

ENVIRONMENTAL MANAGEMENT PROGRAM DESCRIPTIONS

Newfoundland Power Inc.

2011

Introduction

Newfoundland Power is the principal distributor of electricity in the Province of Newfoundland and Labrador, serving over 243,000 customers throughout the island portion of the Province, representing approximately 85 per cent of the Province's electricity customers. The balance of the population is served by the Province's other electric utility, Newfoundland & Labrador Hydro ("Newfoundland Hydro"), a Crown corporation that also serves several larger industrial customers in Newfoundland. Sales to residential customers have consistently generated approximately 60 per cent of the Company's revenue. Approximately 93 per cent of the electricity that Newfoundland Power sells to its customers is purchased from Newfoundland Hydro. The Company generates the remainder of its energy requirements.

Newfoundland Power operates 29 generating plants comprised of 23 small hydro and 6 thermal plants. As many of the plants were constructed when environmental control was minimal, there was little done to implement controls to prevent and/or contain potential spills. The Company also has approximately 11,000 km of transmission and distribution lines, 130 substations, oil filled electrical equipment and line trucks. Associated with these plants and equipment are various quantities of fluids, which may, on occasion, be accidentally released into the environment. These fluids typically consist of lubricating oil for bearings, glycol for cooling systems, insulating oil for electrical equipment and hydraulic fluid for vehicles. In the case of oil filled electrical equipment rust has been a major cause factor for spills. Also hydraulic failures on line trucks are a significant contributor to spills.

Relevant Newfoundland Power Environmental Policy Commitments

- Committed to prevention of pollution.
- Committed to meeting the requirements of applicable environmental legislation, regulations, and accepted standards of environmental protection.
- Committed to continual improvement in environmental performance.

Summary of 2010 EMS Objectives, Targets and Programmes:

1. Wooden Penstock Removal Program
2. Wicket Gate Bushing Replacement Program
3. Runner Replacement Program
4. Hydroelectric Energy Production Increase
5. Bearing Oil Cooling System Control Enhancement Program
6. PCB Phase-Out Program
7. Bushings and Instrument Transformer Phase Out Program
8. Sulphur Hexafluoride (SF₆) Management Program
9. Mini-Padmount Transformer Accelerated Replacement Program
10. Mercury Vapour Street Light Replacement Program
11. Customer Energy Conservation Program
12. Hydraulic Awareness and Training Program

1. WOODEN PENSTOCK REMOVAL PROGRAM

Background

The Company utilizes penstocks to convey water from forebay reservoirs to the hydro plants. In the past, many of these penstocks were constructed using creosote treated wooden staves which over time leached creosote from the wood creating contamination. Leaching continues as long as the wooden penstock is present. As the wooden penstocks deteriorate, the Company has been replacing them with either steel or fiberglass, thus eliminating the source of contamination. With this in mind, the Company will eliminate 9 creosote treated wooden penstocks between 2001 and December 31, 2014.

2. WICKET GATE BUSHING REPLACEMENT PROGRAM

Background

Over the years, the Company has experienced a number of petroleum releases from its hydro plants. In some plants, the wicket gate bushing component requires greasing for proper operation of the turbine. Greasing of these bushings can result in the release of petroleum products into the environment. To reduce the number of these greased bushings in the system, the Company has identified plants where the bushings can be replaced with greaseless bushings.

3. RUNNER REPLACEMENT PROGRAM

Background

Inefficient use of water at Company hydro plants can require additional Bunker C to be burned at the Holyrood thermal plant. The Company seeks to maintain efficient use of water at its hydro plants. When a turbine runner requires replacement, the Company will seek an optimized design to ensure the most efficient use of water possible.

4. HYDROELECTRIC ENERGY PRODUCTION INCREASE

Background

Due to the high cost of producing thermal electricity at Holyrood, the Company is seeking ways to increase production at the existing hydro facilities. In 2007, the Company completed a capital upgrade at the Rattling Brook plant that reduced the required amount of bunker 'C' at Holyrood.

There are additional ways to increase production at other plants through improvements to operations, dams, penstocks and turbines. The Company completed a study in 2008 which provided an inventory of potential hydroelectric energy increase initiatives and also final engineering design for the most feasible projects.

By increasing hydroelectric generation at existing plants, the requirement for fossil fuel generation will be reduced. This will result in fewer emissions being emitted into the environment. With this in mind, the Company will increase hydroelectric energy production at 6 Company hydro plants between 2009 and December 31, 2016.

5. BEARING OIL COOLING SYSTEM CONTROL ENHANCEMENT PROGRAM

Background

Over the years, the Company has experienced a number of petroleum releases from its hydro plants. The bulk of these releases originate with the bearing oil-cooling system that utilizes cold water from the penstock passing through a coil (to cool the oil) submersed in the bearing oil pot. If the cooling coil fails, water will fill the bearing pot, raising the oil level and forcing the oil out and resulting in a release. To address the issue, three controls have been identified for implementation which will minimize the potential for petroleum releases in 23 hydro plants between 2001 and December 31, 2012.

6. PCB PHASE-OUT PROGRAM

Background

Polychlorinated Biphenyls (PCB's) contaminated oil filled electrical equipment has been an operational issue with the Company for some years. The majority of the PCB problem was the result of cross contamination of mineral oil with PCB's during manufacture. This resulted in equipment manufactured during a certain time frame to have low level PCB - normally found in the range of 50 - 500 mg/kg. From the time that PCB's were recognized as a problem and to present, various initiatives have been deployed to remove PCB contaminated equipment from service. Early in the process, the Company concentrated on the high-risk areas. All oil filled equipment located in sensitive areas were addressed to ensure that concentration levels were less than 50 mg/kg PCBs, then all large pieces of oil filled equipment (volume greater than 1000 litres) were addressed. The remaining contaminated equipment is comprised of pole mounted distribution transformers located in non-sensitive areas and some oil filled equipment in various substations. It is estimated that approximately 4 percent of the remaining older vintage equipment is contaminated.

Note: PCB items such as street lighting capacitors, ballasts in florescent lighting fixtures in buildings, PILC cables and potheads will be addressed through attrition.

Breaker and transformer bushings, PT's, and CT's will be addressed in Objective and Target #7 "*Bushings and Instrument Transformer Phase Out Program*". Newfoundland Power has received an approval from Environment Canada to extend the end-of-use for bushings, CTs and PTs to December 31, 2014.

The Company is determined to have all its oil filled electrical equipment in service meet a concentration level of less than 50 mg/kg PCBs by December, 2015.

7. BUSHINGS AND INSTRUMENT TRANSFORMER PHASE OUT PROGRAM

Background

Newfoundland Power's existing PCB phase-out program as outlined in its Environmental Objectives and Targets is scheduled for completion in 2015.

The existing Program excludes breaker and transformer bushings as well as street lighting capacitors, ballasts in florescent lighting fixtures in buildings, potheads, PILC cables (Refer to Objective and Target # 6 " *PCB Phase Out Program*") These were to be addressed through attrition as they are removed from service. In September 2008, Environment Canada published the PCB Regulations which required the elimination of all equipment containing PCBs in a concentration of 500 mg/kg or more by December 31, 2009.

In consultation with Environment Canada, the electrical utility sector is recommending that bushings and instrument transformers be included in the 2025 end-of-use deadline to facilitate orderly replacement through attrition, testing and replacement programs.

Considering the uncertainty of the proposed changes to the PCB Regulations, the 2011 objective will be to complete testing of bushings on units that an oil sample can be taken from on power transformers and bulk oil filled breakers that are to be removed from service for maintenance in 2011. Bushings that are tested at 50 mg/kg or greater will be identified for replacement.

8. SULPHUR HEXAFLUORIDE (SF₆) MANAGEMENT PROGRAM

Background

Sulphur hexafluoride (SF₆) is a persistent greenhouse gas. Its Global Warming Potential (GWP) is estimated to be 23,900 Carbon Dioxide (CO₂) equivalent (over a period of one hundred years). SF₆ is a synthetic gas used as an arc extinguishing and insulating medium in electrical equipment. This gas can at times be released during the operation and maintenance of circuit breakers.

SF₆ releases can be controlled through best management practices such as; SF₆ recovery, reuse and recycling utilizing specialized equipment and SF₆ leaks can be detected using leak detection technologies and minimized by maintaining or replacing the SF₆ insulated equipment.

The Company has an ongoing 10 year regular maintenance cycle for all SF₆ breakers. These breakers were built by various manufactures and are of various vintages. Based on service history it has been determined that the Westinghouse/Siemens breakers which have been in service for some time have a higher potential to release SF₆ gas compared to breakers from other manufacturers. There were 30 of these Westinghouse/Siemens breakers in service as of year-end 2006. Over the last several years the Company adopted a more focused approach in eliminating our most troublesome units through replacements with refurbished or new breakers. In mid-2008, it was decided that the Company would no longer be refurbishing the

Westinghouse/Siemens breakers, rather these will be replaced with new units. As of year end 2009, there were 23 units which had been refurbished or replaced with new.

The Company is determined to continue to ensure that SF₆ gas is managed in an environmentally responsible manner. With this in mind the Company will replace 12 Westinghouse/ Siemens SF₆ breakers by December 31, 2013.

9. MINI-PADMOUNT TRANSFORMER ACCELERATED REPLACEMENT PROGRAM

Background

Spills from mini-padmout transformers have been an operational issue with the Company for a number of years. The problem is due to corrosion deteriorating the structural integrity of the steel casing to an extent where oil is released into the environment. Since this rust occurs underneath the unit it is difficult to identify during a routine inspection. Therefore the Company plans to identify and replace a number of the older units which it believes has the highest risk of a spill. As per the current practice the new replacement units will be constructed of stainless steel rather than the mild steel which was used in the past. This program will be implemented in the St. John's area where the vast majority of the older mini-padmouted transformers are in service. Also, as per the Company's current practice, all new padmouted transformers which are purchased for either replacement or new services will be of stainless steel construction.

10. MERCURY VAPOUR STREET LIGHT REPLACEMENT PROGRAM

Background

The Company maintains approximately 56,000 streetlights providing street and area lighting throughout its service territory, including approximately 7,000 Mercury Vapour (MV) streetlights. These MV streetlights are not as energy efficient as the High Pressure Sodium (HPS) streetlights that have replaced the MV units as the Company standard. Through normal attrition approximately 538 MV streetlights are replaced each year. At the current replacement rate it will take approximately 13 years to remove all of the remaining 7,000 MV streetlights from the distribution system.

By replacing these older MV street lights there is the added benefit of removing lighting fixtures which have a higher probability of containing PCB. The majority of the mercury vapour lights which the Company purchased were manufactured at a time when PCB was approved for use. By removing these older fixtures one will phase out any remaining PCBs associated with our street lighting fixtures.

With this in mind the Company will replace all remaining mercury vapour street lights (approximately 7000 units) by December 31, 2011.

11. CUSTOMER ENERGY CONSERVATION PROGRAM

Background

In June 2008, Newfoundland Power and Newfoundland and Labrador Hydro completed a five year conservation plan entitled the *Five-Year Conservation Plan: 2008 – 2013* (the Plan) which outlined specific programs to deliver energy efficiency savings to customers over the next five years, with the expectation that the Plan would evolve with the Province's conservation activities. The plan, as revised in the fall of 2008, forecast annual energy savings that by the end of 2013 total 70 GWh. The plan included savings from three residential conservation programs, one commercial program and one industrial program. Newfoundland Power's portion of the total energy savings was forecast to be 20 GWh.

With this in mind the following objectives were set:

- To encourage our customers to conserve energy through energy conservation programs, information sessions and advertising. Through the programs implemented in 2009 it is expected that these programs will reduce the Company's sales by 15 GWh during 2013 (this is participants savings less an estimate of those would have implemented the changes without the programs). This objective will be updated as new programs are introduced and the five year plan is updated.
- The following table provides the targeted participants savings required to meet the forecast net savings of 15 GWh in as per the plan.

Year	Participant Savings (GWh)	Savings During 2013 (GWh)	Annualized Savings (GWh)
2009	0.6	2.1	2.1
2010	2.3	4.4	4.4
2011	2.7	5.1	5.1
2012	3.0	5.7	5.7
2013	3.3	3.3	6.1
Total savings in 2013 ¹		20.6	23.4

1 – Total Participant Savings of 20.6GWh in 2013 is greater than 15 GWh to account for the potential that some customers may have implemented the cost savings measures without the conservation program

12. Hydraulic Awareness and Training Program

Background

In 2002, the Company initiated a program focused on replacing deteriorating hydraulic hoses on line vehicles. This program was successful in identifying and

replacing deteriorating hoses and an investigation to the causes of the deterioration lead to a higher standard of hoses on our vehicles.

From 2003 to 2005, the number of spills caused by hydraulic components dropped significantly to a low of 12 spills caused by hydraulics in 2005. Over the last 5 years there has been an ever increasing number of environmental spills associated with our fleet vehicles, in particular our hydraulic aerial devices. In 2010 we completed a comprehensive review of our vehicle spills and unlike our experience from the 90's there is no clear pattern of component failure. There is however, a number of themes that run through most of the spill occurrences. The majority of events could have been prevented by an increased level of diligence by the operator of the vehicle or the suppliers who are inspecting and repairing our vehicles. In order to reverse this trend we will be implementing a number of initiatives in 2011.

- A Hydraulic system awareness program will be developed and delivered to all operators of the aerial fleet. This will include the proper operation of the equipment along with inspection techniques to identify potential failures. The completion date of the training program by December 31, 2011
- The Company will implement a two year program for mechanics from external suppliers containing the following three modules.
 1. Structural and Regulations
 2. Hydraulics One and Two
 3. Hydraulics Three and Four
- To further improve the diligence of suppliers the Company will implement an audit program that will see the Company's internal Vehicle Service Centre Mechanics review the thoroughness of inspections at external garages who do work on the Company's behalf