MOSES SOUTH STABILITY LIMITS ANALYSIS

FOR

ALL LINES I/S AND LINE OUTAGE CONDITIONS

Report MS-08

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MOSES SOUTH STABILITY LIMITS ANALYSIS FOR ALL LINES I/S AND LINE OUTAGE CONDITIONS

I. INTRODUCTION

The purpose of this study is to re-evaluate the Moses South transient stability limits for all lines in service and maintenance/line outage conditions. The last comprehensive Moses South transient stability limit analysis was done in 1993, about 15 years ago. There has been a considerable number of system upgrade in the North Country since the last analysis. These upgrades include wind generation projects on the Willis – Plattsburg 230 kV lines and the Adirondack – Porter 230 kV transmission corridor. It has therefore become necessary to re-evaluate and confirm the existing stability limits.

This report documents the result of the analysis as presented in table 1 below and the recommendations are based on the results of the simulation of criteria contingencies shown in table 2, of the NYISO 2008 peak load case. All assumptions are documented in the base case development section of the report.

This report includes the result of the stability analysis, copies of stability plots, and base case assumptions made in developing the various transfer cases for the all lines in service and the different line outage scenarios.

II. RECOMMENDATION

From the result of the analysis presented on tables 1, it is recommended that the following Moses South stability limits be employed on the condition that the eight unit rejection SPS at Moses be armed at all times for the contingent loss of L33 and L34 ties to Ontario. The limits stated below are however a confirmation of the existing limits. This analysis is not intended to propose an increase in the Moses South limits but to confirm the existing limits.

Table 1, shows the actual test levels and the operating margin limits for the different configurations.

III. RESULTS

Table 1: Summary of Stability Limits

Summary Of Stability Limit Analysis for Moses South Interface (All I/S and Line Outage Conditions)			
Case No/Name	**Base Case Description**	**Moses South Base Case Transfer Level**	**Moses South Stability Limit with 10% Margin**
Case1A MS_3225-All-Lines-IS.sav	Seasonal Limit With 2 HVDC Poles I/S (Max Chat - Massena = 2370 MW	**3225 MW**	**2900 MW**
Case2A MS_2900_AlcoaBTie-OS.sav	Alcoa Bus Tie (R8105) 115 kV O/S	**2900 MW**	**2600 MW**
Case3A MS_2727_MAP(B2)-OS.sav	One Moses - Adirondack - Porter (MAP) B2 230 kV Cuicuit O/S	**2727 MW**	**2450 MW**
Case4A MS_2900_3#ChatBKs&Splt-Bus_1#HVDC.sav	3 Chat Banks 765/120 kV I/S Split Bus & 1 HVDC Pole I/S (Max Chat - Massena = 1900 MW)	**2900 MW**	**2600 MW**
Case5A MS_2612_2#ChatBKs_1#HVDC.sav	2 Chat Banks 765/120 kV I/S 1 HVDC Pole I/S (Max Chat - Massena 1650 MW)	**2612 MW**	**2350 MW**
Case6A MS-2390_3#ChatBKs_1#HVDC.sav	3 Chat Banks765/120 kV I/S 1 HVDC Pole I/S (Max Chat - Massena 1400 MW)	**2390 MW**	**2150 MW**
Case7A MS-2230_2#HVDC-OS.sav	2 HVDC Poles O/S (Max Chat - Massena = 1170 MW AC)	**2230 MW**	**2000 MW**
Case8A MS-1230-MSU1-IS_2#HVDC-OS.sav	MSU-1 I/S With No Direct Transfer Trip For Generation Rejection At Quebec (Max Chat - Massena = 650 MW)	**1230 MW**	**1100 MW**
Case9A case9A-MS-750_7040=475_MSU1-OS.sav	Massena -Marcy 765 kV (MSU-1) O/S (Max Chat - Massena = 475 MW)	**750 MW**	**675 MW**
Case10A MS-560_MSU1&MAP-OS.sav	MSU-1 Massena -Marcy 765 kV & One Moses - Adirondack - Porter 230 kV O/S (Chat - Massena=475 kV)	**560 MW**	**500 MW**

IV. DISCUSSION

STUDY ASSUMPTIONS AND METHODOLOGY

Table 2: Moses South Interface Definition

TABLE 2		
Moses South Interface Definition		
Name	**Line ID**	**Voltage (kV)**
***Massena-Marcy**	MSU1	765
***Moses-Adirondack**	MA-1	230
***Moses-Adirondack**	MA-2	230
***Dennison-Colton**	4	115
***Dennison-Colton**	5	115
***Alcoa-N. Ogdensburg**	13	115
Malone-Colton*	3	115

Base Case Development

The study used the 2007 series, NERC/MMWG and summer 2008 NYISO dynamics representation. Study cases for the all lines and line outage conditions were setup as described in table 1. The table describes the status of the Chateauguay HVDC, the maximum Chateauguay – Massena (7040) transfer and the status of the 3 transformer banks (760/112 kV) for each scenario.

For the "Case1A" (All-Lines in Service) and other scenarios with Chateauguay- Massena flow is more than 2170 MW, both Chateauguay second harmonic filters were put in service. Both Chateauguay second harmonic filters are required to be in service for MSC-7040 flow levels above 2170 MW.

For details on the base case configuration for each scenario, refer to the transcription diagram and summary of the load flow base case in the appendixes.

Transfer Case Development

For the transfer load flow for each case scenario, generation shifts between Hydro Quebec (Chateauguay HVDC and Beauharnois machines), Ontario and New York systems were primarily used to adjust flow on Moses South. For most cases with high Moses South transfer L33 and L34 phase angle regulators were scheduled at 250 MW each.

SVC/STATCOM Normal Operating Mode

The Leed/Fraser SVC and Marcy STATCOM are modeled in service, the base case load flow were solved with the SVCs/STATCOM set to minimum (0 Mvar) output by adjusting their respective voltage schedules in the pre-contingency case.

Contingency Analysis

Table 3 outlines the most critical/limiting contingencies tested for this analysis. Description of all the contingencies evaluated and selected resulting simulation plots are attached in the appendix.

The contingencies performed for this analysis, were tested and evaluated in accordance with the "Standards for Planning and Operating the New York ISO Bulk Power System" and the NYISO Transmission Planning Guideline #2. The NYISO stability transfer limit, obtained from a stable simulation of the most severe contingencies, is obtained by reducing the test level of the interface in question by the larger of:

10% of the pre-contingency transfer on the interface or 200 MW

Table 3: Simulated Faults For Moses South Stability Limit Study

Simulated Faults For Moses South Stability Limit Study	
Fault No.	**Fault Description**
MS01	3PH-NC@MARCY 765/MASSENA-MARCY MSU-1 W/REJ. RADIAL QUEBEC GEN.
MS02	3PH-NC@MOSES 230KV/MOSES-ADIR-PORTER W/NO REJ.
MS03-rej4	LLG@MOSES 230/MOSES-ADIR-PORTER W/4-UNIT REJ
MS03	LLG@MOSES 230/MOSES-ADIR-PORTER W/no UNIT REJ
MS04	3PH-NC@MOSES 230/MASSENA-MOSES 765/230 MMS-1
MS05	3PH-NC@MASSENA 765/MASSENA-MOSES 765/230 MMS-1
MS06	SLG-STK@MOSES/MASSENA-MOSES MMS-1 W/NO REJ
MS07	SLG-STK@MASSENA765/MASSENA-MOSES 765/230 MMS-1
MS08-rej4	SLG-STK@MOSES /MOSES-ADIR.-PORTER 230 W4-UNIT REJ
MS08-rej8	MS08-8 SLG-STK@MOSES /MOSES-ADIR.-PORTER 230 W/8-UNIT REJ
MS08	SLG-STK@MOSES /MOSES-ADIR.-PORTER 230 W/NO REJ
MS09	3PH-NC@MASSENA 765/MASSENA-MARCY MSU-1 W/REJ
MS10	SLG-STK@MOSES /MOSES-WILLIS-PLATT 230
MS11-rej8	SLG-STK@MOSES 230/MASSENA-MOSES 230#MMS-2 W/8REJ (MS06 with Rej.)
MS12	3PH-NC@CHATEAUGUAY 765KV/CHATEAUGUAY-MASSENA MSC-7040
MS13	LLG@MOSES /MOSES-MASSENA 230
MS15-rej4	LLG@MOSES 230/MOSES-ST.LAWRENCE L33/34P R0
MS15-rej8	LLG@MOSES 230/MOSES-ST.LAWRENCE L33/34P R0
MS15	LLG@MOSES 230/MOSES-ST.LAWRENCE L33/34P R0
CE03	SLG/STK@EDIC345/EDIC-N.SCOT#14;BKUP CLR@FITZ345
CE07AR	LLG @MARCY/EDIC ON MARCY-COOPER & EDIC-FRASER DBL CKT
CE15	SLG/STK@MARCY345/VOLNEY-MARCY VU-19/STK@MARCY 345
NYISO-2	3PH@ADIRONDACK- PORTOR 230
NYISO-3	No fault Loss of ADIRONDACK- PORTOR 230