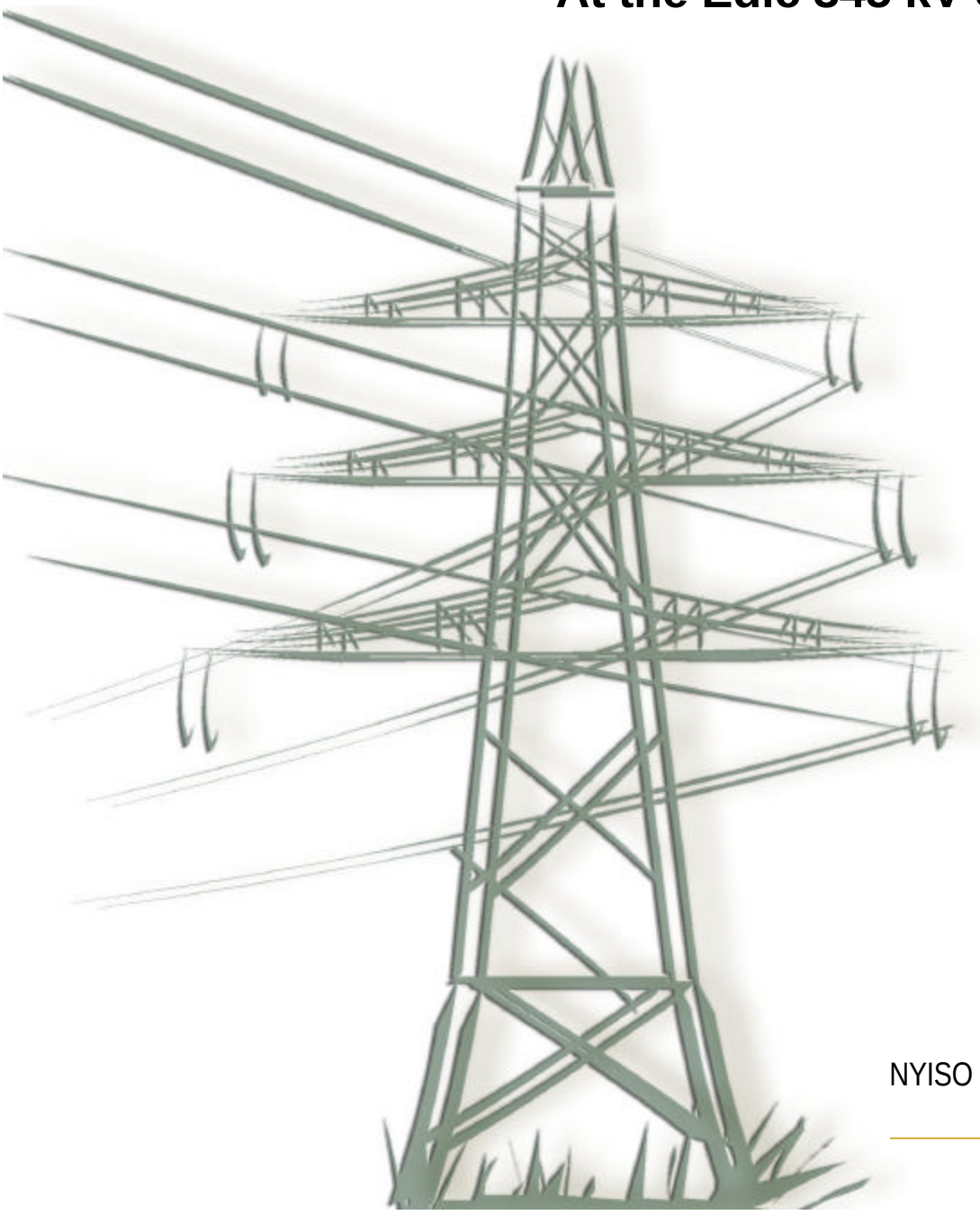
Central East Voltage Analysis

For Addition of 200 MVAr Capacitor Bank

At the Edic 345 kV Substation



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prepared by

NYISO Operations Engineering

INTRODUCTION

This report summarizes the voltage analysis performed for Central East voltage limits for the addition of the 200 MVAr capacitor bank at the Edic 345 kV substation. This analysis evaluates only the "as found system" and quantifies the benefits of the addition of the Edic capacitor by examining the Central East voltage collapse limits with and without the capacitor bank in service. The individual penalties for the existing equipment have not been re-evaluated.

RECOMMENDATIONS

Based on the report findings, the following action is recommended:

Revise the Central East voltage collapse transfer limits and critical transfer levels for use with Edic 345kV shunt capacitor in service.

Determination of Penalty for Out of Service Based on Adjusted Maximum Transfer Levels

Status	*Critical Transfer Level*		*Recommended Penalty*	
	Marcy South Northern double circuits	New Scotland # 99 Bus	Marcy South Northern double circuits	New Scotland # 99 Bus
As Found System	3628	2182	--	--
Edic Capacitor in-service	3675	2212	45	30

METHODOLOGY

The starting point for the analysis was the Summer 2002 operating study base case with the Edic Capacitor bank out of service. The Marcy FACTS is modeled as in-service and operating in full STATCOM mode (+/- 200 MVAr) and the Oakdale 135 MVAr capacitor bank is in-service.

The transfer cases were built with increasing Central East transfers to the point of voltage collapse. The Marcy Statcom and the Leeds and Fraser SVC's were set to provide approximately 0 MVAr in the pre-contingency cases, and provide maximum voltage

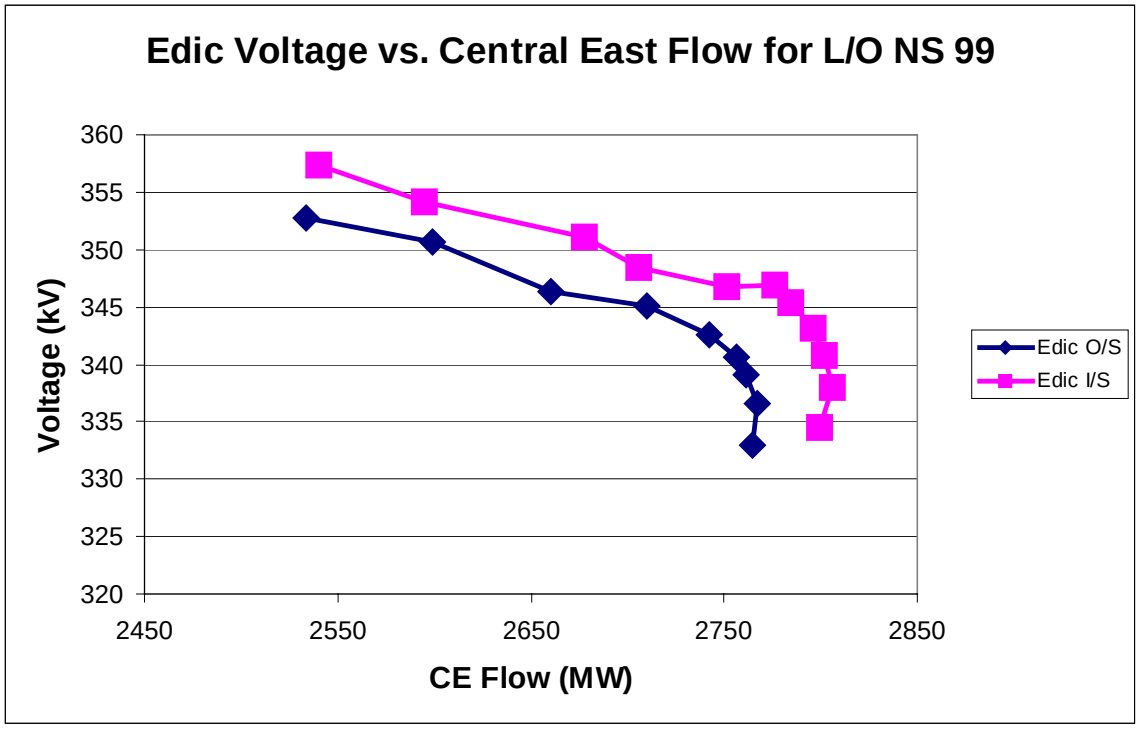
support in the post-contingency cases. Transfer case were also built with the Edic capacitor modeled as in-service to evaluate the increase in the limit.

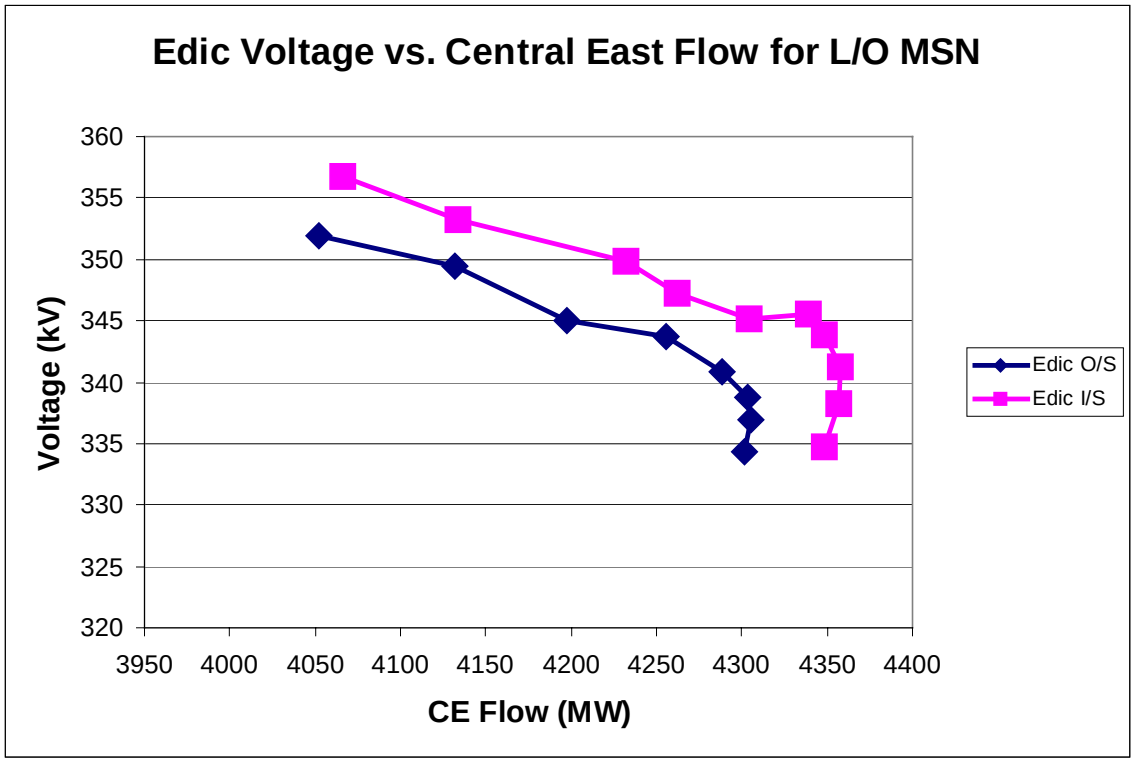
Central East Maximum Transfer limits (MTL) were calculated for the following contingencies:

1) New Scotland #99 bus fault (NS 99)
2) Marcy South North tower contingency (MSN)

RESULTS

The following curves show the Edic 345 kV station voltage versus the post-contingency flow on Central East, with and without the Edic capacitor in-service for the New Scotland #99 bus fault and the Marcy South North tower contingency.


Edic Voltage vs. Central East Flow for L/O NS 99
Voltage (kV)
360
355
350
345
340
335
330
325
320
2450
2550
2650
2750
2850
CE Flow (MW)
Edic O/S
Edic I/S


Edic Voltage vs. Central East Flow for L/O MSN
Voltage (kV)
360
355
350
345
340
335
330
325
320
3950
4000
4050
4100
4150
4200
4250
4300
4350
4400
CE Flow (MW)
Edic O/S
Edic I/S

Base Case		Phase I study NS99		Phase II AFS NS99		Phase II Edic I/S NS99		Phase I study MSN		Phase II AFS MSN		Phase II Edic I/S MSN	
Contingency													
MAXIMUM TRANSFER LEVELS		2720		2761.4		2784.7		4358		4303		4348.1	
LESS 5% SAFETY MARGIN		-136.0		-138.1		-139.2		-217.9		-215.2		-217.4	
POST-CONT. PV-20 FLOW		-226.9		-268.4		-261.7		-226.4		-266.5		-264.9	
POST-CONT. INGHAMS FLOW		-171.4		-172.3		-171.2		-190.7		-192.7		-190.0	
ADJUSTED M.T.L.		2185.7		2182.6		2212.6		3723.0		3628.7		3675.8	
(AS ROUNDED)		**2185**		**2180**		**2210**		**3720**		**3625**		**3675**	
SPECIFY # OF UNITS OR CAP BANKS IN SERVICE													
FITZPATRICK	1												
OSWEGO 5	1												
OSWEGO 6	1		0		0		0		0		0		0
NINE MILE 2	1		0		0		0		0		0		0
SITHE 1-6	6		0		0		0		0		0		0
MARCY STATCOM	1	-35	0	-35	0	-35	0	-45	0	-45	0	-45	0
LEEDS SVC	1	-20	0	-20	0	-20	0	-35	0	-35	0	-35	0
FREASER SVC	1	-20	0	-20	0	-20	0	-35	0	-35	0	-35	0
MARCY CAPS	2	-35	0	-35	0	-35	0	-45	0	-45	0	-45	0
N.SCOT CAPS	3	-20	0	-20	0	-20	0	-25	0	-25	0	-25	0
LEEDS CAPS	2	-15	0	-15	0	-15	0	-20	0	-20	0	-20	0
FRASER CAPS	2	-15	0	-15	0	-15	0	-20	0	-20	0	-20	0
GILBOA CAP	1	-15	0	-15	0	-15	0	-20	0	-20	0	-20	0
ROTTERDAM CAPS	2	-15	0	-15	0	-15	0	-20	0	-20	0	-20	0
OAKDALE CAP	1	-15	0	-15	0	-15	0	-15	0	-15	0	-15	0
MARCY REACTOR	0	-35	0	-35	0	-35	0	-45	0	-45	0	-45	0
MASS. REACTORS	0	-15	0	-15	0	-15	0	-20	0	-20	0	-20	0
OMS CORRECTION													
ADD POST-CONT. PV-20 FLOW													
ADD POST-CONT. INGHAMS FLOW													
POST-CONTINGENCY C-E OPERATING LIMITS													