Hydro's operations would be voluminous and would contain matters unrelated to, and unnecessary for, the determination of issues before the Board in the present matter. Please refer to CA-NLH-019, Attachments 1-19 which are summarized as follows:

Attachment	Description
CA-NLH-019, Attachment 1	Instruction 013 - Extended outages to customers
CA-NLH-019, Attachment 2	Instruction 014 - Major system disturbances
CA-NLH-019, Attachment 3	Instruction A-003 - Notification of weather warnings and lightning activity
CA-NLH-019, Attachment 4	Instruction A-017 - Customer trouble calls
CA-NLH-019, Attachment 5	Instruction A-018 - Forest fire response - fires near transmission lines
CA-NLH-019, Attachment 6	Instruction A-022 - Customer communications during unscheduled interruptions
CA-NLH-019, Attachment 7	Instruction A-024 - Customer communications
CA-NLH-019, Attachment 8	Instruction A-026 - Breaching dams
CA-NLH-019, Attachment 9	Instruction T-001 - Generation loading sequence and generation shortages
CA-NLH-019, Attachment 10	Instruction T-007 - Holyrood, Hardwoods and general Holyrood blackstart restoration using Hardwoods Gas Turbine
CA-NLH-019, Attachment 11	Instruction T-021 - Frequent automatic or manual line reclosing
CA-NLH-019, Attachment 12	Instruction T-022 - Restoration of the Avalon Peninsula when isolated from Bay d'Espoir
CA-NLH-019, Attachment 13	Instruction T-023 - TL202, TL206, TL207 automatic restoration
CA-NLH-019, Attachment 14	Instruction T-025 - Restoration of Holyrood 230 kV Bus B11B13
CA-NLH-019, Attachment 15	Instruction T-063 - Operation without TL239 or TL259 in service

Attachment	Description
CA-NLH-019, Attachment 16	Instruction T-063 - Operation without TL239 or TL259 in service
CA-NLH-019, Attachment 17	Instruction T-069 - Restoration of the 138 kV System - All lines available
CA-NLH-019, Attachment 18	Instruction T-073 - Restoring service to customers in Happy Valley
CA-NLH-019, Attachment 19	Instruction T-078 - Hardwoods and Oxen Pond restoration

HYDRO
THE POWER OF COMMITMENT

NEWFOUNDLAND AND LABRADOR HYDRO - OPERATIONS

STANDARD INSTRUCTION

TITLE: EXTENDED OUTAGES TO CUSTOMERS**	Inst. No. 013 Rev. No. Page 1 of 1

Introduction

In order to answer customer enquiries, it is necessary for the Energy Control Center (ECC) to be kept up to date on the status of outages which involve either domestic or industrial customers.

Procedure

Planned outages: if it is determined that the outage will extend beyond the allocated time, the person responsible for the outage will contact the ECC as soon as possible. He will communicate the reason for the delay in restoration of service and the time service will be restored.

Forced outages: the reason for the outage and the time required to restore service shall be communicated to the ECC, as soon as it is determined.

In both cases, the ECC shall be kept updated, periodically, as to the progress of the work and the expected restoration time.

** Part of the Emergency Response Plan

PREPARED BY:	APPROVED/CHECKED BY:	ISSUED DATE: 1997-07-31
D. Fever		REV. DATE:

HYDRO
THE POWER OF COMMITMENT

NEWFOUNDLAND AND LABRADOR HYDRO - OPERATIONS

STANDARD INSTRUCTION

TITLE: **MAJOR SYSTEM DISTURBANCES****	**Inst. No.** 014 **Rev. No.** 1 **Page** 1 **of** 3

Introduction

During Major Power System Disturbances, Senior Management Personnel are available to direct operations and maintain contact with major customers. They will keep Executive Management and the Manager – Communications advised.

Definition

A **Major Power System Disturbance** is a disturbance caused by failures of either generating units or transmission components which results in the interruption to delivery points in excess of 30 minutes or which result in underfrequency load shedding and customers are prevented from restoring their load within 30 minutes.

Responsibilities

ECC Shift Supervisor -

1. Shall, as soon as it is evident that a Major System Disturbance has occurred, notify either the ECC Superintendent or designate or after regular hours the System On-call Person about the incident.

2. Advise the Manager – Communications on the status of the power interruption to allow the necessary public statements.

PREPARED BY:	**APPROVED/CHECKED BY:**	**ISSUED DATE:** 1998-06-08
B. Butler	J. Haynes/D. Reeves	**REV. DATE:** 2003-04-03

HYDRO
THE POWER OF COMMITMENT

NEWFOUNDLAND AND LABRADOR HYDRO - OPERATIONS

STANDARD INSTRUCTION

TITLE: MAJOR SYSTEM DISTURBANCES	**Inst. No.** 014 **Rev. No.** 1 **Page** 2 **of** 3

Responsibilities (cont'd.)

ECC Superintendent or Designate or System On-call Person -

1. Notify the appropriate Regional Manager/Superintendent or Designate to facilitate speedy restoration of power to affected customers. Support staff such as Engineering and Customer Services are available to assist as needed.

2. Discuss the situation with Newfoundland Power if any of their customers are affected.

3. Advise industrial customers of the situation if the disturbance has had or is likely to have an effect on their operation.

4. Advise Senior Management on the situation and keep them informed.

5. Maintain contact with the Energy Control Center until service is restored.

6. Maintain contact with Newfoundland Power and industrial customers to advise them on the progress being made until power is restored.

PREPARED BY:	**APPROVED/CHECKED BY:**	**ISSUED DATE:** 1998-06-08
B. Butler	J. Haynes/D. Reeves	**REV. DATE:** 2003-04-03

HYDRO
THE POWER OF COMMITMENT

NEWFOUNDLAND AND LABRADOR HYDRO - OPERATIONS

STANDARD INSTRUCTION

TITLE: MAJOR SYSTEM DISTURBANCES	**Inst. No.** 014 **Rev. No.** 1 **Page** 3 **of** 3

Responsibilities (cont'd.)

Regional Manager - 1. Industrial customers shall be contacted by the Regional Manager/ Superintendent if the problem is of a local nature.

ECC Superintendent- 1. All persons who have System On-call duty shall be provided the names and phone numbers of Newfoundland Power and industrial customer contacts.

** Part of the Emergency Response Plan

PREPARED BY:	**APPROVED/CHECKED BY:**	**ISSUED DATE:** 1998-06-08
B. Butler	J. Haynes/D. Reeves	**REV. DATE:** 2003-04-03

SYSTEM OPERATING INSTRUCTION

STATION:	GENERAL	**Inst. No.**	A-003
TITLE:	Notification of Weather Warnings and Lightning Activity	**Page** 1	**of** 2

GENERAL

Weather warnings include extreme winds, heavy rainfalls or floods, lightning, ice storms, blizzards, and other extreme occurrences. Warnings are not the regular daily public forecasts that Environment Canada issues. Also, the Energy Control Centre operates a real time Lightning Tracking System (LTS) application to monitor the activity of lightning around Newfoundland and Labrador.

OBJECTIVE

Its primary purpose is to provide early warning of lightning activity and adverse weather. Use this information to improve power system security and reliability. In response to warnings, Energy Control Centre staff shall position the power system in order to guard against the impending threat of lightning and adverse weather.

ADVERSE WEATHER:

Procedure

When Environment Canada issues to the Energy Control Centre a special weather warning, the information contained in the warning shall be forwarded to regional and plant staff, who maybe potentially impacted. After hours, on-call persons shall be notified.

Use this information to improve power system security and reliability. In response to warnings, Energy Control Centre staff shall position the power system in order to guard against the impending threat of adverse weather.

LIGHTNING ACTIVITY

Similarly, others may benefit from notification of lightning activity. The Energy Control Centre shall notify other parties that may be impacted by lightning activity.

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SYSTEM OPERATING INSTRUCTION

STATION:	GENERAL	**Inst. No.**	A-003
TITLE:	Notification of Weather Warnings and Lightning Activity	**Page** 2	**of** 2

PROCEDURE

Energy Control Centre staff will notify the following parties of lightning that may affect their operations or activities:

1. Hydro personnel working in switchyards or near transmission lines.
2. Bay d'Espoir Control Room
3. Holyrood Control Room
4. Northern region personnel (Manager – Generation and Terminals or Production Supervisor during normal hours and on-call after hours) of any lightning activity in the vicinity of L'Anse au Loop and Lac Robertson
5. Newfoundland Power Control Centre
6. Industrial Customers
7. Exploits Grand Falls Control Room

**Part of the Emergency Response Plan

REVISION HISTORY

Version Number	Date	Description of Change
0	2004-08-23	Original Issue
2	2013-09-25	Add Exploits Grand Falls Control Room

PREPARED: Bob Butler/Ross Kearley	**APPROVED:**

HYDRO
THE POWER OF COMMITMENT

SYSTEM OPERATING INSTRUCTION

STATION:	GENERAL	**Inst. No.**	A-017
		Rev. No.	02
TITLE:	CUSTOMER TROUBLE CALLS **	**Page** 1	**of** 2

Introduction

The Energy Control Centre (ECC) is responsible for handling trouble calls from Hydro's distribution customers during off-normal working hours. ECC personnel shall keep the Outage Information System messaging current in order to provide customers with the latest information regarding power system outages affecting them.

Procedure

1. When a trouble call is received from a customer, ECC shift personnel shall record the details of the phone call and immediately forward them to the appropriate regional on-call person. At a minimum, provide the regional on-call with:

   a. name of the person who called;
   b. their telephone number;
   c. their community; and
   d. description of the trouble.

   The above information shall be recorded on a log sheet to facilitate the accurate transfer of information to the Customer Communication Centre (CCC) or during ECC shift changes.

   The regional on-call, or a member of the work crew dispatched, shall keep ECC abreast of the problem and notify the ECC when the problem has been corrected and power has been restored to customers in an affected area. This feedback is necessary for ECC to better manage new trouble calls and IVR message updates. ECC shall encourage regular updates from field and regional on-call personnel.

PREPARED BY: Gus Collier Jason Tobin	**APPROVED/CHECKED BY:**	**ISSUED DATE:**	1995-12-19
		REV. DATE:	2008-02-22

HYDRO
THE POWER OF COMMITMENT

SYSTEM OPERATING INSTRUCTION

STATION:	GENERAL	**Inst. No.**	A-017
		Rev. No.	02
TITLE:	CUSTOMER TROUBLE CALLS **	**Page** 2	**of** 2

Procedure (cont'd.)

2. During major system disturbances, where it is anticipated that the number of trouble calls into the ECC is or will be unmanageable, the Superintendent, ECC, during normal working hours or Customer Services on-call after hours, shall be contacted to arrange for calls to be transferred to the CCC. The CCC will remain operational until all customers are restored and trouble calls no longer pose a problem for the ECC.

   The ECC Shift Supervisor shall consider the following when making a decision to initiate activation of the CCC:

   a. number of customers or geographic area impacted
   b. number of trouble calls ongoing or anticipated
   c. length of time customers have been without power
   d. estimate of the restoration time
   e. time of day, time of year
   f. weather conditions/warnings
   g. consultation with the system on-call

** Part of the Emergency Response Plan

PREPARED BY: Gus Collier Jason Tobin	**APPROVED/CHECKED BY:**	**ISSUED DATE:**	1995-12-19
		REV. DATE:	2008-02-22

HYDRO
THE POWER OF COMMITMENT

SYSTEM OPERATING INSTRUCTION

STATION:	GENERAL	**Inst. No.**	A-018
TITLE:	FOREST FIRE RESPONSE – FIRES NEAR TRANSMISSION LINES **	**Rev. No.**	02
		Page 1	**of** 4

Introduction

Forest fires occurring in the vicinity of transmission lines present the potential for direct damage to transmission line structures. It also creates operational concerns for Control Center operators and others involved in fire suppression activities.

The exchange of reliable information plays a key role in effectively managing a fire situation. It is therefore important that all personnel involved recognize **the necessity of forwarding information and instructions as quickly as possible.**

Communication

Reports of forest fire activity near transmission lines will normally be reported to the **Newfoundland Power Control Centre (737-5847)** or the **Newfoundland and Labrador Hydro Energy Control Centre (745-3116, 745-3123, 737-1957 or 737-1958)** by the Newfoundland and Labrador Forest Service.

At that time, the Control Centre will be informed as to the location of the fire and will determine if the affected transmission line is within their jurisdiction. If it is not in their jurisdiction, the Control Centre will advise the Forest Service of the correct jurisdiction.

When the Forest Service has contacted the Control Centre having jurisdiction over the transmission line, the Control Centre shall be given a contact within the Forest Service.

Incidents may occur when the report of a forest fire may go directly to a utility representative. In such cases, the representative receiving the call will immediately inform the Control Centre, relaying all pertinent information.

PREPARED BY: Robert Butler Jason Tobin	**APPROVED/CHECKED BY:**	**ISSUED DATE:**	1996-06-10
		REV. DATE:	2008-02-22

HYDRO
THE POWER OF COMMITMENT

SYSTEM OPERATING INSTRUCTION

STATION:	GENERAL	**Inst. No.**	A-018
TITLE:	FOREST FIRE RESPONSE – FIRES NEAR TRANSMISSION LINES **	**Rev. No.**	02
		Page 2	**of** 4

Communication (cont'd.)

Utility personnel dispatched to the fire scene will advise the Forest Service contact they are enroute.

ECC staff, having been advised of a fire situation, will proceed to invoke the following procedures.

Procedures

1. When informed of forest fire activity on or near a transmission line right of way, Energy Control Centre will:

   a. confirm the fire location, name and telephone number of the Forest Service contact person, name of the "Fire Boss" assigned to the scene and where/how this person may be contacted.
   b. advise the ECC Superintendent or appropriate on-call personnel of the fire situation.
   c. request that a utility representative be immediately dispatched to the fire scene (location of the Fire Boss).

2. Once on site, the utility representative shall:

   a. in consultation with the "Fire Boss", inspect the scene and evaluate the situation.
   b. identify the lines involved by the designated line number.
   c. report this information to the ECC.

PREPARED BY: Robert Butler Jason Tobin	**APPROVED/CHECKED BY:**	**ISSUED DATE:**	1996-06-10
		REV. DATE:	2008-02-22

HYDRO
THE POWER OF COMMITMENT

SYSTEM OPERATING INSTRUCTION

STATION:	GENERAL	**Inst. No.**	A-018
TITLE:	FOREST FIRE RESPONSE – FIRES NEAR TRANSMISSION LINES **	**Rev. No.**	002
		Page 3	**of** 4

Procedures (cont'd.)

3. The utility representative shall remain at the scene until the fire no longer poses a threat to the transmission line.

4. The utility representative shall periodically (at least once per hour) contact the ECC and inform the them of the status of the fire and fire fighting activity.

5. ECC shall pass all updated information to the ECC Superintendent or the on-call person.

Guidelines

1. Transmission Lines **will not normally** be removed from service as a result of forest fire activity within a transmission line right of way.

2. The decision to remove a transmission line from service will be made by the ECC Shift Supervisor. A decision of this nature will normally involve:

   a. an on-site assessment of the situation by utility personnel
   b. consideration as to the impact that the loss of this line will have on customer supply and power system security
   c. consultation with Control Centre and System Operations personnel

PREPARED BY: Robert Butler Jason Tobin	**APPROVED/CHECKED BY:**	**ISSUED DATE:**	1996-06-10
		REV. DATE:	2008-02-22

HYDRO
THE POWER OF COMMITMENT

SYSTEM OPERATING INSTRUCTION

STATION:	GENERAL	**Inst. No.**	A-018
TITLE:	FOREST FIRE RESPONSE – FIRES NEAR TRANSMISSION LINES **	**Rev. No.**	02
		Page 4	**of** 4

Guidelines (cont'd.)

3. Transmission lines will be immediately removed from service in the following situations:

   a. Structures are damaged to the point they are considered structurally unsafe.
   b. Direct threat to personnel safety.

4. If a line is removed from service, it shall **not be re-energized** until approval to do so has been received from the on-site utility representative.

5. Lines which are removed from service due to fire activity will be inspected by utility personnel prior to re-energization.

6 Ground personnel engaged in fire suppression activities near or at the right of way will:

   a. clear the area when water bombing is underway
   b. not direct streams of water at overhead conductors
   c. maintain a safe working distance from energized conductors

7. The direct water bombing of transmission structures shall be avoided.

8. When possible, water bombing shall be done parallel to the transmission lines.

9. When possible, salt water will not be used for water bombing around energized lines.

PREPARED BY: Robert Butler Jason Tobin	**APPROVED/CHECKED BY:**	**ISSUED DATE:**	1996-06-10
		REV. DATE:	2008-02-22

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SYSTEM OPERATING INSTRUCTION

STATION:	General	**Inst. No.**	A-022
TITLE:	Customer Communications During Unscheduled Interruptions	**Page** 1	**of** 3

Introduction

Hydro is committed to providing fast and accurate information to its customers following any unplanned service interruptions. The Energy Control Centre (ECC) plays a critical role in this process and therefore the following procedure shall be followed when there are unplanned service interruptions to ensure all customers are informed.

For long duration outages, greater than 5 minutes, Senior Communications Advisor – Corporate Relations (CR) or designate must be notified so that any required public statements are made. Also for these disturbances the regional offices must be notified to appropriately respond to customer inquiries. For major power system disturbances, as defined below, additional contact with industrial customers and Newfoundland Power is required. In these incidents Management personnel must be kept informed to discuss the problems with these customers.

A **Major Power System Disturbance** is a disturbance caused by failures of either generating units or transmission components which results in the interruption to delivery points in excess of 30 minutes or which results in underfrequency load shedding and customers are prevented from restoring their load within 30 minutes.

Immediately following any Major System Disturbance notify the Vice President of Hydro and the Vice President of Corporate Relations.

Guidelines

1. **Short Durations Outages (Momentary to 5 minutes)**

   a) The ECC Shift Supervisor shall notify the customer's control room immediately after the power is restored and inform them of the equipment affected and suspected cause.

   b) The ECC Shift Supervisor shall notify the appropriate Hydro Regional Office or Regional On-Call Person of the incident and inform them of the equipment affected and suspected cause.

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SYSTEM OPERATING INSTRUCTION

STATION:	General	**Inst. No.**	A-022
TITLE:	Customer Communications During Unscheduled Interruptions	**Page** 2	**of** 3

1. **Short Durations Outages (Momentary to 5 minutes)** (cont'd.)

   c) The ECC Shift Supervisor shall notify the ECC Supervisor or Manager of System Operations of the incident. If the incident occurred outside working hours they shall be notified at the start of the next business day.

   d) The Senior Communications Advisor – Corporate Relations and Senior Management shall be notified of these incidents by the ECC Supervisor or Manager of System Operations during normal working hours. Outside normal working hours, information on these outages shall be forwarded by the ECC Shift Supervisor to the Senior Communications Advisor – Corporate Relations as necessary on weekends or the start of the next business day during weekdays.

2. **Long Duration Outages (5 to 30 minutes)**

   a) The ECC Shift Supervisor shall notify the customer's control room immediately and inform them of the situation including the equipment affected, suspected cause and expected duration.

   b) The ECC Shift Supervisor shall notify the appropriate Hydro Regional Office or Regional On-Call Person of the situation.

   c) The ECC Shift Supervisor shall notify the ECC Supervisor or Manager of System Operations or, if outside normal working hours and it is deemed necessary, the System On-Call Person.

   d) The ECC Supervisor, Manager of System Operations or ECC Shift Supervisor, if outside working hours, shall advise the Senior Communications Advisor – Corporate Relations of the situation and the action being taken.

   e) Senior Management shall be notified of these incidents by the ECC Supervisor or Manager of System Operations as necessary.

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SYSTEM OPERATING INSTRUCTION

STATION:	General	**Inst. No.**	A-022
TITLE:	Customer Communications During Unscheduled Interruptions	**Page** 3	**of** 3

3. **Major Power System Disturbances (Greater than 30 minutes)**

a) The ECC Shift Supervisor shall notify the customer's control room immediately and inform them of the situation including the equipment affected, suspected cause and expected duration.

b) The ECC Shift Supervisor shall notify the appropriate Hydro Regional Office or Regional On-Call Person of the situation.

c) The ECC Shift Supervisor shall, as soon as it is evident that a Major System Disturbance has occurred notify the ECC Supervisor, Manager of System Operations or after regular hours the System On-Call Person about the incident.

d) The ECC Supervisor, Manager of System Operations or ECC Shift Supervisor, if outside working hours, shall advise the Senior Communications Advisor – Corporate Relations of the situation and the action being taken.

e) The ECC Supervisor, Manager of System Operations or System On-Call Person shall keep Newfoundland Power and industrial customers advised when they are affected, until power is restored.

f) The ECC Supervisor, Manager of System Operations or System On-Call Person shall request support from Customer Services when necessary for managing customer trouble calls.

g) Senior Management shall be notified of these incidents by the ECC Supervisor or Manager of System Operations and if outside normal working hours, System On-call.

** Part of the Emergency Response Plan

REVISION HISTORY

Version Number	Date	Description of Change
0	2004-08-23	Original Issue
2	2013-04-17	Notification after Power Outage

PREPARED: Jason Dean	**APPROVED:**

HYDRO
THE POWER OF COMMITMENT

SYSTEM OPERATING INSTRUCTION

STATION:	GENERAL	**Inst. No.**	A-024
TITLE:	CUSTOMER COMMUNICATIONS **	**Rev. No.**	01
		Page 1	**of** 2

Objective

To maintain a consistently high level of service to our industrial and utility customers, it is necessary to keep them abreast of any system event(s), planned or unplanned, that may affect their operation or service capability.

Procedure

Energy Control Centre staff will notify customers, that are impacted or potentially impacted by:

1) voltage deviations - primarily applies to North Atlantic Refining Limited as they are very sensitive to voltage deviations on the Avalon system. This includes disturbances on the system resulting in voltages outside 96 to 104 percent of nominal due to reactive control limitations;

2) system frequency deviations caused by sudden loss of generation or increase in load. Report frequency deviations outside plus or minus 1 Hertz.

3) equipment trouble;

4) planned major transmission equipment being removed from service;

5) Holyrood generating unit commitment changes - applies to Newfoundland Power and North Atlantic Refining Limited as this affects the eastern voltage profile;

6) impending poor weather conditions;

7) work protection hold-offs in place; and

PREPARED BY:	**APPROVED/CHECKED BY:**	**ISSUED DATE:**	1999-07-27
Robert Butler		**REV. DATE:**	2008-02-26

HYDRO
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SYSTEM OPERATING INSTRUCTION

STATION: GENERAL	**Inst. No.** A-024
TITLE: CUSTOMER COMMUNICATIONS	**Rev. No.** 01
	Page 2 **of** 2

Procedure (con't.d)

8) other events that may impact a customer's operation.

In each case, a verbal communication will be made to the relevant customer(s) as soon as practical following the event. An entry will be made in the station diary stating that the customer was notified and the reason for the communication.

** Part of the Emergency Response Plan

PREPARED BY:	**APPROVED/CHECKED BY:**	**ISSUED DATE:**	1999-07-27
Robert Butler		**REV. DATE:**	2008-02-26

HYDRO THE POWER OF COMMITMENT

SYSTEM OPERATING INSTRUCTION

STATION:	BAY D'ESPOIR, SNOOKS ARM	**Inst. No.**	A-026
TITLE:	EMERGENCY PREPAREDNESS PLANS - BAY D'ESPOIR HYDROELECTRIC DEVELOPMENT LONG POND RESERVOIR AND VICTORIA DAM, SNOOKS ARM HYDROELECTRIC DEVELOPMENT SNOOKS ARM MAIN DAM	**Rev. No.**	01
		Page 1	**of** 5

INTRODUCTION:

Newfoundland & Labrador Hydro have developed Emergency Preparedness Plans for breaching any of the dams on the Long Pond reservoir, Victoria or Snooks Arm. These plans address procedures, responsibilities, and communications to be followed in the unlikely event a breach of a Long Pond dam, Victoria Dam or the Snooks Arm Main Dam occurs resulting in downstream inundation. Registered Copy # **11** of these plans are stored in the Energy Control Centre; we should review these plans regularly so that we are always prepared. This instruction defines specific expectations of the Energy Control Centre staff under these plans.

PROCEDURE: LONG POND RESERVOIR

1. Use the telemetry for the Long Pond reservoir elevation to detect a potential dam breach. Report to Bay d'Espoir control room any unusual decreases in Long Pond elevation. This or an observer report of a (potential) dam breach may initiate the Long Pond Emergency Preparedness Plan.

   ---------- *Long Pond Emergency Preparedness Plan is initiated* ----------

PREPARED BY:	**APPROVED/CHECKED BY:**	**ISSUED DATE:**	2000-06-09
Robert Butler		**REV. DATE:**	2008-02-27

HYDRO
THE POWER OF COMMITMENT

SYSTEM OPERATING INSTRUCTION

STATION:	BAY D'ESPOIR, SNOOKS ARM	**Inst. No.**	A-026
TITLE:	EMERGENCY PREPAREDNESS PLANS - BAY D'ESPOIR HYDROELECTRIC DEVELOPMENT LONG POND RESERVOIR AND VICTORIA DAM, SNOOKS ARM HYDROELECTRIC DEVELOPMENT SNOOKS ARM MAIN DAM	**Rev. No.**	01
		Page 2	**of** 5

PROCEDURE: (con't.d)

2. Refer to Figure 2-1, Notification Flow Chart, Page 1 of 2 of the Long Pond Emergency Preparedness Plan. The Energy Control Centre is the fourth alternate for the Manager, Hydro Generation. As an alternate we are not expected to assess the potential for a dam breach but to fill a communications gap as loss of the Operation Voice and VHF access to PSTN would be imminent under certain Long Pond dam failures. If the communications are destroyed as a result of Bay d'Espoir powerhouse inundation, Energy Control Centre staff is expected to make notifications in phase 2 of the Emergency Preparedness Plan. Contacts are to be make directly - do not leave messages.

3. Refer to Figure 2-1, Notification Flow Chart, Page 2 of 2 of the Long Pond Emergency Preparedness Plan. The Energy Control Centre is the second alternate for the Asset Manager, Hydro. For the same reason stated in 2, Energy Control Centre staff may be required to make further notifications. Contacts are to be made directly – do not leave messages.

4. If phase 2 of the Emergency Preparedness Plan is activated and the Energy Control Centre is notified by the Asset Manager, Hydro contact:

   a) System On-call
   b) Superintendent – Energy Control Centre
      (Manager, Systems Operations and Customer Services if Superintendent cannot be reached)

PREPARED BY:	**APPROVED/CHECKED BY:**	**ISSUED DATE:**	2000-06-09
Robert Butler		**REV. DATE:**	2008-02-27

HYDRO
THE POWER OF COMMITMENT

SYSTEM OPERATING INSTRUCTION

STATION:	BAY D'ESPOIR, SNOOKS ARM	**Inst. No.**	A-026
TITLE:	EMERGENCY PREPAREDNESS PLANS - BAY D'ESPOIR HYDROELECTRIC DEVELOPMENT LONG POND RESERVOIR AND VICTORIA DAM, SNOOKS ARM HYDROELECTRIC DEVELOPMENT SNOOKS ARM MAIN DAM	**Rev. No.**	01
		Page 3	**of** 5

PROCEDURE: (cont'd.)

5. Reduce flow from upstream of Long Pond by shutting down Upper Salmon generator, and closing Ebbegunbaeg Control Structure gates and if applicable any Upper Salmon Spillways. Communicate this to Manager, Hydro Generation.

6. Spilling at the Salmon River spillway may be required. This will be determined by Manager, Hydro Generation.

7. Provide assistance in the communications aspect of the Emergency Preparedness Plan. This is especially important when responding during adverse weather or periods of darkness as additional problems may occur.

---------- *Bay d'Espoir Plant becomes inundated* ----------

8. Execute plan for loss of major generation source. Reference Emergency Plans for Generation and Transmission and Rural Operations.

PREPARED BY:	**APPROVED/CHECKED BY:**	**ISSUED DATE:**	2000-06-09
Robert Butler		**REV. DATE:**	2008-02-27

HYDRO THE POWER OF COMMITMENT

SYSTEM OPERATING INSTRUCTION

STATION:	BAY D'ESPOIR, SNOOKS ARM	**Inst. No.**	A-026
TITLE:	EMERGENCY PREPAREDNESS PLANS - BAY D'ESPOIR HYDROELECTRIC DEVELOPMENT LONG POND RESERVOIR AND VICTORIA DAM, SNOOKS ARM HYDROELECTRIC DEVELOPMENT SNOOKS ARM MAIN DAM	**Rev. No.**	01
		Page 4	**of** 5

PROCEDURE: Victoria Dam

1. Use the telemetry for the Victoria reservoir elevation to detect a potential dam breach. Report to Bay d'Espoir control room any unusual decreases in the Victoria elevation. This or an observer report of a (potential) dam breach may initiate the Victoria Emergency Preparedness Plan.

   ---------- *Victoria Emergency Preparedness Plan is initiated* ----------

2. In the event phase 2 of the Victoria Emergency Preparedness Plan is activated, the Energy Control Centre will be contacted by the Asset Manager – Hydro or the Alternate. Refer to Figure 2-1, Notification Flow Chart, Page 2 of 2 of the Victoria Emergency Preparedness Plan. Energy Control Centre staff will then contact the following people

   a) System On-call
   c) Superintendent – Energy Control Centre
   (Manager, Systems Operations and Customer Services if Superintendent cannot be reached)

3. Reduce flow into Victoria by opening all Control Structures. Communicate this to Manager, Hydro Generation

4. Provide assistance in the communications aspect of the Emergency Preparedness Plan. This is especially important when responding during adverse weather or periods of darkness as additional problems may occur.

PREPARED BY:	**APPROVED/CHECKED BY:**	**ISSUED DATE:**	2000-06-09
Robert Butler		**REV. DATE:**	2008-02-27

HYDRO THE POWER OF COMMITMENT

SYSTEM OPERATING INSTRUCTION

STATION:	BAY D'ESPOIR, SNOOKS ARM	**Inst. No.**	A-026
TITLE:	EMERGENCY PREPAREDNESS PLANS - BAY D'ESPOIR HYDROELECTRIC DEVELOPMENT LONG POND RESERVOIR AND VICTORIA DAM, SNOOKS ARM HYDROELECTRIC DEVELOPMENT SNOOKS ARM MAIN DAM	**Rev. No.**	01
		Page 5	**of** 5

PROCEDURE: SNOOKS ARM MAIN DAM

1. An observer report of a (potential) dam breach may initiate the Snooks Arm Emergency Preparedness Plan.

   ---------- *Snooks Arm Emergency Preparedness Plan is initiated* ----------

2. In the event phase 2 of the Snooks Arm Emergency Preparedness Plan is activated, the Energy Control Centre will be contacted by the Asset Manager – Hydro or the Alternate. Refer to Figure 2-1, Notification Flow Chart, Page 2 of 2 of the Snooks Arm Emergency Preparedness Plan. Energy Control Centre staff will then contact the following people

   a) System On-call
   d) Superintendent – Energy Control Centre
   (Manager, Systems Operations and Customer Services if Superintendent cannot be reached)

3. Provide assistance in the communications aspect of the Emergency Preparedness Plan. This is especially important when responding during adverse weather or periods of darkness as additional problems may occur.

NOTES:

- *Tests of all the above Emergency preparedness plans will be conducted annually to determine Hydro's state of readiness*.
- *Keep a diary of any communication made*.

PREPARED BY:	**APPROVED/CHECKED BY:**	**ISSUED DATE:**	2000-06-09
Robert Butler		**REV. DATE:**	2008-02-27

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SYSTEM OPERATING INSTRUCTION

STATION:	GENERAL	**Inst. No.**	T-001
TITLE:	GENERATION LOADING SEQUENCE AND GENERATION SHORTAGES*, **	**Rev. No.**	07
		Page 1	**of** 2

INTRODUCTION

In the event of a system generation shortage, the following guidelines shall be followed in the sequence outlined in order to minimize outages to customers:

PROCEDURE

A. Normal Generation Loading Sequence

1. Bring on line all available Hydro hydroelectric generators and load them to near their full capacity.

2. Request Newfoundland Power to maximize their hydro production.

3. Make a Capacity Request of Deer Lake Power to maximize their hydroelectric generation.

4. Request Non-Utility Generators to maximize their hydro production.

5. Increase Holyrood production to near full capacity.

6. Notify customers taking non-firm power and energy that if they continue to take non-firm power, the energy will be charged at higher standby generation rates.

7. Ask Newfoundland Power to curtail any interruptible loads available.

8. Start and load standby generators, both Hydro and Newfoundland Power units, in order of increasing average energy production cost with due consideration for unit start-up time.

PREPARED BY:	**APPROVED/CHECKED BY:**	**ISSUED DATE:** 1992-07-16
Robert Butler		**REV. DATE:** 2009-04-29

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SYSTEM OPERATING INSTRUCTION

STATION:	GENERAL	**Inst. No.**	T-001
TITLE:	GENERATION LOADING SEQUENCE AND GENERATION SHORTAGES	**Rev. No.**	07
		Page 2	**of** 2

PROCEDURE (cont'd.)

9. Cancel all non-firm power delivery to customers and ensure all industrial customers are within contract limits.

If load is still increasing and it is apparent that a generation shortage may occur, proceed as follows:

10. Ensure that steps A1 to A9 above have been followed and implemented.

11. Inform Newfoundland Power of Hydro's need to reduce supply voltage at Hardwoods and Oxen Pond and other delivery points to minimum levels to facilitate load reduction. Begin voltage reduction.

12. Request industrial customers to shed non-essential loads and inform them of system conditions.

13. Request industrial customers to shed additional load.

14. Request Newfoundland Power to shed load by rotating feeders. At the same time, shed load by rotating feeders in Hydro's Rural areas where feeder control exists.

Note:

Generation from Wind Farms may shutdown with little notice.

* Part of the Environmental Plan
** Part of the Emergency Response Plan

PREPARED BY:	**APPROVED/CHECKED BY:**	**ISSUED DATE:** 1992-07-16
Robert Butler		**REV. DATE:** 2009-04-29

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SYSTEM OPERATING INSTRUCTION

STATION:	**Holyrood, Hardwoods and General**	**Inst. No.**	T-007
TITLE:	**Holyrood Black Start Restoration Using Hardwoods Gas Turbine****	**Page** 1	**of** 4

Introduction

The Avalon Peninsula may become separated from Bay d'Espoir and the remainder of the power system during ice, wind or other storm events. When this happens, Holyrood generation will likely trip due to an imbalance between area load and on-line generation. Customers will be without power until the Hardwoods Gas Turbine and Holyrood fossil units are placed in-service and the load is reconnected.

The goal of this instruction is to supply the necessary black start load (5-10 MW) of the Holyrood Generating Plant using the Hardwoods gas turbine via TL242.

Guidelines

Hardwoods Terminal Station

- Use the "Black Start - Open Breakers" command button to open the following breakers at HWD TS to facilitate energizing a dead bus:
  - B2L42
  - B1B2
  - B7C1
  - B7T1
  - B7T2
  - B8T4
  - B8T3
  - B8B9
  - B8C2
  - B7T5
- Confirm open the breakers listed above

Newfoundland Power Operations

- Consult with the Newfoundland Power Control Centre; inform them a black start will be initiated via the Hardwoods Gas Turbine. Request that they open all breakers associated with their 66kV Bus 6:
  - HWD-54L-B
  - HWD-5L-B
  - HWD-19L-B

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SYSTEM OPERATING INSTRUCTION

STATION:	**Holyrood, Hardwoods and General**	**Inst. No.**	T-007
TITLE:	**Holyrood Black Start Restoration Using Hardwoods Gas Turbine****	**Page** 2	**of** 4

Guidelines (cont'd.)

Newfoundland Power Operations (cont'd.)

HWD-79L-B
HWD-72L-B
HWD-T2-B
HWD-T1-B

- With Newfoundland Power, confirm open the breakers listed above

Hardwoods Gas Turbine

- Request Hardwoods Gas Turbine to be started locally (Both Ends A & B, if available) in Black Start Operation as per Instruction T-075.

Holyrood Operations

- Consult with the Holyrood Control Room; inform them a black start will be initiated via the Hardwoods Gas Turbine. Request that they confirm open HRD B2L42 and HRD ST34. Have them standby until ECC is ready to energize their station service boards via transformer SST-34.

Holyrood Terminal Station

- Use the "Black Start - Open Breaker" command button to open the following breakers at HRD TS to facilitate energizing a dead bus:

B12B15
B12L18
B12L17
B6T10
B6L3
B7L2
B7T5
B7L38

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SYSTEM OPERATING INSTRUCTION

STATION:	**Holyrood, Hardwoods and General**	**Inst. No.**	T-007
TITLE:	**Holyrood Black Start Restoration Using Hardwoods Gas Turbine****	**Page** 3	**of** 4

Guidelines (cont'd.)

Energizing TL242

- The present operating philosophy requires that a local operator is required to close the Gas Turbine breaker, G1T5 at Hardwoods, under a black start condition (as per Instruction T-075). Have the operator close G1T5. Check closed.
- Energize B8 by closing HWD B7T5. Check closed.
- Adjust the generator output voltage to achieve approximately 67 kV on Bus 8.
- Adjust HWD T3 tap to position 4 and energize B2 by closing HWD B8T3. Check closed.
- Close and/or check closed HRD B12L42.
- Energize HRD B12 via TL242 by closing HWD B2L42. Check closed. If necessary, adjust HWD T3 tap position to achieve acceptable voltage levels on HRD B12.

Energizing Holyrood Station Service Boards

- Close and/or check closed HRD B12T10. Note that B12T10 must be closed before B6T10 as they are interlocked (described in instruction T-048).
- Energize B6 by closing DRD B6T10. Check closed.
- HRD T10 tap position can't be adjusted without station service power, which is provided by the Holyrood Plant. Without station service available, HWD T3 tap position can be adjusted to achieve acceptable voltage levels on HRD B6. Once the Holyrood Plant energizes their Unit Service and Station Service Boards, station service power should become available in the Holyrood Terminal Station. Once station service power is available, HRD T10 tap changer can be used to achieve acceptable voltage levels on HRD B6.

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SYSTEM OPERATING INSTRUCTION

STATION:	**Holyrood, Hardwoods and General**	**Inst. No.**	T-007
TITLE:	**Holyrood Black Start Restoration Using Hardwoods Gas Turbine****	**Page** 4	**of** 4

Guidelines (cont'd.)

Holyrood Operations

- Inform the Holyrood Control Room their station service boards are ready to be energized. When they are ready, energize transformer SST-34 by closing HRD B6L3. Check closed. They may close ST34 and proceed with their Black Start procedure.

ECC Operations

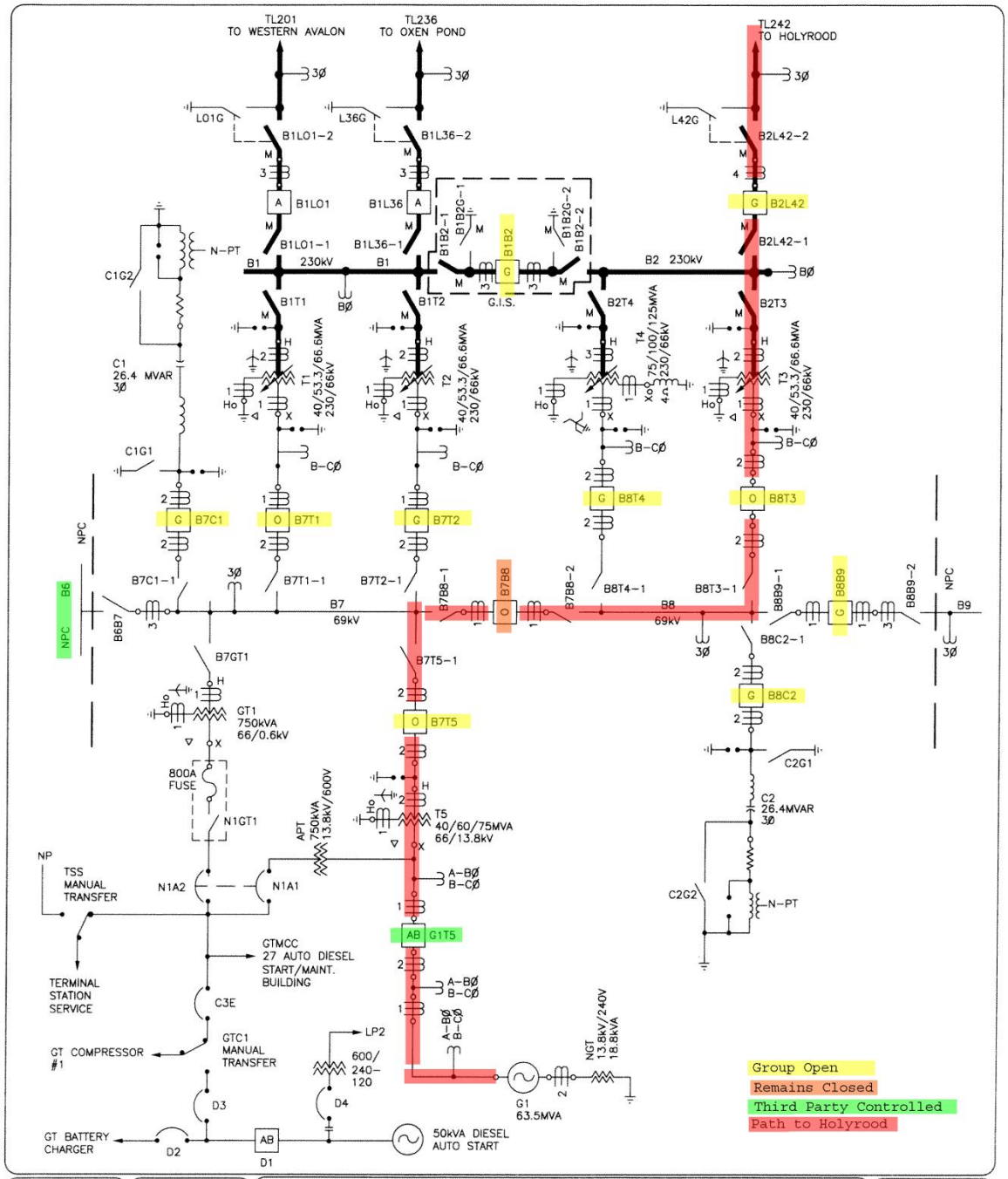
- Proceed with Instruction T-022 Restoration Of The Avalon Peninsula When Isolated From Bay d'Espoir.

** Part of the Emergency Response Plan

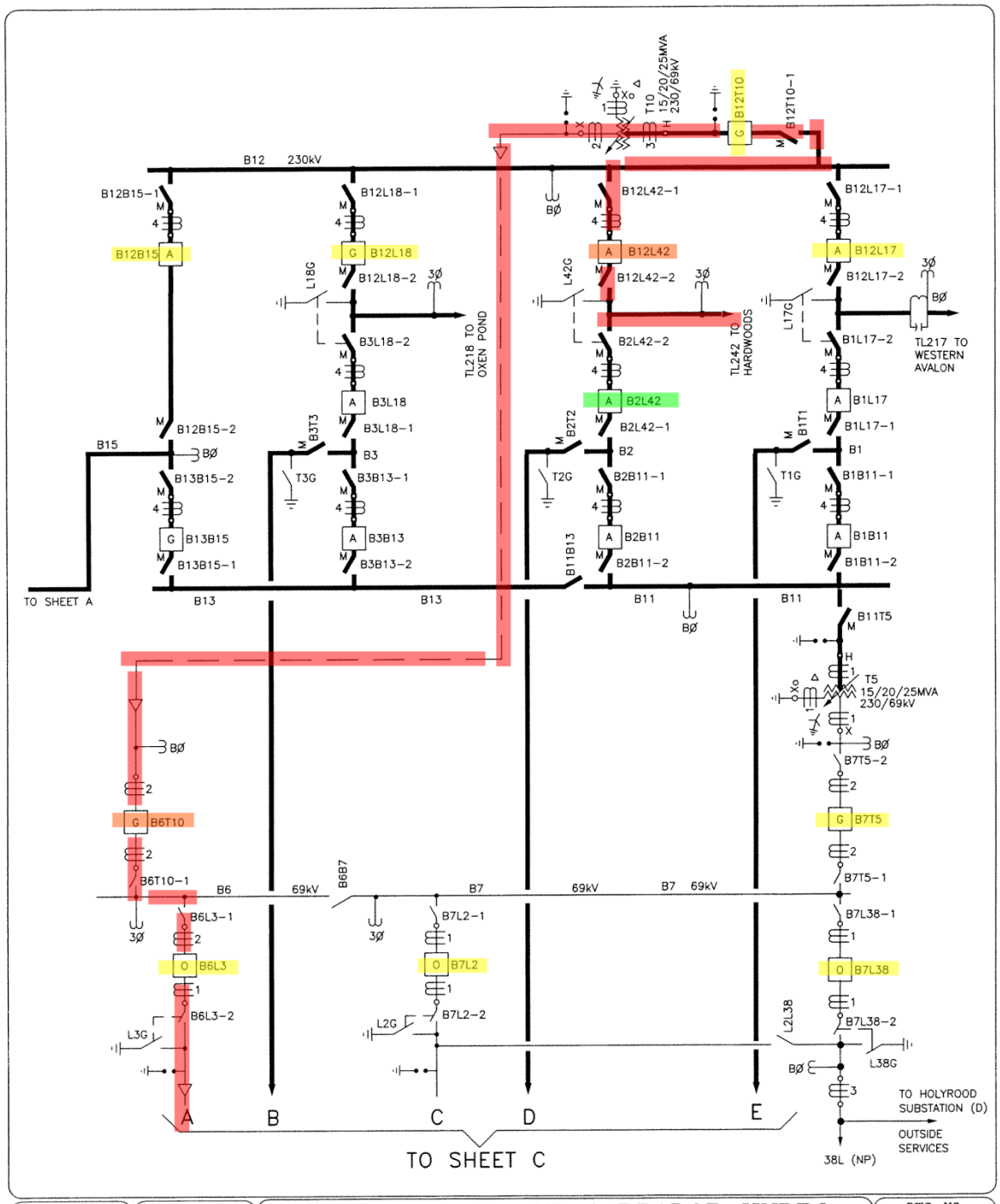
REVISION HISTORY

Version Number	Date	Description of Change
0	2012-06-07	Original Issue
1	2013-10-31	Updates

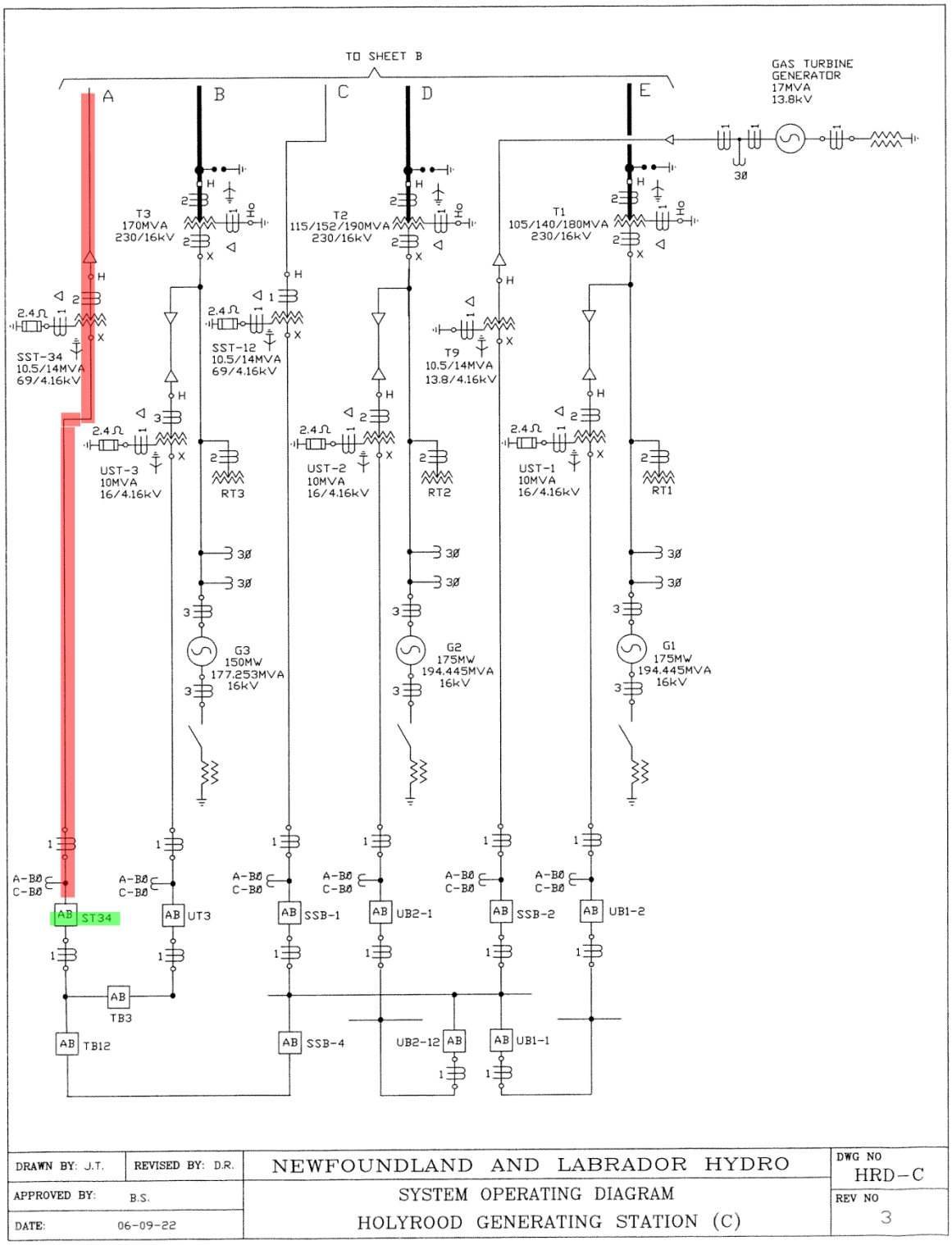
PREPARED: R. Coish	**APPROVED:**



DRAWN BY: J.T.	REVISED BY: D.R.	NEWFOUNDLAND AND LABRADOR HYDRO	DWG NO HWD-1
APPROVED BY R. STOYLES		SYSTEM OPERATING DIAGRAM HARDWOODS TERMINAL STATION	REV NO 18
DATE 2007/10/25			



DRAWN BY: J.T.	REVISED BY: D.R.	NEWFOUNDLAND AND LABRADOR HYDRO	DWG. NO. HRD-B
APPROVED BY: J.F.		SYSTEM OPERATING DIAGRAM HOLYROOD TERMINAL STATION (B)	REV. NO. 10
DATE: 05-03-16			


TO SHEET B
A
B
C
D
E
GAS TURBINE GENERATOR 17MVA 13.8kV
3Ø
T3 170MVA 230/16kV
T2 115/152/190MVA 230/16kV
T1 105/140/180MVA 230/16kV
SST-34 10.5/14MVA 69/4.16kV
SST-12 10.5/14MVA 69/4.16kV
T9 10.5/14MVA 13.8/4.16kV
UST-3 10MVA 16/4.16kV
UST-2 10MVA 16/4.16kV
UST-1 10MVA 16/4.16kV
RT3
RT2
RT1
G3 150MW 177.253MVA 16kV
G2 175MW 194.445MVA 16kV
G1 175MW 194.445MVA 16kV
A-BØ C-BØ
AB ST34
AB UT3
AB SSB-1
AB UB2-1
AB SSB-2
AB UB1-2
AB TB3
AB TB12
AB SSB-4
UB2-12 AB
AB UB1-1
DRAWN BY: J.T.
REVISED BY: D.R.
APPROVED BY: B.S.
DATE: 06-09-22
NEWFOUNDLAND AND LABRADOR HYDRO
SYSTEM OPERATING DIAGRAM
HOLYROOD GENERATING STATION (C)
DWG NO HRD-C
REV NO 3

HYDRO
THE POWER OF COMMITMENT

SYSTEM OPERATING INSTRUCTION

STATION:	GENERAL	**Inst. No.**	T-021
TITLE:	FREQUENT AUTOMATIC OR MANUAL LINE RECLOSING**	**Rev. No.**	001
		Page 1	**of** 2

INTRODUCTION

At times due to equipment failures, severe weather or other causes transmission lines may frequently reclose or be manually reclosed. When this occurs measures should be taken to minimize the impact on customers. From a customer's view frequent re-energizing of their load may be more of a problem than a continuous interruption. Therefore taking a line out of service and running stand-by diesels during frequent recloses should be considered. The following guidelines should be followed during periods of frequent reclosing.

GUIDELINES

1. Reroute the supply to customers via transmission lines which are not having troubles.

2. Take the affected line out of service until the weather abates or crews can make repairs to the line. This may result in a prolonged outage to the customer but less frequent interruptions.

3. Open the feeders at the terminal stations affected while the line is tested or the problem area identified. This will also result in a longer interruption but fewer surges.

4. Provide a back-up supply or voltage support via stand-by diesel plants. Depending on the nature of the trouble this should include isolation from the system and the affected line.

PREPARED/ REVISED BY: R. C. Butler	**APPROVED/CHECKED BY:**	**ISSUED DATE:**	1997-04-25
		REV. DATE:	2000-02-15

HYDRO
THE POWER OF COMMITMENT

SYSTEM OPERATING INSTRUCTION

STATION:	GENERAL	**Inst. No.**	T-021
TITLE:	FREQUENT AUTOMATIC OR MANUAL LINE RECLOSING	**Rev. No.**	001
		Page 2	**of** 2

GUIDELINES (cont'd.)

4. (cont'd.)

In particular, reclosing activities on TL 239, TL 259, TL 241, TL 244 and TL 256 all directly interrupt St. Anthony and Roddickton customers. If the reclosing is occurring on the 138 kV lines then the St. Anthony plant should be separated from the grid and if possible operated to supply the Roddickton and Bear Cove loads as well.

Faults on TL 221, TL 227, TL 262 and the feeders at Bear Cove may cause severe voltage dips to the St. Anthony and Roddickton customers. If TL 221, TL 227, TL 262 or feeders at Bear Cove reclose frequently the St. Anthony plant should remain in parallel with the system with minimum loads.

The decision to take any of these measures should be based on the number of reclose operations, the cause of the trouble, and the likelihood that the trouble will continue. The regional staff responsible should be notified of the reclosing, consulted as to the possible cause of the trouble and the action the ECC is taking to alleviate customer disturbances.

When a decision is made to interrupt customer load for a period of time while a line is repaired or to prevent frequent reclose operations a public notice should be made to notify customers of the likely duration. This will be made or arranged by the regional staff.

** Part of the Emergency Response Plan

PREPARED/ REVISED BY: R. C. Butler	**APPROVED/CHECKED BY:**	**ISSUED DATE:**	1997-04-25
		REV. DATE:	2000-02-15

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SYSTEM OPERATING INSTRUCTION

STATION:	GENERAL	**Inst. No.**	T-022
TITLE:	RESTORATION OF THE AVALON PENINSULA WHEN ISOLATED FROM BAY D'ESPOIR**	**Page** 1	**of** 5

Introduction

The Avalon Peninsula may become separated from Bay d'Espoir and the remainder of the power system during ice, wind or other storm events. When this happens, Holyrood generation will likely trip due to an imbalance between area load and on-line generation. Customers will be without power until Hardwoods Gas Turbine and Holyrood fossil units are placed in-service and load reconnected.

The Hardwoods gas turbine, normally started first following a disruption, can operate into a dead bus system and be loaded in isochronous mode. It can be loaded at a rate of 4 MW per minute per turbine. With both turbines available Hardwoods can be loaded at 8 MW per minute.

Holyrood Units 1 or 2 can also operate into a dead bus system and be loaded in isochronous mode using its Mark V Electro Hydraulic Control System. However, the limitations on the unit's boiler must be respected. Once up to rated speed and connected to the transmission system load can be picked up in 10 MW blocks, allowing 5 minutes to ensure boiler drum level stability before accepting the next block of load. This must be done until the load on the unit reaches 60 MW. At this load level, boiler control is much more stable.

Restoring these units in isolation from Bay d'Espoir requires very close co-ordination between Newfoundland & Labrador Hydro's Energy Control Centre, Newfoundland Power's Control Centre and the Holyrood Thermal Plant.

In order to pick up larger blocks of load and restore customers to service quicker the units should be synchronized together and when possible, with Newfoundland Power's generation on the Southern Shore.

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SYSTEM OPERATING INSTRUCTION

STATION:	GENERAL	**Inst. No.**	T-022
TITLE:	RESTORATION OF THE AVALON PENINSULA WHEN ISOLATED FROM BAY D'ESPOIR**	**Page** 2	**of** 5

Guidelines

Hardwoods Gas Turbine

- Start Hardwoods Gas Turbine and place it in isochronous mode. This unit should be synchronized with Newfoundland Power's Southern Shore generation and Holyrood generation where possible. The amount of load to be picked up by these units cannot exceed their response capability. Thus, Newfoundland Power must have load blocks ready to be restored when requested by Energy Control Centre to match the units' capability.

Parallel Operation with Holyrood

- Simultaneous with starting Hardwoods, the Holyrood Thermal Generating Station will be initiating a plant black start. The Holyrood units are black started using local diesel generation to start the Holyrood gas turbine which in turn supplies fans, pumps and other unit auxiliaries.

- Depending on the status of the Holyrood units at the time of the interruption, it may take several hours to bring a unit up to rated speed. Holyrood's Shift Supervisor will advise ECC as to which of Units 1 or 2 will be starting first.

- Once a Holyrood unit is up to rated speed and ready to be connected to the transmission network, Holyrood personnel will notify the Energy Control Centre. ECC personnel will co-ordinate activities on the power system to ensure that a route has been established to supply voltage to synchronize with Hardwoods and Southern Shore generation.

- If a Holyrood unit is synchronized, the incoming unit may be loaded at a rate of 2 MW per minute in load limit control until it reaches 60 MW. To raise the load from zero to 60 MW, Hardwoods will offload to Holyrood. Following the transfer of 2 MW of load to Holyrood, Hardwoods (in isochronous mode) will accept additional Newfoundland Power load. This will continue until the Holyrood unit reaches 60 MW. Once at that load level, Hardwoods should be placed in <u>droop</u> mode and Holyrood placed in <u>speed/load</u> control mode

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SYSTEM OPERATING INSTRUCTION

STATION:	GENERAL	**Inst. No.**	T-022
TITLE:	RESTORATION OF THE AVALON PENINSULA WHEN ISOLATED FROM BAY D'ESPOIR**	**Page** 3	**of** 5

Parallel Operation with Holyrood (cont'd.)

- Once the incoming HRD Unit is synchronized, it should be placed in speed/load control mode with operating limits to permit stable boiler operation during unit loading. This will be done until the load on Unit 1 or 2 reaches 60 MW.

- Once the Holyrood unit reaches 60 MW and is in speed/load control and Hardwoods in droop mode, load can be restored more quickly as both units share new loads. The load can be increased by 4 MW/minute per turbine at Hardwoods and in accordance with the attached table for Holyrood. ECC will convey this to Newfoundland Power to prepare them for further load restoration.

- As blocks of load are picked up by the units, ECC will inform Holyrood personnel of the amount of load expected to be picked up. Holyrood personnel will observe the frequency and if necessary increase the load limit to assist in stabilizing the frequency. Holyrood personnel will notify ECC when additional load may be restored. ECC will in turn convey this to Newfoundland Power.

- This process will continue as other Holyrood units are placed in-service and all customers are restored.

Isochronous Operation of Holyrood Unit 1 or 2

- If a transmission route to Holyrood is not available and Holyrood Unit 1 or 2 is available, then one of the units will be operated in isochronous mode to supply isolated loads. Once Unit 1 or 2 is up to rated speed and ready to be connected to the transmission network Holyrood personnel will notify the Energy Control Centre. ECC will direct the closure of one of the unit's breakers to connect to the dead 230 kV transmission network with no load connected.

- At this point Newfoundland Power, at the direction of ECC personnel, will start closing feeders to restore customers. Holyrood Unit 1 or 2 can pick up 10 MW blocks with 5 minutes in between block restoration to allow the boiler drum time to stabilize and avoid the possibility of the unit tripping. Newfoundland Power will make ready 10 MW load blocks for this process. The customers supplied will depend on transmission routes available and the priority set by Newfoundland Power.

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SYSTEM OPERATING INSTRUCTION

STATION:	GENERAL	**Inst. No.**	T-022
TITLE:	RESTORATION OF THE AVALON PENINSULA WHEN ISOLATED FROM BAY D'ESPOIR**	**Page** 4	**of** 5

Isochronous Operation of Holyrood Unit 1 or 2 (cont'd)

- This process will continue until the unit's load reaches 60 MW. At approximately 20 MW there will be a pause in unit loading due to changeover from full to partial arc steam admission. Holyrood personnel will contact ECC when the changeover is complete. Use the attached table for operation beyond the 60 MW load level.

Cold Load Pickup

Generally, the longer the outage duration for domestic customers the greater the load pickup. It is not unusual to have a cold load pickup that may be 2-4 times the normal distribution feeder peak. It is, therefore, very important that Newfoundland Power accurately indicate the amount of load that will be picked-up when feeders are energized so that underfrequency tripping does not occur. In fact if possible feeders without underfrequency tripping should be used.

Wind Generation

During the initial disturbance which isolates the Avalon Peninsula, the resulting frequency decay will, in all likelihood, cause the wind farms at Fermeuse and St. Lawrence to trip (the latter if the Burin peninsula system remains connected to the Avalon). During the restoration of the Avalon and the corresponding cold load pick-up issues, frequency control could be problematic. The Wind Farms should not be re-connected to the system until the Holyrood plant is in a stable mode of operation and the load is restored. When connected, the output of the wind farm(s) should be limited to the total pick-up capability of the Holyrood plant in the event that the wind generation is suddenly lost or rejected.

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SYSTEM OPERATING INSTRUCTION

STATION:	GENERAL	**Inst. No.**	T-022
TITLE:	RESTORATION OF THE AVALON PENINSULA WHEN ISOLATED FROM BAY D'ESPOIR**	**Page** 5	**of** 5

HOLYROOD UNITS
MAXIMUM LOAD PICK-UP
ISOLATED AVALON SYSTEM

Unit Number	Unit Load MW	Load Increase MW	Load Limit MW
1, 2 or 3	0-60	2 MW/min	On load limit
1, 2 or 3 alone	60-100	10	15 MW above speed load
1 & 2	60-100	20	15 MW above speed load/unit
1, 2 & 3	60-100	30	15 MW above speed load/unit
1 or 2 alone	100-140	15	20 MW above speed load/unit
3	100-140	10	15 MW above speed load/unit
1 & 2	100-140	30	20 MW above speed load/unit
1, 2 & 3	100-140	50	Unit 1 & 2, 20 MW above speed load/unit Unit 3, 15 MW above speed load
1 or 2 alone	140-160	10	15 MW above speed load
Hardwoods GT		8	
Hardwoods +1 unit	60-100	20	Holyrood Unit 15 MW above speed load

** Part of the Emergency Response Plan

REVISION HISTORY

Version Number	Date	Description of Change
0	1996-11-27	Original Issue
2	2011-04-27	Changes to Holyrood and Wind Farm Considerations

PREPARED: Kevin Goulding	**APPROVED:**

newfoundland labrador hydro
a nalcor energy company

SYSTEM OPERATING INSTRUCTION

STATION:	General, EPR	**Inst. No.**	T-023
TITLE:	TL202/TL206/TL207 Automatic Restoration**	**Page** 1	**of** 8

1.0 OVERVIEW

The TL202/TL206/TL207 restoration scheme has been developed to automatically restore power on TL207 from either TL202 or TL206. It is activated by sensing a loss of voltage on all three phases of TL207 and TL237 at Come-by-Chance. The loss of voltage at Come-by-Chance is further confirmed by checking the voltage on all three phases on TL207 at Sunnyside and TL237 at Western Avalon. Once the loss of voltage is confirmed, the program will open the TL237 breakers at Western Avalon and will also open the required 230 kV breakers at Sunnyside. If there is 230 kV voltage present at Sunnyside, the program will restore TL207. If there is no 230 kV voltage at Sunnyside the program will first attempt to restore TL202. If it is unable to restore TL202 it will try TL206. Once the program has restored either TL202 or TL206, it will restore TL207.

The program uses the manual points for the 230 kV disconnects associated with the Auto Restore Program at Bay d' Espoir, Sunnyside and Come-by-Chance, as well as the appropriate control and scan inhibit tags, to determine the path available for restoring TL207. Therefore, to achieve minimum restoration time from the auto restore program, the pseudo points for the manual disconnects at Bay d'Espoir, Sunnyside and Come-by-Chance must be maintained in the correct state on the EMS. As well, all appropriate control inhibit and scan inhibit tags must be kept current.

2.0 DISPLAY PAGE

The interface display page (Figure 1), may be accessed to review the state of the auto restore program by:

I. the ARS button on the CBC one-line display

II. typing the mnemonic **ars** on the command line

From this page, the program status and transmission line availability can be changed, and the progress of the auto restoration monitored. Messages generated by the program are displayed on this page.

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SYSTEM OPERATING INSTRUCTION

STATION:	General, EPR	**Inst. No.**	T-023
TITLE:	TL202/TL206/TL207 Automatic Restoration**	**Page** 2	**of** 8

2.1 SINGLE LINE DISPLAY

The single line on the interface page shows the present state of each of the breakers and disconnects used in the restoration process. A segment of the relevant transmission line is defined to represent the current state of each of the voltage relays at Sunnyside, Come-by-Chance and Western Avalon. A green segment represents a **no voltage condition** and a red segment represents a **voltage present** condition.

2.2 Activity Log

An activity log window on the interface page displays messages indicating the progress of the auto restoration sequence.

2.3 PROGRAM STATUS

The program mode can be changed from the interface page. The two states of the program are **enabled** and **disabled.** The operator can toggle the status between the two states.

The program state is updated by the application. The state can either be **online** meaning the application is ready to respond to a loss of voltage at CBC, **offline** indicating that the application will not respond to a loss of voltage at CBC or **executing** indicating that auto restoration is in progress.

2.4 TRANSMISSION LINE AVAILABILITY

Two status points have been defined on the interface page to enable the operator to change the participation status of TL202 and TL206 in the restoration scheme. These two status points are : **TL202_available and TL206_available** . The states associated with these points are **yes/no** and they can be toggled by the operator.

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SYSTEM OPERATING INSTRUCTION

STATION:	General, EPR	**Inst. No.**	T-023
TITLE:	TL202/TL206/TL207 Automatic Restoration**	**Page** 3	**of** 8

3.0 MAPBOARD

Visual indication of the status of the auto restore program is displayed on the mapboard display for Come-by-Chance. When the auto restore program is active, the indication **"Restoration in progress"** is illuminated.

If the program mode is in the **"disabled"** state, a **minor alarm** is indicated on the Come-by-Chance display.

If TL 202 or TL 206 is **unavailable**, a **minor alarm** is indicated on the Come-by-Chance display.

When the **auto restore program is running, a major alarm** is indicated in the Come-by-Chance display.

4.0 CBC REMOTE INDICATION

The status of the auto restoration application at ECC is transmitted to the control room at NARL. This information is displayed on the interface page in the CBC Remote Indication block, on the ARS System Summary display of the EMS.

(at CBC) Program Mode: Indicates the state of the program mode as viewed at the NARL control room. (Enabled or Disabled)

(at CBC) Is Executing: Indicates the execution status of the application as viewed at the NARL control room (Not Running or Running)

(at CBC) Out of Sync: Indicates if there is a discrepancy between the program mode at ECC and the (at CBC) Program Mode points. (No, Yes)

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SYSTEM OPERATING INSTRUCTION

STATION:	General, EPR	**Inst. No.**	T-023
TITLE:	TL202/TL206/TL207 Automatic Restoration**	**Page** 4	**of** 8

5.0 PROGRAM CONSTRAINTS

- If a transmission line recloser is in the off position, the restoration scheme will not operate for that line.
- Breakers will not close if any of the associated breaker fail lockouts, bus lockouts or transformer lockouts have operated.
- If an attempt is made to restore the line by one breaker and that attempt fails the program will not try the same line with another breaker.
- If the program is running and there is a failover of computers, the program will terminate.
- If the disconnects on TL207 at Sunnyside are indicating open, the program will not operate. If the disconnects on either TL202 or TL206 are indicating open the program will not use that route.

6.0 PROGRAM FEATURES

- After the restoration program has been running for three minutes, it will time out and the following message will be displayed; “Program Abort: Watchdog timed out, ensure auto restore is in manual mode.”
- Groups of breakers which are operated by the program, as a result of group controls, will be logged individually in the alarm summary when they change state.
- If part way through the restoration on either TL202 or TL206, power is lost on the route being restored, then restoration will be attempted by the other route.

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SYSTEM OPERATING INSTRUCTION

STATION:	General, EPR	**Inst. No.**	T-023
TITLE:	TL202/TL206/TL207 Automatic Restoration**	**Page** 5	**of** 8

6.1 OPERATOR PROCEDURES

a) The operator can prevent the auto restoration process from operating, even while it is active, by setting the program mode to **"disabled".**

b) If work under a Hold-off or Work Protection is in progress on either TL202 or TL206, make the line unavailable by selecting **"NO"** on the Transmission Line Availability section of the display.

c) For switching on TL202 or TL206, as part of the Order-to-Operate, make the line being switched unavailable prior to the start of switching.

d) For switching on TL207, disable the program by setting the mode to **disabled** prior to the start of switching and while TL207 is out of service.

e) If the auto restoration program operates a number of times in succession, disable the program by setting the mode to **"disabled".**

f) If any of the following RTU's are out of service, the auto restoration process shall be disabled, by setting the program mode to **"disabled":**

Both Bay d'Espoir Plant and Bay d'Espoir T.S. (If only one RTU is out of service, do not disable the program)

Sunnyside

Come-by-Chance

Western Avalon

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SYSTEM OPERATING INSTRUCTION

STATION:	General, EPR	**Inst. No.**	T-023
TITLE:	TL202/TL206/TL207 Automatic Restoration**	**Page** 6	**of** 8

6.1 OPERATOR PROCEDURES (cont'd.)

g) If any of the following stations are in local control, the auto restoration process shall be disabled, by setting the program mode to **"disabled"**:

Both Bay d'Espoir Plant and Bay d'Espoir T.S. (if only one station is in local control, do not disable the program)

Sunnyside

Come-by-Chance

Western Avalon

h) The operator must ensure that the manual points for the 230 kV disconnects associated with the auto restore program at Bay d'Espoir, Sunnyside and Come-by-Chance are maintained in the correct state on the EMS.

i) The operator must ensure that all control inhibit and scan inhibit tags associated with equipment used in the auto restoration process are kept current.

j) If the program mode automatically switches to "**disabled**" it may be returned to "**enabled**" if the cause of the automatic switching is identified and corrected. Otherwise, Energy Systems staff should be contacted before returning the program mode to "**enabled**".

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SYSTEM OPERATING INSTRUCTION

STATION:	General, EPR	**Inst. No.**	T-023
TITLE:	TL202/TL206/TL207 Automatic Restoration**	**Page** 7	**of** 8

6.1 OPERATOR PROCEDURES (cont'd.)

k) In the event of a loss of voltage on the CBC 230 kV bus, protection will cause the capacitor bank breakers to open. If the capacitor bank breakers remain closed and the disconnects are closed, then auto restoration will terminate before restoring power to the bus. ECC should then attempt to open the capacitor bank breakers **before** restoring power to the bus manually.

Once it has terminated, ARS will not resume execution and cannot be restarted manually.

Once voltage is restored to CBC 230 kV bus, then switch on the required number of banks - observing the 5 minute minimum switching time. Based on system loading and equipment status, the CBC bus voltage may be extremely high if the bus was restored with the capacitor banks still online.

l. While the auto restore program is running, preparation for the restoration of power to Western Avalon, Holyrood, Hardwoods and Oxen Pond should proceed, including operating necessary breakers in these stations.

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SYSTEM OPERATING INSTRUCTION

STATION:	General, EPR	**Inst. No.**	T-023
TITLE:	TL202/TL206/TL207 Automatic Restoration**	**Page** 8	**of** 8

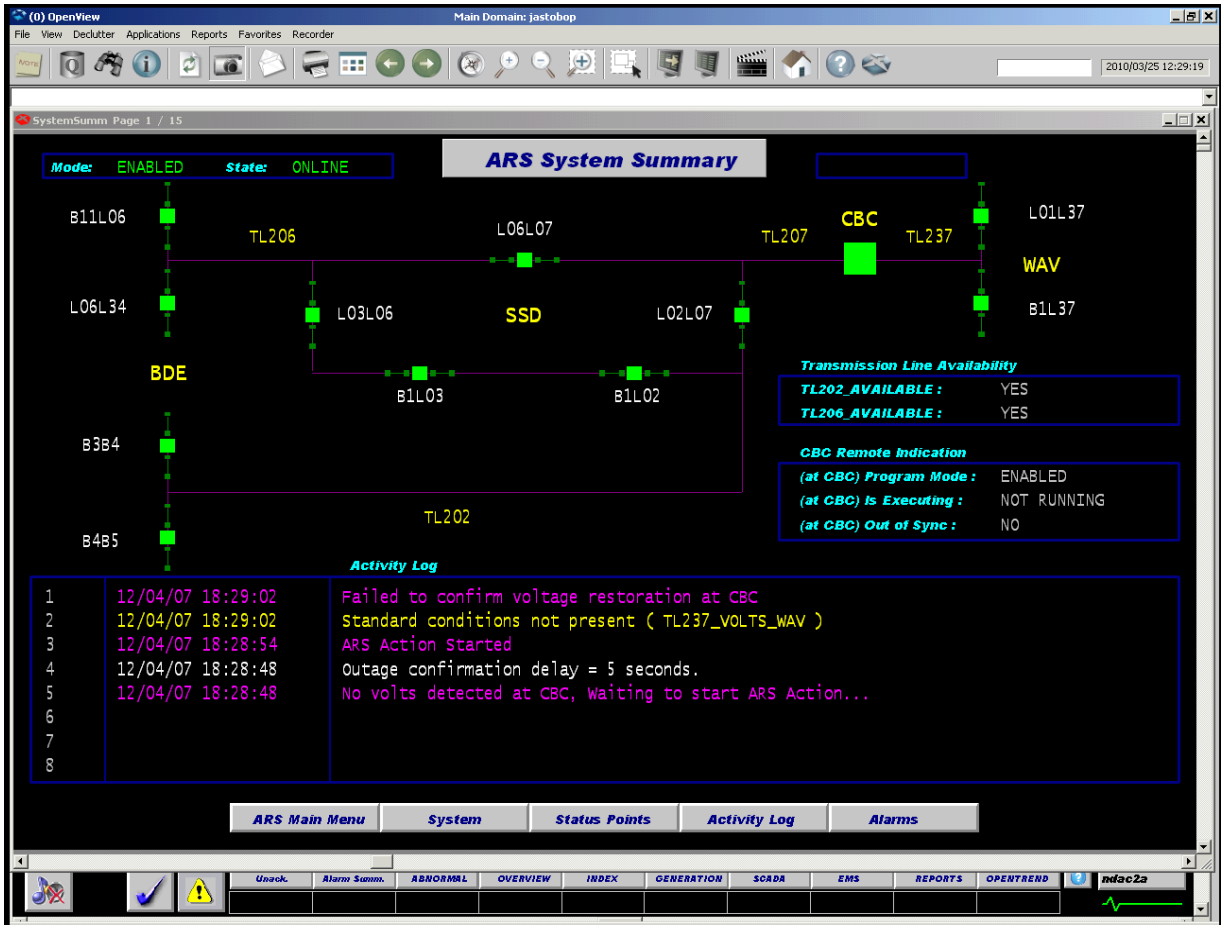

FIGURE 1.
** Part of the Emergency Response Plan

REVISION HISTORY

Version Number	Date	Description of Change
0	1997-03-21	Original Issue
2	2012-04-04	Add 6 k) – Program Features

PREPARED: Dennis Hartley	**APPROVED:**

HYDRO

SYSTEM OPERATING INSTRUCTION

STATION:	HOLYROOD	**Inst. No.**	T-025
TITLE:	RESTORATION OF HOLYROOD 230 kV BUS. B11B13 **	**Rev. No.**	
		Page 1	**of** 1

INTRODUCTION

The Holyrood 230 kV bus B11B13 can be energized through two sources, through the 66 kV system and T5 or through the 230 kV system and either one of four 230 kV breakers. Once the 230 kV Bus is energized it has to be synchronized with the other system. The synchronizing on this bus uses a potential transformer on “B” phase, measuring “B” phase to ground voltage. This voltage has to match the “B” phase voltage of the other system before the breaker closes.

When the 230 kV bus is energized via T5 the bus connected in a “delta” (underground) system as the high side of T5 is connected in “delta”. This results in the B phase P.T. on the 230 kV bus giving inaccurate values of “B” phase voltage, as there is no solid three phase ground reference on the bus. The inaccuracy of the P.T. measurement then may result in the 230 kV breaker being closed with unmatched voltages.

When the 230 kV bus is energized via a 230 kV breaker, the bus is connected in “wye” as there are several grounded “wye” connected transformers on the 230 kV system. Therefore, in this way the P.T. will give accurate values of “B” phase voltage and correct voltage matching before breaker closure.

PROCEDURE

1. Do not attempt to synchronize the two systems at Holyrood via the 230 kV breakers if the 230 kV bus B11B13 is energized from the 66 kV system.

2. The normal method of energizing the 230 kV bus B11B13 is via one of the 230 kV breakers and then synchronizing on B7L38 or B8L39.

** Part of the Emergency Response Plan

PREPARED BY:	**APPROVED/CHECKED BY:**	**ISSUED DATE:** 1987-01-20
D. Fever		**REV. DATE:**

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SYSTEM OPERATING INSTRUCTION

STATION:	Great Northern Peninsula	**Inst. No.**	T-063
TITLE:	Operation Without TL 239 or TL 259 In Service**	**Page** 1	**of** 7

INTRODUCTION

The Great Northern Peninsula 138 kV transmission system has very long lines which can be subject to very high voltages due to line charging. When these lines are in service supplying load the reactors at Plum Point and Bear Cove and the capacitors at St. Anthony Airport are operated to maintain the voltage within ± 5% of nominal. However, when there is a disturbance on the system and the 138 kV lines trip or are out of service for maintenance, caution must be exercised when operating and restoring the system to avoid high voltages and undesirable voltage swings.

Following an outage to the Great Northern Peninsula transmission system, and either TL 239 or TL 259 are not available appropriate shunt reactors will be placed in service prior to the re-energization procedure. During the re-energization of the transmission system, capacitors at the St. Anthony Airport must be switched out. **Also one shunt reactor at Plum Point must remain in service at all times.**

When either TL 239 or TL 259 or both are not available for service the system can be restored and operated up to St. Anthony from Deer Lake. However, the reactors required for voltage control must be identified prior to restoration of the system and the capacitors at the St. Anthony Airport must be removed from service. Switching of the reactors and capacitors should be avoided when either TL 239 or TL 259 are out as severe voltage swings may result. However, in the case of extended outages to TL 239 or TL 259 when the number of reactors or capacitors must be changed in order to maintain acceptable voltage levels then reactor or capacitor switching is permitted. Prior to switching reactors or capacitors with TL 239 or TL 259 out of service all steps should be taken with respect to minimizing the voltage swing. This should include voltage adjustments via OLTC's where possible and placing in service diesel units at Hawkes Bay and St. Anthony.

With these lines out under certain loading conditions the Hawkes Bay diesel units and the St. Anthony diesel units will be required for voltage support. During periods of high load each feeder in Hawkes Bay, Plum Point and Bear Cove must be switched separately to avoid unacceptable voltage drops.

Also, it is important that when either TL 239 or TL 259 are out of service the **reclosing must be turned off** on all GNP lines. This is necessary due to the reduced fault levels.

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SYSTEM OPERATING INSTRUCTION

STATION:	Great Northern Peninsula	**Inst. No.**	T-063
TITLE:	Operation Without TL 239 or TL 259 In Service**	**Page** 2	**of** 7

PROCEDURE

The following guidelines in section A should be followed when operating and restoring the GNP 138 kV system without TL 239, TL 259 or both TL 239 and TL 259 in service. In addition guidelines for specific line outages are provided in section B to D.

A. General Guidelines

1. Reclosing must be turned off on all lines used to supply the GNP including TL 226 if TL 239 is out.

2. Prior to the removal from service of these lines or before energizing the system the required reactors must be placed in service. Also, the capacitors at St. Anthony Airport must be removed from service.

   Switching of reactors and capacitors with these lines out is permitted when the diesel units are on and only after all other options for voltage adjustment have been used.

   At no time is it permitted to operate under these conditions with less than one reactor in service.

3. When energizing the lines they shall be energized in the following line sections unless otherwise instructed in sections B to D.

   a) 66 kV to Peters Barren and Hawkes Bay
   b) 138 kV to Bear Cove
   c) 138 kV/69 kV to St. Anthony/Roddickton

4. During periods when the Hawkes Bay diesel units are required both Hawkes Bay feeders should be opened prior to energizing the Hawkes Bay T.S.. The diesel should be put on line prior to closing the feeders to avoid severe voltage drops in the area.

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SYSTEM OPERATING INSTRUCTION

STATION:	Great Northern Peninsula	**Inst. No.**	T-063
TITLE:	Operation Without TL 239 or TL 259 In Service**	**Page** 3	**of** 7

PROCEDURE (cont'd.)

B. TL 259 NOT AVAILABLE

1. Reactor Requirement

Two reactors are required for all load levels.

2. Diesel Requirement

Either Hawkes Bay or St. Anthony diesel units must be placed in service to limit the load on Berry Hill T1 to 25 MVA.

3. Restoration Requirement

a) Energize to Peters Barren and Hawkes Bay, place Peters Barren T1 in nominal tap.

b) Energize TL 241 with one reactor at Plum Point and the Plum Point load connected. TL 244 should be open at Plum Point.

c) If the load north of Berry Hill is above 25 MVA the St. Anthony Diesel plant should be placed in service to supply the St. Anthony area prior to energizing TL 244. The plant can then be synchronized via B1T1 at St. Anthony after TL 261 is energized.

d) Energize TL 244, TL 256, TL 257, TL 261 with all connected load, one reactor in at Bear Cove, and the St. Anthony Airport capacitor breakers open.

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SYSTEM OPERATING INSTRUCTION

STATION:	Great Northern Peninsula	**Inst. No.**	T-063
TITLE:	Operation Without TL 239 or TL 259 In Service**	**Page** 4	**of** 7

PROCEDURE (cont'd.)

C. TL 239 NOT AVAILABLE

1. Reactor Requirement

The minimum expected load during the TL 239 outage will determine the reactor requirements as switching of reactors while TL 239 is out should be avoided.

TABLE 1
Minimum load level to supply during a TL 239 outage

Shunt Reactor Required	Minimum Load North of Berry Hill	Minimum Load on TL 241
3	Up to 10.9 MW	Up to 7.1 MW
2	10.9 to 20.0 MW	7.1 to 13.0 MW
1	Above 20.0 MW	Above 13.0 MW

2. Diesel Requirement

TABLE 2
Diesel Operation with TL 239 out

# of Shunt Reactors	Diesel Units Required	Load North of Berry Hill	TL 241 Load
3	0	0 to 15.9 MW	0 to 10.3 MW
3	HBY G1	15.9 to 19.4 MW	10.3 to 12.6 MW
3	HBY G1, G2	19.4 to 20.9 MW	12.6 to 13.6 MW
3	HBY+SDP	20.9 to 27.2 MW	13.6 to 17.6 MW
2	0	10.9 to 19.4 MW	7.1 to 12.6 MW
2	HBY G1	19.4 to 22.6 MW	12.6 to 14.6 MW
2	HBY G1, G2	22.6 to 24.4 MW	14.6 to 15.8 MW
2	HBY+SDP	24.4 to 33.2 MW	25.8 to 21.4 MW
1	0	N/A	N/A
1	HBY G1	N/A	N/A
1	HBY G1, G2	N/A	N/A
1	HBY+SDP	N/A	N/A

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SYSTEM OPERATING INSTRUCTION

STATION:	Great Northern Peninsula	**Inst. No.**	T-063
TITLE:	Operation Without TL 239 or TL 259 In Service**	**Page** 5	**of** 7

PROCEDURE (cont'd.)

C. TL 239 NOT AVAILABLE (cont'd.)

3. Restoration Requirement

Follow these steps in restoration following a forced outage:

a) Energize up to Hawkes Bay via TL 259.

b) Place the Hawkes Bay diesels on if required.

c) Energize TL 241 through to TL 244 including the loads and required reactors at Plum Point and Bear Cove.

d) Energize TL 256 and all lines and loads at Roddickton and St. Anthony. The St. Anthony Airport transformer T1 should be placed in nominal tap prior to energizing.

D. TL 239 AND TL 259 NOT AVAILABLE

1. Reactor Requirement

The minimum expected load during the outage to these lines will determine the reactor requirements as switching of reactors while the lines are out should be avoided.

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SYSTEM OPERATING INSTRUCTION

STATION:	Great Northern Peninsula	**Inst. No.**	T-063
TITLE:	Operation Without TL 239 or TL 259 In Service**	**Page** 6	**of** 7

PROCEDURE (cont'd.)

D. TL 239 AND TL 259 NOT AVAILABLE (cont'd.)

1. Reactor Requirement (cont'd.)

TABLE 3		
Minimum load level to supply during a TL 239 and TL 259 outage		
Shunt Reactor Required	Minimum Load North of Berry Hill	Minimum Load on TL 241
3	Up to 7.8 MW	Up to 5.0 MW
2	7.8 to 13.5 MW	5.0 to 8.8 MW
1	Above 13.5 MW	Above 8.8 MW

2. Diesel Requirement

Diesel Generation is required as shown in Table 4.

TABLE 4			
Diesel Operation with TL 239 and TL 259 out of service			
# of Shunt Reactors	Diesel Units Required	Load North of Berry Hill	TL 241 Load
3	0	0 to 9.1 MW	0 to 5.9 MW
3	HBY G1	9.1 to 12.0 MW	5.9 to 7.8 MW
3	HBY G1, G2	12.0 to 14.4 MW	7.8 to 9.3 MW
3	HBY+SDP	14.4 to 23.0 MW	9.3 to 14.9 MW
2	0	7.8 to 13.1 MW	5.0 to 8.5 MW
2	HBY G1	13.1 to 16.1 MW	8.5 to 10.5 MW
2	HBY G1, G2	16.1 to 18.4 MW	10.5 to 12.0 MW
2	HBY+SDP	18.4 to 27.0 MW	12.0 to 17.5 MW
1	0	13.5 to 16.1 MW	8.8 to 10.5 MW
1	HBY G1	16.1 to 19.2 MW	10.5 to 12.5 MW
1	HBY G1, G2	19.2 to 20.6 MW	12.5 to 13.4 MW
1	HBY+SDP	20.6 to 28.9 MW	13.4 to 18.9 MW

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SYSTEM OPERATING INSTRUCTION

STATION:	Great Northern Peninsula	**Inst. No.**	T-063
TITLE:	Operation Without TL 239 or TL 259 In Service**	**Page** 7	**of** 7

PROCEDURE (cont'd.)

D. TL 239 AND TL 259 NOT AVAILABLE (cont'd.)

3. Restoration Requirement

a) Energize all load to Peters Barren including Hawkes Bay.

b) Place the Hawkes Bay diesels on if required.

c) Energize TL 241 Plum Point loads and reactor (s) with TL 244 open at Plum Point.

d) Energize TL 244, Bear Cove reactor (if required), TL 256 and all connected load. The St. Anthony Airport transformer T1 should be placed in nominal tap prior to energizing.

** Part of the Emergency Response Plan

REVISION HISTORY

Version Number	Date	Description of Change
0	1995-10-30	Original Issue
1	2011-08-31	Removed reference to capacitor and reactor automatic mode of operation.

PREPARED: R. Henderson	**APPROVED:**

HYDRO

SYSTEM OPERATING INSTRUCTION

STATION:	HOLYROOD	**Inst. No.**	T-067
TITLE:	GUIDELINE FOR SYNCHRONIZING THE HOLYROOD PLANT WHEN ISOLATED FROM THE MAIN GRID **	**Rev. No.**	
		Page 1	**of** 1

Introduction

During severe weather conditions the Holyrood Plant may become isolated from the main transmission grid and be used to supply the Avalon Peninsula load. Synchronizing the Holyrood Plant with the main grid following repairs or maintenance to equipment between the plant and the main grid must proceed cautiously.

When synchronizing, high voltages may occur across the synchronizing breaker. If a high level of salt contamination is present on the breaker it may flashover across the interrupter and fault to ground. If this occurs on the Holyrood 230 kV bus the Holyrood plant will likely trip off and all operating units will shutdown. This will cause an extended outage to the customers while the plant is restored to service.

Procedure

The isolated Holyrood Plant should not be synchronized using a breaker in the Holyrood Terminal Station when high levels of contamination are present in that station. Synchronizing should be done at either Hardwoods or Western Avalon.

When preparing to synchronize the isolated Holyrood Plant with the main grid a check should be made at the Holyrood T.S. for high levels of contamination. The terminal maintenance staff at Whitbourne should be contacted to confirm whether contamination is present and whether synchronizing is recommended at the station. If severe contamination is present then synchronizing should be performed at another station.

If the terminal maintenance staff report they do not recommend synchronizing at any of the stations then synchronizing will be delayed if possible until conditions improve or cleaning is done.

** Part of the Emergency Response Plan

PREPARED BY:	**APPROVED/CHECKED BY:**	**ISSUED DATE:** 1996-01-23
R. Henderson		**REV. DATE:**

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SYSTEM OPERATING INSTRUCTION

STATION:	Great Northern Peninsula	**Inst. No.**	T-069
TITLE:	Restoration of the 138 kV System – All Lines Available**	**Page** 1	**of** 2

INTRODUCTION

The Great Northern Peninsula 138 kV transmission system has very long lines which can be subject to very high voltages due to line charging. When these lines are in service supplying load the reactors at Plum Point and Bear Cove and the capacitors at St. Anthony Airport are operated to maintain the voltage within ± 5% of nominal. However, when there is a disturbance on the system and the 138 kV lines trip caution must be exercised when restoring the system to avoid high voltages and undesirable voltage swings.

When any 138 kV line south of Bear Cove trips, TL 256 and the St. Anthony Airport capacitors will also trip on loss of voltage. The system can then be restored in two steps as follows:

1) Restore the line south of Bear Cove which tripped, and

2) After allowing the voltage to stabilize at Bear Cove restore TL 256 and connected load.

Please note that the capacitors at the St. Anthony Airport will not switch back in until three minutes following the trip. This is to allow the bank to discharge.

GUIDELINES

The following points should be considered when restoring the GNP 138 kV lines following a line trip.

1. If any 138 kV line south of Bear Cove trips, TL 256 and the St. Anthony Airport capacitors will trip on loss of voltage.

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SYSTEM OPERATING INSTRUCTION

STATION:	Great Northern peninsula	**Inst. No.**	T-069
TITLE:	Restoration of the 138 kV System – All Lines Available**	**Page** 2	**of** 2

GUIDELINES (cont'd.)

2. Care shall be exercised when using reactor and capacitor controls to maintain acceptable voltages during each step of the restoration process.

3. The voltage up to Bear Cove should be stabilized prior to picking up TL 256.

4. The capacitors at St. Anthony Airport cannot be switched in until three (3) minutes after the initial trip.

5. If the line outage is sustained and cold load pickup becomes significant the system should be energized in smaller increments and the voltage stabilized at each step.

** Part of the Emergency Response Plan

REVISION HISTORY

Version Number	Date	Description of Change
0	1996-09-19	Original Issue
1	2011-08-31	Removed reference to reactor/capacitor in automatic mode.

PREPARED: R. Henderson	**APPROVED:**

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SYSTEM OPERATING INSTRUCTION

STATION:	HAPPY VALLEY	**Inst. No.**	T-073
TITLE:	RESTORING SERVICE TO CUSTOMERS IN HAPPY VALLEY **	**Page** 1	**of** 7

INTRODUCTION

The 138 kV transmission lines from Churchill Falls to Happy Valley-Goose Bay, L1301 and L1302, are the primary supply to customers in the Happy Valley-Goose Bay region. Transmission line L1301 transverses from Churchill Falls (CHF) Switchyard to Muskrat Falls (MFATS3) Terminal Station and L1302 from MFATS3 to the Happy Valley (HVY) Terminal Station. Loss of either of these transmission lines will result in a power outage to the area. Upon a loss of L1301 or L1302, the backup supply, a 27 MW gas turbine in Happy Valley, is used to supply customers. It is capable of supplying most of the firm load, however, not during colder periods. To restore most of the firm load year round, the gas turbine must be supplemented using the North Plant Diesels, capable of delivering 5 MW at best. The peak firm rural load can be expected to reach 64 MW.

Power is distributed to the Happy Valley-Goose Bay area by seven 25 kV feeders: L1, L7, L8, L10, L15, L16 and L17. All feeders have reclosers except lines L15 and L17, which use oil circuit breakers for line protection and restoration.

To adequately service the area's customers, close adherence to the procedures that follow is necessary. Failure to do so may result in significant delays in restoring service to customers. This instruction provides guidelines for restoring feeders at Happy Valley, black starting the Happy Valley gas turbine, and restoring L1301/L1302. Refer to technical operating instruction T -066 for guidelines on 25kV bus regulation.

PROCEDURES

A. Feeder Restoration

Feeders L1, L7, L8, L10, and L16 are equipped with reclosers, designed to lockout on the fourth reclose operation. Feeders L15 and L17 are protected by oil circuit breakers. Should any of these feeders trip, Energy Control Centre personnel will:

1. Notify immediately Labrador on-call personnel;
2. Forward all pertinent information relating to the event to Lines Supervisor, Labrador On-Call or their designate; and
3. Wait for instruction before returning the feeder to service from Lines Supervisor, Labrador On-Call or their designate.

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SYSTEM OPERATING INSTRUCTION

STATION:	HAPPY VALLEY	**Inst. No.**	T-073
TITLE:	RESTORING SERVICE TO CUSTOMERS IN HAPPY VALLEY **	**Page** 2	**of** 7

A. **Feeder Restoration** (cont'd.)

The Labrador on-call personnel shall initiate a patrol of the affected feeder to determine the cause of the problem to ensure there is no safety concern in re-energizing the line.

B. **Restoring 1301L/L1302**

Before restoring, please see Instruction 045 "Re-Energization of Power Lines"

If L1301 trips at Churchill Falls or L1302 trips at Muskrat Falls, the Happy Valley end of L1302 trips on timed (30 seconds) under voltage. In addition, L15 will trip on under voltage provided either T1B12 or T2B14 is closed. When restoring service to customers via L1301/L1302 it is important that HVY customers are restored, with acceptable voltages, prior to restoring MFATS3. To ensure acceptable quality of service follow this procedure.

When L1301 or L1302 trips, perform the following:

1. Contact Churchill Falls to discuss the plan of action. If the lines cannot be restored proceed with a black start of the gas turbine and follow its procedure;

2. Ensure Happy Valley breakers 13-1, T1B12, T2B14 and HV15-CB1 are open and MFATS3 breaker B1T1 is open;
   a. If L1301 tripped, ensure B1L1302 is closed;
   b. If L1302 tripped, restoration will be from B1L1302 at MFATS3;

3. Return to service the affected transmission line(s);
   a. If L1301 tripped, request that Churchill Falls energize L1301 at Churchill Falls. If the line fails to close proceed with a black start of the gas turbine and follow its procedure;
   b. If L1302 tripped, ECC will energize L1302 at MFATS3. If the line fails to close proceed with a black start of the gas turbine and follow its procedure;

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SYSTEM OPERATING INSTRUCTION

STATION:	HAPPY VALLEY	**Inst. No.**	T-073
TITLE:	RESTORING SERVICE TO CUSTOMERS IN HAPPY VALLEY **	**Page** 3	**of** 7

PROCEDURES (cont'd.)

B. **Restoring 1301L/L1302** (cont'd.)

4. Close Happy Valley breaker 13-1;

5. Use the following table of Happy Valley bus voltages for various load blocks and transformer tap positions to determine the number of feeders to open. The area in grey shows the range of acceptable voltages.

Labrador East Switching Study
Happy Valley 25 kV Bus Voltages
For Various Load Blocks and 138/25 kV
Transformer Tap Positions

Load MW	Transformer Tap Position			
	1	9	13	17
Happy Valley 138 kV Bus @ 149.3 kV Prior to Restoration				
0	25.78 kV	27.05 kV	27.75 kV	28.48 kV
5	25.30 kV	26.55 kV	27.20 kV	27.90 kV
10	24.80 kV	25.98 kV	26.60 kV	27.28 kV
15	24.22 kV	25.35 kV	25.95 kV	26.58 kV
20	23.60 kV	24.65 kV	25.22 kV	25.80 kV
25	22.90 kV	23.90 kV	24.42 kV	24.98 kV
30	22.18 kV	23.08 kV	23.55 kV	24.05 kV
Happy Valley 138 kV Bus @ 152.2 kV Prior to Restoration				
0	26.25 kV	27.58 kV	28.28 kV	29.02 kV
5	25.80 kV	27.05 kV	27.72 kV	28.45 kV
10	25.28 kV	26.48 kV	27.12 kV	27.80 kV
15	24.70 kV	25.85 kV	26.48 kV	27.10 kV
20	24.08 kV	25.18 kV	25.75 kV	26.35 kV
25	23.40 kV	24.42 kV	24.95 kV	25.50 kV
30	22.68 kV	23.60 kV	24.10 kV	24.60 kV

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SYSTEM OPERATING INSTRUCTION

STATION:	HAPPY VALLEY	**Inst. No.**	T-073
TITLE:	RESTORING SERVICE TO CUSTOMERS IN HAPPY VALLEY **	**Page** 4	**of** 7

PROCEDURES (cont'd.)

B. Restoring 1301L/L1302 (cont'd.)

6. Close Happy Valley breakers T1B12 and T2B14. Restore remainder of feeder loads. Load shall be restored according to the following sequence:

Feeder	Approx.* Peak Load (MW)	Approx. % of Total System Load	Notes
HV7-R1	10.0	17.5	Northwest River / Sheshatshui – North Side Diesel Plant
HV1-R1	14.3	25.1	Core Business area, Hospital
HV17-CB1	9.3	16.3	CFB Goose Bay (Firm Load)
HV10-R1	10.5	18.4	Core Business, Hotels, Town Water, etc.
HV8-R1	12.5	21.9	Residential area
HV16-R1	0.4	0.7	Farming area, Radar Site
HV15-CB1	20.6	Secondary Load	DND boilers – ensure they are off prior to energizing. The boilers may be restored once the system has stabilized.

7. Restore MFATS3 by closing B1T1.

8. Notify the Labrador Region on-call person as soon as possible.

C. Happy Valley Gas Turbine Black Start

Under black start conditions, the gas turbine is to be started in isolation from the rest of the system. Once the unit has been successfully started and connected to the 25 kV station bus, the process of restoring customer loads can begin. To ensure that the unit performs properly, it is necessary to make sure that the unit is given sufficient time between load steps to stabilize.

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SYSTEM OPERATING INSTRUCTION

STATION:	HAPPY VALLEY	**Inst. No.**	T-073
TITLE:	RESTORING SERVICE TO CUSTOMERS IN HAPPY VALLEY **	**Page** 5	**of** 7

PROCEDURES (cont'd.)

C. **<u>Happy Valley Gas Turbine Black Start</u>** (cont'd.)

1. Contact Happy Valley on-call personnel to notify of the reason for the outage and the decision to black start the gas turbine;

2. Open 25 kV breakers B11B12, T1B12 and T2B14;

3. Open all 25 kV feeders:

a)	HV1-R1	HV16-R1
b)	HV7-R1	HV15-CB1
c)	HV8-R1	HV17-CB1
d)	HV10-R1	

4. Check via the EMS station one line that all recloser bypasses are open;

5. Ensure that gas turbine breaker G1T3 is open and B12T3 is closed. With B12T3 closed, the station service will be supplied upon G1T3 closure regardless of the position of the station service transfer switch. If AC is not sensed when G1T3 closes, then G1T3 will trip.

6. Verify the status of the following Happy Valley Gas Turbine SCADA points:

a)	UNIT CONTROL:	REMOTE
b)	DEAD BUS VERIFICATION:	ON
c)	READY TO START:	YES

7. Place UNIT in GENERATE MODE. The gas turbine loading rate is maintained by the control system at 5 MW per minute when loaded manually. For block loading the unit can accept load immediately up to a maximum of 10 MW at a time, however, a frequency sag to approximately 57 Hertz will occur for about 5 seconds, and a wait time of two minutes is required before the next block can be loaded.

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SYSTEM OPERATING INSTRUCTION

STATION:	HAPPY VALLEY	**Inst. No.**	T-073
TITLE:	RESTORING SERVICE TO CUSTOMERS IN HAPPY VALLEY **	**Page** 6	**of** 7

PROCEDURES (cont'd.)

C. **<u>Happy Valley Gas Turbine Black Start</u>** (cont'd.)

8. Verify the governor is in ISOCHRONOUS MODE. The governor should default to isochronous mode once the gas turbine control system senses a dead bus.

9. Place Loading in AUTOMATIC and Load in BASE and select START. The unit's speed will increase to synchronous speed and the control system will then close G1T3 automatically. AC station service will then be restored. The unit is now ready to accept load. If breaker G1T3 does not close within 3 minutes of reaching synchronous speed, ensure the unit's frequency is 60 Hertz and manually close G1T3.

10. Begin restoring service to Happy Valley feeders according to the following sequence. L15 may be restored but DND must be notified to keep the electric boilers off until notified. Reclosing on all Happy Valley feeders shall be placed in single operation to lockout by local personnel as soon as practical to afford the Gas Turbine greater protection.

Feeder	Approx.* Peak Load (MW)	Approx. % of Total System Load	Notes
HV7-R1	10.0	17.5	Northwest River / Sheshatshui – North Side Diesel Plant
HV1-R1	14.3	25.1	Core Business area, Hospital
HV17-CB1	9.3	16.3	CFB Goose Bay (Firm Load)
HV10-R1	10.5	18.4	Core Business, Hotels, Town Water, etc.
HV8-R1	12.5	21.9	Residential area
HV16-R1	0.4	0.7	Farming area, Radar Site
HV15-CB1	20.6	Secondary Load	DND boilers – ensure they are off prior to energizing. The boilers may be restored once the system has stabilized.

*2005 peak forecast shown for illustration.

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SYSTEM OPERATING INSTRUCTION

STATION:	HAPPY VALLEY	**Inst. No.**	T-073
TITLE:	RESTORING SERVICE TO CUSTOMERS IN HAPPY VALLEY **	**Page** 7	**of** 7

PROCEDURES (cont'd.)

C. **Happy Valley Gas Turbine Black Start** (cont'd.)

The unit can be loaded in blocks up to a maximum of 10 MW at a time. The loading rate for the unit is 5 MW per minute and load blocks must follow this rate. Feeders which are greater than 10 MW must be sectionalized before restoration can occur. After the first block is loaded, a wait time is required before the next block can be loaded and this time will vary depending upon the load restored. Example wait times are listed below:

Load (MW)	Wait Time (mins)
2	½
5	1
7	1 ½
10	2

** Part of the Emergency Response Plan

REVISION HISTORY

Version Number	Date	Description of Change
0	2000-09-29	Original Issue
5	2013-03-26	Wording change to: Procedures A & B

PREPARED: R. Coish	**APPROVED:**

HYDRO
THE POWER OF COMMITMENT

SYSTEM OPERATING INSTRUCTION

STATION:	**Hardwoods and Oxen Pond**	**Inst. No.**	T-078
TITLE:	**Hardwoods and Oxen Pond Restoration ****	**Rev. No.**	
		Page 1	**of** 6

Introduction:

Newfoundland and Labrador Hydro (**NLH**) supplies Newfoundland Power (**NP**) customers in the St. John's and surrounding areas using three delivery points

- Hardwoods 66 kV (busses 7 and 8);
- Oxen Pond 66 kV (busses 2 and 5); and
- Holyrood 69 kV (38L).

During one peak (on February 15, 2003 at 1800 hours) when the system load was 1402 MW, the total area load was approximately 520 MW. Hardwoods station, including its gas turbine, supplied 216 MW, Oxen Pond supplied 222 MW and Holyrood 38L, 36 MW. The remaining 46 MW was supplied by Newfoundland Power's generation.

The Newfoundland Power's 66 kV system is configured with connections between the three delivery points. Hardwoods is connected to Holyrood via two lines, 49L and 79L, which run from Hardwoods to Chamberlains. Real power normally flows from Hardwoods to Chamberlains. Oxen Pond does not directly connect into Holyrood. Hardwoods and Oxen Pond are connected via three lines, 13L (St. John's Main to Stamp's Lane), 15L (Molloy's to Stamp's Lane) and 54L (Hardwoods to Kenmount). The net real power flow across all three lines, under normal conditions, is relatively low. Most of Newfoundland Power's generation is located in the Hardwoods systems, with a small amount of generation in the Holyrood system.

Capacity:

It is important to understand the capacity of transmission and terminal equipment when meeting customers load requirements, especially under a contingency situation. These physical capabilities, or limits, shall always be respected.

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SYSTEM OPERATING INSTRUCTION

STATION:	**Hardwoods and Oxen Pond**	**Inst. No.**	T-078
TITLE:	**Hardwoods and Oxen Pond Restoration**	**Rev. No.**	
		Page 2	**of** 6

Introduction (cont'd.)

The transmission line capacity into Hardwoods and Oxen Pond stations are provided below for different ambient temperatures.

Hardwoods (MVA)	25°C	15°C	0°C	SCADA Alarm
TL201	208	260	322	User shall
TL236	237	298	370	define
TL242	330	420	524	limits *
	775	978	1216	

Oxen Pond (MVA)	25°C	15°C	0°C	SCADA Alarm
TL218	237	298	370	User shall
TL236	237	298	370	define
	474	596	740	limits *

* seasonally adjusted

Terminal station transformer capacities at Hardwoods and Oxen Pond, assuming all cooling mechanisms are functioning properly, are provided. Normal operating and firm capacities are included. Firm indicates capacity under the largest single contingency, the loss of the biggest transformer.

Hardwoods	Capacity	Trip Setting	SCADA Alarm
Transformer T1	67 MVA	95 MVA	60 MVA
Transformer T2	67 MVA	95 MVA	60 MVA
Transformer T3	67 MVA	95 MVA	60 MVA
Transformer T4	125 MVA	175 MVA	115 MVA
Gas turbine	50 MVA		
Station	376 MVA		
	358 MW (95% pf)		
Firm	251 MVA		
	240 MW (95% pf)		

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B. Butler		**REV. DATE:**

HYDRO
THE POWER OF COMMITMENT

SYSTEM OPERATING INSTRUCTION

STATION:	**Hardwoods and Oxen Pond**	**Inst. No.**	T-078
TITLE:	**Hardwoods and Oxen Pond Restoration**	**Rev. No.**	
		Page 3	**of** 6

Introduction (cont'd.)

Oxen Pond	Capacity	Trip Setting	SCADA Alarm
Transformer T1	67 MVA	95 MVA	60 MVA
Transformer T2	125 MVA	191 MVA	115 MVA
Transformer T3	125 MVA	191 MVA	115 MVA
Station	317 MVA		
	300 MW (95% pf)		
Firm	192 MVA		
	182 MW (95% pf)		

Oxen Pond & Hardwoods	Capacity
Firm	568 MVA
	540 MW (assume 95% pf)

Holyrood	Capacity	Trip Setting	SCADA Alarm
Transformer T5	25 MVA	38 MVA	22 MVA
Transformer T10	25 MVA	33 MVA	22 MVA
Station	50 MVA		
	48 MW (95% pf)		

Reliability

Newfoundland Power operates its 66 kV transmission in the St. John's and surrounding area as a system, connecting the Hardwoods 66 kV, Oxen Pond 66 kV and Holyrood 69 kV delivery points. Interruption of one or two of these three delivery points may affect customers, however, it depends on the time of year, time of day, which particular delivery points are affected, configuration of the Newfoundland Power system and other related conditions.

Interruption of the Holyrood 38L delivery point should not affect customer service as customers will be supplied through the Hardwoods delivery point via 49L and 79L.

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B. Butler		**REV. DATE:**

HYDRO
THE POWER OF COMMITMENT

SYSTEM OPERATING INSTRUCTION

STATION:	**Hardwoods and Oxen Pond**	**Inst. No.**	T-078
TITLE:	**Hardwoods and Oxen Pond Restoration**	**Rev. No.**	
		Page 4	**of** 6

Reliability (cont'd.)

Interruption of Oxen Pond or Hardwoods may result in service outages to some of Newfoundland Power's customers. During heavier load periods customers will be affected when all the load switches to the in-service delivery point and overloads Newfoundland Power's transmission. During lighter load periods, Newfoundland Power may be able to supply all their customers through the remaining delivery point. However, voltage remains a concern when supplying Newfoundland Power without Hardwoods or Oxen Pond available, due mainly to the lack of regulation on their system.

Restoration Guidelines

Perform the following steps after the loss of Hardwoods or Oxen Pond, resulting in customer interruption

1. NLH will monitor the system frequency and ensure AGC status is ON and the frequency stable. At the same time NLH will contact NP to initiate this restoration procedure.
2. If required, NLH will direct personnel to the problem station to investigate. TRO personnel will normally be contacted first, however, ECC staff are available should the need arise.
3. If applicable, NLH will isolate problem and restore remaining station equipment to service. The fully capable station will be used to restore as many customers as possible to service while personnel attend to and isolate the problem area.
4. Supply as many NP customers in the Holyrood – Seal Cove area from 38L by opening the loop near the Hardwoods end. The objective is to offload as much as possible the load on 49L and 79L at Hardwoods.

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B. Butler		**REV. DATE:**

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THE POWER OF COMMITMENT

SYSTEM OPERATING INSTRUCTION

STATION:	**Hardwoods and Oxen Pond**	**Inst. No.**	T-078
TITLE:	**Hardwoods and Oxen Pond Restoration**	**Rev. No.**	
		Page 5	**of** 6

Restoration Guidelines (cont'd.)

5. NP will isolate their substations in preparation for the restoration process. Depending on the load and if not already tripped, NP shall be prepared to separate OPD and HWD systems to facilitate the restoration process. During restoration, NLH will approve the connection of OPD and HWD into one system.
6. NLH will secure generation requirements. Have as many generating units on-line as possible to assist with frequency regulation during the restoration process. Start the Hardwoods gas turbine using both gas engines. Ensure both Cat Arm units are placed in speed mode. If possible, place Holyrood units at an output level that will assist with frequency regulation. Units are at their maximum shall be reduced by about 15 to 20 MW each, depending on the unit load and if there is sufficient other generation. Ensure the Holyrood units are in speed load control. These steps shall not slow greatly the restoration of customers and should be done co-incidentally if these actions have a long duration.
7. NP will start their generation, to be ready to be connected to the transmission network as it is restored. This will offload the requirement from NLH.
8. NP will have ready 20- to 40-MW load blocks to restore using their individual or group breaker control schemes. NP will set the priority for customer restoration. NP will provide to NLH reasonably accurate measures of the load being restored and will, if necessary, apply appropriate cold load pickup relationships.
9. NLH will schedule the frequency setpoint to 60.05 Hertz.
10. Establish and maintain between NLH and NP control centres a continuous and dedicated voice communications channel during customer restoration.
11. NLH will direct the restoration of NP customer load blocks. NP will begin with their larger load blocks and end with the smaller loads.
12. NP will restore load as directed by NLH.

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SYSTEM OPERATING INSTRUCTION

STATION:	**Hardwoods and Oxen Pond**	**Inst. No.**	T-078
TITLE:	**Hardwoods and Oxen Pond Restoration**	**Rev. No.**	
		Page 6	**of** 6

Restoration Guidelines (cont'd.)

13. NLH will
    - monitor the frequency level and ensure AGC is ON,
    - check for potential transmission line or station transformer overloading (ALARMS and SCADA displays), and
    - monitor station voltages (ALARMS and SCADA displays).

14. NP will monitor their system for potential equipment overload and low voltages.
15. NLH may adjust Holyrood and other generation output level to assist in frequency regulation. This action should not slow greatly customer restoration.
16. Repeat steps 11 to 15 until all customers are restored to service.
17. Return all system operating parameters to normal.

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