Engineering Report

Holyrood Generating Station
MCC Assessment

REGISTERED PROFESSIONAL ENGINEER
PEGNL
DENNIS J. KEHOE
SIGNATURE
DATE
NEWFOUNDLAND & LABRADOR

Newfoundland and Labrador Hydro
St. John's, NL

Stantec Consulting Ltd.
Suite 1 South,
130 Eileen Stubbs Ave,
Dartmouth, Nova Scotia, B3B 2C4

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January 15, 2009
Project #: 133530025

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1.0 Introduction

In 2007, Neill and Gunter (Now Stantec Consulting) were contracted by Newfoundland and Labrador Hydro (Hydro) to provide an Arc-Flash Hazard Analysis at the Holyrood Generating Station.

Part of this analysis was to calculate available fault currents and compare the indicated fault levels to equipment interrupting ratings. This comparison would identify equipment that is applied close to or over its ratings. Performing this comparison required that equipment ratings be clearly established.

The report concluded that all 4,160V switchgear and 600V switchgear are applied well within their ratings. However, the field information gathering process was unable to determine the equipment ratings for the 600V Motor Control Centers (MCC's). The fault levels for the equipment were established in the report however, the comparison of equipment ratings to the available fault level could not be completed. As a consequence, the report recommended that Hydro ...

> *"Initiate a program to gather Motor Control Center data that will allow a comparison to be made between the available fault levels and the Motor Control Center ratings."*

For 600V MCC's, this would include the bus bracing data as well as the individual starter protective device ratings.

As a consequence of the recommendations in the Arc-Flash Hazard Analysis Report, Hydro initiated a comprehensive field data collection study for the MCC's. This report presents the results of that investigation.

In June 2008, Stantec Consulting performed an inspection of all Motor Control Centers (MCC's) at the Holyrood Generating Station. Hydro staff assisted Stantec Personnel by providing access to individual starters in all MCC's. The process involved picking a representative number of starters in each MCC so that all starter sizes would be inspected. Nameplate information was taken from the short circuit protection equipment in the selected starters.

2.0 Plant Layout

Hydro identifies the Motor Control Center (MCC) equipment in the plant as either Stage 1 equipment or Stage 2 equipment. This designation corresponds to the construction timeline with Generator Units 1 and 2 coming on stream as Stage 1 in 1970 and Generator Unit 3 as Stage 2 in 1980.

The Motor Control Centers (MCC's) installed on Stage 1 construction were predominantly General Electric CR7092C Series MCC's and they are now almost 40 years old. The MCC's installed on Stage 2 construction were predominantly Siemens Model 8PU and they are nearly 30 years old. There were a small number of MCC's manufactured by either Square D (Model 6, Class 8998) or Allen Bradley (Bulletin 2100). The Square D MCC's would be at least 20 years old whereas the Allen Bradley MCC was a fairly recent installation.

Stantec inspected one additional Motor Control Center (MCC) in the Gas Turbine building. It was manufactured by Associated Electric Industries (AEI). This MCC will be covered under a separate report dealing specifically with the Gas Turbine equipment including the MCC, the Voltage Regulator and the Start Rectifier.

3.0 Site Investigation

The short circuit interrupting ratings for Motor Control Centers (MCC's) consist of a bus bracing rating in Kilo Amps (kA) and the starter interrupting rating in Kilo Amps (kA). The Motor Control Center (MCC) bus bracing must be able to physically withstand the mechanical forces imposed on it by the maximum anticipated fault level. The short circuit protection device within individual starters has an interrupting rating and it too must be higher than the maximum anticipated fault level.

Unfortunately, it is not always possible to establish the interrupting rating of a device by an inspection of the nameplate data. In some instances the interrupting rating is simply not listed on the nameplate, or the nameplate has deteriorated over time such that the information is unreadable. Where the interrupting rating of a device was not readily discernible from a nameplate inspection, Stantec used the series, catalog, or model number of the device and researched the equipment on the respective Manufacturer's web site to determine short circuit ratings.

3.1 Overall MCC Assessment

The inspection of the Holyrood MCC's resulted in the conclusion that the general condition of the MCC's is acceptable. It was observed that in several instances circuit breakers, contactors and overloads in starter units had been replaced with newer components likely due to failure of the original equipment or obsolescence. This should not be considered unusual given the age of this equipment. However, as long as the underlying equipment ratings are still adequate, there are no specific criteria which would suggest an MCC should be replaced. Individual starter components and entire starter units are readily available and can be used to replace original equipment that is no longer serviceable. The only real concern is that reliability, measured by mean time to failure, tends to deteriorate with age.

3.2 Stage 1 MCC's

The MCC's installed on Stage 1 are predominantly General Electric CR7092C series. Based on the Instruction Bulletin for the General Electric CR7092C series MCC, the bus bracing is 25 kA which in all cases is well above available short circuit levels. Individual starter units utilized General Electric TEF, TED and TFJ thermal magnetic circuit breakers. Research on the GE web site indicates the interrupting rating on these breakers is a minimum of 14 kA.

3.3 Stage 2 MCC's

The MCC's installed on Stage 2 are predominantly Siemens Model 8PU. Based on Stantec's research, including discussions with Siemens technical support, the minimum bus bracing offered on this MCC model was 22 kA. Individual starter units utilized a variety of Circuit Breakers, Fuses and Motor Circuit protectors. In all cases, the minimum interrupting rating of the starter units was determined to be 14 kA.

3.4 Square D MCC's

There are several Square D MCC's in the plant. All Square D MCC's were Model 6, Class 8998. The bus bracing on these MCC's is rated at 42 kA. The short circuit protection within the starter units was provided by FA, FAL and FHL thermal magnetic circuit breakers. The interrupting rating on the FA and FAL breakers is 14 kA. FHL breakers are rated at 18 kA. Hence, the minimum interrupting rating for these MCC's is 14 kA.

3.5 Allen Bradley MCC

A single MCC was manufactured by Allen Bradley. It was a Bulletin 2100 series with a bus bracing of 42 kA. The short circuit protection in the starter units was provided by HRC fuses with a 100 kA interrupting rating.

4.0 Analysis of Field Data Collection

Appendix 1 contains a tabulation of the various bus (MCC) numbers and compares calculated short circuit level with the equipment ratings as established in Section 3 of this report. Some aspects of the table require explanation.

Some of the listed devices appear with separate MCC numbers when in fact they are devices within another MCC. For example, MCC 12B is listed as a separate MCC, when in fact it is a non-fused main disconnect switch on MCC 12. A non-fused disconnect would never interrupt fault current and therefore has no interrupting rating. Similarly, MCC BAB3 B is listed as a separate MCC, but it is a pair of interlocked molded case switches within MCC BAB3. These switches are used to manually transfer supply from breaker BAB-3 to MCC SDB-34. Again a molded case switch does not interrupt fault current and therefore has no interrupting rating.

> *For evaluation of protective devices, the Arc Flash Study used the following criteria:*
>
> *FAIL* — *Component is applied over 100% percent of its rating.*
>
> *MARGINAL* — *Component is applied between 85 – 100% of its rating.*
>
> *The Study noted that equipment rated as MARGINAL is still applied within its rating. The marginal rating simply highlights areas where load growth or system modifications should be carefully analyzed.*

The analysis in this report uses the criteria that all equipment applied within its rating is acceptable. This approach is recommended based on the methodology used to calculate maximum available fault current in the Arc Flash Study. An Arc Flash Study, by necessity, models the system using the worst case scenario that all motors connected to an individual MCC are operating and contributing to available fault current. However, this is an unlikely scenario for the Holyrood Plant, given that individual motors have some redundancy and rarely if ever operate at the same time. More significantly, if all motors connected to an MCC were running, the MCC supply feeder would in most instances be overloaded resulting in an overload trip of the MCC supply feeder breaker.

4.1 Findings

The spreadsheet, in Appendix 1, indicates that the MCC's identified below are installed in circuits where the available fault current exceeds the rating of the short circuit protection device within the individual starters:

MCC C1, MCC C2, MCC C3, MCC E1, MCC GPB 34 and MCC SDB 34

5.0 Equipment Retrofit / Replacement

The consequences of having a short circuit protection device installed in a circuit where the maximum available fault current exceeds the device interrupting rating cannot be overstated. Newfoundland Hydro must take every opportunity to correct this situation. In the narrative below, some of the options available to resolve these issues are identified:

1. Total MCC Replacement
2. Replacement of Short Circuit Devices in individual MCC Starters
3. Installation of Series Reactors to Reduce Available Fault Current

5.1 Total MCC Replacement

Given the age of the MCC's at the Holyrood Plant, there is an argument to be made for complete replacement of the MCC's identified in Section 4.1 above. The bus bracing and short circuit interrupting ratings for new MCC's will easily exceed the available fault currents at the Holyrood Plant.

The only negative aspect to replacing the MCC's is cost. This would clearly be the most expensive option. Although it is dependent on the starter sizes within each MCC section, an average budget for purchasing new MCC's (front mounted units only) would be $10,000 per vertical section. The installation cost would add another $10,000 per section on the assumption that all motor feeder and control conductors can be re-terminated on the new MCC's.

Although an actual count of starters, starter sizes, and number of sections was not completed during the field investigation, an approximate count was obtained from the MCC Single Line Diagram A0-1403-500-E-004.

	Starters	Equivalent Sections (Single Sided)
• MCC C1	24	6
• MCC C2	11	2
• MCC C3	13	3
• MCC E1	27	7
• MCC C2	11	2
• MCC GPB 34	22	6
• MCC SDB 34	13	3
Total	121	29

Based on this approach, an estimate for new replacement MCC's including engineering at 10% and 20% contingency would be $765,000.

5.2 Replacement of Short Circuit Devices in individual MCC Starters

In all cases the MCC bus bracing was sufficient to withstand available fault current magnitudes. Consequently, Hydro could replace the individual short circuit protection devices in each MCC starter as an alternative. The Predominant short circuit protection devices are molded case thermal magnetic breakers.

Three options are available for replacement of the existing thermal magnetic breakers. Hydro could install new thermal magnetic breakers, new Motor Circuit Protectors or new fused disconnect switches.

For thermal magnetic breakers or Motor Circuit Protectors it is reasonable to assume that the existing "through the door" breaker handles could be retrofitted to accommodate new breakers or motor circuit protectors. For new fused disconnect switches, the handle and perhaps the entire door might need replacement. The advantage of a fused disconnect switch is that it would generally provide slightly faster fault clearing times and hence reduce arc flash energy. However the arc flash hazard rating for the starter could not be reduced due to the fact that the incoming supply conductors on the high side of the fused switch would still retain the Arc Flash Hazard of the MCC supply feeder. As a consequence, Stantec could not recommend the extra cost associated with fused switches.

Motor Circuit Protectors have an instantaneous trip rating only and they are typically less expensive than a Thermal Magnetic Breaker which has both an instantaneous rating and a thermal (i.e. overload) rating. In an MCC starter, motor overload protection is provided by a separate overload device hence the Motor Circuit Protector is generally a more practical solution in a new MCC. However, as a retrofit device, a Motor Circuit Protector does not have an interrupting rating listed on its nameplate due to the fact that they must be tested as an assembly with the associated contactor and overload relay. Based on this, Stantec cannot recommend new Motor Circuit Protectors for this retrofit application.

By replacing the existing molded case circuit breakers, with higher interrupting rated circuit breakers, Hydro could be assured that high magnitude faults within the MCC starter would be cleared hence eliminating the potential of an eventful failure of a circuit breaker as is currently the case. To implement this approach it will require replacement of all existing short circuit protection devices with new Circuit Breakers. In order to determine a budget for this work, an assumption was made that all 121 starters identified in the previous section were equivalent to a Size 2 Starter. The maximum continuous rating for a Circuit Breaker in a 600 Volt Size 2 starter is 50 Amps. The cost to purchase a 50 Amp, 600 Volt, 18 kA, thermal magnetic circuit breaker is estimated at $500. The installation cost would be approximately $250 per device assuming the existing handle can be adjusted to suit the replacement Circuit Breaker. Based on 121 starters, equated to a Size 2, a budget estimate for these replacements including engineering at 10% and 20% contingency would be $120,000.

5.3 Installation of Series Reactors

A detailed analysis of the installation of series reactors was not part of the scope of Stantec's engagement however a preliminary investigation was completed because in some instances series reactors can provide a cost effective solution.

A series reactor installed in the supply feeder to an MCC will reduce the maximum anticipated fault level. By selecting an appropriately sized reactor (i.e. sized for maximum full load current on the MCC), it is possible to reduce the available fault level at each MCC to the point that the existing short circuit protection devices would be applied within their interrupting rating. In addition, this approach has the advantage of potentially reducing the Arc Flash Hazard level at each MCC. Series reactors have some negative aspects in that they introduce additional energy losses, reduce the voltage arriving at the MCC and they limit the inrush current for motor starting which could reduce the maximum HP where across the line starting can be used. Prior to a decision on implementation, all of these concerns would have to be examined for each individual MCC.

Stantec had previously modeled the Holyrood Electrical Distribution System using SKM software as part of their Arc Flash Study in 2007. Stantec used this existing SKM model to predict the feasibility of using series reactors to reduce the fault level to the point that the existing equipment could handle the anticipated fault level. This preliminary analysis is documented in a report attached as Appendix 2. The analysis indicates that the installation of series reactors has the potential to be a viable option for some MCC installations. Intuitively, we can state that if the fault level is reduced at an MCC, it is likely there would also be a reduction in the Arc Flash Energy. (Note: The reader is cautioned that if the fault clearing time increased due to the reduced fault level the Arc Flash Energy could remain the same.)

As the report indicates, a detailed study would have to be performed on each of the MCC's to verify that the installation would indeed lower the fault level below existing equipment ratings yet the potential impacts on system losses, steady state voltage and motor starting would be acceptable or alternatively could be easily mitigated. The impact on Arc Flash rating could also be determined. Prior to initiating the study, there would be load monitoring requirements at each MCC to determine the full load amp rating of the Series Reactors.

Budget pricing of $12,100 was obtained from Hammond Power Solutions for a typical series reactor rated at 600 Amp and 600 Volts. A budget estimate including engineering at 10% and 20% contingency, for the installation of 7 series reactors would be $185,000.

This estimate assumes that the reactors would be installed at floor level (4' X 4' footprint) adjacent to the respective MCC. If the reactors had to be elevated due to floor space constraints, there would be an additional cost for structural supports to accommodate the reactors which have an approximate weight of 1,000 lbs each. Without additional site specific engineering, it would be difficult to put a price on the potential costs of structural supports.

6.0 Conclusions and Recommendations

The field inspection identified seven (7) Motor Control Centers where the available fault current exceeded the interrupting rating of the individual starter protection devices. This violates a fairly basic principle of the Canadian Electrical Code:

> ***14-012 Ratings of protective and control equipment***
> *In circuits of 750 V and less,*
> *(a) Electrical equipment required to interrupt fault currents shall have ratings sufficient for the voltage employed and for the fault current that is available at the terminals ...*

Newfoundland and Labrador Hydro must take reasonable steps to correct this deficiency.

The potential solutions available to Hydro have been identified and Stantec have provided preliminary capital cost estimates. The most expensive option is to replace the MCC's with new suitably rated MCC's. Given the age of the existing MCC's, this option would reduce maintenance cost and improve operational reliability. It would be very difficult to try to quantify the dollar value of reduced maintenance and increased reliability. Stantec could not recommend replacement of the existing MCC's because of the significantly higher costs - $765,000.

Replacing the individual short circuit protective devices within each starter is a viable alternative. This option requires the purchase of thermal magnetic circuit breakers with an 18 kA interrupting rating for five (5) MCC's and a 22 kA rating for two (2) MCC's. The footprint of current technology breakers is smaller that the existing circuit breakers so retrofit of the replacement breakers should not be an issue. Our analysis was not able to determine if the "through the door" handles could be easily modified to accommodate the new breakers however Stantec does not believe this to be a serious concern. This option would be the least cost solution ($120,000) to resolve the problem of short circuit levels exceeding the interrupting rating of the Starters.

Stantec performed a preliminary analysis on the feasibility of installing series reactors. Series Reactors could reduce the available fault current at each MCC such that the existing equipment would be operating within its interrupting rating. A potential side benefit from the installation of series reactors is that the actual Arc Flash Hazard Levels could possibly be reduced at each MCC. This has obvious safety benefits for Hydro Maintenance Staff. The cost to retrofit all seven MCC's was estimated at $185,000.

Using the SKM model for the Holyrood Plant, Stantec investigated 4 MCC's using generic reactor sizing based on assumed maximum full load current. The preliminary analysis indicates that some of the MCC's are good candidates for series reactor installation. Prior to implementing series reactors, a detailed study would have to be performed on each MCC to determine the maximum load requirements of the MCC. This would allow a selection of a specific reactor size which in turn would identify the characteristics of the series reactor (i.e. impedance). The specific impedance value would then be used in the SKM model to verify that the installation would indeed lower the fault level below existing equipment ratings yet the potential impacts on system losses, steady state voltage and motor starting would be proven to be acceptable or alternatively could be easily mitigated. The potential reduction in Arc Flash Hazard Level should also be calculated.

Based on the above analysis, it is our recommendation that Hydro initiate the required analysis for series reactor installation on all seven (7) MCC's.

It is possible that series reactors will not be suitable for some of the MCC's at Holyrood. As a potential alternative solution, Stantec would recommend that Hydro purchase a small number of suitably rated breakers and field verify the level of effort required to retrofit the breakers to existing starters including modification of the breaker handles.

STANTEC CONSULTING LTD.

APPENDIX 1

MCC Short Circuit Interrupting Assessment

STANTEC CONSULTING
HOLYROOD GENERATING STATION
MCC SHORT CIRCUIT INTERRUPTING ASSESSMENT

Client: Newfoundland Hydro

Project: Engineering Services

File: 133530025

Date: October 8, 2008

Revision: 0

MCC (Bus) Name	Short Circuit Level from Arc Flash Study	Manufacturer	Model	Bus Bracing	Starter Interrupting Rating	Comments
	3 Phase Amps			(kA)	(kA)	
MCC 12	9,943	Allen Bradley	Bulletin 2100	42	100	New Allen Bradley MCC
MCC 12 B	10,000	Allen Bradley	Bulletin 2100	N/A	N/A	Not a separate MCC, Main non-fused Disconnect Switch
MCC A1	12,817	GE	CR7092C	25	14	
MCC A1-1	7,597	GE	CR7092C	25	14	
MCC A1-2	2,380	N/A	N/A	N/A	N/A	Not an MCC control panel only no main breaker
MCC A1-3	9,784	Square D	Class 8998	42	14	
MCC B1	13,353	GE	CR7092C	25	14	
MCC B1-1	7,737	GE	CR7092C	25	14	
MCC B1-2	2,384	N/A	N/A	N/A	N/A	Not an MCC control panel only no main breaker
MCC B1-3	10,064	Square D	Class 8998	42	14	
MCC BAB 3	13,544	Siemens	8PU	22	14	
MCC BAB3 B	13,659	N/A	N/A	N/A	No O/L or S/C	Incoming Disconnects from BAB3 / SDB3 Klockner Moeller N12-630NA
MCC BAB3-3	10,092	Square D	Class 8998	42	14	
MCC BRV3	8,898	Siemens	8PU	22	14	
MCC C1	21,734	GE	CR7092C	25	14	
MCC C1 SD	16,209	GE	TFK236225	25	22	Circuit Breaker supplying Switchyard Panel "A"
MCC C2	14,992	GE	CR7092C	25	14	
MCC C3	15,030	GE	CR7092C	25	14	
MCC C3 SD	11,814	N/A	N/A	N/A		Switchyard Panel "A" Feeder Disconnected
MCC C4	7,872		CR7092C	25	14	
MCC C5	13,603	GE	CR7092C	25	14	
MCC C6	7,223	GE	CR7092C	25	14	
MCC C7	11,789	GE	CR7092C	25	14	
MCC C8	5,927	GE	CR7092C	25	14	
MCC C9	9,498	GE	CR7092C	25	14	
MCC CWP 34	7,014	Siemens	8PU	22	14	
MCC E1	20,890	GE	CR7092C	25	14	
MCC ESB 34	17,101	Siemens	8PU	22	18	
MCC GPB 34	17,735	Siemens	8PU	22	14	

STANTEC CONSULTING
HOLYROOD GENERATING STATION
MCC SHORT CIRCUIT INTERRUPTING ASSESSMENT

Client: Newfoundland Hydro

File: 133530025

Project: Engineering Services

Date: October 8, 2008

Revision: 0

MCC (Bus) Name	Short Circuit Level from Arc Flash Study	Manufacturer	Model	Bus Bracing	Starter Interrupting Rating	Comments
	3 Phase Amps			(kA)	(kA)	
MCC GPB34 SD	13,954	Klockner Moeller	ZM9a	22	18	Circuit Breaker supplying Switchyard Panel "A"
MCC GT	2,504	Future Report	Future Report	Future Report	Fuses	
MCC HPH3	8,636	Siemens	8PU	22	14	
MCC SB3	9,804	N/A	N/A	N/A	14	14 kA breaker protecting soot blower control panel not an MCC
MCC SDB34	14,696	Siemens	8PU	22	14	
MCC TAB 3 B	12,978	N/A	N/A	N/A	No O/L or S/C	Incoming Disconnects from TAB3 / SDB3 Klockner Moeller N12-630NA
MCC TAB 34	12,895	Siemens	8PU	22	14	
MCC WAM 34	15,435	Siemens	8PX2	42	18	
MCC WTP 34	11,814	Square D	JX 54	42	14	

APPENDIX 2

Preliminary Analysis - Series Reactor Installation

A study was performed on MCCs fed from auxiliary transformer AT-C, Power Centre C to determine if series reactors were feasible.

Normal operating conditions were used for the analysis. Note that normal operation conditions did not result in worst case fault levels.

Worst case Fault level (This is not practical)	→	all connected loads online	→	ATC xfmr 164%	→	Power Centre C voltage drop = 10%

Normal operating conditions were used for this analysis where transformer capacity is likely to be 100% or less. This was achieved by turning off some loads as dictated by the Holyrood Preliminary Fault Study (2005-11-23). Also, a 60% diversity factor was applied to all loads. By applying these conditions, the voltage drop was approximately 3% at Power Centre C with the transformer AT-C running at 93% capacity.

	Sym. 3ph fault level	**Voltage drop at Bus**	**Demand Load (motors)**	Load Flow & Fault Study Results for Existing System
MCC E1	17.9 kA	3.27%	66 kVA	
MCC C1	18.4 kA	3.62%	457kVA	
MCC C2	13.3 kA	3.45%	69kVA	
MCC 3C	13.4 kA	3.49%	80kVA	

It should be noted that the transformer AT-C has an impedance of 12%; therefore, the primary tap was set at -5% to minimize voltage drop.

Series Reactor Specifications provided by Hammond:

- 3-phase air core
- Indoor rated
- Z = 0.012 ohm – assume X>>R ~ X/R = 20
- 600A, 600V continuous
- 12kA fault current for 3 seconds

Results obtained with series reactor added to four MCCs. Note that the fault level will decrease as more reactors are added to MCCs.

	Sym. 3ph fault level	**Voltage drop at Bus**	**Voltage drop through reactor**	Load Flow & Fault Study Results <u>with</u> Reactor Added
MCC E1	11.4 kA	3.55%	0.3%	
MCC C1	10.8 kA	5.35%	1.7%	
MCC C2	10.1 kA	3.71%	0.3%	
MCC 3C	10.1 kA	3.77%	0.3%	

Where breakers are rated for 14 kA, fault level should not excel 85% of the interrupting rating, equal to 11.9 kA.

Voltage drop should not exceed 5%.

Recommendations

Upon investigating the MCCs connected to Power Centre C in the Holyrood generating station, it is concluded that some of the MCCs may be candidates for adding a series reactor.

The results obtained show that for an initial voltage drop of 3% at Power Centre C with the transformer AT-C running at 93% capacity, the voltage drop at MCC C2, C3, and E1 will not exceed a 5% voltage drop under steady state conditions with a diversity factor of 60% applied when a series reactor was added.

The results obtained also show that when all motors (modeled as lump sum) are started at the same time, the voltage drop for MCC C2, C3, and E1 does not drop below 85% of the nominal voltage of 600V.

Implementation

If this concept is to be applied, the following steps should be completed before implementation:

- Check the typical demand for the MCCs and re-run a load flow study for typical voltage drop values on existing system.
- Have a vendor provide a custom design reactor to suit the particular MCC. Note that one size may not be suitable to every MCC. Vendors capable of these services are Hammond Power Solutions and Stein Industries.
- Complete a load flow, motor starting, and fault study for each MCC with the specifications of the custom reactor. Note that each MCC will have to be assessed individually.

APPENDIX 3

Field Data Collection

STANTEC CONSULTING
HOLYROOD GENERATING STATION
MCC FIELD DATA COLLECTION

Client: Newfoundland Hydro **File:** 133530025

Project: Engineering Services **Date:** October 8, 2008
Revision: 0

MCC	STARTER INFORMATION							
	STARTER ID TAG	HP	TYPE	INTERRUPT RATING	DEVICE	RATING	MANUFACTURER	PART NUMBER
MCC-BAB-3: Siemens Model 8PU 600A H, 400A V, Ser # A-52-5042	SOOT BLOWER MCC-SB-3		BREAKER	14 kA	BREAKER	50	KLOCKNER-MOELLER	NZM 6B-63
	WELDING RECEPTACLE		BREAKER	22 kA	BREAKER	100	KLOCKNER-MOELLER	NZM H6-100
	MCC-HPH-3		BREAKER	14 kA	BREAKER	70	KLOCKNER-MOELLER	ZM 6A-70
	HARD HAT VESTIBULE HEATER		FUSED DISCONNECT	100 kA	HRC FUSE	15A	ENGLISH ELECTRIC	HRC FORM II
	FLAME SCANNER COOLING BLOWER - NORTH	5	STARTER	100 kA	HRC FUSE	15A	SIEMENS	3NW2114
	UNIT 3 WATERLANCE WATER SUPPLY PUMP	30	STARTER	18 kA	MCP	50A	SIEMENS	CED6-ET1 (CAT# ED63A050)
	RESERVE FEEDWATER TRANSFER PUMP	75	STARTER	14 kA	BREAKER	100	KLOCKNER-MOELLER	NZM 6B-100
	UNIT 3 FUEL OIL PUMP - WEST	60	STARTER	14 kA	BREAKER	100	KLOCKNER-MOELLER	NZM 6B-63
	GENERAL SERVICES COOLING WATER PUMP - WEST	20	STARTER	100 kA	HRC FUSE	40A	SIEMENS	FORM II CLASS C
	STAGE 2 BOILER ROOM VENTILATION MCC BRV-3		BREAKER	14 kA	BREAKER	100	KLOCKNER-MOELLER	NZM 6-100
	WATERLANCE CONTROL PANEL		BREAKER	18 kA	BREAKER	20A	SIEMENS	ED63B020
MCC SB-3	MAIN BREAKER		CONTROL PANEL	14 kA	BREAKER	15A	GENERAL ELECTRIC	TED136015
MCC-SDB-34: Siemens Model 8PU 600A H, 400/600A V, Ser # A-52-5042	GENERAL AUX WATER COOLING PUMP - EAST	20	STARTER	14kA	BREAKER	100A	KLOCKNER-MOELLER	NZM 6B-63
	LP HEATER DRAIN PUMP - EAST		BUCKET MISSING TOOK PHOTO OF VERTICAL BUS					
	UNIT 3 VACUUM PUMP - SOUTH	107	BREAKER	14 kA	BREAKER	100A	KLOCKNER-MOELLER	NZM 6B-160
	UNIT 3 LUBE OIL CENTRIFUGE - PORT	68 kW	BREAKER	14 kA	BREAKER	100A	KLOCKNER-MOELLER	NZM 6B-63
	UNIT 3 AUX COOLING PUMP - EAST	60	STARTER	14 kA		100A	KLOCKNER-MOELLER	NZM 6B-63

STANTEC CONSULTING
HOLYROOD GENERATING STATION
MCC FIELD DATA COLLECTION

Client: Newfoundland Hydro **File:** 133530025

Project: Engineering Services **Date:** October 8, 2008
Revision: 0

MCC	STARTER INFORMATION							
	STARTER ID TAG	HP	TYPE	INTERRUPT RATING	DEVICE	RATING	MANUFACTURER	PART NUMBER
MCC-TAB-34: Siemens Model 8PU 600A H, 400/600A V, Ser # A-52-5042	TURBINE HEATER		STARTER	100 Ka	FUSE	20A	ENGLISH ELECTRIC	HRC
	MECH VACUUM PUMP - NORTH	107	BREAKER	14 kA	BREAKER	100A	KLOCKNER-MOELLER	NZM 6B-160
	LP HEATER DRAIN PUMP - WEST	60	STARTER	14 kA	BREAKER	100A	KLOCKNER-MOELLER	NZM 6B-63
	AUX COOLING WATER PUMP - WEST	60	STARTER	14 kA	BREAKER	100A	KLOCKNER-MOELLER	NZM 6B-63
MCC-GPB-34: Siemens Model 8PU 600A H, 400/600A V, Ser # A-52-5042	WELDING RECEPTACLE - COL S9-3		BREAKER	14 kA	BREAKER	70A	KLOCKNER-MOELLER	NZM 6B-100
	AC UNIT - WEST CONDENSOR DISCONNECT		DUAL BREAKER	18 kA	BREAKER	50A	SIEMENS	ED63B50
	AC UNIT - SOUTH EVAPORATOR DISCONNECT			18 kA	BREAKER	15A	SIEMENS	ED63B15
	SWITCHYARD 600V DISTRIBUTION FEEDER		BREAKER	18 kA	BREAKER	225A	KLOCKNER-MOELLER	NZM 9-250
	UPS POWER SUPPLY #4 BYPASS AC SUPPLY		BREAKER	18 kA	BREAKER	100A	SIEMENS	CED 63B 100
	UPS POWER SUPPLY #3 BYPASS AC SUPPLY		BREAKER	18 Ka	BREAKER	100A	SIEMENS	CED 63B 100
MCC-ESB-34: Siemens Model 8PU 600A H, 400/600A V, Ser # A-52-5042	BATTERY CHARGER 250 VDC		BREAKER	18 kA	BREAKER	100A	SIEMENS	CED 63B 100
	GAS TURBINE STARTUP SUPPLY		BREAKER	18 kA	BREAKER	225A	KLOCKNER-MOELLER	NZM 9-250
	UPS #4 MAIN AC SUPPLY		BREAKER	18 kA	BREAKER	90A	KLOCKNER-MOELLER	NZM H6-100
	UPS #3 MAIN AC SUPPLY		BREAKER	18 kA	BREAKER	70A	KLOCKNER-MOELLER	NZM H6-100
MCC-BAB3-3: Square D Model CL 8998, 300A. 600V, Ser # 735848-B	AIR BLOWER	20	STARTER	14 Ka	MCP	30A	SQUARE D	FA FRAME
	CAUSTIC METERING PUMP #2	2	STARTER	14 kA	MCP	7A	SQUARE D	FA FRAME
	DEMINERALIZED WATER PUMP	5	STARTER	14 kA	MCP	15A	SQUARE D	FA FRAME

STANTEC CONSULTING
HOLYROOD GENERATING STATION
MCC FIELD DATA COLLECTION

Client: Newfoundland Hydro | **File:** 133530025

Project: Engineering Services | **Date:** October 8, 2008
Revision: 0

MCC	STARTER INFORMATION							
	STARTER ID TAG	HP	TYPE	INTERRUPT RATING	DEVICE	RATING	MANUFACTURER	PART NUMBER
MCC-HPH-3: Siemens Model 8PU 600A H, 400/600A V, Ser # A-52-5042	UNIT 3 HP HEATER 6 MOV & PILOT VALVE		FUSED DISCONNECT	200 kA	FUSE	25A	SIEMENS	HRC
	WELDING RECEPTACLE		BREAKER	14 kA	BREAKER	70A	KLOCKNER-MOELLER	NZM 6B-100
MCC-BRV-34: Siemens Model 8PU 600A H, 400/600A V, Ser # E-59-0062	VENT FAN #2 NOTE: ALL BUCKETS FUSED EXCEPT WELDING RECPTACLE	7 1/2	STARTER	100 kA	HRC FUSE	15A	SHAMUT	FORM II
MCC-WAM-34: Siemens Model 8PX2 600A H, 440A V, Ser # M4-13988	NORTH BOTTOM WARM AIR MAKE UP FAN	40	STARTER	100 kA	LOW PEAK FUSE		BUSS	LPJ-60SP
	SOUTH DISTRIBUTION TRANSFORMER		BREAKER FEEDING 35A FUSES	18 kA	BREAKER	20A	SIEMENS	ED63B020
	UNIT 3 SOUTH WARM AIR MAKE UP FAN	30	STARTER		AJT FUSE	45A		
	CEMS ROOM TRANSFORMER		BREAKER	18 kA	BREAKER	100A	SIEMENS	ED63B100
	CONDENSATE RETURN PUMPS	7 1/2	BREAKER	18 kA	BREAKER	30A	SIEMENS	ED63B030
MCC-WTP-34: Square D 7 Section 600A H, 600A V, Ser # 2686560-A	EXTERIOR SUMP PIT 5B SOUTH	5	STARTER	14 kA	MCP	50A	SQUARE D	FAL3605016MV
	DILUTION WATER PUMP NORTH	15	STARTER	18 kA	MCP	30A	SQUARE D	FHL3603015MV
	SPARE SECTION 6-D		STARTER	14 kA	MCP	100A	SQUARE D	FAL3610018MV
	SECTION 1-B		DUAL BREAKERS	18 kA	BREAKER	60A	SQUARE D	FHL36060V
MCC-CWP-34: Siemens Model 8PU 600A H, 400A V, Ser # A-52-5042	UNIT 3 TRAVELLING SCREEN - WEST	1 1/2	STARTER	100 kA	HRC II FUSE	6A	GOULD	FES6
	UNIT 3 TRAVELLING SCREEN WASH PUMP - EAST	50	STARTER	14 kA	BREAKER	70A	MOELLER	NMZ 6B-100
	WELDING RECEPTACLE		BREAKER	14 kA	BREAKER	60A	MOELLER	NMZ 6B
PANEL A SWITCHYARD	600V PANEL		BREAKER		BREAKERS		SQUARE D	TYPE ML

STANTEC CONSULTING
HOLYROOD GENERATING STATION
MCC FIELD DATA COLLECTION

Client: Newfoundland Hydro — **File:** 133530025

Project: Engineering Services — **Date:** October 8, 2008

Revision: 0

MCC	STARTER INFORMATION							
	STARTER ID TAG	HP	TYPE	INTERRUPT RATING	DEVICE	RATING	MANUFACTURER	PART NUMBER
MCC-A1: CGE MCC CA7092C Type C, Class 1, 600V, 600A	UNIT 1 MAIN FUEL OIL PUMP EAST	75	STARTER	22 kA	BREAKER	125A	GENERAL ELECTRIC	TFJ
	UNIT 1 LUBE OIL CENTRIFUGE (PORTABLE)	68 kW		14 kA	BREAKER	100A	GENERAL ELECTRIC	TEF 136100
	UNIT 1 GEN AUXILLIARY COOLING WATER PUMP NORTH	30	STARTER	14 kA	BREAKER	70A	FEDERAL PIONEER	CED 136070 8804
	UNIT 1 MECHANICAL VACUUM PUMP NORTH	50	STARTER	14 kA	BREAKER	100A	GENERAL ELECTRIC	TEF 136100
	UNIT 1 STOP VALVE BELOW SEAT DRAIN MOV 1-TD-V108	1/8	REVERSING STARTER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015
	UNIT 1 GLAND SEAL WATER EMERGENCY PUMP	30	STARTER	14 kA	BREAKER	70A	GENERAL ELECTRIC	TEF 136070
	UNIT 1 IGNITER AIR BOOSTER FAN	15	STARTER	14 kA	BREAKER	40A	GENERAL ELECTRIC	TEF 136040
	UNIT 1 RH REHEAT STOP VALVE MOV 1-TD-V126	1/8	REVERSING STARTER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015
MCC-C2: CGE MCC CR7092C Type C, Class 1, 600V, 600A	WELDING RECEPTACLE		DUAL BREAKER	14 kA	BREAKER	70A	GENERAL ELECTRIC	TEF 136070
	UNIT 1 EXCITER FIELD FLASHING			14 kA	BREAKER	15A	GENERAL ELECTRIC	TED
	UNIT 1 SCANNER AIR FAN	2	STARTER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015
	UNIT 1 MAIN FUEL OIL PUMP WEST	75	STARTER	14 kA	BREAKER	125A	GENERAL ELECTRIC	TFJ 236125
MCC-C1: CGE MCC CR7092C Type C, Class 1, 600V, 600A	VACUUM CLEANER EXHAUSTER	25	STARTER	14 kA	BREAKER	70A	FEDERAL PIONEER	CED 136070
	TURBINE HALL CRANE FEEDER	145	BREAKER	22 kA	BREAKER	150A	GENERAL ELECTRIC	TFJ 236150WL
	UNIT 2 EXCITER TEST SUPPLY		BREAKER	14 kA	BREAKER	15A	FEDERAL PIONEER	CED 136015
	UNIT 2 SEAL OIL SKID PUMP WEST		BREAKER	14 kA	BREAKER	30A	GENERAL ELECTRIC	TED 136030
	SPARE BUCKET		STARTER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015

STANTEC CONSULTING
HOLYROOD GENERATING STATION
MCC FIELD DATA COLLECTION

Client: Newfoundland Hydro **File:** 133530025

Project: Engineering Services **Date:** October 8, 2008
Revision: 0

MCC	STARTER INFORMATION							
	STARTER ID TAG	HP	TYPE	INTERRUPT RATING	DEVICE	RATING	MANUFACTURER	PART NUMBER
MCC-E1: CGE MCC CR7092C Type C, Class 1, 600V, 600A	UNIT 1 FLAME SCANNER AIR FAN WEST	2	STARTER	14 kA	BREAKER	15A	GENERAL ELECTRIC	THEF 136015
	UNIT 1 AC LUBE OIL PUMP "B" SOUTH	20	STARTER	14 kA	BREAKER	40A	GENERAL ELECTRIC	TEF 136040
	UNIT 2 258 VDC BATTERY CHARGER		DUAL BREAKER	14 kA	BREAKER	100A	GENERAL ELECTRIC	TEF 136100
	SPARE			14 kA	BREAKER	100A	GENERAL ELECTRIC	TEF 136100
	GT START UP SUPPLY		BREAKER	22 kA	BREAKER	200A	GENERAL ELECTRIC	TFJ 236200
MCC A1-2	CONTROL PANEL		NO MAIN BREAKER					
MCC-C4: CGE MCC CR70926	UNIT 2 BOILER ROOM VENTILATION FANS #9 & #10	7.5x2	STARTER	14 kA	BREAKER	40A	GENERAL ELECTRIC	TED 136040
	UNIT 2 ROOF EXHAUST FAN	2	STARTER	14 kA	BREAKER	20A	GENERAL ELECTRIC	TEF 136020
	BOILER ROOM HOIST	14.5x2	BREAKER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TED 136015
MCC-A1-3: Square D CL8998 Type C, Ser # 735848-B	UNIT 1 CAUSTIC METERING PUMP	2	STARTER	14 kA	MCP	7A	SQUARE D	FA FRAME
	DEMINERALIZED WATER BOOSTER PUMP	5	STARTER	14 kA	MCP	15A	SQUARE D	FA FRAME
	AIR BLOWER	20	STARTER	14 kA	MCP	30A	SQUARE D	FA FRAME
MCC-A1-1: CGE MCC CR7092C Type C, Class 1, 600V, 600A	UNIT 1 HP HEATER #4 & #5, FEEDWATER BYPASS VALVE MOV 1-HFW-VIII		REVERSING STARTER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015
	UNIT 1 HP HEATER #6, BLED STEAM LINE ISOLATING VALVE	2	REVERSING STARTER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015
	UNIT 1 HP HEATER #6, FEEDWATER BYPASS VALVE		REVERSING STARTER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015
	TEMPERATURE PROBE		DUAL BREAKER	14 kA	BREAKER	30A	GENERAL ELECTRIC	TEF 136030
	SPARE			14 kA	BREAKER	15	GENERAL ELECTRIC	TED 136015
	UNIT 1 BOILER START UP VENT VALVE MOV 1-BV-121	2	REVERSING STARTER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015

STANTEC CONSULTING
HOLYROOD GENERATING STATION
MCC FIELD DATA COLLECTION

Client: Newfoundland Hydro **File:** 133530025

Project: Engineering Services **Date:** October 8, 2008
Revision: 0

MCC	STARTER INFORMATION							
	STARTER ID TAG	HP	TYPE	INTERRUPT RATING	DEVICE	RATING	MANUFACTURER	PART NUMBER
MCC-C5: CGE MCC CR7092C Type C, Class 1, 600V, 600A	DEMINERALIZED WATER PUMP SOUTH	25	BREAKER	14 kA	BREAKER	30A	SIEMENS	NOT VISIBLE
	HEAT RECOVERY UNIT WATER TREATMENT PLANT	60 A	STARTER	14 kA	BREAKER	60A	GENERAL ELECTRIC	TED 136060
	SPARE		STARTER	14 kA	BREAKER	70A	GENERAL ELECTRIC	TED 136070
	SPARE		STARTER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015
	SPARE		STARTER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015
	SPARE		STARTER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015
	CLEARWELL PUMP SOUTH	50	STARTER	14 kA	BREAKER	70A	GENERAL ELECTRIC	TEF 136070
MCC-B1: CGE MCC CR7092C Type C, Class 1, 600V, 600A	MAIN TRANSFOMER T2 AUXILIARIES	8	DUAL BREAKER	14 kA	BREAKER	100A	GENERAL ELECTRIC	TEF 136100
	SPARE			14 kA	BREAKER	100A	GENERAL ELECTRIC	TEF 136100
	UNIT 2 MECHANICAL VACUUM PUMP NORTH	50	STARTER	14 kA	BREAKER	100A	GENERAL ELECTRIC	TEF 136100
	UNIT 2 TG COOLING WATER PUMP NORTH	30	STARTER	14 kA	BREAKER	70A	GENERAL ELECTRIC	TEF 136070
	UNIT 2 HYDRAULIC FLUID PUMP NORTH	15	STARTER	14 kA	BREAKER	30A	GENERAL ELECTRIC	TED 136030
	AC LUBE OIL PUMP NORTH	20	STARTER	14 kA	BREAKER	30A	GENERAL ELECTRIC	TED 136030
	LUBE OIL CENTRIFUGE (PORTABLE)		BREAKER	14 kA	BREAKER	100A	GENERAL ELECTRIC	TEF 136100
	UNIT 2 SEALANT VACUUM PUMP SKID	1	DUAL BREAKER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TED 136015
	UNIT 2 SEAL OILPUMP EAST SKID	5		14 kA	BREAKER	30A	GENERAL ELECTRIC	TED 136030
	HP HEATER MCC-B1-1		BREAKER	14 kA	BREAKER	100A	GENERAL ELECTRIC	TEF 136100
	UNIT 2 RESERVE FEED WATER TRANSFER PUMP	60	STARTER	18 kA	BREAKER	100A	GENERAL ELECTRIC	TFJ 236100
	GLAND SEAL CONDENSER EXHAUSTER NORTH	3	STARTER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015
	UNIT 2 CONDENSATE POLISHERS		BREAKER	14 kA	BREAKER	30A	GENERAL ELECTRIC	TED 136030
	UNIT 2 TURBINE CASING DRAIN MOV	1/8	REVERSING STARTER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015
	UNIT 2 RH REHEAT STOP VALVE ABOVE SEAT DRAIN	1/8	REVERSING STARTER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015
	UNIT 2 STEAM SEAL REGULATOR DRAIN VALVE MOV	1/8	REVERSING STARTER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015
	UNIT 2 STEAM SEAL REGULATOR BYPASS VALVE MOV	1/8	REVERSING STARTER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015

STANTEC CONSULTING
HOLYROOD GENERATING STATION
MCC FIELD DATA COLLECTION

Client: Newfoundland Hydro | **File:** 133530025

Project: Engineering Services | **Date:** October 8, 2008
Revision: 0

MCC	STARTER INFORMATION							
	STARTER ID TAG	HP	TYPE	INTERRUPT RATING	DEVICE	RATING	MANUFACTURER	PART NUMBER
MCC B1-2	CONTROL PANEL		NO MAIN BREAKER					
MCC-B1-1: CGE MCC CR7092C Type C, Class 1, 600V, 600A HP HEATER	BOILER START UP VENTILATION VALVE	2	STARTER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015
	HP HEATER 4&5 FEEDWATER BYPASS VALVE		TWO REVERSING CONTACTORS	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015
	HP HEATER 4&5 FEEDWATER BYPASS PILOT VALVE		TWO REVERSING CONTACTORS	14 kA				
	HP HEATER #6 FEEDWATER BYPASS VALVE		TWO REVERSING CONTACTORS	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015
	HP HEATER #6 FEEDWATER BYPASS PILOT VALVE		TWO REVERSING CONTACTORS	14 kA				
MCC-B1-3: Square D CL8998 Type C, 2 Section, Ser # 735848-B	UNIT 2 CAUSTIC METERING PUMP #1 SOUTH	2	STARTER	14 kA	MCP	7A	SQUARE D	FA FRAME
	UNIT 2 CAUSTIC METERING PUMP #2 NORTH	2	STARTER	14 kA	MCP	7A	SQUARE D	FA FRAME
	UNIT 2 DEMINERALIZED WATER BOOSTER PUMP	5	STARTER	14 kA	MCP	15A	SQUARE D	FA FRAME
	UNIT 2 AIR BLOWER	20	STARTER	14 kA	MCP	30A	SQUARE D	FA FRAME
	ACID METERING PUMP #1 SOUTH	1/2	STARTER	14 kA	MCP	3A	SQUARE D	FA FRAME
MCC-C9: CGE MCC CR7092C Type C, Class 1, 600V, 600A	HD BAND SAW	1	DUAL BREAKER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF136015
	WASHER HOT WATER TANK			14 kA	BREAKER	40A	GENERAL ELECTRIC	TED 136040
	TUR 630A LATHE		DUAL BREAKER	14 kA	BREAKER	30A	FEDERAL PIONEER	CED 136030
	FLOOR DRILL PRESS			14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015
	CIRCUIT #1 WELDER		DUAL BREAKER	14 kA	BREAKER	40A	GENERAL ELECTRIC	TEF 136040
	COLCHESTER MASCAR 1600 LATHE			14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015
	SANDBLASTER		DUAL BREAKER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TED 136015
	MACHINE SHOP JIB HOIST	1/2		14 kA	BREAKER	15A	GENERAL ELECTRIC	TED 136015
MCC-C8: CGE MCC CR7092C Type C, Class 1, 600V, 600A	SLOP TANK PUMP	1/2	STARTER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015
	SPARE		STARTER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015
	SPARE		STARTER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015

STANTEC CONSULTING
HOLYROOD GENERATING STATION
MCC FIELD DATA COLLECTION

Client:	Newfoundland Hydro	**File:**	133530025
Project:	Engineering Services	**Date:**	October 8, 2008
		Revision:	0

MCC	STARTER INFORMATION							
	STARTER ID TAG	HP	TYPE	INTERRUPT RATING	DEVICE	RATING	MANUFACTURER	PART NUMBER
MCC-C7: CGE MCC CR7092C Type C, Class 1, 600V, 600A	DOMESTIC WATER HEATER #1		DUAL BREAKER	14 kA	BREAKER	70A	GENERAL ELECTRIC	TED 136070
	DOMESTIC WATER HEATER #2			14 kA	BREAKER	70A	GENERAL ELECTRIC	TED 136070
	SPARE		STARTER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015
	HEATER LUNCH ROOM		STARTER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015
MCC-C3: CGE MCC CR7092C Type C, Class 1, 600V, 600A	UNIT 2 EXCITER FIELD FLASHING SUPPLY		DUAL BREAKER	14 kA	BREAKER	15A	SIEMENS	307153
	WELDING OUTLET 60A			14 kA	BREAKER	70A	GENERAL ELECTRIC	TED 136070
	GENERAL AUXILIARY COOLING WATER PUMP SOUTH	30	STARTER	14 kA	BREAKER	70A	GENERAL ELECTRIC	TEF 136070
	AMMONIA SKID CONTROL		BREAKER	14 kA	BREAKER	30A	GENERAL ELECTRIC	TED 136030
	UNIT 2 HYDRAULIC FLUID PUMP SOUTH	15	STARTER	14 kA	BREAKER	30A	GENERAL ELECTRIC	TED 136030
	UNIT 2 MECHANICAL VACUUM PUMP SOUTH	50	STARTER	14 kA	BREAKER	70A	FEDERAL PIONEER	CED6
	MECHANICAL VACUUM RECIRCULATING SEAL WATER PUMP SOUTH	15	STARTER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015
	GLAND SEAL CONDENSER EXHAUSTER SOUTH	3	STARTER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015
	SEPTIC SYSTEM MANHOLE PUMP 7A	1 1/2	BREAKER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015
MCC-C6: CGE MCC CR7092C Type C, Class 1, 600V, 600A	UNIT 2 COOLING WATER PUMP DISCHARGE VALVE WEST	2/3	REVERSING STARTER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015
	UNIT 2 COOLING WATER PUMP DISCHARGE VALVE EAST	2/3	REVERSING STARTER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015
	UNIT 2 TRAVELLING SCREEN EAST	5	STARTER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015
	SCREEN WASH PUMP EAST	7 1/2	STARTER	14 kA	BREAKER	20A	GENERAL ELECTRIC	TEF 136020
	ROOF EXHAUST FAN WEST	1/2	STARTER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TEF 136015
	COOLING WATER SUMP PUMP WEST		BREAKER	14 kA	BREAKER	15A	CUTLER HAMMER	SERIES C
	UNIT 1 SELF CLEAN COPPER ION INJECTION SYSTEM		BREAKER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TED 136015
	UNIT 1 BOOSTER PUMP		STARTER	14 kA	BREAKER	15A	GENERAL ELECTRIC	TED 136015

STANTEC CONSULTING
HOLYROOD GENERATING STATION
MCC FIELD DATA COLLECTION

Client:	Newfoundland Hydro	**File:**	133530025
Project:	Engineering Services	**Date:**	October 8, 2008
		Revision:	0

MCC	STARTER INFORMATION							
	STARTER ID TAG	HP	TYPE	INTERRUPT RATING	DEVICE	RATING	MANUFACTURER	PART NUMBER
MCC-C12: Allen Bradley MCC BUL 2100, 600A H, 300A V, Cat # 7498S-C	TREATED WATER TRANSFER PUMP (P-4A)	3	STARTER	100 kA	FUSE	15A		AJT HRC
	CAUSTIC TRANSFER PUMP EAST (P-9A)	3	STARTER	100 kA	FUSE	15A		AJT HRC
	SPARE		STARTER	100 kA	FUSE	15A		AJT HRC
	CONTINUOUS/PERIODIC BASIN EXHAUST FAN	1	STARTER	100 kA	FUSE	15A		AJT HRC