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4.10.4 Feeder No. 62 (135 Mvars).

4.10.5 Feeder No. 61 (124 Mvars).

5.0 REFERENCE SPECIFICATIONS

The following specifications are listed for reference.

- 5.1 EO4150 - Procedure for De-energizing or Energizing 500 kV, 345 kV, 138 kV, and 69 kV
- 5.2 EP-7200 - Indian Point No. 2 and 3 Generating Station 345 kV Voltage Schedule
- 5.3 EP-7210 - Queensbridge Substation 69 kV feeder voltage regulation
- 5.4 EP-7220 - East 13th Street Substation 69 kV and 138 kV Bus Voltage Regulation
- 5.5 EP-7230 - Astoria Generating Station Voltage Schedule
- 5.6 EP-7240 - East River Generating Station 69kV Voltage Schedule
- 5.7 EP-7250 - Arthur Kill Generating Station 138 kV and 345 kV Voltage Schedule
- 5.8 EP-7260 - Waterside No. 1 Operating Procedure for the 60 Hz 13.6 kV Main Bus Sections and Voltage Regulation
- 5.9 EP-7270 - Waterside No. 2 Operating Procedure for the 60 Hz 13.6 kV Main Bus Sections and Voltage Regulation
- 5.10 EP-7290 - Ravenswood Generating Station 138 kV and 345 kV Voltage Schedule
- 5.11 EO-4292 - Maximum Operating Voltage on the 138 kV 230 kV and 345 kV Systems
- 5.12 HTOD-633 - Operating Connections at 60 Hz Substations Sprain Brook Substation
- 5.13 EP-7400 - Rapid Re-Energization of the Con Edison System after complete System "Blackout"

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- 5.14 EO-4600 - 60 Hertz Start-Up Procedures (General Discussion).
- 5.15 EO-4601 - 60 Hertz Start-Up Procedure (Index).
- 5.16 EP-7300 - Voltage Schedules for Independent Gas Turbine Complexes.

6.0 ATTACHMENTS:

- 6.1 APPENDIX I - 345/138 kV autotransformers to be utilized to transfer reactive power (MVARs) between the 345 kV and 138 kV systems.
- 6.2 APPENDIX II - List of fixed and switchable shunt reactors which can be utilized to maintain proper voltages and their associated risks if they are switched out of service.

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REVISION 1: Revised to reflect new ownership of generation facilities and new governing entities. Review Date: September, 2007	FILE: System Operation Manual No. 5
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APPENDIX I

<u>Location of Autotransformers</u>	<u>Bank Number</u>
1. Farragut-Hudson Avenue East	8, 9 and 10: "X" windings only
2. *Rainey-Vernon	8W, 8E
3. Sprain Brook-Dunwoodie	N1, S6, N7 (S1 has no TCUL facility - see note below)**
4. Tremont	11 and 12
5. East 13 th Street	10, 12, 13, 14, 15, 16, 17, (11 has no TCUL facility - see note below)***
6. Gowanus	T2, T14
7. Fresh Kills	R1 (Voltage Regulator), R2
8. Millwood	TA1
9. Ramapo	W1500 (500/345 kV)
10. Buchanan North	TA5
11. Farragut	1, 2, 3, 4, 5, 6, 7

* Move last if Ravenswood No. 1 and No. 2 generators are out of service.

** The MVA loading on Transformer S1 at Dunwoodie South should be monitored to avoid overloading the transformer.

*** The MVA loading on Transformer 11 at East 13th Street should be monitored to avoid overloading the transformer.

**** Transformer is controlled by Central Hudson Gas and Electric Corporation.

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APPENDIX 2

THE RISKS WITHOUT EXISTING SHUNT REACTORS

STATION	REACTORS	MVAR EACH	RISKS WITHOUT REACTORS	AFFECTED EQUIPMENT
Eastview	R1, R2, R3 & R4	40	Surge arresters at White Plains, Harrison and Elmsford overloaded and may fail.	Surge arresters.
Pleasantville	R1 & R2	20	High overvoltages at high sides of transformers during fault clearing from 13.8KV. Possible ferroresonance.	Surge arresters & transformers at Pleasantville, Dun. N. & S.
Dunwoodie	R1	150	Ferroresonance during fault clearing from Pleasantville with breaker #6 stuck at Dunwoodie. During normal switching, high overvoltages.	Transformers at Pleasantville 13KV, Dunwoodie N. and Shore Road. Breakers at Dun. 345KV and at Shore Road.
Sprain Brook	S6A	150	Charging current exceeds breaker rating during primary & backup switching.	Breakers at Tremont F1, F2, F3, & F4.
	2N1 & 2N2	150	During fault clearing, temporary overvoltage exceeds related breaker and arrester capabilities.	Breakers and arresters at Dunwoodie and East Garden City. Note: With series reactors O/S, two of 4 Y-49 shunt reactors are needed for normal operations. For energization and de-energization, 3 shunt reactors must be in service. With series reactors I/S, three of 4 shunt reactors must be I/S

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<u>STATION</u>	<u>REACTORS</u>	<u>MVAR EACH</u>	<u>RISKS WITHOUT REACTORS</u>	<u>AFFECTED EQUIPMENT</u>
Rainey	4S1 & 4S2	150	Stuck breaker at W. 49 St. during fault clearing, possible ferroresonance and high overvoltages may occur.	Transformers and arresters at W. 49 St.
	5S1 & 5S2	150	Stuck breaker at W. 49 St. during fault clearing, possible ferroresonance and high overvoltages may occur.	Transformers and arresters at W. 49 St.
	1E & 5W	150	Stuck breaker conditions at Rainey or breaker #8 at Dunwoodie, possible ferroresonance may develop. Charging current exceeds interrupting capabilities of breakers at E. 13 St., and E. River 69 KV. Stuck breaker condition at Farragut, possible ferroresonance may develop during fault clearing.	Breakers at Dunwoodie and Rainey. Transformers and arresters at Rainey, Dun. N. & Pleasantville. Breakers at E. 13 St. & East River 69 KV. Transformers and arresters at E. 13 St.
Astoria	61 & 62	150		
Farragut	R11 & R12	60	Stuck breaker conditions at Farragut, possible ferroresonance and high overvoltages during fault clearing from Brownsville, Water St., Plymouth St. and E. 13 St.	Transformers & Phase Angle Regulators on B3402 & C3403. Surge Arresters at Farragut.

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<u>STATION</u>	<u>REACTORS</u>	<u>MVAR EACH</u>	<u>RISKS WITHOUT REACTORS</u>	<u>AFFECTED EQUIPMENT</u>
Gowanus	R6 & R18	150	Stuck breaker conditions at either Farmgut or Gowanus, high temporary overvoltages during backup fault clearing from Poletti, E. 13 St., E. River, Seaport, Plymouth St., Hudson Ave. East, or Greenwood 138 KV, respectively.	Transformers, Phase Angle Regulators, & Arresters along the associated Feeders.
Goethals	R25 & R26	150	Stuckbreaker conditions at either Farmgut or Gowanus, high temporary overvoltages during backup fault clearing from Poletti, E. 13 St., E. River, Seaport, Plymouth St., Hudson Ave. East, or Greenwood 138 KV, respectively.	Transformers, Phase Angle Regulators, & Arresters along the associated Feeders.
Goethals (A2253)	TN1 & TN2	70	High transient overvoltages during fault clearing operations.	Transformer, Phase angle regulator and Arresters on Fdr. A2253
E. 179 St.	5W & 6E	75	Voltage control.	
Greenwood	2S & 3N	75	Voltage control.	