Q. Under the heading of Substations, Replacements Due to In-Service Failures, please provide an inventory of replacement equipment at the beginning of 2010, an inventory at the end of 2010, and a listing, as well as purchase price, of equipment that was replaced throughout the year.

A. *Substations, Replacements Due to In-Service Failures*

The Substations, Replacements Due to In-Service Failures item involves the replacement of substation equipment that has been retired due to storm damage, lightning strikes, vandalism, electrical or mechanical failure, corrosion damage and failure during maintenance testing. Equipment replaced under this item includes circuit breakers, reclosers, potential transformers, voltage regulators, protective relays, battery banks and chargers, and switches.[1] Substation equipment that fails in-service requires immediate attention as it is essential to the integrity and reliability of the electrical supply to customers.

Replacements under this item are typically due to emergencies, failure of equipment while in service, or observed deficiencies indicating risk of imminent failure. The project cost estimate is based upon historical expenditures.

Inventory of Replacement Equipment

Newfoundland Power maintains an inventory of spare and replacement substation equipment.[2] This inventory is comprised of items purchased to be used as spare equipment, as well as equipment that has been removed from service due to malfunction or damage and subsequently assessed and refurbished.

The Company does not keep a history of the inventory of spare and replacement equipment. Therefore, a listing of spare and replacement equipment as of the beginning and end of 2010 could not be reconstructed within the time frame allowed for responses to requests for information.

Table 1 provides a summary of the Company's current spare and replacement substation equipment inventory, categorized by equipment type.

[1] Repair or replacement of substation power transformers would not be included in this item. The Company has a fleet of portable substations that are used for emergency restoration of service in the event of an in-service failure of a power transformer. A small number of power transformers are held in reserve and are restricted to use in only a few locations.

[2] The Company's approach to maintaining spare substation equipment is based on the criticality of this equipment to electrical system reliability. The required quantity and types of spare substation equipment are determined based on engineering judgement, giving consideration to past experience, equipment criticality, physical condition, environmental risk, potential repair costs and delays to service restoration in the event of in-service failure.

Table 1
Spare Substation Equipment
Inventory as of August 7, 2011[3]

Equipment Type	Quantity
Circuit Breakers (all voltage classes)	9
Reclosers (all voltage classes)	10
Protective Relays (various types)	22
Potential Transformers (all voltage classes)	27
Voltage Regulators (all voltage classes)	27
Battery Chargers	8
Switches (all voltage classes)	20

Table 2 provides a list of equipment which Newfoundland Power purchased in 2010 that was placed into the substation spare equipment inventory as future replacements for in-service failures.

Table 2
Spare Substation Equipment
Purchased in 2010

Equipment	Quantity	Unit Cost[4] ($)
138 KV Circuit Breakers	1	$60,000
66 KV Circuit Breakers	5	$44,000
25 KV Circuit Breakers	1	$31,200
Reclosers	6	$22,000
Protective Relays (various types)	4	$8,800
66 KV Potential Transformers	4	$6,600
25 KV Potential Transformers	4	$2,000
Voltage Regulators (all voltage classes)	9	$17,000
125 VDC Battery Banks	6	$13,300
125 VDC Battery Chargers	6	$4,600
48 VDC Battery Banks	1	$1,500
48 VDC Battery Chargers	1	$2,500
66 KV Switches	5	$4,900

[3] This list includes equipment that is currently available as replacement for in-service failures. This list does not include equipment that is awaiting assessment to determine whether it can be refurbished and placed into the reserve of spare and replacement substation equipment.

[4] Reflects the approximate cost of each unit of equipment purchased in 2010.

2010 Equipment Replacements

Table 3 provides a listing of equipment replaced in 2010 through the Substations, Replacements Due to In-Service Failures item, categorized by equipment type.

Table 3
2010 Substations, Replacements
Due to In-Service Failures

Equipment Replaced	Location
Circuit Breakers	
66 kV Breaker	Bayview Substation BVS-358L-B
138 kV Breaker	Clarenville Substation CLV-124L-B
66 kV Breaker	Goulds Substation GOU-3L-B
66 kV Breaker	Hardwoods Substation HWD-54L-B
25 kV Breaker	Kenmount Substation KEN-03-B
66 kV Breaker	Laurentian Substation LAU-305L-B
66 kV Breaker	Ridge Road Substation RRD-32L-B
66 kV Breaker	Ridge Road Substation RRD-67L-B
Reclosers	
Recloser	Bishop Falls Substation BFS-01-R
Recloser	Dunville Substation DUN-02-R
Recloser	Gander Bay Substation GBY-03-R3
Recloser (2 units)	Gillams Substation GIL-01-R & GIL-02-R
Recloser	Islington Substation ISL-01-R
Recloser (2 units)	Kelligrews Substation KEL-01-R & KEL-02-R
Recloser (2 units)	Marystown Substation MSY-01-R & MSY-02-R
Recloser	Pulpit Rock Substation PUL-03-R
Recloser	St. Catherine's Substation SCT-01-R
Recloser (2 units)	Summerford Substation SUM-01-R & SUM-02-R
Recloser	Twillingate Substation TWG-01-R
Recloser	Western Avalon Substation WAV-01-R
Protective Relays	
Protective Relay	Boyds Cove Substation BOY-TL254-B
Protective Relay	Grand Falls Substation GFS-07-B
Protective Relay	Kings Bridge Substation KBR-16L-B
Protective Relay	Kelligrews Substation KEL-52L-B
Protective Relay	Oxen Pond Substation OXP-32L-B
Protective Relay	Oxen Pond Substation OXP-67L-B
Protective Relay	Pepperell Substation PEP-16L-B
Protective Relay	Ridge Road Substation RRD-32L-B
Protective Relay	Ridge Road Substation RRD-67L-B
Protective Relay	Seal Cove Substation SCV-38L-B
Protective Relay	Seal Cove Substation SCV-52L-B

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Table 3 (continued)
2010 Substations, Replacements
Due to In-Service Failures

Equipment Replaced	Location
Potential Transformers	
25 kV PT (2 units)	Kelligrews Substation
Voltage Regulators	
Voltage Regulator (2 units)	Clarenville Substation CLV-03-VR1
Voltage Regulator	Doyle's Substation DOY-01-VR1
Voltage Regulator (3 units)	Garnish Substation GAR-01-VR1
Voltage Regulator (3 units)	Greenhill Substation GRH-02-VR1
Voltage Regulator	Glovertown Substation GLV-02-VR1
Voltage Regulator	Terra Nova Substation TNS-01-VR1
Voltage Regulator	Wesleyville Substation WES-02-VR2
Battery Banks & Chargers	
125 VDC Battery Bank and Charger	Carbonear Substation
125 VDC Battery Bank and Charger	Gambo Substation
125 VDC Battery Bank and Charger	Greenhill Substation
125 VDC Battery Bank and Charger	Hardwoods Substation East Building
125 VDC Battery Bank and Charger	Lawn Plant Substation
48 VDC Battery Bank and Charger	Lewisporte Substation
125 VDC Battery Charger	Molloys Lane Substation
125 VDC Battery Bank and Charger	Rose Blanche Plant Substation