

Prepared for:
Cross Hudson Corporation

ENVIRONMENTAL MANAGEMENT AND CONSTRUCTION PLAN

Cross Hudson Project – Manhattan Segment

Manhattan, New York

Confidential

Submitted by Cross Hudson Corporation

Prepared by
Ecology and Environment, Inc./ENSR Corporation
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TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
1.0 INTRODUCTION / PURPOSE	1
2.0 STATUS OF OTHER PERMITS AND APPROVALS	2
3.0 MANHATTAN SEGMENT ROUTE DESCRIPTION	5
3.1 Temporary Cofferdam to HDD Pit	6
3.2 Upland Cable Route from HDD Pit to 49 th Street Substation.....	6
3.3 Connection of the Upland Cable to Consolidated Edison (ConEd) West 49 th Street Substation.....	7
4.0 PRE-CONSTRUCTION CONSIDERATIONS	7
4.1 Regulatory Notifications.....	7
4.2 Utility Markings	9
4.3 Land Owner Coordination	9
4.4 Site Security/Site Marking.....	10
4.5 Site Preparation, Access, and Parking	11
4.6 Parking and Staging Areas	13
4.7 Construction Schedule	14
5.0 CONSTRUCTION PROCEDURES	16
5.1 Erosion and Sedimentation Controls	17
5.2 Stormwater Management.....	17
5.3 Spill Prevention Plan	18
5.4 Soil Management.....	21
5.5 Groundwater Dewatering	22
5.6 Unanticipated Cultural Resource Discovery	22

5.7	Hazardous Material Handling and Disposal	22
6.0	ANTICIPATED CONSTRUCTION METHODS.....	24
6.1	Electrical Grid Connection	24
6.2	Manhattan Segment Cable Installation.....	25
6.2.1	General.....	25
6.2.2	Temporary Cofferdam	27
6.2.3	Horizontal Directional Drill.....	28
6.2.4	Splicing and Dielectric Cooling Chamber	29
6.2.5	Bike Path to 12th Avenue Crossing.....	29
6.2.6	12 th Avenue Crossing.....	30
6.3	Dredging and Dredged Material Management	32
7.0	PUBLIC HEALTH AND SAFETY	32
7.1	Noise.....	32
7.2	Electromagnetic Field (EMF)	33
7.3	Maintenance and Protection of Traffic (MPT)	33
7.3.1	Bike Path.....	33
7.3.2	Crossing of 12th Avenue	34
7.4	Protection of Public Areas.....	34
7.5	Lighting	34
8.0	POST-CONSTRUCTION CONSIDERATIONS	34
8.1	Clean-up and Restoration	35
8.2	Notifications/Certifications	35
9.0	PROJECT SUPERVISION	36
9.1	Independent Inspector.....	36
9.2	Construction Crew.....	37

9.3	Construction Supervision and Inspection	37
9.4	Weekly Project Meetings.....	40

Attachments

Attachment A	Copy of the Certificate and Cross Reference Table
Attachment B	List of Potentially Affected Upland Utility Companies
Attachment C	Soil Erosion and Sediment Control Plan (SESCP)
Attachment D	Spill Prevention Plan (SPP)
Attachment E	Independent Inspector(s) Certification and Documentation
Attachment F	Permit Status Summary Table
Attachment G	Manhattan Segment Cable Route Figure
Attachment H	Project Plans
Attachment I	Maintenance and Protection of Traffic Plans
Attachment J	Other Permits and Approvals
J-1	US Army Corps of Engineers
J-2	NYS Department of Transportation
J-3	NYC Department of Transportation
J-4	NYC Department of Environmental Protection
J-5	NYS Office of General Services
J-6	New York ISO and Consolidated Edison Interconnection Agreements
J-7	NYISO Attachment Facility Study
Attachment K	Cable Design Specifications
Attachment L	EMF Certification

LIST OF ACRONYMS

AC	Alternating current
ATRAS	Annual Transmission Reliability Assessment Study
C&D	Construction and demolition
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
ConEd	Consolidated Edison
dBA	decibels
DPS	Department of Public Service
DTS	Distributed temperature sensor
EM&CP	Environmental Management and Construction Plan
EMF	Electromagnetic Field
FERC	Federal Energy Regulatory Commission
FTB	Fluidized thermal backfill
HDD	Horizontal directional drill
HDPE	High density polyethylene
HPFF	High-pressure fluid-filled
HRPT	Hudson River Park Trust
kV	kilovolt
L _{eq}	one-hour equivalent sound level
MLW	Mean low water
MPT	Maintenance and Protection of Traffic
NAERO	North American Electric Reliability Organization
NERC	North American Electric Reliability Council
NJDEP	New Jersey Department of Environmental Protection
NOI	Notice of Intent
NPCC	Northeast Power Coordinating Council
NPDES	National Pollutant Discharge Elimination System
NYC	New York City
NYCDOT	New York City Department of Transportation
NYCDOT OCMC	Office of Construction Mitigation and Coordination
NYCEDC	New York City Economic Development Corporation

NYISO	New York Independent System Operator
NYCRR	New York City Rules and Regulations
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOT	New York State Department of Transportation
NYSDPS	New York State Department of Public Services
NYSHPO	New York State Historic Preservation Office
NYSOGS	New York State Office of General Services
NYSPSC	New York State Public Service Commission
NYSRC	New York State Reliability Council
OPRHP	Office of Parks, Recreation and Historic Preservation
OSHA	Occupation Health and Safety Administration
SCFF	Self-Contained Fluid Filled
SESCP	Soil Erosion and Sediment Control Plan
SPDES	New York State Pollutant Discharge Elimination System
SPP	Spill Prevention Plan
SRIS	System Reliability Impact Study
TPAS	Transmission Planning and Advisory Subcommittee
TSDF	Treatment, storage or disposal facilities
USACE	US Army Corps of Engineers
USCG	United States Coast Guard
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
UST	Underground storage tanks

1.0 INTRODUCTION / PURPOSE

Cross Hudson Corporation (CHC) submits this Environmental Management and Construction Plan (EM&CP or Plan) for the Cross Hudson Project Manhattan Segment Installation. The EM&CP incorporates the environmental protection measures contained in the Article VII Application (as amended) and the New York State Public Service Commission (NYSPSC) *Opinion and Order Granting Certificate of Environmental Compatibility and Public Need*, Case 01-T-1474 (Certificate), dated April 17, 2003, and amended October 21, 2004. This document contains a design plan that reflects the project's conformance with the Certificate, applicable federal, state and local regulations; a discussion of the status of the Certificate Holder's efforts to obtain permits necessary for project construction from the City of New York, the United States and state and local agencies in New Jersey; and a discussion of the status of the interconnection Agreement for the Certificated facilities.

This EM&CP follows the *Standards and Practices for Environmental Management and Construction of Gas Transmission Facilities in New York State*, plus those conditions identified in the Certificate.

A copy of the Certificate, as amended, is contained in Attachment A. Attachment A also includes references to locations within this EM&CP addressing each ordering paragraph and/or condition in the Certificate pertaining to the cable system construction and installation.

This EM&CP reflects the results of a comprehensive review of the Manhattan Segment conducted by CHC and its contractors in the spring and summer of 2007, as well as discussions with all involved landowners and other interested parties, and incorporates recommendations made by those parties with respect to the location of temporary construction activities and project scheduling. Construction requirements and design details provided in this document may be supplemented as design requirements change due to the requirements of other agencies such as the New York State Department of Transportation.

The Cross Hudson Project involves the construction of a 670 MVA, 345-kilovolt (kV), alternating current (AC) electric generator lead connecting the Bergen Station in Ridgely, New Jersey to the Consolidated Edison (ConEd) West 49th Street Substation in New York City. The Cable System will be composed of one underground AC circuit that will originate at a 230 to 345 kV switchyard at the Bergen Generating Station. Pursuant to Condition 57 of the Article VII Certificate, CHC will design, engineer, and construct the Project as provided in the System Reliability Impact Study (SRIS), approved by the Transmission Planning and Advisory Subcommittee (TPAS) and the NYISO Operating Committee, and the appropriate NYISO Annual Transmission Reliability Assessment Study (ATRAS), and in accordance with the applicable published planning and design standards and best engineering practices of NYISO, ConEd, New York State Reliability Council (NYSRC), Northeast Power Coordinating Council (NPCC), North American Electric Reliability Council, and North American Electric Reliability Organization and successor organizations.

The Project consists of installing cables along a corridor approximately 8 miles long, of which approximately 3.5 miles will be located on land in New Jersey, 4 miles will be located beneath the Hudson River, and 0.5 miles will be located in upland areas New York City.

The circuit will be composed of three conductors, installed in underground conduits and duct banks, each representing one phase of the circuit. In addition to the three main conductors, the installation will also

include a distributed temperature sensor (DTS) and fiber optic cables for monitoring, relaying, and communication purposes. Pursuant to Certificate Condition 1, the upland cable route may deviate by up to 100 feet in either direction from the certified centerline.

The portion of the cable system described herein as the Manhattan Segment is the portion of the project between a temporary cofferdam located [REDACTED] off shore of Piers 94 and 95 in the Hudson River and the ConEd West 49th Street Substation located just East of 12th Avenue (West Side Highway) between West 49th and West 50th Streets in Manhattan, NY (see Figure 1-1, Attachment G).

The “Hudson River” segment of the Project is described in a separate EM&CP document, and consists of the portion of the project in the Hudson River within New York State jurisdiction that is installed by jet plow methods from the temporary cofferdam due east of Edgewater, New Jersey to a temporary cofferdam near Piers 94 and 95.

The filing and review of the EM&CP in “segments” is intended to facilitate construction of the “Manhattan Land” Segment” while CCH continues the finalization of the design for the “Hudson River” segment. The cofferdam structure located at the demarcation point between the two segments provides temporary construction access to the submarine cable that is required for the Hudson River installation.

As required by the Certificate, the following information is included in the Manhattan Segment EM&CP:

- Status of other permits and agreements;
- Route descriptions;
- Pre-construction, construction, and post-construction considerations;
- Construction methods; and
- Public health and safety.

2.0 STATUS OF OTHER PERMITS AND APPROVALS

In addition to the Article VII Certificate, permits and approvals for the Project must be obtained from the State of New York Department of Transportation, the City of New York, the United States Army Corps of Engineers (USACE), and state and local agencies in New Jersey. Cross Hudson is also responsible for negotiating land use agreements with land owners and complying with the conditions of those agreements. All permits and approvals required for construction will be obtained prior to commencement of the covered activity. Copies of permits (and any modifications thereto) will be provided to the Commission as they are obtained. Copies of the USACE permit and all New York permits/approvals will be included in this EM&CP (Attachment J) as they are issued. This section provides a general discussion of the permits required and their status. A summary table of NYSDOT, New York City agencies and the USACE permit requirements and conditions of land owner agreements is presented in Attachment F.

Cross Hudson also must obtain electrical interconnection approval from the NYISO, and enter into an Interconnection Agreement with the NYISO and Con Edison. The status of the interconnection process also is discussed in this section.

The U.S. Army Corps of Engineers

USACE has jurisdiction over the placement of structures and dredging and filling of materials in waters of the United States. As such, a permit is required for the portion of the project within the Hudson River and portions of the project in New Jersey where the cable will cross through wetlands and cross Bellman's Creek. There are no wetlands along the upland cable route in New York. The USACE issued a permit for this project in September 2003. It expires in March 2009. A Copy of that permit is provided in Attachment J-1. Since the time the permit was issued, the Article VII Certificate and New Jersey Waterfront Development permits have been modified. A request for a minor modification to the USACE permit to incorporate those changes was submitted in June 2007. It is anticipated that the modification will be issued in October 2007. The USACE permit is included as Attachment J-1.

Since the requested modifications affect the HDD borehole and temporary cofferdam construction, construction of these components of the project will not begin until after the modified permit has been issued. Upland construction outside of the jurisdiction of the USACE may be initiated prior to the issuance of a modified permit.

New York Permits and Approvals

A Certificate of Environmental Compatibility and Public Need pursuant to Article VII of the NYS Public Service Law was issued in October 2004. New York State and local permits are not typically required for the construction or operation of facilities for which Article VII Certificates have been issued. However, Condition 5 of the Certificate for the Project authorizes the City of New York agencies to require CHC to obtain permits as described below. In addition land interests must be obtained from NYSDOT, NYCDOT, and NYSOGS.

NYS Department of Transportation

The NYSDOT is the owner of 12th Avenue. As such CHC must obtain a permit for the use of the property. The permit has two components: a Use and Occupancy Agreement and a Special Permit for Construction activities. CHC has had several meetings with NYSDOT to discuss construction methods and traffic control measures that will be used for the project. No activities on NYSDOT property will be initiated until the required permits have been issued. It is expected that final permits will be issued by January 2008. Copies of the NYSDOT permits will be included as Attachment J-2.

NYC Department of Transportation

A Revocable Consent is the method for the conveyance of public property within the City of New York. Though the use of lands has no direct relationship to the activities of the NYCDOT the agency acts as agent for the city in this matter. Since the cable will occupy property owned by the city (the area between Pier 94 and 95 and the sidewalks and bike path adjacent to 12th Avenue), a revocable consent is required. The revocable consent will be the instrument used to address land occupancy conditions on the project required by city agencies including the requirements of:

- NYC Economic Development Corporation (owner of Piers 94 and 95) and the tenants to facilities located on the Piers;

- NYC DOT, NYC Bureau of Water Supply and Sewers and other city agencies responsible for utilities that will be crossed by the project;
- NYC DOT and other city agencies responsible for street and sidewalk excavation and structural welding and utility installation; and
- NYC Police and Fire Departments.

CHC has met with and provided plans for the project to all City agencies with an interest in the project and is currently negotiating the terms of the Revocable Consent. Manhattan Construction activities will not be initiated until the revocable consent has been issued. It is expected that the Revocable Consent will be finalized by January 1, 2008. A copy of the Revocable Consent will be included as Attachment J-3.

NYC Department of Environmental Protection

The NYCDEP is responsible for the issuance of permits for the discharge of wastewater or storm water to the sewer system. Project discharges will result from the dewatering of trenches and other underground project structures. Activities that require dewatering will not be initiated until permits have been issued. It is anticipated that the discharge permit will be issued by January 2008. A copy of the discharge permit will be included as Attachment J-4.

NYS Office of General Services

The Office of General Services issues easements for the use of land under the Hudson River. An application for a use and occupancy permit is expected to be filed in October 2007 and obtained by January 2008. No in water activities on state owned land will be initiated until the use and occupancy permit has been obtained. A copy will be included as Attachment J-5. An application for a permanent easement is expected to be filed after construction is completed.

NYISO and Consolidated Edison Interconnection Process

Consolidated Edison owns the substation where the cable will terminate in New York. Construction in the substation will be governed by the Interconnection Agreement to be executed among New York Independent System Operator, Consolidated Edison and CHC. Presentation of an Interconnection Agreement is governed by the NYISO Tariff. Pursuant to those procedures, CHC participated in the NYISO's Facility Study process and accepted its allocation of costs for identified system upgrade facilities (SUFs). Also in accordance with the NYISO Tariff, on July 10, 2007, CHC made its payments to certain other developers for headroom as required by the Facility Study. The Interconnection Agreement will include as appendices not only the SUFs, but also will identify all Attachment Facilities required to interconnect. (The Interconnection Agreement will be incorporated into the EM&CP as Attachment J-6.) The Attachment Facility Study is being prepared by the NYISO and was nearly complete when, on August 22, 2007, the Federal Energy Regulatory Commission (FERC) issued an order in response to a complaint filed by Hudson Transmission Partners (HTP) which alleged that the Project should be removed from the NYISO interconnection queue. Pursuant to the FERC order, the CHC Project was removed from the queue effective August 22, 2007. On September 21, 2007 both the CHC and the NYISO filed requests for rehearing of FERC's order. In addition, among other things, CHC has

filed a new interconnection request with the NYISO, and is seeking to have that request placed in the queue at an appropriate position. Once completed, the Attachment Facility Study will be included as Attachment J-7. CHC has worked with ConEd to ensure that the system will have power system relay protection and appropriate communication capabilities to ensure that the operation of the transmission system is adequate under NPCC Bulk Power System Protection Criteria and meets the protection requirements of NERC, NPCC, NYSRC, NYISO, ConEd, and successor transmission owners.

New Jersey Permits

The New Jersey Department of Environmental Protection (NJDEP) has jurisdiction over the construction of the cable in the Hudson River within New Jersey and in New Jersey wetlands. It also regulates the disposal of dredged sediments within the state. The NJDEP issued the permits for the project in January of 2003. These permits expire in January 2008 (cable construction) and March (dredging) of 2008. Because the in water installation may not be completed prior to January 2008, a new application was submitted in May 2007 which will allow for sufficient time for construction (including dredging) to be completed after January 2008. The modified in-water permit was issued in September 2007. An extension of the upland permit will be requested 30 days prior to expiration.

In addition to the above, New Jersey requires that local building permits and zoning approvals be obtained prior to construction. CHC is in the process of obtaining those permits. It is anticipated that all required NJDEP permits and approvals will be obtained prior to December 2007.

With the exception of the approval of a New Jersey disposal facility (applied for in May 2007) for the spoils from the dredging of the temporary cofferdam, the initiation of construction activities covered in this EM&CP are not contingent on obtaining any New Jersey approvals. No dredging will occur until approval of a disposal facility has been received.

3.0 MANHATTAN SEGMENT ROUTE DESCRIPTION

This section provides a general description of the cable route and construction methods that will be used for the installation of the electric generator lead from the temporary cofferdam to the area where the cable makes landfall, then to the ConEd West 49th Street Substation in New York City. Additional detail on the construction methods is provided in Section 6. The discussion is divided into three parts, which reflect the three major construction phases of the Manhattan Segment

- Temporary Cofferdam to HDD Pit;
- Upland Cable Route from HDD Pit to West 49th Street Substation; and
- Connection of the upland cable to Consolidated Edison (ConEd) West 49th Street Substation.

The route extends east from slightly beyond the ends of Manhattan Piers 94 and 95 in the Hudson River, making landfall near West 56th Street, turning south just east of the Pier 94 head house, extending south along the Hudson River Bike Path and 12th Avenue and crossing 12th Avenue between West 49th and West 50th Streets to enter ConEd's West 49th Street Substation.

3.1 Temporary Cofferdam to HDD Pit

A temporary cofferdam will be constructed in the Hudson River between Piers 94 and 95, [REDACTED], parallel with West 56th Street (see Attachment H). The area within and adjacent to the open end of the temporary cofferdam will be mechanically dredged to achieve elevations and slopes necessary to facilitate the construction of the HDD borehole. The HDD provides the transition corridor from jet plow embedment of the cable in the Hudson River to cut and cover cable laying operations upland. The borehole will have a maximum diameter of [REDACTED] and will extend a distance of approximately [REDACTED] shore side of the cofferdam to the HDD pit. This pit or point of entry for the HDD, will be constructed landward of the Pier 94 and 95 head house. Drilling proceeds from the HDD pit to the temporary cofferdam using drill steel (rods) and a controllable rotary drill bit. Once the HDD is complete, empty conduits attached to the drill rods are pulled back to the HDD pit by the directional drilling equipment from the temporary cofferdam. The cable conduits will then be pulled and/or pushed thru the empty HDD conduit from the cofferdam. Upon delivery, the submarine cable will be fed from storage reels on the cable ship through a submerged jet-plow sled into the temporary cofferdam and into the end of the HDD conduit at the temporary cofferdam mud line. The cable will then be pushed and/or pulled through the HDD conduit and entry pit, stopping at the Transition Vault, otherwise known as the Splicing Chamber.

Any potential impacts of HDD operations will be temporary and localized resulting from sediment disturbance within the temporary cofferdam area at the seaward end of Piers 94 to 95. Impact to water quality conditions in the Hudson River will be limited to the temporary disturbance of river bottom sediments associated with the dredging of the HDD receiving pits. Water quality and essential fish habitat (EFH) impacts will be minimized by conducting excavation activities within the cofferdam. Permit conditions specifying time period restrictions for cofferdam installation will further limit impacts on water quality and EFH. The dredged area and depth are the minimum amount necessary to facilitate this landfall transition.

The HDD construction process will involve the use of drilling fluids which are composed of a carrier fluid and solids containing inorganic bentonite clay and admixtures. The drilling fluids when combined in a water slurry help transport drill cuttings to the surface for recycling and aid in the stabilization of the in-situ rock/sediment drilling formations and provide lubrication for the HDD drill steel (rods) and down-hole assemblies (drill bits).

3.2 Upland Cable Route from HDD Pit to 49th Street Substation

The upland cable route will be installed underground in previously developed areas and established rights-of-way or easements, all of which are located in non-residential areas. This approach eliminates use of undeveloped land or natural resource areas, avoids permanent impacts to open spaces (i.e., park lands) and minimizes disruption to community and neighborhood services.

The cable route will continue from the HDD entry pit by turning southward in an open cut trench to an underground Splicing Chamber that will be constructed in the [REDACTED], west of both 12th Avenue and [REDACTED] (see Attachment H). The open cut trench between the entry pit and Splicing Chamber is designed to anchor the submarine cable. The Splicing Chamber provides for the physical interconnection and transition (i.e., splice) from the specially-armored submarine-type cables to the land-type cables that will extend to ConEd's West 49th Street Substation. In addition, the Splicing

Chamber houses fluid-filled pressure tanks which maintain the fluid pressure within the cable. The Splicing Chamber will consist of a permanent, water resistant concrete vault constructed in a pit excavation with permanent sheet-pile walls and two permanent locking manhole risers extending to the surface for future access and maintenance. The size of the Splicing Chamber was determined by the cable equipment needed to perform the transition. See Section 6.2.2 for a discussion of design details of the Splicing Chamber.

From the Splicing Chamber, cable conduits will extend south [REDACTED]
[REDACTED]
[REDACTED]

The cable route will continue southward within, and at certain locations adjacent to, the existing Bike Path pavement limits using open trench excavation to install cable conduit pipes. This will require pavement restoration, and maintenance and protection of pedestrian and bicycle traffic, including temporary relocation of bicycle and pedestrian traffic onto the existing NYCEDC property.

The cable route [REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]. Pavement and sidewalk restoration will be required and performed in accordance with NYSDOT design standards and specifications which will be specified in drawings provided in permits that will be issued by the NYSDOT prior to construction. Bike path restoration will also be required and performed in accordance with NYSDOT design standards and specifications under agreement with the NYCEDC. Maintenance and protection of traffic requirements will be in accordance with NYCDOT standards and traffic regulations and the Official Compilation of Codes, Rules and Regulations of the State of New York, Title 17, Volume B (NYCRR).

3.3 Connection of the Upland Cable to Consolidated Edison (ConEd) West 49th Street Substation

The cable will connect to ConEd's West 49th Street Substation along the [REDACTED] side of the substation building structure. It will pass beneath the existing building foundation and enter the basement level of the substation [REDACTED]

[REDACTED] terminate at ConEd's existing electrical power distribution facilities, via terminal buses.

4.0 PRE-CONSTRUCTION CONSIDERATIONS

This section discusses the general procedures that will be followed prior to the commencement of construction including regulatory notifications, utility markings, landowner coordination, site management (including security) and coordination with the Independent Inspector.

4.1 Regulatory Notifications

Prior to commencing construction activities, CHC will provide notice to the NYSPSC and other interested parties identified in the Certificate, including:

- New York State Department of Environmental Conservation (NYSDEC);

- NYSDEC Region 2 Office;
- New York State Office of Parks, Recreation and Historic Preservation (OPRHP);
- Hudson River Park Trust;
- New York City Economic Development Corporation;
- US Army Corps of Engineers (USACE);
- New York State Department of Transportation;
- New York City Department of Transportation;
- New York State Office of General Services (NYOGS);
- United States Coast Guard (USCG);
- NYC Police and Fire Emergency service and municipal agencies; and
- Public.

Contact information is included in Attachment B.

CHC will make notifications of impending construction activities as required in associated Project permits. For example, Certificate Condition 30 requires that CHC provide notice to the HRPT, local officials, emergency personnel, and the local media and display notice in public places. The format of the public notices will be as agreed with the NYCDOT and other applicable agencies prior to construction, at least two weeks prior to commencement of site preparation. Condition 33 of the Certificate requires that CHC provide NYSDPS and NYSDEC with a minimum of five days notice before commencing construction or clearing activities. Pursuant to Certificate Condition 11, CHC will notify local fire officials and emergency management teams of chemicals and wastes stored on site.

Pursuant to Certificate Condition 27, CHC will report any proposed changes in the approved EM&CP to the following persons:

- NYSDPS staff;
- NYSDEC staff;
- HRPT staff; and
- Independent Inspector.

Though not specifically required by the Certificate, CHC will also inform the NYSDOT, NYCDOT, all active parties that have requested to be notified and the property owners or lessees whose property is affected by the proposed change. CHC will not execute any changes to this EM&CP until it receives

NYSDPS Staff approval, except in emergency situations threatening personal injury, property damage, severe adverse environmental impacts or as specified in the EM&CP.

Public notification of construction activities will include notices posted on conspicuous community bulletin boards, or variable message signs as directed by the NYCDOT or as requested by the various agencies. A toll-free telephone number has been established (1-866-733-0002), and will be posted to record and address public comments and concerns. NYSPSC contact numbers (the Secretary and Commission's Environmental Compliance Section) will be provided in all notices to ensure that the community's concerns are properly addressed.

Status reports and notices identified under Construction Supervision and Inspection (refer to Section 9.3) will be made available for public review at the on site Project construction offices.

4.2 Utility Markings

Certificate Condition 18 requires that CHC comply with the requirements for protection of underground facilities set forth in 16 NYCRR Part 753. Every effort will be made to identify all utilities, drainage facilities and other underground structures within the work area will be located prior to construction activities. As part of the design process, CHC has contacted all known utilities who could potentially have lines in the area in order to identify utilities crossing the route. Known utilities have been identified on design drawings. Approximately 2 months prior to commencement of construction activities, CHC will notify all identified private and public utility companies and property owners for utility mark-outs, location and depth information. In addition, the New York One Call Agency will be contacted to locate utilities of private utility owners and franchisees (e.g., telephone, power, communication) in public ways a minimum of three business days prior to the start of construction activities.

CHC will also obtain from One Call a listing of utilities not subscribing to the One Call service, and will make notice to these Owners similar to above.

Care will be taken during trench excavation to protect and support exposed utilities and other underground structures in accordance with all applicable requirements, including the requirements of the utility owners, property owners, NYCDOT and NYSDOT (Part 131 of NYSDOT Rules & Regulations, NYCRR Title 17 - Accommodation of Utilities within State Highway Right-of-Way). In addition, trenching operations will meet all requirements of the Occupational Health and Safety Administration (OSHA, 29 CFR Part 1926 and other applicable regulations).

Attachment B includes contact information for all affected utilities.

4.3 Land Owner Coordination

All construction activities in the Manhattan Segment, with the exception of the tie-in to the Con Ed substation will take place on public property owned either by the City of New York or the State of New York. Portions of properties owned by the City of New York adjacent to the cable route are leased to private entities. There are no residences in immediate proximity to the project, but construction activities may have limited potential to conflict with current recreational, commercial and public activities.

The Pier 88 to 94 properties will be affected by the installation of the cable and construction of the Splicing Chamber. Piers 88 to 92 are leased by the NYCEDC to P&O Ports North America, which operates passenger cruise ship berthing operations. NYCEDC leases Pier 94 to ENK International, New York, which uses the space for trade and fashion show events. In addition, the NYSDOT maintains a bike path that runs along the cable route between 12th Avenue and the Hudson River. The cable will be installed along the bike path from the landfall between the Piers 94 and 95 headhouse until it crosses 12th Avenue at the 49th Street substation. In an effort to minimize potential impacts to Pier operations, recreational use of the bike path, and public access to the waterfront during construction activities, CHC has been closely coordinating planning with NYSDOT, NYCDOT, NYCEDC, HRPT, P&O Ports and ENK International.

Construction activities are being scheduled in coordination with the Pier facility managers to accommodate special berthing operations or special events at the piers to the extent practical. NYCDOT Office of Construction Mitigation and Coordination (OCMC) develops the traffic stipulations that will affect construction activities, including allowable lane closure times and durations. OCMC has jurisdiction for permits for all work within city roads and sidewalks. OCMC's permit traffic stipulations are intended to minimize the construction impacts on vehicular and pedestrian traffic and to adjacent residences and businesses.

All construction work and maintenance and protection of traffic (MPT) work will be coordinated with OCMC. MPT plans have also been submitted to NYSDOT for review. Proposed MPT plans are included as Attachment I. Final MPT Plans will be included when approved.

CHC will coordinate with ConEd prior to entering and performing work within the existing West 49th Street Substation. Any ConEd design requirements will be identified in Attachment J-6.

Authorizations to occupy New York City property in the form of Revocable Consents will be obtained from NYCDOT, and a use and occupancy permit to build within a State highway will be obtained from the NYS Department of Transportation, prior to construction to provide construction vehicle access to the site and areas for installation, staging, and storage of materials and equipment. Agreements are being negotiated with property owners for easements. These agreements generally will convey the right to reconstruct, remove, replace, maintain and operate ducts and manholes within the established area and to use areas immediately adjacent for temporary containment of excavated material. A copy of the revocable consent will be included in Attachment J-2.

In addition, CHC will be coordinating with representatives of Community Board No. 4 to insure the community's interests are represented throughout the cable installation process. Meetings to discuss project activities will be scheduled on a regular basis with community groups starting two weeks prior to construction and continuing through project completion. Community concerns will be recorded and addressed through the toll free hotline discussed in Section 4.1. A CHC community outreach representative will be available as required to meet with community members on an individual basis or in small group settings as appropriate.

4.4 Site Security/Site Marking

Open trenching techniques will be employed throughout much of the construction process. In order to minimize potential for accidents, standard work-site safety protocols will be used during construction

activities. All trenches and pits will be clearly marked with warning tape, signs and reflective markers. Street opening permits, vehicular, pedestrian, and bicycle traffic control barricades and traffic protection devices will be provided in accordance with NYCDOT (OCMC) requirements to protect the work area. All excavations within active roads, i.e., traffic lanes not detoured, including pedestrian, and bike paths will be covered with steel plates or otherwise properly secured during periods when construction crews are not actively working in an area to keep all lanes usable for weekdays and peak hour traffic. Furthermore, trenching operations will meet all requirements of OSHA (29 CFR Part 1926). Temporary security fencing will be provided where practical, and where permitted by the landowner, to secure both work areas and temporary storage areas along the construction route.

As discussed in Section 4.3, Maintenance-and-Protection-of-Traffic plans will be prepared for the work in the Manhattan Segment. The crossing of 12th Avenue requires that MPT drawings be prepared and submitted for approval by NYSDOT (OCMC). Construction activities in the Manhattan Segment will include the temporary closure of travel lanes along 12th Avenue during construction activity. The existing 12th Avenue roadway includes three travel lanes southbound and one left turn lane onto West 50th Street for a total of four lanes. Twelfth Avenue northbound includes three travel lanes. CHC will periodically consult with NYSDOT and NYCDOT (OCMC) relative to traffic conditions in the Project area and will attempt to minimize impacts resulting from construction activities (Certificate Condition 14).

4.5 Site Preparation, Access, and Parking

During construction and commissioning of the Project, heavy equipment such as excavators and trucks will be required. Transportation of materials and equipment along the Manhattan Segment will be completed with limited impact to the community and in accordance with authorization from property owners. Construction materials necessary for the construction of the Splicing Chamber will include conventional materials used in the construction of below ground concrete structures. Materials necessary for the construction consist primarily of cable, duct, concrete and fill material. Delivery of construction materials to the site will be accomplished via truck and barge. The existing roadways and piers are suitable for delivery of materials and will support construction equipment.

During cofferdam construction a 160-foot/180-foot long by 54-foot wide construction barge will be moored via spuds at the cofferdam location. A standard Notice to Mariners will be issued to the USCG to advise other mariners of the barge's location and limited maneuverability. Standard day/night approved navigation signals will be displayed to warn other mariners of the barge location and its limited maneuverability. Once the installation of the cofferdam sheeting is completed the sheets will be cut at a pre-determined height above the river bed. This position will be communicated to the USCG. The construction barge will leave the site upon completion of the cofferdam, thereby allowing surface navigation at the site.

During HDD construction operations an HDD marine support barge (160-foot/180-foot) will take up station at the cofferdam location. This barge will support the HDD operation and the installation of the conduits. Again a standard Notice to Mariners will be issued to the USCG to advise other mariners of the barge's location and limited maneuverability. Standard day/night approved navigation signals will be displayed to warn other mariners of the barge location and its limited maneuverability. Once HDD operations are complete the barge shall leave the site thereby allowing surface navigation at the site.

When cable installation operations are completed all cofferdam sheeting that is present above the river bed will be removed.

Access and materials required for cofferdam construction will be mobilized by tug boat and barge to the cofferdam location, and staged at the cofferdam location during the course of cofferdam construction. Worker access will be by tugboat, from the marine Contractor's berthing facility in New Jersey. Cofferdam construction will not impede ship traffic on the Hudson River.

Access and materials required for the HDD operations will be mobilized by truck to the HDD area, and staged within this area during the course of cofferdam construction. Worker access will be by foot, with workers traveling to and from the job site by public transportation. Some workers may drive their personal vehicles to work, but they will be required to park their personal vehicles in existing parking areas or in public parking spaces.

A portion of the cable system will run [REDACTED]. Access to this area [REDACTED] is available from [REDACTED]. Where the cable system crosses 12th Avenue, a NYSDOT Use and Occupancy Permit will be obtained to install and maintain the cable system across 12th Avenue. Access to portions of 12th Avenue where cable installation is planned will be provided via 12th Avenue itself and local cross streets. Access to the upland Project area will normally occur during regular business hours, and deliveries generally will be scheduled to avoid periods of peak traffic flow. A detailed discussion of hours of construction and work restrictions is provided in Section 4.7.

The ConEd West 49th Street Substation is located on the east side of 12th Avenue between West 49th and West 50th Streets. Vehicle approach and access to the building is available via 12th Avenue, West 49th Street, and West 50th Street. [REDACTED]

Recent redevelopment projects located along the riverfront to encourage public use and recreation and provide access to the scenic vistas of the Hudson River include modernization of Pier 94 and construction of a Bike Path that runs parallel to the waterfront area on the west side of the West Side Highway. During construction in the Project area, restrictions in access to any recreational areas will be temporary and minimized when possible.

Certificate Condition 7 requires that construction activities be scheduled to avoid material interference with the operation of the Passenger Ship Terminal at Piers 90 and 92 and to minimize or avoid, to the extent practicable, interference with access to Pier 94 for trade shows. CHC and its Contractors will coordinate with the operator of the terminal and schedule work in accordance with this Condition and other constraints as described in this EM&CP. CHC will take the following actions to properly coordinate cable construction with the existing facility operations;

- CHC will present a detailed overview of construction at stakeholder meetings well in advance of any work. During these presentations, CHC will encourage feedback from the stakeholders to identify each participant's top concerns for construction.
- Following these meetings, CHC will revise its approach, as appropriate, to facilitate the concerns of the various participants. CHC will conduct multiple planning presentations to properly communicate

the final plan for construction prior to work starting on site. The final construction work plan will include a list of concerns identified during stakeholder meetings and show each issue will be addressed during construction.

- Included in these discussions (and final work plan) will be a listing of proposed working days and working hours. CHC anticipates the need to work a variety of different days and hours to properly coordinate the work, and get the work done with the least impact to the businesses, while still maintaining a productive construction schedule.

Certificate Condition 19 requires that construction activities be scheduled to minimize or avoid, to the extent practicable, disturbance to pedestrian use of recreation ways, use of the recreational bike path, access to port facilities, and parkland development. CHC will schedule work in accordance with this Condition and other constraints as described in this EM&CP.

Construction-related activities will normally occur between the hours of 7:00 a.m. to 6:00 p.m. (excluding weekends and holidays) except as noted below:

- HDD and cable laying operations are scheduled to the extent possible during normal project working hours between 7:00 a.m. to 6:00 p.m., seven days a week. Every effort will be made to restrict operations to this period however conditions may sometimes warrant work outside of this period to safeguard the project and to protect the down-hole equipment. If this is the case, work may continue after 6:00 p.m. as necessary to rectify a problem and conditions will be documented.
- The owners of the Piers and of 12th Avenue have specifically requested the Contractor work portions of the job at night to better accommodate their business schedule. CCH will provide the DPS staff written notification of all work activities scheduled in response to such requests at least 2 weeks prior to the initiation of an after hours activity.
- Pursuant to NYCDOT issued permits, oversized deliveries will be exempted from the restrictions limiting deliveries to 7:00 a.m. to 6:00 p.m.. In accordance with Certificate Condition 10, nighttime deliveries will be permitted to facilitate compliance with restrictions on daytime construction on public roadways or public access areas or which require the cessation of activities that require continuous work effort once started.
- With prior approval of PSC.

4.6 Parking and Staging Areas

CHC has made agreements to park construction crew vehicles and store construction equipment, associated supplies, and excavated materials in designated lay-down areas in the existing Pier 94 and Pier 92 NYCEDC parking lots. Contractor employees will be required to park in public parking areas, so as not to interfere with normal traffic or existing land use or cause a safety hazard. The majority of workers in Manhattan use public transport to commute to work as it is usually the most convenient means of transportation, as a result it is expected that the number of workers using personal vehicles to travel to the site will be small. In the case that construction workers choose to use a personal vehicle to commute they will be required to find their own parking off site. There are public parking areas available for use adjacent to the site. Staged construction equipment and stored material will not interfere with the

operations of the Piers. Temporary security fencing and/or barriers will be provided as needed to secure temporary staging areas on NYCEDC property.

CHC has requested that NYSDOT grant permission for temporary staging and storage of construction equipment and associated materials along the Bike Path itself. Such an arrangement would require, at a minimum, that bike and pedestrian traffic be directed onto a temporary Bike Path detour to be provided and maintained for as long as materials are stored on the Bike Path. The temporary construction storage on the Bike Path will not interfere with access to the temporary Bike Path detour and will not adversely affect the long term use of the Bike Path (i.e., pavement will not suffer any permanent damage, discoloration, settling, etc. and if any damage is identified, the damaged areas will be restored to equal or better than original condition.). Temporary security fencing and/or barriers will be provided as needed to secure temporary staging areas on the Bike Path. If staging is permitted, conditions will be included in the use and occupancy agreement describing necessary requirements.

All staging/storage areas are identified on the Project Plans and/or MPT Plans (see Attachments H and I).

Some small tools and equipment may be stored within the West 49th Street Substation with ConEd's approval. However, due to space constraints, CHC will not store large pieces of construction equipment or on-road vehicles in the West 49th Street Substation or the basement.

[REDACTED]

[REDACTED] Timber lagging may be necessary on the 12th Avenue side of the drill pit to allow the drill rig to be located as far as possible from the bulkhead line (to make it practical for HDD equipment to drill along a path passing safely below the existing bulkheads and without penetrating the bulkhead while maintaining practical drilling inclination angle and bending curvatures). It is expected that the three other sides of the pit can be sloped down to the pit bottom. Creation of a relatively flat horizontal to vertical (4 to 1) slope on the south side of the excavation will allow construction equipment and vehicles to access the HDD area. Slopes on the other two sides (north and west sides) can be inclined at a steeper inclination (2 to 1 horizontal to vertical).

Prior to excavation, CHC, where practical, will sample the soils in place to determine the classification for offsite disposal. CHC will locate off-site receivers for all drilling spoils and slurry produced during the HDD process. Separate (off-site) stockpile containment areas may be used to temporarily store soils removed from the drill pit excavation. Soils will be reinstalled into the drill pit if deemed suitable for backfill. Unsuitable soils will be removed from the site and properly disposed of.

4.7 Construction Schedule

As preliminary schedule for the construction of the Manhattan segment of the Project is provided in Figure 4-1. Updates to this schedule will be provided to DPS staff as appropriate.

Redacted as Trade Secret

Figure 4-1

Road construction in Manhattan is subject to holiday restrictions that will apply to work in the 12th Avenue (West Side Highway/Route 9A) right of way. The City of New York prohibits all street and sidewalk construction work in portions of Manhattan from approximately November 18 of each year through January 2 of the next year. Only emergency work and previously permitted ongoing construction, or work specifically allowed by the NYCDOT and NYSDOT as applicable, may be conducted. These restrictions are designed to minimize street traffic and sidewalk congestion during the holiday season. Restrictions on CHC's work in public highways will be noted on the NYCDOT permit.

Since 12th Avenue is classified as a New York State Highway (New York State Highway 9A), work on 12th Avenue, in the 12th Avenue right-of-way, and in the 12th Avenue Bike Path falls under the jurisdiction of NYSDOT. Therefore, additional work schedule restrictions may be implemented by NYSDOT for construction activities located along the 12th Avenue Bike Path, 12th Avenue, and especially the 12th Avenue crossing point, where night shift or weekend work restrictions can be expected. These restrictions will be included in the NYSDOT permit when issued.

In addition to the calendar restraints discussed above, NYSDOT Region 11 has established work hour restrictions for 12th Avenue lane closure work. Approval of an MPT by NYCDOT may provide for deviation from NYSDOT allowable work hours. Actual work hour restrictions for the project will be those identified in the MPT (see Attachments I and J-2). The allowable work hours for a typical NYCDOT project in this vicinity are summarized in Table 4-1.

Table 4-1
NYSDOT Allowable Work Hours– 12th Avenue

Traffic Direction	One-Lane Closure			Two-Lane Closure		
	Weekdays Mon – Fri Morning	Friday Eve – Sat Morning	Sat Eve – Sun Morning	Weekdays Mon – Fri Morning	Fri Eve – Sat Morning	Sat Eve – Sun Morning
Southbound	10A - 3P, 10P - 6A	10P Fri – 7A	10P Sat - 10A Sun	1201A - 5A	1A - 0630A	2A - 9A
Northbound	10A - 2P, 11P - 6A	11P Fri – 2P	Sat midnight - 2P Sun	1201A - 5A	1A - 0630A	2A - 9A

Any adjustments of route alignment that are necessary will likely occur in the 12th Avenue and West 50th Street areas where existing underground utilities are especially congested. Cable conduit installation can proceed in either direction and even be constructed in non-consecutive segments, if necessary, to satisfy work restrictions and coordination requirements with NYSDOT and NYCEDC. Final project requirements will be determined by CHC in coordination with both the NYSDOT and NYCEDC.

Additionally, a seasonal schedule restriction is placed on in-river work in the Article VII Certificate. Certificate Condition 41 indicates that construction within navigable waters shall not occur between November 15 and April 15 of the subsequent year. This restriction applies to installation and removal of the temporary cofferdam but does not apply to HDD operations or dredging and backfilling within the temporary cofferdam once it has been constructed. These two constraints determine the feasible early and late start dates for the Manhattan work.

Jet-plow installation, which will be addressed in the “Hudson River” segment EM&CP is expected to proceed from the Edgewater temporary cofferdam to the Manhattan temporary cofferdam. The Splicing Chamber must be constructed and the HDD conduit must be installed before the start date for the jet plow portion of the work.

5.0 CONSTRUCTION PROCEDURES

This section discusses the general procedures that will be followed during construction including the installation of Erosion and Sedimentation Controls, Stormwater Management, Spill Prevention Measures and development of a Soil Management Plan.

Based on the route selected for the Manhattan Segment and the construction methodology that will be used, the area of disturbance from the point at which the cable makes landfall in Manhattan to the ConEd West 49th Street Substation will be less than one acre in area. Since the Manhattan Segment construction activities result in land disturbance of less than one acre, the Project is not subject to the provisions of New York’s State Pollutant Discharge Elimination System Regulations and is not required to file a NOI for coverage under the SPDES General Permit for Stormwater Discharges from Construction Activity. Permits will be obtained from the NYC Department of Environmental Protection (NYCDEP) for the discharge of wastewater/storm water into the City sewer system.

CHC will implement the following Erosion and Sediment, and Storm water Management Controls during installation.

5.1 Erosion and Sedimentation Controls

All upland work in the Manhattan will be conducted within impermeable surfaces, i.e., concrete or asphalt pavement. However, erosion and sedimentation controls will be installed as necessary around soil piles to prevent runoff into storm sewers and streets prior to the commencement of construction. Sedimentation controls will be maintained until the construction area has been stabilized. Tracking of soil off-site by construction equipment and delivery vehicles, and the generation of dust shall be minimized at all times. Sprinkler systems will be employed, if needed, to minimize dust generation.

CHC will sample, and classify for reuse, or off-site disposal, the excavated soils in situ, i.e., prior to excavation. Soil containment areas are identified on the Project Plans (see Attachment H). Temporary containment areas may be used to store soils during a shift. These areas will be arranged as shown in the Soil Erosion and Sediment Control Plan (SESCP) to store soils excavated from trenches along the cable route or to form the Splicing Chamber. The storage containment areas will be located on impermeable surfaces, bounded on four sides with filtering barriers, i.e., hay bales or equivalent filtering media to form soil containing edge barriers to filter any groundwater or precipitation draining from the excavated soils until the soils are either reused as backfill or removed for disposal by CHC. All storage containment areas will be constructed in such a way that existing pavements will not suffer any long term damage, discoloration, settlement, or any other adverse affects from the storage and handling of excavated soils. Damaged surfaces will be restored to their original or better condition. Every effort will be made to avoid the need for on site storage of soils by directly loading soils into trucks for off site storage/disposal.

Soils excavated from the HDD pit will either be reused as backfill for closing the HDD pit, or disposed of at an appropriately licensed facility. CHC will provide the PSC on site representative the name of off-site receivers for all unusable excavated materials prior to disposal. Only regulatory agency-approved and licensed facilities will be used.

HDD operations will be conducted to minimize or avoid impacts to water quality in the Hudson River to the greatest extent practicable. The HDD operation will be self-contained and use a drilling fluid recirculation system. The recirculation system will recycle drilling fluids and process drilling returns for offsite disposal to minimize excess fluid disposal and residual returns. None of these materials will be directly discharged or released to marine or tidal waters in the Hudson River. If drilling fluid is inadvertently released during drilling, the Contractor will notify the PSC and other appropriate agencies and initiate clean-up procedures immediately.

Due to the limited and contained nature of the dredging necessary to construct the temporary cofferdam, and the temporary and short-term turbidity generated during construction and installation, no significant impact on Hudson River hydrodynamics or aquatic resources are expected. The use of closed clam shell dredging techniques as required in the Article VII Certificate will control suspended sediment.

5.2 Stormwater Management

The impacts of storm water generation during precipitation events or as a result of water used to control fugitive dust generation will be minimized by the use of containment equipment as described above. The SESCO has been prepared to describe the best management practices that will be followed to minimize storm water runoff. A copy of the SESCO is contained in Attachment C. Although, as discussed above, an SPDES General Permit is not needed to authorize construction of the Manhattan Segment, the SESCO

is consistent with NYSDEC's technical standards and with the requirements of the SPDES General Permit for Construction Activities.

Under normal conditions, sediment from construction activities is the only potential contaminant of stormwater discharged from the construction workspace. Erosion and sediment control measures, which will minimize the potential for discharge of sediment-laden stormwater, are addressed in Section 5.1 and the SESCO. Non-stormwater discharges, resulting from spill incidents, are addressed in Section 5.3. Water generated from fugitive dust control and dewatering, will be managed similar to other stormwater sources since it has the potential to be discharged into the municipal storm water system.

5.3 Spill Prevention Plan

To minimize the impact from potential spills of petroleum products and other potentially hazardous materials that may be used during construction, CHC has prepared a SPP, which is included as Attachment D.

If Contractors are unsure as to the severity of a spill or the appropriate actions to take they may call the appropriate spill response numbers including:

NYSDEC - Spills Unit Chemical and Petroleum 24-Hour Help line

1-888-457-4351

and

NYSDEC – Region 2 Spill Response Coordinator

Mr. Randy Austin

718-482-4929

and

National Response Center (NRC)

1-800-424-8802 or 1-202-267-2625

CHC will maintain an adequate supply of spill response equipment on-site to control spills of hazardous materials that may be used during construction activities, including:

- Sorbents, including pillows, wipe sheets, and sawdust.
- Commercially available spill kits (or equivalent) to handle spills of varying sizes.
- In-ground or aboveground containment structures such as berms, gutters, dikes, culverts and holding tanks and sumps and collection systems.
- Shovels or small backhoes for the excavation of contaminated soils or materials.

- Drums, barrels, and other temporary storage containers for the clean up and transport of contaminated materials.
- Absorbent pads that are large enough to handle a complete loss of engine oil or hydraulic fluid for placement under static machinery.
- Small sorbent kits for all vehicles and machinery.

In addition, CHC will stock the following equipment when conducting waterborne activities:

- Rapid deployment fire proof/fire resistant oil containment floats and booms. The minimum length of booms should be sufficient to surround the work area and vessels. All booms will conform to USDOT and United States Coast Guard requirements.
- Oil removal or skimming equipment should be on hand or on call, including oleophilic and hydrophobic absorbent booms or mats and/or mechanical skimmers.
- Sampling equipment of sufficient amounts to enable 24- hour monitoring if necessary.

When conducting waterborne activities, CHC will also stock or have access to dispersants, dispersant delivery platforms (i.e., aerial or marine), loading facilities, communications, etc.

CHC will comply with the following standards for the storage of fuels and other hazardous materials under all applicable local, state, and federal regulations covering the transport, storage, and handling of hazardous materials:

- Maintain copies of materials safety data sheets on site.
- All applicable state, local and federal regulations covering the transport, storage and handling of oil.
- Fuels and other controlled materials will be stored in designated areas approved by local Fire Department, or United States Coast Guard, as applicable. All such areas will be at a minimum, 100 feet from any water body, watercourse, wetland or known spring or well.
- Above ground tanks will be equipped with secondary containment devices. Oil will be kept in restricted access areas and kept separate from other construction activities.
- Yards and storage areas will be equipped with sufficient supplies of spill control and absorbent materials for the volumes present.
- Spill control supplies will be clearly marked, readily accessible, and personnel will be instructed on their use prior to the initiation of construction.

When refueling equipment during construction, the following standards will be applied:

- Equipment refueled in yards will be refueled in a clearly marked and designated refueling area;

- Refueling areas will be surrounded on at least two sides by dikes, berms, or retaining walls to contain spilled oil, fuels or lubricants;
- Care will be exercised at all times to prevent overfilling;
- When refueling, all fuel trucks, portable drums and tanks will be inspected for leaks or signs of wear; and
- All refueling trucks will carry spill containment materials, and the driver/operator will be trained in their use and responsible for their employ after spills.

CHC will also:

- Develop a list of approved waste clean-up Contractors in the project area and providing it to the Independent Inspector prior to the initiation of construction. The list will be maintained in the project office for reference.
- Train and equip company personnel for spill emergency response and to immediately take steps to contain any spills at the source.
- Require its Contractor to notify CHC immediately, and coordinate spill containment and clean-up measures. CHC will report spills to NYSDEC, NYSDPS and the National Response Center as required by law.
- If a spill occurs in a water body, sampling will begin immediately to determine the nature and effect of the spill.

Construction crews may handle small spills on land if sufficient materials and equipment are available on-site to excavate and containerize spilled material. If a spill cannot be adequately excavated and properly disposed of by construction crews, a licensed waste specialist will be contacted. CHC will coordinate all activities and ensure that all containerized wastes are properly labeled for shipment to licensed facilities able to accept said materials.

HDD operations will be designed to include a drilling fluid fracture or overburden breakout monitoring program to minimize the potential of drilling fluid breakout into tidal waters of the Hudson River. The HDD conduit systems will be drilled through rock and sediment overburden within the limits of the Hudson River. It is anticipated that drilling depths in the overburden will be sufficiently deep to avoid pressure-induced breakout of drilling fluids through the river bottom based primarily on estimates of overburden thickness and porosity. A visual and operational monitoring program will be implemented during the operation to ensure an immediate response should a breakout occur. This monitoring includes:

- Visual monitoring of surface waters in the adjacent Hudson River by drilling operation monitoring personnel on a daily basis to observe potential drilling fluid breakout points;
- Drilling fluid volume monitoring by technicians on a daily basis throughout the drilling and reaming operations for each HDD conduit system;

- Development and implementation of a fluid loss response plan and protocol by the drill operator in the event that a fluid loss occurs. A copy of the response plans will be maintained in the onsite project office. It will include drill stem adjustments; injection of loss circulation additives, such as Benseal, that can be mixed with drilling fluids at the mud tanks; and other mitigation measures as appropriate; and
- Use of appropriate bentonite drilling fluids that will gel or coagulate upon contact with salt water. In the unlikely event of a drilling fluid release, the bentonite fluid density and composition will cause it to remain as a cohesive mass on the riverbed in a localized slurry pile similar to the consistency of gelatin. This cohesive mass will be contained within the temporary cofferdam, and can be quickly cleaned and removed by divers and appropriate diver-operated vacuum equipment. If necessary, a mechanical dredge may be used to remove impacted river sediment within the temporary cofferdam.

When the horizontal directional drilling (HDD) bore nears the temporary cofferdam, fresh water will be injected into the bore to reduce bentonite concentrations in the bore. The fresh water will push the majority of the bentonite back to the HDD rig where it will be recovered. As the HDD exits into the temporary cofferdam, any remaining bentonite will congeal as it is exposed to the marine water in the Hudson River. The congealed bentonite will be contained within the temporary cofferdam where it will be removed as described above.

5.4 Soil Management

Soils generated from the cable installation and sediment and soil generated from installation/construction of the drill entry pit will be handled and managed in accordance with federal and state specifications.

Excavated soil and sediment will be trucked off site and stored at an off-site location for reuse or disposed of off-site as required in accordance with applicable regulations. The soil containment areas are indicated on the site plans in Attachment H will be used for limited temporary storage only. If additional backfill is needed, only clean fill will be used. If contamination of soil or sediment is suspected the soils will be segregated, a sampling plan will be developed, and sampling will be performed. Soil that does not meet reuse standards will be disposed of in accordance with all applicable federal and state regulations.

Asphalt pavement removed during construction will also be trucked off site for storage or disposed of in accordance with applicable state and local regulations. Pavement removed during construction may be used as a sub-base beneath the newly paved areas. Excess pavement will be disposed of at an authorized construction and demolition (C&D) debris processing facility, pursuant to Subpart 360-16 "Solid Waste Disposal Facilities" of the NYSDEC regulations.

Excavation and backfilling activities by CHC will be staged so as to minimize any need to re-excavate material following determinations made with respect to the appropriate off-site disposition of excess soil. CHC will monitor and manage this process so as to avoid reusing any soil that is contaminated (e.g., odor or visual discrepancies) and unsuitable for reuse. CHC will be responsible for any re-excavation necessary due to the failure to monitor and manage this process properly.

CHC will have a staff person on-site with the requisite training and experience to observe site conditions and ensure the appropriate management of excavated soils.

In the event of discovery of potentially contaminated soil due to an historic spill, discharge or release to the environment of any toxic or hazardous waste, chemical or substance or any other non-compliance with environmental Law, CHC will promptly notify appropriate local, state, and federal agencies.

5.5 Groundwater Dewatering

During excavation and trenching operations, groundwater may be encountered. Previous subsurface investigations indicate that the depth to groundwater is generally less than 10 feet below grade, and excavation depth is anticipated to be approximately 4 to 8 feet below grade. Should groundwater be encountered, dewatering procedures will be developed prior to construction, in accordance with the applicable permit conditions. Based on sampling previously conducted, it is not expected that groundwater contamination will be an issue. Dewatering procedures include the pumping of clear water, i.e., water with no visible suspended solids, or the pumping of turbid water through a filtering system direct to a storm inlet in accordance with sewer system discharge permits issued by the NYCDEP. See Attachment J-4.

5.6 Unanticipated Cultural Resource Discovery

Cultural resource surveys have been completed along the Project route.

The Manhattan bulkhead has been designated as an historic structure and must be avoided to maintain the present New York State Historic Preservation Office (NYSHPO) determination (NYSHPO 7/16/02) that the Project does not cause an "adverse impact" to the bulkhead. In keeping with NYSHPO requirements, the project design will ensure that HDD and cable installation activities will not impact the existing historic bulkhead structure or its foundations. The project plans showing the relationship of the HDD to the bulkhead are contained in Attachment H.

If cultural resources are encountered during installation, CHC will stabilize the area, cease construction activities in the immediate vicinity of the find and protect the find from damage. CHC will notify NYSDPS and OPRHP within 24 hours to determine the best course of action. No construction activities will be allowed to recommence in the area of the find until the significance of the resource has been evaluated and the need for and scope of impact mitigation has been determined.

If human remains or evidence of human burials is encountered during construction or during archaeological data recovery, all work in the vicinity of the find shall cease immediately and the remains shall be protected from further damage. CHC will notify NYSDPS and OPRHP within 24 hours of the discovery.

5.7 Hazardous Material Handling and Disposal

"Hazardous Material" means any chemicals, materials or substances designated, classified or regulated as hazardous or toxic or as pollutants or contaminants under applicable law. All hazardous materials will be handled, stored, and disposed of in accordance with applicable local, state and federal regulations including applicable OSHA construction standards.

Extensive investigations were conducted during the reviews for the Hudson River Park redevelopment project and the adjacent Route 9A reconstruction project. The purpose of the investigations was to

determine the potential for hazardous material exposure. The investigations found that there was "no immediate danger" from hazardous materials, although much of the site had been previously occupied by various industrial facilities. These sites included coal yards, gasoline stations, vehicle maintenance repair shops, smelting and refining operations, paint and varnish manufacturers, printing companies, and gas companies.

Limited data exists concerning the presence and location of underground storage tanks (USTs) and associated contaminated soils that may be present as a result of these USTs. If a tank is discovered during construction activities, said activities will be stopped, and the Contractor will notify CHC. The Independent Inspector will make recommendations for the appropriate course of action including, but not limited to, the need to report possible spills to the appropriate agencies.

Non-petroleum contamination (i.e., coal tar or buried drums) may also be encountered and may require reporting under applicable regulations such as CERCLA. If soils, sludge, or groundwater show evidence of potential contamination (such as discoloration, staining, or odors), the affected areas will be secured. CHC will conduct the necessary soil or water sampling and laboratory analysis to determine the nature of the material and potential contamination. Samples will be analyzed for parameters appropriate for the suspected contaminant and those parameters requested by the disposal facility. While waiting for analytical results, potentially contaminated soil will be stored so as to minimize exposure in accordance with applicable regulations. The property owner will be notified of the findings of the laboratory analysis, if contamination is discovered.

In general, excavated material will be returned to the hole from which it was removed (consistent with a November 1989 NYSDEC TAGM 4032 Memo regarding the disposal of cuttings and spoil generated on-site during subsurface investigations). Material that cannot be reused on-site, as determined by in situ soil classification prior to excavation, will be properly excavated and disposed offsite.

Promptly after discovering any material on-site believed or considered to be a hazardous material or antiquity of a nature which would require action other than those hazardous materials or antiquities whose existence (and/or remediation) has been expressly addressed herein, CHC shall:

- Stop work in any affected area as appropriate.
- Promptly present a plan for properly addressing the situation.

CHC will determine the legal alternatives for removal and disposal of hazardous material, identification of off-site disposal sites and shall develop and implement a health and safety plan for the removal and disposal of hazardous materials including obtaining permits (if necessary) in its or CHC's name. CHC will obtain and maintain copies of all documents relating to such hazardous material including hazardous waste manifests, approvals and/or authorizations from landfill or other treatment, storage or disposal facilities (TSDFs), and all laboratory data.

CHC will be responsible for any remediation of hazardous materials; however, CHC also will ascertain the extent to which the owner of the property on which any hazardous materials are discovered should be involved in or bear financial responsibility for, any remediation, and any remedial activity undertaken by or on behalf of CHC shall be without prejudice to CHC's rights to seek or obtain reimbursement from responsible parties.

6.0 ANTICIPATED CONSTRUCTION METHODS

Section 6.0 contains a summary of the general methodologies that will be used during construction of the Project, a description of the cable to be used in the Project and detailed discussions of each portion of the Manhattan Segment. Final construction methodologies are subject to modification dependent on final requirements that will be included in permits/approvals issued by NYSDOT, NYCDOT, and USACE and incorporated into this EM&CP. See Attachments J-1 through J-7.

6.1 Electrical Grid Connection

CHC will design, engineer, and construct the Project as provided in the System Reliability Impact Study (SRIS) approved by the New York Independent System Operator (NYISO), the Transmission Planning and Advisory Subcommittee (TPAS), NYISO Operating Committee, and NYISO Class Year 2006 Annual Transmission Reliability Assessment Study (ATRAS) and/or any applicable subsequent SRIS or ATRAS. Design, engineering and construction will also be conducted in accordance with the applicable and published planning and design standards and best engineering practices of NYISO, ConEd, the New York State Reliability Council (NYSRC), Northeast Power Coordinating Council (NPCC), North American Electric Reliability Council (NERC) and North American Electric Reliability Organization (NAERO) and successor organizations depending upon where the facilities are to be built and which standards and practices are applicable. Specific requirements shall be those required by NYISO Operating Committee and TPAS in the approved SRIS and by any interconnection or facilities modification agreements made with ConEd.

CHC will design the system in consultation with ConEd, and any successor Transmission Owner, to ensure that the system will have power system relay protection and appropriate communication capabilities such that operation of the electric transmission system is adequate under NPCC Bulk Power System Protection Criteria and meets the protection requirements at all times of the NERC, NPCC, NYSRC, NYISO, and ConEd and successor Transmission Owner (as defined in the NYISO Agreement). CHC will ensure compliance with applicable NPCC criteria and shall be responsible for the costs to verify that the relay protection system is in compliance with applicable NPCC, NYISO, NYSRC and ConEd criteria.

[REDACTED]

The final design and construction of the ConEd West 49th Street Substation wall penetration requires a review of the existing Substation drawings including details on basement slab and foundation, locations of existing utilities underneath the adjacent sidewalk and location of existing cables and piping within the basement. The necessary structural design elements for the penetration that must be considered include:

- Foundation and slab construction material;
- Foundation and slab thickness;

- Type and size of reinforcement; and
- Waterproofing present.

CHC and its Contractors will be responsible for all engineering design, equipment procurement and construction activities for installation of the 345-kV SCFF cable system up to and including assembly of the terminations within ConEd's West 49th Street Substation.

When designing and installing components within ConEd's West 49TH Street Substation, CHC will comply with all ConEd specification requirements related to construction materials, procedures and work practices. CHC will prepare a site specific Health and Safety Plan to ConEd under its own approval process. A ConEd Engineering Inspector will be notified of and provided an opportunity to observe all construction operations inside the West 49TH Street Substation.

It is expected that work within ConEd's West 49TH Street Substation will take approximately two to three months to complete, however this work may not be continuous.

6.2 Manhattan Segment Cable Installation

A description of construction methodologies proposed for the Manhattan Segment is provided in this section. The cable route and pre-construction considerations have been discussed in previous sections.

6.2.1 General

SCFF technology, supplied by the Mitsubishi Corporation has been selected for the project. See Attachment K for cable design specifications. Typical construction for underground power transmission cables includes open trench excavation, laying and joining conduits, backfilling with fluidized thermal backfill (a specialized low-strength concrete product with engineered thermal conductivity properties) and native earth, replacing topsoil or pavement, pulling cable, splicing cable and adding fluid. See drawing 10 of 11.

In accordance with Certificate Condition 36, CHC will limit construction to the right-of-way and approved work areas as detailed in this Plan.

The duct bank cross section at various locations will include two types of basic cable arrangements:

- Trefoil; and
- Side-by-side.

The trefoil arrangement consists of a stacked three cable arrangement in which one transmission cable is laid above two transmission cables with the communications cables placed alongside the top transmission cable. The distributed temperature sensor (DTS) cable can either be placed above the communication cable or between the two bottom transmission cables. The side-by-side arrangement consists of three transmission cables laid in a horizontal, flat position. The communications cables can be placed along both sides of the outer transmission cables, and the DTS cable can be placed alongside the center transmission cable.

In areas of congested utilities running parallel to the proposed cable route, the trefoil arrangement is preferred, and in areas of congested utilities perpendicular to the proposed cable route, the side-by-side arrangement is preferred. [REDACTED]

[REDACTED]. The trefoil arrangement permits the trench excavation to be narrower but deeper, and the side-by-side arrangement permits the trench excavation to be shallower but wider. The underground construction will include both types of cable arrangements, and transitions between the trefoil arrangement and the side by side arrangement are possible.

Construction activity in the Manhattan Segment will include open trench excavation in paved areas. Maintenance and protection of vehicular and pedestrian traffic will be required during construction within the existing parking lot, the Bike Path crossing and while entering and exiting from 12th Avenue (refer to Section 7.3 of this Plan). In addition, pavement restoration and new pavement markings will be required when cable installation is completed (refer to Section 8.1 of this Plan).

Trench construction will commence with pavement cutting using typical water-cooled diamond or abrasive blade saws or pavement router cutters to score the pavement prior to its removal. Pavement removal will require use of pneumatic pavement breakers and hydraulic excavators. Along the Bike Path, removal of pavers may require hand removal to save removed pieces for reuse and to avoid any unnecessary damage to remaining pieces.

Either pneumatic-tired or crawler-mounted excavators will be used for trench excavation. Because they are relatively stable even without stabilizing jacks, crawler-mounted excavators can often be used to efficiently excavate and transport loads, but may require use of plywood or other matting to protect the existing pavement. Since crawler equipment is relatively slow, it is expected that pneumatic-tired hydraulic front-loading tractors will be used to carry loads over longer distances (i.e., between lay-down areas and excavation areas). Approximately 1,200 cubic yards of material will be excavated from the trench, loaded on to trucks and transported immediately off-site. This will preclude the possibility of run off from soils entering the sewer system.

Pneumatic-tired hydraulic cranes or side-boom crawler cranes will be used for unloading trucks and handling heavier loads at the lay-down areas. In areas where utility congestion may be encountered, hand digging may be required to avoid damaging existing utilities.

Cable installation will require a layer of fluidized thermal backfill (FTB) bedding (or equivalent) in which either the conduit or transmission cables are laid. The depth of the trench may increase to lay the cable below any existing utilities.

Backfill materials will conform to NYSDOT Standard Specifications in those areas governed by NYSDOT (i.e., the Bike Path and 12th Avenue). Once the conduits are in place, the SCFF cables will be pulled between the Splicing Chamber and the ConEd West 49th Street Substation and the conductors will be connected to the circuit.

The underground cable pulling system will consist of a storage reel or drum positioned at one end of the pull section, with a hydraulic cable winch positioned at the other end. Temporary sheaves may be installed to route the cable from the above ground work areas into and through the conduit itself. Pulling begins by pushing or blowing a line through the conduit from the hydraulic winch to the storage reel. The

line is then fastened to the cable, and then the line and the cable are pulled back through the conduit to the winch end of the pull section where the line is disconnected.

6.2.2 Temporary Cofferdam

A temporary steel sheet pile cofferdam will be constructed in the Hudson River to provide a submerged, submarine work space excavated by dredging into the river mud line. Dredged material will be dewatered in accordance with permit requirements and then transported by barge to an approved authorized disposal facility. The dredging work will be performed in accordance with all applicable Project permits.

Installation, dredging, and removal of the temporary cofferdam and associated dredging will be performed in accordance with the requirements of the Project permits including, but not limited to, the Article VII Certificate, EM&CP, USACE permit, 401 Water Quality Certification. The USCG will be notified of the temporary cofferdam installation at least 30 days prior to the start of installation, and USCG-approved markings and/or warning signs must be placed around the temporary cofferdam.

The sheeted underwater space created by dredging within the temporary cofferdam will be used for routing the submarine cables to land through ducts installed by HDD. When the jet plow operation arrives at the Manhattan cofferdam the cables will be pulled out of the jet plow sled and paid off from the storage reel and floated out into the river in an Omega loop. As the cable pulling work begins, the cables will be fastened to pulling lines previously installed in the ducts contained within the HDD conduit and then pulled to land by a cable winch machine. Once each cable is extended from the HDD pit to the Splicing Chamber and anchored, the jet-plow will be towed from the temporary cofferdam by the cable installation vessel, plowing the submarine cable into the riverbed to the New Jersey cofferdam. Once the submarine cable has been installed, the temporary cofferdam will be backfilled to the original mud line levels with clean sand backfill material, and the steel sheet piling will then be removed. The in-water time-of-year restriction will apply to the placement of backfill and removal of the cofferdam.

The cofferdam must be dredged deep enough to accommodate the required minimum submarine cable burial depth. The Contractor will be required to achieve a minimum burial depth of 15 feet below the existing riverbed in Federal Navigation Channel near the Manhattan landfall and a minimum of 10 feet below the existing riverbed outside of the federal Navigation Channel.

The temporary cofferdam will be constructed using steel sheet piles driven from a barge-mounted crane. The top of the sheet piles will be cut-off approximately 6 feet above the river bottom to minimize and contain the turbidity associated with the dredging and jet-plow embedment operations. Even though it will not be dewatered, the cofferdam will be subjected to wave forces during the installation period and to outside mud line earth pressures from the time that dredging begins until final backfilling. To resist these forces, it is expected that steel sheet piling will be required to be stabilized by horizontal bracing that may consist of wales and struts, if needed. Any system of wales and struts will be designed to adequately support the cofferdam, but at the same time not interfere with efficient dredging, parking and withdrawal of the jet plow; HDD bore drilling, pull-back or insertion of the submarine cables into the HDD conduits.

The location of the temporary cofferdam will be appropriately marked at the river surface to warn vessels of the submerged object. In addition, the location of the temporary cofferdam will be published and broadcast as a USCG Notice to Mariners.

After installation of the cables to the HDD pit, the temporary cofferdam will be backfilled with clean sand material (i.e., free from contaminants) to restore pre-construction hydrography and to protect the cables. This backfilling operation will be subject to time-of-year restrictions as conditioned in the Project's permits.

6.2.3 Horizontal Directional Drill

This Plan was prepared such that proposed construction activity in the vicinity of the Hudson River shoreline bulkhead will have no impacts on the bulkhead and its related substructure. Comments received to date from DPS, OPRHP, and HRPT have been incorporated into the development of construction specifications and procedures (Certificate Condition 53).

The HDD pit will be excavated by simple open excavation methods using typical construction equipment. This work will generally occur on paved areas in the UDC parking and walkway areas. Excavation will be performed in a supported enclosure. A temporary (less than one day) storage containment area will also be constructed within the designated laydown area to store and contain the soils excavated to form the HDD pit if these soils are not placed directly into trucks or containers for offsite disposal.

The location of the HDD pit may impact existing utilities and lighting. All lights, light poles, utilities and signage that will be disturbed as a result of construction activities will be restored upon completion of cable construction. Temporary lighting will be provided, if required.

Spoils from the HDD pit will be collected in leak-resistant storage bins that can be transported from the site or placed directly into trucks for offsite disposal. A double-bin sedimentation system is expected to be necessary. Used slurry containing drill cuttings collected from the HDD borehole will be routed through hoses to a primary sedimentation tank, where most, or all, drill cuttings will settle out. A connection between the primary and secondary sedimentation bins near the top of the bins will be used to transfer processed slurry, free from drill cuttings, from the primary bin to the secondary bin for storage. Processed slurry will be drawn from the secondary sedimentation bin by the drill rig mud pump to maintain constant drilling advance. Once collected sediments in the primary sedimentation bin reach handling capacity, used slurry will be diverted to another empty primary sedimentation bin. With one empty primary sedimentation bin kept in standby mode, the drilling process can continue uninterrupted until drilling is complete. Primary bins that have been filled will be transported from the site.

Installation of the cables for the HDD portion of the Manhattan Segment will begin with the dredging and construction of the cofferdam in the Hudson River and the installation of the HDD entry pit in the EDC parking lot. Once the cofferdam and entry pit are established and the HDD equipment is setup, an initial pilot hole (approximately 10-inch diameter) from the HDD pit to the temporary cofferdam is installed. Once the pilot hole is completed, the pilot hole drilling tool is exchanged with a larger diameter reaming tool and the drill hole is incrementally increased to the final diameter. At this point in the process, the conduit will be installed within the drilled hole to connect the entry pit to the cofferdam.

Sections of pre-assembled HDD conduit will be transported to the cofferdam site via barges, assembled on the barges and temporarily placed in the water for storage at approved locations in the river. An initial section of conduit will be lowered to the underwater drill head within the cofferdam after completion of HDD bore back reaming. Once fastened to the final back reaming bit swivel attachment by divers (if performed underwater) or by on-deck work crews (if performed on a surface work vessel), the conduit

will be pulled back through the borehole by the drill string from the cofferdam to the HDD pit. Additional lengths of conduit will be fuse welded to the conduit being pulled, as required until the final conduit length is achieved. Conduit sections will be as long as can be practically handled to minimize mid-pull delays, and under ideal conditions the entire HDD conduit would be fully assembled and prepared for continuous pulling with no welding or fusing required during pull-back.

A maximum [REDACTED] diameter final borehole will be required to house the required cable ducts for [REDACTED] armored submarine-type power SCFF cable assemblies, and [REDACTED] fiber optics communication control cables. The final HDD bore size and alignment will be determined prior to commencement of HDD mobilization.

Once the HDD bore is completed and conduits have been installed, CHC will demobilize the HDD equipment. The conduit will then be capped under water at the mudline and left idle until the submarine cable is delivered.

After delivery of the cable, CHC will pull the cables into the empty conduit from the cofferdam to land. Pulling lines that will be used to pull the cables into and through the conduit will be installed in the conduit ahead of the cable pulling operation. Separate conduits will be provided for each of the three armored submarine cable conductors, and the two fiber optics communication cables.

6.2.4 Splicing and Dielectric Cooling Chamber

Chamber pits will be excavated by simple open excavation methods using a combination of hydraulic crawler-mounted and rubber-tired equipment and dump trucks. This work will be performed within the [REDACTED] with excavation either being performed in a steel sheet-pile enclosure or, if geotechnical conditions are favorable, in a simpler excavation with sloped sides. A temporary storage containment area will be constructed to store and contain soils excavated that are not immediately transported to the offsite disposal facility. Due to congestion [REDACTED] all excavated materials and temporary containment areas will be removed prior to the end of each shift.

6.2.5 Bike Path to 12th Avenue Crossing

All construction along the Bike Path, including but not limited to excavation, backfilling, and pavement restoration, will be performed in accordance with NYSDOT Standard Specifications for Construction and Materials, Sections 200 (Earthwork), 300 (Bases and Sub bases), 400 (Bituminous Pavements), and 500 (Rigid Pavements), plus other project-specific requirements required by NYSDOT. Equipment and construction methods are discussed in Section 6.2.1.

Construction activity along the Bike Path also includes removal and replacement of special brick and stone pavers. Hand removal and temporary storage of the existing pavers may be required due to the high cost of replacement of these materials and the limited material sources that will be acceptable to NYSDOT. Prior to initiation of construction activities a photo inventory of the bike path will be completed to document pre-construction conditions.

6.2.6 12th Avenue Crossing

The proposed Open Trench Cable installation will include additional utility exploration, vertical soldier pile installation, removal of existing pavement, trench excavation and installation of temporary decking and replacement pavement. The crossing of 12th Avenue will also require the partial removal of the ornamental medians. Upon completion of construction, existing vegetation and other landscaping within the medians and all affected decorative curbs and sidewalks will be replaced. Prior to initiation of construction activities a photo inventory of the 12th Avenue crossing will be completed to document pre-construction conditions.

A brief description and an approximation of the time necessary to perform construction activities within the 12th Avenue right-of-way are provided in this section.

6.2.6.1 Trenching and Temporary Plating

The initial steps of the cable installation work include additional utility exploration, support of excavation equipment installation, temporary pavement removal, temporary replacement pavement temporary cover plate installation and trench excavation below pavement level. After trenching across 12th Avenue has been completed, the cable conduits will be installed across the full width of 12th Avenue. After the conduit is installed, the trench will be backfilled and compacted up to the underside level of the existing concrete pavements across the full width of 12th Avenue. All backfill materials will conform to NYSDOT material quality and compaction specifications. Permanent restoration of the concrete pavement will begin with the removal of the existing pavement back to existing pavement construction joints or to new joints approved by NYSDOT. Permanent concrete pavement replacement will be conducted in lane-wide increments and will conform to all NYSDOT requirements. Actual cable pulling will be performed at a later date from remote pulling and feeding locations with no impact on existing 12th Avenue traffic patterns.

The width of the proposed trench will be approximately 48 inches. The actual trench width is subject to existing underground conditions, and the final conduit layout (see Attachment H). CCH will retain the services of a licensed professional engineer to design the support of excavation systems and street plating systems to adequately ensure the safe passage of the traveling public throughout the construction process. Trenching and decking work will include:

- Excavation and backfilling of additional test pits and/or soft-dig vacuum probe holes to locate existing utilities. The estimated time for excavation and backfilling of test pits and soft-dig holes is approximately one month.
- Trench Excavation will be performed in multiple lane increments until the conduit trench is excavated and plated across the full width of 12th Avenue. This work will also include excavation beneath the 12th Avenue center median. If work is performed using one-lane increments, trench excavation across 12th Avenue will require approximately one month. If two-lane increments are permitted by NYSDOT, trench excavation across 12th Avenue will be reduced.

6.2.6.2 Conduit Installation and Backfilling

Using the open trenching method conduit installation will be performed in multi lane increments until the conduit is installed across the full width of 12th Avenue. Conduit installation will not begin until trenching and plate installation across 12th Avenue is complete. This approach will facilitate complete mapping of all existing utilities to determine the most suitable conduit path across the roadway and taking into consideration the bending radius limitations for the conduits and pulling tension capacity of the cables. Once the optimal conduit path is determined, conduit installation and trench backfilling will commence. Backfilling lifts will be placed and compacted per NYSDOT requirements to the underside level of the existing concrete pavement. As backfilling lifts are placed, support of excavation materials for temporary trench sidewall support will remain in place if allowed by the NYSDOT. The estimated time to complete conduit installation and backfilling is approximately one month if work proceeds in one-lane increments or reduced if work proceeds in multi-lane increments.

6.2.6.3 Concrete Pavement and Sidewalk Reconstruction

It is estimated that approximately 25 12-foot by 12-foot pavement panels will be impacted as a result of construction activities across 12th Avenue. This number may change depending on actual conditions encountered. On the northbound side of 12th Avenue between [REDACTED] and [REDACTED] Streets, approximately 10 feet of concrete or block sidewalks and granite curbs will also require reconstruction as a result of construction activities.

Reconstruction of concrete pavement panels will be conducted in one-lane or, if permitted, in multi-lane increments. Replacement will include the removal of existing concrete pavement back to existing joint lines. To expedite the construction process, CHC will design a temporary support of excavation system to support the temporary plating that will remain in place supporting traffic until all work is complete. After the work is complete, any necessary temporary support structures will be removed if required by the NYSDOT, then sub-base materials will be replaced and re-compacted, edge joints will be prepared and the final concrete pavement will be cast.

Reconstruction of the concrete pavement panels and sidewalk will conform to NYSDOT standard drawings, specifications and the Route 9A Reconstruction Project Repair Details for Replacement of 50 Year Concrete Pavement and Concrete Sidewalk (dated September 7, 2001) as prepared by the NYSDOT and NYCDOT. Current NYSDOT standards require that each 12-foot by 12-foot panel be replaced in its entirety, regardless of the extent to which it is affected by temporary construction. The specifications require a high-early strength concrete (NYSDOT Class F), with a cure time of three days and a strength of 2,000 pounds per square inch. To maintain traffic flow after concrete has been poured, steel plates will be placed over the concrete after a required waiting period in accordance with NYSDOT specifications. Therefore, the reconstruction of each panel may take multiple shifts, assuming extended work hours per shift per panel. It is anticipated that all pavement panels in each given lane area will be reconstructed and cured at the same time. The total time for the pavement replacement with full removal of temporary support structures is estimated to be approximately two months assuming work progresses in one-lane increments, and in a reduced timeframe assuming work progresses in multi-lane increments.

6.3 Dredging and Dredged Material Management

Dredging of the temporary cofferdam will use mechanical methods and be performed in accordance with all applicable permit requirements. Pursuant to Certificate Condition 47, a closed environmental bucket with sealing gaskets or an overlapping sealed design at the jaws and seals or flaps positioned at location of vent openings will be used for dredging. The seals and flaps on the bucket will tightly cover the openings while the bucket is lifted through the water column into the barge. Drawings and specifications for the environmental bucket will be provided to NYSDEC prior to the start of dredging operations.

During dredging, the bucket hoist speed will be limited to approximately 2 feet per second, and the bucket must be lifted in a continuous motion through the water column and into the barge. CHC will demonstrate to the Independent Inspector's satisfaction that the bucket dredge operator has sufficient control over the bucket depth in the water and bucket closure so that sediment re-suspension from bucket contact with the bottom and bucket overfilling is minimized. If significant loss of visible sediment from the bucket is observed, dredging must be halted and the bucket inspected for defects. Operations will remain suspended until all necessary repairs or replacements have been made.

Dredged materials will be collected in spoil barges moored directly alongside the cofferdam. Excavated spoils from the cofferdam will be disposed of at an approved upland disposal facility. Certificate Condition 48 requires that dredged material be placed in barges that are in good operating condition and appropriately designed to contain dredged sediments. Use of deck barges is not allowed unless the barge is specifically modified to prevent barge overflow. Prior to releasing the bucket's load of dredged material into the barge, the bucket will be lowered to the level of the barge's gunwales. Barge overflow is not allowed, and dredged material will not be side cast, stockpiled onsite or reintroduced into the Hudson River.

Dewatering of dredged material will occur in the barge and will take place while the barge is on-site. The dredged material will remain in the barges for at least 24 hours prior to the discharge of any supernatant water. If CHC decides to use a second barge for dewatering of the dredged material, the water will remain in the second barge for at least 24 hours after any final disturbance prior to discharging.

Dredged material will be transported by barge to an approved authorized upland disposal facility. No dewatering of dredged material at the disposal facility will be allowed.

7.0 PUBLIC HEALTH AND SAFETY

Section 7.0 summarizes public health concerns and the actions that will be taken to minimize impacts to the community. Areas of concern include exposure to noise and electromagnetic fields (EMF), protection of pedestrians and provisions for lighting and protection of public areas during construction activities.

7.1 Noise

There are no federal or state noise regulations containing limitations (i.e., decibel limits) that apply to this Project. The controlling regulations are found in the City of New York Noise Code and the City's Zoning Resolution. Title 24, Chapter 2 of the NYC Administrative Code limits sound levels from a site according to "noise quality zones" that are keyed to zoning districts, not actual land use. The HDD site and all abutting properties are located in an N-3 noise quality zone associated with manufacturing and

industrial land use. The nearest residential zone (an R-9 district) is located at 11th Avenue at West 55th Street.

The NYC Noise Code (Section 24-243(b)) establishes a limit of 70 decibels (dBA), both day and night on the one-hour equivalent sound level (L_{eq}) for all land uses in the industrial zone that could be impacted by the Project. The Code also sets limits on the L_{eq} of 65 dBA during the day (7 a.m. to 10 p.m.) and 55 dBA at night (10 p.m. to 7 a.m.) for properties in the residential zone.

If mitigation is required to minimize the noise impact, the Contractor will muffle the noise sources using mufflers mounted to the various equipment, or if this method is not effective, the Contractor will erect a noise barrier to achieve compliance with the City's octave band and broadband limits. The noise barrier will be designed by the Contractor's licensed professional engineer.

Contractor's drill rigs and support equipment with combustible engines have been retrofitted with "critical mufflers". Critical mufflers are the best available technology currently being used for exhaust noise reduction. In addition to the new mufflers, the engine compartments have been modified with acoustic board insulation to further reduce noise generated by mechanical means.

Noise barriers erected around the Drill Rig System, Mud Pump System, and the Solids Control System are another way to decrease decibel readings. "Sound Blankets", installed on a chain link fence, or double mounting pressure treated particleboard on a 2-inch by 4-inch frame can keep noise levels down. Both of these options have been used in the past and could be installed depending on the situation.

The work site will be monitored for activity and construction noise on a frequent basis, to keep the levels in the 70 dBA range outside of the work area. These readings can be logged and submitted in weekly reports. If decibel readings indicate noise levels above 70 dBA, noise attenuation measures shall be modified.

7.2 Electromagnetic Field (EMF)

In accordance with Certificate Condition 8, the Manhattan Segment will be designed, engineered and constructed such that its operation will comply with the EMF standards established by the New York Public Service Commission in Opinion No. 78-13 (issued on June 19, 1978) and the Statement of Interim Policy on Magnetic Fields of Major Electric Transmission Facilities (issued September 11, 1990). See Attachment L for EMF Certification.

7.3 Maintenance and Protection of Traffic (MPT)

The crossing of 12th Avenue and construction along the Bike Path require the preparation of MPT as part of the permit requirements. (The proposed MPT plan is included in Attachment I.) An MPT plan approved by the NYCDOT OCMC will be required prior to permit issuance. A copy of the permit and approved MPT plan will be provided to PSC prior to construction and included in Attachment J-2.

7.3.1 Bike Path

Maintenance and protection of Bike Path pedestrian and bicycle traffic is required during construction and at any time that construction vehicles enter and exit 12th Avenue via any of the local street entrances.

Bike Path traffic will be temporarily diverted to a detour route through the NYCEDC Pier 94 and Pier 92 parking and access roadway areas.

7.3.2 Crossing of 12th Avenue

Construction activities in this segment will require the temporary closure of multiple travel lanes at a time during construction activity. The existing 12th Avenue roadway includes multiple travel lanes in both directions.

Each significant operation requiring MPT will begin with the installation of temporary maintenance and protection of traffic devices for lane closures in accordance with permit requirements and will end with removal of MPT devices to return traffic flow patterns to normal conditions. During the course of work activities requiring MPT, it is anticipated that the NYCDOT OCMC will require that temporary MPT devices will be uncovered at the start of the shift, and recovered at the end of the shift. It is anticipated that trenching work will be performed on nights and weekends for approximately four months. Street closure times will be governed by NYCDOT standard street closure time guidelines that are based on traffic counts performed by the NYCDOT and permit conditions.

OCMC has established specific work hour restrictions for 12th Avenue lane for the southbound or northbound lanes, day of construction (whether the work is performed on weekdays, Saturdays, or Sundays) and number of lanes to be closed (one lane or multiple lanes). Time restrictions are narrower for multiple lane closures than for one lane closures. Allowable work times are summarized in Section 4.7.

7.4 Protection of Public Areas

CHC and its Contractors will perform all work in such a manner that public areas are protected and public access to those areas is maintained. Demarcation devices will be erected to route vehicular and pedestrian traffic around work areas while maximizing access to the Bike Path, the Hudson River Park, the Pier 94 convention center and the Passenger Ship Terminal. Lay down and construction areas will be kept to the minimum size necessary to ensure safe work conditions.

7.5 Lighting

Temporary lighting will be installed and maintained around the work areas, as required, for protection of public health and safety and for safe operation in the construction areas, as per OSHA standards for construction safety in a work place. The temporary lighting will supplement ambient lighting as needed to achieve the proper lighting. Any temporary lighting will be oriented in such a way as to minimize off-site glare.

8.0 POST-CONSTRUCTION CONSIDERATIONS

This section addresses environmental issues following completion of construction activities and cable installation including cleanup, restoration activities and notifications.

8.1 Clean-up and Restoration

Upon completion of construction and installation activities in a given area along the cable route, clean up and restoration activities will commence immediately. All excess material and equipment will be removed from the construction site, and excess construction debris will be disposed of appropriately. Residual soil deemed not suitable for re-use on-site will be disposed of in accordance with all applicable regulations.

Once the "Manhattan" segment upland construction activities are complete, all disturbed areas of property (and other staging areas) will be restored to preconstruction conditions. The presence of the completed structures below the Pier 94 parking lot will not affect day-to-day use of the parking lot or Pier 94.

In paved areas disturbed by project activities, Contractors will restore the asphalt or concrete pavement to create a finished surface that meets NYSDOT and/or NYCDOT standards. In some cases, the full extent of the pavement details will not be known until the pavement cuts and trench excavations are made. Edges of pavement will be trimmed vertically to provide an effective joint with the pavement patch. It may be necessary to strike-off and compact the final lift in conformance with the shape and grade of the existing roadway to ensure that the joints are flush.

Erosion and sedimentation barriers will be maintained until conditions potentially generating erosion and sedimentation have been eliminated. All erosion and sedimentation control devices will be removed and disposed of appropriately. If this project generates an accumulation of soils or debris outside of the immediate work area, CHC will remove those soils and return the affected areas to a broom clean condition. All barricades and traffic control devices that are not in use will be properly stored.

Upon completion of construction activities, the site will be monitored in accordance with the conditions of the Article VII Certificate. Graded areas that will be affected by construction operations are limited to raised landscape planters. Landscape planters will be assessed and replaced if necessary.

8.2 Notifications/Certifications

CHC will certify that sediment was removed from sediment traps or sediment ponds. In addition, CHC will certify that the inspection and requirements discussed in Section 9.3 of the EM&CP have been satisfied. In addition, CHC will certify that any required stabilization measures were initiated in portions of the site where construction activities have ceased. This requirement does not apply where the initiation of stabilization measures is precluded by snow cover or frozen ground conditions within 14 days after construction activity ceases. If this occurs, stabilization measures will be initiated as soon as practicable.

Three (3) post construction reports will be submitted to the NYSPSC. The first report will be submitted within 10 days after the cable in-service date (Certificate Condition 35). This report will notify the Commission that all restoration activities have been completed and are in compliance with the EM&CP. The second and third reports, required by Certificate Condition 52, require that annual site audit compliance inspections be conducted for two years after the Project is operational. Inspections will include a review of the status of all Certificate conditions, requirements and commitments as well as a field review of the Project area. It may also include reviews of all complaints received and their proposed or actual resolution, significant comments, concerns or suggestions made by the public or

agency/government officials, review of the status of the Project in relation to the overall schedule established prior to construction and any other significant issues.

9.0 PROJECT SUPERVISION

This section addresses supervision of construction activities and cable installation including cleanup and restoration activities.

9.1 Independent Inspector

In accordance with Certificate Condition 28 CHC proposes to contract with P.W. Grosser Consulting to act as Independent Inspectors. The Independent inspectors will coordinate with and report to the PSC and conduct environmental field inspections. The designated inspector will be on-site at all times during start-up of each field operation and at all times during environmentally sensitive phases of construction.

The responsibilities of the inspectors will include:

- Review and understand pertinent requirements contained in the EM&CPs regarding compliance;
- Conduct field inspections based on checklists indicating compliance issues for equipment, activities, and procedures;
- Checklists will be completed and filed for each site visit;
- Any corrective actions will be documented by the inspectors on the checklists; and
- Inspection checklists, Incident Reports and Monthly Progress Reports will be provided to PSC and the designated Project and E&S Manager(s).

Multiple Independent Inspector(s) will be provided if warranted in order to inspect more than one operation at a time and to substitute for the Independent Inspector(s) as necessary.

In addition to conducting regular field inspections, the independent inspectors will be required to conduct environmental audits on a monthly basis. The auditor will be an individual other than the inspectors. The auditor responsibilities will be to verify:

- Inspections are documented and performed properly;
- Corrective actions have been implemented;
- Maintenance performed; and
- Paperwork is complete and checklists submitted.

The Auditor will prepare a Monthly Progress Report.

Name(s) of the proposed Independent Environmental Inspector(s) and a statement of qualifications for each inspector demonstrating sufficient knowledge and experience in environmental matters to complete the

inspections and audits are provided in Attachment E. Additional name(s) and qualifications of Independent Environmental Inspector(s) will be provided as necessary.

The Independent Inspector(s) will have stop-work capability if they are not satisfied with the level of environmental compliance, consider a situation to be an imminent environmental or safety hazard, and/or require more information before allowing an activity to proceed. A certification confirming the independence of the inspector(s) from the Certificate Holder and certifying the authority of the inspectors(s) to "stop work" in cases of noncompliance or imminent environmental or safety hazard will be completed by each independent inspector. A copy of the Certification is provided in Attachment E.

The contractor and/or CHC Construction Site Manager and/or Environmental Health and Safety Manager(s) will be notified immediately of any "stop-work" issuances throughout the course of the construction. Any stop-work issuance, the nature of the stop work issuance and means of resolution, and the involved staff will be documented on an incident report sheet.

Copies of the Inspection Report (IR) that will be filled out by the Independent Inspector(s) and the Incident Data Sheet (IDS) that is used to record when there is a spill or other emergency response are provided in Attachment E.

The UR and IDS provide space to indicate any corrective actions undertaken or to be done to prevent the incident from reoccurring or to indicate any maintenance required on the item inspected. Copies of all IRs with identified corrective actions will be provided to the DPS, the CCH Construction Site Manager and/or on-site Environmental Health and Safety Manager(s). The Independent Inspector(s) is responsible for ensuring that the corrective actions are undertaken and completed before formally closing out the IR form. Corrective actions implemented as part of the site walk-downs will be summarized in the Monthly Progress Report prepared by the Independent Inspector(s) and will be provided to the DPS, CCH Construction Site Manager and/or on-site Environmental Health and Safety Manager(s).

9.2 Construction Crew

Contractors and crews will be required to understand and adhere to the requirements contained in this EM&CP. Copies of the EM&CP, the Certificate, and applicable environmental permits and regulations will be provided to all Contractors and will be available on-site. Adherence to applicable conditions, terms and requirements of these documents will be a condition in any construction contract entered into by CHC, CHC's Engineering, Procurement, and Construction Contractor, and any third party. Prior to construction, all contractor supervisory personnel shall be provided with environmental training to familiarize them with the basic principles of erosion and sedimentation control as well as specific applicable environmental permit conditions.

9.3 Construction Supervision and Inspection

Inspection of construction activities will be thorough and responsive to changing on-site conditions. A construction supervisor will be present on-site for the duration of the construction activities and will direct construction crews in their daily activities and coordinate material deliveries and handling in accordance with the procedures established in this document.

The Independent Inspector will be present at the startup of construction and at all times during environmentally sensitive phases of construction (i.e., in-river, the waterfront and parklands), including the placement of erosion and sediment controls and site restoration. Appropriate inspection personnel will be equipped with sufficient documentation, transportation and communication equipment to monitor compliance with the provisions of the Article VII Certificate, subsequent orders, applicable provisions of the Public Service Law and the EM&CP (Certificate Condition 51). In the event that multiple construction activities occur simultaneously, one inspector will be assigned to each area, and no inspector will be assigned to more than two active construction areas at one time (Certificate Condition 28(q)(3)).

The Independent Inspector will conduct an assessment of the site prior to the commencement of construction and certify in an inspection report that the appropriate erosion and sediment controls described in the SESCO have been adequately installed or implemented to ensure overall preparedness of the site for the commencement of construction. Following the commencement of construction, site inspections will be conducted by the Independent Inspector at least once every seven calendar days and within 24 hours of the end of a precipitation event of 0.5 inches or greater. In the event that a failed erosion control is identified, that control will be immediately repaired or replaced.

During each inspection, the Independent Inspector shall record the following information:

- On a site map, indicate the extent of all disturbed site areas and drainage pathways and site areas that are expected to undergo initial disturbance or significant site work within the next 14-day period;
- Indicate on a site map all areas of the site that have undergone temporary or permanent stabilization;
- Indicate all disturbed site areas that have not undergone active site work during the previous 14-day period;
- Inspect all sediment control practices and record the approximate degree of sediment accumulation as a percentage of the sediment storage volume;
- Inspect all erosion and sediment control practices and record all maintenance requirements such as verifying the integrity of barrier or diversion systems (i.e., silt fencing) and containment systems. Identify any evidence of rill or gully erosion occurring on slopes and any loss of stabilizing vegetation or seeding/mulching. Document any excessive deposition of sediment or ponding of water along barrier or diversion systems. Record the depth of sediment within containment structures, any erosion near outlet and overflow structures and verify the ability of rock filters around perforated riser pipes to pass water; and
- All deficiencies that are identified with the implementation of the SESCO.

All inspection reports will be kept in a logbook maintained on-site by CHC. Prior to the commencement of construction, CHC will certify (in the site log book) that the SESCO meets all federal, state and local erosion and sediment control requirements. A summary of the site inspection activities will be posted in a publicly accessible location on a monthly basis.

Phone logs will be kept that list the date of any complaints and concerns (expressed by the public or government officials), contact information for the complaining party and measures taken to resolve the complaints and the outcome. Phone logs will be made available to NYSDPS upon request.

Pursuant to Certificate Condition 34, CHC will submit weekly reports including a summary of the previous week's construction activities and indicating construction activities and locations scheduled for the next two weeks to NYSDPS and NYSDEC.

Pursuant to Certificate Condition 52, monthly site audit compliance inspections will be conducted. Inspections will include a review of the status of all Certificate conditions, requirements and commitments as well as a field review of the Project. It may also include reviews of all complaints received and their proposed or actual resolution, significant comments, concerns or suggestions made by the public or government officials, review of the status of the Project in relation to the overall schedule established prior to construction and any other significant issues.

Pursuant to Certificate Condition 65, CHC will provide NYSDPS and ConEd with monthly reports on the progress of construction and an update regarding the construction schedule after commencement of construction of the certified facilities. These reports may be consolidated with the weekly reports required under Certificate Condition 34.

The Independent Inspector or NYSDPS staff representatives will have the authority to immediately stop construction if it is determined that continuation of activities will result in a violation of federal, state or local regulations. A stop-work order will expire within 24 hours unless confirmed by a single Commissioner. If confirmed, CHC may seek reconsideration from the confirming Commissioner or the entire Commission. Once the emergency prompting the issuance of the stop-work order is resolved to the satisfaction of the Commissioner or the entire Commission, the order will be lifted. The stop-work order will remain in effect until the emergency has been satisfactorily resolved (Certificate Condition 50). In the event a stop-work order is issued, CHC and its Contractors may undertake any safety-related activities deemed necessary and appropriate under the circumstances (Certificate Condition 50).

Supervisors may be any personnel appointed by CHC or its Contractor with at least five years of applicable project experience. Independent Inspectors must be environmental scientists/engineers with a minimum of one to three years of experience. Both supervisors and inspectors are also required to have working knowledge of the requirements established in this EM&CP.

The Cross Hudson Project will adhere to the Institute of Electrical and Electronics Engineering (IEEE) guidance documents for maintenance, operation, and safety of underground and submarine cable, industrial power systems. A Facilities Management Plan will be submitted after the commencement of construction. No modifications to these reference standards are required prior to construction. After completion of all construction activities, the Cross Hudson Project will amend these standards to include a list of site specific parameters identified during construction activities that require specific alterations or amendments to these standards.

9.4 Weekly Project Meetings

Weekly project meetings will be held with the PSC construction inspector, the independent inspector and the construction supervisor to discuss planned activities for the week, to go over inspection reports from the prior week and to address any outstanding compliance issues.

CROSS HUDSON PROJECT

ENVIRONMENTAL MANAGEMENT AND CONSTRUCTION PLAN

ATTACHMENT A

Copy of the and Cross Reference Table Article VII Certificate

**ARTICLE VII CERTIFICATE CONDITION
CROSS-REFERENCE TABLE**

Article VII Certificate Condition	Detail	Comments
Condition 1	Amended CEC and PN granted	Section 1.0
Condition 2	30 time period to petition for rehearing or accept and comply with Certificate	Accepted by CHC
Condition 3	Permission to start some work in NY prior to receiving all Permits	Accepted by CHC
Condition 4(a) and (b)	Laws and Regulations	Table 2.0 and Attachment F
Condition 5	Laws and Regulations	Table 2.0 and Attachment F
Condition 6	Petition to seek resolution of unreasonable requirements	Accepted by CHC
Condition 7	Avoidance of material interference at Piers 90 and 92	Section 4.5
Condition 8	Project to comply with established EMF Standards	Section 7.2
Condition 9	Hours of work activity	Section 4.7
Condition 10	Hours of delivery	Sections 4.5 and 4.7
Condition 11	On-site chemical and waste notifications to local officials	Section 4.1
Condition 12	Fugitive dust and airborne debris	Section 5.1
Condition 13	Designated parking areas	Sections 4.5 and 4.6
Condition 14	Traffic	Section 4.4
Condition 15	Delivery of oversized facility components	Section 4.5
Condition 16	Compatibility with adjacent infrastructure	Section 4.2
Condition 17	Compatibility with adjacent infrastructure	Section 4.2
Condition 18	Utility markings	Section 4.2
Condition 19	Minimization of Pedestrian disturbance	Section 4.5 and 4.7

**ARTICLE VII CERTIFICATE CONDITION
CROSS-REFERENCE TABLE**

Article VII Certificate Condition	Detail	Comments
Condition 20	Environmental protection measures	Section 5.0
Condition 21	Facility conformance with applicable permits and codes	Section 5.0 and Attachments F and H
Condition 22	EM&CP submissions	Accepted by CHC
Condition 23	EM&CP submissions	Accepted by CHC
Condition 24	EM&CP filing notification	Accepted by CHC
Condition 25 (a) and (b)	EM&CP segmentation	Section 1.0 and Hudson River EM&CP
Condition 26	EM&CP filing notification	Accepted by CHC
Condition 27	Proposed changes to approved EM&CP	Section 4.1
Condition 28(a)	Access, construction ROW	Section 4.3
Condition 28(b)	Horizontal directional drilling	Sections 6.2.3
Condition 28(c)	Wire pulling plans	Section 6.2
Condition 28(d)	Parking storage and staging areas	Sections 4.5 and 4.6
Condition 28(e)	Erosion control details	Section 5.1
Condition 28(f)	Spoil control plans	Section 5.4
Condition 28(g)	Spill prevention and control plans	Section 5.3
Condition 28(h)	Hazardous materials handling and disposal	Sections 5.7
Condition 28(i)	Public Safety	Section 7.3
Condition 28(j)	Pedestrian Access	Sections 4.4 and 7.3
Condition 28(k)	Pavement Restoration	Section 6.2.6.3 and 8.1
Condition 28(l)	Night time construction including lighting and noise	Sections 7.1 and 7.5

**ARTICLE VII CERTIFICATE CONDITION
CROSS-REFERENCE TABLE**

Article VII Certificate Condition	Detail	Comments
Condition 28(m)	Underwater construction, vessel spill containment and control	See Hudson River EM&CP
Condition 28(n)	Site restoration	Section 8.1
Condition 28(o)	Construction schedule	Section 4.7
Condition 28(p)	Dredging issues	Section 6.3
Condition 28(q)	Engineer certification of EMF compliance	Attachment L
Condition 28(r) 1-7	Compliance Plan	Section 9.1 and Attachment E, Independent Inspector
Condition 28 (s)	Dielectric fluid issues	Attachment D
Condition 29	Complaint resolution	Section 4.1
Condition 30	Notification of Officials	Section 4.1
Condition 31	Construction contractors provided with Certificate, EM&CP, 401 WQC and 6 NYCRR Parts 700-704	Section 9.2
Condition 32	Penalties for violation of the Certificate	Section 9.2
Condition 33	Regulatory notifications	Section 4.1
Condition 34	Weekly reports	Section 9.3
Condition 35	Notification of in service transmission facilities	Section 8.2
Condition 36	Construction and maintenance confined to certified ROW and additional workspace	Section 6.2.1
Condition 37	Soil handling and erosion control	Sections 5.1, 5.4
Condition 38	Minimization of open pits	Sections 6.2 and 6.3
Condition 39	Notification of final restoration	Section 8.2
Condition 40	Facility Management Plan	Sections 4.2 and 4.3
Condition 41	Navigable Waters Construction Windows	Section 4.7

**ARTICLE VII CERTIFICATE CONDITION
CROSS-REFERENCE TABLE**

Article VII Certificate Condition	Detail	Comments
Condition 42	Jet Plow Trials	See Hudson River EM&CP
Condition 43	Jet Plowing	See Hudson River EM&CP
Condition 44	Submarine Cable minimum burial depths	Section 6.2.2
Condition 45	HDD and Dredging	Section 6.2.2 and 6.2.3
Condition 46	Pre and post-installation sediment and benthic monitoring	See Hudson River EM&CP
Condition 47 (a through e)	Dredging environmental bucket specifications	Section 6.3
Condition 48 (a and b)	Dredging operational requirements	Section 6.3
Condition 49	Water quality and marine sediment analysis, laboratory certification	See Hudson River EM&CP
Condition 50	Environmental Supervision	Section 9.3
Condition 51	Environmental Supervision	Section 9.3
Condition 52	Environmental Supervision	Sections 8.2 and 9.3
Condition 53	Cultural Resources/Bulkhead Protection	Section 5.6
Condition 54	Archeological Contingency	Section 5.6
Condition 55	Human remains/burial Contingency	Section 5.6
Condition 56	Cultural resource survey requirement	Section 5.6
Condition 57	System Reliability	Section 1.0
Condition 58	System Reliability	Section 1.0
Condition 59	Certificate Holder responsibilities	Accepted by CHC
Condition 60	Certificate Holder responsibilities	Accepted by CHC
Condition 61	Certificate Holder responsibilities	Accepted by CHC

**ARTICLE VII CERTIFICATE CONDITION
CROSS-REFERENCE TABLE**

Article VII Certificate Condition	Detail	Comments
Condition 62	Certificate Holder responsibilities	Accepted by CHC
Condition 63	Certificate Holder responsibilities	Accepted by CHC
Condition 64	Financing	Accepted by CHC
Condition 65	Construction progress reporting	Section 9.3
Condition 66	Certificated facility connection to NYC	Accepted by CHC
Condition 67	Certificated facility and electric power offered for sale to NYISO control area	Accepted by CHC
Condition 68	Certificated facility equipment failure	Accepted by CHC
Condition 69	Certificate Holder application for permission to connect to PJMISO	Accepted by CHC

Article VII

STATE OF NEW YORK
PUBLIC SERVICE COMMISSION

At a session of the Public Service
Commission held in the City of
Albany on October 20, 2004

COMMISSIONERS PRESENT:

William M. Flynn, Chairman
Thomas J. Dunleavy
Leonard A. Weiss
Neal N. Galvin

CASE 01-T-1474 - Application by PSEG Power Cross Hudson Corporation for a Certificate of Environmental Compatibility and Public Need for the Construction of a 1200 MW, 345 kV Electric Generator Lead from PSEG's Generating Station at Ridgefield, New Jersey, to a Consolidated Edison Company of New York, Inc. Electric Substation Located on West 49th Street in New York City -- Petition to Amend Opinion and Order issued April 17, 2003 filed by PSEG Power Cross Hudson Corporation.

ORDER GRANTING AMENDMENT OF CERTIFICATE OF ENVIRONMENTAL
COMPATIBILITY AND PUBLIC NEED

(Issued and Effective October 21, 2004)

BY THE COMMISSION:

INTRODUCTION

On April 17, 2003, we granted a Certificate of Environmental Compatibility and Public Need (Certificate) to PSEG Power Cross Hudson Corporation (PSEG or the company) authorizing, subject to conditions, the construction and operation of the New York Portion of a 345 kV electric transmission facility (including associated equipment) that would extend from New Jersey to the West 49th Street Substation of Consolidated Edison Company of New York, Inc. (Con Edison) in the Borough Manhattan, New York City. Pursuant to §123(2) of the Public Service Law (PSL), in a petition filed August 13, 2004, PSEG requested that

the Certificate be amended in four respects: 1) to modify the location of the submarine cable's landfall to the Piers 94 and 95 Alternate Landfall and related minor changes in the location of the cofferdam, the transition station and the Horizontal Directional Drill (HDD) operations area; 2) to increase the diameter of the HDD borehole up to a maximum of 66 inches; 3) to increase the dredged volume and clean backfill volume at the temporary cofferdam in New York to a total of approximately 4,500 cubic yards; and 4) to store up to 2,000 gallons of dielectric fluid in six properly contained tanks within an underground vault near the transition station and to have dielectric fluid connected to the stop joints in the transition station.

As required by 16 NYCRR §85-2.10, the company published notices of the proposed certificate amendment in the New York Post, a newspaper of general circulation in New York City on July 29 and August 5, 2004. By Notice issued August 17, 2004, a deadline for the receipt of comments on the proposed amendment of September 3, 2004 was established.

Comments were submitted by Con Edison, New York City Economic Development Corporation (NYCEDC) and the New York State Department of Environmental Conservation (DEC)¹. By letter dated September 28, 2004 the company responded to the comments and provided an update on communication and agreements with parties.

PSEG also sought written confirmation that the Water Quality Certification issued pursuant to Section 401 of the Clean Water Act applies to the facility as it is proposed to be modified.

¹ No party argued that a hearing should be held in connection with the proposed certificate amendments.

THE PROPOSED AMENDMENT

Each of the requested changes is described below:

1. Landfall Moved South

At the time the Certificate was granted, PSEG and the Hudson River Park Trust (HRPT) had been coordinating their construction schedules so that the cable system could be installed prior to the reconstruction of the Clinton Cove Park Area of the Hudson River Park. It is now apparent that the Hudson River Park construction will occur before the installation of the transmission facility. If the transmission facility were to be installed in the newly renovated park, significant disturbance of the new park features would occur and a significant increase in park restoration costs would be incurred. As a result PSEG has requested an alternative landfall location between Piers 94 and 95, some 185 feet south of its approved location (see Appendix A hereto).

To support the HDD operations at the alternative landfall while minimizing disruption of tradeshow and passenger ship operations, PSEG has been coordinating with the NYCEDC to locate the HDD pit and the transition station in the northern portion of the parking area for Pier 94 UnConvention Center and to drill under the UnConvention Center building foundation and between Piers 94 and 95.

The HDD drilling operation and alignment will extend under the UnConvention Center building's foundation in bedrock so as to avoid damage to the building and its foundation, under the existing bulkhead in bedrock to avoid damage to the bulkhead, and under the Hudson River overburden in the areas between Piers 94 and 95 to the temporary cofferdam. The temporary cofferdam would be placed seaward of the end of Pier 94 in the Federal Channel. The submarine route in the Hudson River authorized by the Certificate would be extended by approximately 555 feet to enter the new temporary cofferdam.

2. HDD Borehole Size Increased

PSEG's original Article VII application stated that the 30-inch diameter steel conduit was expected to be used in the HDD process. As PSEG evaluated transmission wire technologies offered by Engineering, Procurement and Construction (EPC) contractors it became clear that a larger borehole diameter is required to satisfy wire system design requirements for load and thermal conditions to meet applicable codes.

PSEG seeks to amend the Certificate to authorize an increase in the conduit diameter to a maximum of 66 inches. High density polyethylene conduits will be installed within the large conduit for each phase of the cable system (three 14-inch diameter conduits and for each communication bundle (two 4-inch diameter conduits)).

3. Increased Volume of Dredged Material

PSEG provided information in the application and supporting documents stating that approximately 3,400 cubic yards of material would be dredged from the temporary cofferdam at the New York landfall at the seaward end of the HDD borehole. As PSEG has evaluated wire technologies offered by EPC contractors it has become clear that the larger borehole diameter will require an increase in the size of the temporary cofferdam to support HDD operations. In addition, the larger borehole will require that the jetplow be set at a different depth to align the cable with the conduits that the cables will be pulled through. As a result an increase of approximately 1,000 cubic yards in the volume of material to be dredged from inside the temporary cofferdam at the New York landfall is required.

4. Dielectric Fluid Storage

Dielectric fluid is used as thermal insulation to protect the transmission wire system during operation, and is contained within the hollow core. The authorized facility had the dielectric fluid storage tanks only on the New Jersey side of the Hudson River. As PSEG evaluated design details with EPC

contractors it became clear that dielectric fluid storage tanks will be required on both sides of the Hudson River.

Six dielectric fluid storage tanks will be located within a second underground vault to be constructed adjacent to the transition station. An underground pipe will connect each tank to a phase of the wire system. Up to 2,000 gallons of dielectric fluid will be stored in secure tanks. The volume will vary during operation.

COMMENTS

Con Edison has no objections to the proposed amendments to the Certificate. It requests that PSEG confirm that the proposed amendments will not require amendments or revisions to the PSEG Power's Cross Hudson Project West 49th Street Substation Work Plan (SWP). Specifically Con Edison would like to know what effect of the dielectric storage reservoirs would have.

Con Edison requested that PSEG specifically confirm that the amendments will not affect the substation. If the amendments do affect the substation, Con Edison asserted PSEG should describe in detail the exact nature of such effects.

NYCEDC stated its support for the project, but noted that last year the New York City Planning Commission authorized an alteration in the waterfront public access and visual corridor requirements to facilitate a change of use to trade exposition by UCI, Inc. (UCI), NYCEDC's lessee, within an existing building located at Pier 94. According to NYCEDC, this material change in circumstances introduces a new party, UCI, which may be adversely affected by the revised PSEG route plan. NYCEDC recommended as a condition of approval that PSEG should be required to work out a satisfactory arrangement with UCI to address contingencies that may arise during the construction period. PSEG has indicated a willingness to do so.

In addition NYCEDC stated that consideration should be given to reopening the issue of the community impact fund

(\$300,000) previously approved in this proceeding. NYCEDC claimed that the size and disposition of the fund should be subject to review in light of the new circumstances. Some parties, such as HRPT, will face a lessened impact under the revised route, while others, notably UCI, may confront new issues.

NYCEDC believes the new route as proposed will minimize the disruptive impact on the community in the immediate vicinity, resulting from the construction of the transmission facility, and will permit the maximum practicable use of the adjoining facilities during the construction period. In addition, the permanent effects of a subterranean transmission line on the community should, according to NYCEDC, remain minimal under the revised route proposed by PSEG.

Citing several licensing and consent issues still under negotiation, NYCEDC asked to include a provision in any amended certificate that PSEG will resolve all outstanding issues, and will work to ensure that its construction activities will not adversely affect the passenger ship and show activities on nearby piers. To the extent that there are unavoidable effects during the construction phase, a compensation formula should be devised in order to forestall any losses by UCI, NYCEDC, or other affected parties.

Noting that PSEG has been willing to adjust construction calendar and work shifts to accommodate the needs of other parties, NYCEDC asked that this approach be memorialized.

DEC noted that there will be a slight increase in the underwater length of the facility, but concluded that no additional sediment sampling will be required and that all of the monitoring, dredging and trenching conditions contained in the original Certificate should be applied to the amended project.

DEC noted that the dielectric fluid to be stored in the underground vault may be subject to hazardous substance bulk storage regulations. Environmental Conservation Law (ECL)

Articles 37 and 40 and the implementing regulations at 6 NYCRR Parts 595 through 599 govern the handling and storage of hazardous substances and the design of storage tanks. Public Service Law § 130 preempts state and local approvals for this facility, but DEC stated it would be in the public interest for the Commission to allow DEC to retain the authority to register this facility in the bulk storage program.

DISCUSSION

Most of Con Edison's comments relate to whether the proposed amendment will require changes to the SWP. The SWP has never been a part of the record in this proceeding and is an as yet unfinished, unexecuted agreement between two parties. Further, the SWP appears to be part of the services agreement governing engineering and design of attachment facilities that is regulated by the Federal Energy Regulatory Commission. The Certificate includes all the conditions necessary to assure that PSEG satisfies all applicable state jurisdictional requirements. Specifically, conditions 57 through 62 require PSEG to comply with all applicable engineering, design, construction and operational requirements of Con Edison and other jurisdictional entities. Therefore, no changes to the Certificate are necessary in response to Con Edison's comments.

DEC's comment on hazardous materials storage has merit. It can be resolved by addition of a new provision to Certificate condition 28(s) which would require that the design and operation of the dielectric fluid storage tanks demonstrate compliance with applicable requirements of State Law.

PSEG and NYCEDC agree that revision of Certificate condition 7 to read as set forth below will adequately resolve NYCEDC's comments with respect to construction coordination and impact avoidance:

7. the Certificate holder shall route and construct the transmission facilities through the New York City landfall between Piers 94 and 95 in a manner that will avoid material interference with operation of the passenger ship terminal at piers 90 and 92, and minimize, to the maximum extent practicable, interference to Pier 94 for trade shows. The Certificate Holder shall coordinate construction with the HRPT and the NYCEDC, and with any other project in the New York City Landfall area that is taking place at the same time as the Certificate Holder's project. The coordination with NYCEDC shall include coordination for purposes of minimizing interference with the trade show activities of NYCEDC's lessee, UCI.

PSEG and NYCEDC have discussed resolution of NYCEDC's other comments and have agreed to resolve them through an agreement(s) to be negotiated in connection with the issuance of a revocable consent to occupy lands owned by NYCEDC. PSEG and NYCEDC have agreed, therefore, that no changes to the Article VII Certificate conditions are necessary to address this issue. Thus, the forgoing measures will fully resolve NYCEDC comments on the proposed amendment.

As noted above, PSEG asked that we confirm that the water quality certification issued in connection with the original certificate remains valid. We conclude that it does, since the certificate conditions contained in Appendix B hereto are as protective of water quality as those included in the original certificate.

CONCLUSION

After consideration of the physical setting, location and environmental impacts of the proposed changes and in accordance with PSL §123(2) we conclude that the proposed changes will not result in any material increase in any environmental impact of the authorized facility or a substantial change in the location of all or a portion of such facility other than as provided in the application for a certificate. The impacts of changing the locations of the landfall, HDD pit, and the

transition station, changing the dimensions of HDD bore and associated dredging and excavations and the construction and operation of an underground dielectric fluid storage vault would be essentially the same as those associated with the routing, design and installation technique authorized in the Certificate. Moreover, the findings made in the Certificate pursuant to PSL \$126(1) remain unchanged. While we conclude that the proposed amendments are without significant impact, the company shall, as part of the Environmental Management and Construction Plan, obtain such information as is necessary to finalize the proposed route modifications.

After careful consideration of the PSEG's petition and the comments thereon, we will grant an Amendment of the Certificate as described herein and in the Certificate Conditions contained in Appendix B hereto.²

The Commission orders:

1. The Certificate of Environmental Compatibility and Public Need granted to PSEG Power Cross Hudson Corporation on April 17, 2003 is amended as described in the petition filed August 13, 2004 and in this order.
2. The Certificate Holder shall file, within 30 days after the issuance of this Order, either a written acceptance of the Amended Certificate or a petition for rehearing of such order. Failure to timely file either an acceptance or a petition for rehearing shall invalidate the Amended Certificate.

² Changes to the Certificate Conditions appear primarily in Conditions 5, 7, 28, and 45; however, for the convenience of the parties and contractors, the conditions originally imposed in the Certificate have been included in Appendix B.

CASE 01-T-1474

3. This proceeding is continued.
By the Commission,

(SIGNED)

JACLYN A. BRILLING
Secretary

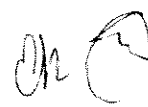
PSEG POWER CROSS HUDSON CORPORATION
Proposed Amended Certificate Conditions

Amended Submarine Cable Route Description

The following route description delineates the approximate route centerline. A 200 foot wide corridor along the upland route will be established to allow for minor route refinements during final design and construction.

From the HDD borehole exit point in Edgewater, New Jersey, the Submarine Cable will continue in a southeasterly direction to the New York - New Jersey state line, where it will enter New York waters at a location with approximate coordinates of 40°48'37"N; 73°58'32"W, which is located approximately 1,900 feet west of the Manhattan shoreline off West 113th Street. Once in New York waters, the Submarine Cable route will cross most of the Hudson River's width before turning south approximately 720 feet west of the Manhattan shoreline off West 112th Street. From that point, the route will run parallel to the New York City shoreline, at distances between approximately 480 and 1,100 feet west of the shoreline, between West 112th Street and West 59th Street. At a point approximately 1,050 feet offshore of West 59th Street, the Submarine Cable will enter the Federal Navigation Channel and proceed through the flanks of the Federal Channel for a distance of approximately 1,280 feet before turning to the east. From there, the route will run approximately 200 feet to the east to the HDD borehole exit point at the New York City Landfall approximately 160 feet seaward of Pier 94. The HDD borehole will run beneath the area between Piers 94 and 95. In New York waters, the Submarine Cable will be located under the riverbed of the Hudson River within a grant, lease, or other real property interest to be obtained by PSEG Cross Hudson Corporation from the New York State Office of General Services for a distance of approximately 3 miles, from Hudson River Park Trust for the distance within Park waters, and from the New York City Economic Development Commission for upland areas.

From the HDD transition station underneath a the south end of the Pier 94 parking lot, the cable will travel in a southerly direction along the alignment of the NYSDOT bike path parallel to Route 9A to a turning point where it will cross Route 9A (12th Avenue) and enter the West 49th Street Substation.



NEW YORK STATE
PUBLIC SERVICE COMMISSION

IN THE MATTER

- of the -

Case 01-T-1474

Application of PSEG Power Cross Hudson
Corporation for a Certificate of Environmental
Compatibility and Public Need to Construct
Pursuant to Article VII of the Public Service
Law for the Construction of a 1200 MW,
345 kV Electric Generator Lead

Amended Certificate Conditions

The Commission orders:

1. Subject to the conditions set forth in this Opinion and Order, the PSEG Power Cross Hudson Corporation ("Certificate Holder") is granted an Amended Certificate of Environmental Compatibility and Public Need authorizing construction and operation of a 600 MW, 345 kV AC, underground electric generator lead along the project route identified in Appendix A, hereto, and of the appurtenant interconnection to the West 49th Street Substation and other associated equipment (the "Transmission Facilities"). The conditions set forth in this Opinion and Order shall apply only to the portions of the Transmission Facilities certified within the State of New York.
2. The Certificate Holder shall, within 30 days after the issuance of the Certificate, submit to the Commission either a petition for rehearing or a verified statement that it accepts and will comply with the Certificate. Failure to comply with this condition shall invalidate the Certificate.
3. The Certificate Holder will be permitted, at its own risk, to commence site preparation and construction of the Transmission Facilities other than dredging or actual installation of the submarine cable in the Hudson River through jet plowing prior to receiving the necessary permits or approvals from the State of New Jersey for the New Jersey portion of the Transmission Facilities. In the event that the Certificate Holder is unable to obtain the necessary permits and approvals in New Jersey, it shall stop work in New York State and restore the site to a condition

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acceptable to the owner of the property on which any site preparation or construction has occurred.

Laws and Regulations

4. (a) Each substantive federal, state and local law, regulation, code and ordinance (including the New York City Zoning Resolution) applicable to the location of the Transmission Facilities authorized by the Certificate shall apply, except any substantive local law or regulation which the Public Service Commission ("Commission") has refused to apply as being unreasonably restrictive.

(b) No state or local legal provision purporting to require any approval, consent, permit, certificate or other condition for the construction or operation of the Transmission Facilities authorized by the Certificate shall apply, except (i) those of the Public Service Law and regulations and orders adopted thereunder, (ii) those provided by otherwise applicable State law for the protection of employees engaged in the construction and operation of the facilities, (iii) those permits issued under a federally delegated environmental permitting program, and (iv) those referenced in Condition 5 below.
5. Subject to the Commission's ongoing jurisdiction, the Certificate Holder will be permitted to seek the following New York City ("City") regulatory permits and approvals that would be applicable to the construction work for or operation of the Transmission Facilities in the absence of PSL § 130 including but not limited to:
 - (a) Building permits
 - (b) Street excavation permits
 - (c) Street closure permits
 - (d) Permits for structural welding
 - (e) Permits under the New York City Fire Code
 - (f) Permits for the use and supply of water
 - (g) Permits for the discharge of wastewater or stormwater to the sewer system
 - (h) Permits for the installation of conduits and utility lines in City streets
 - (i) Certificate of Occupancy for underground vaults

A copy of each permit or approval received from the City shall be provided to DPS Staff by the Certificate Holder promptly after the Certificate Holder's receipt of such permit or approval.

6. If PSEG believes that any action taken, or determination made, by the City in furtherance of the City's review of the permits and approvals referenced in paragraph 5, above, is unreasonable or unreasonably delayed, PSEG may petition the Commission, upon reasonable notice to the City, to seek a resolution of any such unreasonable or unreasonably delayed requirement. The City may respond to the petition, within three business days, to address the reasonableness of any requirement or delay.
7. The Certificate Holder shall route and construct the Transmission Facilities through the New York City landfall between Piers 94 and 95 in a manner that will avoid material interference with operation of the passenger ship terminal at Piers 90 and 92, and minimize, to the maximum extent practicable, interference with access to Pier 94 for trade shows. The Certificate Holder shall coordinate construction with the Hudson River Park Trust ("HRPT") and the New York City Economic Development Corporation ("NYCEDC"), and with any other project in the New York City landfall area that is taking place at the same time as the Certificate Holder's project. The coordination with NYCEDC shall include coordination for purposes of minimizing interference with the trade show activities of NYCEDC's lessee, UCI, Inc.

Public Health and Safety

8. The Certificate Holder shall design, engineer and construct the Transmission Facilities such that their operation shall comply with the electromagnetic field ("EMF") standards established by the Commission in Opinion No. 78-13 (issued on June 19, 1978) and the Statement of Interim Policy on Magnetic Fields of Major Electric Transmission Facilities (issued September 11, 1990), respectively.
9. Construction work outside the walls of buildings whose exterior walls and roof are substantially complete shall take place between 7:00 a.m. and 6:00 p.m. as required by § 24-227 of the Noise Code. For certain construction phases and activities, additional work hours may be necessary. Nothing herein shall preclude the Certificate Holder from making necessary arrangements for the extension of work hours with appropriate authorities of the City of New York. Noise mitigation procedures shall follow those set forth in the approved Environmental Management and Construction Plan ("EM&CP"). DPS Staff shall be notified at least 24 hours in

advance if planned weekend, evening or holiday construction becomes necessary. This condition is not intended to prohibit nighttime construction reasonably necessary to comply with restrictions on daytime construction on or along roadways or public access areas or to require the cessation of construction activities which require a continuous work effort once started.

10. Deliveries related to construction activities shall take place between 7:00 a.m. and 6:00 p.m., except that, to the extent required to accommodate oversized delivery pursuant to New York City Department of Transportation ("NYCDOT") permit, the Transmission Facilities shall be exempt from restrictions limiting delivery to 7:00 a.m. to 6:00 p.m. This condition is not intended to prohibit nighttime deliveries reasonably necessary to facilitate compliance with restrictions on daytime construction in or along roadways or public access areas or to require the cessation of construction activities which require a continuous work effort once started.
11. The Certificate Holder shall keep local fire department and emergency management teams apprised of chemicals and waste on site.
12. The Certificate Holder shall take appropriate measures as outlined in the EM&CP to minimize fugitive dust and airborne debris from construction activity.
13. The Certificate Holder shall instruct its contractors to park in designated areas, which do not interfere with normal traffic, do not cause any safety hazard or interfere with existing land uses.
14. The Certificate Holder shall periodically consult with the NYCDOT about traffic conditions near the project site, and shall make good faith efforts to minimize the impact of the construction of the Transmission Facilities on area traffic circulation.
15. To the extent required in connection with the delivery of oversized facility components, the Certificate Holder or its suppliers shall obtain any necessary permits from the NYCDOT.
16. The Certificate Holder shall engineer and construct its facilities to be fully compatible with the operation and maintenance of nearby electric, gas, telecommunication, water, sewer, and related facilities; details of such other facilities and measures to protect the integrity, operation,

and maintenance of those facilities shall be presented in the EM&CP.

17. The Certificate Holder shall coordinate maintenance of its facilities with those of any adjacent utility facilities.
18. The Certificate Holder shall comply with the requirements for the protection of underground facilities set forth in 16 NYCRR Part 753.
19. The Certificate Holder shall coordinate and schedule construction and maintenance activities to minimize or avoid, to the extent practicable, disturbance to pedestrian use of recreation ways, use of the recreational bikeway, access to port facilities, convention facilities, and parkland development plans. Details of construction schedule and coordination with the HRPT and NYCEDC shall be presented in the EM&CP.

Environmental Management and Construction Plan

20. Except where this Certificate requires otherwise, the environmental protection measures contained in the Application (as amended by the August 2004 Application for amendment), the 401 Water Quality Certification, and in the Joint Proposal (to the extent adopted in this Certificate), shall be incorporated into the EM&CP and applied during construction, operation and maintenance of the certified Facilities. Applicable provisions of the EM&CP and orders approving the EM&CPs shall be accommodated in contracts associated with the Transmission Facilities.
21. The Certificate Holder shall provide, as a part of the EM&CP, a final design plan that reflects the Transmission Facilities' conformance with the certificate, applicable federal, state and local requirements (including, but not limited to, applicable regulations, including the Bureau of Alcohol, Tobacco and Firearms, Occupational Safety and Health Administration, Federal Fire Code, New York State Code 39, the Hudson River Park Act, the New York City Building Code, the Rules of the City of New York, chemical and waste-storage use and handling regulations), a discussion of the status of the Certificate Holder's efforts to obtain permits necessary for project construction from the City of New York, the United States, and agencies in New Jersey, and a discussion of the status of the Interconnection Agreement for the certificated facilities.
22. The Certificate Holder shall not begin site preparation or construction with respect to any portion of the Transmission Facilities in New York (except for surveying, boring and

such other related activities as are necessary to prepare final design plans) before it has submitted to the Commission, and the parties identified in condition 23, below, and the Commission has approved, an EM&CP for the relevant portion of the Project.

23. The Certificate Holder shall submit four copies of the EM&CP to the Commission, serve four copies on the Staff of the New York State Department of Environmental Conservation ("DEC"), one copy on the Region 2 office of the DEC, one copy on the Commissioner of the New York State Office of Parks, Recreation and Historic Preservation ("OPRHP"), and one copy on the HRPT, serve at least one copy on any other New York State agency (and its relevant regional offices) which requests the document, serve one copy on active parties on the service list who request the document, and place copies for inspection by the public in at least one public library or other convenient location in each municipality in which construction will take place. Contemporaneously with the submission and service of the EM&CP, the Certificate Holder shall provide notice, in the manner specified below, that the EM&CP has been filed.
24. The Certificate Holder shall serve written notice(s) of the filing of the EM&CP on all active parties to this proceeding, on each person on the Commission's service list considered potentially affected by the subject matter in the EM&CP, and on all statutory parties to this proceeding, and shall attach a copy of the notice to each copy of the EM&CP. The Certificate Holder also shall attempt to serve similar written notice(s) on each person from whom rights-of-way are required, on each person owning the underlying land right to an easement being acquired and on each person currently leasing a portion of any right-of-way to be used for the Transmission Facilities. Further, the Certificate Holder shall publish the notice(s) in a newspaper or newspaper of general circulation in the vicinity of the facility.
25. (a) The filing and review of the EM&CP may be segmented in order to permit commencement of construction of on-land components of the Transmission Facilities not subject to the permitting authority of the U.S. Army Corps of Engineers.
(b) The Certificate Holder shall comply with any conditions contained in a Water Quality Certification issued pursuant to § 401 of the Federal Clean Water Act.
26. The written notice(s) and the newspaper notice(s) shall contain, at a minimum, the following: a statement that the EM&CP has been filed; a general description of the

Transmission Facilities and the EM&CP; a listing of the locations where the EM&CP is available for public inspection; a statement that any person desiring additional information about a specific geographical location or specific subject may request it from the Certificate Holder; the name, address, and telephone numbers of the Certificate Holder's representative and the Independent Inspector; the address of the Commission, and a statement that any person may comment on the EM&CP by filing written comments with the Commission and the Certificate Holder within 30 days of the filing date with the Commission of the EM&CP (or within 30 days of the date of the newspapers notice, whichever is later). A certificate of service indicating upon whom all EM&CP notices and documents were served and a copy of the written notice shall be submitted to the Commission at the time the EM&CP is filed and shall be a condition precedent to approval of the EM&CP.

27. The Certificate Holder shall report any proposed changes in the approved EM&CP to DPS Staff, DEC Staff, HRPT, NYCEDC and to the Independent Inspector. DPS Staff will refer to the Secretary of the Commission (or a designee) reports of any proposed changes that do not cause substantial change in environmental impact or are not related to contested issues decided during the proceeding. DPS Staff will refer all other proposed changes in the EM&CP to the Commission for approval. Upon being advised that DPS Staff will refer a proposed change to the Commission, the Certificate Holder shall notify all active parties that have requested (before the approval of the EM&CP) to be so notified, as well as property owners or lessees whose property is affected by the proposed change. The notice shall describe the original conditions and the requested change and state that documents supporting the request are available for inspection at specified locations, and state that persons may comment by writing or calling (followed by written confirmation) to the Commission within 15 days of the notification date. Any delay in receipt of written confirmation will not delay Commission action on the proposed change. The Certificate Holder shall not execute any proposed change until it receives oral or written approval, except in emergency situations threatening personal injury, property damage or severe adverse environmental impact or as specified in the EM&CP.
28. The Certificate Holder shall address at least the following information in the EM&CP:
- (a) details of work site dimensions, construction rights-of-way, and off-rights-of-way access needs and locations; measures to protect adjacent facilities,

- structures, and ornamental vegetation, and access to adjacent commercial uses;
- (b) details of horizontal directional drilling pit location, stabilization and nuisance control;
- (c) details of wire pulling plans;
- (d) designated parking areas and equipment storage and staging locations;
- (e) details of erosion control plans;
- (f) spoil control plans for excavations;
- (g) fuel and fluids spill prevention and control plans;
- (h) hazardous materials handling and disposal;
- (i) public road traffic control and public safety;
- (j) pedestrian access, recreation trail /bikeway traffic control plan; fencing around open work areas and provisions for through traffic, alternative access;
- (k) plans and specifications for pavement restoration;
- (l) nighttime construction provisions, including lighting & noise control;
- (m) underwater construction and vessel spill containment and control plans;
- (n) site restoration details;
- (o) construction schedule and coordination plans;
- (p) dredging and dredged materials management and disposal;
- (q) provision for submission of a certification by a professional engineer licensed by the State of New York stating that, if constructed in accordance with the final design plans, the Transmission Facilities will comply with the electromagnetic and magnetic field standards referenced in Condition "8", above.
- (r) A Compliance Plan which shall include:
 - (1) The name(s) of the environmental inspector(s) and a statement of qualifications for each inspector demonstrating sufficient knowledge and experience

- in environmental matters to complete the inspections and audits;
- (2) A certification confirming the independence of the inspector(s) from the Certificate Holder and certifying the authority of the inspector(s) to "stop work" in cases of non-compliance or imminent environmental or safety hazard;
 - (3) Provision for deployment of more than one inspector in the event that two or more major field operations are undertaken simultaneously, such that at least one inspector shall be assigned to each construction area and no inspector shall be assigned to more than two active construction areas at any one time;
 - (4) A proposed checklist of matters to inspect for compliance, including the specific items or locations to be inspected, the inspection to be employed (e.g. visual, auditory, testing by instrument, etc.), and acceptability criteria to be applied by the inspector(s);
 - (5) A procedure setting forth how the Certificate Holder shall respond to and correct problems found by the inspector(s);
 - (6) A schedule for monthly environmental audits during construction and submission of audit checklists, together with a written explanation of problem(s) signed by the auditor(s) and an authorized representative of the Certificate Holder, to DPS Staff, DEC Staff, and local agency and/or building inspectors; and
 - (7) A schedule for submission of annual audits during the first two years of operation of the Facility to DPS, DEC, and appropriate local agencies.
- (s) details of the design of the dielectric fluid storage tanks and storage vault, including containment, demonstrating compliance with applicable requirements of State Law.

Notices and Public Complaints

29. The Certificate Holder shall make available to the public a toll free or local phone number of an agent or employee where complaints may be received during the construction of the certified facilities. In addition, the phone number of

the Secretary, and the phone number of the Commission's Environmental Compliance Section, shall also be provided in the event there are questions or concerns. A log shall be maintained which lists at least the date of any complaint, identity and contact information for the complaining party, the date of the Certificate Holder's response, and a description of the outcome. Phone logs shall be made available to DPS Staff upon its request. During DPS Staff's compliance inspections, the Certificate Holder shall report to DPS Staff every unresolved complaint.

30. No less than two weeks before commencing site preparation, the Certificate Holder shall give notice to the HRPT, NYCEDC, local officials and emergency personnel. The Certificate Holder shall also provide such notice for dissemination to local media and display in public places (such as general stores, post offices, community centers and conspicuous community bulletin boards). The notice shall contain a map and a description of the Transmission Facilities in the local area, the anticipated date for start of construction and the name, address and local or toll-free telephone number of an employee or agent of the Certificate Holder. The notice shall also contain a statement that the project is under the jurisdiction of the Public Service Commission which is responsible for enforcing compliance with environmental and construction conditions, which may be contacted at an address and telephone number to be provided. Where possible, the notice will be written in language reasonably understandable to the average person. Upon distribution, a copy shall be submitted to the Secretary of the Commission, the DEC Commissioner, and DEC Staff.
31. The Certificate Holder shall provide construction contractors with complete copies of the Certificate, EM&CP, 401 Water Quality Certification, and 6 NYCRR Parts 700-704. To the extent that the listed documents are available before contracts for construction services are executed, such copies shall be provided to the contractors prior to execution of such contracts.
32. The Certificate Holder shall notify all construction contractors that the Commission may seek to recover penalties for violation of the Certificate, not only from the Certificate Holder, but also from its construction contractors, and that construction contractors may also be liable for other fines penalties and environmental damage.
33. The Certificate Holder shall inform the Secretary and the Staff of the DPS and DEC at least five days before commencing construction or clearing on this project.

34. The Certificate Holder shall provide DPS Staff, DEC Staff, NYCEDC and the HRPT (with respect to work within the Hudson River Park) with weekly status reports summarizing the previous week's construction and indicating construction activities and locations scheduled for the next two weeks.
35. Within ten days after the Transmission Facilities are in service, the Certificate Holder shall notify the Commission of that fact.

Right-of-Way, Construction, Maintenance and Restoration

36. The Certificate Holder shall confine construction and subsequent maintenance to the certified right-of-way and approved additional work areas, as detailed in the EM&CP.
37. The Certificate Holder shall prepare detailed soil handling and erosion control plans to be included in the EM&CP. The soil handling and erosion plan shall include specifications for testing, stockpiling or removal from site, storage, erosion control, restoration, compaction of backfill in trenches, and site preparation and enhancement for restoration within the Clinton Cove area of the Hudson River Park. PSEG shall install temporary erosion control devices as soon as practicable and appropriate as indicated in the EM&CP and any stormwater and erosion control plans.
38. The Certificate Holder shall provide details in the EM&CP of street work, including provisions for minimizing the duration and extent of open pits within and adjoining public streets and rights-of-way.
39. Within ten days of the completion of final restoration, the Certificate Holder shall notify the Commission that all restoration has been completed in compliance with the EM&CP.
40. The Certificate Holder shall submit a facility management plan, as part of the EM&CP, which includes discussion of patrols, marking and maintenance of facilities, and coordination of activities with underlying landowners and managers.

Installation, Suspended Sediment and Water Quality Monitoring

41. Construction within navigable waters shall not occur between November 15 of any calendar year and April 15 of the following calendar year. After prior consultation with DEC Staff, however, the Certificate Holder may petition the Commission for a modification of this construction window provided copies of the petition are served on all active

parties to this proceeding that have requested (before the approval of the EM&CP) to be so notified. The results of the consultation shall be reported in the petition.

42. During the jet plow trials and the installation, the Certificate Holder shall implement the Suspended Sediment/Water Quality Monitoring Plan ("Monitoring Plan") attached hereto as Appendix B. The Certificate Holder shall operate the jet plow (subject to the approval of the field representatives of DPS Staff and DEC Staff) in accordance with the operating conditions determined through the jet plow trials described in Appendix B to minimize suspension of in-situ sediments. If the jet plow trials demonstrate that the preferred operating conditions result in Trial Related TSS Concentrations (as defined in Appendix B) of more than 200 mg/L, PSEG shall work with the staffs of DPS and DEC to evaluate and implement reasonable modifications to the jet plow operating conditions to minimize in-situ sediment suspension induced by the jet plow.
43. Water quality:
 - (a) The Certificate holder must determine Ambient Background turbidity (NTU), Ambient Background TSS, and ambient background total PCB (method 608), arsenic, cadmium, copper, lead, and mercury (method 1631) concentrations within the water column of the Hudson River outside the effects of the jetting event during the jetting portions of the project, as described in the Monitoring Plan attached hereto as Appendix B. Metals shall be reported as total and dissolved fractions. Samples shall be collected at a location at least 200 feet up-current of the work area (or at such longer distance as may be necessary to maintain a reasonably safe survey distance in front of the cable installation vessel when the cable ship is traveling against the current) and outside of the effect of the jetting event. Sampling distances down-current of the project shall be measured from the location of the jet plow in the Hudson River. Samples shall be collected at three depths: approximately 18 inches below the surface, at mid-depth and at three feet above the bottom.
 - (b)
 - 1) Suspended sediment plume monitoring and water quality monitoring shall be conducted at the locations and frequency set forth in the Monitoring Plan (Appendix B).
 - 2) During the installation of the cable system by jet plowing, there shall be no project-related

exceedance, as defined below, measured at a point 500 feet downcurrent of the jet plow (such distance constituting the DEC-established mixing zone), of the criteria set forth below with respect to water quality parameters of the particular chemical constituents listed in condition 43(a) above.

(A) Chemical Constituents:

- (i) for the dissolved fraction of each chemical constituent listed in condition 43(a) above, other than mercury, the greater of 1.3 times the highest ambient background level measured during the same sampling day at the up-current reference location, or the established "Aquatic (Acute)" water quality standard and/or "Aquatic (Chronic) Standard," as applicable, and as set forth in the Water Quality Regulations published in 6 NYCRR Part 703. The 30 percent increase over ambient is intended to cover statistical differences in the reported results and variability in the concentrations measured in the ambient samples; and
- (ii) for the dissolved fraction of mercury, 0.14 micrograms/L in excess of the highest ambient background level measured during the same sampling day at the up-current reference location.
- (iii) compliance determinations will be made using a depth to depth comparison of measured parameters utilizing the sampling methods set forth in Appendix B.

(B) Project-Related TSS Concentrations: 200 mg/L above Ambient Background TSS.

- (3) If, during jet plow installation of the cable, the real time data collected under the Monitoring Plan indicate that Project-Related TSS Concentrations (as measured at 500 feet downcurrent of the jet plow) exceed Ambient Background TSS (both terms as defined in the Monitoring Plan) by 200 mg/L, DPS Staff, DEC Staff and the independent environmental inspector shall be immediately notified. The Certificate holder shall immediately employ one or more of the following environmental protection measures after consultation with the field representatives of DPS Staff, DEC Staff and the independent environmental inspector changing the rate of advancement of the jet plow, modifying hydraulic jetting pressures, or implementing other

reasonable operational controls that may reduce suspension of in-situ sediments. Nothing in this subsection, however, is intended to require that hydraulic jetting pressures be reduced to levels which would not allow burial to the depths specified in condition 44, below, through a single installation pass.

- (4) Nothing in this Certificate and its appendices shall limit either (a) the authority of the Department of Environmental Conservation to monitor the environmental and health impacts resulting from the construction and operation of the project and to enforce applicable provisions of the Environmental Conservation Law (including those which provide for summary abatement authority) and applicable implementing regulations governing the environmental and health impacts resulting from such construction and operation, or (b) any defenses to such enforcement that the Certificate Holder may be able to assert under applicable law.
- 44. The Certificate Holder shall install the Submarine Cables at a burial depth of a minimum of 15 feet below the existing riverbed in the Federal Navigation Channel, and a minimum of 10 feet below the existing riverbed outside of the Federal Navigation Channel.
- 45. The Certificate Holder shall employ horizontal directional drilling ("HDD") with associated cofferdam installation and dredging within the cofferdams to install the proposed submarine cable system from the proposed cable landfall location between Piers 94 and 95. This work shall be completed in accordance with the EM&CP. No dredging is authorized by this certificate except for dredging in connection with installation of the cofferdams and dredging within the cofferdams.
- 46. Pre and Post Installation Monitoring:
 - (a) A pre- and post-installation sediment monitoring plan shall be submitted in the EM&CP after consultation with DEC Staff and DPS Staff. The results of that consultation shall be reported in the plan submission. The plan shall provide that pre- and post- installation surficial sediment samples (top two centimeters) will be collected and analyzed prior to and subsequent to the completion of jet plow installation of the cable system, and that post-installation sampling shall commence promptly after the completion of the jet plow



installation process. Specific methods and equipment shall be described to ensure the top two centimeters of ambient sediment are adequately collected, retained and sequestered for analysis. Samples shall be collected and analyzed for arsenic, cadmium, copper, lead, mercury, total PCBs using a congener-specific method, as outlined in the Corps of Engineers/EPA Regional Testing Manual for Dredged Materials, and total PAH. Surficial sediment samples shall be collected at stations located 50 and 100 meters up-river and down-river from the planned route. At least five locations spaced evenly along the route shall be identified from which the sampling stations shall be established (total of 20 samples). The Certificate Holder shall submit to the DEC and DPS Staffs a report which provides the analytical results, and compares them to pre-installation chemical concentrations in surficial sediments.

- (b) A pre and post-installation benthic community monitoring plan shall be submitted in the EM&CP after consultation with DEC Staff and DPS Staff. The results of that consultation shall be reported in the plan submission. The plan shall provide for periodic benthic monitoring within an area extending approximately one hundred feet (100') on either side of the jet plowed trench for at least 18 months after completion of jet plow installation. The plan shall provide for one pre-installation benthic monitoring and at least one post-installation monitoring during the same season.
 - (c) A mitigation plan shall be submitted in the EM&CP after consultation with DEC Staff and DPS Staff to accommodate and address the impacts to benthic habitat. The results of that consultation shall be reported in the plan submission. Since remediation of the impacted habitat and benthic community is impracticable, the mitigation plan shall provide criteria (which must be proposed only after consultation with DEC Staff) for determining when mitigation is necessary, and a method and schedule for implementation of mitigation.
47. An environmental bucket shall be used for dredging silt or other fine-grained materials during HDD pit and cofferdam construction operations. Drawings and specifications of the environmental bucket must be provided to the DEC Staff and DPS Staff prior to the anticipated start of dredging. Bucket specifications:

- (a) A closed environmental bucket with sealing gaskets or an overlapping sealed design at the jaws, and seals or flaps positioned at locations of vent openings shall be selected to minimize the loss of material during transport through the water column and into the barge. Seals or flaps designed or installed at the jaws and locations of vent openings must tightly cover these openings while the bucket is lifted through the water column and into the barge.
 - (b) If significant loss of water and visible sediments from the bucket is observed, the operator or independent inspector shall halt dredging operations and inspect the bucket for defects. Operations shall be suspended until all necessary repairs or replacements are made.
 - (c) The material removed may not be side cast or returned to the water. Bucket shall be lowered to the level of the barge gunwales prior to release of the load.
 - (d) Bucket hoist speed shall be limited to approximately 2 feet per second. The bucket shall be lifted in a continuous motion through the water column and into the barge. There shall be no barge overflow.
 - (e) The contractor shall demonstrate to the independent inspector's satisfaction that the bucket dredge operator has sufficient control over the bucket depth in the water and bucket closure so that the sediment resuspension from bucket contact with the bottom and bucket over-filling is minimized.
48. Other operational requirements:
- (a) Only barges in good operating condition and appropriately designed to contain discharged sediments, shall be employed to contain the sediment and water placed in them. Deck barges shall not be employed, unless modified to allow no barge overflow.
 - (b) All sediments excavated during this HDD pit and cofferdam construction operation must be disposed of at a DEC approved upland disposal site. Dredge material shall not be sidecast, stockpiled on-site, or re-introduced into the harbor.
49. All laboratory analyses of Hudson River water quality and marine sediments required in this Certificate must be conducted by a laboratory certified by the New York State Department of Health.

Environmental Supervision

50. The authority granted in the Certificate and any subsequent order(s) in this proceeding is subject to the following conditions necessary to ensure compliance with such order(s):
- (a) The Certificate Holder shall regard the DPS Staff representatives (certified pursuant to Public Service Law § 8) as the Commission's designated representatives in the field. In the event of any emergency resulting from the specific construction or maintenance activities that violate or may violate the terms of the Certificate or any other order in this proceeding, such DPS Staff representatives may issue a stop-work order for that location or activity.
 - (b) A stop-work order shall expire in 24 hours unless confirmed by a single Commissioner. If a stop-work order is confirmed, the Certificate Holder may seek reconsideration from the confirming Commissioner or the whole Commission. If the emergency prompting the issuance of a stop-work order is resolved to the satisfaction of the Commissioner or the Commission, the stop-work order will be lifted. If the emergency has not been satisfactorily resolved, the stop-work order will remain in effect.
 - (c) Stop-work authority shall be exercised sparingly and with due regard to the potential economic costs involved and possible impact on construction activities. Before exercising such authority, DPS Staff field representatives may consult with the Independent Inspector, or may initiate action based upon the Independent Inspector's oral report, and shall attempt (wherever practicable) to direct preventive or remedial action through the Certificate Holder's representatives possessing comparable authority. In the event that DPS Staff field representatives issue a stop work order, neither the Certificate Holder nor the contractor will be prevented from undertaking any such safety-related activities as they deem necessary and appropriate under the circumstances.
 - (d) In the event of any emergency involving specific construction or maintenance activities that violate or threaten to violate the terms of the Certificate or any other order in this proceeding, DPS Staff field representatives may direct the Certificate Holder to install appropriate mitigative measures or devices.

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51. The Independent Inspector and appropriate inspection personnel of the Certificate Holder shall be on site at the start-up of each field operation and at all times during environmentally sensitive phases of construction such as in-river, waterfront areas, and parklands. The Independent Inspector and appropriate inspection personnel of the Certificate Holder shall be equipped with sufficient documentation, and transportation and communication equipment to monitor effectively contractor compliance with the provisions of this Certificate, subsequent Orders in this proceeding, applicable sections of the Public Service Law, and the Commission approved EM&CP.
52. The Certificate Holder shall organize and conduct site compliance audit inspections for DPS Staff as needed but not less frequently than once a month during the site preparation, HDD, in-river excavation and cable-laying, upland excavation, construction, and restoration phases of the Project, and at least annually for two years after the project is operational. The inspection shall include a review of the status of all certification conditions, requirements, and commitments, as well as a field review of the project, if necessary. The inspection may also include:
- (a) reviews of all complaints received, and their proposed or actual resolutions;
 - (b) reviews of any significant comments, concerns or suggestions made by the public, local governments, or other agencies.
 - (c) reviews of the status of the project in relation to the overall schedule established prior to the commencement of construction; and
 - (d) any other items the Certificate Holder or DPS Staff consider appropriate. The Certificate Holder shall circulate a written record of the results of the inspection to involved agencies.

Cultural Resources

53. The Certificate Holder shall present to DPS Staff, OPRHP, NYCEDC and the HRPT, prior to submission of the EM&CP, details of the proposed construction activity in the vicinity of the Hudson River shoreline bulkhead, including specifications and procedures for minimizing impacts to the bulkhead and related sub-structure. The EM&CP shall incorporate details for bulkhead protection including the resolution of comments received from DPS Staff, OPRHP, and the HRPT.



54. Should archeological materials be encountered during construction, the Certificate Holder shall stabilize the area and cease construction activities in the immediate vicinity of the find and protect the same from further damage. Within twenty-four hours of such discovery, the Certificate Holder shall notify DPS Staff and OPRHP to determine the best course of action. No construction activities shall be permitted in the vicinity of the find until such time as the significance of the resource has been evaluated and the need for and scope of impact mitigation has been determined.
55. Should human remains or evidence of human burials be encountered during the conduct of archeological data recovery fieldwork or during construction, all work in the vicinity of the find shall be immediately halted and the remains shall be protected from further damage. Within twenty-four hours of any such discovery, the Certificate Holder shall notify the DPS Staff and OPRHP. All archaeological/burial encounters and their handling shall be reported in the status reports required by Condition 34, above.
56. The Certificate Holder shall refrain from undertaking construction in areas where cultural resource surveys have not been completed and until such time as the results of any additional cultural resource surveys that are required have been reviewed by the appropriate authorities, including OPRHP, DPS Staff, and, for areas within the Hudson River Park, the HRPT. DPS Staff shall be contacted prior to commencement of construction in any such areas.

Transmission System Reliability

57. The Certificate Holder is authorized to construct and agrees to design, engineer, and construct transmission facilities in support of the Transmission Facilities as provided in the System Reliability Impact Study ("SRIS") approved by the New York Independent System Operator ("NYISO"), the Transmission Planning and Advisory Subcommittee ("TPAS"), the NYISO Operating Committee, and the NYISO Class Year 2002 Annual Transmission Reliability Assessment Study ("ATRAS"), and in accordance with the applicable and published planning and design standards and best engineering practices of NYISO, Consolidated Edison Company of New York, Inc. ("Con Edison"), the New York State Reliability Council ("NYSRC"), Northeast Power Coordinating Council ("NPCC"), North American Electric Reliability Council ("NERC"), and North American Electric Reliability Organization ("NAERO"), and successor organizations depending upon where the facilities are to be built and which standards and practices



are applicable. Specific requirements shall be those required by the NYISO Operating Committee and TPAS in the approved SRIS and by any interconnection or facilities modification agreements made with Consolidated Edison.

58. The Certificate Holder shall work with Con Edison, and any successor Transmission Owner (as defined in the NYISO Agreement), to ensure that, with the addition of the Transmission Facilities (as defined in the Interconnection Agreement between the Certificate Holder and Con Edison), the system will have power system relay protection and appropriate communication capabilities to ensure that operation of the electric transmission system is adequate under NPCC Bulk Power System Protection Criteria, and meets the protection requirements at all times of the NERC, NPCC, NYSRC, NYISO, and Con Edison, and successor Transmission Owner (as defined in the NYISO Agreement). The Certificate holder shall ensure compliance with applicable NPCC criteria and shall be responsible for the costs to verify that the relay protection system is in compliance with applicable NPCC, NYISO, NYSRC and Consolidated Edison criteria.
59. (a) The Certificate Holder shall be responsible for its Transmission Facilities' share of the cost of System Upgrade Facilities as determined by the NYISO in accordance with its FERC-approved tariffs, rules and procedures.
- (b) The Certificate Holder shall be responsible for the cost of Attachment Facilities as they are defined in Attachment S of the NYISO's Open Access Transmission Tariff and set forth in the Interconnection Agreement between the Certificate Holder and Con Edison.
- (c) Payments from the Certificate Holder to Con Edison of the amounts contemplated in this Certificate Condition shall be made in accordance with the terms of the Interconnection Agreement between the Certificate Holder and Con Edison.
60. The Certificate Holder shall operate the Transmission Facilities in accordance with the approved tariffs and applicable rules and protocols of Con Edison, NYISO, NYSRC, NPCC, NERC, and NAERO, and successor organizations. The Certificate holder may seek subsequent review of any specific operational orders at the NYISO, the Commission, the FERC, or in any other appropriate forum.
61. The Certificate Holder shall be in full compliance with the applicable reliability criteria of Con Edison, NYISO, NPCC, NYSRC, NERC, NAERO and successors. If it fails to meet the

reliability criteria at any time, the Certificate Holder shall notify the NYISO immediately, in accordance with NYISO requirements, and shall simultaneously provide the Commission and Con Edison with a copy of the NYISO notice.

62. The Certificate Holder shall file a copy of the following documents with the Commission : all facilities agreements with New Jersey utilities, PJM and Con Edison, and successor Transmission Owner (as defined in the NYISO Agreement); the SRIS approved by the NYISO Operating Committee; the interconnection study approved by PJM and the local utility in New Jersey, any documents produced as a result of the updating of requirements by the NYSRC; the Relay Coordination Study (which will be filed not later than six months prior to the projected date for commercial operation of the facility); and a copy of the facilities design studies for the New York and PJM portions of the Transmission Facilities, including all updates.
63. The Certificate Holder shall obey unit commitment and dispatch instructions issued by NYISO, or its successor, in order to maintain the reliability of the transmission system. In the event that the NYISO System Operator encounters communication difficulties, the Certificate holder shall obey dispatch instructions issued by the Con Edison Energy Control Center, or its successor, in order to maintain the reliability of the transmission system.

Financing, Construction Progress Reports, Equipment Failure

64. The Certificate Holder, within 60 days after the Final Authorization Date, shall notify the Commission, by affidavit signed by an officer of the Certificate Holder attesting that the financing of the certificated facilities is in place. If balance sheet financing, as opposed to project financing, is planned for the certificated facilities, such affidavit shall state that the Certificate Holder is capable of financing the certificated facilities from operating cash flows and existing credit facilities. Regardless of the type of financing, such affidavit shall state that the affiant has no knowledge of pending or imminent events that may materially affect the Certificate Holder's ability to construct the Transmission Facilities. Such affidavit shall state the credit rating of the Certificate Holder's parent company, and any recent or expected changes to such rating. For purposes of this condition, Final Authorization Date shall mean the first date on which all of the following events have occurred:

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- (a) all federal, state and local regulatory approvals and permits necessary to authorize construction of the Transmission Facilities to commence have been issued, and
 - (b) the Interconnection Agreement and Service Agreement for the Transmission Facilities have been executed by all necessary parties. At monthly intervals after the filing of the EM&CP, the Certificate Holder shall provide to DPS Staff a report indicating the status of the Interconnection Agreement and Service Agreement for the project and each regulatory approval and permit necessary to authorize commencement of construction of the project.
65. (a) After commencement of construction of the certificated facilities, the Certificate Holder shall provide the DPS Staff and Con Edison with a monthly report on the progress of construction and an update of the construction schedule (these reports may be coordinated and consolidated with the reports required under condition 34, above). In the event the Commission determines that construction is not proceeding at a pace that is consistent with Good Utility Practice, and that a modification, revocation, or suspension of the Certificate may, therefore, be warranted, the Commission may issue a show cause order requiring the Certificate Holder to explain why construction is behind schedule and to describe such measures as are being taken to get back on schedule. The Order to Show Cause will set forth the alleged facts that appear to warrant the intended action. The Certificate Holder shall have thirty days after the issuance of such Order to respond and other parties may also file comments within such period. Thereafter, if the Commission is still considering action with respect to the Certificate, an evidentiary hearing will be held prior to issuance of any final order of the Commission to amend the certificate if required by Public Service Law §123(2), or to revoke or suspend the Certificate. It shall be a defense in any proceeding initiated pursuant to this condition if the delay of concern to the Commission (a) arises in material part from actions or circumstances beyond the reasonable control of the Certificate Holder (including the actions of third parties), (b) is not in material part caused by the fault of the Certificate Holder, or (c) is not inconsistent with a schedule that constitutes Good Utility Practice.



- (b) The Certificate Holder shall file with the Commission, 18 months after the commencement of construction, a detailed progress report. Should that report indicate that construction will not be completed within six months; the Certificate Holder shall include in the report an explanation of the circumstances contributing to the delay and a demonstration showing why construction should be permitted to proceed. In these circumstances, an order to show cause will not be issued by the Commission, but a hearing will be held before the Commission takes any action to amend the Certificate if required by Public Service Law § 123(2), or to revoke or suspend the Certificate.
- (c) For purposes of this condition, Good Utility Practice shall mean any of the applicable acts, practices or methods from time to time (i) required by the NYSRC, NPCC, NERC or the NYISO or any successor thereto, or any other organization with similar duties, including any local, state, regional, national or international reliability organization, or required by any rules issued pursuant to the authority of any such organization, in each case, with jurisdiction or authority in respect of Con Edison or Con Edison's transmission facilities or the Certificate Holder or the certificated facilities and whether or not the Party whose conduct is at issue is a member thereof, or by any other person acting pursuant to the authority of any of the foregoing entities or organizations or (ii) engaged in or approved by a significant portion of the electric generation and transmission industry in the United States during the relevant time period with respect to similar facilities if in any case there are no acts, practices or methods required by clause (i) applicable at such time.
66. Except for periods during which the certificated facilities are unable to safely and reliably convey electrical energy to the New York power grid (e.g., because of problems with the certificated facilities, themselves, upstream electrical equipment, or the West 49th Street Substation) Bergen Unit 2 shall be exclusively connected to the New York City market over the certificated facilities for a period ending upon the last day of the summer capability period (as defined by the NYISO) next succeeding the fourth anniversary date of commercial operation of the certificated facilities.
67. For a period of five years after the last day of the period of exclusive connection set forth in condition 66, above, if no electric power is offered for sale into the NYISO control area over the Certificated Facilities for a period of more



than a year, the Commission may issue a show cause Order requiring the Certificate Holder to explain why power has not been offered for sale for such period, and specifying what, if any, action the Commission may be considering with respect to the Certificate and the basis for such action. The Certificate Holder shall have thirty days after issuance of such Order to respond, and other parties may file comments within such period. Thereafter, if the Commission is still considering action with respect to the Certificate, a hearing will be held prior to issuance of any final order of the Commission to amend the Certificate (if required by Public Service Law § 123 (2)), or to revoke or suspend the Certificate.

68. In the event that an equipment failure of the certificated facilities causes a significant reduction in the capability of the certificated facilities to deliver power, the Certificate Holder shall promptly provide to DPS Staff and Con Edison copies of all notices, filings, and other substantive written communications with the NYISO as to such reduction, any plans for making repairs to remedy the reduction, and the schedule for any such repairs. The Certificate Holder shall report monthly to the DPS Staff and Con Edison on the progress of any repairs. If such equipment failure is not completely repaired within nine months of its occurrence, the Certificate Holder shall provide a detailed report to the Commission within nine months and two weeks after the equipment failure setting forth the progress on the repairs and indicating whether the repairs will be completed within three months; if the repairs will not be completed within three months, the Certificate Holder shall explain the circumstances contributing to the delay and demonstrate why the repairs should continue to be pursued. A hearing will be held before the Commission takes any action to amend the Certificate (if required by Public Service Law § 123(2)), or to revoke or suspend the Certificate.
69. If, at any time after the expiration of the exclusive connection period set forth in condition 66, above, the Certificate Holder applies to the PJMISO for permission to interconnect Bergen Unit 2 to the PJMISO control area, the Certificate Holder shall provide notice of such application to DPS Staff, the NYISO, and Con Edison contemporaneously with the filing of such application with the PJMISO.

Dated: _____, 2004



CROSS HUDSON PROJECT

ENVIRONMENTAL MANAGEMENT AND CONSTRUCTION PLAN

ATTACHMENT B

List of Potentially Affected Upland Utility Companies and Other Interested Parties

**UTILITIES LOCATED IN MANHATTAN UPLAND SEGMENT
INCLUDING OWNERS KNOWN OR LIKELY TO HAVE UTILITIES**

Utility Owner	Contact Information
NYC Water Mr. Vincent J. Soriano Chief, Central Mapping and Records Bureau of Water and Sewer Operations 59-17 Junction Boulevard Corona, NY 11368-5107	718-595-5755 (voice)
NYC Sewer Mr. Simon Gelin Bureau of Water and Sewer Operations Department of Sewer Records 40 Worth Street Room 336 New York, NY 10013-2904	212-442-1904 (voice)
CABLEVISION OF NYC Mr. Ed Lepinsky 500 Brush Ave. Bronx, NY 10465	718-861-7361 (voice) 718-597-3240 (fax) (e-mail)
CABLEVISION SYSTEMS (HAUPPAUGE) Ms. Yvette Lectora 1600 Motor Pkwy. Hauppauge, NY 11788	631-348-6800 (voice) 631-582-5631 (fax)
CON EDISON COMMUNICATIONS LLC Mr. Matt Mahony 29-76 Northern Blvd., 5th Fl. Long Island City, NY 11101	718-752-7523 (voice) 509-267-3499 (fax) mahonym@electricfiber.com (e-mail)
CONSOLIDATED EDISON OF NEW YORK Mr. John Zizolfo 118-29 Queens Blvd.-G3 Forest Hills, NY 11375	718-275-3135 (voice) 718-275-3664 (fax) zizolfoj@coned.com (e-mail)

**UTILITIES LOCATED IN MANHATTAN UPLAND SEGMENT
INCLUDING OWNERS KNOWN OR LIKELY TO HAVE UTILITIES**

Utility Owner	Contact Information
DOMINION TELECOM, INC. Mr. Edward A. Palombo 625 Liberty Ave. Pittsburgh, PA 15222	412-690-4712 (voice) 412-690-4777 (fax) epalombo@dom.com (e-mail)
EMPIRE CITY SUBWAY Mr. Kurt Findeisen 50 Varick St., Rm. 507 New York, NY 10014	877-327-7753 (voice) 212-941-5827 (fax) kurt.w.findeisen@verizon.com (e-mail)
GENUITY SOLUTIONS INC. Mr. Steven Cole 175 N. College Ave. Indianapolis, IN 46202	317-488-2389 (voice) 317-633-4824 (fax)
GEOLOGIC SERVICES CORP. Mr. Daniel Canavan Corporate Drive, Suite 201 Bohemia, NY 11716	631-218-0612 x212 (voice) 631-218-0787 (fax) canavan@ny.gsc-global.com (e-mail)
GLOBAL CROSSING, LTD. Mr. John Wilson 33 Precision Dr. Shirley, NY 11967	631-205-3909 (voice) 631-205-3986 (fax) jawilson@globalcrossing.com (e-mail)
GUIDE DOG FOUNDATION FOR THE BLIND Mr. Wells Jones 371 East Jericho Tpke. Smithtown, NY 11787	631-265-2121 (voice) 631-361-5192 (fax) Wells@GuideDog.org (e-mail)
IROQUOIS GAS TRANSMISSION Mr. Don Moore One Corporate Dr., Suite 600 Shelton, CT 06484	203-925-7224 (voice) 203-925-7213 (fax)

**UTILITIES LOCATED IN MANHATTAN UPLAND SEGMENT
INCLUDING OWNERS KNOWN OR LIKELY TO HAVE UTILITIES**

Utility Owner	Contact Information
KEYSPAN COMMUNICATIONS CORP. Mr. Patrick Boyle 1377 Motor Pkwy., Suite 208 Islandia, NY 11749	631-300-3723 (voice) 631-300-3702 (fax) pboyle@keyspanservices.com (e-mail)
KEYSPAN ENERGY DELIVERY Mr. Eric Zweier 287 Maspeth Ave. Brooklyn, NY 11211	718-963-5515 (voice) 718-388-4029 (fax) ezweier@keyspanenergy.com (e-mail)
LEVEL 3 COMMUNICATIONS, LLC Ms. Krista Shoe 1025 Eldorado Blvd., Bldg. 13C Broomfield, CO 80021	720-888-3100 (voice) 720-888-3303 (fax) krista.shoe@level3.com (e-mail)
MCI/WORLDCOM Ms. Joyce Flachmeier 2250 Lakeside Blvd. Richardson, TX 75082	729-5805 (voice) 972-729-6240 (fax) Joyce.flachmeier@mci.com
NEW YORK STATE UNIFIED COURT SYSTEM Mr. Christopher Grimaldi 25 Beaver St., 9th Fl. New York, NY 10004	212-428-2554 (voice) 212-401-9021 (fax) cgrimaldi@courts.state.ny.us (e-mail)
NEW YORK WATER SERVICE CORP. Mr. Michael Kane 60 Brooklyn Ave. Merrick, NY 11566	516-378-3922 ext. 304 (voice) 516-378-6030 (fax)
PORT AUTHORITY OF NY & NJ Mr. James Kozo 241 Erie St., Rm. 236 Jersey City, NJ 07310	201-595-4839 (voice) 201-595-4837 (fax)

**UTILITIES LOCATED IN MANHATTAN UPLAND SEGMENT
INCLUDING OWNERS KNOWN OR LIKELY TO HAVE UTILITIES**

Utility Owner	Contact Information
QWEST COMMUNICATIONS INTERNATIONAL Ms. Beth McLaurin 555 17th St., 9th Fl. Denver, CO 80202	800-283-4237 (voice) 303-291-1729 (fax) Beth.MacLaurin@qwest.com
RCN TELECOM SERVICES OF NEW YORK, INC. Mr. Mike Barone 52-35 74th St. Elmhurst, NY 11373	718-552-9770 (voice) 718-552-9767 (fax)
SIAC Mr. Don Sobel 2 Metrotech Center, 9th Fl. Brooklyn, NY 11201	212-383-7082 (voice) 212-335-0420 (fax) 212-336-9649 (alt. fax)
TCG (TELEPORT) Lloyd MCGown 301 W. Whaley St., Rm 403 Longview, TX 75601	
TELEPLEX COIN COMM, INC. Mr. Alan Rothenstreich 11 Hubert St. New York, NY 10013	212-965-8800 ext. 234 (voice) 212-965-9889 (fax) a.rothenstreich@tccteleplex.com (e-mail)
TEXAS EASTERN GAS PIPELINE Mr. Tim Vaughan 501 Coolidge St. South Plainfield, NJ 07080	908-757-1212 ext. 214 (voice) 908-756-0695 (fax) tevaughan@duke-energy.com (e-mail)

**UTILITIES LOCATED IN MANHATTAN UPLAND SEGMENT
INCLUDING OWNERS KNOWN OR LIKELY TO HAVE UTILITIES**

Utility Owner	Contact Information
TIME WARNER CABLE OF NEW YORK CITY Mr. William Bouyea 109-15 14th Ave. College Point, NY 11356	718-888-4254 (voice) 718-888-4200 (fax) william.bouyea@twcable.com (e-mail)
NORTO INDUSTRY Mr. Peter Miloski 586 Union Ave. Holtsville, NY 11742	631-475-5060 (voice) 631-475-5365 (fax)
VERIZON COMMUNICATIONS Roger Sampson 2203 McConnell Ct. Bellmore, NY 11710	516-785-5860 (voice) 516-785-7991 (fax) roger.e.sampson@verizon.com
WILLIAMS GAS PIPELINES/TRANSCO Mr. Mark Sacchetti 99 Farber Rd. Princeton, NJ 08540	609-936-2421 (voice) 609-936-2430 (fax) Mark.A.Sacchetti@Williams.com (e-mail)
New York City, Economic Development Corporation Mr. Tom Simpson 110 Williams Street NY, NY 10038	(212) 312-4241 (voice) (212) 312-3915 (fax) tsimpson@nycedc.com (e-mail)
Hudson River Parks Trust Ms. Connie Fishman Pier 40, West St @ W. Houston St New York, NY 10014	(212) 627-2020 (voice) (212) 627-2021 (fax) cfishman@hrpt.state.ny.us (e-mail)
NY State Dept of Transportation, Region 11 Mr. Mike Anderson 21 South End Avenue NY, NY 10280-1044	(212) 267-4113 (voice) (212) 267-4114 (fax) manderson@dot.state.ny.us (e-mail)

**UTILITIES LOCATED IN MANHATTAN UPLAND SEGMENT
INCLUDING OWNERS KNOWN OR LIKELY TO HAVE UTILITIES**

Utility Owner	Contact Information
NY City Dept of Transportation Mr. David Jehn 40 Worth St - 9th Floor South NY, NY 10013	(212) 442-8048 (voice) (212) 442-8070 (fax) djehn@dot.nyc.gov (e-mail)
FDNY: Pat McNally, Chief of Operations - FDNY, 9 MetroTech Center, Brooklyn, NY 11201. Also, call Paul Geoghean to ensure Manhattan coordination: 718-855-8571.	NYPD: Inspector McCarthy: 718-706-6062. Traffic Management Center- NYPD, Room G2, 28-11 Queens Plaza North, Long Island City, NY 11101.

CROSS HUDSON PROJECT

ENVIRONMENTAL MANAGEMENT AND CONSTRUCTION PLAN

ATTACHMENT C

Soil Erosion and Sediment Control Plan

Prepared for:
Cross Hudson Corporation



SOIL EROSION AND SEDIMENT CONTROL PLAN

Cross Hudson Project

Manhattan, New York

Confidential

ENSR Corporation
August 1, 2007
Document No.: 10923-012-100

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
1.0 INTRODUCTION/PROJECT DESCRIPTION.....	1
2.0 SITE DESCRIPTION.....	2
2.1 Existing Conditions	2
3.0 STORMWATER CONTROLS.....	3
3.1 Erosion and Sediment Control.....	4
3.2 Stabilization Measures.....	5
3.3 Dust Control.....	7
3.4 Structural Practices.....	8
3.5 Non-Storm Water Discharges.....	9
4.0 OTHER CONTROLS.....	10
4.1 Good Housekeeping/Material Management	10
4.2 Waste Disposal.....	10
4.3 Hazardous Products.....	11
4.4 Contaminated Soils.....	12
4.5 Concrete Trucks	12
4.6 Minimizing Offsite Vehicle Tracking Of Sediments	12
4.7 Petroleum Products	13
4.8 Spills	13
5.0 TIMING OF CONTROLS AND MEASURES	14
6.0 MAINTENANCE AND INSPECTION PROCEDURES.....	15
6.1 Erosion and Sediment Control Inspection and Maintenance Practices	15

FIGURES

Figure 1-1	Site Plan
Figure 3-1	Erosion & Sedimentation Control – Typical Silt Fence Detail
Figure 3-2	Erosion & Sedimentation Control – Typical Hay bale Detail
Figure 3-3	Erosion & Sedimentation Control – Typical Drain Inlet Detail

1.0 INTRODUCTION/PROJECT DESCRIPTION

The Cross Hudson Project involves the construction of a 670 MVA, 345-kV AC electric generator lead connecting the Bergen Generating Station in Ridgefield, New Jersey to the Consolidated Edison ("ConEd") West 49th Street Substation in New York City. The Cable System will be composed of one (1) underground Alternating Current ("AC") circuit that will originate at the Bergen Generating Station. The Project consists of installing cables along a corridor approximately 8 miles in length, of which approximately 3.5 miles will be located on land in New Jersey, 4.0 miles beneath the Hudson River, and 0.5 miles in New York City ("NYC").

The Manhattan Segment includes that portion of the Project between the ConEd West 49th Street Substation connection and the temporary cofferdam at the end of the HDD borehole. The cable system will be composed of Self-Contained Fluid Filled ("SCFF") cable installed in underground conduits and duct banks. Using site-appropriate construction techniques, including HDD and conventional trench and cover techniques, the cable system will be installed between the temporary cofferdam to the ConEd West 49th Street Substation.

Stormwater may be generated during precipitation events or as a result of water used to control fugitive dust generation. During construction, stormwater from the construction site will be filtered through erosion/sedimentation controls that will be installed around the affected areas of the site and allowed to dissipate into the underlying or surrounding soils or discharge to storm drains.

Pursuant to the Clean Water Act, stormwater discharges from certain construction activities are unlawful unless they are authorized by a National Pollutant Discharge Elimination System ("NPDES") permit or by a state permit program. New York's State Pollutant Discharge Elimination System ("SPDES") is a NPDES-approved program. A SPDES general permit may be used for construction activities involving soil disturbances of between one and five acres. Discharges of pollutants to other waters of New York State, such as groundwater, are also unlawful unless they are authorized by a SPDES permit. Coverage under a general permit may be obtained by submitting a Notice of Intent ("NOI") to NYSDEC.

Based on the route selected for the Manhattan Upland Segment and the construction methodology that will be used, the area of disturbance from where the cable makes landfall in Manhattan to the ConEd West 49th Street Substation will be less than 1 acre. Since the Manhattan Segment construction activities including clearing, grading, and excavating result in land disturbance of less than one acre, the Project is not subject to the provisions of New York's State Pollutant Discharge Elimination System Regulations and is not required to file a NOI for coverage under the SPDES General Permit for Stormwater Discharges from Construction Activity. Furthermore, NYSDEC indicated in the Article VII Certificate that they did not believe that the Project would require a SPDES Permit.

Although, not subject to the provisions of New York's State Pollutant Discharge Elimination System Regulations, CHC prepared this plan in accordance with NYSDEC's technical standards for erosion and sediment controls as detailed in the *"New York Standards and Specifications for Erosion and Sediment Control"* to assure compliance with the state's water quality standards.

2.0 SITE DESCRIPTION

- 1. Name of construction site:** Cross Hudson Project
Construction of a 670 MVA, 345 kV AC electric generator lead
- 2. Site Area:** < 1 acre disturbed area
- 3. Location of construction site:** Manhattan
- 4. Storm water runoff flow prediction:** Refer to Figure 1-1
- 5. Receiving water(s):** Hudson River

Figure 1-1 provides a site plan for the area that will be affected by the construction of the Manhattan Segment, including the location of storm drains.

2.1 Existing Conditions

This section describes the existing topography, soils, and groundwater along the Manhattan Segment.

Topography

The cable system will make landfall in New York City between Piers 94 and 95. The proposed cable route will be located approximately equidistant from the southerly side of Pier 95 and the northerly side of Pier 94 to allow for a proper alignment into the proposed splicing chamber. The Manhattan Segment Project Area generally consists of developed properties with impervious surfaces.

The Project Area elevations in NYC range from approximately eight feet North American Vertical Datum 1988 (NAVD88) where the cable makes landfall to approximately 20 feet NAVD88 in the vicinity of the ConEd West 49th Street Substation. At the location where the splicing chamber will be constructed, elevations range from approximately 13-20 feet NAVD88. Along the upland cable route between the splicing chamber and the ConEd West 49th Street substation, elevations range between approximately 16-20 feet NAVD88.

Soils and Sediments

Most New York City soils are anthropogenic (have been altered by man-made activities), and the shorelines have been modified extensively by filling. These conditions are expected in the upland Project Area, which is presently covered with pavement and buildings.

Groundwater

Groundwater within the Manhattan Segment is classified by NYSDEC as GA, which is the classification for fresh groundwater (6 NYCRR, Chapter X, § 701.15). The best usage of Class GA waters is a source of potable water supply. However, because all fresh groundwater of the state are classified GA, this classification is not an indicator of site-specific water quality. Groundwater on the island of Manhattan is not used for water supply purposes, and no significant unconsolidated aquifers have been identified (USGS, 1988). New York City's potable water is supplied from the Croton and Catskill/Delaware systems in upstate New York (NYCDEP, 2001).

Although the potential for groundwater contamination exists due to previous land use, it is not expected that groundwater contamination will be an issue during construction activities along the Manhattan Segment.

3.0 STORMWATER CONTROLS

No wetlands or other waters of the United States (other than the Hudson River) are located along the Manhattan Segment. However, erosion and sedimentation controls will be installed prior to the commencement of construction activities around affected portions of the Project area (in impermeable areas) and around catch basins along the proposed cable route.

Tracking of sediments off-site by construction equipment and delivery vehicles, and the generation of dust shall be minimized at all times by staging equipment and vehicles on asphalt and concrete surfaces. Based on observations of the site conditions, made by the project team, sprinkler systems or street sweepers will be employed, if needed, to minimize dust generation.

The construction technique is to excavate soils and place them directly into trucks/disposal containers, to avoid on site stockpiling. When necessary, excavated soil will be stored along the site in designated locations. Storage containment areas will be arranged to store soils excavated from trenches along the cable route or from the Splicing Chamber. Storage containment areas will consist of a perimeter ring of filter media to filter any groundwater or precipitation and contain sediment draining from the excavated soils until the soils are either reused as backfill or removed for disposal by the Contractor to a NYSDEC approved disposal area.

If necessary, a storage containment area to store soils excavated to form the HDD pit will be arranged. The storage containment area will be constructed in the same manner described above to filter any groundwater or precipitation and contain sediment draining from the excavated soils until the soils are either reused as backfill for closing the HDD pit, or removed for disposal by the Contractor. During the execution of the HDD, the soil and rock that is cut at the advancing face of the bore and pumped back to the mud plant will be screened from the drilling fluid and deposited directly into disposal containers. Once the soil and rock is removed from the drilling fluid, it is pumped directly from the mud plant to the drilling rig to be re-used. The drilling fluid does not leave the closed circuit established between the drilling rig and the mud plant during the drilling operation. Drilling fluid will come back to the HDD pit during the pull back of the conduits, it will be contained in the pit and pumped to disposal containers as the pull back of the conduits progresses. A perimeter ring of filter fabric will be installed around the HDD area to contain any sediment that may flow as a result of the operation of the mud plant or the drilling rig. The Contractor will locate off-site receivers for all unusable excavated materials from all excavations. The following sections describe proposed erosion and sediment controls that may be used at the site.

3.1 Erosion and Sediment Control

The soil erosion and sediment control portion of this Storm Water Pollution Prevention Plan will:

- Minimize the amount of disturbed soil;
- Control runoff from offsite areas from flowing across disturbed areas;
- Slow down the runoff flowing across the site;
- Minimize sediment in onsite runoff before it leaves the site; and
- Meet or exceed local or State requirements for sediment and erosion control plans.

Minimize The Amount Of Disturbed Soil

Most work takes place in impermeable surfaces (paved areas) therefore land disturbance is limited to the excavated areas (trench and pits). This enables the Contractor to minimize the amount of disturbed soil on the construction site and decreases the amount of soil that may potentially erode from the site, and the amount of controls constructed to remove the sediment from the runoff. Furthermore, since the construction project will occur over a controlled area, the project will be staged so that only a small portion of the site will be disturbed at any one time. Phased construction over impermeable surfaces helps to lessen the risk of erosion by minimizing the amount of disturbed soil that is exposed at any one time.

3.2 Stabilization Measures

The total area not covered by an impermeable surface is less than one tenth of an acre and is limited to raised planters along the road way. However, preserving existing vegetation or revegetating disturbed soil as soon as possible after construction is the most effective way to control erosion and will be employed. Vegetation cover will reduce erosion potential by:

- Shielding the soil surface from the direct erosive impact of raindrops;
- Improving the soil's water storage porosity and capacity so more water can infiltrate into the ground;
- Slowing the runoff and allowing the sediment to drop out or deposit; and
- Physically holding the soil in place with plant roots.

Vegetative and other site stabilization practices shall include both temporary and permanent controls. Temporary controls will provide cover for exposed or disturbed areas for short periods of time until permanent erosion controls are put in place. Permanent vegetative practices shall be used when soil-disturbing activities are completed. Both temporary and permanent erosion control practices are discussed in detail below.

Temporary Seeding

The current construction technique does not envision the need for temporary seeding because there are limited permeable surfaces, however if permeable surfaces are disturbed the contractor may employ temporary seeding. Temporary seeding reduces erosion and sedimentation by stabilizing disturbed areas that will not be stabilized for long periods of time, where permanent plant growth is not necessary or appropriate for disturbed areas with a higher likelihood of erosion. This practice uses fast growing grasses whose root systems hold down the soils so that they are less apt to be carried offsite by storm water runoff or wind. Temporary seeding also reduces the problems associated with mud and dust from bare soil surfaces during construction.

Temporary seeding shall be performed on permeable surfaces that have been disturbed by construction and which are likely to be redisturbed, but not for several weeks or more. Typical areas might include denuded areas, soil stockpiles, dikes, dams, sides of sediment basins, and temporary road banks. Based on the anticipated schedule of construction activities, the project team will jointly determine areas that must be temporarily reseeded and will develop a temporary seeding schedule. Generally, temporary seeding will take place as soon as practicable after the last land disturbing activity in an area, as allowed by weather conditions.

Mulching

The current construction technique does not envision the need for mulching because there are limited permeable surfaces, however if permeable surfaces are disturbed the contractor may employ mulching. Mulching is a temporary soil stabilization or erosion control practice where materials such as grass, hay, woodchips, wood fibers, straw, or gravel/stone are placed on the soil surface. In addition to stabilizing soils, mulching can reduce the speed of storm water runoff over an area. When used together with seeding or planting, mulching can aid in plant growth by holding the seeds, fertilizer, and topsoil in place, by helping to retain moisture, and by insulating against extreme temperatures.

Permanent Seeding And Planting

Construction techniques will include replacement of existing planters (structures and planting) to equal or better than previous conditions. Permanent seeding of planters provides stabilization to the soil by holding soil particles in place. Vegetation reduces sediments and runoff to downstream areas by slowing the velocity of runoff and permitting greater infiltration of the runoff. Vegetation also filters sediments, helps the soil absorb water, improves wildlife habitats, and enhances the aesthetics of a site. Permanent seeding and planting will be employed for the existing permeable surfaces where long-lived plant cover is desired.

Preservation Of Natural Vegetation

The preservation of natural vegetation preserves stabilized areas, minimizes erosion potential, protects water quality, and provides aesthetic benefits. This practice is used as a permanent control measure and is applicable to all types of sites. Areas where preserving vegetation can be particularly beneficial are floodplains, wetlands, stream banks, steep slopes, and other areas where erosion controls would be difficult to establish, install, or maintain.

Preservation of vegetation on a site should be planned before any site disturbance begins. Preservation requires good site management to minimize the impact of construction activities on existing vegetation. Trees to be preserved must be marked and protected from ground disturbances around the base of the tree. Proper maintenance is important to ensure healthy vegetation that can control erosion.

Due to the nature of construction activities and site conditions, it is not expected that temporary erosion/sediment control measures will be required. However, it is possible that soil removed from excavations will need to be stored on site for short periods of time. In the event that excavated soil becomes an issue, the Contractor will be responsible for minimizing erosion by covering or wetting exposed soil stockpiles, if necessary. Excavated soils that are not reused on site will be removed

from the site, in accordance with state and local regulations. Permanent erosion control measures consist of resurfacing the impervious surface to match the existing surface.

To minimize erosion and sedimentation in those areas that are not covered by an impervious surface, the Contractor will remove as little existing topsoil as possible. Furthermore, all site controls will be in place before the topsoil is removed. If topsoil is brought in from another site, the type of soil used will be compatible with the subsoil onsite. Any topsoil that is stockpiled onsite will not obstruct other operations. The contractor will employ some form of temporary control, including seeding, mulching, and the installation of silt fencing to prevent or control erosion and dust generation. Permanent controls will consist of restoration of vegetation with native cover to match pre-construction conditions.

3.3 Dust Control

Wind is capable of causing erosion, particularly during dry periods. Wind erosion can occur wherever the surface soil is loose and dry, vegetation is sparse or absent, and the wind is sufficiently strong. Wind erodes soils and transports the sediments offsite, where they may be washed into the receiving water by subsequent precipitation. Therefore, various methods of dust control will be employed to prevent dust from being carried away from the construction site, including:

- Vegetation Cover - For disturbed permeable areas not subject to traffic, vegetation provides the most practical method of dust control;
- Mulch, including gravel/stone - When properly applied, mulch offers a fast, effective means of controlling dust;
- Water Sprinkling – Affected portions of the site may be sprinkled until the surface is wet. Sprinkling is especially effective for dust control in open excavations and traffic routes;
- Stone - Used to stabilize construction roads and as an effective dust control measure; and

The Contractor will be responsible for implementing dust controls, as necessary, to minimize any offsite impacts. The construction area consists predominantly of impervious surfaces, use of street sweepers and water sprinkling will be the most practical temporary dust control measures. The project team will observe site characteristics and conditions to determine the likelihood of dust generation and the most feasible dust control measure that should be implemented. Permanent controls will include restoration of vegetation with native cover to pre-construction conditions.

3.4 Structural Practices

Structural practices used in sediment and erosion control divert storm water flows away from exposed areas, convey runoff, prevent sediments from moving offsite, and can also reduce the erosive forces of runoff waters. Construction techniques in Manhattan do not consider the use of silt fences, hay bales and jersey barriers along the route because all the areas are paved. There are two primary areas that require sediment control: stock piles of soils and inlets. Construction techniques will include placement of filtering media around stockpiles and inlets to preclude sediment migration. The controls can either be used as permanent or temporary measures. Practices to be employed include the following:

- Silt Fence/Hay bales;
- Silt Fence/Jersey barriers; and
- Storm Drain Inlet Protection.

Silt Fence/Hay bales

Construction techniques do not include the use of silt fences because most areas are paved. However if the project team determines that a silt fence is appropriate it will be installed where needed. A silt fence (or filter fence) is a temporary sedimentation control measure that consists of posts with filter fabric stretched across the posts or a wire support fence. The lower edge of the fence is vertically trenched and covered by backfill. Silt fences are most effective where there is overland flow (i.e., runoff that flows over the surface of the ground as a thin, even layer). Silt fences may also be used to catch wind blown soil. Hay bales are used in the same manner and serve the same purpose. Both silt fences and hay bales work best in areas that have an adequate layer of topsoil (approximately 5-10 inches) in which the control can be securely anchored.

In those disturbed areas that are not characterized by 5-10 inches of soil, hay bales can be anchored with rebar, instead of wood stakes. Alternatively, hay bales can be replaced with Jersey barriers with silt fence, which do not require staking or anchoring.

Any silt fences, hay bales, and Jersey barriers required by the project team will be installed prior to major soil disturbance in the Project area. Silt fences/hay bales will be placed across the bottom of a slope along a line of uniform elevation (perpendicular to the direction of flow) at the outer boundary of the work area. Silt fences and hay bales do not have to surround the work area completely to be effective. Silt fences and hay bales may be used in combination with each other or other erosion and sediment practices.

Refer to Figures 3-1 and 3-2 for schematic drawings of typical erosion and sedimentation control measures.

Storm Drain Inlet Protection

Storm drain inlet protection is a filtering measure placed in or around any inlet or drain to trap sediment and prevent sediment from entering inlet structures. Additionally, it serves to prevent silting of inlets, storm drainage systems, or receiving channels. Inlet protection may be composed of filter fabric, hay bales or silt sacks.

Installation of inlet protection measures will take place before any soil disturbance in the Project area. The type of material used will depend on site conditions and the size of the drainage area. Inlet protection may be used in combination with other measures, such as silt fences, to provide more effective sediment removal. Refer to Figure 3-3 for a schematic drawing of typical drain inlet erosion and sedimentation control measures.

The Contractor will be responsible for implementing structural controls prior to commencement of construction activities. Structural controls may include, stockpiling excavated soils in bermed containment areas, installation of filter media around exposed soils and installation of storm drain inlet protection in or around storm drain inlets located around the construction area. Storm drain inlet protection will be compatible with the type of surface present around each storm drain inlet and will preclude traffic impacts. Storm drain inlets affected by construction activities will be inspected on a weekly basis and before predicted rain events to confirm the integrity of structural controls. If deficiencies are found, they will be corrected as soon as possible.

3.5 Non-Storm Water Discharges

The following non-storm water discharges may occur from the site during the construction period:

- Water from hoses or sprinklers;
- Pavement wash waters (where no spills or leaks of toxic or hazardous materials have occurred); and
- Uncontaminated groundwater (from dewatering activities).

During excavation and trenching operations, groundwater may be encountered. Previous subsurface investigations indicate that the depth to groundwater is generally less than 10 feet below grade, and excavation is anticipated to be approximately 4-8 feet below grade. Should groundwater be encountered, dewatering procedures have been developed.

Groundwater dewatering, collection, and discharge procedures must be performed in accordance with applicable regulations and permit conditions.

Any groundwater that is not collected will be discharged to storm drains. In the event that groundwater is discharged to the storm drains, it will be treated in the same manner as stormwater. Prior to pumping and discharging groundwater, the Contractor will implement the appropriate structural controls.

4.0 OTHER CONTROLS

In addition to stormwater controls discussed in Section 3.0, the Contractor will be responsible for implementing additional controls designed to minimize contamination of stormwater due to construction activities. Potential controls are discussed in the remainder of this section.

4.1 Good Housekeeping/Material Management

The Contractor will be responsible for maintaining the Project area in a neat and orderly condition and minimizing exposure to stormwater. Good housekeeping measures that will be employed include:

- Neat and orderly storage of any chemicals and fuels that are stored at the site;
- Providing receptacles and regular disposal of garbage, rubbish, construction waste, and sanitary waste;
- Prompt cleanup of any spills that have occurred (liquid or dry materials); and
- Cleanup of sediments that have been tracked by vehicles or have been transported by wind or storm water about the site or onto nearby roadways.

4.2 Waste Disposal

Construction projects such as the one proposed tend to generate construction wastes, which may include but are not limited to:

- Trees and shrubs removed during clearing phases of construction;
- Packaging materials, including wood, paper, plastic, etc.;
- Scrap or surplus building materials such as scrap metals, rubber, plastic and glass, masonry products, and other solid waste materials; and

- Materials resulting from the demolition of structures.

The Contractor will take the following steps to ensure proper disposal of construction wastes:

- Designate a waste collection area onsite;
- Provide an adequate number of containers with lids or covers that can be placed over the container prior to rainfall, if required;
- Locate containers in a covered area (if possible);
- Arrange for waste collection before containers overflow;
- If a container does spill, provide cleanup immediately;
- Plan for additional containers and more frequent pickups during the demolition operations; and
- Ensure that construction waste is collected, removed, and disposed of only at authorized disposal areas.

The project team will perform daily walkthroughs of the site to verify compliance with waste disposal measures. The project team will also use these daily walkthroughs to perform other inspections documented in the EM&CP, as required.

4.3 Hazardous Products

Construction projects such as the one proposed may also generate hazardous wastes, including:

- Paints;
- Cleaning solvents; and
- Concrete curing compounds and additives.

The Contractor will be responsible for maintaining MSDS for all hazardous materials at the Project area and following the manufacturers' recommendations. The Contractor will store all hazardous materials in the appropriate containers such that their exposure to stormwater is minimized. Any hazardous waste will be stored in a designated location in accordance with applicable regulations and disposed of in accordance with state and federal hazardous waste regulations. Furthermore, the Contractor will maintain an adequate supply of spill response equipment to contain and clean up spills of hazardous materials in the areas where these materials are stored or used and will contain and clean up spills immediately after they occur.

4.4 Contaminated Soils

Contaminated soils may be encountered onsite during earthmoving activities or during the cleanup of a spill or leak of a hazardous product. Material storage areas may also have been contaminated by undetected spills. The nature of the contaminants may or may not be known.

The construction technique will consider the in-situ classification of soils prior to excavation to plan for proper reuse or disposal. This will preclude the placement of unknown contaminated soils in stockpiles. The Contractor may store excavated soil in containment areas bordered by a filtering media to filter groundwater or precipitation and contain sediment draining from the excavated soils until the soils are either reused as backfill or removed for disposal by the Contractor.

4.5 Concrete Trucks

Emptying excess concrete or washing concrete trucks may be allowed onsite. However, concrete trucks will be strictly prohibited from performing these activities outside of designated washout containment areas. The Contractor will be responsible for ensuring that concrete trucks are washed in designated areas only and excess concrete and wash water are disposed of in a manner that prevents contact between these materials and storm water. Collected wash water would be filtered prior to being discharged to stormwater drains. Excess concrete could be disposed of in another centralized, bermed location and remain there until cured, at which time it may be properly disposed of.

4.6 Minimizing Offsite Vehicle Tracking Of Sediments

Sediment may be tracked off site by vehicular traffic driving over unpaved portions of the site. The Contractor will be responsible for implementing the measures listed below to control offsite tracking of sediments when there is vehicle traffic at the construction site:

- Construction equipment and vehicles will be placed on paved surfaces (where possible);
- Stabilizing permeable areas (i.e., gravel cover) to reduce offsite tracking of mud and dirt;
- Sweeping paved streets adjacent to the site to remove any excess mud, dirt, or rock tracked from the site;
- Scheduling deliveries or other traffic at a time when personnel are available to provide cleanup if it is required; and

4.7 Petroleum Products

Oil, gasoline, lubricants, and asphaltic substances are classified as petroleum products. The Contractor must handle these materials carefully to minimize their exposure to storm water. Petroleum products usually occur in two site areas:

- Areas where road construction/paving is occurring; and
- Vehicle storage, maintenance and refueling areas.

The Contractor will be responsible for implementing the following practices to reduce stormwater contamination by petroleum products:

- Maintain an adequate supply of spill response equipment to contain and clean up petroleum spills in fuel storage areas or on board maintenance and fueling vehicles;
- Store petroleum products and fuel vehicles in properly demarcated areas;
- Contain and clean up petroleum spills immediately;
- Perform required preventive maintenance on all onsite equipment to prevent leakage (e.g., check for and fix gas or oil leaks in construction vehicles on a regular basis);
- Properly apply asphaltic substances (refer to manufacturer's instructions) to reduce the risk of stormwater contamination; and

4.8 Spills

The Contractor will be responsible for complying with the provisions of the Spill Prevention Plan (SPP) that was developed to:

- Stop the source of the spill;
- Contain the spill;
- Clean up the spill;
- Dispose of materials contaminated by the spill; and
- Identify and train personnel responsible for spill prevention and control.

In addition to the measures discussed in the SPP, the Contractor is responsible for complying with the following measures, as applicable:

- Store and handle materials to prevent spills;
- Tightly seal containers;
- Make sure all containers are clearly labeled; and
- Stack containers neatly and securely.
- Reduce storm water contact if there is a spill;
- Clearly post cleanup procedures;
- Maintain spill response equipment in an accessible location;
- Contain spills;
- Stop the source of the spill; and
- Remediate spills.
- Dispose of contaminated materials in accordance with state and local requirements;
- Identify personnel responsible for responding to a spill of toxic or hazardous materials;
- Provide personnel spill response training;
- Post names of spill response personnel; and
- Contract with a private firm that specializes in spill cleanup in the event a spill exceeds the capabilities of on-site personnel.

5.0 TIMING OF CONTROLS AND MEASURES

Construction activities for the installation of underground power transmission cables includes open trench excavation, laying and joining conduits, backfilling with fluidized thermal backfill and native earth, replacing topsoil or pavement, pulling cable through pipes between manholes, splicing the cables, and adding dielectric cooling fluid. Construction activity in the Manhattan Segment will include open trench excavation in primarily paved areas. Trench construction will commence with pavement cutting using typical water-cooled diamond or abrasive blade saws or pavement router cutters to score the pavement prior to its removal. Pavement removal will require use of pneumatic pavement breakers and hydraulic excavators. See the EM&CP for a detailed construction schedule for various activities.

It is expected that the Splicing Chamber and HDD pull pits will be excavated by simple open excavation methods using a combination of hydraulic track-mounted excavators, rubber-tired loaders and typical 10 to 40 cubic yard dump trucks. When necessary, excavated soil will be stored along the site in designated locations as described previously herein.

Erosion and sedimentation controls will be installed prior to the commencement of construction activities and inspected periodically and prior to and following major storm events.

Tracking of sediments off-site by construction equipment and delivery vehicles, and the generation of dust shall be minimized at all times as previously described herein.

6.0 MAINTENANCE AND INSPECTION PROCEDURES

6.1 Erosion and Sediment Control Inspection and Maintenance Practices

The Contractor will implement the following inspection and maintenance practices to maintain erosion and sediment controls:

- All control measures will be inspected at least once each week and prior to and following any storm event;
- All control measures will be maintained in good working order. If repairs are necessary, they will be initiated within 24 hours of report;
- Built up sediment will be removed from silt fence when it has reached one-third the height of the silt fence or hay bale;
- Silt fences will be inspected for depth of sediment, tears, to see if the fabric is securely attached to the fence posts, and to see that the fence posts are firmly in the ground. The effective life span for a silt fence depends upon the material of construction and maintenance. Areas where runoff eroded a channel beneath the fence, or where the fence was caused to sag or collapse by runoff flowing over the top will be noted and corrected;
- Inlet protection structures will be inspected at least once each week and following any storm event. Repairs and silt removal should be performed as necessary. Storm drain inlet protection structures should be removed only after the disturbed areas are completely stabilized;
- Sediment basins (if constructed) will be inspected for depth of sediment, and built up sediment will be removed when it reaches 10% of the design capacity or at the end of the job;
- Diversion dikes (if constructed) will be inspected and any breaches promptly repaired;
- Temporary and permanent seeding and plantings will be inspected for bare spots, washouts, and healthy growth;
- A maintenance inspection report will be made after each inspection;

- Personnel selected for inspection and maintenance responsibilities will receive training from the project team. They will be trained in all the inspection and maintenance practices necessary for keeping the erosion and sediment controls used onsite in good working order;
- Inspection and maintenance of all disturbed areas of the Project site and material storage areas on a regular basis; and
- Inspection of excavated soil stockpiles on a regular basis for signs of erosion.

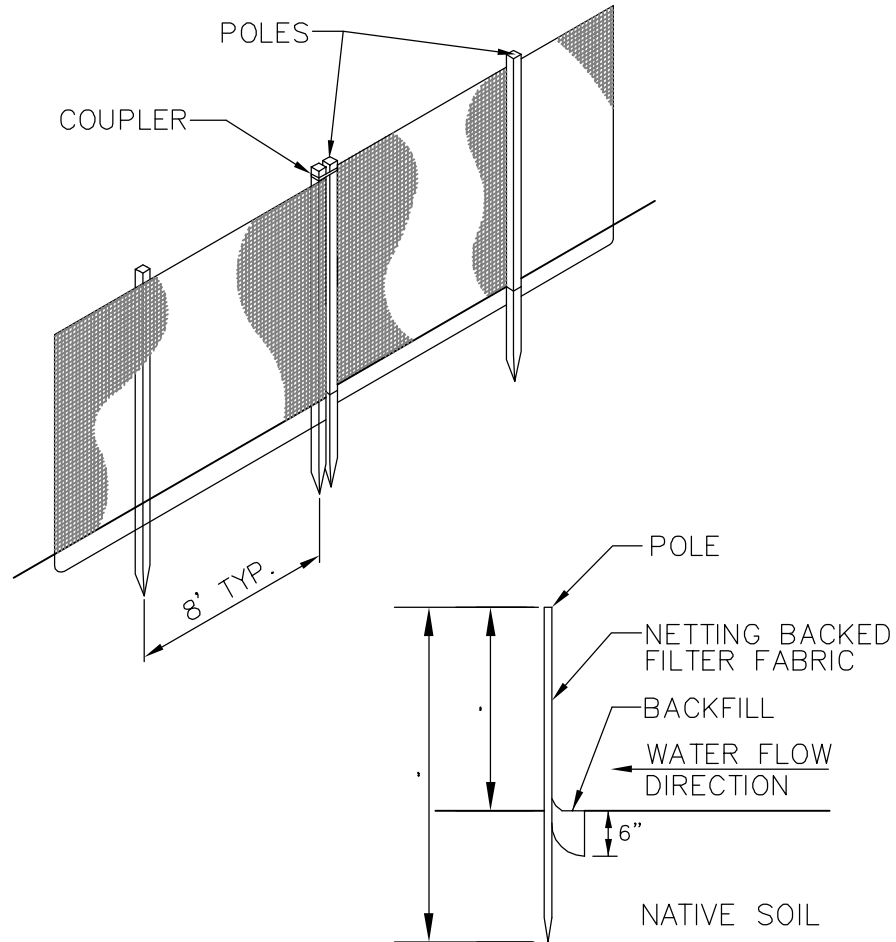
CROSS HUDSON CABLE PROJECT

SOIL EROSION AND SEDIMENT CONTROL PLAN

FIGURES

Redacted as Critical Infrastructure Information

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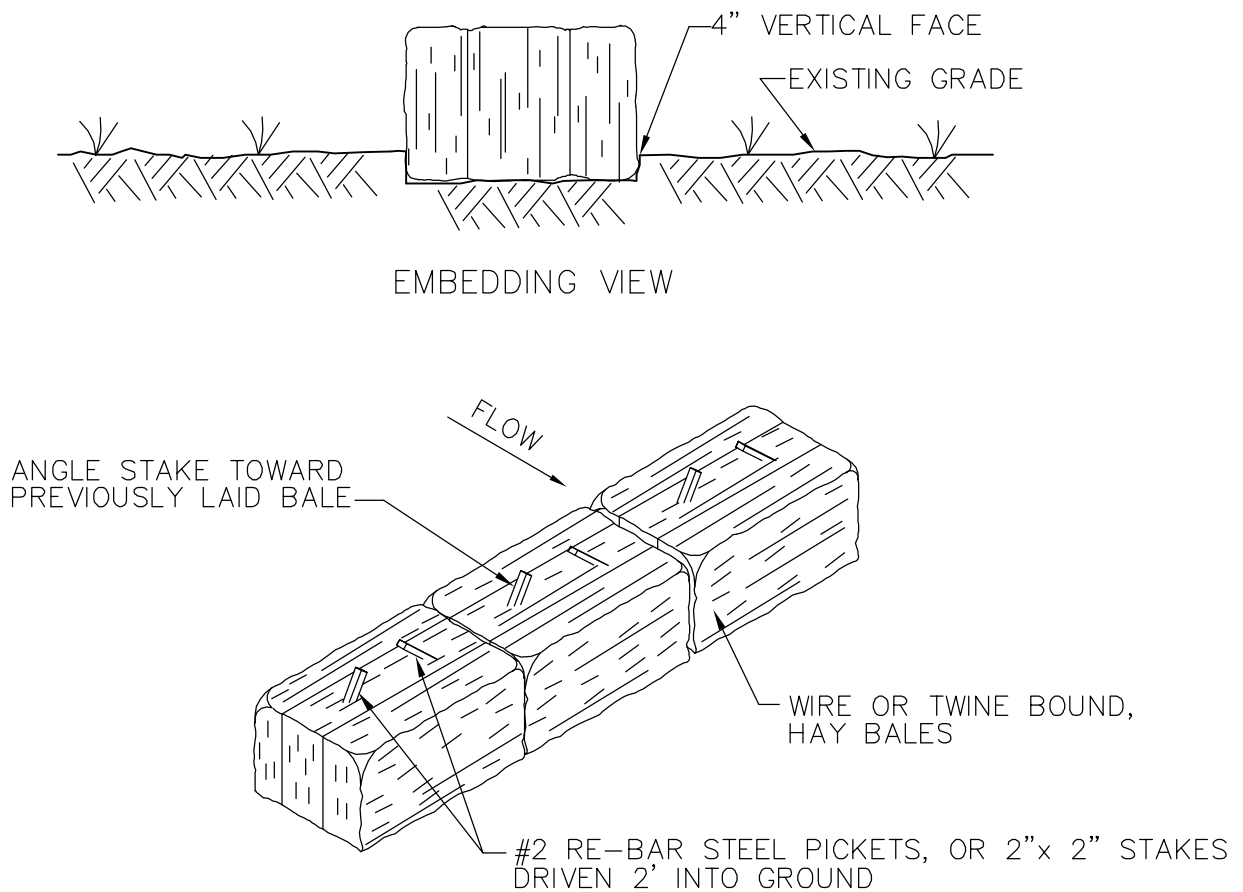
NOTES:

1. THE FILTER FABRIC MUST BE LOCATED ON THE UP-SLOPE SIDE OF THE FENCE.
2. THE BOTTOM 6" OF FILTER FABRIC MUST BE BURIED IN A PRE-EXCAVATED TRENCH WHICH WILL BE BACKFILLED, TAMPED AND SEEDED FOR STABILITY.

TYPICAL SILT FENCE DETAIL

N.T.S.

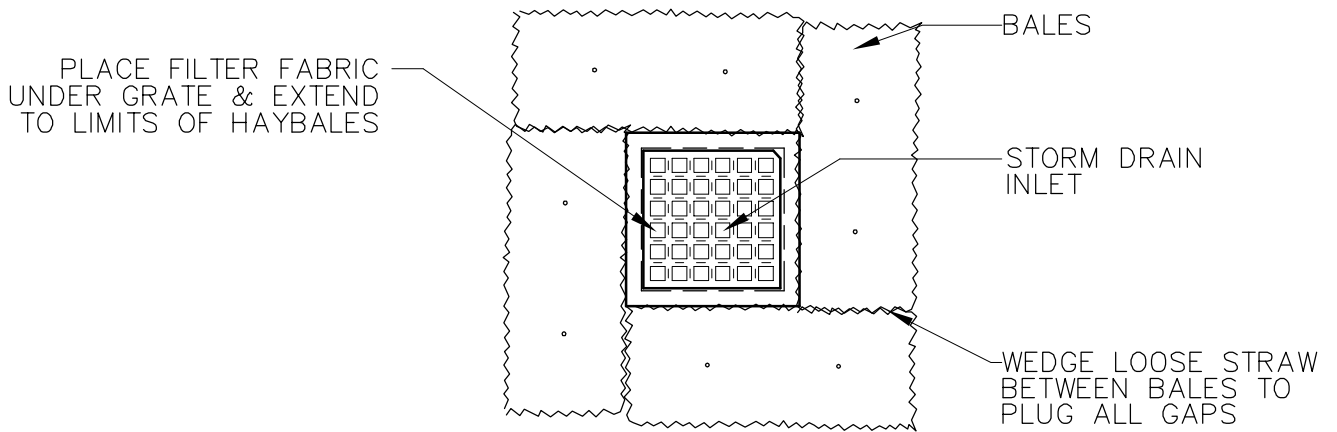
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TYPICAL HAYBALE DETAIL

N.T.S.

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HAYBALE EROSION CONTROL AT DRAIN INLETS

NTS

CROSS HUDSON PROJECT

ENVIRONMENTAL MANAGEMENT AND CONSTRUCTION PLAN

ATTACHMENT D

Spill Prevention Plan

Prepared for:
Cross Hudson Corporation

SPILL PREVENTION PLAN

Cross Hudson Project

Manhattan, New York

Confidential

ENSR Corporation
August 1, 2007
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TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
1.0 INTRODUCTION.....	1
2.0 SITE DESCRIPTION.....	1
3.0 FACILITY DRAINAGE AND MANAGEMENT OF RUNOFF.....	2
3.1 Topography.....	2
3.2 Surface Water.....	2
3.3 Direction of Flow.....	3
3.3.1 Upland Segment.....	3
3.3.2 Hudson River.....	3
4.0 OIL STORAGE OPERATIONS.....	3
4.1 Refueling Protocols.....	4
4.1.1 Land-Based Equipment.....	4
4.1.2 Marine Equipment.....	5
4.2 In-Process Use Oils.....	5
4.2.1 Cable Installation.....	6
5.0 LOADING/UNLOADING PROCEDURES.....	6
5.1 Bulk Fuel Transfer.....	7
5.2 Drum Transfers.....	8
6.0 INSPECTIONS AND RECORDS.....	8
7.0 SECURITY.....	9
8.0 PERSONNEL TRAINING.....	9
9.0 EMERGENCY RESPONSE.....	10
9.1 Emergency Equipment.....	10
9.2 Emergency Procedures.....	11
10.0 NOTIFICATIONS.....	13
10.1 Oral Notifications.....	13
10.2 Written Notifications.....	14

APPENDICES

Appendix A Sample Inspection and Reporting Forms & Spill Response Equipment

Appendix B	Sample SPP Training Outline
Appendix C	Tables
	Table 1-1 Emergency Contacts
	Table 4-1 Oil Source Summary
Appendix D	Site Plan Figure

DISCHARGE RESPONSE REPORTING - QUICK REFERENCE SUMMARY

1. Extinguish all sources of ignition.
2. Isolate incompatible or reactive chemical substances.
3. Isolate all potential environmental receptors including drains, sumps, soil, etc.
4. Determine if the discharge is incidental¹ or non-incidental²:
 - Discharges include, but are not limited to, any spilling, leaking, pumping, pouring, emitting, emptying, or dumping of oil that is not otherwise permitted under other programs.
 - For incidental discharges - attempt to stop or contain the discharge at the source without endangering yourself or others.
 - For non-incidental discharges - immediately report the discharge to the Cross Hudson representative.
5. Reporting to outside agencies – CHC representatives will conduct necessary reporting to outside agencies.
 - If a discharge of oil or hazardous material has entered the environment - report to New York State Department of Environmental Conservation (“NYSDEC”).
 - If a discharge migrates off of the construction site, report to the Local Fire Department.
 - If a discharge enters the sewer system, report to New York City Department of Environmental Protection.

¹ Based on guidance contained in the Spill Guidance Manual published by NYSDEC, **“Incidental”** discharge is defined as a discharge which meets ALL of the following criteria: 1) The quantity is known to be less than 5 gallons; 2) The discharge is contained and under the control of the facility; 3) The discharge has not and will not reach the state’s water or any land; 4) The discharge is cleaned up within 2 hours of discovery. A discharge is considered to have not impacted land if it occurs on a paved surface such as asphalt or concrete. A discharge in a dirt or gravel parking lot is considered to have impacted land and is reportable.

² **“Non-incidental”** discharges are those discharges that fail any of the above criteria for incidental discharge and any amount that impact environmental receptors. The Independent Inspector will conduct external notification and reporting as required to regulatory agencies and/or first-responders.

- If a discharge causes a sheen or discoloration of navigable waters or adjoining shorelines - report to the National Response Center ("NRC").
6. Recover material discharged and clean up discharge area.
 7. Decontaminate tools and equipment. Collect all rinsate and debris.
 8. Dispose of waste materials in accordance with all applicable regulations and Cross Hudson procedures.
 9. Cross Hudson representatives will conduct follow-up written notifications to applicable agencies.
 10. Cross Hudson representatives will coordinate an incident analysis with the involved parties to develop plans necessary to prevent recurrence.

1.0 INTRODUCTION

The Cross Hudson Project involves the construction of a 670 MVA, 345 kV AC electric generator lead connecting the Bergen Generating Station in Ridgefield, New Jersey to the Consolidated Edison (ConEd) West 49th Street Substation in New York City. The Cable System will be composed of one (1) underground Alternating Current ("AC") circuit that will originate at a 230-345 kV switchyard to be constructed at the Bergen Generating Station. The Project consists of installing cables along a corridor approximately 8 miles in length, of which approximately 3.5 miles will be located on land in New Jersey, 4.0 miles beneath the Hudson River, and 0.5 miles in New York City ("NYC").

The Manhattan Segment includes those portions of the Project between the West 49th Street Substation connection and the temporary cofferdam at the end of the HDD borehole. The cable system will be composed of Self-Contained Fluid Filled ("SCFF") cable installed in underground conduits and duct banks. Using site-appropriate construction techniques, the underground cable system will be installed along the indicated route between Bergen Generating Station and the Hudson River. The cable system in the Manhattan Segment consists of two components: a water component and a land component. The water component will be buried in the bed of the Hudson River within conduits installed by horizontal directional drilling ("HDD"), and will make landfall in New York City between Piers 94 and 95. The land component uses site-appropriate construction techniques, including HDD (where the land component meets the water component) and conventional trench and cover techniques, the cable system will be installed from the area where landfall is made to the ConEd West 49th Street Substation. In addition to the three main conductors, the system includes two fiber optic cables for monitoring, relaying, and communication purposes. The land installation will also include a distributed temperature sensor ("DTS").

This Spill Prevention Plan ("SPP") contains information pertaining to the prevention of spills, containment of spills, response and clean-up measures, and reporting procedures for the construction of the Manhattan Segment of the Cross Hudson Project.

2.0 SITE DESCRIPTION

- 1. Name of construction site:** Cross Hudson Project, Manhattan Segment
- 2. Type of construction site:** Construction of a 670 MVA, 345 kV AC electric generator lead
- 3. Location of construction site:** New York City (Manhattan), NY
- 4. Maximum oil storage/handling capacity:** Approximately 3,000 gallons
- 5. Normal daily oil capacity:** Varies (dependent on construction activities)
- 6. Name and title of person accountable for spill prevention, control and countermeasures at site:** Kiewit Construction Company, Project Manager Fred Hammel.

- 7. Spill History:** Historic spill information and soil and groundwater conditions are presented in the Environmental Management and Construction Plan ("EM&CP").
- 8. Storm water runoff flow prediction:** Refer to Appendix E
- 9. Sensitive receptor(s):** Hudson River

This SPP includes the oil containing equipment located at the Cross Hudson site that either stores or uses oil in quantities of 55 gallons or greater. Oil containing equipment located at the site that contains less than 55 gallons of oil (i.e., various pieces of machinery, portable containers, and tanks) is exempt from the requirements of this SPP. Table 4-1 contains a summary of all oil containing devices and storage containers that are subject to the provisions of this SPP.

Site plans were developed in accordance with the requirements of the SPP regulations. Appendix E provides a site plan for Cross Hudson that includes the locations of storm drains and site drainage (refer to Section 3.0 for a detailed discussion).

3.0 FACILITY DRAINAGE AND MANAGEMENT OF RUNOFF

3.1 Topography

The construction site is located on relatively flat terrain located in an urban setting. The majority of the construction will occur in developed, paved areas. The Hudson River is located to the west of the site. The site is not located in or around any wetland areas.

The cable system will make landfall in New York City between Piers 94 and 95. The Manhattan Segment Project Area generally consists of developed properties with impervious surfaces.

The Project Area elevations range from approximately 8 feet North American Vertical Datum 1998 (NAVD88) where the cable makes landfall to approximately 20 feet NAVD88 in the vicinity of the ConEd West 49th Street Substation. At the location where the Splicing Chamber will be constructed, elevations range from approximately 13-20 feet NAVD88. Along the upland cable route between the Splicing Chamber and the ConEd West 49th Street substation, elevations range between approximately 16-20 feet NAVD88.

3.2 Surface Water

The major surface water resource in the vicinity of the site is the Hudson River, which is located between 50 feet and 250 feet west of the western boundary of the site. The Hudson River flows in a southerly direction and empties into New York Harbor.

3.3 Direction of Flow

3.3.1 Upland Segment

If there is a release to the environment at this construction site, the most likely environmental receptor potentially affected by the release is paved surfaces or exposed soil if a spill occurs adjacent to an excavation. Surface drainage from the construction site occurs by overland flow from higher terrain to the adjacent low-lying areas. Storm drains, which are located throughout the site, are also possible receptors.

Releases within the paved surfaces, splicing and dielectric fluid chamber and the ConEd West 49th Street Substation would be retained by the impervious floors and walls of these buildings and detected by construction personnel for subsequent cleanup. Table 4-1 provides a summary of secondary containment and engineering measures designed to reduce spill potential.

Control and containment measures that reduce the likelihood that oil will impact surface water bodies in the event of a spill will be implemented. Table 4-1 summarizes all oil containing equipment and storage locations, containment measures, as well as the most likely route of exposure and pollution prevention strategies designed to minimize exposure. If stormwater collects in any secondary containment area, it will be visually inspected for evidence of an oil leak (i.e., visible sheen) before being manually removed.

There are a number of storm drains, designed to collect stormwater runoff, located along the proposed construction route. The majority of stormwater runoff is directed to the Hudson River, the local drainage outlet for Manhattan.

3.3.2 Hudson River

Any spills that occur from marine vessels or as a result of cable installation operations that occur in the river will directly impact the Hudson River. All marine vessels will be equipped with spill control measures and staffed with trained personnel in the event of a spill.

4.0 OIL STORAGE OPERATIONS

This section describes oil storage and oil-containing equipment at the site. The material and construction of each container is compatible with the material stored and conditions of storage. Individual portable containers (i.e., 55 gallon drums) are not depicted on the site plan, but locations where these portable containers are typically stored in significant quantities are identified. Oil loading and unloading procedures are described in detail in Section 5.0.

Construction phase oil storage and containment will be limited to minimal quantities stored in temporary containers located within the designated staging area and to those oils associated with non-transportation related, heavy construction equipment, hereafter referred to as “in-process use” oils. Details regarding the storage capacity, type of oil and other materials, and containment capacity for volumes of at least 55 gallons that are present in tanks, containers, or various devices are provided in Table 4-1.

If a release of oil were to occur from tanks, containers, or process equipment, the amount of material spilled would depend on the size of the container and the type of release. Total materials released could range from a few drips to approximately 1,000 gallons and the maximum rate of flow could be the instantaneous (complete failure of the container or device) release of 1,000 gallons. Spills occurring during the construction of this Project have the potential to impact a surface water body (see Section 3.0).

Contractors will comply with the following standards for the storage of oil:

- Maintain copies of materials safety data sheets on-site.
- All applicable state, local and federal regulations covering the transport, storage and handling of oil.
- Fuels and other controlled materials will be stored in designated areas. All such areas will be at a minimum, 100 feet from any water body, watercourse, wetland or known spring or well.
- Above ground tanks will be equipped with secondary containment devices (i.e., double walled fuel tanks). Oil will be kept in restricted access areas and kept separate from other construction activities.
- All yards and storage areas shall be equipped with sufficient supplies of spill control and absorbent materials for the volumes present.
- Spill control supplies will be clearly marked, readily accessible, and personnel will be instructed on their use prior to the initiation of construction.

4.1 Refueling Protocols

4.1.1 Land-Based Equipment

Refueling of construction equipment on-site will occur on a staging area or directly in the construction area. Fuel oil will be brought onto the construction site as necessary. A permanent fueling station is not proposed at this time. If a temporary fueling station is required, a double walled refueling tank will be placed on site on top of an impermeable surface (i.e., concrete or pavement) to prevent discharged fuel from reaching a navigable water. The materials and construction of the temporary refueling tank will be compatible with the storage of fuel(s)

dispensed (i.e., gasoline, diesel, etc.). The temporary refueling tank will be firmly secured into the substrate supported by an appropriate foundation to prevent settlement.

Other oils associated with oil-containing construction equipment, such as lubricating oils and hydraulic oils, will also be brought onto the construction site as necessary or will be stored in containers within a fuel and oil storage building. The material and construction of each building will be compatible with respect to the material stored and ambient storage conditions. The contents of all tanks and containers of various oils within this building will be kept at ambient temperature and pressure.

In order to prevent vehicle departure before complete disconnect of flexible or fixed transfer lines, the fuel delivery truck driver will remain with the refueling vehicle at all times during the fuel transfer process. Additionally, prior to filling and departure of any tank car or tank truck, the delivery truck driver shall notify appropriate site personnel so that the lowermost drain and all outlets of such vehicles will be closely examined to prevent liquid leakage while in transit. Instructions will be provided to bulk oil delivery truck drivers for loading/unloading procedures.

4.1.2 Marine Equipment

It will not be necessary to refuel the barge that is in the river. However, equipment located on the barge may require refueling. In the event that refueling becomes necessary, a refueling barge would be sent to the barge in the river, and a refueling hose would be passed from the refueling barge to the construction barge. Any operations refueling will be subject to US Coast Guard regulations.

4.2 In-Process Use Oils

In-process use oils associated with non-transportation related, heavy construction equipment and other oil-containing devices have the potential to be released as they maneuver and operate throughout the construction site. The proposed schedule for construction operations is detailed in the EM&CP for the Project.

The nature and volume of oils contained within construction equipment are typical for construction operations of this scale and include diesel fuels, lubricating oils, and hydraulic oils. All heavy construction equipment will be equipped with spill response materials such as absorbents to contain material that may be inadvertently released. Temporary, construction-phase sheds or job boxes with spill response kits will be located in an area adjacent to the refueling station or other appropriate locations throughout the proposed project area. All heavy construction equipment supervisors will be adequately trained in emergency spill response procedures and familiar with this SPP document (see Section 8.0).

Inspections of non-transportation related, heavy construction equipment are conducted at least weekly and during each visit to the refueling station for any leakage of oils. All observations are recorded in an inspection log (refer to the sample log contained in Appendix A).

Table 4-1 summarizes exterior oil storage and oil-containing equipment at the site, and provides location, equipment capacity, the most likely route of exposure, and secondary containment, engineering controls, and pollution prevention strategy in case of a spill.

4.2.1 Cable Installation

The Cross Hudson Project includes the installation of one 345 kV AC generator lead, consisting of three SCFF cables. Each of the cables is filled with approximately 1,000 gallons of dielectric fluid. During installation, the upland and submarine cable types must be spliced together in a Splicing Chamber.

Splicing of the Cross Hudson Project cable takes place underground, in a controlled environment. The splicing is performed in the splicing chamber, which is a contained concrete vault. A minor quantity of dielectric fluid could be spilled, but would be contained within the splicing chamber. The environment around the splicing chamber is also controlled, usually with the use of a tent or tarp to cover the area.

Inspections of non-transportation related, marine construction equipment will be conducted at least weekly and during each visit to the refueling station for any leakage of oils. All observations are recorded in an inspection log (refer to the sample log contained in Appendix A).

Table 4-1 summarizes exterior oil storage and oil-containing equipment at the site, and provides location, equipment capacity, the most likely route of exposure, and secondary containment, engineering controls, and pollution prevention strategy in case of a spill.

5.0 LOADING/UNLOADING PROCEDURES

Fueling operations at the site are handled by the Contractors, who are responsible for fuel deliveries for diesel, No. 2 fuel oil, and unleaded gasoline. All tanks are filled from tanker trucks. Personnel observing filling are required to verify that adequate tank capacity is available prior to unloading to minimize the likelihood of tank overfills. Personnel are provided with both formal and on the job training in all aspects of fuel deliveries. Cross Hudson employees have also received training in spill control measures and proper reporting procedures in the event of any equipment malfunction and/or spill.

When refueling equipment during construction the following standards will be applied:

- Equipment refueled in yards shall be refueled in a clearly marked and designated refueling area;
- Designated refueling areas will be located on impermeable surfaces to contain spilled oil, fuels or lubricants;
- Care will be exercised at all times to prevent overfilling;
- When refueling, all fuel trucks, portable drums and tanks will be inspected for leaks or signs of wear; and
- All refueling trucks will carry spill containment materials, and the driver/operator will be trained in their use and responsible for their employ after spills.

No refueling will be performed within 100 feet of any wetland, stream, known well or spring. The only exception to this prohibition will be portable water pumps and barge refueling activities.

5.1 Bulk Fuel Transfer

When fuel is transferred from a tank truck, the driver will park in the appropriate staging area. The fill connection for each tank is located within a secondary containment area and a spill bucket is placed beneath connections during loading operations. Should a transfer hose fail during the loading process, fuel would not be released from the tank since it is loaded into the top of tank, above the liquid level. If at any time a release occurs, transfer operations will be stopped immediately and spill response measures will be implemented.

The following steps describe the delivery procedures for bulk fuel:

1. Drivers delivering fuel must inform the appropriate Contractor of their presence on site. The Contractor will verify that adequate tank volume is available for the delivery. No unscheduled fuel deliveries can be made to the facility.
2. The Contractor will assist the driver and oversee the delivery.
3. The driver must park the truck in the appropriate unloading area.
4. The driver must inform the Contractor of the location of the emergency stop switch that will stop the transfer pump on the truck.
5. The handbrake must be set and the truck wheels are chocked to prevent movement of the vehicle prior to disconnecting hoses.
6. Drip pans must be placed beneath each connection or valve of the truck and under the fill connection. A spill box, containment, or permanent spill bucket is used to control any minor leaks from the check valve and fill pipe.

7. The driver must make the appropriate connections from the truck to the storage tank fill port, and the Contractor will monitor the operation.
8. After the previous steps have been taken, the driver can transfer the fuel. During transfer, the driver and the Contractor must carefully observe the truck and hose.
9. Upon completion of the transfer, the driver will ensure that the transfer hose is empty before disconnecting. If any fuel is spilled, cleanup will begin immediately.
10. Any fuel collected in the drip pans will be transferred to the proper waste containers in the storage area.
11. The Contractor will ensure that the fill pipe cap has been re-secured.
12. Only after all the steps described above have been satisfactorily completed will the driver be allowed to move the vehicle and leave the site.

5.2 Drum Transfers

When materials are transported on-site using a forklift, either a drum attachment is used or containers are secured to pallets on the forklift to prevent the containers from falling during movement. If a barrel dolly is used, the operator will ensure that the barrel is compatible with the dolly and that the barrel is properly secured to the dolly. The following outlines delivery and transport procedures for small containers:

1. Containers are checked for damaged areas or signs of corrosion. If any is detected, the container contents are transferred to an appropriate container and labeled prior to moving.
2. Cross Hudson personnel ensure that containers are securely closed prior to moving.
3. Containers are secured on forks or pallets when using a forklift or properly secured when using a dolly to prevent containers from falling during movement.

6.0 INSPECTIONS AND RECORDS

Inspection procedures have been developed for oil storage areas to prevent or quickly detect signs of oil leakage, equipment malfunction, structure deterioration, and depletion of spill control equipment. If a repair or alteration will affect the risk of discharge, additional tank evaluations will be considered. Key personnel at the site who are familiar with locations and type of equipment conduct periodic inspections of all oil-containing equipment and storage containers included in this SPP. Other properly trained personnel may assist with inspections, as needed.

Inspections and maintenance procedures will be conducted at weekly intervals and after each precipitation event to evaluate storage areas for the presence of oil and to observe the integrity of the equipment. If storm water accumulates near any of the oil storage areas, the storm water will be visually inspected for any evidence of a sheen prior to removal. The observations of each inspection and any remedial action taken will be recorded in an inspection log. If there is no visible sheen present on accumulated storm water, removal procedures will entail manually activated pumping of discharge into the site's drainage system. The presence of a visible sheen on the accumulated storm water is evidence of a spill and will trigger appropriate response actions. In addition to routine inspection of temporary fuel tanks and oil storage areas, inspections also review, and replenish if necessary, the contents of spill response kits located throughout the site.

A copy of this SPP, including records of all inspections and tests, will be maintained on site. All records of visual inspections will include the following information, where appropriate:

- Date and time of inspection;
- Type of inspection (visual, hydrostatic, etc.);
- Signature of the inspector;
- Results of the inspection, including remedial actions necessary;
- Remedial or preventative actions taken; and
- Explanation of why remedial actions were not completed, if applicable.

7.0 SECURITY

Cross Hudson's Contractor will monitor conditions on the site during all working hours. Access to sensitive areas is controlled to prevent unauthorized entry. The construction area is well lit at night, and lighting is adequate for the identification of spills and prevention of spills through vandalism. All oil-containing devices are located within secured buildings, locked enclosures, or are equipped with locks to prevent unauthorized access.

8.0 PERSONNEL TRAINING

All personnel that might be involved in the discovery of and response to a release of oil at the site will be familiar with this SPP, the nature of oils contained on-site that could be released, and the location, use, and maintenance of site spill response equipment. To protect human health and the environment, a training program will be conducted to ensure that spill response personnel understand the hazards associated with all materials with the potential for release and applicable emergency response regulations.

Supervisory training (including that for Emergency responders) will be conducted to ensure that personnel responsible for implementing the activities described in this plan, or who are otherwise responsible for oil pollution control, are familiar with the components and goals of this plan. Personnel will be trained as appropriate for their job duties, on good housekeeping measures, proper operation and maintenance of equipment, proper handling procedures for oil and waste oil, and procedures to follow during an emergency. The purpose of the training is to ensure that discharges are prevented and spill response procedures are reviewed. Training may be provided in a formal classroom type setting, as on-the-job training, or during safety meetings as appropriate. Spill response procedures and signs will be posted at the facility providing spill response equipment location.

Furthermore, training sessions will be conducted after any release and response to a release has occurred.

9.0 EMERGENCY RESPONSE

All spills are to be reported to the Cross Hudson representative. Small, contained spills will be addressed by the Contractor. Large spills and those involving flammable material may require the assistance of outside agencies.

The following sections describe the emergency equipment maintained at the facility and the procedures the Contractor will take in the event of a release of oil.

9.1 Emergency Equipment

The Contractor will store absorbent materials (i.e., spill pads, socks, booms, etc.), empty 55-gallon drums, brooms, shovels, and personal protective equipment (PPE) on site to handle incidental spills. The spill response equipment is stored near construction equipment, on marine vessels, and in lockers throughout the construction site. Response personnel can quickly access spill response equipment to facilitate quick responses in the event of a spill. On a monthly basis, the Contractor will verify that there is adequate spill response equipment to mitigate incidental spills. Generally, oil spills greater than 55 gallons are handled by a licensed spill response and waste removal contractor.

Absorbent materials may be used to contain spills and prevent oil from reaching navigable waters. The Contractor may set up absorbent materials based on the direction of the oil flow and the volume of oil that is released.

The Contractor will maintain an adequate supply of on-site to control spills of hazardous materials, which may be used during construction activities, including:

- Sorbents, including pillows, wipe sheets and sawdust.

- Commercially available spill kits (or equivalent) to handle spills of varying sizes.
- Shovels or small backhoes for the excavation of contaminated soils or materials.
- Drums, barrels and other temporary storage containers for the clean up and transport of contaminated materials.
- Absorbent pads for placement under static machinery large enough to handle a complete loss of engine oil or hydraulic fluid.
- Small sorbent kits for all vehicles and machinery.

In addition, the Contractor must stock the following equipment when conducting waterborne activities:

- Rapid deployment fire proof/fire resistant oil containment floats and booms. The minimum length of booms should be sufficient to surround the work area and vessels. All booms will conform to USDOT and US Coast Guard requirements.
- Oil removal or skimming equipment should be on hand or on call, including olephilic and hydrophobic absorbent booms or mats and/or mechanical skimmers.
- Sampling equipment of sufficient amounts to enable 24- hour monitoring if necessary.

When conducting waterborne activities, the Contractor must also stock or have access to dispersants, dispersant delivery platforms (i.e., aerial or marine), loading facilities, communications, etc. A list of spill response equipment is provided in Appendix A of the SPP.

9.2 Emergency Procedures

The responsibility for control and clean up of small oil spills lies primarily with the Contractor, which will employ properly trained personnel to support oil spill clean up operations as required. If a spill presents an immediate hazard to personnel safety or the environment or is too large and cannot be handled by on-site personnel, spill response contractors may be contacted by the CHC Construction Site Manager.

If a release of oil from a tank or container occurs, the following actions will be taken:

1. The Contractor will stop oil transfer operations or container movement (if applicable) until the release is stopped and oil spill debris material is removed.
2. The first person discovering any release of oil is responsible for securing the area and notifying the CHC Construction Site Manager to determine the appropriate course of action for containment and removal of the oil and waste material. If necessary, a licensed contractor may be contacted.
3. Other Emergency Response Personnel (listed in Table 1-1) will be contacted as necessary.

4. The CHC Construction Site Manager will function as Incident Commander until relieved by a representative of a response agency) and will:
 - Notify the Contractor of hazards caused by the spill;
 - Take appropriate measures to cope with the emergency; and
 - Order evacuation, if necessary (in conformance with the procedures outlined in the emergency evacuation plan).
5. The Contractor is responsible for securing the incident scene and directing traffic away from the area until relieved by the appropriate emergency personnel.
6. If determined to be safe, trained personnel will take immediate steps to stop the discharge and begin clean-up operations using mechanical methods (i.e., shovels, brooms, absorbent materials, etc.).

Procedures for containment and clean up of oil spills include:

- Removal of all sources of ignition from the spill area;
 - Donning of appropriate PPE (i.e., rubber boots and work gloves);
 - Focusing efforts on preventing the oil from spreading from the area into drains or waterways;
 - Applying absorbent materials for No. 2 fuel oil, diesel fuel, gasoline, dielectric fluid, etc.;
 - Construction of containment structures with absorbent booms, and other absorbent materials, such as sand or dirt;
 - Transferring spilled materials into appropriate containers, such as drums or plastic bags using non-sparking shovels, pumps, or brooms; and
 - Consideration of appropriate alternatives for large spills, such as contracting a spill cleanup contractor.
7. If a spill is immediately hazardous (i.e., gasoline spill that poses a fire or explosion hazard), and cannot be handled by on-site personnel, or has entered the environment, the CHC Construction Site Manager will contact a spill response contractor.
 8. CHC will initiate other clean-up activities and monitoring, if required by applicable regulatory authorities.
 9. CHC will submit written reports to the required authorities, where applicable.
 10. CHC will update authorities with new information as it becomes available, if necessary.
 11. CHC will document spill response activities and maintain records of all spill notifications and responses on site.

Oil-containing debris resulting from oil releases to the environment (land or water) and contaminated spill response materials will be retained for characterization in the appropriate designated area pending disposal. Disposal will be performed in accordance with all applicable hazardous waste and/or solid waste regulations. If the debris is determined to be non-hazardous, it will be stored on site pending disposal at a facility licensed to accept such waste. If the waste is determined to be hazardous, it will be stored and disposed of with other hazardous waste generated at the site. Records, including manifests, documenting the date the contaminated debris were removed from the site and the location of ultimate disposal will be retained on site and/or submitted to authorities as necessary and in accordance with applicable regulatory requirements.

The Emergency Contact List (Table 1-1) contains contact information in case of any spill related emergency.

10.0 NOTIFICATIONS

This section details the response and notification procedures that are to be implemented in the event of an oil spill at the site that has contacted or threatens to contact environmental receptors such as exposed soil, surface water, storm drains, or any entry point to the local sanitary sewerage system. When personnel have observed a release of oil of any volume, the Cross Hudson representative will be notified. The observer of the spill will communicate the location of the release, the material released, the volume of material released, and whether any amount has reached floor drains, storm drains, or exposed soil. The Cross Hudson representative will be responsible for determining what external notifications are required and for making all external notifications to appropriate regulatory agencies in the event of a spill or other emergency.

The procedures for notifications to the appropriate regulatory agencies in the event of a spill are described below.

10.1 Oral Notifications

At a minimum, the Contractor shall notify CHC in the event of an oil discharge, who will instruct personnel with regard to further notification(s). Phone numbers have been provided in the Emergency Contact List, located in Table 1-1.

1. Fire Department/Local Emergency Planning Council (LEPC) (if a fire or fume hazard is present or discharge migrates off of the construction site)
2. New York City Department of Environmental Protection (if discharge enters sewer system)
3. National Response Center (if discharge causes a film or sheen upon water surface)

4. NYSDEC Oil and Chemical Spill Hotline (any reportable/non-incidental discharge)
5. NYSDEC Region 2 Office (any reportable/non-incidental discharge)
6. NYSDEC Region 2 Bureau of Spills Management (any reportable/non-incidental discharge)
7. Licensed Cleanup Contractor (in case of any large spills)

Pursuant to 6 NYCRR 613.8 - Reporting Of Spills And Discharges, non-incidental discharges of petroleum must be reported to NYSDEC within two (2) hours of discovery by calling the NYSDEC Oil Spill telephone hotline.

If a spill occurs, notification will be made to the National Response Center when the facility discharges oil in harmful quantities into or upon navigable waters of the state or adjoining shorelines. Harmful quantities include discharges of oil that:

- Violate applicable water quality standards;
- Cause a film or sheen upon or discoloration of the water or adjoining shorelines; or
- Cause a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines.

10.2 Written Notifications

Required written notifications will be made by the Cross Hudson representative to the proper authorities (within ten days for NYSDEC), and will contain the following information, as applicable:

- Facility name and location;
- Date, time, and place of discharge;
- Names, addresses, and telephone numbers of all persons potentially responsible or liable for the discharge;
- The cause of the discharge, including a failure analysis of the system or subsystem in which the failure occurred, and the amount and type of material released;
- Description of containment and removal operations, including costs of these operations;
- The corrective actions and/or countermeasures taken, including an adequate description of equipment repairs and/or replacements (including any third-party damages and costs of containment and removal operations);
- Additional preventative measures taken or contemplated to minimize the possibility of recurrence; and

- Such other information as the authority may reasonably require pertinent to the SPP or discharge event (for example, site maps, flow diagrams, topographical maps, SPP).

In addition, a written report shall be submitted to the US EPA Regional Administrator and a copy of said report will be submitted to NYSDEC whenever construction activities have:

- Discharged more than 1,000 gallons of oil in a single discharge event; or
- Discharged more than 42 gallons (1 barrel) of oil in each of two discharge events within any twelve-month period.

The report must be submitted within 60 days and should be sent to:

Regional Administrator
c/o Chief Emergency Response
US EPA, Region 2
290 Broadway
New York, NY 10007-1866
Phone: (212) 637-5000

CROSS HUDSON PROJECT

SPILL PREVENTION PLAN

APPENDIX A

Sample Inspection and Reporting Forms and Spill Response Equipment

Appendix A

Oil Storage Area Inspections

All references to container are meant to include all tanks and containers storing ≥ 55 gallons of oil.

Conduct inspections on a monthly basis. If there is no oil in a particular container, make a notation on the log. The date and time of the inspection and the inspector's name at the top of the log prior to conducting the inspection will also be noted. If no deficiencies are noted, indicate such in the appropriate cell. If deficiencies are discovered, note the deficiencies and record any corrective actions taken or needed. Record the final resolution or outcome of each corrective action. All deficiencies must be corrected as soon as possible.

Use the following guidelines for inspecting the container system, completing the inspection log, and taking corrective actions.

1. Inspect the area for adequate **housekeeping**. If there is trash, clutter, spilled materials, or waste in the area, clean it up.
2. Inspect the **condition** of accessible portions of containers. Check for signs of release of oil or corrosion. Releases of oil may be evident by observation of liquid in the secondary containment system, or moisture at the seams or other locations on the container. If this is observed, ensure that no additional oil is added. Steps must be taken to empty the container and correct the problem. If any signs of rust are observed on the exterior of a container wall, note the size and location in the inspection log and have the container repaired/repainted the next time the container is emptied. In the meantime, continue to watch for any increase in size of the rust spot and any signs of release.
3. Inspect accessible portions of the **area immediately surrounding the oil storing container and the secondary containment** system to detect signs of release (i.e., wet spots, stains, etc.). If signs of a release are observed, ensure that no additional oil is added to the container. Steps must be taken to empty the container and correct the problem. Inspect the secondary containment system to ensure it is in good condition (e.g., no cracks or gaps in concrete dikes, no signs of corrosion in steel dikes). In addition, the floors and walls should be examined for signs of cracks or deterioration. If deterioration is noted, the area should be repaired.
4. Inspect all visible **ancillary equipment**. Ancillary equipment includes piping, fittings, pumps, valves, gauges, etc. used to distribute, meter, or control the flow of oil or to view the level of oil. Inspect all visible portions of the ancillary equipment. Check for signs of releases (i.e., drips, corrosion, damage, missing or loose parts, etc.). If these problems are detected, ensure that no additional oil is transferred to the ancillary equipment. Steps must be taken to correct the problem.
5. If any items are noted in the log as deficient, they must be documented and corrected immediately. **Describe corrective actions** in the space provided. If more space is needed, use the comment section at the bottom of the table, with a cross-reference to the date and item number. If the integrity of the container or containment structure is compromised, and/or if there is evidence of a release or potential release of oil, the system must be shut down until the deficiency is corrected, and re-inspected prior to resuming operations.
6. Enter the **date that corrective action was completed**. If corrective action cannot be completed on the same day as the inspection, indicate the date that it is anticipated to be completed, and, once completed, make a notation to confirm that it was completed and the actual date of completion.

A copy of inspection records must be kept for at least three years from the date of the inspection.

Appendix A

Inspection Checklist

Date: _____

Time: _____

Inspector's Printed Name: _____

Inspector's Signature: _____

Exterior surfaces of all tanks, pipes, valves, and other equipment must be checked for leaks and maintenance deficiencies. A check mark indicates that the tanks or equipment are in acceptable condition. Acceptable condition means there are no signs of corrosion or release of oil, the containment is intact (including floors), and equipment and controls are properly functioning. For any item that is not considered to be in acceptable condition, corrective actions and the date the action is completed must be identified. Refer to the instructions for monthly oil storage area inspections for details regarding inspection procedures. Records of inspections must be kept for three years.

[illegible]

Appendix A Spill Response Equipment Inspection List

The site must be stocked with spill response equipment (i.e., sorbent materials, pads, sausage booms, shovels, boots, gloves, coveralls, etc.) such that response personnel can reach any spill location within minutes.

Item	Approximate Inventory	Inventory On Hand & Comments
PPE		
Safety Goggles		
Tyvek Suits		
Neoprene Overboots		
Work Gloves		
Spill Control Equipment		
Inert Absorbent Material		
Absorbent Pillows		
Absorbent Pads		
Absorbent Booms		
Spill Control Tools		
Shovels		
Brooms		
Miscellaneous hand tools		
Squeegees		
Traffic cones		
Barrier Tape		
Miscellaneous		
Empty Drums		
Over-pack Drums		

Date Inspected _____

Name _____

Appendix A
Spill Response Form

Date: _____

This document is to be used when making phone notification to an outside entity of a reportable oil spill in satisfaction of NYSDEC notification requirements (6 NYCRR 613.8). Complete form prior to making phone notification and retain as part of release file.

Name, telephone number of caller, name of individual and agency notified (agency location)

Location of the oil spill or threat of oil spill

Date and time of the oil spill occurred; duration of the oil spill

Name and type of the oil released or threatened to be released

Approximate quantity of oil spilled or threatened to be spilled

Source of the oil spill

Brief description of the spill

Name, phone # of company contact person at involved location

Name, phone # of owner/operator/senior manager of involved location

Measures already taken/ to be taken in response to the oil spill

List any other pertinent information, which is relevant to assessing degree of hazard posed by the release of oil, including but not limited to: precautions and evacuation recommendations, potential environment impact, indication of hazardous nature of the released material, etc.

CROSS HUDSON PROJECT

SPILL PREVENTION PLAN

APPENDIX B

Sample SPP Training Outline

Appendix B

Sample SPP Training Outline

Training Outline

The following topics will be discussed during SPP training:

- Designated Person Accountable for Spill Prevention, Spill Prevention Procedures, and Spill Reporting Requirements;
- Review History/Cause of Known Spill Events at the Site;
- Describe Recently Developed Precautionary Measures;
- Describe Storage Tanks and Tank Operations;
- Describe Spill Containment/Control for Each Tank;
- Describe Tank Truck Unloading Procedures;
- Describe Spill Containment/Control for Tank Truck Unloading;
- Describe Use and Location of Spill Control Equipment;
- Describe Procedures for Draining/Pumping Oil from Containment Area;
- Describe Site Security Precautions; and
- Additional Information Relevant to SPP.

CROSS HUDSON PROJECT

SPILL PREVENTION PLAN

APPENDIX C

Tables

Appendix C

Table 1-1

Emergency Contact List

Cross Hudson Project Emergency Contact List	
Emergency Coordinators	
CHC: Contractor Representative: Fred Hammel	Office: 201-571-2500 Mobile: 617-839-8276
City Agencies	
NYC Fire Department (LEPC)	911 or (212) 628-2900
NYC Department of Environmental Protection	311 or (212) 639-9675
NYC Department of Public Safety	311
NYC Police Department Switchboard	911 or (646) 610-5000
State Agencies	
New York State DEC Oil Spill Hotline (24 hour)	(800) 457-7362
New York State DEC Region 2 Office (Manhattan)	(718) 482-4900
New York State DEC Region 2 Bureau of Spills Management	(718) 482-4929
Chemical Bulk Storage Help line	(518) 402-9543
New York State Fire Marshall	(518) 474-6746
Federal Agencies	
National Response Center / Spill Hotline Alternative Spill Hotline	(800) 424-8802 (732) 548-8730
EPA Region 2	(212) 637-3000
Spill Response Contractors	
Clean Harbors, Inc.	(800) 645-8265 (24 hr)
Safety Kleen (Northeast), Inc.	(800) 669-5740 or (718) 777-6700
Healthcare Services	
Bellevue Hospital Center 462 First Avenue	(212) 562-4141
Harlem Hospital Center 506 Lenox Avenue	(212) 939-1000
Metropolitan Hospital Center 1901 First Avenue	(212) 423-6262

Appendix C
Table 4-1
Oil Source Summary

Source	Contents	Capacity (Gallons)	Secondary Containment, Engineering Controls, and Pollution Prevention Strategy in Case of Spill	Most likely route of exposure
Construction Equipment	Fuel Oil Hydraulic oil Lubricating Oil Transmission Fluid		Refueling will occur at the work location on top of an impermeable surface. The refueling area will be located a minimum of 50 feet from any waterbody. Spill response equipment will be located in designated and clearly marked areas throughout the construction site, facilitating quick access in the event of a spill. Stormwater pollution control measures, including silt fencing and storm drain inlet protection, will be implemented at the construction site. Storm drain inlet protection will be installed on all potentially affected storm drains. Other control measures implemented at the site will provide containment in the event of a spill. Construction equipment is inspected on a weekly basis, minimizing the potential for a spill.	Spills from construction equipment have the potential to impact paved surfaces and exposed earth. Spills that occur over exposed soils are not expected to contact navigable waters because spills would permeate exposed soil. All impacted soils would be removed from the site for proper disposal. Spills that contact exposed groundwater will be remediated by pumping affected groundwater into containers or tank trucks for proper disposal. Therefore, spills that impact groundwater are not expected to contact navigable waters. Due to the implementation of stormwater pollution control measures, including silt fencing and storm drain inlet protection, it is not expected that spills on paved surfaces will enter storm drains and impact navigable waters.

Source	Contents	Capacity (Gallons)	Secondary Containment, Engineering Controls, and Pollution Prevention Strategy in Case of Spill	Most likely route of exposure
Marine Vessels	Fuel Oil Hydraulic oil Lubricating Oil Transmission Fluid		USCG and USDOT procedures will be followed when refueling of equipment located aboard marine vessels is refueled. Spill response equipment will be located on marine vessels facilitating quick access in the event of a spill from the vessel. Spill response equipment will meet USCG and USDOT requirements. Marine equipment is inspected on a weekly basis, minimizing the potential for a spill.	Spills from marine vessels may directly impact navigable waters. Presence of spill response equipment and implementation of spill control measures will minimize impacts. Due to the implementation of spill prevention and control measures, it is not expected that spills from equipment located aboard marine vessels will contact navigable waters.
Miscellaneous oil products and waste oil stored throughout the site	Varies		Paved surfaces and building structures serve as secondary containment (i.e., constructed with impervious floors and away from exterior walls, drains, and doorways) for miscellaneous oil products stored inside that are not located on spill containment pallets or within bermed areas.	Spills from portable containers are not expected to contact navigable waters due to their location at the site, presence of spill response equipment or use of spill containment systems.

CROSS HUDSON PROJECT

SPILL PREVENTION PLAN

APPENDIX D

Site Plan Figure

Redacted as Critical Infrastructure Information

CROSS HUDSON PROJECT

ENVIRONMENTAL MANAGEMENT AND CONSTRUCTION PLAN

ATTACHMENT E

Independent Inspector(s) Certification and Documentation

Independent Inspector Program Verification Form

Name of Independent Inspector(s):

_____	_____
(Print Name)	Company Affiliation
_____	_____
(Print Name)	Company Affiliation
_____	_____
(Print Name)	Company Affiliation

Statement of Qualifications of Independent Inspector(s):

Per condition 50(a) of the Certificate of Environmental Compatibility and Public Need, issued by the New York State Public Service Commission (DPS), CHC acknowledges the Independent Inspector shall be the DPS field representative. In the event of any emergency resulting from the specific construction or maintenance activities that violate or may violate the terms of the Certificate or any other order in this proceeding, such DPS representatives may issue a stop work order for that location or activity.

I hereby attest that I am an independent inspector and am in no way affiliated with CHC.

_____	_____
Signature	Date
_____	_____
Signature	Date
_____	_____
Signature	Date

INSPECTION REPORT

Name/Title:

Date of Inspection: Time:

Locations Inspected:

Compliance	
Acceptable	Unacceptable

Item Inspected:

Solid Waste Storage Trash Bins Condition

Hazmat Storage

Environmentally Sensitive Areas / Wetlands / Sensitive Resource Areas / Project Site Limits

Vehicle Maintenance Areas/Fugitive Dust Controls

Stormwater Control/Sediment Basins and Outfalls

Erosion Controls and Silt Fencing

Other Items Inspected:

Remarks

Additional Comments:

Signed by _____

Received by _____

Date

INCIDENT DATA SHEET

(Page 1 of 2)

Incident Description:	
Emergency Coordinator(s) Responding:	
Date/Time:	
<u>Releases/Spills.</u>	
Product ID:	Time of Release:
Physical State:	Total Amount Released (units):
Offsite impact with threat to human health and/or environment?: Yes No	
If "yes", New York DEC contacted?:	
Date/Time/Case #:	
Person Contacted:	
Notes:	
If "yes" and involving releases resulting in visible sheen on surface waters, exceeding CERCLA RQ, and/or hazardous wastes, was NRC contacted?:	
Date/Time/Case #: Notes:	
Off-site Emergency Response	
Entity:	Team Leader:
Time of Arrival:	
Notes:	
Injuries/Medical Response	
Personnel Injuries?:	
Describe (name/nature of injury/medical services):	

INCIDENT DATA SHEET

(Page 2 of 2)

Clean-up Activities

Date/Time Started:

Date/Time Completed:

Responsible Individual:

Describe Action Taken:

Confirmatory Sampling (if appropriate)

Material Handling/Disposal

Hazardous Waste Generated?: Yes No

Physical State:

Describe waste type/estimated amount/storage actions:

Date Generated:

CROSS HUDSON PROJECT

ENVIRONMENTAL MANAGEMENT AND CONSTRUCTION PLAN

ATTACHMENT F

Permit Status Summary Table

**CROSS HUDSON CABLE PROJECT
PERMIT/APPROVAL STATUS SUMMARY TABLE**

Permit	Regulatory Authority	Project Area(s)	Issued	Comment
FEDERAL				
U.S. Army Corps of Engineers Permit	Navigable waters and Wetlands	Hudson River, Bellmans Creek and Wetlands west of the Bellmans Creek tributary	ISSUED 9/22/02 modified 9/5/06	Additional modification required to make consistent with state permit. Request for modification submitted 4/07. Approval pending. To be included in Attachment J-1
NEW YORK STATE				
New York State Public Service Commission	NY State energy projects.	Cert. of Environmental Com. & Public Need Authorizes Construction of a 600 megawatt, 345 kV Electric Generator Lead from PSEG's Bergen Generating Station to a ConEd's electric substation Located On W. 49th St	ISSUED 10/21/04	
New York State Office of General Services (NYSOGS)	Administers property rights for underwater lands in NY.	Underwater lands in the Hudson River in NY State.		Approval pending. To be included in Attachment J -5
New York State Department of Transportation	NY State owned roadways	Authorizes construction and cable easement at the West Side Highway (Route 9A)		Approval pending. To be included in Attachment J-2
New York State Parks, Recreation and Historic Preservation	NY Parks, Recreation and Historic Lands	Authorizes construction near the historic bulkheads	ISSUED 07/16/02	Construction will not impact bulkhead.
NEW YORK CITY				
NYC Department of Transportation	NYC owned roadways and land easements (Revocable Consent)	Authorizes construction on bike path and city owned sidewalks and administers land easements for NYC owned properties		Approval pending. To be included in Attachment J-3
NYC Department of Environmental Protection	Discharges of wastewater to City sewers	Authorizes discharge for dewatering of trenches		Approval pending. To be included in Attachment J-4.
Consolidated Edison	Interconnection to electric facilities	Interconnection to West 49 th St. Substation		Approval pending. To be included in Attachment J-6.

**CROSS HUDSON CABLE PROJECT
PERMIT/APPROVAL STATUS SUMMARY TABLE**

Permit	Regulatory Authority	Project Area(s)	Issued	Comment
NEW JERSEY				
NJDEP-LURP Waterfront Development Conditions	Tidally flowed waters Areas below and within 500' landward of the mean high water line.	Areas near and below the <u>mean high water line</u> including Bellmans Creek and the Bellmans Creek tributary; and areas within 500' east of Bellmans Creek tributary; and 500' landward of the Hudson River in Edgewater Commons SC.	ISSUED 01/27/03	
NJDEP-LURP Freshwater Wetland Areas Conditions	Wetlands in NJ east of the Bellmans Creek tributary (not within NJMC)	<u>Wetlands</u> in NJ east of Bellmans Creek tributary (and within 50' of wetlands) includes the NYS&W raised ROW; Floodplain "Project Wide" from Bergen Gen. to the Hudson River.		
NJDEP-LURP Stream Encroachment Conditions (100-Year Floodplain)	Streams and Floodplain within NJ, including floodplain areas within the NJMC.	(1) <u>Floodplain</u> on Bergen Gen (switchyard); at the (2) Ridgefield Auto Terminal (entire terminal is within the 100 year floodplain); (3) Service bridge area and lower footing; (4) Floodplain at Hudson River (w/in Edgewater Commons SC). AND regulates (5) Bellmans Creek and the tributary bridge crossings; and (6) Within 25' of these stream banks.	ISSUED 01/27/03	
NJDEP Riparian Claims - Tidelands Office	Underwater Claims in New Jersey	Hudson River (NJ), Bellmans Creek and the tributary	ISSUED 08/20/03	Notification about minor changes to cofferdam and route to be submitted after new dredge permit is issued. See below.
NJDEP Office of Dredging & Sediment Technology	Dredge areas	NY and NJ Dredges and the disposal of the spoils; and the jet plow	ISSUED 03/06/03	New permit required if in water activities not completed by 03/03/08. Renewal application submitted 4/07. Approval pending.

**CROSS HUDSON CABLE PROJECT
PERMIT/APPROVAL STATUS SUMMARY TABLE**

Permit	Regulatory Authority	Project Area(s)	Issued	Comment
NEW JERSEY (CONTINUED)				
NJMC Zoning Certificate for the Bergen Generating Station Switchyard	A Zoning Certificate approves structures within the NJMC	Construction activities associated with the Switchyard, including any movement of spoils on the site.	ISSUED 04/30/03	Permit issued for 1 year. Request for extension pending
NJMC Zoning Certificate for "Service Bridge"	A Zoning Certificate approves structures within the NJMC	Construction activities associated with the service bridge over wetlands and floodplain. Specifically permits a structure in the Marshland Preservation Zone.	ISSUED 01/07/03	Permit issued for 1 year. Request for extension pending.
NJMC Variance for "Service Bridge"	A Variance approves a use within a Zone that doesn't typically permit the use.	Permits the structure (bridge) to be built in the Marshland Preservation Zone. A Variance permitted this otherwise unpermitted use.	ISSUED 12/30/02	Permit issued for 1 year. Request for extension pending.
NJMC Plan Release Engineering	Plan Release, Partial Release for Footings and Foundations	Partial Release for any Footings and Foundations		Approval Pending
New Jersey State Historic Preservation Office (SHPO)	Regulates Historic Features, structures or lands in NJ.	Regulates construction within the 92nd Street Tunnel since it is historic. Also regulates the Cemetery at the Western Tunnel Portal and underwater wrecks, but the current project does not enter these areas.	ISSUED 01/03/03	SHPO requires field coordination prior to construction in the Tunnel. Coordination ongoing.
NJ Department of Transportation (New Jersey Turnpike/Fairview)	NJDOT Lands	Regulates construction work under the New Jersey Turnpike in Fairview Borough.		Agency coordination required to coordinate construction through turnpike easement. Coordination Ongoing.
County Soil Conservation District(s) - Bergen and Hudson County	Regulated Soil disturbances greater than 5000 SF	Regulated Soil disturbances greater than 5000 SF by County in NJ. Submit closer to project start.		Sediment and storm water control plan approval pending.

**CROSS HUDSON CABLE PROJECT
PERMIT/APPROVAL STATUS SUMMARY TABLE**

Permit	Regulatory Authority	Project Area(s)	Issued	Comment
NEW JERSEY (CONTINUED)				
County Planning Board(s) - Bergen and Hudson County	Regulates construction on County lands or close to county lands or affecting county drainage.	Possibly areas near the Bergen Turnpike and New River Road, depending on County Facility locations/requirements		Approval pending.
Bergen County Roads Dept. (New River Road/Edgewater)	Regulates construction on Bergen County Roads.	New River Road in Edgewater.		Agency coordination required at River Road crossing. Coordination ongoing.
Ridgefield Borough Construction Permits	Approves construction in a municipality	Dependant on Municipal requirements		Approval pending.
North Bergen Township Construction Permits	Approves construction in a municipality	Dependent on Municipal requirements		Approval pending.
Fairview Borough Construction Permits	Approves construction in a municipality	Dependent on Municipal requirements		Approval pending..
Cliffside Park Borough Construction Permits	Approves construction in a municipality	Dependent on Municipal requirements		Approval pending..
Edgewater Borough Construction Permits	Approves construction in a municipality	Dependent on Municipal requirements		Approval pending..

CROSS HUDSON PROJECT

ENVIRONMENTAL MANAGEMENT AND CONSTRUCTION PLAN

ATTACHMENT G

MANHATTAN SEGMENT CABLE ROUTE FIGURE

Redacted as Critical Infrastructure Information

CROSS HUDSON PROJECT

ENVIRONMENTAL MANAGEMENT AND CONSTRUCTION PLAN

ATTACHMENT H

PROJECT PLANS

(Rolled drawings provided separately)

Prepared By:

INDEX OF DRAWINGS

<u>SHEET #</u>	<u>DRAWING NAME</u>	<u>SHEET ORIGINATOR</u>
1	TITLE SHEET AND INDEX OF SHEETS	DMJM HARRIS
2	KEY PLAN	DMJM HARRIS
3	PLAN & PROFILE 1	DAWN ENGINEERING
4	PLAN & PROFILE 2	DMJM HARRIS
5	PLAN & PROFILE 3	DMJM HARRIS
6	PLAN & PROFILE 4	DMJM HARRIS
7	PLAN & PROFILE 5	J. POWERS
8	COFFERDAM DESIGN DETAILS	CALDWELL
9	EDC HDD DRILL PIT LOCATION DETAILS	DAWN ENGINEERING
10	EDC HDD DRILLING PROFILE DETAILS	DAWN ENGINEERING
11	ARMOR CLAMP BAY AND DTS SPLICE MANHOLE	J. POWERS
12	TRANSITION JOINT VAULT DETAILS	J. POWERS
13	SECTION DETAILS	DMJM HARRIS
14	UTILITY CROSSING LIST	DMJM HARRIS
15	PHASE 1 STAGING, RESTORATION, EC PLAN	DMJM HARRIS
16	PHASE 2 STAGING, RESTORATION, EC (PLAN 1)	DMJM HARRIS
17	PHASE 2 STAGING, RESTORATION, EC (PLAN 2)	DMJM HARRIS
18	PHASE 2 STAGING, RESTORATION, EC (PLAN 3)	DMJM HARRIS
19	PHASE 3 STAGING, RESTORATION, EC PLAN	DMJM HARRIS
20	PHASE 4 STAGING, RESTORATION, EC PLAN	DMJM HARRIS
21	EROSION CONTROL DETAILS	DMJM HARRIS

CCH HOLDINGS GROUP LLC
September 10, 2007

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KEY MAP	
MANHATTAN EMCP	
ENG. NO.	SHEET NO.
ENGIN HARRIS	2

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ADDITIONAL SHEETS REQUIRED			
REVISION			
CROSS HUDSON PROJECT CCH HOLDINGS GROUP LLC			
PLAN & PROFILE - 1			
MANHATTAN EMCP			
DWG. NO.	PP-01	SHEET NO.	3
EMMA HARRIS AECOM			
400 THIRD AVENUE NEW YORK, NY 10016			

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CROSS HUDSON PROJECT CCH HOLDINGS GROUP LLC	
DETAIL - 3 EDC HDD DRILLING PROFILE	
MANHATTAN EMCP	
DWG. NO. DET-115	SHEET NO. 10
EMCP HAZARDOUS	ASCOM

Redacted as Critical Infrastructure Information

CROSS HUDSON PROJECT CCH HOLDINGS GROUP LLC	
DETAIL - 4 ARMOR CLAMP BAY AND DTS SPLICE MANHOLE	
MANHATTAN EMCP	
CHDL NO. DET2C	SHEET NO. 11
CHDH/ENR/0005	AECOM

Redacted as Critical Infrastructure Information

CROSS HUDSON PROJECT CCH HOLDINGS GROUP LLC	
DETAIL - 5 TRANSITION JOINT VAULT DETAILS	
MANHATTAN EMCP	
ENG. NO. DETD	SHEET NO. 12
DAN HARRIS	ALCOM

Redacted as Critical Infrastructure Information

DATE		SHEET NO.		13	
DWG. NO.		DET-2		SHEET NO.	
DAMEN HARRIS		AECOM		SEE EXHIBIT 10-10-10	
CROSS HUDSON PROJECT		CCH HOLDINGS GROUP LLC		MANHATTAN EMCP	
DETAIL - 6		SECTION DETAILS			

Redacted as Critical Infrastructure Information

CROSS HUDSON PROJECT CCH HOLDINGS GROUP LLC	
DETAIL - 7 UTILITY CROSSING LIST	
MANHATTAN EMCP	
DATE: 01/11/11	SHEET NO.: 14
ENGINEER: AECOM	DESIGNED BY: AECOM

[illegible]

	
SCALE: 1" = 20' @ 11	
1" = 4.0' V	
	
CROSS HUDSON PROJECT CCH HOLDINGS GROUP LLC	
PHASE 2 (PLAN 1) STAGING, RESTORATION, & EROSION CONTROL	
MANHATTAN EMCP	
DWG. NO.	SHEET NO.
(DRAWN / CHECKED) / REVISION	18

[illegible]

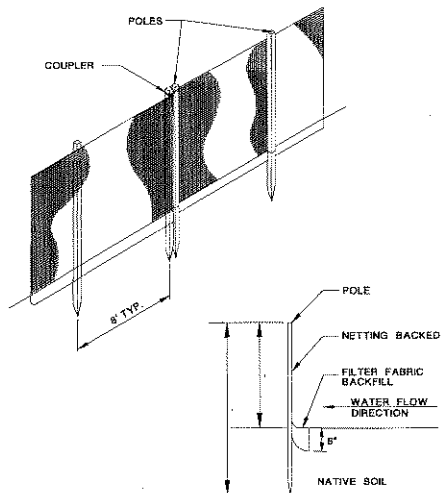
Redacted as Critical Infrastructure Information

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   GRAPHIC SCALE SCALE: 1" = 20' H 1" = 40' V	
	
A 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
PROJECT LOCATION CROSS HUDSON PROJECT CCH HOLDINGS GROUP LLC	
PHASE 3 STAGING, RESTORATION, & EROSION CONTROL	
MANHATTAN EMCP	
DWG. NO. _____ DWG. HATCHES _____ DATE _____	RESECS _____ SHEET NO. _____ 19

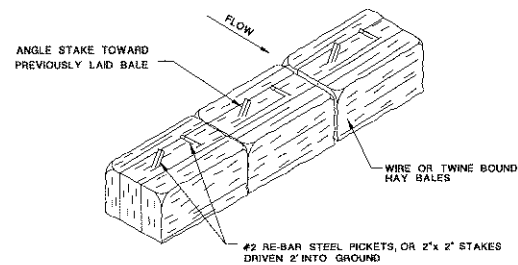
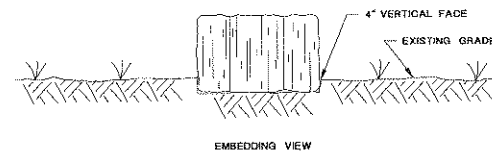
[illegible]



- NOTES:
1. THE FILTER FABRIC MUST BE LOCATED ON THE UP-SLOPE SIDE OF THE FENCE.
 2. THE BOTTOM 6" OF FILTER FABRIC MUST BE BURIED IN A PRE-EXCAVATED TRENCH WHICH WILL BE BACKFILLED, TAMPED AND SEEDED FOR STABILITY.

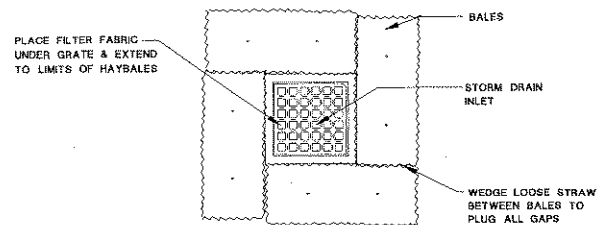
TYPICAL SILT FENCE DETAIL

N.T.S.



TYPICAL HAYBALE DETAIL

N.T.S.



HAYBALE EROSION CONTROL AT DRAIN INLETS

NTS

DATE	DESCRIPTION	BY	CHKD	APP'D
10/1/10	DESIGN	EC	PL	10/1/10
10/1/10	REVISION			
CROSS HUDSON PROJECT				
CCH HOLDINGS GROUP LLC				
EROSION CONTROL				
DETAILS				
MANHATTAN EMCP				
DWG. NO.	EC001-1	SHEET NO.	2	
EMCH/HAAS/AECOM		CROSS-HUDSON PROJECT		

CROSS HUDSON PROJECT

ENVIRONMENTAL MANAGEMENT AND CONSTRUCTION PLAN

ATTACHMENT I

MAINTENANCE AND PROTECTION OF TRAFFIC PLAN

Redacted as Critical Infrastructure Information

INFORMATION			
	KIEWIT CONSTRUCTION CO.		
	479 CHESTNUT RIDGE ROAD, 2ND FLOOR WOODCLIFF LAKE, NJ 07677		
	PROJECT NAME		
	CROSS HUDSON CABLE		
	DRAWING TITLE		
12TH AVENUE CROSSING			
JOB NO.	DWG. BY	CHK. BY	DWG. NO.
14-21508	FP	RA	KCC-12-001
	SCALE:	DATE:	
	1/4"=1'-0"	8/17/07	1 OF 4

Redacted as Critical Infrastructure Information

INFORMATION			
	KIEWIT CONSTRUCTION CO.		
	470 CHESTNUT RIDGE ROAD, 2ND FLOOR WOODCLIFF LAKE, NJ 07677		
	PROJECT NAME		
	CROSS HUDSON CABLE		
DRAWING TITLE			
12TH AVENUE CROSSING			
JOB NO.	DESIGN BY	CHECK BY	DWG. NO.
14-21508	FP	RA	KCC-12-002
	SCALE	DATE	SHEET
	1/4"=1'-0"	8/17/07	2 OF 4

Redacted as Critical Infrastructure Information

INFORMATION			
	KIEWIT CONSTRUCTION CO. 470 CHESTNUT RIDGE ROAD, 2ND FLOOR WOODCLIFF LAKE, NJ 07677		
	PROJECT NAME CROSS HUDSON CABLE		
	DRAWING TITLE 12TH AVENUE CROSSING		
	JOB NO. 14-21508	DWN. BY. FP SCALE 1/4"=1'-0"	CAL. BY. RA DATE 8/17/07

Redacted as Critical Infrastructure Information

	KIEWIT CONSTRUCTION CO. 470 CHESTNUT RIDGE ROAD, 2ND FLOOR WOODCLIFF LAKE, NJ 07677			
	PROJECT NAME			
	CROSS HUDSON CABLE			
	DRAWING TITLE			
	12TH AVENUE CROSSING			
JOB NO. 14-21508	DWN. BY: FP SCALE: 1/4"=1'-0"	CRD. BY: RA DATE: 8/17/07	DWG. NO. KCC-12-004 SHEET 4 OF 4	

CROSS HUDSON PROJECT

ENVIRONMENTAL MANAGEMENT AND CONSTRUCTION PLAN

ATTACHMENT J-1

US ARMY CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY PERMIT

Permittee: PSEG Power Cross Hudson Corporation LLC, 80 Park Plaza, T17
Newark, NJ 07102, (973) 430-8832

Permit No.: 2001-01201-2

Issuing Office: New York District Corps of Engineers

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description:

Construct a 600 MW, 345 KV alternating current (AC) electric generator lead connecting the Bergen Generating Station in Ridgefield, NJ to the ConEd West 49th Street Substation in New York City. Install three (3) electric cables and associated communication and temperature sensing cables bundled together in the Hudson River. Install conduits for the cable system landfill transition by horizontal directional drilling (HDD). From a drill pit in Edgewater, NJ, drill a 36-inch diameter borehole by HDD into the Hudson River. Install a cofferdam at the seaward end of the HDD borehole prior to the beginning of the HDD borehole construction. Dredge sediment inside the cofferdam to a depth of 45-feet below mean lower low water (MLLW). Install the submarine cable system in a single trench by jet plow embedment to a minimum depth of approximately 15-feet below the present bottom of the Federal Channel and a depth of approximately 10-feet below the river bottom outside of the Federal Channel. Approximately 185-feet seaward of Pier 96, install a cofferdam prior to the beginning of HDD borehole construction. Dredge the sediment inside the cofferdam to a depth of 48-feet below MLLW. HDD a borehole between Piers 95 and 96. All work shall be performed in accordance with the attached diagrams, New York State Department Public Service Commission Case No. 01-T-1474 and New Jersey Department of Environmental Protection Permit No. 0000-02-0045.1, each incorporating the State's Section 401 Water Quality Certification, and Special Conditions A - R, which are hereby made a part of this permit.

Project Location: IN: Hudson River

AT: Township of Edgewater, Bergen County, New Jersey and
Borough of Manhattan, New York County, New York

Permit Conditions:

General Conditions:

1. The time limit for completing the work authorized ends on September 22, 2006. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.
2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

ENG FORM 1721, Nov 86

EDITION OF SEP 82 IS OBSOLETE

(33 CFR 325 (Appendix A))

1145b (Hudson River / PSEG Cross Hudson Corporation LLC / Electric Cable, Dredging, Cofferdams)

PERMITTEE: PSEG Power Cross Hudson Corporation LLC
PERMIT NO.: 2001-01201

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

Special Conditions:

(A) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

(B) The cable shall be installed at a minimum depth of 38 feet below mean low water (MLW) in the Hudson River Federal Navigation Channel, where the current authorized depth is 30 feet below MLW.

(C) The permittee would be required to relocate the cable should it become necessary to maintain the full authorized depth of the 48-feet below MLW in the Federal Navigation Channel area.

(D) A minimum three (3) weeks advance notice prior to construction activity, the permittee must submit two (2) finalized sets of construction drawings to William Gas Pipeline-Transco (WGP-Transco) offices. The drawings must include the information requested in WGP-Transco's letter dated 22 April 2002.

(E) A minimum vertical clearance of 15-feet is recommended between the bottom of the electric generator lead and the top of any WGP-Transco facility. A lesser clearance that will not adversely affect any WGP-Transco facility is authorized.

(F) The permittee must notify WGP-Transco five (5) working days before commencing construction activities.

(G) The permittee shall submit to the office of the Corps of Engineers-New York District a copy of an approved Environmental Management and Construction Plan for review and comment in accordance with Condition 23 of the State of New York Public Service Commission Opinion and Order No. 01-T-1474.

(H) The permittee shall submit diagrams showing the actual location of the cable system within six (6) months of installation to the appropriate state and federal agencies.

PERMITTEE: PSEG Power Cross Hudson Corporation LLC
PERMIT NO.: 2001-01201

(I) The permittee shall perform a hydrographic/side scan sonar survey along the cable route approximately nine (9) to twelve (12) months after the cable system has been installed to verify that benthic profile recovery has been achieved. This survey shall be submitted to the U.S. Army Corps of Engineers-New York District (USACE-NYD) and the National Marine Fisheries Service (NMFS) for review. If NMFS and USACE-NYD determine that benthic recovery is adequately achieved based on the results of the first survey, no further surveys shall be required. If NMFS and USACE-NYD determine that benthic profile recovery is not adequately achieved after the first survey event, additional hydrographic surveys will be undertaken at approximately 12-month intervals after the first survey until it has been determined that recovery has been achieved. Prior to undertaking the surveys, a benthic profile recovery plan would be coordinated with USACE-NYD and NMFS.

(J) The permittee shall conduct benthic grab sampling if it has been determined that benthic profile recovery is not adequately achieved after the second hydrographic/side scan sonar survey. If the results from the benthic community sampling indicate that there is no significant difference between the benthic community composition in the disturbed riverbed areas within the limits and the areas outside of the cable installation corridor, then no further action or mitigation would be required. If the benthic community composition analysis indicates that recovery has not been achieved, then the permittee shall coordinate with the USACE and NMFS to evaluate and implement additional monitoring or appropriate mitigation for adversely affected Essential Fish Habitat (EFH).

(K) The permittee shall adhere to all the conditions and appendices specified in the State of New York Public Service Commission Opinion and Order No. 01-T-1474 for the Article VII Certificate of Environmental Compatibility and Public Need.

(L) The permittee shall notify the United States Coast Guard (USCG), Staten Island, New York, and provide the following information: 1) when the start and completion dates for the Cross Hudson Project are known, 2) the hours during which work would be done, i.e. daylight or 24-hours, 3) the name and description of work vessels on scene, 4) the VHF radio channel(s) the vessels would be monitoring, and 5) a company point of contact available 24-hours a day. The information would be faxed to the USCG office at 718-354-4190, and would be provided a minimum 30-days before project commencement.

(M) The permittee shall contact the New York City Dockmaster, Mr. Mike O'Rourke, at the 79th Street Boat Basin at 212-496-2105, to ensure there are no conflicts with the recreational mooring field along the shoreline. The permittee shall supply evidence of such contact with the New York District.

(N) The permittee shall adhere to the special conditions provided in the New Jersey Department of Environmental Protection (NJDEP) Permit No. 0000-02-0045.1, incorporating the Section 401 Water Quality Certification.

(O) The permittee shall adhere to the special conditions provided in the New York State Department of Public Service Article VII Water Quality Certification.

(P) The permittee shall coordinate with the County of Bergen Department of Public Works (DPW) and relocate the conduit as necessary to ensure the traffic signal equipment is not compromised.

PERMITTEE: PSEG Power Cross Hudson Corporation LLC
PERMIT NO.: 2001-01201

(Q) The permittee shall coordinate with the members of the County of Bergen DEP to complete a detailed location survey to include drainage and sanitary sewer systems at the New River Road intersection, located at Edgewater, New Jersey.

(R) The permittee shall coordinate with Frank Linardi, Supervisor of Roads, County of Bergen, 70 Zabriskie Street, Hackensack, New Jersey 07601, at 201-626-2811, and assure all required construction permits are secured before construction commencement.

Further Information:

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:

(X) Section 10 of the Rivers and Harbors Act of 1899 (33 U.S. Code 403).

(X) Section 404 of the Clean Water Act (33 U.S. Code 1344).

() Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).

2. Limits of this authorization:

a. This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.

b. This permit does not grant any property rights or exclusive privileges.

c. This permit does not authorize any injury to the property or rights of others.

d. This permit does not authorize interference with any existing or proposed Federal project.

3. Limits of Federal Liability: In issuing this permit, the Federal Government does not assume any liability for the following:

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

d. Design or construction deficiencies associated with the permitted work.

e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision: This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

a. You fail to comply with the terms and conditions of this permit.

b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (See 4 above).

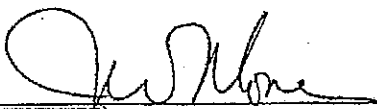
c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

PERMITTEE: PSEG Power Cross Hudson Corporation LLC
PERMIT NO.: 2001-01201

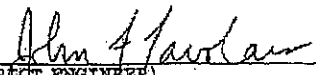
Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions: General Condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

 , Vice President September 18, 2003
(PERMITTEE) (DATE)
PSEG Power Cross Hudson Corporation LLC

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

x  September 22, 2003
(DISTRICT ENGINEER) (DATE)
For and in behalf of
John B. O'Dowd
Colonel, U.S. Army
District Engineer

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below. A copy of the permit signed by the transferee should be sent to this office.

(TRANSFeree) (DATE)



Certification

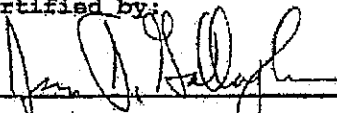
The New York State Public Service Commission certifies pursuant to Section 401 of the Federal Water Pollution Control Act, 33 U.S.C. Section 1341(a)(1); Article VII of the New York State Public Service Law; 16 NYCRR Subpart 85-2; and 6 NYCRR Subpart 608.9, that if the Applicant submits an acceptable Environmental Management & Construction Plan ("EM&CP") segment for the in-water construction work and complies with the conditions stated below, construction of the Project will comply with applicable requirements of Sections 301, 302, 303, 306 and 307 of the Federal Water Pollution Control Act ("Clean Water Act"), as amended, and will not violate New York State water quality standards and requirements. This certification is issued in conjunction with the Certificate of Environmental Compatibility and Public Need (Opinion and Order No. ___) issued to PSEG Cross Hudson in Case 01-T-1474 ("Certificate").

Conditions

1. No in-water work shall commence until all pre-construction conditions relating to such work contained in the Certificate have been met to the satisfaction of the New York State Public Service Commission.
2. Construction and operation of the Transmission Facility shall at all times be in conformance with the application in Case 01-T-1474, to the degree not superseded by the Certificate, and all conditions of approval contained in the Certificate.
3. Construction and operation of the Transmission Facility shall at all times be in conformance with the terms and conditions of the Joint Proposal dated February 11, 2003 and filed in Case 01-T-1474, to the degree not superseded by the Certificate.
4. Construction and Operation of the Transmission Facility shall at all times be in conformance with the EM&CP, and all conditions incorporated in any order approving the EM&CP, in Case 01-T-1474.
5. The Applicant shall provide a copy of this certification to the U.S. Army Corps of Engineers along with a copy of the application, Joint Stipulations, Certificate, EM&CP, and order approving the EM&CP (and all subsequent EM&CPs and approval orders) in Case 01-T-1474 so that the U.S. Army Corps of Engineers will have a complete record of the conditions that apply hereto.

6. The Applicant shall provide to all construction contractors complete copies of the Article VII Certificate, the approved EM&CP, and this certification.

Certified by:



Jim Gallagher, Director
Office Electricity and
Environment
New York State Department of Public
Service
Three Empire State Plaza
Albany, New York 12223

CROSS HUDSON PROJECT

ENVIRONMENTAL MANAGEMENT AND CONSTRUCTION PLAN

ATTACHMENT J-2

NYS DEPARTMENT OF TRANSPORTATION

To be inserted upon issuance.

CROSS HUDSON PROJECT

ENVIRONMENTAL MANAGEMENT AND CONSTRUCTION PLAN

ATTACHMENT J-3

NYC DEPARTMENT OF TRANSPORTATION

To be inserted upon issuance.

CROSS HUDSON PROJECT

ENVIRONMENTAL MANAGEMENT AND CONSTRUCTION PLAN

ATTACHMENT J-4

NYC DEPARTMENT OF ENVIRONMENTAL PROTECTION

To be inserted upon issuance.

CROSS HUDSON PROJECT

ENVIRONMENTAL MANAGEMENT AND CONSTRUCTION PLAN

ATTACHMENT J-5

NYS OFFICE OF GENERAL SERVICES

To be inserted upon issuance.

CROSS HUDSON PROJECT

ENVIRONMENTAL MANAGEMENT AND CONSTRUCTION PLAN

ATTACHMENT J-6

NEW YORK ISO AND CONSOLIDATED EDISON INTERCONNECTION AGREEMENTS

To be inserted upon issuance.

CROSS HUDSON PROJECT

ENVIRONMENTAL MANAGEMENT AND CONSTRUCTION PLAN

ATTACHMENT J-7

NYISO ATTACHMENT FACILITY STUDY



APPENDICES

Facilities Study for Class 2006: Part 2 – System Upgrade Facilities

- A. Class Year 2006 Interconnection Project Facilities Study Working Group (IPFSWG)
- B. Interface Definitions
- C. Thermal Results
- D. Voltage Results
- E. Stability Results
- F. Short Circuit Results

April16, 2007

Appendix A

Class 2006 Cost Allocation Study Work Group (IPFSWG) Membership list

**Class 2006 Interconnection Project Facilities Study Working Group (IPFSWG)
Membership List**

First Name	Last Name	Company
Anie	Philip	Keyspan
Chris	Swartley	UPC Wind
David	Applebaum	Florida Power and Light
Dean	Ellis	NYISO
Doug	Brown	Siemens PTI
Edward	Santalesa	ConEd
Edward	Schrom	PSC
Ernie	Cardone	NYISO
George	Dunn	NYP&A
Glenn	Sampson	Noble Power
Gregory	Drake	NYISO
Jack	Feinstein	Caithness Energy
James	D'Andrea	Keyspan
Japal	Patel	Keyspan
Jessica	Gamache	NYISO
Jim	Parmelee	LIPA
John	Beck	ConEd
John	Marczewski	Energy Initiatives Group
John	Reynolds	Professional Asset Management, LLC
Juan	Villar	Florida Power and Light
Karen	Gach	NYISO
Kevin	DePugh	NYSEG/RG&E
Larry	Eng	L&M Eng Consulting
Lathrop	Craig	PSEG
Laura	Popa	NYISO
Lewis	Staley	Fortistar
Madison	Milhous	Keyspan
Mark	Forchilli	NGRID Nimo
Mitchell	Garber	Caithness Energy
Muhammad	Mueen	NGRID Nimo
Patrick	Doyle	Horizon Wind
Peter	Kelly	Sigma Energy Solutions
Polina	Adelson	Keyspan
Rich	Felak	Felak Consulting Company
Rich	Wright	Central Hudson
Richard	McMichael	Horizon Wind
Robert	Eisenhuth	Keyspan
Roger	Kelley	Fortistar
Roleto	Mangonon	O&R
Scott	Butler	ConEd
Shawn	Briggs	Marble River
Skip	Brennan	Community Energy

Steven	Corey	NYISO
Steven	Wokanovicz	NYPA
Susan	Manessis	Keyspan
Thinh	Nguyen	NYISO
Thomas	Piascik	PSEG
Tim	Conboy	Acciona
Tom	Shields	PPM Energy
Tony	Colman	AES

Appendix B

Interface Definitions

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MONITOR INTERFACE 'DYSINGER-OPEN'
FROM BUS 75404 TO BUS 79800 CKT 1 / KINTI345 345 *ROCH 345 345 1
FROM BUS 75417 TO BUS 75414 CKT 1 /*STOLE230 230 MEYER230 230 1 REPLACED BY PROJECT NO. 144
FROM BUS 75417 TO BUS 75420 CKT 1 /*STOLE230 230 HGHSHLDN 230 1 PROJECT NO. 144
FROM BUS 76510 TO BUS 75994 CKT 1 /*ANDOVER TO PALMT115 115KV OPERATED NORMALLY OPEN
FROM BUS 76702 TO BUS 77122 CKT 1 /*LOCKPORT 115 SOUR-111 115 1
FROM BUS 76702 TO BUS 77101 CKT 1 /*LOCKPORT 115 SHEL-113 115 1
FROM BUS 76702 TO BUS 77126 CKT 1 /*LOCKPORT 115 TELRDTP1 115 1
FROM BUS 76702 TO BUS 77115 CKT 1 /*LOCKPORT 115 NAKR-108 115 1
FROM BUS 76702 TO BUS 77125 CKT 1 /*LOCKPORT 115 TELRDPT1 115 1
FROM BUS 76702 TO BUS 77117 CKT 1 /*LOCKPORT 115 OAKFLDTP 115 1
FROM BUS 79584 TO BUS 79800 CKT 1 / NIAG 345 345 *ROCH 345 345 1
END
MONITOR INTERFACE 'DYSINGER-CLOSE'
FROM BUS 75404 TO BUS 79800 CKT 1 / KINTI345 345 *ROCH 345 345 1
FROM BUS 75417 TO BUS 75414 CKT 1 /*STOLE230 230 MEYER230 230 1 REPLACED BY PROJECT NO. 144
FROM BUS 75417 TO BUS 75420 CKT 1 /*STOLE230 230 HGHSHLDN 230 1 PROJECT NO. 144
FROM BUS 76510 TO BUS 75994 CKT 1 /*ANDOVER TO PALMT115 115KV OPERATED NORMALLY OPEN
FROM BUS 76702 TO BUS 77122 CKT 1 /*LOCKPORT 115 SOUR-111 115 1
FROM BUS 76702 TO BUS 77101 CKT 1 /*LOCKPORT 115 SHEL-113 115 1
FROM BUS 76702 TO BUS 77126 CKT 1 /*LOCKPORT 115 TELRDTP1 115 1
FROM BUS 76702 TO BUS 77115 CKT 1 /*LOCKPORT 115 NAKR-108 115 1
FROM BUS 76702 TO BUS 77125 CKT 1 /*LOCKPORT 115 TELRDPT1 115 1
FROM BUS 76702 TO BUS 77117 CKT 1 /*LOCKPORT 115 OAKFLDTP 115 1
FROM BUS 79584 TO BUS 79800 CKT 1 / NIAG 345 345 *ROCH 345 345 1
FROM BUS 2 TO BUS 74300 CKT 1 / BRANCHBG 500 RAMAPO 5 500
FROM BUS 4989 TO BUS 74328 CKT 1 / HUDSON-1 345 FARRGUT1 345
FROM BUS 5039 TO BUS 74329 CKT 1 / HUDSON-2 345 FARRGUT2 345
FROM BUS 4996 TO BUS 74371 CKT 1 / LINDEN 9 230 GOETHALS 230
FROM BUS 5028 TO BUS 79302 CKT 1 / WALDWICK 345 SMAHWAH1 345
FROM BUS 5028 TO BUS 79303 CKT 1 / WALDWICK 345 SMAHWAH2 345
FROM BUS 479 TO BUS 75407 CKT 1 / HOMER CY 345 WATRC345 345
FROM BUS 382 TO BUS 75413 CKT 1 / E.TOWNDA 230 HILSD230 230
FROM BUS 387 TO BUS 75457 CKT 1 / LAUREL L 115 GOUDY115 115
FROM BUS 383 TO BUS 75486 CKT 1 / E.SAYRE 115 N.WAV115 115
FROM BUS 81255 TO BUS 79589 CKT 1 / STLAWL34 230 MOSES E 230
FROM BUS 81256 TO BUS 79589 CKT 1 / STLAWL33 230 MOSES E 230
FROM BUS 9803 TO BUS 79311 CKT 1 / 9803* HCOR138 138 79311 BURNS138 138 1 RECO TIE
FROM BUS 9804 TO BUS 79302 CKT 1 / 9804* SMAH138 138 79302 SMAHWAH1 345 1 RECO TIE
FROM BUS 9804 TO BUS 79319 CKT 1 / 9804* SMAH138 138 79319 RAMP138 138 1 RECO TIE
FROM BUS 9806 TO BUS 79357 CKT 1 / 9806 CLOSTR6969.0 79357* SPARKILL69.0 1 RECO TIE
FROM BUS 9808 TO BUS 79362 CKT 1 / 9808 HCOR69 69.0 79362* WNYA69 69.0 1 RECO TIE
FROM BUS 9809 TO BUS 79327 CKT 1 / 9809 MONTVALE69.0 79327* BLUHILL 69.0 1 RECO TIE
FROM BUS 9809 TO BUS 79327 CKT 2 / 9809 MONTVALE69.0 79327* BLUHILL 69.0 2 RECO TIE
FROM BUS 9809 TO BUS 79400 CKT 1 / 9809* MONTVALE69.0 79400 L491T 69.0 1 RECO TIE
FROM BUS 9810 TO BUS 79340 CKT 1 / 9810* SMAH69 69.0 79340 HILB69 69.0 1 RECO TIE
FROM BUS 9811 TO BUS 79376 CKT 1 / 9811 HCOR34 34.5 79376* PEARL34 34.5 1 RECO TIE
FROM BUS 74959 TO BUS 74958 CKT 1 / NEPTCONV 345 NWBRG 345
FROM BUS 91099 TO BUS 74315 CKT 1 / LINDEN VFT
END
MONITOR INTERFACE 'WEST CENTRAL-OPEN'
FROM BUS 75417 TO BUS 75414 CKT 1 /*STOLE230 230 MEYER230 230 1 REPLACED BY PROJECT NO. 144
FROM BUS 75417 TO BUS 75420 CKT 1 /*STOLE230 230 HGHSHLDN 230 1 PROJECT NO. 144
FROM BUS 76510 TO BUS 75994 CKT 1 / ANDOVER TO PALMT115 115KV OPERATED NORMALLY OPEN
FROM BUS 77111 TO BUS 77110 CKT 1 / 3891 {MORTIMER 115} 3862 {LAWLER-1 115} 1
FROM BUS 77111 TO BUS 77463 CKT 1 / 3891 {MORTIMER 115} 3863 {LAWLER-2 115} 1
FROM BUS 79805 TO BUS 75893 CKT 1 / 5211 {CLYDE199 115} 3621 {SLEIG115 115} 1
FROM BUS 79805 TO BUS 77433 CKT 1 / 5211 {CLYDE199 115} 4140 {CLTNCORN 115} 1
FROM BUS 79875 TO BUS 77444 CKT 1 / 5212 {FARMNGTN34.5} 3865 {FARMGTN1 115} 1
FROM BUS 79875 TO BUS 77447 CKT 1 / 5212 {FARMNGTN34.5} 3868 {FRMGTN-4 115} 1
FROM BUS 79946 TO BUS 77447 CKT 1 / 5216 {S168 12.0} 3868 {FRMGTN-4 115} 1
FROM BUS 79810 TO BUS 75995 CKT 1 / 5265 {STA 162 115} 3616 {S.PER115 115} 1
FROM BUS 79801 TO BUS 77400 CKT 1 / 5436 {PANNELL3 345} 4143 {CLAY 345} 1
FROM BUS 79801 TO BUS 77400 CKT 2 / 5436 {PANNELL3 345} 4143 {CLAY 345} 2
FROM BUS 79825 TO BUS 77447 CKT 1 / 5438 {PANNELLI 115} 3868 {FRMGTN-4 115} 1
FROM BUS 79826 TO BUS 75892 CKT 1 / 5439 {QUAKER 115} 3592 {MACDN115 115} 1
FROM BUS 79826 TO BUS 75893 CKT 1 / 5439 {QUAKER 115} 3621 {SLEIG115 115} 1
FROM BUS 79918 TO BUS 79805 CKT 1 / CLYDE34 34.5 CLYDE199 115
FROM BUS 79922 TO BUS 75576 CKT 1 / C708 LB 34.5 WOLCOT34 34.5
FROM BUS 75901 TO BUS 75902 CKT 1 / BROWNS C 34.5 CLYDE34 (BROWNS TIE) 34.5
FROM BUS 79804 TO BUS 75893 CKT 1 / 79804 S121 B#2 115 75893* SLEIG115 115 1
FROM BUS 79874 TO BUS 77417 CKT 1 / 79874 STA127 34.5 77417* HOOKRD 115 1
END
MONITOR INTERFACE 'WEST CENTRAL-CLOSE'
FROM BUS 75417 TO BUS 75414 CKT 1 /*STOLE230 230 MEYER230 230 1 REPLACED BY PROJECT NO. 144
FROM BUS 75417 TO BUS 75420 CKT 1 /*STOLE230 230 HGHSHLDN 230 1 PROJECT NO. 144
FROM BUS 77111 TO BUS 77110 CKT 1 / 3891 {MORTIMER 115} 3862 {LAWLER-1 115} 1
FROM BUS 77111 TO BUS 77463 CKT 1 / 3891 {MORTIMER 115} 3863 {LAWLER-2 115} 1
FROM BUS 79805 TO BUS 75893 CKT 1 / 5211 {CLYDE199 115} 3621 {SLEIG115 115} 1
FROM BUS 79805 TO BUS 77433 CKT 1 / 5211 {CLYDE199 115} 4140 {CLTNCORN 115} 1
FROM BUS 79875 TO BUS 77444 CKT 1 / 5212 {FARMNGTN34.5} 3865 {FARMGTN1 115} 1

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FROM BUS 79875 TO BUS 77447 CKT 1 / 5212 { FARMNGTN34.5 } 3868 { FRMGTN-4 115 } 1
 FROM BUS 79946 TO BUS 77447 CKT 1 / 5216 { S168 12.0 } 3868 { FRMGTN-4 115 } 1
 FROM BUS 79810 TO BUS 75995 CKT 1 / 5265 { STA 162 115 } 3616 { S.PER115 115 } 1
 FROM BUS 79801 TO BUS 77400 CKT 1 / 5436 { PANNELL3 345 } 4143 { CLAY 345 } 1
 FROM BUS 79801 TO BUS 77400 CKT 2 / 5436 { PANNELL3 345 } 4143 { CLAY 345 } 2
 FROM BUS 79825 TO BUS 77447 CKT 1 / 5438 { PANNELLI 115 } 3868 { FRMGTN-4 115 } 1
 FROM BUS 79826 TO BUS 75892 CKT 1 / 5439 { QUAKER 115 } 3592 { MACDN115 115 } 1
 FROM BUS 76510 TO BUS 75994 CKT 1 / ANDOVER1 115 PALMT115 115 OPERATED NORMALLY OPEN
 FROM BUS 79826 TO BUS 75893 CKT 1 / 5439 { QUAKER 115 } 3621 { SLEIG115 115 } 1
 FROM BUS 79918 TO BUS 79805 CKT 1 / CLYDE34 34.5 CLYDE199 115
 FROM BUS 79922 TO BUS 75576 CKT 1 / C708 LB 34.5 WOLCOT34 34.5
 FROM BUS 75901 TO BUS 75902 CKT 1 / BROWNS C 34.5 CLYDE34 (BROWNS TIE) 34.5
 FROM BUS 79804 TO BUS 75893 CKT 1 / 79804 S121 B#2 115 75893* SLEIG115 115 1
 FROM BUS 79874 TO BUS 77417 CKT 1 / 79874 STA127 34.5 77417* HOOKRD 115 1
 FROM BUS 2 TO BUS 74300 CKT 1 / BRANCHBG 500 RAMAPO 5 500
 FROM BUS 4989 TO BUS 74328 CKT 1 / HUDSON-1 345 FARRGUT1 345
 FROM BUS 5039 TO BUS 74329 CKT 1 / HUDSON-2 345 FARRGUT2 345
 FROM BUS 4996 TO BUS 74371 CKT 1 / LINDEN 9 230 GOETHALS 230
 FROM BUS 5028 TO BUS 79302 CKT 1 / WALDWICK 345 SMAHWAH1 345
 FROM BUS 5028 TO BUS 79303 CKT 1 / WALDWICK 345 SMAHWAH2 345
 FROM BUS 479 TO BUS 75407 CKT 1 / HOMER CY 345 WATRC345 345
 FROM BUS 382 TO BUS 75413 CKT 1 / E.TOWNDA 230 HILSD230 230
 FROM BUS 387 TO BUS 75457 CKT 1 / LAUREL L 115 GOUDY115 115
 FROM BUS 383 TO BUS 75486 CKT 1 / E.SAYRE 115 N.WAV115 115
 FROM BUS 81255 TO BUS 79589 CKT 1 / STLAWL34 230 MOSES E 230
 FROM BUS 81256 TO BUS 79589 CKT 1 / STLAWL33 230 MOSES E 230
 FROM BUS 9803 TO BUS 79311 CKT 1 / 9803* HCOR138 138 79311 BURNS138 138 1 RECO TIE
 FROM BUS 9804 TO BUS 79302 CKT 1 / 9804* SMAH138 138 79302 SMAHWAH1 345 1 RECO TIE
 FROM BUS 9804 TO BUS 79319 CKT 1 / 9804* SMAH138 138 79319 RAMP138 138 1 RECO TIE
 FROM BUS 9806 TO BUS 79357 CKT 1 / 9806 CLOSTR6969.0 79357* SPARKILL69.0 1 RECO TIE
 FROM BUS 9808 TO BUS 79362 CKT 1 / 9808 HCOR69 69.0 79362* WNYA69 69.0 1 RECO TIE
 FROM BUS 9809 TO BUS 79327 CKT 1 / 9809 MONTVALE69.0 79327* BLUHILL 69.0 1 RECO TIE
 FROM BUS 9809 TO BUS 79327 CKT 2 / 9809 MONTVALE69.0 79327* BLUHILL 69.0 2 RECO TIE
 FROM BUS 9809 TO BUS 79400 CKT 1 / 9809* MONTVALE69.0 79400 L491T 69.0 1 RECO TIE
 FROM BUS 9810 TO BUS 79340 CKT 1 / 9810* SMAH69 69.0 79340 HILB69 69.0 1 RECO TIE
 FROM BUS 9811 TO BUS 79376 CKT 1 / 9811 HCOR34 34.5 79376* PEARL34 34.5 1 RECO TIE
 FROM BUS 74959 TO BUS 74958 CKT 1 / NEPTCONV 345 NWBRG 345
 FROM BUS 91099 TO BUS 74315 CKT 1 / LINDEN VFT
 END
 MONITOR INTERFACE 'MOSES SOUTH-OPEN'
 FROM BUS 78000 TO BUS 78010 CKT 1 / 4155* ALCOA-NM 115 4169 BROWNING 115 1
 FROM BUS 78017 TO BUS 78002 CKT 1 / 4191* DENNISON 115 4156 ANDRWS-4 115 1
 FROM BUS 78017 TO BUS 78032 CKT 1 / 4191 DENNISON 115 4229* LWRNCE-B 115 1
 FROM BUS 79578 TO BUS 79577 CKT 1 / 4888* MASSA765 765 4887 MARCY765 765 1
 FROM BUS 79590 TO BUS 79585 CKT 1 / 4903* MOSES-WM 230 4898 ADRONIB1 230 1
 FROM BUS 79590 TO BUS 79586 CKT 1 / 4903* MOSES-WM 230 4899 ADRONIB2 230 1
 FROM BUS 78001 TO BUS 78014 CKT 1 / ALLENS F 115 COLTON 115
 END
 MONITOR INTERFACE 'MOSES SOUTH-CLOSE'
 FROM BUS 78000 TO BUS 78010 CKT 1 / 4155* ALCOA-NM 115 4169 BROWNING 115 1
 FROM BUS 78017 TO BUS 78002 CKT 1 / 4191* DENNISON 115 4156 ANDRWS-4 115 1
 FROM BUS 78017 TO BUS 78032 CKT 1 / 4191 DENNISON 115 4229* LWRNCE-B 115 1
 FROM BUS 79578 TO BUS 79577 CKT 1 / 4888* MASSA765 765 4887 MARCY765 765 1
 FROM BUS 79590 TO BUS 79585 CKT 1 / 4903* MOSES-WM 230 4898 ADRONIB1 230 1
 FROM BUS 79590 TO BUS 79586 CKT 1 / 4903* MOSES-WM 230 4899 ADRONIB2 230 1
 FROM BUS 78001 TO BUS 78014 CKT 1 / ALLENS F 115 COLTON 115
 FROM BUS 79589 TO BUS 81255 CKT 1 / MOSES E 230 STLAWL34 230
 FROM BUS 79589 TO BUS 81256 CKT 1 / MOSES E 230 STLAWL33 230
 FROM BUS 79602 TO BUS 70511 CKT 1 / PLAT T#3 115 GRAND IS 115
 END
 MONITOR INTERFACE 'TOTAL-EAST' / RATING 6500 / STABILITY RATING 4 OSWEGO UNITS
 FROM BUS 75512 TO BUS 76210 CKT 1 / W.WDB115 115 W.WDBR6969.0
 FROM BUS 75403 TO BUS 79581 CKT 1 / FRASR345 345 GILB 345 345
 FROM BUS 75400 TO BUS 79304 CKT 1 / COOPC345 345 SHOEMTAP 345
 FROM BUS 75400 TO BUS 74001 CKT 2 / COOPC345 345 ROCKTAV 345
 FROM BUS 2 TO BUS 74300 CKT 1 / BRANCHBG 500 RAMAPO 5 500
 FROM BUS 4989 TO BUS 74328 CKT 1 / HUDSON 1 345 FARRGUT1 345
 FROM BUS 5039 TO BUS 74329 CKT 1 / HUDSON 2 345 FARRGUT2 345
 FROM BUS 4996 TO BUS 74371 CKT 1 / LINDEN 230 GOETHALS 230
 FROM BUS 5028 TO BUS 79302 CKT 1 / WALDWICK 345 SMAHWAH1 345
 FROM BUS 5028 TO BUS 79303 CKT 1 / WALDWICK 345 SMAHWAH2 345
 FROM BUS 75447 TO BUS 79136 CKT 1 / E.SPR115 115 INGHAM-E 115 } 1
 FROM BUS 78450 TO BUS 78702 CKT 1 / EDIC 345 N.SCOT77 345 } 1
 FROM BUS 78460 TO BUS 78980 CKT 1 / PORTER 2 230 ROTRDM.2 230 } 1 REPLACED BY PROJECT NO. 186
 FROM BUS 78454 TO BUS 78980 CKT 1 / JORDANVILLE 230 ROTRDM.2 230 } 1 PROJECT NO. 186
 FROM BUS 78460 TO BUS 78980 CKT 2 / PORTER 2 230 ROTRDM.2 230 } 2
 FROM BUS 78478 TO BUS 79136 CKT 1 / INGMS-CD 115 INGHAM-E 115 } 1
 FROM BUS 79583 TO BUS 78703 CKT 1 / MARCY T1 345 N.SCOT99 345 } 1
 FROM BUS 79602 TO BUS 70511 CKT 1 / PLAT T#3 115 GRAND IS 115 } 1
 FROM BUS 9803 TO BUS 79311 CKT 1 / 9803* HCOR138 138 79311 BURNS138 138 1 RECO TIE
 FROM BUS 9804 TO BUS 79302 CKT 1 / 9804* SMAH138 138 79302 SMAHWAH1 345 1 RECO TIE

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FROM BUS 9804 TO BUS 79319 CKT 1 / 9804* SMAH138 138 79319 RAMP138 138 1 RECO TIE
FROM BUS 9806 TO BUS 79357 CKT 1 / 9806 CLOSTR6969.0 79357* SPARKILL69.0 1 RECO TIE
FROM BUS 9808 TO BUS 79362 CKT 1 / 9808 HCOR69 69.0 79362* WNYA69 69.0 1 RECO TIE
FROM BUS 9809 TO BUS 79327 CKT 1 / 9809 MONTVALE69.0 79327* BLUHILL 69.0 1 RECO TIE
FROM BUS 9809 TO BUS 79327 CKT 2 / 9809 MONTVALE69.0 79327* BLUHILL 69.0 2 RECO TIE
FROM BUS 9809 TO BUS 79400 CKT 1 / 9809* MONTVALE69.0 79400 L491T 69.0 1 RECO TIE
FROM BUS 9810 TO BUS 79340 CKT 1 / 9810* SMAH69 69.0 79340 HILB69 69.0 1 RECO TIE
FROM BUS 9811 TO BUS 79376 CKT 1 / 9811 HCOR34 34.5 79376* PEARL34 34.5 1 RECO TIE
FROM BUS 74959 TO BUS 74958 CKT 1 / NEPTCONV 345 NWBRG 345
FROM BUS 91099 TO BUS 74315 CKT 1 / LINDEN VFT
END
MONITOR INTERFACE 'CENTRAL-EAST' / RATINGS 3100 3100 3100 / STABILITY RATING 3 OSWEGO UNITS
FROM BUS 75447 TO BUS 79136 CKT 1 / E.SPR115 115 INGHAM-E 115} 1
FROM BUS 78450 TO BUS 78702 CKT 1 / EDIC 345 N.SCOT77 345} 1
FROM BUS 78460 TO BUS 78980 CKT 1 / PORTER 2 230 ROTRDM.2 230} 1 REPLACED BY PROJECT NO. 186
FROM BUS 78454 TO BUS 78980 CKT 1 / JORDANVILLE 230 ROTRDM.2 230} 1 PROJECT NO. 186
FROM BUS 78460 TO BUS 78980 CKT 2 / PORTER 2 230 ROTRDM.2 230} 2
FROM BUS 78478 TO BUS 79136 CKT 1 / INGMS-CD 115 INGHAM-E 115} 1
FROM BUS 79583 TO BUS 78703 CKT 1 / MARCY T1 345 N.SCOT99 345} 1
FROM BUS 79602 TO BUS 70511 CKT 1 / PLAT T#3 115 GRAND IS 115} 1
END
MONITOR INTERFACE 'SPRAIN BROOK DUNWOODIE SOUTH-OPEN'
FROM BUS 74316 TO BUS 75000 CKT 1 / DUNWODIE 345 SHORE RD 345
FROM BUS 74348 TO BUS 74351 CKT 1 / SPRBROOK 345 TREMONT 345
FROM BUS 74349 TO BUS 79607 CKT 1 / REACBUS 345 DVNPT NK 345
FROM BUS 74420 TO BUS 74533 CKT 1 / DUN NO1R 138 S CREEK 138
FROM BUS 74421 TO BUS 74533 CKT 1 / DUN NO2R 138 S CREEK 138
FROM BUS 74424 TO BUS 74435 CKT 1 / DUN SO1R 138 E179 ST 138
FROM BUS 74567 TO BUS 74354 CKT 1 / REACTORM51 W 49 ST 345
FROM BUS 74568 TO BUS 74354 CKT 2 / REACTORM51 W 49 ST 345
FROM BUS 74650 TO BUS 74691 CKT 3 / REAC71 345 S. BRONX 345
FROM BUS 74651 TO BUS 74691 CKT 4 / REAC72 345 S. BRONX 345
FROM BUS 74348 TO BUS 74897 CKT 1 / SPRBROOK 345 SHERMAN CREEK 345 M29 PROJECT
END
MONITOR INTERFACE 'SPRAIN BROOK DUNWOODIE SOUTH-CLOSE'
FROM BUS 74316 TO BUS 75000 CKT 1 / DUNWODIE 345 SHORE RD 345
FROM BUS 74348 TO BUS 74351 CKT 1 / SPRBROOK 345 TREMONT 345
FROM BUS 74349 TO BUS 79607 CKT 1 / REACBUS 345 DVNPT NK 345
FROM BUS 74420 TO BUS 74533 CKT 1 / DUN NO1R 138 S CREEK 138
FROM BUS 74421 TO BUS 74533 CKT 1 / DUN NO2R 138 S CREEK 138
FROM BUS 74424 TO BUS 74435 CKT 1 / DUN SO1R 138 E179 ST 138
FROM BUS 74567 TO BUS 74354 CKT 1 / REACTORM51 W 49 ST 345
FROM BUS 74568 TO BUS 74354 CKT 2 / REACTORM51 W 49 ST 345
FROM BUS 74650 TO BUS 74691 CKT 3 / REAC71 345 S. BRONX 345
FROM BUS 74651 TO BUS 74691 CKT 4 / REAC72 345 S. BRONX 345
FROM BUS 4989 TO BUS 74328 CKT 1 / HUDSON-1 345 FARRGUT1 345
FROM BUS 4996 TO BUS 74371 CKT 1 / LINDEN 9 230 GOETHALS 230
FROM BUS 5039 TO BUS 74329 CKT 1 / HUDSON-2 345 FARRGUT2 345
FROM BUS 73166 TO BUS 75053 CKT 1 / NORHR138 138 NRTHPT P 138
FROM BUS 75078 TO BUS 75062 CKT 1 / SHMHVDCL 138 SHOREHAM 138
FROM BUS 74348 TO BUS 74897 CKT 1 / SPRBROOK 345 SHERMAN CREEK 345 M29 PROJECT
FROM BUS 74959 TO BUS 74958 CKT 1 / NEPTCONV 345 NWBRG 345 PJM-LI HVDC PROJECT
FROM BUS 91099 TO BUS 74315 CKT 1 / LINDEN VFT LINDEN VFT PROJECT
END

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Appendix C

Thermal Results

Branch Violations

PSS/MUST 8.2 -- Managing and Utilizing System Transmission -- TUE, OCT 03 2006 10:02
 2006 CLASS YEAR ATBA BASE CASE
 2011 SUMMER PEAK LOAD W/ UPDATE PJM REP
 Case.File C:\SHARE\CY06\CY06ATBA-SUM11-4.sav
 Subsys.File C:\SHARE\CY06\thermal\CY2006_NY.sub
 Monit.File C:\SHARE\CY06\thermal\CY2006_NY.mon
 Contin.File C:\SHARE\CY06\thermal\CY2006_NY.con
 Exclud.File C:\SHARE\CY06\thermal\CY2006_atba_atra.exc

Study transfer not defined

***** Report on violations *****

Note: some contingencies generated by MUST as a result of the user defined may not be a valid contingency.

Branches with MW flow more than 100.0 % of nominal rating

**	From bus	** **	To bus	** CKT	ContMW	BaseFlo w	Rating	ContLd%	Ncon	Contingency
78033	MALONE	115	78168 MALONE 3	34.5 2	13.1	13.1	11.9	110		** Base Case **
78041	NICHOLVL	115	78176 NICHOLVI	34.5 1	24.1	24.1	13.8	175		** Base Case **
74020	DANSKAMA	115	74021 DC CBLTP	115 1	272.7	143.4	199.0	137	15	74015 AC CBLTP 115 74020 DANSKAMA 115 1
74021	DC CBLTP	115	74041 N.CHELSE	115 1	272.5	143.2	253.0	108	15	74015 AC CBLTP 115 74020 DANSKAMA 115 1
74020	DANSKAMA	115	74021 DC CBLTP	115 1	272.5	143.4	199.0	137	16	74015 AC CBLTP 115 74041 N.CHELSE 115 1
74021	DC CBLTP	115	74041 N.CHELSE	115 1	272.3	143.2	253.0	108	16	74015 AC CBLTP 115 74041 N.CHELSE 115 1
74015	AC CBLTP	115	74020 DANSKAMA	115 1	-272.0	-138.7	211.0	129	26	74020 DANSKAMA 115 74021 DC CBLTP 115 1
74015	AC CBLTP	115	74041 N.CHELSE	115 1	271.8	138.5	211.0	129	26	74020 DANSKAMA 115 74021 DC CBLTP 115 1
74015	AC CBLTP	115	74020 DANSKAMA	115 1	-271.9	-138.7	211.0	129	30	74021 DC CBLTP 115 74041 N.CHELSE 115 1
74015	AC CBLTP	115	74041 N.CHELSE	115 1	271.7	138.5	211.0	129	30	74021 DC CBLTP 115 74041 N.CHELSE 115 1
79316	LOVET138	138	79324 BOW138	138 1	-318.2	-46.1	288.9	110	72	74311 BOWLINE2 345 74340 LADENTWN 345 1
74323	E15ST 46	345	74327 FARRAGUT	345 1	-1047.8	-544.9	914.0	115	104	74322 E15ST 45 345 74327 FARRAGUT 345 1
74322	E15ST 45	345	74327 FARRAGUT	345 1	-1048.6	-549.6	893.0	117	108	74323 E15ST 46 345 74327 FARRAGUT 345 1
5028	WALDWICK	345	79303 SMAHWAH2	345 1	-1059.9	-553.3	793.0	134	179	74347 RAMAPO 345 79302 SMAHWAH1 345 1
5028	WALDWICK	345	79302 SMAHWAH1	345 1	-925.2	-432.1	758.0	122	180	74347 RAMAPO 345 79303 SMAHWAH2 345 1
74958	NWBRG	345	75050 NEWBRGE	138 2	660.2	330.1	585.0	113	459	74958 NWBRG 345 75050 NEWBRGE 138 1
74958	NWBRG	345	75050 NEWBRGE	138 1	660.2	330.1	585.0	113	460	74958 NWBRG 345 75050 NEWBRGE 138 2
75581	STEPH115	115	75652 STEPHT34	34.5 1	36.3	17.3	33.3	109	606	75435 CHURC115 115 75443 CRARY115 115 1
76539	NILE115	115	76610 NILEXFR	34.5 1	-17.5	4.6	12.7	137	810	76522 DUGN-157 115 76539 NILE115 115 1
76750	45KTS153	115	76847 KTS23	23.0 2	57.4	30.1	51.6	111	924	76700 GRDNVL1 115 76749 44KTS153 115 1
76749	44KTS153	115	76847 KTS23	23.0 4	56.8	29.9	51.6	110	925	76700 GRDNVL1 115 76750 45KTS153 115 1
76749	44KTS153	115	76847 KTS23	23.0 5	55.9	29.4	51.6	108	925	76700 GRDNVL1 115 76750 45KTS153 115 1
76711	PACK(S)W	115	79601 NIAG115W	115 3	-276.7	-193.6	253.0	109	958	76711 PACK(S)W 115 79601 NIAG115W 115 1
76711	PACK(S)W	115	79601 NIAG115W	115 3	-276.7	-193.6	253.0	109	959	76711 PACK(S)W 115 79601 NIAG115W 115 2
77419	A/B_LYS9	115	77958 ANH-BSC1	13.2 1	24.7	7.3	14.9	166	1088	77416 A/B_LY13 115 77423 ANHBS-13 115 1
77419	A/B_LYS9	115	77959 ANH-BSC2	4.16 1	19.8	6.8	11.3	176	1088	77416 A/B_LY13 115 77423 ANHBS-13 115 1
77488	SOLVAY-B	115	77852 SOLVAY34	34.5 1	-85.7	8.5	27.0	317	1155	77450 GERES LK 115 77519 SOLVTAP2 115 1
77489	SOLVAY-N	115	77852 SOLVAY34	34.5 3	33.2	7.9	24.3	137	1155	77450 GERES LK 115 77519 SOLVTAP2 115 1
77489	SOLVAY-N	115	77852 SOLVAY34	34.5 4	33.2	7.3	25.8	129	1155	77450 GERES LK 115 77519 SOLVTAP2 115 1
77488	SOLVAY-B	115	77852 SOLVAY34	34.5 1	30.9	8.5	27.0	115	1156	77450 GERES LK 115 77520 CRUC TAP 115 1
77488	SOLVAY-B	115	77852 SOLVAY34	34.5 1	-32.6	8.5	27.0	121	1189	77488 SOLVAY-B 115 77519 SOLVTAP2 115 1

78001 ALLENS F	115	78014 COLTON	115	1	-149.2	-64.3	128.0	117	1266	78033 MALONE	115	79606 WILL 115	115	1
78001 ALLENS F	115	78045 PARISHVL	115	1	151.1	66.2	144.0	105	1266	78033 MALONE	115	79606 WILL 115	115	1
78041 NICHOLVL	115	78045 PARISHVL	115	1	-151.3	-66.4	143.8	105	1266	78033 MALONE	115	79606 WILL 115	115	1
78478 INGMS-CD	115	78552 INGHAMS	46.0	1	-13.5	-7.1	12.2	111	1311	78478 INGMS-CD	115	78498 SALBRY4	115	1
78478 INGMS-CD	115	78552 INGHAMS	46.0	1	-14.3	-7.1	12.2	117	1335	78496 VALLEY	115	78498 SALBRY4	115	1
78766 N.SCOT1	115	78797 UNVL 9TP	115	1	120.6	94.7	120.0	101	1351	78704 REYNLD3	345	78778 REY. RD.	115	1
78770 OC W +MG	115	78797 UNVL 9TP	115	1	-120.6	-94.7	120.0	101	1351	78704 REYNLD3	345	78778 REY. RD.	115	1
78760 JMC2+9TP	115	78770 OC W +MG	115	1	-132.0	-79.0	120.0	110	1394	78760 JMC2+9TP	115	78766 N.SCOT1	115	1
78766 N.SCOT1	115	78797 UNVL 9TP	115	1	147.1	94.7	120.0	123	1394	78760 JMC2+9TP	115	78766 N.SCOT1	115	1
78770 OC W +MG	115	78797 UNVL 9TP	115	1	-147.1	-94.7	120.0	123	1394	78760 JMC2+9TP	115	78766 N.SCOT1	115	1
79118 BROOK1	115	79296 BROOK	34.5	1	-48.6	21.0	34.6	140	1471	79117 BROOK W	115	79118 BROOK1	115	1
74018 SUGARLF	115	74046 ROCK TV1	115	1	-221.0	-141.9	204.0	108	1524	79304 MDTN TAP	345	79322 SHOEMTAP	138	1
74018 SUGARLF	115	79359 SGRLF69	69.0	1	220.4	141.3	204.0	108	1524	79304 MDTN TAP	345	79322 SHOEMTAP	138	1
74018 SUGARLF	115	74046 ROCK TV1	115	1	-221.0	-141.9	204.0	108	1542	79321 SHOEM138	138	79322 SHOEMTAP	138	1
74018 SUGARLF	115	79359 SGRLF69	69.0	1	220.4	141.3	204.0	108	1542	79321 SHOEM138	138	79322 SHOEMTAP	138	1
79611 TR-TAP2	115	79615 REYN T#2	115	1	159.9	74.2	145.0	110	1583	79599 MOS 115	115	79610 TR-TAP1	115	1
79614 REYN T#1	115	79760 GM T#1	115	1	-79.7	6.0	50.0	159	1583	79599 MOS 115	115	79610 TR-TAP1	115	1
79615 REYN T#2	115	79761 GM T#2	115	2	91.7	6.0	50.0	183	1583	79599 MOS 115	115	79610 TR-TAP1	115	1
79760 GM T#1	115	79767 GM-CFD	13.8	1	-79.7	6.0	50.0	159	1583	79599 MOS 115	115	79610 TR-TAP1	115	1
79761 GM T#2	115	79767 GM-CFD	13.8	1	91.7	6.0	50.0	183	1583	79599 MOS 115	115	79610 TR-TAP1	115	1
79610 TR-TAP1	115	79614 REYN T#1	115	1	159.9	74.2	145.0	110	1584	79599 MOS 115	115	79611 TR-TAP2	115	1
79614 REYN T#1	115	79760 GM T#1	115	1	91.7	6.0	50.0	183	1584	79599 MOS 115	115	79611 TR-TAP2	115	1
79615 REYN T#2	115	79761 GM T#2	115	2	-79.7	6.0	50.0	159	1584	79599 MOS 115	115	79611 TR-TAP2	115	1
79760 GM T#1	115	79767 GM-CFD	13.8	1	91.7	6.0	50.0	183	1584	79599 MOS 115	115	79611 TR-TAP2	115	1
79761 GM T#2	115	79767 GM-CFD	13.8	1	-79.7	6.0	50.0	159	1584	79599 MOS 115	115	79611 TR-TAP2	115	1
79611 TR-TAP2	115	79615 REYN T#2	115	1	148.4	74.2	145.0	102	1589	79610 TR-TAP1	115	79614 REYN T#1	115	1
79614 REYN T#1	115	79760 GM T#1	115	1	-68.2	6.0	50.0	136	1589	79610 TR-TAP1	115	79614 REYN T#1	115	1
79615 REYN T#2	115	79761 GM T#2	115	2	80.2	6.0	50.0	160	1589	79610 TR-TAP1	115	79614 REYN T#1	115	1
79760 GM T#1	115	79767 GM-CFD	13.8	1	-68.2	6.0	50.0	136	1589	79610 TR-TAP1	115	79614 REYN T#1	115	1
79761 GM T#2	115	79767 GM-CFD	13.8	1	80.2	6.0	50.0	160	1589	79610 TR-TAP1	115	79614 REYN T#1	115	1
79610 TR-TAP1	115	79614 REYN T#1	115	1	148.4	74.2	145.0	102	1591	79611 TR-TAP2	115	79615 REYN T#2	115	1
79614 REYN T#1	115	79760 GM T#1	115	1	80.2	6.0	50.0	160	1591	79611 TR-TAP2	115	79615 REYN T#2	115	1
79615 REYN T#2	115	79761 GM T#2	115	2	-68.2	6.0	50.0	136	1591	79611 TR-TAP2	115	79615 REYN T#2	115	1
79760 GM T#1	115	79767 GM-CFD	13.8	1	80.2	6.0	50.0	160	1591	79611 TR-TAP2	115	79615 REYN T#2	115	1
79761 GM T#2	115	79767 GM-CFD	13.8	1	-68.2	6.0	50.0	136	1591	79611 TR-TAP2	115	79615 REYN T#2	115	1
79674 PMLD 2	115	79677 PMLD2-46	46.0	1	43.8	12.2	40.0	110	1600	79673 PMLD 1	115	79675 PMLD 3	115	1
79813 S37 115	115	79848 S67-2115	115	1	-285.5	-169.9	280.0	102	1636	79811 S82-1115	115	79834 JCT 921	115	1
79828 S204 908	115	79912 S204 34	34.5	1	71.1	43.5	67.0	106	1659	79827 STA 424	115	79830 S204-909	115	1
79813 S37 115	115	79848 S67-2115	115	1	-285.5	-169.9	280.0	102	1664	79834 JCT 921	115	79847 S48-1115	115	1
5028 WALDWICK	345	79303 SMAHWAH2	345	1	-935.6	-553.3	793.0	118	1681	5028 WALDWICK	345	79302 SMAHWAH1	345	1
5028 WALDWICK	345	79302 SMAHWAH1	345	1	-924.1	-432.1	758.0	122	1682	5028 WALDWICK	345	79303 SMAHWAH2	345	1
74040 N.CAT. 1	115	74116 N.CAT 6	69.0	5	56.5	33.4	55.0	103	1706	74040 N.CAT. 1	115	74116 N.CAT 6	69.0	4
74033 KNAPPS 1	115	74107 KNAPPS 6	69.0	1	49.4	20.5	49.0	101	1710	74043 PL.VAL 1	115	74120 PL.VAL 6	69.0	10
74338 IP2 345	345	74701 IND PT 2	22.0	2	-1032.3	-516.2	607.0	170	1733	74338 IP2 345	345	74701 IND PT 2	22.0	1
74338 IP2 345	345	74701 IND PT 2	22.0	1	-1032.3	-516.2	607.0	170	1734	74338 IP2 345	345	74701 IND PT 2	22.0	2
74403 ASTORIAW	138	74704 AST 3	20.0	2	-352.0	-176.0	306.0	115	1774	74403 ASTORIAW	138	74704 AST 3	20.0	1
74403 ASTORIAW	138	74704 AST 3	20.0	1	-352.0	-176.0	306.0	115	1775	74403 ASTORIAW	138	74704 AST 3	20.0	2
75477 MILKN115	115	76111 MILKN 2	18.0	2	-125.6	-63.0	97.7	129	2173	75477 MILKN115	115	76111 MILKN 2	18.0	1
75477 MILKN115	115	76111 MILKN 2	18.0	1	-125.6	-62.6	97.7	129	2174	75477 MILKN115	115	76111 MILKN 2	18.0	2
75477 MILKN115	115	76112 MILKN 1	13.8	2	-125.6	-62.9	94.6	133	2175	75477 MILKN115	115	76112 MILKN 1	13.8	1
75477 MILKN115	115	76112 MILKN 1	13.8	1	-125.6	-62.7	94.6	133	2176	75477 MILKN115	115	76112 MILKN 1	13.8	2
75453 FLATS115	115	75909 FLAT ST2	34.5	1	44.9	22.8	40.8	110	2228	75891 GRNDG115	115	75915 GRNIDG34	34.5	1

75891 GRNDG115	115	75964 GRNIDG 4	13.8	2	-107.3	-53.0	84.2	127	2230	75891 GRNDG115	115	75964 GRNIDG 4	13.8	1
75891 GRNDG115	115	75964 GRNIDG 4	13.8	1	-107.3	-54.2	75.0	143	2231	75891 GRNDG115	115	75964 GRNIDG 4	13.8	2
77119 PTSFD-24	115	79911 STA 56	34.5	2	69.1	44.8	56.0	123	2414	77119 PTSFD-23	115	79911 STA 56	34.5	1
77118 PTSFD-23	115	79911 STA 56	34.5	1	68.2	43.0	56.0	122	2415	77119 PTSFD-24	115	79911 STA 56	34.5	2
77447 FRMGTN-4	115	79875 FARMNGTN	34.5	1	68.0	44.9	67.0	102	2446	77444 FARMGTN1	115	79875 FARMNGTN	34.5	1
77444 FARMGTN1	115	79875 FARMNGTN	34.5	1	68.0	23.1	67.0	102	2447	77447 FRMGTN-4	115	79875 FARMNGTN	34.5	1
77466 LTHSE HL	115	77963 LIGHHILL	12.0	1	-23.9	-14.0	20.1	119	2466	77466 LTHSE HL	115	77963 LIGHHILL	12.0	2
78032 LWRNCE-B	115	78403 LAWRENCE	13.2	1	16.3	8.1	10.0	163	2507	78031 LWRNCE-A	115	78403 LAWRENCE	13.2	1
78031 LWRNCE-A	115	78403 LAWRENCE	13.2	1	16.3	8.2	10.0	163	2508	78032 LWRNCE-B	115	78403 LAWRENCE	13.2	1
78033 MALONE	115	78168 MALONE 3	34.5	1	23.3	10.2	12.9	181	2510	78033 MALONE	115	78168 MALONE 3	34.5	2
79548 IP#3 GEN	22.0	79582 IP3 345	345	2	1046.5	521.2	607.0	172	2640	79548 IP#3 GEN	22.0	79582 IP3 345	345	1
79548 IP#3 GEN	22.0	79582 IP3 345	345	1	1046.5	525.3	607.0	172	2641	79548 IP#3 GEN	22.0	79582 IP3 345	345	2
79828 S204 908	115	79912 S204 34	34.5	1	70.9	43.5	67.0	106	2676	79827 STA 424	115	79910 STA 424	34.5	1
79828 S204 908	115	79912 S204 34	34.5	1	67.7	43.5	67.0	101	2678	79829 S204 911	115	79912 S204 34	34.5	1
79833 S42 115	115	79981 STA42 B	11.5	4	33.7	27.1	32.8	103	2683	79833 S42 115	115	79907 S42 34-3	34.5	1
74348 SPRBROOK	345	74423 DUN SO T	138	7	450.6	249.0	440.0	102	2701	TWR:W89&W90				
74422 DUN SO	138	74423 DUN SO T	138	1	-450.6	-249.0	440.0	102	2701	TWR:W89&W90				
74332 FR KILLS	345	74470 FRKILLSR	138	1	489.4	180.0	414.0	118	2704	TWR:21&22				
74468 FR-KILLS	138	74470 FRKILLSR	138	1	-489.1	-179.7	414.0	118	2704	TWR:21&22				
74039 MODENA 1	115	74113 MODENA 6	69.0	1	-60.8	-13.2	41.0	148	2710	TWR:34&42				
75512 W.WDB115	115	76210 W.WDBR69	69.0	1	91.1	16.7	48.3	189	2710	TWR:34&42				
79311 BURNS138	138	79313 MONSEY	138	1	-609.1	-146.0	466.7	131	2718	TWR:67&68&BW				
79313 MONSEY	138	79361 TALLMAN	138	1	-642.4	-179.2	480.0	134	2718	TWR:67&68&BW				
79319 RAMP138	138	79361 TALLMAN	138	1	699.4	236.2	480.0	146	2718	TWR:67&68&BW				
76555 SAWYER80	230	76559 SAWYERB3	230	1	168.4	53.4	140.0	120	2730	TWR:77&78				
76559 SAWYERB3	230	76686 SAWYER23	23.0	1	168.3	53.3	128.0	132	2730	TWR:77&78				
76554 SAWYER78	230	76558 SAWYERB2	230	1	168.7	57.5	140.0	121	2731	TWR:77&80				
76558 SAWYERB2	230	76686 SAWYER23	23.0	1	168.6	57.4	128.0	132	2731	TWR:77&80				
76660 ELM-70	230	76837 ELMST23.	23.0	1	101.0	50.3	96.0	105	2733	TWR:79&80				
74435 E179 ST	138	74497 HG 6	138	1	392.8	186.6	365.0	108	2734	GEN:POLETTIX				
5028 WALDWICK	345	79303 SMAHWAH2	345	1	-938.7	-553.3	793.0	118	2768	SER:69 & J				
5028 WALDWICK	345	79302 SMAHWAH1	345	1	-924.4	-432.1	758.0	122	2769	SER:70 & K				
74018 SUGARLF	115	74046 ROCK TV1	115	1	-216.2	-141.9	204.0	106	2774	SER:CMT34&MTR34				
74018 SUGARLF	115	79359 SGRLF69	69.0	1	215.6	141.3	204.0	106	2774	SER:CMT34&MTR34				
74335 GOTHLS S	345	74337 GOWANUSS	345	1	811.0	490.7	759.0	107	2856	SB:FRES_345_2				
74335 GOTHLS S	345	74337 GOWANUSS	345	1	817.4	490.7	759.0	108	2859	SB:FRES_345_6				
5028 WALDWICK	345	79302 SMAHWAH1	345	1	-924.2	-432.1	758.0	122	2897	SB:RMP_345_T-70-2				
5028 WALDWICK	345	79302 SMAHWAH1	345	1	-924.2	-432.1	758.0	122	2898	SB:RMP_345_70-2Y				
5028 WALDWICK	345	79303 SMAHWAH2	345	1	-943.8	-553.3	793.0	119	2899	SB:RMP_345_T-2500-69-2				
5028 WALDWICK	345	79303 SMAHWAH2	345	1	-943.8	-553.3	793.0	119	2900	SB:RMP_345_69-2Y				
74018 SUGARLF	115	74046 ROCK TV1	115	1	-215.9	-141.9	204.0	106	2961	SB:COOP_345_B2-3482				
74018 SUGARLF	115	79359 SGRLF69	69.0	1	215.4	141.3	204.0	106	2961	SB:COOP_345_B2-3482				
74018 SUGARLF	115	74046 ROCK TV1	115	1	-215.9	-141.9	204.0	106	2962	SB:COOP_345_34-B382				
74018 SUGARLF	115	79359 SGRLF69	69.0	1	215.4	141.3	204.0	106	2962	SB:COOP_345_34-B382				
78757 BOC 2T	115	78760 JMC2+9TP	115	1	-121.9	-88.6	120.0	102	2992	SB:HURL_345_30151				
78757 BOC 2T	115	78760 JMC2+9TP	115	1	-121.9	-88.6	120.0	102	2993	SB:HURL_345_30353				
78757 BOC 2T	115	78760 JMC2+9TP	115	1	-121.8	-88.6	120.0	102	2994	SB:HURL_345_30354				
79611 TR-TAP2	115	79615 REYN T#2	115	1	159.9	74.2	145.0	110	3022	SB:MOSE_115_1414				
79614 REYN T#1	115	79760 GM T#1	115	1	-79.7	6.0	50.0	159	3022	SB:MOSE_115_1414				
79615 REYN T#2	115	79761 GM T#2	115	2	91.7	6.0	50.0	183	3022	SB:MOSE_115_1414				
79760 GM T#1	115	79767 GM-CFD	13.8	1	-79.7	6.0	50.0	159	3022	SB:MOSE_115_1414				
79761 GM T#2	115	79767 GM-CFD	13.8	1	91.7	6.0	50.0	183	3022	SB:MOSE_115_1414				

79610	TR-TAP1	115	79614	REYN T#1	115	1	159.9	74.2	145.0	110	3027	SB:MOSE_115_1614
79614	REYN T#1	115	79760	GM T#1	115	1	91.7	6.0	50.0	183	3027	SB:MOSE_115_1614
79615	REYN T#2	115	79761	GM T#2	115	2	-79.7	6.0	50.0	159	3027	SB:MOSE_115_1614
79760	GM T#1	115	79767	GM-CFD	13.8	1	91.7	6.0	50.0	183	3027	SB:MOSE_115_1614
79761	GM T#2	115	79767	GM-CFD	13.8	1	-79.7	6.0	50.0	159	3027	SB:MOSE_115_1614
74018	SUGARLF	115	74046	ROCK TV1	115	1	-212.6	-141.9	204.0	104	3058	SB:ROCK_345_31153
74018	SUGARLF	115	79359	SGRLF69	69.0	1	212.0	141.3	204.0	104	3058	SB:ROCK_345_31153
78782	RTRDM1	115	78980	ROTRDM.2	230	2	-361.8	-206.8	355.0	102	3067	SB:ROTT_230_R84
79800	ROCH 345	345	79819	S80 1TR	115	1	250.0	156.7	236.0	106	3116	SB:ROCH_345_1X8082
79800	ROCH 345	345	79819	S80 1TR	115	1	261.4	156.7	236.0	111	3117	SB:ROCH_345_2T8082
79800	ROCH 345	345	79821	S80 3TR	115	3	260.2	156.0	251.0	104	3117	SB:ROCH_345_2T8082
79819	S80 1TR	115	79849	S82 B#3	115	1	473.7	264.8	462.0	103	3117	SB:ROCH_345_2T8082
74020	DANSKAMA	115	74021	DC CBLTP	115	1	200.1	143.4	199.0	101	3171	SIN:430

Branch Violations

PSS/MUST 8.2 -- Managing and Utilizing System Transmission -- TUE, OCT 03 2006 10:04
 2006 CLASS YEAR ATRA BASE CASE
 2011 SUMMER PEAK LOAD W/ UPDATE PJM REP
 Case.File C:\SHARE\CY06\CY06ATRA-SUM11.sav
 Subsys.File C:\SHARE\CY06\thermal\CY2006_NY.sub
 Monit.File C:\SHARE\CY06\thermal\CY2006_NY.mon
 Contin.File C:\SHARE\CY06\thermal\CY2006_NY.con
 Exclud.File C:\SHARE\CY06\thermal\CY2006_atba_atra.exc

Study transfer not defined

***** Report on violations *****

Note: some contingencies generated by MUST as a result of the user defined may not be a valid contingency.

Branches with MW flow more than 100.0 % of nominal rating

**	From bus	** **	To bus	** CKT	ContMW	w	Rating	ContLd%	Ncon	Contingency			
78033	MALONE	115	78168 MALONE 3	34.5 2	13.1	13.1	11.9	110		**	Base Case	**	
78041	NICHOLVL	115	78176 NICHOLVI	34.5 1	23.9	23.9	13.8	173		**	Base Case	**	
74020	DANSKAMA	115	74021 DC CBLTP	115 1	271.7	142.9	199.0	137	15	74015 AC CBLTP	115	74020 DANSKAMA	115 1
74021	DC CBLTP	115	74041 N.CHELSE	115 1	271.5	142.7	253.0	107	15	74015 AC CBLTP	115	74020 DANSKAMA	115 1
74020	DANSKAMA	115	74021 DC CBLTP	115 1	271.5	142.9	199.0	136	16	74015 AC CBLTP	115	74041 N.CHELSE	115 1
74021	DC CBLTP	115	74041 N.CHELSE	115 1	271.3	142.7	253.0	107	16	74015 AC CBLTP	115	74041 N.CHELSE	115 1
74015	AC CBLTP	115	74020 DANSKAMA	115 1	-271.1	-138.2	211.0	129	26	74020 DANSKAMA	115	74021 DC CBLTP	115 1
74015	AC CBLTP	115	74041 N.CHELSE	115 1	270.8	138.0	211.0	128	26	74020 DANSKAMA	115	74021 DC CBLTP	115 1
74015	AC CBLTP	115	74020 DANSKAMA	115 1	-270.9	-138.2	211.0	128	30	74021 DC CBLTP	115	74041 N.CHELSE	115 1
74015	AC CBLTP	115	74041 N.CHELSE	115 1	270.7	138.0	211.0	128	30	74021 DC CBLTP	115	74041 N.CHELSE	115 1
79316	LOVET138	138	79324 BOW138	138 1	-318.2	-46.1	288.9	110	72	74311 BOWLINE2	345	74340 LADENTWN	345 1
74315	COGNTECH	345	74335 GOTHLS S	345 2	940.1	470.6	902.0	104	83	74315 COGNTECH	345	74335 GOTHLS S	345 1
74315	COGNTECH	345	74335 GOTHLS S	345 1	940.1	470.6	902.0	104	84	74315 COGNTECH	345	74335 GOTHLS S	345 2
74335	GOTHLS S	345	74337 GOWANUSS	345 1	849.5	494.5	759.0	112	149	74332 FR KILLS	345	74335 GOTHLS S	345 1
74344	PLTVLLEY	345	78701 LEEDS 3	345 2	-1544.7	-1082.7	1538.0	100	167	74344 PLTVLLEY	345	78705 ATHENS	345 1
5028	WALDWICK	345	79303 SMAHWAH2	345 1	-1060.7	-553.8	793.0	134	182	74347 RAMAPO	345	79302 SMAHWAH1	345 1
5028	WALDWICK	345	79302 SMAHWAH1	345 1	-925.9	-432.5	758.0	122	183	74347 RAMAPO	345	79303 SMAHWAH2	345 1
74403	ASTORIAW	138	74496 HG 5	138 1	283.5	147.2	277.0	102	247	74403 ASTORIAW	138	74497 HG 6	138 1
74468	FR-KILLS	138	74571 WILWBK2	138 1	319.5	182.9	316.0	101	348	74468 FR-KILLS	138	74570 WILWBK1	138 1
74468	FR-KILLS	138	74570 WILWBK1	138 1	316.9	170.9	316.0	100	349	74468 FR-KILLS	138	74571 WILWBK2	138 1
74958	NWBRG	345	75050 NEWBRGE	138 2	660.2	330.1	585.0	113	468	74958 NWBRG	345	75050 NEWBRGE	138 1
74958	NWBRG	345	75050 NEWBRGE	138 1	660.2	330.1	585.0	113	469	74958 NWBRG	345	75050 NEWBRGE	138 2
75026	BRKHVEN2	138	75095 EDWRDSAV	138 1	315.2	165.7	303.0	104	530	75049 WILDWOOD	138	75062 SHOREHAM	138 1
75581	STEPH115	115	75652 STEPHT34	34.5 1	36.3	17.3	33.3	109	620	75435 CHURC115	115	75443 CRARY115	115 1
76539	NILE115	115	76610 NILEXFR	34.5 1	-17.4	4.7	12.7	137	825	76522 DUGN-157	115	76539 NILE115	115 1
76750	45KTS153	115	76847 KTS23	23.0 2	57.4	30.1	51.6	111	939	76700 GRDNVL1	115	76749 44KTS153	115 1
76749	44KTS153	115	76847 KTS23	23.0 4	56.8	29.9	51.6	110	940	76700 GRDNVL1	115	76750 45KTS153	115 1
76749	44KTS153	115	76847 KTS23	23.0 5	55.9	29.4	51.6	108	940	76700 GRDNVL1	115	76750 45KTS153	115 1
77125	TELRDTP1	115	77275 TELRD34	34.5 1	66.4	29.7	63.5	105	959	76702 LOCKPORT	115	77126 TELRDTP1	115 1
76711	PACK(S)W	115	79601 NIAG115W	115 3	-272.2	-190.4	253.0	108	973	76711 PACK(S)W	115	79601 NIAG115W	115 1
76711	PACK(S)W	115	79601 NIAG115W	115 3	-272.2	-190.4	253.0	108	974	76711 PACK(S)W	115	79601 NIAG115W	115 2
77419	A/B_LYS9	115	77958 ANH-BSC1	13.2 1	24.7	7.1	14.9	166	1103	77416 A/B_LY13	115	77423 ANHBS-13	115 1
77419	A/B_LYS9	115	77959 ANH-BSC2	4.16 1	19.8	6.6	11.3	176	1103	77416 A/B_LY13	115	77423 ANHBS-13	115 1

77488 SOLVAY-B	115	77852 SOLVAY34	34.5	1	-85.7	8.2	27.0	317	1170	77450 GERES LK	115	77519 SOLVTAP2	115	1
77489 SOLVAY-N	115	77852 SOLVAY34	34.5	3	32.8	7.7	24.3	135	1170	77450 GERES LK	115	77519 SOLVTAP2	115	1
77489 SOLVAY-N	115	77852 SOLVAY34	34.5	4	32.8	7.0	25.8	127	1170	77450 GERES LK	115	77519 SOLVTAP2	115	1
77488 SOLVAY-B	115	77852 SOLVAY34	34.5	1	30.4	8.2	27.0	113	1171	77450 GERES LK	115	77520 CRUC TAP	115	1
77488 SOLVAY-B	115	77852 SOLVAY34	34.5	1	-32.6	8.2	27.0	121	1204	77488 SOLVAY-B	115	77519 SOLVTAP2	115	1
78001 ALLENS F	115	78014 COLTON	115	1	-148.1	-33.6	128.0	116	1281	78033 MALONE	115	79606 WILL 115	115	1
78001 ALLENS F	115	78045 PARISHVL	115	1	150.5	35.9	144.0	105	1281	78033 MALONE	115	79606 WILL 115	115	1
78041 NICHOLVL	115	78045 PARISHVL	115	1	-150.7	-36.2	143.8	105	1281	78033 MALONE	115	79606 WILL 115	115	1
78478 INGMS-CD	115	78552 INGHAMS	46.0	1	-15.8	-2.4	12.2	130	1329	78478 INGMS-CD	115	78498 SALBRY4	115	1
78766 N.SCOT1	115	78797 UNVL 9TP	115	1	121.8	95.6	120.0	102	1369	78704 REYNLD3	345	78778 REY. RD.	115	1
78770 OC W +MG	115	78797 UNVL 9TP	115	1	-121.8	-95.6	120.0	102	1369	78704 REYNLD3	345	78778 REY. RD.	115	1
78760 JMC2+9TP	115	78770 OC W +MG	115	1	-133.4	-79.9	120.0	111	1412	78760 JMC2+9TP	115	78766 N.SCOT1	115	1
78766 N.SCOT1	115	78797 UNVL 9TP	115	1	148.4	95.6	120.0	124	1412	78760 JMC2+9TP	115	78766 N.SCOT1	115	1
78770 OC W +MG	115	78797 UNVL 9TP	115	1	-148.4	-95.6	120.0	124	1412	78760 JMC2+9TP	115	78766 N.SCOT1	115	1
79118 BROOK1	115	79296 BROOK	34.5	1	-48.6	20.8	34.6	140	1489	79117 BROOK W	115	79118 BROOK1	115	1
74018 SUGARLF	115	74046 ROCK TV1	115	1	-220.7	-141.9	204.0	108	1542	79304 MDTN TAP	345	79322 SHOEMTAP	138	1
74018 SUGARLF	115	79359 SGRLF69	69.0	1	220.2	141.4	204.0	108	1542	79304 MDTN TAP	345	79322 SHOEMTAP	138	1
74018 SUGARLF	115	74046 ROCK TV1	115	1	-220.7	-141.9	204.0	108	1560	79321 SHOEM138	138	79322 SHOEMTAP	138	1
74018 SUGARLF	115	79359 SGRLF69	69.0	1	220.2	141.4	204.0	108	1560	79321 SHOEM138	138	79322 SHOEMTAP	138	1
79596 WILLIS W	230	79720 NOBLE_S	230	1	-227.2	-128.0	203.0	112	1561	79595 WILLIS E	230	79546 MRW_HCW	230	1
78009 BRNS FLS	115	78057 TAYLORVL	115	2	117.7	44.2	114.0	103	1568	79577 MARCY765	765	79578 MASS 765	765	1
79546 MRW_HCW	230	79595 WILLIS E	230	1	236.1	153.2	203.0	116	1600	79596 WILLIS W	230	79720 NOBLE_S	230	1
79611 TR-TAP2	115	79615 REYN T#2	115	1	159.9	74.2	145.0	110	1609	79599 MOS 115	115	79610 TR-TAP1	115	1
79614 REYN T#1	115	79760 GM T#1	115	1	-79.7	6.0	50.0	159	1609	79599 MOS 115	115	79610 TR-TAP1	115	1
79615 REYN T#2	115	79761 GM T#2	115	2	91.7	6.0	50.0	183	1609	79599 MOS 115	115	79610 TR-TAP1	115	1
79760 GM T#1	115	79767 GM-CFD	13.8	1	-79.7	6.0	50.0	159	1609	79599 MOS 115	115	79610 TR-TAP1	115	1
79761 GM T#2	115	79767 GM-CFD	13.8	1	91.7	6.0	50.0	183	1609	79599 MOS 115	115	79610 TR-TAP1	115	1
79610 TR-TAP1	115	79614 REYN T#1	115	1	159.9	74.2	145.0	110	1610	79599 MOS 115	115	79611 TR-TAP2	115	1
79614 REYN T#1	115	79760 GM T#1	115	1	91.7	6.0	50.0	183	1610	79599 MOS 115	115	79611 TR-TAP2	115	1
79615 REYN T#2	115	79761 GM T#2	115	2	-79.7	6.0	50.0	159	1610	79599 MOS 115	115	79611 TR-TAP2	115	1
79760 GM T#1	115	79767 GM-CFD	13.8	1	91.7	6.0	50.0	183	1610	79599 MOS 115	115	79611 TR-TAP2	115	1
79761 GM T#2	115	79767 GM-CFD	13.8	1	-79.7	6.0	50.0	159	1610	79599 MOS 115	115	79611 TR-TAP2	115	1
79611 TR-TAP2	115	79615 REYN T#2	115	1	148.4	74.2	145.0	102	1615	79610 TR-TAP1	115	79614 REYN T#1	115	1
79614 REYN T#1	115	79760 GM T#1	115	1	-68.2	6.0	50.0	136	1615	79610 TR-TAP1	115	79614 REYN T#1	115	1
79615 REYN T#2	115	79761 GM T#2	115	2	80.2	6.0	50.0	160	1615	79610 TR-TAP1	115	79614 REYN T#1	115	1
79760 GM T#1	115	79767 GM-CFD	13.8	1	-68.2	6.0	50.0	136	1615	79610 TR-TAP1	115	79614 REYN T#1	115	1
79761 GM T#2	115	79767 GM-CFD	13.8	1	80.2	6.0	50.0	160	1615	79610 TR-TAP1	115	79614 REYN T#1	115	1
79610 TR-TAP1	115	79614 REYN T#1	115	1	148.4	74.2	145.0	102	1617	79611 TR-TAP2	115	79615 REYN T#2	115	1
79614 REYN T#1	115	79760 GM T#1	115	1	80.2	6.0	50.0	160	1617	79611 TR-TAP2	115	79615 REYN T#2	115	1
79615 REYN T#2	115	79761 GM T#2	115	2	-68.2	6.0	50.0	136	1617	79611 TR-TAP2	115	79615 REYN T#2	115	1
79760 GM T#1	115	79767 GM-CFD	13.8	1	80.2	6.0	50.0	160	1617	79611 TR-TAP2	115	79615 REYN T#2	115	1
79761 GM T#2	115	79767 GM-CFD	13.8	1	-68.2	6.0	50.0	136	1617	79611 TR-TAP2	115	79615 REYN T#2	115	1
79674 PMLD 2	115	79677 PMLD2-46	46.0	1	43.8	11.9	40.0	110	1626	79673 PMLD 1	115	79675 PMLD 3	115	1
79813 S37 115	115	79848 S67-2115	115	1	-285.4	-168.9	280.0	102	1662	79811 S82-1115	115	79834 JCT 921	115	1
79828 S204 908	115	79912 S204 34	34.5	1	71.0	43.5	67.0	106	1685	79827 STA 424	115	79830 S204-909	115	1
79813 S37 115	115	79848 S67-2115	115	1	-285.4	-168.9	280.0	102	1690	79834 JCT 921	115	79847 S48-1115	115	1
5028 WALDWICK	345	79303 SMAHWAH2	345	1	-936.3	-553.8	793.0	118	1707	5028 WALDWICK	345	79302 SMAHWAH1	345	1
5028 WALDWICK	345	79302 SMAHWAH1	345	1	-924.8	-432.5	758.0	122	1708	5028 WALDWICK	345	79303 SMAHWAH2	345	1
74040 N.CAT. 1	115	74116 N.CAT 6	69.0	5	56.5	33.4	55.0	103	1732	74040 N.CAT. 1	115	74116 N.CAT 6	69.0	4
74033 KNAPPS 1	115	74107 KNAPPS 6	69.0	1	49.5	20.5	49.0	101	1736	74043 PL.VAL 1	115	74120 PL.VAL 6	69.0	10
74338 IP2 345	345	74701 IND PT 2	22.0	2	-1032.7	-516.3	607.0	170	1760	74338 IP2 345	345	74701 IND PT 2	22.0	1
74338 IP2 345	345	74701 IND PT 2	22.0	1	-1032.7	-516.3	607.0	170	1761	74338 IP2 345	345	74701 IND PT 2	22.0	2

75477 MILKN115	115	76111 MILKN 2	18.0	2	-125.6	-63.0	97.7	129	2204	75477 MILKN115	115	76111 MILKN 2	18.0	1
75477 MILKN115	115	76111 MILKN 2	18.0	1	-125.6	-62.6	97.7	129	2205	75477 MILKN115	115	76111 MILKN 2	18.0	2
75477 MILKN115	115	76112 MILKN 1	13.8	2	-125.6	-62.9	94.6	133	2206	75477 MILKN115	115	76112 MILKN 1	13.8	1
75477 MILKN115	115	76112 MILKN 1	13.8	1	-125.6	-62.7	94.6	133	2207	75477 MILKN115	115	76112 MILKN 1	13.8	2
75453 FLATS115	115	75909 FLAT ST2	34.5	1	44.9	23.1	40.8	110	2259	75891 GRNDG115	115	75915 GRNIDG34	34.5	1
75891 GRNDG115	115	75964 GRNIDG 4	13.8	2	-107.3	-53.0	84.2	127	2261	75891 GRNDG115	115	75964 GRNIDG 4	13.8	1
75891 GRNDG115	115	75964 GRNIDG 4	13.8	1	-107.3	-54.2	75.0	143	2262	75891 GRNDG115	115	75964 GRNIDG 4	13.8	2
77119 PTSFD-24	115	79911 STA 56	34.5	2	69.1	44.8	56.0	123	2445	77118 PTSFD-23	115	79911 STA 56	34.5	1
77118 PTSFD-23	115	79911 STA 56	34.5	1	68.2	43.0	56.0	122	2446	77119 PTSFD-24	115	79911 STA 56	34.5	2
77447 FRMGTN-4	115	79875 FARMNGTN	34.5	1	68.0	45.9	67.0	102	2477	77444 FARMGTN1	115	79875 FARMNGTN	34.5	1
77444 FARMGTN1	115	79875 FARMNGTN	34.5	1	68.0	22.1	67.0	102	2478	77447 FRMGTN-4	115	79875 FARMNGTN	34.5	1
77466 LTHSE HL	115	77963 LIGHHILL	12.0	1	-23.9	-14.0	20.1	119	2497	77466 LTHSE HL	115	77963 LIGHHILL	12.0	2
78032 LWRNCE-B	115	78403 LAWRENCE	13.2	1	16.3	8.1	10.0	163	2538	78031 LWRNCE-A	115	78403 LAWRENCE	13.2	1
78031 LWRNCE-A	115	78403 LAWRENCE	13.2	1	16.3	8.2	10.0	163	2539	78032 LWRNCE-B	115	78403 LAWRENCE	13.2	1
78033 MALONE	115	78168 MALONE 3	34.5	1	23.3	10.2	12.9	181	2541	78033 MALONE	115	78168 MALONE 3	34.5	2
79548 IP#3 GEN	22.0	79582 IP3 345	345	2	1046.5	521.2	607.0	172	2671	79548 IP#3 GEN	22.0	79582 IP3 345	345	1
79548 IP#3 GEN	22.0	79582 IP3 345	345	1	1046.5	525.3	607.0	172	2672	79548 IP#3 GEN	22.0	79582 IP3 345	345	2
79828 S204 908	115	79912 S204 34	34.5	1	70.9	43.5	67.0	106	2707	79827 STA 424	115	79910 STA 424	34.5	1
79828 S204 908	115	79912 S204 34	34.5	1	67.7	43.5	67.0	101	2709	79829 S204 911	115	79912 S204 34	34.5	1
79833 S42 115	115	79981 STA42 B	11.5	4	33.7	27.1	32.8	103	2714	79833 S42 115	115	79907 S42 34-3	34.5	1
74348 SPRBROOK	345	74423 DUN SO T	138	7	443.4	249.6	440.0	101	2753	TWR:W89&W90				
74422 DUN SO	138	74423 DUN SO T	138	1	-443.4	-249.6	440.0	101	2753	TWR:W89&W90				
74335 GOTHLS S	345	74337 GOWANUSS	345	1	854.3	494.5	759.0	113	2756	TWR:21&22				
74039 MODENA 1	115	74113 MODENA 6	69.0	1	-59.2	-12.7	41.0	145	2762	TWR:34&42				
75512 W.WDB115	115	76210 W.WDBR69	69.0	1	88.5	15.6	48.3	183	2762	TWR:34&42				
78478 INGMS-CD	115	78498 SALBRY4	115	1	-124.1	-101.6	120.0	103	2763	TWR:40&41				
78478 INGMS-CD	115	78498 SALBRY4	115	1	-122.1	-101.6	120.0	102	2766	TWR:31&41				
79311 BURNS138	138	79313 MONSEY	138	1	-609.1	-145.7	466.7	131	2770	TWR:67&68&BW				
79313 MONSEY	138	79361 TALLMAN	138	1	-642.3	-179.0	480.0	134	2770	TWR:67&68&BW				
79319 RAMP138	138	79361 TALLMAN	138	1	699.3	235.9	480.0	146	2770	TWR:67&68&BW				
75427 BRAIN115	115	75434 CHATP115	115	1	398.4	3.2	131.0	304	2775	TWR:MW/WP1&2				
75427 BRAIN115	115	75475 LYONS115	115	1	-398.5	-3.2	152.0	262	2775	TWR:MW/WP1&2				
75434 CHATP115	115	79606 WILL 115	115	1	398.8	3.6	131.0	304	2775	TWR:MW/WP1&2				
75471 KENTS115	115	75475 LYONS115	115	1	399.6	4.4	152.0	263	2775	TWR:MW/WP1&2				
75471 KENTS115	115	79685 SARANAC	115	1	-376.6	-44.8	152.0	248	2775	TWR:MW/WP1&2				
78001 ALLENS F	115	78014 COLTON	115	1	250.7	-33.6	128.0	196	2775	TWR:MW/WP1&2				
78001 ALLENS F	115	78045 PARISHVL	115	1	-248.3	35.9	144.0	172	2775	TWR:MW/WP1&2				
78033 MALONE	115	78041 NICHOLVL	115	1	272.3	-11.9	159.0	171	2775	TWR:MW/WP1&2				
78033 MALONE	115	79606 WILL 115	115	1	-398.8	-114.6	179.7	222	2775	TWR:MW/WP1&2				
78041 NICHOLVL	115	78045 PARISHVL	115	1	248.1	-36.2	143.8	173	2775	TWR:MW/WP1&2				
79672 PLAT 115	115	79694 T MIL RD	115	1	379.0	56.9	123.0	308	2775	TWR:MW/WP1&2				
79685 SARANAC	115	79694 T MIL RD	115	1	-376.8	-45.0	123.0	306	2775	TWR:MW/WP1&2				
76555 SAWYER80	230	76559 SAWYERB3	230	1	167.9	54.0	140.0	120	2782	TWR:77&78				
76559 SAWYERB3	230	76686 SAWYER23	23.0	1	167.8	53.9	128.0	131	2782	TWR:77&78				
76554 SAWYER78	230	76558 SAWYERB2	230	1	168.2	57.2	140.0	120	2783	TWR:77&80				
76558 SAWYERB2	230	76686 SAWYER23	23.0	1	168.1	57.1	128.0	131	2783	TWR:77&80				
5028 WALDWICK	345	79303 SMAHWAH2	345	1	-939.5	-553.8	793.0	119	2820	SER:69 & J				
5028 WALDWICK	345	79302 SMAHWAH1	345	1	-925.2	-432.5	758.0	122	2821	SER:70 & K				
74018 SUGARLF	115	74046 ROCK TV1	115	1	-216.0	-141.9	204.0	106	2826	SER:CMT34&MTR34				
74018 SUGARLF	115	79359 SGRLF69	69.0	1	215.5	141.4	204.0	106	2826	SER:CMT34&MTR34				
74315 COGNTECH	345	91099 LINVFT4	345	1	642.6	-298.5	500.0	129	2862	BUS:GOETHALS_S_345				
74335 GOTHLS S	345	74337 GOWANUSS	345	1	854.8	494.5	759.0	113	2907	SB:FRES_345_1				

74335	GOTHLS S	345	74337	GOWANUSS	345	1	853.9	494.5	759.0	113	2909	SB:FRES_345_3
74335	GOTHLS S	345	74337	GOWANUSS	345	1	763.0	494.5	759.0	101	2911	SB:FRES_345_6
74315	COGNTECH	345	91099	LINVFT4	345	1	642.6	-298.5	500.0	129	2912	SB:GTHL_345_SOUTH_8>6
5028	WALDWICK	345	79302	SMAHWAH1	345	1	-924.9	-432.5	758.0	122	2949	SB:RMP_345_T-70-2
5028	WALDWICK	345	79302	SMAHWAH1	345	1	-924.9	-432.5	758.0	122	2950	SB:RMP_345_70-2Y
5028	WALDWICK	345	79303	SMAHWAH2	345	1	-944.6	-553.8	793.0	119	2951	SB:RMP_345_T-2500-69-2
5028	WALDWICK	345	79303	SMAHWAH2	345	1	-944.6	-553.8	793.0	119	2952	SB:RMP_345_69-2Y
74018	SUGARLF	115	74046	ROCK TV1	115	1	-215.8	-141.9	204.0	106	3013	SB:COOP_345_B2-3482
74018	SUGARLF	115	79359	SGRLF69	69.0	1	215.2	141.4	204.0	106	3013	SB:COOP_345_B2-3482
74018	SUGARLF	115	74046	ROCK TV1	115	1	-215.8	-141.9	204.0	106	3014	SB:COOP_345_34-B382
74018	SUGARLF	115	79359	SGRLF69	69.0	1	215.2	141.4	204.0	106	3014	SB:COOP_345_34-B382
78757	BOC 2T	115	78760	JMC2+9TP	115	1	-122.1	-88.4	120.0	102	3044	SB:HURL_345_30151
78757	BOC 2T	115	78760	JMC2+9TP	115	1	-122.0	-88.4	120.0	102	3045	SB:HURL_345_30353
78757	BOC 2T	115	78760	JMC2+9TP	115	1	-122.0	-88.4	120.0	102	3046	SB:HURL_345_30354
79611	TR-TAP2	115	79615	REYN T#2	115	1	159.9	74.2	145.0	110	3074	SB:MOSE_115_1414
79614	REYN T#1	115	79760	GM T#1	115	1	-79.7	6.0	50.0	159	3074	SB:MOSE_115_1414
79615	REYN T#2	115	79761	GM T#2	115	2	91.7	6.0	50.0	183	3074	SB:MOSE_115_1414
79760	GM T#1	115	79767	GM-CFD	13.8	1	-79.7	6.0	50.0	159	3074	SB:MOSE_115_1414
79761	GM T#2	115	79767	GM-CFD	13.8	1	91.7	6.0	50.0	183	3074	SB:MOSE_115_1414
79610	TR-TAP1	115	79614	REYN T#1	115	1	159.9	74.2	145.0	110	3079	SB:MOSE_115_1614
79614	REYN T#1	115	79760	GM T#1	115	1	91.7	6.0	50.0	183	3079	SB:MOSE_115_1614
79615	REYN T#2	115	79761	GM T#2	115	2	-79.7	6.0	50.0	159	3079	SB:MOSE_115_1614
79760	GM T#1	115	79767	GM-CFD	13.8	1	91.7	6.0	50.0	183	3079	SB:MOSE_115_1614
79761	GM T#2	115	79767	GM-CFD	13.8	1	-79.7	6.0	50.0	159	3079	SB:MOSE_115_1614
74018	SUGARLF	115	74046	ROCK TV1	115	1	-211.8	-141.9	204.0	104	3110	SB:ROCK_345_31153
74018	SUGARLF	115	79359	SGRLF69	69.0	1	211.2	141.4	204.0	104	3110	SB:ROCK_345_31153
78782	RTRDM1	115	78980	ROTRDM.2	230	2	-475.7	-214.6	355.0	134	3119	SB:ROTT_230_R84
79800	ROCH 345	345	79819	S80 1TR	115	1	240.0	150.3	236.0	102	3168	SB:ROCH_345_1X8082
79800	ROCH 345	345	79819	S80 1TR	115	1	250.9	150.3	236.0	106	3169	SB:ROCH_345_2T8082
74020	DANSKAMA	115	74021	DC CBLTP	115	1	199.2	142.9	199.0	100	3223	SIN:430
78478	INGMS-CD	115	78498	SALBRY4	115	1	-125.6	-101.6	120.0	105	3253	TWR:30&40PORJOR
78478	INGMS-CD	115	78498	SALBRY4	115	1	-125.6	-101.6	120.0	105	3254	TWR:30&40JORROT
78782	RTRDM1	115	78980	ROTRDM.2	230	2	-363.4	-214.6	355.0	102	3257	SB:ROTT_230_R84JOR
79546	MRW_HCW	230	79595	WILLIS E	230	1	222.1	153.2	203.0	109	3265	SB:WILL_230_2114W
79596	WILLIS W	230	79720	NOBLE_S	230	1	-213.7	-128.0	203.0	105	3266	SB:WILL_230_2214W
79546	MRW_HCW	230	79595	WILLIS E	230	1	222.1	153.2	203.0	109	3267	SB:WILL_230_2102W
79596	WILLIS W	230	79720	NOBLE_S	230	1	-213.6	-128.0	203.0	105	3268	SB:WILL_230_2202W

Interface Details

PSS/MUST 8.2 -- Managing and Utilizing System Transmission -- TUE, OCT 03 2006 14:10

2006 CLASS YEAR ATBA BASE CASE

2011 SUMMER PEAK LOAD W/ UPDATE PJM REP

Case.File C:\SHARE\CY06\CY06ATBA-SUM11-4.sav

Subsys.File C:\SHARE\CY06\thermal\CY2006_dyse.sub

Monit.File C:\SHARE\CY06\thermal\CY2006_dyse.mon

Contin.File C:\SHARE\CY06\thermal\CY2006_NY.con

Exclud.File none

Study transfer. From DE_G_SHIFT To OPPOSING . Transfer level - 2000.0 MW

***** Base Case Report *****

List of 4 interfaces of total 7

**** Interface ****	Limit Import	Limit Export	InitFlow	ResFlow	Change	PTDF
1 DYSE-OPEN	-3987.0	3987.0	1956.8	3623.9	1667.1	0.83354

List of interface branches

** From Bus	** **	To Bus	** CKT	InitFlow	ResFlow	PTDF
75404 KINTI345	345	79800 ROCH 345	345 1	603.8	1094.4	0.2453
75417 STOLE230	230	75414 MEYER230	230 1	238.0	457.8	0.1099
76510 ANDOVER1	115	75994 PALMT115	115 1	0.0	0.0	0.0000
76702 LOCKPORT	115	77101 SHEL -113	115 1	86.8	142.0	0.0276
76702 LOCKPORT	115	77115 NAKR -108	115 1	66.0	87.2	0.0106
76702 LOCKPORT	115	77117 OAKFLDTP	115 1	73.8	97.5	0.0119
76702 LOCKPORT	115	77122 SOUR -111	115 1	82.5	137.0	0.0273
76702 LOCKPORT	115	77125 TELRDTP1	115 1	93.7	122.3	0.0143
76702 LOCKPORT	115	77126 TELRDTP1	115 1	95.5	149.5	0.0270
79584 NIAG 345	345	79800 ROCH 345	345 1	616.8	1336.3	0.3597

List of 4 interfaces of total 7

**** Interface ****	Limit Import	Limit Export	InitFlow	ResFlow	Change	PTDF
2 DYSE-CLOSE	-10255.7	10255.7	3166.1	5166.1	2000.0	1.00000

List of interface branches

** From Bus	** **	To Bus	** CKT	InitFlow	ResFlow	PTDF
2 BRANCHBG	500	74300 RAMAP0 5	500 1	801.3	801.3	-0.0000
382 E.TWANDA	230	75413 HILSD230	230 1	-132.4	-43.3	0.0445
383 E.SAYRE	115	75486 N.WAV115	115 1	-54.0	-12.1	0.0209
387 LAUREL L	115	75457 GOUDY115	115 1	-42.4	3.9	0.0232
479 HOMER CY	345	75407 WATRC345	345 1	472.5	628.2	0.0778
4989 HUDSON1	345	74328 FARRGUT1	345 1	399.3	399.3	0.0000
4996 LINDEN	230	74371 GOETHALS	230 1	200.5	200.5	0.0000
5028 WALDWICK	345	79302 SMAHWAH1	345 1	-432.1	-437.6	-0.0028
5028 WALDWICK	345	79303 SMAHWAH2	345 1	-553.3	-547.8	0.0028
5039 HUDSON2	345	74329 FARRGUT2	345 1	399.3	399.3	0.0000
9803 HCOR138	138	79311 BURNS138	138 1	-99.2	-99.6	-0.0002
9804 SMAH138	138	79319 RAMP138	138 1	-79.1	-91.5	-0.0062
9804 SMAH138	138	79302 SMAHWAH1	345 1	-185.5	-168.8	0.0083
9806 CLOSTR69	69.0	79357 SPARKILL	69.0 1	-16.1	-15.2	0.0005
9808 HCOR69	69.0	79362 WNYA69	69.0 1	-26.0	-23.4	0.0013
9809 MONTVALE	69.0	79327 BLUHILL	69.0 1	5.8	5.8	0.0000
9809 MONTVALE	69.0	79327 BLUHILL	69.0 2	5.8	5.8	0.0000
9809 MONTVALE	69.0	79400 L491T	69.0 1	-47.6	-46.7	0.0005
9810 SMAH69	69.0	79340 HILB69	69.0 1	-73.3	-81.4	-0.0041
9811 HCOR34	34.5	79376 PEARL34	34.5 1	5.3	5.1	-0.0001
74959 NEPTCONV	345	74958 NWBRG	345 1	660.2	660.2	0.0000

75404	KINTI345	345	79800	ROCH 345	345	1	603.8	1094.4	0.2453
75417	STOLE230	230	75414	MEYER230	230	1	238.0	457.8	0.1099
76510	ANDOVER1	115	75994	PALMT115	115	1	0.0	0.0	0.0000
76702	LOCKPORT	115	77101	SHEL-113	115	1	86.8	142.0	0.0276
76702	LOCKPORT	115	77115	NAKR-108	115	1	66.0	87.2	0.0106
76702	LOCKPORT	115	77117	OAKFLDTP	115	1	73.8	97.5	0.0119
76702	LOCKPORT	115	77122	SOUR-111	115	1	82.5	137.0	0.0273
76702	LOCKPORT	115	77125	TELRDTP1	115	1	93.7	122.3	0.0143
76702	LOCKPORT	115	77126	TELRDTP1	115	1	95.5	149.5	0.0270
79584	NIAG 345	345	79800	ROCH 345	345	1	616.8	1336.3	0.3597
81255	STLAWL34	230	79589	MOSES E	230	1	0.2	0.2	0.0000
81256	STLAWL33	230	79589	MOSES E	230	1	0.0	0.0	0.0000

List of 4 interfaces of total 7

**** Interface ****	Limit	Limit				
	Import	Export	InitFlow	ResFlow	Change	PTDF
3 WESTC-OPEN	-4310.0	4310.0	449.0	2116.1	1667.1	0.83354

List of interface branches

**	From Bus	**	**	To Bus	**	CKT	InitFlow	ResFlow	PTDF
75417	STOLE230	230	75414	MEYER230	230	1	238.0	457.8	0.1099
79922	C708 LD	34.5	75576	WOLCOT34	34.5	1	0.0	0.0	0.0000
79826	QUAKER	115	75892	MACDN115	115	1	37.0	42.4	0.0027
79804	S121 B#2	115	75893	SLEIG115	115	1	73.4	123.0	0.0248
79805	CLYDE199	115	75893	SLEIG115	115	1	-32.4	-83.7	-0.0257
79826	QUAKER	115	75893	SLEIG115	115	1	0.0	0.0	0.0000
75901	BROWNS C	34.5	75902	CLYDE 34	34.5	1	0.0	0.0	0.0000
76510	ANDOVER1	115	75994	PALMT115	115	1	0.0	0.0	0.0000
79810	STA 162	115	75995	S.PER115	115	1	-10.4	-2.3	0.0041
77111	MORTIMER	115	77110	LAWLER-1	115	1	68.1	118.6	0.0252
77111	MORTIMER	115	77463	LAWLER-2	115	1	47.5	99.4	0.0260
79801	PANNELL3	345	77400	CLAY	345	1	18.2	623.0	0.3024
79801	PANNELL3	345	77400	CLAY	345	2	18.2	625.0	0.3034
79874	STA127	34.5	77417	HOOKRD	115	1	-24.3	-24.3	0.0000
79805	CLYDE199	115	77433	CLTNCORN	115	1	11.1	62.5	0.0257
79875	FARMNGTN	34.5	77444	FARMGTN1	115	1	-23.1	-19.9	0.0016
79825	PANNELLI	115	77447	FRMGTN-4	115	1	104.5	174.7	0.0351
79875	FARMNGTN	34.5	77447	FRMGTN-4	115	1	-44.9	-48.1	-0.0016
79946	S168	12.0	77447	FRMGTN-4	115	1	-10.7	-10.7	0.0000
79918	CLYDE 34	34.5	79805	CLYDE199	115	1	-21.2	-21.2	0.0000

List of 4 interfaces of total 7

**** Interface ****	Limit	Limit				
	Import	Export	InitFlow	ResFlow	Change	PTDF
4 WESTC-CLOSE	-10578.7	10578.7	1658.3	3658.3	2000.0	1.00000

List of interface branches

**	From Bus	**	**	To Bus	**	CKT	InitFlow	ResFlow	PTDF
2	BRANCHBG	500	74300	RAMAPO 5	500	1	801.3	801.3	-0.0000
382	E.TWANDA	230	75413	HILSD230	230	1	-132.4	-43.3	0.0445
383	E.SAYRE	115	75486	N.WAV115	115	1	-54.0	-12.1	0.0209
387	LAUREL L	115	75457	GOUDY115	115	1	-42.4	3.9	0.0232
479	HOMER CY	345	75407	WATRC345	345	1	472.5	628.2	0.0778
4989	HUDSON1	345	74328	FARRGUT1	345	1	399.3	399.3	0.0000
4996	LINDEN	230	74371	GOETHALS	230	1	200.5	200.5	0.0000
5028	WALDWICK	345	79302	SMAHWAH1	345	1	-432.1	-437.6	-0.0028
5028	WALDWICK	345	79303	SMAHWAH2	345	1	-553.3	-547.8	0.0028
5039	HUDSON2	345	74329	FARRGUT2	345	1	399.3	399.3	0.0000
9803	HCOR138	138	79311	BURNS138	138	1	-99.2	-99.6	-0.0002
9804	SMAH138	138	79319	RAMP138	138	1	-79.1	-91.5	-0.0062

9804	SMAH138	138	79302	SMAHWAH1	345	1	-185.5	-168.8	0.0083
9806	CLOSTR69	69.0	79357	SPARKILL	69.0	1	-16.1	-15.2	0.0005
9808	HCOR69	69.0	79362	WNYA69	69.0	1	-26.0	-23.4	0.0013
9809	MONTVALE	69.0	79327	BLUHILL	69.0	1	5.8	5.8	0.0000
9809	MONTVALE	69.0	79327	BLUHILL	69.0	2	5.8	5.8	0.0000
9809	MONTVALE	69.0	79400	L491T	69.0	1	-47.6	-46.7	0.0005
9810	SMAH69	69.0	79340	HILB69	69.0	1	-73.3	-81.4	-0.0041
9811	HCOR34	34.5	79376	PEARL34	34.5	1	5.3	5.1	-0.0001
74959	NEPTCONV	345	74958	NWBRG	345	1	660.2	660.2	0.0000
75417	STOLE230	230	75414	MEYER230	230	1	238.0	457.8	0.1099
79922	C708 LD	34.5	75576	WOLCOT34	34.5	1	0.0	0.0	0.0000
79826	QUAKER	115	75892	MACDN115	115	1	37.0	42.4	0.0027
79804	S121 B#2	115	75893	SLEIG115	115	1	73.4	123.0	0.0248
79805	CLYDE199	115	75893	SLEIG115	115	1	-32.4	-83.7	-0.0257
79826	QUAKER	115	75893	SLEIG115	115	1	0.0	0.0	0.0000
75901	BROWNS C	34.5	75902	CLYDE 34	34.5	1	0.0	0.0	0.0000
76510	ANDOVER1	115	75994	PALMT115	115	1	0.0	0.0	0.0000
79810	STA 162	115	75995	S.PER115	115	1	-10.4	-2.3	0.0041
77111	MORTIMER	115	77110	LAWLER-1	115	1	68.1	118.6	0.0252
77111	MORTIMER	115	77463	LAWLER-2	115	1	47.5	99.4	0.0260
79801	PANNELL3	345	77400	CLAY	345	1	18.2	623.0	0.3024
79801	PANNELL3	345	77400	CLAY	345	2	18.2	625.0	0.3034
79874	STA127	34.5	77417	HOOKRD	115	1	-24.3	-24.3	0.0000
79805	CLYDE199	115	77433	CLTNCORN	115	1	11.1	62.5	0.0257
79875	FARMNGTN	34.5	77444	FARMGTN1	115	1	-23.1	-19.9	0.0016
79825	PANNELLI	115	77447	FRMGTN-4	115	1	104.5	174.7	0.0351
79875	FARMNGTN	34.5	77447	FRMGTN-4	115	1	-44.9	-48.1	-0.0016
79946	S168	12.0	77447	FRMGTN-4	115	1	-10.7	-10.7	0.0000
81255	STLAWL34	230	79589	MOSES E	230	1	0.2	0.2	0.0000
81256	STLAWL33	230	79589	MOSES E	230	1	0.0	0.0	0.0000
79918	CLYDE 34	34.5	79805	CLYDE199	115	1	-21.2	-21.2	0.0000

FCITC Single Study

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PSS/MUST      8.2  -- Managing and Utilizing System Transmission --   TUE, OCT 03 2006  14:10
2006 CLASS YEAR ATBA BASE CASE
2011 SUMMER PEAK LOAD W/ UPDATE PJM REP
Case.File      C:\SHARE\CY06\CY06ATBA-SUM11-4.sav
Subsys.File    C:\SHARE\CY06\thermal\CY2006_dyse.sub
Monit.File     C:\SHARE\CY06\thermal\CY2006_dyse.mon
Contin.File    C:\SHARE\CY06\thermal\CY2006_NY.con
Exclud.File    none

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Study transfer. From DE_G_SHIFT To OPPOSING . Transfer level - 2000.0 MW

Violations report ordered by transfer capability. Total 3640 violations

Interface-1	Interface	1	DYSE-OPEN	Init.Flow=	1956.84	TDF=	0.8335
Interface-2	Interface	2	DYSE-CLOSE	Init.Flow=	3166.13	TDF=	1.0000
Interface-3	Interface	3	WESTC-OPEN	Init.Flow=	449.01	TDF=	0.8335
Interface-4	Interface	4	WESTC-CLOSE	Init.Flow=	1658.31	TDF=	1.0000

IntFce1	IntFce2	IntFce3	IntFce4	<----- LIMITING ELEMENT ----->						PRE- RATING	<----- CONTINGENCY DESCRIPTION ----->										
TRANS				<----- FROM -----> <----- TO ----->CKT						DISTR.	SHIFT	BAS/CNT									
CAPAB										FACTOR	MW	A/B									
2031.9	3256.1	524.0	1748.3	76663	GRDNVL2	230	76700	GRDNVL1	115	1	0.04277	276.2	280.0	SB:GARD_230_R735 1699							
														Open	76500	DUNKIRK	230	76663	GRDNVL2	230	2
														Open	76663	GRDNVL2	230	76700	GRDNVL1	115	2
														Open	76663	GRDNVL2	230	76700	GRDNVL1	115	3
														Open	76663	GRDNVL2	230	76668	SUNY-79	230	1
														Open	76663	GRDNVL2	230	76667	SENCA-72	230	1
														Open	75412	GARDV230	230	76663	GRDNVL2	230	1
2230.7	3494.7	722.9	1986.9	75465	HINMN115	115	76702	LOCKPORT	115	1	0.05090	235.3	252.0	SB:STOL_230_6652>6752>6552 1680							
														Open	75412	GARDV230	230	75417	STOLE230	230	1
														Open	75414	MEYER230	230	75417	STOLE230	230	1
														Open	75416	ROBIN230	230	75417	STOLE230	230	1
2266.4	3537.5	758.6	2029.7	75465	HINMN115	115	76702	LOCKPORT	115	1	0.05003	233.4	252.0	75416	ROBIN230	230	75417	STOLE230	230	1	26
														Open	75416	ROBIN230	230	75417	STOLE230	230	1
2289.1	3564.7	781.3	2056.9*	75465	HINMN115	115	76702	LOCKPORT	115	1	0.05481	230.2	252.0	SB:ROCH_345_3402 1720							
														Open	79584	NIAG 345	345	79800	ROCH 345	345	1
														Open	79800	ROCH 345	345	79819	S80 1TR	115	1
2362.3	3652.6	854.5	2144.8	75498	S.OWE115	115	75668	LOUN5115	115	1	-0.05575	-103.9	131.0	SB:OAKD_345_36-3122 1641							
														Open	75405	OAKDL345	345	75407	WATRC345	345	1
														Open	75405	OAKDL345	345	77403	LAFAYTTE	345	1
2375.6	3668.5	867.8	2160.7	75465	HINMN115	115	76261	HARIS115	115	1	-0.03424	-220.8	238.0	Base Case							
2389.7	3685.4	881.9	2177.6	75465	HINMN115	115	76261	HARIS115	115	1	-0.04944	-261.3	287.0	SB:STOL_230_6652>6752>6552 1680							
														Open	75412	GARDV230	230	75417	STOLE230	230	1
														Open	75414	MEYER230	230	75417	STOLE230	230	1
														Open	75416	ROBIN230	230	75417	STOLE230	230	1
2428.1	3731.5	920.3	2223.7	75465	HINMN115	115	76261	HARIS115	115	1	-0.04859	-259.5	287.0	75416	ROBIN230	230	75417	STOLE230	230	1	26
														Open	75416	ROBIN230	230	75417	STOLE230	230	1
2436.7	3741.9	928.9	2234.0*	75465	HINMN115	115	76261	HARIS115	115	1	-0.05324	-256.3	287.0								

2519.0	3840.5	1011.2	2332.7	75400	C00PC345	345	75403	FRASR345	345	1	-0.27046	-1221.6	1404.0	Open 79800 ROCH 345	345	79819	S80 1TR	115	1
														TwR:31&41					1316
														Open 78460 PORTER 2	230	78980	ROTRDM.2	230	2
														Open 75400 C00PC345	345	79583	MARCY T1	345	1
2567.7	3899.0	1059.9	2391.2	75400	C00PC345	345	75403	FRASR345	345	1	-0.26822	-1207.4	1404.0	75400 C00PC345	345	79583	MARCY T1	345	5
														Open 75400 C00PC345	345	79583	MARCY T1	345	1
2567.7	3899.0	1059.9	2391.2*	75400	C00PC345	345	75403	FRASR345	345	1	-0.26822	-1207.4	1404.0	SB:C00P_345_4182					1562
														Open 75400 C00PC345	345	79583	MARCY T1	345	1
2582.2	3916.4	1074.4	2408.5	75465	HINMN115	115	76702	LOCKPORT	115	1	0.03525	193.6	220.0	Base Case					
2615.5	3956.3	1107.6	2448.5	75467	JENN 115	115	75469	KATEL115	115	1	-0.03237	-113.4	139.0	75403 FRASR345	345	75405	OAKDL345	345	6
														Open 75403 FRASR345	345	75405	OAKDL345	345	1
2615.5	3956.3	1107.6	2448.5	75467	JENN 115	115	75469	KATEL115	115	1	-0.03237	-113.4	139.0	SB:FRAS_345_B1-3262					1580
														Open 75403 FRASR345	345	75405	OAKDL345	345	1
2616.8	3957.9	1109.0	2450.1	76702	LOCKPORT	115	77122	SOUR-111	115	1	0.04224	110.6	144.0	SB:ROCH_345_3402					1720
														Open 79584 NIAG 345	345	79800	ROCH 345	345	1
														Open 79800 ROCH 345	345	79819	S80 1TR	115	1
2636.8	3981.9	1129.0	2474.0	76702	LOCKPORT	115	77122	SOUR-111	115	1	0.04201	109.7	144.0	SB:NIAG_345_3108					1711
														Open 79584 NIAG 345	345	79800	ROCH 345	345	1
														Open 79584 NIAG 345	345	79592	NIAGAR2W	230	1
2655.1	4003.8	1147.3	2496.0*	76702	LOCKPORT	115	77122	SOUR-111	115	1	0.04241	108.5	144.0	79584 NIAG 345	345	79800	ROCH 345	345	1
														Open 79584 NIAG 345	345	79800	ROCH 345	345	1
2697.8	4055.0	1190.0	2547.2	77122	SOUR-111	115	77123	SWDN-111	115	1	0.04224	106.5	144.0	SB:ROCH_345_3402					1720
														Open 79584 NIAG 345	345	79800	ROCH 345	345	1
														Open 79800 ROCH 345	345	79819	S80 1TR	115	1
2718.2	4079.5	1210.3	2571.7	77122	SOUR-111	115	77123	SWDN-111	115	1	0.04201	105.6	144.0	SB:NIAG_345_3108					1711
														Open 79584 NIAG 345	345	79800	ROCH 345	345	1
														Open 79584 NIAG 345	345	79592	NIAGAR2W	230	1
2735.7	4100.5	1227.9	2592.7*	77122	SOUR-111	115	77123	SWDN-111	115	1	0.04241	104.4	144.0	79584 NIAG 345	345	79800	ROCH 345	345	1
														Open 79584 NIAG 345	345	79800	ROCH 345	345	1
2743.3	4109.6	1235.4	2601.8	75486	N.WAV115	115	75668	LOUNS115	115	1	0.05575	107.4	160.0	SB:OAKD_345_36-3122					1641
														Open 75405 OAKDL345	345	75407	WATRC345	345	1
														Open 75405 OAKDL345	345	77403	LAFAYTTE	345	1
2786.5	4161.5	1278.7	2653.7	76702	LOCKPORT	115	77126	TELRDTP1	115	1	0.04186	123.3	165.0	SB:ROCH_345_3402					1720
														Open 79584 NIAG 345	345	79800	ROCH 345	345	1
														Open 79800 ROCH 345	345	79819	S80 1TR	115	1
2807.4	4186.5	1299.6	2678.7	76702	LOCKPORT	115	77126	TELRDTP1	115	1	0.04164	122.5	165.0	SB:NIAG_345_3108					1711
														Open 79584 NIAG 345	345	79800	ROCH 345	345	1
														Open 79584 NIAG 345	345	79592	NIAGAR2W	230	1
2816.7	4197.7	1308.9	2689.9	75464	HILSD115	115	75812	CHEMU115	115	1	0.03146	144.5	177.0	SB:OAKD_345_36-3122					1641
														Open 75405 OAKDL345	345	75407	WATRC345	345	1
														Open 75405 OAKDL345	345	77403	LAFAYTTE	345	1
2824.1	4206.6	1316.3	2698.7*	76702	LOCKPORT	115	77126	TELRDTP1	115	1	0.04204	121.3	165.0	79584 NIAG 345	345	79800	ROCH 345	345	1
														Open 79584 NIAG 345	345	79800	ROCH 345	345	1
2842.2	4228.3	1334.4	2720.5	75469	KATEL115	115	75488	OAKDL115	115	1	-0.03237	-128.6	163.0	75403 FRASR345	345	75405	OAKDL345	345	6
														Open 75403 FRASR345	345	75405	OAKDL345	345	1
2842.2	4228.3	1334.4	2720.5	75469	KATEL115	115	75488	OAKDL115	115	1	-0.03237	-128.6	163.0	SB:FRAS_345_B1-3262					1580
														Open 75403 FRASR345	345	75405	OAKDL345	345	1
2845.0	4231.6	1337.1	2723.8*	75467	JENN 115	115	75469	KATEL115	115	1	-0.03246	-104.4	139.0	SB:OAKD_345_32-B222					1639
														Open 75403 FRASR345	345	75405	OAKDL345	345	1
														Open 75405 OAKDL345	345	75490	OAK3M115	115	1
2895.7	4292.4	1387.8	2784.6	79584	NIAG 345	345	79800	ROCH 345	345	1	0.49325	945.5	1501.0	75404 KINTI345	345	79800	ROCH 345	345	1
														Open 75404 KINTI345	345	79800	ROCH 345	345	1
2911.4	4311.3	1403.6	2803.5	79584	NIAG 345	345	79800	ROCH 345	345	1	0.49360	935.7	1501.0	SB:ROCH_345_3502					1723
														Open 75404 KINTI345	345	79800	ROCH 345	345	1
														Open 79800 ROCH 345	345	79819	S80 1TR	115	1

2912.4	4312.5	1404.5	2804.6	75486 N.WAV115	115	75812 CHEMU115	115	1	-0.03146	-140.9	177.0	SB:OAKD_345_36-3122			1641
												Open 75405 OAKDL345	345	75407 WATRC345	345 1
												Open 75405 OAKDL345	345	77403 LAFAYTTE	345 1
2928.0	4331.2	1420.1	2823.4	76702 LOCKPORT	115	77101 SHEL-113	115	1	0.04273	115.2	165.0	SB:ROCH_345_3402			1720
												Open 79584 NIAG 345	345	79800 ROCH 345	345 1
												Open 79800 ROCH 345	345	79819 S80 1TR	115 1
2939.9	4345.5	1432.1	2837.7*	79584 NIAG 345	345	79800 ROCH 345	345	1	0.47686	938.6	1501.0	SB:ROCH_345_3508			1724
												Open 79800 ROCH 345	345	79801 PANNELL3	345 1
												Open 75404 KINTI345	345	79800 ROCH 345	345 1
2949.6	4357.1	1441.8	2849.3	76702 LOCKPORT	115	77101 SHEL-113	115	1	0.04250	114.4	165.0	SB:NIAG_345_3108			1711
												Open 79584 NIAG 345	345	79800 ROCH 345	345 1
												Open 79584 NIAG 345	345	79592 NIAGAR2W	230 1
2961.2	4371.0	1453.3	2863.2	75444 DELHI115	115	75454 DEL T115	115	1	0.06852	81.4	164.0	Open 75403 FRASR345	345	75405 OAKDL345	345 1 6
												Open 75403 FRASR345	345	75405 OAKDL345	345 1
2961.2	4371.0	1453.3	2863.2	75444 DELHI115	115	75454 DEL T115	115	1	0.06852	81.4	164.0	SB:FRAS_345_B1-3262			1580
												Open 75403 FRASR345	345	75405 OAKDL345	345 1
2964.9	4375.6	1457.1	2867.7*	76702 LOCKPORT	115	77101 SHEL-113	115	1	0.04290	113.1	165.0	Open 79584 NIAG 345	345	79800 ROCH 345	345 1 735
												Open 79584 NIAG 345	345	79800 ROCH 345	345 1
2977.1	4390.2	1469.3	2882.4	75457 GOUDY115	115	75498 S.OWE115	115	1	-0.05575	-62.8	131.0	SB:OAKD_345_36-3122			1641
												Open 75405 OAKDL345	345	75407 WATRC345	345 1
												Open 75405 OAKDL345	345	77403 LAFAYTTE	345 1
3015.8	4436.6	1508.0	2928.8	75403 FRASR345	345	75405 OAKDL345	345	1	-0.31898	-974.8	1380.0	TWR:40&41			1313
												Open 75403 FRASR345	345	78450 EDIC	345 1
												Open 75400 COOPC345	345	79583 MARCY T1	345 1
3034.9	4459.5	1527.1	2951.7	78703 N.SCOT99	345	79583 MARCY T1	345	1	-0.26023	-1313.4	1650.0	SB:EDIC_345_R140			1577
												Open 78450 EDIC	345	78702 N.SCOT77	345 1
												Open 78450 EDIC	345	78460 PORTER 2	230 1
												Open 78450 EDIC	345	78485 PORTER 1	115 1
3064.8	4495.3	1557.0	2987.5	77109 LAPPINS1	115	77116 NLEROYTA	115	1	0.04487	100.4	160.0	SB:ROCH_345_3402			1720
												Open 79584 NIAG 345	345	79800 ROCH 345	345 1
												Open 79800 ROCH 345	345	79819 S80 1TR	115 1
3071.0	4502.8	1563.2	2995.0*	75469 KATEL115	115	75488 OAKDL115	115	1	-0.03246	-119.6	163.0	SB:OAKD_345_32-B222			1639
												Open 75403 FRASR345	345	75405 OAKDL345	345 1
												Open 75405 OAKDL345	345	75490 OAK3M115	115 1
3072.3	4504.3	1564.4	2996.5	79592 NIAGAR2W	230	79600 NIAG115E	115	1	0.10586	97.3	239.0	SB:PACK_230_R304			1714
												Open 76665 PACKARD2	230	79592 NIAGAR2W	230 2
												Open 76553 SAWYER77	230	76665 PACKARD2	230 1
												Open 76553 SAWYER77	230	76664 HUNTLEY2	230 1
												Open 76665 PACKARD2	230	76711 PACK(S)W	115 2
												Open 76665 PACKARD2	230	76710 PACK(N)E	115 1
												Open 76665 PACKARD2	230	79592 NIAGAR2W	230 1
												Open 76554 SAWYER78	230	76665 PACKARD2	230 2
3077.0	4509.9	1569.1	3002.1	78450 EDIC	345	78702 N.SCOT77	345	1	0.24354	1210.7	1538.0	SIN:170			1762
												Open 78703 N.SCOT99	345	79583 MARCY T1	345 1
												Open 78478 INGMS-CD	115	79136 INGHAM-E	115 1
												Open 78485 PORTER 1	115	78496 VALLEY	115 1
3077.0	4509.9	1569.1	3002.1	78450 EDIC	345	78702 N.SCOT77	345	1	0.24354	1210.7	1538.0	SIN:180			1763
												Open 78703 N.SCOT99	345	79583 MARCY T1	345 1
												Open 78478 INGMS-CD	115	79136 INGHAM-E	115 1
												Open 78485 PORTER 1	115	79655 ILION	115 1
3087.1	4522.2	1579.3	3014.3	77109 LAPPINS1	115	77116 NLEROYTA	115	1	0.04463	99.5	160.0	SB:NIAG_345_3108			1711
												Open 79584 NIAG 345	345	79800 ROCH 345	345 1
												Open 79584 NIAG 345	345	79592 NIAGAR2W	230 1
3092.8	4528.9	1585.0	3021.1*	75444 DELHI115	115	75454 DEL T115	115	1	0.06864	70.5	164.0	SB:OAKD_345_32-B222			1639
												Open 75403 FRASR345	345	75405 OAKDL345	345 1

FCITC Single Study

PSS/MUST 8.2 -- Managing and Utilizing System Transmission -- TUE, OCT 03 2006 14:10
 2006 CLASS YEAR ATBA BASE CASE
 2011 SUMMER PEAK LOAD W/ UPDATE PJM REP
 Case.File C:\SHARE\CY06\CY06ATBA-SUM11-4.sav
 Subsys.File C:\SHARE\CY06\thermal\CY2006_dyse.sub
 Monit.File C:\SHARE\CY06\thermal\CY2006_dyse.mon
 Contin.File C:\SHARE\CY06\thermal\CY2006_NY.con
 Exclud.File none

Study transfer. From DE_6_SHIFT To OPPOSING . Transfer level - 2000.0 MW

Violations report ordered by transfer capability. Total 227 violations

Interface-1	Interface	1 DYSE-OPEN	Init.Flow=	1956.84	TDF= 0.8335
Interface-2	Interface	2 DYSE-CLOSE	Init.Flow=	3166.13	TDF= 1.0000
Interface-3	Interface	3 WESTC-OPEN	Init.Flow=	449.01	TDF= 0.8335
Interface-4	Interface	4 WESTC-CLOSE	Init.Flow=	1658.31	TDF= 1.0000

IntFce1	IntFce2	IntFce3	IntFce4	LIMITING ELEMENT				PRE- RATING	CONTINGENCY DESCRIPTION						
TRANS				FROM	TO	CKT	FACTOR	SHIFT	BAS/CNT						
2375.6	3668.5	867.8	2160.7	75465 HINMN115	115	76261 HARIS115	115 1	-0.03424	-220.8	238.0	Base Case				
2541.7	3867.8	1033.9	2360.0	75498 S.OWE115	115	75668 LOUNS115	115 1	-0.05575	-103.9	143.0	SB:OAKD_345_36-3122			1641	
											Open	75405 OAKDL345	345	75407 WATRC345	345 1
											Open	75405 OAKDL345	345	77403 LAFAYTTE	345 1
2582.2	3916.4	1074.4	2408.5	75465 HINMN115	115	76702 LOCKPORT	115 1	0.03525	193.6	220.0	Base Case				
2689.2	4044.8	1181.4	2537.0	75465 HINMN115	115	76702 LOCKPORT	115 1	0.05090	235.3	280.0	SB:STOL_230_6652>6752>6552			1680	
											Open	75412 GARDV230	230	75417 STOLE230	230 1
											Open	75414 MEYER230	230	75417 STOLE230	230 1
											Open	75416 ROBIN230	230	75417 STOLE230	230 1
2710.0	4069.7	1202.2	2561.9	75465 HINMN115	115	76261 HARIS115	115 1	-0.04944	-261.3	306.0	SB:STOL_230_6652>6752>6552			1680	
											Open	75412 GARDV230	230	75417 STOLE230	230 1
											Open	75414 MEYER230	230	75417 STOLE230	230 1
											Open	75416 ROBIN230	230	75417 STOLE230	230 1
2714.9	4075.6	1207.1	2567.8	75465 HINMN115	115	76702 LOCKPORT	115 1	0.05481	230.2	280.0	SB:ROCH_345_3402			1720	
											Open	79584 NIAG 345	345	79800 ROCH 345	345 1
											Open	79800 ROCH 345	345	79819 S80 1TR	115 1
2732.9	4097.2	1225.1	2589.4*	75465 HINMN115	115	76702 LOCKPORT	115 1	0.05003	233.4	280.0	75416 ROBIN230 230			75417 STOLE230 230 1 26	
											Open	75416 ROBIN230	230	75417 STOLE230	230 1
2734.2	4098.7	1226.4	2590.9	75465 HINMN115	115	76261 HARIS115	115 1	-0.05324	-256.3	306.0	SB:ROCH_345_3402			1720	
											Open	79584 NIAG 345	345	79800 ROCH 345	345 1
											Open	79800 ROCH 345	345	79819 S80 1TR	115 1
2752.7	4121.0	1244.9	2613.1*	75465 HINMN115	115	76261 HARIS115	115 1	-0.05291	-255.5	306.0	SB:NIAG_345_3108			1711	
											Open	79584 NIAG 345	345	79800 ROCH 345	345 1
											Open	79584 NIAG 345	345	79592 NIAGAR2W	230 1
2869.7	4261.3	1361.9	2753.4	75464 HILSD115	115	75812 CHEMU115	115 1	0.03146	144.5	179.0	SB:OAKD_345_36-3122			1641	
											Open	75405 OAKDL345	345	75407 WATRC345	345 1
											Open	75405 OAKDL345	345	77403 LAFAYTTE	345 1
2912.9	4313.1	1405.0	2805.2	76702 LOCKPORT	115	77122 SOUR-111	115 1	0.04224	110.6	159.0	SB:ROCH_345_3402			1720	

[illegible]

													Open 75404 KINTI345	345	79800 ROCH 345	345	1
3217.9	4679.0	1710.1	3171.2	77100 SOUR-114	115	77111 MORTIMER	115	1	0.04377	86.8	153.0	SB:NIAG_345_3108					1711
													Open 79584 NIAG 345	345	79800 ROCH 345	345	1
													Open 79584 NIAG 345	345	79592 NIAGAR2W	230	1
3220.6	4682.2	1712.8	3174.4	76702 LOCKPORT	115	77101 SHEL-113	115	1	0.04273	115.2	180.0	SB:ROCH_345_3402					1720
													Open 79584 NIAG 345	345	79800 ROCH 345	345	1
													Open 79800 ROCH 345	345	79819 S80 1TR	115	1
3222.1	4684.1	1714.3	3176.2	79584 NIAG 345	345	79800 ROCH 345	345	1	0.49360	935.7	1685.0	SB:ROCH_345_3502					1723
													Open 75404 KINTI345	345	79800 ROCH 345	345	1
													Open 79800 ROCH 345	345	79819 S80 1TR	115	1
3230.8	4694.5	1722.9	3186.6*	77100 SOUR-114	115	77111 MORTIMER	115	1	0.04419	85.5	153.0	79584 NIAG 345	345	79800 ROCH 345	345	1	735
													Open 79584 NIAG 345	345	79800 ROCH 345	345	1
3235.2	4699.8	1727.4	3192.0	Interface	7	JUNK			0.52145	2650.3	3450.0	TWR:34&42					1312
													Open 74001 ROCK TAV	345	75400 COOPC345	345	2
													Open 75400 COOPC345	345	79304 MDTN TAP	345	1
													Open 74001 ROCK TAV	345	79304 MDTN TAP	345	1
3243.8	4710.1	1735.9	3202.2	76702 LOCKPORT	115	77101 SHEL-113	115	1	0.04250	114.4	180.0	SB:NIAG_345_3108					1711
													Open 79584 NIAG 345	345	79800 ROCH 345	345	1
													Open 79584 NIAG 345	345	79592 NIAGAR2W	230	1
3256.4	4725.2	1748.5	3217.3*	76702 LOCKPORT	115	77101 SHEL-113	115	1	0.04290	113.1	180.0	79584 NIAG 345	345	79800 ROCH 345	345	1	735
													Open 79584 NIAG 345	345	79800 ROCH 345	345	1
3261.6	4731.4	1753.7	3223.6*	79584 NIAG 345	345	79800 ROCH 345	345	1	0.47686	938.6	1685.0	SB:ROCH_345_3508					1724
													Open 79800 ROCH 345	345	79801 PANNELL3	345	1
													Open 75404 KINTI345	345	79800 ROCH 345	345	1
3306.3	4785.1	1798.5	3277.2	77109 LAPPINS1	115	77116 NLEROYTA	115	1	0.04487	100.4	173.0	SB:ROCH_345_3402					1720
													Open 79584 NIAG 345	345	79800 ROCH 345	345	1
													Open 79800 ROCH 345	345	79819 S80 1TR	115	1
3329.9	4813.4	1822.1	3305.6	77109 LAPPINS1	115	77116 NLEROYTA	115	1	0.04463	99.5	173.0	SB:NIAG_345_3108					1711
													Open 79584 NIAG 345	345	79800 ROCH 345	345	1
													Open 79584 NIAG 345	345	79592 NIAGAR2W	230	1
3341.7	4827.6	1833.9	3319.7*	77109 LAPPINS1	115	77116 NLEROYTA	115	1	0.04506	98.1	173.0	79584 NIAG 345	345	79800 ROCH 345	345	1	735
													Open 79584 NIAG 345	345	79800 ROCH 345	345	1
3358.5	4847.7	1850.7	3339.9*	75467 JENN 115	115	75469 KATEL115	115	1	-0.03246	-104.4	159.0	SB:OAKD_345_32-B222					1639
													Open 75403 FRASR345	345	75405 OAKDL345	345	1
													Open 75405 OAKDL345	345	75490 OAK3M115	115	1
3374.3	4866.6	1866.4	3358.8	75403 FRASR345	345	75405 OAKDL345	345	1	-0.30352	-863.9	1380.0	SB:EDIC_345_R915					1572
													Open 77400 CLAY	345	78450 EDIC	345	2
													Open 75403 FRASR345	345	78450 EDIC	345	1
3407.8	4906.8	1899.9	3399.0*	Interface	7	JUNK			0.46924	2633.2	3450.0	SIN:430					1773
													Open 74002 ROSETON	345	74331 FISHKILL	345	1
													Open 74018 SUGARLF	115	74046 ROCK TV1	115	1
3413.3	4913.4	1905.5	3405.6	75414 MEYER230	230	75417 STOLE230	230	1	-0.10991	-238.0	430.0	Base Case					
3415.0	4915.5	1907.2	3407.7	75411 AVOCA230	230	75413 HILSD230	230	1	0.09046	224.8	383.0	SER:HC-WC_30&W-F_171					1384
													Open 479 HOMER CY	345	75407 WATRC345	345	1
													Open 281 WARREN	115	76527 FALCONER	115	1
3418.9	4920.1	1911.1	3412.3	75411 AVOCA230	230	75413 HILSD230	230	1	0.08923	226.5	383.0	SER:HCWC/NWES					1390
													Open 479 HOMER CY	345	75407 WATRC345	345	1
													Open 383 E.SAYRE	115	75486 N.WAV115	115	1
3420.2	4921.7	1912.4	3413.9*	75411 AVOCA230	230	75413 HILSD230	230	1	0.08888	227.0	383.0	479 HOMER CY	345	75407 WATRC345	345	1	814
													Open 479 HOMER CY	345	75407 WATRC345	345	1
3420.3	4921.9	1912.5	3414.1	77101 SHEL-113	115	77124 SWDN-113	115	1	0.04274	105.0	180.0	SB:ROCH_345_3402					1720
													Open 79584 NIAG 345	345	79800 ROCH 345	345	1
													Open 79800 ROCH 345	345	79819 S80 1TR	115	1
3428.2	4931.3	1920.4	3423.5	75403 FRASR345	345	79581 GILB 345	345	1	0.31736	963.8	1524.0	TWR:41&33					1314
													Open 75400 COOPC345	345	79583 MARCY T1	345	1

3432.0	4935.8	1924.1	3428.0	77100 SOUR-114	115	77126 TELRDTP1	115	1	-0.04402	-102.1	180.0	Open 75400 C00PC345	345	75403 FRASR345	345	1	1720
												SB:ROCH_345_3402					
												Open 79584 NIAG 345	345	79800 ROCH 345		345	1
												Open 79800 ROCH 345	345	79819 S80 1TR		115	1
3440.5	4946.1	1932.7	3438.2	75400 C00PC345	345	75403 FRASR345	345	1	-0.27046	-1221.6	1703.0	TWR:31&41					1316
												Open 78460 PORTER 2	230	78980 ROTRDM.2		230	2
												Open 75400 C00PC345	345	79583 MARCY T1		345	1
3444.6	4951.0	1936.8	3443.1	77101 SHEL-113	115	77124 SWDN-113	115	1	0.04251	104.1	180.0	SB:NIAG_345_3108					1711
												Open 79584 NIAG 345	345	79800 ROCH 345		345	1
												Open 79584 NIAG 345	345	79592 NIAGAR2W		230	1
3447.8	4954.8	1939.9	3447.0	77111 MORTIMER	115	77123 SWDN-111	115	1	-0.04471	-73.0	153.0	SB:ROCH_345_3402					1720
												Open 79584 NIAG 345	345	79800 ROCH 345		345	1
												Open 79800 ROCH 345	345	79819 S80 1TR		115	1
3455.3	4963.8	1947.5	3456.0*	77101 SHEL-113	115	77124 SWDN-113	115	1	0.04292	102.8	180.0	79584 NIAG 345	345	79800 ROCH 345	345	1	735
												Open 79584 NIAG 345	345	79800 ROCH 345		345	1
3456.3	4965.0	1948.5	3457.2	77100 SOUR-114	115	77126 TELRDTP1	115	1	-0.04378	-101.2	180.0	SB:NIAG_345_3108					1711
												Open 79584 NIAG 345	345	79800 ROCH 345		345	1
												Open 79584 NIAG 345	345	79592 NIAGAR2W		230	1
3458.1	4967.2	1950.3	3459.3	79592 NIAGAR2W	230	79600 NIAG115E	115	1	0.10586	97.3	288.0	SB:PACK_230_R304					1714
												Open 76665 PACKARD2	230	79592 NIAGAR2W		230	2
												Open 76553 SAWYER77	230	76665 PACKARD2		230	1
												Open 76553 SAWYER77	230	76664 HUNTLEY2		230	1
												Open 76665 PACKARD2	230	76711 PACK(S)W		115	2
												Open 76665 PACKARD2	230	76710 PACK(N)E		115	1
												Open 76665 PACKARD2	230	79592 NIAGAR2W		230	1
												Open 76554 SAWYER78	230	76665 PACKARD2		230	2
3464.3	4974.7	1956.5	3466.8*	75403 FRASR345	345	75405 OAKDL345	345	1	-0.30995	-819.5	1380.0	SB:FRAS_345_40-B262					1587
												Open 75403 FRASR345	345	78450 EDIC		345	1
												Open 75403 FRASR345	345	75455 FRASR115		115	1
3466.2	4976.9	1958.4	3469.1	77111 MORTIMER	115	77124 SWDN-113	115	1	-0.04534	-70.9	153.0	SB:ROCH_345_3402					1720
												Open 79584 NIAG 345	345	79800 ROCH 345		345	1
												Open 79800 ROCH 345	345	79819 S80 1TR		115	1
3466.9	4977.7	1959.1	3469.9*	77100 SOUR-114	115	77126 TELRDTP1	115	1	-0.04420	-99.9	180.0	79584 NIAG 345	345	79800 ROCH 345	345	1	735
												Open 79584 NIAG 345	345	79800 ROCH 345		345	1
3472.2	4984.1	1964.3	3476.2	77111 MORTIMER	115	77123 SWDN-111	115	1	-0.04447	-72.2	153.0	SB:NIAG_345_3108					1711
												Open 79584 NIAG 345	345	79800 ROCH 345		345	1
												Open 79584 NIAG 345	345	79592 NIAGAR2W		230	1
3474.0	4986.2	1966.2	3478.4	76663 GRDNVL2	230	76700 GRDNVL1	115	1	0.04277	276.2	354.0	SB:GARD_230_R735					1699
												Open 76500 DUNKIRK	230	76663 GRDNVL2		230	2
												Open 76663 GRDNVL2	230	76700 GRDNVL1		115	2
												Open 76663 GRDNVL2	230	76700 GRDNVL1		115	3
												Open 76663 GRDNVL2	230	76668 SUNY-79		230	1
												Open 76663 GRDNVL2	230	76667 SENCA-72		230	1
												Open 75412 GARDV230	230	76663 GRDNVL2		230	1
3482.6	4996.6	1974.8	3488.8*	77111 MORTIMER	115	77123 SWDN-111	115	1	-0.04489	-70.8	153.0	79584 NIAG 345	345	79800 ROCH 345	345	1	735
												Open 79584 NIAG 345	345	79800 ROCH 345		345	1
3484.1	4998.3	1976.2	3490.5	75403 FRASR345	345	79581 GILB 345	345	1	0.31617	944.7	1524.0	TWR:34&42					1312
												Open 74001 ROCK TAV	345	75400 C00PC345		345	2
												Open 75400 C00PC345	345	79304 MDTN TAP		345	1
												Open 74001 ROCK TAV	345	79304 MDTN TAP		345	1
3489.8	5005.2	1981.9	3497.4	78703 N.SCOT99	345	79583 MARCY T1	345	1	-0.26023	-1313.4	1792.0	SB:EDIC_345_R140					1577
												Open 78450 EDIC	345	78702 N.SCOT77		345	1
												Open 78450 EDIC	345	78460 PORTER 2		230	1
												Open 78450 EDIC	345	78485 PORTER 1		115	1
3490.7	5006.3	1982.9	3498.5	77111 MORTIMER	115	77124 SWDN-113	115	1	-0.04510	-70.0	153.0	SB:NIAG_345_3108					1711

Interface Details

PSS/MUST 8.2 -- Managing and Utilizing System Transmission -- TUE, OCT 03 2006 14:08

2006 CLASS YEAR ATRA BASE CASE

2011 SUMMER PEAK LOAD W/ UPDATE PJM REP

Case.File C:\SHARE\CY06\CY06ATRA-SUM11.sav

Subsys.File C:\SHARE\CY06\thermal\CY2006_dyse.sub

Monit.File C:\SHARE\CY06\thermal\CY2006_dyse.mon

Contin.File C:\SHARE\CY06\thermal\CY2006_NY.con

Exclud.File none

Study transfer. From DE_G_SHIFT To OPPOSING . Transfer level - 2000.0 MW

***** Base Case Report *****

List of 4 interfaces of total 7

```

**** Interface ****
                Limit      Limit
                Import      Export  InitFlow  ResFlow  Change  PTDF
1 DYSE-OPEN      -4417.0    4417.0    1821.9    3489.0    1667.1  0.83354

List of interface branches
**      From Bus      ** **      To Bus      ** CKT  InitFlow  ResFlow  PTDF
75404 KINTI345      345 79800 ROCH 345    345 1      539.5    1030.2    0.2453
75417 STOLE230      230 75414 MEYER230    230 1      0.0      0.0      0.0000
75417 STOLE230      230 75420 SHLDN230    230 1      108.8    328.6    0.1099
76510 ANDOVER1      115 75994 PALMT115    115 1      0.0      0.0      0.0000
76702 LOCKPORT      115 77101 SHEL-113    115 1      92.6    147.7    0.0276
76702 LOCKPORT      115 77115 NAKR-108    115 1      68.2     89.4    0.0106
76702 LOCKPORT      115 77117 OAKFLDTP    115 1      76.2     99.9    0.0119
76702 LOCKPORT      115 77122 SOUR-111    115 1      88.3    142.8    0.0273
76702 LOCKPORT      115 77125 TELRDTP1    115 1      96.8    125.4    0.0143
76702 LOCKPORT      115 77126 TELRDTP1    115 1     101.2    155.2    0.0270
79584 NIAG 345      345 79800 ROCH 345    345 1     650.4    1369.8    0.3597

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List of 4 interfaces of total 7

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**** Interface ****
                Limit      Limit
                Import      Export  InitFlow  ResFlow  Change  PTDF
2 DYSE-CLOSE     -11185.7    11185.7    3336.4    5336.4    2000.0  1.00000

List of interface branches
**      From Bus      ** **      To Bus      ** CKT  InitFlow  ResFlow  PTDF
2 BRANCHBG      500 74300 RAMAPO 5    500 1      798.4    798.4    0.0000
382 E.TWANDA      230 75413 HILSD230    230 1     -137.1    -48.0    0.0445
383 E.SAYRE      115 75486 N.WAV115    115 1     -53.6    -11.7    0.0209
387 LAUREL L      115 75457 GOUDY115    115 1     -41.4      4.9    0.0232
479 HOMER CY      345 75407 WATRC345    345 1     476.3    632.0    0.0778
4989 HUDSON1      345 74328 FARRGUT1    345 1     399.4    399.4    0.0000
4996 LINDEN      230 74371 GOETHALS    230 1     200.3    200.3    0.0000
5028 WALDWICK      345 79302 SMAHWAH1    345 1    -432.5   -438.0   -0.0028
5028 WALDWICK      345 79303 SMAHWAH2    345 1   -553.8   -548.2    0.0028
5039 HUDSON2      345 74329 FARRGUT2    345 1     399.3    399.3    0.0000
9803 HCOR138      138 79311 BURNS138    138 1     -99.2    -99.6   -0.0002
9804 SMAH138      138 79319 RAMP138     138 1     -79.0    -91.5   -0.0062
9804 SMAH138      138 79302 SMAHWAH1    345 1   -185.6   -168.9   0.0083
9806 CLOSTR69      69.0 79357 SPARKILL    69.0 1     -16.1    -15.2    0.0005
9808 HCOR69      69.0 79362 WNYA69     69.0 1     -26.0    -23.5    0.0013
9809 MONTVALE      69.0 79327 BLUHILL    69.0 1      5.8      5.8    0.0000
9809 MONTVALE      69.0 79327 BLUHILL    69.0 2      5.8      5.8    0.0000
9809 MONTVALE      69.0 79400 L491T     69.0 1    -47.6    -46.7    0.0005

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9810	SMAH69	69.0	79340	HILB69	69.0	1	-73.3	-81.4	-0.0041
9811	HCOR34	34.5	79376	PEARL34	34.5	1	5.3	5.1	-0.0001
91099	LINVFT4	345	74315	COGNTECH	345	1	298.5	298.5	0.0000
74959	NEPTCONV	345	74958	NWBRG	345	1	660.2	660.2	0.0000
75404	KINTI345	345	79800	ROCH 345	345	1	539.5	1030.2	0.2453
75417	STOLE230	230	75414	MEYER230	230	1	0.0	0.0	0.0000
75417	STOLE230	230	75420	SHLDN230	230	1	108.8	328.6	0.1099
76510	ANDOVER1	115	75994	PALMT115	115	1	0.0	0.0	0.0000
76702	LOCKPORT	115	77101	SHEL-113	115	1	92.6	147.7	0.0276
76702	LOCKPORT	115	77115	NAKR-108	115	1	68.2	89.4	0.0106
76702	LOCKPORT	115	77117	OAKFLDTP	115	1	76.2	99.9	0.0119
76702	LOCKPORT	115	77122	SOUR-111	115	1	88.3	142.8	0.0273
76702	LOCKPORT	115	77125	TELRDTP1	115	1	96.8	125.4	0.0143
76702	LOCKPORT	115	77126	TELRDTP1	115	1	101.2	155.2	0.0270
79584	NIAG 345	345	79800	ROCH 345	345	1	650.4	1369.8	0.3597
81255	STLAWL34	230	79589	MOSES E	230	1	5.7	5.7	0.0000
81256	STLAWL33	230	79589	MOSES E	230	1	4.6	4.6	0.0000

List of 4 interfaces of total 7

**** Interface ****			Limit	Limit					
			Import	Export	InitFlow	ResFlow	Change	PTDF	
3 WESTC-OPEN			-4740.0	4740.0	314.2	1981.3	1667.1	0.83354	
List of interface branches									
**	From Bus	**	**	To Bus	**	CKT	InitFlow	ResFlow	PTDF
	75417	STOLE230	230	75414	MEYER230	230	1	0.0	0.0
	75417	STOLE230	230	75420	SHLDN230	230	1	108.8	328.6
	79922	C708 LD	34.5	75576	WOLCOT34	34.5	1	0.0	0.0
	79826	QUAKER	115	75892	MACDN115	115	1	36.6	42.0
	79804	S121 B#2	115	75893	SLEIG115	115	1	71.1	120.7
	79805	CLYDE199	115	75893	SLEIG115	115	1	-30.6	-81.9
	79826	QUAKER	115	75893	SLEIG115	115	1	0.0	0.0
	75901	BROWNS C	34.5	75902	CLYDE 34	34.5	1	0.0	0.0
	76510	ANDOVER1	115	75994	PALMT115	115	1	0.0	0.0
	79810	STA 162	115	75995	S.PER115	115	1	-28.4	-20.2
	77111	MORTIMER	115	77110	LAWLER-1	115	1	69.5	119.9
	77111	MORTIMER	115	77463	LAWLER-2	115	1	49.3	101.2
	79801	PANNELL3	345	77400	CLAY	345	1	30.3	635.1
	79801	PANNELL3	345	77400	CLAY	345	2	30.4	637.2
	79874	STA127	34.5	77417	HOOKRD	115	1	-24.3	-24.3
	79805	CLYDE199	115	77433	CLTNCORN	115	1	9.3	60.7
	79875	FARMNGTN	34.5	77444	FARMGTN1	115	1	-22.1	-18.9
	79825	PANNELLI	115	77447	FRMGTN-4	115	1	92.2	162.4
	79875	FARMNGTN	34.5	77447	FRMGTN-4	115	1	-45.9	-49.1
	79946	S168	12.0	77447	FRMGTN-4	115	1	-10.7	-10.7
	79918	CLYDE 34	34.5	79805	CLYDE199	115	1	-21.2	-21.2

List of 4 interfaces of total 7

**** Interface ****			Limit	Limit					
			Import	Export	InitFlow	ResFlow	Change	PTDF	
4 WESTC-CLOSE			-11508.7	11508.7	1828.6	3828.6	2000.0	1.00000	
List of interface branches									
**	From Bus	**	**	To Bus	**	CKT	InitFlow	ResFlow	PTDF
	2	BRANCHBG	500	74300	RAMAPO 5	500	1	798.4	798.4
	382	E.TWANDA	230	75413	HILSD230	230	1	-137.1	-48.0
	383	E.SAYRE	115	75486	N.WAV115	115	1	-53.6	-11.7
	387	LAUREL L	115	75457	GOUDY115	115	1	-41.4	4.9
	479	HOMER CY	345	75407	WATRC345	345	1	476.3	632.0

4989 HUDSON1	345	74328 FARRGUT1	345 1	399.4	399.4	0.0000
4996 LINDEN	230	74371 GOETHALS	230 1	200.3	200.3	0.0000
5028 WALDWICK	345	79302 SMAHWAH1	345 1	-432.5	-438.0	-0.0028
5028 WALDWICK	345	79303 SMAHWAH2	345 1	-553.8	-548.2	0.0028
5039 HUDSON2	345	74329 FARRGUT2	345 1	399.3	399.3	0.0000
9803 HCOR138	138	79311 BURNS138	138 1	-99.2	-99.6	-0.0002
9804 SMAH138	138	79319 RAMP138	138 1	-79.0	-91.5	-0.0062
9804 SMAH138	138	79302 SMAHWAH1	345 1	-185.6	-168.9	0.0083
9806 CLOSTR69	69.0	79357 SPARKILL	69.0 1	-16.1	-15.2	0.0005
9808 HCOR69	69.0	79362 WNYA69	69.0 1	-26.0	-23.5	0.0013
9809 MONTVALE	69.0	79327 BLUHILL	69.0 1	5.8	5.8	0.0000
9809 MONTVALE	69.0	79327 BLUHILL	69.0 2	5.8	5.8	0.0000
9809 MONTVALE	69.0	79400 L491T	69.0 1	-47.6	-46.7	0.0005
9810 SMAH69	69.0	79340 HILB69	69.0 1	-73.3	-81.4	-0.0041
9811 HCOR34	34.5	79376 PEARL34	34.5 1	5.3	5.1	-0.0001
91099 LINVFT4	345	74315 COGNTECH	345 1	298.5	298.5	0.0000
74959 NEPTCONV	345	74958 NWBRG	345 1	660.2	660.2	0.0000
75417 STOLE230	230	75414 MEYER230	230 1	0.0	0.0	0.0000
75417 STOLE230	230	75420 SHLDN230	230 1	108.8	328.6	0.1099
79922 C708 LD	34.5	75576 WOLCOT34	34.5 1	0.0	0.0	0.0000
79826 QUAKER	115	75892 MACDN115	115 1	36.6	42.0	0.0027
79804 S121 B#2	115	75893 SLEIG115	115 1	71.1	120.7	0.0248
79805 CLYDE199	115	75893 SLEIG115	115 1	-30.6	-81.9	-0.0257
79826 QUAKER	115	75893 SLEIG115	115 1	0.0	0.0	0.0000
75901 BROWNS C	34.5	75902 CLYDE 34	34.5 1	0.0	0.0	0.0000
76510 ANDOVER1	115	75994 PALMT115	115 1	0.0	0.0	0.0000
79810 STA 162	115	75995 S.PER115	115 1	-28.4	-20.2	0.0041
77111 MORTIMER	115	77110 LAWLER-1	115 1	69.5	119.9	0.0252
77111 MORTIMER	115	77463 LAWLER-2	115 1	49.3	101.2	0.0260
79801 PANNELL3	345	77400 CLAY	345 1	30.3	635.1	0.3024
79801 PANNELL3	345	77400 CLAY	345 2	30.4	637.2	0.3034
79874 STA127	34.5	77417 HOOKRD	115 1	-24.3	-24.3	0.0000
79805 CLYDE199	115	77433 CLTNCORN	115 1	9.3	60.7	0.0257
79875 FARMNGTN	34.5	77444 FARMGTN1	115 1	-22.1	-18.9	0.0016
79825 PANNELLI	115	77447 FRMGTN-4	115 1	92.2	162.4	0.0351
79875 FARMNGTN	34.5	77447 FRMGTN-4	115 1	-45.9	-49.1	-0.0016
79946 S168	12.0	77447 FRMGTN-4	115 1	-10.7	-10.7	0.0000
81255 STLAWL34	230	79589 MOSES E	230 1	5.7	5.7	0.0000
81256 STLAWL33	230	79589 MOSES E	230 1	4.6	4.6	0.0000
79918 CLYDE 34	34.5	79805 CLYDE199	115 1	-21.2	-21.2	0.0000

FCITC Single Study

PSS/MUST 8.2 -- Managing and Utilizing System Transmission -- TUE, OCT 03 2006 14:08
 2006 CLASS YEAR ATRA BASE CASE
 2011 SUMMER PEAK LOAD W/ UPDATE PJM REP
 Case.File C:\SHARE\CY06\CY06ATRA-SUM11.sav
 Subsys.File C:\SHARE\CY06\thermal\CY2006_dyse.sub
 Monit.File C:\SHARE\CY06\thermal\CY2006_dyse.mon
 Contin.File C:\SHARE\CY06\thermal\CY2006_NY.con
 Exclud.File none

Study transfer. From DE_6_SHIFT To OPPOSING . Transfer level - 2000.0 MW

Violations report ordered by transfer capability. Total 5617 violations

Interface-1	Interface	1	DYSE-OPEN	Init.Flow=	1821.93	TDF=	0.8335
Interface-2	Interface	2	DYSE-CLOSE	Init.Flow=	3336.36	TDF=	1.0000
Interface-3	Interface	3	WESTC-OPEN	Init.Flow=	314.19	TDF=	0.8335
Interface-4	Interface	4	WESTC-CLOSE	Init.Flow=	1828.62	TDF=	1.0000

IntFce1	IntFce2	IntFce3	IntFce4	LIMITING ELEMENT						PRE- RATING			CONTINGENCY DESCRIPTION				
TRANS				FROM		TO		CKT	DISTR.	SHIFT	BAS/CNT						
CAPAB									FACTOR	MW	A/B						
1988.6	3536.3	480.9	2028.6	75465	HINMN115	115	76702	LOCKPORT	115	1	0.05478	241.0	252.0	SB:ROCH_345_3402			1738
														Open 79584 NIAG 345	345	79800 ROCH 345	345 1
														Open 79800 ROCH 345	345	79819 S80 1TR	115 1
1992.7	3541.3	485.0	2033.5	75465	HINMN115	115	76702	LOCKPORT	115	1	0.05444	240.8	252.0	SB:NIAG_345_3108			1729
														Open 79584 NIAG 345	345	79800 ROCH 345	345 1
														Open 79584 NIAG 345	345	79592 NIAGAR2W	230 1
2020.2	3574.3	512.5	2066.5	75465	HINMN115	115	76261	HARIS115	115	1	-0.03424	-229.9	238.0	Base Case			
2026.1	3581.3	518.3	2073.5*	75465	HINMN115	115	76702	LOCKPORT	115	1	0.05501	238.5	252.0	79584 NIAG 345	345	79800 ROCH 345	345 1
														Open 79584 NIAG 345	345	79800 ROCH 345	345 1
2135.3	3712.3	627.5	2204.5	75465	HINMN115	115	76261	HARIS115	115	1	-0.05321	-267.0	287.0	SB:ROCH_345_3402			1738
														Open 79584 NIAG 345	345	79800 ROCH 345	345 1
														Open 79800 ROCH 345	345	79819 S80 1TR	115 1
2140.3	3718.3	632.6	2210.6	75465	HINMN115	115	76261	HARIS115	115	1	-0.05288	-266.8	287.0	SB:NIAG_345_3108			1729
														Open 79584 NIAG 345	345	79800 ROCH 345	345 1
														Open 79584 NIAG 345	345	79592 NIAGAR2W	230 1
2172.1	3756.5	664.4	2248.7*	75465	HINMN115	115	76261	HARIS115	115	1	-0.05343	-264.6	287.0	79584 NIAG 345	345	79800 ROCH 345	345 1
														Open 79584 NIAG 345	345	79800 ROCH 345	345 1
2228.5	3824.1	720.7	2316.4	75465	HINMN115	115	76702	LOCKPORT	115	1	0.03525	202.8	220.0	Base Case			
2318.3	3931.8	810.5	2424.1	75498	S.OWE115	115	75668	LOUNIS115	115	1	-0.05574	-97.8	131.0	SB:OAKD_345_36-3122			1659
														Open 75405 OAKDL345	345	75407 WATRC345	345 1
														Open 75405 OAKDL345	345	77403 LAFAYTTE	345 1
2343.3	3961.9	835.6	2454.1	76702	LOCKPORT	115	77122	SOUR-111	115	1	0.04222	117.6	144.0	SB:ROCH_345_3402			1738
														Open 79584 NIAG 345	345	79800 ROCH 345	345 1
														Open 79800 ROCH 345	345	79819 S80 1TR	115 1
2352.6	3973.0	844.9	2465.3	76702	LOCKPORT	115	77122	SOUR-111	115	1	0.04199	117.3	144.0	SB:NIAG_345_3108			1729
														Open 79584 NIAG 345	345	79800 ROCH 345	345 1
														Open 79584 NIAG 345	345	79592 NIAGAR2W	230 1
2374.6	3999.3	866.8	2491.6	Interface	7	JUNK			0.52711	2726.5	3076.0	TWR:41&33					1332

[illegible]

2764.0	4466.5	1256.2	2958.8	79584 NIAG 345	345	79800 ROCH 345	345 1	0.49312	943.7	1501.0	75404 KINTI345	345	79800 ROCH 345	345 1	13
											Open 75404 KINTI345	345	79800 ROCH 345	345 1	
2779.2	4484.8	1271.4	2977.0	79584 NIAG 345	345	79800 ROCH 345	345 1	0.49347	934.3	1501.0	SB:ROCH_345_3502				1741
											Open 75404 KINTI345	345	79800 ROCH 345	345 1	
											Open 79800 ROCH 345	345	79819 S80 1TR	115 1	
2790.0	4497.7	1282.2	2990.0	75411 AVOCA230	230	75413 HILSD230	230 1	0.09574	271.8	383.0	SB:MEYE_230_6723				1641
											Open 75414 MEYER230	230	75993 MEYER M4	34.5 1	
2790.0	4497.7	1282.2	2990.0	75411 AVOCA230	230	75413 HILSD230	230 1	0.09574	271.8	383.0	75414 MEYER230	230	75993 MEYER M4	34.5 1	837
											Open 75414 MEYER230	230	75993 MEYER M4	34.5 1	
2801.3	4511.3	1293.6	3003.6	77109 LAPPINS1	115	77116 NLEROYTA	115 1	0.04485	107.3	160.0	SB:ROCH_345_3402				1738
											Open 79584 NIAG 345	345	79800 ROCH 345	345 1	
											Open 79800 ROCH 345	345	79819 S80 1TR	115 1	
2809.6	4521.2	1301.8	3013.5*	79584 NIAG 345	345	79800 ROCH 345	345 1	0.47670	936.2	1501.0	SB:ROCH_345_3508				1742
											Open 79800 ROCH 345	345	79801 PANNELL3	345 1	
											Open 75404 KINTI345	345	79800 ROCH 345	345 1	
2813.1	4525.5	1305.4	3017.7	77109 LAPPINS1	115	77116 NLEROYTA	115 1	0.04461	107.0	160.0	SB:NIAG_345_3108				1729
											Open 79584 NIAG 345	345	79800 ROCH 345	345 1	
											Open 79584 NIAG 345	345	79592 NIAGAR2W	230 1	
2822.7	4537.0	1315.0	3029.3*	75411 AVOCA230	230	75413 HILSD230	230 1	0.09045	274.4	383.0	SER:HC-WC_30&W-F_171				1402
											Open 479 HOMER CY	345	75407 WATRC345	345 1	
											Open 281 WARREN	115	76527 FALCONER	115 1	
2835.9	4552.8	1328.2	3045.1*	77109 LAPPINS1	115	77116 NLEROYTA	115 1	0.04504	105.2	160.0	79584 NIAG 345	345	79800 ROCH 345	345 1	747
											Open 79584 NIAG 345	345	79800 ROCH 345	345 1	
2856.2	4577.2	1348.5	3069.5	75486 N.WAV115	115	75812 CHEMU115	115 1	-0.03146	-138.0	177.0	SB:OAKD_345_36-3122				1659
											Open 75405 OAKDL345	345	75407 WATRC345	345 1	
											Open 75405 OAKDL345	345	77403 LAFAYTTE	345 1	
2861.8	4583.9	1354.1	3076.2	77100 SOUR-114	115	77111 MORTIMER	115 1	0.04398	94.1	149.0	SB:ROCH_345_3402				1738
											Open 79584 NIAG 345	345	79800 ROCH 345	345 1	
											Open 79800 ROCH 345	345	79819 S80 1TR	115 1	
2862.3	4584.5	1354.6	3076.7	77101 SHEL-113	115	77124 SWDN-113	115 1	0.04272	111.7	165.0	SB:ROCH_345_3402				1738
											Open 79584 NIAG 345	345	79800 ROCH 345	345 1	
											Open 79800 ROCH 345	345	79819 S80 1TR	115 1	
2868.9	4592.5	1361.2	3084.7	77111 MORTIMER	115	77123 SWDN-111	115 1	-0.04469	-79.9	136.0	SB:ROCH_345_3402				1738
											Open 79584 NIAG 345	345	79800 ROCH 345	345 1	
											Open 79800 ROCH 345	345	79819 S80 1TR	115 1	
2873.9	4598.4	1366.2	3090.7	77100 SOUR-114	115	77111 MORTIMER	115 1	0.04375	93.8	149.0	SB:NIAG_345_3108				1729
											Open 79584 NIAG 345	345	79800 ROCH 345	345 1	
											Open 79584 NIAG 345	345	79592 NIAGAR2W	230 1	
2874.4	4599.0	1366.6	3091.3	77101 SHEL-113	115	77124 SWDN-113	115 1	0.04249	111.3	165.0	SB:NIAG_345_3108				1729
											Open 79584 NIAG 345	345	79800 ROCH 345	345 1	
											Open 79584 NIAG 345	345	79592 NIAGAR2W	230 1	
2878.7	4604.2	1371.0	3096.4	77100 SOUR-114	115	77126 TELRDTP1	115 1	-0.04400	-109.2	165.0	SB:ROCH_345_3402				1738
											Open 79584 NIAG 345	345	79800 ROCH 345	345 1	
											Open 79800 ROCH 345	345	79819 S80 1TR	115 1	
2881.1	4607.0	1373.3	3099.3	77111 MORTIMER	115	77123 SWDN-111	115 1	-0.04445	-79.5	136.0	SB:NIAG_345_3108				1729
											Open 79584 NIAG 345	345	79800 ROCH 345	345 1	
											Open 79584 NIAG 345	345	79592 NIAGAR2W	230 1	
2890.9	4618.8	1383.2	3111.1	77100 SOUR-114	115	77126 TELRDTP1	115 1	-0.04376	-108.9	165.0	SB:NIAG_345_3108				1729
											Open 79584 NIAG 345	345	79800 ROCH 345	345 1	
											Open 79584 NIAG 345	345	79592 NIAGAR2W	230 1	
2896.2	4625.1	1388.4	3117.4*	77100 SOUR-114	115	77111 MORTIMER	115 1	0.04417	92.1	149.0	79584 NIAG 345	345	79800 ROCH 345	345 1	747
											Open 79584 NIAG 345	345	79800 ROCH 345	345 1	
2896.6	4625.7	1388.9	3117.9*	77101 SHEL-113	115	77124 SWDN-113	115 1	0.04290	109.7	165.0	79584 NIAG 345	345	79800 ROCH 345	345 1	747
											Open 79584 NIAG 345	345	79800 ROCH 345	345 1	
2903.2	4633.6	1395.5	3125.8*	77111 MORTIMER	115	77123 SWDN-111	115 1	-0.04487	-77.8	136.0	79584 NIAG 345	345	79800 ROCH 345	345 1	747

FCITC Single Study

PSS/MUST 8.2 -- Managing and Utilizing System Transmission -- TUE, OCT 03 2006 14:09
 2006 CLASS YEAR ATRA BASE CASE
 2011 SUMMER PEAK LOAD W/ UPDATE PJM REP
 Case.File C:\SHARE\CY06\CY06ATRA-SUM11.sav
 Subsys.File C:\SHARE\CY06\thermal\CY2006_dyse.sub
 Monit.File C:\SHARE\CY06\thermal\CY2006_dyse.mon
 Contin.File C:\SHARE\CY06\thermal\CY2006_NY.con
 Exclud.File none

Study transfer. From DE_6_SHIFT To OPPOSING . Transfer level - 2000.0 MW

Violations report ordered by transfer capability. Total 2015 violations

Interface-1	Interface	1	DYSE-OPEN	Init.Flow=	1821.93	TDF=	0.8335
Interface-2	Interface	2	DYSE-CLOSE	Init.Flow=	3336.36	TDF=	1.0000
Interface-3	Interface	3	WESTC-OPEN	Init.Flow=	314.19	TDF=	0.8335
Interface-4	Interface	4	WESTC-CLOSE	Init.Flow=	1828.62	TDF=	1.0000

IntFce1	IntFce2	IntFce3	IntFce4	LIMITING ELEMENT				PRE- RATING	CONTINGENCY DESCRIPTION					
TRANS				FROM	TO	CKT	FACTOR	SHIFT	BAS/CNT					
CAPAB														
2020.2	3574.3	512.5	2066.5	75465 HINMN115	115	76261 HARIS115	115 1	-0.03424	-229.9	238.0	Base Case			
2228.5	3824.1	720.7	2316.4	75465 HINMN115	115	76702 LOCKPORT	115 1	0.03525	202.8	220.0	Base Case			
2374.6	3999.3	866.8	2491.6	Interface	7	JUNK		0.52711	2726.5	3076.0	TWR:41&33		1332	
											Open 75400 COOPC345	345	79583 MARCY T1	345 1
											Open 75400 COOPC345	345	75403 FRASR345	345 1
2414.6	4047.4	906.9	2539.7	75465 HINMN115	115	76702 LOCKPORT	115 1	0.05478	241.0	280.0	SB:ROCH_345_3402		1738	
											Open 79584 NIAG 345	345	79800 ROCH 345	345 1
											Open 79800 ROCH 345	345	79819 S80 1TR	115 1
2421.5	4055.6	913.7	2547.9	75465 HINMN115	115	76702 LOCKPORT	115 1	0.05444	240.8	280.0	SB:NIAG_345_3108		1729	
											Open 79584 NIAG 345	345	79800 ROCH 345	345 1
											Open 79584 NIAG 345	345	79592 NIAGAR2W	230 1
2432.9	4069.3	925.1	2561.6	75465 HINMN115	115	76261 HARIS115	115 1	-0.05321	-267.0	306.0	SB:ROCH_345_3402		1738	
											Open 79584 NIAG 345	345	79800 ROCH 345	345 1
											Open 79800 ROCH 345	345	79819 S80 1TR	115 1
2439.8	4077.6	932.0	2569.9	75465 HINMN115	115	76261 HARIS115	115 1	-0.05288	-266.8	306.0	SB:NIAG_345_3108		1729	
											Open 79584 NIAG 345	345	79800 ROCH 345	345 1
											Open 79584 NIAG 345	345	79592 NIAGAR2W	230 1
2450.4	4090.3	942.6	2582.5*	75465 HINMN115	115	76702 LOCKPORT	115 1	0.05501	238.5	280.0	79584 NIAG 345	345	79800 ROCH 345	345 1 747
											Open 79584 NIAG 345	345	79800 ROCH 345	345 1
2468.5	4112.1	960.8	2604.3*	75465 HINMN115	115	76261 HARIS115	115 1	-0.05343	-264.6	306.0	79584 NIAG 345	345	79800 ROCH 345	345 1 747
											Open 79584 NIAG 345	345	79800 ROCH 345	345 1
2474.3	4119.0	966.5	2611.2	Interface	7	JUNK		0.52142	2667.9	3076.0	TWR:34&42		1330	
											Open 74001 ROCK TAV	345	75400 COOPC345	345 2
											Open 75400 COOPC345	345	79304 MDTN TAP	345 1
											Open 74001 ROCK TAV	345	79304 MDTN TAP	345 1
2497.7	4147.1	990.0	2639.3	75498 S.OWE115	115	75668 LOUNS115	115 1	-0.05574	-97.8	143.0	SB:OAKD_345_36-3122		1659	
											Open 75405 OAKDL345	345	75407 WATRC345	345 1
											Open 75405 OAKDL345	345	77403 LAFAYTTE	345 1

2562.6	4225.0	1054.9	2717.2*	Interface	7	JUNK			0.46919	2659.1	3076.0	SIN:430					1791		
												Open 74002 ROSETON	345	74331	FISHKILL		345 1		
												Open 74018 SUGARLF	115	74046	ROCK TV1		115 1		
2639.5	4317.2	1131.7	2809.4	76702	LOCKPORT	115	77122	SOUR-111	115	1	0.04222	117.6	159.0	SB:ROCH_345_3402			1738		
												Open 79584 NIAG 345	345	79800	ROCH 345		345 1		
												Open 79800 ROCH 345	345	79819	S80 1TR		115 1		
2650.4	4330.2	1142.6	2822.5	76702	LOCKPORT	115	77122	SOUR-111	115	1	0.04199	117.3	159.0	SB:NIAG_345_3108			1729		
												Open 79584 NIAG 345	345	79800	ROCH 345		345 1		
												Open 79584 NIAG 345	345	79592	NIAGAR2W		230 1		
2674.7	4359.4	1167.0	2851.7*	76702	LOCKPORT	115	77122	SOUR-111	115	1	0.04239	115.6	159.0	79584 NIAG 345	345	79800	ROCH 345	345 1	747
												Open 79584 NIAG 345	345	79800	ROCH 345		345 1		
2731.7	4427.8	1224.0	2920.1	77122	SOUR-111	115	77123	SWDN-111	115	1	0.04222	112.9	159.0	SB:ROCH_345_3402			1738		
												Open 79584 NIAG 345	345	79800	ROCH 345		345 1		
												Open 79800 ROCH 345	345	79819	S80 1TR		115 1		
2743.1	4441.5	1235.4	2933.8	77122	SOUR-111	115	77123	SWDN-111	115	1	0.04199	112.6	159.0	SB:NIAG_345_3108			1729		
												Open 79584 NIAG 345	345	79800	ROCH 345		345 1		
												Open 79584 NIAG 345	345	79592	NIAGAR2W		230 1		
2766.6	4469.6	1258.8	2961.9*	77122	SOUR-111	115	77123	SWDN-111	115	1	0.04239	111.0	159.0	79584 NIAG 345	345	79800	ROCH 345	345 1	747
												Open 79584 NIAG 345	345	79800	ROCH 345		345 1		
2790.0	4497.7	1282.2	2990.0	75411	AVOCA230	230	75413	HILSD230	230	1	0.09574	271.8	383.0	SB:MEYE_230_6723			1641		
												Open 75414 MEYER230	230	75993	MEYER M4		34.5 1		
2790.0	4497.7	1282.2	2990.0	75411	AVOCA230	230	75413	HILSD230	230	1	0.09574	271.8	383.0	75414 MEYER230	230	75993	MEYER M4	34.5 1	837
												Open 75414 MEYER230	230	75993	MEYER M4		34.5 1		
2811.6	4523.7	1303.9	3016.0	75464	HILSD115	115	75812	CHEMU115	115	1	0.03146	141.6	179.0	SB:OAKD_345_36-3122			1659		
												Open 75405 OAKDL345	345	75407	WATRC345		345 1		
												Open 75405 OAKDL345	345	77403	LAFAYTTE		345 1		
2813.3	4525.8	1305.6	3018.0	76702	LOCKPORT	115	77126	TELRDTP1	115	1	0.04184	130.2	180.0	SB:ROCH_345_3402			1738		
												Open 79584 NIAG 345	345	79800	ROCH 345		345 1		
												Open 79800 ROCH 345	345	79819	S80 1TR		115 1		
2822.7	4537.0	1315.0	3029.3*	75411	AVOCA230	230	75413	HILSD230	230	1	0.09045	274.4	383.0	SER:HC-WC_30&W-F_171			1402		
												Open 479 HOMER CY	345	75407	WATRC345		345 1		
												Open 281 WARREN	115	76527	FALCONER		115 1		
2825.2	4540.0	1317.4	3032.2	76702	LOCKPORT	115	77126	TELRDTP1	115	1	0.04162	129.9	180.0	SB:NIAG_345_3108			1729		
												Open 79584 NIAG 345	345	79800	ROCH 345		345 1		
												Open 79584 NIAG 345	345	79592	NIAGAR2W		230 1		
2847.9	4567.2	1340.1	3059.4*	76702	LOCKPORT	115	77126	TELRDTP1	115	1	0.04201	128.3	180.0	79584 NIAG 345	345	79800	ROCH 345	345 1	747
												Open 79584 NIAG 345	345	79800	ROCH 345		345 1		
2893.4	4621.8	1385.6	3114.0	75486	N.WAV115	115	75668	LOUNSS115	115	1	0.05574	101.4	173.0	SB:OAKD_345_36-3122			1659		
												Open 75405 OAKDL345	345	75407	WATRC345		345 1		
												Open 75405 OAKDL345	345	77403	LAFAYTTE		345 1		
2909.2	4640.8	1401.5	3133.1	75486	N.WAV115	115	75812	CHEMU115	115	1	-0.03146	-138.0	179.0	SB:OAKD_345_36-3122			1659		
												Open 75405 OAKDL345	345	75407	WATRC345		345 1		
												Open 75405 OAKDL345	345	77403	LAFAYTTE		345 1		
2937.6	4674.9	1429.9	3167.1	77100	SOUR-114	115	77111	MORTIMER	115	1	0.04398	94.1	153.0	SB:ROCH_345_3402			1738		
												Open 79584 NIAG 345	345	79800	ROCH 345		345 1		
												Open 79800 ROCH 345	345	79819	S80 1TR		115 1		
2948.8	4688.3	1441.0	3180.5	76702	LOCKPORT	115	77101	SHEL-113	115	1	0.04271	122.3	180.0	SB:ROCH_345_3402			1738		
												Open 79584 NIAG 345	345	79800	ROCH 345		345 1		
												Open 79800 ROCH 345	345	79819	S80 1TR		115 1		
2950.1	4689.9	1442.4	3182.1	77100	SOUR-114	115	77111	MORTIMER	115	1	0.04375	93.8	153.0	SB:NIAG_345_3108			1729		
												Open 79584 NIAG 345	345	79800	ROCH 345		345 1		
												Open 79584 NIAG 345	345	79592	NIAGAR2W		230 1		
2961.4	4703.3	1453.6	3195.6	76702	LOCKPORT	115	77101	SHEL-113	115	1	0.04248	121.9	180.0	SB:NIAG_345_3108			1729		
												Open 79584 NIAG 345	345	79800	ROCH 345		345 1		
												Open 79584 NIAG 345	345	79592	NIAGAR2W		230 1		

Interface Details

PSS/MUST 8.2 -- Managing and Utilizing System Transmission -- TUE, OCT 03 2006 13:20

2006 CLASS YEAR ATBA BASE CASE

2011 SUMMER PEAK LOAD W/ UPDATE PJM REP

Case.File C:\SHARE\CY06\CY06ATBA-SUM11-4.sav

Subsys.File C:\SHARE\CY06\thermal\CY2006_ms.sub

Monit.File C:\SHARE\CY06\thermal\CY2006_ms.mon

Contin.File C:\SHARE\CY06\thermal\CY2006_NY.con

Exclud.File C:\SHARE\CY06\thermal\CY2006_atba_atra_ms.exc

Study transfer. From MS_G_SHIFT To OPPOSING . Transfer level - 2000.0 MW

***** Base Case Report *****

List of 2 interfaces of total 3

```

**** Interface ****
                Limit      Limit
                Import      Export  InitFlow  ResFlow  Change  PTDF
1 MOSES-OPEN    -5358.0    5358.0    1033.4    3033.4    2000.0  1.00000

List of interface branches
**      From Bus      ** **      To Bus      ** CKT  InitFlow  ResFlow  PTDF
78000 ALCOA-NM      115 78010 BRADY      115 1    -21.1     1.1     0.0111
78001 ALLENS F      115 78014 COLTON     115 1    -64.3    -33.8    0.0152
78017 DENNISON      115 78002 ANDRWS-4    115 1     -2.5     40.7    0.0216
78017 DENNISON      115 78032 LWRNCE-B    115 1     -1.5     41.6    0.0216
79578 MASS 765      765 79577 MARCY765    765 1    970.9    2449.6   0.7394
79590 MOSES W       230 79585 ADRON B1    230 1     75.9     267.0   0.0956
79590 MOSES W       230 79586 ADRON B2    230 1     76.0     267.1   0.0956

```

List of 2 interfaces of total 3

```

**** Interface ****
                Limit      Limit
                Import      Export  InitFlow  ResFlow  Change  PTDF
2 MOSES-CLOSE    -6184.0    6184.0    1150.4    3150.4    2000.0  1.00000

List of interface branches
**      From Bus      ** **      To Bus      ** CKT  InitFlow  ResFlow  PTDF
79602 PLAT T#3      115 70511 GRAND IS    115 1    117.3    117.3   -0.0000
78000 ALCOA-NM      115 78010 BRADY      115 1    -21.1     1.1     0.0111
78001 ALLENS F      115 78014 COLTON     115 1    -64.3    -33.8    0.0152
78017 DENNISON      115 78002 ANDRWS-4    115 1     -2.5     40.7    0.0216
78017 DENNISON      115 78032 LWRNCE-B    115 1     -1.5     41.6    0.0216
79578 MASS 765      765 79577 MARCY765    765 1    970.9    2449.6   0.7394
79590 MOSES W       230 79585 ADRON B1    230 1     75.9     267.0   0.0956
79590 MOSES W       230 79586 ADRON B2    230 1     76.0     267.1   0.0956
79589 MOSES E       230 81255 STLAWL34    230 1     -0.2     -0.2    0.0000
79589 MOSES E       230 81256 STLAWL33    230 1     -0.0     -0.0    0.0000

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FCITC Single Study

PSS/MUST 8.2 -- Managing and Utilizing System Transmission -- TUE, OCT 03 2006 13:19
 2006 CLASS YEAR ATBA BASE CASE
 2011 SUMMER PEAK LOAD W/ UPDATE PJM REP
 Case.File C:\SHARE\CY06\CY06ATBA-SUM11-4.sav
 Subsys.File C:\SHARE\CY06\thermal\CY2006_ms.sub
 Monit.File C:\SHARE\CY06\thermal\CY2006_ms.mon
 Contin.File C:\SHARE\CY06\thermal\CY2006_NY.con
 Exclud.File C:\SHARE\CY06\thermal\CY2006_atba_atra_ms.exc

Study transfer. From MS_6_SHIFT To OPPOSING . Transfer level - 2000.0 MW

Violations report ordered by transfer capability. Total 1789 violations

Interface-1 Interface 1 MOSES-OPEN Init.Flow= 1033.36 TDF= 1.0000
 Interface-2 Interface 2 MOSES-CLOSE Init.Flow= 1150.40 TDF= 1.0000

IntFce1	IntFce2	PRE- RATING					CONTINGENCY DESCRIPTION				
TRANS		LIMITING ELEMENT									
CAPAB		FROM		TO	CKT	DISTR.	SHIFT	BAS/CNT			
1094.2	1211.2	79517 MOS21-24	13.8	79590 MOSES W	230 6	0.50000	227.6	258.0	GEN:SEAB&OMS	439	
									Open 70508 SANDB115	115	70509 SB RCTOR
									Decrease bus 72869 SBRK G1	25.0	generation by
									GEN:SEABROOK	437	100.0 percent dispatch
1094.2	1211.2	79517 MOS21-24	13.8	79590 MOSES W	230 6	0.50000	227.6	258.0	Decrease bus 72869 SBRK G1	25.0	generation by
									GEN:MILLST 3	436	100.0 percent dispatch
1094.2	1211.3*	79517 MOS21-24	13.8	79590 MOSES W	230 6	0.50000	227.6	258.0	Decrease bus 73563 MILL#3	24.0	generation by
									Base Case		100.0 percent dispatch
1094.9	1211.9	79517 MOS21-24	13.8	79590 MOSES W	230 6	0.50000	227.2	258.0	GEN:SEAB&OMS	439	
1131.4	1248.5	79514 MOS17-20	13.8	79589 MOSES E	230 5	0.50000	209.0	258.0	Open 70508 SANDB115	115	70509 SB RCTOR
									Decrease bus 72869 SBRK G1	25.0	generation by
									GEN:SEABROOK	437	100.0 percent dispatch
1131.4	1248.5	79514 MOS17-20	13.8	79589 MOSES E	230 5	0.50000	209.0	258.0	Decrease bus 72869 SBRK G1	25.0	generation by
									GEN:MILLST 3	436	100.0 percent dispatch
1131.5	1248.5*	79514 MOS17-20	13.8	79589 MOSES E	230 5	0.50000	208.9	258.0	Decrease bus 73563 MILL#3	24.0	generation by
									Base Case		100.0 percent dispatch
1132.1	1249.1	79514 MOS17-20	13.8	79589 MOSES E	230 5	0.50000	208.6	258.0	TWR:MMS1&2	405	
1963.1	2080.1	78009 BRNS FLS	115	78057 TAYLORVL	115 2	0.07994	39.7	114.0	Open 79587 MASS230A	230	79589 MOSES E
									Open 79588 MASS230B	230	79589 MOSES E
1988.8	2105.8	78460 PORTER 2	230	79586 ADRON B2	230 1	-0.13988	-344.4	478.0	SB:PORT_230_R845	738	
									Open 78450 EDIC	345	78460 PORTER 2
									Open 78460 PORTER 2	230	79178 CHASES L
2001.0	2118.1	78028 LOWVILLE	115	78057 TAYLORVL	115 1	-0.04276	-72.6	114.0	TWR:MMS1&2	405	
									Open 79587 MASS230A	230	79589 MOSES E
									Open 79588 MASS230B	230	79589 MOSES E
2038.2	2155.2	78009 BRNS FLS	115	78057 TAYLORVL	115 1	0.07994	39.7	120.0	TWR:MMS1&2	405	
									Open 79587 MASS230A	230	79589 MOSES E
									Open 79588 MASS230B	230	79589 MOSES E
2063.5	2180.6	78460 PORTER 2	230	79178 CHASES L	230 1	-0.23408	-263.9	505.0	TWR:MMS1&2	405	
									Open 79587 MASS230A	230	79589 MOSES E

2072.7	2189.7	79577 MARCY765	765	79583 MARCY T1	345 1	0.70534	920.9	1654.0	Open 79588 MASS230B SB:MARC_345_3302	230	79589 MOSES E	230 1	700
2072.7	2189.7	79577 MARCY765	765	79583 MARCY T1	345 1	0.70534	920.9	1654.0	Open 79577 MARCY765 79577 MARCY765	765	79583 MARCY T1	345 2	192
2095.1	2212.1	78009 BRNS FLS	115	78021 FLAT RCK	115 1	-0.07976	-37.3	122.0	Open 79577 MARCY765 TWR:MMS1&2	765	79583 MARCY T1	345 2	405
2105.3	2222.3	79585 ADRON B1	230	79590 MOSES W	230 1	-0.23408	-108.1	359.0	Open 79587 MASS230A Open 79588 MASS230B	230	79589 MOSES E	230 1	405
2105.4	2222.5	78009 BRNS FLS	115	78025 HIGLEY	115 1	-0.08013	-36.1	122.0	Open 79587 MASS230A Open 79588 MASS230B	230	79589 MOSES E	230 1	405
2126.4	2243.4	78014 COLTON	115	78021 FLAT RCK	115 1	0.07976	35.8	123.0	Open 79587 MASS230A Open 79588 MASS230B	230	79589 MOSES E	230 1	405
2164.1	2281.1*	79577 MARCY765	765	79583 MARCY T1	345 1	0.70053	861.9	1654.0	Open 79587 MASS230A Open 79588 MASS230B SB:MARC_345_3308	230	79589 MOSES E	230 1	701
2177.9	2294.9	78460 PORTER 2	230	79586 ADRON B2	230 1	-0.23408	-210.1	478.0	Open 79577 MARCY765 Open 78703 N.SCOT99	765	79583 MARCY T1	345 2	345 1
2187.4	2304.4	78008 BREMEN	115	78057 TAYLORVL	115 1	-0.04274	-64.7	114.0	TWR:MMS1&2 Open 79587 MASS230A Open 79588 MASS230B	230	79589 MOSES E	230 1	405
2188.0	2305.0	78460 PORTER 2	230	79178 CHASES L	230 1	-0.14855	-333.5	505.0	Open 79587 MASS230A Open 79588 MASS230B TWR:MP12&18	230	79589 MOSES E	230 1	392
2197.4	2314.4*	78460 PORTER 2	230	79586 ADRON B2	230 1	-0.14822	-305.5	478.0	Open 78460 PORTER 2 Open 78703 N.SCOT99	230	79586 ADRON B2	230 1	737
2208.1	2325.1	78009 BRNS FLS	115	78057 TAYLORVL	115 2	0.05660	47.5	114.0	SB:PORT_230_R110 Open 78460 PORTER 2	345	79583 MARCY T1	345 1	84
2216.6	2333.6*	78460 PORTER 2	230	79178 CHASES L	230 1	-0.14822	-329.6	505.0	Open 78009 BRNS FLS Open 78460 PORTER 2	115	78057 TAYLORVL	115 1	144
2220.3	2337.3	79586 ADRON B2	230	79590 MOSES W	230 1	-0.23408	-108.2	386.0	Open 78460 PORTER 2 TWR:MMS1&2	230	79586 ADRON B2	230 1	405
2241.3	2358.3	79587 MASS230A	230	79589 MOSES E	230 1	-0.63580	-383.0	1151.0	Open 79587 MASS230A Open 79588 MASS230B SB:MASS_765_7108	230	79589 MOSES E	230 1	774
2241.4	2358.4	79578 MASS 765	765	79587 MASS230A	230 1	-0.63580	-383.0	1151.0	Open 79578 MASS 765 Open 79578 MASS 765 SB:MASS_765_7108	765	79588 MASS230B	230 1	774
2307.3	2424.4	79577 MARCY765	765	79583 MARCY T1	345 2	0.69502	907.6	1793.0	Open 79578 MASS 765 Open 79578 MASS 765 79577 MARCY765	765	79588 MASS230B	230 1	191
2307.3	2424.4	79577 MARCY765	765	79583 MARCY T1	345 2	0.69502	907.6	1793.0	Open 79577 MARCY765 SB:MARC_345_3214	765	79583 MARCY T1	345 1	699
2314.1	2431.1	78009 BRNS FLS	115	78057 TAYLORVL	115 1	0.05660	47.5	120.0	Open 79577 MARCY765 78009 BRNS FLS	765	79583 MARCY T1	345 1	85
2353.4	2470.5	78014 COLTON	115	78025 HIGLEY	115 1	0.08013	38.2	144.0	Open 78009 BRNS FLS TWR:MMS1&2	115	78057 TAYLORVL	115 2	405
2364.0	2481.1	78011 BU+LY+MO	115	78471 B00NVL	115 1	0.04274	64.1	121.0	Open 79587 MASS230A Open 79588 MASS230B TWR:MMS1&2	230	79589 MOSES E	230 1	405
									Open 79587 MASS230A	230	79589 MOSES E	230 1	

FCITC Single Study

PSS/MUST 8.2 -- Managing and Utilizing System Transmission -- TUE, OCT 03 2006 13:20
 2006 CLASS YEAR ATBA BASE CASE
 2011 SUMMER PEAK LOAD W/ UPDATE PJM REP
 Case.File C:\SHARE\CY06\CY06ATBA-SUM11-4.sav
 Subsys.File C:\SHARE\CY06\thermal\CY2006_ms.sub
 Monit.File C:\SHARE\CY06\thermal\CY2006_ms.mon
 Contin.File C:\SHARE\CY06\thermal\CY2006_NY.con
 Exclud.File C:\SHARE\CY06\thermal\CY2006_atba_atra_ms.exc

Study transfer. From MS_6_SHIFT To OPPOSING . Transfer level - 2000.0 MW

Violations report ordered by transfer capability. Total 1764 violations

Interface-1 Interface 1 MOSES-OPEN Init.Flow= 1033.36 TDF= 1.0000
 Interface-2 Interface 2 MOSES-CLOSE Init.Flow= 1150.40 TDF= 1.0000

IntFce1	IntFce2	LIMITING ELEMENT					PRE- RATING										
TRANS		<----->					DISTR.	SHIFT	BAS/CNT								
CAPAB		<----->					FACTOR	MW	A/C	<----->							
1094.2	1211.2	79517	MOS21-24	13.8	79590	MOSES W	230	6	0.50000	227.6	258.0	GEN:SEABROOK			437		
												Decrease bus	72869	SBRK G1	25.0	generation by	100.0 percent dispatch
1094.2	1211.2	79517	MOS21-24	13.8	79590	MOSES W	230	6	0.50000	227.6	258.0	GEN:SEAB&OMS			439		
												Open	70508	SANDB115	115	70509 SB RCTOR	115 2
												Decrease bus	72869	SBRK G1	25.0	generation by	100.0 percent dispatch
1094.2	1211.3*	79517	MOS21-24	13.8	79590	MOSES W	230	6	0.50000	227.6	258.0	GEN:MLS3&OMS			438		
												Open	70508	SANDB115	115	70509 SB RCTOR	115 2
												Decrease bus	73563	MILL#3	24.0	generation by	100.0 percent dispatch
1094.9	1211.9	79517	MOS21-24	13.8	79590	MOSES W	230	6	0.50000	227.2	258.0	Base Case					
1131.4	1248.5	79514	MOS17-20	13.8	79589	MOSES E	230	5	0.50000	209.0	258.0	GEN:SEAB&OMS			439		
												Open	70508	SANDB115	115	70509 SB RCTOR	115 2
												Decrease bus	72869	SBRK G1	25.0	generation by	100.0 percent dispatch
1131.4	1248.5	79514	MOS17-20	13.8	79589	MOSES E	230	5	0.50000	209.0	258.0	GEN:SEABROOK			437		
												Decrease bus	72869	SBRK G1	25.0	generation by	100.0 percent dispatch
1131.5	1248.5*	79514	MOS17-20	13.8	79589	MOSES E	230	5	0.50000	208.9	258.0	GEN:MLS3&OMS			438		
												Open	70508	SANDB115	115	70509 SB RCTOR	115 2
												Decrease bus	73563	MILL#3	24.0	generation by	100.0 percent dispatch
1132.1	1249.1	79514	MOS17-20	13.8	79589	MOSES E	230	5	0.50000	208.6	258.0	Base Case					
2072.7	2189.7	79577	MARCY765	765	79583	MARCY T1	345	1	0.70534	920.9	1654.0	79577 MARCY765	765	79583 MARCY T1	345	2	192
												Open	79577	MARCY765	765	79583 MARCY T1	345 2
2072.7	2189.7	79577	MARCY765	765	79583	MARCY T1	345	1	0.70534	920.9	1654.0	SB:MARC_345_3302			700		
												Open	79577	MARCY765	765	79583 MARCY T1	345 2
2164.1	2281.1*	79577	MARCY765	765	79583	MARCY T1	345	1	0.70053	861.9	1654.0	SB:MARC_345_3308			701		
												Open	79577	MARCY765	765	79583 MARCY T1	345 2
												Open	78703	N.SCOT99	345	79583 MARCY T1	345 1
2213.3	2330.3	78009	BRNS FLS	115	78057	TAYLORVL	115	2	0.07994	39.7	134.0	TWR:MMS1&2			405		
												Open	79587	MASS230A	230	79589 MOSES E	230 1
												Open	79588	MASS230B	230	79589 MOSES E	230 1
2225.8	2342.8	78009	BRNS FLS	115	78057	TAYLORVL	115	1	0.07994	39.7	135.0	TWR:MMS1&2			405		
												Open	79587	MASS230A	230	79589 MOSES E	230 1

2258.0	2375.1	78009 BRNS FLS	115	78021 FLAT RCK	115 1	-0.07976	-37.3	135.0	Open 79588 MASS230B	230	79589 MOSES E	230 1
									TWR:MMS1&2			405
									Open 79587 MASS230A	230	79589 MOSES E	230 1
									Open 79588 MASS230B	230	79589 MOSES E	230 1
2267.7	2384.7	78009 BRNS FLS	115	78025 HIGLEY	115 1	-0.08013	-36.1	135.0	TWR:MMS1&2			405
									Open 79587 MASS230A	230	79589 MOSES E	230 1
									Open 79588 MASS230B	230	79589 MOSES E	230 1
2298.5	2415.5	78460 PORTER 2	230	79178 CHASES L	230 1	-0.23408	-263.9	560.0	TWR:MMS1&2			405
									Open 79587 MASS230A	230	79589 MOSES E	230 1
									Open 79588 MASS230B	230	79589 MOSES E	230 1
2364.6	2481.7	78014 COLTON	115	78021 FLAT RCK	115 1	0.07976	35.8	142.0	TWR:MMS1&2			405
									Open 79587 MASS230A	230	79589 MOSES E	230 1
									Open 79588 MASS230B	230	79589 MOSES E	230 1
2450.9	2568.0	79586 ADRON B2	230	79590 MOSES W	230 1	-0.23408	-108.2	440.0	TWR:MMS1&2			405
									Open 79587 MASS230A	230	79589 MOSES E	230 1
									Open 79588 MASS230B	230	79589 MOSES E	230 1
2451.3	2568.3	79585 ADRON B1	230	79590 MOSES W	230 1	-0.23408	-108.1	440.0	TWR:MMS1&2			405
									Open 79587 MASS230A	230	79589 MOSES E	230 1
									Open 79588 MASS230B	230	79589 MOSES E	230 1
2468.7	2585.8	78028 LOWVILLE	115	78057 TAYLORVL	115 1	-0.04276	-72.6	134.0	TWR:MMS1&2			405
									Open 79587 MASS230A	230	79589 MOSES E	230 1
									Open 79588 MASS230B	230	79589 MOSES E	230 1
2490.7	2607.8	78014 COLTON	115	78025 HIGLEY	115 1	0.08013	38.2	155.0	TWR:MMS1&2			405
									Open 79587 MASS230A	230	79589 MOSES E	230 1
									Open 79588 MASS230B	230	79589 MOSES E	230 1
2532.4	2649.5	78460 PORTER 2	230	79586 ADRON B2	230 1	-0.23408	-210.1	561.0	TWR:MMS1&2			405
									Open 79587 MASS230A	230	79589 MOSES E	230 1
									Open 79588 MASS230B	230	79589 MOSES E	230 1
2551.1	2668.2	79587 MASS230A	230	79589 MOSES E	230 1	-0.63580	-383.0	1348.0	SB:MASS_765_7108			774
									Open 79578 MASS 765	765	79588 MASS230B	230 1
									Open 79578 MASS 765	765	84819 CHA-NY	765 1
2551.2	2668.2	79578 MASS 765	765	79587 MASS230A	230 1	-0.63580	-383.0	1348.0	SB:MASS_765_7108			774
									Open 79578 MASS 765	765	79588 MASS230B	230 1
									Open 79578 MASS 765	765	84819 CHA-NY	765 1
2558.2	2675.3	78460 PORTER 2	230	79178 CHASES L	230 1	-0.14855	-333.5	560.0	TWR:MP12&18			392
									Open 78460 PORTER 2	230	79586 ADRON B2	230 1
									Open 78703 N.SCOT99	345	79583 MARCY T1	345 1
2561.4	2678.4	78009 BRNS FLS	115	78057 TAYLORVL	115 2	0.05660	47.5	134.0	78009 BRNS FLS	115	78057 TAYLORVL	115 1 84
									Open 78009 BRNS FLS	115	78057 TAYLORVL	115 1
2579.1	2696.1	78009 BRNS FLS	115	78057 TAYLORVL	115 1	0.05660	47.5	135.0	78009 BRNS FLS	115	78057 TAYLORVL	115 2 85
									Open 78009 BRNS FLS	115	78057 TAYLORVL	115 2
2582.1	2699.2	78460 PORTER 2	230	79586 ADRON B2	230 1	-0.13988	-344.4	561.0	SB:PORT_230_R845			738
									Open 78450 EDIC	345	78460 PORTER 2	230 1
									Open 78460 PORTER 2	230	79178 CHASES L	230 1
2587.7	2704.7*	78460 PORTER 2	230	79178 CHASES L	230 1	-0.14822	-329.6	560.0	78460 PORTER 2	230	79586 ADRON B2	230 1 144
									Open 78460 PORTER 2	230	79586 ADRON B2	230 1
2655.3	2772.3	78008 BREMEN	115	78057 TAYLORVL	115 1	-0.04274	-64.7	134.0	TWR:MMS1&2			405
									Open 79587 MASS230A	230	79589 MOSES E	230 1
									Open 79588 MASS230B	230	79589 MOSES E	230 1
2668.4	2785.4	78009 BRNS FLS	115	78021 FLAT RCK	115 1	-0.05585	-43.7	135.0	78014 COLTON	115	78025 HIGLEY	115 1 94
									Open 78014 COLTON	115	78025 HIGLEY	115 1
2691.6	2808.6*	78009 BRNS FLS	115	78021 FLAT RCK	115 1	-0.05585	-42.4	135.0	78009 BRNS FLS	115	78025 HIGLEY	115 1 82
									Open 78009 BRNS FLS	115	78025 HIGLEY	115 1
2697.0	2814.0	78009 BRNS FLS	115	78025 HIGLEY	115 1	-0.05595	-41.9	135.0	78009 BRNS FLS	115	78021 FLAT RCK	115 1 81
									Open 78009 BRNS FLS	115	78021 FLAT RCK	115 1

Interface Details

PSS/MUST 8.2 -- Managing and Utilizing System Transmission -- TUE, OCT 03 2006 13:22

2006 CLASS YEAR ATRA BASE CASE

2011 SUMMER PEAK LOAD W/ UPDATE PJM REP

Case.File C:\SHARE\CY06\CY06ATRA-SUM11.sav

Subsys.File C:\SHARE\CY06\thermal\CY2006_ms.sub

Monit.File C:\SHARE\CY06\thermal\CY2006_ms.mon

Contin.File C:\SHARE\CY06\thermal\CY2006_NY.con

Exclud.File C:\SHARE\CY06\thermal\CY2006_atba_atra_ms.exc

Study transfer. From MS_G_SHIFT To OPPOSING . Transfer level - 2000.0 MW

***** Base Case Report *****

List of 2 interfaces of total 3

```

**** Interface ****
                Limit      Limit
                Import      Export  InitFlow  ResFlow  Change  PTDF
1 MOSES-OPEN    -5358.0    5358.0    1406.5    3406.5    2000.0  1.00000

List of interface branches
**      From Bus      ** **      To Bus      ** CKT  InitFlow  ResFlow  PTDF
78000 ALCOA-NM      115 78010 BRADY      115 1    -20.7     1.5     0.0111
78001 ALLENS F      115 78014 COLTON    115 1    -33.6     -3.1     0.0152
78017 DENNISON      115 78002 ANDRWS-4  115 1     -1.6     41.5     0.0216
78017 DENNISON      115 78032 LWRNCE-B  115 1     -0.7     42.4     0.0216
79578 MASS 765      765 79577 MARCY765  765 1    1208.6    2687.3   0.7394
79590 MOSES W       230 79585 ADRON B1   230 1    127.3     318.4    0.0956
79590 MOSES W       230 79586 ADRON B2   230 1    127.3     318.4    0.0956

```

List of 2 interfaces of total 3

```

**** Interface ****
                Limit      Limit
                Import      Export  InitFlow  ResFlow  Change  PTDF
2 MOSES-CLOSE    -6184.0    6184.0    1510.2    3510.2    2000.0  1.00000

List of interface branches
**      From Bus      ** **      To Bus      ** CKT  InitFlow  ResFlow  PTDF
79602 PLAT T#3      115 70511 GRAND IS   115 1    114.0    114.0    -0.0000
78000 ALCOA-NM      115 78010 BRADY      115 1    -20.7     1.5     0.0111
78001 ALLENS F      115 78014 COLTON    115 1    -33.6     -3.1     0.0152
78017 DENNISON      115 78002 ANDRWS-4  115 1     -1.6     41.5     0.0216
78017 DENNISON      115 78032 LWRNCE-B  115 1     -0.7     42.4     0.0216
79578 MASS 765      765 79577 MARCY765  765 1    1208.6    2687.3   0.7394
79590 MOSES W       230 79585 ADRON B1   230 1    127.3     318.4    0.0956
79590 MOSES W       230 79586 ADRON B2   230 1    127.3     318.4    0.0956
79589 MOSES E       230 81255 STLAWL34  230 1     -5.7     -5.7     0.0000
79589 MOSES E       230 81256 STLAWL33  230 1     -4.6     -4.6     0.0000

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FCITC Single Study

PSS/MUST 8.2 -- Managing and Utilizing System Transmission -- TUE, OCT 03 2006 13:22
 2006 CLASS YEAR ATRA BASE CASE
 2011 SUMMER PEAK LOAD W/ UPDATE PJM REP
 Case.File C:\SHARE\CY06\CY06ATRA-SUM11.sav
 Subsys.File C:\SHARE\CY06\thermal\CY2006_ms.sub
 Monit.File C:\SHARE\CY06\thermal\CY2006_ms.mon
 Contin.File C:\SHARE\CY06\thermal\CY2006_NY.con
 Exclud.File C:\SHARE\CY06\thermal\CY2006_atba_atra_ms.exc

Study transfer. From MS_6_SHIFT To OPPOSING . Transfer level - 2000.0 MW

Violations report ordered by transfer capability. Total 2195 violations

Interface-1 Interface 1 MOSES-OPEN Init.Flow= 1406.47 TDF= 1.0000
 Interface-2 Interface 2 MOSES-CLOSE Init.Flow= 1510.15 TDF= 1.0000

IntFce1	IntFce2	PRE- RATING					DISTR. SHIFT BAS/CNT					CONTINGENCY DESCRIPTION				
TRANS		<----- LIMITING ELEMENT ----->					FACT	MW	A/B			<----->				
CAPAB		<----- FROM -----> <----- TO ----->CKT														
1467.5	1571.2	79517	MOS21-24	13.8	79590	MOSES W	230	6	0.50000	227.5	258.0	GEN:SEABROOK			448	
												Decrease bus	72869	SBRK G1	25.0 generation by	100.0 percent dispatch
1467.5	1571.2	79517	MOS21-24	13.8	79590	MOSES W	230	6	0.50000	227.5	258.0	GEN:SEAB&OMS			450	
												Open	70508	SANDB115	115	70509 SB RCTOR
												Decrease bus	72869	SBRK G1	25.0 generation by	100.0 percent dispatch
1467.5	1571.2*	79517	MOS21-24	13.8	79590	MOSES W	230	6	0.50000	227.5	258.0	GEN:MILLST 3			447	
												Decrease bus	73563	MILL#3	24.0 generation by	100.0 percent dispatch
1468.0	1571.7	79517	MOS21-24	13.8	79590	MOSES W	230	6	0.50000	227.2	258.0	Base Case				
1492.3	1596.0	79514	MOS17-20	13.8	79589	MOSES E	230	5	0.50000	215.1	258.0	GEN:SEAB&OMS			450	
												Open	70508	SANDB115	115	70509 SB RCTOR
												Decrease bus	72869	SBRK G1	25.0 generation by	100.0 percent dispatch
1492.3	1596.0	79514	MOS17-20	13.8	79589	MOSES E	230	5	0.50000	215.1	258.0	GEN:SEABROOK			448	
												Decrease bus	72869	SBRK G1	25.0 generation by	100.0 percent dispatch
1492.3	1596.0*	79514	MOS17-20	13.8	79589	MOSES E	230	5	0.50000	215.1	258.0	GEN:MILLST 3			447	
												Decrease bus	73563	MILL#3	24.0 generation by	100.0 percent dispatch
1492.8	1596.5	79514	MOS17-20	13.8	79589	MOSES E	230	5	0.50000	214.8	258.0	Base Case				
1969.3	2073.0	78009	BRNS FLS	115	78057	TAYLORVL	115	2	0.07973	69.1	114.0	TWR:MMS1&2			416	
												Open	79587	MASS230A	230	79589 MOSES E
												Open	79588	MASS230B	230	79589 MOSES E
2044.6	2148.2	78009	BRNS FLS	115	78057	TAYLORVL	115	1	0.07973	69.1	120.0	TWR:MMS1&2			416	
												Open	79587	MASS230A	230	79589 MOSES E
												Open	79588	MASS230B	230	79589 MOSES E
2071.7	2175.4	79585	ADRON B1	230	79590	MOSES W	230	1	-0.23341	-203.7	359.0	TWR:MMS1&2			416	
												Open	79587	MASS230A	230	79589 MOSES E
												Open	79588	MASS230B	230	79589 MOSES E
2093.0	2196.7	78009	BRNS FLS	115	78021	FLAT RCK	115	1	-0.07955	-67.4	122.0	TWR:MMS1&2			416	
												Open	79587	MASS230A	230	79589 MOSES E
												Open	79588	MASS230B	230	79589 MOSES E
2096.4	2200.0	78009	BRNS FLS	115	78025	HIGLEY	115	1	-0.07991	-66.9	122.0	TWR:MMS1&2			416	
												Open	79587	MASS230A	230	79589 MOSES E

2124.4	2228.1	78014 COLTON	115	78021 FLAT RCK	115 1	0.07955	65.9	123.0	Open 79588 MASS230B	230	79589 MOSES E	230 1
									TWR:MMS1&2			416
									Open 79587 MASS230A	230	79589 MOSES E	230 1
									Open 79588 MASS230B	230	79589 MOSES E	230 1
2128.7	2232.4	79577 MARCY765	765	79583 MARCY T1	345 1	0.70524	1144.7	1654.0	79577 MARCY765	765	79583 MARCY T1	345 2 196
									Open 79577 MARCY765	765	79583 MARCY T1	345 2
2128.7	2232.4	79577 MARCY765	765	79583 MARCY T1	345 1	0.70524	1144.7	1654.0	SB:MARC_345_3302			711
									Open 79577 MARCY765	765	79583 MARCY T1	345 2
2149.2	2252.9	78009 BRNS FLS	115	78057 TAYLORVL	115 2	0.05660	72.0	114.0	78009 BRNS FLS	115	78057 TAYLORVL	115 1 84
									Open 78009 BRNS FLS	115	78057 TAYLORVL	115 1
2187.2	2290.9	79586 ADRON B2	230	79590 MOSES W	230 1	-0.23341	-203.8	386.0	TWR:MMS1&2			416
									Open 79587 MASS230A	230	79589 MOSES E	230 1
									Open 79588 MASS230B	230	79589 MOSES E	230 1
2209.7	2313.4*	79577 MARCY765	765	79583 MARCY T1	345 1	0.70043	1091.4	1654.0	SB:MARC_345_3308			712
									Open 79577 MARCY765	765	79583 MARCY T1	345 2
									Open 78703 N.SCOT99	345	79583 MARCY T1	345 1
2250.6	2354.3	78028 LOWVILLE	115	78057 TAYLORVL	115 1	-0.04266	-78.0	114.0	TWR:MMS1&2			416
									Open 79587 MASS230A	230	79589 MOSES E	230 1
									Open 79588 MASS230B	230	79589 MOSES E	230 1
2255.2	2358.9	78009 BRNS FLS	115	78057 TAYLORVL	115 1	0.05660	72.0	120.0	78009 BRNS FLS	115	78057 TAYLORVL	115 2 85
									Open 78009 BRNS FLS	115	78057 TAYLORVL	115 2
2281.9	2385.5*	78009 BRNS FLS	115	78057 TAYLORVL	115 2	0.05866	62.7	114.0	79589 MOSES E	230	79590 MOSES W	230 1 205
									Open 79589 MOSES E	230	79590 MOSES W	230 1
2291.1	2394.8	79587 MASS230A	230	79589 MOSES E	230 1	-0.63553	-588.8	1151.0	SB:MASS_765_7108			785
									Open 79578 MASS 765	765	79588 MASS230B	230 1
									Open 79578 MASS 765	765	84819 CHA-NY	765 1
2291.5	2395.2	79578 MASS 765	765	79587 MASS230A	230 1	-0.63553	-588.5	1151.0	SB:MASS_765_7108			785
									Open 79578 MASS 765	765	79588 MASS230B	230 1
									Open 79578 MASS 765	765	84819 CHA-NY	765 1
2345.0	2448.7	78014 COLTON	115	78025 HIGLEY	115 1	0.07991	69.0	144.0	TWR:MMS1&2			416
									Open 79587 MASS230A	230	79589 MOSES E	230 1
									Open 79588 MASS230B	230	79589 MOSES E	230 1
2350.8	2454.5	78009 BRNS FLS	115	78021 FLAT RCK	115 1	-0.05585	-69.3	122.0	78014 COLTON	115	78025 HIGLEY	115 1 94
									Open 78014 COLTON	115	78025 HIGLEY	115 1
2363.3	2467.0	79577 MARCY765	765	79583 MARCY T1	345 2	0.69489	1128.1	1793.0	79577 MARCY765	765	79583 MARCY T1	345 1 195
									Open 79577 MARCY765	765	79583 MARCY T1	345 1
2363.3	2467.0	79577 MARCY765	765	79583 MARCY T1	345 2	0.69489	1128.1	1793.0	SB:MARC_345_3214			710
									Open 79577 MARCY765	765	79583 MARCY T1	345 1
2374.0	2477.7*	78009 BRNS FLS	115	78021 FLAT RCK	115 1	-0.05585	-68.0	122.0	78009 BRNS FLS	115	78025 HIGLEY	115 1 82
									Open 78009 BRNS FLS	115	78025 HIGLEY	115 1
2375.9	2479.6	78009 BRNS FLS	115	78025 HIGLEY	115 1	-0.05595	-67.8	122.0	78009 BRNS FLS	115	78021 FLAT RCK	115 1 81
									Open 78009 BRNS FLS	115	78021 FLAT RCK	115 1
2384.2	2487.8*	78009 BRNS FLS	115	78057 TAYLORVL	115 1	0.05866	62.7	120.0	79589 MOSES E	230	79590 MOSES W	230 1 205
									Open 79589 MOSES E	230	79590 MOSES W	230 1
2392.3	2495.9*	78009 BRNS FLS	115	78025 HIGLEY	115 1	-0.05595	-66.8	122.0	78014 COLTON	115	78021 FLAT RCK	115 1 93
									Open 78014 COLTON	115	78021 FLAT RCK	115 1
2395.6	2499.3	78014 COLTON	115	78021 FLAT RCK	115 1	0.05585	67.8	123.0	78014 COLTON	115	78025 HIGLEY	115 1 94
									Open 78014 COLTON	115	78025 HIGLEY	115 1
2418.8	2522.5*	78014 COLTON	115	78021 FLAT RCK	115 1	0.05585	66.5	123.0	78009 BRNS FLS	115	78025 HIGLEY	115 1 82
									Open 78009 BRNS FLS	115	78025 HIGLEY	115 1
2425.5	2529.2*	79577 MARCY765	765	79583 MARCY T1	345 2	0.69140	1088.4	1793.0	SB:MARC_345_3208			709
									Open 79577 MARCY765	765	79583 MARCY T1	345 1
									Open 75400 COOPC345	345	79583 MARCY T1	345 1
2429.6	2533.3	78460 PORTER 2	230	79586 ADRON B2	230 1	-0.23341	-239.2	478.0	TWR:MMS1&2			416
									Open 79587 MASS230A	230	79589 MOSES E	230 1

FCITC Single Study

PSS/MUST 8.2 -- Managing and Utilizing System Transmission -- TUE, OCT 03 2006 13:21
 2006 CLASS YEAR ATRA BASE CASE
 2011 SUMMER PEAK LOAD W/ UPDATE PJM REP
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 Monit.File C:\SHARE\CY06\thermal\CY2006_ms.mon
 Contin.File C:\SHARE\CY06\thermal\CY2006_NY.con
 Exclud.File C:\SHARE\CY06\thermal\CY2006_atba_atra_ms.exc

Study transfer. From MS_6_SHIFT To OPPOSING . Transfer level - 2000.0 MW

Violations report ordered by transfer capability. Total 1897 violations

Interface-1 Interface 1 MOSES-OPEN Init.Flow= 1406.47 TDF= 1.0000
 Interface-2 Interface 2 MOSES-CLOSE Init.Flow= 1510.15 TDF= 1.0000

IntFce1	IntFce2	PRE- RATING					CONTINGENCY DESCRIPTION				
TRANS	CAPAB	FROM	TO	CKT	FACTOR	MW	A/C	SHIFT	BAS/CNT	DISTR.	DESCRIPTION
1467.5	1571.2	79517 MOS21-24	13.8	79590 MOSES W	230 6	0.50000	227.5	258.0	GEN:SEABROOK	448	
									Decrease bus	72869 SBRK G1	25.0 generation by 100.0 percent dispatch
1467.5	1571.2	79517 MOS21-24	13.8	79590 MOSES W	230 6	0.50000	227.5	258.0	GEN:SEAB&OMS	450	
									Open 70508 SANDB115	115	70509 SB RCTOR 115 2
									Decrease bus	72869 SBRK G1	25.0 generation by 100.0 percent dispatch
1467.5	1571.2*	79517 MOS21-24	13.8	79590 MOSES W	230 6	0.50000	227.5	258.0	GEN:MILLST 3	447	
									Decrease bus	73563 MILL#3	24.0 generation by 100.0 percent dispatch
1468.0	1571.7	79517 MOS21-24	13.8	79590 MOSES W	230 6	0.50000	227.2	258.0	Base Case		
1492.3	1596.0	79514 MOS17-20	13.8	79589 MOSES E	230 5	0.50000	215.1	258.0	GEN:SEAB&OMS	450	
									Open 70508 SANDB115	115	70509 SB RCTOR 115 2
									Decrease bus	72869 SBRK G1	25.0 generation by 100.0 percent dispatch
1492.3	1596.0	79514 MOS17-20	13.8	79589 MOSES E	230 5	0.50000	215.1	258.0	GEN:SEABROOK	448	
									Decrease bus	72869 SBRK G1	25.0 generation by 100.0 percent dispatch
1492.3	1596.0*	79514 MOS17-20	13.8	79589 MOSES E	230 5	0.50000	215.1	258.0	GEN:MILLST 3	447	
									Decrease bus	73563 MILL#3	24.0 generation by 100.0 percent dispatch
1492.8	1596.5	79514 MOS17-20	13.8	79589 MOSES E	230 5	0.50000	214.8	258.0	Base Case		
2128.7	2232.4	79577 MARCY765	765	79583 MARCY T1	345 1	0.70524	1144.7	1654.0	79577 MARCY765	765	79583 MARCY T1 345 2 196
									Open 79577 MARCY765	765	79583 MARCY T1 345 2
2128.7	2232.4	79577 MARCY765	765	79583 MARCY T1	345 1	0.70524	1144.7	1654.0	SB:MARC_345_3302		711
									Open 79577 MARCY765	765	79583 MARCY T1 345 2
2209.7	2313.4*	79577 MARCY765	765	79583 MARCY T1	345 1	0.70043	1091.4	1654.0	SB:MARC_345_3308		712
									Open 79577 MARCY765	765	79583 MARCY T1 345 2
									Open 78703 N.SCOT99	345	79583 MARCY T1 345 1
2220.2	2323.8	78009 BRNS FLS	115	78057 TAYLORVL	115 2	0.07973	69.1	134.0	TWR:MMS1&2		416
									Open 79587 MASS230A	230	79589 MOSES E 230 1
									Open 79588 MASS230B	230	79589 MOSES E 230 1
2232.7	2336.4	78009 BRNS FLS	115	78057 TAYLORVL	115 1	0.07973	69.1	135.0	TWR:MMS1&2		416
									Open 79587 MASS230A	230	79589 MOSES E 230 1
									Open 79588 MASS230B	230	79589 MOSES E 230 1
2256.4	2360.1	78009 BRNS FLS	115	78021 FLAT RCK	115 1	-0.07955	-67.4	135.0	TWR:MMS1&2		416

										Open 79587 MASS230A	230	79589 MOSES E	230	1
										Open 79588 MASS230B	230	79589 MOSES E	230	1
2259.0	2362.7	78009 BRNS FLS	115	78025 HIGLEY	115	1	-0.07991	-66.9	135.0	TWR:MMS1&2				416
										Open 79587 MASS230A	230	79589 MOSES E	230	1
										Open 79588 MASS230B	230	79589 MOSES E	230	1
2363.2	2466.9	78014 COLTON	115	78021 FLAT RCK	115	1	0.07955	65.9	142.0	TWR:MMS1&2				416
										Open 79587 MASS230A	230	79589 MOSES E	230	1
										Open 79588 MASS230B	230	79589 MOSES E	230	1
2418.6	2522.3	79586 ADRON B2	230	79590 MOSES W	230	1	-0.23341	-203.8	440.0	TWR:MMS1&2				416
										Open 79587 MASS230A	230	79589 MOSES E	230	1
										Open 79588 MASS230B	230	79589 MOSES E	230	1
2418.7	2522.4	79585 ADRON B1	230	79590 MOSES W	230	1	-0.23341	-203.7	440.0	TWR:MMS1&2				416
										Open 79587 MASS230A	230	79589 MOSES E	230	1
										Open 79588 MASS230B	230	79589 MOSES E	230	1
2482.7	2586.4	78014 COLTON	115	78025 HIGLEY	115	1	0.07991	69.0	155.0	TWR:MMS1&2				416
										Open 79587 MASS230A	230	79589 MOSES E	230	1
										Open 79588 MASS230B	230	79589 MOSES E	230	1
2502.6	2606.3	78009 BRNS FLS	115	78057 TAYLORVL	115	2	0.05660	72.0	134.0	78009 BRNS FLS	115	78057 TAYLORVL	115	1 84
										Open 78009 BRNS FLS	115	78057 TAYLORVL	115	2 85
2520.2	2623.9	78009 BRNS FLS	115	78057 TAYLORVL	115	1	0.05660	72.0	135.0	78009 BRNS FLS	115	78057 TAYLORVL	115	2 85
										Open 78009 BRNS FLS	115	78057 TAYLORVL	115	2
2583.6	2687.3	78009 BRNS FLS	115	78021 FLAT RCK	115	1	-0.05585	-69.3	135.0	78014 COLTON	115	78025 HIGLEY	115	1 94
										Open 78014 COLTON	115	78025 HIGLEY	115	1
2601.1	2704.8	79587 MASS230A	230	79589 MOSES E	230	1	-0.63553	-588.8	1348.0	SB:MASS_765_7108				785
										Open 79578 MASS 765	765	79588 MASS230B	230	1
										Open 79578 MASS 765	765	84819 CHA-NY	765	1
2601.5	2705.2	79578 MASS 765	765	79587 MASS230A	230	1	-0.63553	-588.5	1348.0	SB:MASS_765_7108				785
										Open 79578 MASS 765	765	79588 MASS230B	230	1
										Open 79578 MASS 765	765	84819 CHA-NY	765	1
2606.8	2710.5*	78009 BRNS FLS	115	78021 FLAT RCK	115	1	-0.05585	-68.0	135.0	78009 BRNS FLS	115	78025 HIGLEY	115	1 82
										Open 78009 BRNS FLS	115	78025 HIGLEY	115	1
2608.3	2711.9	78009 BRNS FLS	115	78025 HIGLEY	115	1	-0.05595	-67.8	135.0	78009 BRNS FLS	115	78021 FLAT RCK	115	1 81
										Open 78009 BRNS FLS	115	78021 FLAT RCK	115	1
2622.8	2726.5*	78009 BRNS FLS	115	78057 TAYLORVL	115	2	0.05866	62.7	134.0	79589 MOSES E	230	79590 MOSES W	230	1 205
										Open 79589 MOSES E	230	79590 MOSES W	230	1
2624.6	2728.3*	78009 BRNS FLS	115	78025 HIGLEY	115	1	-0.05595	-66.8	135.0	78014 COLTON	115	78021 FLAT RCK	115	1 93
										Open 78014 COLTON	115	78021 FLAT RCK	115	1
2639.9	2743.6*	78009 BRNS FLS	115	78057 TAYLORVL	115	1	0.05866	62.7	135.0	79589 MOSES E	230	79590 MOSES W	230	1 205
										Open 79589 MOSES E	230	79590 MOSES W	230	1
2689.9	2793.5	78460 PORTER 2	230	79178 CHASES L	230	1	-0.23341	-260.4	560.0	TWR:MMS1&2				416
										Open 79587 MASS230A	230	79589 MOSES E	230	1
										Open 79588 MASS230B	230	79589 MOSES E	230	1
2719.5	2823.2	78028 LOWVILLE	115	78057 TAYLORVL	115	1	-0.04266	-78.0	134.0	TWR:MMS1&2				416
										Open 79587 MASS230A	230	79589 MOSES E	230	1
										Open 79588 MASS230B	230	79589 MOSES E	230	1
2735.8	2839.5	78014 COLTON	115	78021 FLAT RCK	115	1	0.05585	67.8	142.0	78014 COLTON	115	78025 HIGLEY	115	1 94
										Open 78014 COLTON	115	78025 HIGLEY	115	1
2759.0	2862.7*	78014 COLTON	115	78021 FLAT RCK	115	1	0.05585	66.5	142.0	78009 BRNS FLS	115	78025 HIGLEY	115	1 82
										Open 78009 BRNS FLS	115	78025 HIGLEY	115	1
2785.2	2888.9	78460 PORTER 2	230	79586 ADRON B2	230	1	-0.23341	-239.2	561.0	TWR:MMS1&2				416
										Open 79587 MASS230A	230	79589 MOSES E	230	1
										Open 79588 MASS230B	230	79589 MOSES E	230	1
2905.8	3009.5	78008 BREMEN	115	78057 TAYLORVL	115	1	-0.04264	-70.1	134.0	TWR:MMS1&2				416
										Open 79587 MASS230A	230	79589 MOSES E	230	1
										Open 79588 MASS230B	230	79589 MOSES E	230	1

Interface Details

PSS/MUST 8.2 -- Managing and Utilizing System Transmission -- TUE, OCT 03 2006 11:13

2006 CLASS YEAR ATBA BASE CASE

2011 SUMMER PEAK LOAD W/ UPDATE PJM REP

Case.File C:\SHARE\CY06\CY06ATBA-SUM11-4.sav

Subsys.File C:\SHARE\CY06\thermal\CY2006_te.sub

Monit.File C:\SHARE\CY06\thermal\CY2006_te.mon

Contin.File C:\SHARE\CY06\thermal\CY2006_NY.con

Exclud.File none

Study transfer. From TE_G_SHIFT To OPPOSING . Transfer level - 2000.0 MW

***** Base Case Report *****

List of 2 interfaces of total 3

**** Interface ****			Limit	Limit	InitFlow	ResFlow	Change	PTDF
			Import	Export				
1 TOTAL-EAST			-12900.8	12900.8	5477.2	7477.2	2000.0	1.00000
List of interface branches								
**	From Bus	** **	To Bus	** CKT	InitFlow	ResFlow	PTDF	
2	BRANCHBG	500	74300 RAMAPO 5	500 1	801.3	801.3	-0.0000	
4989	HUDSON1	345	74328 FARRGUT1	345 1	399.3	399.3	0.0000	
4996	LINDEN	230	74371 GOETHALS	230 1	200.5	200.5	0.0000	
5028	WALDWICK	345	79302 SMAHWAH1	345 1	-432.1	-437.6	-0.0027	
5028	WALDWICK	345	79303 SMAHWAH2	345 1	-553.3	-547.8	0.0027	
5039	HUDSON2	345	74329 FARRGUT2	345 1	399.3	399.3	0.0000	
9803	HCOR138	138	79311 BURNS138	138 1	-99.2	-99.6	-0.0002	
9804	SMAH138	138	79319 RAMP138	138 1	-79.1	-91.4	-0.0062	
9804	SMAH138	138	79302 SMAHWAH1	345 1	-185.5	-168.9	0.0083	
9806	CLOSTR69	69.0	79357 SPARKILL	69.0 1	-16.1	-15.2	0.0005	
9808	HCOR69	69.0	79362 WNYA69	69.0 1	-26.0	-23.4	0.0013	
9809	MONTVALE	69.0	79327 BLUHILL	69.0 1	5.8	5.8	0.0000	
9809	MONTVALE	69.0	79327 BLUHILL	69.0 2	5.8	5.8	0.0000	
9809	MONTVALE	69.0	79400 L491T	69.0 1	-47.6	-46.7	0.0005	
9810	SMAH69	69.0	79340 HILB69	69.0 1	-73.3	-81.3	-0.0040	
9811	HCOR34	34.5	79376 PEARL34	34.5 1	5.3	5.1	-0.0001	
79602	PLAT T#3	115	70511 GRAND IS	115 1	117.3	117.3	0.0000	
75400	C00PC345	345	74001 ROCK TAV	345 2	692.0	1014.0	0.1610	
74959	NEPTCONV	345	74958 NWBRG	345 1	660.2	660.2	0.0000	
75400	C00PC345	345	79304 MDTN TAP	345 1	794.4	1141.0	0.1733	
75403	FRASR345	345	79581 GILB 345	345 1	384.5	714.6	0.1650	
75447	E.SPR115	115	79136 INGHAM-E	115 1	17.3	34.7	0.0087	
75512	W.WDB115	115	76210 W.WDBR69	69.0 1	16.7	26.5	0.0049	
78450	EDIC	345	78702 N.SCOT77	345 1	864.2	1244.2	0.1900	
78460	PORTER 2	230	78980 ROTRDM.2	230 1	268.0	358.7	0.0454	
78460	PORTER 2	230	78980 ROTRDM.2	230 2	275.2	368.4	0.0466	
78478	INGMS-CD	115	79136 INGHAM-E	115 1	119.9	119.9	0.0000	
79583	MARCY T1	345	78703 N.SCOT99	345 1	962.4	1372.5	0.2051	

List of 2 interfaces of total 3

**** Interface ****			Limit	Limit	InitFlow	ResFlow	Change	PTDF
			Import	Export				
2 CENTRAL-EAST			-4172.0	4172.0	2624.3	3615.8	991.5	0.49573
List of interface branches								
**	From Bus	** **	To Bus	** CKT	InitFlow	ResFlow	PTDF	
79602	PLAT T#3	115	70511 GRAND IS	115 1	117.3	117.3	0.0000	
75447	E.SPR115	115	79136 INGHAM-E	115 1	17.3	34.7	0.0087	
78450	EDIC	345	78702 N.SCOT77	345 1	864.2	1244.2	0.1900	
78460	PORTER 2	230	78980 ROTRDM.2	230 1	268.0	358.7	0.0454	
78460	PORTER 2	230	78980 ROTRDM.2	230 2	275.2	368.4	0.0466	
78478	INGMS-CD	115	79136 INGHAM-E	115 1	119.9	119.9	0.0000	
79583	MARCY T1	345	78703 N.SCOT99	345 1	962.4	1372.5	0.2051	

FCITC Single Study

PSS/MUST 8.2 -- Managing and Utilizing System Transmission -- TUE, OCT 03 2006 11:32
 2006 CLASS YEAR ATRA BASE CASE
 2011 SUMMER PEAK LOAD W/ UPDATE PJM REP
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 Monit.File C:\SHARE\CY06\thermal\CY2006_te.mon
 Contin.File C:\SHARE\CY06\thermal\CY2006_NY.con
 Exclud.File none

Study transfer. From TE_G-SHIFT To OPPOSING . Transfer level - 2000.0 MW

Violations report ordered by transfer capability. Total 214 violations

Interface-1 Interface 1 TOTAL-EAST Init.Flow= 5409.12 TDF= 1.0000
 Interface-2 Interface 2 CENTRAL-EAST Init.Flow= 2472.80 TDF= 0.4957

IntFce1	IntFce2	PRE- RATING					CONTINGENCY DESCRIPTION				
TRANS		LIMITING ELEMENT									
CAPAB		FROM		TO	CKT	DISTR.	SHIFT	BAS/CNT			
3034.0	1295.4	78782 RTRDM1	115	78980 ROTRDM.2	230 2	-0.05082	-475.7	355.0	SB:ROTT_230_R84		1056
									Open 78782 RTRDM1	115 78980 ROTRDM.2	230 1
									Open 78782 RTRDM1	115 78980 ROTRDM.2	230 3
5155.7	2347.2	78782 RTRDM1	115	78980 ROTRDM.2	230 2	-0.03319	-363.4	355.0	SB:ROTT_230_R84J0R		1194
									Open 78980 ROTRDM.2	230 78454 JORDNVLL	230 1
									Open 78782 RTRDM1	115 78980 ROTRDM.2	230 1
									Open 78782 RTRDM1	115 78980 ROTRDM.2	230 3
5386.1	2461.4	74344 PLTVLLEY	345	78701 LEEDS 3	345 2	-0.28884	-1544.7	1538.0	74344 PLTVLLEY	345 78705 ATHENS	345 1 72
									Open 74344 PLTVLLEY	345 78705 ATHENS	345 1
5517.8	2526.7	74344 PLTVLLEY	345	78705 ATHENS	345 1	-0.28091	-1507.5	1538.0	SB:LEED_345_R92		987
									Open 74344 PLTVLLEY	345 78701 LEEDS 3	345 2
5517.8	2526.7	74344 PLTVLLEY	345	78705 ATHENS	345 1	-0.28091	-1507.5	1538.0	74344 PLTVLLEY	345 78701 LEEDS 3	345 2 71
									Open 74344 PLTVLLEY	345 78701 LEEDS 3	345 2
5557.1	2546.2	74344 PLTVLLEY	345	78701 LEEDS 3	345 2	-0.27696	-1497.0	1538.0	SB:PV_345_RNS4		869
									Open 74344 PLTVLLEY	345 78705 ATHENS	345 1
									Open 74341 MILLWOOD	345 74344 PLTVLLEY	345 1
5697.8	2615.9*	74344 PLTVLLEY	345	78705 ATHENS	345 1	-0.26958	-1460.2	1538.0	SB:PV_345_RNS5		871
									Open 74344 PLTVLLEY	345 78701 LEEDS 3	345 2
									Open 74344 PLTVLLEY	345 74356 WOOD B	345 1
									Open 74341 MILLWOOD	345 74356 WOOD B	345 1
									Open 74356 WOOD B	345 75409 WOODB345	345 1
									Open 75409 WOODB345	345 75515 WOODS115	115 1
5939.9	2736.0*	74344 PLTVLLEY	345	78701 LEEDS 3	345 2	-0.28884	-1384.7	1538.0	SB:LEED_345_R95		993
									Open 78701 LEEDS 3	345 78705 ATHENS	345 1
6127.8	2829.1	78782 RTRDM1	115	78980 ROTRDM.2	230 3	-0.04610	-335.9	369.0	SB:ROTT_230_R83		1055
									Open 78460 PORTER 2	230 78980 ROTRDM.2	230 2
									Open 78782 RTRDM1	115 78980 ROTRDM.2	230 1
									Open 78782 RTRDM1	115 78980 ROTRDM.2	230 2
									Open 72385 BRSWAMP	230 78980 ROTRDM.2	230 1
6168.7	2849.4	75400 C00PC345	345	75403 FRASR345	345 1	-0.25887	-1207.4	1404.0	TWR:31&41		703
									Open 78460 PORTER 2	230 78980 ROTRDM.2	230 2
									Open 75400 C00PC345	345 79583 MARCY T1	345 1

6228.8	2879.1	75400 C00PC345	345	75403 FRASR345	345 1	-0.25642	-1193.8	1404.0	SB:C00P_345_4182				949
									Open 75400 C00PC345	345	79583 MARCY T1	345 1	
6228.8	2879.1*	75400 C00PC345	345	75403 FRASR345	345 1	-0.25642	-1193.8	1404.0	SB:MARC_345_3202				1003
									Open 75400 C00PC345	345	79583 MARCY T1	345 1	
6401.8	2964.9	78701 LEEDS 3	345	79581 GILB 345	345 1	-0.20615	-1400.4	1605.0	BUS:N.S._99				788
									Open 78703 N.SCOT99	345	79581 GILB 345	345 1	
									Open 78703 N.SCOT99	345	79583 MARCY T1	345 1	
									Open 78703 N.SCOT99	345	78766 N.SCOT1	115 1	
									Open 78701 LEEDS 3	345	78703 N.SCOT99	345 2	
									Open 78702 N.SCOT77	345	78703 N.SCOT99	345 1	
6401.8	2964.9	78701 LEEDS 3	345	79581 GILB 345	345 1	-0.20615	-1400.4	1605.0	SB:NSCT_345_R1>R18>R94>R61				1024
									Open 78703 N.SCOT99	345	79581 GILB 345	345 1	
									Open 78703 N.SCOT99	345	79583 MARCY T1	345 1	
									Open 78703 N.SCOT99	345	78766 N.SCOT1	115 1	
									Open 78701 LEEDS 3	345	78703 N.SCOT99	345 2	
									Open 78702 N.SCOT77	345	78703 N.SCOT99	345 1	
6425.1	2976.5	78701 LEEDS 3	345	78702 N.SCOT77	345 1	-0.29665	-1236.6	1538.0	78701 LEEDS 3	345	78703 N.SCOT99	345 2	262
									Open 78701 LEEDS 3	345	78703 N.SCOT99	345 2	
6425.1	2976.5	78701 LEEDS 3	345	78702 N.SCOT77	345 1	-0.29665	-1236.6	1538.0	SB:LEED_345_R94				994
									Open 78701 LEEDS 3	345	78703 N.SCOT99	345 2	
6436.5	2982.1	78701 LEEDS 3	345	78703 N.SCOT99	345 2	-0.29593	-1234.0	1538.0	78701 LEEDS 3	345	78702 N.SCOT77	345 1	261
									Open 78701 LEEDS 3	345	78702 N.SCOT77	345 1	
6468.8	2998.1	79308 CHESTER	138	79321 SHOEM138	138 1	-0.05769	-227.8	288.9	SIN:440				1161
									Open 74001 ROCK TAV	345	74347 RAMAPO	345 1	
									Open 74018 SUGARLF	115	74046 ROCK TV1	115 1	
6542.1	3034.5*	78701 LEEDS 3	345	79581 GILB 345	345 1	-0.23224	-1341.9	1605.0	TWR:41&33				701
									Open 75400 C00PC345	345	79583 MARCY T1	345 1	
									Open 75400 C00PC345	345	75403 FRASR345	345 1	
6601.9	3064.1	78454 JORDNVLL	230	78980 ROTRDM.2	230 1	0.06763	424.3	505.0	TWR:31&41				703
									Open 78460 PORTER 2	230	78980 ROTRDM.2	230 2	
									Open 75400 C00PC345	345	79583 MARCY T1	345 1	
6618.1	3072.1	79304 MDTN TAP	345	79322 SHOEMTAP	138 1	0.07333	520.3	609.0	SIN:440				1161
									Open 74001 ROCK TAV	345	74347 RAMAPO	345 1	
									Open 74018 SUGARLF	115	74046 ROCK TV1	115 1	
6632.4	3079.2	74344 PLTVLLEY	345	78701 LEEDS 3	345 2	-0.20299	-1082.7	1331.0	Base Case				
6687.5	3106.6*	78782 RTRDM1	115	78980 ROTRDM.2	230 2	-0.03364	-312.0	355.0	78782 RTRDM1	115	78980 ROTRDM.2	230 1	353
									Open 78782 RTRDM1	115	78980 ROTRDM.2	230 1	
6771.6	3148.2	Interface 3 JUNK				0.39617	2122.2	2662.0	Base Case				
6783.4	3154.1	Interface 3 JUNK				0.52643	2726.5	3450.0	TWR:41&33				701
									Open 75400 C00PC345	345	79583 MARCY T1	345 1	
									Open 75400 C00PC345	345	75403 FRASR345	345 1	
6791.0	3157.9	79308 CHESTER	138	79321 SHOEM138	138 1	-0.05509	-212.8	288.9	SB:ROCK_345_37752				1050
									Open 74001 ROCK TAV	345	74347 RAMAPO	345 1	
									Open 74001 ROCK TAV	345	74046 ROCK TV1	115 1	
6796.8	3160.7*	79308 CHESTER	138	79321 SHOEM138	138 1	-0.05222	-216.4	288.9	SB:RMP_345_77-2X				880
									Open 74001 ROCK TAV	345	74347 RAMAPO	345 1	
									Open 74347 RAMAPO	345	79319 RAMP138	138 2	
6799.4	3162.0	78701 LEEDS 3	345	78705 ATHENS	345 1	0.28091	1147.5	1538.0	SB:LEED_345_R92				987
									Open 74344 PLTVLLEY	345	78701 LEEDS 3	345 2	
6799.4	3162.0	78701 LEEDS 3	345	78705 ATHENS	345 1	0.28091	1147.5	1538.0	74344 PLTVLLEY	345	78701 LEEDS 3	345 2	71
									Open 74344 PLTVLLEY	345	78701 LEEDS 3	345 2	
6909.6	3216.6	Interface 3 JUNK				0.52123	2667.9	3450.0	TWR:34&42				699
									Open 74001 ROCK TAV	345	75400 C00PC345	345 2	
									Open 75400 C00PC345	345	79304 MDTN TAP	345 1	
									Open 74001 ROCK TAV	345	79304 MDTN TAP	345 1	
6918.0	3220.8	74344 PLTVLLEY	345	78705 ATHENS	345 1	-0.19318	-1039.5	1331.0	Base Case				

Interface Details

PSS/MUST 8.2 -- Managing and Utilizing System Transmission -- TUE, OCT 03 2006 11:16
 2006 CLASS YEAR ATRA BASE CASE
 2011 SUMMER PEAK LOAD W/ UPDATE PJM REP
 Case.File C:\SHARE\CY06\CY06ATRA-SUM11.sav
 Subsys.File C:\SHARE\CY06\thermal\CY2006_te.sub
 Monit.File C:\SHARE\CY06\thermal\CY2006_te.mon
 Contin.File C:\SHARE\CY06\thermal\CY2006_NY.con
 Exclud.File none

Study transfer. From TE_G_SHIFT To OPPOSING . Transfer level - 2000.0 MW

***** Base Case Report *****

List of 2 interfaces of total 3

*** Interface ***		Limit		Limit					
		Import	Export	InitFlow	ResFlow	Change	PTDF		
1	TOTAL-EAST	-13840.8	13840.8	5409.1	7409.1	2000.0	1.00000		
List of interface branches									
**	From Bus	**	**	To Bus	**	CKT	InitFlow	ResFlow	PTDF
	2 BRANCHBG	500	74300	RAMAPO 5	500	1	798.4	798.4	0.0000
	4989 HUDSON1	345	74328	FARRGUT1	345	1	399.4	399.4	0.0000
	4996 LINDEN	230	74371	GOETHALS	230	1	200.3	200.3	0.0000
	5028 WALDWICK	345	79302	SMAHWAH1	345	1	-432.5	-438.0	-0.0027
	5028 WALDWICK	345	79303	SMAHWAH2	345	1	-553.8	-548.3	0.0027
	5039 HUDSON2	345	74329	FARRGUT2	345	1	399.3	399.3	0.0000
	9803 HCOR138	138	79311	BURNS138	138	1	-99.2	-99.6	-0.0002
	9804 SMAH138	138	79319	RAMP138	138	1	-79.0	-91.4	-0.0062
	9804 SMAH138	138	79302	SMAHWAH1	345	1	-185.6	-169.0	0.0083
	9806 CLOSTR69	69.0	79357	SPARKILL	69.0	1	-16.1	-15.2	0.0005
	9808 HCOR69	69.0	79362	WNYA69	69.0	1	-26.0	-23.5	0.0013
	9809 MONTVALE	69.0	79327	BLUHILL	69.0	1	5.8	5.8	0.0000
	9809 MONTVALE	69.0	79327	BLUHILL	69.0	2	5.8	5.8	0.0000
	9809 MONTVALE	69.0	79400	L491T	69.0	1	-47.6	-46.7	0.0005
	9810 SMAH69	69.0	79340	HILB69	69.0	1	-73.3	-81.3	-0.0040
	9811 HCOR34	34.5	79376	PEARL34	34.5	1	5.3	5.1	-0.0001
	79602 PLAT T#3	115	70511	GRAND IS	115	1	114.0	114.0	0.0000
	75400 COOPC345	345	74001	ROCK TAV	345	2	676.3	998.3	0.1610
	91099 LINVFT4	345	74315	COGNTECH	345	1	298.5	298.5	0.0000
	74959 NEPTCONV	345	74958	NWBRG	345	1	660.2	660.2	0.0000
	75400 COOPC345	345	79304	MDTN TAP	345	1	778.3	1125.0	0.1733
	75403 FRASR345	345	79581	GILB 345	345	1	206.1	536.2	0.1650
	75447 E.SPR115	115	79136	INGHAM-E	115	1	20.5	37.9	0.0087
	75512 W.WDB115	115	76210	W.WDBR69	69.0	1	15.6	25.4	0.0049
	78450 EDIC	345	78702	N.SCOT77	345	1	781.8	1161.7	0.1900
	78460 PORTER 2	230	78980	ROTRDM.2	230	1	0.0	0.0	0.0000
	78460 PORTER 2	230	78980	ROTRDM.2	230	2	263.1	356.3	0.0466
	78478 INGMS-CD	115	79136	INGHAM-E	115	1	117.7	117.7	0.0000
	79583 MARCY T1	345	78703	N.SCOT99	345	1	870.0	1280.2	0.2051
	78454 JORDNVLL	230	78980	ROTRDM.2	230	1	305.7	396.4	0.0454

List of 2 interfaces of total 3

**** Interface ***			Limit	Limit					
			Import	Export	InitFlow	ResFlow	Change	PTDF	
2 CENTRAL-EAST			-4612.0	4612.0	2472.8	3464.3	991.5	0.49573	
List of interface branches									
**	From Bus	**	**	To Bus	**	CKT	InitFlow	ResFlow	PTDF
	79602 PLAT T#3	115	70511	GRAND IS	115	1	114.0	114.0	0.0000
	75447 E.SPR115	115	79136	INGHAM-E	115	1	20.5	37.9	0.0087
	78450 EDIC	345	78702	N.SCOT77	345	1	781.8	1161.7	0.1900
	78460 PORTER 2	230	78980	ROTRDM.2	230	1	0.0	0.0	0.0000
	78460 PORTER 2	230	78980	ROTRDM.2	230	2	263.1	356.3	0.0466
	78478 INGMS-CD	115	79136	INGHAM-E	115	1	117.7	117.7	0.0000
	79583 MARCY T1	345	78703	N.SCOT99	345	1	870.0	1280.2	0.2051
	78454 JORDNVLL	230	78980	ROTRDM.2	230	1	305.7	396.4	0.0454

FCITC Single Study

PSS/MUST 8.2 -- Managing and Utilizing System Transmission -- TUE, OCT 03 2006 11:14
 2006 CLASS YEAR ATBA BASE CASE
 2011 SUMMER PEAK LOAD W/ UPDATE PJM REP
 Case.File C:\SHARE\CY06\CY06ATBA-SUM11-4.sav
 Subsys.File C:\SHARE\CY06\thermal\CY2006_te.sub
 Monit.File C:\SHARE\CY06\thermal\CY2006_te.mon
 Contin.File C:\SHARE\CY06\thermal\CY2006_NY.con
 Exclud.File none

Study transfer. From TE_G_SHIFT To OPPOSING . Transfer level - 2000.0 MW

Violations report ordered by transfer capability. Total 108 violations

Interface-1 Interface 1 TOTAL-EAST Init.Flow= 5477.19 TDF= 1.0000
 Interface-2 Interface 2 CENTRAL-EAST Init.Flow= 2624.31 TDF= 0.4957

IntFce1	IntFce2	LIMITING ELEMENT				PRE- RATING			CONTINGENCY DESCRIPTION						
TRANS		FROM	TO	CKT	DISTR.	SHIFT	BAS/CNT	FACTOR	MW	A/C					
6173.6	2969.6	Interface	3	JUNK	0.52646	2709.4	3076.0	TWR:41&33				697			
								Open 75400 COOPC345	345	79583	MARCY T1	345 1			
								Open 75400 COOPC345	345	75403	FRASR345	345 1			
6176.0	2970.8	74344	PLTVLLEY	345	78701	LEEDS 3	345 2	-0.28886	-1523.1	1725.0	74344	PLTVLLEY 345	78705	ATHENS 345 1	72
								Open 74344 PLTVLLEY	345	78705	ATHENS	345 1			
6294.0	3029.2	Interface	3	JUNK	0.52125	2650.3	3076.0	TWR:34&42				695			
								Open 74001 ROCK TAV	345	75400	COOPC345	345 2			
								Open 75400 COOPC345	345	79304	MDTN TAP	345 1			
								Open 74001 ROCK TAV	345	79304	MDTN TAP	345 1			
6326.1	3045.1	74344	PLTVLLEY	345	78705	ATHENS	345 1	-0.28093	-1486.5	1725.0	74344	PLTVLLEY 345	78701	LEEDS 3 345 2	71
								Open 74344 PLTVLLEY	345	78701	LEEDS 3	345 2			
6326.1	3045.1	74344	PLTVLLEY	345	78705	ATHENS	345 1	-0.28093	-1486.5	1725.0	SB:LEED_345_R92				983
								Open 74344 PLTVLLEY	345	78701	LEEDS 3	345 2			
6376.9	3070.3	74344	PLTVLLEY	345	78701	LEEDS 3	345 2	-0.27698	-1475.8	1725.0	SB:PV_345_RNS4				865
								Open 74344 PLTVLLEY	345	78705	ATHENS	345 1			
								Open 74341 MILLWOOD	345	74344	PLTVLLEY	345 1			
6418.5	3091.0*	Interface	3	JUNK	0.47038	2633.2	3076.0	SIN:430				1156			
								Open 74002 ROSETON	345	74331	FISHKILL	345 1			
								Open 74018 SUGARLF	115	74046	ROCK TV1	115 1			
6536.1	3149.2*	74344	PLTVLLEY	345	78705	ATHENS	345 1	-0.26960	-1439.5	1725.0	SB:PV_345_RNS5				867
								Open 74344 PLTVLLEY	345	78701	LEEDS 3	345 2			
								Open 74344 PLTVLLEY	345	74356	WOOD B	345 1			
								Open 74341 MILLWOOD	345	74356	WOOD B	345 1			
								Open 74356 WOOD B	345	75409	WOODB345	345 1			
								Open 75409 WOODB345	345	75515	WOODS115	115 1			
6688.2	3224.7	78782	RTRDM1	115	78980	ROTRDM.2	230 2	-0.03317	-361.8	402.0	SB:ROTT_230_R84				1052
								Open 78460 PORTER 2	230	78980	ROTRDM.2	230 1			
								Open 78782 RTRDM1	115	78980	ROTRDM.2	230 1			
								Open 78782 RTRDM1	115	78980	ROTRDM.2	230 3			
6730.0	3245.4*	74344	PLTVLLEY	345	78701	LEEDS 3	345 2	-0.28886	-1363.1	1725.0	78701	LEEDS 3 345	78705	ATHENS 345 1	261
								Open 78701 LEEDS 3	345	78705	ATHENS	345 1			

6774.3	3267.4	79308 CHESTER	138	79321 SHOEM138	138 1	-0.05769	-229.6	304.4	SIN:440			1157
									Open 74001 ROCK TAV	345	74347 RAMAPO	345 1
									Open 74018 SUGARLF	115	74046 ROCK TV1	115 1
6775.2	3267.8	74344 PLTVLLEY	345	78701 LEEDS 3	345 2	-0.20299	-1067.5	1331.0	Base Case			
6914.5	3336.8	Interface 3 JUNK				0.39617	2092.6	2662.0	Base Case			
6968.8	3363.8	78701 LEEDS 3	345	78702 N.SCOT77	345 1	-0.29665	-1281.5	1724.0	78701 LEEDS 3	345	78703 N.SCOT99	345 2 260
									Open 78701 LEEDS 3	345	78703 N.SCOT99	345 2
6968.8	3363.8	78701 LEEDS 3	345	78702 N.SCOT77	345 1	-0.29665	-1281.5	1724.0	SB:LEED_345_R94			990
									Open 78701 LEEDS 3	345	78703 N.SCOT99	345 2
6977.8	3368.2	75403 FRASR345	345	75405 OAKDL345	345 1	-0.27006	-974.8	1380.0	TWR:40&41			696
									Open 75403 FRASR345	345	78450 EDIC	345 1
									Open 75400 COOPC345	345	79583 MARCY T1	345 1
6982.5	3370.5	78701 LEEDS 3	345	78703 N.SCOT99	345 2	-0.29594	-1278.5	1724.0	78701 LEEDS 3	345	78702 N.SCOT77	345 1 259
									Open 78701 LEEDS 3	345	78702 N.SCOT77	345 1
7050.1	3404.0	75400 COOPC345	345	75403 FRASR345	345 1	-0.19329	-903.0	1207.0	Base Case			
7060.9	3409.4	74344 PLTVLLEY	345	78705 ATHENS	345 1	-0.19318	-1025.1	1331.0	Base Case			
7074.5	3416.1	75444 DELHI115	115	75454 DEL T115	115 1	0.05169	81.4	164.0	SB:FRAS_345_B1-3262			963
									Open 75403 FRASR345	345	75405 OAKDL345	345 1
7074.5	3416.1	75444 DELHI115	115	75454 DEL T115	115 1	0.05169	81.4	164.0	75403 FRASR345	345	75405 OAKDL345	345 1 506
									Open 75403 FRASR345	345	75405 OAKDL345	345 1
7107.8	3432.6	79308 CHESTER	138	79321 SHOEM138	138 1	-0.05509	-214.6	304.4	SB:ROCK_345_37752			1046
									Open 74001 ROCK TAV	345	74347 RAMAPO	345 1
									Open 74001 ROCK TAV	345	74046 ROCK TV1	115 1
7129.4	3443.4*	79308 CHESTER	138	79321 SHOEM138	138 1	-0.05222	-218.1	304.4	SB:RMP_345_77-2X			876
									Open 74001 ROCK TAV	345	74347 RAMAPO	345 1
									Open 74347 RAMAPO	345	79319 RAMP138	138 2
7206.2	3481.4	78703 N.SCOT99	345	79583 MARCY T1	345 1	-0.27679	-1313.4	1792.0	SB:EDIC_345_R140			960
									Open 78450 EDIC	345	78702 N.SCOT77	345 1
									Open 78450 EDIC	345	78460 PORTER 2	230 1
									Open 78450 EDIC	345	78485 PORTER 1	115 1
7263.3	3509.8	78703 N.SCOT99	345	79583 MARCY T1	345 1	-0.27185	-1306.4	1792.0	TWR:40&41			696
									Open 75403 FRASR345	345	78450 EDIC	345 1
									Open 75400 COOPC345	345	79583 MARCY T1	345 1
7303.9	3529.9*	75444 DELHI115	115	75454 DEL T115	115 1	0.05121	70.5	164.0	SB:OAKD_345_32-B222			1022
									Open 75403 FRASR345	345	75405 OAKDL345	345 1
									Open 75405 OAKDL345	345	75490 OAK3M115	115 1
7310.0	3532.9*	78703 N.SCOT99	345	79583 MARCY T1	345 1	-0.27241	-1292.7	1792.0	SIN:160			1144
									Open 78450 EDIC	345	78702 N.SCOT77	345 1
									Open 78478 INGMS-CD	115	79136 INGHAM-E	115 1
									Open 78485 PORTER 1	115	78496 VALLEY	115 1
7336.9	3546.2	75400 COOPC345	345	75403 FRASR345	345 1	-0.25886	-1221.6	1703.0	TWR:31&41			699
									Open 78460 PORTER 2	230	78980 ROTRDM.2	230 2
									Open 75400 COOPC345	345	79583 MARCY T1	345 1
7359.0	3557.2	79308 CHESTER	138	79323 SGRLF138	138 1	0.05769	195.8	304.4	SIN:440			1157
									Open 74001 ROCK TAV	345	74347 RAMAPO	345 1
									Open 74018 SUGARLF	115	74046 ROCK TV1	115 1
7409.8	3582.4	75400 COOPC345	345	75403 FRASR345	345 1	-0.25642	-1207.4	1703.0	SB:MARC_345_3202			999
									Open 75400 COOPC345	345	79583 MARCY T1	345 1
7409.8	3582.4*	75400 COOPC345	345	75403 FRASR345	345 1	-0.25642	-1207.4	1703.0	75400 COOPC345	345	79583 MARCY T1	345 1 83
									Open 75400 COOPC345	345	79583 MARCY T1	345 1
7420.6	3587.7	75403 FRASR345	345	79581 GILB 345	345 1	0.28825	963.8	1524.0	TWR:41&33			697
									Open 75400 COOPC345	345	79583 MARCY T1	345 1
									Open 75400 COOPC345	345	75403 FRASR345	345 1
7446.5	3600.6	79304 MDTN TAP	345	79322 SHOEMTAP	138 1	0.07333	522.6	667.0	SIN:440			1157
									Open 74001 ROCK TAV	345	74347 RAMAPO	345 1

FCITC Single Study

PSS/MUST 8.2 -- Managing and Utilizing System Transmission -- TUE, OCT 03 2006 11:11
 2006 CLASS YEAR ATBA BASE CASE
 2011 SUMMER PEAK LOAD W/ UPDATE PJM REP
 Case.File C:\SHARE\CY06\CY06ATBA-SUM11-4.sav
 Subsys.File C:\SHARE\CY06\thermal\CY2006_te.sub
 Monit.File C:\SHARE\CY06\thermal\CY2006_te.mon
 Contin.File C:\SHARE\CY06\thermal\CY2006_NY.con
 Exclud.File none

Study transfer. From TE_G_SHIFT To OPPOSING . Transfer level - 2000.0 MW

Violations report ordered by transfer capability. Total 233 violations

Interface-1 Interface 1 TOTAL-EAST Init.Flow= 5477.19 TDF= 1.0000
 Interface-2 Interface 2 CENTRAL-EAST Init.Flow= 2624.31 TDF= 0.4957

IntFce1	IntFce2							PRE- RATING													
TRANS		<----- LIMITING ELEMENT ----->						DISTR.	SHIFT	BAS/CNT	<----- CONTINGENCY DESCRIPTION ----->										
CAPAB		FROM		TO		CKT		FACTOR	MW	A/B											
5271.4	2522.3	78782	RTRDM1	115	78980	ROTRDM.2	230	2	-0.03317	-361.8	355.0	SB:ROTT_230_R84									
												Open	78460	PORTER 2	230	78980	ROTRDM.2	230	1		
												Open	78782	RTRDM1	115	78980	ROTRDM.2	230	1		
												Open	78782	RTRDM1	115	78980	ROTRDM.2	230	3		
5528.7	2649.8	74344	PLTVLLEY	345	78701	LEEDS 3	345	2	-0.28886	-1523.1	1538.0	74344	PLTVLLEY	345	78705	ATHENS	345	1	72		
												Open	74344	PLTVLLEY	345	78705	ATHENS	345	1		
5660.4	2715.1	74344	PLTVLLEY	345	78705	ATHENS	345	1	-0.28093	-1486.5	1538.0	74344	PLTVLLEY	345	78701	LEEDS 3	345	2	71		
												Open	74344	PLTVLLEY	345	78701	LEEDS 3	345	2		
5660.4	2715.1	74344	PLTVLLEY	345	78705	ATHENS	345	1	-0.28093	-1486.5	1538.0	SB:LEED_345_R92								983	
												Open	74344	PLTVLLEY	345	78701	LEEDS 3	345	2		
5701.8	2735.6	74344	PLTVLLEY	345	78701	LEEDS 3	345	2	-0.27698	-1475.8	1538.0	SB:PV_345_RNS4								865	
												Open	74344	PLTVLLEY	345	78705	ATHENS	345	1		
												Open	74341	MILLWOOD	345	74344	PLTVLLEY	345	1		
5842.4	2805.4*	74344	PLTVLLEY	345	78705	ATHENS	345	1	-0.26960	-1439.5	1538.0	SB:PV_345_RNS5								867	
												Open	74344	PLTVLLEY	345	78701	LEEDS 3	345	2		
												Open	74344	PLTVLLEY	345	74356	WOOD B	345	1		
												Open	74341	MILLWOOD	345	74356	WOOD B	345	1		
												Open	74356	WOOD B	345	75409	WOODB345	345	1		
												Open	75409	WOODB345	345	75515	WOODS115	115	1		
6049.8	2908.2*	74344	PLTVLLEY	345	78701	LEEDS 3	345	2	-0.26975	-1383.5	1538.0	TWR:41&33								697	
												Open	75400	C00PC345	345	79583	MARCY T1	345	1		
												Open	75400	C00PC345	345	75403	FRASR345	345	1		
6173.6	2969.6	Interface	3	JUNK					0.52646	2709.4	3076.0	TWR:41&33								697	
												Open	75400	C00PC345	345	79583	MARCY T1	345	1		
												Open	75400	C00PC345	345	75403	FRASR345	345	1		
6181.8	2973.6	75400	C00PC345	345	75403	FRASR345	345	1	-0.25886	-1221.6	1404.0	TWR:31&41								699	
												Open	78460	PORTER 2	230	78980	ROTRDM.2	230	2		
												Open	75400	C00PC345	345	79583	MARCY T1	345	1		
6243.8	3004.3	75400	C00PC345	345	75403	FRASR345	345	1	-0.25642	-1207.4	1404.0	SB:C00P_345_4182								945	
												Open	75400	C00PC345	345	79583	MARCY T1	345	1		
6243.8	3004.3*	75400	C00PC345	345	75403	FRASR345	345	1	-0.25642	-1207.4	1404.0	SB:MARC_345_3202								999	
												Open	75400	C00PC345	345	79583	MARCY T1	345	1		

6294.0	3029.2	Interface	3	JUNK			0.52125	2650.3	3076.0	TWR:34&42			695
										Open 74001 ROCK TAV	345	75400 COOPC345	345 2
										Open 75400 COOPC345	345	79304 MDTN TAP	345 1
										Open 74001 ROCK TAV	345	79304 MDTN TAP	345 1
6341.8	3052.9	78701 LEEDS 3	345	78702 N.SCOT77	345 1	-0.29665	-1281.5	1538.0		78701 LEEDS 3	345	78703 N.SCOT99	345 2 260
										Open 78701 LEEDS 3	345	78703 N.SCOT99	345 2
6341.8	3052.9	78701 LEEDS 3	345	78702 N.SCOT77	345 1	-0.29665	-1281.5	1538.0		SB:LEED_345_R94			990
										Open 78701 LEEDS 3	345	78703 N.SCOT99	345 2
6354.0	3059.0	78701 LEEDS 3	345	78703 N.SCOT99	345 2	-0.29594	-1278.5	1538.0		78701 LEEDS 3	345	78702 N.SCOT77	345 1 259
										Open 78701 LEEDS 3	345	78702 N.SCOT77	345 1
6418.5	3091.0*	Interface	3	JUNK			0.47038	2633.2	3076.0	SIN:430			1156
										Open 74002 ROSETON	345	74331 FISHKILL	345 1
										Open 74018 SUGARLF	115	74046 ROCK TV1	115 1
6505.7	3134.2	79308 CHESTER	138	79321 SHOEM138	138 1	-0.05769	-229.6	288.9		SIN:440			1157
										Open 74001 ROCK TAV	345	74347 RAMAPO	345 1
										Open 74018 SUGARLF	115	74046 ROCK TV1	115 1
6655.6	3208.5	79304 MDTN TAP	345	79322 SHOEMTAP	138 1	0.07333	522.6	609.0		SIN:440			1157
										Open 74001 ROCK TAV	345	74347 RAMAPO	345 1
										Open 74018 SUGARLF	115	74046 ROCK TV1	115 1
6693.2	3227.1	78703 N.SCOT99	345	79583 MARCY T1	345 1	-0.27679	-1313.4	1650.0		SB:EDIC_345_R140			960
										Open 78450 EDIC	345	78702 N.SCOT77	345 1
										Open 78450 EDIC	345	78460 PORTER 2	230 1
										Open 78450 EDIC	345	78485 PORTER 1	115 1
6741.0	3250.8	78703 N.SCOT99	345	79583 MARCY T1	345 1	-0.27185	-1306.4	1650.0		TWR:40&41			696
										Open 75403 FRASR345	345	78450 EDIC	345 1
										Open 75400 COOPC345	345	79583 MARCY T1	345 1
6741.3	3250.9	78450 EDIC	345	78702 N.SCOT77	345 1	0.25890	1210.7	1538.0		SIN:170			1145
										Open 78703 N.SCOT99	345	79583 MARCY T1	345 1
										Open 78478 INGMS-CD	115	79136 INGHAM-E	115 1
										Open 78485 PORTER 1	115	78496 VALLEY	115 1
6741.3	3251.0	78450 EDIC	345	78702 N.SCOT77	345 1	0.25890	1210.7	1538.0		SIN:180			1146
										Open 78703 N.SCOT99	345	79583 MARCY T1	345 1
										Open 78478 INGMS-CD	115	79136 INGHAM-E	115 1
										Open 78485 PORTER 1	115	79655 ILION	115 1
6775.2	3267.8	74344 PLTVLLEY	345	78701 LEEDS 3	345 2	-0.20299	-1067.5	1331.0		Base Case			
6782.1	3271.2	78782 RTRDM1	115	78980 ROTRDM.2	230 3	-0.04608	-308.9	369.0		SB:ROTT_230_R83			1051
										Open 78460 PORTER 2	230	78980 ROTRDM.2	230 2
										Open 78782 RTRDM1	115	78980 ROTRDM.2	230 1
										Open 78782 RTRDM1	115	78980 ROTRDM.2	230 2
										Open 72385 BRSWAMP	230	78980 ROTRDM.2	230 1
6788.8	3274.5*	78703 N.SCOT99	345	79583 MARCY T1	345 1	-0.27241	-1292.7	1650.0		SIN:160			1144
										Open 78450 EDIC	345	78702 N.SCOT77	345 1
										Open 78478 INGMS-CD	115	79136 INGHAM-E	115 1
										Open 78485 PORTER 1	115	78496 VALLEY	115 1
6826.4	3293.2	79308 CHESTER	138	79321 SHOEM138	138 1	-0.05509	-214.6	288.9		SB:ROCK_345_37752			1046
										Open 74001 ROCK TAV	345	74347 RAMAPO	345 1
										Open 74001 ROCK TAV	345	74046 ROCK TV1	115 1
6832.6	3296.2*	79308 CHESTER	138	79321 SHOEM138	138 1	-0.05222	-218.1	288.9		SB:RMP_345_77-2X			876
										Open 74001 ROCK TAV	345	74347 RAMAPO	345 1
										Open 74347 RAMAPO	345	79319 RAMP138	138 2
6845.5	3302.6	78701 LEEDS 3	345	78703 N.SCOT99	345 2	-0.26526	-1175.0	1538.0		SB:LEED_345_?2			994
										Open 78701 LEEDS 3	345	78705 ATHENS	345 1
										Open 78701 LEEDS 3	345	78702 N.SCOT77	345 1
6862.3	3311.0*	78450 EDIC	345	78702 N.SCOT77	345 1	0.25747	1181.4	1538.0		TWR:MP12&18			694
										Open 78460 PORTER 2	230	79586 ADRON B2	230 1
										Open 78703 N.SCOT99	345	79583 MARCY T1	345 1

FCITC Single Study

PSS/MUST 8.2 -- Managing and Utilizing System Transmission -- TUE, OCT 03 2006 11:15
 2006 CLASS YEAR ATRA BASE CASE
 2011 SUMMER PEAK LOAD W/ UPDATE PJM REP
 Case.File C:\SHARE\CY06\CY06ATRA-SUM11.sav
 Subsys.File C:\SHARE\CY06\thermal\CY2006_te.sub
 Monit.File C:\SHARE\CY06\thermal\CY2006_te.mon
 Contin.File C:\SHARE\CY06\thermal\CY2006_NY.con
 Exclud.File none

Study transfer. From TE_G_SHIFT To OPPOSING . Transfer level - 2000.0 MW

Violations report ordered by transfer capability. Total 78 violations

Interface-1 Interface 1 TOTAL-EAST Init.Flow= 5409.12 TDF= 1.0000
 Interface-2 Interface 2 CENTRAL-EAST Init.Flow= 2472.80 TDF= 0.4957

IntFce1	IntFce2	PRE- RATING				CONTINGENCY DESCRIPTION				
TRANS		LIMITING ELEMENT				DISTR.	SHIFT	BAS/CNT		
CAPAB		FROM	TO	CKT	FACTOR	MW	A/C			
3958.9	1753.9	78782 RTRDM1	115	78980 ROTRDM.2	230 2	-0.05082	-475.7	402.0	SB:ROTT_230_R84	1056
									Open 78782 RTRDM1	115 78980 ROTRDM.2 230 1
									Open 78782 RTRDM1	115 78980 ROTRDM.2 230 3
6033.5	2782.3	74344 PLTVLLEY	345	78701 LEEDS 3	345 2	-0.28884	-1544.7	1725.0	74344 PLTVLLEY	345 78705 ATHENS 345 1 72
									Open 74344 PLTVLLEY	345 78705 ATHENS 345 1
6183.5	2856.7	74344 PLTVLLEY	345	78705 ATHENS	345 1	-0.28091	-1507.5	1725.0	74344 PLTVLLEY	345 78701 LEEDS 3 345 2 71
									Open 74344 PLTVLLEY	345 78701 LEEDS 3 345 2
6183.5	2856.7	74344 PLTVLLEY	345	78705 ATHENS	345 1	-0.28091	-1507.5	1725.0	SB:LEED_345_R92	987
									Open 74344 PLTVLLEY	345 78701 LEEDS 3 345 2
6232.3	2880.9	74344 PLTVLLEY	345	78701 LEEDS 3	345 2	-0.27696	-1497.0	1725.0	SB:PV_345_RNS4	869
									Open 74344 PLTVLLEY	345 78705 ATHENS 345 1
									Open 74341 MILLWOOD	345 74344 PLTVLLEY 345 1
6391.5	2959.8*	74344 PLTVLLEY	345	78705 ATHENS	345 1	-0.26958	-1460.2	1725.0	SB:PV_345_RNS5	871
									Open 74344 PLTVLLEY	345 78701 LEEDS 3 345 2
									Open 74344 PLTVLLEY	345 74356 WOOD B 345 1
									Open 74341 MILLWOOD	345 74356 WOOD B 345 1
									Open 74356 WOOD B	345 75409 WOODB345 345 1
									Open 75409 WOODB345	345 75515 WOODS115 115 1
6571.8	3049.2	78782 RTRDM1	115	78980 ROTRDM.2	230 2	-0.03319	-363.4	402.0	SB:ROTT_230_R84J0R	1194
									Open 78980 ROTRDM.2	230 78454 JORDNVLL 230 1
									Open 78782 RTRDM1	115 78980 ROTRDM.2 230 1
									Open 78782 RTRDM1	115 78980 ROTRDM.2 230 3
6587.4	3056.9*	74344 PLTVLLEY	345	78701 LEEDS 3	345 2	-0.28884	-1384.7	1725.0	SB:LEED_345_R95	993
									Open 78701 LEEDS 3	345 78705 ATHENS 345 1
6632.4	3079.2	74344 PLTVLLEY	345	78701 LEEDS 3	345 2	-0.20299	-1082.7	1331.0	Base Case	
6737.5	3131.3	79308 CHESTER	138	79321 SHOEM138	138 1	-0.05769	-227.8	304.4	SIN:440	1161
									Open 74001 ROCK TAV	345 74347 RAMAPO 345 1

6771.6	3148.2	Interface	3	JUNK						Open 74018 SUGARLF	115	74046 ROCK TV1	115	1
6783.4	3154.1	Interface	3	JUNK						Base Case				
										TWR:41&33				701
										Open 75400 COOPC345	345	79583 MARCY T1	345	1
										Open 75400 COOPC345	345	75403 FRASR345	345	1
6909.6	3216.6	Interface	3	JUNK						TWR:34&42				699
										Open 74001 ROCK TAV	345	75400 COOPC345	345	2
										Open 75400 COOPC345	345	79304 MDTN TAP	345	1
										Open 74001 ROCK TAV	345	79304 MDTN TAP	345	1
6918.0	3220.8	74344 PLTVLLEY	345	78705 ATHENS	345	1	-0.19318	-1039.5	1331.0	Base Case				
6974.0	3248.6	75400 COOPC345	345	75403 FRASR345	345	1	-0.19329	-904.5	1207.0	Base Case				
7052.1	3287.3	78701 LEEDS 3	345	78702 N.SCOT77	345	1	-0.29665	-1236.6	1724.0	78701 LEEDS 3	345	78703 N.SCOT99	345	2 262
										Open 78701 LEEDS 3	345	78703 N.SCOT99	345	2
7052.1	3287.3	78701 LEEDS 3	345	78702 N.SCOT77	345	1	-0.29665	-1236.6	1724.0	SB:LEED_345_R94				994
										Open 78701 LEEDS 3	345	78703 N.SCOT99	345	2
7065.0	3293.7	78701 LEEDS 3	345	78703 N.SCOT99	345	2	-0.29593	-1234.0	1724.0	78701 LEEDS 3	345	78702 N.SCOT77	345	1 261
										Open 78701 LEEDS 3	345	78702 N.SCOT77	345	1
7072.4	3297.3	79308 CHESTER	138	79321 SHOEM138	138	1	-0.05509	-212.8	304.4	SB:ROCK_345_37752				1050
										Open 74001 ROCK TAV	345	74347 RAMAPO	345	1
										Open 74001 ROCK TAV	345	74046 ROCK TV1	115	1
7090.7	3306.4*	Interface	3	JUNK						SIN:430				1160
										Open 74002 ROSETON	345	74331 FISHKILL	345	1
										Open 74018 SUGARLF	115	74046 ROCK TV1	115	1
7093.6	3307.9*	79308 CHESTER	138	79321 SHOEM138	138	1	-0.05222	-216.4	304.4	SB:RMP_345_77-2X				880
										Open 74001 ROCK TAV	345	74347 RAMAPO	345	1
										Open 74347 RAMAPO	345	79319 RAMP138	138	2
7290.4	3405.4	75444 DELHI115	115	75454 DEL T115	115	1	0.05168	66.8	164.0	SB:FRAS_345_B1-3262				967
										Open 75403 FRASR345	345	75405 OAKDL345	345	1
7290.4	3405.4	75444 DELHI115	115	75454 DEL T115	115	1	0.05168	66.8	164.0	75403 FRASR345	345	75405 OAKDL345	345	1 508
										Open 75403 FRASR345	345	75405 OAKDL345	345	1
7299.2	3409.8	78782 RTRDM1	115	78980 ROTRDM.2	230	3	-0.04610	-335.9	423.0	SB:ROTT_230_R83				1055
										Open 78460 PORTER 2	230	78980 ROTRDM.2	230	2
										Open 78782 RTRDM1	115	78980 ROTRDM.2	230	1
										Open 78782 RTRDM1	115	78980 ROTRDM.2	230	2
										Open 72385 BRWAMP	230	78980 ROTRDM.2	230	1
7321.6	3420.9	79308 CHESTER	138	79323 SGRLF138	138	1	0.05769	194.1	304.4	SIN:440				1161
										Open 74001 ROCK TAV	345	74347 RAMAPO	345	1
										Open 74018 SUGARLF	115	74046 ROCK TV1	115	1
7323.8	3421.9	75400 COOPC345	345	75403 FRASR345	345	1	-0.25887	-1207.4	1703.0	TWR:31&41				703
										Open 78460 PORTER 2	230	78980 ROTRDM.2	230	2
										Open 75400 COOPC345	345	79583 MARCY T1	345	1
7374.5	3447.1	75403 FRASR345	345	75405 OAKDL345	345	1	-0.27009	-849.2	1380.0	TWR:40&41				700
										Open 75403 FRASR345	345	78450 EDIC	345	1
										Open 75400 COOPC345	345	79583 MARCY T1	345	1
7394.8	3457.2	75400 COOPC345	345	75403 FRASR345	345	1	-0.25642	-1193.8	1703.0	SB:COOP_345_4182				949
										Open 75400 COOPC345	345	79583 MARCY T1	345	1
7394.8	3457.2*	75400 COOPC345	345	75403 FRASR345	345	1	-0.25642	-1193.8	1703.0	75400 COOPC345	345	79583 MARCY T1	345	1 83
										Open 75400 COOPC345	345	79583 MARCY T1	345	1
7409.0	3464.2	79304 MDTN TAP	345	79322 SHOEMTAP	138	1	0.07333	520.3	667.0	SIN:440				1161
										Open 74001 ROCK TAV	345	74347 RAMAPO	345	1
										Open 74018 SUGARLF	115	74046 ROCK TV1	115	1

Interface Details

PSS/MUST 8.2 -- Managing and Utilizing System Transmission -- TUE, OCT 03 2006 11:38

2006 CLASS YEAR ATBA BASE CASE

2011 SUMMER PEAK LOAD W/ UPDATE PJM REP

Case.File C:\SHARE\CY06\CY06ATBA-SUM11-4.sav

Subsys.File C:\SHARE\CY06\thermal\CY2006_ds.sub

Monit.File C:\SHARE\CY06\thermal\CY2006_ds.mon

Contin.File C:\SHARE\CY06\thermal\CY2006_NY.con

Exclud.File none

Study transfer. From DS_G_SHIFT To OPPOSING . Transfer level - 2000.0 MW

***** Base Case Report *****

List of 2 interfaces of total 6

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**** Interface ****
                Limit      Limit
                Import      Export  InitFlow  ResFlow  Change  PTFD
1 DUNW-SOUT-OP  -6334.0    6334.0    3920.5    5920.5    2000.0  1.00000

List of interface branches
**      From Bus      ** **      To Bus      ** CKT  InitFlow  ResFlow  PTFD
74316 DUNWODIE      345 75000 SHORE RD      345 1      495.8    495.8    -0.0000
74348 SPRBROOK      345 74351 TREMONT      345 1      429.2    429.2    0.0000
74348 SPRBROOK      345 74897 SHCRK      345 1      351.3    351.3    0.0000
74349 REACBUS      345 79607 DVNPT NK      345 1      628.8    628.8    -0.0000
74567 REACM51      345 74354 W 49 ST      345 1      436.9    920.8    0.2420
74568 REACM52      345 74354 W 49 ST      345 2      436.9    920.8    0.2420
74420 DUN N01R      138 74533 S CREEK      138 1      79.7     79.7     0.0000
74421 DUN N02R      138 74533 S CREEK      138 1      79.7     79.7     0.0000
74424 DUN S01R      138 74435 E179 ST      138 1      159.6    159.6    0.0000
74650 REAC71      345 74691 S. BRONX      345 3      411.3    927.4    0.2580
74651 REAC72      345 74691 S. BRONX      345 4      411.3    927.4    0.2580
```

List of 2 interfaces of total 6

```
**** Interface ****
                Limit      Limit
                Import      Export  InitFlow  ResFlow  Change  PTFD
2 DUNW-SOUT-CL  -7553.0    7553.0    6010.6    8010.6U    2000.0  1.00000

List of interface branches
**      From Bus      ** **      To Bus      ** CKT  InitFlow  ResFlow  PTFD
4989 HUDSON1      345 74328 FARRGUT1      345 1      399.3    399.3    0.0000
4996 LINDEN      230 74371 GOETHALS      230 1      200.5    200.5    0.0000
5039 HUDSON2      345 74329 FARRGUT2      345 1      399.3    399.3    0.0000
73166 NORHR138      138 75053 NRTHPT P      138 1      101.3    101.3    0.0000
74316 DUNWODIE      345 75000 SHORE RD      345 1      495.8    495.8    -0.0000
74348 SPRBROOK      345 74351 TREMONT      345 1      429.2    429.2    0.0000
74348 SPRBROOK      345 74897 SHCRK      345 1      351.3    351.3    0.0000
74349 REACBUS      345 79607 DVNPT NK      345 1      628.8    628.8    -0.0000
74567 REACM51      345 74354 W 49 ST      345 1      436.9    920.8    0.2420
74568 REACM52      345 74354 W 49 ST      345 2      436.9    920.8    0.2420
74420 DUN N01R      138 74533 S CREEK      138 1      79.7     79.7     0.0000
74421 DUN N02R      138 74533 S CREEK      138 1      79.7     79.7     0.0000
74424 DUN S01R      138 74435 E179 ST      138 1      159.6    159.6    0.0000
74650 REAC71      345 74691 S. BRONX      345 3      411.3    927.4    0.2580
74651 REAC72      345 74691 S. BRONX      345 4      411.3    927.4    0.2580
74959 NEPTCONV      345 74958 NWBRG      345 1      660.2    660.2    0.0000
75078 SHMHVDCL      192 75062 SHOREHAM      138 1      329.5    329.5    0.0000
```

FCITC Single Study

PSS/MUST 8.2 -- Managing and Utilizing System Transmission -- TUE, OCT 03 2006 11:35

2006 CLASS YEAR ATRA BASE CASE

2011 SUMMER PEAK LOAD W/ UPDATE PJM REP

Case.File C:\SHARE\CY06\CY06ATRA-SUM11.sav

Subsys.File C:\SHARE\CY06\thermal\CY2006_ds.sub

Monit.File C:\SHARE\CY06\thermal\CY2006_ds.mon

Contin.File C:\SHARE\CY06\thermal\CY2006_NY.con

Exclud.File none

Study transfer. From DS_G_SHIFT To OPPOSING . Transfer level - 2000.0 MW

Violations report ordered by transfer capability. Total 11402 violations

Interface-1 Interface 1 DUNW-SOUT-OP Init.Flow= 3921.22 TDF= 1.0000
Interface-2 Interface 2 DUNW-SOUT-CL Init.Flow= 6309.93 TDF= 1.0000

IntFce1	IntFce2	LIMITING ELEMENT						PRE- RATING			CONTINGENCY DESCRIPTION		
TRANS		FROM		TO	CKT	DISTR.	SHIFT	BAS/CNT					
CAPAB						FACTOR	MW	A/B					
4019.3	6408.0	74531	RAINEY8W	138	74612 8W DUM	138 1	-0.29810	-212.8	242.0	Base Case			
4019.3	6408.0	74345	RAINEY	345	74612 8W DUM	138 8	0.29810	212.8	242.0	Base Case			
4021.2	6410.0	74531	RAINEY8W	138	74557 VERNON-W	138 1	0.29810	212.2	242.0	Base Case			
4054.7	6443.4	74531	RAINEY8W	138	74612 8W DUM	138 1	-0.29810	-304.2	344.0	GEN:POLETTIX			
										Decrease bus	79538	POLETGT2 18.0 generation by	
										Decrease bus	79539	POLETSTG 18.0 generation by	
										Decrease bus	79540	POLETGT1 18.0 generation by	
4054.7	6443.4	74345	RAINEY	345	74612 8W DUM	138 8	0.29810	304.2	344.0	GEN:POLETTIX			
										Decrease bus	79538	POLETGT2 18.0 generation by	
										Decrease bus	79539	POLETSTG 18.0 generation by	
										Decrease bus	79540	POLETGT1 18.0 generation by	
4056.7	6445.4	74531	RAINEY8W	138	74557 VERNON-W	138 1	0.29810	303.6	344.0	GEN:POLETTIX			
										Decrease bus	79538	POLETGT2 18.0 generation by	
										Decrease bus	79539	POLETSTG 18.0 generation by	
										Decrease bus	79540	POLETGT1 18.0 generation by	
4092.9	6481.6	74345	RAINEY	345	74612 8W DUM	138 8	0.39856	275.6	344.0	74345 RAINCY	345	74611 8E DUM 138 8	
										Open 74345 RAINCY	345	74611 8E DUM 138 1	
4092.9	6481.6	74531	RAINEY8W	138	74612 8W DUM	138 1	-0.39856	-275.6	344.0	74530 RAINCY8E	138	74611 8E DUM 138 1	
										Open 74530 RAINCY8E	138	74611 8E DUM 138 1	
4092.9	6481.6*	74531	RAINEY8W	138	74612 8W DUM	138 1	-0.39856	-275.6	344.0	74345 RAINCY	345	74611 8E DUM 138 8	
										Open 74345 RAINCY	345	74611 8E DUM 138 8	

4092.9	6481.6*	74345 RAINEY	345	74612 8W DUM	138 8	0.39856	275.6	344.0	74530 RAINEY8E	138	74611 8E DUM	138 1
									Open 74530 RAINEY8E	138	74611 8E DUM	138 1
4094.4	6483.1	74531 RAINEY8W	138	74557 VERNON-W	138 1	0.39856	275.0	344.0	74530 RAINEY8E	138	74611 8E DUM	138 1
									Open 74530 RAINEY8E	138	74611 8E DUM	138 1
4094.4	6483.1*	74531 RAINEY8W	138	74557 VERNON-W	138 1	0.39856	275.0	344.0	74345 RAINEY	345	74611 8E DUM	138 8
									Open 74345 RAINEY	345	74611 8E DUM	138 8
4097.6	6486.3	74345 RAINEY	345	74611 8E DUM	138 8	0.30190	188.8	242.0	Base Case			
4097.6	6486.3	74530 RAINEY8E	138	74611 8E DUM	138 1	-0.30190	-188.8	242.0	Base Case			
4098.8	6487.5	74530 RAINEY8E	138	74556 VERNON-E	138 1	0.30190	188.4	242.0	Base Case			
4108.5	6497.2	74530 RAINEY8E	138	74611 8E DUM	138 1	-0.30190	-281.5	338.0	GEN:POLETTIX			
									Decrease bus 79538 POLETGT2	18.0	generation by	
									Decrease bus 79539 POLETSTG	18.0	generation by	
									Decrease bus 79540 POLETGT1	18.0	generation by	
4108.5	6497.2	74345 RAINEY	345	74611 8E DUM	138 8	0.30190	281.5	338.0	GEN:POLETTIX			
									Decrease bus 79538 POLETGT2	18.0	generation by	
									Decrease bus 79539 POLETSTG	18.0	generation by	
									Decrease bus 79540 POLETGT1	18.0	generation by	
4109.7	6498.4	74530 RAINEY8E	138	74556 VERNON-E	138 1	0.30190	281.1	338.0	GEN:POLETTIX			
									Decrease bus 79538 POLETGT2	18.0	generation by	
									Decrease bus 79539 POLETSTG	18.0	generation by	
									Decrease bus 79540 POLETGT1	18.0	generation by	
4114.8	6503.5	74345 RAINEY	345	74611 8E DUM	138 8	0.40198	260.2	338.0	74531 RAINEY8W	138	74612 8W DUM	138 1
									Open 74531 RAINEY8W	138	74612 8W DUM	138 1
4114.8	6503.5*	74345 RAINEY	345	74611 8E DUM	138 8	0.40198	260.2	338.0	74345 RAINEY	345	74612 8W DUM	138 8
									Open 74345 RAINEY	345	74612 8W DUM	138 8
4114.8	6503.5	74530 RAINEY8E	138	74611 8E DUM	138 1	-0.40198	-260.2	338.0	74531 RAINEY8W	138	74612 8W DUM	138 1
									Open 74531 RAINEY8W	138	74612 8W DUM	138 1
4114.8	6503.5*	74530 RAINEY8E	138	74611 8E DUM	138 1	-0.40198	-260.2	338.0	74345 RAINEY	345	74612 8W DUM	138 8
									Open 74345 RAINEY	345	74612 8W DUM	138 8
4115.7	6504.4	74530 RAINEY8E	138	74556 VERNON-E	138 1	0.40198	259.8	338.0	74345 RAINEY	345	74612 8W DUM	138 8
									Open 74345 RAINEY	345	74612 8W DUM	138 8
4115.7	6504.4*	74530 RAINEY8E	138	74556 VERNON-E	138 1	0.40198	259.8	338.0	74531 RAINEY8W	138	74612 8W DUM	138 1
									Open 74531 RAINEY8W	138	74612 8W DUM	138 1
4585.1	6973.8	Interface 6 JUNK				0.52644	2726.5	3076.0	TWR:41&33			
									Open 75400 COOPC345	345	79583 MARCY T1	345
									Open 75400 COOPC345	345	75403 FRASR345	345
4622.8	7011.5	74345 RAINEY	345	74691 S. BRONX	345 3	-0.50668	-552.6	908.0	SB:RAIN_345_4W			1
									Open 74345 RAINEY	345	74527 RAINEY3W	138
									Open 74345 RAINEY	345	74691 S. BRONX	345
4622.8	7011.5	74345 RAINEY	345	74691 S. BRONX	345 4	-0.50668	-552.6	908.0	SB:SBRX_345_4			1
									Open 74684 SBNXT3	138	74691 S. BRONX	345
									Open 74345 RAINEY	345	74691 S. BRONX	345
4622.8	7011.5	74345 RAINEY	345	74691 S. BRONX	345 3	-0.50668	-552.6	908.0	SB:SBRX_345_7			1
									Open 74687 SBNXT4	138	74691 S. BRONX	345
									Open 74345 RAINEY	345	74691 S. BRONX	345

4622.8	7011.5*	74345 RAINEY	345	74691 S. BRONX	345 3	-0.50668	-552.6	908.0	SB:SBRX_345_8	1
									Open 74678 SBNXT1	138 74691 S. BRONX 345
									Open 74345 RAINEY	345 74691 S. BRONX 345
4622.8	7011.5	74345 RAINEY	345	74691 S. BRONX	345 4	-0.50668	-552.6	908.0	74345 RAINEY	345 74691 S. BRONX 345 3
									Open 74345 RAINEY	345 74691 S. BRONX 345
4622.8	7011.5*	74345 RAINEY	345	74691 S. BRONX	345 4	-0.50668	-552.6	908.0	SB:SBRX_345_3	1
									Open 74681 SBNXT2	138 74691 S. BRONX 345
									Open 74345 RAINEY	345 74691 S. BRONX 345
4704.1	7092.8	Interface	6	JUNK		0.52123	2667.9	3076.0	TWR:34&42	
									Open 74001 ROCK TAV	345 75400 COOPC345 345
									Open 75400 COOPC345	345 79304 MDTN TAP 345
									Open 74001 ROCK TAV	345 79304 MDTN TAP 345
4807.8	7196.5*	Interface	6	JUNK		0.47024	2659.1	3076.0	SIN:430	1
									Open 74002 ROSETON	345 74331 FISHKILL 345
									Open 74018 SUGARLF	115 74046 ROCK TV1 115
4897.1	7285.8	74525 QUENBRDG	138	74556 VERNON-E	138 2	-0.23916	-270.6	504.0	74525 QUENBRDG	138 74557 VERNON-W 138 1
									Open 74525 QUENBRDG	138 74557 VERNON-W 138
4954.3	7343.0	74525 QUENBRDG	138	74557 VERNON-W	138 1	-0.23837	-257.7	504.0	74525 QUENBRDG	138 74556 VERNON-E 138 2
									Open 74525 QUENBRDG	138 74556 VERNON-E 138
5090.9	7479.6	74525 QUENBRDG	138	74556 VERNON-E	138 2	-0.15076	-327.7	504.0	GEN:POLETTIX	
									Decrease bus 79538 POLETGT2	18.0 generation by
									Decrease bus 79539 POLETSTG	18.0 generation by
									Decrease bus 79540 POLETGT1	18.0 generation by
5173.6	7562.3	74650 REAC71	345	74691 S. BRONX	345 3	0.31579	512.5	908.0	74651 REAC72	345 74691 S. BRONX 345 4
									Open 74651 REAC72	345 74691 S. BRONX 345
5173.6	7562.3	74650 REAC71	345	74691 S. BRONX	345 3	0.31579	512.5	908.0	74316 DUNWODIE	345 74651 REAC72 345 SR
									Open 74316 DUNWODIE	345 74651 REAC72 345
5173.6	7562.3	74651 REAC72	345	74691 S. BRONX	345 4	0.31579	512.5	908.0	SB:SBRX_345_5	1
									Open 74684 SBNXT3	138 74691 S. BRONX 345
									Open 74650 REAC71	345 74691 S. BRONX 345
									Open 74316 DUNWODIE	345 74650 REAC71 345
5173.6	7562.3*	74650 REAC71	345	74691 S. BRONX	345 3	0.31579	512.5	908.0	SB:SBRX_345_2	1
									Open 74681 SBNXT2	138 74691 S. BRONX 345
									Open 74651 REAC72	345 74691 S. BRONX 345
									Open 74316 DUNWODIE	345 74651 REAC72 345
5173.6	7562.3	74651 REAC72	345	74691 S. BRONX	345 4	0.31579	512.5	908.0	74316 DUNWODIE	345 74650 REAC71 345 SR
									Open 74316 DUNWODIE	345 74650 REAC71 345
5173.6	7562.3*	74651 REAC72	345	74691 S. BRONX	345 4	0.31579	512.5	908.0	74650 REAC71	345 74691 S. BRONX 345 3
									Open 74650 REAC71	345 74691 S. BRONX 345
5283.8	7672.5	Interface	6	JUNK		0.39617	2122.2	2662.0	Base Case	
5316.0	7704.7	74525 QUENBRDG	138	74557 VERNON-W	138 1	-0.14924	-295.9	504.0	GEN:POLETTIX	
									Decrease bus 79538 POLETGT2	18.0 generation by
									Decrease bus 79539 POLETSTG	18.0 generation by
									Decrease bus 79540 POLETGT1	18.0 generation by
5379.1	7767.8	74650 REAC71	345	74691 S. BRONX	345 3	0.25804	418.8	795.0	Base Case	

5379.1	7767.8	74651 REAC72	345	74691 S. BRONX	345 4	0.25804	418.8	795.0	Base Case				
5418.7	7807.4	74354 W 49 ST	345	74568 REACM52	345 2	-0.29291	-523.4	962.0	SB:SPRA_345_RS4				1
									Open 74348 SPRBROOK	345	74567 REACM51	345	
									Open 74354 W 49 ST	345	74567 REACM51	345	
									Open 74348 SPRBROOK	345	74419 DUN NO T	138	
5418.7	7807.4	74354 W 49 ST	345	74567 REACM51	345 1	-0.29291	-523.4	962.0	SB:SPRA_345_RS5				1
									Open 74348 SPRBROOK	345	74568 REACM52	345	
									Open 74354 W 49 ST	345	74568 REACM52	345	
									Open 74348 SPRBROOK	345	74419 DUN NO T	138	
5432.2	7820.9	74354 W 49 ST	345	74567 REACM51	345 1	-0.29285	-519.5	962.0	74348 SPRBROOK	345	74568 REACM52	345 SR	
									Open 74348 SPRBROOK	345	74568 REACM52	345	
5432.2	7820.9	74354 W 49 ST	345	74568 REACM52	345 2	-0.29285	-519.5	962.0	74348 SPRBROOK	345	74567 REACM51	345 SR	
									Open 74348 SPRBROOK	345	74567 REACM51	345	
5432.8	7821.5*	74354 W 49 ST	345	74568 REACM52	345 2	-0.29285	-519.3	962.0	SB:W_49_345_BTN				1
									Open 74348 SPRBROOK	345	74567 REACM51	345	
									Open 74354 W 49 ST	345	74567 REACM51	345	
									Open 74354 W 49 ST	345	74595 W49 ST 3	138	
5432.8	7821.5*	74354 W 49 ST	345	74567 REACM51	345 1	-0.29285	-519.3	962.0	SB:W_49_345_3				1
									Open 74348 SPRBROOK	345	74568 REACM52	345	
									Open 74354 W 49 ST	345	74568 REACM52	345	
									Open 74354 W 49 ST	345	74594 W49 ST 2	138	
5476.7	7865.4	74525 QUENBRDG	138	74556 VERNON-E	138 2	-0.15076	-181.5	416.0	Base Case				
5623.1	8011.8	74484 GRENWOOD	138	74556 VERNON-E	138 1	-0.03043	-199.2	251.0	74525 QUENBRDG	138	74556 VERNON-E	138 2	
									Open 74525 QUENBRDG	138	74556 VERNON-E	138	
5664.3	8053.0	Interface 2 DUNW-SOUT-CL				1.00000	6309.9	8053.0	Base Case				
5700.7	8089.4	74525 QUENBRDG	138	74557 VERNON-W	138 1	-0.14924	-150.4	416.0	Base Case				
5706.7	8095.4	74354 W 49 ST	345	74567 REACM51	345 1	-0.24196	-429.0	861.0	Base Case				
5706.7	8095.4	74354 W 49 ST	345	74568 REACM52	345 2	-0.24196	-429.0	861.0	Base Case				
5710.3	8099.0*	74525 QUENBRDG	138	74556 VERNON-E	138 2	-0.15076	-234.3	504.0	74403 ASTORIAW	138	79539 POLETSTG	18.0 1	
									Open 74403 ASTORIAW	138	79539 POLETSTG	18.0	
5836.2	8224.9	74322 E15ST 45	345	74354 W 49 ST	345 1	-0.47305	-56.1	962.0	SB:FARR_345_8W				1
									Open 74323 E15ST 46	345	74327 FARRAGUT	345	
									Open 74323 E15ST 46	345	74354 W 49 ST	345	
									Open 74323 E15ST 46	345	74434 E13 ST	138	
									Open 74323 E15ST 46	345	74547 T13MPT	138	
									Open 74327 FARRAGUT	345	74446 F/S38M13	138	
									Open 74327 FARRAGUT	345	74486 HAE TR1	138	
5849.7	8238.4	74322 E15ST 45	345	74354 W 49 ST	345 1	-0.47296	-49.9	962.0	SB:W_49_345_6				1
									Open 74323 E15ST 46	345	74354 W 49 ST	345	
									Open 74354 W 49 ST	345	74597 W49 ST 5	138	
									Open 74323 E15ST 46	345	74327 FARRAGUT	345	
									Open 74323 E15ST 46	345	74434 E13 ST	138	
									Open 74323 E15ST 46	345	74547 T13MPT	138	
5849.7	8238.4*	74322 E15ST 45	345	74354 W 49 ST	345 1	-0.47296	-49.9	962.0	BUS:E13TH_46_345				1
									Open 74323 E15ST 46	345	74327 FARRAGUT	345	

Interface Details

PSS/MUST 8.2 -- Managing and Utilizing System Transmission -- TUE, OCT 03 2006 11:36

2006 CLASS YEAR ATRA BASE CASE

2011 SUMMER PEAK LOAD W/ UPDATE PJM REP

Case.File C:\SHARE\CY06\CY06ATRA-SUM11.sav

Subsys.File C:\SHARE\CY06\thermal\CY2006_ds.sub

Monit.File C:\SHARE\CY06\thermal\CY2006_ds.mon

Contin.File C:\SHARE\CY06\thermal\CY2006_NY.con

Exclud.File none

Study transfer. From DS_G_SHIFT To OPPOSING . Transfer level - 2000.0 MW

***** Base Case Report *****

List of 2 interfaces of total 6

```
**** Interface ****
                Limit      Limit
                Import      Export      InitFlow      ResFlow      Change      PTDF
1 DUNW-SOUT-OP      -6334.0      6334.0      3921.2      5921.2      2000.0      1.00000

List of interface branches
**      From Bus      ** **      To Bus      ** CKT      InitFlow      ResFlow      PTDF
74316 DUNWODIE      345 75000 SHORE RD      345 1      495.3      495.3      -0.0000
74348 SPRBROOK      345 74351 TREMONT      345 1      429.2      429.2      0.0000
74348 SPRBROOK      345 74897 SHCRK      345 1      351.3      351.3      0.0000
74349 REACBUS      345 79607 DVNPT NK      345 1      630.5      630.5      -0.0000
74567 REACM51      345 74354 W 49 ST      345 1      429.0      912.9      0.2420
74568 REACM52      345 74354 W 49 ST      345 2      429.0      912.9      0.2420
74420 DUN N01R      138 74533 S CREEK      138 1      79.8      79.8      0.0000
74421 DUN N02R      138 74533 S CREEK      138 1      79.8      79.8      0.0000
74424 DUN S01R      138 74435 E179 ST      138 1      159.8      159.8      -0.0000
74650 REAC71      345 74691 S. BRONX      345 3      418.8      934.9      0.2580
74651 REAC72      345 74691 S. BRONX      345 4      418.8      934.9      0.2580
```

List of 2 interfaces of total 6

```
**** Interface ****
                Limit      Limit
                Import      Export      InitFlow      ResFlow      Change      PTDF
2 DUNW-SOUT-CL      -8053.0      8053.0      6309.9      8309.9U      2000.0      1.00000

List of interface branches
**      From Bus      ** **      To Bus      ** CKT      InitFlow      ResFlow      PTDF
4989 HUDSON1      345 74328 FARRGUT1      345 1      399.4      399.4      0.0000
4996 LINDEN      230 74371 GOETHALS      230 1      200.3      200.3      0.0000
5039 HUDSON2      345 74329 FARRGUT2      345 1      399.3      399.3      0.0000
73166 NORHR138      138 75053 NRTHPT P      138 1      101.4      101.4      0.0000
91099 LINVFT4      345 74315 COGNTECH      345 1      298.5      298.5      0.0000
74316 DUNWODIE      345 75000 SHORE RD      345 1      495.3      495.3      -0.0000
74348 SPRBROOK      345 74351 TREMONT      345 1      429.2      429.2      0.0000
74348 SPRBROOK      345 74897 SHCRK      345 1      351.3      351.3      0.0000
74349 REACBUS      345 79607 DVNPT NK      345 1      630.5      630.5      -0.0000
74567 REACM51      345 74354 W 49 ST      345 1      429.0      912.9      0.2420
74568 REACM52      345 74354 W 49 ST      345 2      429.0      912.9      0.2420
74420 DUN N01R      138 74533 S CREEK      138 1      79.8      79.8      0.0000
74421 DUN N02R      138 74533 S CREEK      138 1      79.8      79.8      0.0000
74424 DUN S01R      138 74435 E179 ST      138 1      159.8      159.8      -0.0000
74650 REAC71      345 74691 S. BRONX      345 3      418.8      934.9      0.2580
74651 REAC72      345 74691 S. BRONX      345 4      418.8      934.9      0.2580
74959 NEPTCONV      345 74958 NWBRG      345 1      660.2      660.2      0.0000
75078 SHMHVDCL      192 75062 SHOREHAM      138 1      329.5      329.5      0.0000
```


FCITC Single Study

PSS/MUST 8.2 -- Managing and Utilizing System Transmission -- TUE, OCT 03 2006 11:38
 2006 CLASS YEAR ATBA BASE CASE
 2011 SUMMER PEAK LOAD W/ UPDATE PJM REP
 Case.File C:\SHARE\CY06\CY06ATBA-SUM11-4.sav
 Subsys.File C:\SHARE\CY06\thermal\CY2006_ds.sub
 Monit.File C:\SHARE\CY06\thermal\CY2006_ds.mon
 Contin.File C:\SHARE\CY06\thermal\CY2006_NY.con
 Exclud.File none

Study transfer. From DS_6_SHIFT To OPPOSING . Transfer level - 2000.0 MW

Violations report ordered by transfer capability. Total 609 violations

Interface-1 Interface 1 DUNW-SOUT-OP Init.Flow= 3920.50 TDF= 1.0000
 Interface-2 Interface 2 DUNW-SOUT-CL Init.Flow= 6010.57 TDF= 1.0000

IntFce1	IntFce2					PRE- RATING							
TRANS		<----- LIMITING ELEMENT ----->				DISTR.	SHIFT	BAS/CNT					
CAPAB		<----- FROM -----> <----- TO ----->CKT				FACTOR	MW	A/C		<----- CONTINGENCY DESCRIPTION ----->			
5204.9	7294.9	74345	RAINEY	345	74691 S. BRONX	345	4	-0.50671	-550.2	1201.0	SB:RAIN_345_2E		1081
											Open 74345 RAINY	345	74691 S. BRONX 345 3
											Open 74345 RAINY	345	74608 2E DUM 138 1
											Open 74526 RAINY2E	138	74608 2E DUM 138 1
											Open 74608 2E DUM	138	74786 RNY 2EGT 13.0 1
											Decrease bus 74786 RNY 2EGT	13.0	generation by 100.0 percent dispatch
5205.1	7295.2	74345	RAINEY	345	74691 S. BRONX	345	3	-0.50671	-550.1	1201.0	SB:RAIN_345_7W		1077
											Open 74345 RAINY	345	74691 S. BRONX 345 4
											Open 74345 RAINY	345	74610 7W DUM 138 1
											Open 74529 RAINY7W	138	74610 7W DUM 138 1
											Open 74610 7W DUM	138	74788 RNY 7WGT 13.0 1
											Decrease bus 74788 RNY 7WGT	13.0	generation by 100.0 percent dispatch
5227.7	7317.8	74345	RAINEY	345	74691 S. BRONX	345	4	-0.50671	-538.6	1201.0	74345 RAINY	345	74691 S. BRONX 345 3 94
											Open 74345 RAINY	345	74691 S. BRONX 345 3
5227.7	7317.8	74345	RAINEY	345	74691 S. BRONX	345	3	-0.50671	-538.6	1201.0	SB:SBRX_345_8		1104
											Open 74678 SBNXT1	138	74691 S. BRONX 345 1
											Open 74345 RAINY	345	74691 S. BRONX 345 4
5227.7	7317.8*	74345	RAINEY	345	74691 S. BRONX	345	3	-0.50671	-538.6	1201.0	SB:SBRX_345_7		1103
											Open 74687 SBNXT4	138	74691 S. BRONX 345 1
											Open 74345 RAINY	345	74691 S. BRONX 345 4
5227.7	7317.8*	74345	RAINEY	345	74691 S. BRONX	345	4	-0.50671	-538.6	1201.0	SB:SBRX_345_3		1099
											Open 74681 SBNXT2	138	74691 S. BRONX 345 1
											Open 74345 RAINY	345	74691 S. BRONX 345 3
5327.3	7417.4	Interface	6 JUNK					0.52647	2709.4	3450.0	TWR:41&33		903
											Open 75400 C00PC345	345	79583 MARCY T1 345 1
											Open 75400 C00PC345	345	75403 FRASR345 345 1
5357.8	7447.9	Interface	6 JUNK					0.39617	2092.6	2662.0	Base Case		
5386.0	7476.1	74531	RAINEY8W	138	74612 8W DUM	138	1	-0.29810	194.9	242.0	Base Case		
5386.0	7476.1	74345	RAINEY	345	74612 8W DUM	138	8	0.29810	-194.9	242.0	Base Case		
5387.6	7477.7	74531	RAINEY8W	138	74557 VERNON-W	138	1	0.29810	-195.3	242.0	Base Case		

5407.3	7497.4	74651 REAC72		345	74691 S. BRONX		345	4	0.25804	411.3	795.0	Base Case								
5407.3	7497.4	74650 REAC71		345	74691 S. BRONX		345	3	0.25804	411.3	795.0	Base Case								
5454.7	7544.8	Interface	6	JUNK					0.52126	2650.3	3450.0	TWR:34&42							901	
												Open	74001 ROCK TAV	345	75400 C00PC345				345	2
												Open	75400 C00PC345	345	79304 MDTN TAP				345	1
												Open	74001 ROCK TAV	345	79304 MDTN TAP				345	1
5462.9	7553.0	Interface	2	DUNW-SOUT-CL					1.00000	6010.6	7553.0	Base Case								
5465.1	7555.2	74345 RAINEY		345	74611 8E DUM		138	8	0.30190	-224.3	242.0	Base Case								
5465.1	7555.2	74530 RAINEY8E		138	74611 8E DUM		138	1	-0.30190	224.3	242.0	Base Case								
5466.8	7556.9	74530 RAINEY8E		138	74556 VERNON-E		138	1	0.30190	-224.8	242.0	Base Case								
5605.7	7695.7	74530 RAINEY8E		138	74611 8E DUM		138	1	-0.40231	290.0	388.0	74345 RAINEY	345	74612 8W DUM		138	8	92		
												Open	74345 RAINEY		345	74612 8W DUM		138	8	
5605.7	7695.7	74530 RAINEY8E		138	74611 8E DUM		138	1	-0.40231	290.0	388.0	74531 RAINEY8W	138	74612 8W DUM		138	1	307		
												Open	74531 RAINEY8W		138	74612 8W DUM		138	1	
5605.7	7695.7	74345 RAINEY		345	74611 8E DUM		138	8	0.40231	-290.0	388.0	74345 RAINEY	345	74612 8W DUM		138	8	92		
												Open	74345 RAINEY		345	74612 8W DUM		138	8	
5605.7	7695.7	74345 RAINEY		345	74611 8E DUM		138	8	0.40231	-290.0	388.0	74531 RAINEY8W	138	74612 8W DUM		138	1	307		
												Open	74531 RAINEY8W		138	74612 8W DUM		138	1	
5606.0	7696.1*	74345 RAINEY		345	74611 8E DUM		138	8	0.40231	-290.1	388.0	SB:RAIN_345_1w							1075	
												Open	74345 RAINEY		345	74702 RAV 3		22.0	1	
												Open	74345 RAINEY		345	74612 8W DUM		138	8	
												Open	74531 RAINEY8W		138	74612 8W DUM		138	1	
												Open	74612 8W DUM		138	74728 RYYGT811		13.8	1	
												Open	74531 RAINEY8W		138	74557 VERNON-W		138	1	
5606.0	7696.1*	74530 RAINEY8E		138	74611 8E DUM		138	1	-0.40231	290.1	388.0	SB:RAIN_345_1w							1075	
												Open	74345 RAINEY		345	74702 RAV 3		22.0	1	
												Open	74345 RAINEY		345	74612 8W DUM		138	8	
												Open	74531 RAINEY8W		138	74612 8W DUM		138	1	
												Open	74612 8W DUM		138	74728 RYYGT811		13.8	1	
												Open	74531 RAINEY8W		138	74557 VERNON-W		138		

FCITC Single Study

PSS/MUST 8.2 -- Managing and Utilizing System Transmission -- TUE, OCT 03 2006 11:39
 2006 CLASS YEAR ATBA BASE CASE
 2011 SUMMER PEAK LOAD W/ UPDATE PJM REP
 Case.File C:\SHARE\CY06\CY06ATBA-SUM11-4.sav
 Subsys.File C:\SHARE\CY06\thermal\CY2006_ds.sub
 Monit.File C:\SHARE\CY06\thermal\CY2006_ds.mon
 Contin.File C:\SHARE\CY06\thermal\CY2006_NY.con
 Exclud.File none

Study transfer. From DS_6_SHIFT To OPPOSING . Transfer level - 2000.0 MW

Violations report ordered by transfer capability. Total 10791 violations

Interface-1 Interface 1 DUNW-SOUT-OP Init.Flow= 3920.50 TDF= 1.0000
 Interface-2 Interface 2 DUNW-SOUT-CL Init.Flow= 6010.57 TDF= 1.0000

IntFce1	IntFce2	TRANS	CAPAB	4616.9	6707.0	Interface	6 JUNK	PRE- RATING	DISTR.	SHIFT	BAS/CNT	CONTINGENCY DESCRIPTION
4616.9	6707.0	Interface	6 JUNK	0.52647	2709.4	3076.0	TWR:41&33	903				
							Open 75400 C00PC345	345	79583	MARCY T1	345	1
							Open 75400 C00PC345	345	75403	FRASR345	345	1
4623.5	6713.5	74345 RAINY	345	74691 S. BRONX	345	4	-0.47355	-575.1	908.0	SB:RAIN_345_1E	1080	
							Open 74345 RAINY	345	74691	S. BRONX	345	3
							Open 74345 RAINY	345	74611	8E DUM	138	8
							Open 74530 RAINY8E	138	74611	8E DUM	138	1
							Open 74611 8E DUM	138	74727	RNYGT4-7	13.8	1
							Decrease bus 74786 RNY 2EGT	13.0	generation by	100.0	percent dispatch	
4626.6	6716.7	74345 RAINY	345	74691 S. BRONX	345	4	-0.50671	-550.2	908.0	SB:RAIN_345_2E	1081	
							Open 74345 RAINY	345	74691	S. BRONX	345	3
							Open 74345 RAINY	345	74608	2E DUM	138	1
							Open 74526 RAINY2E	138	74608	2E DUM	138	1
							Open 74608 2E DUM	138	74786	RNY 2EGT	13.0	1
							Decrease bus 74786 RNY 2EGT	13.0	generation by	100.0	percent dispatch	
4626.9	6716.9	74345 RAINY	345	74691 S. BRONX	345	3	-0.50671	-550.1	908.0	SB:RAIN_345_7W	1077	
							Open 74345 RAINY	345	74691	S. BRONX	345	4
							Open 74345 RAINY	345	74610	7W DUM	138	1
							Open 74529 RAINY7W	138	74610	7W DUM	138	1
							Open 74610 7W DUM	138	74788	RNY 7WGT	13.0	1
							Decrease bus 74788 RNY 7WGT	13.0	generation by	100.0	percent dispatch	
4649.5	6739.5	74345 RAINY	345	74691 S. BRONX	345	3	-0.50671	-538.6	908.0	74345 RAINY	345	4
							Open 74345 RAINY	345	74691	S. BRONX	345	4
4649.5	6739.5*	74345 RAINY	345	74691 S. BRONX	345	4	-0.50671	-538.6	908.0	SB:SBRX_345_4	1100	
							Open 74684 SBNXT3	138	74691	S. BRONX	345	1
							Open 74345 RAINY	345	74691	S. BRONX	345	3
4649.5	6739.5*	74345 RAINY	345	74691 S. BRONX	345	3	-0.50671	-538.6	908.0	SB:SBRX_345_8	1104	
							Open 74678 SBNXT1	138	74691	S. BRONX	345	1
							Open 74345 RAINY	345	74691	S. BRONX	345	4
4737.3	6827.3	Interface	6 JUNK	0.52126	2650.3	3076.0	TWR:34&42	901				

										Open 74001 ROCK TAV	345	75400 COOPC345	345	2
										Open 75400 COOPC345	345	79304 MDTN TAP	345	1
										Open 74001 ROCK TAV	345	79304 MDTN TAP	345	1
4862.0	6952.1*	Interface	6	JUNK			0.47028	2633.2	3076.0	SIN:430				1362
										Open 74002 ROSETON	345	74331 FISHKILL	345	1
										Open 74018 SUGARLF	115	74046 ROCK TV1	115	1
5198.1	7288.1	74651 REAC72	345	74691 S. BRONX	345	4	0.31620	504.0	908.0	74316 DUNWODIE	345	74650 REAC71	345	SR 17
										Open 74316 DUNWODIE	345	74650 REAC71	345	SR
5198.1	7288.1	74651 REAC72	345	74691 S. BRONX	345	4	0.31620	504.0	908.0	SB:SBRX_345_5				1101
										Open 74684 SBNXT3	138	74691 S. BRONX	345	1
										Open 74650 REAC71	345	74691 S. BRONX	345	3
										Open 74316 DUNWODIE	345	74650 REAC71	345	SR
5198.1	7288.1	74650 REAC71	345	74691 S. BRONX	345	3	0.31620	504.0	908.0	74316 DUNWODIE	345	74651 REAC72	345	SR 18
										Open 74316 DUNWODIE	345	74651 REAC72	345	SR
5198.1	7288.1	74650 REAC71	345	74691 S. BRONX	345	3	0.31620	504.0	908.0	74651 REAC72	345	74691 S. BRONX	345	4 356
										Open 74651 REAC72	345	74691 S. BRONX	345	4
5198.1	7288.1*	74650 REAC71	345	74691 S. BRONX	345	3	0.31620	504.0	908.0	SB:SBRX_345_1				1097
										Open 74678 SBNXT1	138	74691 S. BRONX	345	1
										Open 74651 REAC72	345	74691 S. BRONX	345	4
										Open 74316 DUNWODIE	345	74651 REAC72	345	SR
5198.1	7288.1*	74651 REAC72	345	74691 S. BRONX	345	4	0.31620	504.0	908.0	SB:SBRX_345_6				1102
										Open 74687 SBNXT4	138	74691 S. BRONX	345	1
										Open 74650 REAC71	345	74691 S. BRONX	345	3
										Open 74316 DUNWODIE	345	74650 REAC71	345	SR
5357.8	7447.9	Interface	6	JUNK			0.39617	2092.6	2662.0	Base Case				
5380.6	7470.7	74354 W 49 ST	345	74568 REACM52	345	2	-0.29328	-533.8	962.0	SB:SPRA_345_RS4				1112
										Open 74348 SPRBROOK	345	74567 REACM51	345	SR
										Open 74354 W 49 ST	345	74567 REACM51	345	1
										Open 74348 SPRBROOK	345	74419 DUN NO T	138	6
5380.6	7470.7	74354 W 49 ST	345	74567 REACM51	345	1	-0.29328	-533.8	962.0	SB:SPRA_345_RS5				1115
										Open 74348 SPRBROOK	345	74568 REACM52	345	SR
										Open 74354 W 49 ST	345	74568 REACM52	345	2
										Open 74348 SPRBROOK	345	74419 DUN NO T	138	6
5386.0	7476.1	74345 RAINEY	345	74612 8W DUM	138	8	0.29810	-194.9	242.0	Base Case				
5386.0	7476.1	74531 RAINEY8W	138	74612 8W DUM	138	1	-0.29810	194.9	242.0	Base Case				
5387.6	7477.7	74531 RAINEY8W	138	74557 VERNON-W	138	1	0.29810	-195.3	242.0	Base Case				
5394.7	7484.8	74354 W 49 ST	345	74567 REACM51	345	1	-0.29322	-529.7	962.0	74348 SPRBROOK	345	74568 REACM52	345	SR 101
										Open 74348 SPRBROOK	345	74568 REACM52	345	SR
5394.7	7484.8	74354 W 49 ST	345	74568 REACM52	345	2	-0.29322	-529.7	962.0	74348 SPRBROOK	345	74567 REACM51	345	SR 100
										Open 74348 SPRBROOK	345	74567 REACM51	345	SR
5395.4	7485.5*	74354 W 49 ST	345	74567 REACM51	345	1	-0.29322	-529.5	962.0	SB:W_49_345_3				1123
										Open 74348 SPRBROOK	345	74568 REACM52	345	SR
										Open 74354 W 49 ST	345	74568 REACM52	345	2
										Open 74354 W 49 ST	345	74594 W49 ST 2	138	1
5395.4	7485.5*	74354 W 49 ST	345	74568 REACM52	345	2	-0.29322	-529.5	962.0	SB:W_49_345_2				1122
										Open 74348 SPRBROOK	345	74567 REACM51	345	SR
										Open 74354 W 49 ST	345	74567 REACM51	345	1
										Open 74354 W 49 ST	345	74596 W49 ST 4	138	1
5407.3	7497.4	74651 REAC72	345	74691 S. BRONX	345	4	0.25804	411.3	795.0	Base Case				
5407.3	7497.4	74650 REAC71	345	74691 S. BRONX	345	3	0.25804	411.3	795.0	Base Case				
5417.3	7507.4	74345 RAINEY	345	74612 8W DUM	138	8	0.29810	-102.2	344.0	GEN:POLETTIX				925
										Decrease bus 79538 POLETGT2	18.0	generation by	100.0	percent dispatch
										Decrease bus 79539 POLETSTG	18.0	generation by	100.0	percent dispatch
										Decrease bus 79540 POLETGT1	18.0	generation by	100.0	percent dispatch
5417.3	7507.4	74531 RAINEY8W	138	74612 8W DUM	138	1	-0.29810	102.2	344.0	GEN:POLETTIX				925

FCITC Single Study

PSS/MUST 8.2 -- Managing and Utilizing System Transmission -- TUE, OCT 03 2006 11:37
 2006 CLASS YEAR ATRA BASE CASE
 2011 SUMMER PEAK LOAD W/ UPDATE PJM REP
 Case.File C:\SHARE\CY06\CY06ATRA-SUM11.sav
 Subsys.File C:\SHARE\CY06\thermal\CY2006_ds.sub
 Monit.File C:\SHARE\CY06\thermal\CY2006_ds.mon
 Contin.File C:\SHARE\CY06\thermal\CY2006_NY.con
 Exclud.File none

Study transfer. From DS_6_SHIFT To OPPOSING . Transfer level - 2000.0 MW

Violations report ordered by transfer capability. Total 8595 violations

Interface-1 Interface 1 DUNW-SOUT-OP Init.Flow= 3921.22 TDF= 1.0000
 Interface-2 Interface 2 DUNW-SOUT-CL Init.Flow= 6309.93 TDF= 1.0000

IntFce1	IntFce2	TRANS	CAPAB	FROM	TO	CKT	PRE- RATING	DISTR.	SHIFT	BAS/CNT	CONTINGENCY DESCRIPTION
4019.3	6408.0	74531 RAINY8W	138	74612 8W DUM	138 1	-0.29810	-212.8	242.0	Base Case		
4019.3	6408.0	74345 RAINY	345	74612 8W DUM	138 8	0.29810	212.8	242.0	Base Case		
4021.2	6410.0	74531 RAINY8W	138	74557 VERNON-W	138 1	0.29810	212.2	242.0	Base Case		
4097.6	6486.3	74530 RAINY8E	138	74611 8E DUM	138 1	-0.30190	-188.8	242.0	Base Case		
4097.6	6486.3	74345 RAINY	345	74611 8E DUM	138 8	0.30190	188.8	242.0	Base Case		
4098.8	6487.5	74530 RAINY8E	138	74556 VERNON-E	138 1	0.30190	188.4	242.0	Base Case		
4239.2	6627.9	74345 RAINY	345	74611 8E DUM	138 8	0.40198	260.2	388.0	74345 RAINY	345	74612 8W DUM 138 8 92
									Open 74345 RAINY	345	74612 8W DUM 138 8
4239.2	6627.9	74530 RAINY8E	138	74611 8E DUM	138 1	-0.40198	-260.2	388.0	74345 RAINY	345	74612 8W DUM 138 8 92
									Open 74345 RAINY	345	74612 8W DUM 138 8
4239.2	6627.9	74345 RAINY	345	74611 8E DUM	138 8	0.40198	260.2	388.0	74531 RAINY8W	138	74612 8W DUM 138 1 311
									Open 74531 RAINY8W	138	74612 8W DUM 138 1
4239.2	6627.9	74530 RAINY8E	138	74611 8E DUM	138 1	-0.40198	-260.2	388.0	74531 RAINY8W	138	74612 8W DUM 138 1 311
									Open 74531 RAINY8W	138	74612 8W DUM 138 1
4239.6	6628.3*	74345 RAINY	345	74611 8E DUM	138 8	0.40198	260.0	388.0	SB:RAIN_345_8W		1105
									Open 74345 RAINY	345	74610 7W DUM 138 1
									Open 74529 RAINY7W	138	74610 7W DUM 138 1
									Open 74610 7W DUM	138	74788 RNY 7WGT 13.0 1
									Open 74345 RAINY	345	74612 8W DUM 138 8
									Open 74531 RAINY8W	138	74612 8W DUM 138 1
									Open 74612 8W DUM	138	74728 RYYGT811 13.8 1
									Open 74531 RAINY8W	138	74557 VERNON-W 138 1
4239.6	6628.3*	74530 RAINY8E	138	74611 8E DUM	138 1	-0.40198	-260.0	388.0	SB:RAIN_345_8W		1105
									Open 74345 RAINY	345	74610 7W DUM 138 1
									Open 74529 RAINY7W	138	74610 7W DUM 138 1
									Open 74610 7W DUM	138	74788 RNY 7WGT 13.0 1
									Open 74345 RAINY	345	74612 8W DUM 138 8
									Open 74531 RAINY8W	138	74612 8W DUM 138 1
									Open 74612 8W DUM	138	74728 RYYGT811 13.8 1
									Open 74531 RAINY8W	138	74557 VERNON-W 138 1

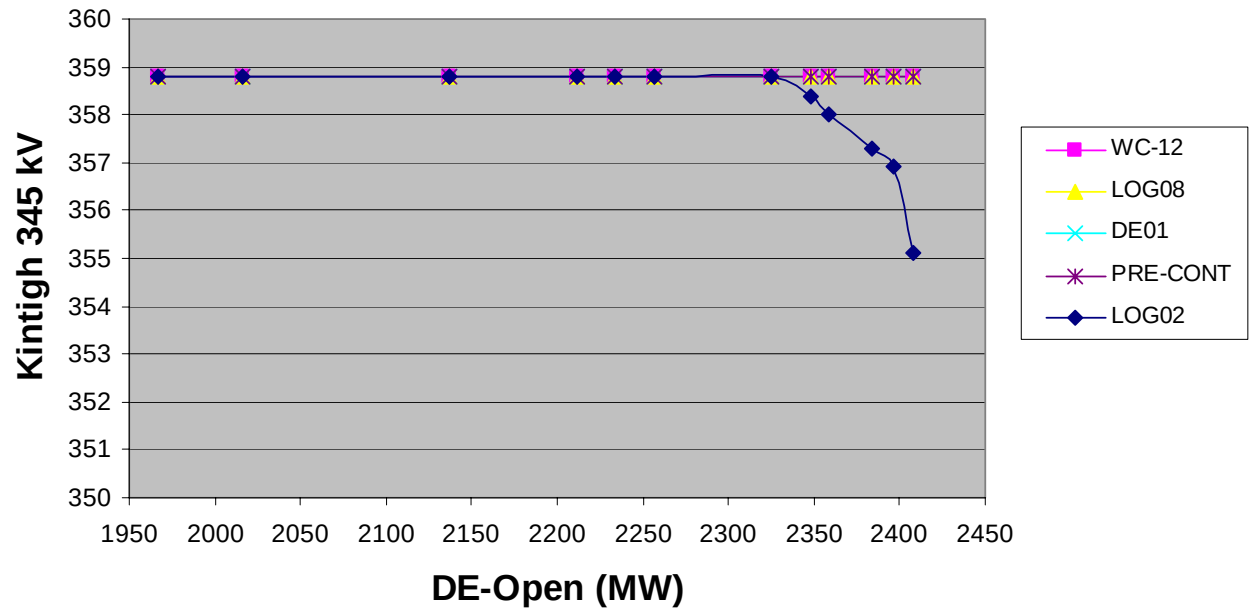
4240.1	6628.8	74530 RAINY8E	138	74556 VERNON-E	138 1	0.40198	259.8	388.0	74531 RAINY8W	138	74612 8W DUM	138 1	311
									Open 74531 RAINY8W		138 74612 8W DUM		138 1
4240.1	6628.8	74530 RAINY8E	138	74556 VERNON-E	138 1	0.40198	259.8	388.0	74345 RAINY	345	74612 8W DUM	138 8	92
									Open 74345 RAINY		345 74612 8W DUM		138 8
4240.5	6629.2*	74530 RAINY8E	138	74556 VERNON-E	138 1	0.40198	259.7	388.0	SB:RAIN_345_8W				1105
									Open 74345 RAINY		345 74610 7W DUM		138 1
									Open 74529 RAINY7W		138 74610 7W DUM		138 1
									Open 74610 7W DUM		138 74788 RNY 7WGT	13.0	1
									Open 74345 RAINY		345 74612 8W DUM		138 8
									Open 74531 RAINY8W		138 74612 8W DUM		138 1
									Open 74612 8W DUM		138 74728 RYYGT811	13.8	1
									Open 74531 RAINY8W		138 74557 VERNON-W		138 1
4240.9	6629.6	74345 RAINY	345	74612 8W DUM	138 8	0.39856	275.6	403.0	74530 RAINY8E	138	74611 8E DUM	138 1	309
									Open 74530 RAINY8E		138 74611 8E DUM		138 1
4240.9	6629.6	74345 RAINY	345	74612 8W DUM	138 8	0.39856	275.6	403.0	74345 RAINY	345	74611 8E DUM	138 8	91
									Open 74345 RAINY		345 74611 8E DUM		138 8
4240.9	6629.6	74531 RAINY8W	138	74612 8W DUM	138 1	-0.39856	-275.6	403.0	74530 RAINY8E	138	74611 8E DUM	138 1	309
									Open 74530 RAINY8E		138 74611 8E DUM		138 1
4240.9	6629.6	74531 RAINY8W	138	74612 8W DUM	138 1	-0.39856	-275.6	403.0	74345 RAINY	345	74611 8E DUM	138 8	91
									Open 74345 RAINY		345 74611 8E DUM		138 8
4241.2	6629.9*	74531 RAINY8W	138	74612 8W DUM	138 1	-0.39856	-275.5	403.0	74530 RAINY8E	138	74556 VERNON-E	138 1	308
									Open 74530 RAINY8E		138 74556 VERNON-E		138 1
4241.2	6629.9*	74345 RAINY	345	74612 8W DUM	138 8	0.39856	275.5	403.0	74530 RAINY8E	138	74556 VERNON-E	138 1	308
									Open 74530 RAINY8E		138 74556 VERNON-E		138 1
4242.4	6631.1	74531 RAINY8W	138	74557 VERNON-W	138 1	0.39856	275.0	403.0	74345 RAINY	345	74611 8E DUM	138 8	91
									Open 74345 RAINY		345 74611 8E DUM		138 8
4242.4	6631.1	74531 RAINY8W	138	74557 VERNON-W	138 1	0.39856	275.0	403.0	74530 RAINY8E	138	74611 8E DUM	138 1	309
									Open 74530 RAINY8E		138 74611 8E DUM		138 1
4242.7	6631.4*	74531 RAINY8W	138	74557 VERNON-W	138 1	0.39856	274.9	403.0	74530 RAINY8E	138	74556 VERNON-E	138 1	308
									Open 74530 RAINY8E		138 74556 VERNON-E		138 1
4585.1	6973.8	Interface	6	JUNK		0.52644	2726.5	3076.0	TWR:41&33				930
									Open 75400 COOPC345	345	79583 MARCY T1	345	1
									Open 75400 COOPC345	345	75403 FRASR345	345	1
4704.1	7092.8	Interface	6	JUNK		0.52123	2667.9	3076.0	TWR:34&42				928
									Open 74001 ROCK TAV	345	75400 COOPC345	345	2
									Open 75400 COOPC345	345	79304 MDTN TAP	345	1
									Open 74001 ROCK TAV	345	79304 MDTN TAP	345	1
4807.8	7196.5*	Interface	6	JUNK		0.47024	2659.1	3076.0	SIN:430				1389
									Open 74002 ROSETON	345	74331 FISHKILL	345	1
									Open 74018 SUGARLF	115	74046 ROCK TV1	115	1
5201.0	7589.7	74345 RAINY	345	74691 S. BRONX	345 3	-0.50668	-552.6	1201.0	SB:SBRX_345_8				1131
									Open 74678 SBNXT1	138	74691 S. BRONX	345	1
									Open 74345 RAINY		345 74691 S. BRONX		345 4
5201.0	7589.7	74345 RAINY	345	74691 S. BRONX	345 4	-0.50668	-552.6	1201.0	74345 RAINY	345	74691 S. BRONX	345 3	94
									Open 74345 RAINY		345 74691 S. BRONX		345 3
5201.0	7589.7	74345 RAINY	345	74691 S. BRONX	345 4	-0.50668	-552.6	1201.0	SB:SBRX_345_3				1126
									Open 74681 SBNXT2	138	74691 S. BRONX	345	1
									Open 74345 RAINY	345	74691 S. BRONX	345	3
5201.0	7589.7	74345 RAINY	345	74691 S. BRONX	345 3	-0.50668	-552.6	1201.0	SB:RAIN_345_4W				1103
									Open 74345 RAINY	345	74527 RAINY3W	138	1
									Open 74345 RAINY	345	74691 S. BRONX	345	4
5201.0	7589.7*	74345 RAINY	345	74691 S. BRONX	345 3	-0.50668	-552.6	1201.0	74345 RAINY	345	74691 S. BRONX	345 4	95
									Open 74345 RAINY	345	74691 S. BRONX	345	4
5201.0	7589.7*	74345 RAINY	345	74691 S. BRONX	345 4	-0.50668	-552.6	1201.0	SB:SBRX_345_4				1127
									Open 74684 SBNXT3	138	74691 S. BRONX	345	1

5283.8	7672.5	Interface	6	JUNK						Open 74345 RAINY	345	74691 S. BRONX	345	3
						0.39617	2122.2	2662.0		Base Case				
5379.1	7767.8	74650 REAC71		345	74691 S. BRONX	345	3	0.25804	418.8	795.0				
5379.1	7767.8	74651 REAC72		345	74691 S. BRONX	345	4	0.25804	418.8	795.0				
5476.7	7865.4	74525 QUENBRDG		138	74556 VERNON-E	138	2	-0.15076	-181.5	416.0				
5587.0	7975.7	74525 QUENBRDG		138	74556 VERNON-E	138	2	-0.23916	-270.6	669.0				
											74525 QUENBRDG	138	74557 VERNON-W	138
											Open 74525 QUENBRDG		138	74557 VERNON-W
											74525 QUENBRDG	138	74556 VERNON-E	138
5646.5	8035.3	74525 QUENBRDG		138	74557 VERNON-W	138	1	-0.23837	-257.7	669.0				
											Open 74525 QUENBRDG		138	74556 VERNON-E
														138
5664.3	8053.0	Interface	2	DUNW-SOUT-CL										
						1.00000	6309.9	8053.0		Base Case				
5700.7	8089.4	74525 QUENBRDG		138	74557 VERNON-W	138	1	-0.14924	-150.4	416.0				
5706.7	8095.4	74354 W 49 ST		345	74567 REACM51	345	1	-0.24196	-429.0	861.0				
5706.7	8095.4	74354 W 49 ST		345	74568 REACM52	345	2	-0.24196	-429.0	861.0				
5911.6	8300.3	74345 RAINY		345	74691 S. BRONX	345	4	-0.25804	-281.4	795.0				
5911.6	8300.3	74345 RAINY		345	74691 S. BRONX	345	3	-0.25804	-281.4	795.0				

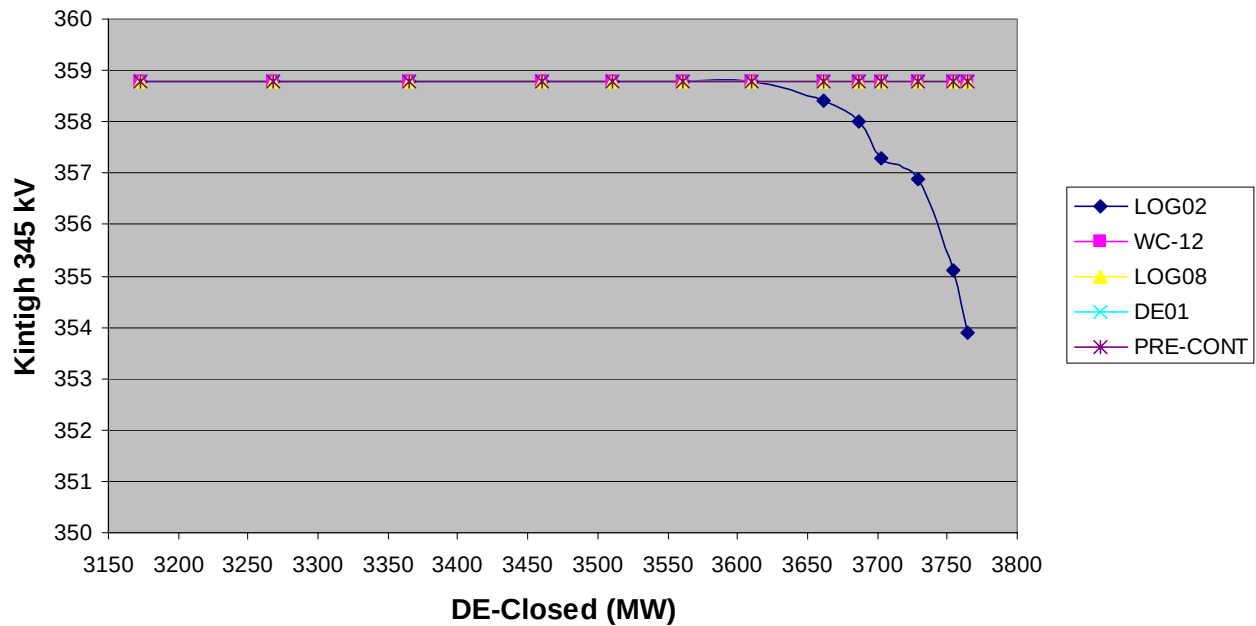
Appendix D

Voltage Results

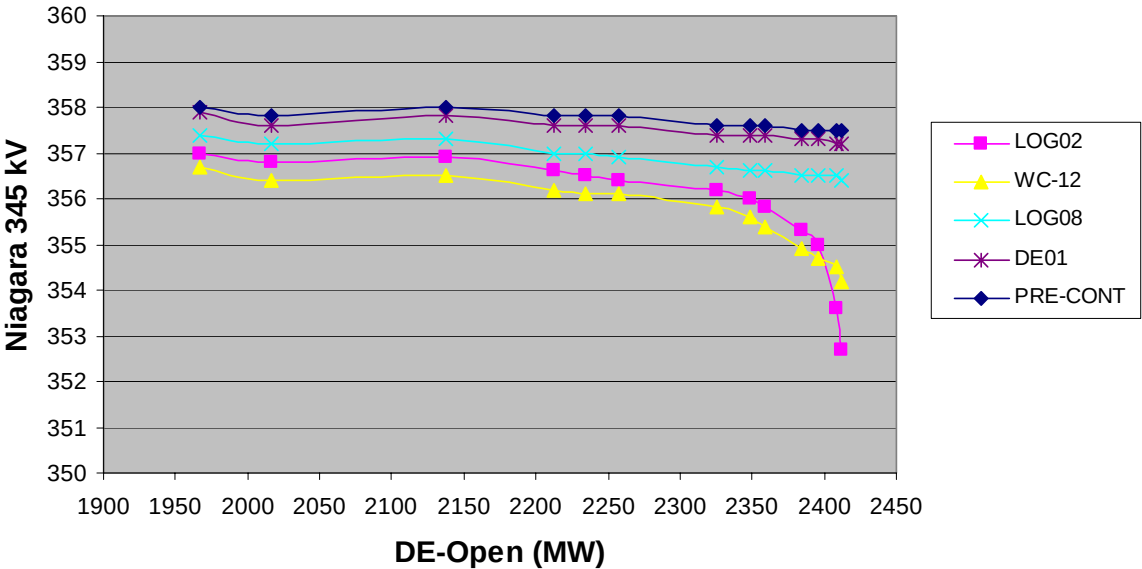
PV Curve: DE Open Interface; Case: ATBA



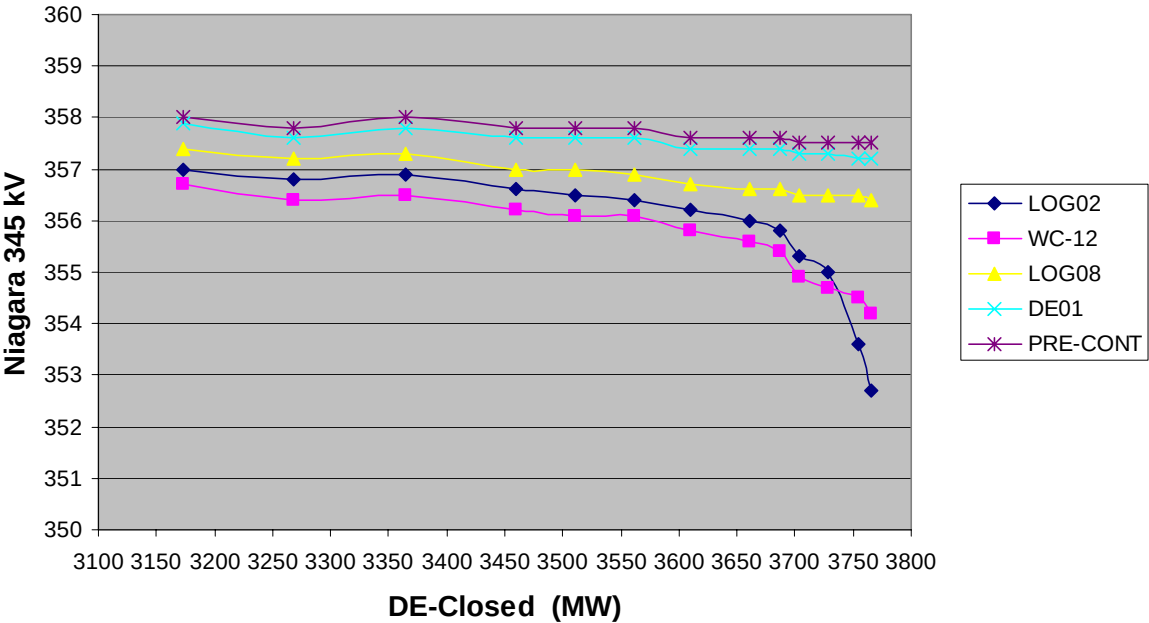
PV Curve - DE Closed Interface; Case: ATBA



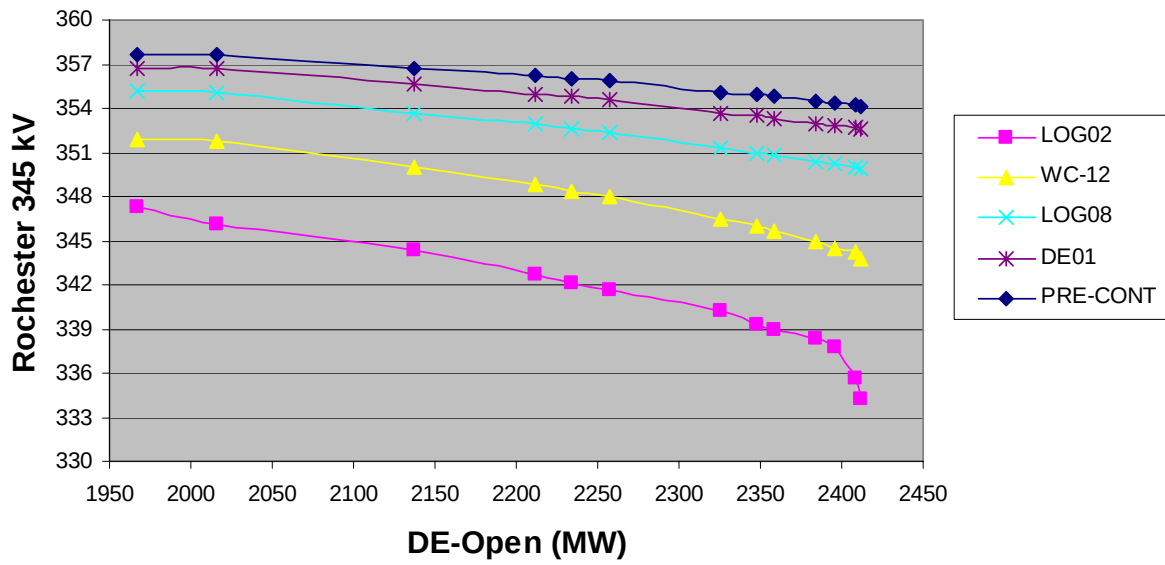
PV Curve - DE Open Interface; Case: ATBA



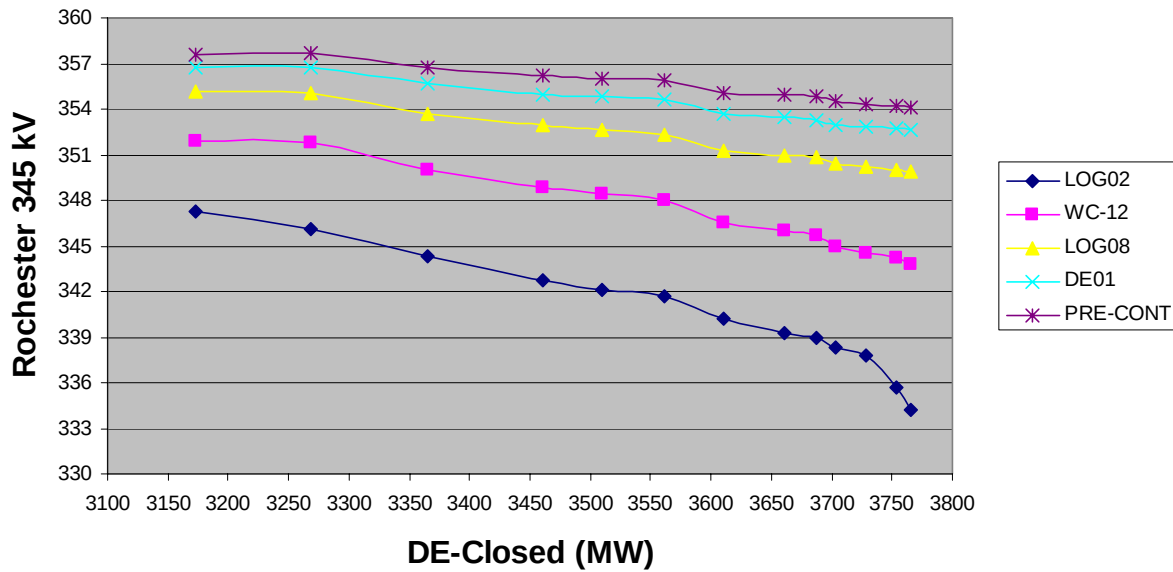
PV Curve - DE Closed Interface; Case: ATBA



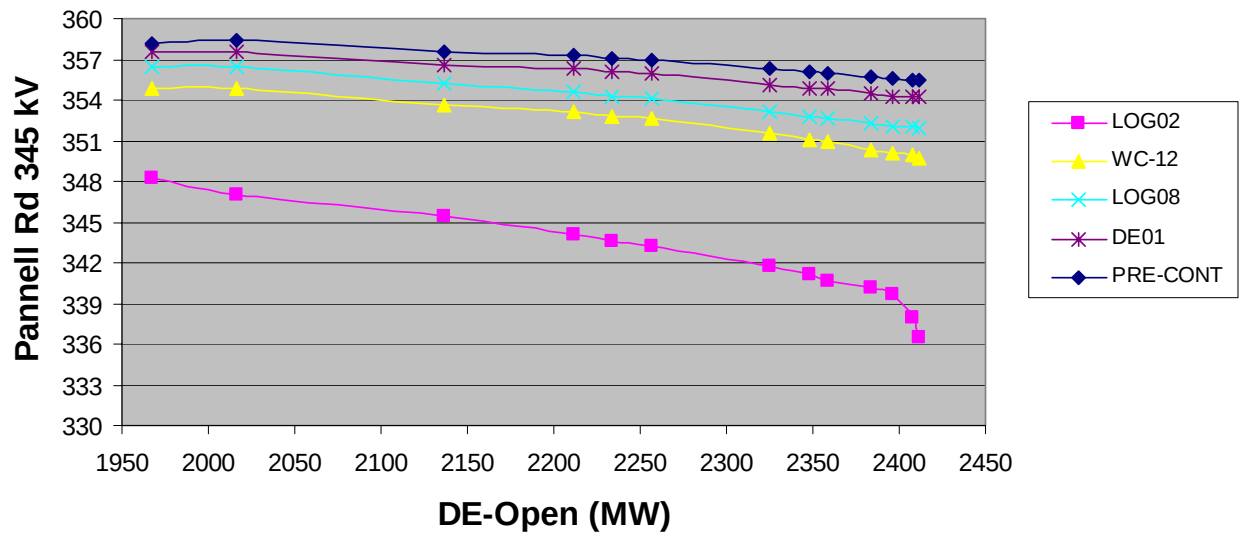
PV Curve: DE Open Interface; Case:ATBA



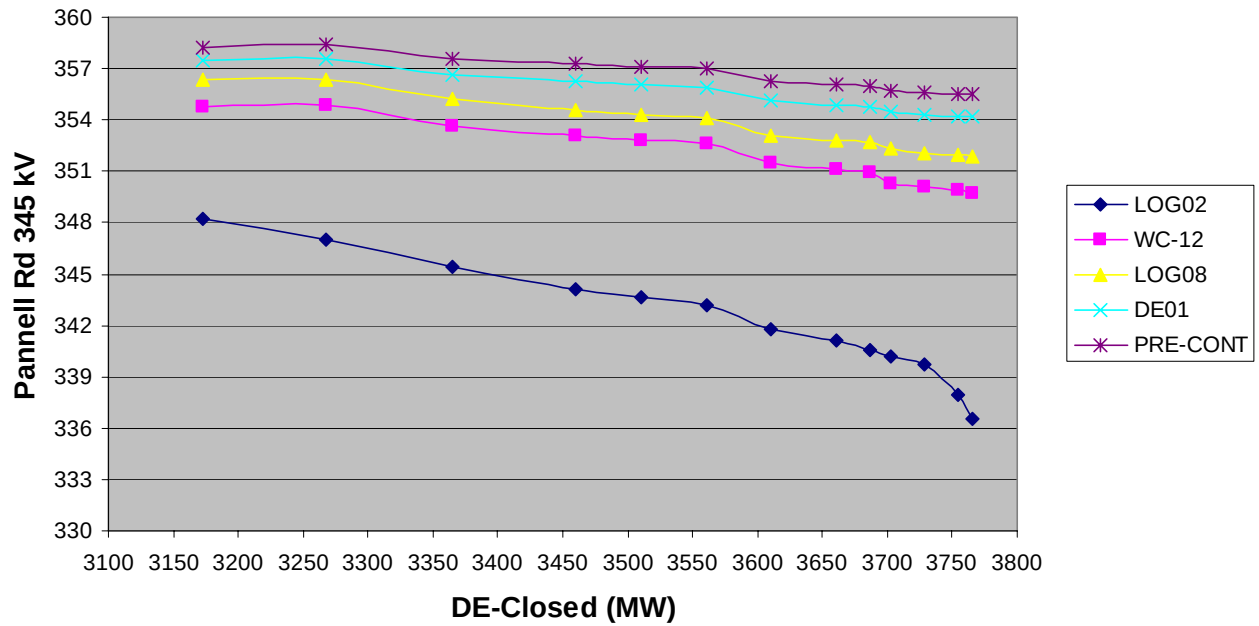
PV Curve - DE Closed Interface; Case:ATBA



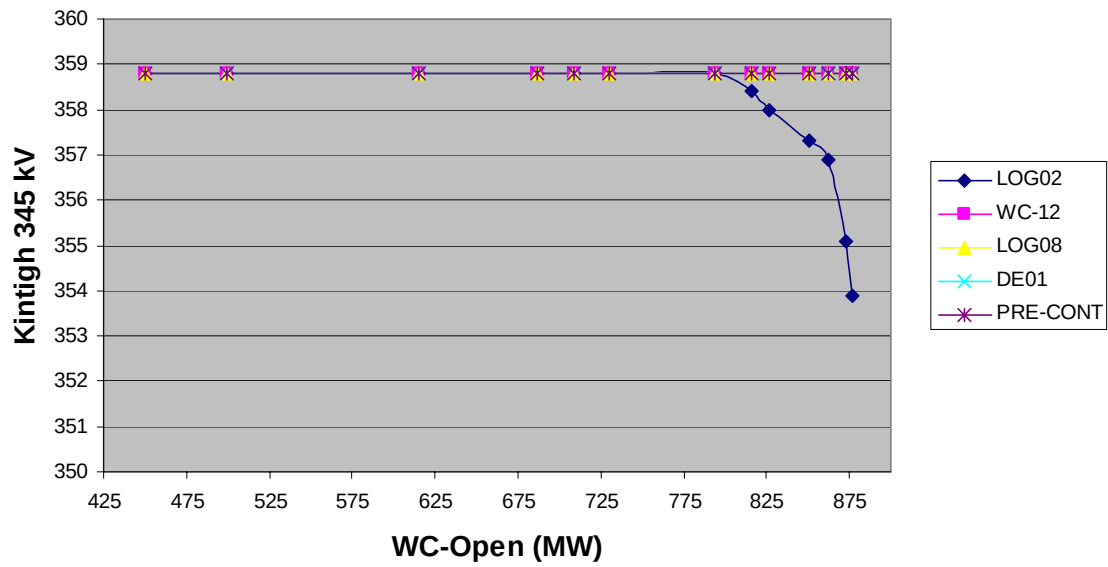
PV Curve: DE Open Interface; Case: ATBA



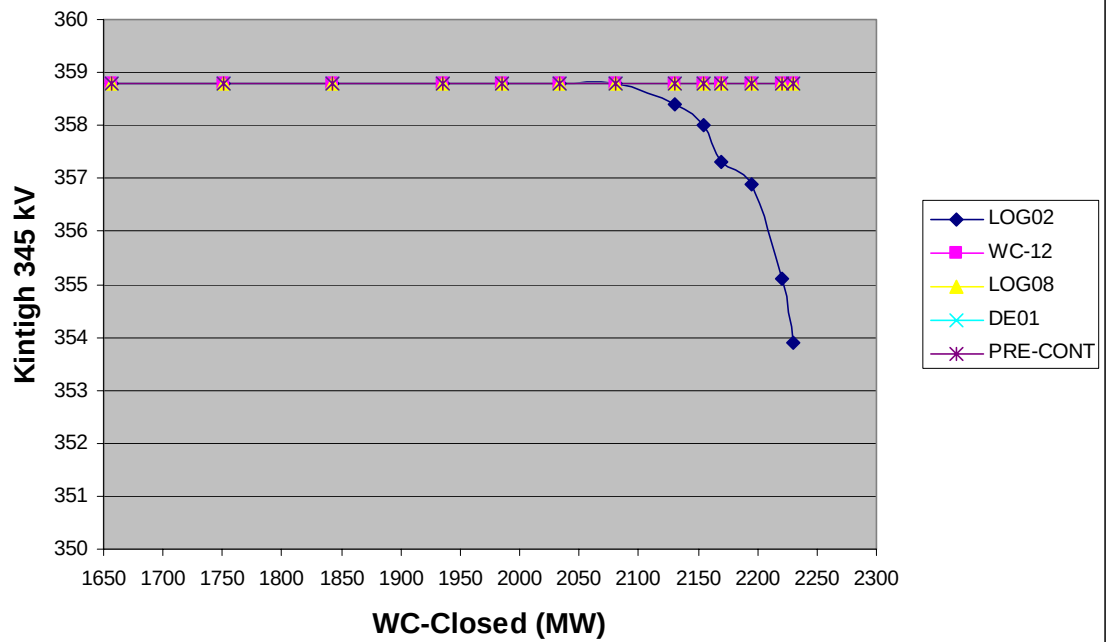
PV Curve - DE Closed Interface; Case: ATBA



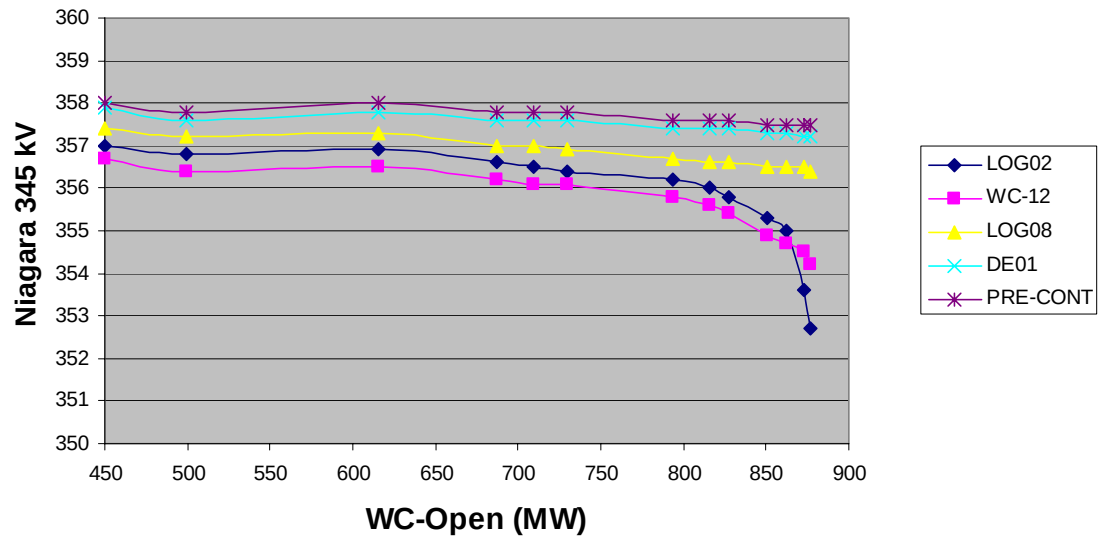
PV Curve: WC-Open Interface; Case: ATBA



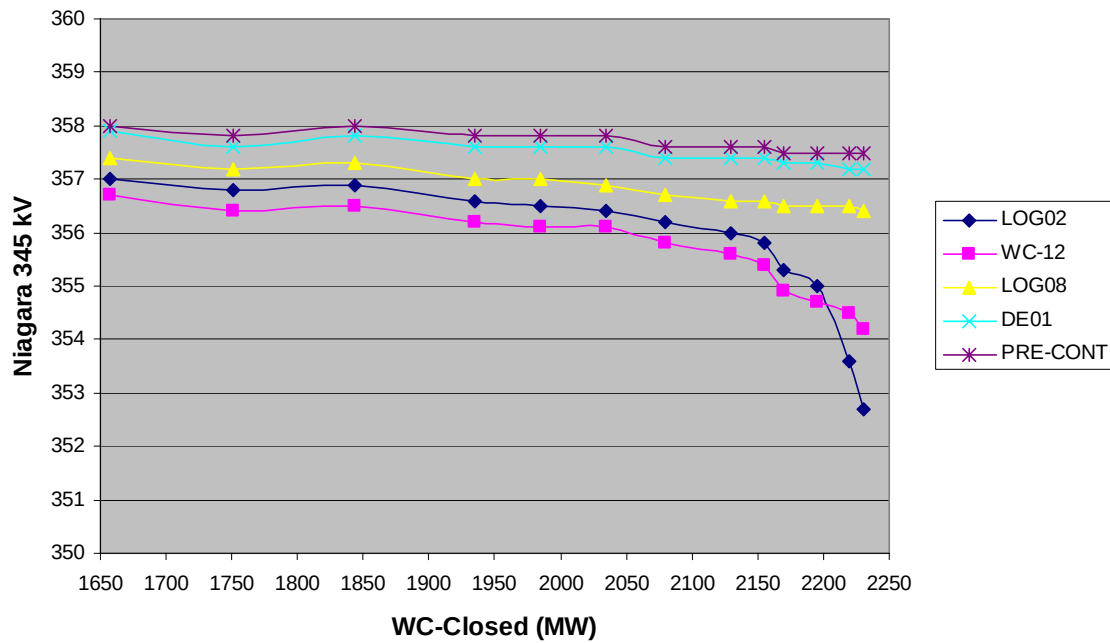
PV Curve: WC-Closed Interface; Case: ATBA



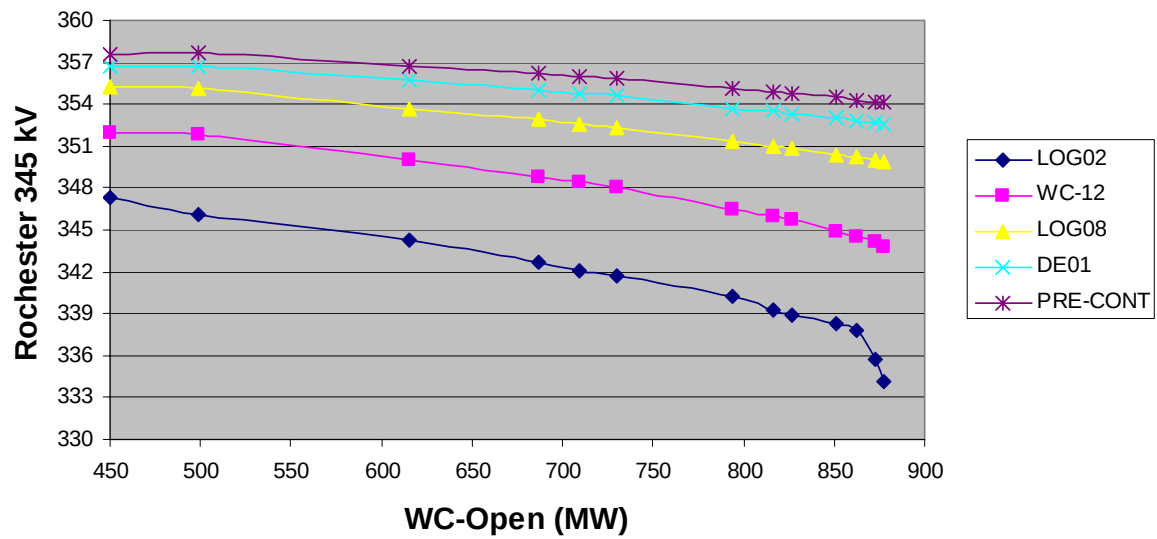
PV Curve: WC-Open Interface; Case: ATBA



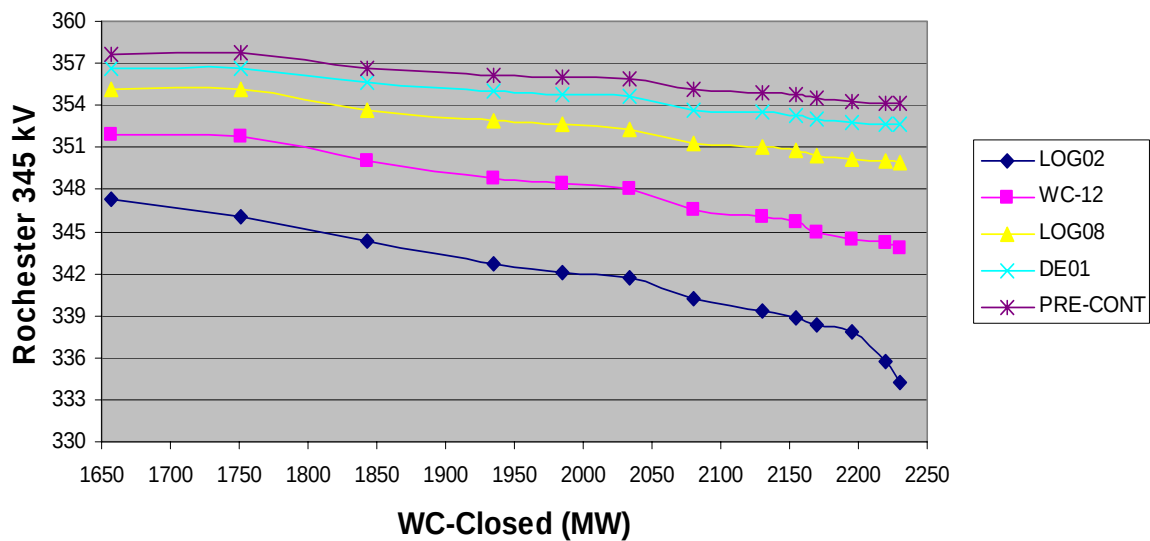
PV Curve: WC-Closed Interface; Case: ATBA



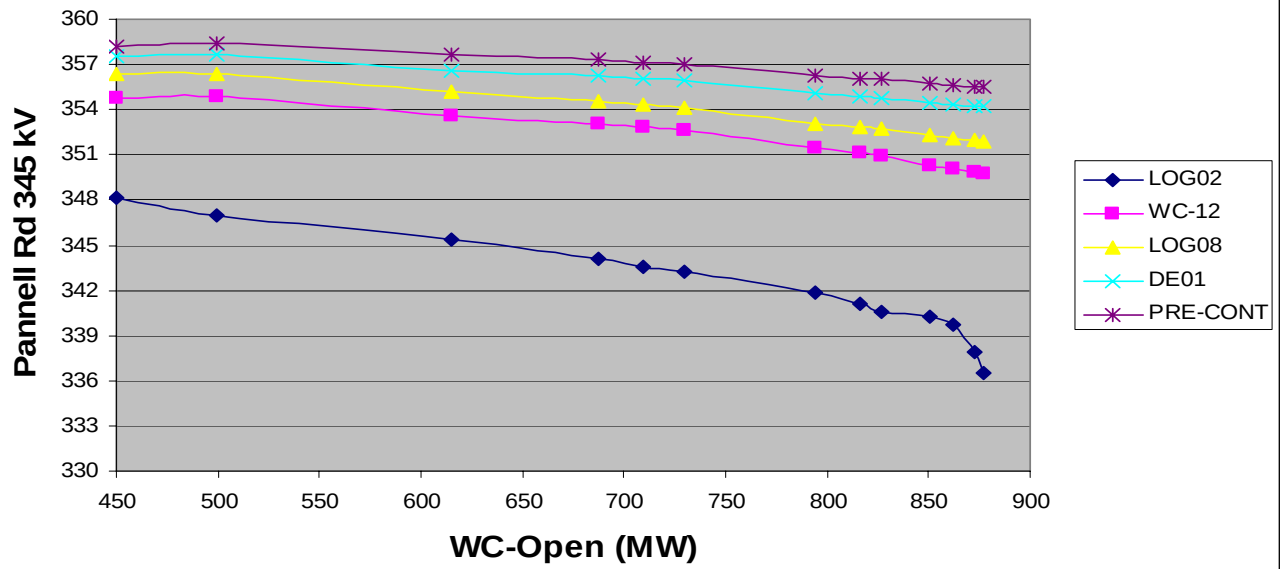
PV Curve: WC-Open Interface; Case:ATBA



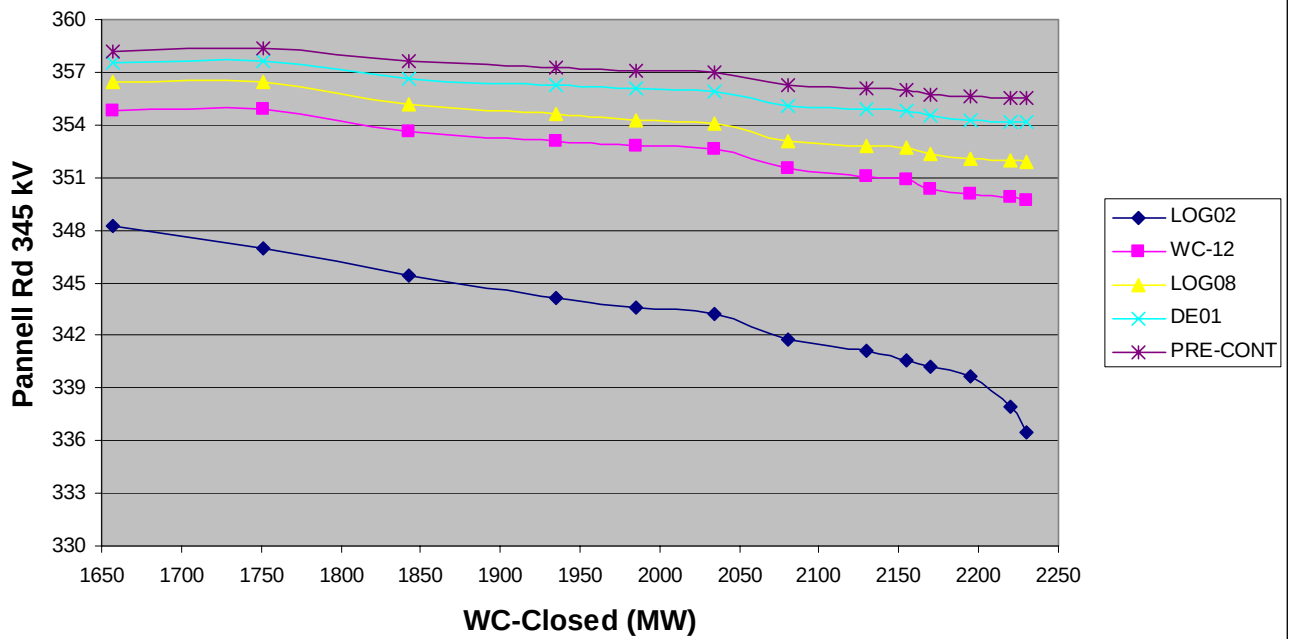
PV Curve: WC-Closed Interface; Case: ATBA



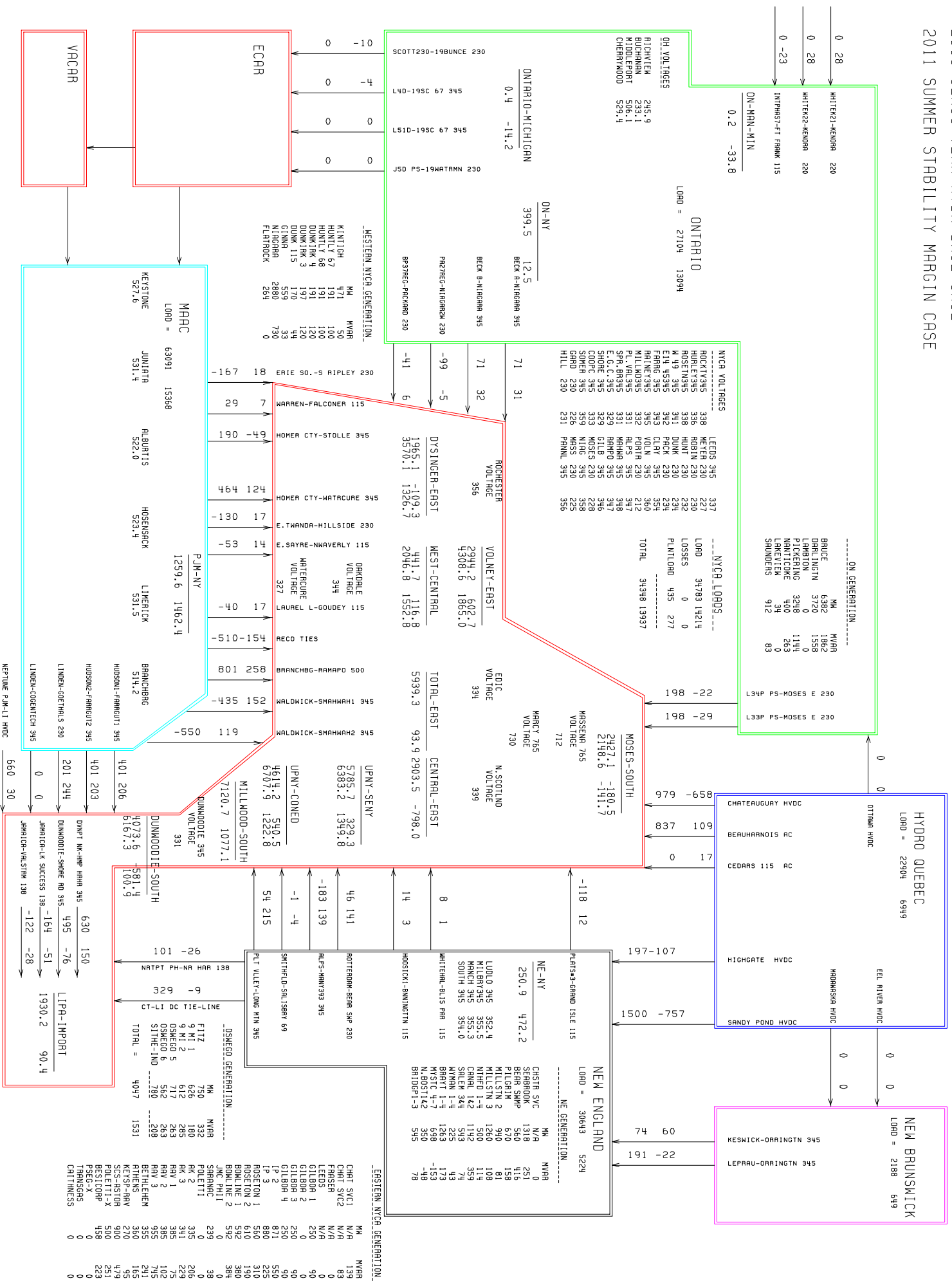
PV Curve: WC-Open Interface; Case: ATBA



PV Curve: WC-Closed Interface; Case: ATBA

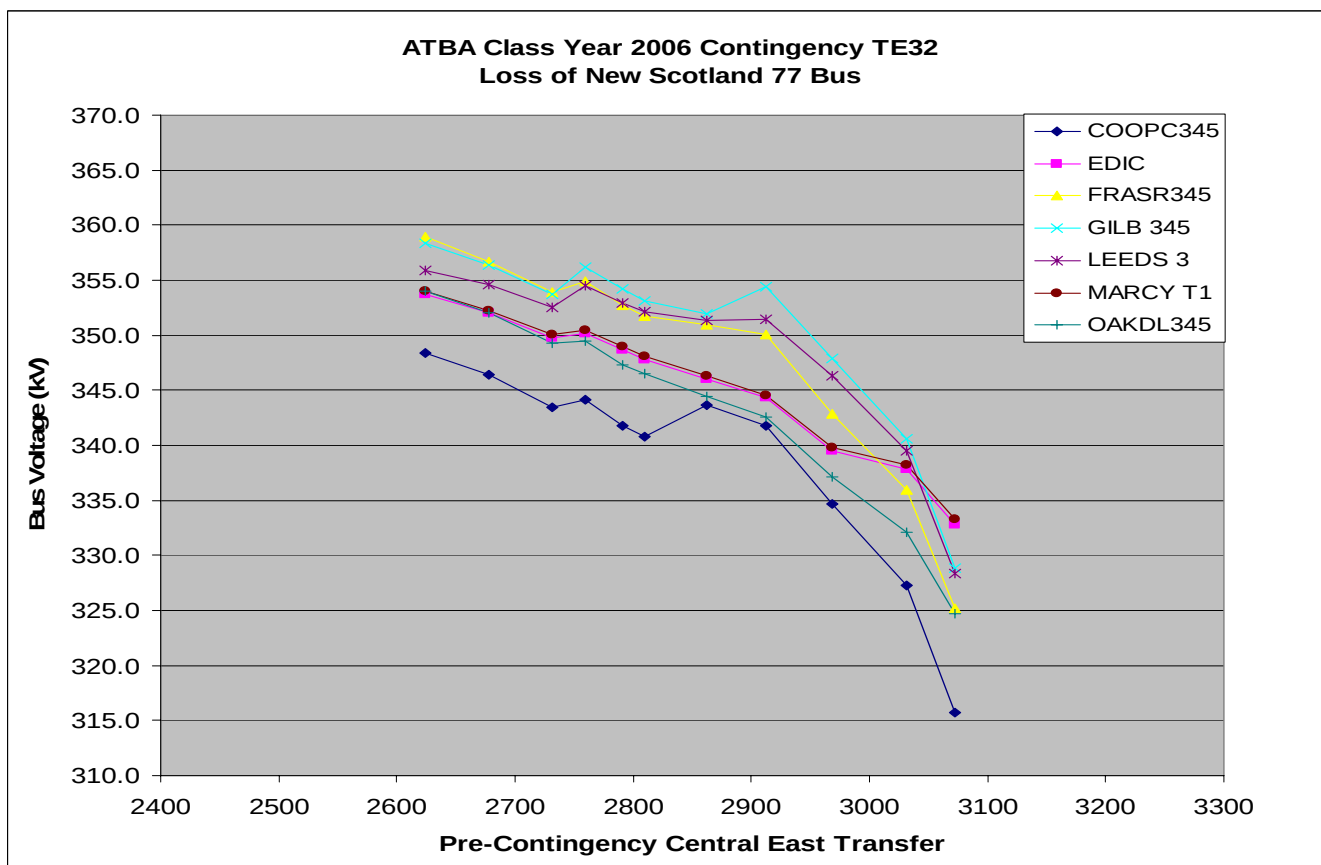
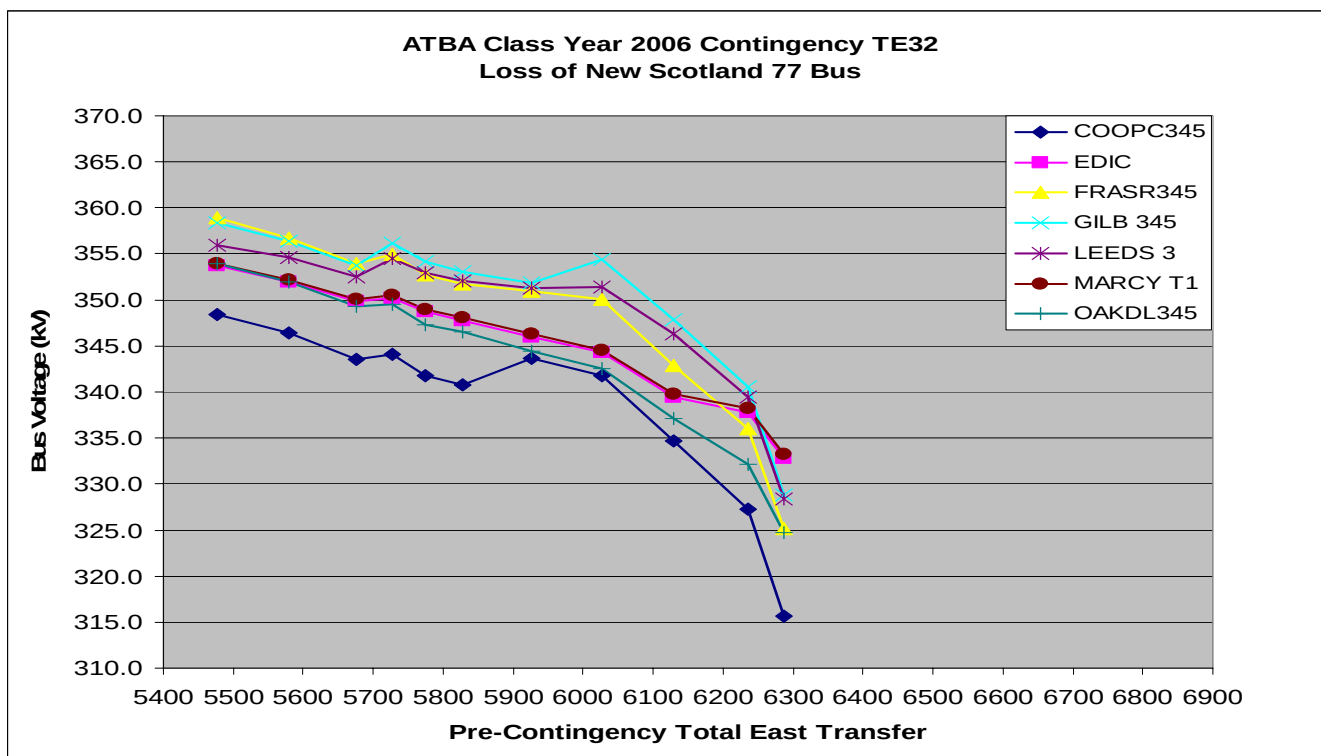


2006 CLASS YEAR	ATBA BASE CASE	2011 SUMMER STABILITY MARGIN CASE
2006	100%	100%
2007	100%	100%
2008	100%	100%
2009	100%	100%
2010	100%	100%
2011	100%	100%
2012	100%	100%
2013	100%	100%
2014	100%	100%
2015	100%	100%
2016	100%	100%
2017	100%	100%
2018	100%	100%
2019	100%	100%
2020	100%	100%
2021	100%	100%
2022	100%	100%
2023	100%	100%
2024	100%	100%
2025	100%	100%
2026	100%	100%
2027	100%	100%
2028	100%	100%
2029	100%	100%
2030	100%	100%
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2037	100%	100%
2038	100%	100%
2039	100%	100%
2040	100%	100%
2041	100%	100%
2042	100%	100%
2043	100%	100%
2044	100%	100%
2045	100%	100%
2046	100%	100%
2047	100%	100%
2048	100%	100%
2049	100%	100%
2050	100%	100%

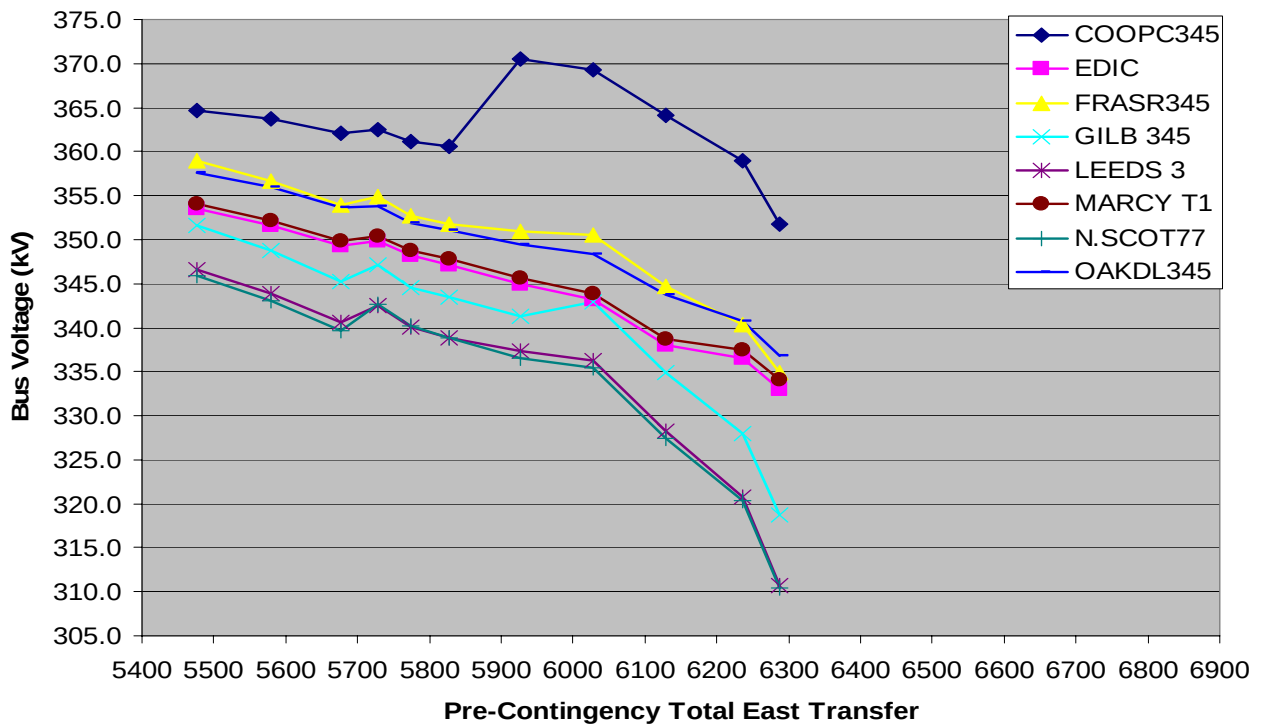


ATBA Moses South Voltage Results

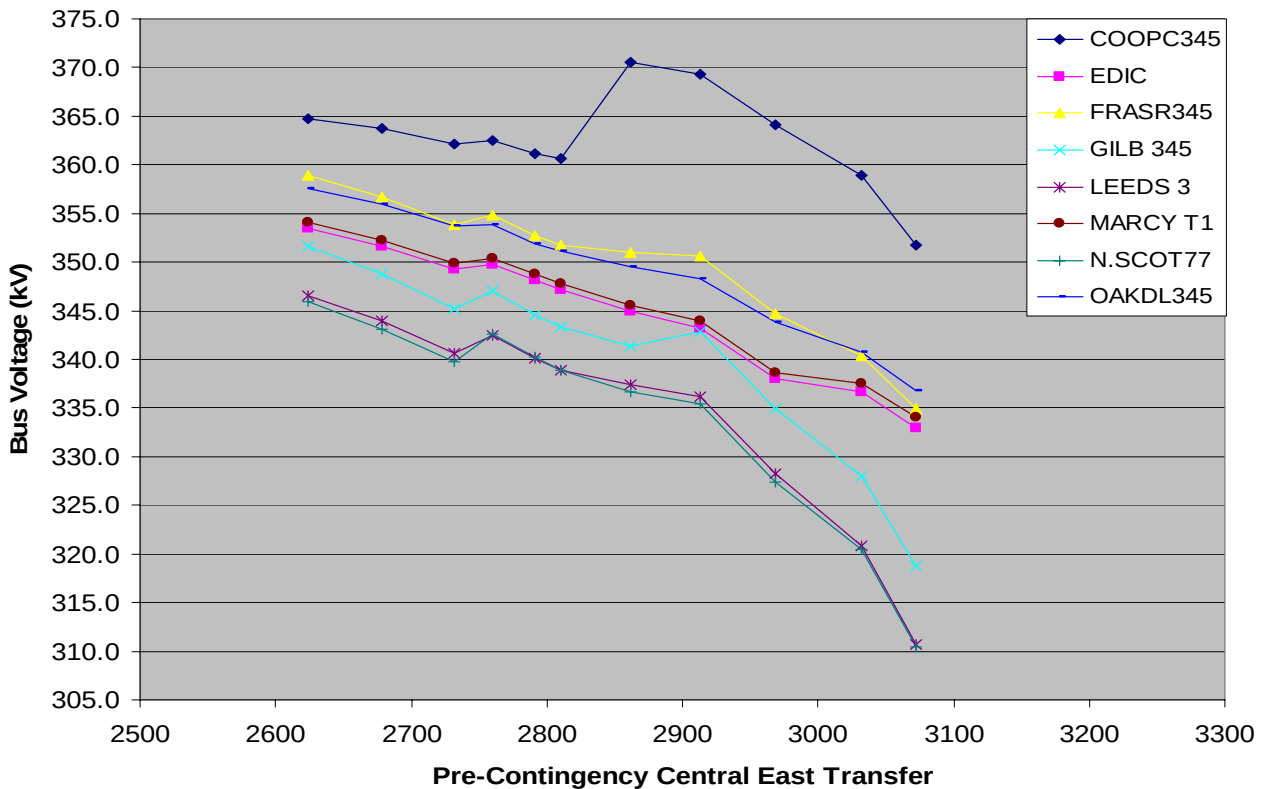
Bus No.	Bus Name	Pre-Cont V	ce07	ce08	ce09	ce18	log13	log18
77400	CLAY345	357.42	355.695	357.42	355.695	357.42	354.66	357.075
75400	CCRN345	349.485	357.42	363.285	346.725	365.7	348.795	356.385
78450	EDIC345	347.415	345.69	346.725	344.31	347.07	342.24	353.97
74327	FARAG345	351.555	351.9	350.865	351.555	346.38	351.21	352.245
75403	FRAS345	356.385	356.385	356.385	356.385	356.385	356.385	356.385
76663	GRDVL230	226.55	225.86	226.55	226.32	226.55	224.94	225.17
78701	LEED345	353.625	352.59	343.62	353.625	338.1	353.625	355.35
79583	MAR345	347.07	345.69	346.725	343.965	347.07	342.24	354.66
74341	MILWD345	347.415	347.76	345.345	347.76	335.34	347.415	349.14
78702	NSCT345A	352.935	347.415	341.895	353.28	339.48	347.76	357.765
78703	NSCT345B	352.935	347.415	341.895	353.28	339.48	347.76	357.765
75405	OAK345	356.73	346.38	358.11	353.97	359.145	348.45	351.9
79801	PNLRD345	355.35	354.66	355.695	354.66	356.04	350.52	350.52
74344	PV345	347.415	347.07	341.205	347.76	331.545	348.45	349.83
74001	ROCK345	353.97	357.765	357.765	352.935	338.445	353.97	357.42
75404	SOMR345	358.8	358.8	358.8	358.8	358.8	358.8	358.8
79800	STA80345	354.66	354.315	355.35	354.315	355.35	349.485	348.795
79590	STLAW230	230.23	230.23	230.23	229.77	230.23	227.47	230.69
75418	WATR230	232.99	227.01	233.45	231.15	233.68	224.71	226.55



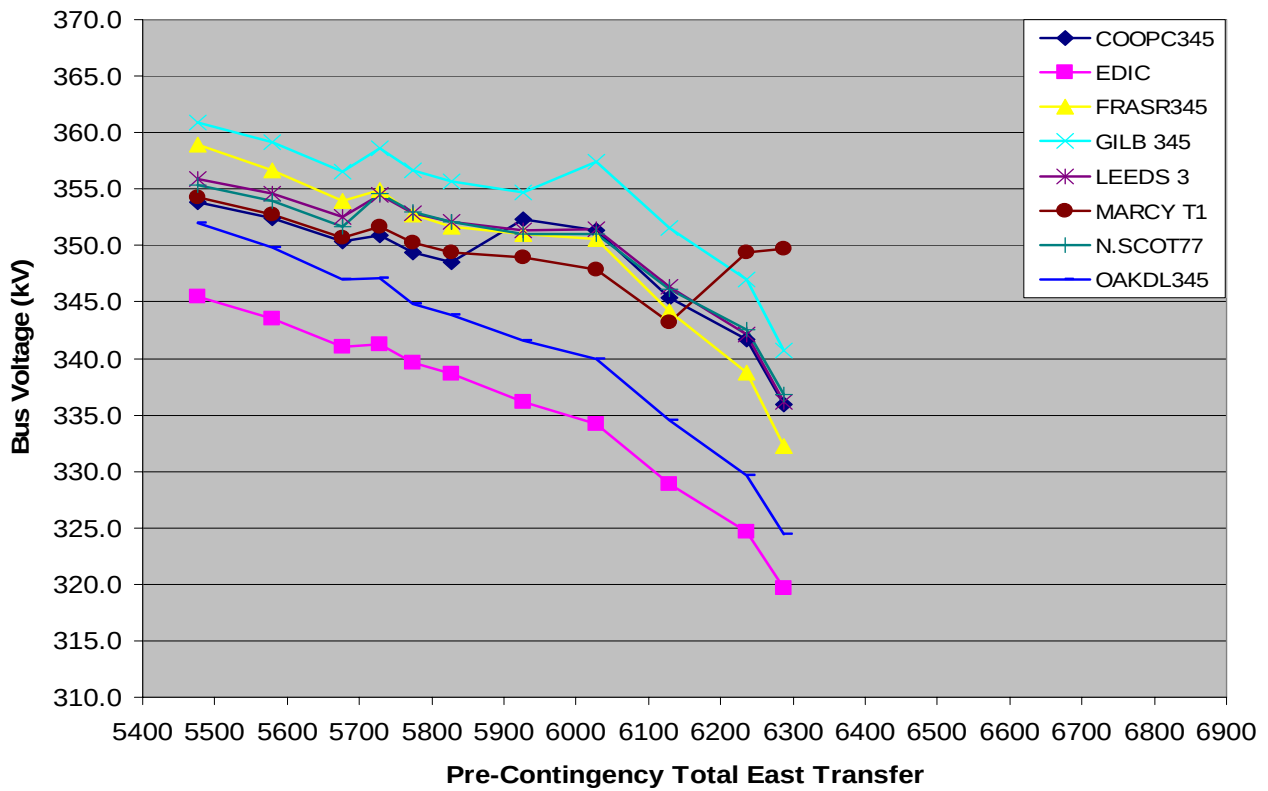
ATBA CY2006 Contingency CE08
Loss of Marcy South, Coopers-Marcy & Coopers-Fraser



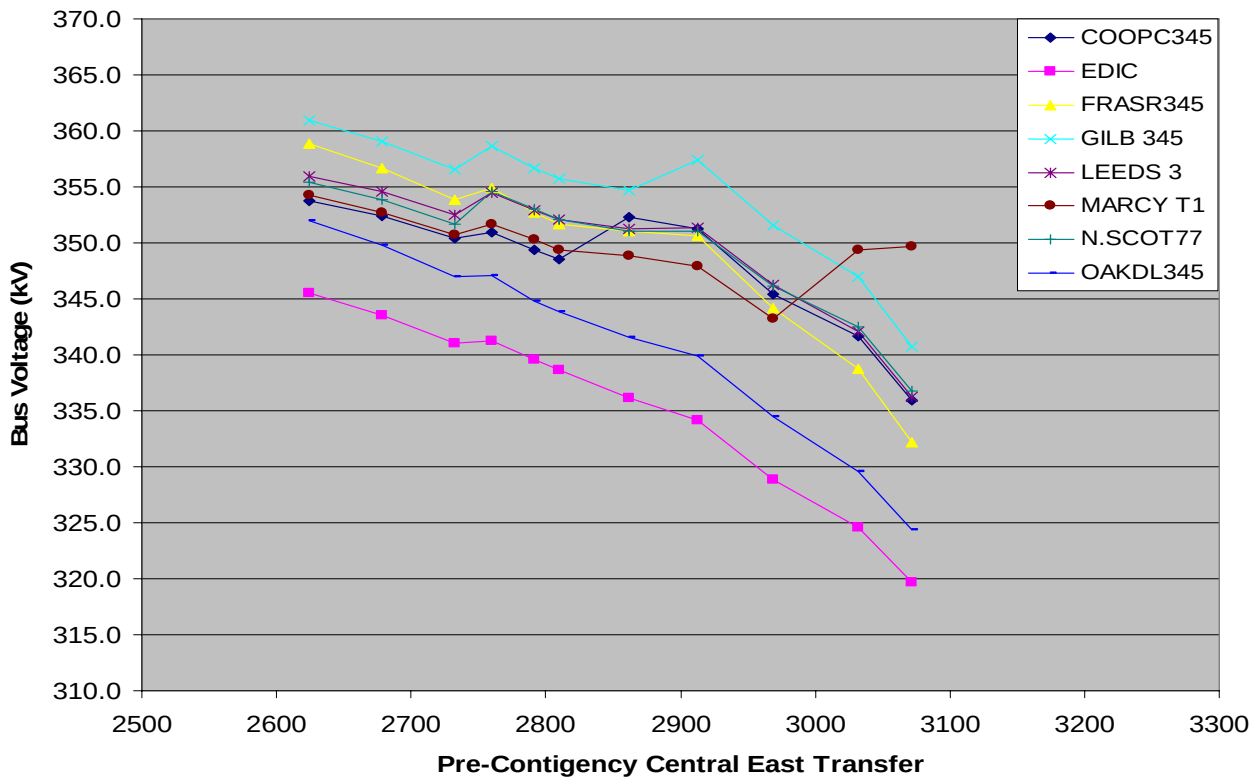
ATBA CY2006 Contingency CE08
Loss of Marcy South, Coopers-Marcy & Coopers-Fraser

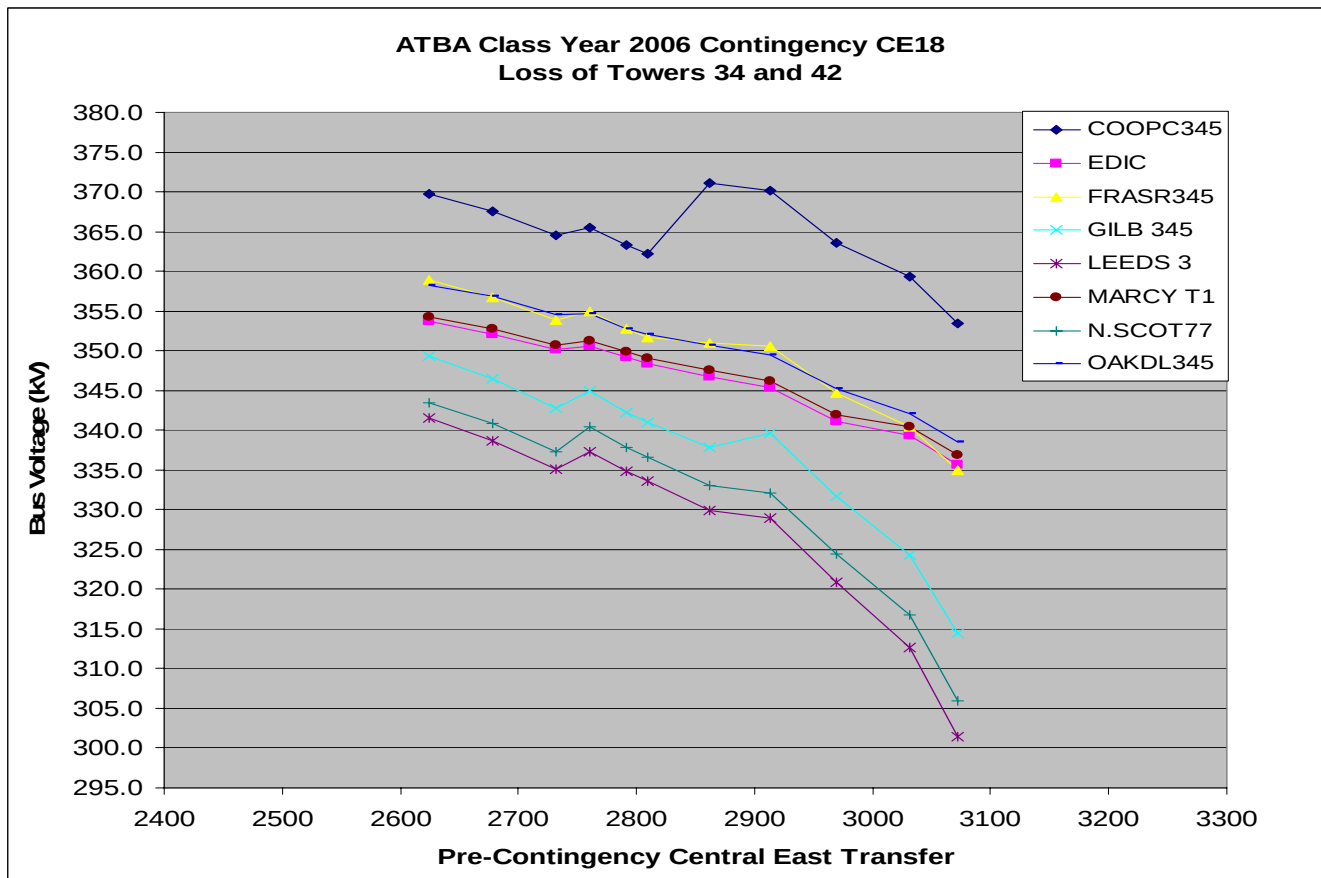
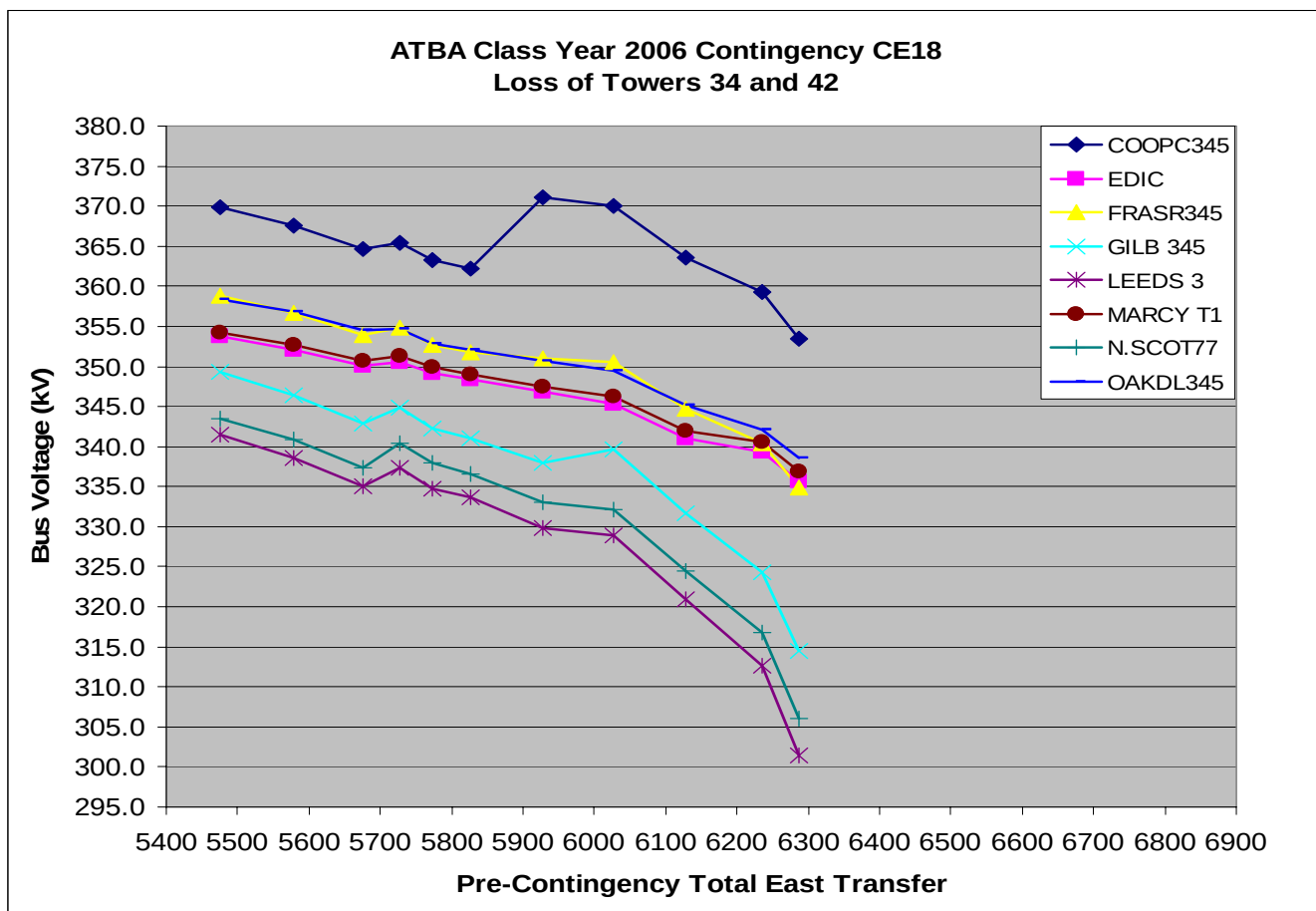


ATBA Class Year 2006 Contingency CE15
Marcy Stuck Breaker, Lose Edic and Volney Lines

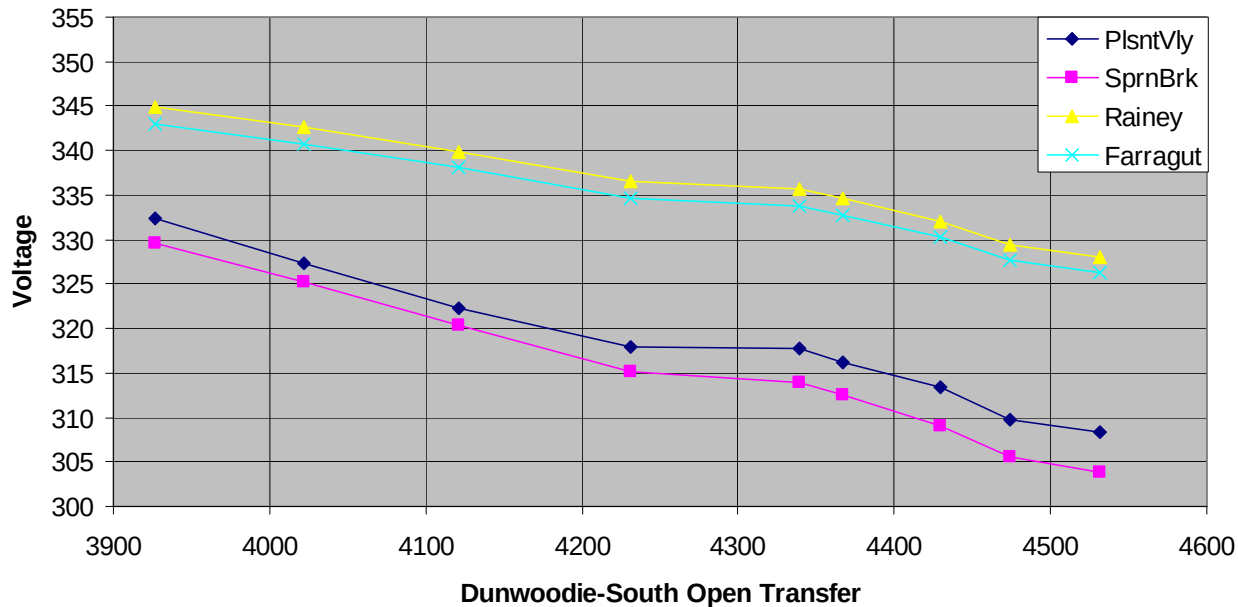


ATBA Class Year 2006 Contingency CE15
Marcy Stuck Breaker, Lose Edic and Volney Lines

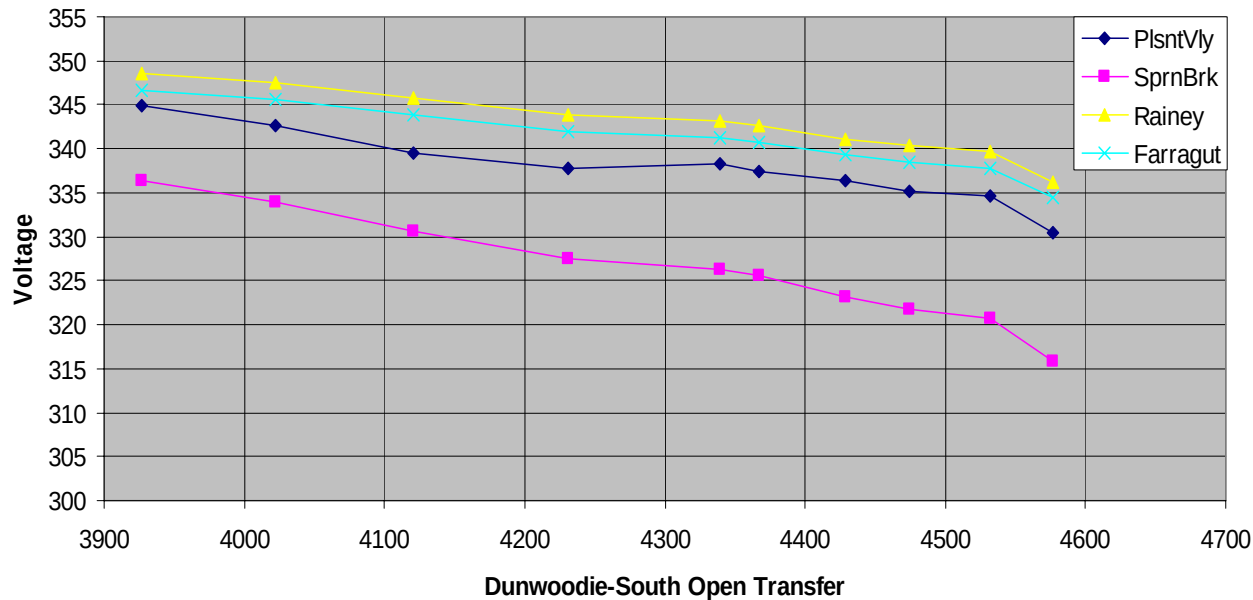




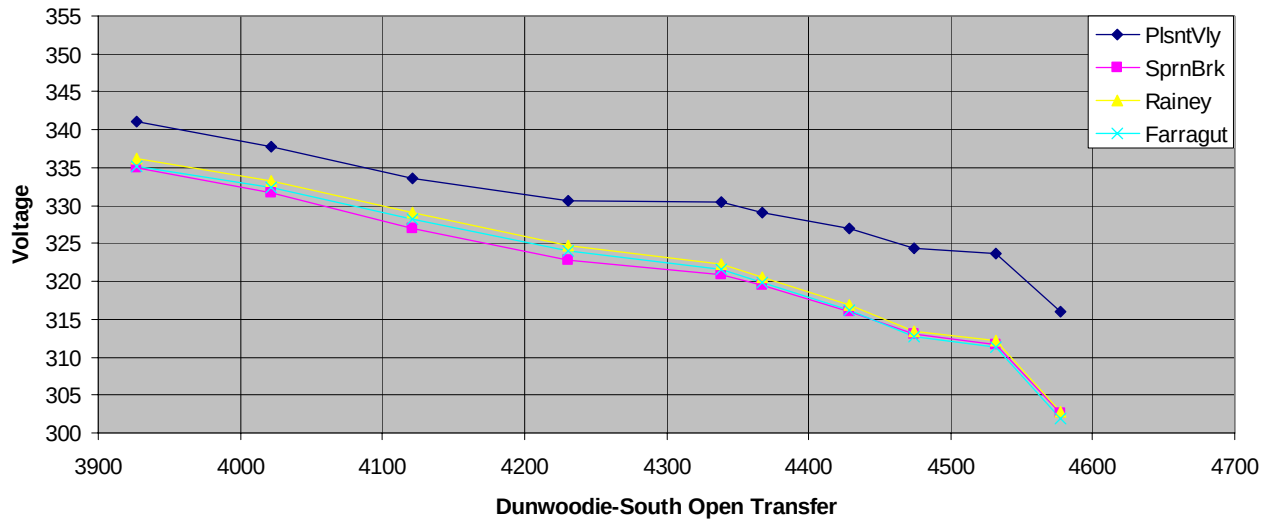
Dunwoodie-South P-V: UC26 L/O Tower 67 & 68



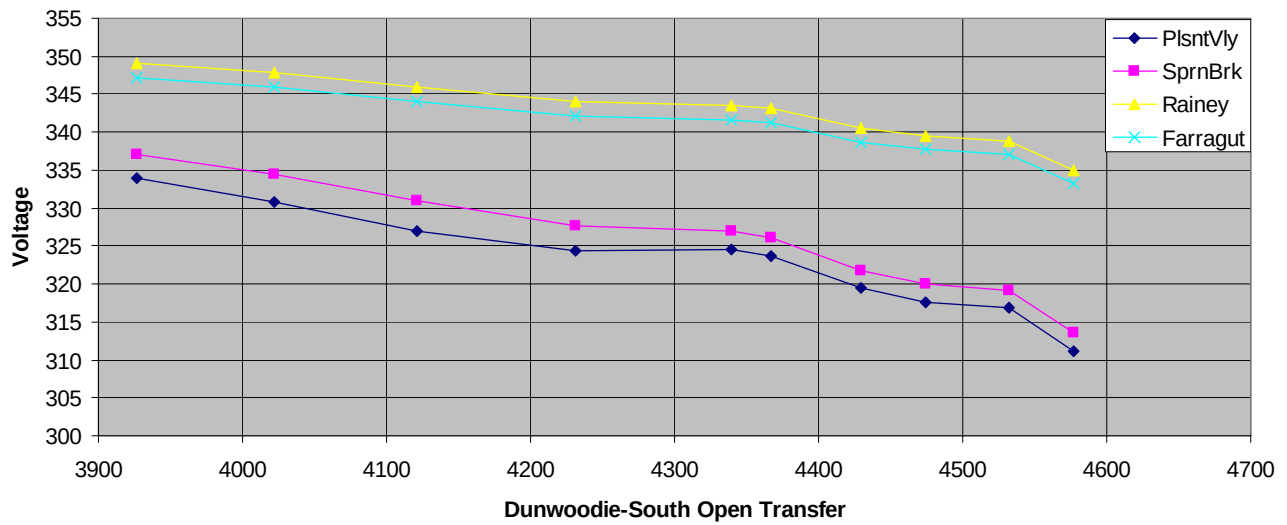
Dunwoodie-South P-V: UC20 L/O Tower W89 & W90



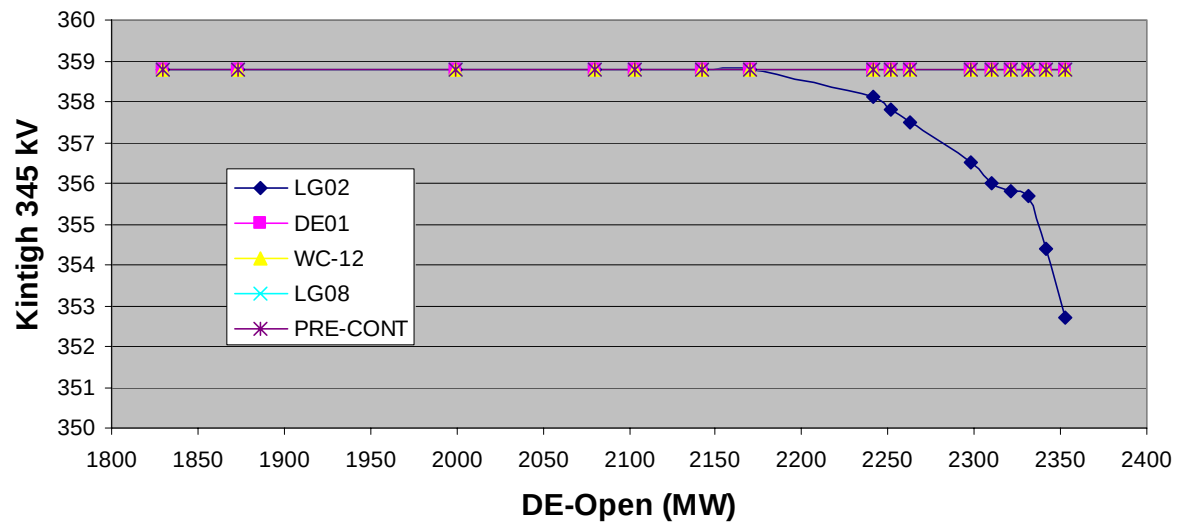
Dunwoodie-South P-V: LOG09 L/O Ravenswood



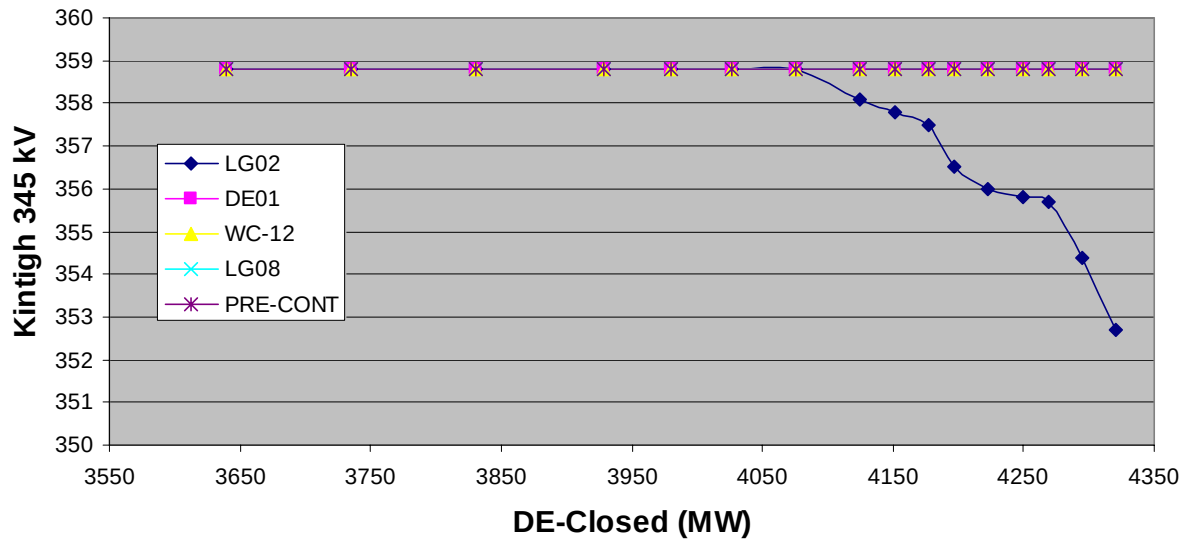
Dunwoodie-South P-V: CE18 L/O Tower 34 & 42



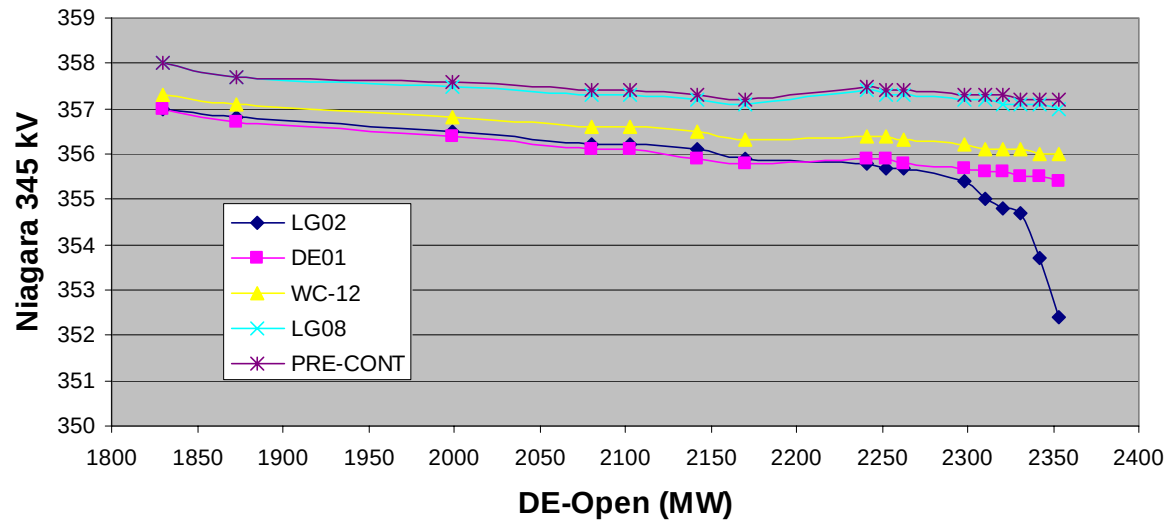
PV Curve: DE Open Interface; Case: ATRA



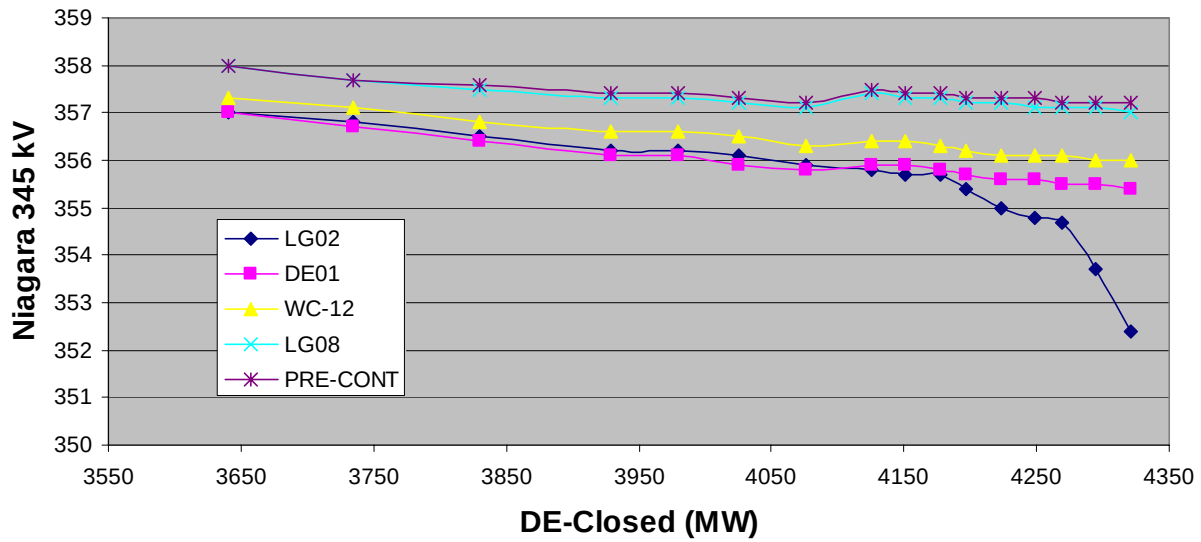
PV Curve: DE-Closed Interface; Case: ATRA



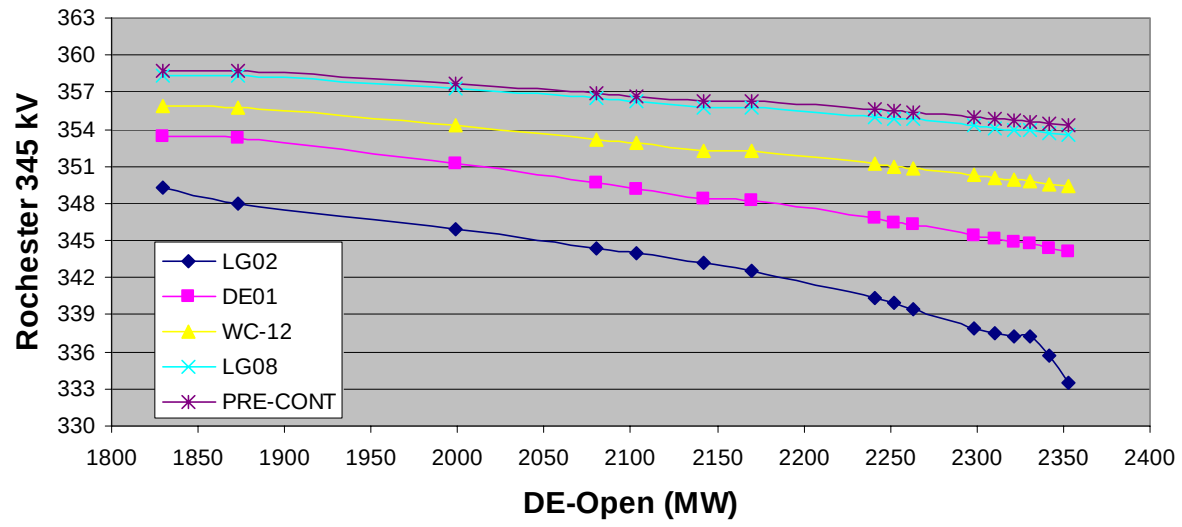
PV Curve: DE Open Interface; Case: ATRA



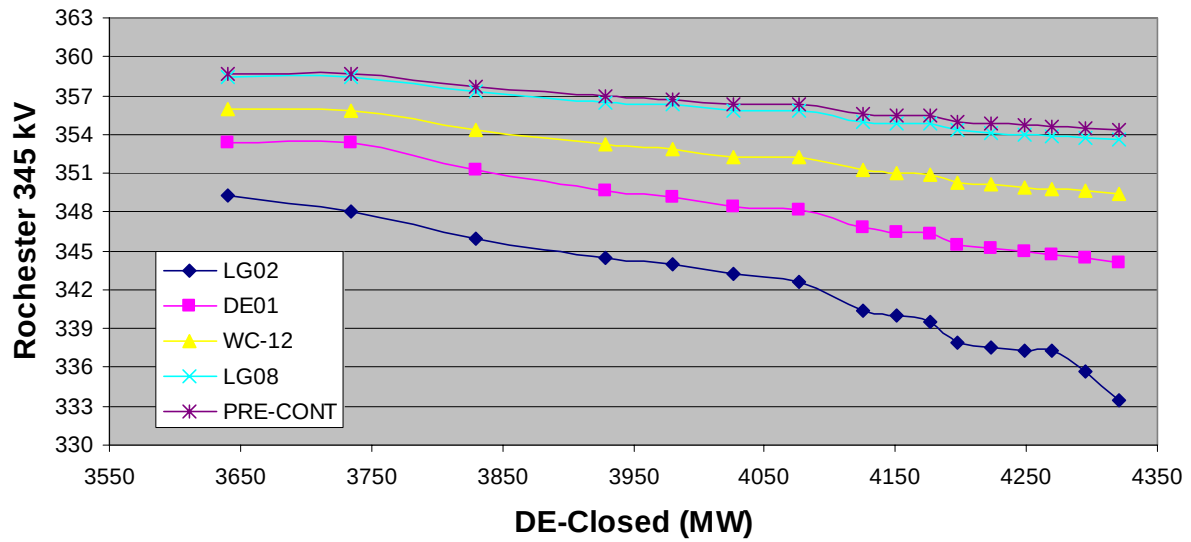
PV Curve: DE-Closed Interface; Case: ATRA



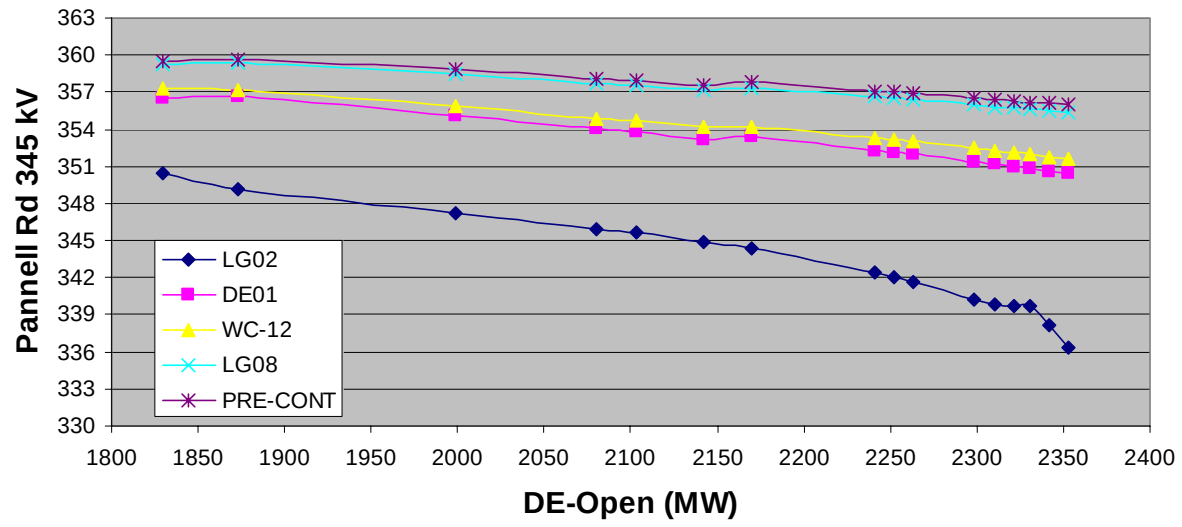
PV Curve: DE Open Interface; Case: ATRA



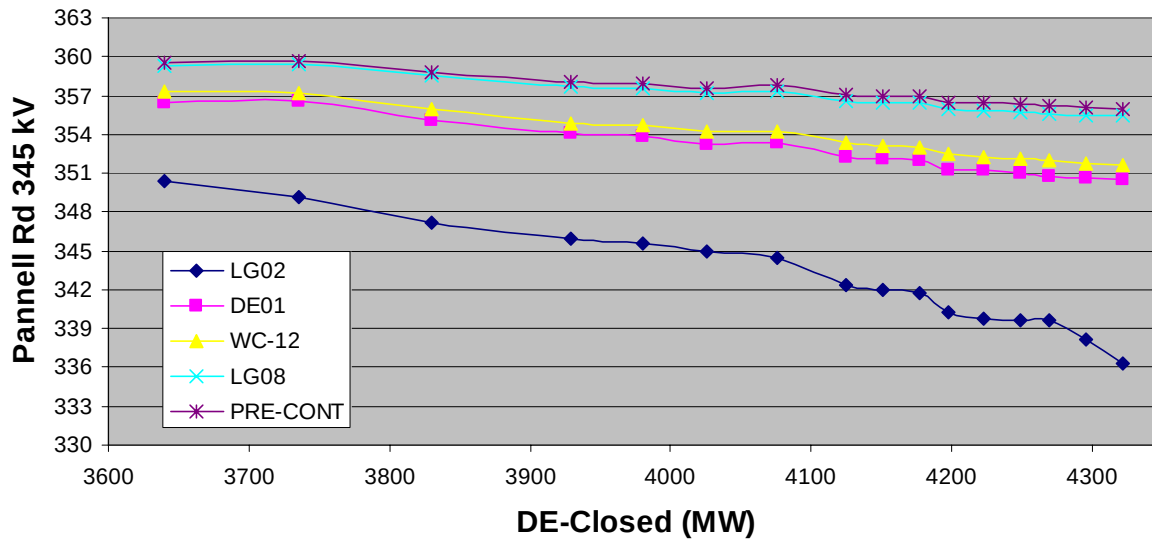
PV Curve: DE-Closed Interface; Case: ATRA



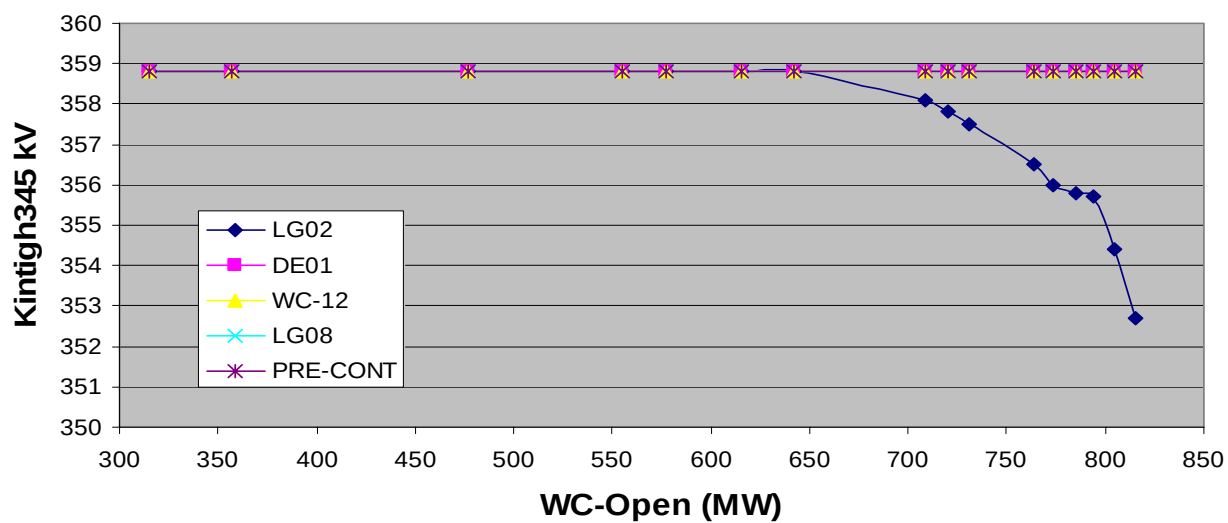
PV Curve: DE Open Interface; Case: ATRA



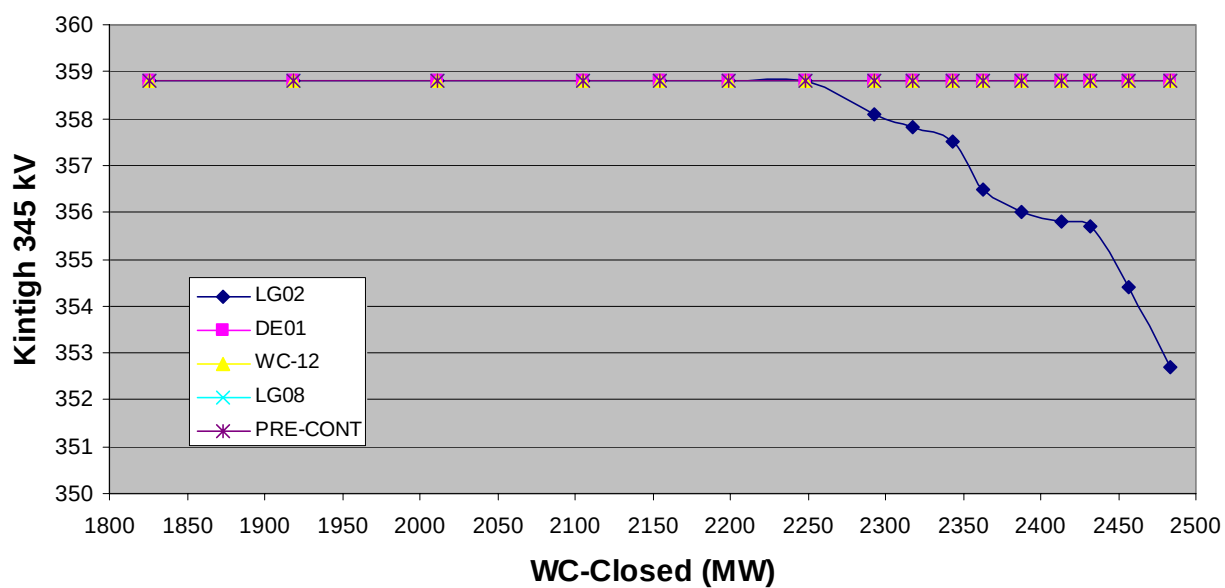
PV Curve: DE-Closed Interface; Case: ATRA



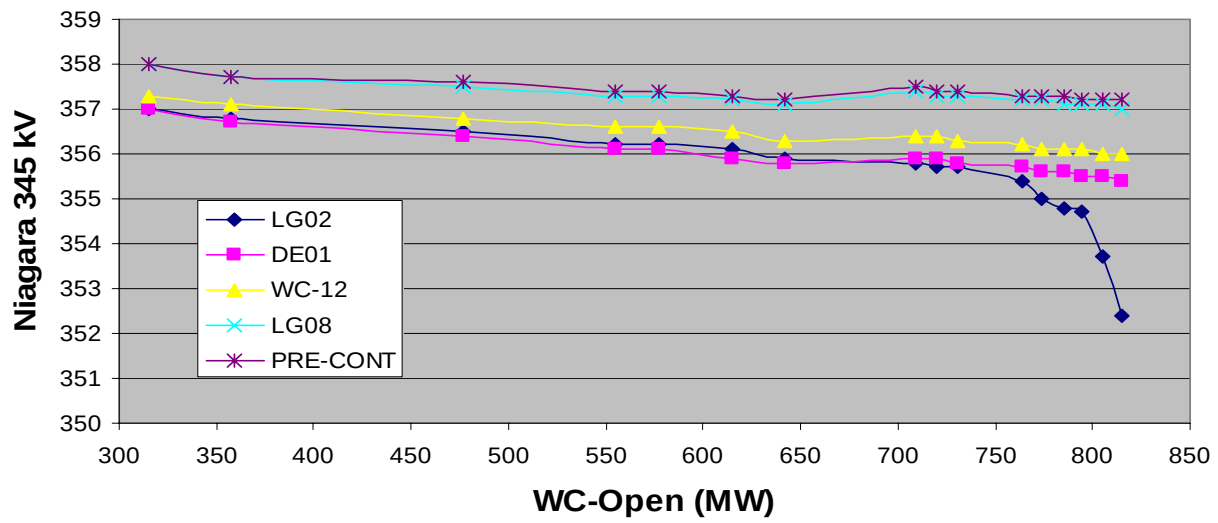
PV Curve: WC Open Interface; Case: ATRA



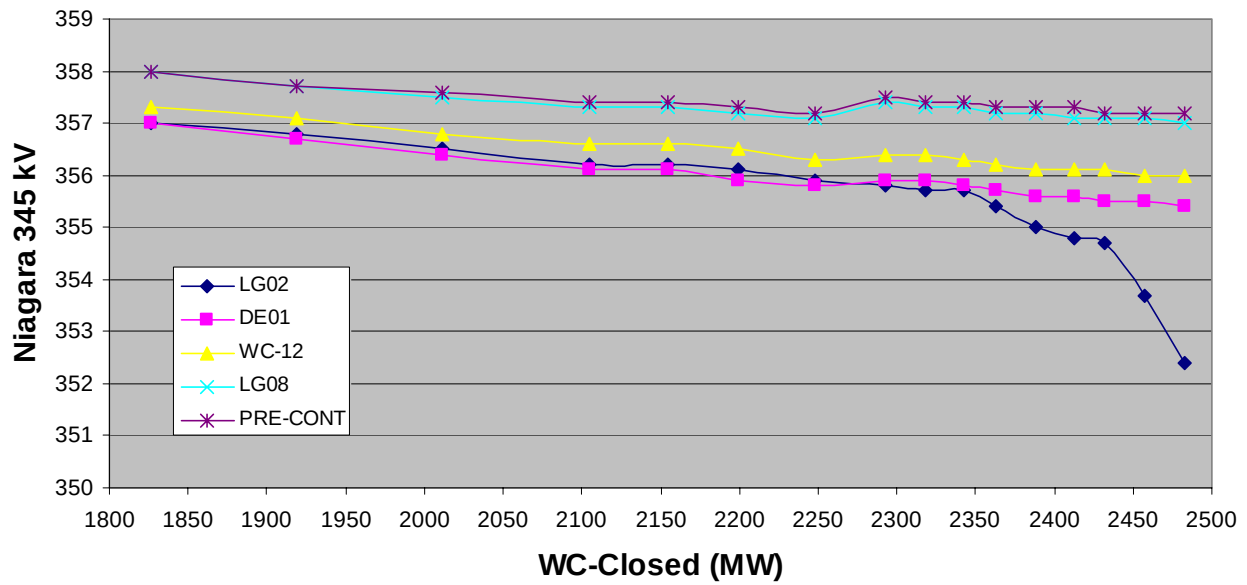
PV Curve: WC Closed Interface; Case: ATRA



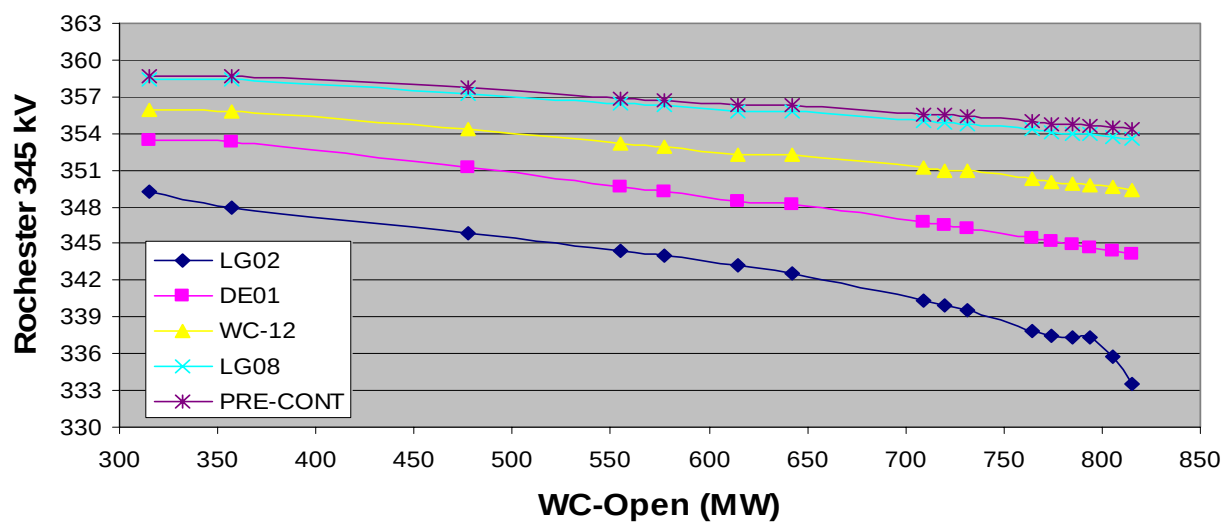
PV Curve: WC Open Interface; Case: ATRA



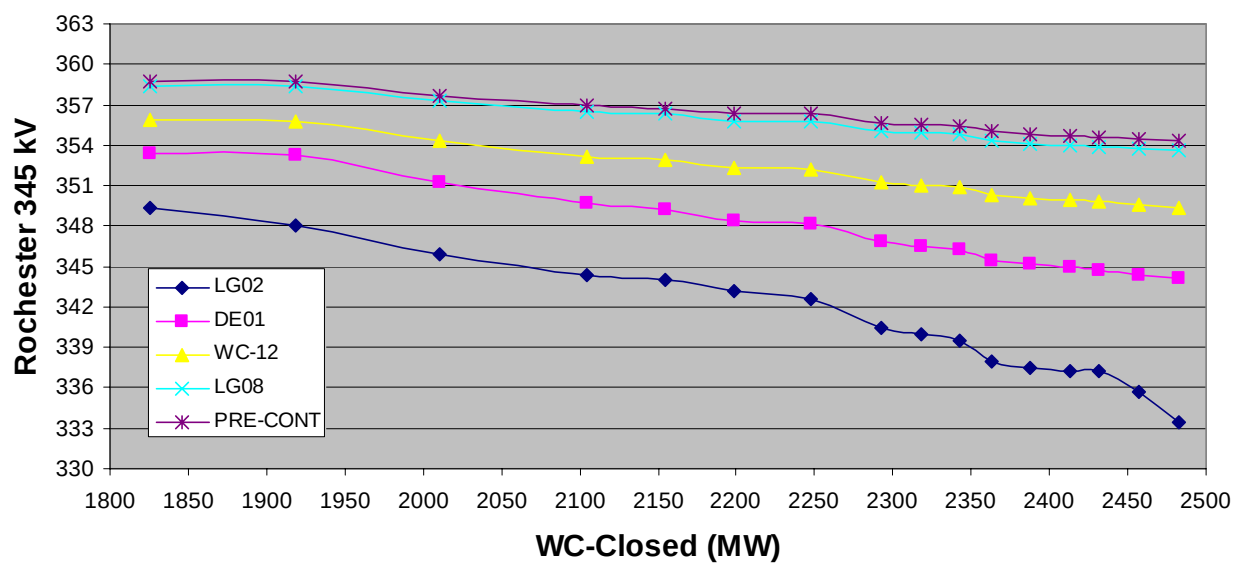
PV Curve: WC Closed Interface; Case: ATRA



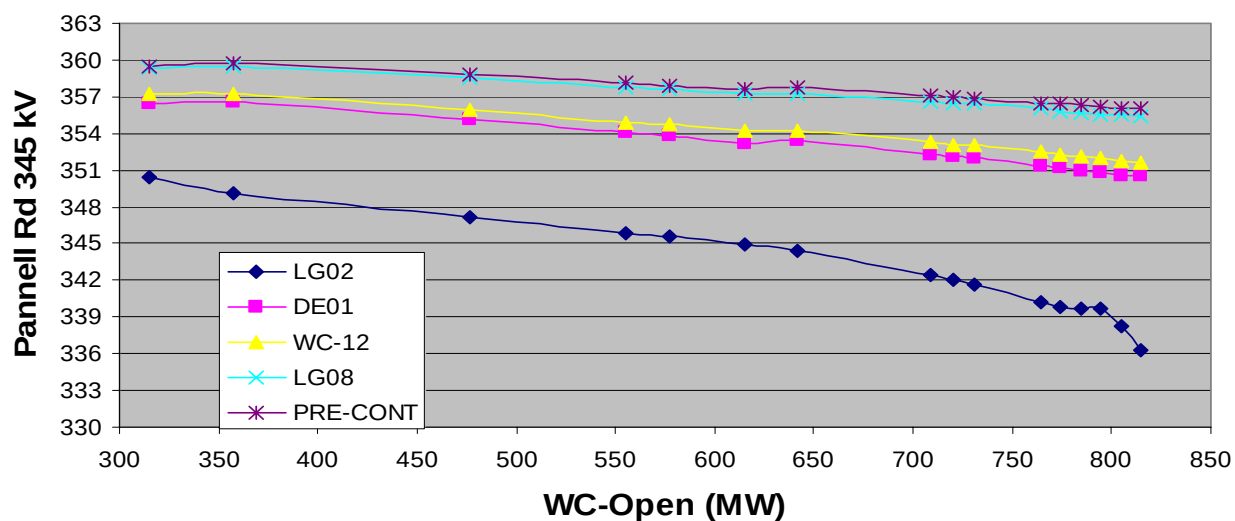
PV Curve: WC Open Interface; Case: ATRA



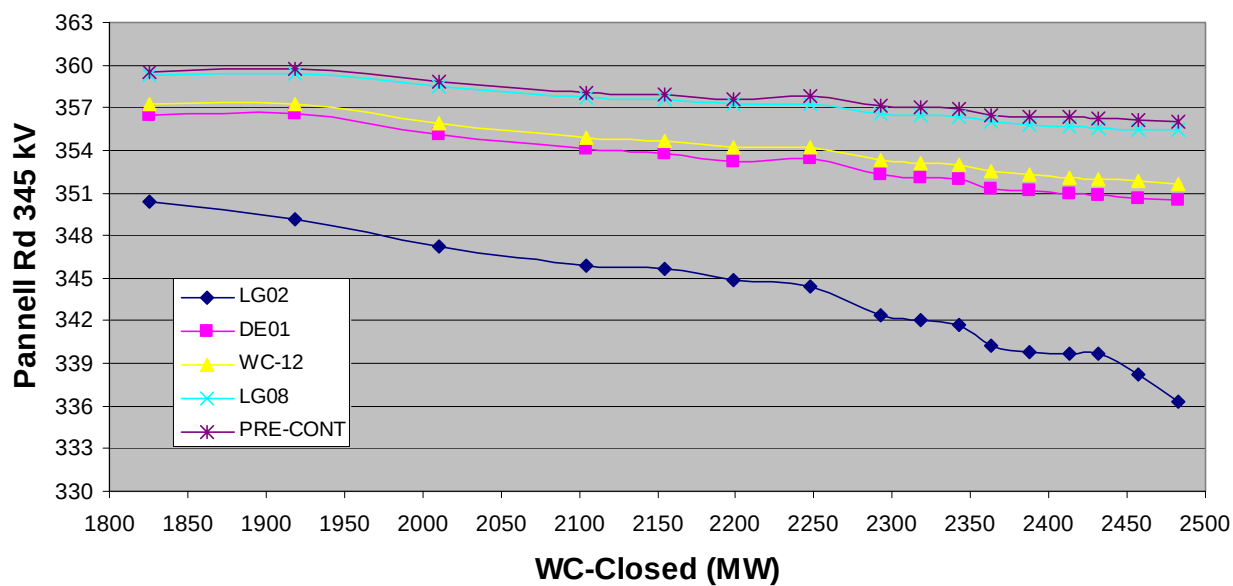
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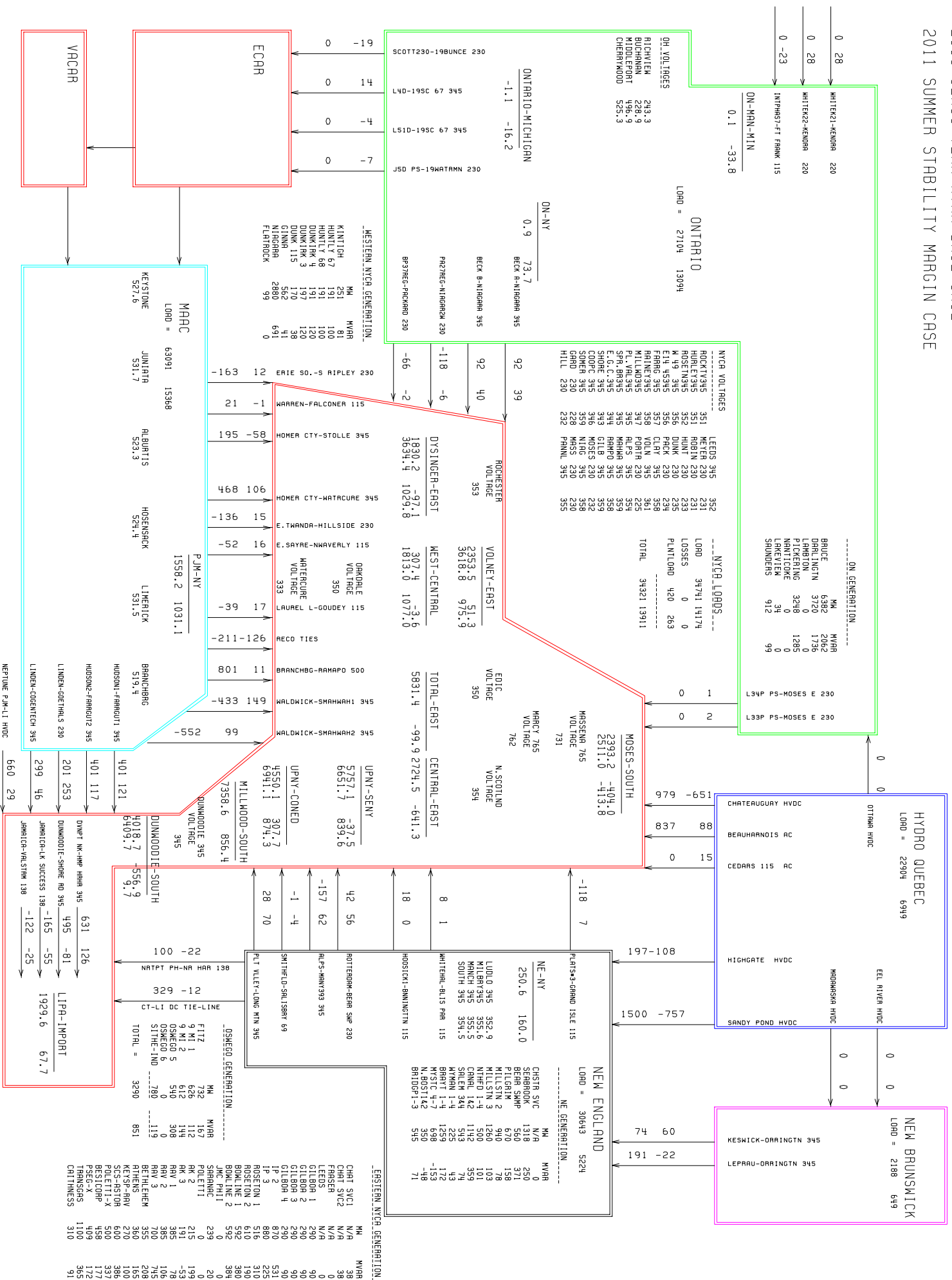
PV Curve: WC Open Interface; Case: ATRA



PV Curve: WC Closed Interface; Case: ATRA



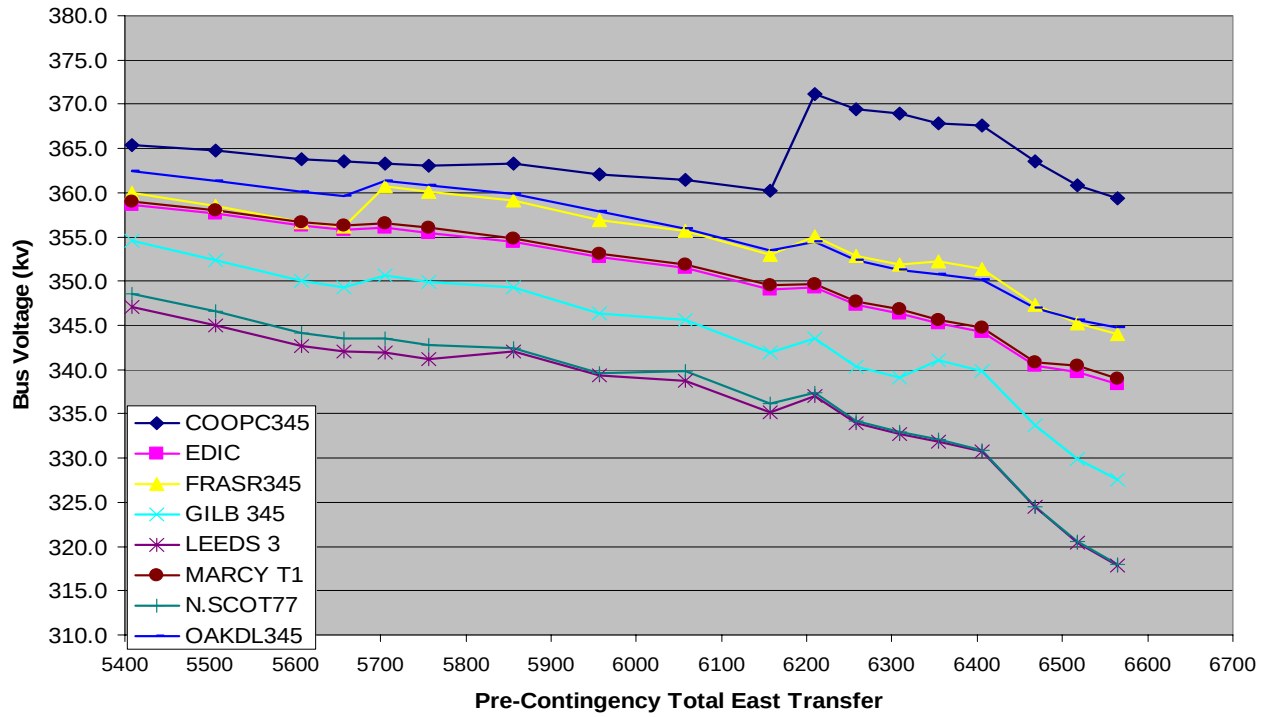
2006 CLASS YEAR ATRA BASE CASE	
2011 SUMMER STABILITY MARGIN CASE	



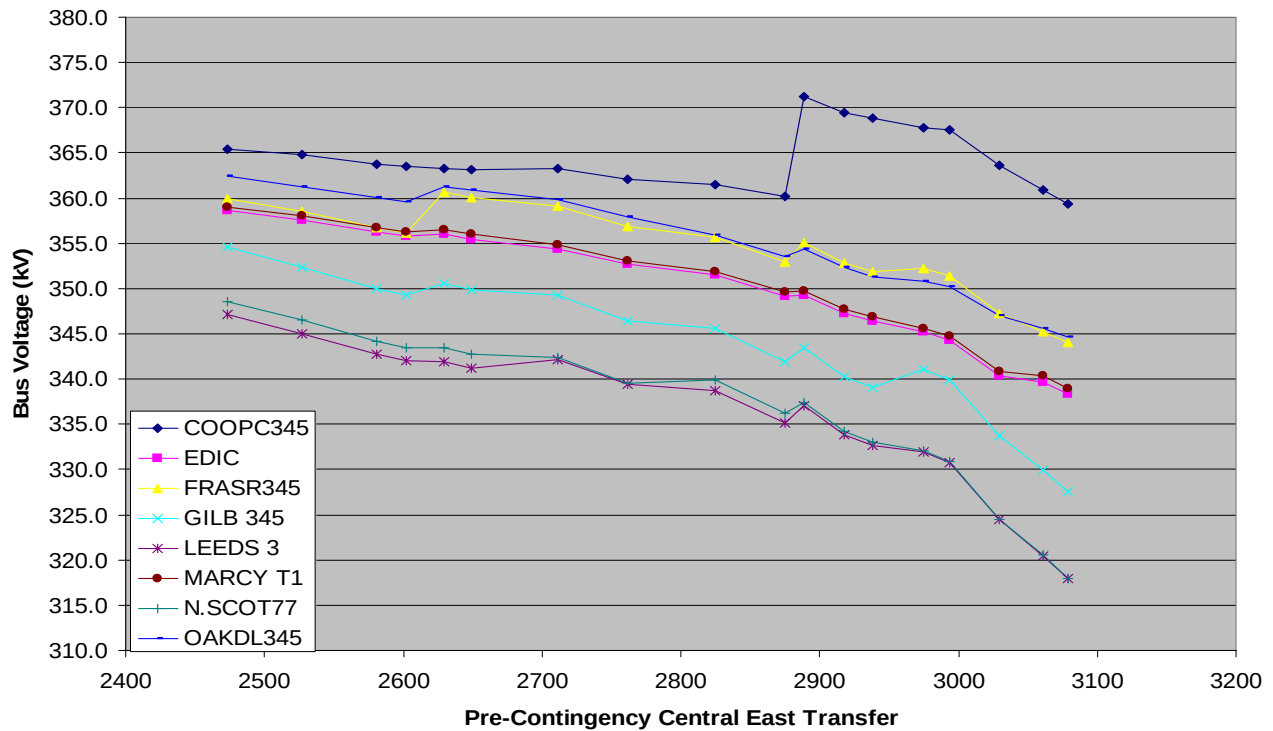
ATRA Moses South Voltage Results

Bus No.	Bus Name	Pre-Cont V	ce07	ce08	ce09	ce18	log13	log18
77400	CLAY345	357.765	357.765	358.8	358.11	358.8	354.66	357.075
75400	CCRN345	358.455	358.455	364.665	350.52	369.84	348.795	356.385
78450	EDIC345	351.555	351.555	351.555	350.52	351.9	342.24	353.97
74327	FARAG345	357.075	357.075	357.075	357.075	354.315	351.21	352.245
75403	FRAS345	359.835	359.835	359.835	359.835	359.835	356.385	356.385
76663	GRDVL230	227.93	227.93	228.39	228.16	228.39	224.94	225.17
78701	LEED345	353.97	353.97	345	353.97	340.515	353.625	355.35
79583	MAR345	351.555	351.555	351.555	350.175	351.555	342.24	354.66
74341	MILWD345	348.795	348.795	346.725	348.795	339.135	347.415	349.14
78702	NSCT345A	351.9	351.9	345.69	355.695	343.62	347.76	357.765
78703	NSCT345B	351.9	351.9	345.69	355.35	343.62	347.76	357.765
75405	OAK345	347.415	347.415	356.385	352.935	356.73	348.45	351.9
79801	PNLRD345	356.04	356.04	356.73	356.04	356.73	350.52	350.52
74344	PV345	347.76	347.76	342.585	348.45	334.65	348.45	349.83
74001	ROCK345	358.11	358.11	359.145	354.66	341.895	353.97	357.42
75404	SOMR345	358.8	358.8	358.8	358.8	358.8	358.8	358.8
79800	STA80345	355.35	355.35	356.04	355.35	356.04	349.485	348.795
79590	STLAW230	233.22	233.22	233.22	232.99	233.22	227.47	230.69
75418	WATR230	228.39	228.39	233.45	231.84	233.68	224.71	226.55

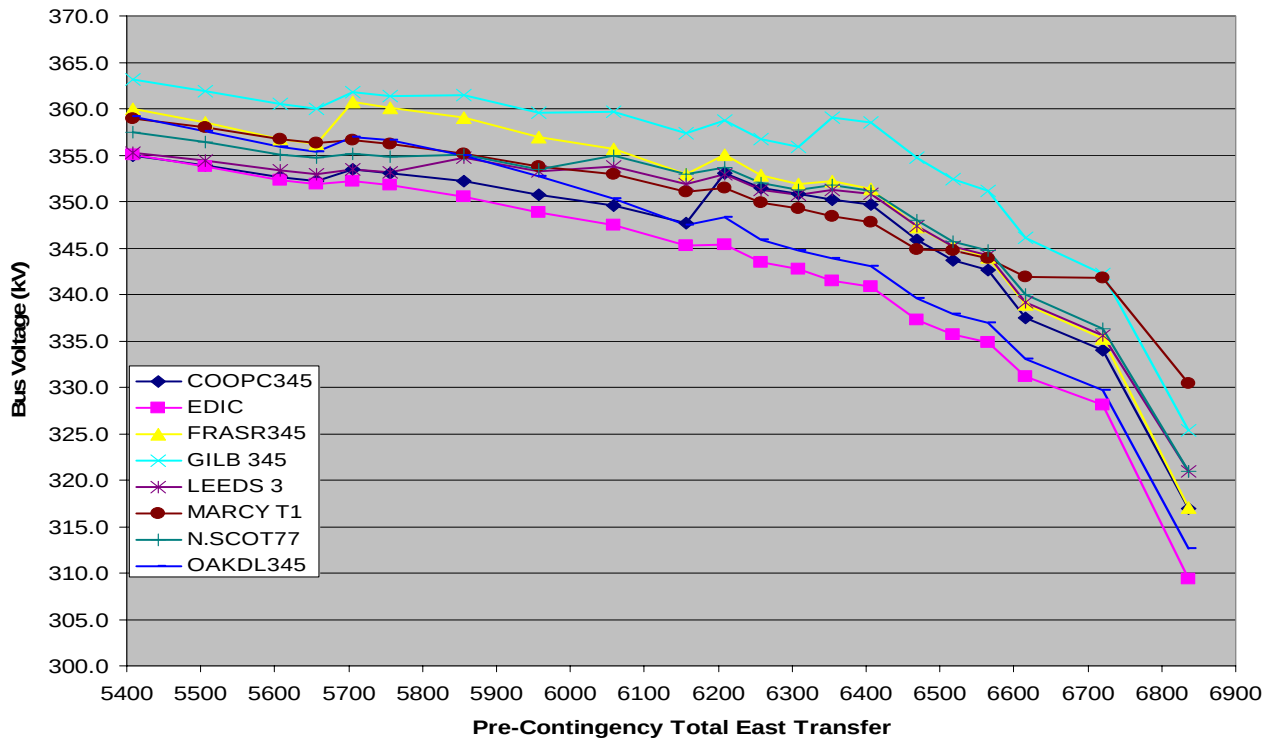
ATRA CY2006 Contingency CE08
Loss of Marcy South, Coopers-Marcy & Coopers-Fraser



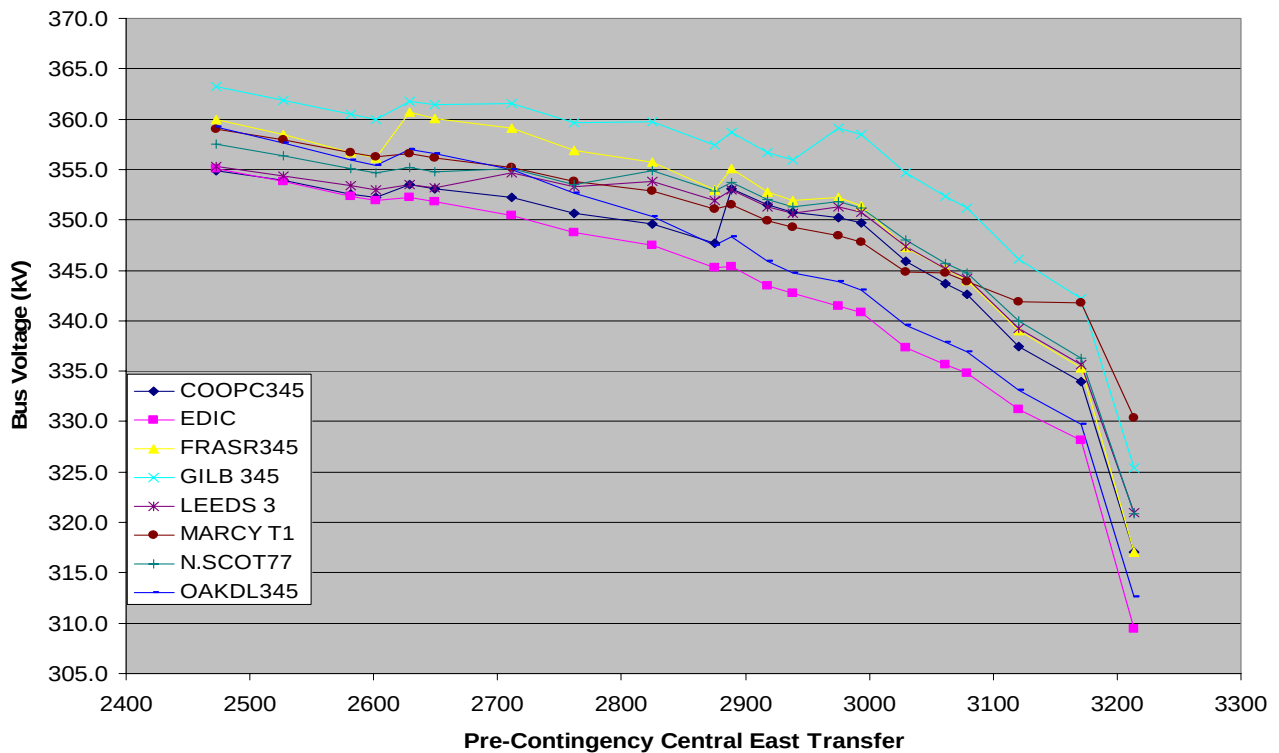
ATRA CY2006 Contingency CE08
Loss of Marcy South, Coopers-Marcy & Coopers-Fraser



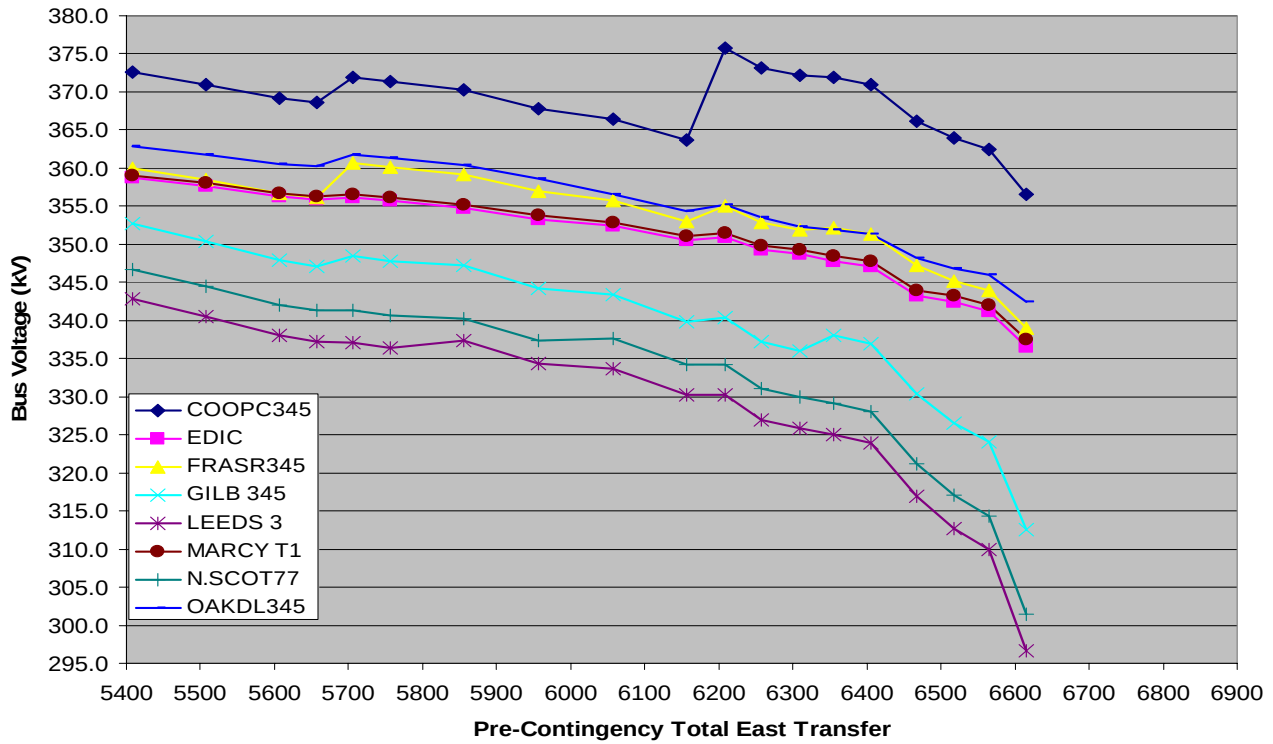
**ATRA Class Year 2006 Contingency CE15
Marcy Stuck Breaker, Lose Edic and Volney Lines**



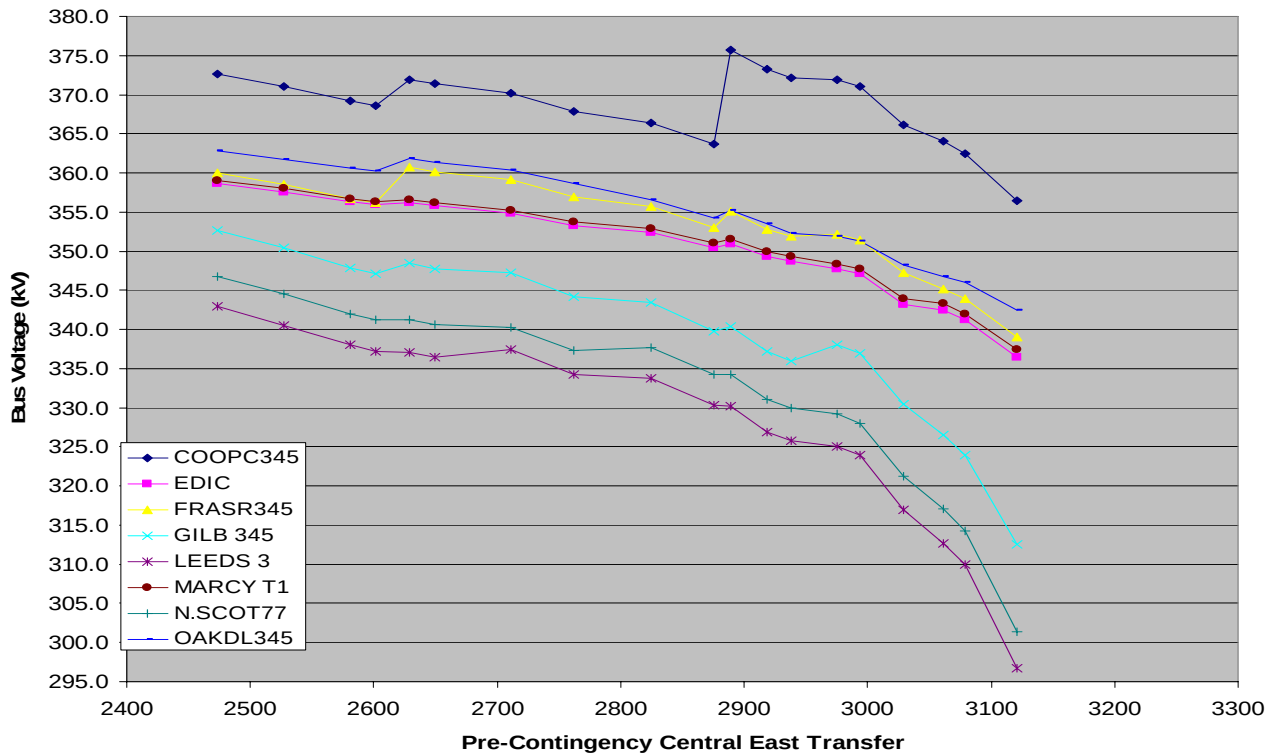
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Marcy Stuck Breaker, Lose Edic and Volney Lines**



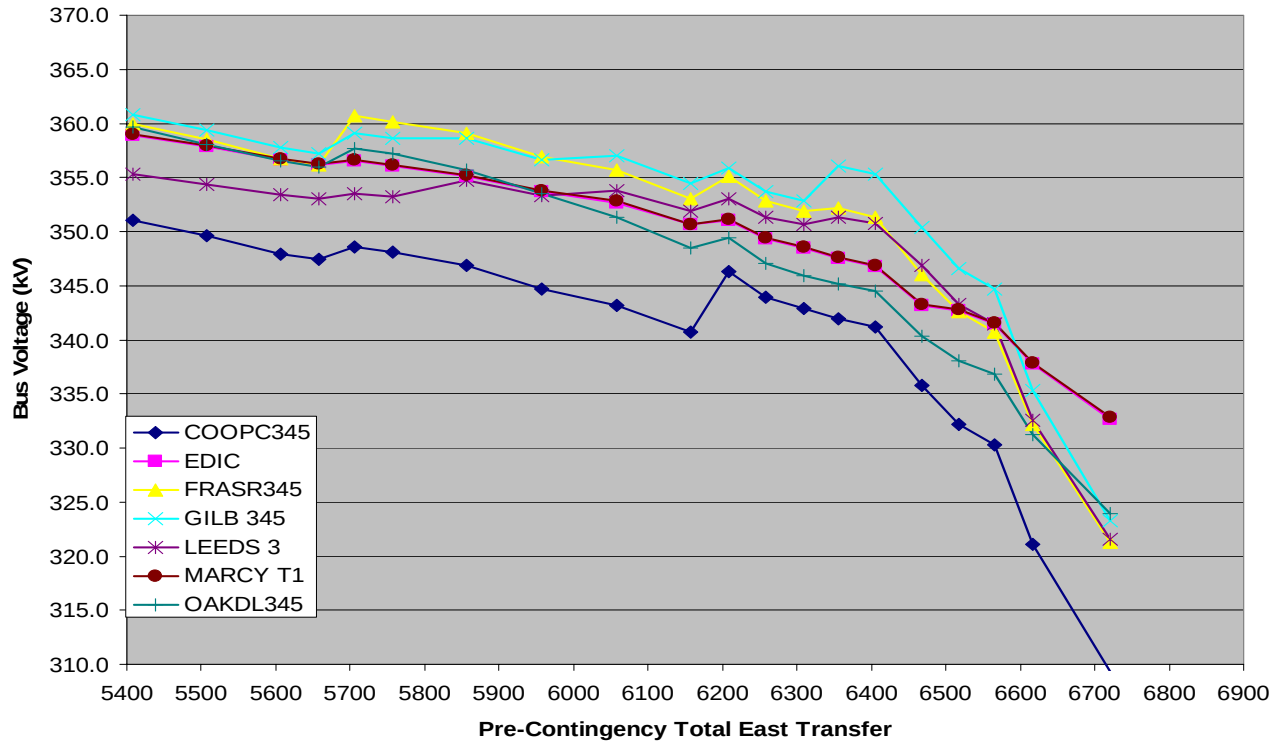
**ATRA Class Year 2006 Contingency CE18
Loss of Towers 34 and 42**



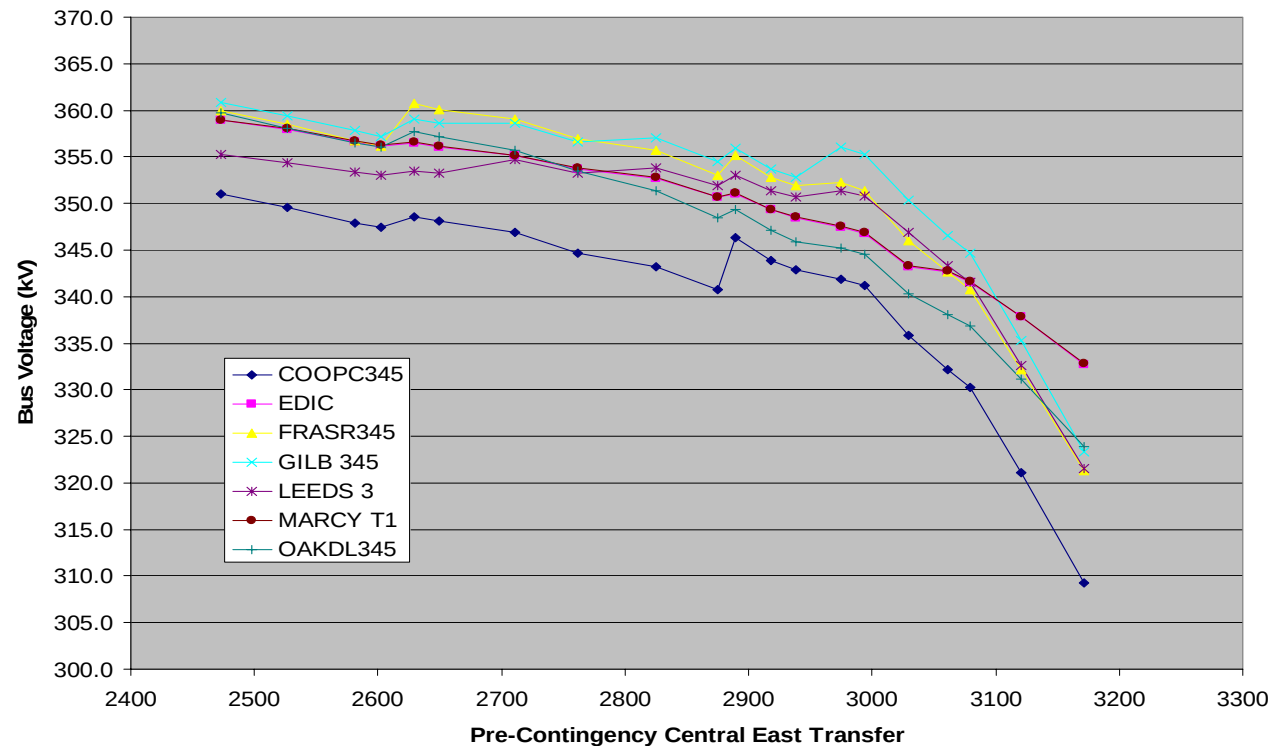
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Loss of Towers 34 and 42**



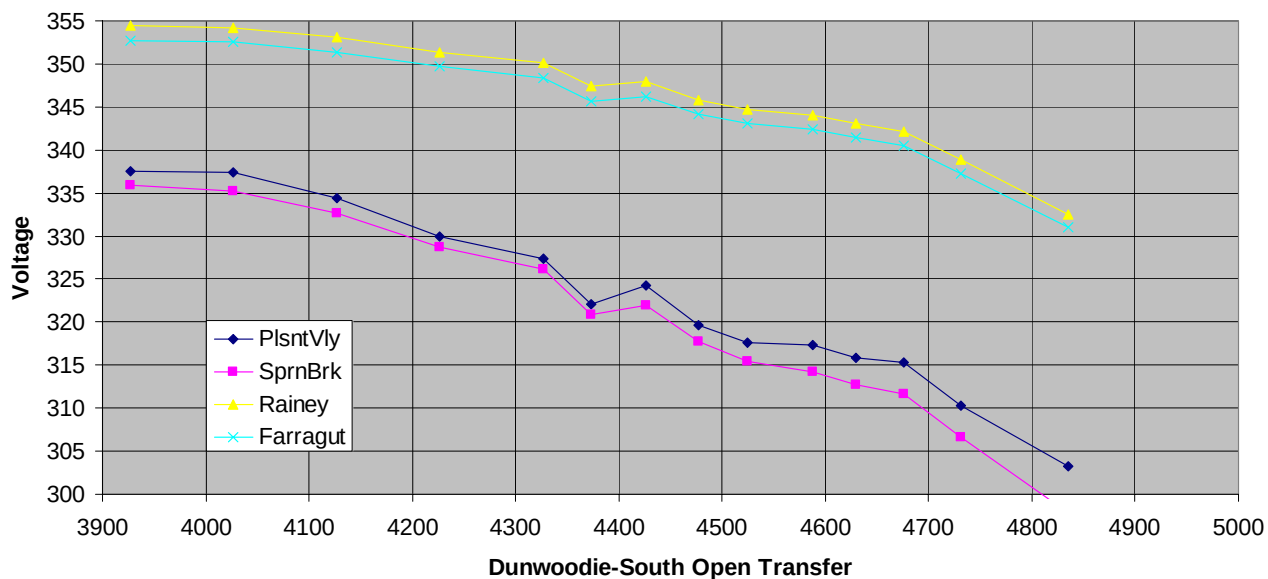
**ATRA Class Year 2006 Contingency TE32
Loss of New Scotland 77 Bus**



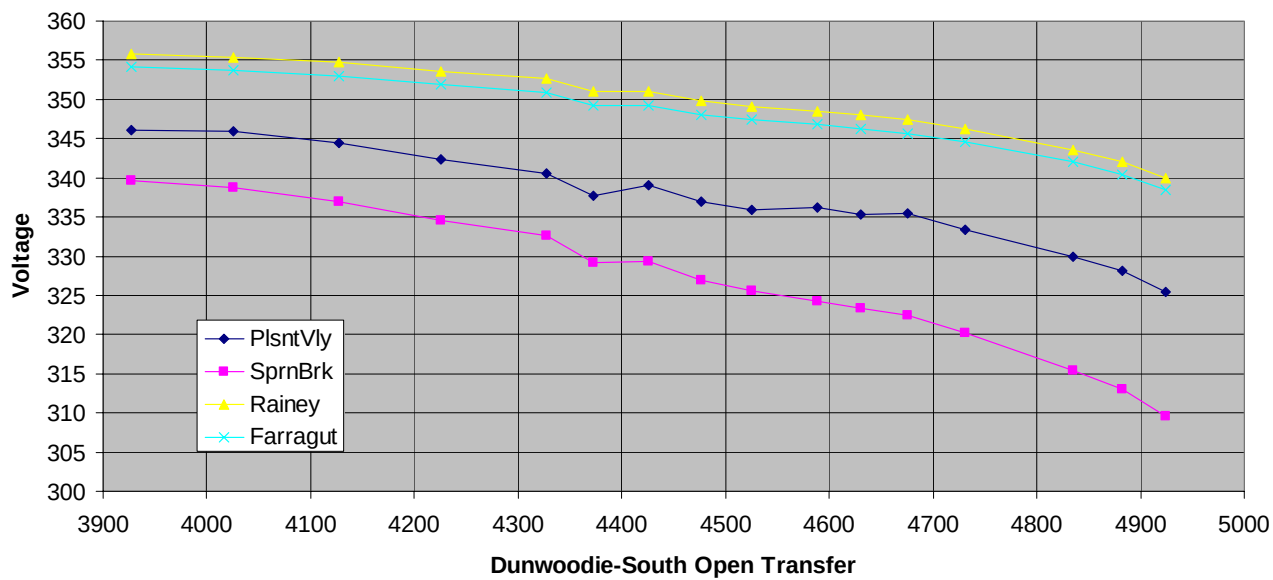
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Loss of New Scotland 77 Bus**



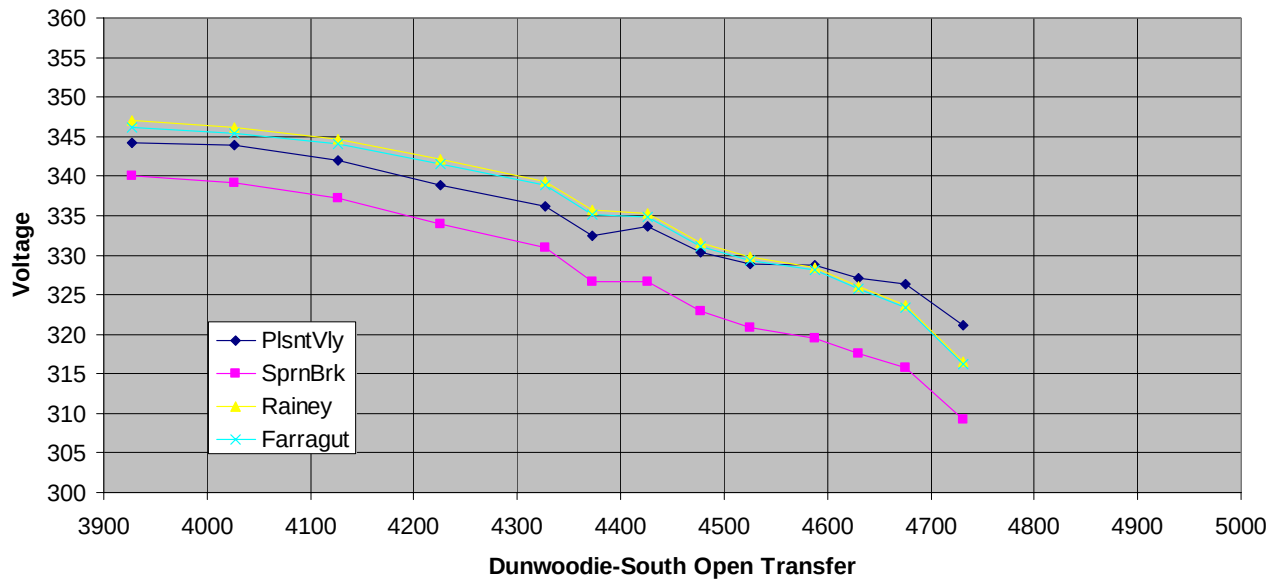
Dunwoodie-South P-V: UC26 L/O Tower 67 & 68



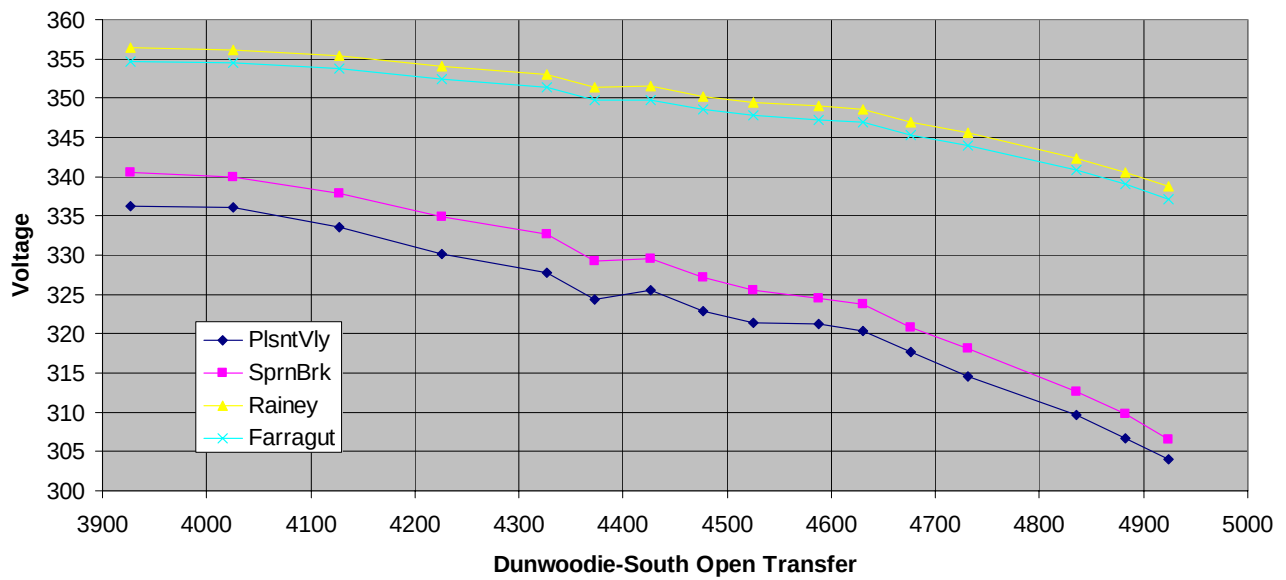
Dunwoodie-South P-V: UC20 L/O Tower W89 & W90



Dunwoodie-South P-V: LOG09 L/O Ravenswood



Dunwoodie-South P-V: CE18 L/O Tower 34 & 42



Appendix E

Stability Results

ATBA/ATRA Inter-Area Flow Diagrams

ATBA/ATRA Stability Margin Case Results

CE07 – LLG-NC@EDIC 345/TWR: MARCY-COOPERS CORNERS UCC2-41 & EDIC-FRASER EF24-40

CE18 – LLG-NC@ROCK TAV 345/TWR: COOPERS CORNERS-ROCK TAVERN CCRT-34 & CCRT-42

CE34 – L/O BOTH POLES OF PHASE II W/O FAULT

DS01 – SLG-STK@SPRNBK-W49/STK RNS5/CLEARW99/W64

MS01 – 3PH-NC@MARCY 765/MARCY-MASSENA MSU-1 SPS #41 TRIPS MASSENA-CHATEAUGUAY MSC-7040

MS06 – SLG-STK@MOSES 230/MOSES-MASSENA MMS-2 W/ BACKUP CLEARING MOSES T4 (230/115)

TE32 – 3PH-NC@NEW SCOTLAND 345 KV 77 BUS, L/O #14 (EDIC), #2 (ALPS), #93 (LEEDS), T2 (345/115)

TE33 – 3PH-NC@NEW SCOTLAND 345 KV 99 BUS, L/O UNS-18 (MARCY), GNS-1 (GILBOA), #94 (LEEDS), T1

UC25 – 3PH-NC@RAVENSWOOD #3

WC12 – SLG-STK@ROCHESTER 345/NIAGARA-ROCHESTER NR2 W/ BACKUP CLEARING ROCHESTER-PANNELL RD RP-2

ATRA VOLTAGE & FREQUENCY PLOTS OF WINDFARMS

CE35 - 3PH-NC@JORDNVLL ON JORDNVLL-PORTER 2 230 KV

CE36 - 3PH-NC@JORDNVLL ON JORDNVLL-ROTRDM.2 230 KV

CE37 - 3PH-NC@SALBRY4 ON SALBRY4-INGMS-CD 115 KV

CE38 - 3PH-NC@SALBRY4 ONSALBRY4-VALLEY 115 KV

MS17 - 3PH-NC@WILLIS E 230KV/MOSES W-WILLIS E (MW-1)

MS18 - LLG-NC@MOSES 230KV/MOSES-WILLIS E & W (MW-1 & MW-2)

MS20 - 3PH-NC@MRBLRWD 230KV/WILLIS E-MRW_HCW (WPN1)

MS21 - 3PH-NC@WILLIS W/ WILLIS W-NOBLE_S (CLINTON) (WRY2)

MS24 - 3PH-NC@NOBLE_N/MRW_HCW-NOBLE_N (ALTONA) (PND1)

MS26 - 3PH-NC@NOBLE_N/NOBLE_N-PLAT T#1-PLAT 115 (DP1)

MS27 - 3PH-NC@NOBLE_S/NOBLE_S-PLAT T#4-PLAT 115 (RYP2)

ST13 - 3PH-NC@MUNNSVILLE/MUNNSVILLE-MORRISVILLE 46

ST14 - 3PH-NC@MEYER230/MEYER230-CNDGUA_T 230 KV

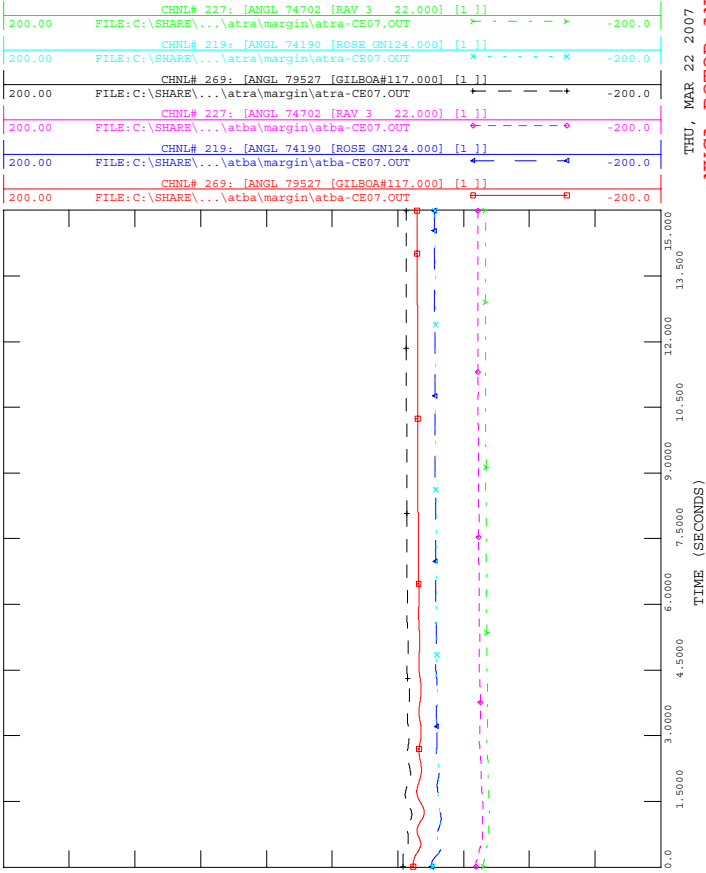
ST15 - 3PH-NC@SHLDN230/MEYER230-SHLDN230 230 KV

ST16 - 3PH-NC@W HILL_T/W HILL_T-ONEIDA 115 KV

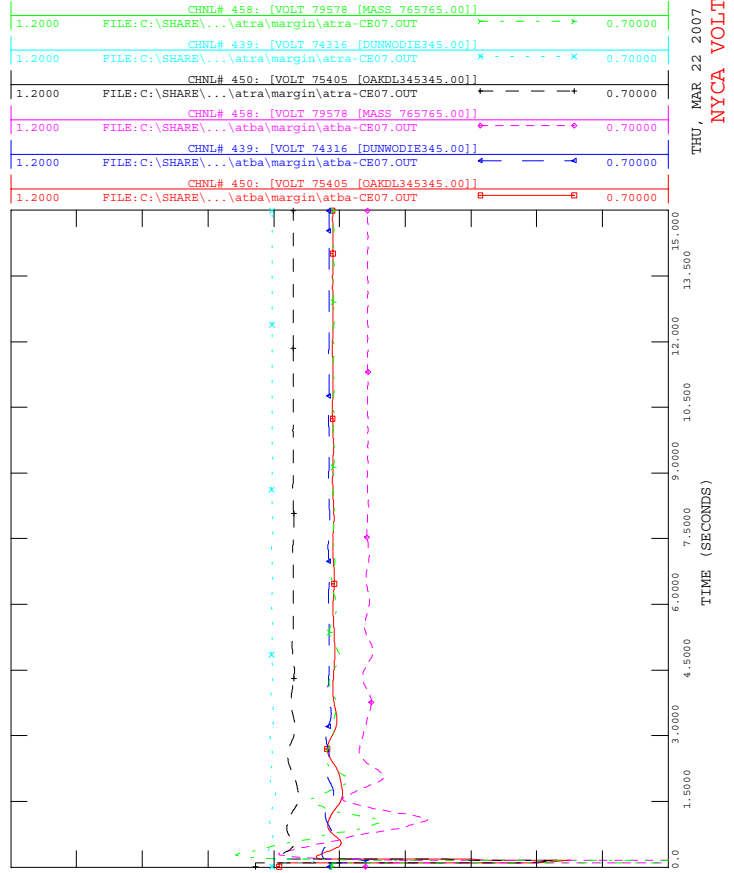
ST17 - 3PH-NC@ARCADE ON ARCADE-SPVL-151 115 KV



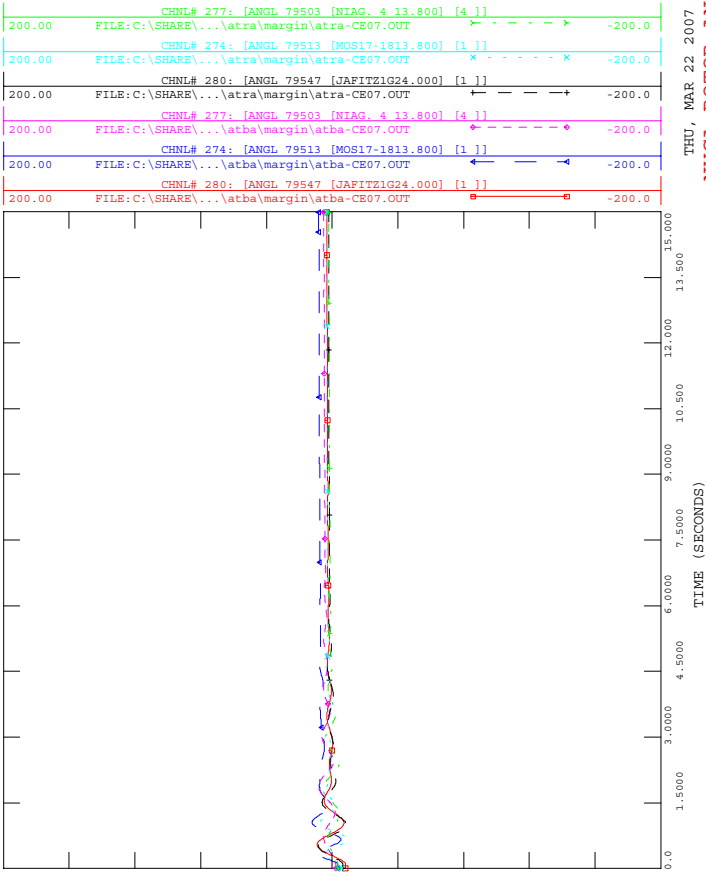
2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
LLG-NC@EDIC 345/TWR: MARCY-COOPERS CORNERS UCC2-41
& EDIC-FRASER EF24-40



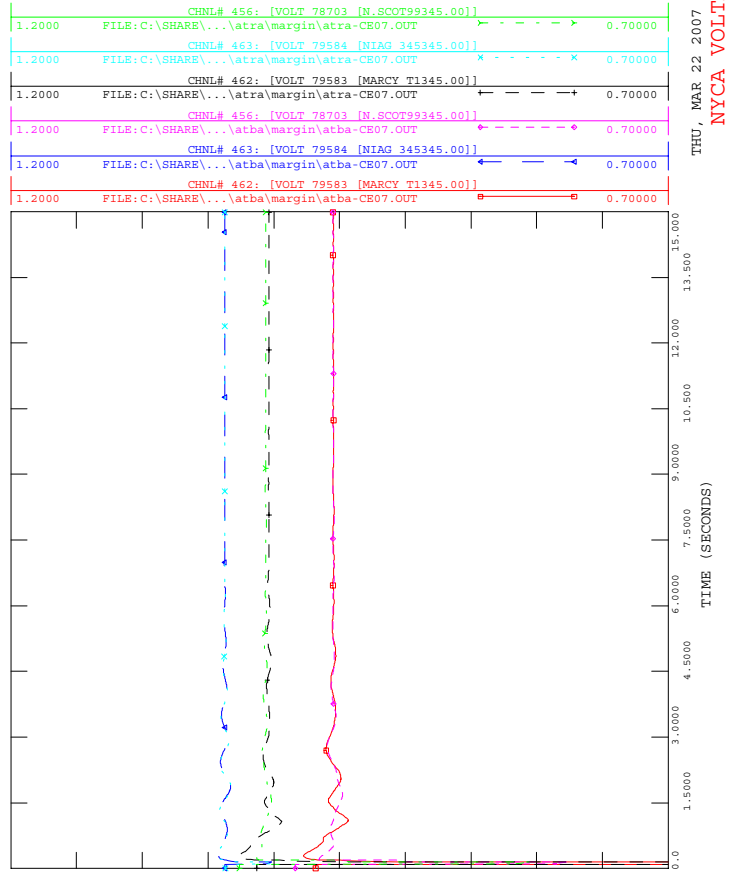
2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
LLG-NC@EDIC 345/TWR: MARCY-COOPERS CORNERS UCC2-41
& EDIC-FRASER EF24-40



2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
LLG-NC@EDIC 345/TWR: MARCY-COOPERS CORNERS UCC2-41
& EDIC-FRASER EF24-40

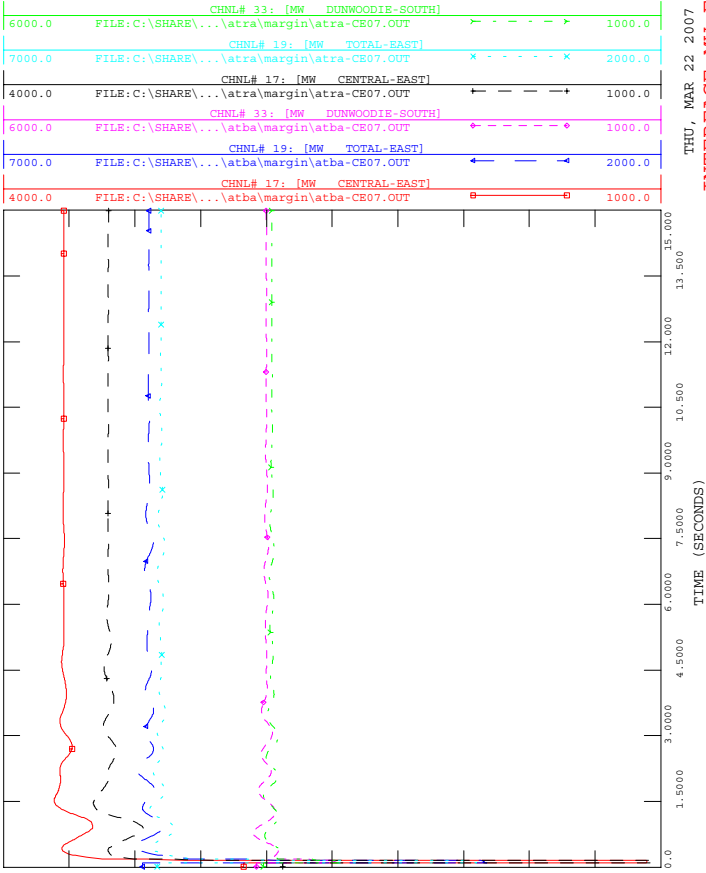


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2011 SUMMER STABILITY MARGIN CASE
LLG-NC@EDIC 345/TWR: MARCY-COOPERS CORNERS UCC2-41
& EDIC-FRASER EF24-40

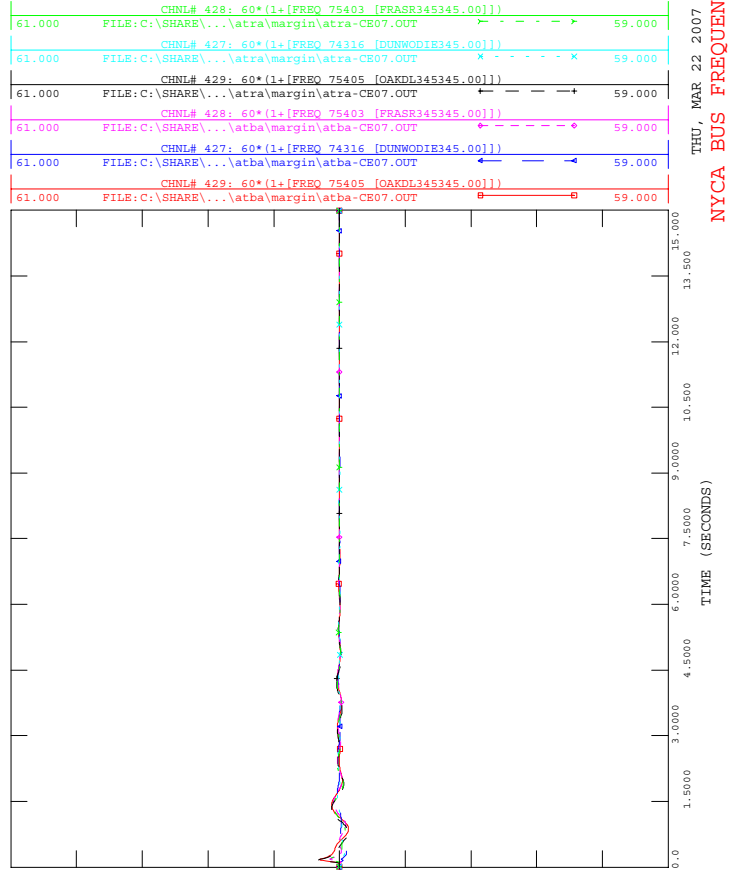




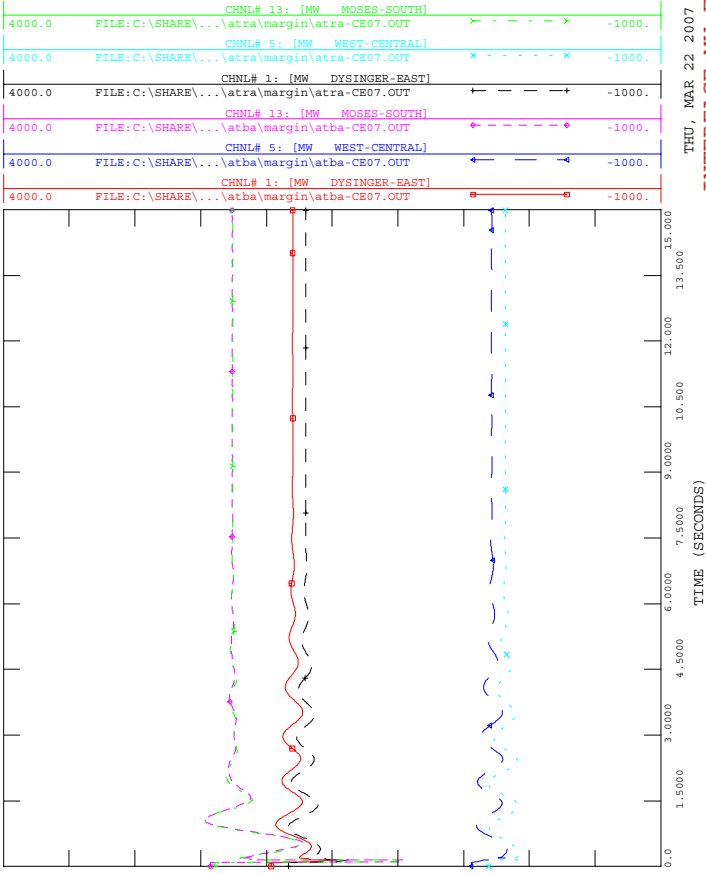
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LLG-NC@EDIC 345/TWR: MARCY-COOPERS CORNERS UCC2-41
& EDIC-FRASER EF24-40



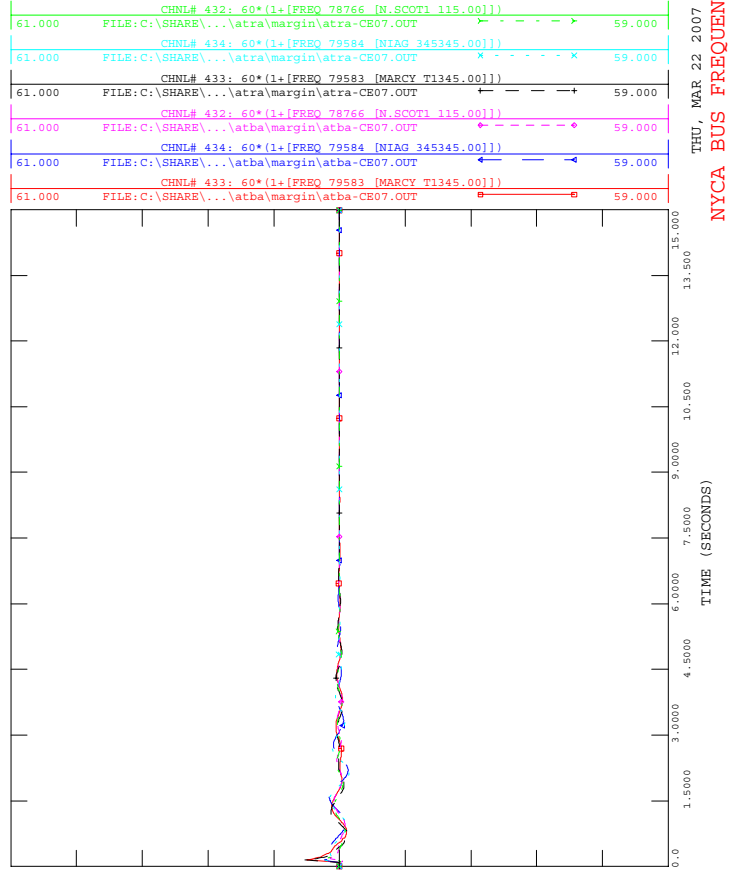
2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
LLG-NC@EDIC 345/TWR: MARCY-COOPERS CORNERS UCC2-41
& EDIC-FRASER EF24-40



2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
LLG-NC@EDIC 345/TWR: MARCY-COOPERS CORNERS UCC2-41
& EDIC-FRASER EF24-40

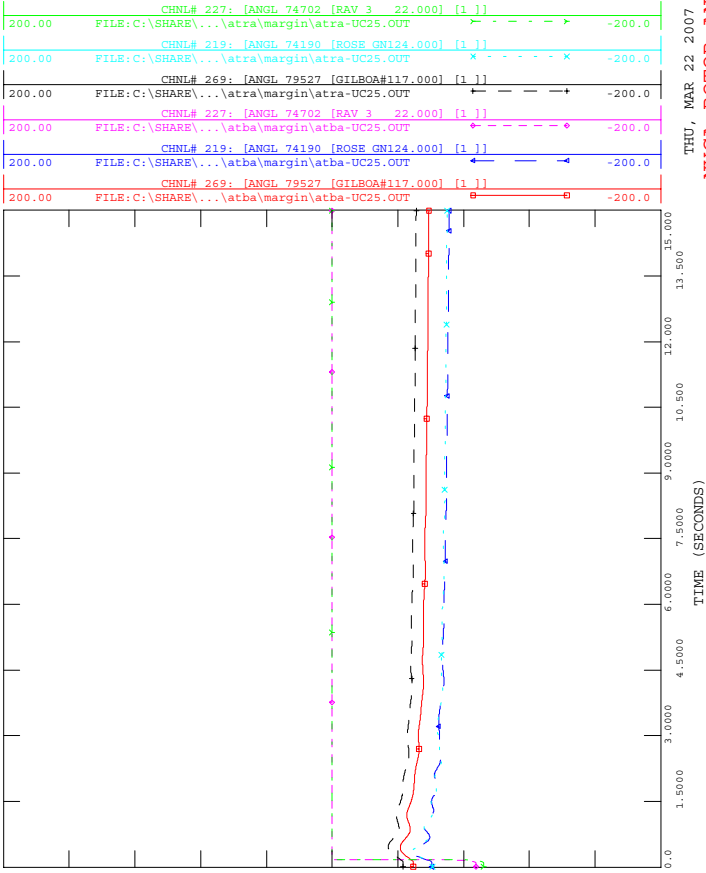


2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
LLG-NC@EDIC 345/TWR: MARCY-COOPERS CORNERS UCC2-41
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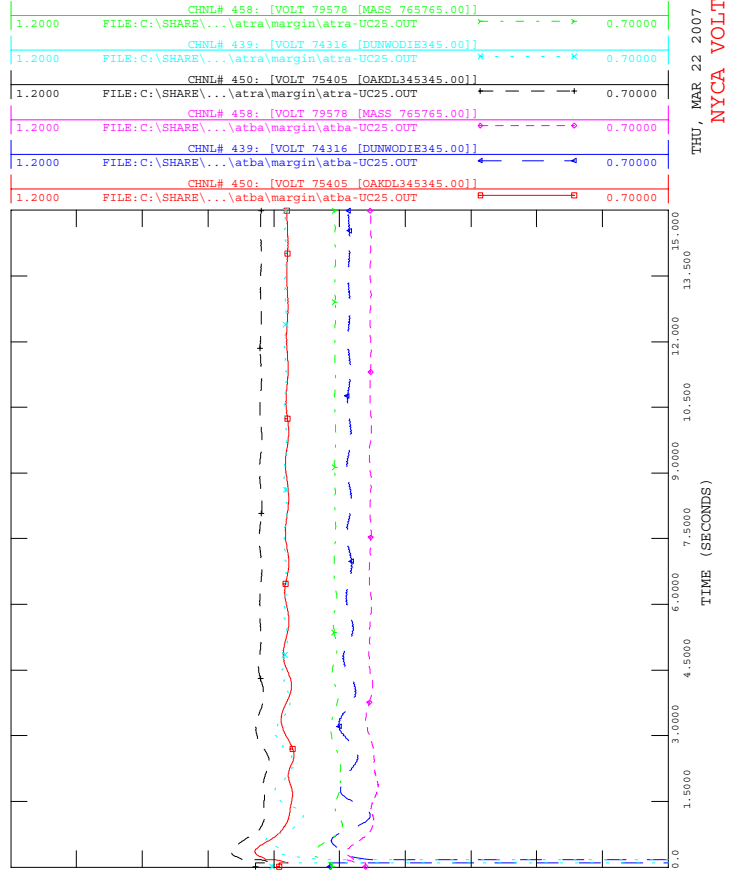




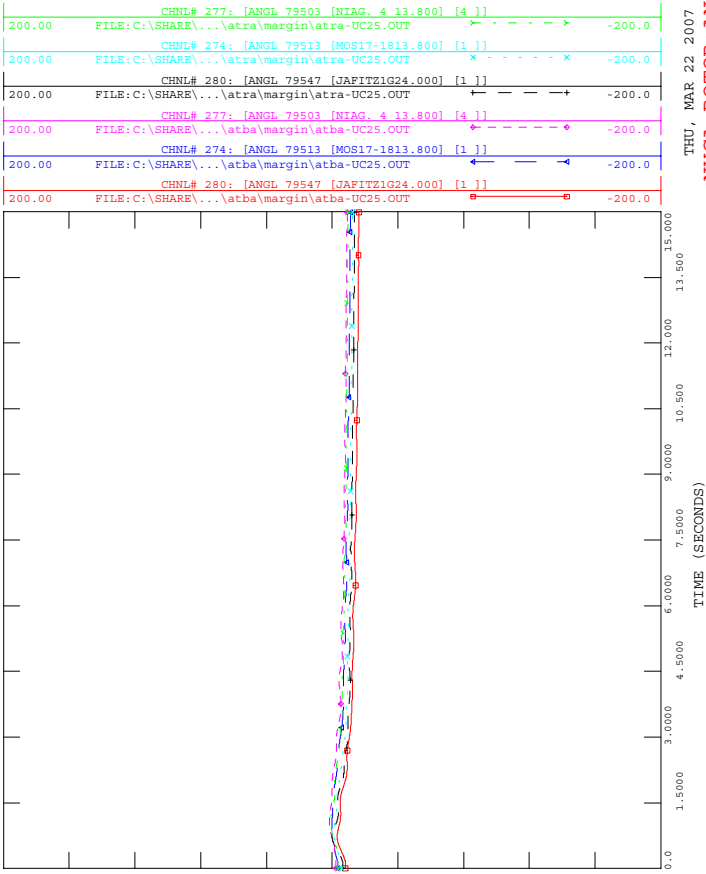
2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@RAVENSWOOD #3



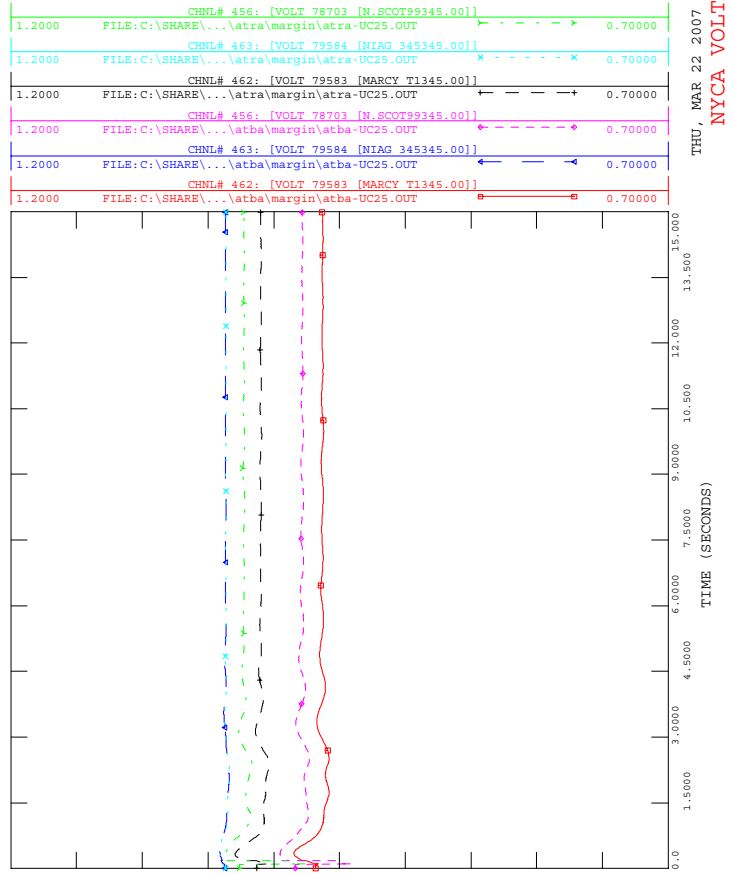
2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@RAVENSWOOD #3



2006 ATBA/ATRA
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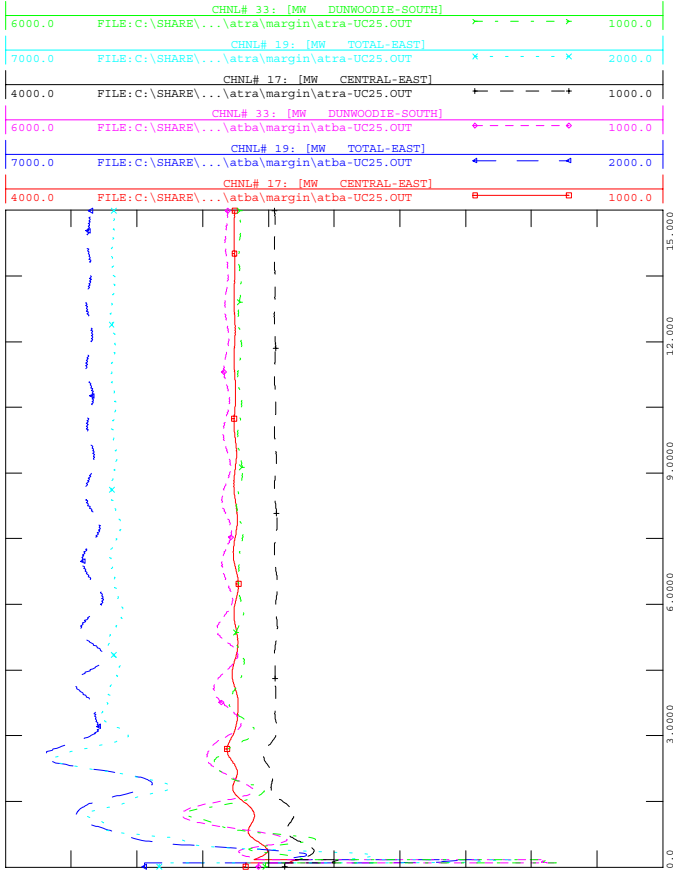


2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@RAVENSWOOD #3





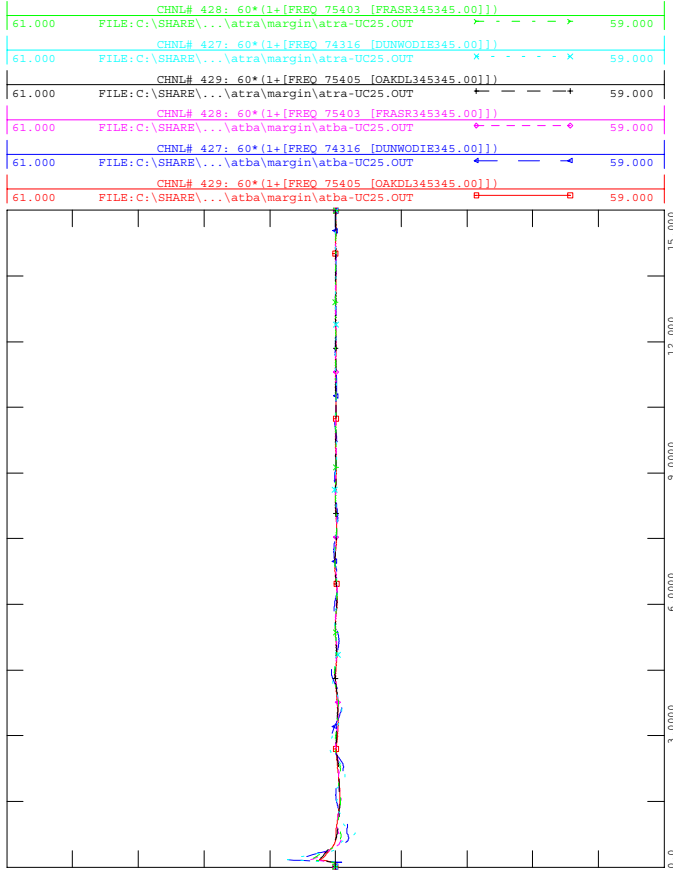
2006 ATBA/ATRA
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3PH-NC@RAVENSWOOD #3



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INTERFACE MW FLOWS



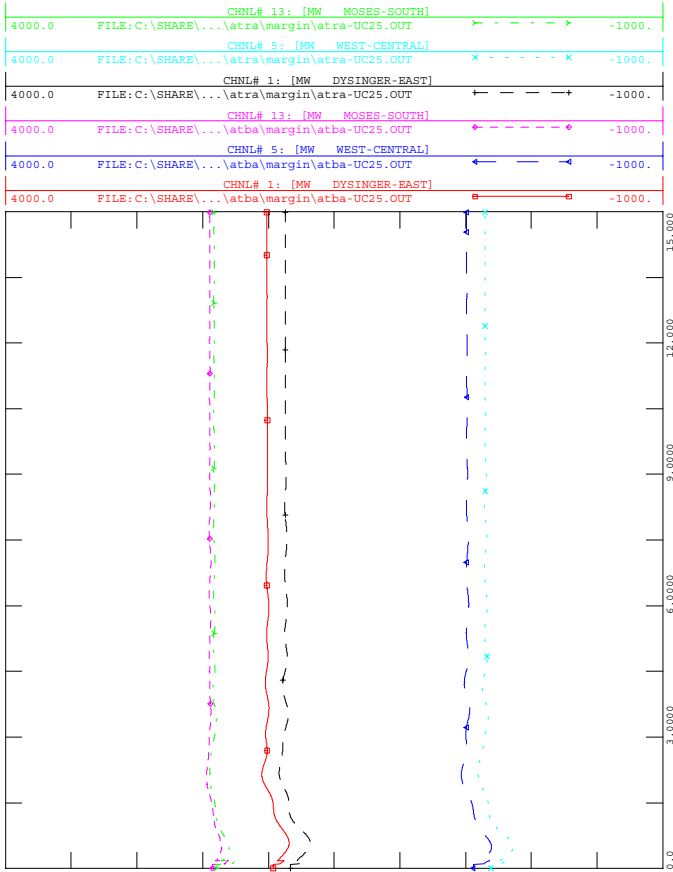
2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@RAVENSWOOD #3



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NYCA BUS FREQUENCIES



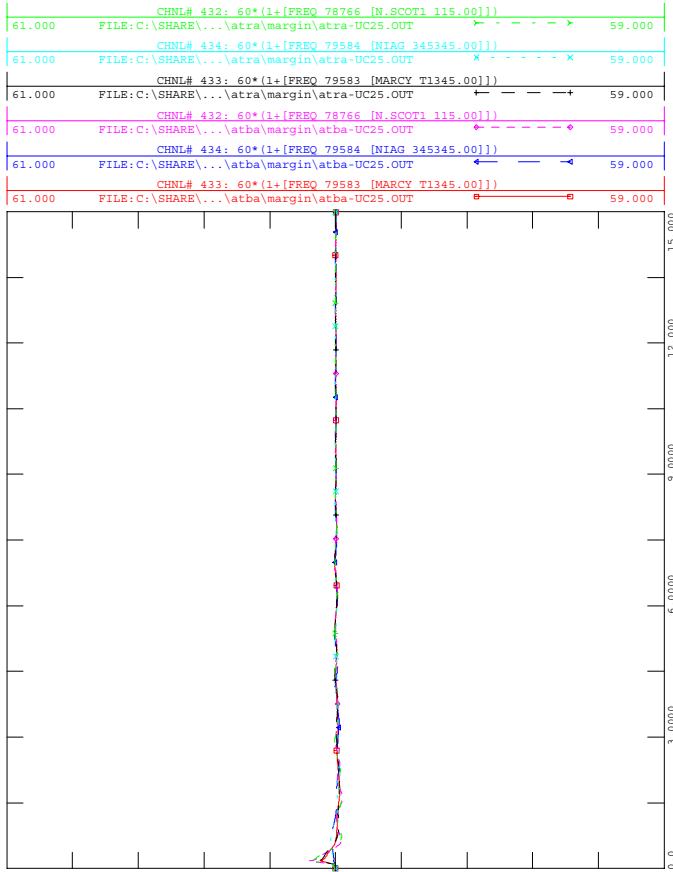
2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@RAVENSWOOD #3



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INTERFACE MW FLOWS



2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@RAVENSWOOD #3

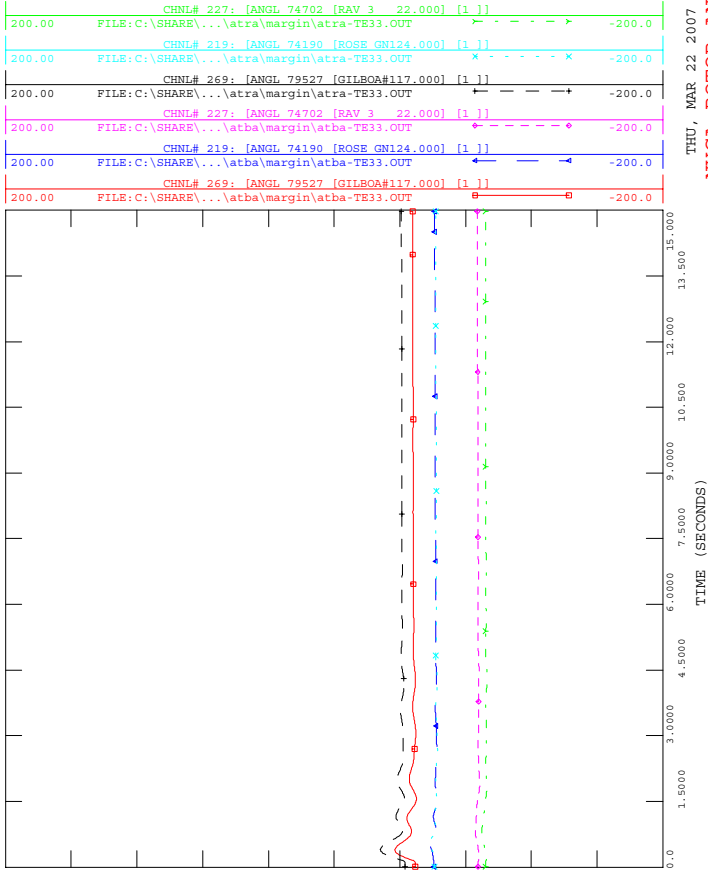


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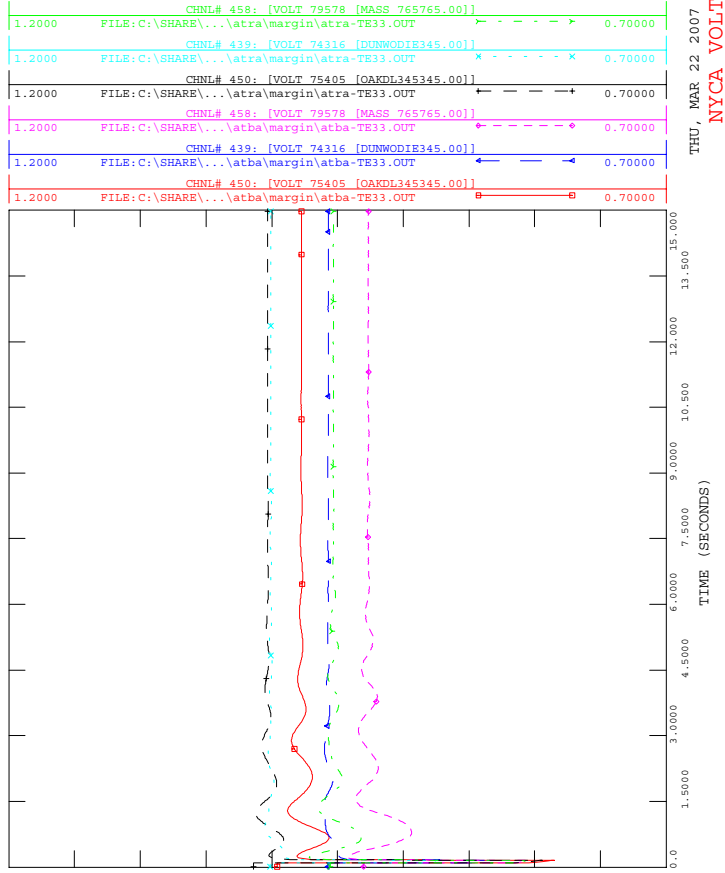
2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NEW SCOTLAND 345 KV 99 BUS
L/O UNS-18 (MARCY), GNS-1 (GILBOA), #94 (LEEDS), T1

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NYCA ROTOR ANGLES



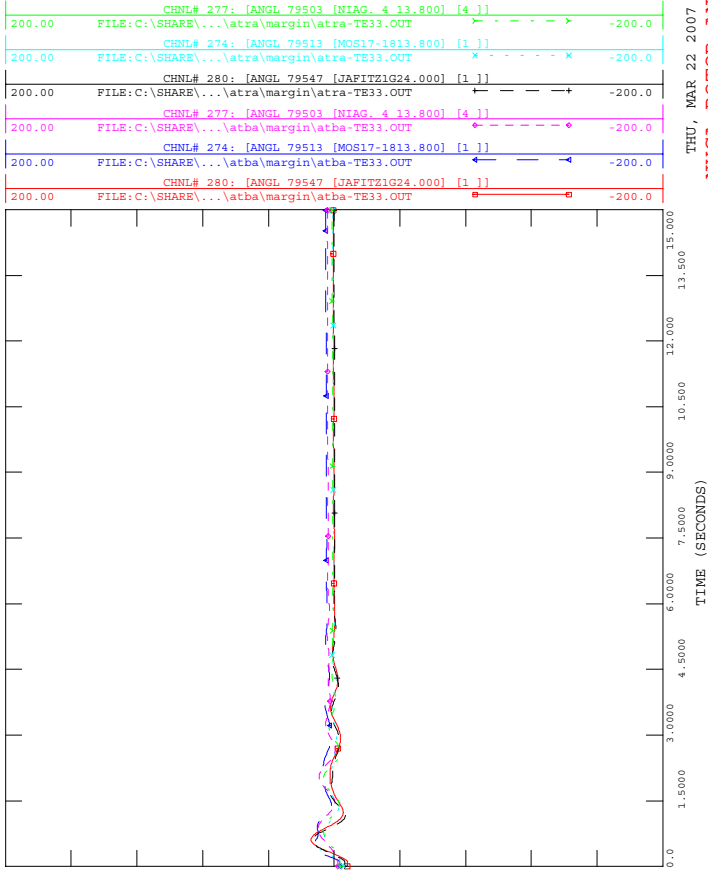
2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NEW SCOTLAND 345 KV 99 BUS
L/O UNS-18 (MARCY), GNS-1 (GILBOA), #94 (LEEDS), T1

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NYCA VOLTAGES



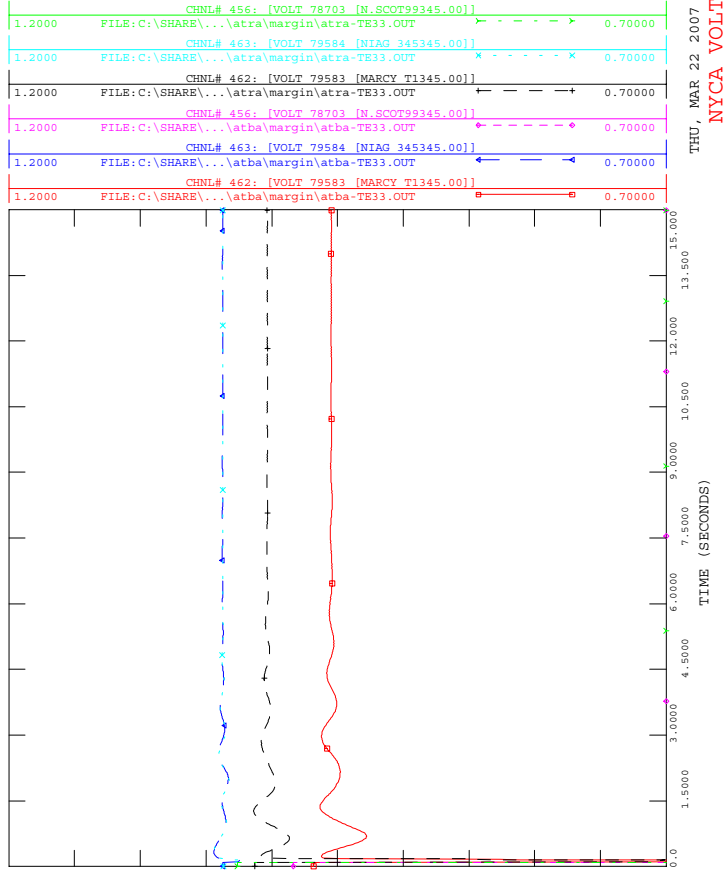
2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NEW SCOTLAND 345 KV 99 BUS
L/O UNS-18 (MARCY), GNS-1 (GILBOA), #94 (LEEDS), T1

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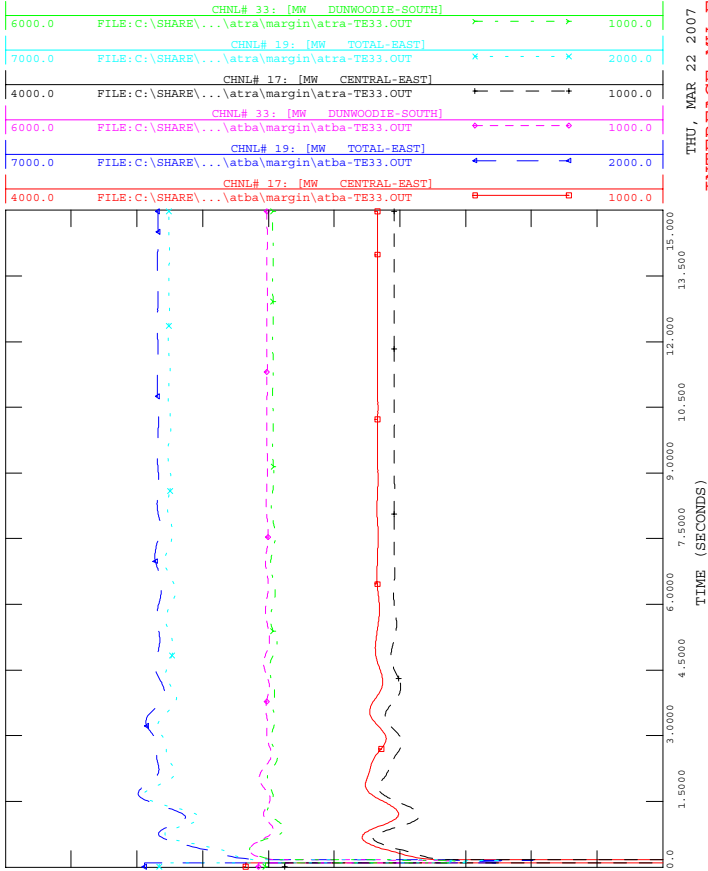
2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NEW SCOTLAND 345 KV 99 BUS
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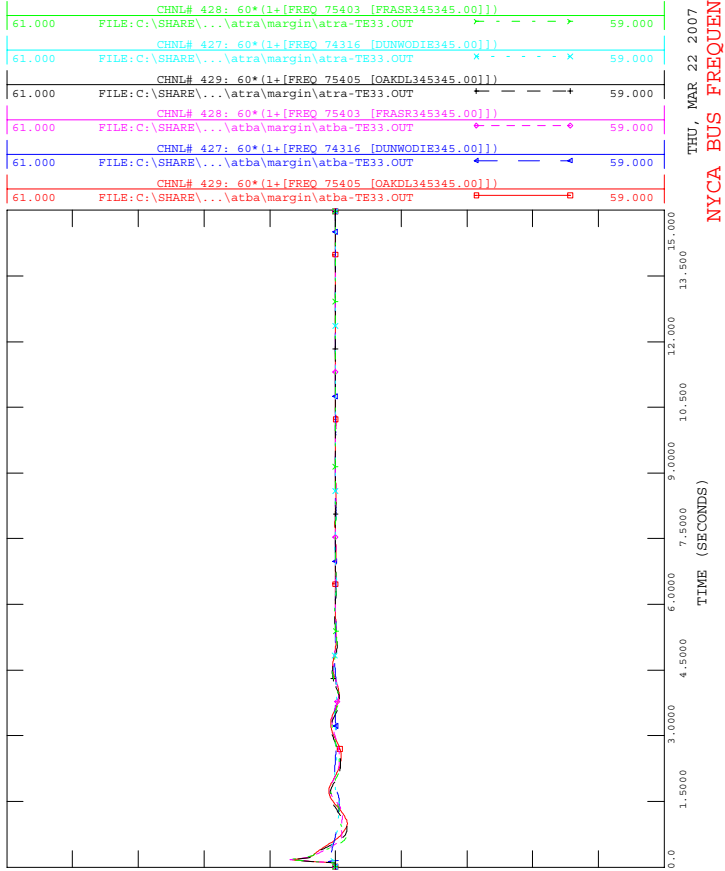




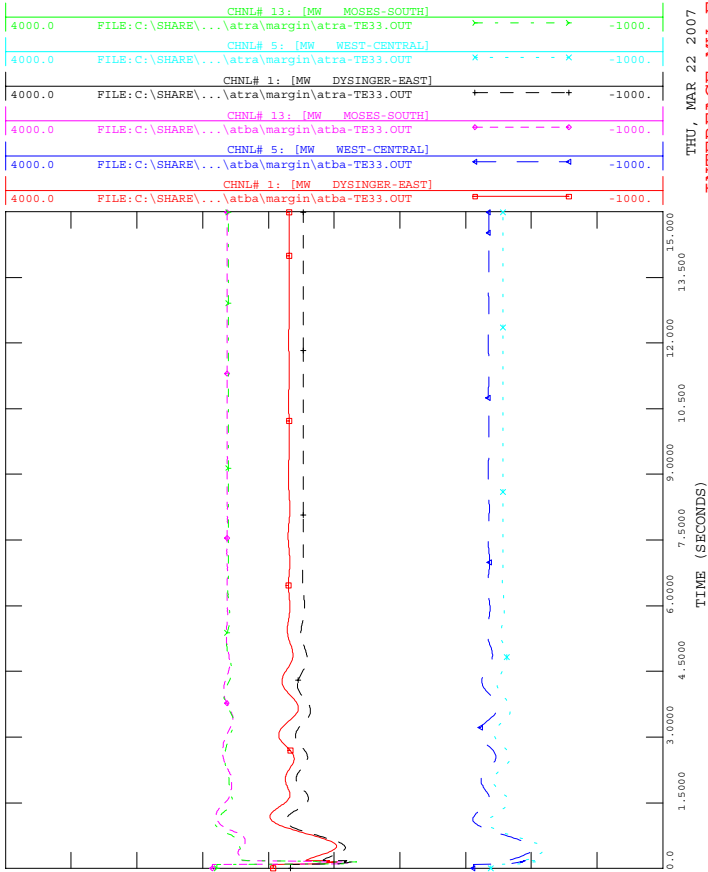
2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NEW SCOTLAND 345 KV 99 BUS
L/O UNS-18 (MARCY), GNS-1 (GILBOA), #94 (LEEDS), T1



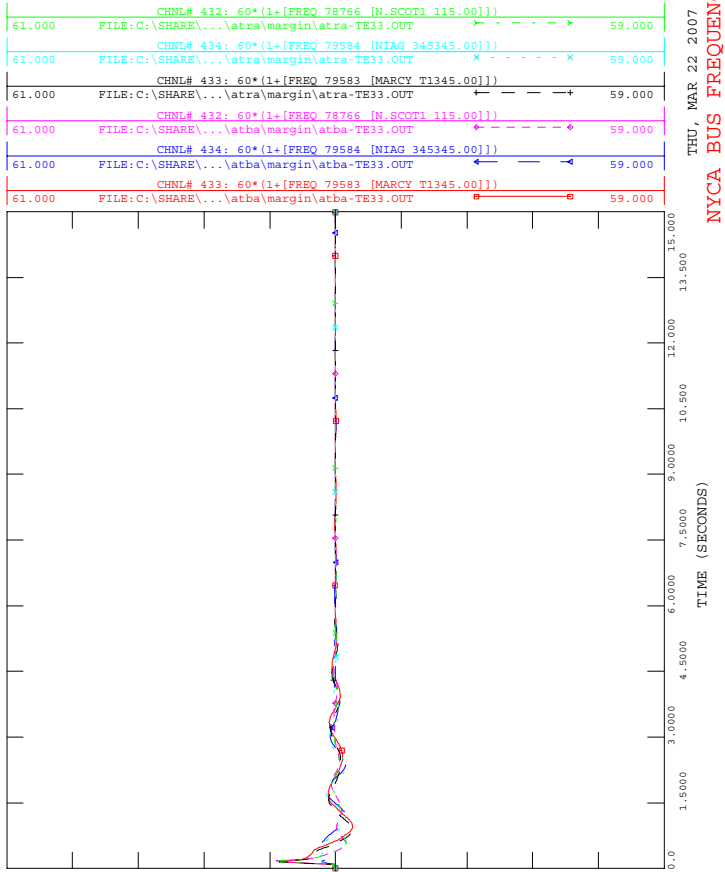
2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
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L/O UNS-18 (MARCY), GNS-1 (GILBOA), #94 (LEEDS), T1



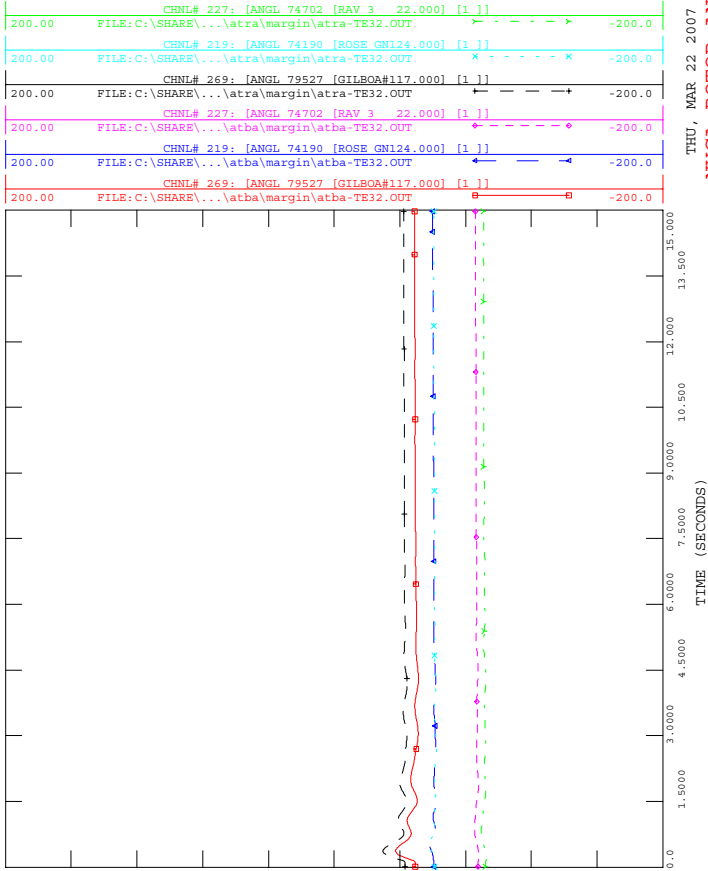
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2011 SUMMER STABILITY MARGIN CASE
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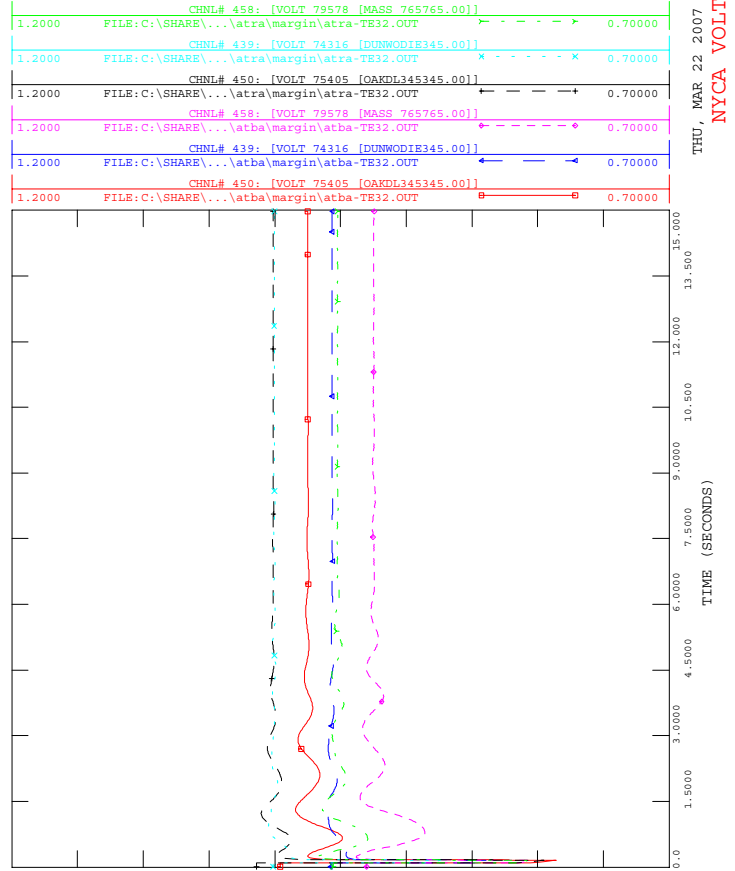
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2011 SUMMER STABILITY MARGIN CASE
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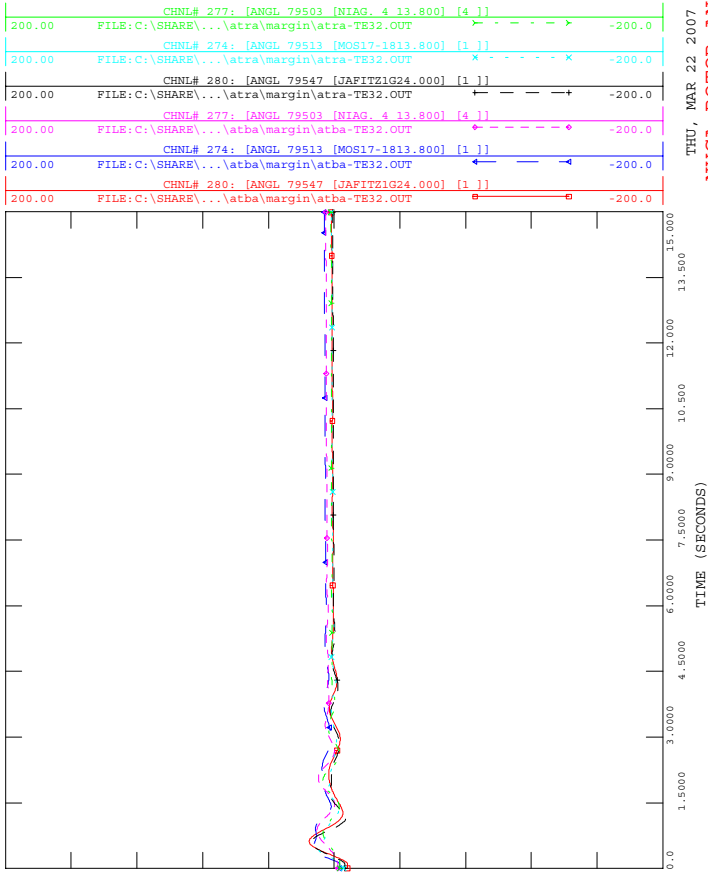
2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NEW SCOTLAND 345 KV 77 BUS
L/O #14 (EDIC), #2 (ALPS), #93 (LEEDS), T2 (345/115)



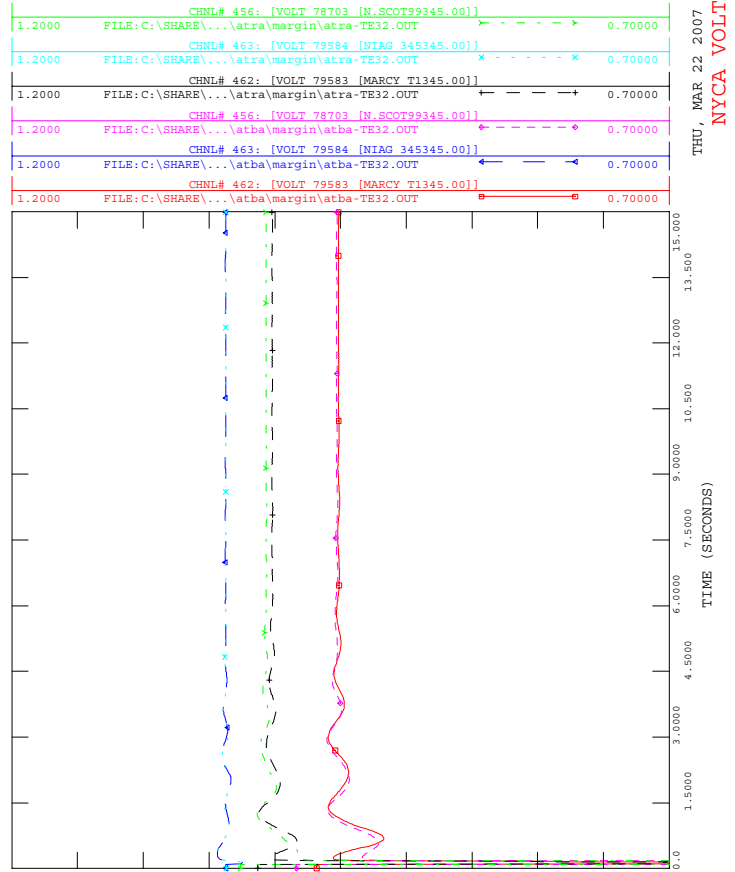
2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NEW SCOTLAND 345 KV 77 BUS
L/O #14 (EDIC), #2 (ALPS), #93 (LEEDS), T2 (345/115)



2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NEW SCOTLAND 345 KV 77 BUS
L/O #14 (EDIC), #2 (ALPS), #93 (LEEDS), T2 (345/115)

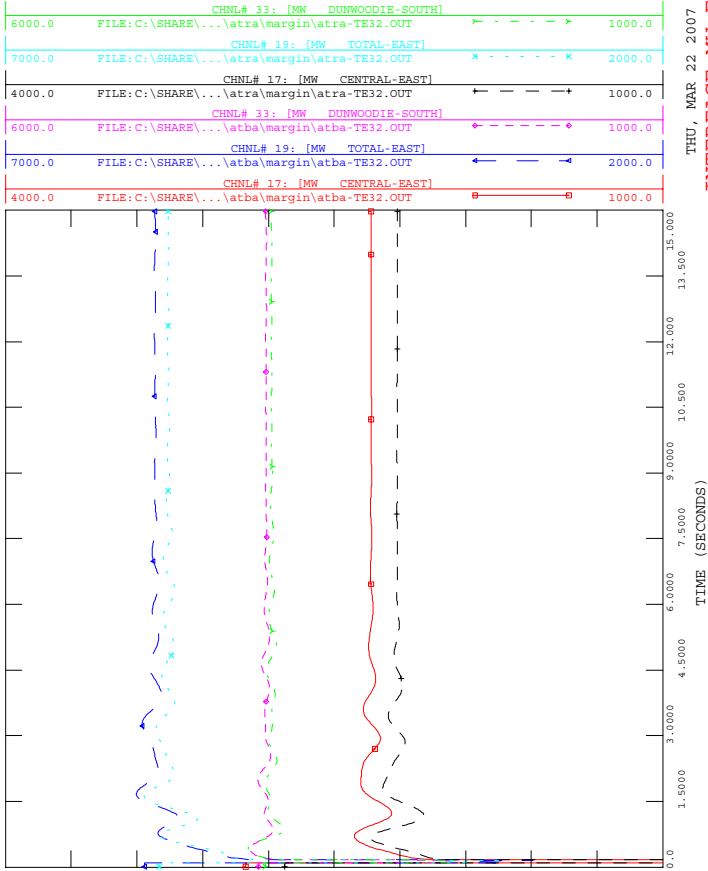


2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NEW SCOTLAND 345 KV 77 BUS
L/O #14 (EDIC), #2 (ALPS), #93 (LEEDS), T2 (345/115)

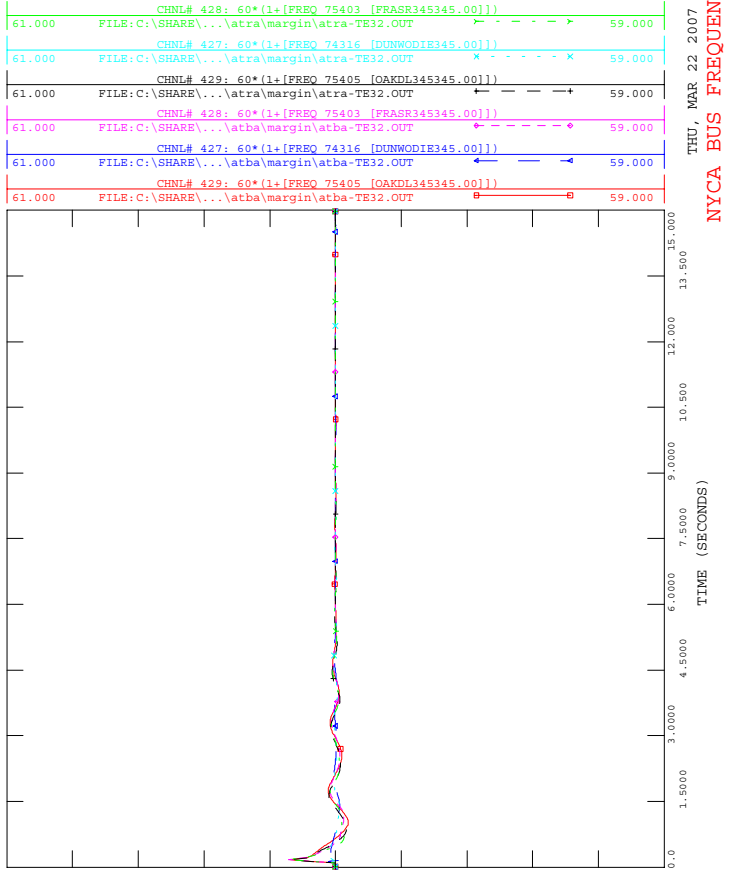




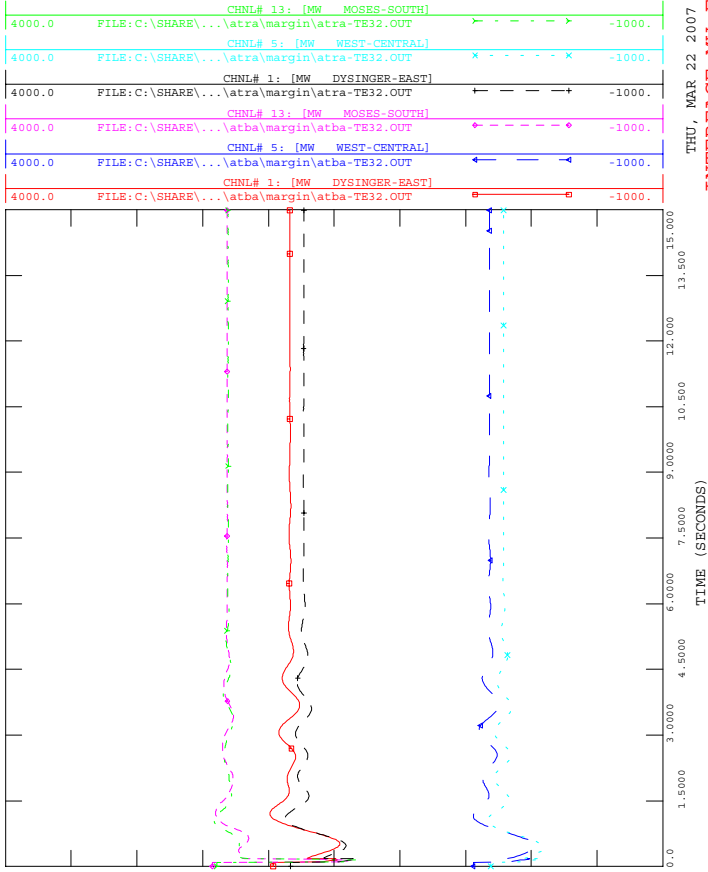
2006 ATBA/ATRA
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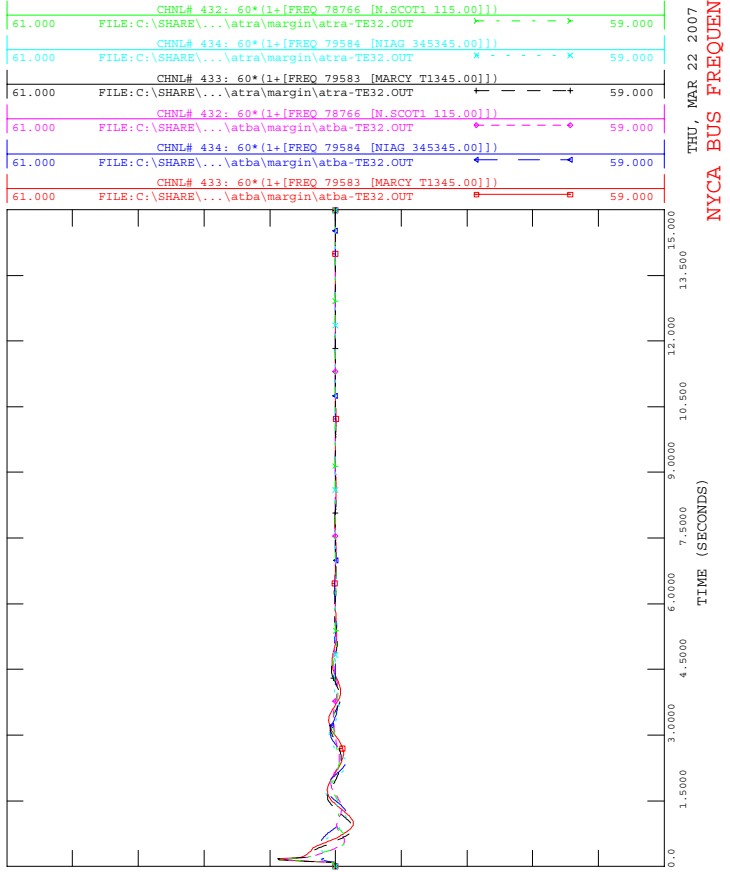
2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NEW SCOTLAND 345 KV 77 BUS
L/O #14 (EDIC), #2 (ALPS), #93 (LEEDS), T2 (345/115)



2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NEW SCOTLAND 345 KV 77 BUS
L/O #14 (EDIC), #2 (ALPS), #93 (LEEDS), T2 (345/115)

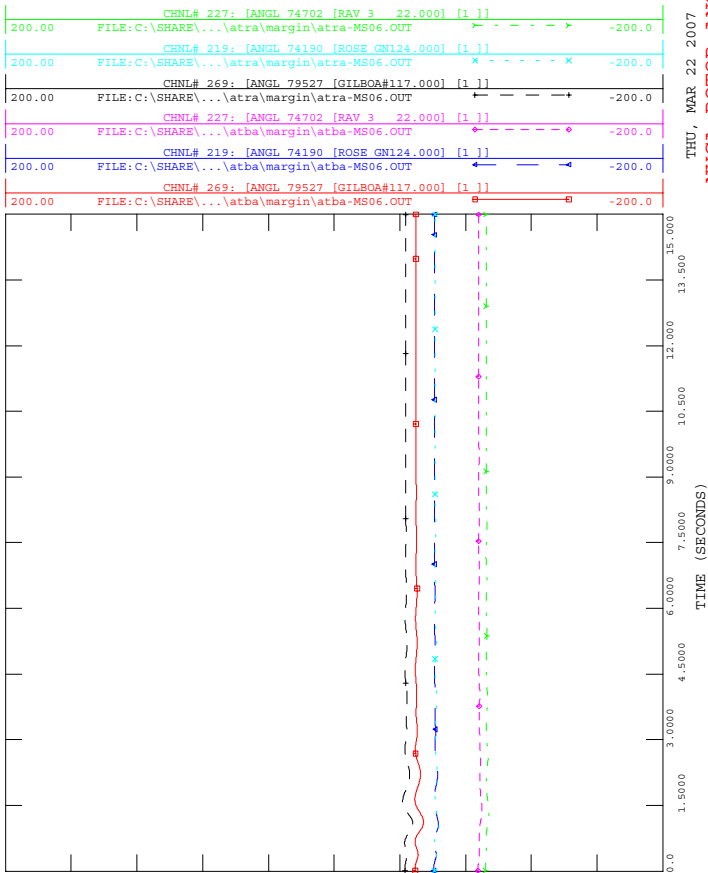


2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NEW SCOTLAND 345 KV 77 BUS
L/O #14 (EDIC), #2 (ALPS), #93 (LEEDS), T2 (345/115)

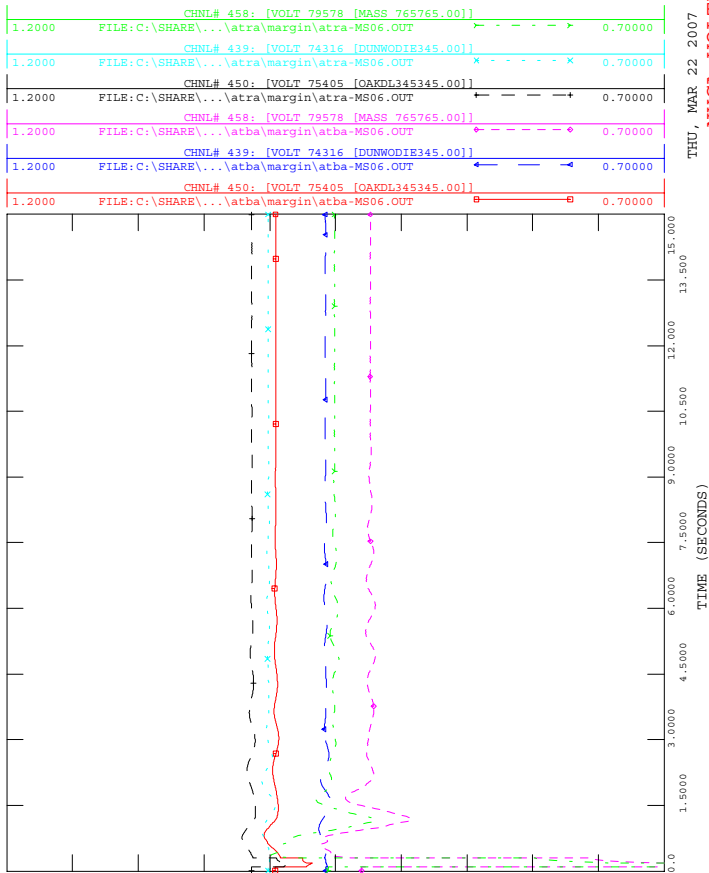




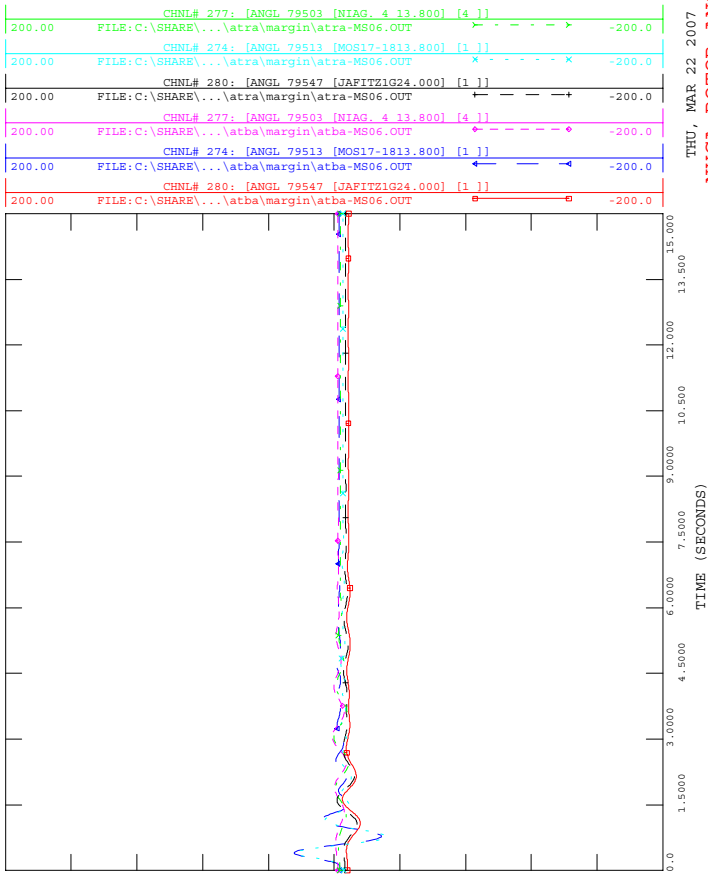
2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
SLG-STK@MOSES 230/MOSES-MASSENA MMS-2
BACKUP CLEARING MOSES T4 (230/115)



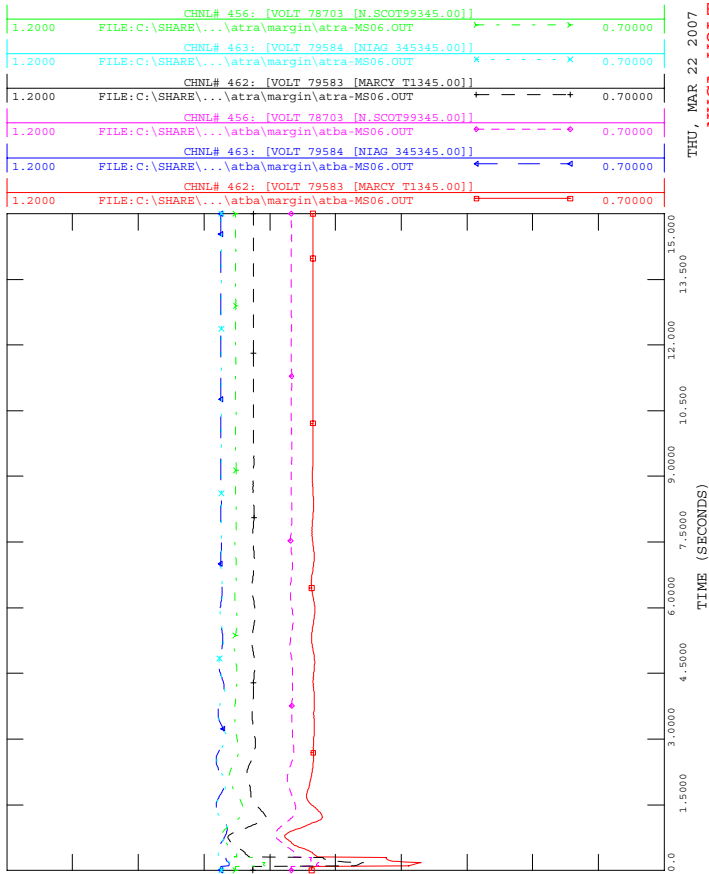
2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
SLG-STK@MOSES 230/MOSES-MASSENA MMS-2
BACKUP CLEARING MOSES T4 (230/115)



2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
SLG-STK@MOSES 230/MOSES-MASSENA MMS-2
BACKUP CLEARING MOSES T4 (230/115)

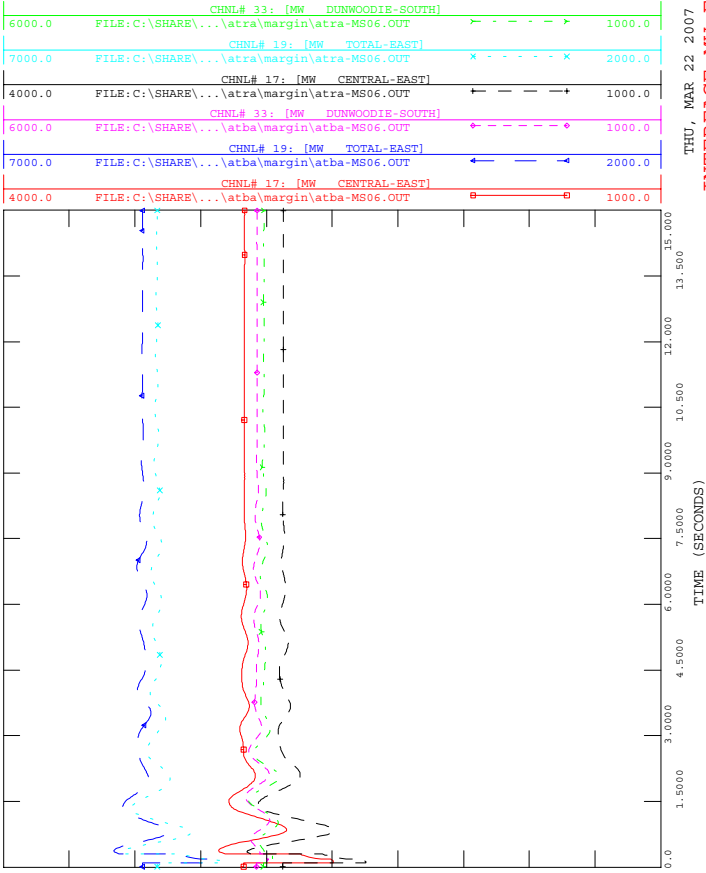


2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
SLG-STK@MOSES 230/MOSES-MASSENA MMS-2
BACKUP CLEARING MOSES T4 (230/115)

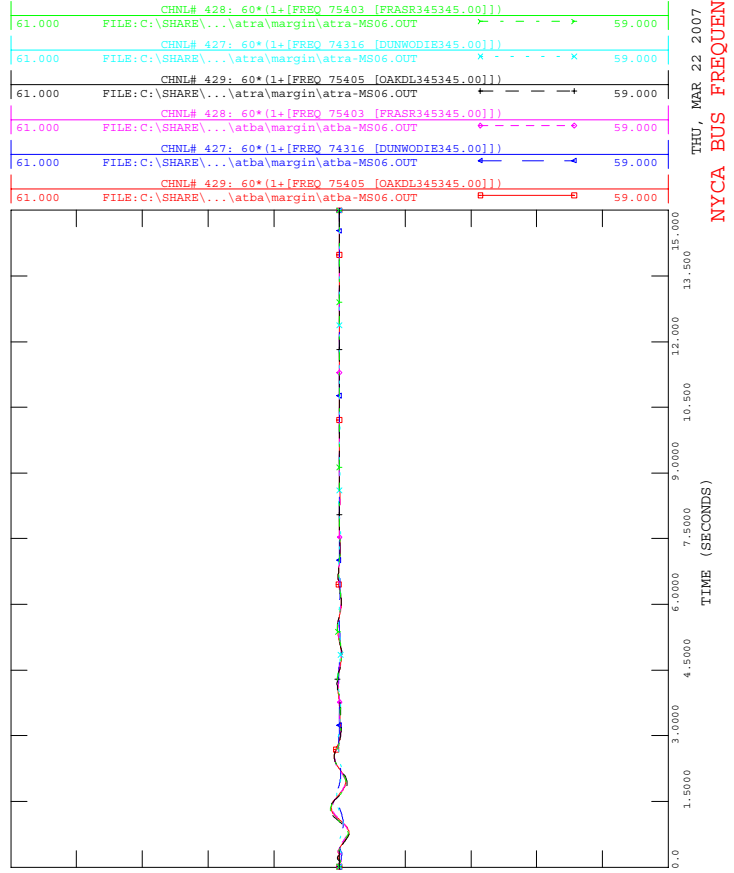




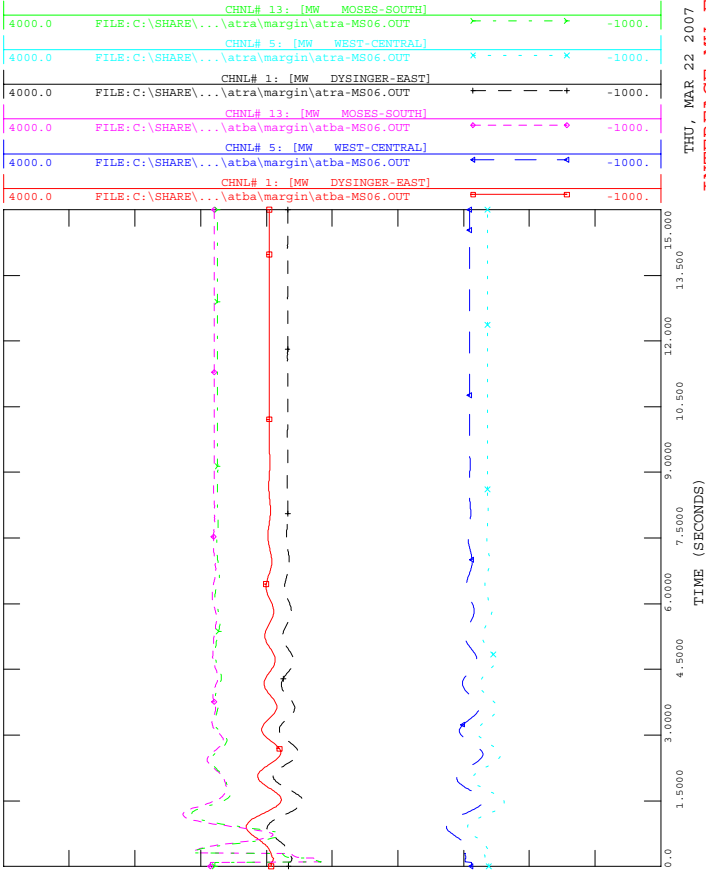
2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
SLG-STK@MOSES 230/MOSES-MASSENA MMS-2
BACKUP CLEARING MOSES T4 (230/115)



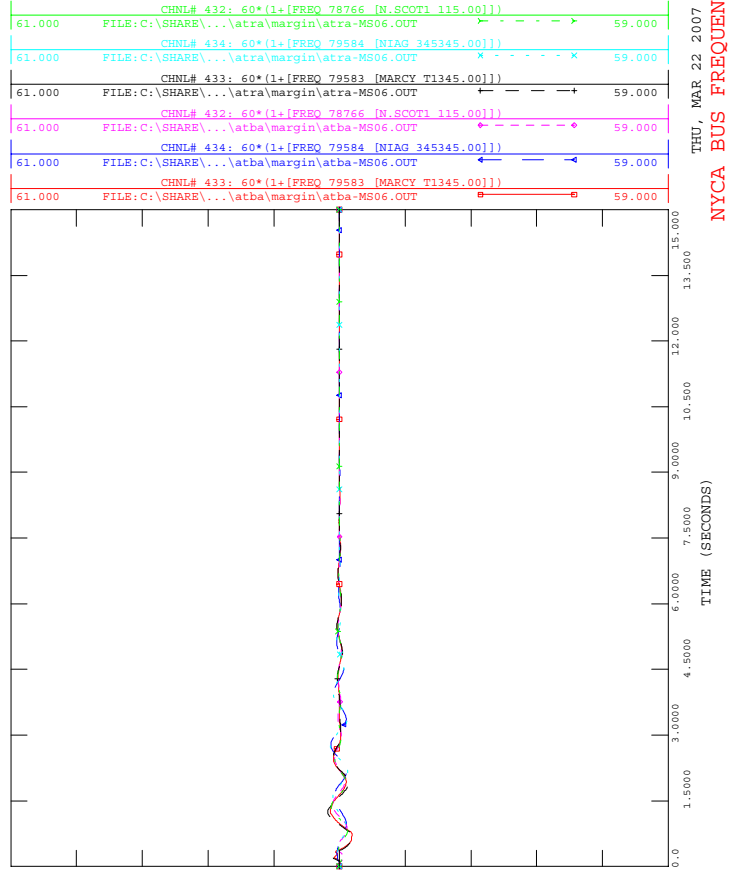
2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
SLG-STK@MOSES 230/MOSES-MASSENA MMS-2
BACKUP CLEARING MOSES T4 (230/115)



2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
SLG-STK@MOSES 230/MOSES-MASSENA MMS-2
BACKUP CLEARING MOSES T4 (230/115)

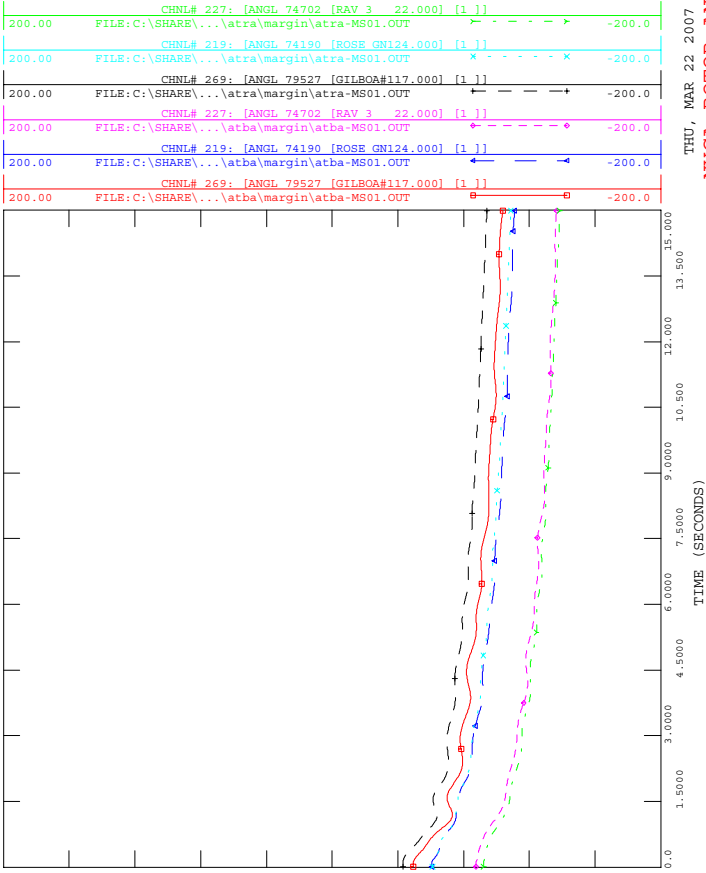


2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
SLG-STK@MOSES 230/MOSES-MASSENA MMS-2
BACKUP CLEARING MOSES T4 (230/115)

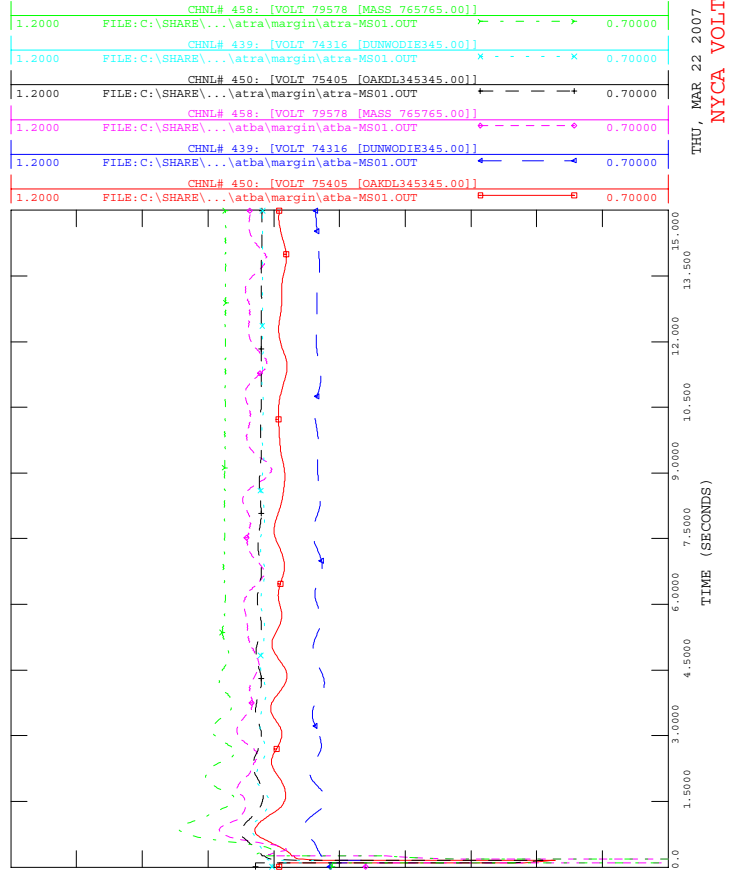




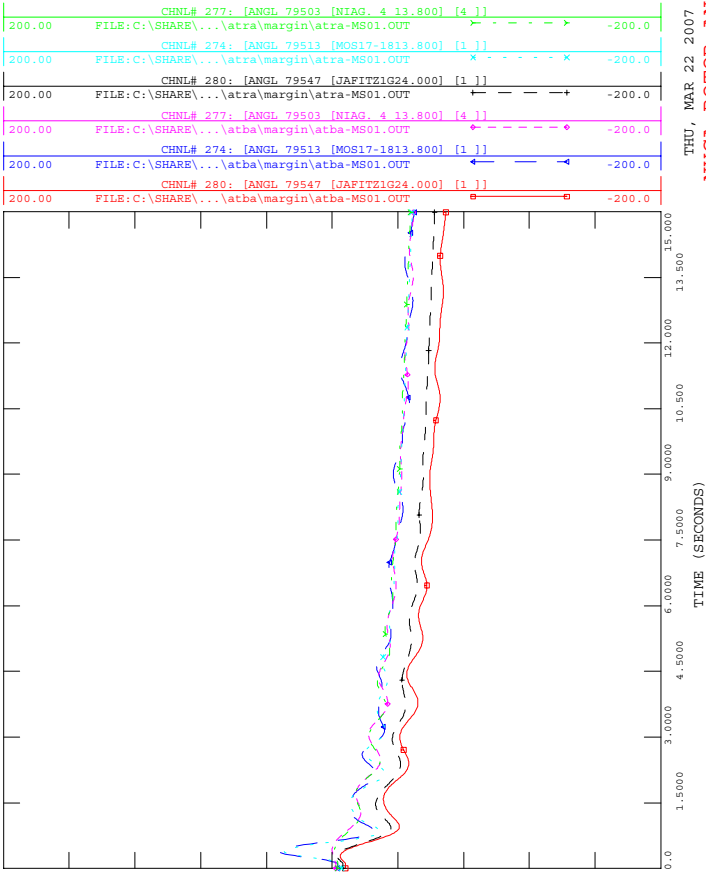
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3PH-NC@MARC 765/MARC-MASSENA MSU-1
SPS #41 TRIPS MASSENA-CHATEAUGUAY MSC-7040



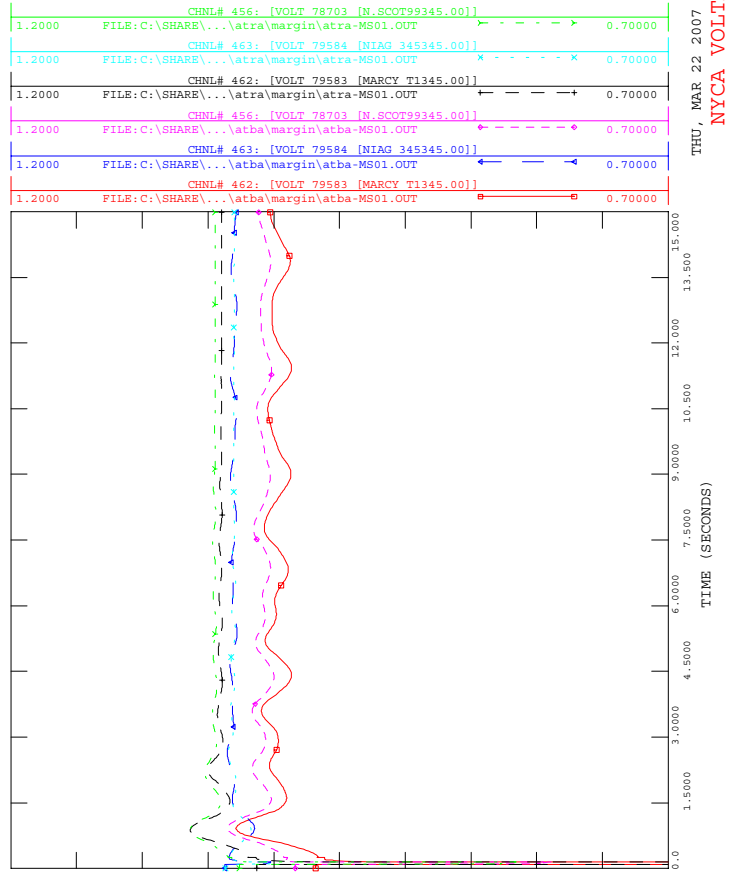
2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MARC 765/MARC-MASSENA MSU-1
SPS #41 TRIPS MASSENA-CHATEAUGUAY MSC-7040



2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MARC 765/MARC-MASSENA MSU-1
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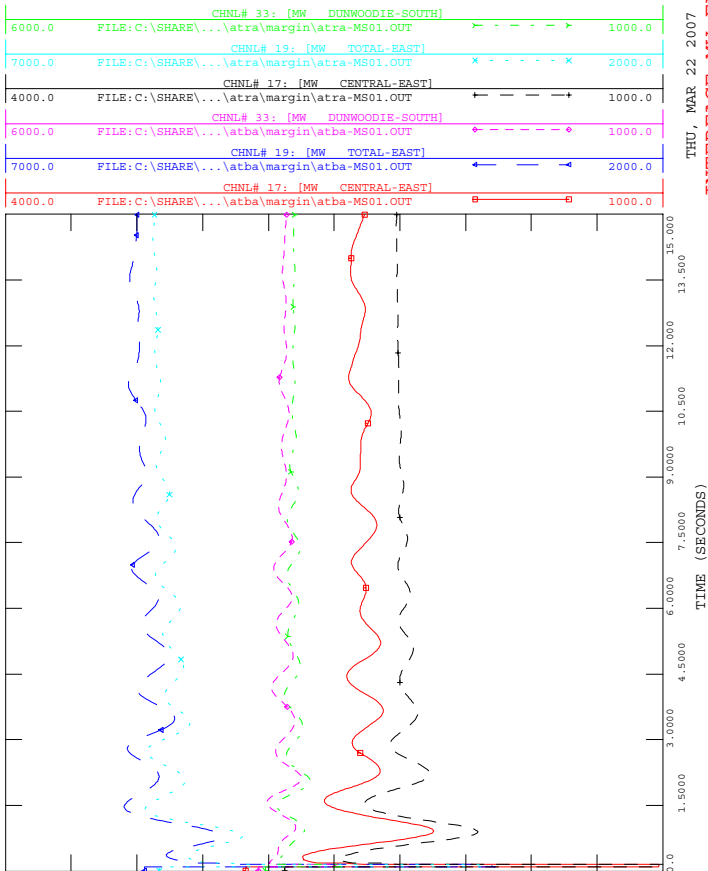
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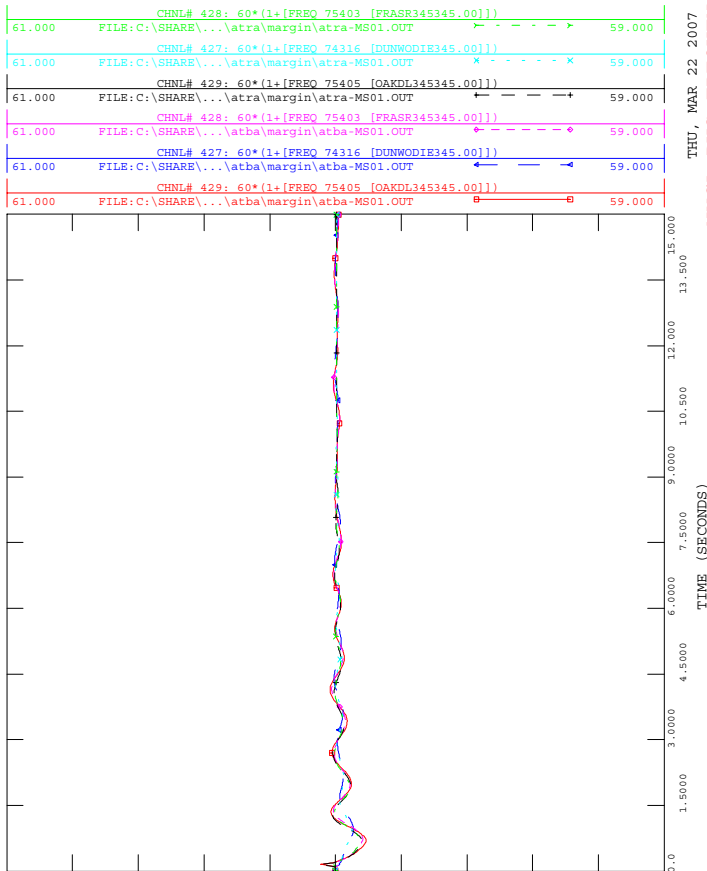
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3PH-NC@MARCUS 765/MARCY-MASSENA MSU-1
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INTERFACE MW FLOWS



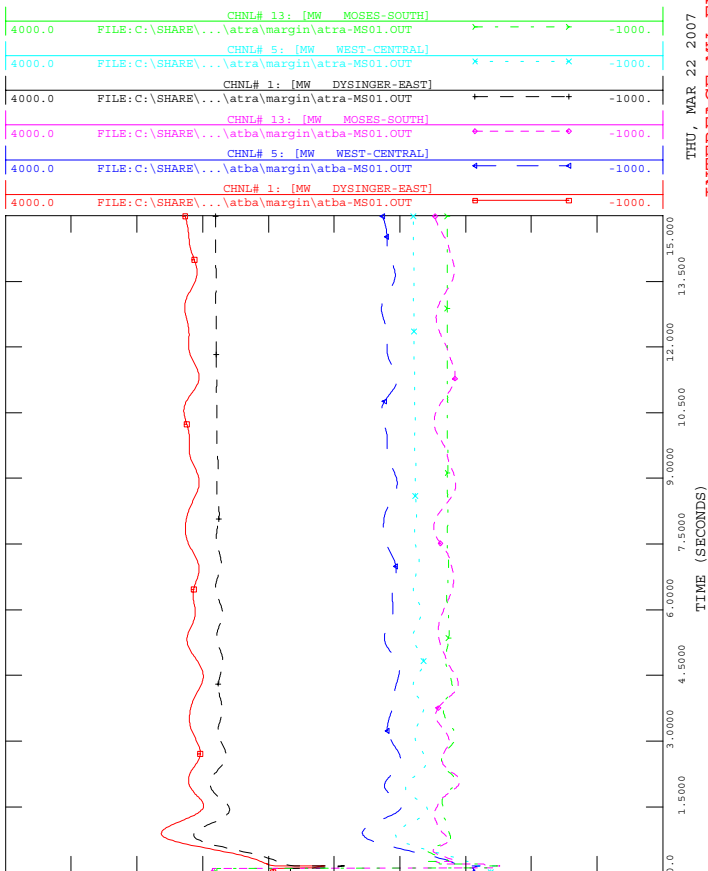
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2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MARCUS 765/MARCY-MASSENA MSU-1
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THU, MAR 22 2007 10:23
NYCA BUS FREQUENCIES



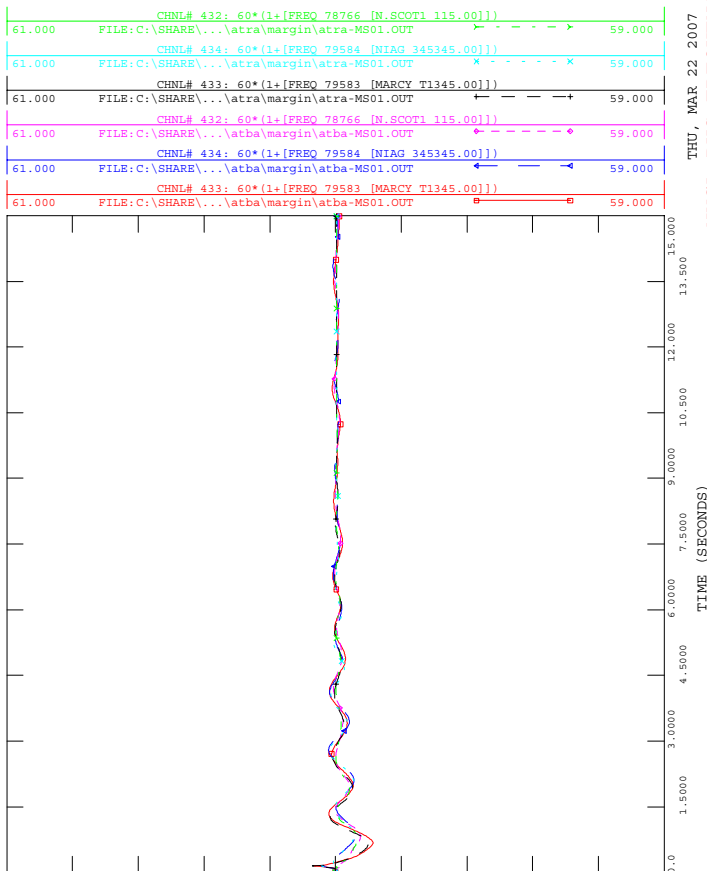
2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MARCUS 765/MARCY-MASSENA MSU-1
SPS #41 TRIPS MASSENA-CHATEAUGUAY MSC-7040

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INTERFACE MW FLOWS



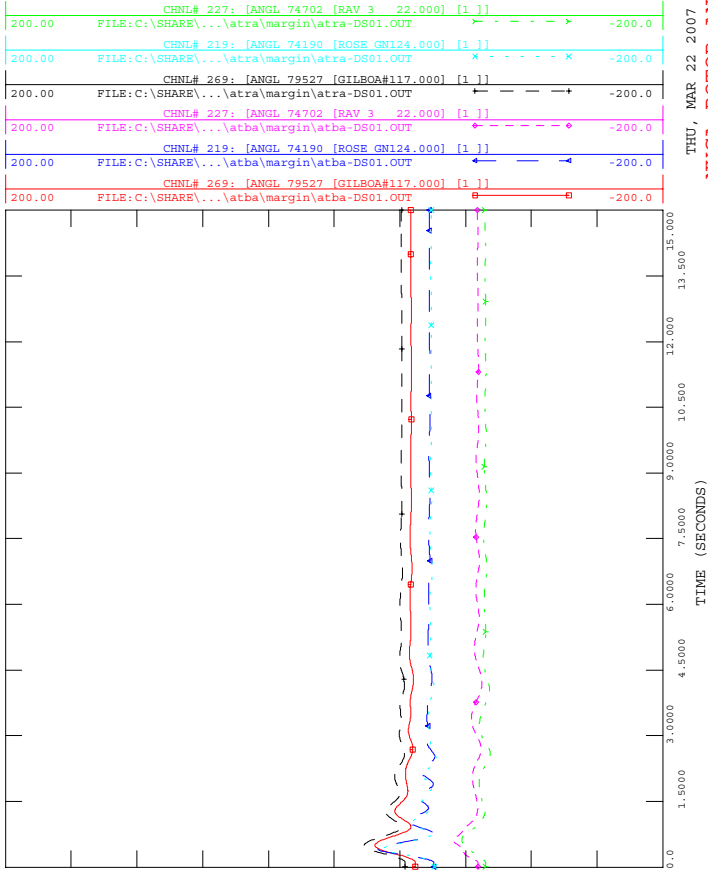
2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MARCUS 765/MARCY-MASSENA MSU-1
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NYCA BUS FREQUENCIES

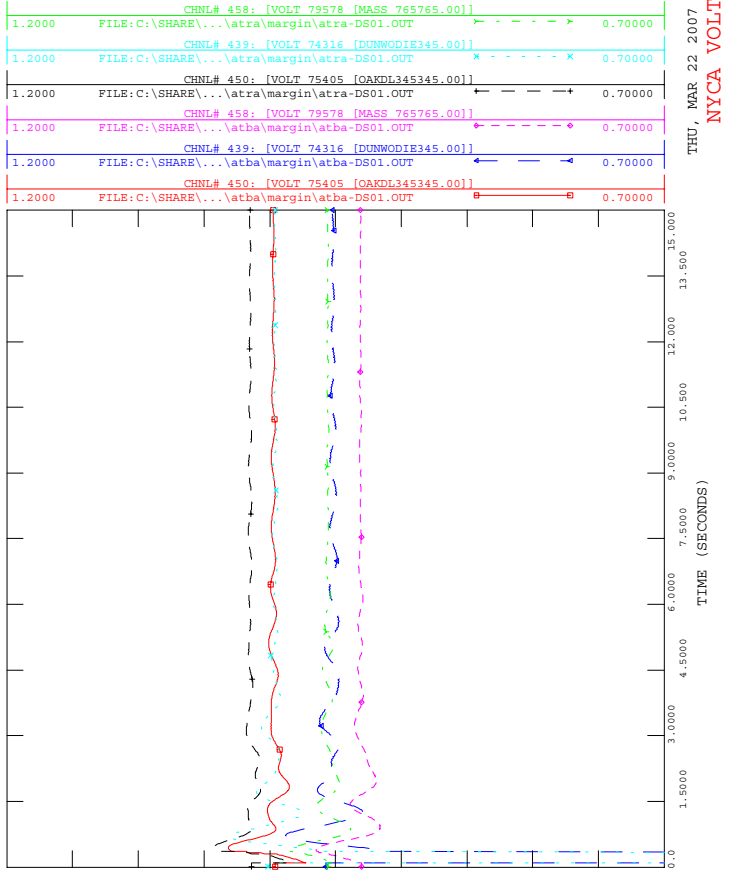




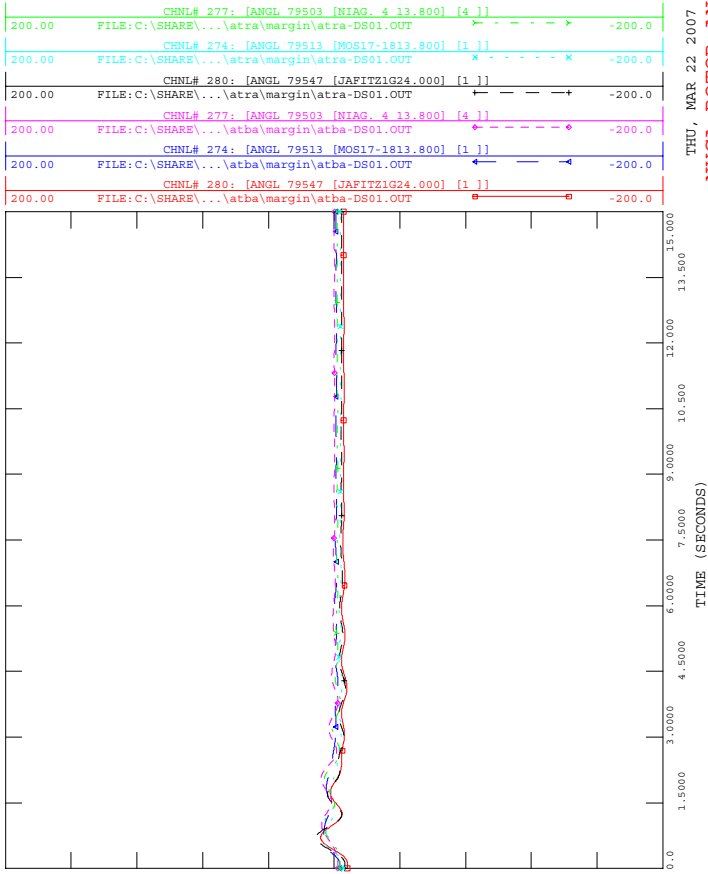
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SLG-STK@SPRNBK-W49/STK RNS5/CLEARW99/W64



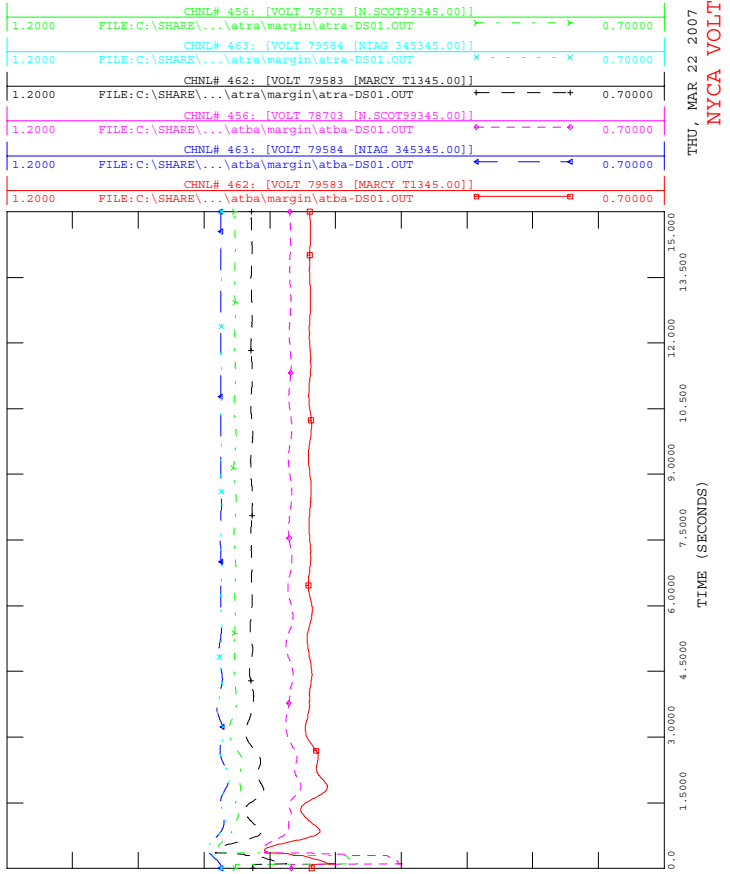
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2011 SUMMER STABILITY MARGIN CASE
SLG-STK@SPRNBK-W49/STK RNS5/CLEARW99/W64



2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
SLG-STK@SPRNBK-W49/STK RNS5/CLEARW99/W64

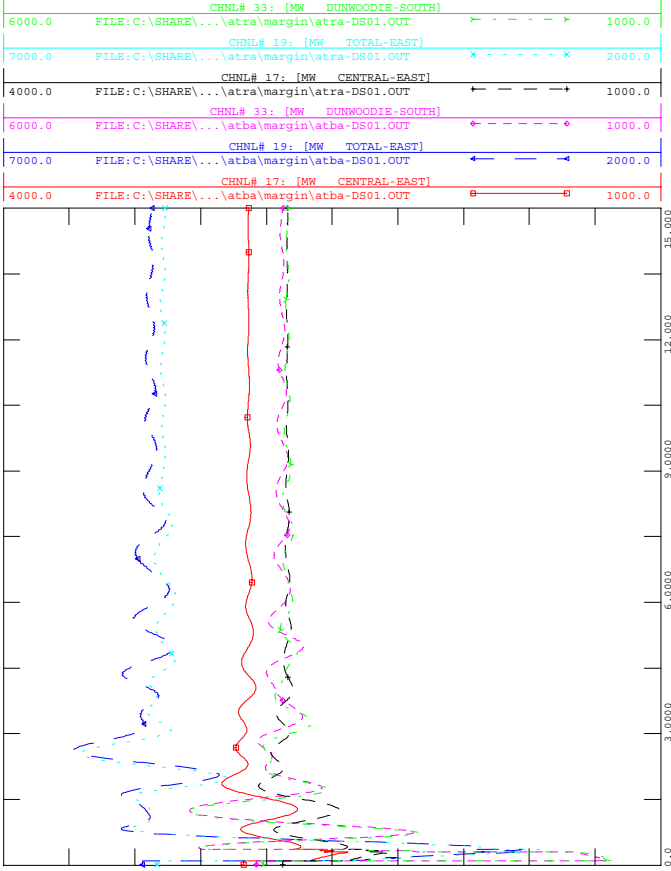


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2011 SUMMER STABILITY MARGIN CASE
SLG-STK@SPRNBK-W49/STK RNS5/CLEARW99/W64





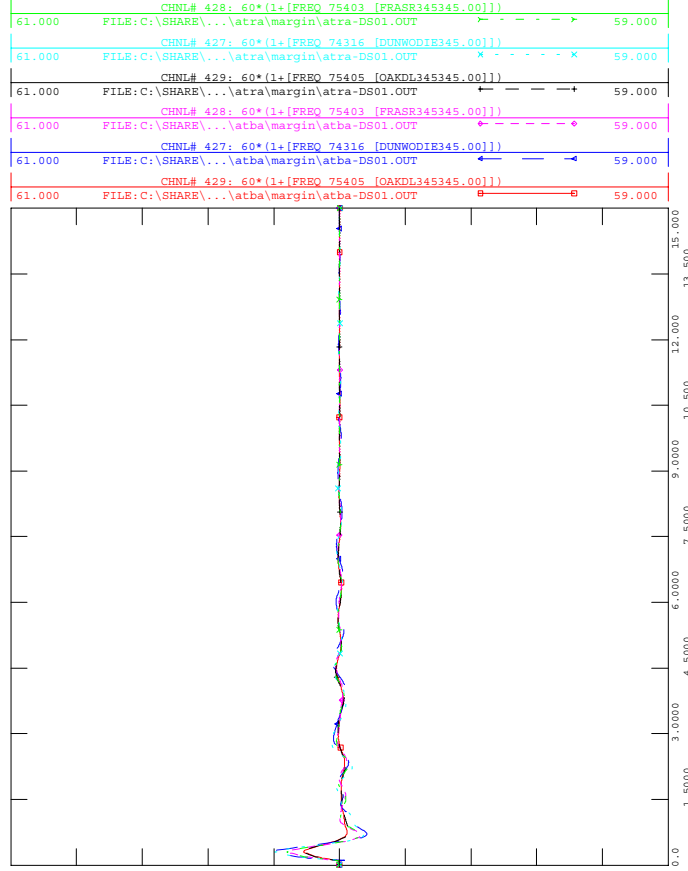
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INTERFACE MW FLOWS



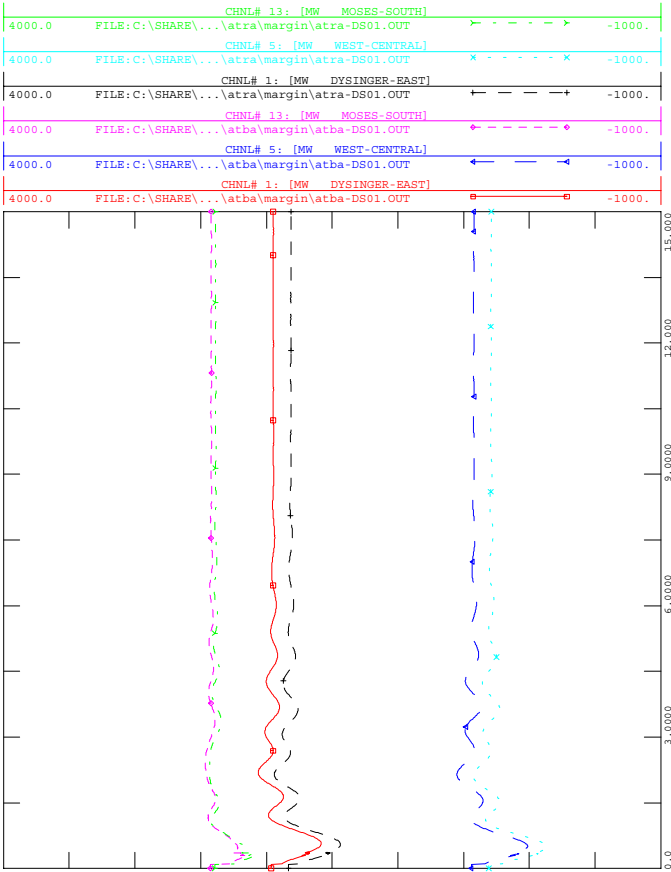
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NYCA BUS FREQUENCIES



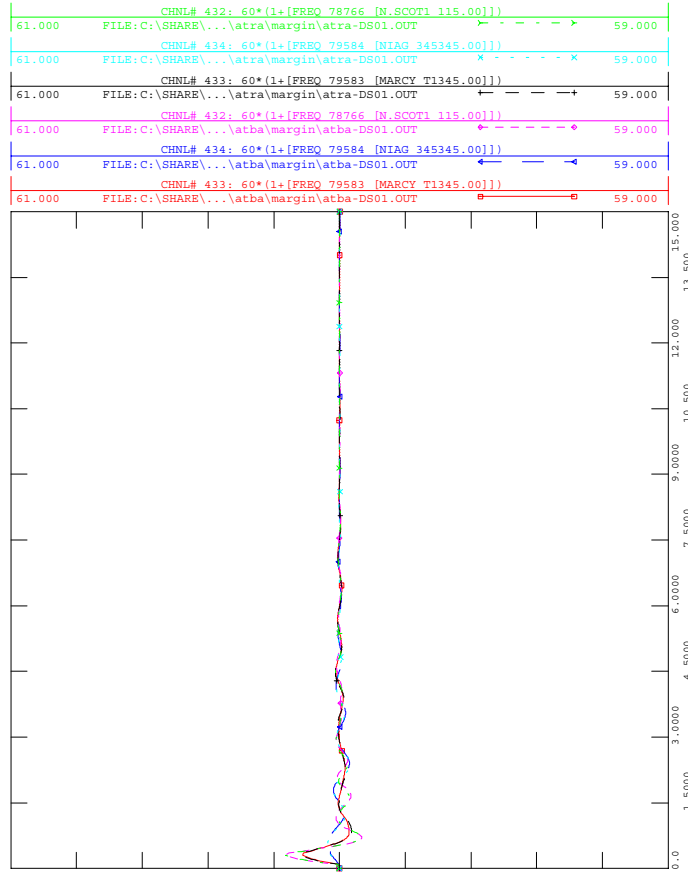
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SLG-STK@SPRNBK-W49/STK RNS5/CLEARW99/W64



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INTERFACE MW FLOWS



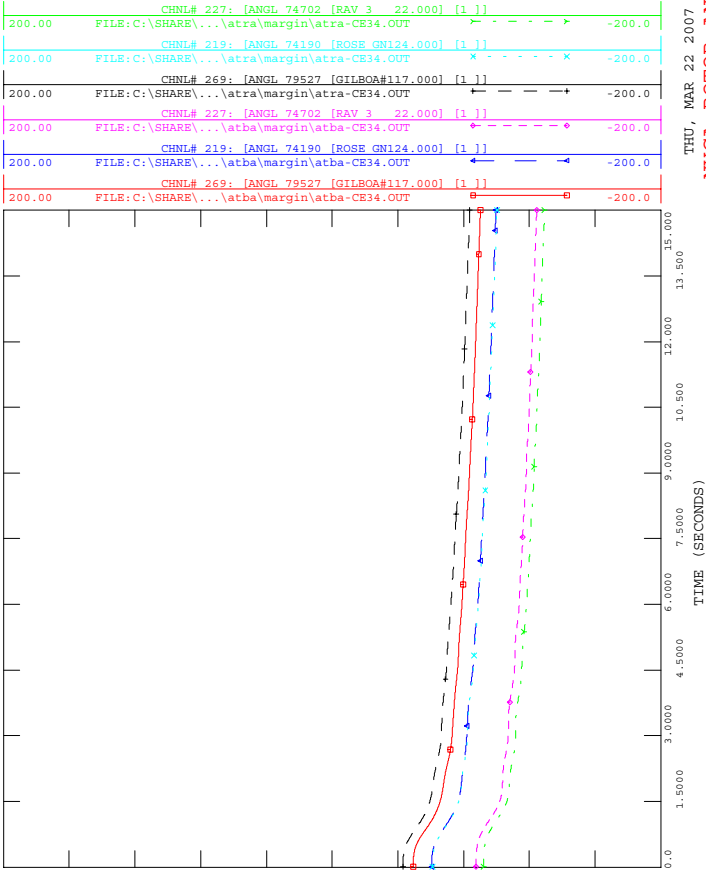
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2011 SUMMER STABILITY MARGIN CASE
SLG-STK@SPRNBK-W49/STK RNS5/CLEARW99/W64



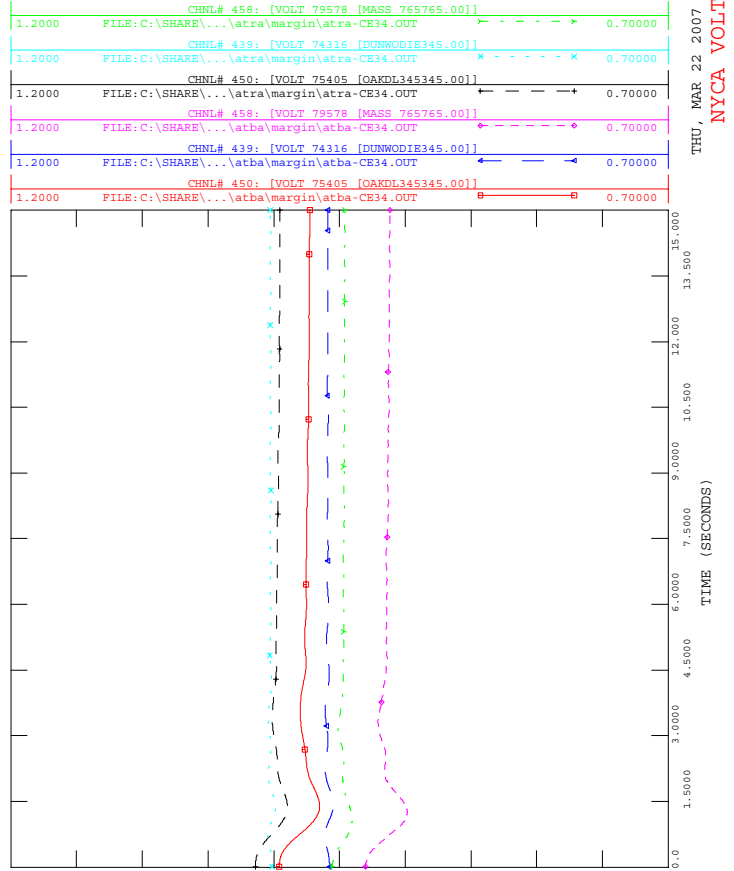
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NYCA BUS FREQUENCIES



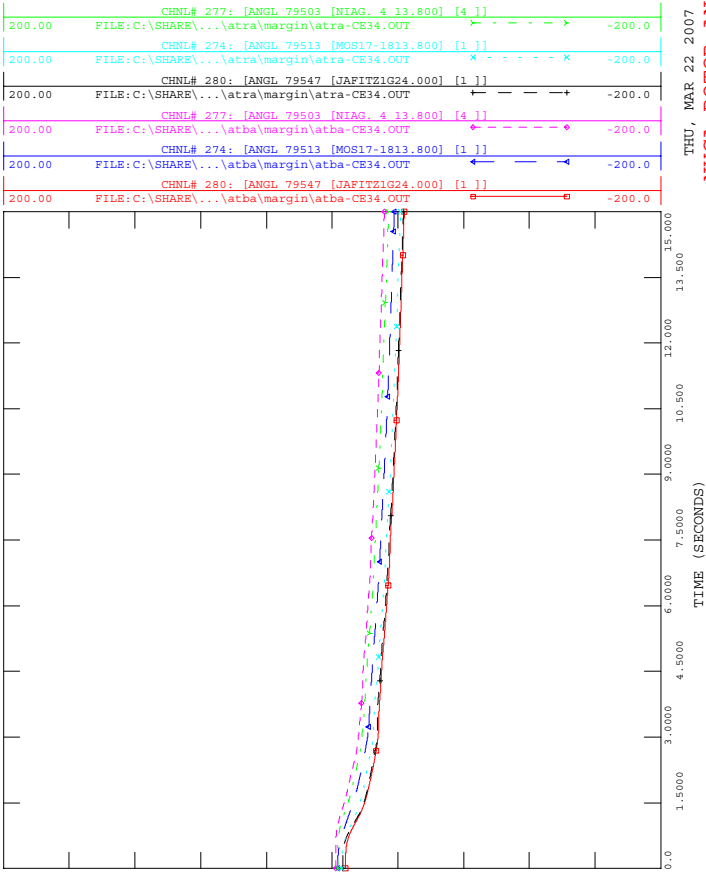
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2011 SUMMER STABILITY MARGIN CASE
L/O BOTH POLES OF PHASE II W/O FAULT



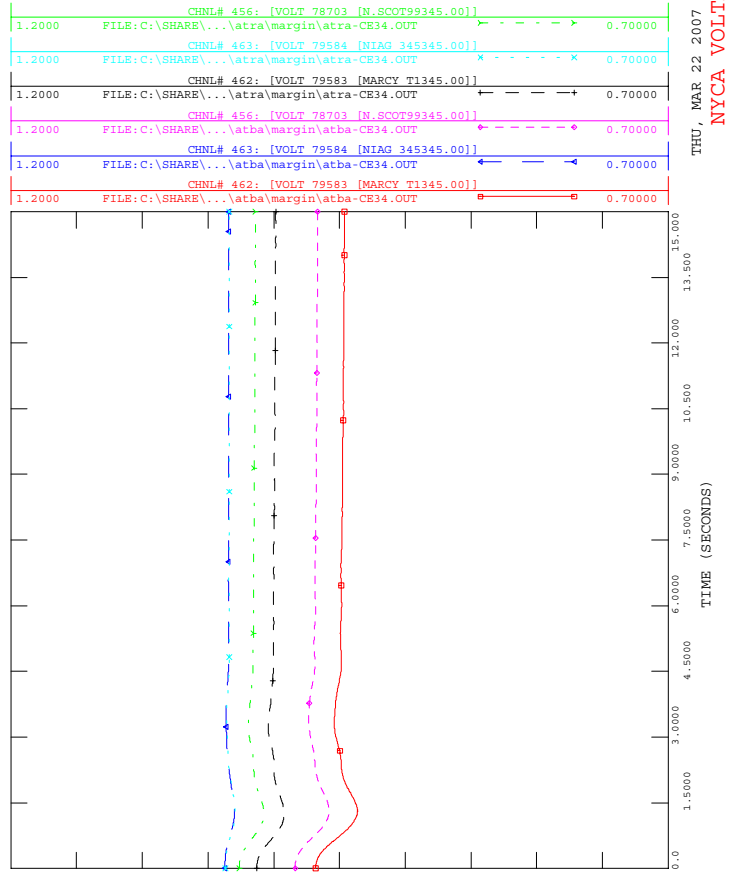
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2011 SUMMER STABILITY MARGIN CASE
L/O BOTH POLES OF PHASE II W/O FAULT



2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
L/O BOTH POLES OF PHASE II W/O FAULT

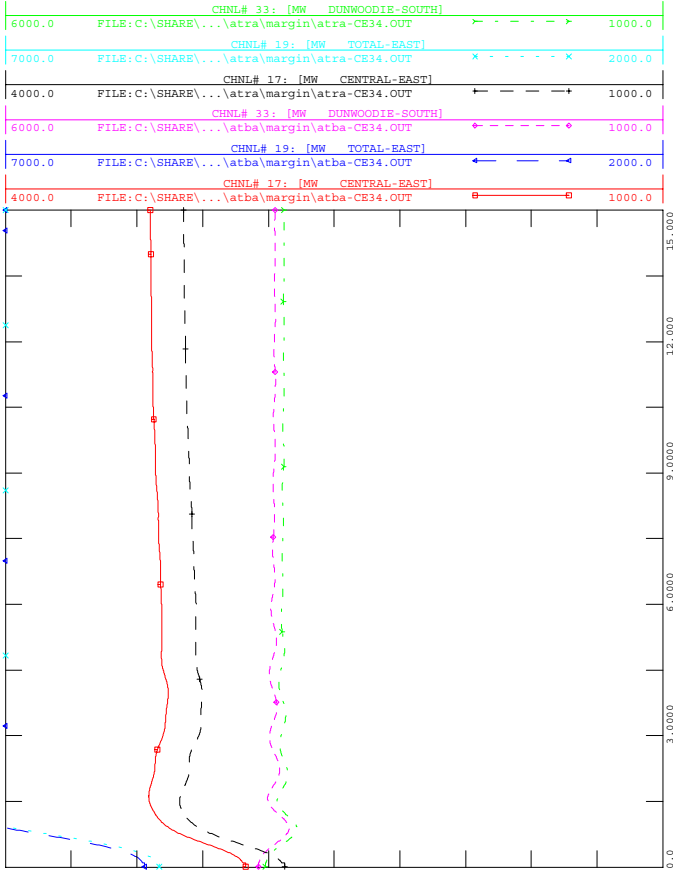


2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
L/O BOTH POLES OF PHASE II W/O FAULT





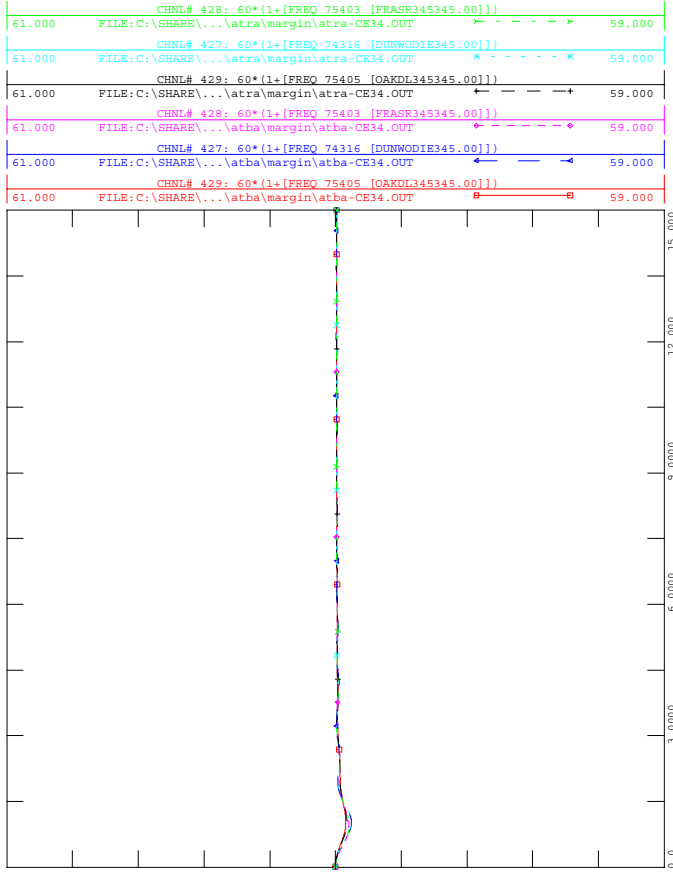
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L/O BOTH POLES OF PHASE II W/O FAULT



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INTERFACE MW FLOWS



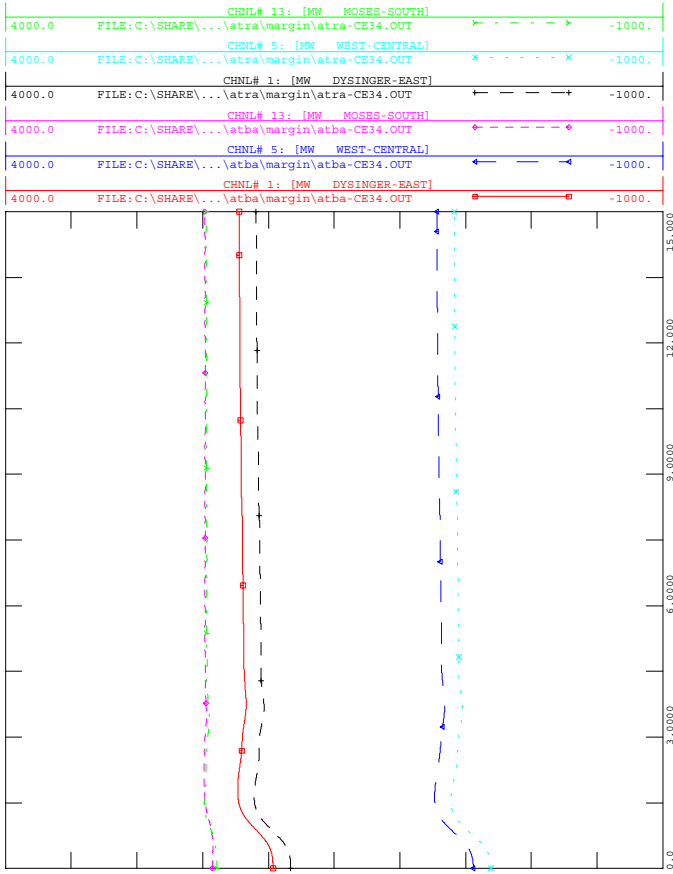
2006 ATBA/ATRA
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L/O BOTH POLES OF PHASE II W/O FAULT



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NYCA BUS FREQUENCIES



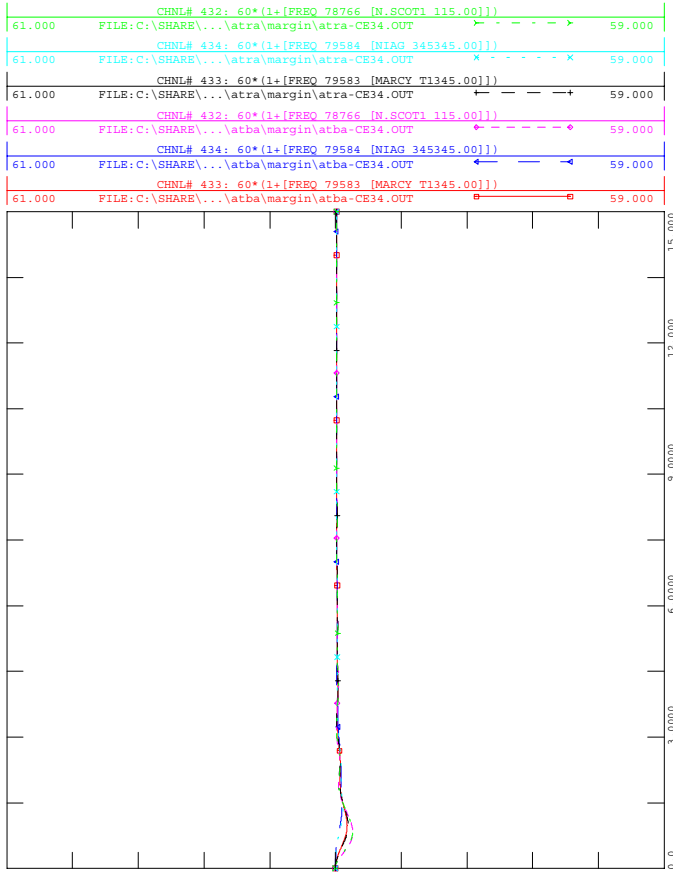
2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
L/O BOTH POLES OF PHASE II W/O FAULT



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INTERFACE MW FLOWS



2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
L/O BOTH POLES OF PHASE II W/O FAULT

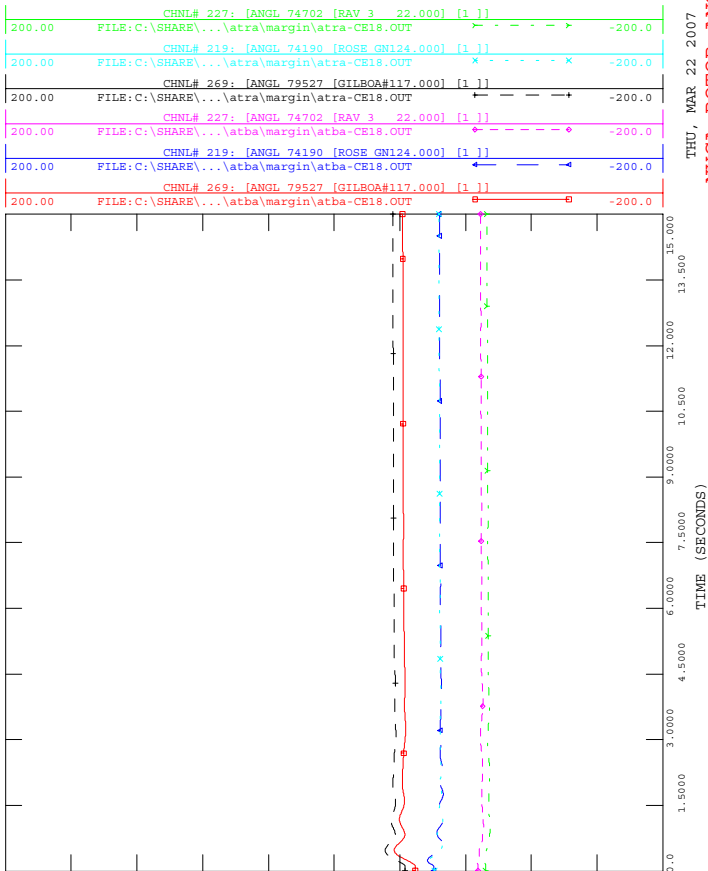


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NYCA BUS FREQUENCIES



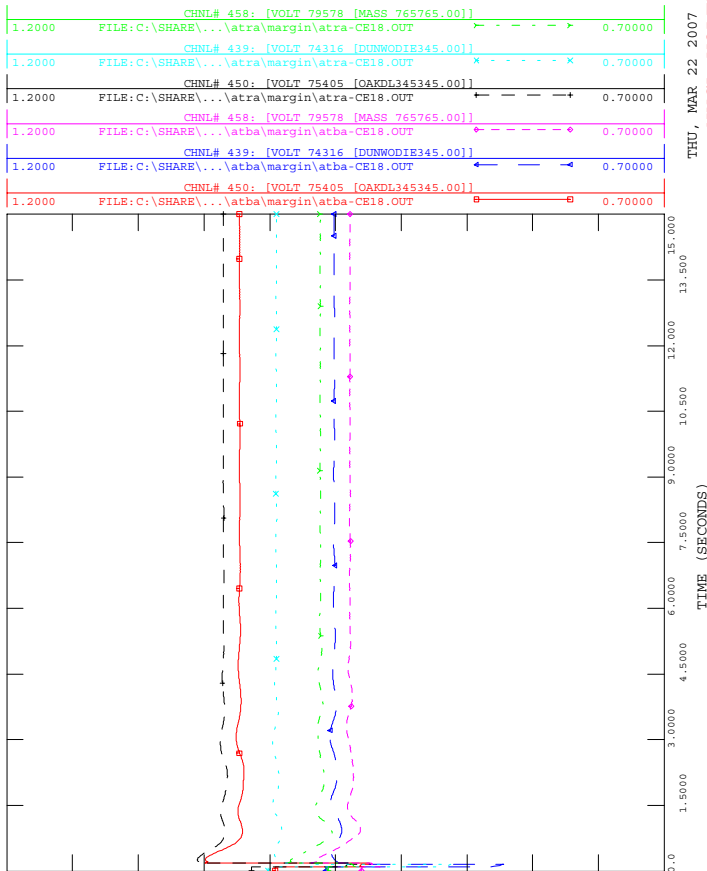
2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
LLG-NC@ROCK TAV 345/TWR: COOPERS CORNERS-ROCK TAVERN
CCRT-34 & CCRT-42

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NYCA ROTOR ANGLES



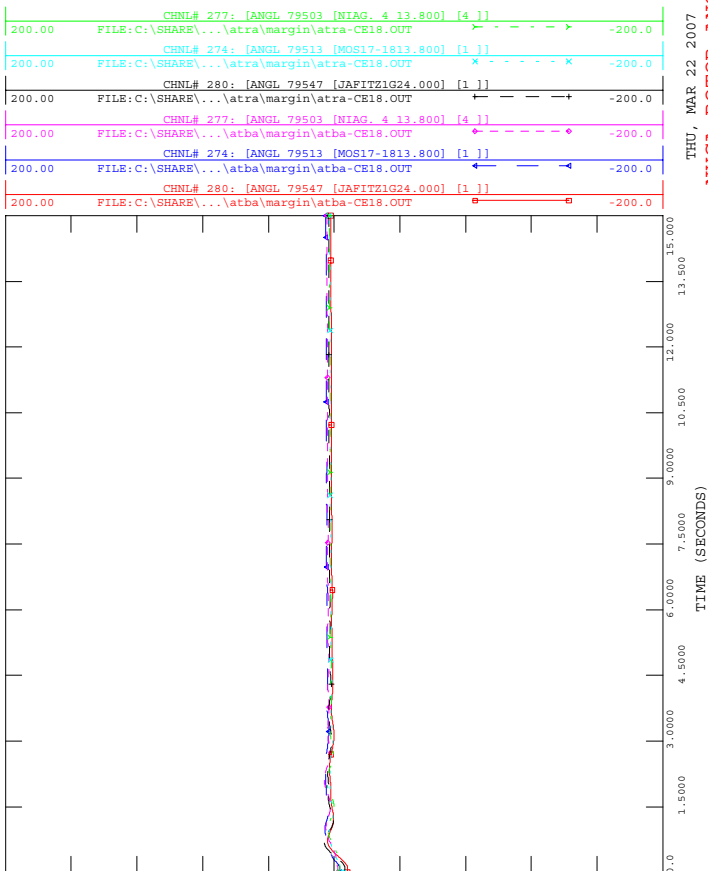
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2011 SUMMER STABILITY MARGIN CASE
LLG-NC@ROCK TAV 345/TWR: COOPERS CORNERS-ROCK TAVERN
CCRT-34 & CCRT-42

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NYCA VOLTAGES



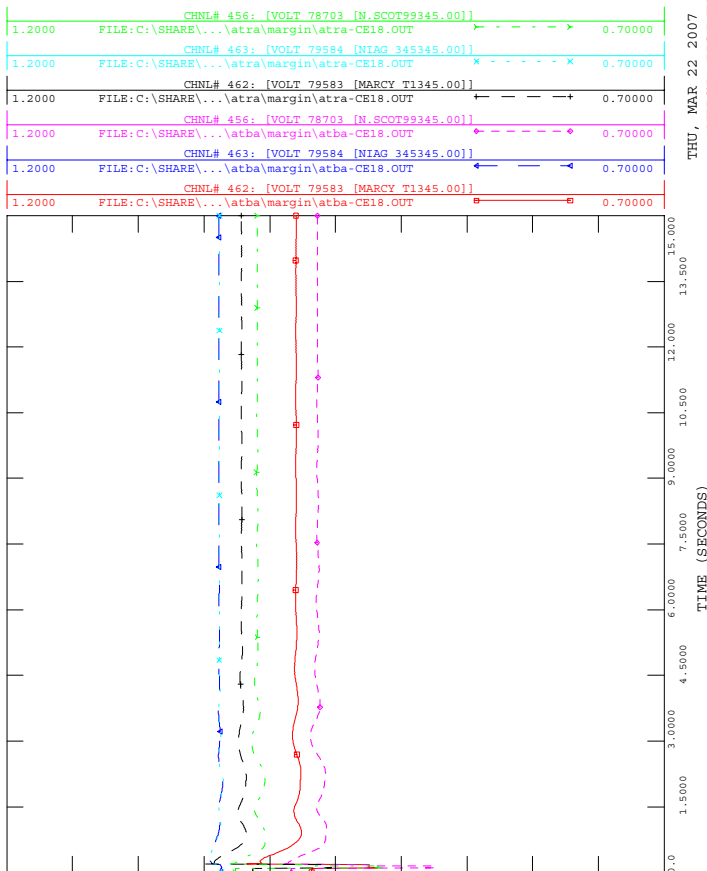
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2011 SUMMER STABILITY MARGIN CASE
LLG-NC@ROCK TAV 345/TWR: COOPERS CORNERS-ROCK TAVERN
CCRT-34 & CCRT-42

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NYCA ROTOR ANGLES



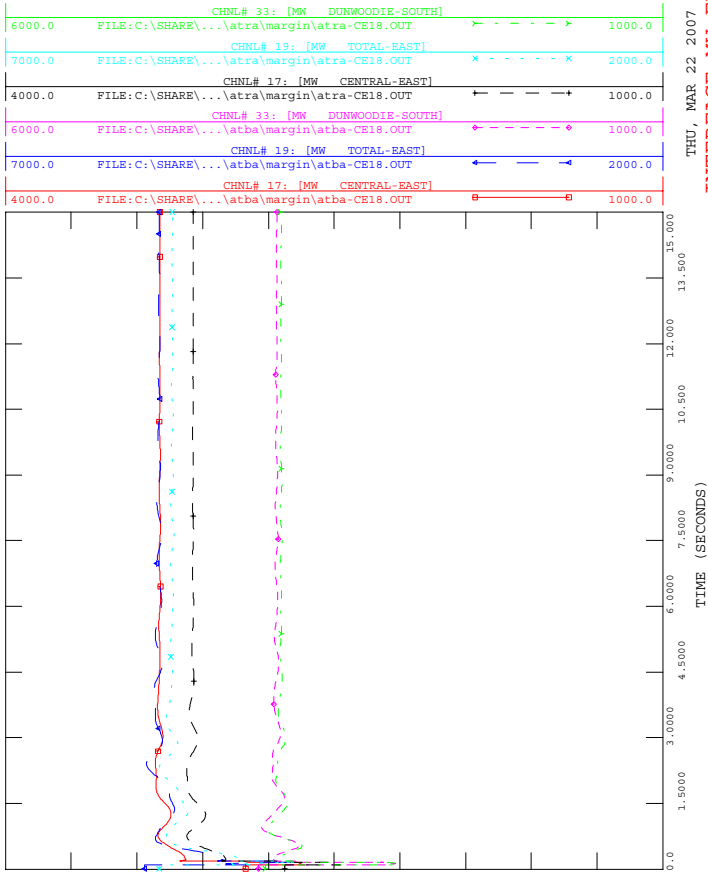
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2011 SUMMER STABILITY MARGIN CASE
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CCRT-34 & CCRT-42

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NYCA VOLTAGES

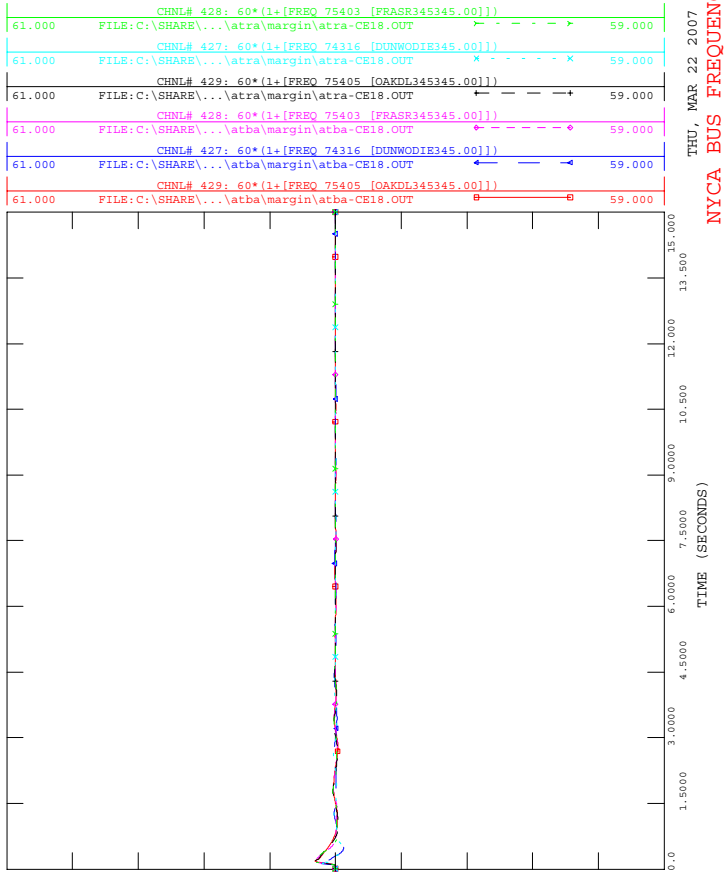




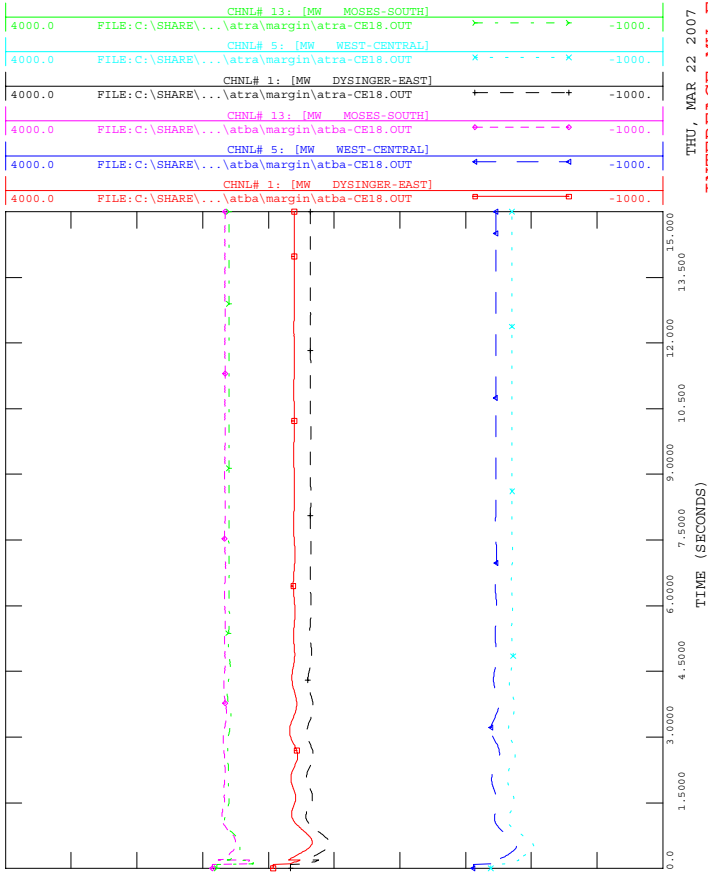
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CCRT-34 & CCRT-42



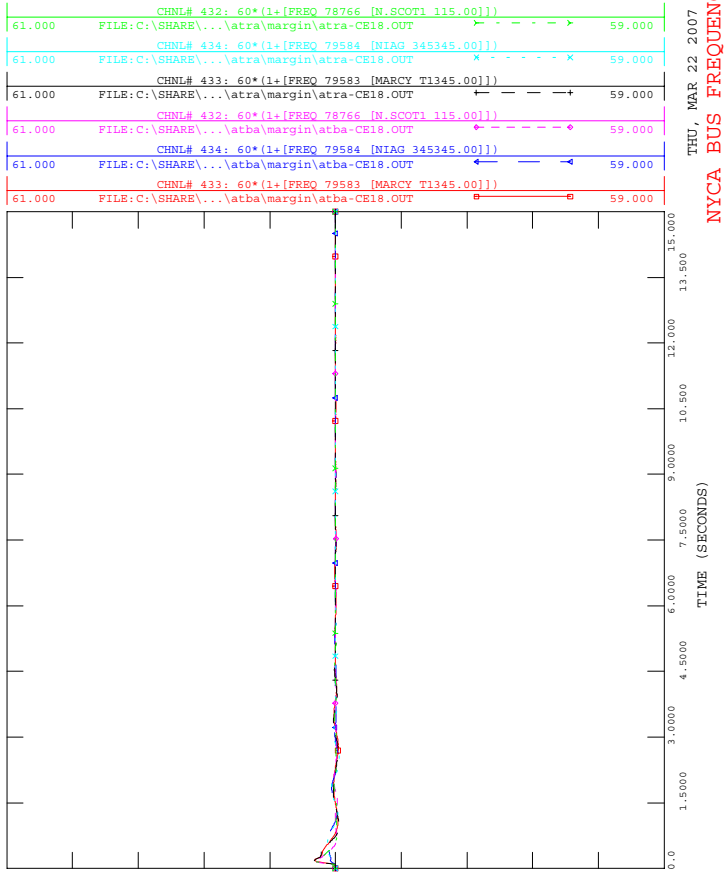
2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
LLG-NC@ROCK TAV 345/TWR: COOPERS CORNERS-ROCK TAVERN
CCRT-34 & CCRT-42



2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
LLG-NC@ROCK TAV 345/TWR: COOPERS CORNERS-ROCK TAVERN
CCRT-34 & CCRT-42

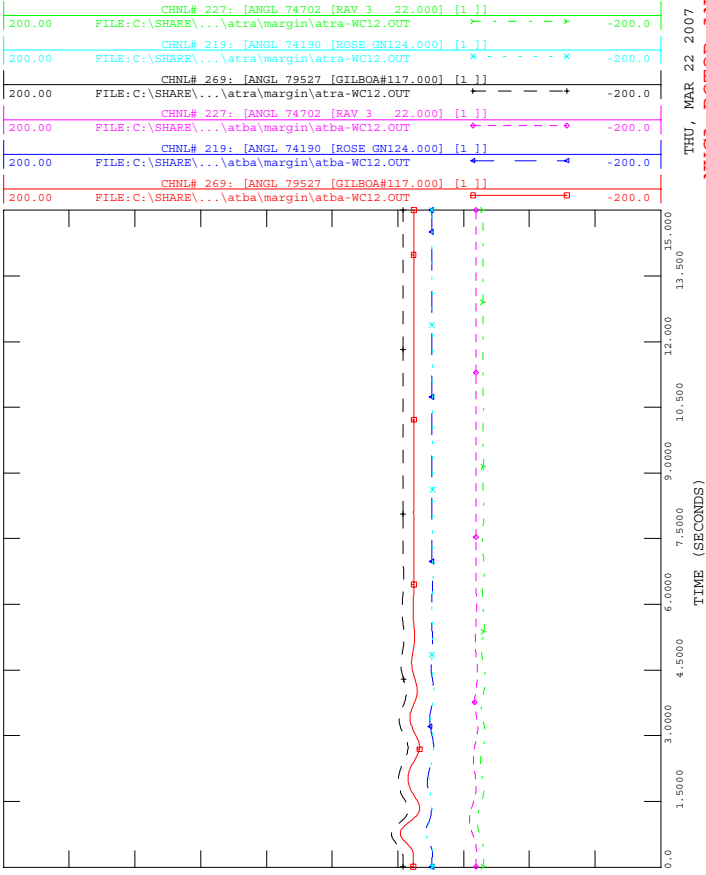


2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
LLG-NC@ROCK TAV 345/TWR: COOPERS CORNERS-ROCK TAVERN
CCRT-34 & CCRT-42

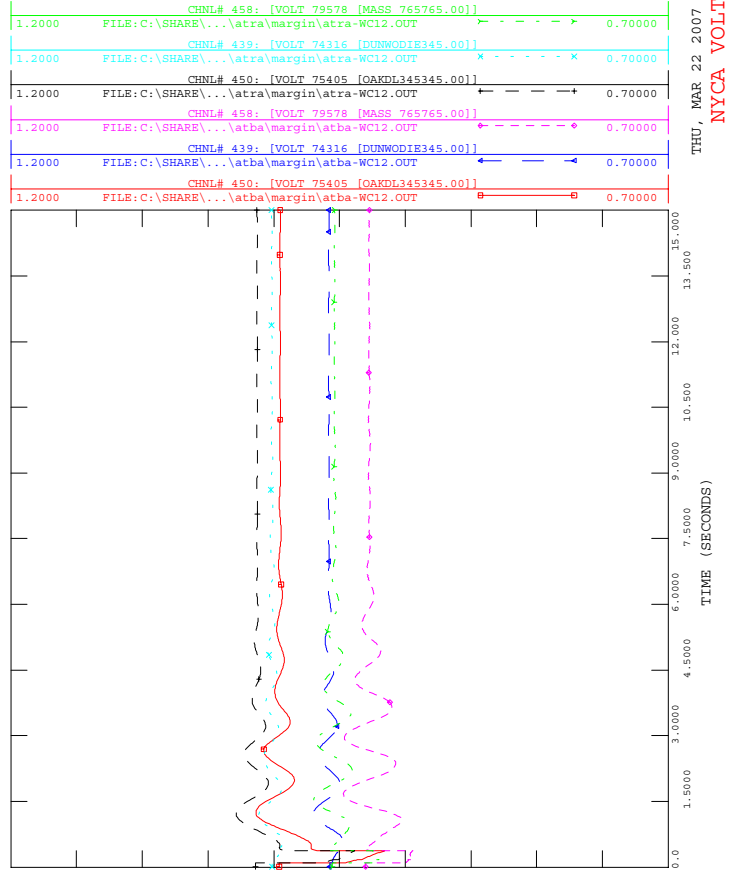




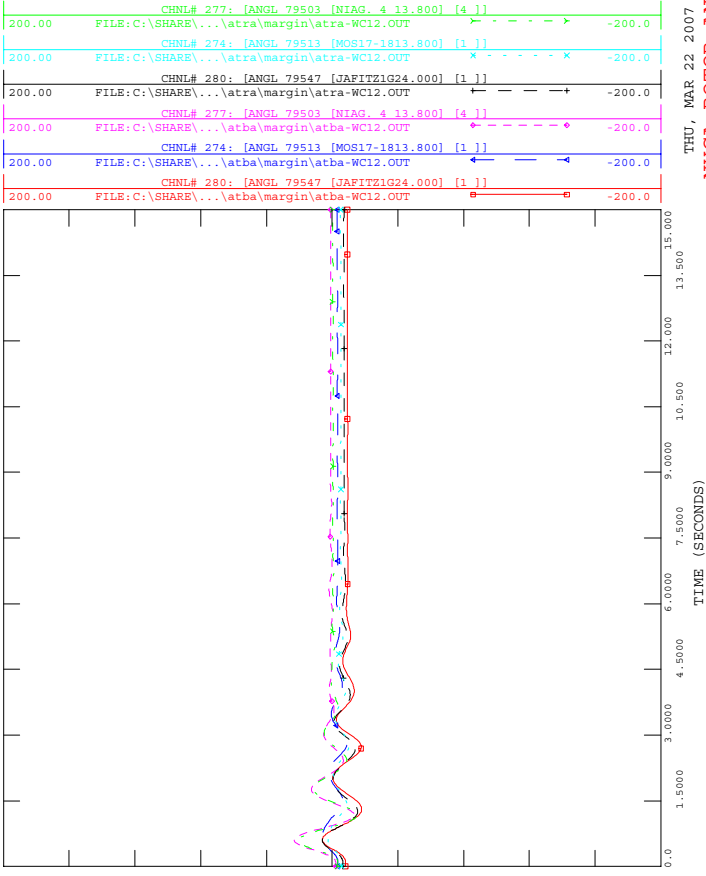
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SLG-STK@ROCHESTER 345/NIAGARA-ROCHESTER NR2
BACKUP CLEARING ROCHESTER-PANNELL RD RP-2



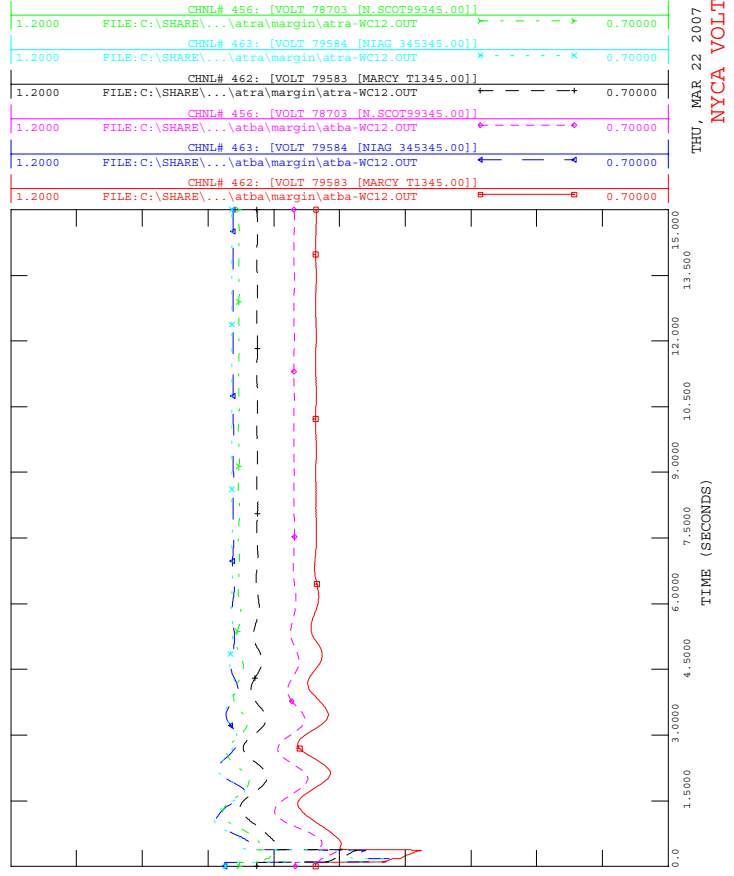
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2011 SUMMER STABILITY MARGIN CASE
SLG-STK@ROCHESTER 345/NIAGARA-ROCHESTER NR2
BACKUP CLEARING ROCHESTER-PANNELL RD RP-2



2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
SLG-STK@ROCHESTER 345/NIAGARA-ROCHESTER NR2
BACKUP CLEARING ROCHESTER-PANNELL RD RP-2

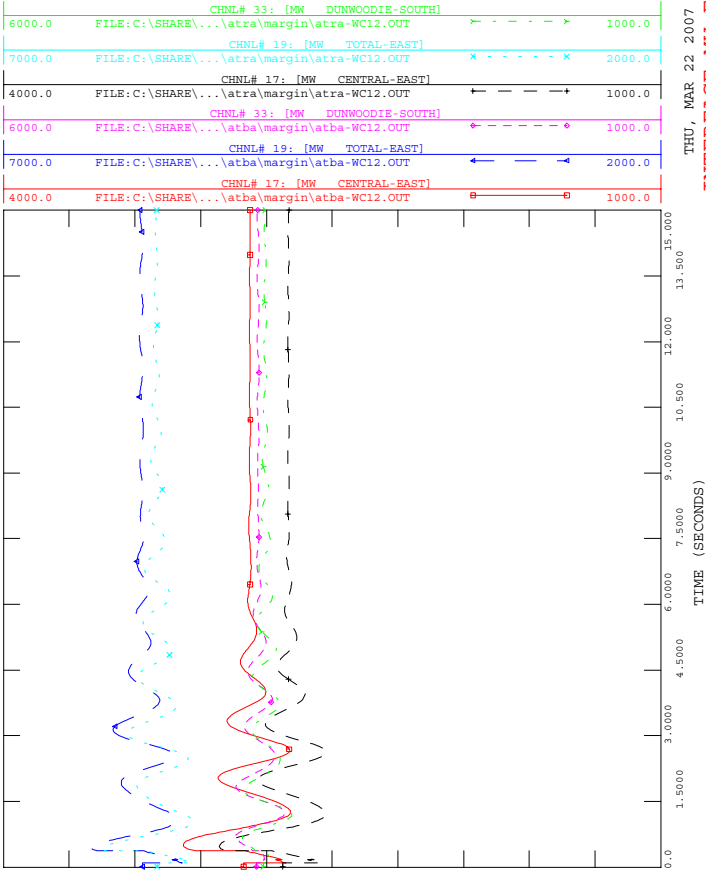


2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
SLG-STK@ROCHESTER 345/NIAGARA-ROCHESTER NR2
BACKUP CLEARING ROCHESTER-PANNELL RD RP-2

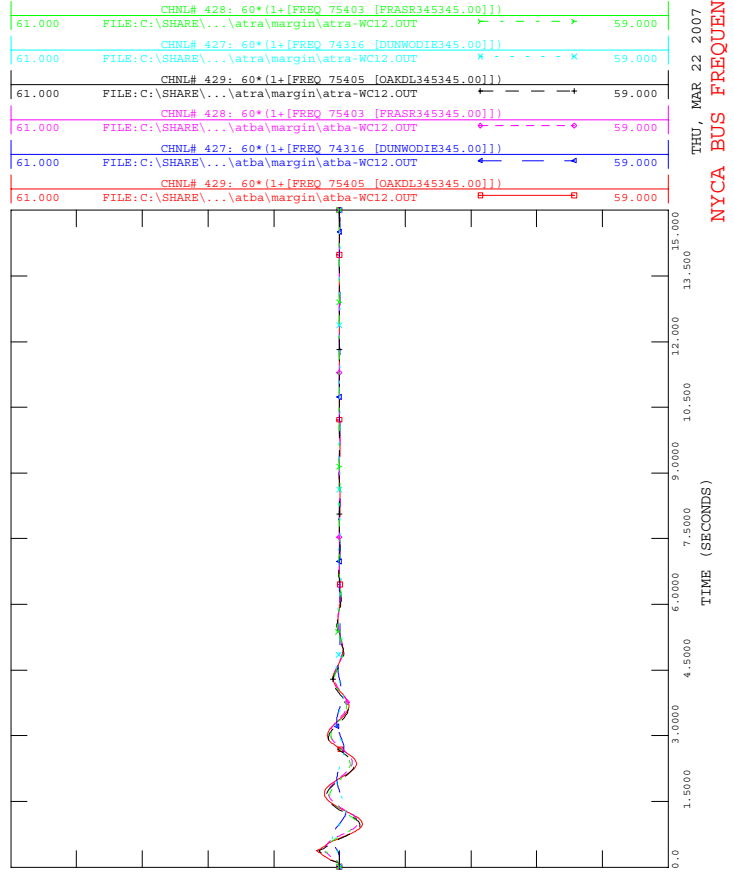




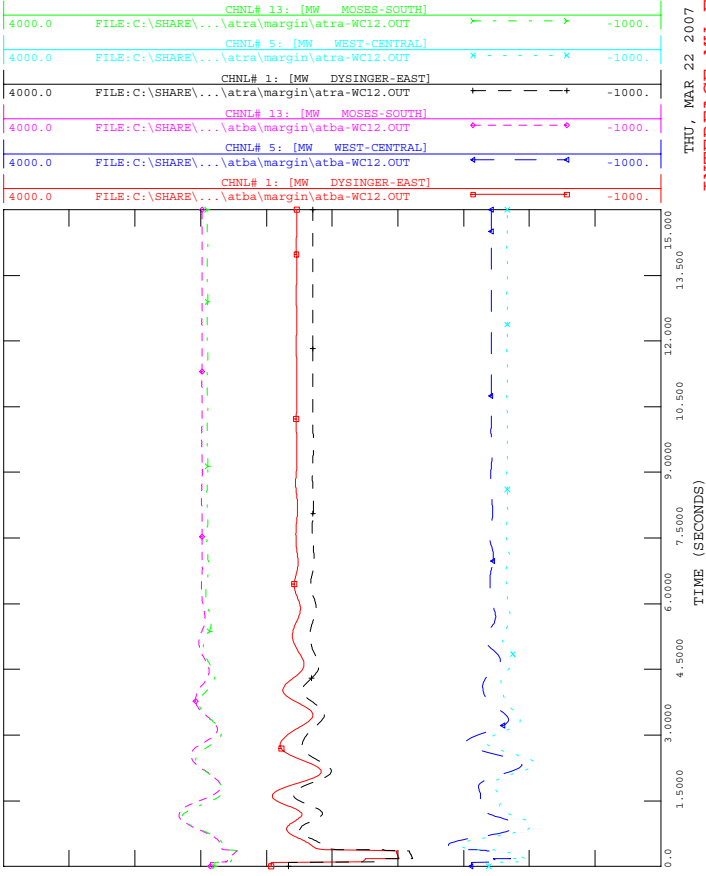
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SLG-STK@ROCHESTER 345/NIAGARA-ROCHESTER NR2
BACKUP CLEARING ROCHESTER-PANNELL RD RP-2



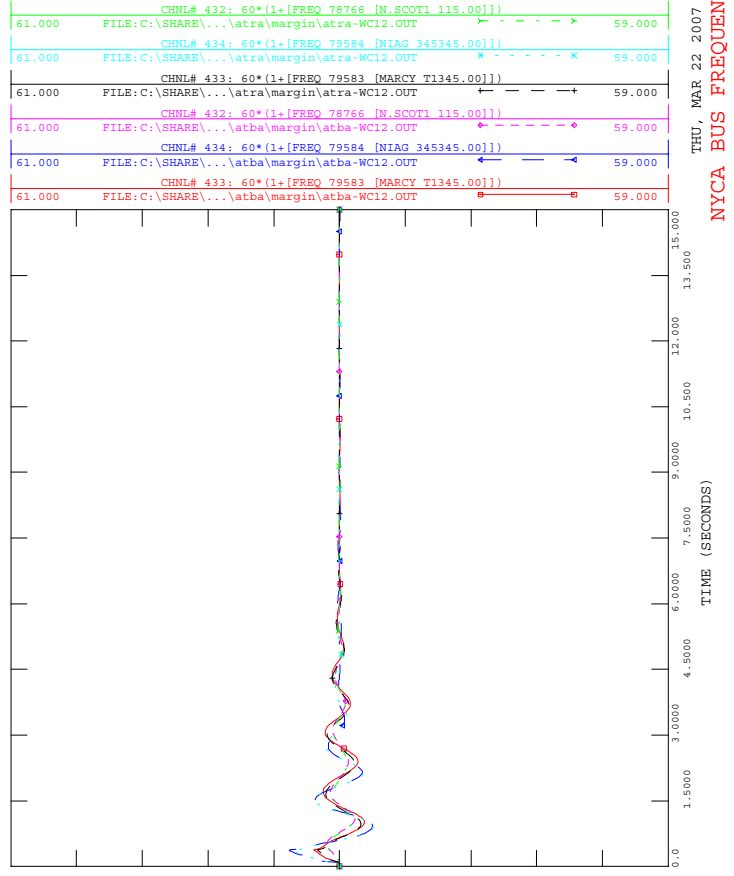
2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
SLG-STK@ROCHESTER 345/NIAGARA-ROCHESTER NR2
BACKUP CLEARING ROCHESTER-PANNELL RD RP-2



2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
SLG-STK@ROCHESTER 345/NIAGARA-ROCHESTER NR2
BACKUP CLEARING ROCHESTER-PANNELL RD RP-2



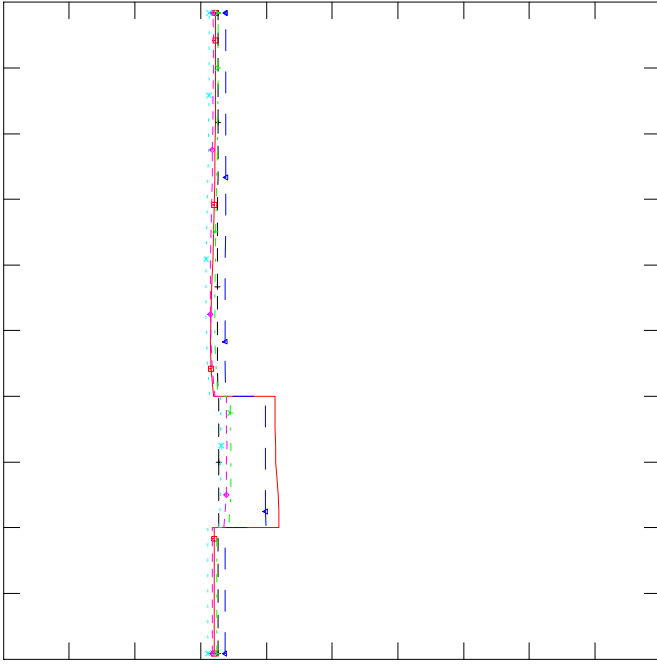
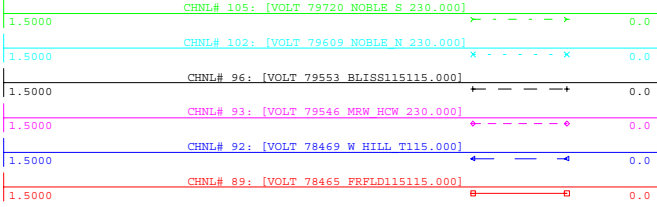
2006 ATBA/ATRA
2011 SUMMER STABILITY MARGIN CASE
SLG-STK@ROCHESTER 345/NIAGARA-ROCHESTER NR2
BACKUP CLEARING ROCHESTER-PANNELL RD RP-2





2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@JORDNVLL ON JORDNVLL-PORTER 2 230 KV

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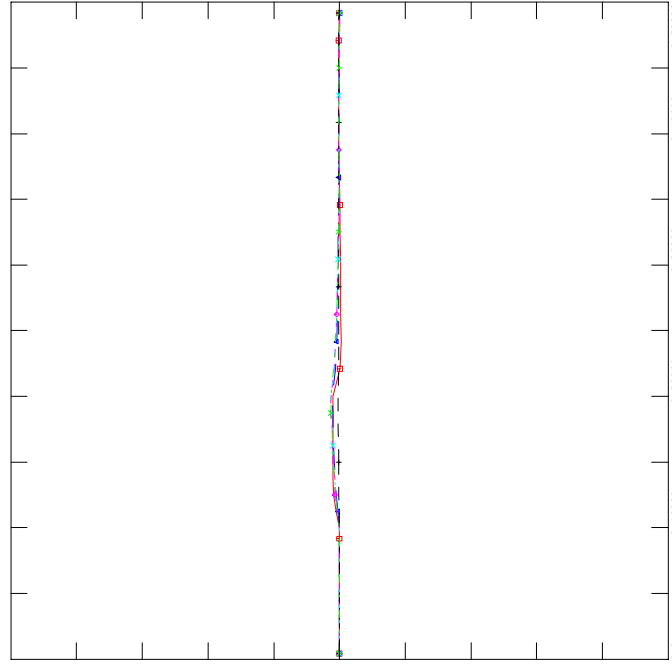
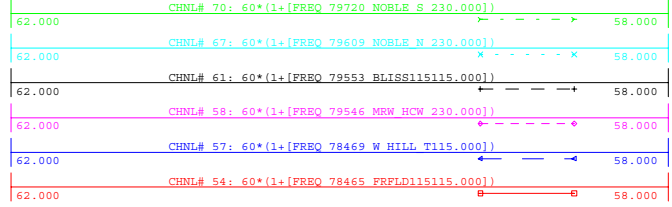


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WIND FARM POI VOLTAGES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@JORDNVLL ON JORDNVLL-PORTER 2 230 KV

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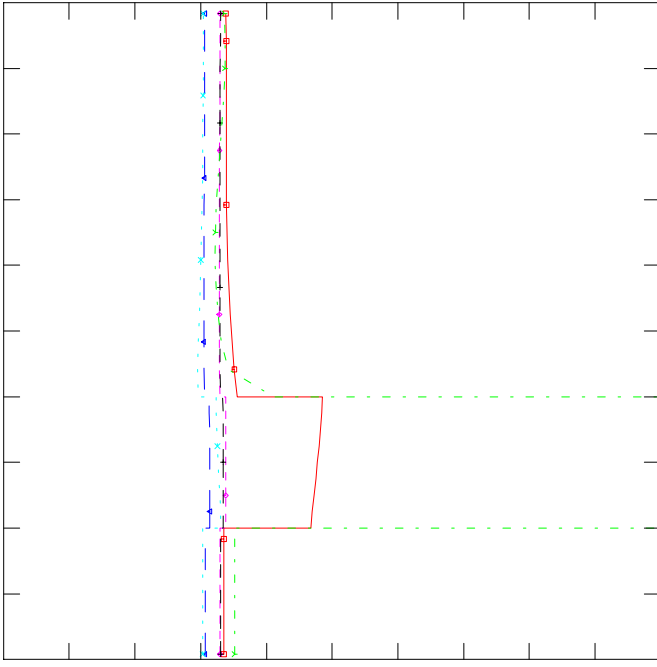
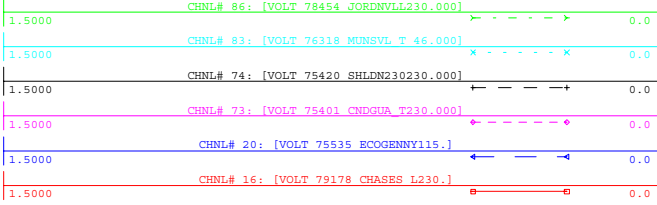


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WIND FARM POI BUS FREQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@JORDNVLL ON JORDNVLL-PORTER 2 230 KV

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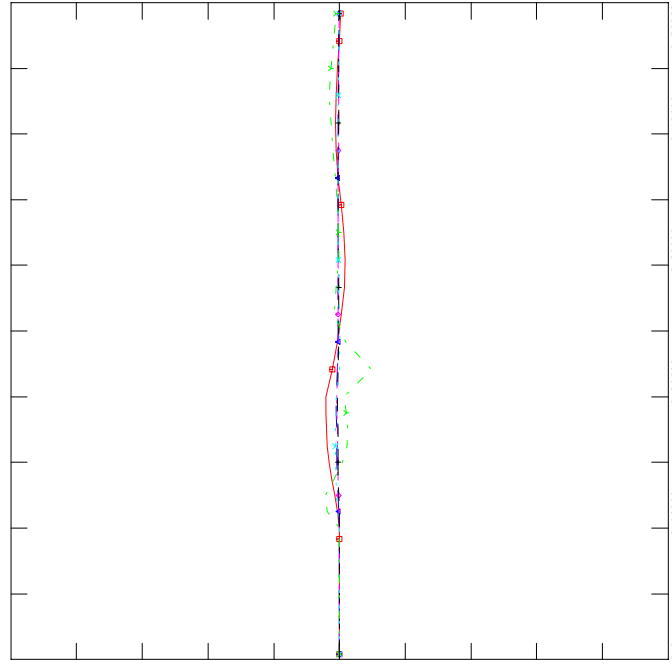
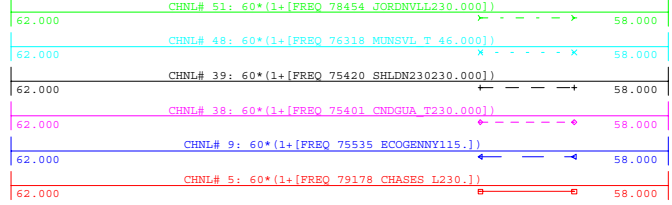


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WIND FARM POI VOLTAGES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@JORDNVLL ON JORDNVLL-PORTER 2 230 KV

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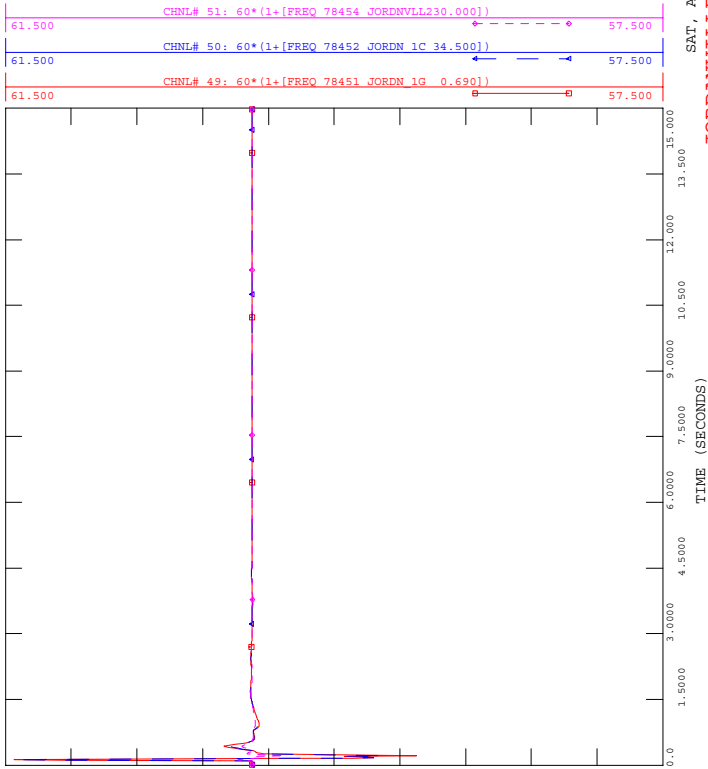
THU, APR 05 2007 9:19
NYCA BUS FREQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@JORDNVLL ON JORDNVLL-PORTER 2 230 KV

FILE: atra-CE35.OUT

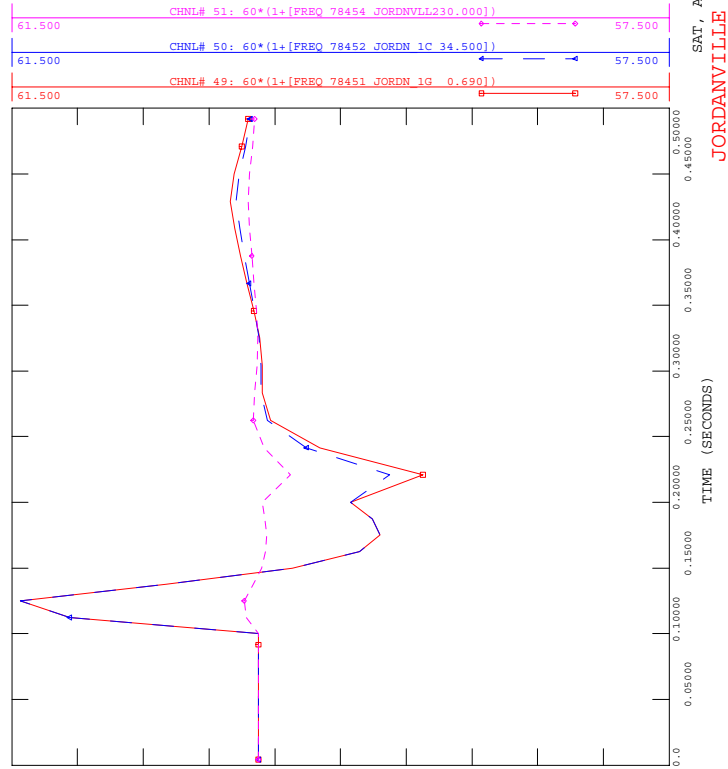
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JORDANVILLE FREQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@JORDNVLL ON JORDNVLL-PORTER 2 230 KV

FILE: atra-CE35.OUT

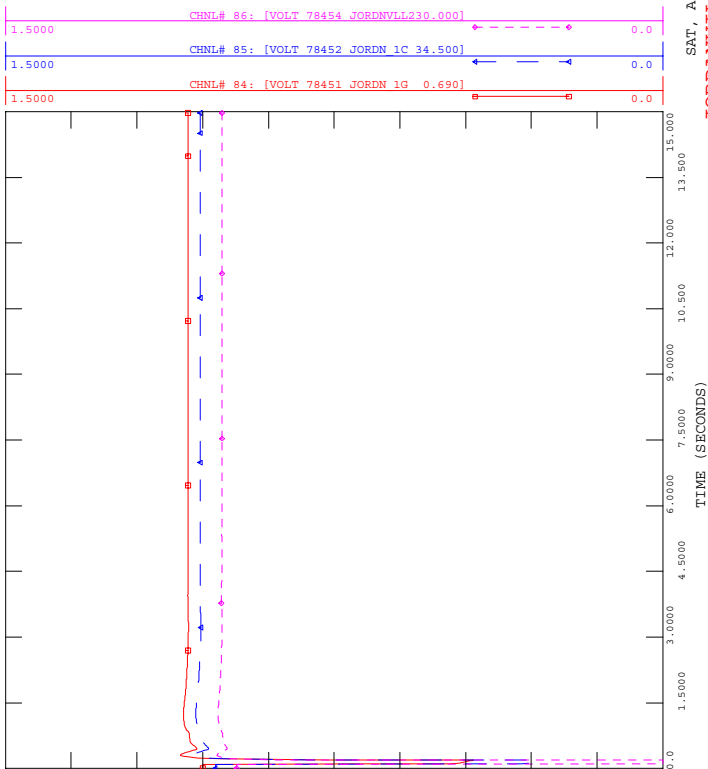
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JORDANVILLE FREQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@JORDNVLL ON JORDNVLL-PORTER 2 230 KV

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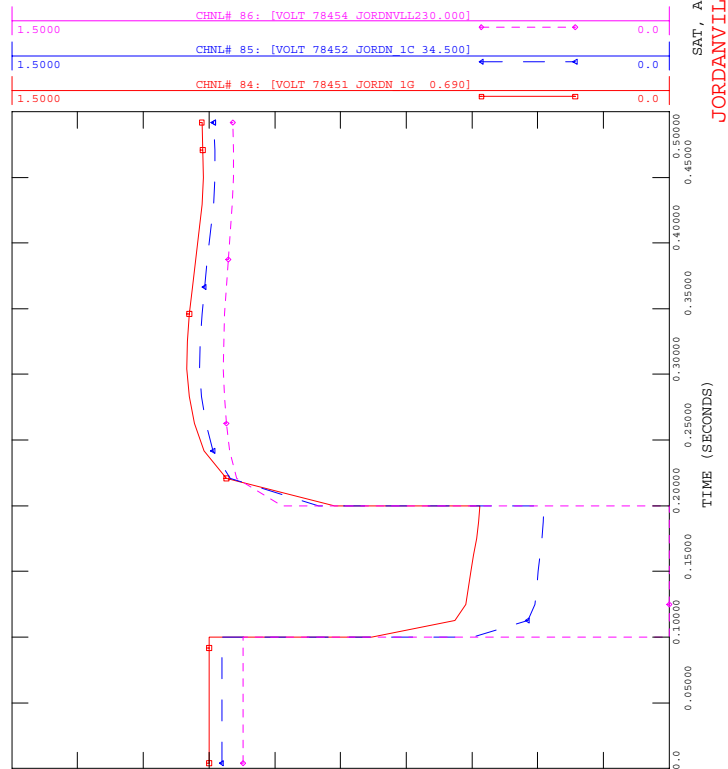
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JORDANVILLE VOLTAGES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@JORDNVLL ON JORDNVLL-PORTER 2 230 KV

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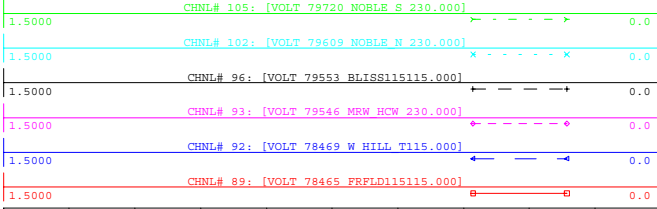
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JORDANVILLE VOLTAGES





2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@JORDNVLL ON JORDNVLL-ROTRDM.2 230 KV

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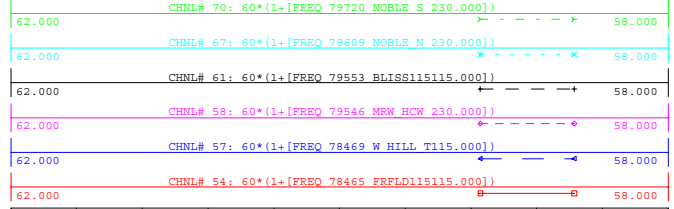


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WIND FARM POI VOLTAGES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@JORDNVLL ON JORDNVLL-ROTRDM.2 230 KV

FILE: atra-CE36.OUT

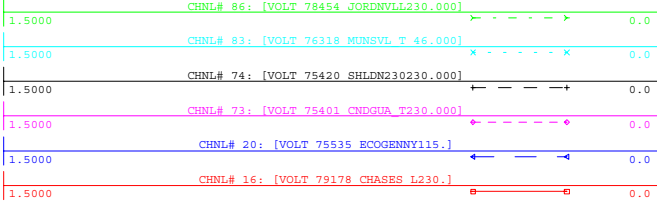


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WIND FARM POI BUS FREQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@JORDNVLL ON JORDNVLL-ROTRDM.2 230 KV

FILE: atra-CE36.OUT

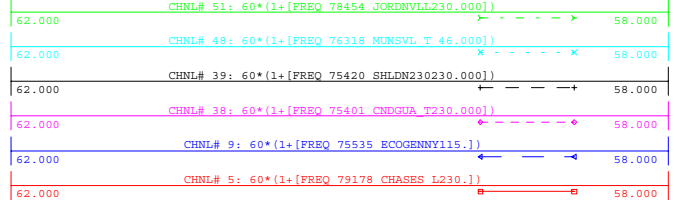


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WIND FARM POI VOLTAGES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@JORDNVLL ON JORDNVLL-ROTRDM.2 230 KV

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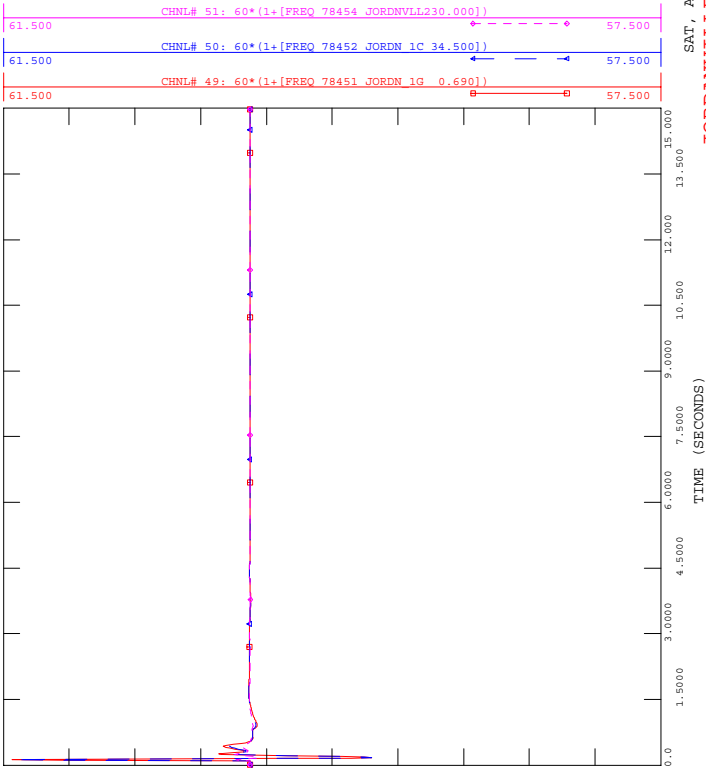
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WIND FARM POI BUS FREQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@JORDNVLL ON JORDNVLL-ROTRDM.2 230 KV

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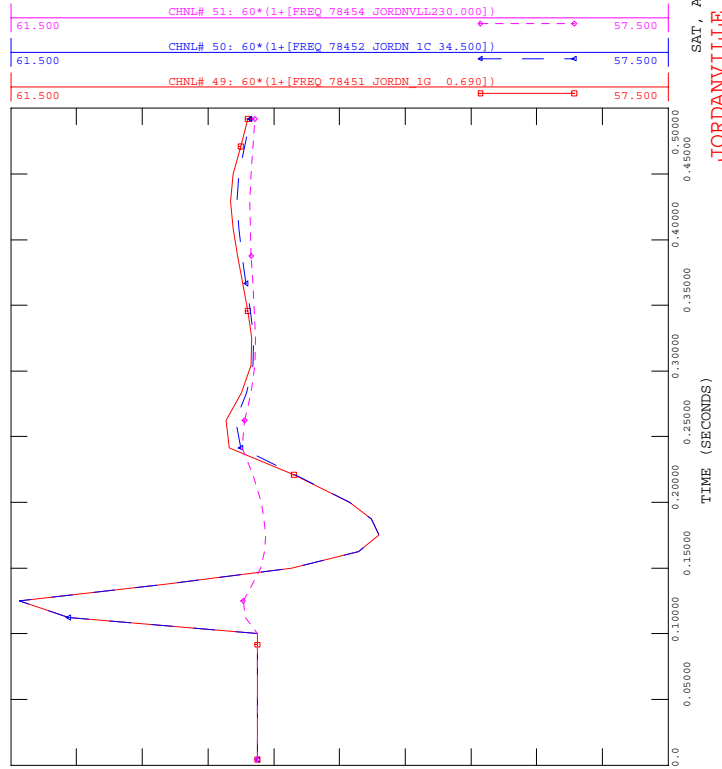
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JORDANVILLE REQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@JORDNVLL ON JORDNVLL-ROTRDM.2 230 KV

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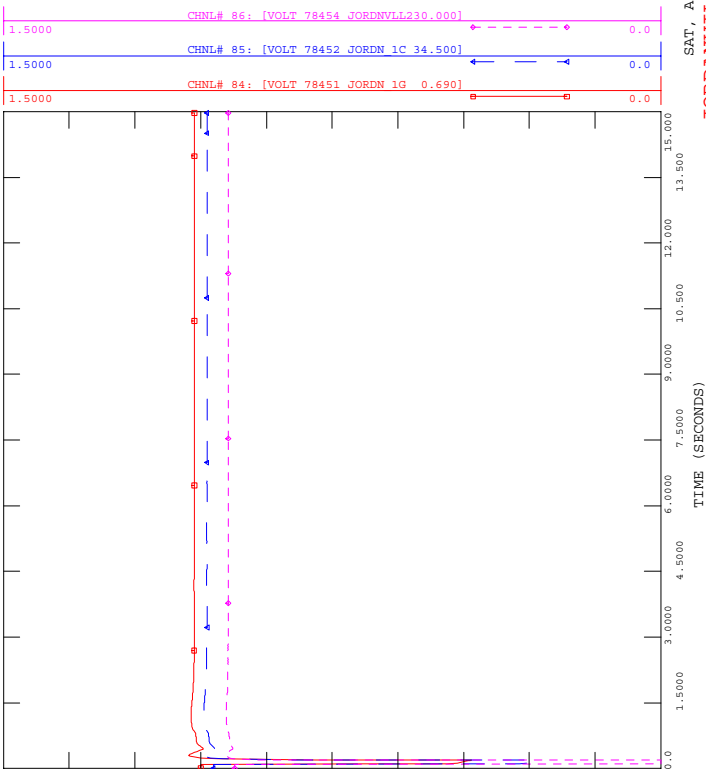
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JORDANVILLE REQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@JORDNVLL ON JORDNVLL-ROTRDM.2 230 KV

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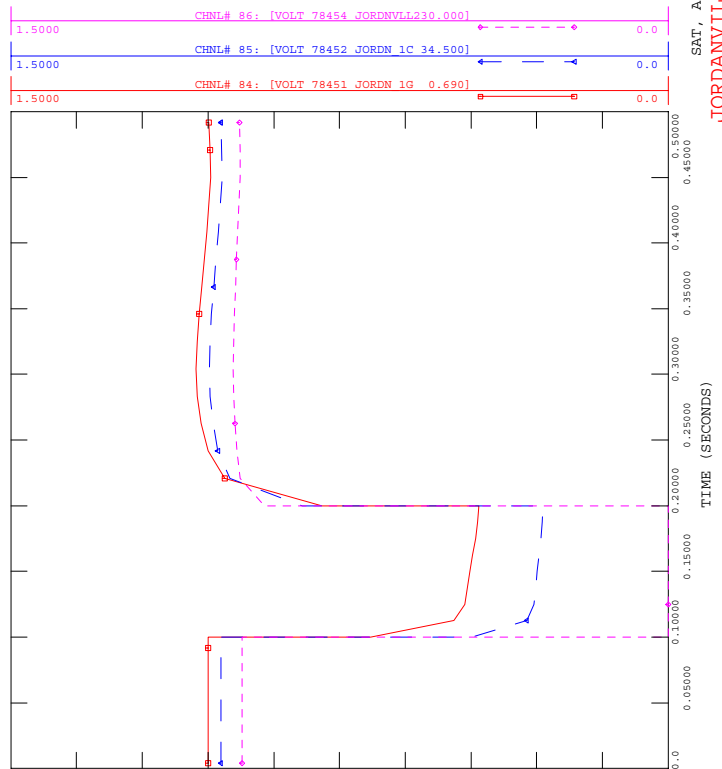
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JORDANVILLE VOLTAGES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@JORDNVLL ON JORDNVLL-ROTRDM.2 230 KV

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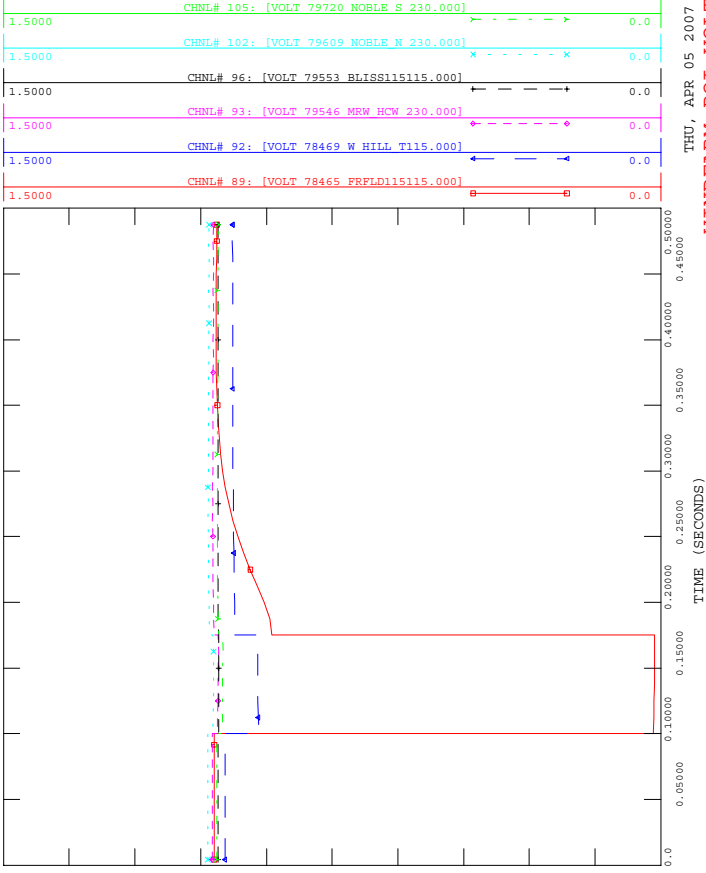
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JORDANVILLE VOLTAGES





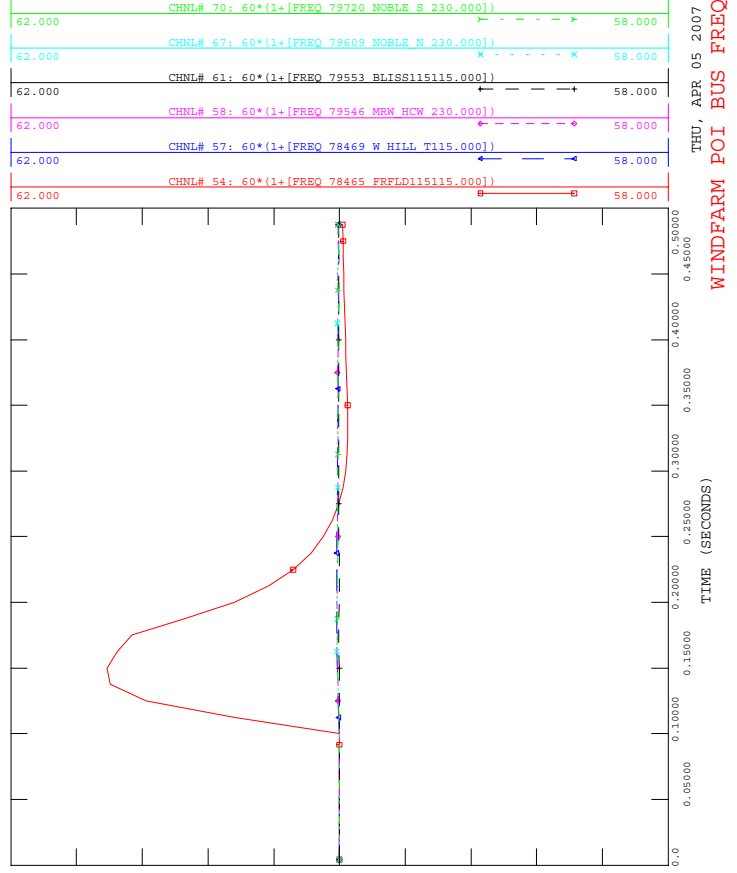
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2011 SUMMER STABILITY MARGIN CASE
3PH-NC@SALBRY4 ON SALBRY4-INGMS-CD 115 KV

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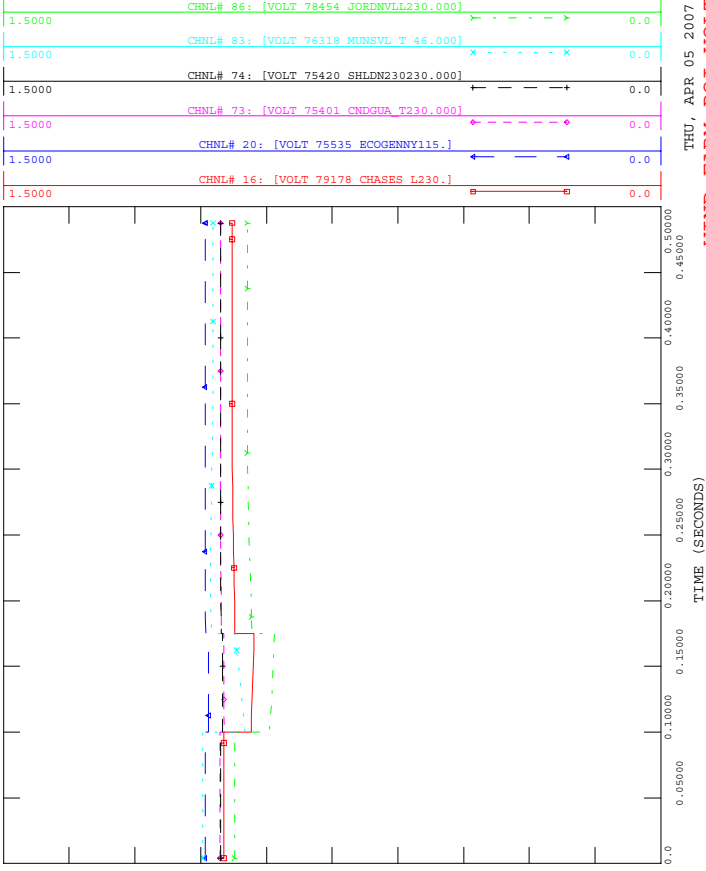
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2011 SUMMER STABILITY MARGIN CASE
3PH-NC@SALBRY4 ON SALBRY4-INGMS-CD 115 KV

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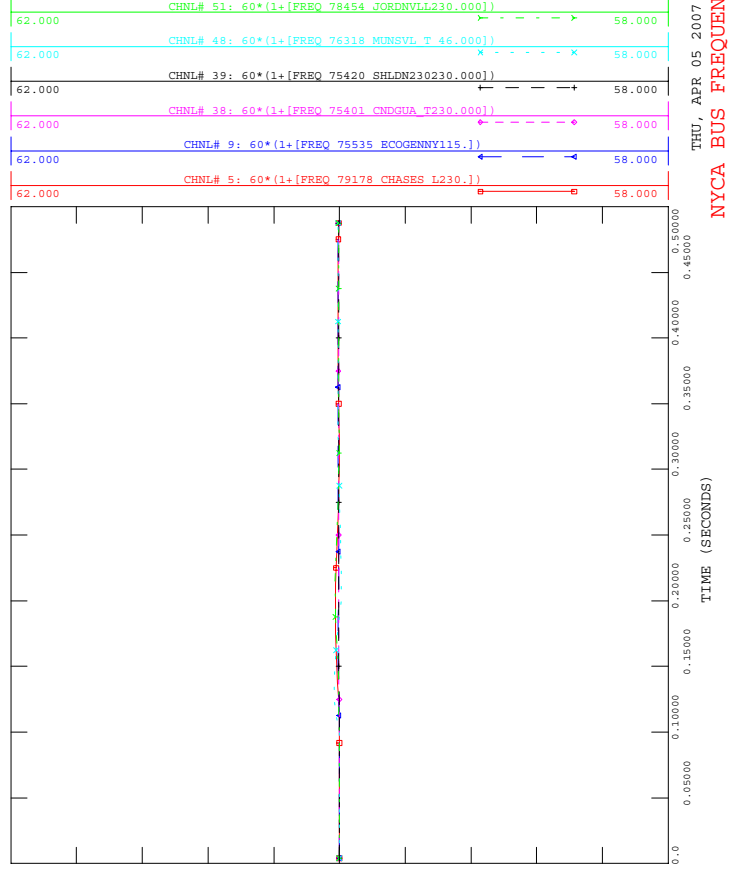
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2011 SUMMER STABILITY MARGIN CASE
3PH-NC@SALBRY4 ON SALBRY4-INGMS-CD 115 KV

FILE: atra-CE37.OUT



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@SALBRY4 ON SALBRY4-INGMS-CD 115 KV

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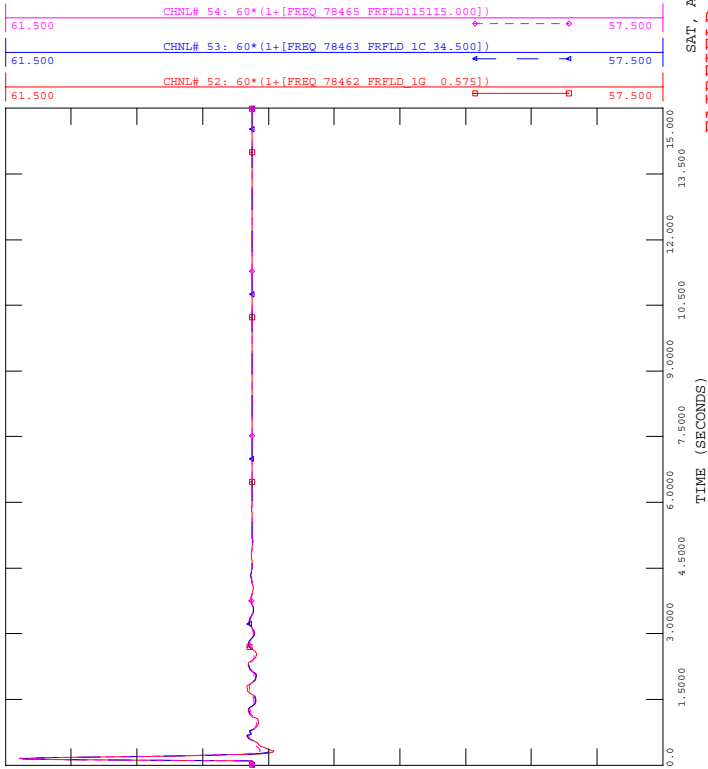




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2011 SUMMER STABILITY MARGIN CASE
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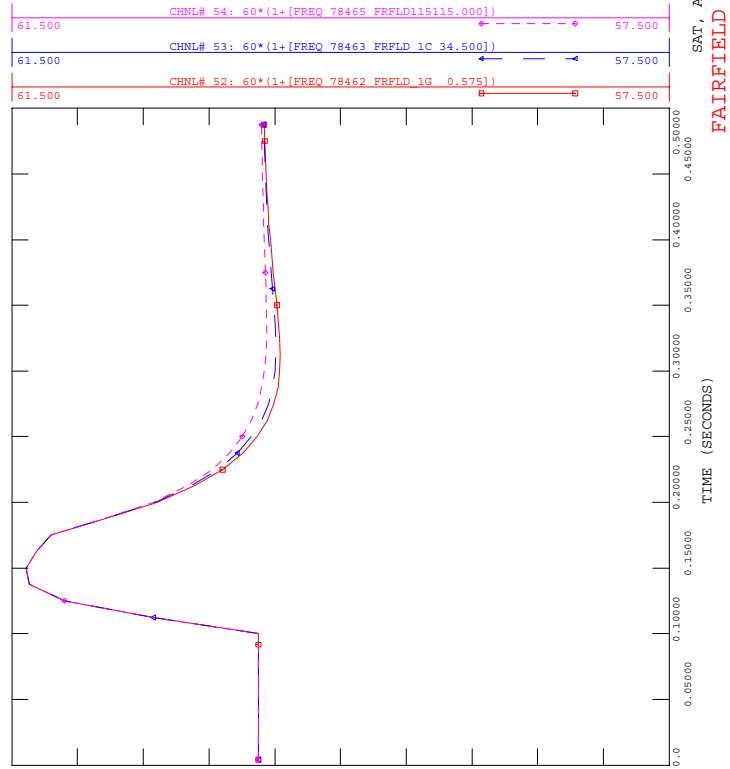
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FAIRFIELD FREQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@SALBRY4 ON SALBRY4-INGMS-CD 115 KV

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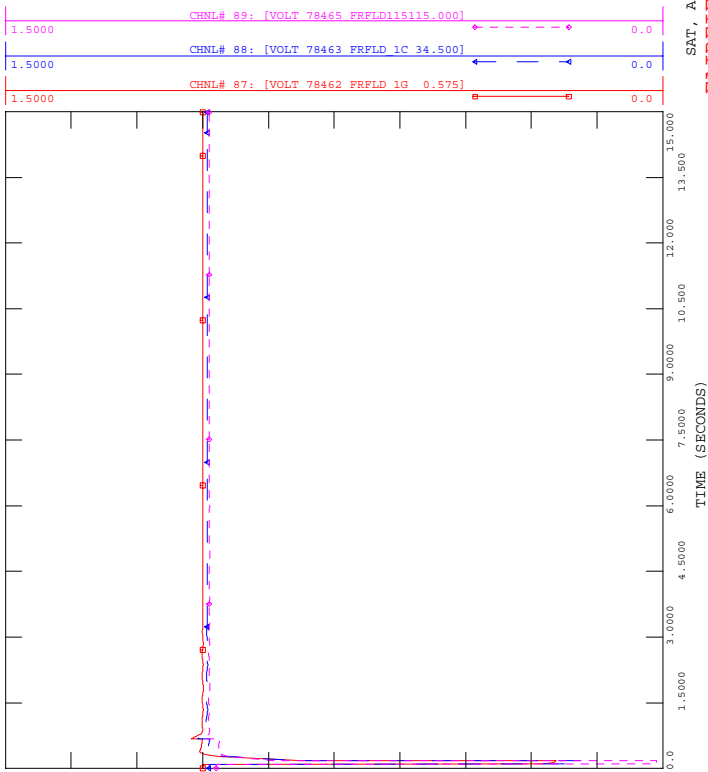
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FAIRFIELD FREQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@SALBRY4 ON SALBRY4-INGMS-CD 115 KV

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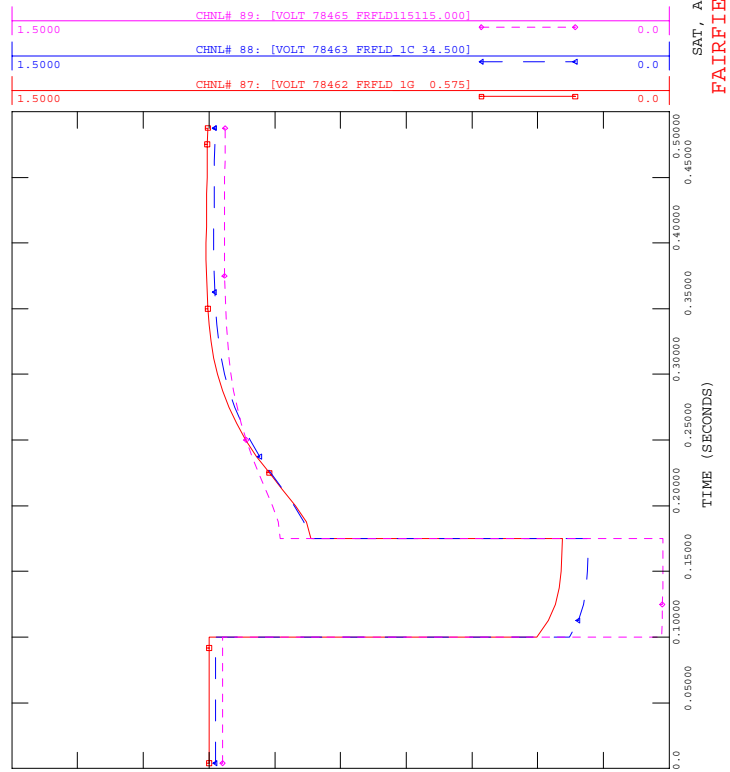
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FAIRFIELD VOLTAGES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@SALBRY4 ON SALBRY4-INGMS-CD 115 KV

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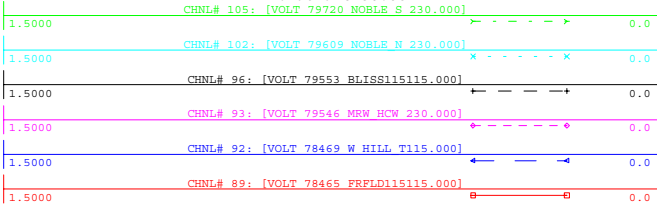
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FAIRFIELD VOLTAGES





2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@SALBRY4 ON SALBRY4-VALLEY 115 KV

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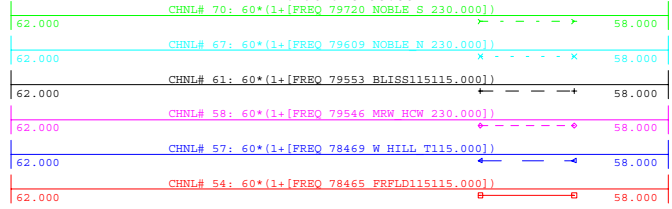


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WINDFARM POI VOLTAGES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@SALBRY4 ON SALBRY4-VALLEY 115 KV

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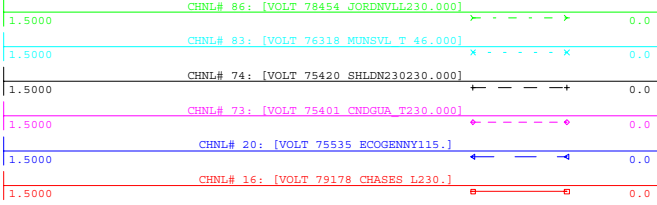


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WINDFARM POI BUS FREQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@SALBRY4 ON SALBRY4-VALLEY 115 KV

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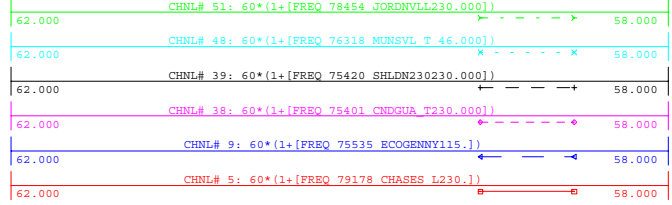


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WIND FARM POI VOLTAGES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@SALBRY4 ON SALBRY4-VALLEY 115 KV

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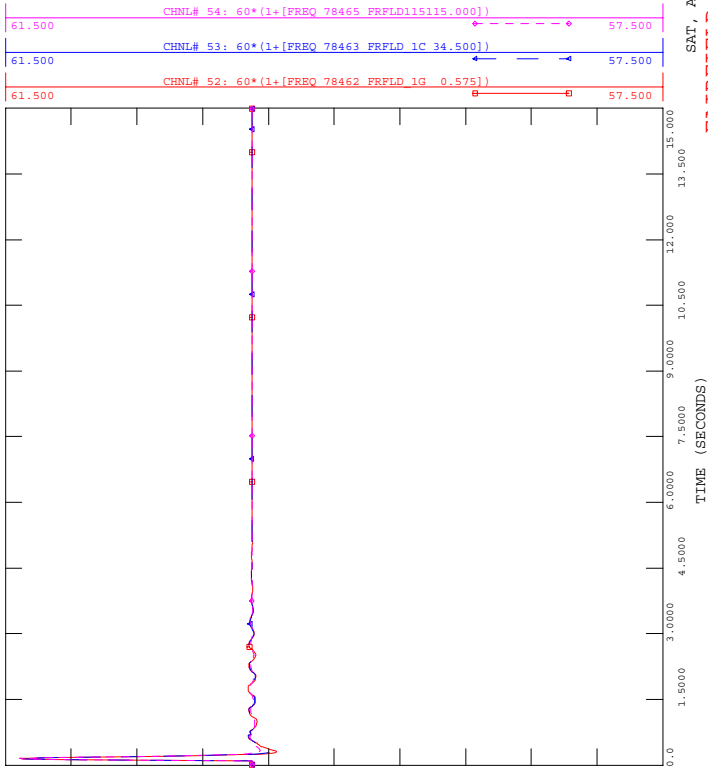
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NYCA BUS FREQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@SALBRY4 ON SALBRY4-VALLEY 115 KV

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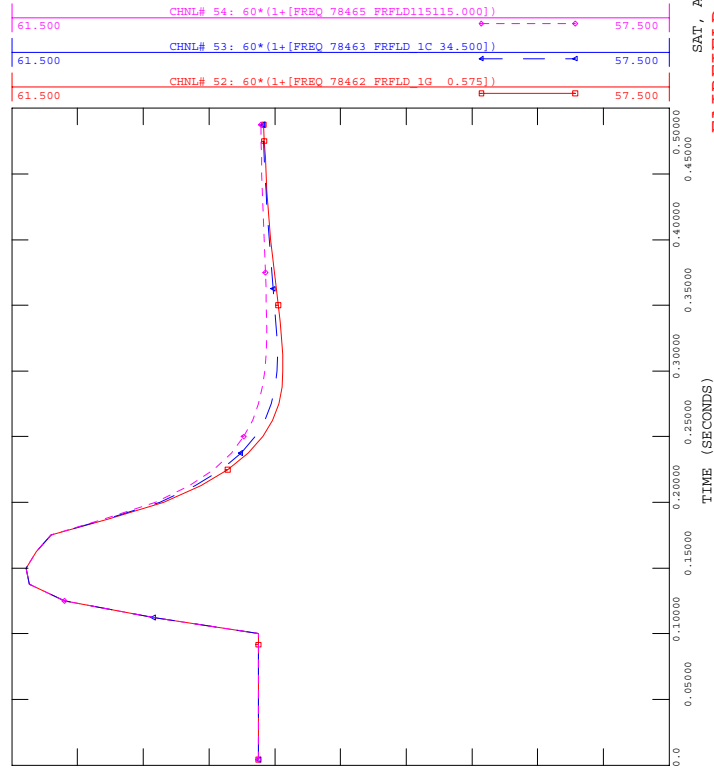
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FAIRFIELD FREQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@SALBRY4 ON SALBRY4-VALLEY 115 KV

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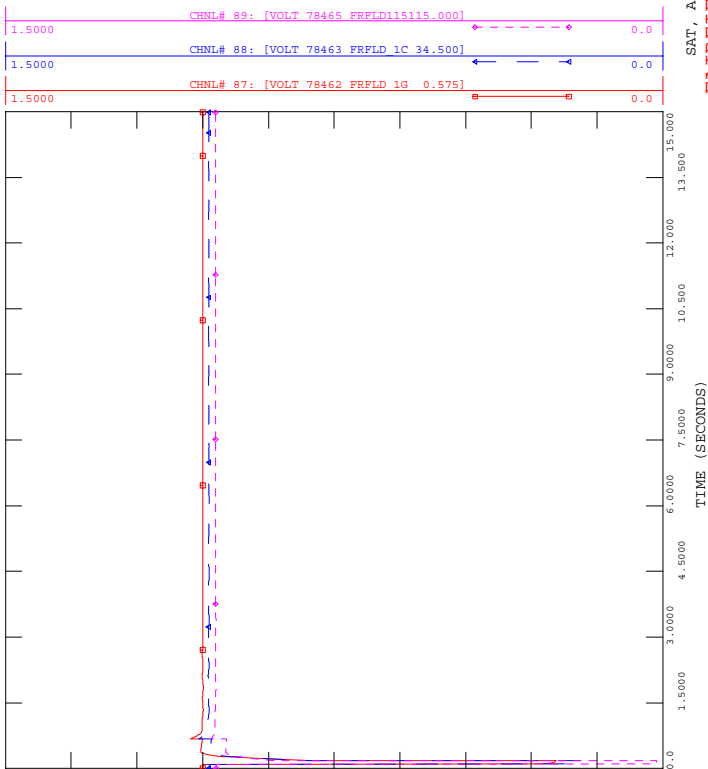
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FAIRFIELD FREQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@SALBRY4 ON SALBRY4-VALLEY 115 KV

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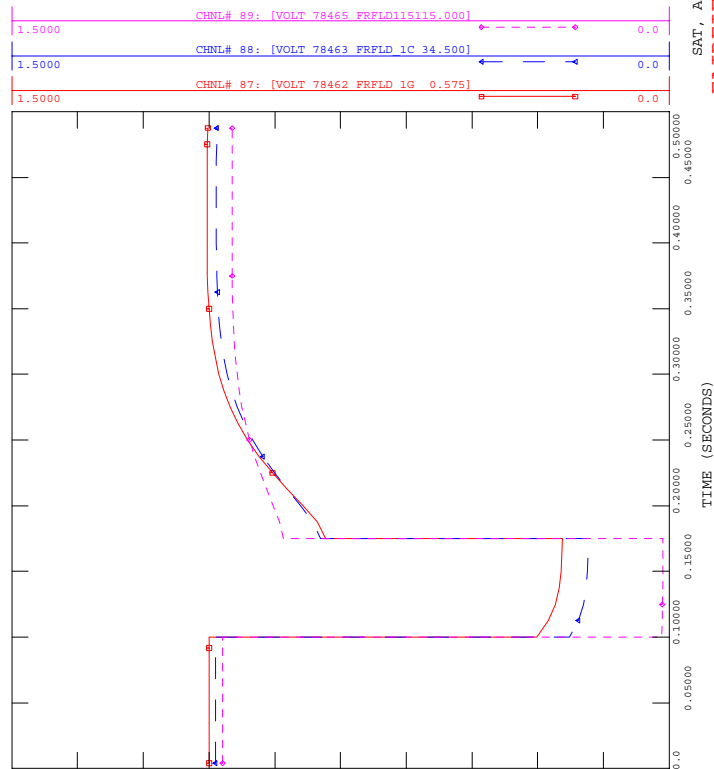
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FAIRFIELD VOLTAGES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@SALBRY4 ON SALBRY4-VALLEY 115 KV

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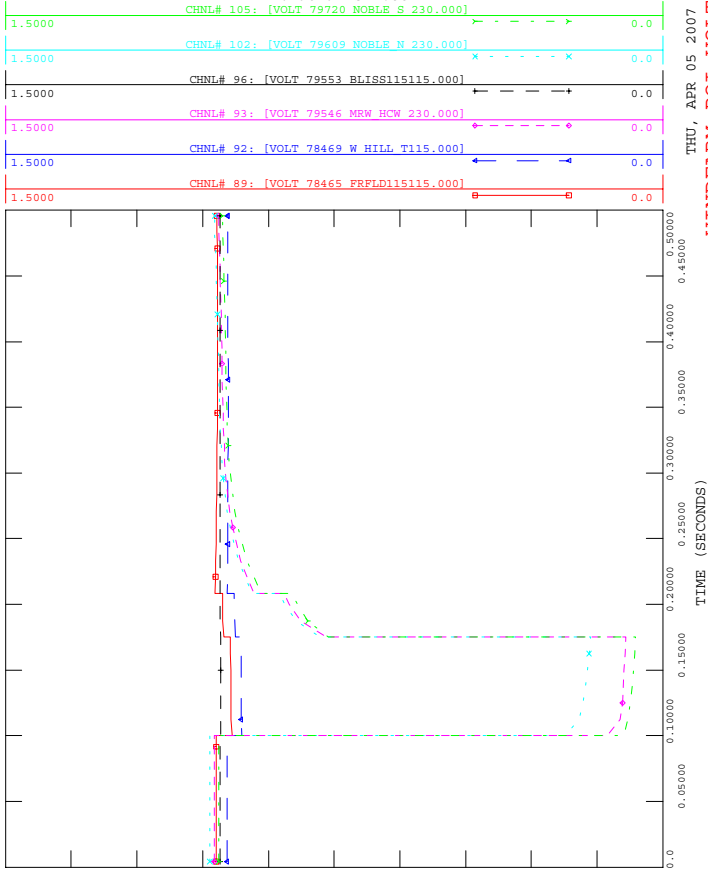
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FAIRFIELD VOLTAGES





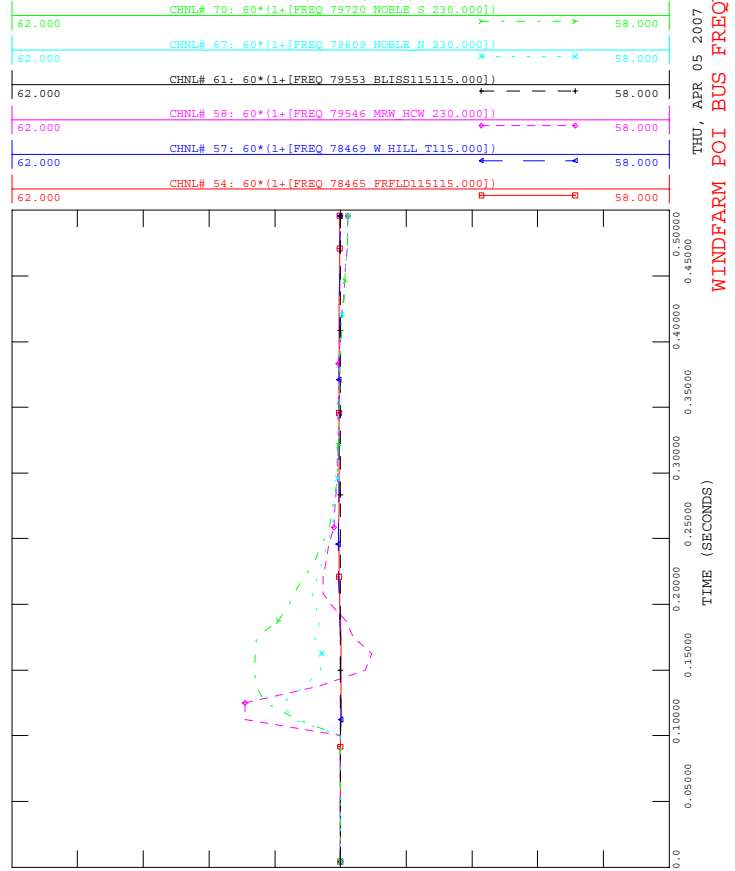
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@WILLIS E 230KV/MOSES W-WILLIS E(MW-1)

FILE: atra-MS17.OUT



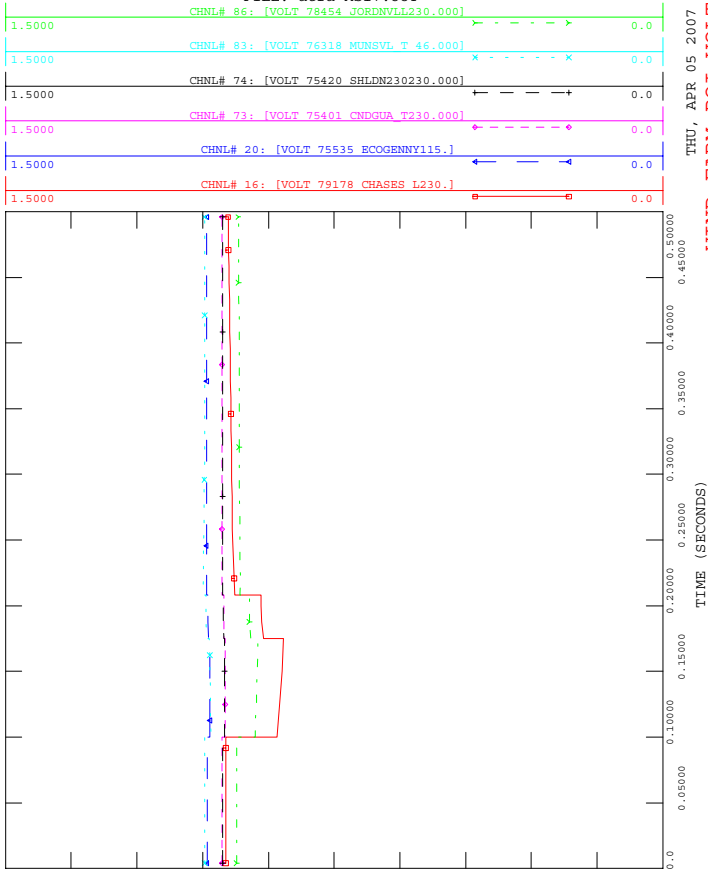
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2011 SUMMER STABILITY MARGIN CASE
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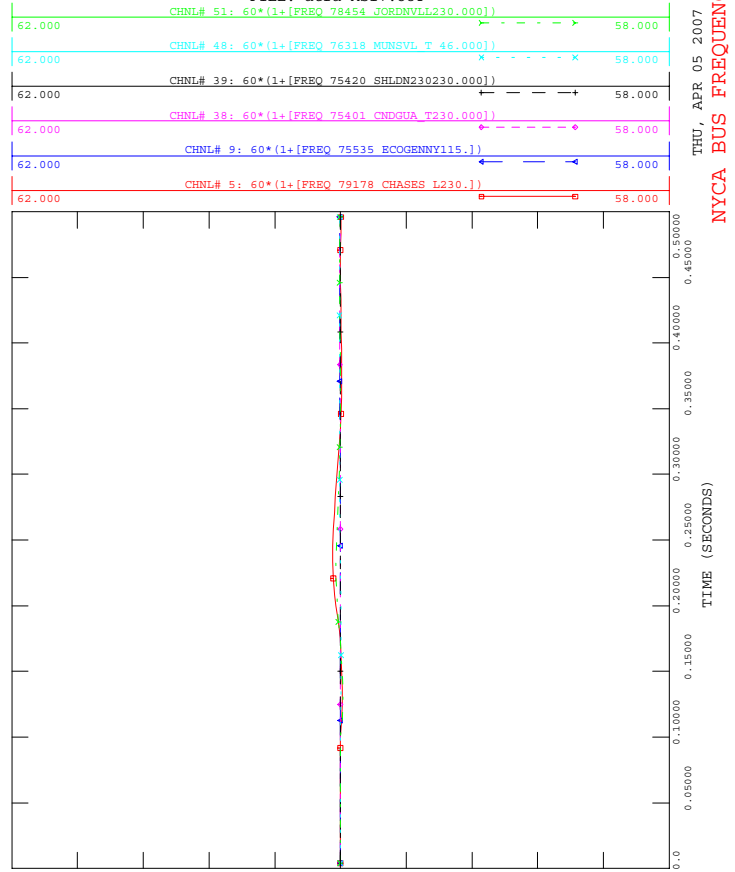
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@WILLIS E 230KV/MOSES W-WILLIS E(MW-1)

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2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@WILLIS E 230KV/MOSES W-WILLIS E(MW-1)

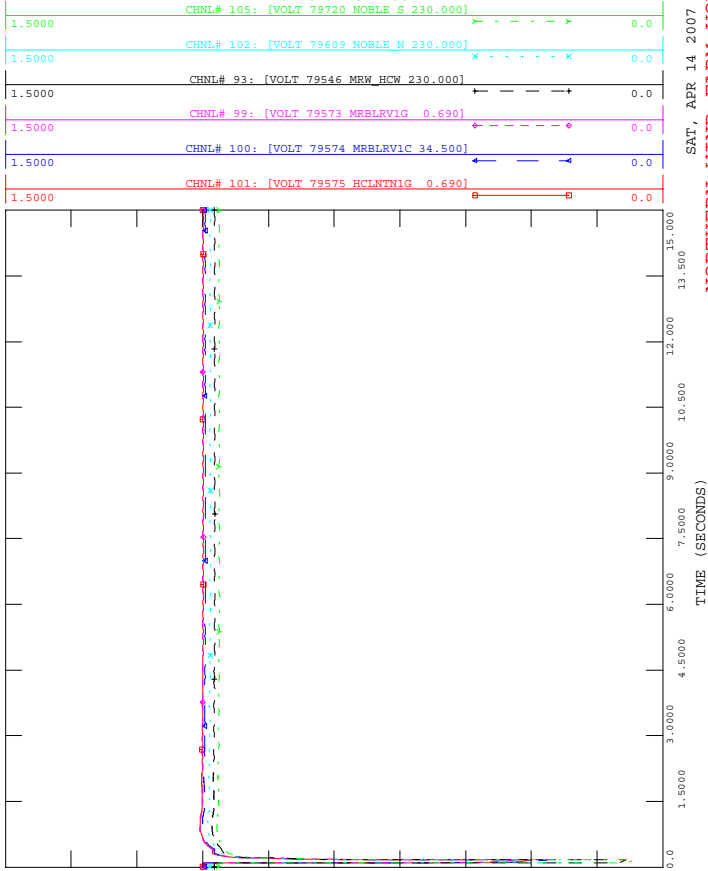
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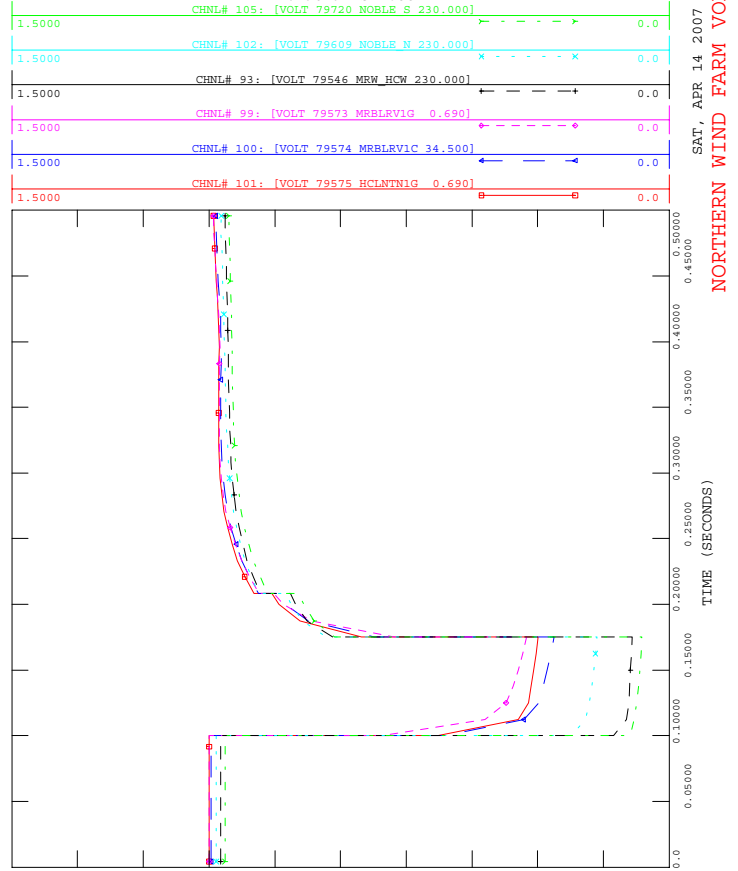
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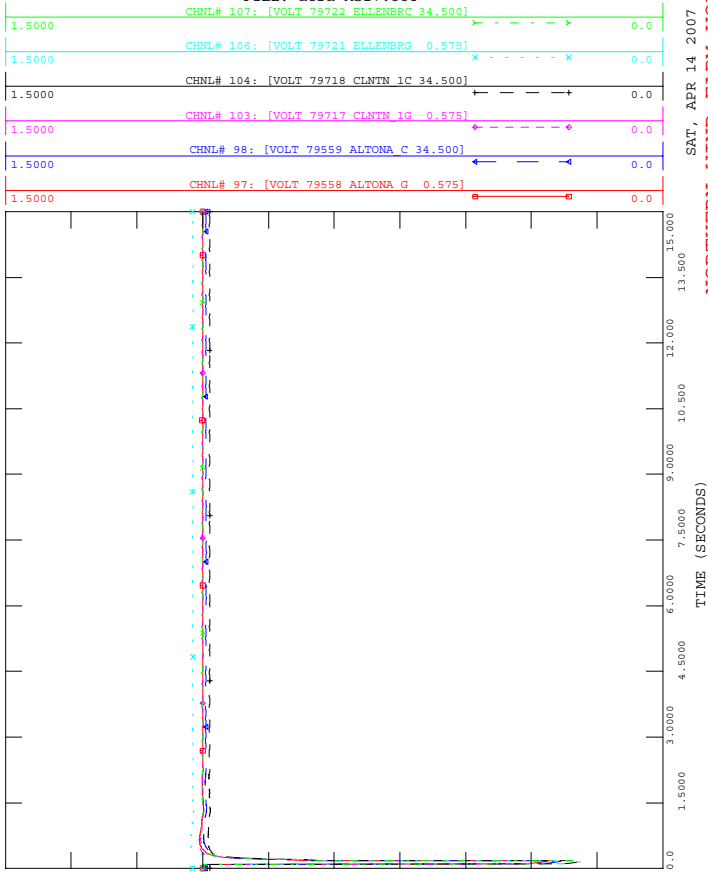
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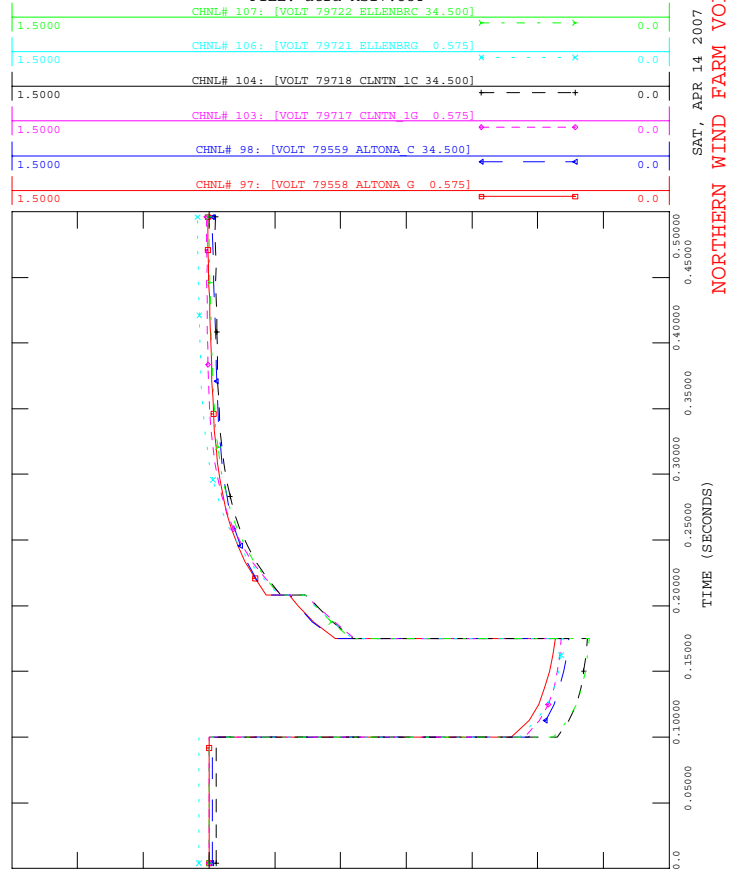
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@WILLIS E 230KV/MOSES W-WILLIS E(MW-1)

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2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@WILLIS E 230KV/MOSES W-WILLIS E(MW-1)

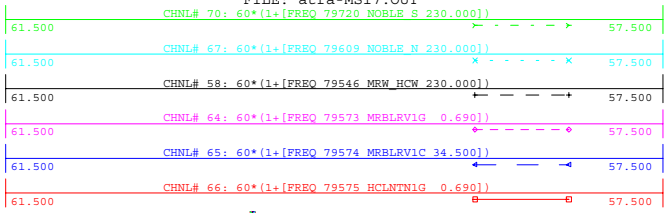
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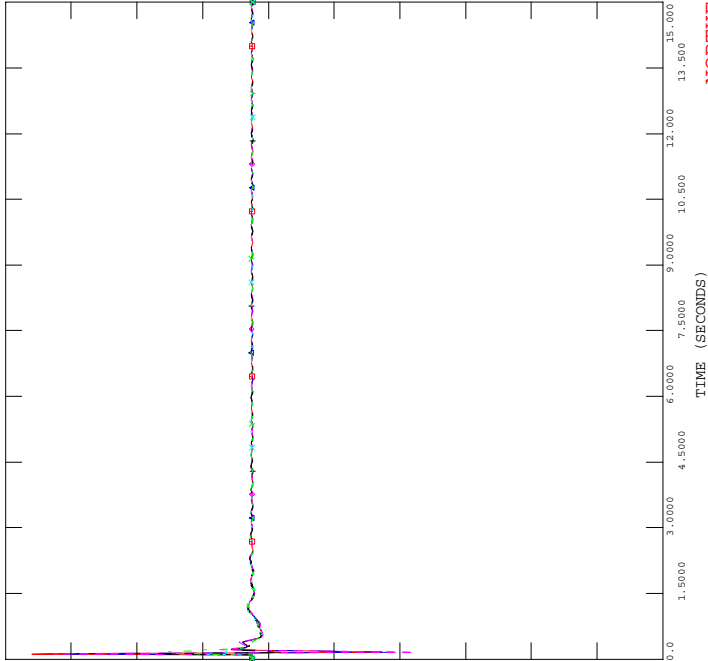


2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
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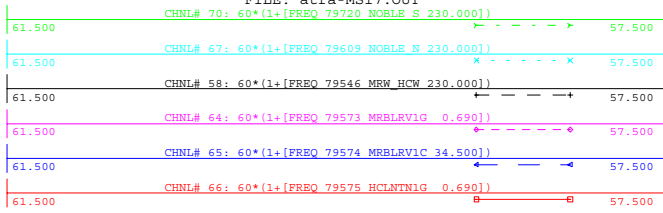


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NORTHERN WIND FARM FREQ

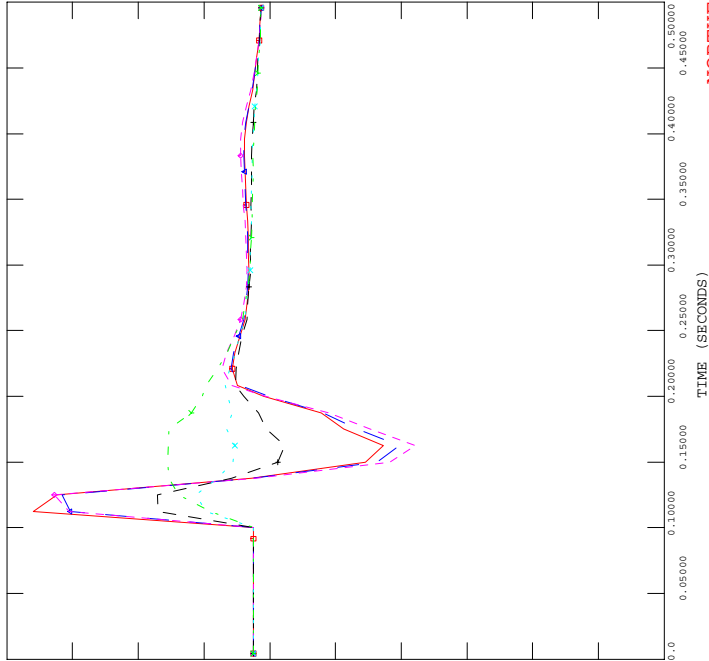


2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@WILLIS E 230KV/MOSES W-WILLIS E(MW-1)

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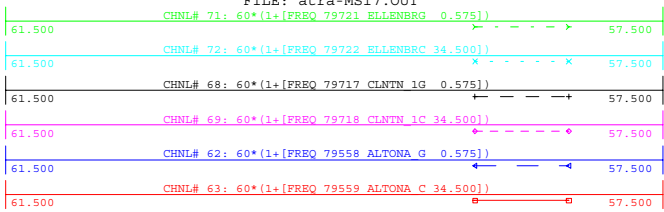


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NORTHERN WIND FARM FREQ

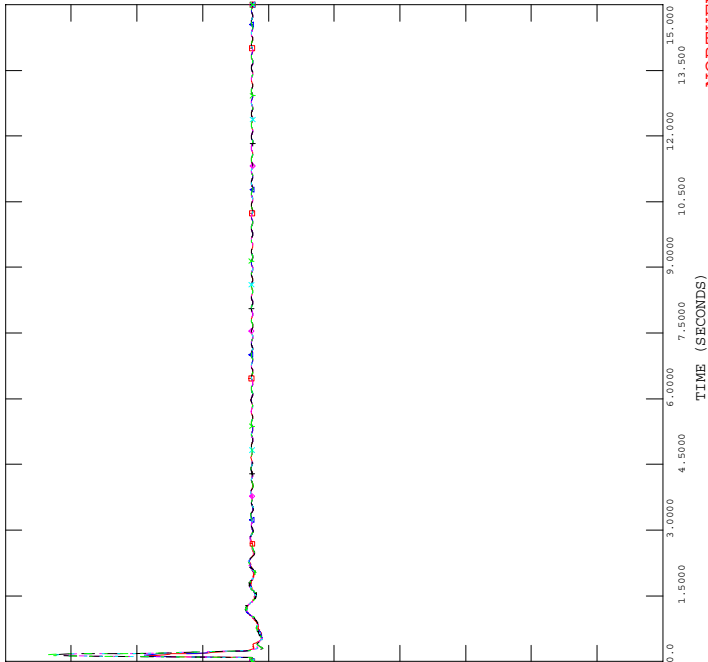


2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@WILLIS E 230KV/MOSES W-WILLIS E(MW-1)

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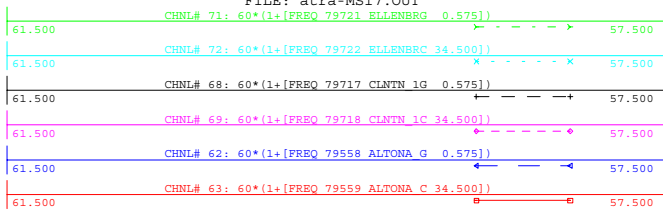


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NORTHERN WIND FARM FREQ

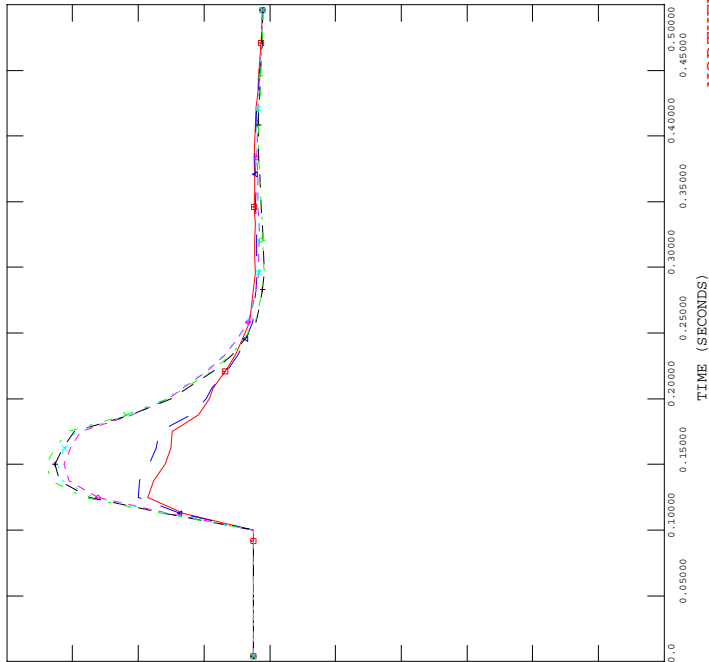


2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@WILLIS E 230KV/MOSES W-WILLIS E(MW-1)

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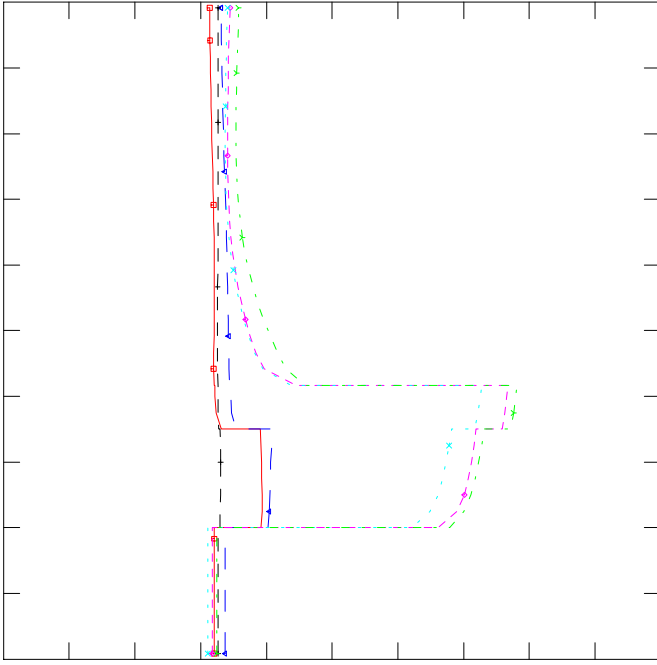
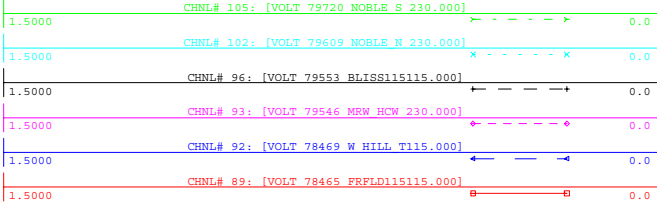
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NORTHERN WIND FARM FREQ





2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
LLG-NC@MOSES 230KV/MOSES-WILLIS E&W MW-1&MW-2)

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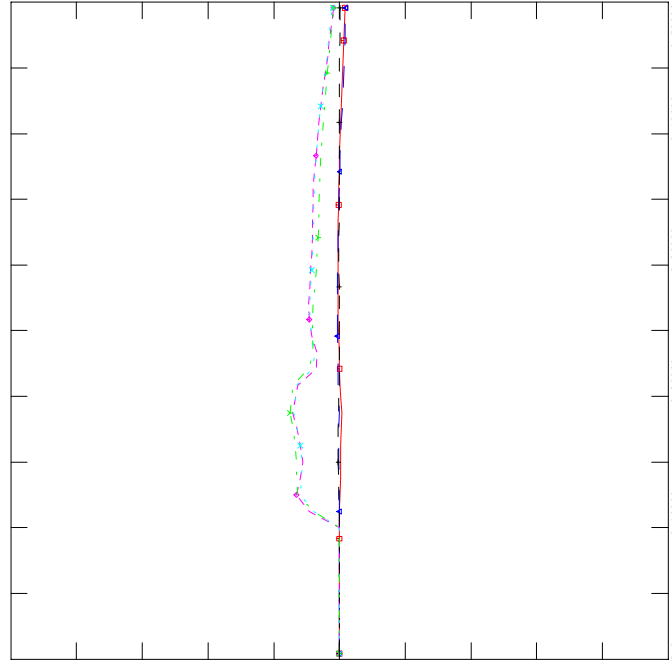
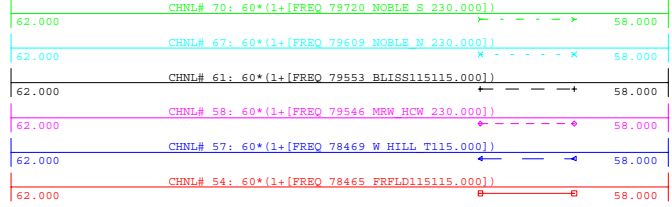


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WINDFARM POI VOLTAGES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
LLG-NC@MOSES 230KV/MOSES-WILLIS E&W MW-1&MW-2)

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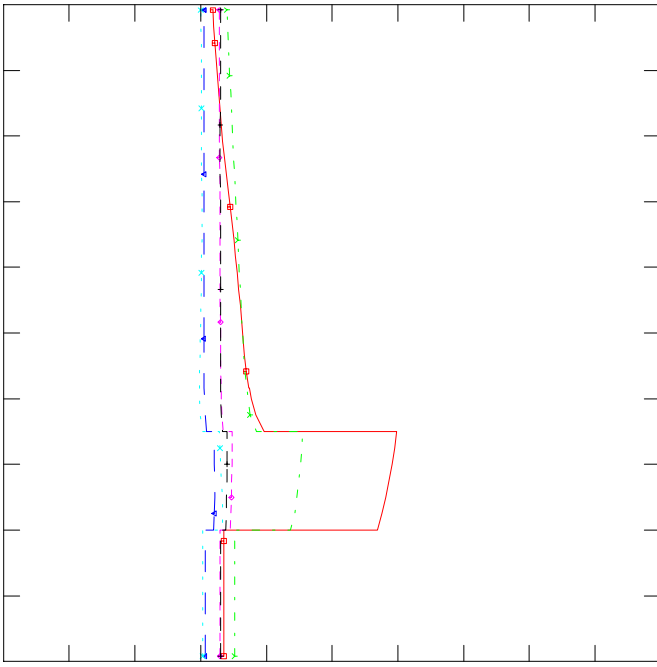
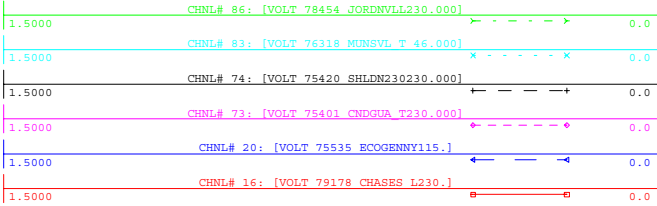


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WINDFARM POI BUS FREQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
LLG-NC@MOSES 230KV/MOSES-WILLIS E&W MW-1&MW-2)

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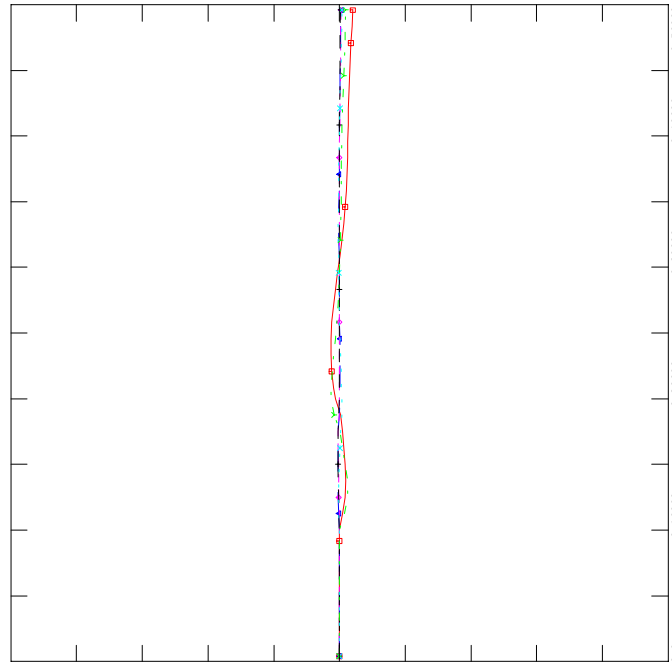
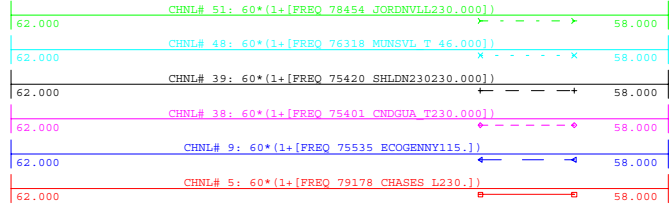


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WIND FARM POI VOLTAGES



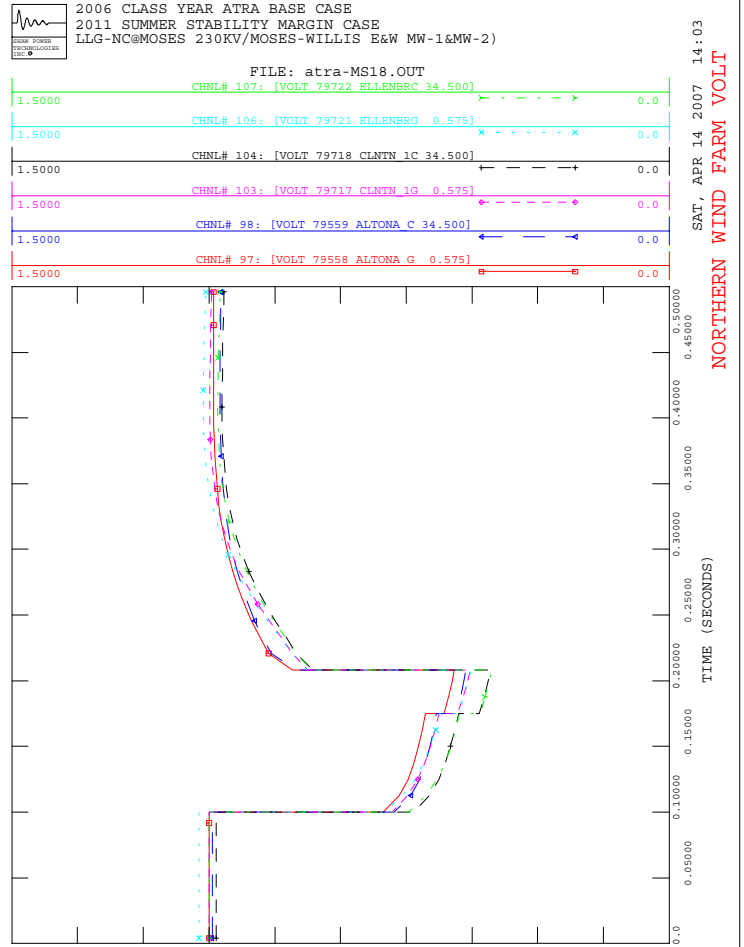
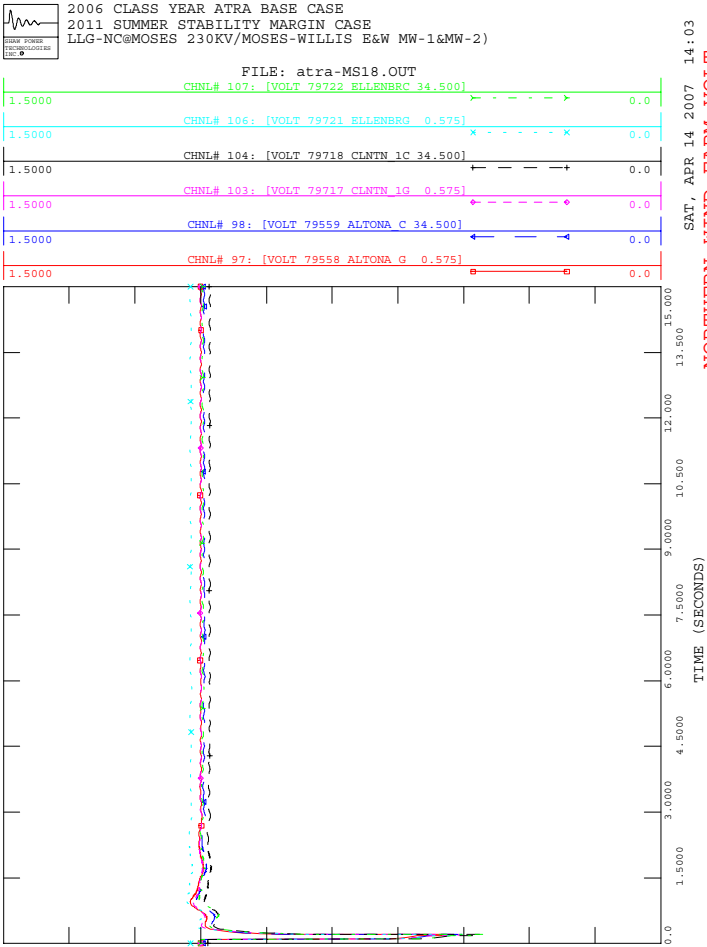
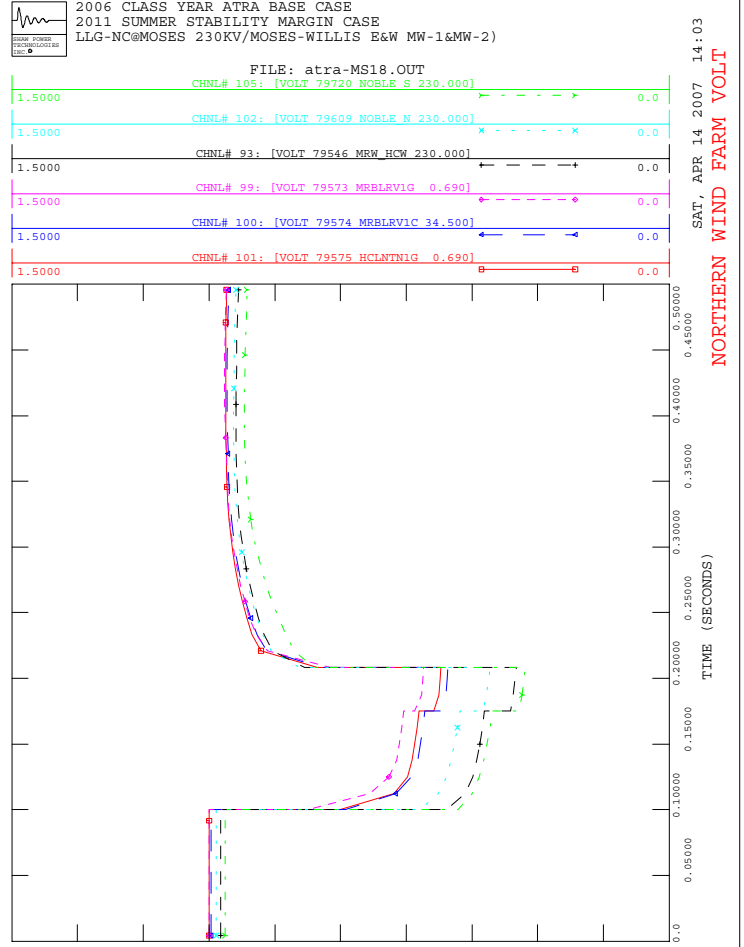
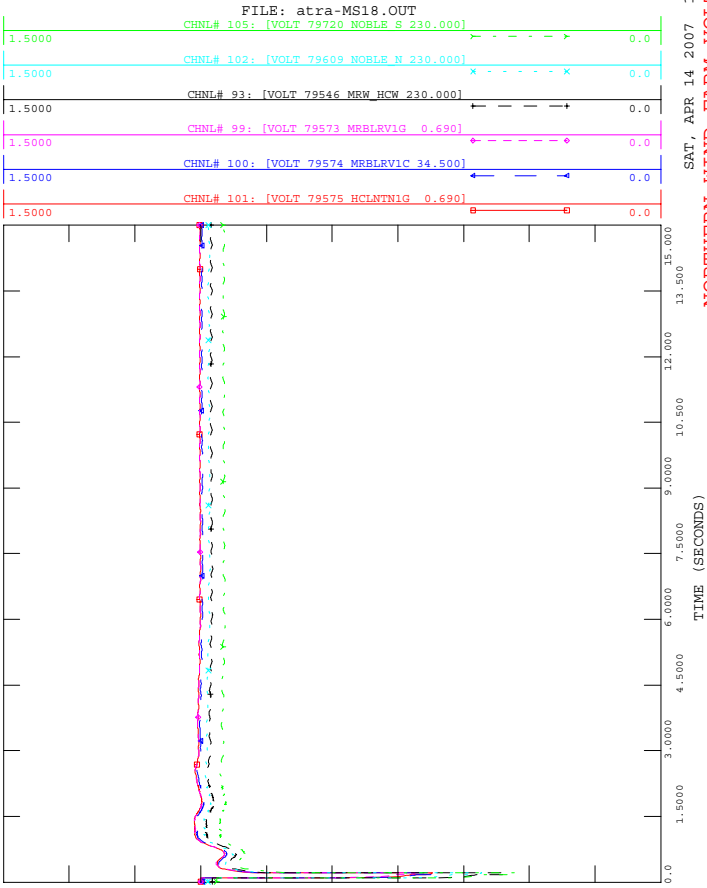
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
LLG-NC@MOSES 230KV/MOSES-WILLIS E&W MW-1&MW-2)

FILE: atra-MS18.OUT



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NYCA BUS FREQUENCIES

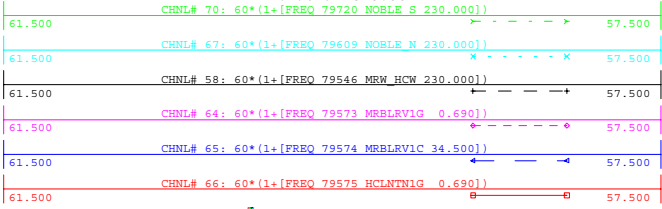
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
LLG-NC@MOSES 230KV/MOSES-WILLIS E&W MW-1&MW-2)



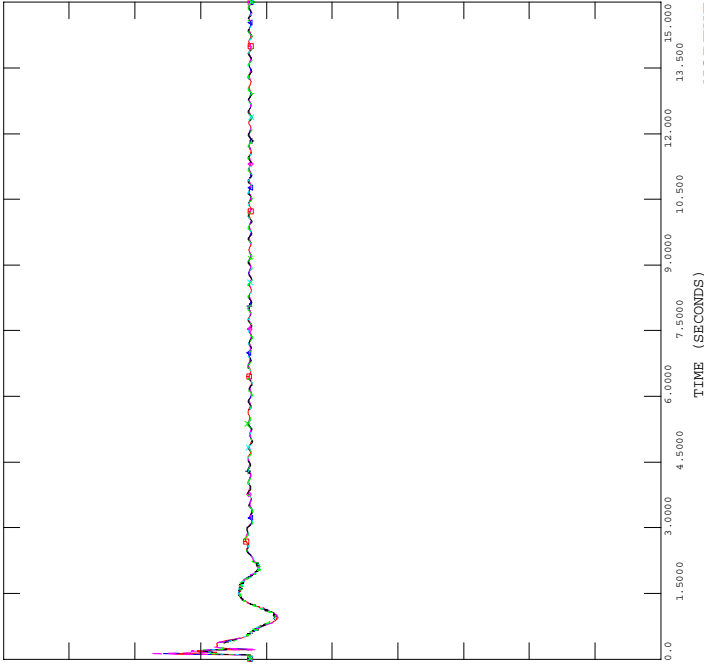


2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
LLG-NC@MOSES 230KV/MOSES-WILLIS E&W MW-1&MW-2)

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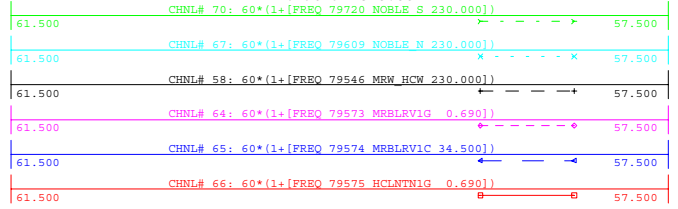


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NORTHERN WIND FARM FREQ

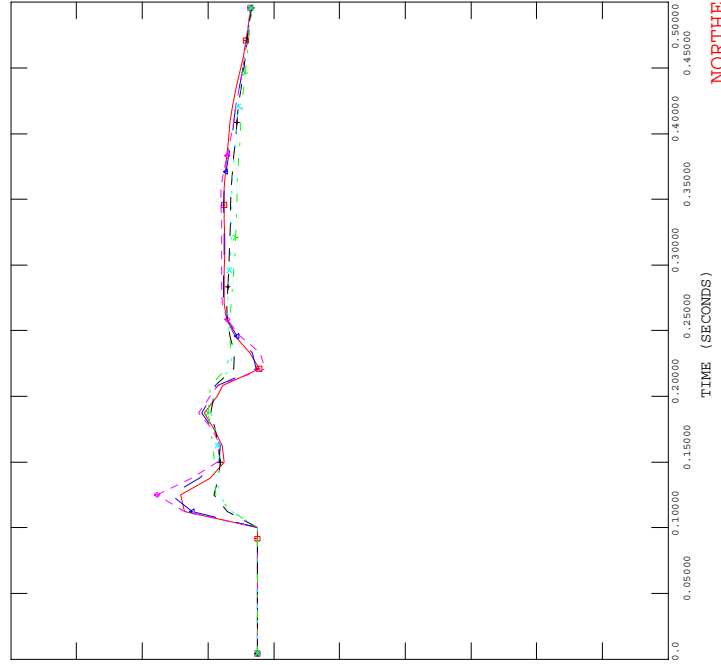


2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
LLG-NC@MOSES 230KV/MOSES-WILLIS E&W MW-1&MW-2)

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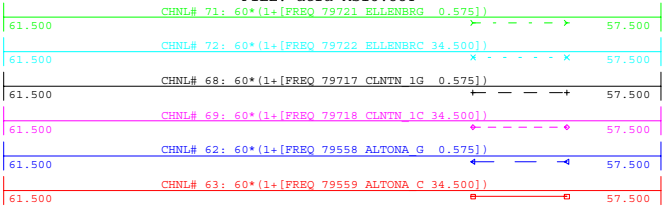


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NORTHERN WIND FARM FREQ

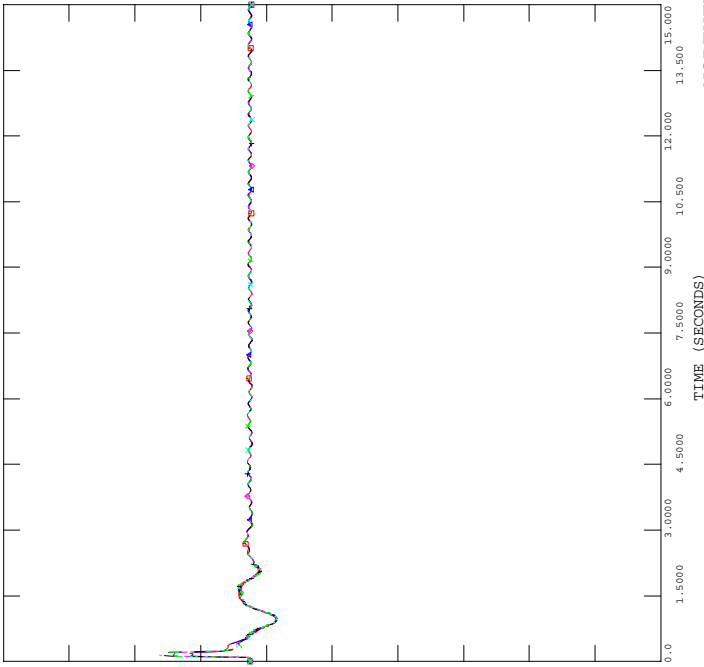


2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
LLG-NC@MOSES 230KV/MOSES-WILLIS E&W MW-1&MW-2)

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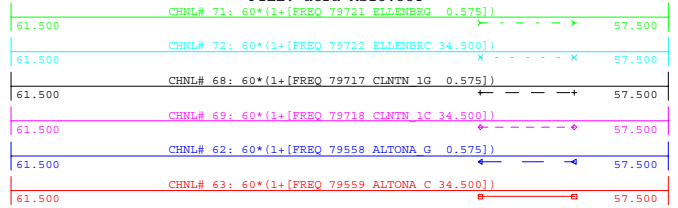


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NORTHERN WIND FARM FREQ

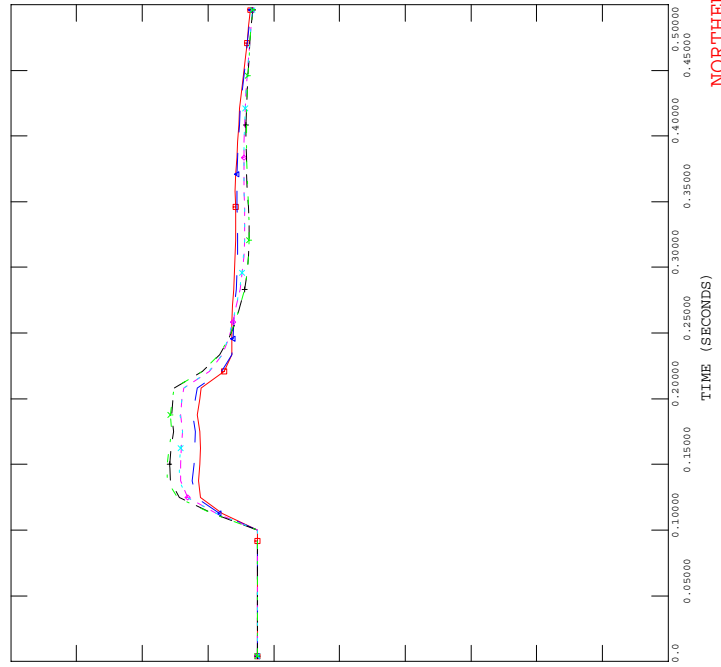


2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
LLG-NC@MOSES 230KV/MOSES-WILLIS E&W MW-1&MW-2)

FILE: atra-MS18.OUT



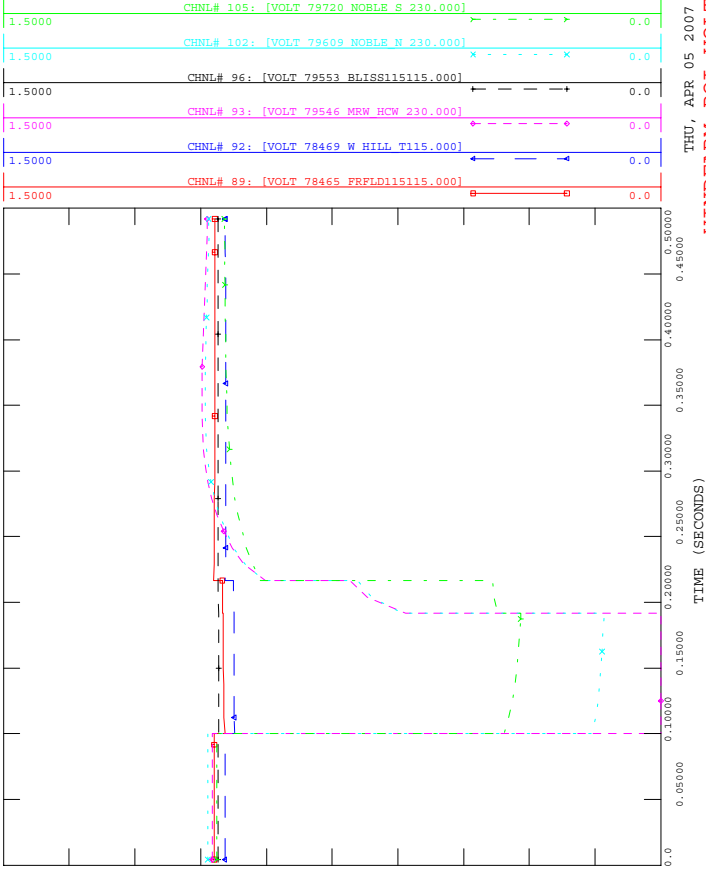
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NORTHERN WIND FARM FREQ





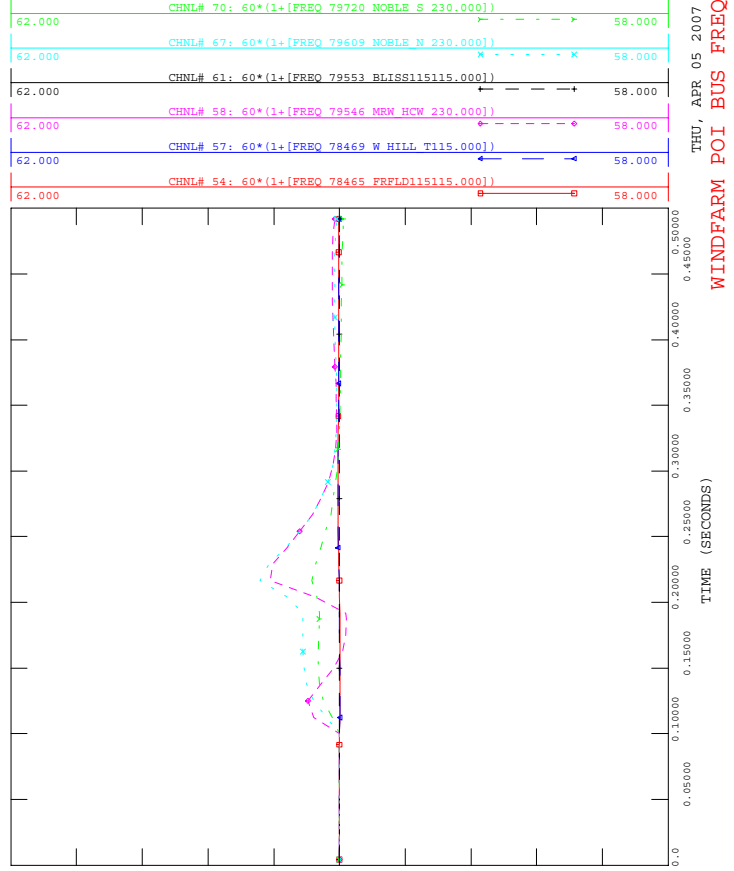
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MRBLRWD 230KV/WILLIS E-MRW_HCW WPN1)

FILE: atra-MS20.OUT



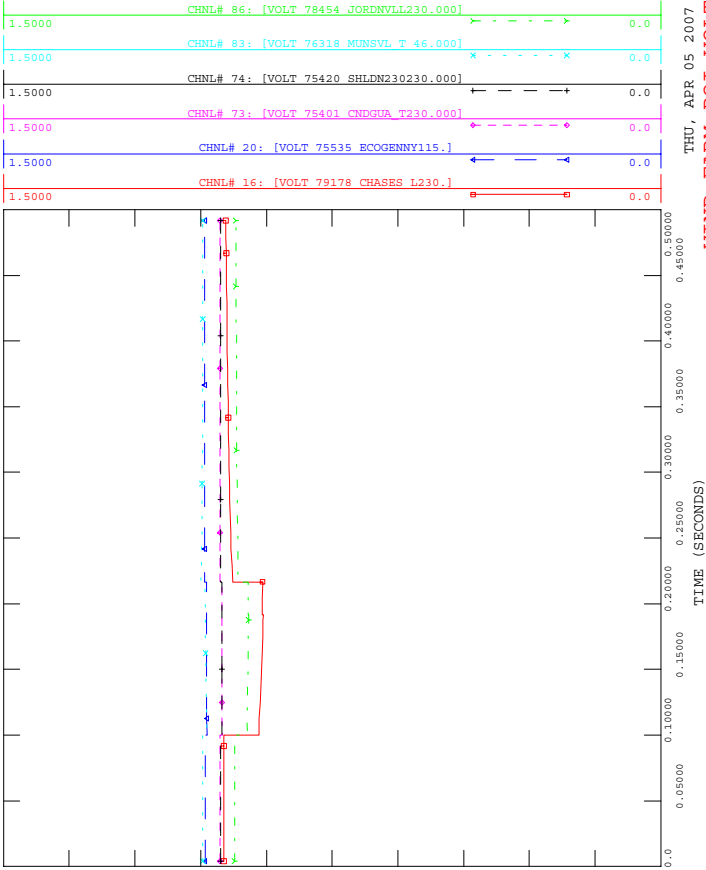
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MRBLRWD 230KV/WILLIS E-MRW_HCW WPN1)

FILE: atra-MS20.OUT



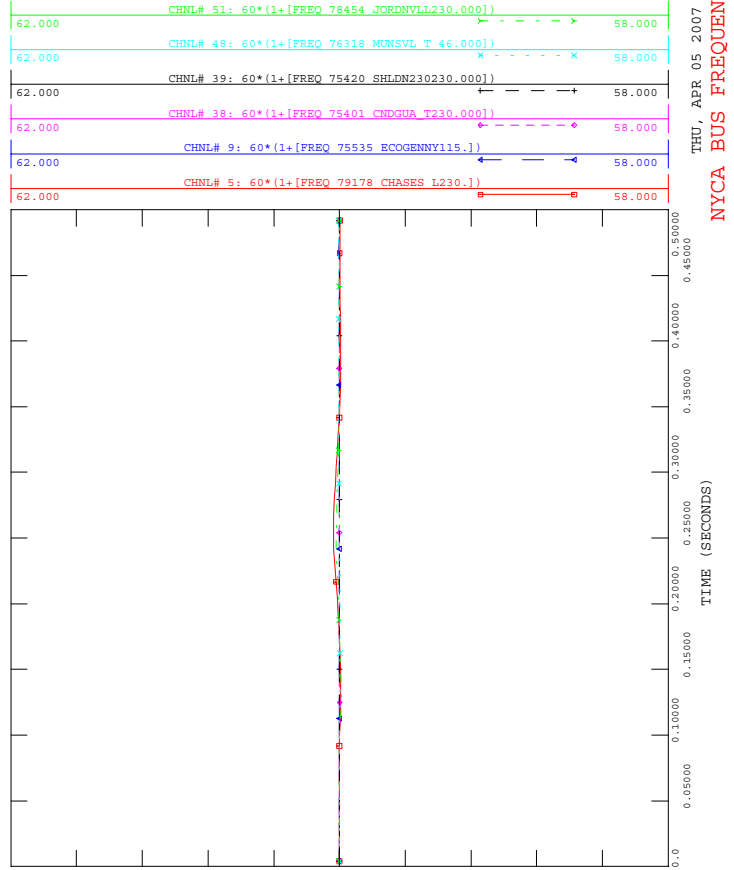
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MRBLRWD 230KV/WILLIS E-MRW_HCW WPN1)

FILE: atra-MS20.OUT



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MRBLRWD 230KV/WILLIS E-MRW_HCW WPN1)

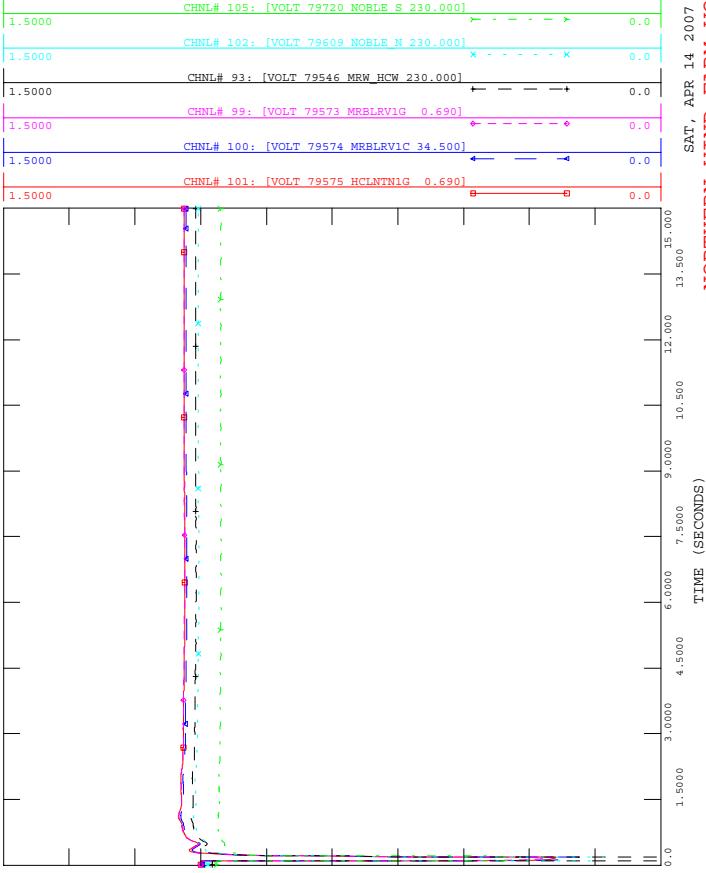
FILE: atra-MS20.OUT





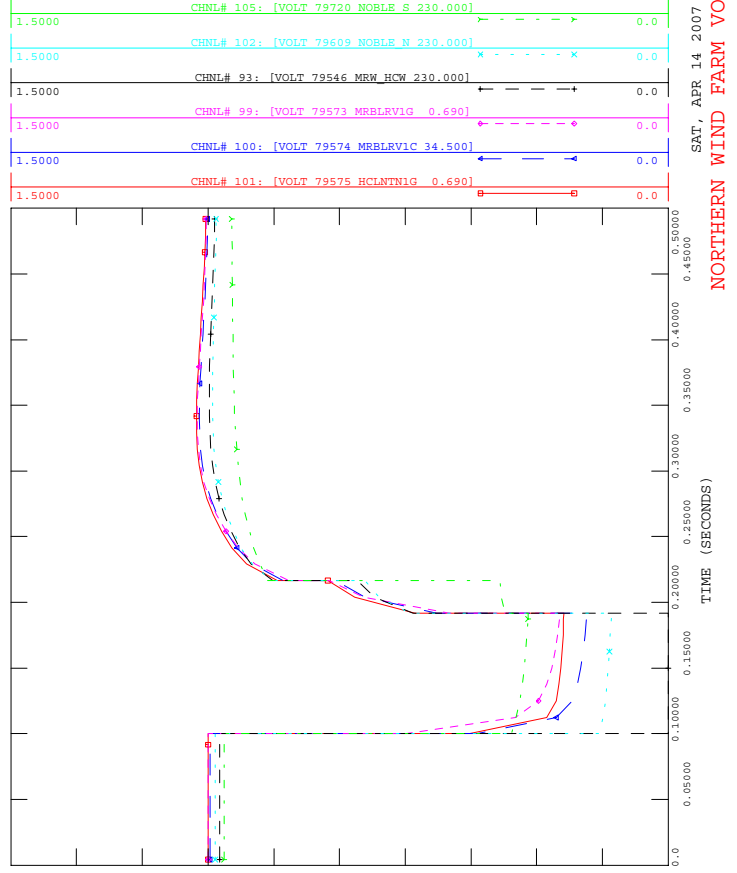
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MRBLRWD 230KV/WILLIS E-MRW_HCW WPN1)

FILE: atra-MS20.OUT



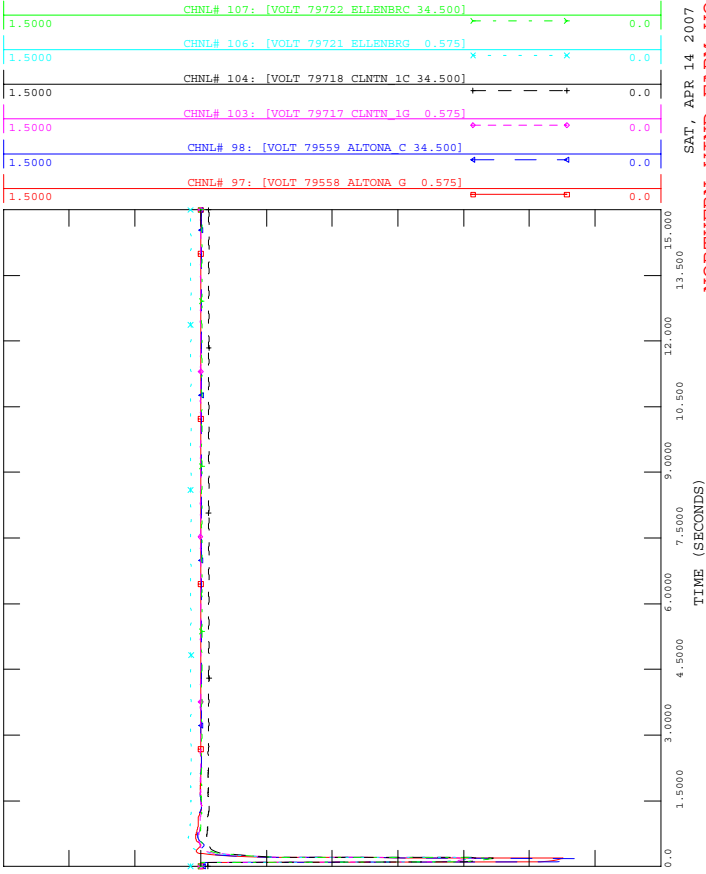
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MRBLRWD 230KV/WILLIS E-MRW_HCW WPN1)

FILE: atra-MS20.OUT



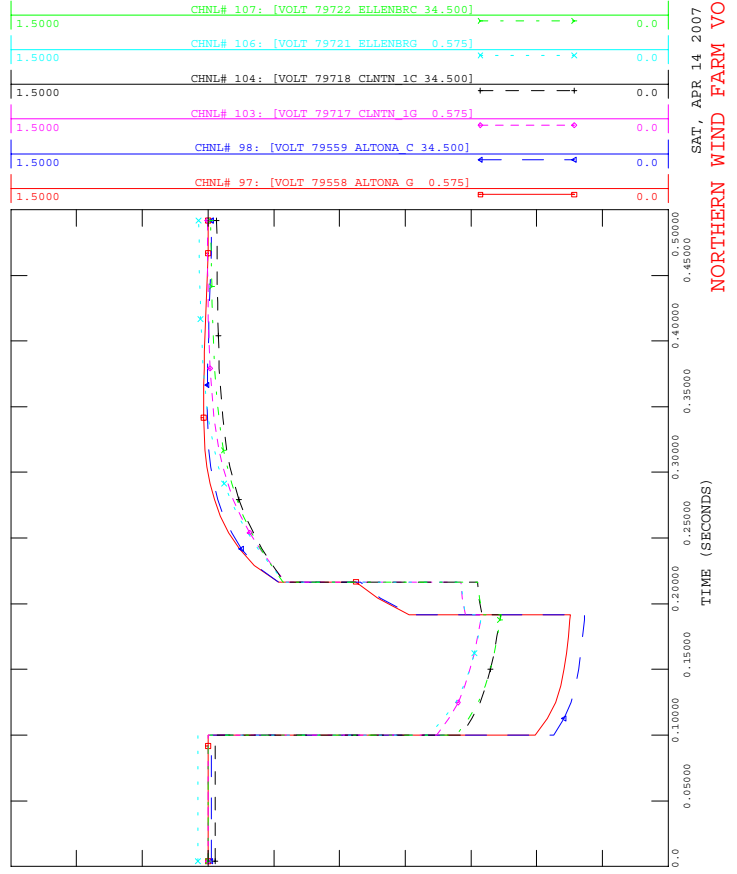
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MRBLRWD 230KV/WILLIS E-MRW_HCW WPN1)

FILE: atra-MS20.OUT



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MRBLRWD 230KV/WILLIS E-MRW_HCW WPN1)

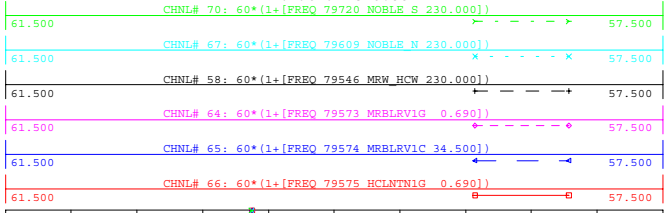
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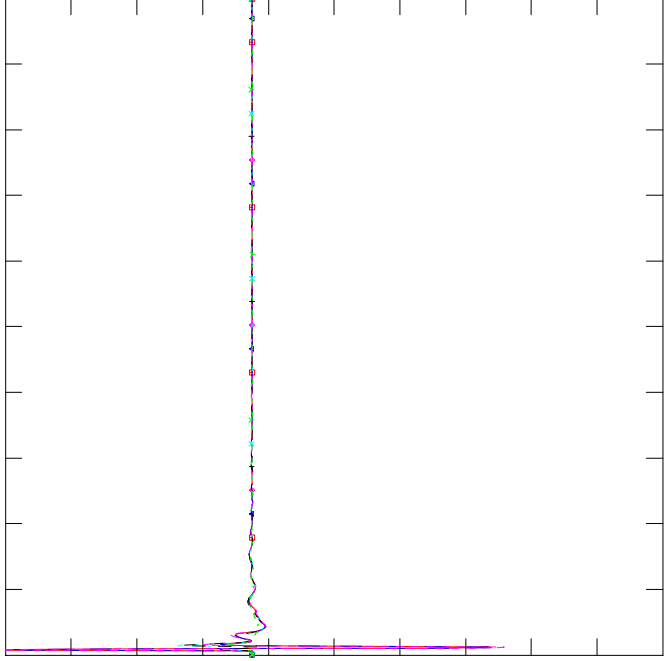
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MRBLRWD 230KV/WILLIS E-MRW_HCW WPN1)

FILE: atra-MS20.OUT



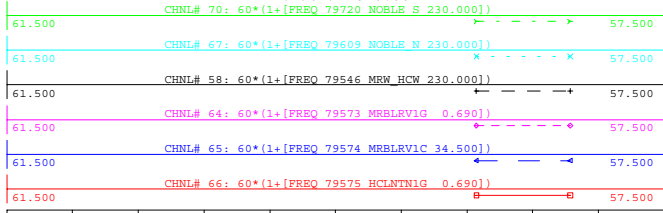
SAT, APR 14 2007 14:03
NORTHERN WIND FARM FREQ

TIME (SECONDS)



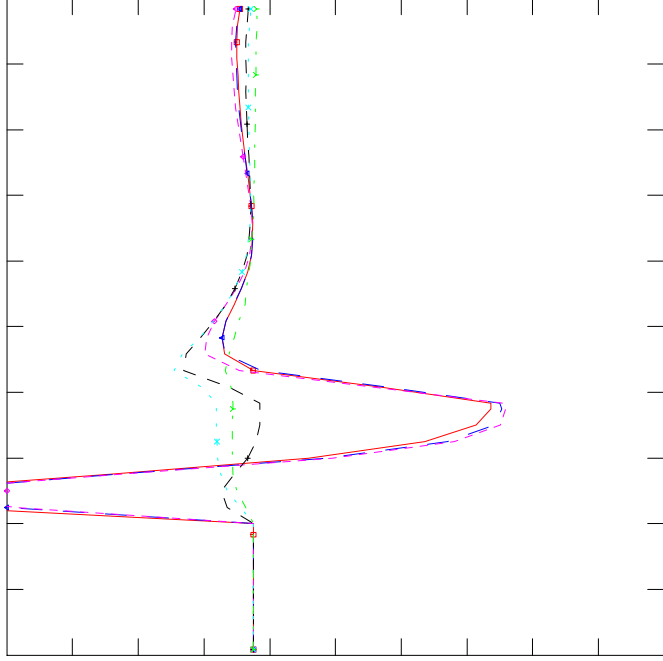
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MRBLRWD 230KV/WILLIS E-MRW_HCW WPN1)

FILE: atra-MS20.OUT



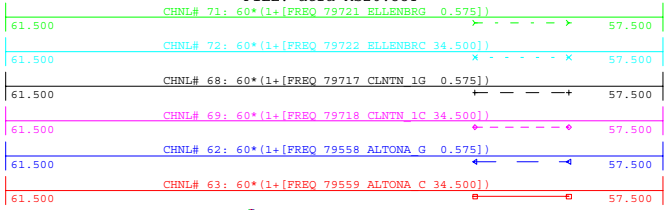
SAT, APR 14 2007 14:03
NORTHERN WIND FARM FREQ

TIME (SECONDS)



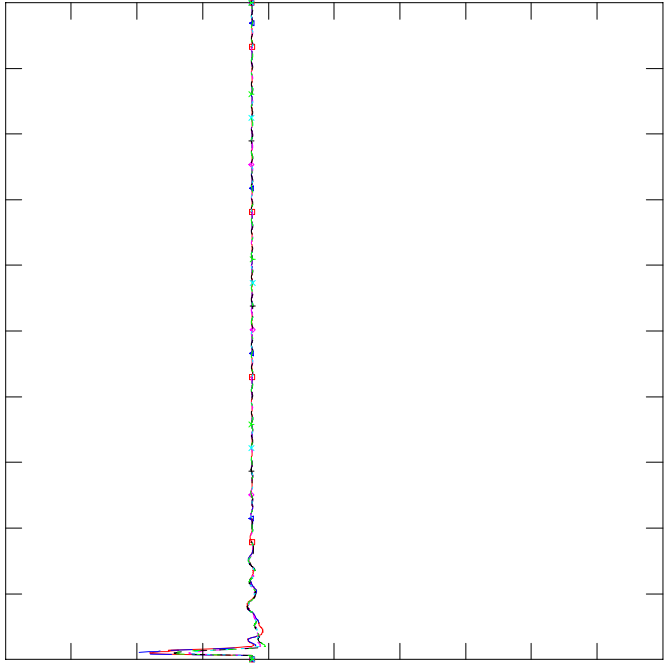
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MRBLRWD 230KV/WILLIS E-MRW_HCW WPN1)

FILE: atra-MS20.OUT



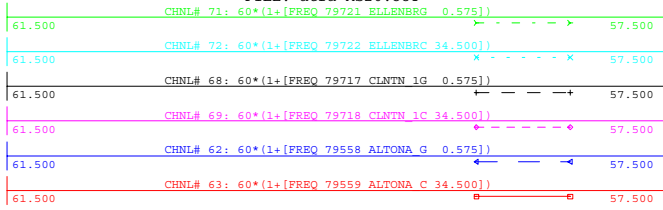
SAT, APR 14 2007 14:03
NORTHERN WIND FARM FREQ

TIME (SECONDS)



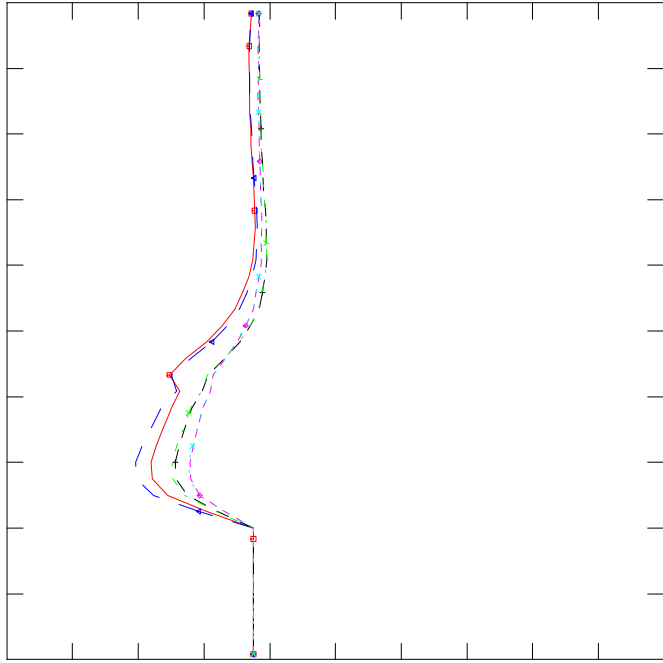
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MRBLRWD 230KV/WILLIS E-MRW_HCW WPN1)

FILE: atra-MS20.OUT



SAT, APR 14 2007 14:03
NORTHERN WIND FARM FREQ

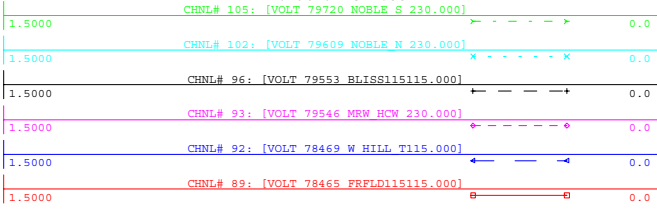
TIME (SECONDS)





2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@WILLIS W/WILLIS W-NOBLE_S (CLINTON) (WRY2)

FILE: atra-MS21.OUT

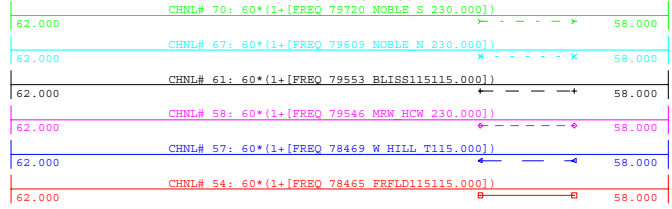


THU, APR 05 2007 9:19
WIND FARM POI VOLTAGES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@WILLIS W/WILLIS W-NOBLE_S (CLINTON) (WRY2)

FILE: atra-MS21.OUT

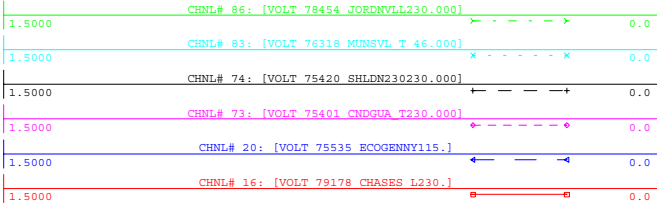


THU, APR 05 2007 9:19
WIND FARM POI BUS FREQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@WILLIS W/WILLIS W-NOBLE_S (CLINTON) (WRY2)

FILE: atra-MS21.OUT

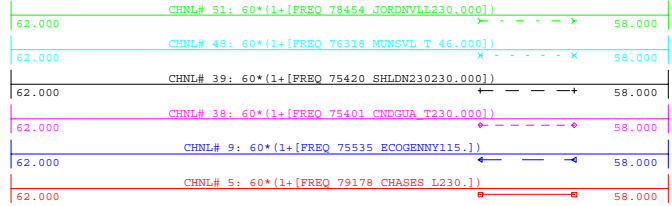


THU, APR 05 2007 9:19
WIND FARM POI VOLTAGES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@WILLIS W/WILLIS W-NOBLE_S (CLINTON) (WRY2)

FILE: atra-MS21.OUT

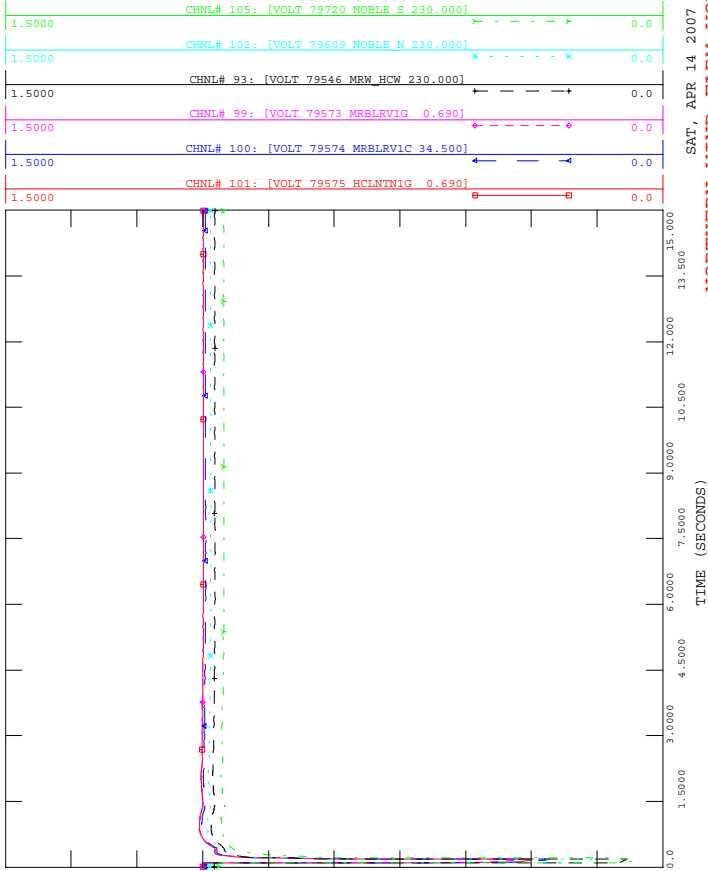


THU, APR 05 2007 9:19
WIND FARM POI BUS FREQUENCIES



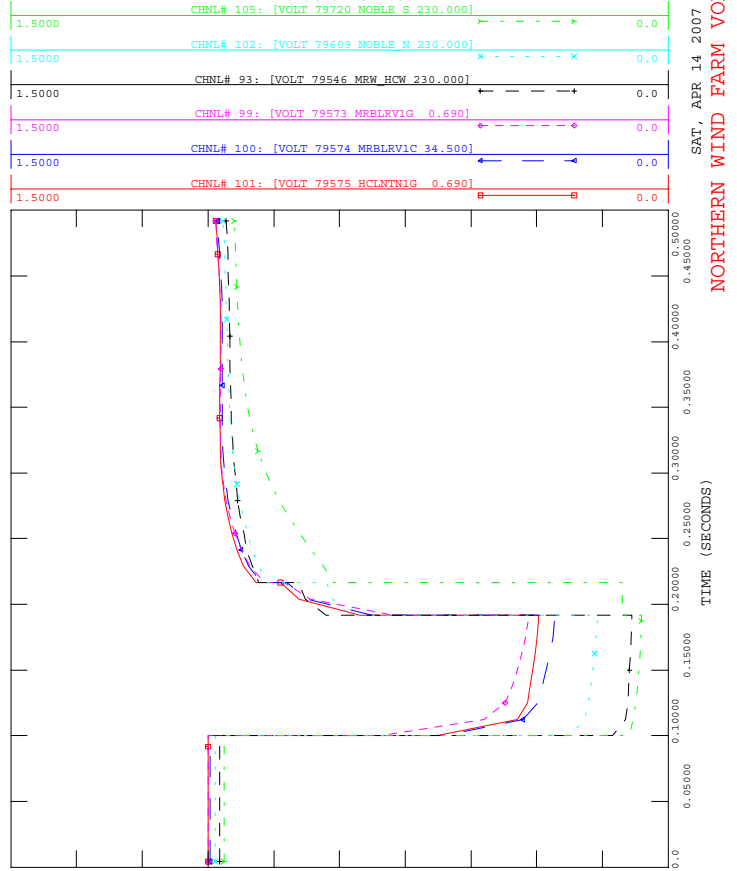
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@WILLIS W/WILLIS W-NOBLE_S (CLINTON) (WRY2)

FILE: atra-MS21.OUT



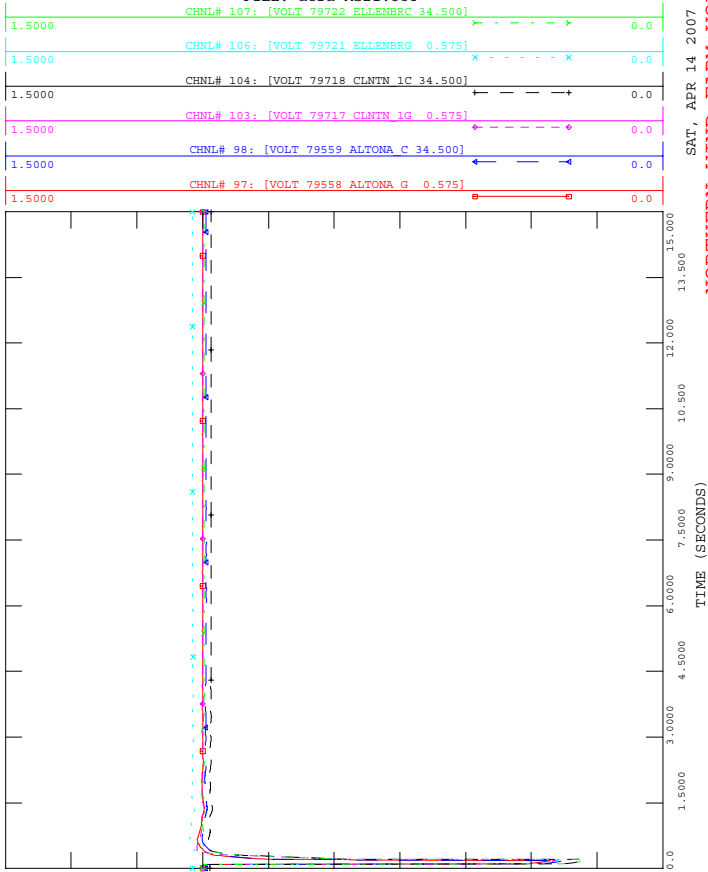
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@WILLIS W/WILLIS W-NOBLE_S (CLINTON) (WRY2)

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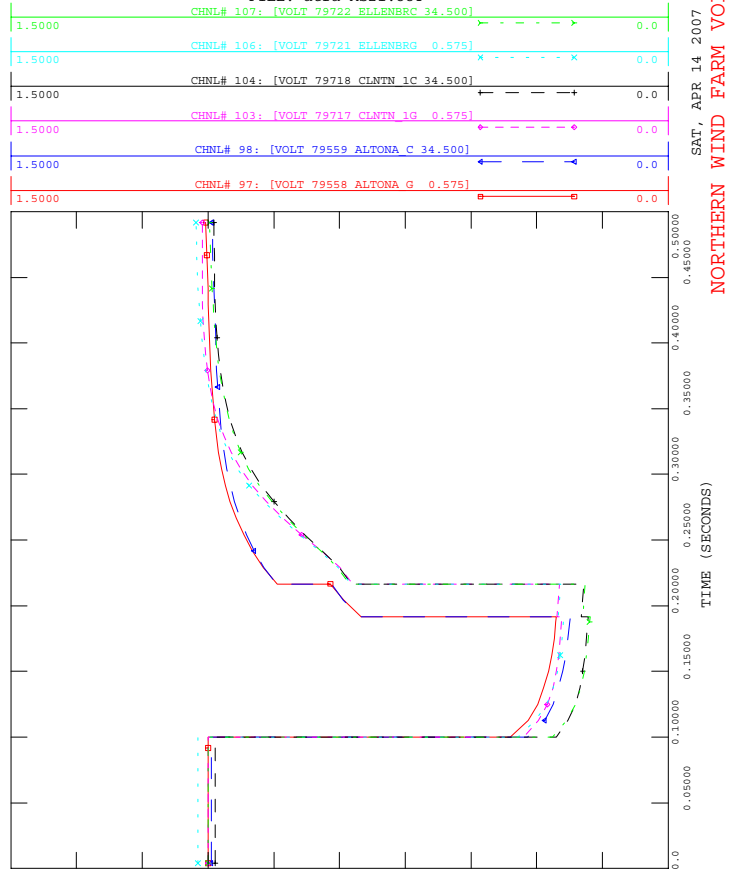
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@WILLIS W/WILLIS W-NOBLE_S (CLINTON) (WRY2)

FILE: atra-MS21.OUT



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@WILLIS W/WILLIS W-NOBLE_S (CLINTON) (WRY2)

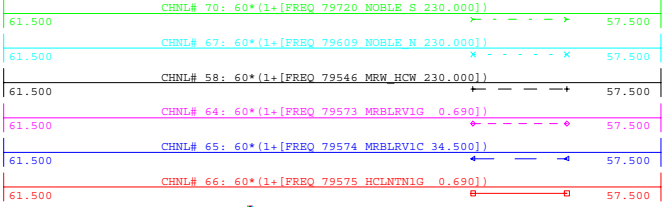
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2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@WILLIS W/WILLIS W-NOBLE_S (CLINTON) (WRY2)

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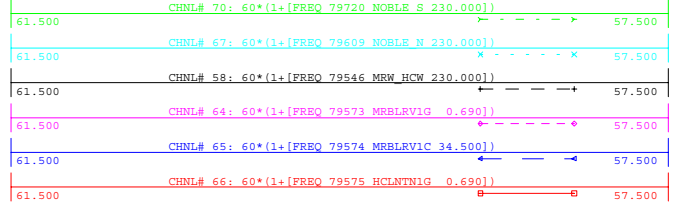


SAT, APR 14 2007 14:03
NORTHERN WIND FARM FREQ



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@WILLIS W/WILLIS W-NOBLE_S (CLINTON) (WRY2)

FILE: atra-MS21.OUT

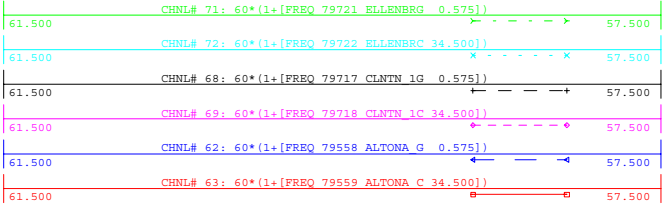


SAT, APR 14 2007 14:03
NORTHERN WIND FARM FREQ



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@WILLIS W/WILLIS W-NOBLE_S (CLINTON) (WRY2)

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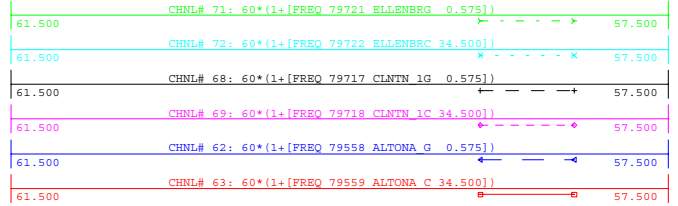


SAT, APR 14 2007 14:03
NORTHERN WIND FARM FREQ



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@WILLIS W/WILLIS W-NOBLE_S (CLINTON) (WRY2)

FILE: atra-MS21.OUT

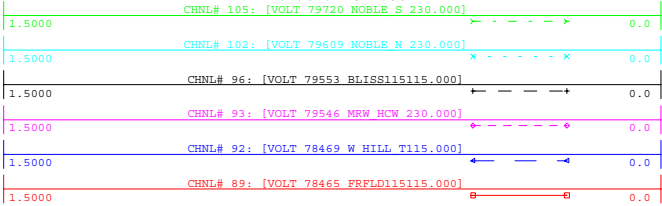


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NORTHERN WIND FARM FREQ



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_N/MRW_HCW-NOBLE_N(ALTONA) (PND1)

FILE: atra-MS24.OUT

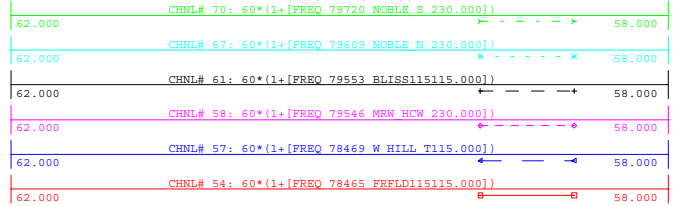


THU, APR 05 2007 9:19
WINDFARM POI VOLTAGES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_N/MRW_HCW-NOBLE_N(ALTONA) (PND1)

FILE: atra-MS24.OUT

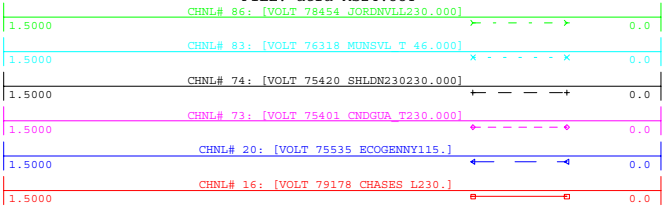


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WINDFARM POI BUS FREQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_N/MRW_HCW-NOBLE_N(ALTONA) (PND1)

FILE: atra-MS24.OUT

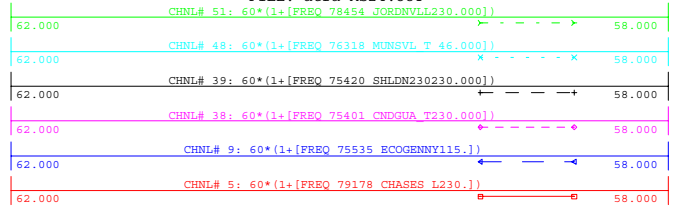


THU, APR 05 2007 9:19
WIND FARM POI VOLTAGES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_N/MRW_HCW-NOBLE_N(ALTONA) (PND1)

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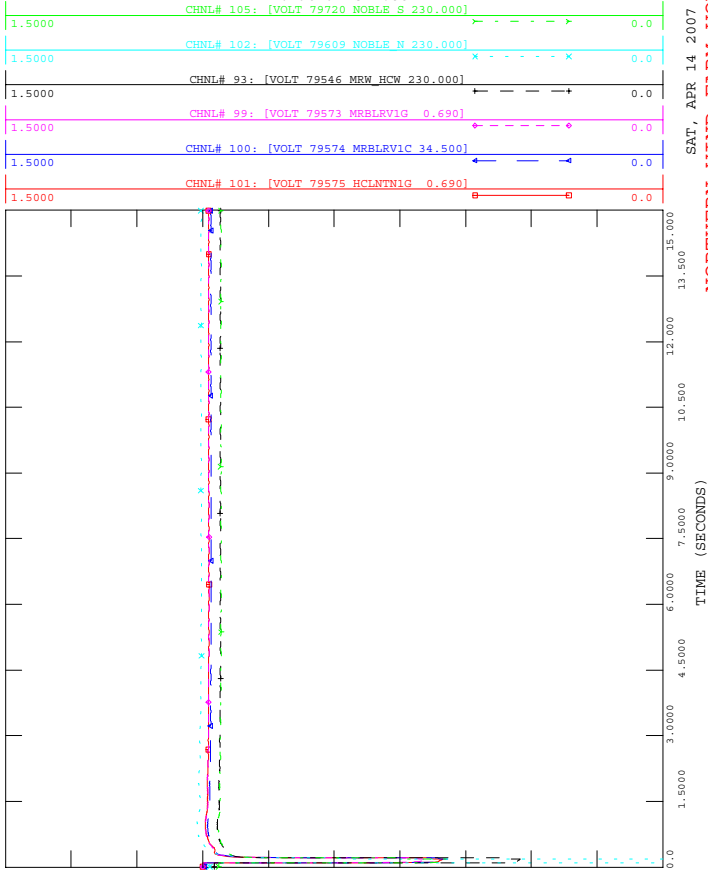


THU, APR 05 2007 9:19
NYCA BUS FREQUENCIES



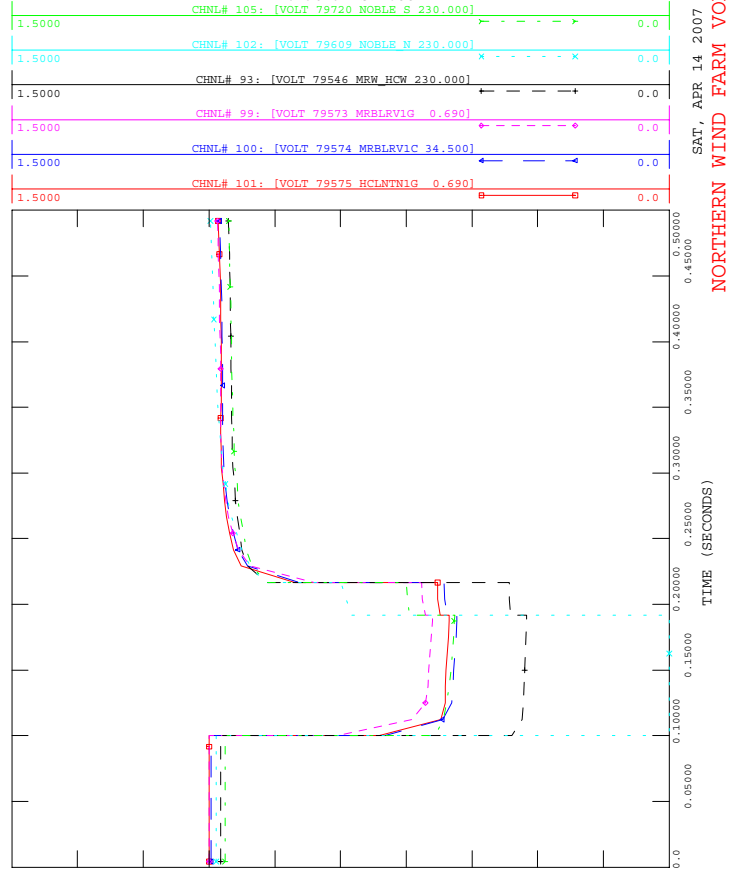
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_N/MRW_HCW-NOBLE_N(ALTONA) (PND1)

FILE: atra-MS24.OUT



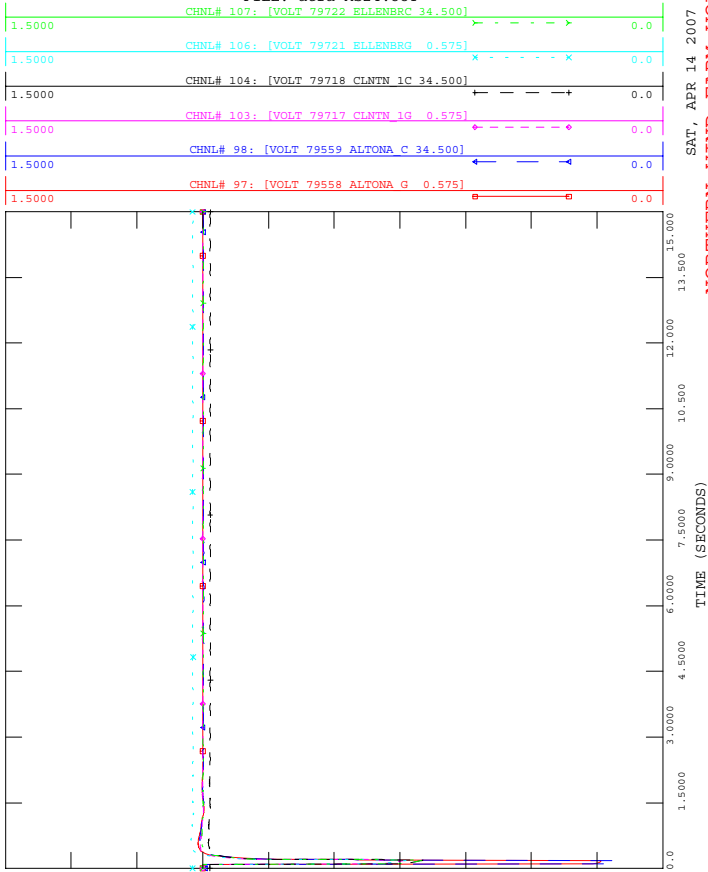
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_N/MRW_HCW-NOBLE_N(ALTONA) (PND1)

FILE: atra-MS24.OUT



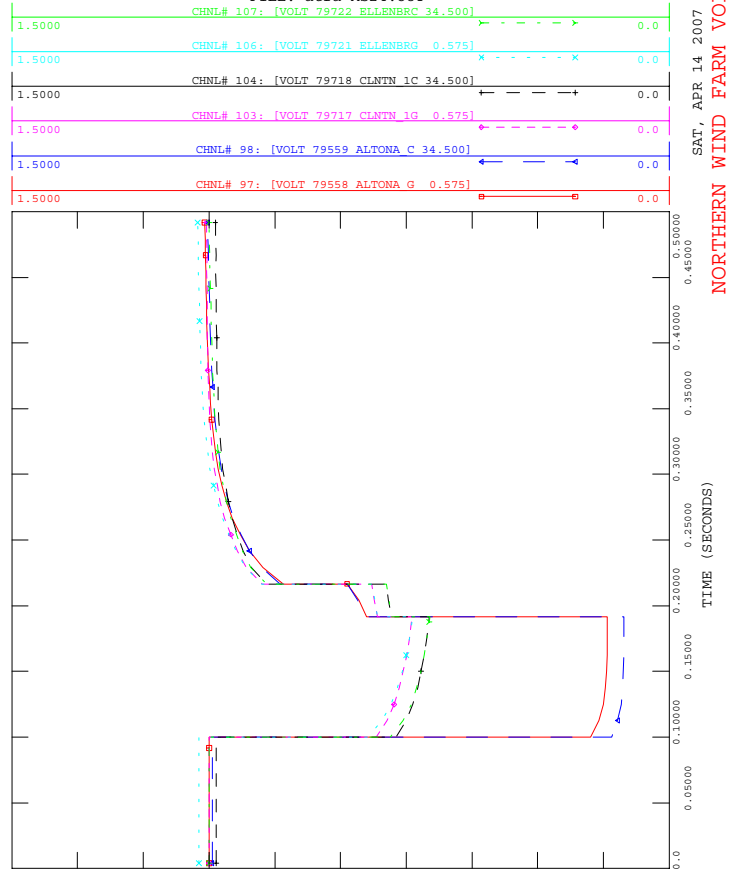
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_N/MRW_HCW-NOBLE_N(ALTONA) (PND1)

FILE: atra-MS24.OUT



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_N/MRW_HCW-NOBLE_N(ALTONA) (PND1)

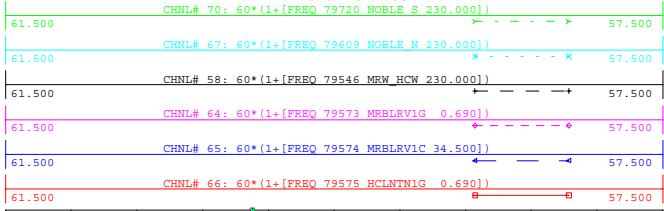
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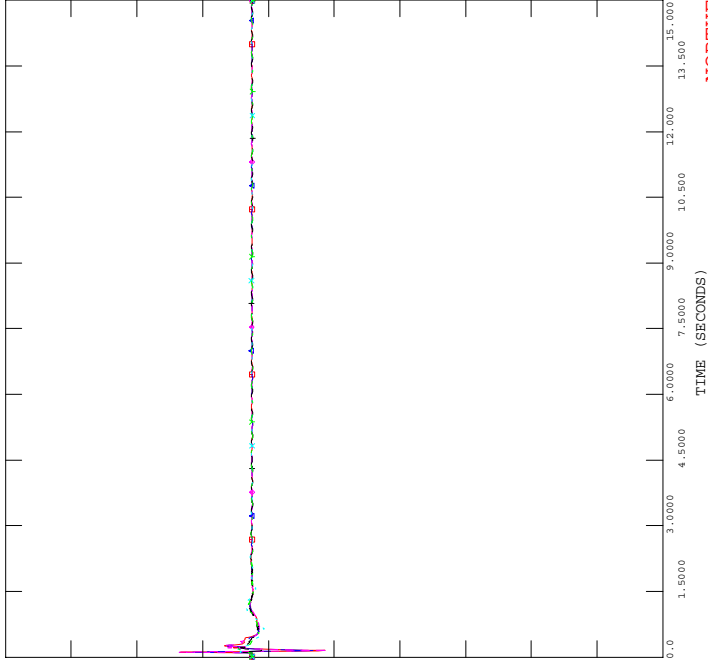


2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_N/MRW_HCW-NOBLE_N(ALTONA) (PND1)

FILE: atra-MS24.OUT

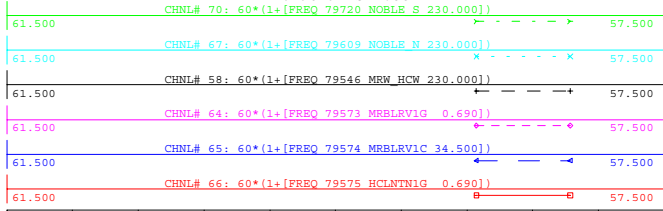


SAT, APR 14 2007 14:03
NORTHERN WIND FARM FREQ

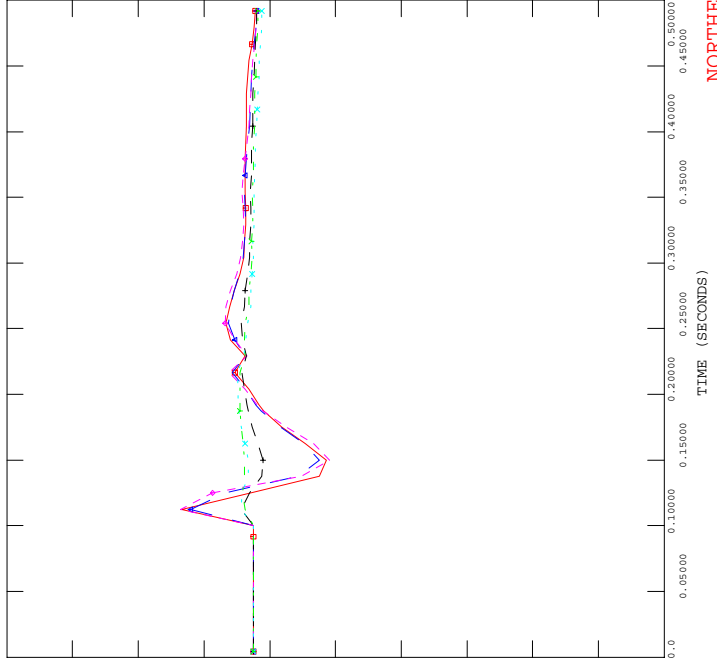


2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_N/MRW_HCW-NOBLE_N(ALTONA) (PND1)

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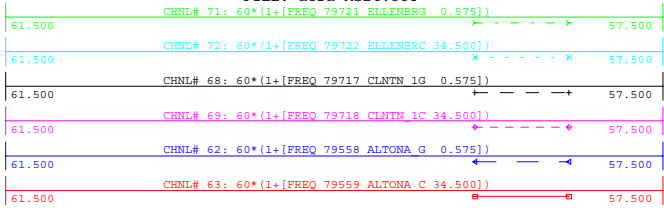


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NORTHERN WIND FARM FREQ

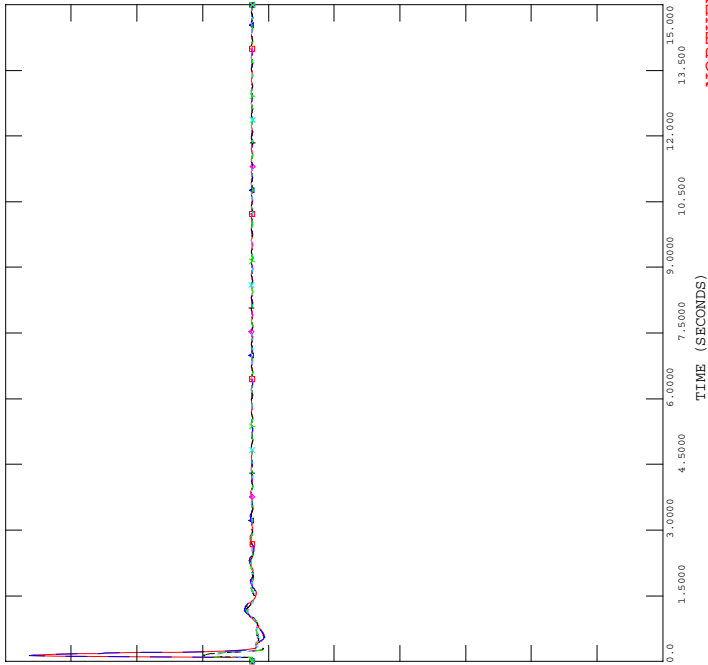


2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_N/MRW_HCW-NOBLE_N(ALTONA) (PND1)

FILE: atra-MS24.OUT

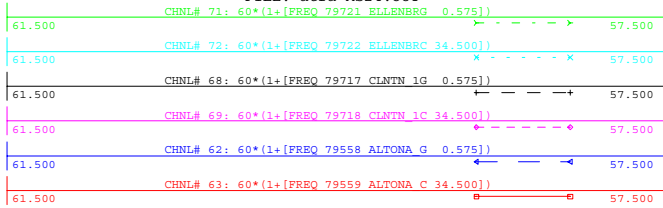


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NORTHERN WIND FARM FREQ

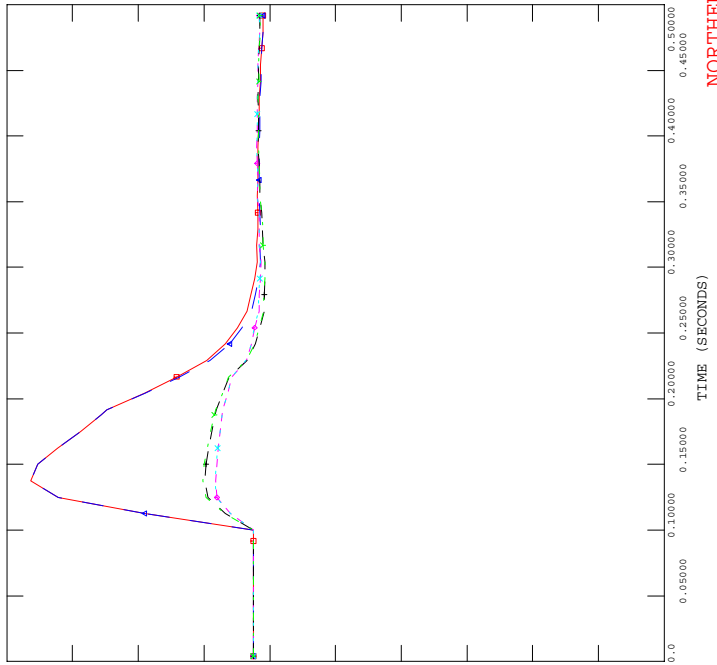


2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_N/MRW_HCW-NOBLE_N(ALTONA) (PND1)

FILE: atra-MS24.OUT



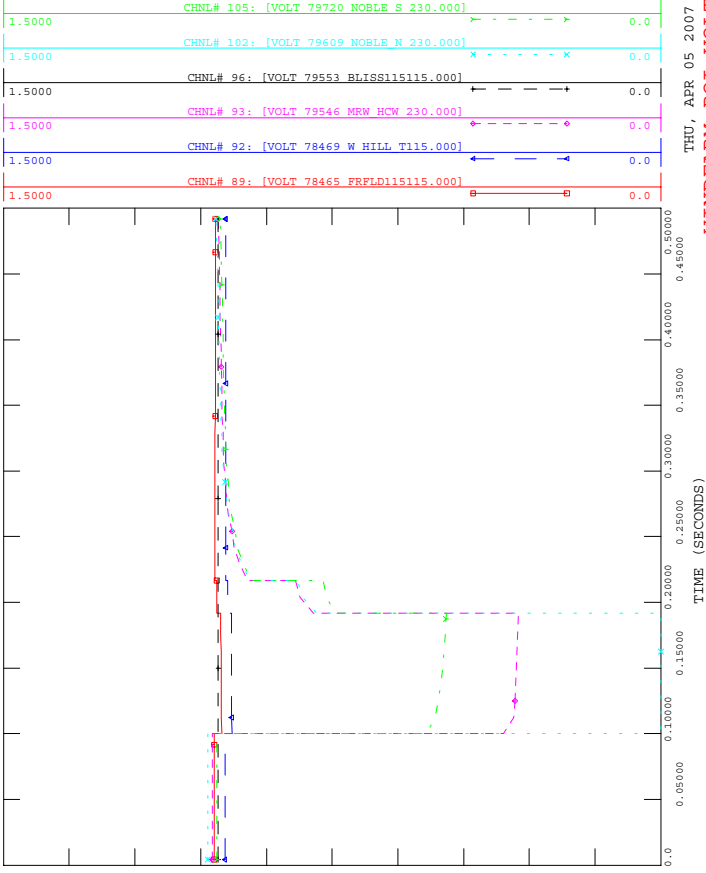
SAT, APR 14 2007 14:03
NORTHERN WIND FARM FREQ





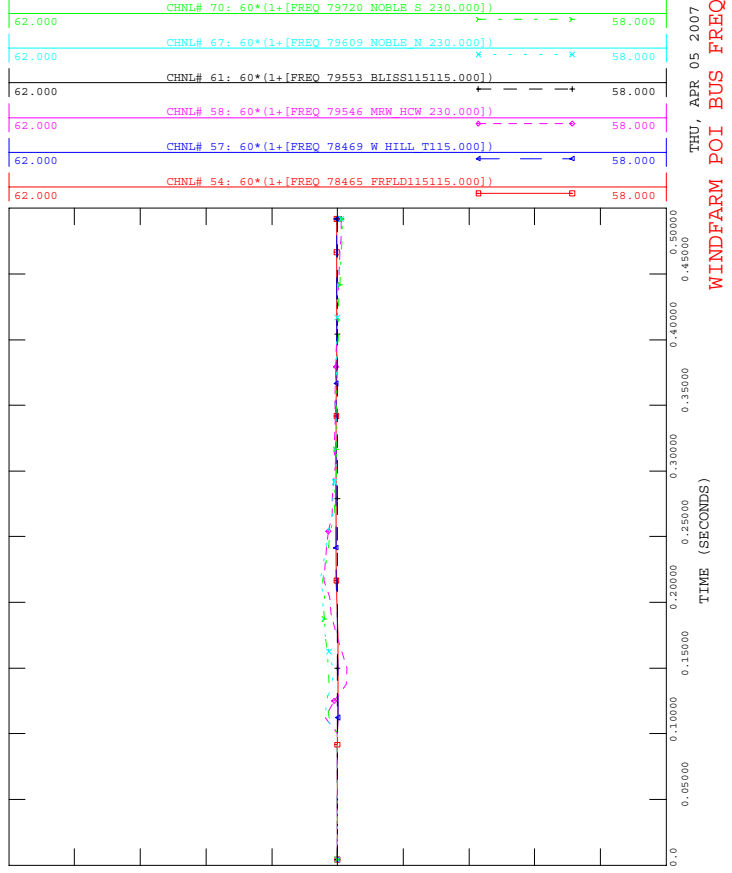
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_N/NOBLE_N-PLAT T#1-PLAT 115(DP1)

FILE: atra-MS26.OUT



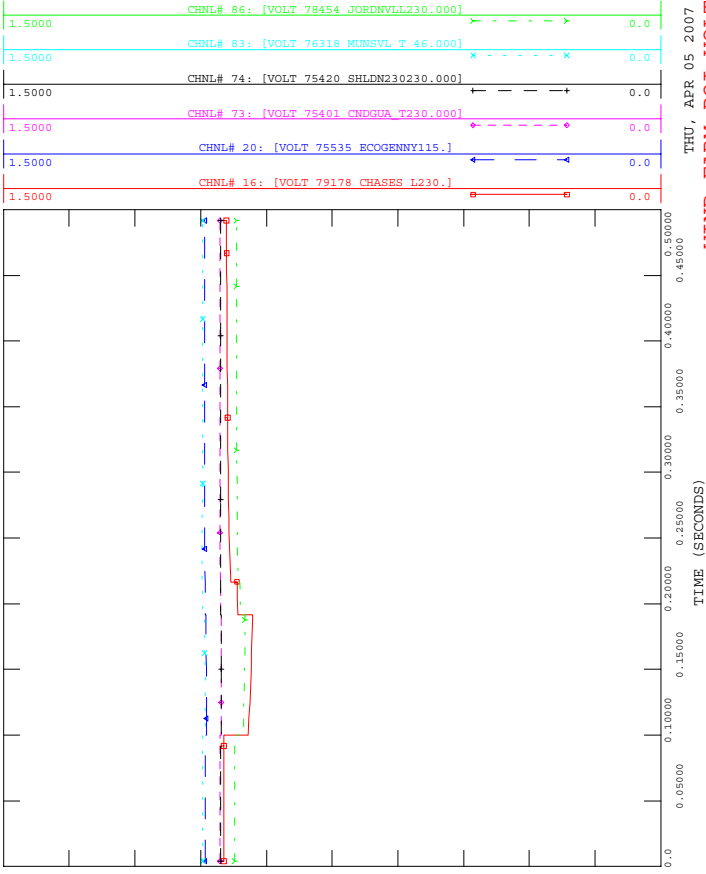
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_N/NOBLE_N-PLAT T#1-PLAT 115(DP1)

FILE: atra-MS26.OUT



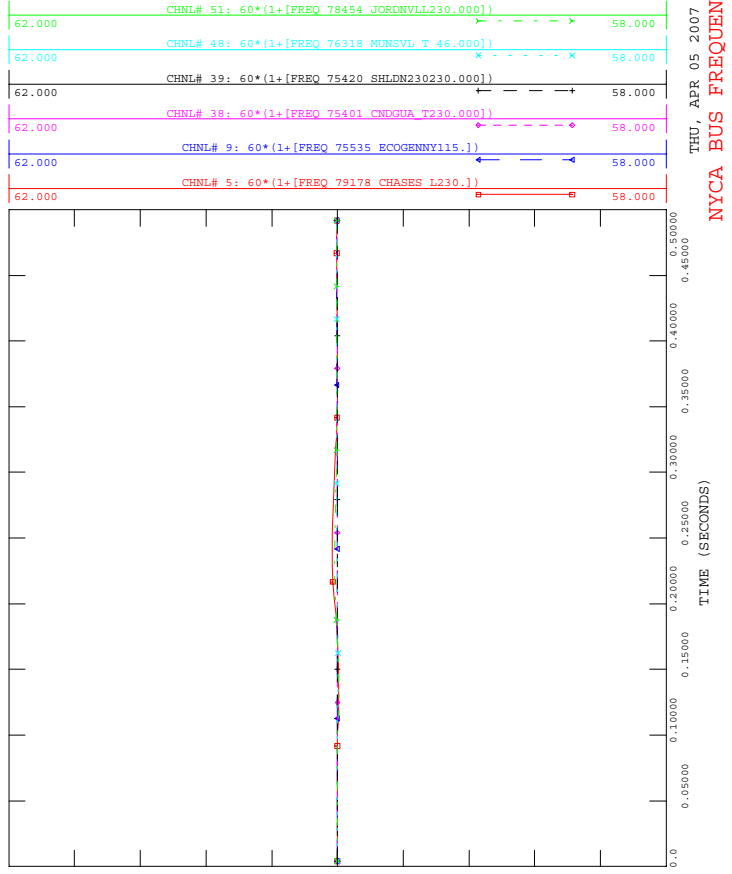
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_N/NOBLE_N-PLAT T#1-PLAT 115(DP1)

FILE: atra-MS26.OUT



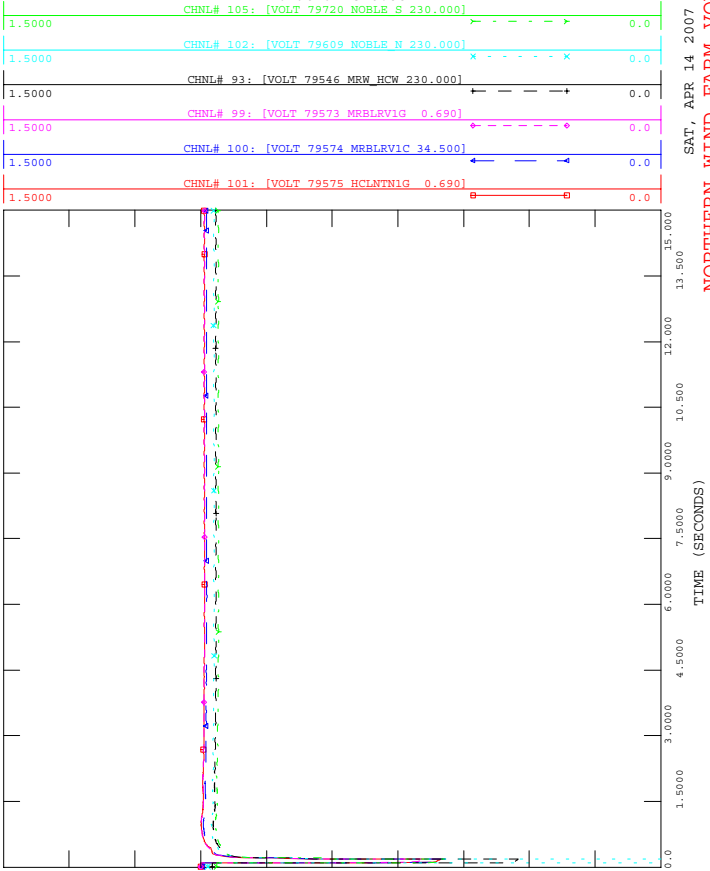
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_N/NOBLE_N-PLAT T#1-PLAT 115(DP1)

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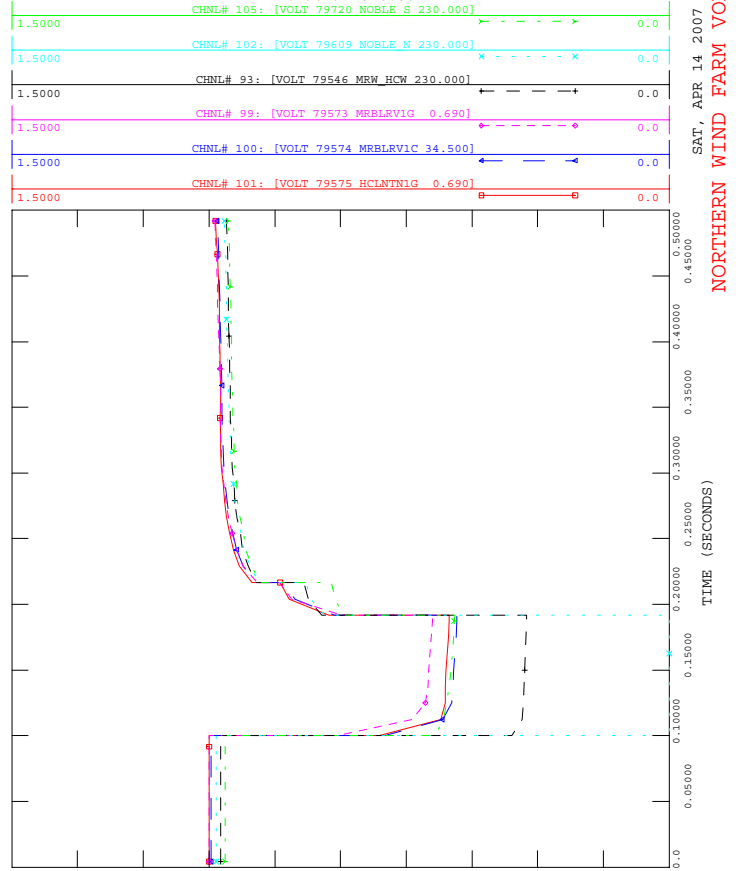
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_N/NOBLE_N-PLAT T#1-PLAT 115(DP1)

FILE: atra-MS26.OUT



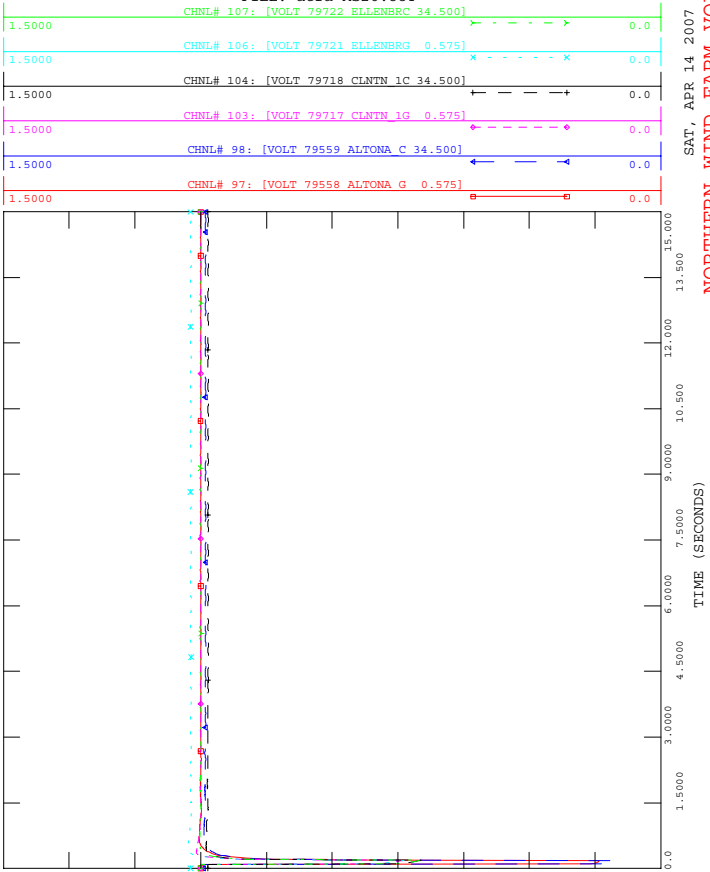
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_N/NOBLE_N-PLAT T#1-PLAT 115(DP1)

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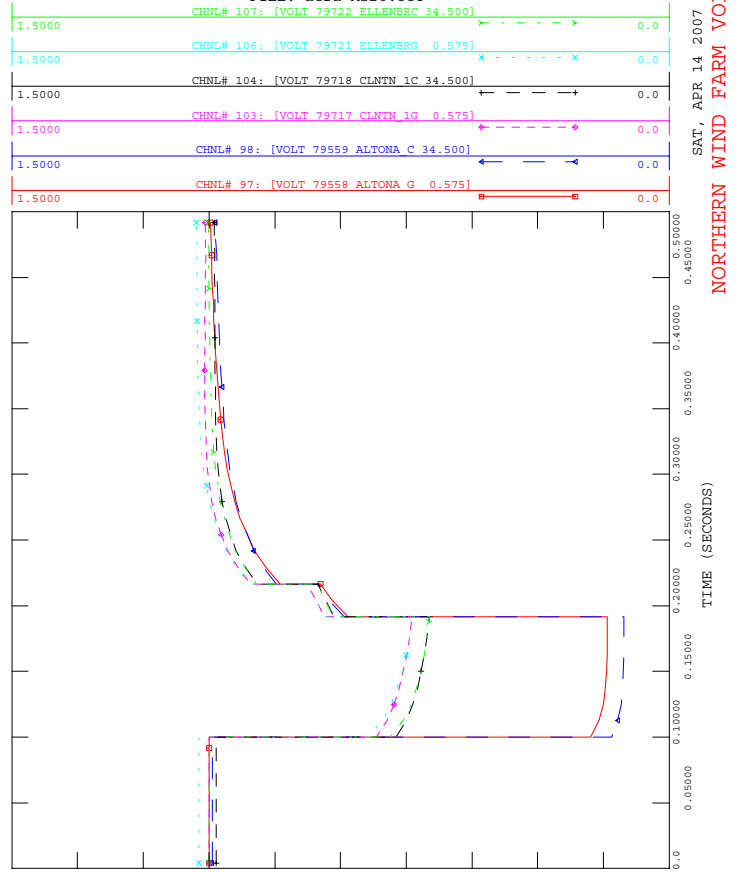
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_N/NOBLE_N-PLAT T#1-PLAT 115(DP1)

FILE: atra-MS26.OUT



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_N/NOBLE_N-PLAT T#1-PLAT 115(DP1)

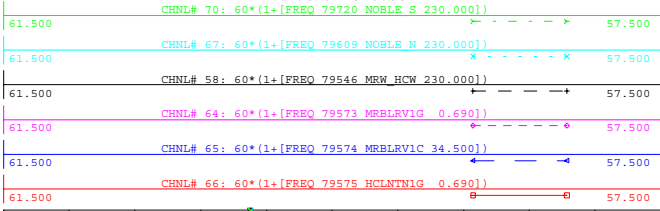
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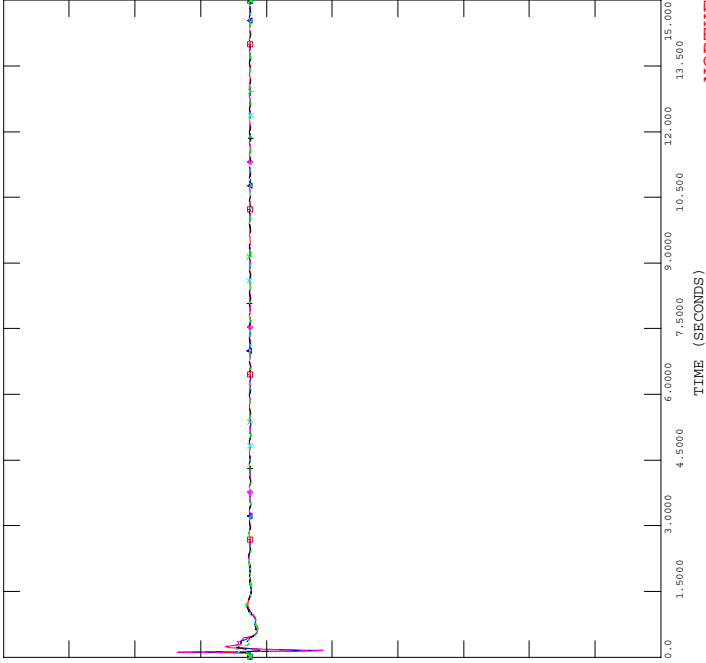


2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_N/NOBLE_N-PLAT T#1-PLAT 115(DP1)

FILE: atra-MS26.OUT

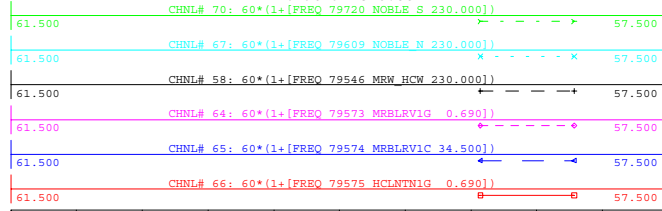


SAT, APR 14 2007 14:03
NORTHERN WIND FARM FREQ

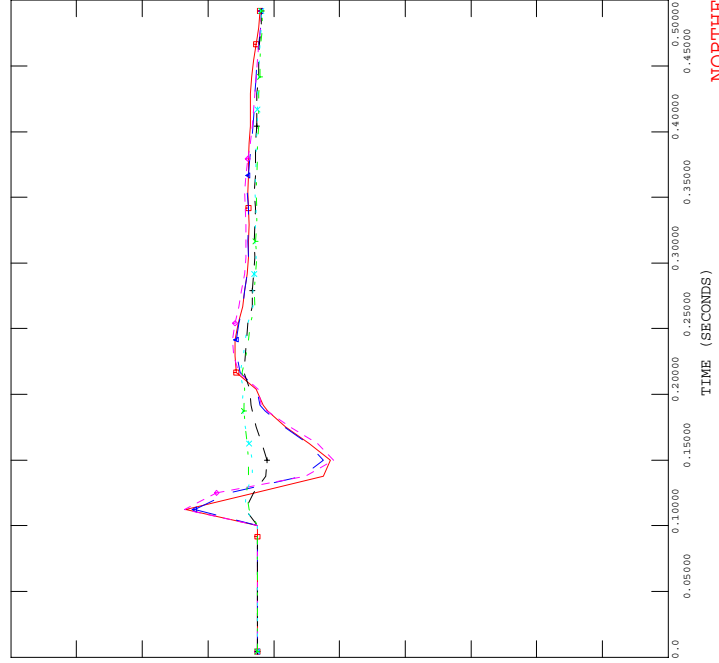


2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_N/NOBLE_N-PLAT T#1-PLAT 115(DP1)

FILE: atra-MS26.OUT

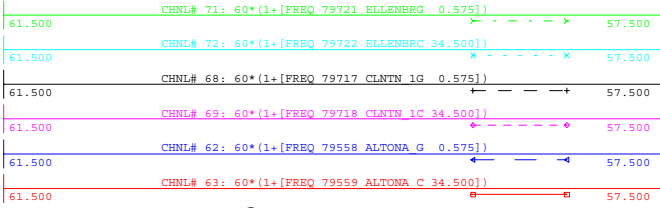


SAT, APR 14 2007 14:03
NORTHERN WIND FARM FREQ

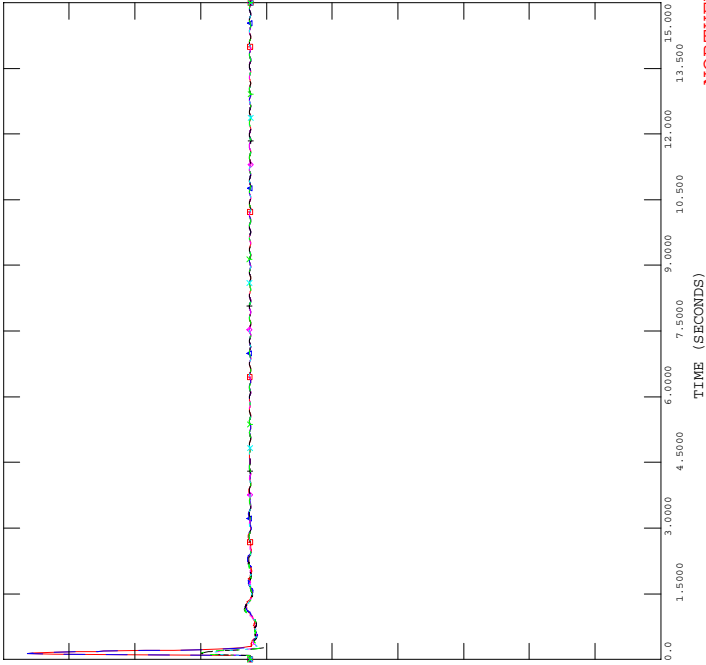


2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_N/NOBLE_N-PLAT T#1-PLAT 115(DP1)

FILE: atra-MS26.OUT

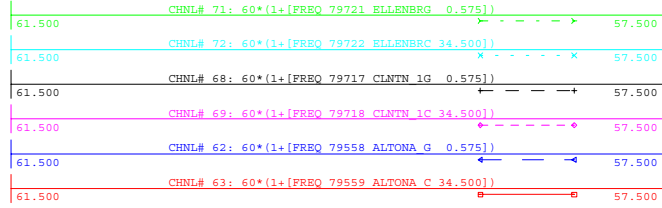


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NORTHERN WIND FARM FREQ

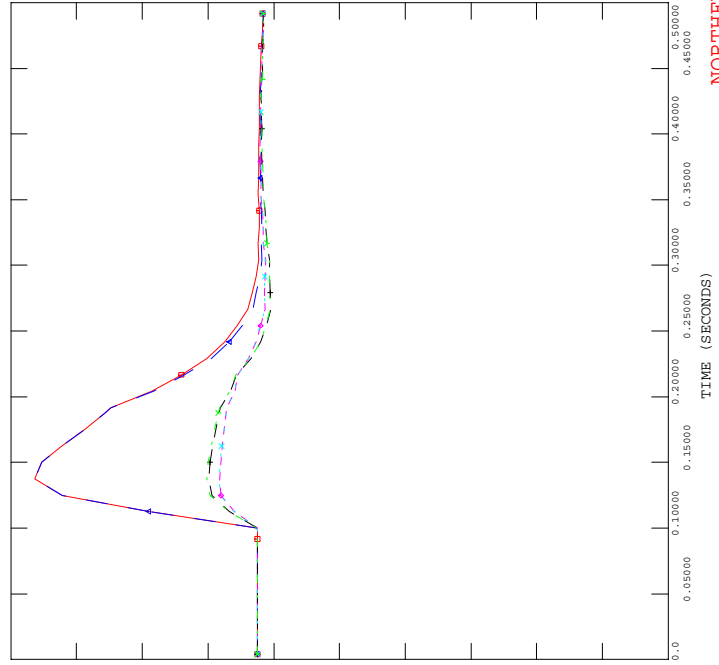


2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_N/NOBLE_N-PLAT T#1-PLAT 115(DP1)

FILE: atra-MS26.OUT



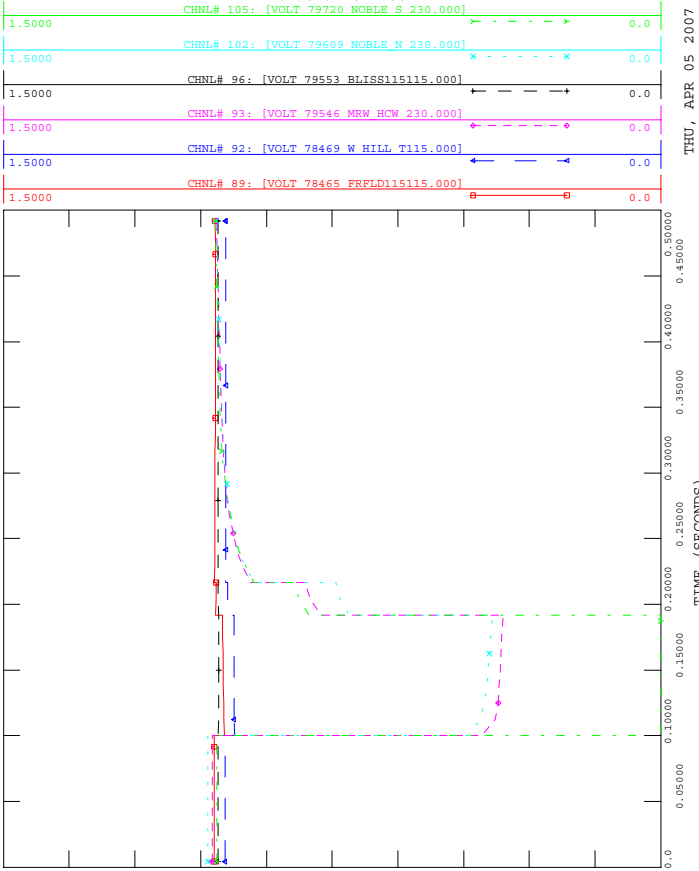
SAT, APR 14 2007 14:03
NORTHERN WIND FARM FREQ





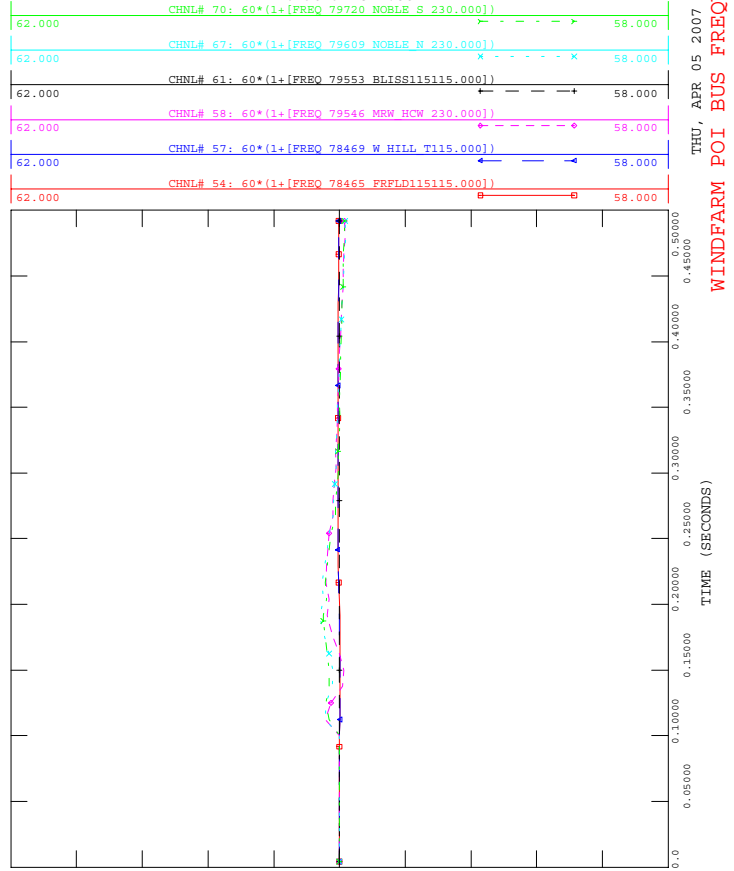
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_S/NOBLE_S-PLAT T#4-PLAT 115(RYP2)

FILE: atra-MS27.OUT



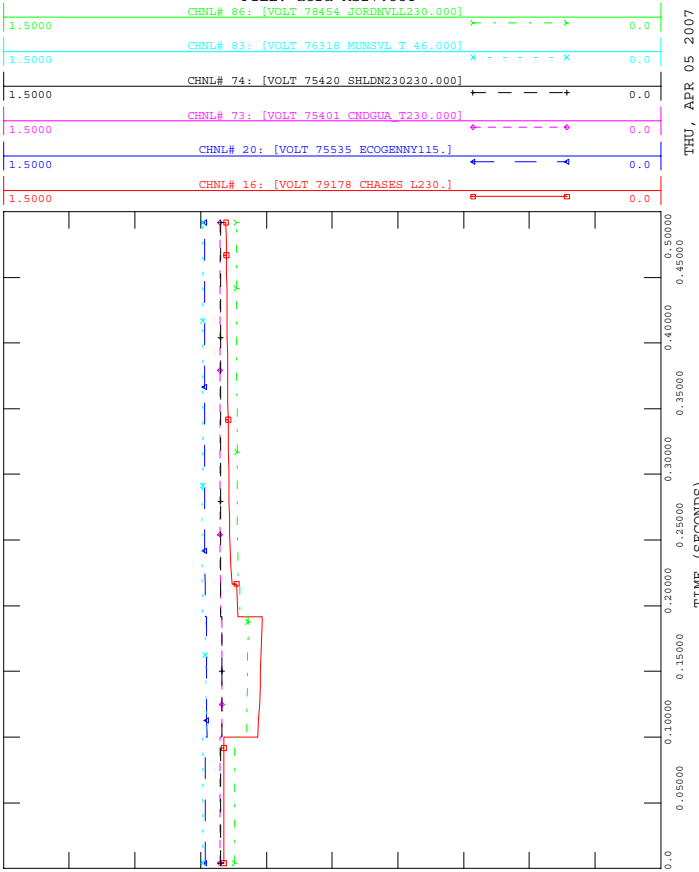
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2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_S/NOBLE_S-PLAT T#4-PLAT 115(RYP2)

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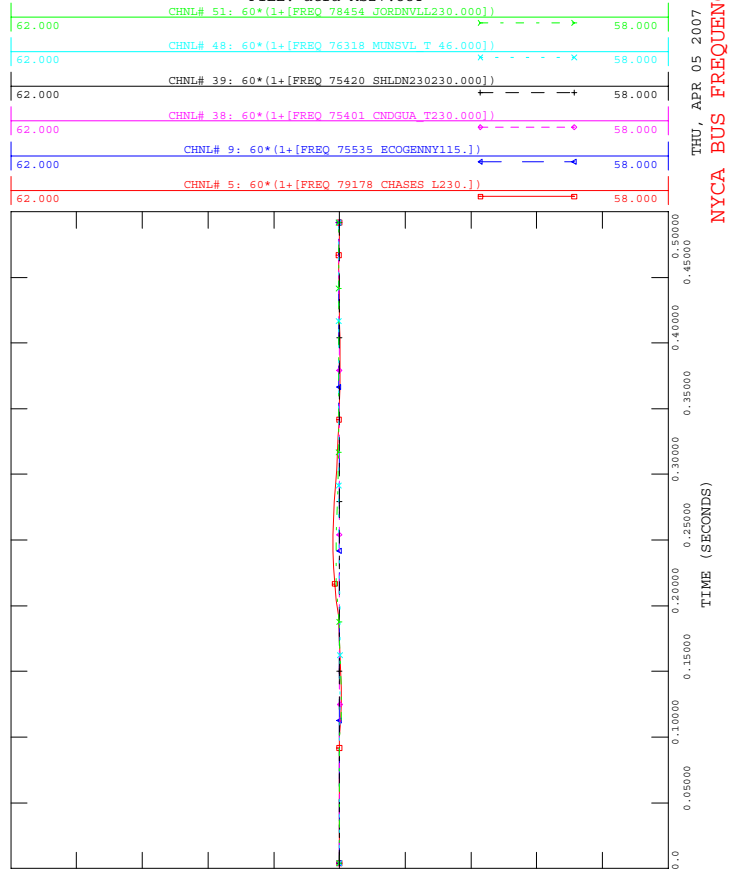
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_S/NOBLE_S-PLAT T#4-PLAT 115(RYP2)

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2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_S/NOBLE_S-PLAT T#4-PLAT 115(RYP2)

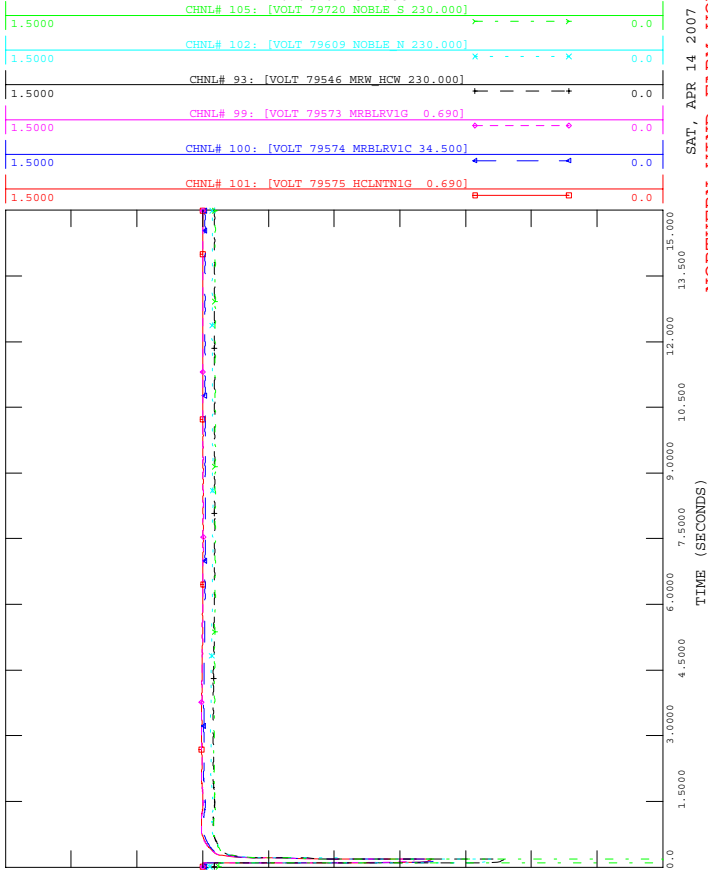
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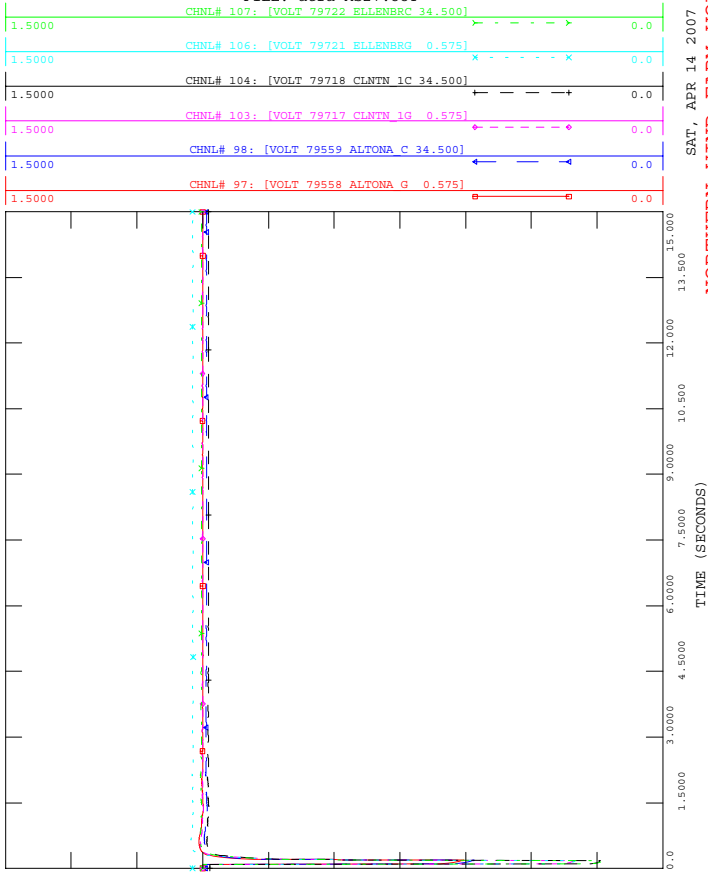
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_S/NOBLE_S-PLAT T#4-PLAT 115(RYP2)

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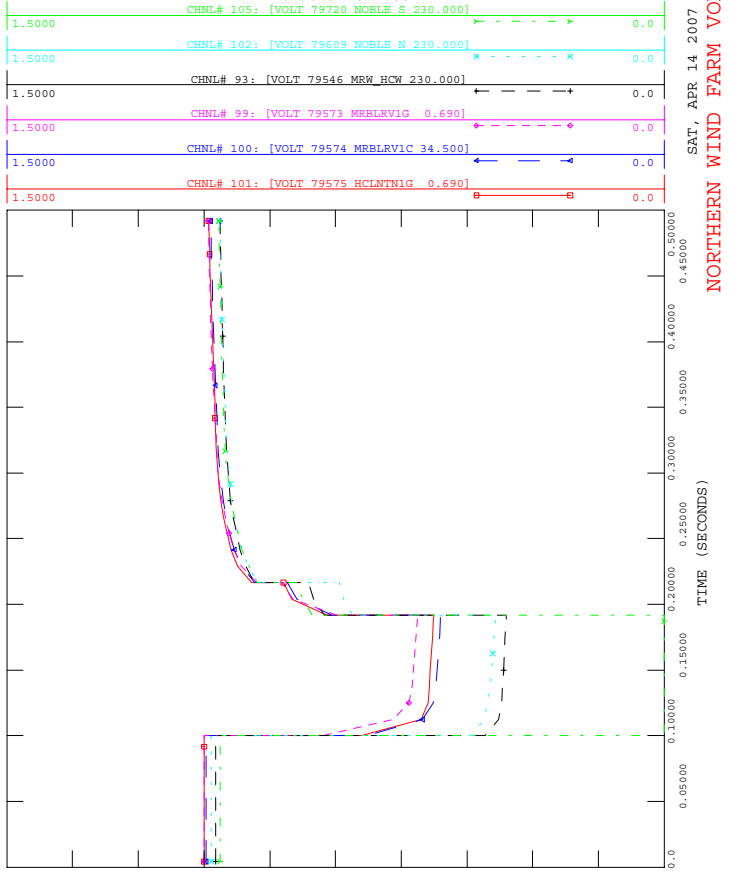
2006 CLASS YEAR ATRA BASE CASE
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3PH-NC@NOBLE_S/NOBLE_S-PLAT T#4-PLAT 115(RYP2)

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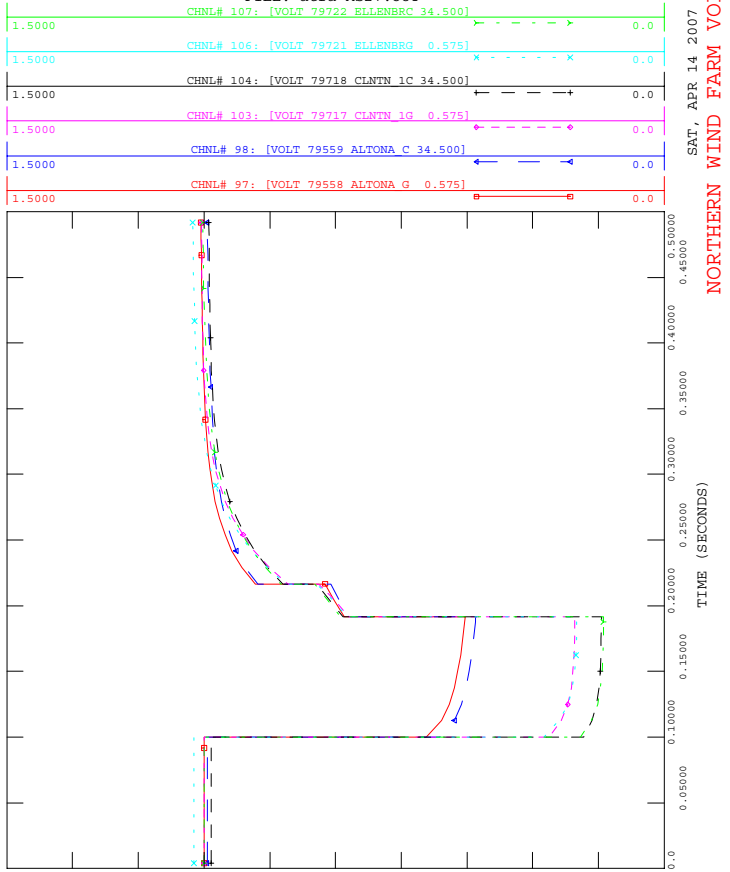
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_S/NOBLE_S-PLAT T#4-PLAT 115(RYP2)

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2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_S/NOBLE_S-PLAT T#4-PLAT 115(RYP2)

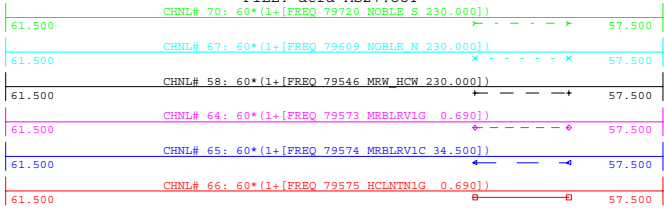
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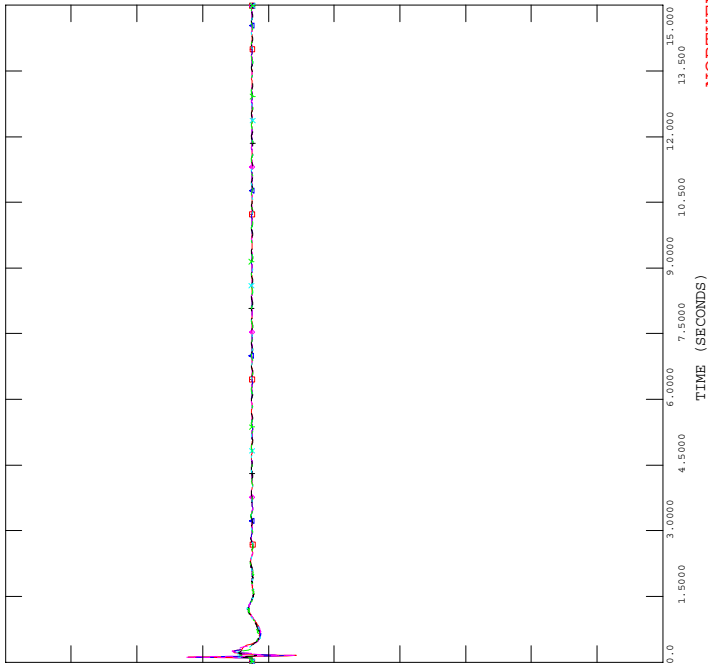


2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_S/NOBLE_S-PLAT T#4-PLAT 115(RYP2)

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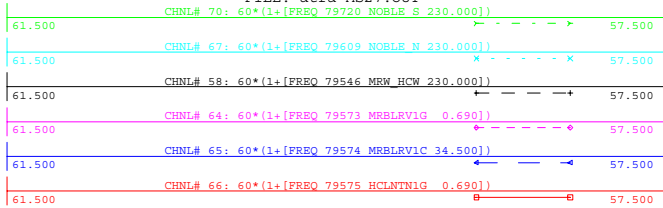


SAT, APR 14 2007 14:03
NORTHERN WIND FARM FREQ

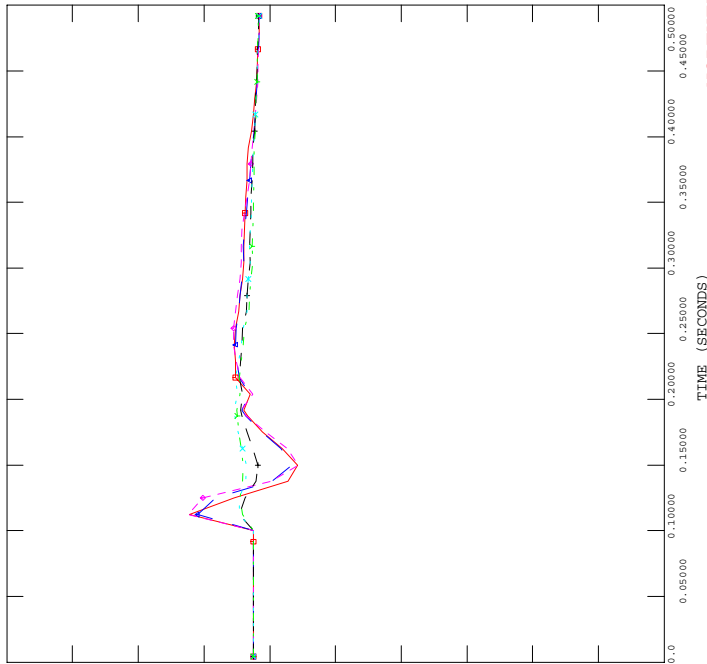


2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_S/NOBLE_S-PLAT T#4-PLAT 115(RYP2)

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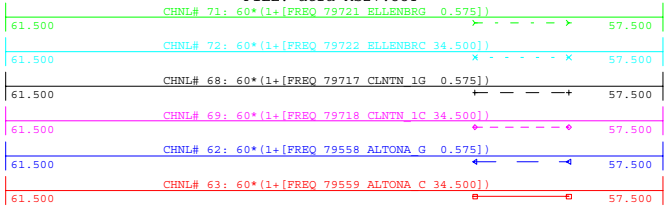


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NORTHERN WIND FARM FREQ

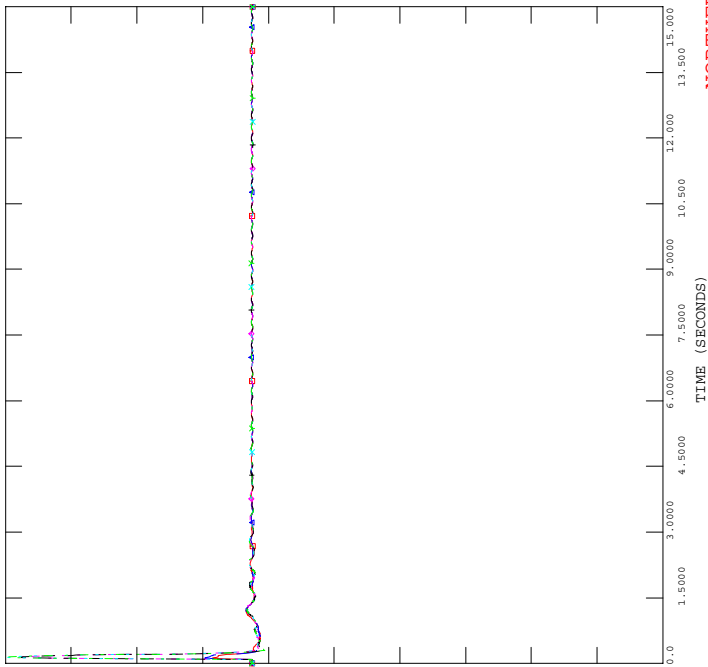


2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_S/NOBLE_S-PLAT T#4-PLAT 115(RYP2)

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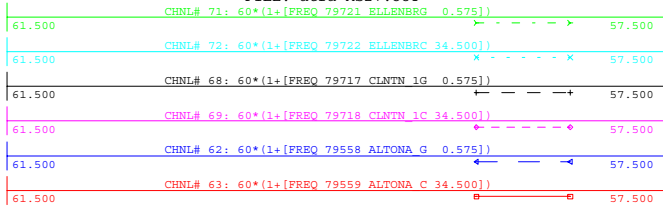


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NORTHERN WIND FARM FREQ

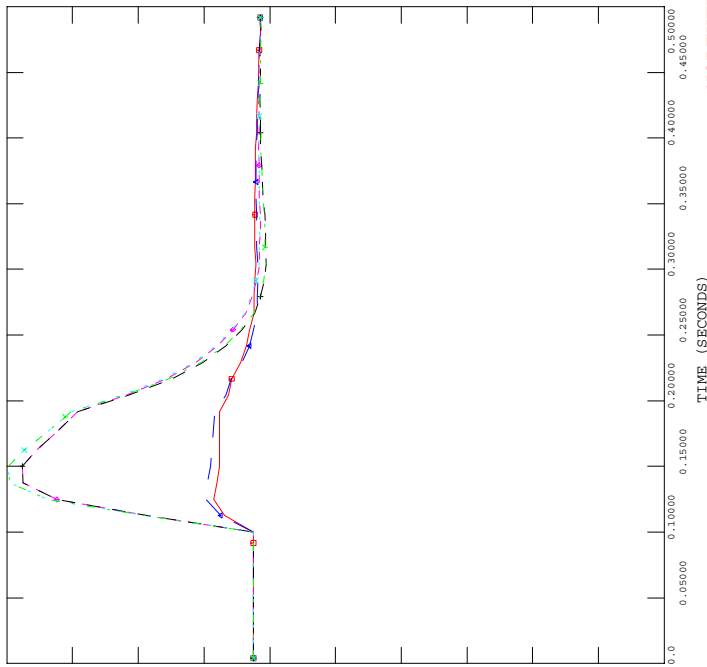


2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@NOBLE_S/NOBLE_S-PLAT T#4-PLAT 115(RYP2)

FILE: atra-MS27.OUT



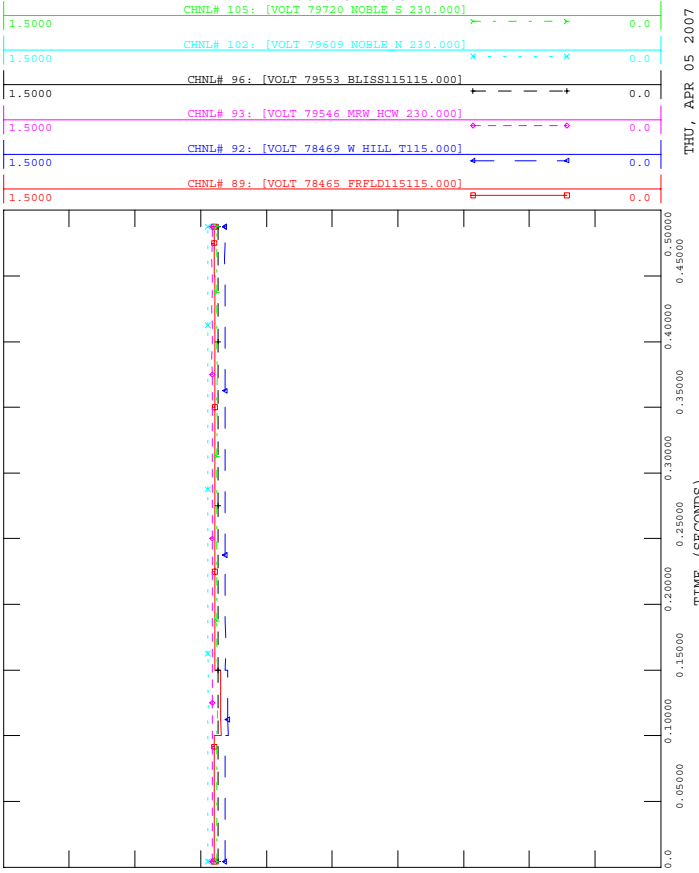
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NORTHERN WIND FARM FREQ





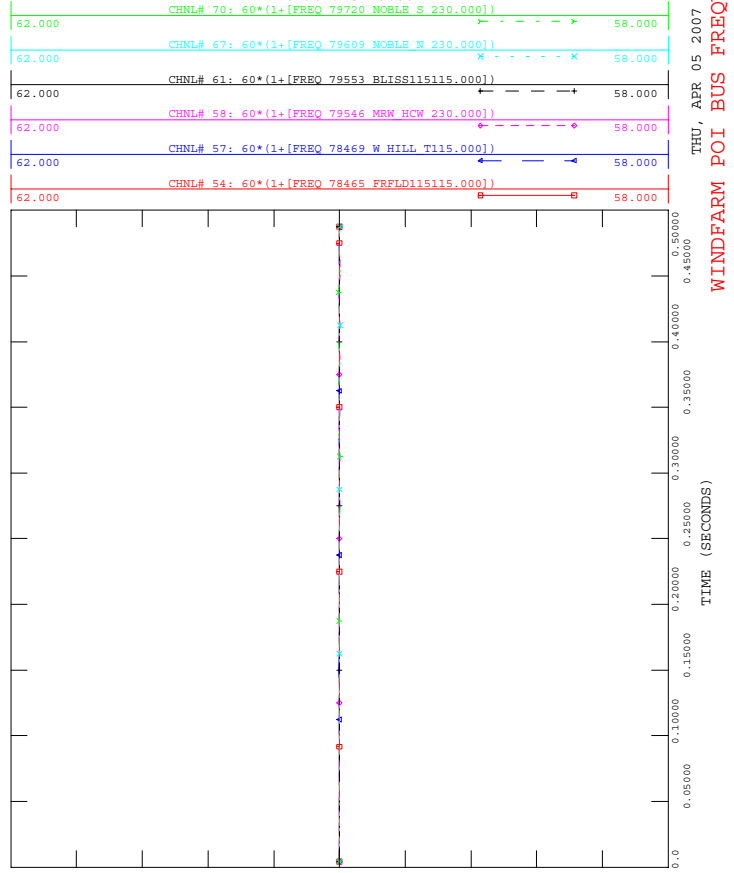
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MUNNSVILLE/MUNNSVILLE-MORRISVILLE 46

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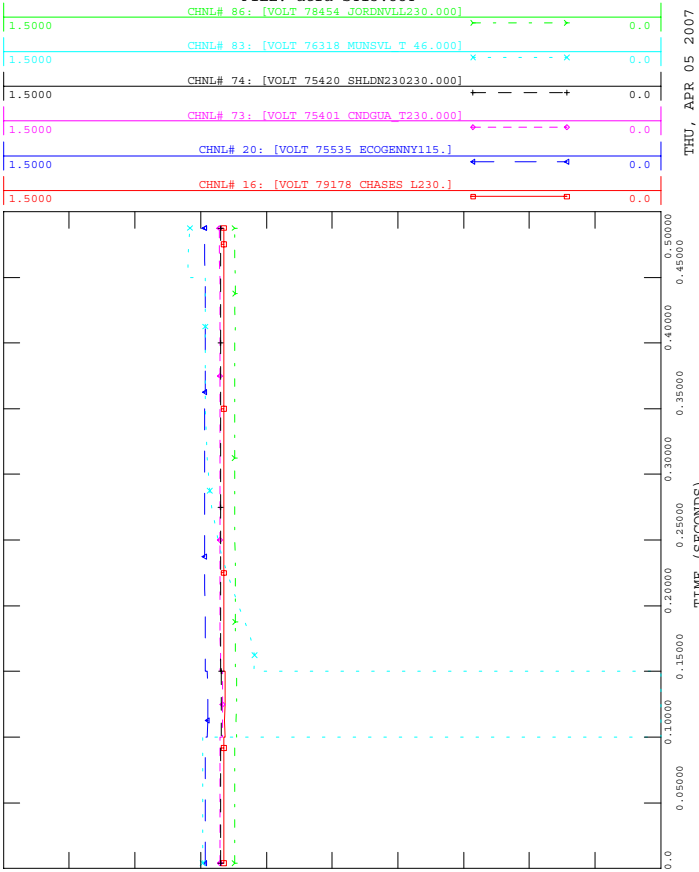
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MUNNSVILLE/MUNNSVILLE-MORRISVILLE 46

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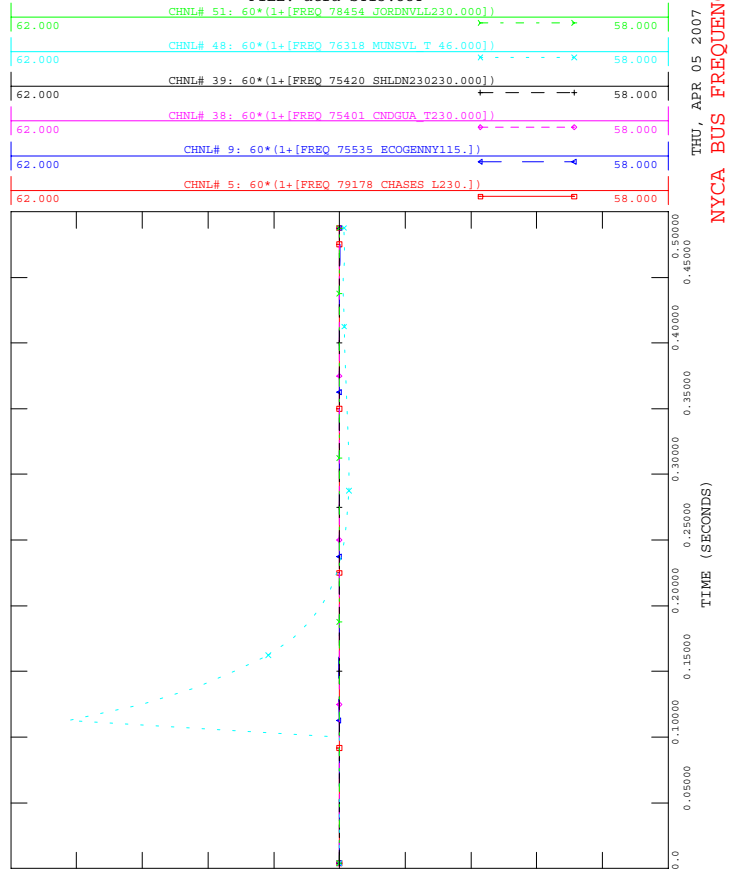
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MUNNSVILLE/MUNNSVILLE-MORRISVILLE 46

FILE: atra-ST13.OUT



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MUNNSVILLE/MUNNSVILLE-MORRISVILLE 46

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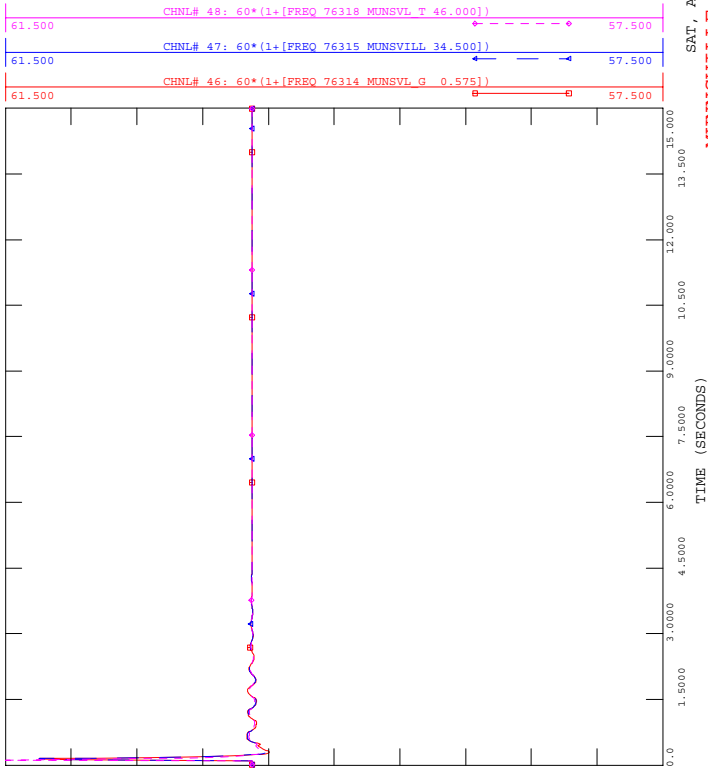




2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MUNNSVILLE/MUNNSVILLE-MORRISVILLE 46

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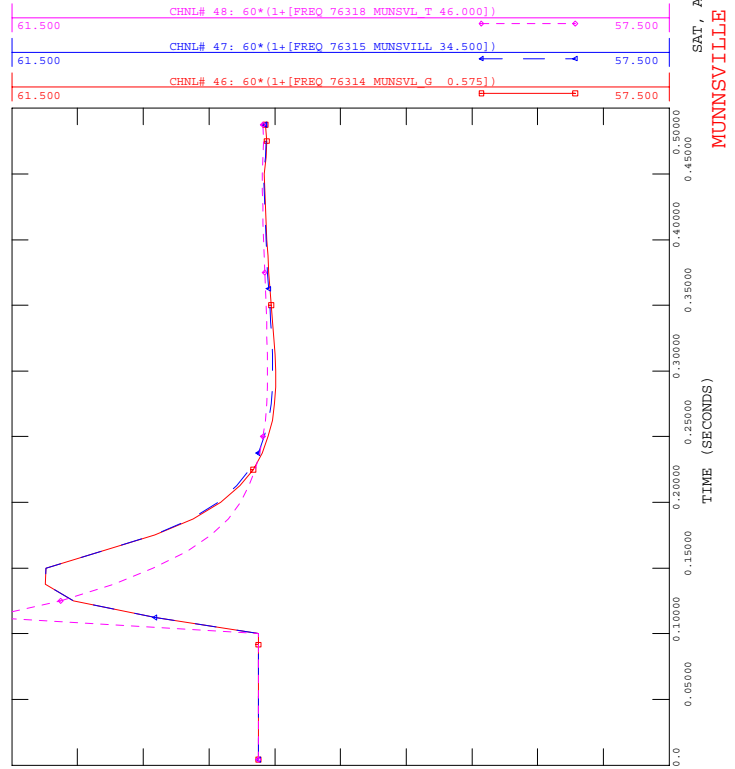
SAT, APR 14 2007 17:23
MUNNSVILLE FREQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MUNNSVILLE/MUNNSVILLE-MORRISVILLE 46

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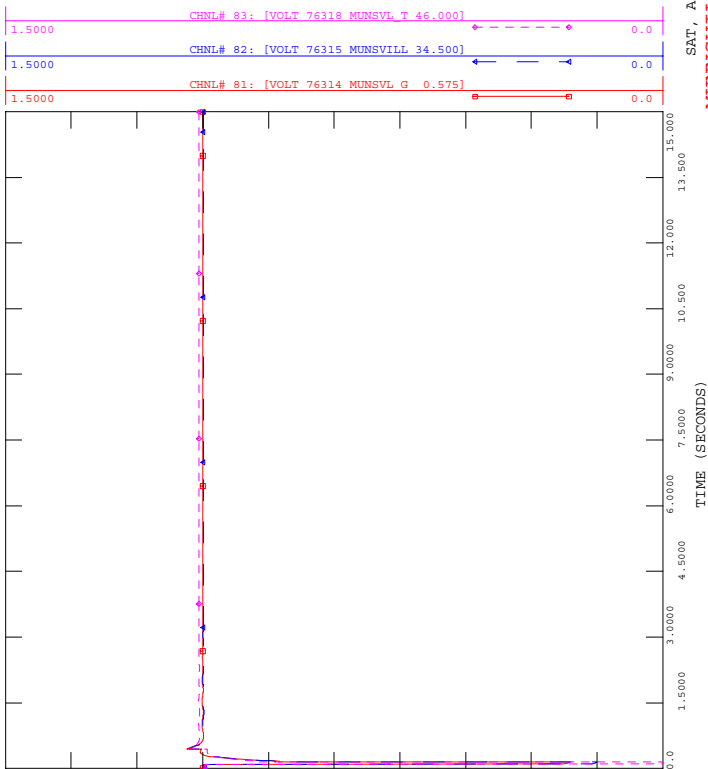
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MUNNSVILLE FREQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MUNNSVILLE/MUNNSVILLE-MORRISVILLE 46

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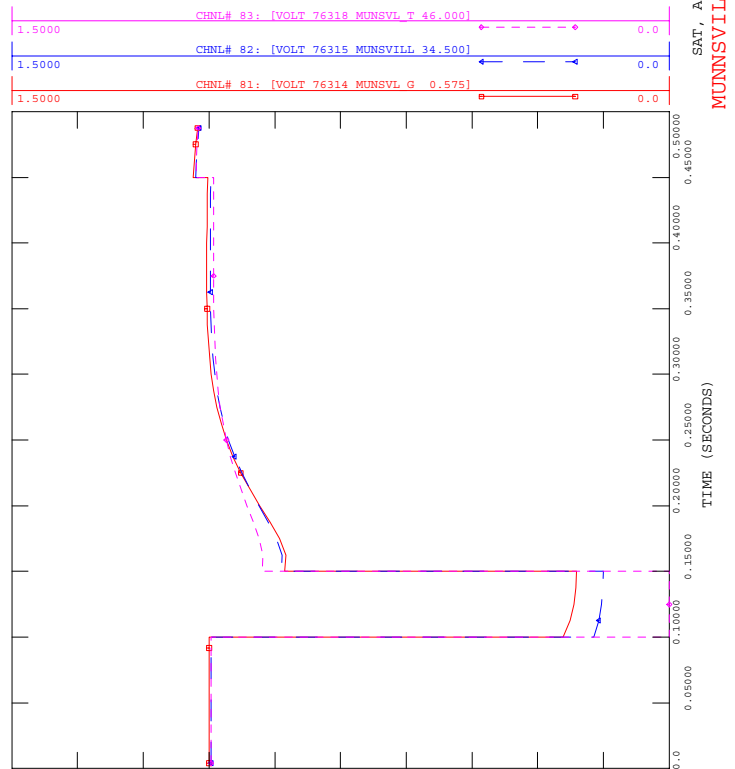
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MUNNSVILLE VOLTAGES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MUNNSVILLE/MUNNSVILLE-MORRISVILLE 46

FILE: atra-ST13.OUT

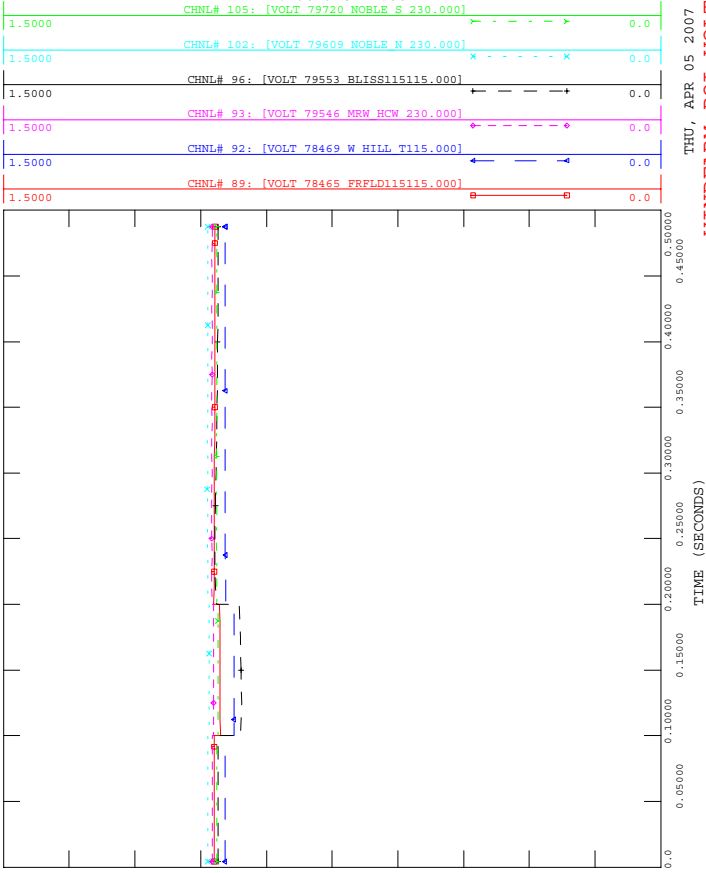
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MUNNSVILLE VOLTAGES





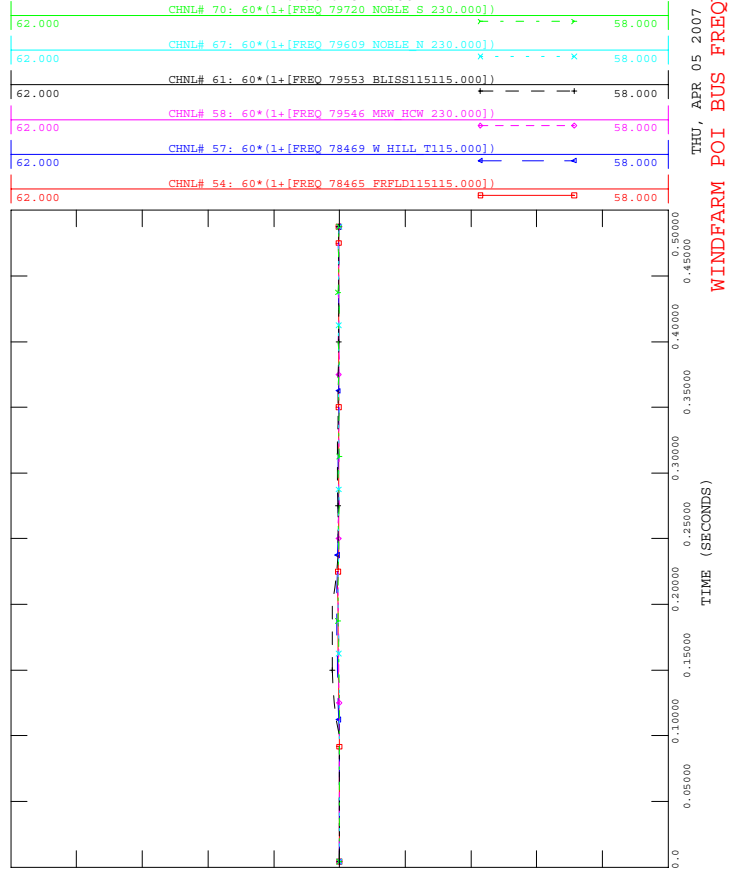
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MEYER230/MEYER230-CNDGUA_T 230KV

FILE: atra-ST14.OUT



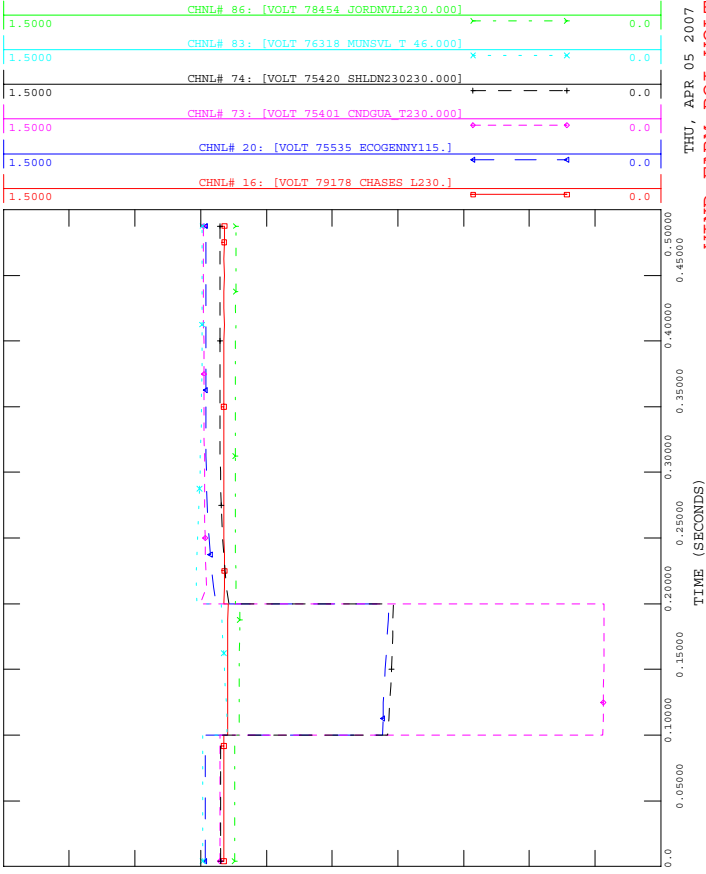
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
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FILE: atra-ST14.OUT



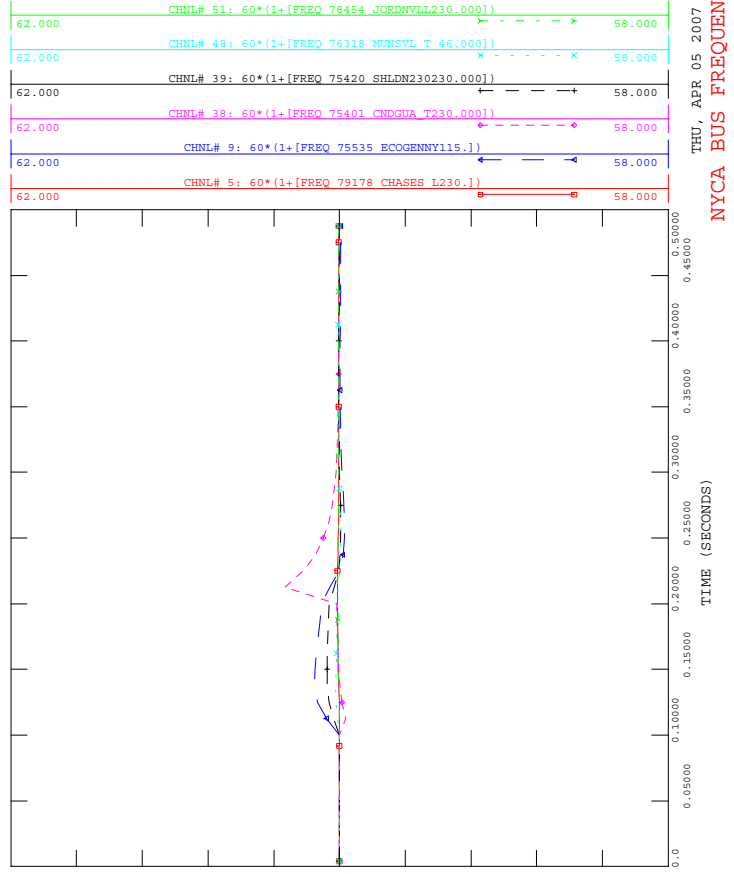
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MEYER230/MEYER230-CNDGUA_T 230KV

FILE: atra-ST14.OUT



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MEYER230/MEYER230-CNDGUA_T 230KV

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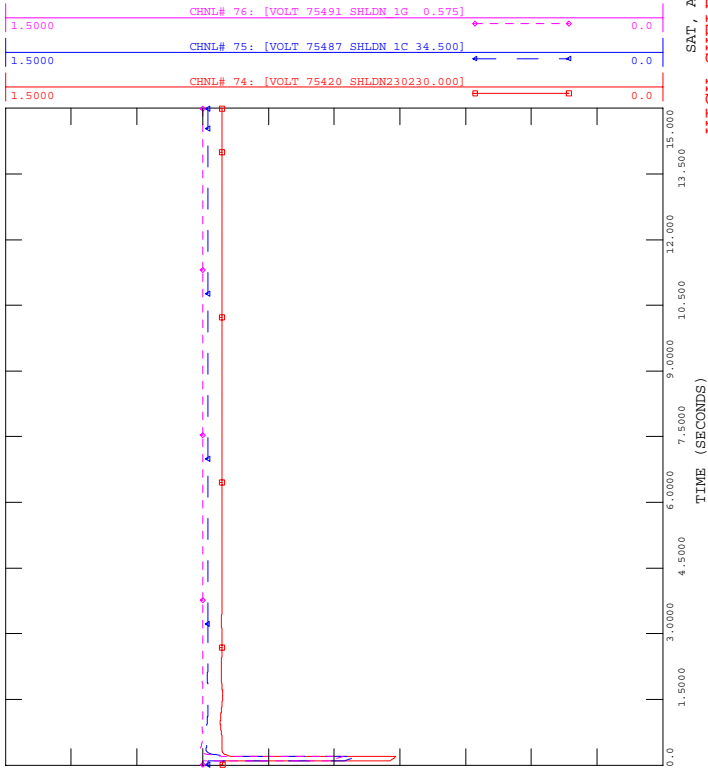




2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MEYER230/MEYER230-CNDGUA_T 230KV

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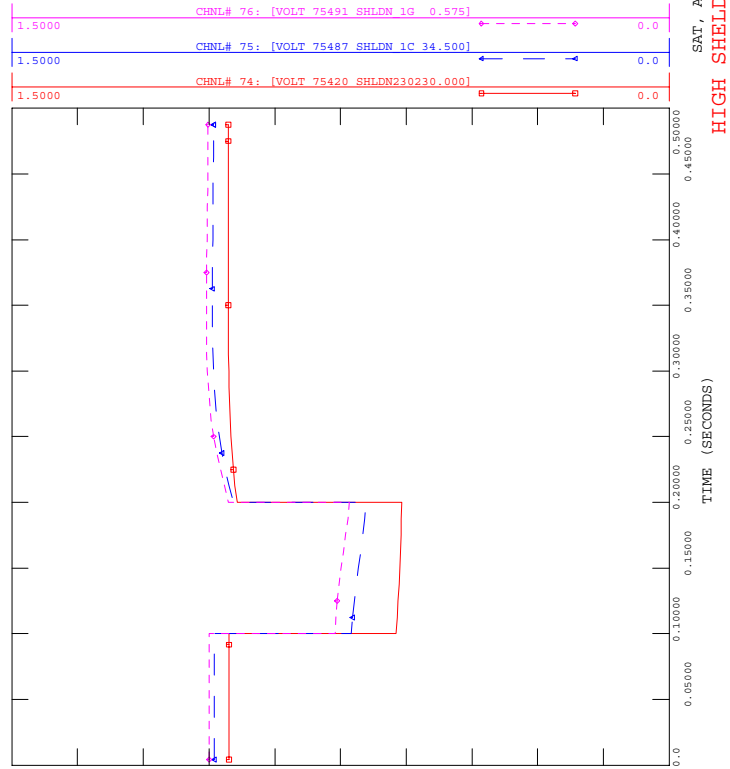
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HIGH SHELTON VOLTAGES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MEYER230/MEYER230-CNDGUA_T 230KV

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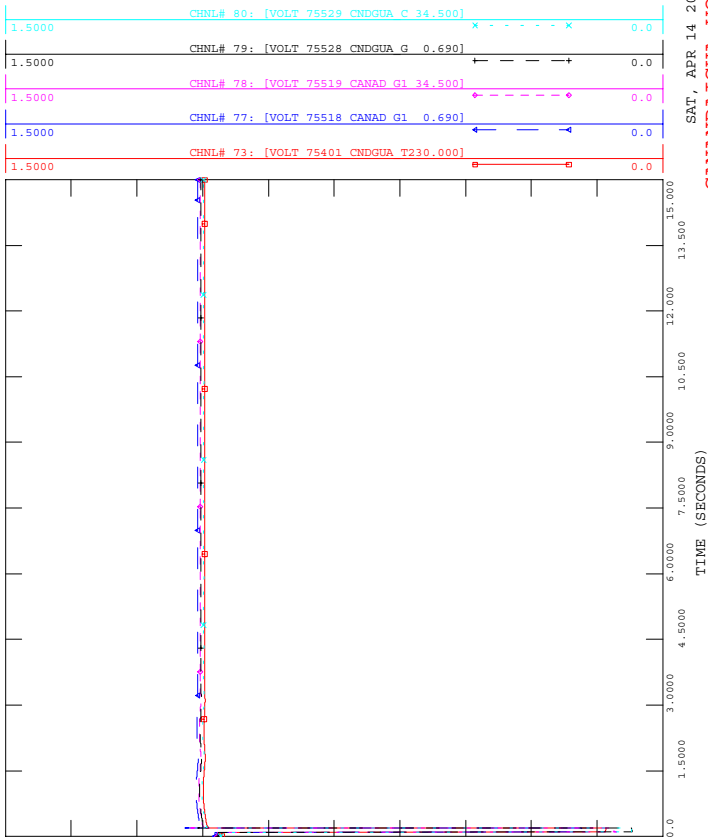
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HIGH SHELTON VOLTAGES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MEYER230/MEYER230-CNDGUA_T 230KV

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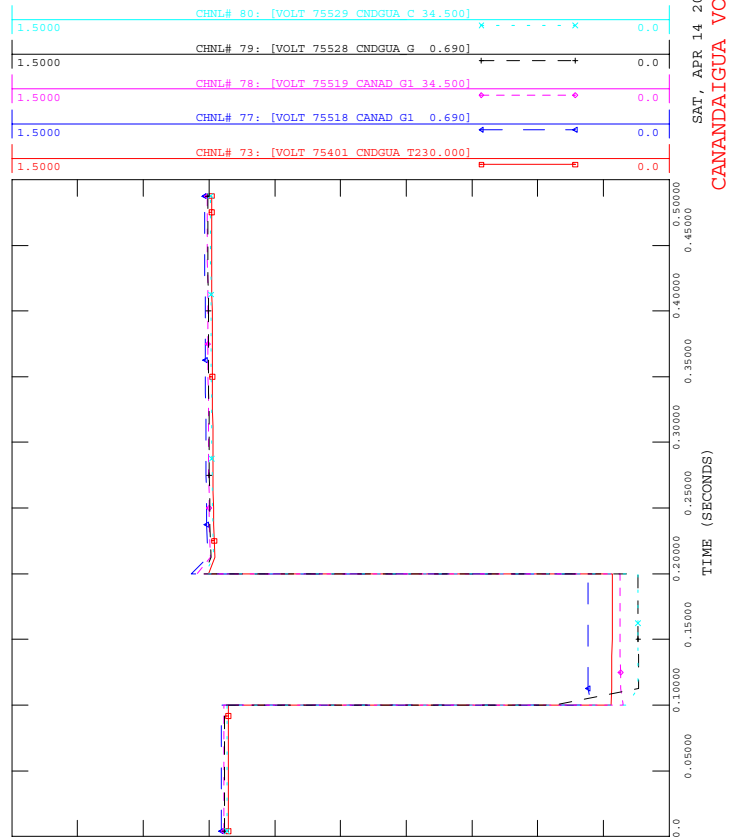
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CANANDAIGUA VOLTAGES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MEYER230/MEYER230-CNDGUA_T 230KV

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CANANDAIGUA VOLTAGES

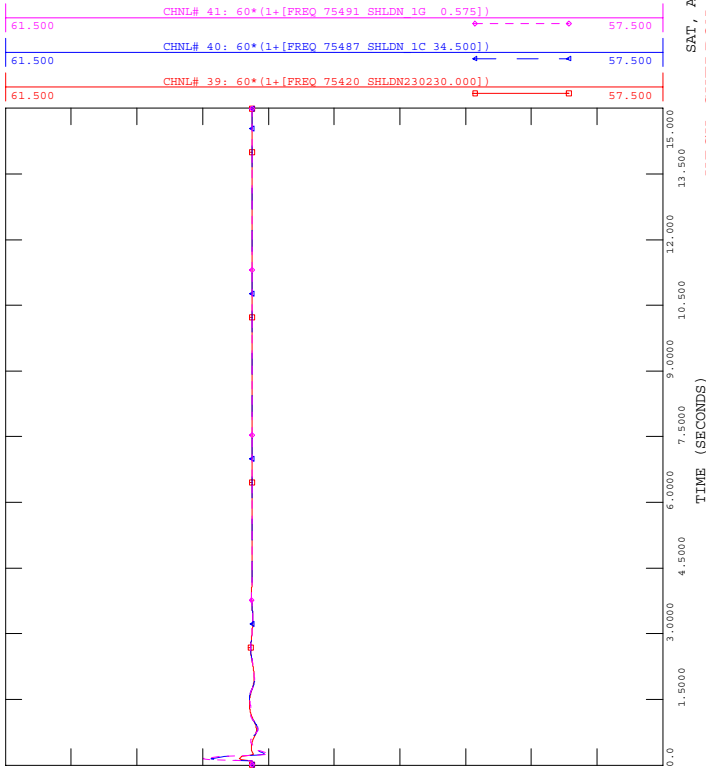




2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MEYER230/MEYER230-CNDGUA_T 230KV

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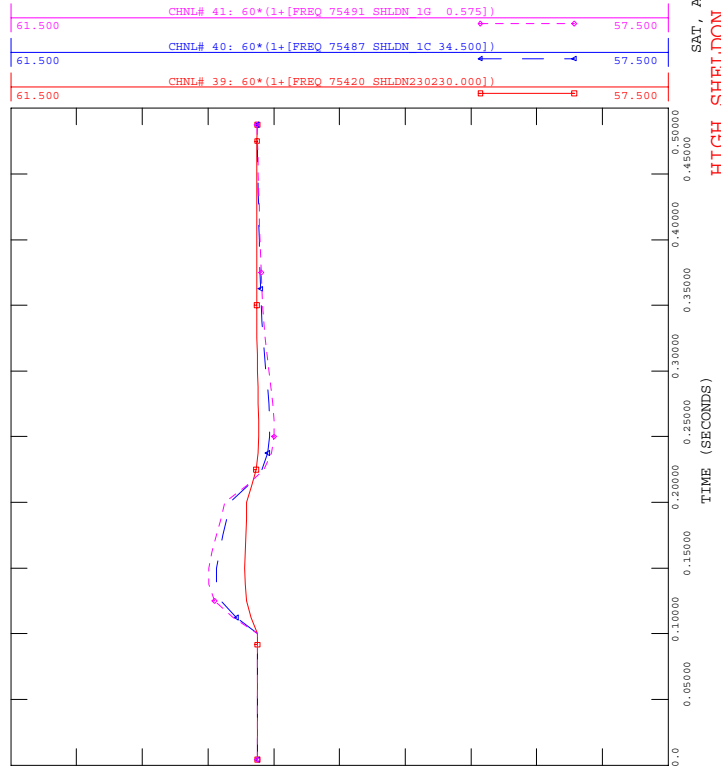
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HIGH SHELTON FREQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MEYER230/MEYER230-CNDGUA_T 230KV

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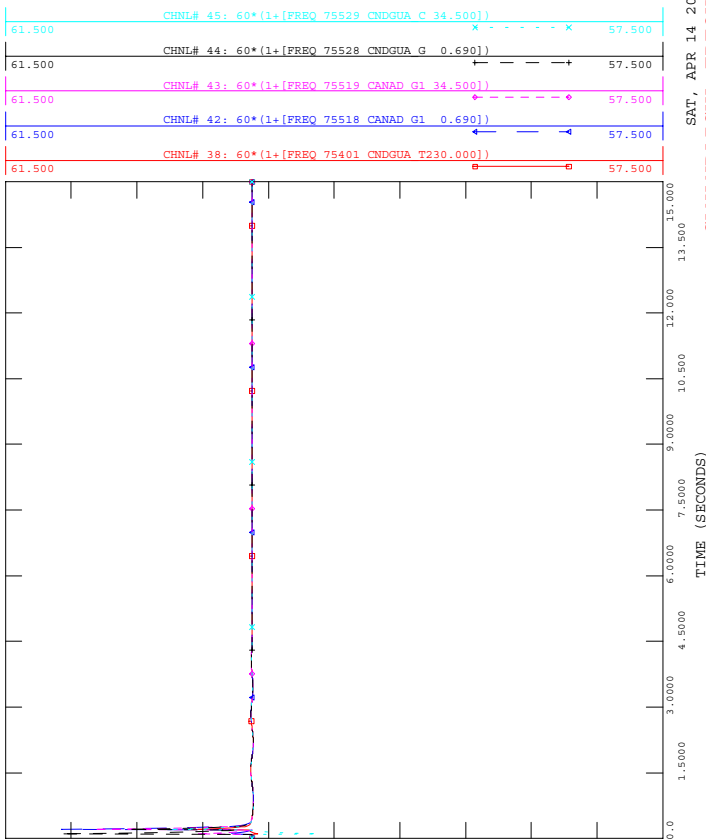
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HIGH SHELTON FREQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MEYER230/MEYER230-CNDGUA_T 230KV

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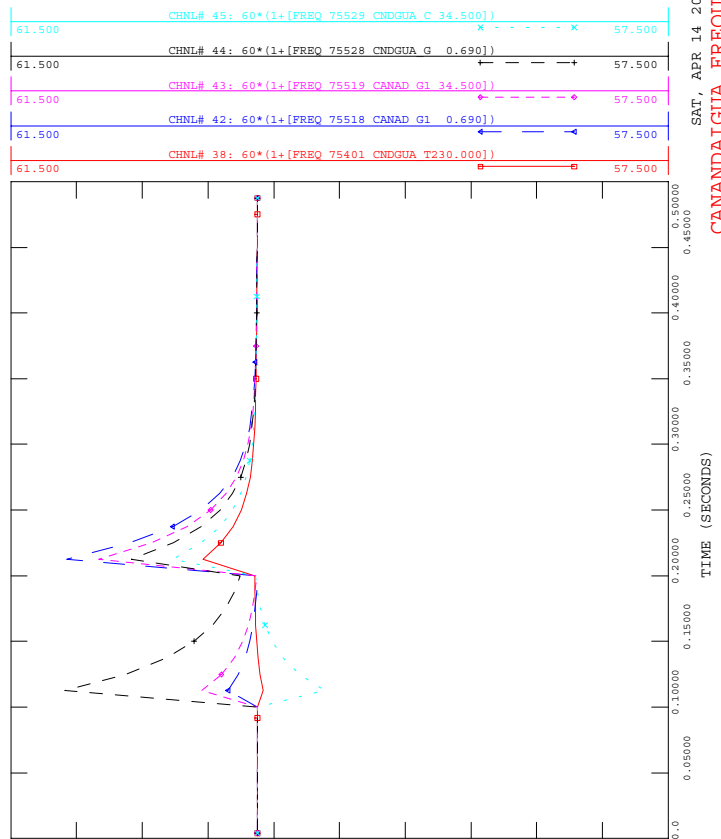
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CANANDAIGUA FREQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@MEYER230/MEYER230-CNDGUA_T 230KV

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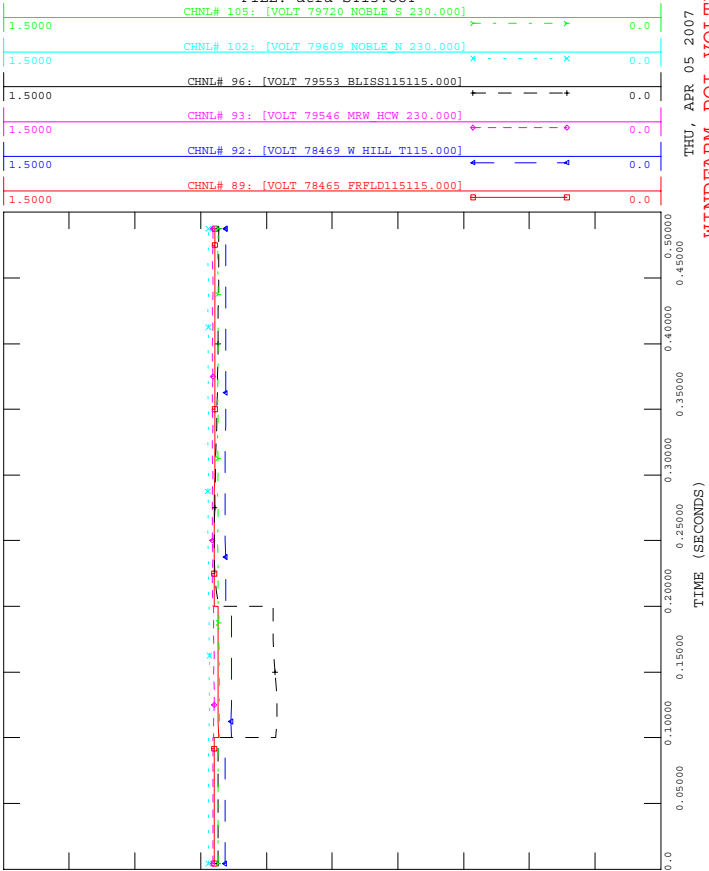
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CANANDAIGUA FREQUENCIES





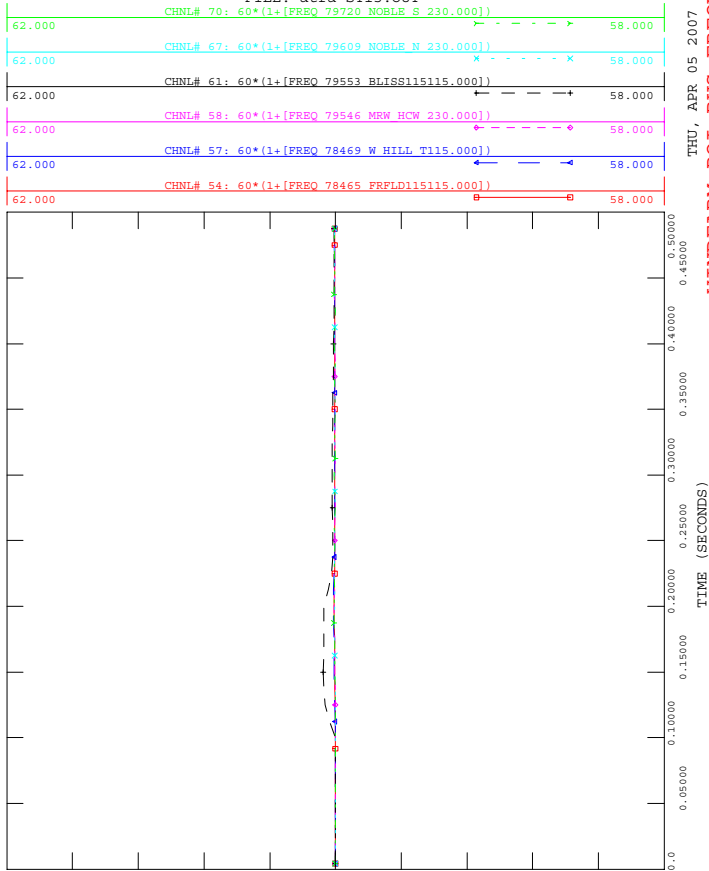
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2011 SUMMER STABILITY MARGIN CASE
3PH-NC@SHLDN230/MEYER230-SHLDN230 230KV

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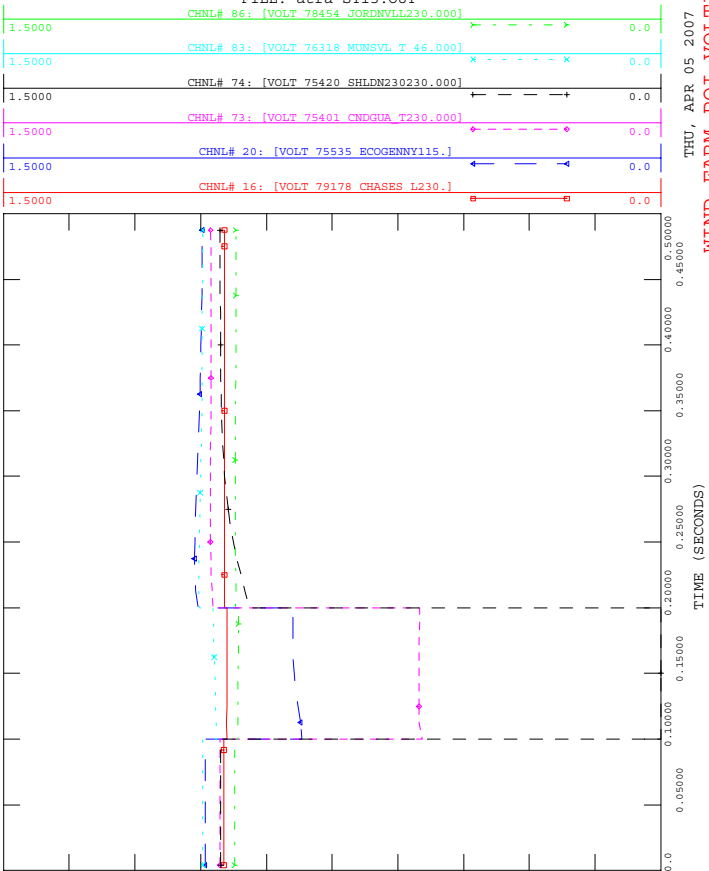
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@SHLDN230/MEYER230-SHLDN230 230KV

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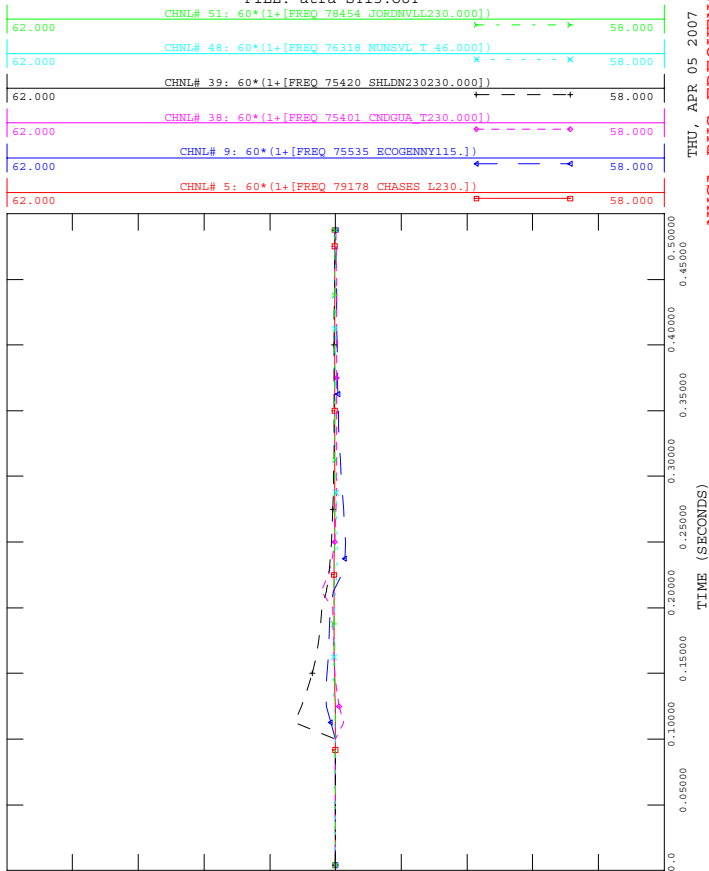
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@SHLDN230/MEYER230-SHLDN230 230KV

FILE: atra-ST15.OUT



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@SHLDN230/MEYER230-SHLDN230 230KV

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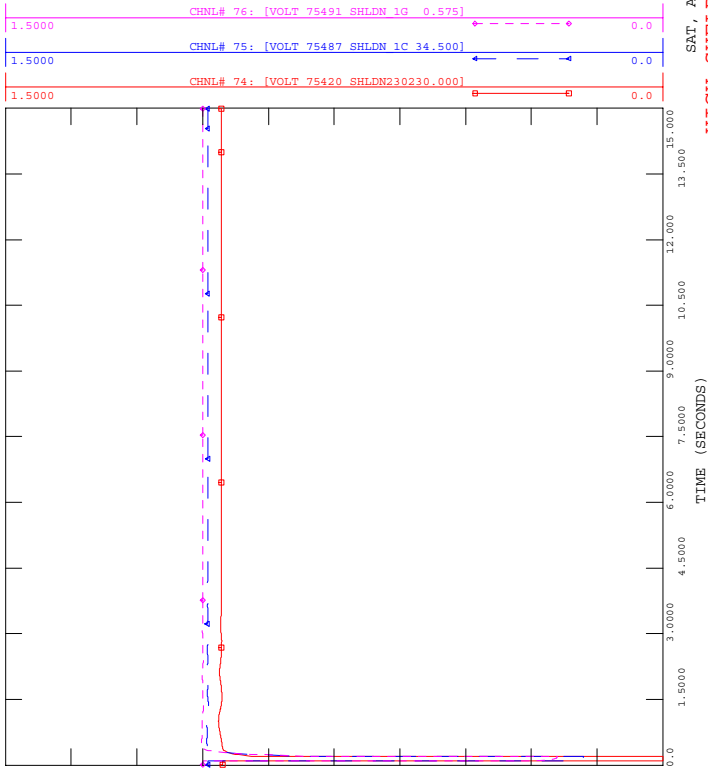




2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@SHLDN230/MEYER230-SHLDN230 230KV

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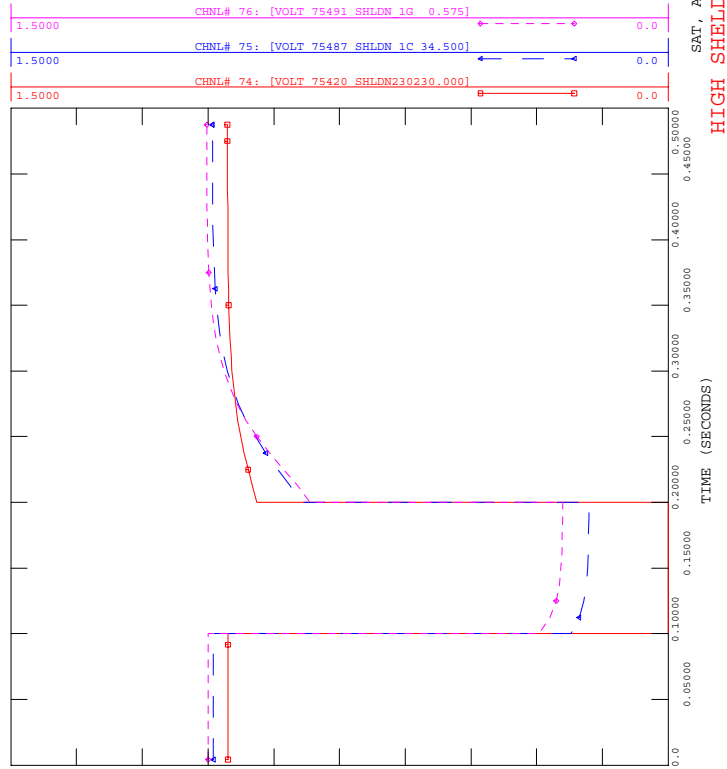
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HIGH SHELTON VOLTAGES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@SHLDN230/MEYER230-SHLDN230 230KV

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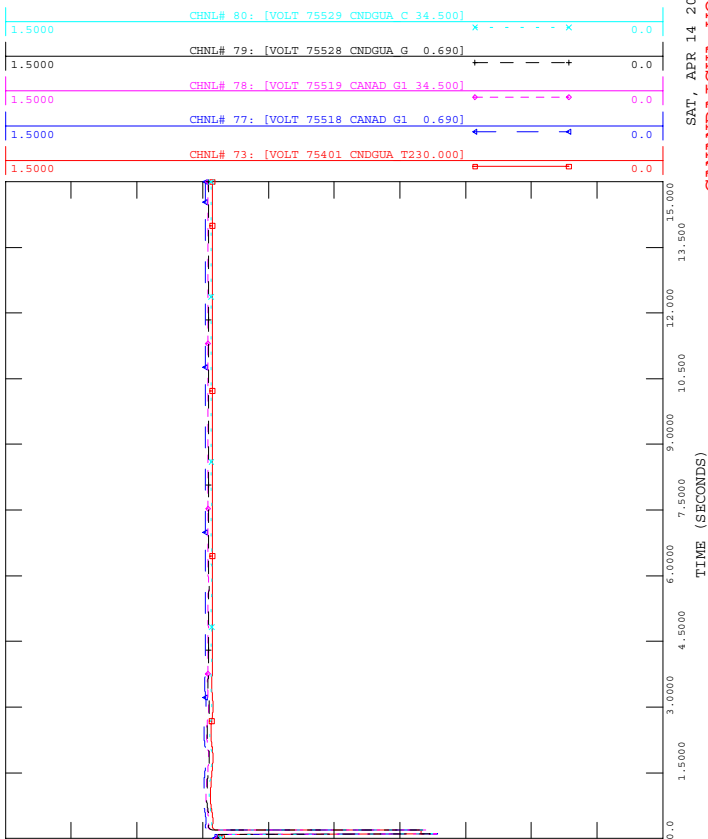
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HIGH SHELTON VOLTAGES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@SHLDN230/MEYER230-SHLDN230 230KV

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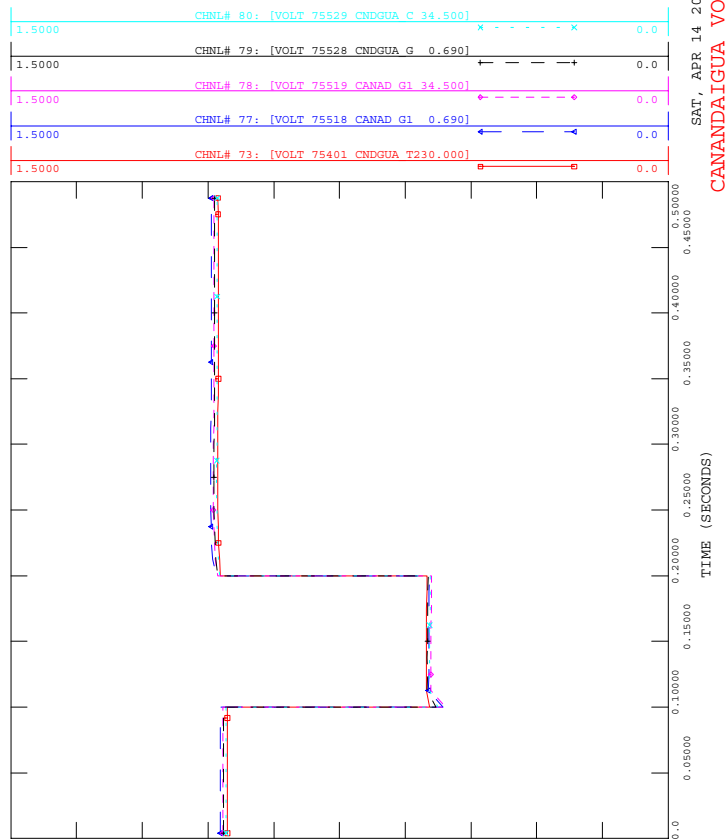
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CANANDAIGUA VOLTAGES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@SHLDN230/MEYER230-SHLDN230 230KV

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CANANDAIGUA VOLTAGES

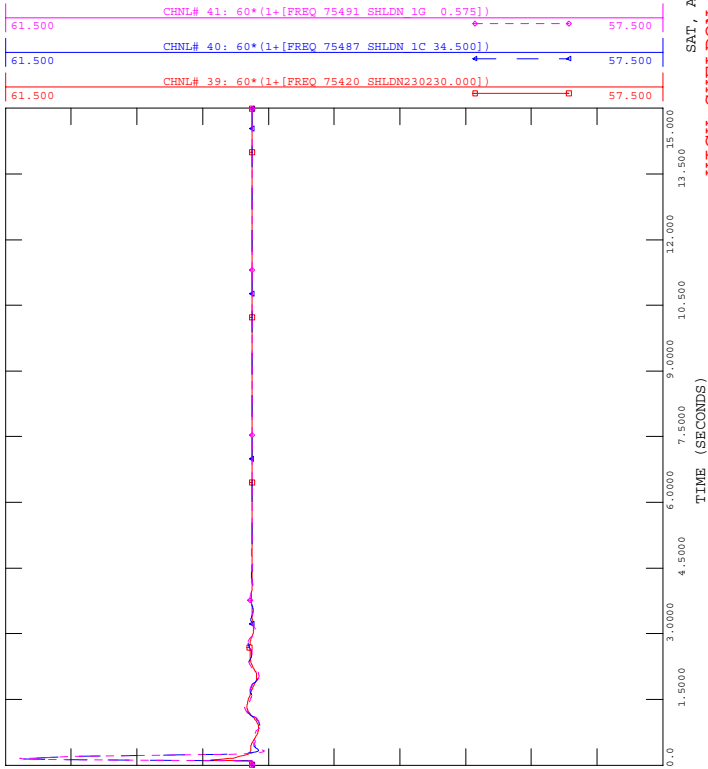




2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@SHLDN230/MEYER230-SHLDN230 230KV

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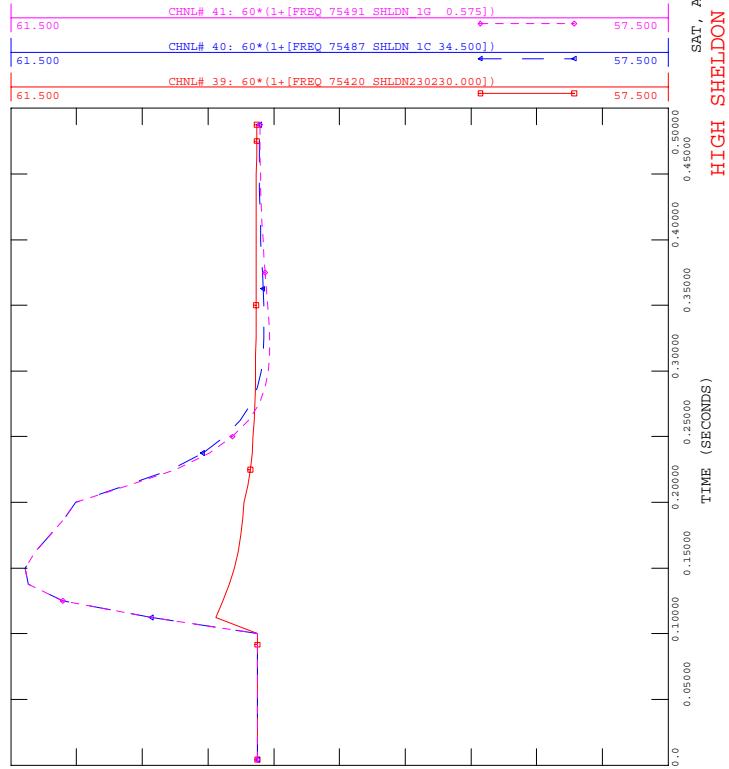
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HIGH SHELTON FREQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@SHLDN230/MEYER230-SHLDN230 230KV

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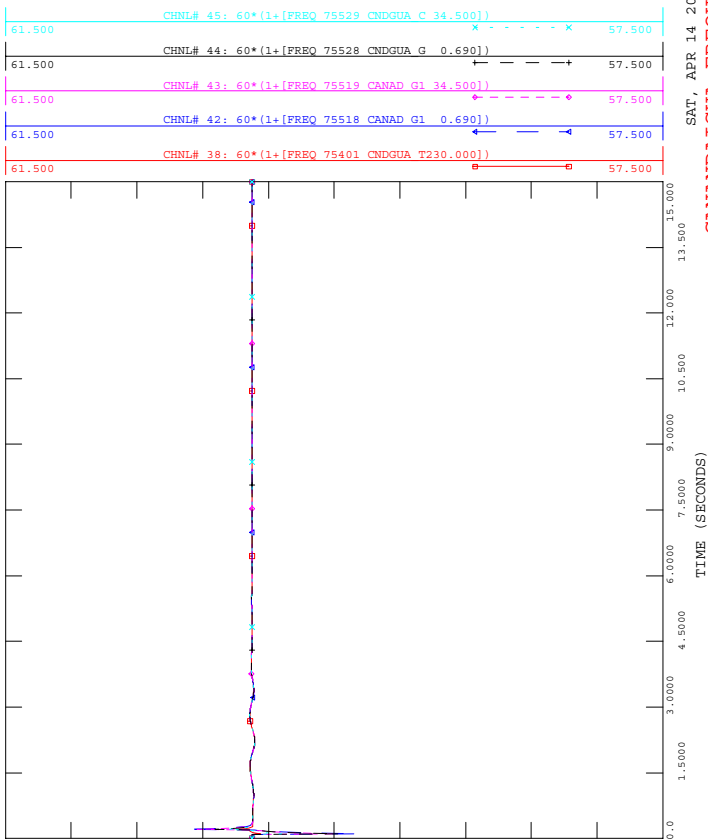
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HIGH SHELTON FREQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@SHLDN230/MEYER230-SHLDN230 230KV

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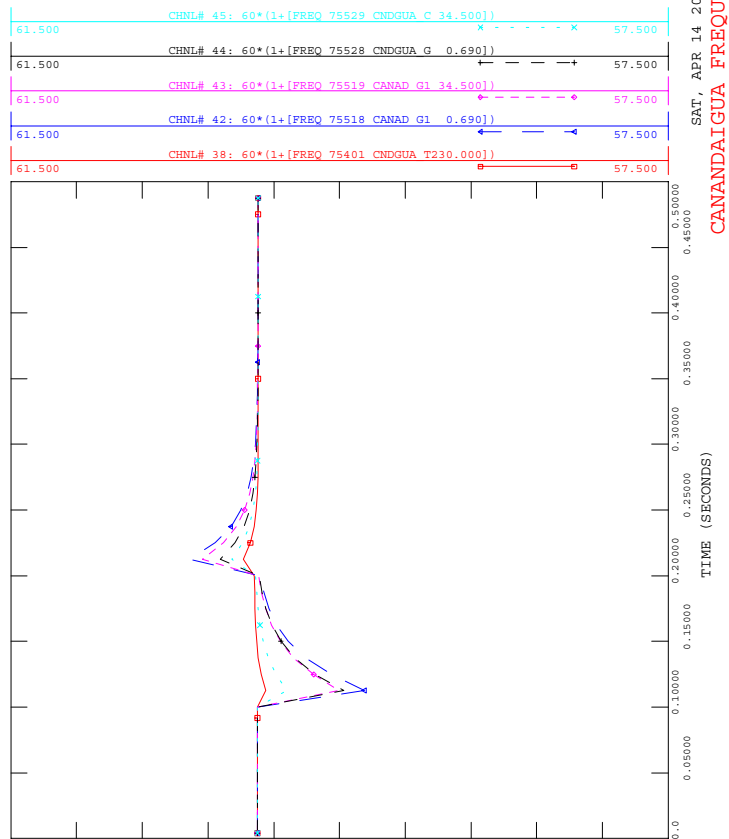
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CANANDAIGUA FREQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@SHLDN230/MEYER230-SHLDN230 230KV

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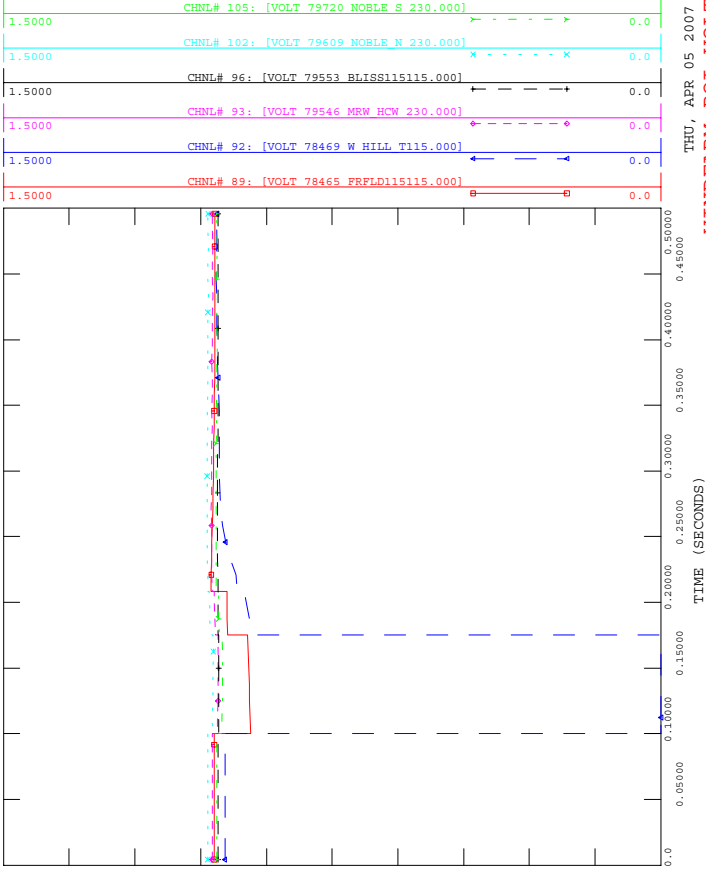
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CANANDAIGUA FREQUENCIES





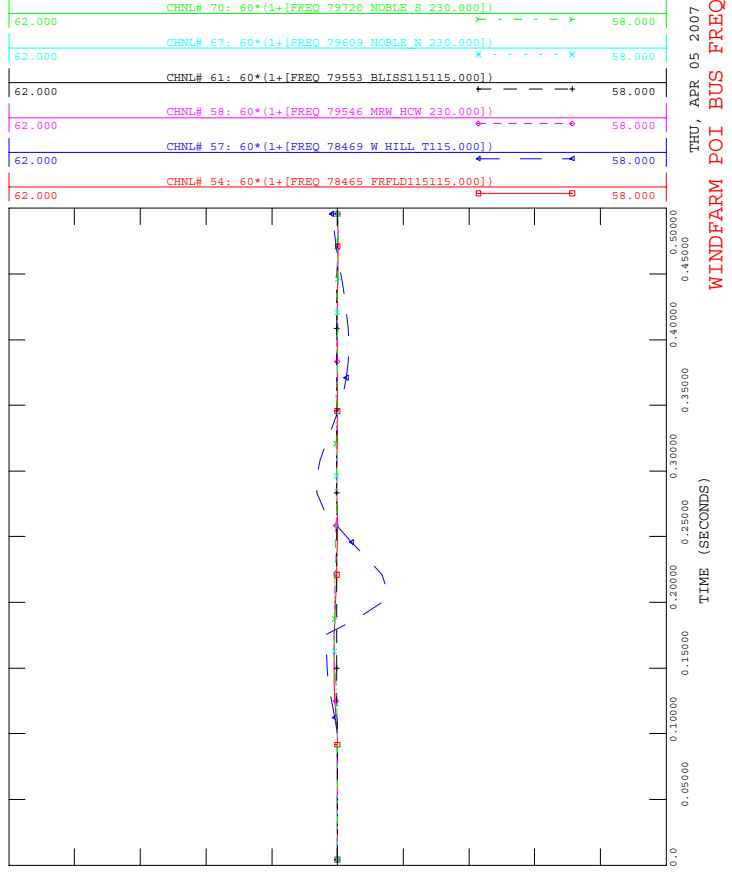
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@W HILL_T/W HILL_T-ONEIDA 115KV

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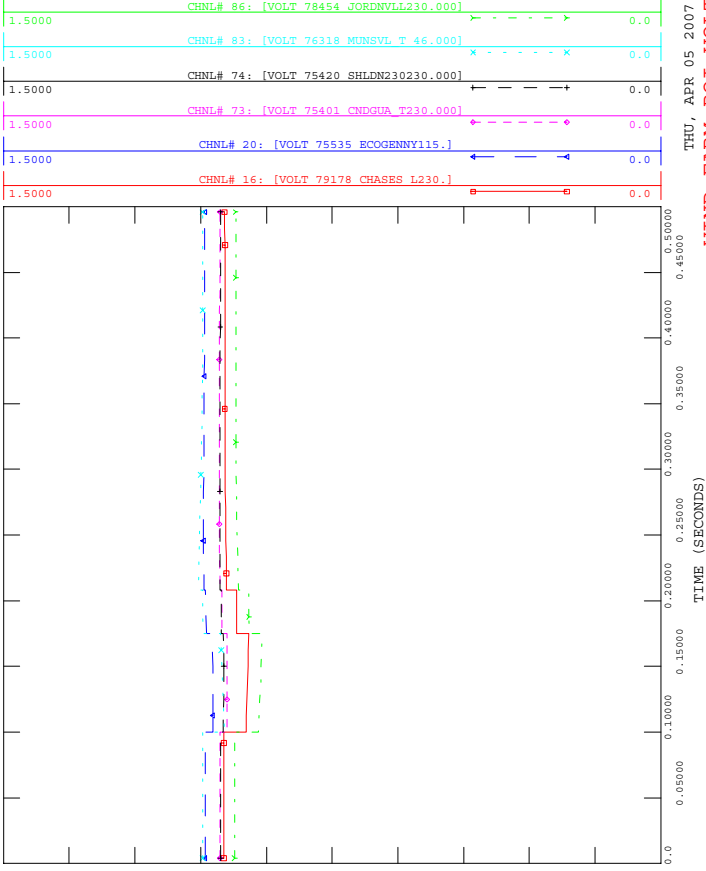
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@W HILL_T/W HILL_T-ONEIDA 115KV

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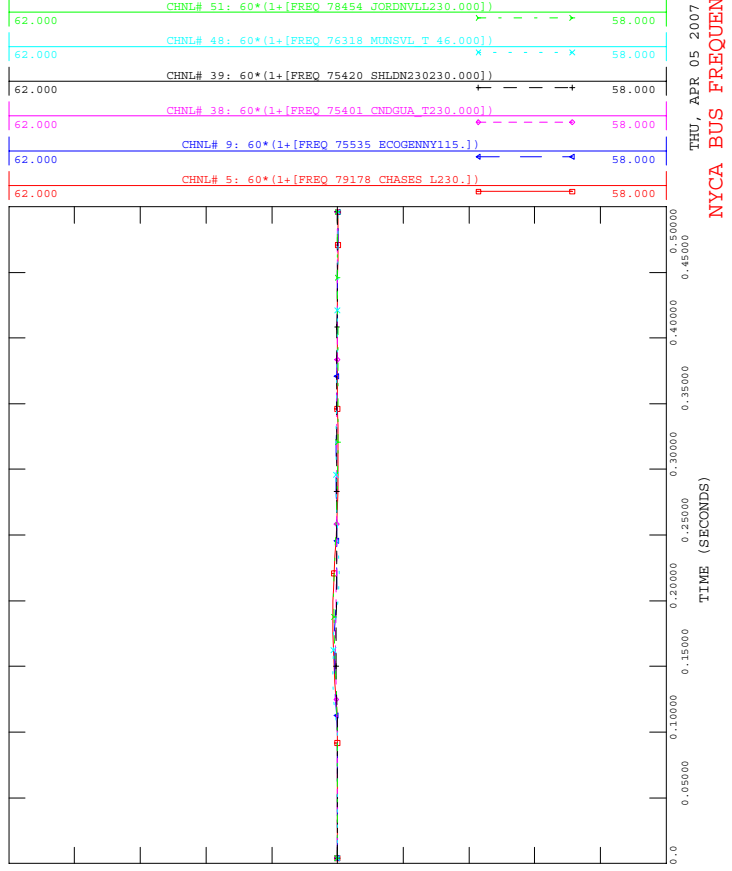
2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@W HILL_T/W HILL_T-ONEIDA 115KV

FILE: atra-ST16.OUT



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@W HILL_T/W HILL_T-ONEIDA 115KV

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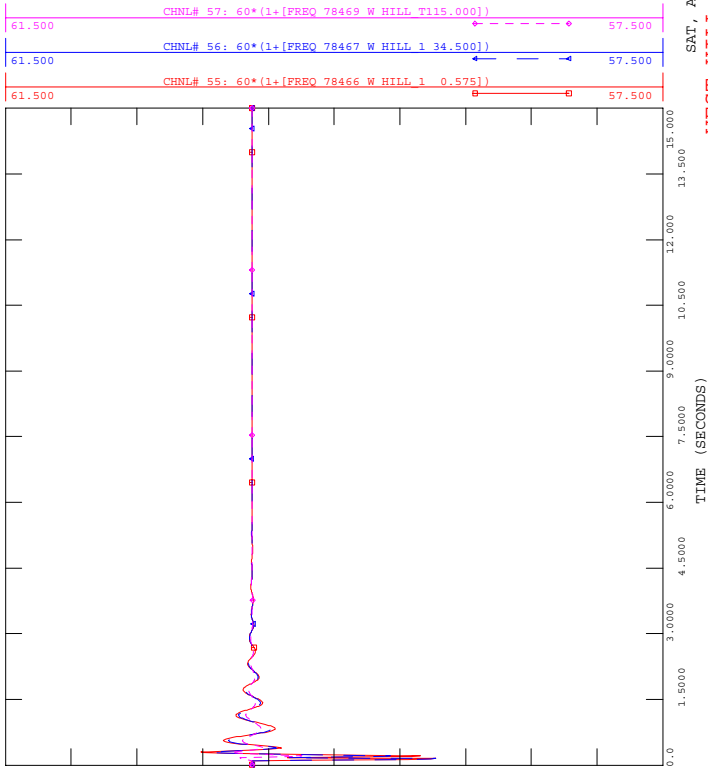




2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@W HILL_T/W HILL_T-ONEIDA 115KV

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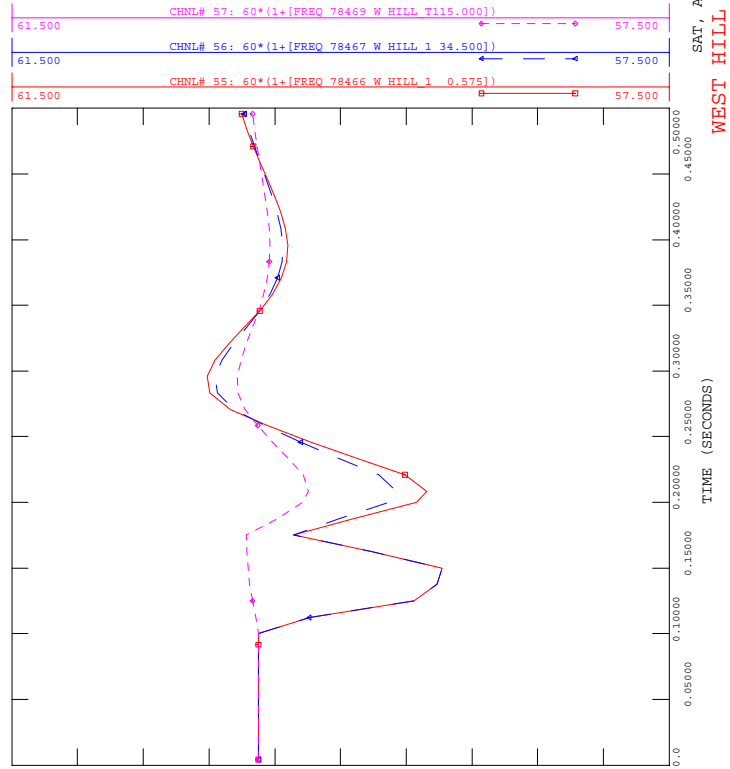
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WEST HILL FREQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@W HILL_T/W HILL_T-ONEIDA 115KV

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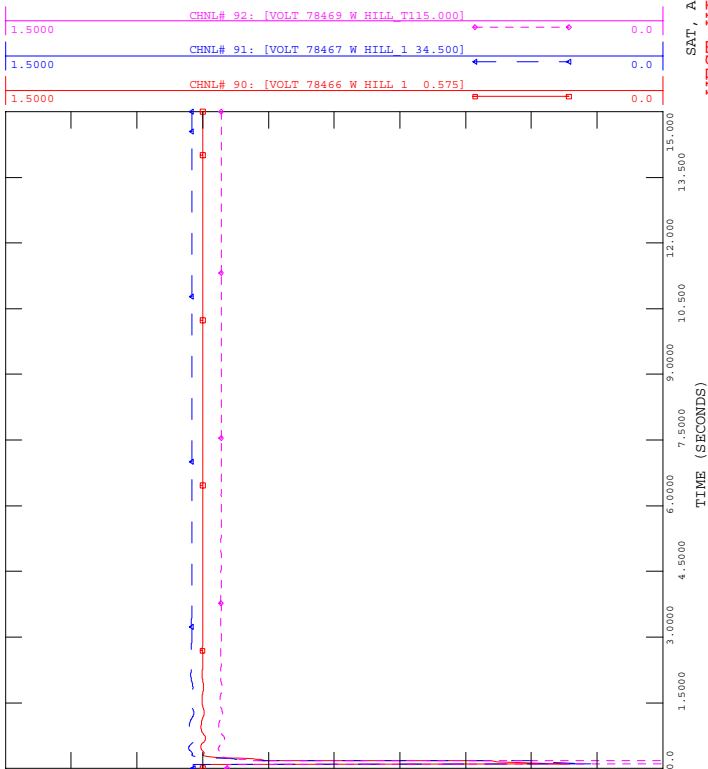
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WEST HILL FREQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@W HILL_T/W HILL_T-ONEIDA 115KV

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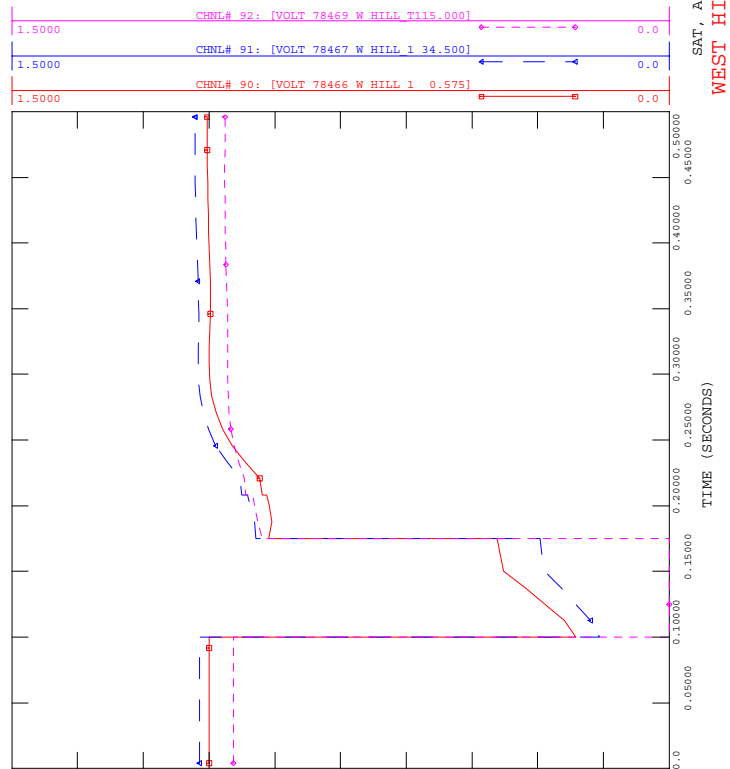
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WEST HILL VOLTAGES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@W HILL_T/W HILL_T-ONEIDA 115KV

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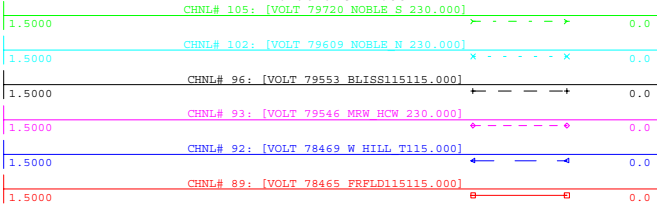
SAT, APR 14 2007 17:25
WEST HILL VOLTAGES





2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@ARCADE ON ARCADE-SPVL-151 115KV

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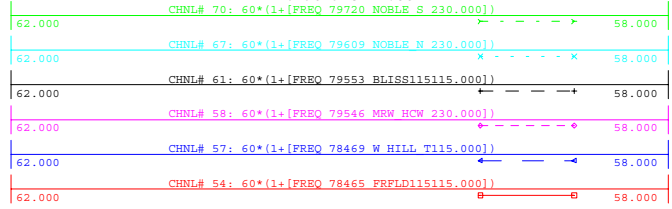


THU, APR 05 2007 9:20
WINDFARM POI VOLTAGES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@ARCADE ON ARCADE-SPVL-151 115KV

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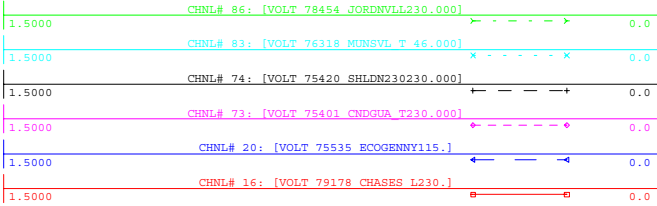


THU, APR 05 2007 9:20
WINDFARM POI BUS FREQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@ARCADE ON ARCADE-SPVL-151 115KV

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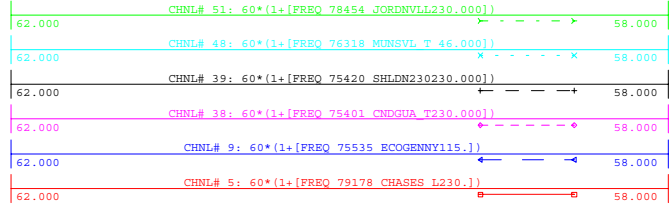


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WIND FARM POI VOLTAGES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@ARCADE ON ARCADE-SPVL-151 115KV

FILE: atra-ST17.OUT



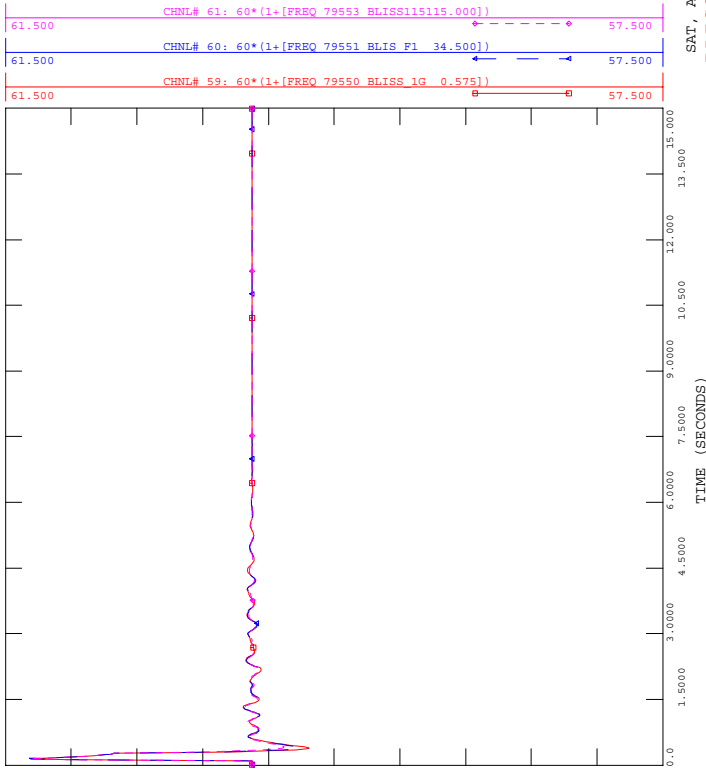
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NYCA BUS FREQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@ARCADE ON ARCADE-SPVL-151 115KV

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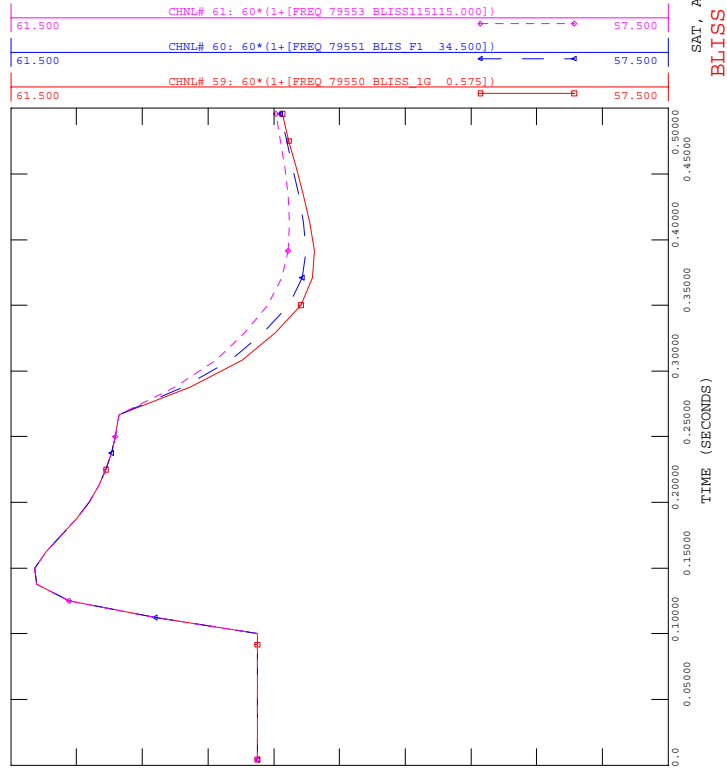
SAT, APR 14 2007 20:56
BLISS FREQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@ARCADE ON ARCADE-SPVL-151 115KV

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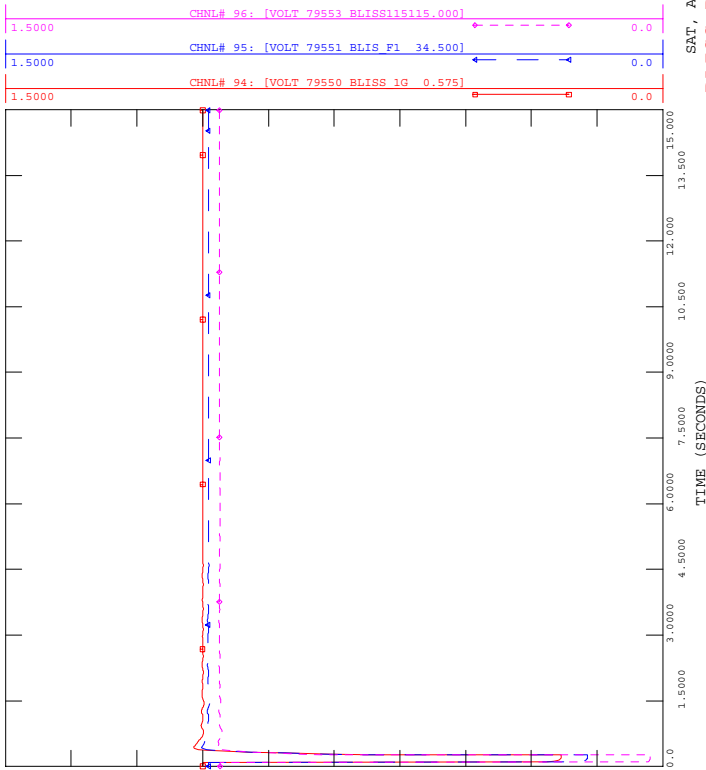
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BLISS FREQUENCIES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@ARCADE ON ARCADE-SPVL-151 115KV

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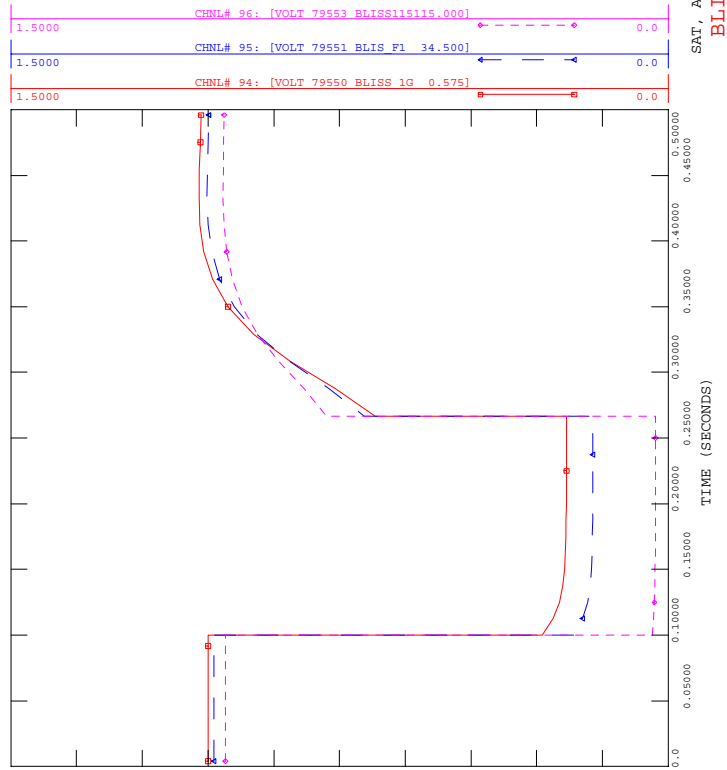
SAT, APR 14 2007 20:56
BLISS BUS VOLTAGES



2006 CLASS YEAR ATRA BASE CASE
2011 SUMMER STABILITY MARGIN CASE
3PH-NC@ARCADE ON ARCADE-SPVL-151 115KV

FILE: atra-ST17.OUT

SAT, APR 14 2007 20:56
BLISS BUS VOLTAGES



Appendix F

Short Circuit Results

BUS NAME	NOM.	ATRA		Spagnoli Δ (A)	Fortistar	Fortistar	Trans		Caithn	Linden	Munnsv	Canand	High	West	Fairfi	Marble	
		Max (A)	Type		VP Δ (A)	VAN Δ (A)	PSEG Δ (A)	Gas Δ (A)	ess Δ (A)	VFT Δ (A)	ille Δ (A)	aigua Δ (A)	Sheldon Δ (A)	Hill Δ (A)	eld Δ (A)	River Δ (A)	
ADIRONDACK	230	10202	3LG	0	0	0	0	0	0	0	0	0	0	0	1	3	7
ALBANY STM1	115	19035	3LG	0	0	0	1	1	0	0	0	0	0	0	0	2	1
ALPS	345	18191	3LG	0	0	0	1	2	0	0	0	0	0	0	0	2	1
AST-EAST-E	138	45079	1LG	6	0	0	15	25	0	-4	0	0	0	0	0	0	0
AST-EAST-W	138	45956	1LG	6	0	0	16	26	0	-4	0	0	0	0	0	0	0
AST-WEST-N	138	46145	1LG	0	6	6	21	44	0	-9	0	0	0	0	0	0	0
AST-WEST-S	138	46145	1LG	0	6	6	22	44	0	-9	0	0	0	0	0	0	0
ATHENS	345	33501	3LG	2	0	0	14	23	0	-1	2	1	0	1	5	2	2
ATLANTA	35	4867	3LG	0	0	0	0	0	0	0	0	8	2	0	0	0	0
AVOCA GAS	230	6098	3LG	0	0	0	0	0	0	0	0	456	59	0	0	0	0
BALLSTON1	115	6694	3LG	0	0	0	0	0	0	0	0	0	0	0	1	0	0
BARRETT	138	48284	2LG	387	0	0	21	34	46	-4	0	0	0	0	0	0	0
BATH #4	115	4926	3LG	0	0	0	0	0	0	0	0	19	5	0	0	0	0
BENNETT	35	6545	1LG	0	0	0	0	0	0	0	0	12	4	0	0	0	0
BENNETT	115	4984	3LG	0	0	0	0	0	0	0	0	37	11	0	0	0	0
BETHLEHEM	115	19484	3LG	0	0	0	1	1	0	0	0	0	0	0	2	1	1
BRKHAVEN	69	27085	1LG	16	0	0	1	1	838	0	0	0	0	0	0	0	0
BRKHAVEN	138	26686	3LG	55	0	0	1	1	3269	0	0	0	0	0	0	0	0
BUCHAN N	345	28460	3LG	9	1	1	50	84	1	-1	0	0	0	0	0	0	0
BUCHAN S	345	38110	3LG	21	1	1	104	175	2	-3	0	0	0	0	0	0	1
BUCHANAN	138	15577	3LG	1	0	0	9	15	0	-1	0	0	0	0	0	0	0
C.ISLIP	138	30077	3LG	159	0	0	2	2	1311	-1	0	0	0	0	0	0	0
CANAL	138	15446	1LG	9	0	0	0	1	526	0	0	0	0	0	0	0	0
CARLE PL	138	41706	3LG	554	0	0	27	45	71	-4	0	0	0	0	0	0	0
CLAY	345	34318	3LG	0	0	0	1	1	0	0	5	6	2	21	12	5	5
COOPERS CRN	345	15417	3LG	1	0	0	5	8	0	0	2	1	0	1	2	1	1
COOPERS CRN4	115	14282	1LG	0	0	0	2	3	0	0	0	0	0	0	0	0	1
CORONA N.	138	43296	2LG	7	0	0	17	28	0	-4	0	0	0	0	0	0	0
CORONA S.	138	42682	2LG	7	0	0	16	28	0	-4	0	0	0	0	0	0	0
CORTLAND N.	115	6203	3LG	0	0	0	0	0	0	0	4	0	0	20	0	0	0
DEWITT	345	20132	3LG	0	0	0	0	1	0	0	4	5	1	12	4	2	2
D-SAWYER77	230	26434	3LG	0	0	0	0	0	0	0	0	13	119	0	0	0	0
DUN NO	138	32395	3LG	10	1	1	55	93	1	-5	0	0	0	0	0	0	0
DUN SO	138	30532	2LG	8	1	1	48	86	0	-5	0	0	0	0	0	0	0
DUNKIRK	230	15120	1LG	0	0	0	0	0	0	0	0	2	21	0	0	0	0
DUNKIRK M1	115	20784	1LG	0	0	0	0	0	0	0	0	1	12	0	0	0	0
DUNWOODIE	345	50727	3LG	87	4	4	381	652	11	-4	0	0	0	0	1	1	1
E 13 ST	138	46485	1LG	2	6	6	843	1361	0	-1	0	0	0	0	0	0	0
E 179 ST	138	48652	2LG	14	2	2	74	131	1	-6	0	0	0	0	0	0	0
E FISHKILL	345	39134	3LG	14	1	1	66	112	2	-3	1	0	0	0	1	1	1

BUS NAME	NOM.	KV	ATRA		Spagnoli Δ (A)	Fortistar VP Δ (A)	Fortistar VAN Δ (A)	PSEG Δ (A)	Trans Gas Δ (A)	Caithn ess Δ (A)	Linden VFT Δ (A)	Munnsv ille Δ (A)	Canand aigua Δ (A)	High Sheldon Δ (A)	West Hill Δ (A)	Fairfi eld Δ (A)	Marble River Δ (A)
			Max (A)	Type													
E RIVER	69	52107	1LG		0	2	2	196	335	0	-17	0	0	0	0	0	0
E WALDEN	115	21520	3LG		0	0	0	4	7	0	-1	0	0	0	0	0	1
E.G.C.	138	74474	2LG		1683	1	1	58	98	208	-6	0	0	0	0	0	0
E.G.C.1	69	45546	3LG		178	0	0	13	21	20	-4	0	0	0	0	0	0
EDIC	345	32996	3LG		0	0	0	2	3	0	0	7	3	1	28	52	14
EELPOT RD	35	6481	2LG		0	0	0	0	0	0	0	0	10	2	0	0	0
EGC PAR	345	25288	3LG		59	1	1	81	136	7	-4	0	0	0	0	0	0
ELWOOD 1	138	37784	2LG		264	0	0	4	7	106	-2	0	0	0	0	0	0
ELWOOD 2	138	37575	2LG		262	0	0	4	7	105	-2	0	0	0	0	0	0
FARRAGUT	345	55799	2LG		14	29	29	3138	5656	1	98	0	0	0	0	0	0
FENNER WINDP	115	7338	3LG		0	0	0	0	0	0	0	1	0	0	219	1	1
FLAT ST.	115	8473	3LG		0	0	0	0	0	0	0	0	14	3	0	0	0
FOXHLS 2	138	35369	2LG		0	783	783	26	49	0	42	0	0	0	0	0	0
FR KILLS	138	40214	2LG		0	1992	1992	33	62	0	111	0	0	0	0	0	0
FR KILLS	345	25447	1LG		0	124	124	86	155	0	1193	0	0	0	0	0	0
FRASER	115	11991	1LG		0	0	0	1	1	0	0	25	1	0	0	3	1
FRASER	345	17310	3LG		0	0	0	2	3	0	0	14	6	1	2	6	2
FREEPORT	138	32766	2LG		352	0	0	12	19	41	-3	0	0	0	0	0	0
FUERA BUSH33	115	30743	3LG		0	0	0	1	2	0	-1	0	0	0	0	5	1
GARDENVILLE1	115	37596	3LG		0	0	0	0	0	0	0	0	32	288	0	0	0
GARDENVILLE1	230	22614	3LG		0	0	0	0	0	0	0	0	36	328	0	0	0
GILBOA 345	345	22711	2LG		0	0	0	3	4	0	-1	3	1	0	1	3	1
GLNWD GT	138	44060	3LG		232	1	1	48	81	28	-5	0	0	0	0	0	0
GLNWD NO	138	46531	3LG		250	1	1	54	92	31	-6	0	0	0	0	0	0
GLNWD SO	138	46026	3LG		247	1	1	54	91	30	-5	0	0	0	0	0	0
GOETHALS	230	43736	3LG		0	13	13	46	82	0	746	0	0	0	0	0	0
GOETHL N	345	27670	1LG		0	129	129	106	193	0	4021	0	0	0	0	0	0
GOETHL S	345	27670	1LG		0	129	129	106	193	0	3623	0	0	0	0	0	0
GOW N	345	20745	2LG		0	68	68	86	159	0	1517	0	0	0	0	0	0
GOW S	345	20754	2LG		0	68	68	86	159	0	1436	0	0	0	0	0	0
GREENBUSH	115	39272	3LG		0	0	0	1	2	0	0	0	0	0	0	7	2
GREENIDGE #4	115	12594	3LG		0	0	0	0	0	0	0	1	20	4	0	0	0
GREENLWN	138	29333	3LG		219	0	0	4	6	75	-1	0	0	0	0	0	0
GRENWOOD	138	53460	2LG		0	828	828	51	100	0	111	0	0	0	0	0	0
GROOMS RD	115	9322	3LG		0	0	0	0	0	0	0	0	0	0	0	2	1
GRUMMANB	69	32715	3LG		218	0	0	4	6	28	-2	0	0	0	0	0	0
HARRISON	115	25378	3LG		0	0	0	0	0	0	0	0	4	33	0	0	0
HARRISONIPP1	115	23405	3LG		0	0	0	0	0	0	0	0	3	27	0	0	0
HARRISONIPP2	115	23188	3LG		0	0	0	0	0	0	0	0	3	26	0	0	0
HAUPAGUE	138	22197	3LG		113	0	0	1	2	462	-1	0	0	0	0	0	0

BUS NAME	NOM.	KV	ATRA		Spagnoli Δ (A)	Fortistar VP Δ (A)	Fortistar VAN Δ (A)	PSEG Δ (A)	Trans Gas Δ (A)	Caithn ess Δ (A)	Linden VFT Δ (A)	Munnsv ille Δ (A)	Canand aigua Δ (A)	High Sheldon Δ (A)	West Hill Δ (A)	Fairfi eld Δ (A)	Marble River Δ (A)
			Max (A)	Type													
HG 6	138	42598	2LG		0	5	5	20	40	0	-8	0	0	0	0	0	0
HILLSIDE #4	115	17944	1LG		0	0	0	0	0	0	0	6	107	14	0	0	1
HILLSIDE 230	230	11816	2LG		0	0	0	0	0	0	0	5	156	18	0	0	0
HMP HRBR	345	31701	2LG		59	1	1	141	240	7	-3	0	0	0	0	0	0
HOLBRK1	69	43581	3LG		85	0	0	1	2	1053	-1	0	0	0	0	0	0
HOLBROOK	138	48492	3LG		345	0	0	3	4	4479	-1	0	0	0	0	0	0
HOLTS GT	138	46007	3LG		302	0	0	2	4	4195	-1	0	0	0	0	0	0
HOLTS GT2	138	46142	3LG		304	0	0	2	4	4200	-1	0	0	0	0	0	0
HUDSON E	138	39250	3LG		34	1	1	99	175	3	-8	0	0	0	0	0	0
HUNTLEY	230	27255	3LG		0	0	0	0	0	0	0	0	15	131	0	0	0
HURLEY AVE.	345	17040	3LG		1	0	0	6	11	0	-1	0	0	0	0	1	1
INDEPENDENCE	345	39594	1LG		0	0	0	1	1	0	0	2	2	0	8	6	3
INGHAMS 99G	115	10510	3LG		0	0	0	0	0	0	0	7	0	0	2	472	1
JAMAICA	138	49697	2LG		70	1	1	81	144	7	-7	0	0	0	0	0	0
LADENTOWN	345	37665	3LG		11	1	1	68	116	1	0	0	0	0	0	0	1
LAFAYETTE	345	18615	3LG		0	0	0	0	1	0	0	5	6	1	9	3	2
LCST GRV	138	39336	3LG		615	0	0	14	24	103	-3	0	0	0	0	0	0
LEEDS	345	34154	3LG		3	0	0	14	23	0	-1	2	1	0	1	5	2
LEVTTOWN	69	35794	3LG		274	0	0	4	7	35	-2	0	0	0	0	0	0
LKE SCSS	69	43948	3LG		114	0	0	20	33	12	-5	0	0	0	0	0	0
LKE SCSS	138	43058	3LG		188	1	1	48	83	23	-5	0	0	0	0	0	0
LOCKPORT E	115	30155	3LG		0	0	0	0	0	0	0	0	5	36	0	0	0
LONG LANE	115	17414	3LG		0	0	0	1	1	0	0	0	0	0	0	2	1
MARCY 345	345	32137	3LG		0	0	0	2	3	0	0	6	3	1	25	45	14
MECO	115	5969	3LG		0	0	0	0	0	0	0	1	0	0	0	41	1
MENANDS 77G	115	32309	3LG		0	0	0	1	2	0	0	0	0	0	0	8	1
MEYER	115	10820	1LG		0	0	0	0	0	0	0	0	496	112	0	0	0
MEYER	230	6771	3LG		0	0	0	0	0	0	0	0	380	120	0	0	0
MIDDLETN TAP	345	16741	3LG		1	0	0	8	13	0	0	1	0	0	0	1	1
MILLR PL	138	14698	3LG		18	0	0	0	1	478	0	0	0	0	0	0	0
MILLWOOD	138	19045	3LG		2	0	0	14	23	0	-2	0	0	0	0	0	0
MILLWOOD	345	44308	3LG		39	2	2	180	304	5	-4	0	0	0	0	1	1
MONTOUR #4	115	12475	3LG		0	0	0	0	0	0	0	7	47	9	1	0	0
MOTT HAVEN	345	48133	2LG		11	20	20	1887	4476	1	42	0	0	0	0	0	0
N TROY77G	115	17706	3LG		0	0	0	0	1	0	0	0	0	0	0	1	1
NAPLES	35	3526	3LG		0	0	0	0	0	0	0	0	4	1	0	0	0
NEWBRID	138	75848	1LG		1955	1	1	47	78	230	-6	0	0	0	0	0	0
NIAGARA 345	345	33733	1LG		0	0	0	0	0	0	0	0	5	40	0	0	0
NIAGRA E 230	230	57013	1LG		0	0	0	0	0	0	0	0	15	138	0	0	0
NIAGRA W 230	230	57013	1LG		0	0	0	0	0	0	0	0	15	138	0	0	0

BUS NAME	NOM.	KV	ATRA		Spagnoli Δ (A)	Fortistar		PSEG Δ (A)	Trans		Caithn ess Δ (A)	Linden VFT Δ (A)	Munnsv ille Δ (A)	Canand aigua Δ (A)	High Sheldon Δ (A)	West Hill Δ (A)	Fairfi eld Δ (A)	Marble River Δ (A)
			Max (A)	Type		VP Δ (A)	VAN Δ (A)		Gas Δ (A)									
NRTHPRT1	138	59880	1LG		728	0	0	6	10		484	-2	0	0	0	0	0	0
NRTHPRT2	138	44281	1LG		283	0	0	5	8		117	-2	0	0	0	0	0	0
NSCOT 99B	345	31331	3LG		1	0	0	6	10		0	-1	3	1	0	3	10	3
NSCOT33	115	49223	2LG		0	0	0	3	4		0	-1	1	0	0	1	16	3
OAKDALE	115	29260	1LG		0	0	0	1	1		0	0	43	39	5	1	2	2
OAKDALE	230	6440	3LG		0	0	0	0	0		0	0	4	16	2	0	0	0
OAKDALE 345	345	12433	3LG		0	0	0	1	1		0	0	15	24	4	1	2	1
OAKWOOD	138	28382	3LG		229	0	0	5	8	65		-1	0	0	0	0	0	0
ONEIDA	115	15591	3LG		0	0	0	0	0	0		0	1	0	0	386	9	2
OSWEGO	345	32911	1LG		0	0	0	0	1	0		0	2	2	0	7	4	3
PACKARD	230	43734	2LG		0	0	0	0	0	0		0	0	13	117	0	0	0
PILGRIM	138	59914	2LG		1162	0	0	8	13		818	-2	0	0	0	0	0	0
PLATTSBURGH	115	16705	2LG		0	0	0	0	0	0		0	0	0	0	0	0	173
PLEASANT VAL	345	40772	3LG		14	1	1	62	105	2		-3	1	0	0	0	2	1
POLETTI	345	41639	2LG		8	17	17	1748	3140	1	38		0	0	0	0	0	0
PORTER	115	42923	1LG		0	0	0	1	2	0		0	4	0	0	105	253	11
PORTER	230	20704	2LG		0	0	0	1	1	0		0	1	0	0	16	44	6
PT JEFF	138	32393	1LG		49	0	0	1	1	689		-1	0	0	0	0	0	0
QUEENSBG	138	44520	2LG		0	7	7	22	44	0		-9	0	0	0	0	0	0
RAINEY	345	53998	2LG		13	26	26	2503	5796	1	68		0	0	0	0	0	0
RAMAPO	345	40707	3LG		11	1	1	74	125	1	2		0	0	0	0	0	1
REYNOLDS	345	15527	3LG		0	0	0	1	1	0		0	0	0	0	0	1	1
REYNOLDS RD	115	39354	3LG		0	0	0	1	2	0		-1	0	0	0	0	8	2
RIVERHD	138	18681	1LG		14	0	0	0	1	821		0	0	0	0	0	0	0
RNKNKOMA	138	38695	3LG		234	0	0	2	3	2639		-1	0	0	0	0	0	0
ROBINSON RD.	115	19937	3LG		0	0	0	0	0	0		0	0	4	39	0	0	0
ROBINSON RD.	230	14661	3LG		0	0	0	0	0	0		0	0	11	100	0	0	0
ROCK TAVERN	115	27209	3LG		1	0	0	8	13	0		-1	0	0	0	0	0	1
ROCK TAVERN	345	26131	3LG		3	0	0	20	34	0		-1	1	0	0	0	1	1
ROSETON	345	34490	3LG		7	1	1	35	60	1		-2	1	0	0	0	1	1
ROSLYN	138	30431	3LG		198	0	0	19	32	24		-3	0	0	0	0	0	0
ROTT99G	115	33548	1LG		0	0	0	1	1	0		0	1	0	0	1	48	3
ROTTERDAM77H	230	12784	3LG		0	0	0	0	0	0		0	0	0	0	1	16	1
ROTTERDAM99H	230	12801	3LG		0	0	0	0	1	0		0	1	0	0	1	16	1
RULAND	69	48660	3LG		904	0	0	7	11	124		-2	0	0	0	0	0	0
RULND RD	138	51052	3LG		4499	0	0	15	24	404		-3	0	0	0	0	0	0
S RIPLEY	230	9038	3LG		0	0	0	0	0	0		0	0	0	2	0	0	0
S080 345kV	345	16859	3LG		0	0	0	0	0	0		0	0	3	4	1	0	1
S122	345	16859	3LG		0	0	0	0	0	0		0	1	3	3	2	1	1
SALISBURY 3	115	10006	1LG		0	0	0	0	0	0		0	3	0	0	1	1594	1

BUS NAME	NOM.	KV	ATRA		Spagnoli Δ (A)	Fortistar VP Δ (A)	Fortistar VAN Δ (A)	PSEG Δ (A)	Trans Gas Δ (A)	Caithn ess Δ (A)	Linden VFT Δ (A)	Munnsv ille Δ (A)	Canand aigua Δ (A)	High Sheldon Δ (A)	West Hill Δ (A)	Fairfi eld Δ (A)	Marble River Δ (A)
			Max (A)	Type													
SCRIBA	345	48745	1LG		0	0	0	1	1	0	0	3	3	1	13	9	5
SHELDON	230	9128	3LG		0	0	0	0	0	0	0	0	95	845	0	0	0
SHM CRK	138	45430	2LG		13	1	1	69	122	1	-6	0	0	0	0	0	0
SHM CRK	345	32165	3LG		33	2	2	151	254	4	-4	0	0	0	0	0	0
SHORE RD	138	50598	2LG		239	1	1	66	113	29	-6	0	0	0	0	0	0
SHORE RD	345	27847	3LG		48	1	1	102	175	6	-4	0	0	0	0	0	0
SHOREHAM	138	25013	2LG		33	0	0	1	1	1365	0	0	0	0	0	0	0
SILLS ROAD	138	33338	2LG		87	0	0	1	2	N/A	-1	0	0	0	0	0	0
SPIER77G	115	16986	3LG		0	0	0	0	0	0	0	0	0	0	0	1	1
SPRN BRK	345	51937	3LG		91	4	4	395	665	11	-4	0	0	0	0	1	1
ST LAWRN 230	230	34392	1LG		0	0	0	0	1	0	0	0	0	0	2	3	139
STOLLE ROAD	115	14792	3LG		0	0	0	0	0	0	0	0	3	25	0	0	0
STOLLE ROAD	230	13712	3LG		0	0	0	0	0	0	0	0	65	606	0	0	0
STOLLE ROAD	345	3901	3LG		0	0	0	0	0	0	0	0	0	3	0	0	0
SYOSSET	138	33945	3LG		359	0	0	7	12	90	-2	0	0	0	0	0	0
TBG 5E	69	32670	3LG		217	0	0	4	6	28	-2	0	0	0	0	0	0
TBG 5EU-1	69	32659	3LG		217	0	0	4	6	28	-2	0	0	0	0	0	0
TBG 5EU-2	69	32659	3LG		217	0	0	4	6	28	-2	0	0	0	0	0	0
VALLEY	115	8430	3LG		0	0	0	0	0	0	0	2	0	0	2	294	1
VERNON E	138	37144	1LG		0	25	25	60	140	0	-13	0	0	0	0	0	0
VERNON W	138	32585	1LG		0	22	22	42	100	0	-13	0	0	0	0	0	0
VLV STRM	138	53583	2LG		525	0	0	29	49	63	-5	0	0	0	0	0	0
VOLNEY	345	37652	2LG		0	0	0	1	1	0	0	3	3	1	12	8	4
W 49 ST	345	49017	2LG		12	21	21	3212	4053	1	57	0	0	0	0	0	0
W.HAV345	345	27428	3LG		5	1	1	35	59	0	0	0	0	0	0	0	0
WADNGRV1	138	23785	2LG		29	0	0	1	1	1154	0	0	0	0	0	0	0
WALLACE	35	2244	3LG		0	0	0	0	0	0	0	0	2	1	0	0	0
WATERCURE230	230	11749	2LG		0	0	0	0	0	0	0	5	138	16	0	0	0
WATERCURE345	345	7739	3LG		0	0	0	0	0	0	0	4	35	5	0	0	0
WAWAYANDA	345	15916	3LG		1	0	0	7	12	0	0	1	0	0	0	1	1
WAYLAND	35	4268	3LG		0	0	0	0	0	0	0	0	8	2	0	0	0
WHAV	138	25020	3LG		1	0	0	13	22	0	0	0	0	0	0	0	0
WHITMAN	115	8292	3LG		0	0	0	0	0	0	0	1	0	0	311	2	1
WILDWOOD	138	22546	3LG		29	0	0	1	1	1105	0	0	0	0	0	0	0
WILLIS 115	115	10903	3LG		0	0	0	0	0	0	0	0	0	0	0	0	127
WILLIS 230	230	12184	3LG		0	0	0	0	0	0	0	0	0	0	0	0	332
WOOD ST.	115	14369	2LG		0	0	0	6	10	0	-2	0	0	0	0	0	0

BUS NAME	NOM.	KV	ATRA		Clinton	Noble	Ellen		Jordanv		
			Max (A)	Type	County	Clinton	Bliss	Altona	burg		Gilboa
					Δ (A)	Δ (A)	Δ (A)	Δ (A)	Δ (A)	Δ (A)	
ADIRONDACK	230	10202	3LG		3	2	0	2	2	0	35
ALBANY STM1	115	19035	3LG		0	0	0	0	0	0	8
ALPS	345	18191	3LG		0	0	0	0	0	0	6
AST-EAST-E	138	45079	1LG		0	0	0	0	0	0	0
AST-EAST-W	138	45956	1LG		0	0	0	0	0	0	0
AST-WEST-N	138	46145	1LG		0	0	0	0	0	0	0
AST-WEST-S	138	46145	1LG		0	0	0	0	0	0	0
ATHENS	345	33501	3LG		0	0	0	0	0	0	15
ATLANTA	35	4867	3LG		0	0	0	0	0	0	0
AVOCA GAS	230	6098	3LG		0	0	0	0	0	0	0
BALLSTON1	115	6694	3LG		0	0	0	0	0	0	5
BARRETT	138	48284	2LG		0	0	0	0	0	0	0
BATH #4	115	4926	3LG		0	0	0	0	0	0	0
BENNETT	35	6545	1LG		0	0	0	0	0	0	0
BENNETT	115	4984	3LG		0	0	0	0	0	0	0
BETHLEHEM	115	19484	3LG		0	0	0	0	0	0	9
BRKHAVEN	69	27085	1LG		0	0	0	0	0	0	0
BRKHAVEN	138	26686	3LG		0	0	0	0	0	0	0
BUCHAN N	345	28460	3LG		0	0	0	0	0	0	0
BUCHAN S	345	38110	3LG		0	0	0	0	0	0	1
BUCHANAN	138	15577	3LG		0	0	0	0	0	0	0
C.ISLIP	138	30077	3LG		0	0	0	0	0	0	0
CANAL	138	15446	1LG		0	0	0	0	0	0	0
CARLE PL	138	41706	3LG		0	0	0	0	0	0	0
CLAY	345	34318	3LG		2	1	0	1	1	0	39
COOPERS CRN	345	15417	3LG		0	0	0	0	0	0	4
COOPERS CRN4	115	14282	1LG		-1	0	0	0	0	0	0
CORONA N.	138	43296	2LG		0	0	0	0	0	0	0
CORONA S.	138	42682	2LG		0	0	0	0	0	0	0
CORTLAND N.	115	6203	3LG		0	0	0	0	0	0	0
DEWITT	345	20132	3LG		0	0	0	0	0	0	10
D-SAWYER77	230	26434	3LG		0	0	37	0	0	0	0
DUN NO	138	32395	3LG		0	0	0	0	0	0	0
DUN SO	138	30532	2LG		0	0	0	0	0	0	0
DUNKIRK	230	15120	1LG		0	0	15	0	0	0	0
DUNKIRK M1	115	20784	1LG		0	0	29	0	0	0	0
DUNWOODIE	345	50727	3LG		0	0	0	0	0	0	2
E 13 ST	138	46485	1LG		0	0	0	0	0	0	0
E 179 ST	138	48652	2LG		0	0	0	0	0	0	0
E FISHKILL	345	39134	3LG		0	0	0	0	0	0	4

BUS NAME	NOM.	KV	ATRA		Clinton	Noble	Ellen		Jordanv	
			Max (A)	Type	County	Clinton	Bliss	Altona	burg	Gilboa
				Δ (A)	Δ (A)	Δ (A)	Δ (A)	Δ (A)	Δ (A)	Δ (A)
E RIVER	69	52107	1LG		0	0	0	0	0	0
E WALDEN	115	21520	3LG		0	0	0	0	0	0
E.G.C.	138	74474	2LG		0	0	0	0	0	0
E.G.C.1	69	45546	3LG		0	0	0	0	0	0
EDIC	345	32996	3LG		15	8	0	7	8	0
EELPOT RD	35	6481	2LG		0	0	0	0	0	0
EGC PAR	345	25288	3LG		0	0	0	0	0	0
ELWOOD 1	138	37784	2LG		0	0	0	0	0	0
ELWOOD 2	138	37575	2LG		0	0	0	0	0	0
FARRAGUT	345	55799	2LG		0	0	0	0	0	0
FENNER WINDP	115	7338	3LG		0	0	0	0	0	1
FLAT ST.	115	8473	3LG		0	0	0	0	0	0
FOXHLS 2	138	35369	2LG		0	0	0	0	0	0
FR KILLS	138	40214	2LG		0	0	0	0	0	0
FR KILLS	345	25447	1LG		0	0	0	0	0	0
FRASER	115	11991	1LG		-1	0	0	0	0	1
FRASER	345	17310	3LG		0	0	0	0	0	9
FREEPORT	138	32766	2LG		0	0	0	0	0	0
FUERA BUSH33	115	30743	3LG		-1	0	0	0	0	19
GARDENVILLE1	115	37596	3LG		0	0	348	0	0	0
GARDENVILLE1	230	22614	3LG		0	0	115	0	0	0
GILBOA 345	345	22711	2LG		0	0	0	0	0	7
GLNWD GT	138	44060	3LG		0	0	0	0	0	0
GLNWD NO	138	46531	3LG		0	0	0	0	0	0
GLNWD SO	138	46026	3LG		0	0	0	0	0	0
GOETHALS	230	43736	3LG		0	0	0	0	0	0
GOETHL N	345	27670	1LG		0	0	0	0	0	0
GOETHL S	345	27670	1LG		0	0	0	0	0	0
GOW N	345	20745	2LG		0	0	0	0	0	0
GOW S	345	20754	2LG		0	0	0	0	0	0
GREENBUSH	115	39272	3LG		-1	0	0	0	0	28
GREENIDGE #4	115	12594	3LG		0	0	0	0	0	0
GREENLWN	138	29333	3LG		0	0	0	0	0	0
GRENWOOD	138	53460	2LG		0	0	0	0	0	0
GROOMS RD	115	9322	3LG		0	0	0	0	0	7
GRUMMANB	69	32715	3LG		0	0	0	0	0	0
HARRISON	115	25378	3LG		0	0	5	0	0	0
HARRISONIPP1	115	23405	3LG		0	0	4	0	0	0
HARRISONIPP2	115	23188	3LG		0	0	4	0	0	0
HAUPAGUE	138	22197	3LG		0	0	0	0	0	0

BUS NAME	NOM.	KV	ATRA Max (A) Type	Clinton	Noble	Ellen			Jordanv		
				County Δ (A)	Clinton Δ (A)	Bliss Δ (A)	Altona Δ (A)	burg Δ (A)	Gilboa Δ (A)	ille Δ (A)	
HG 6	138	42598	2LG		0	0	0	0	0	0	0
HILLSIDE #4	115	17944	1LG		0	0	0	0	0	0	0
HILLSIDE 230	230	11816	2LG		0	0	0	0	0	0	0
HMP HRBR	345	31701	2LG		0	0	0	0	0	0	0
HOLBRK1	69	43581	3LG		0	0	0	0	0	0	0
HOLBROOK	138	48492	3LG		0	0	0	0	0	0	0
HOLTS GT	138	46007	3LG		0	0	0	0	0	0	0
HOLTS GT2	138	46142	3LG		0	0	0	0	0	0	0
HUDSON E	138	39250	3LG		0	0	0	0	0	0	0
HUNTLEY	230	27255	3LG		0	0	41	0	0	0	0
HURLEY AVE.	345	17040	3LG		0	0	0	0	0	0	2
INDEPENDENCE	345	39594	1LG		0	1	0	0	1	0	18
INGHAMS 99G	115	10510	3LG		-1	0	0	0	0	0	12
JAMAICA	138	49697	2LG		0	0	0	0	0	0	0
LADENTOWN	345	37665	3LG		0	0	0	0	0	0	1
LAFAYETTE	345	18615	3LG		0	0	0	0	0	0	7
LCST GRV	138	39336	3LG		0	0	0	0	0	0	0
LEEDS	345	34154	3LG		0	0	0	0	0	0	16
LEVTTOWN	69	35794	3LG		0	0	0	0	0	0	0
LKE SCSS	69	43948	3LG		0	0	0	0	0	0	0
LKE SCSS	138	43058	3LG		0	0	0	0	0	0	0
LOCKPORT E	115	30155	3LG		0	0	9	0	0	0	0
LONG LANE	115	17414	3LG		0	0	0	0	0	0	6
MARCY 345	345	32137	3LG		16	9	0	7	9	0	158
MECO	115	5969	3LG		0	0	0	0	0	0	5
MENANDS 77G	115	32309	3LG		-1	0	0	0	0	0	34
MEYER	115	10820	1LG		0	0	0	0	0	0	0
MEYER	230	6771	3LG		0	0	1	0	0	0	0
MIDDLETN TAP	345	16741	3LG		0	0	0	0	0	0	2
MILLR PL	138	14698	3LG		0	0	0	0	0	0	0
MILLWOOD	138	19045	3LG		0	0	0	0	0	0	0
MILLWOOD	345	44308	3LG		0	0	0	0	0	0	2
MONTOUR #4	115	12475	3LG		0	0	0	0	0	0	0
MOTT HAVEN	345	48133	2LG		0	0	0	0	0	0	0
N TROY77G	115	17706	3LG		0	0	0	0	0	0	5
NAPLES	35	3526	3LG		0	0	0	0	0	0	0
NEWBRID	138	75848	1LG		0	0	0	0	0	0	0
NIAGARA 345	345	33733	1LG		0	0	8	0	0	0	0
NIAGRA E 230	230	57013	1LG		-1	0	29	0	0	0	0
NIAGRA W 230	230	57013	1LG		0	0	29	0	0	0	0

BUS NAME	NOM.	KV	ATRA Max (A) Type	Clinton	Noble	Ellen		Jordanv		
				County Δ (A)	Clinton Δ (A)	Bliss Δ (A)	Altona Δ (A)	burg Δ (A)	Gilboa Δ (A)	ille Δ (A)
NRTHPRT1	138	59880	1LG	0	0	0	0	0	0	0
NRTHPRT2	138	44281	1LG	0	0	0	0	0	0	0
NSCOT 99B	345	31331	3LG	1	1	0	0	1	0	35
NSCOT33	115	49223	2LG	-1	0	0	0	0	0	63
OAKDALE	115	29260	1LG	-1	0	0	0	0	0	1
OAKDALE	230	6440	3LG	0	0	0	0	0	0	0
OAKDALE 345	345	12433	3LG	0	0	0	0	0	0	2
OAKWOOD	138	28382	3LG	0	0	0	0	0	0	0
ONEIDA	115	15591	3LG	-1	0	0	0	0	0	12
OSWEGO	345	32911	1LG	0	0	0	0	0	0	11
PACKARD	230	43734	2LG	0	0	28	0	0	0	0
PILGRIM	138	59914	2LG	0	0	0	0	0	0	0
PLATTSBURGH	115	16705	2LG	261	154	0	297	154	0	0
PLEASANT VAL	345	40772	3LG	0	0	0	0	0	0	5
POLETTI	345	41639	2LG	0	0	0	0	0	0	0
PORTER	115	42923	1LG	1	2	0	1	2	0	406
PORTER	230	20704	2LG	2	1	0	1	1	0	652
PT JEFF	138	32393	1LG	0	0	0	0	0	0	0
QUEENSBG	138	44520	2LG	0	0	0	0	0	0	0
RAINEY	345	53998	2LG	0	0	0	0	0	0	0
RAMAPO	345	40707	3LG	0	0	0	0	0	0	1
REYNOLDS	345	15527	3LG	0	0	0	0	0	0	4
REYNOLDS RD	115	39354	3LG	-1	0	0	0	0	0	33
RIVERHD	138	18681	1LG	0	0	0	0	0	0	0
RNKNKOMA	138	38695	3LG	0	0	0	0	0	0	0
ROBINSON RD.	115	19937	3LG	0	0	4	0	0	0	0
ROBINSON RD.	230	14661	3LG	0	0	6	0	0	0	0
ROCK TAVERN	115	27209	3LG	0	0	0	0	0	0	0
ROCK TAVERN	345	26131	3LG	0	0	0	0	0	0	3
ROSETON	345	34490	3LG	0	0	0	0	0	0	4
ROSLYN	138	30431	3LG	0	0	0	0	0	0	0
ROTT99G	115	33548	1LG	-1	0	0	0	0	0	339
ROTTERDAM77H	230	12784	3LG	0	0	0	0	0	0	221
ROTTERDAM99H	230	12801	3LG	0	0	0	0	0	0	220
RULAND	69	48660	3LG	0	0	0	0	0	0	0
RULND RD	138	51052	3LG	0	0	0	0	0	0	0
S RIPLEY	230	9038	3LG	0	0	2	0	0	0	0
S080 345kV	345	16859	3LG	0	0	0	0	0	0	1
S122	345	16859	3LG	0	0	0	0	0	0	2
SALISBURY 3	115	10006	1LG	-1	0	0	0	0	0	6

BUS NAME	NOM.	KV	ATRA		Clinton Noble		Ellen		Jordanv		
			Max (A)	Type	County Δ (A)	Clinton Δ (A)	Bliss Δ (A)	Altona Δ (A)	burg Δ (A)	Gilboa Δ (A)	ille Δ (A)
SCRIBA	345	48745	1LG		1	1	0	1	1	0	30
SHELDON	230	9128	3LG		0	0	6	0	0	0	0
SHM CRK	138	45430	2LG		0	0	0	0	0	0	0
SHM CRK	345	32165	3LG		0	0	0	0	0	0	1
SHORE RD	138	50598	2LG		0	0	0	0	0	0	0
SHORE RD	345	27847	3LG		0	0	0	0	0	0	0
SHOREHAM	138	25013	2LG		0	0	0	0	0	0	0
SILLS ROAD	138	33338	2LG		0	0	0	0	0	0	0
SPIER77G	115	16986	3LG		0	0	0	0	0	0	5
SPRN BRK	345	51937	3LG		0	0	0	0	0	0	2
ST LAWRN 230	230	34392	1LG		252	137	0	116	137	0	16
STOLLE ROAD	115	14792	3LG		0	0	30	0	0	0	0
STOLLE ROAD	230	13712	3LG		0	0	22	0	0	0	0
STOLLE ROAD	345	3901	3LG		0	0	4	0	0	0	0
SYOSSET	138	33945	3LG		0	0	0	0	0	0	0
TBG 5E	69	32670	3LG		0	0	0	0	0	0	0
TBG 5EU-1	69	32659	3LG		0	0	0	0	0	0	0
TBG 5EU-2	69	32659	3LG		0	0	0	0	0	0	0
VALLEY	115	8430	3LG		-1	0	0	0	0	0	8
VERNON E	138	37144	1LG		0	0	0	0	0	0	0
VERNON W	138	32585	1LG		0	0	0	0	0	0	0
VLV STRM	138	53583	2LG		0	0	0	0	0	0	0
VOLNEY	345	37652	2LG		1	1	0	1	1	0	27
W 49 ST	345	49017	2LG		0	0	0	0	0	0	0
W.HAV345	345	27428	3LG		0	0	0	0	0	0	0
WADNGRV1	138	23785	2LG		0	0	0	0	0	0	0
WALLACE	35	2244	3LG		0	0	0	0	0	0	0
WATERCURE230	230	11749	2LG		0	0	0	0	0	0	0
WATERCURE345	345	7739	3LG		0	0	0	0	0	0	0
WAWAYANDA	345	15916	3LG		0	0	0	0	0	0	2
WAYLAND	35	4268	3LG		0	0	0	0	0	0	0
WHAV	138	25020	3LG		0	0	0	0	0	0	0
WHITMAN	115	8292	3LG		-1	0	0	0	0	0	2
WILDWOOD	138	22546	3LG		0	0	0	0	0	0	0
WILLIS 115	115	10903	3LG		209	110	0	102	110	0	0
WILLIS 230	230	12184	3LG		720	372	0	316	371	0	1
WOOD ST.	115	14369	2LG		0	0	0	0	0	0	0



Facilities Study for Class 2006: Part 2 - System Upgrade Facilities

*Annual Transmission Baseline Assessment
And
Annual Transmission Reliability Assessment*

Prepared by:

NYISO Staff

May 2, 2007

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Table of Contents

	Executive Summary	i
1	Introduction	1-1
2	Thermal, Voltage, and Stability Analysis	2-1
	2.1 ATBA and ATRA Base Case Background	2-1
	2.2 Thermal Analysis	2-2
	2.3 Voltage Analysis	2-5
	2.4 Stability Analysis	2-7
	2.5 Voltage Flicker Test	2-13
3	Resource Reliability Analysis	3-1
	3.1 Load-Capacity Tables	3-1
	3.2 Load Pocket Analysis	3-5
	3.3 Resource Adequacy	3-5
4	Short Circuit Assessment	4-1
	4.1 Statewide Short Circuit Case	4-1
	4.2 Data Collection	4-2
	4.3 Methodology	4-2
	4.4 ATBA	4-3
	4.5 ATRA	4-9
	4.6 NYSEG/RG&E ATBA/ATRA Assessment	4-18
	4.7 LIPA Transmission Upgrade Planning	4-20
5	System Upgrade Facilities	5-1
	5.1 SUFs identified in the ATBA Short Circuit Assessment	5-1
	5.2 SUFs identified in the ATRA Short Circuit Assessment	5-2
	5.3 SUFs Identified via Attachment Facilities Studies	5-4
6	Headroom Usage	6-1
7	Project Cost Allocation	7-1
	7.1 Transmission Owner Cost	7-1
	7.2 Project Developer Cost	7-1
	7.3 Headroom Cost Reimbursement	7-1
8	References & Bibliography	8-1
Appendices		
	A. Interconnection Projects Facilities Study Working Group (IPFSWG)	
	B. Interface Definitions	
	C. Thermal Results	
	D. Voltage Results	
	E. Stability Results	
	F. Short Circuit Results	

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Executive Summary

In the NYISO interconnection process, the Facilities Study ordinarily is the last and most comprehensive of the studies in the process. The purpose of the Facilities Study is to identify the interconnection facilities (i.e., the Attachment Facilities and the System Upgrade Facilities [SUFs]), that would be required for the interconnection of a group of projects referred to as a Class Year (e.g., Class 2006) in this case. Class 2006 is the first Class Year to undergo the full scope of the Facilities Study under the NYISO's Standard Large Facilities Interconnection Procedures (LFIP). [The previous Class Year studies addressed SUFs only, and, although Attachment Facilities were modeled in those studies, the studies did not address identification or cost of Attachment Facilities.]

The Class 2006 Facilities Study was performed in two major parts: Part 1 to address the Attachment Facilities required for each project; and Part 2 to address the SUFs required for the Class Year of projects in aggregate. This report presents the results of the second part (i.e., the SUFs part) of the NYISO Facilities Study for the Class 2006.

The SUFs part of the Facilities Study itself consists of two studies or assessments that are described in Attachment S of the NYISO Open Access Transmission Tariff (OATT): the Annual Transmission Baseline Assessment (ATBA) and the Annual Transmission Reliability Assessment (ATRA). Together, these studies result in the identification and cost allocation of SUFs required for the Class Year projects, and also determine any "Headroom" reimbursements that the current Class Year projects may owe for SUFs from previous Class Year studies. The Class 2006 SUFs studies were performed in accordance with the applicable rules and requirements set forth under Attachment S,¹ and the draft results were presented to the Interconnection Projects Facilities Study (IPFS) working group members through various meetings between August 2006 and March 2007.²

As reflected in this report, the Class 2006 Project Developers will be responsible for SUFs cost of approximately \$62.0 million to securely interconnect their projects into the New York grid.³ Almost all of this cost consists of upgrading the substations. About

¹ Deliverability standards, if any, for the projects in Class 2006 shall be determined in FERC Docket Nos. ER04-449-003, ER04-449-007 and ER04-449-008.

² To enhance the participation of Market Participants in the study process, as required under Attachment S rules, the NYISO assembled a working group of all interested parties, including Transmission Owners, Project Developers, the New York State Department of Public Service, and NYISO staff. The working group was called the Interconnection Projects Facilities Study (IPFS) working group and included 50 members from the above parties. It met five times between August 2006 and March 2007 and developed general consensus on all major issues such as study assumptions, base cases, neighboring system representations, and the study results including the cost allocation.

³ Any difference between a Project Cost Allocation and the actual cost of the Developer's share of required System Upgrade Facilities will be addressed in accordance with applicable provisions of Attachment S and Attachment X of the OATT, including Section IV.G.13 of Attachment S.

\$16.2 million out of this \$62.0 million is the Headroom reimbursement amount that some of the Class 2006 Project Developers will pay to the Class 2001 and the Catch-up Class 2003-2005 Project Developers for the Headroom usage. About \$2.0 million out of this \$62.0 million is the amount that will cost to replace the overdutied circuit breakers in New York City and Long Island areas.

In addition to the above costs, Transmission Owners (e.g., Con Edison, LIPA and NYSEG/RG&E) and Generation Owner (e.g., AES) will be responsible for the replacement of fifty-eight circuit breakers identified as overdutied in the ATBA and/or ATRA at an approximate cost of \$6.6 million. Note that this cost estimate does not include the cost estimate of replacement of some breakers by Con Edison and AES.

In addition to the fifty-eight overdutied circuit breakers identified above, 5 circuit breakers owned by NYSEG/RG&E are being confirmed to be overdutied or not.

The Class 2006 projects will add about 3,896 MW of new generation to the New York grid, including 2,110 MW in New York City and 560 MW in Long Island. Table E-1 shows these projects, their interconnection points, and approximate on line schedule.

Table E-1: Projects included in Class 2006 ATBA and ATRA cases

Developer / Project (1)	Size (MW)	Base Case Status	Proposed In-Service Date	CTO	Zone	Interconnection Points
Class 2001						
SCS Astoria Energy	500 500	B	In Service 2010/05	CONED	J	Astoria East
Class 2002						
NYC Energy Kent Ave	79.9	B	2007/Q4	CONED	J	Vernon-Greenwood
Fortistar LMA Lockport II	79.9	B	2010	NYSEG	A	Harrison Radiator
Calpine JFK Expansion	45	B	2009	CONED	J	JFK
Catch Up Class (2003-2005)						
Entergy Indian Point 2 Uprate	36	B	In Service	CONED	H	Buchanan 345
Entergy Indian Point 3 Uprate	38	B	In Service	CONED	H	Indian Point 345
Atlantic Neptune PJM-LI DC	660	B	2007/Q3	LIPA	K	Newbridge 138
Besicorp	660	B	2009/Q4	NM-NG	F	Reynolds Rd 345
Flat Rock Wind Power	321	B	In Service	NM-NG	E	Adirondack-Porter 230
Global Winds Prattsburgh	55.5	B	2007/11	NYSEG	C	Eel Pot Rd-Flat St 115
ECOGEN Prattsburgh	79.5	B	2008/06	NYSEG	C	Eel Pot Rd-Flat St 115
Constellation Ginna Uprate	95	B	2007	RG&E	B	Ginna 115
Class 2006						
KeySpan Spagnoli Road	250	T	2009/06	LIPA	K	Spagnoli Rd
Fortistar VP	79.9	T	2008/Q4	CONED	J	Fresh Kills 138
Fortistar VAN	79.9	T	2008/Q4	CONED	J	Fresh Kills 138
PSEG Cross Hudson	550	T	2008-09	CONED	J	West 49 th St.
TransGas Energy	1100	T	2012/Q3	CONED	J	Rainey-Farragut
Caithness Bellport	310	T	2008/Q2	LIPA	K	BrookHaven-Holbrook/Hostville
East Coast Power Linden VFT	300	T	2007/Q4	CONED	J	Goethals 345
Airtricity Munnsville	40	T	2007/Q3	NYSEG	E	Madison 46
UPC Canandaigua I	82.5	T	2007/Q4	NYSEG	C	Avoca 230
Invenergy Wind High Sheldon	129	T	2008	NYSEG	C	Stolle Rd-Meyer 230
NY Windpower West Hill	40	T	2008/Q3	NM-NG	C	Oneida-Fenner 115
PPM/Atlantic Renewable Fairfield	120	T	2008/Q4	NM-NG	E	Valley-Inghams 115
Marble River II	84	T	2008/Q4	NYPA	D	Willis-Plattsburg 1 230
Marble River I	134	T	2008/Q4	NYPA	D	Willis-Plattsburg 1 230
Noble Clinton	80	T	2007/Q4	NYPA	D	Willis-Plattsburg 2 230
Noble Bliss	71	T	2007/Q4	Arcade	A	Arcade
Noble Altona	99	T	2007/Q4	NYPA	D	Willis-Plattsburg 1 230
Noble Ellenburg I	79.5	T	2007/Q4	NYPA	D	Willis-Plattsburg 2 230
NYPA Gilboa Uprate	120	T	2007-2010	NYPA	F	Gilboa
Community Energy Jordanville	150	T	2008/Q4	NM-NG	E	Porter-Rotterdam 230

Notes:

- (1) Some Class Year projects that are in service and went through cost allocation are not shown
 B Baseline project-- included in ATBA and ATRA
 T Class 2006 Project-- included in ATRA but not in ATBA

1 Introduction

In the New York Independent System Operator (NYISO) interconnection process, the Facilities Study ordinarily is the last and most comprehensive of the studies in the process. The purpose of the Facilities Study is to identify the interconnection facilities (i.e., the Attachment Facilities and the System Upgrade Facilities [SUFs]) that would be required for the interconnection of a group of projects referred to as a Class Year (e.g., Class 2006) in this case. Class 2006 is the first Class Year to undergo the full scope of the Facilities Study under the NYISO's Standard Large Facilities Interconnection Procedures (LFIP). [The previous Class Year studies addressed SUFs only, and, although Attachment Facilities were modeled in those studies, the studies did not address identification or cost of Attachment Facilities.]

The Class 2006 Facilities Study was performed in two major parts: Part 1 to address the Attachment Facilities required for each project; and Part 2 to address the SUFs required for the Class Year of projects in aggregate. This report presents the results of the second part (i.e., the SUFs part) of the NYISO Facilities Study for the Class 2006.

The SUFs part of the Facilities Study itself consists of two studies or assessments that are described in Attachment S of the NYISO Open Access Transmission Tariff (OATT) [1]: the Annual Transmission Baseline Assessment (ATBA) and the Annual Transmission Reliability Assessment (ATRA). Together, these studies result in the identification and cost allocation of SUFs required for the Class Year projects, and also determine any "Headroom" reimbursements that the current Class Year projects may owe for SUFs from previous Class Year studies.

This report was prepared by the NYISO staff to document the results of the ATBA, the ATRA, and the Project Cost Allocation for the Class 2006 projects.⁴

These studies were performed according to Attachment S rules that describe how to conduct these studies and how to determine Transmission Owners' (TOs) and Project Developers' proportionate share of the total cost of SUFs. Attachment S requires NYISO staff to conduct these studies in cooperation with the Market Participants (MPs). Accordingly, NYISO staff invited all interested parties including MPs and Project Developers to join in an open study working group that ultimately consisted of 50 members, including TOs, Project Developers, NYISO staff and a representative from NYS Department of Public Service (DPS) (see Appendix A for more details). The working group met five times between August 2006 and March 2007 to review the project data, to develop the study assumptions, and to review the study results.

The ATBA and ATRA cases mentioned here are the foundations of these studies. The ATBA case, also referred to as "Baseline System" or "Baseline Case" in this report, is a five year look-ahead of the New York Control Area (NYCA) system and represents 2011

⁴ These are projects that have either (1) not been in a prior Class Year and met two milestones by June 27, 2006: an approved SRIS and the environmental milestone; or (2) rejected a cost allocation from a prior Class Year and met the requirements for re-entry into this Class Year. A list of these projects is shown under Table E-1 on page ii.

peak load conditions. This case includes all Class 2001, Class 2002 and Catch-up Class 2003-2005 projects that accepted their cost allocation. This case also includes transmission and distribution system upgrades to support 2011 load and changes in load patterns. The ATBA case or the Baseline System does not include the Class 2006 projects that are subject to cost allocation.

The ATRA case, on the other hand, consists of the same system representation as the ATBA case with the addition of the Class 2006 projects and associated system changes that go with these projects. It is the difference between these two cases (ATBA and ATRA) that establishes the incremental impact on the system caused by new projects and corresponding system upgrade facilities needed to mitigate those impacts.

The cost allocation process requires the integration of a number of separate studies. To fulfill the requirements of Attachment S, NYISO staff utilized the results of thermal, voltage, and stability analyses of the most recent comprehensive review of the New York Bulk Power System [2] prepared pursuant to the Northeast Power Coordinating Council's (NPCC) reliability compliance and enforcement program requirements. However, there are some changes (e.g., system load forecasted, project cancellations, and project additions) since this last comprehensive review. These changes could impact the results of some New York interfaces (e.g., Dysinger East, West Central, Moses South, Total East, Central East, and Sprain Brook Dunwoodie South interfaces). Therefore, the thermal, voltage and stability of these interfaces were conducted to assess the impact of these changes to the ATBA and ATRA system conditions.

The thermal, voltage and stability analyses for some selected interfaces, and the resource reliability, short circuit, and System Upgrade Facilities studies reported herein were conducted separately by NYISO staff and consultants to complete the cost allocation.

2 Thermal, Voltage, and Stability Analyses

As noted above, NYISO relied on the results of thermal, voltage, and stability studies performed pursuant to the NPCC reliability compliance and enforcement program. The most recent comprehensive review of the New York State Bulk Power System was presented by NYISO staff in May 2006 and covered the year 2010. The study demonstrates that the New York State Bulk Power Transmission System as planned through the year 2010 conforms to the NPCC "Basic Criteria for Design and Operation of Interconnected Power Systems" [3] and the reliability criteria described in the NYSRC Reliability Rules [4].

Note that there are some changes (e.g., system load forecasted, project cancellations, and project additions) since the last comprehensive review. These changes could impact the results of some New York interfaces (e.g., Dysinger East, West Central, Moses South, Total East, Central East, and Sprain Brook Dunwoodie South interfaces). Therefore, the thermal, voltage and stability of these interfaces were conducted to assess the impact of these changes to the ATBA and ATRA system conditions.

The results are discussed in the following paragraphs.

2.1 ATBA and ATRA Base Case Background

NYISO staff used the 2006 FERC-715 Summer 2011 base case as a starting point for the thermal, voltage, and stability studies. Changes made to the 2006 FERC-715 Summer 2011 base case to create the ATBA base case are as follows:

- Updated the transmission and distribution system upgrades supplied by the NY TOs.
- Updated the PJM system representation.
- Removed Class 2006 projects.
- Removed cancellation projects.
- Redispatched units in NYCA and adjusted the NYCA internal phase angle regulators (PARs) to balance the NYCA system load and to remove the pre-contingency violations.

Changes made to the ATBA base case to create the ATRA base case are as follows:

- Added the Class 2006 projects along with all system modifications that go with these projects (e.g., new substations, changes in existing substation configurations, and etc ...).
- Redispatched units in NYCA and adjusted the NYCA PARs to balance the NYCA system load and to remove the pre-contingency violations.

2.2 Thermal Analysis

NYISO staff used the PTI MUST program to perform the ATBA and ATRA thermal analysis. The selected NYCA open and closed interfaces and all 100kV and above transmission lines in the vicinity of these interfaces were monitored. The definition of the selected interfaces is in Appendix B.

Approximately two thousand contingencies were evaluated. All contingencies studied are in accordance with the NPCC Basic Criteria and the NYSRC Reliability Rules. The contingencies examined include the individual opening of all lines connected between buses with base voltage between 100 kV and 765 kV and all appropriate common structure, stuck breaker, generator, multiple element, and DC contingencies. PARs maintain their scheduled power flow pre-contingency but are fixed at their corresponding pre-contingency angle post-contingency. The general direction of generation shifts is from the North and West to Southeastern New York and New England. When an interface besides the one being studied became limiting, the general shift pattern was modified, within the base case conditions and limitations, to minimize this effect. However, no attempt was made to find the maximum thermal limit based on an ideal shift pattern.

Tables 2.1.1 and 2.1.2 provide summaries for the normal and emergency thermal transfer limits determined for the selected interfaces. Additional details regarding the thermal analysis results are provided in Appendix C.

Following are some key observations for this study:

1. The Linden VFT project creates a new tie line between PJM (PSE&G) and NYISO (Con Edison). This tie line is therefore added to those interface definitions which currently include the parallel Mahwah-Waldwick, Hudson-Farragut, and Linden-Goethals lines. The flow across this tie line adds to the interface flows and calculated transfer limits for these interfaces; hence, the ATRA transfer limits for these interfaces could be higher than the ATBA transfer limits.

Note that as part of the Linden VFT project, the Developer plans to upgrade the total ratings of the Linden-Goethals cables from around 900 MW to around 1,100 MW. The new rating would be able to handle the full dispatched outputs of the Linden Cogentech plant (about 744 MW) and the Linden VFT project (300 MW).

2. The ATRA transfer limits of the Dysinger East (open) and West Central (open) interfaces are somewhat lower than the ATBA transfer limits as a result of dispatching the UPC Canandaigua I and Invenergy Wind High Sheldon projects in the ATRA base case. Similar observation is also noted for the Central East and Total East interfaces. The ATRA transfer limits of the Central East and Total East interfaces are somewhat lower than the ATBA transfer limits as a result of dispatching the Jordanville project in the ATRA base case.

Since the reduction of these interfaces can be managed through the normal operating procedures of the NYISO and/or TO, therefore, this reduction is not

considered as a degradation of the system reliability or non-compliance with NERC, NPCC or NYSRC reliability standards. Consequently, under the NYISO minimum interconnection standard, no SUFs are required.

3. Northern Wind Projects: Both Noble and Marble River Project Developers proposed various projects that have a total of 475 MW connected to the Willis-Plattsburg 230 kV double circuits (WP-1 and WP-2 lines). Prior to the Northern wind projects interconnected, each of the Willis-Plattsburg 230 kV double circuits has ratings of 170/203/249 MVA, limited by 115 kV substation equipment at Plattsburgh; however, after the Noble Altona, Marble River I and Marble River II projects (315 MW) interconnected to the WP-1 line, this line will be segmented into three 230 kV lines called Willis-Marble River, Marble River-Noble North, and Noble North-Plattsburg lines, and their ratings are 434/500/562, 434/500/562, and 170/188/214 MVA, respectively. Similarly, after Noble Ellenburg and Clinton (160 MW) interconnected to the WP-2 line, this line will be segmented into two 230 kV lines called Willis-Noble South and Noble South-Plattsburg lines, and their ratings are 396/429/524 and 170/188/214 MVA, respectively.

Note that when the Northern wind farms are fully dispatched, loss of the double 230 kV circuits at Moses results in overloading the Willis-Malone 115 kV line. In addition, loss of Willis-Marble River 230 kV circuit would result in overloading the Noble North-Plattsburg 230 kV circuit and Plattsburg 230/115kV transformer, and the overloading condition may go beyond the Short Term Emergency (STE) rating of these lines.

Adjusting the total output of the Northern wind projects to about 360 MW would mitigate the possible post-contingency violations of these projects; hence, under the NYISO minimum interconnection standard, no SUFs are required. However, the total output of these projects will need to be limited to avoid the potential post-contingency overloading conditions.

Table 2.1.1 - Normal Thermal Transfer Limits (MW)

Interface	ATBA		ATRA	
	(Study Year 2011)		(Study Year 2011)	
	Open	Closed	Open	Closed
Dysinger East	2895 (1)	4292 (1)	2764 (1)	4466 (1)
West Central	1387 (1)	2784 (1)	1256 (1)	2958 (1)
Moses South	1988 (2)	2105 (2)	2071 (3)	2175 (3)
Central East	2973 (4)	N/A	2849 (4)	N/A
Total East	N/A	6183 (4)	N/A	6168 (4)
Sprain Brook Dunwoodie-South	5204 (5)	7294 (5)	5201 (6)	7589 (6)

Notes:

1. **Niagara-Rochester 345** at 1501 MW LTE rating for loss of Kintigh-Rochester 345
2. **Porter-Adirondack 230** at 478 MW LTE rating for loss of Edic-Porter 230 and Porter-Chases Laker 230
3. **Moses-Adirondack 230** at 359 MW LTE rating for loss of tower Massena-Moses 230
4. **Coopers Corners-Fraser 345** at 1404 MW LTE rating for loss of Porter-Rotterdam 230 and Coopers Corners-Marcy 345
5. **Rainey-South Bronx 345** at 1201 MW STE rating for loss Rainey-South Bronx 345, Rainey 345/138 transformer, Rainey 138 circuit, and Rainey 138/13 transformer
6. **Rainey-South Bronx 345** at 1201 MW STE rating for loss of Rainey-South Bronx 345 or Rainey-South Bronx 345 and South Bronx 345/138 transformer

Table 2.1.2 - Emergency Thermal Transfer Limits (MW)

Interface	ATBA		ATRA	
	(Study Year 2011)		(Study Year 2011)	
	Open	Closed	Open	Closed
Dysinger East	3206 (1)	4665 (1)	2790 (2)	4497 (2)
West Central	1698 (1)	3157 (1)	1282 (2)	2990 (2)
Moses South	2072 (3)	2189 (3)	2128 (3)	2232 (3)
Central East	3404 (4)	N/A	3248 (4)	N/A
Total East	N/A	7050 (4)	N/A	6974 (4)
Sprain Brook Dunwoodie-South	5227 (5)	7317 (5)	5201 (5)	7589 (5)

Notes:

1. **Niagara-Rochester 345** at 1685 MW STE rating for loss of Kintigh-Rochester 345
2. **Avoca-Hillside 230** at 383 MW STE rating for loss of Meyer 230/34.5 transformer
3. **Marcy 765/345 transformer** at 1654 MW STE rating for loss of Marcy 765/345 transformer
4. **Coopers Corners-Fraser 345** at 1207 normal rating for pre-contingency loading
5. **Rainey-South Bronx 345** at 1201 MW STE rating for loss of Rainey-South Bronx 345

2.3 Voltage Analysis

NYISO staff and consultants used PTI's PSS/E to evaluate the voltage-based transfer limits in accordance with the NYISO Transmission Planning Guideline #2-0 [5], and with consideration of the voltage limit practice (Exhibit A-3 of NYISO Emergency Operation Manual [6], formerly known as OP-1 practice) which specifies minimum and maximum voltage limits at key New York State Bulk Power System buses. The required post-contingency voltage limit is typically within 5% of nominal.

A set of power flow cases with increasing transfer levels was created from the Summer 2011 ATBA and ATRA base cases. The generation shifts that were employed for the voltage analysis are similar to the ones used for the thermal analysis. These shifts were used to obtain an increase in transfers across the particular interface being studied. The first part of the shift was similar for all interfaces studied, while unique shifts particular to each interface were employed to complete the shifts, within the limitations and condition of the base case. Appropriate contingencies were then selected to run on the particular set of transfer cases for an interface to evaluate the system response for that interface.

In some cases (e.g., Moses South interface) where the interface is known as a thermal limited interface, one transfer case was built with a transfer level of at least 105% above the thermal emergency limit, and the interface's appropriate contingencies were then selected to run on that high transfer case to confirm that the interface being studied is not voltage limited.

In this analysis, all areas in NYCA except New York City use the traditional constant power model for load to conservatively represent the restoration of load to its pre-contingency state. The Con Edison voltage-varying load model is used to model the New York City load in both pre and post-contingency power flow cases.

The reactive power of generators is regulated, within the capabilities of the units, to hold scheduled voltage in both the pre-contingency and post-contingency power flows. Tap settings of PARs and autotransformers are adjusted (within their capabilities) to regulate power flow and voltage, respectively, in the pre-contingency power flow base cases, but are fixed at their corresponding pre-contingency settings in the post-contingency power flow base cases. Similarly, switched shunt capacitors and reactors are switched at pre-determined voltage levels in the pre-contingency power flow base cases, but are held at their corresponding pre-contingency position in the post-contingency power flow base cases. In accordance with NYISO operating practice, SVC and FACTS devices are held at or near zero output in the pre-contingency power flow base cases, but are allowed to regulate voltage, within their capabilities, in the post-contingency power flow base cases.

As the transfer across an interface is increased, the voltage-constrained transfer limit is determined to be the lesser of (a) the pre-contingency power flow at which the post-contingency voltage falls below the OP-1 post-contingency limit, or (b) 95% of the pre-contingency power flow at the "nose" of the post-contingency PV curve. The "nose" is the point at which the slope of the PV curve becomes infinite (vertical) and reaches the point of voltage collapse. This operating point occurs when the reactive capability

supporting the power transfer becomes exhausted. The region near the "nose of the curve" is generally referred to as the region of "voltage instability". Therefore, the voltage-constrained transfer limit is intended to ensure adequate post-contingency voltage and to avoid operating within this region of voltage instability.

Table 2.2.1 provides summaries for the normal and emergency voltage transfer limits determined for the selected interfaces. Additional details regarding the voltage analysis results are provided in Appendix D.

Following are some key observations for this study:

1. As in thermal analysis, the ATRA voltage-constrained transfer limits of the closed versions of the Dysinger East, West Central, Total East, and Sprain Brook Dunwoodie South interfaces are affected by the addition of the Linden VFT tie line to the interface definition. This addition changes the voltage limits across the closed versions of these interfaces; hence, their voltage limits could be higher than the ATBA voltage limits.
2. As in thermal analysis, the ATRA voltage-constrained transfer limits of the Dysinger East and West Central open interfaces are lower than the ATBA voltage-constrained transfer limits due to the dispatch of the Canandaigua I and Invenergy High Sheldon projects.
3. The ATRA voltage-constrained transfer limit of the Sprain Brook Dunwoodie South interface is higher than the ATBA voltage-constrained transfer limit as a result of the PSEG Cross Hudson and TransGas projects connected the Con Edison 345 kV system. These projects provided additional voltage supports to the Con Edison 345 kV system.
4. The St. Lawrence PARs are part of the Moses South closed version interface, and their meter is measured from New York to Ontario. Therefore, importing power from Ontario via the St. Lawrence PARs will be deducted for the calculation of the closed version interface.

When creating the desired ATBA Moses South transfer case, additional power was chosen to bring from Ontario while the ATRA Moses South transfer case did not do so. Therefore, the ATBA voltage-constrained transfer limit of the closed version of the Moses South interface is lower than the ATRA voltage-constrained transfer limit due to the import of power from Ontario via St. Lawrence PARs in the ATBA transfer case. This difference is a result of a different generation dispatched pattern.

Table 2.2.1 - Voltage Transfer Limits (MW)

Interface	Normal				Emergency			
	ATBA		ATRA		ATBA		ATRA	
	Open	Closed	Open	Closed	Open	Closed	Open	Closed
Dysinger East	2291 (1)	3576 (1)	2236 (1)	4105 (1)	2291 (1)	3576 (1)	2236 (1)	4105 (1)
West Central	833 (1)	2118 (1)	775 (1)	2358 (1)	833 (1)	2118 (1)	775 (1)	2358 (1)
Moses South	2305 (2)	2040 (2)	2264 (2)	2385 (2)	2305 (2)	2040 (2)	2264 (2)	2385 (2)
Central East	2918 (3)	N/A	2918 (4)	N/A	2918 (3)	N/A	2925 (5)	N/A
Total East	N/A	5972 (3)	N/A	6236 (5)	N/A	5972 (3)	N/A	6236 (5)
Sprain Brook Dunwoodie South	3950 (6)	6030 (6)	4250 (6)	6640 (6)	4022 (7)	6115 (7)	4327 (7)	6720 (7)

Notes:

1. 95% voltage collapse criteria for loss of Ginna
2. 95% of highest transfer tested. Actual voltage collapse limit is likely to be higher.
3. 95% Voltage Collapse Criteria
4. Post-Contingency Low Limit Violation of the Leeds 345 kV limiting substation for loss of tower 34 & 42
5. 95% Voltage Collapse Criteria for loss of tower Marcy South South
6. Post-Contingency Low Limit Violation of the Sprain Brook 345 kV limiting substation for loss of tower 67& 68
7. Post-Contingency Low Limit Violation of the Sprain Brook 345 kV limiting substation for loss of Ravenswood 3

2.4 Stability Analysis

Two cases (ATBA and ATRA margin cases) were used for this analysis. The Moses South and UPNY-SENY interfaces of the ATBA margin case are loaded at 2,427 and 5,785 MW, respectively. These flows are 11.1% above the more restrictive of the emergency thermal or voltage limit. This case has all Oswego complex generation dispatched at an output of 4,047 MW, 1,800 MW of import from Hydro Quebec, and 400 MW of import from Ontario via St. Lawrence PARs.

The Moses South and UPNY-SENY interfaces of the ATRA margin case are loaded at 2,393 and 5,757 MW, respectively. These flows are also 11.1% above the more restrictive of the emergency thermal or voltage limit. This case has all Oswego complex generation dispatched at an output of 3,290 MW and 1,800 MW of import from Hydro Quebec.

The dynamic representation used in this analysis was developed from the 2006 NPCC BCD library. The real power load models used for various Areas were (1) constant current (power varies with the voltage magnitude) for Hydro Quebec, New Brunswick, MAAC, and ECAR, (2) constant impedance (power varies with the square of the voltage magnitude) for New York and New England, and (3) 50% constant current and 50% constant impedance for Ontario, Nova Scotia, and Cornwall. Reactive load was modeled as constant impedance for all Areas except Hydro Quebec, which uses a 13% constant current and 87% constant impedance model for reactive load.

Table 2.4.1 lists the contingencies evaluated and a determination of the overall system response as being stable or unstable. For these margin cases, all contingencies were stable and damped. Some selected plots are provided in the Appendix E.

Table 2.4.1 – Stability Results

ID	CONTINGENCY	ATBA Margin	ATRA Margin
CE01	3PH-NC@EDIC 345/EDIC-NEW SCOTLAND #14	S	S
CE01AR	3PH-NC@EDIC 345/EDIC-NEW SCOTLAND #14 WITH AUTOMATIC RECLOSING	S	S
CE07	LLG-NC@EDIC 345/TWR: MARCY-COOPERS CORNERS UCC2-41 & EDIC-FRASER EF24-40	S	S
CE07AR	LLG-NC@EDIC 345/TWR: MARCY-COOPERS CORNERS UCC2-41 & EDIC-FRASER EF24-40 WITH AUTOMATIC RECLOSING	S	S
CE17	SLG-STK@MARCY 345/MARCY-COOPERS CORNERS UCC2-41 BACKUP CLEARING MARCY T1 (765/345)	S	S
CE18	LLG-NC TOWER@ROCK TAV/COOPERS CORNERS-ROCK TAVERN D/C	S	S
CE18AR	LLG-NC TOWER@ROCK TAV/COOPERS CORNERS-ROCK TAVERN D/C WITH AUTOMATIC RECLOSING	S	S
CE20	SLG-STK@EDIC 345/EDIC-MARCY UE1-7 BACKUP CLEARING EDIC-PORTER T2 & T4	S	S
CE34	L/O BOTH POLES OF PHASE II INTERCONNECTION W/O FAULT	S	S
CE34OMS	L/O BOTH POLES OF PHASE II INTERCONNECTION W/O FAULT AND PV-20 OMS SPS WILL OPERATE AFTER 1 SEC. REACTOR INSERTION AFTER 5 SEC DELAY.	S	S
DS01	SLG/STK@SPRAINBROOK-W.49th/STK RNS5/CLEAR W99/W64	S	S
DS02	SLG/STK@SPRAINBROOK-DUNWD/STK RNS3/CLEAR W85/W78	S	S
DS10	3PH-NC@GOETHALS SOUTH - TRIP COGENTECH @ 4.5~	S	S
LI01	3PH-NC@HOLTS GT 138 kV BUS#1	S	S
LI02	3PH-NC@BRKHVEN 138 kV ON BRKHVEN-HOLTS GT & BRKHVEN-HOLBROOK	S	S
LI03AR	3PH-NC@PILGRIM 138 kV ON PILGRIM-RULAND DCT WITH AUTOMATIC RECLOSING	S	S
LI04AR	3PH-NC@PILGRIM/HOLBROOK 138 kV ON PILGRIM-HOLTS GT & HOLBROOK-RULAND DCT WITH AUTOMATIC RECLOSING	S	S
LI05	3PH-NC@RULAND 138 kV ON NEWBRGE-RULAND DCT	S	S
LI06	3PH-STK@PILGRIM 138 kV ON PILGRIM-NRTPRT	S	S
MS01	3PH-NC@MARCY 765/MARCY-MASSENA MSU-1 SPS #41 TRIPS MASSENA-CHATEAUGUAY MSC-7040	S	S
MS06	SLG-STK@MOSES 230/MOSES-MASSENA MMS-2 BACKUP CLEARING MOSES T4 (230/115)	S	S
MS068	SLG-STK@MOSES 230/MOSES-MASSENA MMS-2 BACKUP CLEARING MOSES T4, SPS #43 REJECTS 8 MOSES UNITS	S	S

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ID	CONTINGENCY	ATBA Margin	ATRA Margin
MS07	SLG-STK@MASSENA 765/MOSES-MASSENA MMS-1	S	S
MS08	SLG-STK@MOSES 230/MOSES-ADIRONDACK #2 BACKUP CLEARING MOSES-WILLIS-PLATTSBURGH MWP-1	S	S
MS09	3PH-NC@MASSENA 765/MARCY-MASSENA MSU-1 SPS #41 TRIPS MASSENA-CHATEAUGUAY MSC-7040	S	S
MS10	SLG-STK@MOSES 230/MOSES-WILLIS-PLATTSBURGH MWP-1 BACKUP CLEARING MOSES-ADIRONDACK #1	S	S
MS13	LLG-NC@MOSES 230/TWR: MOSES-MASSENA MMS-1 & MMS-2	S	S
MS150	LLG-NC@MOSES 230/MOSES-ST. LAWRENCE L33P & L34P	S	S
MS158	LLG-NC@MOSES 230/MOSES-ST. LAWRENCE L33P & L34P SPS #43 REJECTS 8 MOSES UNITS	S	S
ST01	3PH-NC@STOLLE RD/STOLLE-HOMER CITY 345KV	S	S
ST11	3PH-NC@GARDENVILLE/GARDENVILLE-NIAGARA 115KV LINE #180	S	S
ST12	3PH-NC@C.LINE/COUNTY LINE-BROTHERTOWN 115KV	S	S
TE32	3PH-NC@NEW SCOTLAND 345 KV 77 BUS L/O #14 (EDIC), #2 (ALPS), #93 (LEEDS), T2 (345/115)	S	S
TE33	3PH-NC@NEW SCOTLAND 345 KV 99 BUS L/O UNS-18 (MARCY), GNS-1 (GILBOA), #94 (LEEDS), T1	S	S
UC04	SLG-STK@BUCH N 345/BUCHANAN N.-INDIAN POINT #2 W95 BACKUP CLEARING BUCHANAN-EAST VIEW-SPRAIN BROOK W93/W79	S	S
UC18	3PH-NC@LADENTOWN 345/TWR: LADENTOWN-BUCHANAN S. Y88 AND RAMAPO-BUCHANAN N. Y94	S	S
UC25	3PH-NC@RAVENSWOOD #3	S	S
UC26	LLG-NC@LADENTOWN 345/TWR: LADENTOWN-W.HAVERSTRAW-BOWLINE #67 & #68, L/O BOWLINE UNITS #1 & #2, & W72	S	S
VE05	SLG-STK 32/3622 @OAKDALE/FRASER-OAKDALE-LAFAYETTE 345KV	S	S
WC04	3PH-NC@ROCHESTER 345/SOMERSET-ROCHESTER SR1-39	S	S
WC04AR	3PH-NC@ROCHESTER 345/SOMERSET-ROCHESTER SR1-39 WITH AUTOMATIC RECLOSING	S	S
WC12	SLG-STK@ROCHESTER 345/NIAGARA-ROCHESTER NR2 BACKUP CLEARING ROCHESTER-PANNELL RD RP-2	S	S
WC16	3PH-NC@ GINNA - TRIP GEN.@ 7~	S	S

Notes: S – Stable; U – Unstable; SLG – Single Line-to-Ground Fault; LLG – Line-to-Line-to-Ground Fault; 3PH – 3-Phase Fault; NC – Normal Clearing; STK – Stuck Breaker (delayed clearing)

The Appendix G to the Large Generator Interconnection Agreement contained in Attachment X of the NYISO OATT [7] requires Class 2006 wind projects to meet either the Transition or Post-Transition Low Voltage Ride Through (LVRT) standard. Based on the information that NYISO obtained from the Developers, most of Class Year 2006 wind projects are required to meet the Post-Transition LVRT standard, except Munnsville project and possibly Noble's wind projects. Based on the information Munnsville provided, NYISO determines that Munnsville project qualifies for the Transition LVRT standard. Noble indicated that their wind projects may qualify for the Transition LVRT standard. NYISO noted that in order for the Noble's wind projects to qualify for the Transition LVRT standard, Noble must satisfy the requirements contained in Section A.i of Appendix G.

Class 2006 contains twelve wind projects. In general, the wind farms are susceptible to being tripped by either their voltage or frequency protection relays for close-in faults at the point of interconnection (POI) or one bus away faults from the POI; hence, to evaluate the wind farms' response to the close-in or one bus away faults, some possible contingencies listed in Table 2.4.2 were selected. In addition, all wind farms' protection relays were disabled in the modeling in order to observe the wind farms' response to the faults. The study results are in Appendix E.

Table 2.4.2 – Stability Results

ID	CONTINGENCY
CE35	3PH-NC@JORDNVLL ON JORDNVLL-PORTER 2 230 KV
CE36	3PH-NC@JORDNVLL ON JORDNVLL-ROTRDM.2 230 KV
CE37	3PH-NC@SALBRY4 ON SALBRY4-INGMS-CD 115 KV
CE38	3PH-NC@SALBRY4 ON SALBRY4-VALLEY 115 KV
MS17	3PH-NC@WILLIS E 230KV/MOSES W-WILLIS E (MW-1)
MS18	LLG-NC@MOSES 230KV/MOSES-WILLIS E & W (MW-1 & MW-2)
MS20	3PH-NC@MRBLRWD 230KV/WILLIS E-MRW_HCW (WPN1)
MS21	3PH-NC@WILLIS W/WILLIS W-NOBLE_S (CLINTON) (WRY2)
MS24	3PH-NC@NOBLE_N/MRW_HCW-NOBLE_N (ALTONA) (PND1)
MS26	3PH-NC@NOBLE_N/NOBLE_N-PLAT T#1-PLAT 115 (DP1)
MS27	3PH-NC@NOBLE_S/NOBLE_S-PLAT T#4-PLAT 115 (RYP2)
ST13	3PH-NC@MUNNSVILLE/MUNNSVILLE-MORRISVILLE 46
ST14	3PH-NC@MEYER230/MEYER230-CNDGUA_T 230KV
ST15	3PH-NC@SHLDN230/MEYER230-SHLDN230 230KV
ST16	3PH-NC@W HILL_T/W HILL_T-ONEIDA 115KV
ST17	3PH-NC@ARCADE ON ARCADE-SPVL-151 115KV

Based on the study results for the tested condition, it is likely that the wind farms may not be tripped for close-in or one bus away faults. This conclusion was based on the following assumptions:

1. All wind farms meet either the Transition or Post-Transition LVRT standard described in the Appendix G of the Attachment X; hence, the LVRT setting point is either at 0.15 PU or 0.0 PU for a time delay of 9 cycles (~150 mSec), respectively.
2. All wind farms' voltage protection relays are set to monitor the high side of a plant transformer (POI bus).
3. The continuous voltage operating range is from 0.90 PU to 1.1 PU.
4. All wind farms' under-voltage (UV) protection relays between the LVRT setting point (either at 0.15 PU or 0.0 PU) and the lowest continuous voltage operating point (0.90 PU) that have a time delay less than 200 mSec are disabled (i.e., disable the UV protection relay setting at 0.7 PU for a time delay of 100 mSec).
5. All wind farms' frequency protection relays are set to monitor the generator terminal side.
6. The continuous frequency operating range is from 57.8 to 61.5 Hz.
7. The frequency relay is set to trip the wind farms when their frequency is either above 62.5 Hz or below 57.0 for more than of 20 mSec.
8. All Class 2006 wind farm projects are fully dispatched, except the Northern wind farm projects.
9. The UV protection relay settings that were used in the SRIS for projects, Canandaigua I and High Sheldon are changed to comply with the Post-Transition LVRT standard. If such changes are not made, then the mentioned projects may be tripped for close-in or one bus away faults resulted in not complying with the required LVRT standard.
10. The Post-Transition LVRT standard is applicable for the Noble Altona, Ellenburg, Clinton, and Bliss I projects. If Noble is able to demonstrate that the Transition LVRT standard is applicable for their projects, then for some close-in or one-bus away faults, Noble projects may be tripped by the UV relay; however, such tripping is allowable per the requirement contained in Section A.i of Appendix G.

As indicated in Section 2.2, the total output of the Northern wind projects will need to be limited to avoid the potential post-contingency overloading conditions. In addition to the thermal restriction, the total output of the Northern wind projects may also be restricted due to a potential stability issue. It's noted that with the Northern wind projects at full output, the Northern wind farms may experience unit instability for an MS18 design contingency, a line-to-line-ground fault at Moses resulted in loss of a Moses-Willis tower.

Table 2.4.3 provides a summary of the normal and emergency transfer limits for the selected transmission interfaces used in the studies.

Table 2.4.3 - NYS BULK POWER SYSTEM COMPARISON TRANSFER LIMITS

Interface	ATBA Limit (Study Year 2011)				ATRA Limit (Study Year 2011)			
	Normal		Emergency		Normal		Emergency	
Dysinger East (closed)	3576	VX	3576	VX	4105	VX	4105	VX
Dysinger East (open)	2291	VX	2291	VX	2236	VX	2236	VX
West Central (closed)	2118	VX	2118	VX	2358	VX	2358	VX
West Central (open)	833	VX	833	VX	775	VX	775	VX
Moses South (closed)	2105	T	2189	T	2175	T	2232	T
Moses South (open)	1988	T	2072	T	2071	T	2128	T
Total East	5541	S*	5541	S*	5541	S*	5541	S*
Central East	2907	S*	2849	T	2907	S*	2907	S*
Dunwoodie South (closed)	6030	V	6115	V	6640	V	6720	V
Dunwoodie South (open)	3950	V	4022	V	4250	V	4327	V

Notes:

- 1) Thermal and Voltage Limits Apply under Summer Peak Load Conditions.
 - 2) Emergency Limits account for more restrictive voltage collapse limit.
 - 3) Transfer Limits for All-Lines-In Condition.
 - 4) Transfer Limits assume 400 MW scheduled on the Ramapo PARs.
- * From the 2005 Comprehensive Review, studied year 2010.

Type Codes: T – Thermal; V - Voltage Post-contingency; VX - Voltage 95% from collapse pt; S – Stability

2.5 Voltage Flicker Test

NYSEG/RG&E requested the NYISO to perform the voltage flicker test to verify that the projects interconnected to the NYSEG/RG&E system are in compliance with the voltage flicker (fluctuation) criteria defined in Section 5.2.2.7 of the NYSEG/RG&E document, “Bulletin 86-01, Requirements for Independent Power Producers of Electricity” [8]. The criterion requires that “the Developer shall limit voltage fluctuations in accordance with the 3% curve for transmission or sub-transmission system interconnections, or the 4% curve for distribution system interconnections”.

In order for the NYISO staff to perform the voltage flicker test for projects that are interconnected to the NYSEG/RG&E system, NYSEG/RG&E provided the methodology for this test. The methodology indicates that the voltage flicker equals the starting (in-rush) MVA of a machine times the number of the machines in the wind farm, divided by the short circuit MVA where the wind farm is interconnecting. After that, the “borderline of visibility” curve of Graph 1 in the NYSEG/RG&E Bulletin 86-01 is used to determine the allowable number of fluctuations per hour, minute or second.

Three wind farms from the Class 2006 projects are being connected to the NYSEG/RG&E system. They are the Munnsville, UPC Canandaigua I, and Invenergy High Sheldon projects. The Munnsville and Invenergy High Sheldon projects are planning to use the GE 1.5 MW machine, while the UPC Canandaigua I project is planning to use the Clipper 2.5 MW machine.

Following are the results from the voltage flicker tests::

Munnsville Project

Machine Type: GE

Number of Machines: 27

Full-load MVA: 1.5 MVA

In-rush MVA: 33% (GE provided this data to NYSEG/RG&E)

POI Short-Circuit MVA: 252.4 MVA (This data was based on the ATRA base case without the project in service and 1.05 PU operating voltage.)

$$\% \text{ Voltage Flicker} = (33\% \times 1.5 \times 27) / 252.4 = 5.3\%$$

Based on the above calculation, the voltage fluctuation is about 5.3%. This voltage fluctuation indicated that all of the machines on the wind farm can not be started simultaneously.

Note that if the wind farm plans to start 1 machine at a time, then the voltage fluctuation will be about 0.3% $[(33\% \times 1.5 \times 1) / 252.4 \sim 0.3\%]$. Based on the information provided for the “borderline of visibility” curve of Graph 1 in the NYSEG/RG&E Bulletin 86-01, with a 0.3% voltage deviation, the wind farm may start one machine every 1 second.

Invenergy High Sheldon Project

Machine Type: GE

Number of Machines: 86

Full-load MVA: 1.5 MVA

In-rush MVA: 33% (This data was given by GE to NYSEG/RG&E.)

POI short-circuit MVA: 3598.3 MVA (This data was based on the ATRA base case without the project in service and 1.05 PU operating voltage.)

$$\% \text{ Voltage Flicker} = (33\% \times 1.5 \times 86) / 3598.3 = 1.2\%$$

Based on the above calculation, the voltage fluctuation is about 1.2%. Based on the information provided for the “borderline of visibility” curve of Graph 1 in the NYSEG/RG&E Bulletin 86-01, with a 1.2% voltage deviation, the allowable number of times that all the machines within the wind farm may simultaneously start is 8 times per hour.

Note that if the wind farm plans to start 21 machines at a time, then the voltage fluctuation will be about 0.3% $[(33\% \times 1.5 \times 21) / 3598.3 \sim 0.3\%]$. Based on the information provided for the “borderline of visibility” curve of Graph 1 in the NYSEG/RG&E Bulletin 86-01, with a 0.3% voltage deviation, the wind farm may simultaneously start 21 machines every 1 second.

Canandaigua I Project

In order to calculate the voltage flicker, the in-rush MVA of the Clipper machine needs to be obtained. The Clipper manufacturer provided the necessary documentation to indicate that the in-rush current is negligible since the machine is isolated from the grid through the power electronics.

NYSEG/RG&E reviewed the information provided and concluded that “no start-up limitations will be placed on the Canandaigua I project as long as the units are not started simultaneously”.

Conclusion

The study showed that for some projects, there could be a start-up limitation, and for some projects, there could be no start-up limitations. In any case, if at any time the generation or facilities cause flicker on the NYSEG/RG&E system, the Project Developer will have to study and remedy the situation to bring them within the NYSEG/RG&E Bulletin 86-01 flicker requirements. The Project Developer may not be allowed to have their generation and facilities on-line until the situation is remedied.

3 Resource Reliability Analysis

Attachment S requires that the Baseline System must meet the Applicable Reliability Requirements.⁵ The NYISO annually conducts studies to determine the statewide Installed Reserve Margin (IRM) and locational capacity requirements needed to meet these reliability requirements. The most recent of these studies completed before the start of this study established an 16.5% IRM requirement on a statewide basis, 80% Installed Capacity (ICAP) requirement in the New York City zone and 99% ICAP requirement in the Long Island zone [9].

In addition, there are a number of specific load pockets within NYCA, mostly within the New York City area, that must have adequate local generation installed within the load pockets, to be able to serve their load reliably. These requirements and some more (such as the Loss of Load Expectation [LOLE] criterion), have been tested on the Baseline System for the study period of five years (2007-2011), also per Attachment S. The NYISO 2006 Load and Capacity Data (2006 Gold book) [10] shows the expected load forecast and corresponding generator additions. The study used the information from the 2006 Gold book to discuss whether or not the reliability requirements are met in the following paragraphs.

3.1 Load and Capacity Data

Based on the information provided in Table I-2 of the 2006 Gold book, the load in NYCA is expected to grow by about 1,500 Megawatts during the five years under study (2007-2011). More than half of this growth is expected in the City and in the Long Island areas alone. A number of generation projects are also planned to respond to this additional demand (see Table IV-1 of the 2006 Gold book for detailed information).

Table V-2 of the 2006 Gold book shows a year-by-year load and capacity schedule for the entire NYCA. This table does not include projects that accepted the Class 2001, Class 2002 and Catch-up Class 2003-2005 cost allocation. After these adjustments, the Baseline System capability is shown for each of the five years, 2007 through 2011, in Table 3.1.1.

The resource reliability requirement for NYCA is to meet the 16.5% IRM, at least for the 2007 summer capability period. Table 3.1.1 shows that sufficient resources are available to cover 16.5% IRM for the next five years.

Table 3.1.2 shows the Load and Capacity schedule over the next five years when Class 2006 projects are added as new resources. The NYCA capability and the Reserve Margin increase significantly due to these projects. The Reserve Margin varies between 27% and 37% during the next five years.

Tables 3.1.1 and 3.1.2 demonstrate that the transmission system meets the applicable reliability criteria for both the ATBA and ATRA representations.

⁵ NYSRC Reliability Rules, NPCC Basic Design and Operating Criteria, NERC Planning Standards, NYISO rules, practices and procedures, and local Transmission Owner criteria included in FERC Form No. 715

Table 3.1.1 - Load and Capacity Schedule for Baseline Case (ATBA)

Base Forecast – Summer Capability (kW)	2007	2008	2009	2010	2011
Peak Load	33831000	34314000	34688000	35042000	35348000
Resource Capability Before Adjustments	40373476	39174576	39174576	39184576	39184576
Adjustments to Baseline Case	2259800 (1)	2159800 (2)	2159800 (2)	2159800 (2)	2159800 (2)
Resource Capability	42633276	41334376	41334376	41344376	41344376
Required Capability	39920580	40490520	40931840	41349560	41710640
Actual Reserve	8802276	7020376	6646376	6302376	5996376
Reserve Margin %	26.02%	20.46%	19.16%	17.99%	16.96%
Proposed Resource Additions	0	0	0	0	0
Adjusted Reserve Margin %	26.02%	20.46%	19.16%	17.99%	16.96%

Notes:

- (1) This number is derived from the Class 2001, Class 2002 and Catch-up Class 2003-2005 projects (SCS Astoria [500 MW] + Calpine JFK [45MW] + Kent Ave [79.9 MW] + Fortistar Lockport [79.9 MW] + Neptune [660 MW] + Besicorp [660 MW] + Flatrock [100 MW] + Global Prattsburg [55.5 MW] + Ecogen Prattsburg [79.5 MW]).
- (2) This number is derived from the 2007 ATBA Adjustments minus 100 MW of the Flatrock project since the 2006 Gold book starts to include the Flatrock additional 100 MW in 2008.

Table 3.1.2 - Load and Capacity Schedule for Baseline Case (ATRA)

Base Forecast – Summer Capability (kW)	2007	2008	2009	2010	2011
Peak Load	33831000	34314000	34688000	35042000	35348000
Resource Capability Before Adjustments	40373476	39174576	39174576	39184576	39184576
Adjustments to Baseline Case	5987600 (1)	5887600 (2)	5887600 (2)	5887600 (2)	5887600 (2)
Resource Capability	46361076	45062176	45062176	45072176	45072176
Required Capability	39920580	40490520	40931840	41349560	41710640
Actual Reserve	12530076	10748176	10374176	10030176	9724176
Reserve Margin %	37.04%	31.32%	29.91%	28.62%	27.51%
Proposed Resource Additions	0	0	0	0	0
Adjusted Reserve Margin %	37.04%	31.32%	29.91%	28.62%	27.51%

Notes:

- (1) This number is derived from the 2007 ATBA Adjustments plus the Class 2006 projects (2259.8 MW + Spagnoli [250 MW] + Fortistar VP [79.9 MW] + Fortistar VAN [79.9 MW] + PSEG X Hudson [550 MW] + TransGas [1100 MW] + Caithness [310 MW] + Linden VFT [300 MW] + Munnsville [40 MW] + Canandaigua I [82.5 MW] + Fairfield [120 MW] + Marble River I & II [216 MW] + Noble Clinton [80 MW] + Noble Bliss [71 MW] + Noble Altona [99 MW] + Noble Ellenburg [79.5] + NYPA Gilboa Uprate [120 MW] + Jordanville [150 MW]).
- (2) This number is derived from the 2007 ATRA Adjustments minus 100 MW of Flatrock since the 2006 Gold book starts to include the Flatrock additional MWs in 2008.

Table 3.1.3 addresses the locational reliability requirements within the NYCA. This table shows the NYCA capability broken down by zones. Of significant importance are zone J (New York City) and zone K (Long Island) where the installed generating capability must be at least 80% and 99% of their peak loads respectively. Other zones do not have any specific locational requirement.

Looking at the bottom of table 3.1.3, the total Baseline capacity is compared against the 2011 load and the ICAP requirements. It shows that zone J (New York City) and zone K (Long Island) both meet the ICAP requirements satisfactorily. Other zones within NYCA, having no specific locational requirements, were not evaluated.

This table was created based on the information provided on page 48 of the 2006 Gold book. The table also included some modifications (e.g., added Class 2001, Class 2002 and Catch-up Class 2003-2005 projects, adjusted for retirements, and added Special Case Resources [SCRs]) in accordance with Attachment S requirements to suit this study.

Table 3.1.5
Capacity by Zone including previous Class projects that accepted cost allocation--ATBA

<i>Capability By Zone and Type</i>												
As of April 1, 2006												
	ZONE											NYCA
	A	B	C	D	E	F	G	H	I	J	K	TOTAL
	Summer Capability Period (KW)											
Total Capacity before Adjustments	505066	941320	6589578	1240787	978421	3765074	3428810	2143100	2680	9524800	5290940	38956476
Class 2001 project that accepted the cost allocation but are not included in the above resources												
SCS Astoria										1000000		1000000
Class 2002 projects that accepted the cost allocation but are not included in the above resources												
Calpine JFK Expansion										45000		45000
NYC Energy Kent Avenue										79900		79900
Fortistar LMA Lockport II	79900											79900
Catch-up Class 2003-2005 projects that accepted the cost allocation but are not included in the above resources												
Besicorp						660000						660000
Flatrock					100000							100000
Global Prattsburgh			55500									55500
Ecogen Prattsburgh			79500									79500
Ginna Uprate		95000										95000
Retirements												
NYPA Poletti										-885300		-885300
NRG Huntley 65, 66	-166800											-166800
Russell Station		-238000										-238000
Mirant Lovett 3, 4, 5							-431000					-431000
Total Baseline Capacity	418166	798320	6724578	1240787	978421	4425074	2997810	2143100	2680	9764400	5290940	39330176
2011 Net Load after DSM										12387000	5873000	35093000
Total ICAP requirement										9909600	5814270	41409740
Surplus (deficiency)										(235200)	(523330)	(20796564)
Neptune PJM-LI DC & Cross Sound											990000	990000
Special Case Resources (SCRs)										262000	97000	1016000
New Surplus (deficiency)										26,800	563670	18790564

3.2 Load Pocket Analysis

A Load Pocket is generally defined as an area of the system where electrical demand can not be reliably served just by importing power. Some local generation is required within that load pocket to supplement import capacity and to provide other reliability-related support (e.g., voltage support).

There are a number of load pockets within the NYCA, especially in New York City, with thousands of megawatts of local generation to ensure reliable system operation. However, as the load grows the load/capacity balance in these load pockets needs to be reevaluated to ensure that adequate supplies are still available for reliable system operation.

NYISO staff reviewed the prior cost allocation reports (Class 2001, Class 2002, and Catch-up Class 2003-2005 reports [11-14]) along with the current 2006 Baseline generation resources and concluded that there would be no generation deficiency in any of the previously identified load pockets within New York City. Long Island load pocket was evaluated through Resource Adequacy Analysis and was found adequate throughout the five year study period.

Other TOs in the rest of the state have not identified any load pockets in their service area, and have reported no generation deficiency for the five year study period.

3.3 Resource Adequacy

One final test to ensure that all Resource Reliability requirements are met is to analyze the interconnected system (NYCA plus its interconnected neighboring areas) for a LOLE test. NPCC Reliability criteria require that each control area must meet an LOLE of one day in ten years, or 0.1 day per year.

For this analysis, the NYISO staff used the IRM studies database which is established and maintained by the NYISO for the NYSRC. Appropriate adjustments in that database were made to fit the assumptions of this study.

The reliability analysis was done for the year 2011 using Multi-Area Reliability Simulation (MARS) software. The original assumptions in the IRM study database and the appropriate changes in assumptions for this analysis are presented in the table below.

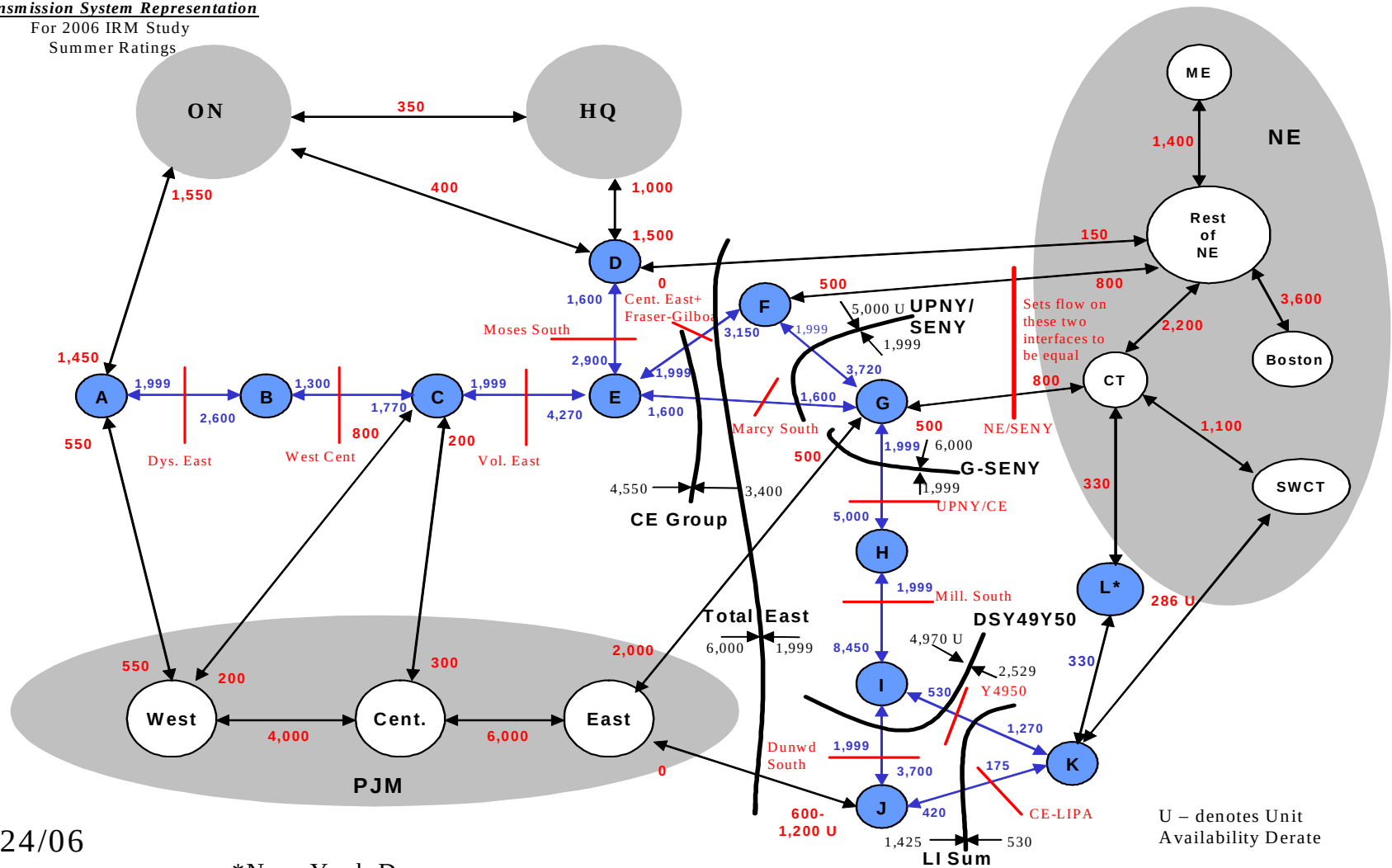
Table 3.3.1 – Reliability Assumptions

BASE CASE ASSUMPTION	2006 IRM REPORT	2011 IPFS RA ANALYSIS
NYCA existing Capacity	All Capacity in the NYCA per the 2005 Gold Book Table III-2.	All Capacity in the NYCA per the 2005 Gold Book plus units currently in service.
NYCA Unit Ratings	Based on 2005 Gold Book	No Change
Planned Capacity	IRM study see Page 28	Per the 2011 ATBA case
Unit Availability	NERC-GADS 2000-2004	No Change, NERC class average for proposed units.
Unit Maintenance Schedule	Scheduled, adjusted for historic performance	No Change
Neighboring Control Areas – except PJM	As provided by neighboring Control Areas through CP-8	No Change
Neighboring Control area – PJM	Used model developed for 2005 Report.	No Change
Load Model	2002 NYCA shape	No Change
Peak Load Forecast	Based on final 2006 ICAP load forecast	Based on forecast in 2006 Gold Book
Load Model Uncertainty	Includes updated load growth uncertainty model	No Change
External ICAP	Grandfathered plus expected external contracts to total 3,085 MW	No Change
Emergency Operating Procedures(excluding SCR/EDRP below)	785 MW load relief	No Change
Special Case Resources/Emergency Demand Response Program	1,016+ 210 MW respectively	No Change
Transfer Limits*	As model in 2006 IRM study.	No Change
Inter-control Area reserve sharing priority	As model in 2006 IRM study.	No Change

*See NYCA Transfer limit diagram on the next page

New York Control Area

Transmission System Representation

For 2006 IRM Study
Summer Ratings

1/24/06

*New York Dummy zone

3.3.1 Changes to assumptions from 2006 IRM study

Changes were made in the areas of peak load and capacity. A NYCA 2011 peak load of 35,348 MW was obtained from the 2006 Gold Book. Areas J and K were forecast to be 12,440 MW and 5,936 MW respectively. Changes to capacity from the Gold Book are shown in two pieces below. First is a reproduction of page 28 of the IRM study highlighting the changes from the Gold Book to the IRM study. Following that is a table showing the capacity changes from the IRM study to this analysis.

From the IRM study:

The unit ratings were obtained from the NYISO “2005 Load & Capacity Data” (2005 Gold Book) [15]. The following changes that were announced after the Gold Book was published are modeled in this study:

- **Retirements:**

Waterside 6, 8 & 9	167 MW	Zone J
- **New Units: (Units installed during 2005)**

East River Repowering	288 MW	Zone J
Bethlehem	750 MW	Zone F
- **Planned Units for 2006:** (These units had a signed interconnection agreement by August 1, 2005.)

Poletti Expansion (1/06)	500 MW	Zone J
Flat Rock (12/05)	198MW	Zone E
SCS Astoria (4/06)	500 MW	Zone J
Calpine Bethpage CC (9/05)	79.9MW	Zone K
Pinelawn steam (9/05)	79.9 MW addition	Zone K
Cedars*	200MW	Zone D

* This unit is modeled as a NYCA resource in the IRM study.

The following table shows the changes from the IRM Study to this analysis.

- **2011 ATBA units (not captured in IRM study):**

Neptune HVDC cable	660 MW	Zone K
SCS Energy-Astoria Phase II	500 MW	NYC
NYC Energy-Kent Ave	79.9 MW	NYC
LMA-Lockport II	79.9 MW	Zone A
Calpine-JFK Expansion	45 MW	NYC
Entergy-Indian Point 2 Uprate	90 MW	Zone H
Entergy-Indian Point 3 Uprate	87 MW	Zone H

Besicorp-Empire State Newsprint	603 MW	Zone F
Flat Rock (Maple Ridge Wind) Ph II	123.8 MW	Zone E
Global Winds – Prattsburgh	75 MW	Zone C
Ecogen – Prattsburgh Wind Farm	79 MW	Zone C
Constellation-Ginna Plant Uprate	111.2 MW	Zone B
• <u>2011 ATBA retirements (not captured in IRM study):</u>		
Poletti	885.3 MW	NYC
Russell	238 MW	Zone B
Huntley 65 & 66	166.8 MW	Zone A
Lovett 3&4	242.5 MW	Zone G
Lovett 5	188.5 MW	Zone G

Table 3.3.2 shows how the final capacity numbers used in the model are arrived at.

3.3.2 Methodology

The analysis was conducted by making the above changes to the IRM study base case MARS database.

3.3.3 Results

The results of the analysis showed that with the 2011 peak load forecast, new capacity, and retirements shown, the NYCA LOLE for the year 2011 is 0.056 days/year. This reliability measure indicates the NYCA system, as described here, will be more reliable than the established criteria of 0.100 days/year.

Sensitivity was performed where the rating for the Dunwoodie South interface was reduced from 4,050 MW to 3,700 MW. This sensitivity yielded LOLE results of 0.057 days/year and also indicated a future system more reliable, in terms of resource adequacy, than established criteria

Table 3.3.3 shows the above results.

**Table 3.3.2 – Determination of Capabilities
Used in the 2011 Facilities Study (FS) Resource Adequacy Study**

	<u>NYCA</u>	<u>LI</u>	<u>NYC</u>
Gold Book	37548	5180	8981
Less Fenner	-30		
Gold book adjusted:	37518	5180	8981
East River	288		288
SCS Astoria	500		500
POLETT	500		500
Behlehem	750		
BETHGT	79.9	79.9	
PINEGT	79.9	79.9	
Cross Sound CL	330	330	
Cedars	200		
Flat Rock	198	-	
Gold book + additions:	40443.8	5669.8	10269
Retire Illion	-54.5		
Waterside	-167		-167
SCR's	1016	97	262
Sales	-290		0
Grand Total:	40948.3	5766.8	10364
FS PROJECTS:			
Additions			
Neptune	660	660	
SCS Ast Ph II	500		500
Kent Ave	79.9		79.9
LMA Lockport	79.9		
JFK Expansion	45		45
Indian Pt2 upgd	40.1		
Indian Pt3 upgd	33.8		
Besicorp	603		
Flat Rock Ph II	123.8		
Global Pratts	75		
ECOGEN Pratts	79		
Ginna Uprate	111.2		
Retirements			
Poletti	-885.3		-885.3
Russell	-238		
Huntley 65 & 66	-166.8		
Lovett 5	-188.5		
Lovett 3 & 4	-242.5		
FS TOTAL	41657.9	6426.8	10103.6

Table 3.3.3**2011 IPFS RA Study**

<u>Case</u>		Area J				Area k				NYCA			
		<u>LOLE</u>	<u>Cap</u>	<u>Load</u>	<u>%cap</u>	<u>LOLE</u>	<u>Cap</u>	<u>Load</u>	<u>%cap</u>	<u>LOLE</u>	<u>Cap</u>	<u>Load</u>	<u>RM*</u>
0	2006 IRM Tech Study Base case**	0.002	10364	11630	89.1%	0.002	5767	5348	107.8%	0.003	40948	33295	22.99%
1	With 2011 ATBA updates (no load added)	0.050	10104	12440	81.2%	0.011	6427	5936	108.3%	0.056	41659	35349	17.85%
The following sensivity cases starts from case 1 above.													
2	Change Dunwoodie interface rating to 3,700 MW	0.052	10104	12440	81.2%	0.011	6427	5936	108.3%	0.057	41659	35349	17.85%

*This is the reserve margin (the capacity to peak load ratio above 100%).

** As found loads and capacities

Rev 01/25/07

Date 1/25/2007 0:25

4 Short Circuit Assessment

From the previous sections in this report, it has been concluded that the Baseline System does not need any system upgrades to meet the Thermal, Voltage and Stability criteria. Nor does it need any generic generation to satisfy Resource Reliability requirements. Thus, the Baseline System meets the Applicable Reliability Requirements and was used as a starting point for the Short Circuit Assessment. It should be noted that the Baseline System represents 2011 peak load conditions and includes all Class 2001, Class 2002 and Catch-up Class 2003-2005 projects that accepted their cost allocation. The Baseline System also includes necessary transmission and distribution system upgrades provided by the respective TOs to support 2011 load. The Baseline System does not include the Class 2006 projects that are subject to cost allocation. These projects were added later to create a separate case that was used to determine their impacts.

The short circuit assessment required several steps to be completed. These steps are described below.

4.1 *Statewide Short Circuit Case*

NYISO staff uses the up to date statewide short circuit case, referred to as “as found system” case or “as found” case as a starting point for this short circuit study. Two new short circuit cases were created from this “as found” case to reflect 2011 summer peak load conditions and to satisfy other Attachment S requirements. The first case, called the ATBA case, required the following changes in the “as found” case:

- Added all Class 2001, Class 2002, and Catch-up Class 2003-2005 projects that accepted their cost allocation (see list in Table E-1, page ii).
- Added all SUFs associated with Class 2001 projects, including Phase shifter at Astoria and bus-tie reactor at Corona.
- Added transmission and distribution system upgrades supplied by NY TOs to support 2011 load.
- Removed NYPA Poletti, NRG Huntley units 65 and 66, Russell station, and Mirant Lovett units 3, 4 and 5 that were all scheduled for retirement prior to summer 2011.
- Updated neighboring system representation (PJM, ISO-NE and IESO) with their latest available planning model reflecting 2011 load.

The second case, called the ATRA case, required the following changes:

- All of the above changes that were made to create the ATBA case
- Added Class 2006 projects along with all system modifications that go with these projects, such as new substations, changes in existing substation configurations, and etc.

- Removed Bergen units from the PJM system representation.

4.2 Data Collection

NYISO staff requested and received up to date information on the ATBA and ATRA base case representations including Class 2001, Class 2002, Catch-up Class 2003-2005, and Class 2006 projects from the TOs and Project Developers. Where no new data was supplied, it was assumed that no significant change has occurred since the data was last supplied to NYISO. A similar data request was made to PJM, ISO-NE and IESO staff. The latest planning model representing 2011 load was received from each of these neighbors.

The updated NYISO statewide base cases were emailed to all interested TOs and Project Developers, and separately to IPFS working group for their review and comments. After incorporating all the comments received, the base cases were considered satisfactory by the working group for the purpose of this study.

4.3 Methodology

The “NYISO Guideline for Fault Current Assessment”, which was approved by the Operating Committee on March 12, 2003 [16], was used to set up the parameters in the short circuit representations and generate the initial fault current levels on a consistent, statewide basis. Key assumptions used under this methodology are as follows:

- a. All generating units are in service
- b. All transmission lines and transformers are in service
- c. All series elements (series reactors, series capacitors) are in service except those that are normally out of service
- d. Ignore load
- e. Ignore Shunts (shunt capacitors, shunt reactors, line charging, etc)
- f. Do not ignore delta-wye transformer phase shift
- g. Do not ignore tap positions of fixed tap transformers
- h. All generator internal voltages are set at 1.0 PU and no phase displacement due to load (i.e., use Flat Gen voltage profile, which is also called as the network solution voltage profile)
- i. Apply the following faults:
 - Three line to Ground
 - Double line to ground
 - Single line to ground

Note that all above key assumptions are used by TOs, except the assumption “h”, which NYSEG/RG&E uses the Flat Bus voltage profile with a pre-fault voltage of 1.05 PU at all buses to calculate fault currents in their system.

NYISO staff used their methodology to determine the fault currents at key buses throughout the NYCA. The highest of the three types of faults at each of the selected

buses was compared against the respective lowest circuit breaker rating at that bus to determine whether the fault duty exceeds the circuit breaker rating.

In many situations, a high substation bus fault does not automatically mean that each circuit breaker rated lower than the substation bus fault will be overdutied. Only an Individual Breaker Analysis (IBA) can provide true fault current a particular breaker will see. Con Edison has provided IBA methodology that was used by NYISO for Con Edison system and similarly, NYSEG/RG&E has provided their IBA methodology.⁶ Other TOs did not have any specific IBA methodology; hence, NYISO staff used the standard, conservative methodology in which the breaker in question is the last breaker opened to clear the fault regardless of the voltage level.

4.4 ATBA

The ATBA case as described under Section 4.1 was reviewed by New York TOs, Project Developers and IPFS working group members (includes all NY TOs and Project Developers). Numerous comments and updates were received throughout the process and the case went through several revisions before it was finalized.

NYISO staff used the finalized base case to complete the ATBA study. About 207 substations that represent all key areas of the NYCA system were selected from across the entire NYCA system for this short circuit evaluation. The substations' fault current magnitudes when a three phase to ground, a double line to ground, and a single line to ground fault are applied at each of the substations evaluated are showed in Table 4.4.1. This table also includes the lowest circuit breaker rating at each of these substations for comparison with the substations' fault currents.

Of 207 substations that were selected to monitor, 25 substations that are highlighted in Table 4.4.1 have the fault current exceeded their lowest circuit breaker rating; hence, the IBA was performed for these flagged substations and the results of IBA are showed in Table 4.4.2.

As indicated in Tables 4.4.1 and 4.4.2, of 25 flagged substations, 17 substations have no overdutied breakers and 8 substations have 22 overdutied breakers. Of 22 overdutied breakers, 3 overdutied breakers (e.g., Greenwood 138 BT, Dunkirk 115 R232-Tie, and Lockport 115 R233-Tie) were already identified in previous Class Year studies, Con Edison has replaced the identified overdutied breaker, and National Grid has plan to replace their overdutied breakers. The remaining 19 overdutied breakers will be subjected to cost allocation.

Note that in addition to 22 overdutied breakers identified above, 43 other breakers identified by NYSEG/RG&E are also overdutied. Details are described in the following Section 4.6.

⁶ NYSEG/RG&E uses the ASPEN Breaker Rating Module™, which follows ANSI/IEEE standards, to rate their breakers and perform the IBA.

It's also noted that the ATBA identified four overdutied circuit-breakers at the Con Edison Astoria West bus that had not been identified as overdutied in previous Class Years. This was due to the fact that certain Astoria generating units (Astoria units 3, 4 and 5) are capable of operating on either the Astoria East or Astoria West bus, and the Class 2006 ATBA and ATRA modeled a different configuration of these units than was used in previous Class Year studies. Operationally, the configuration of the Astoria units is determined on a day-to-day basis, largely dictated by expected power flow conditions. However, the potential for overdutied breakers at Astoria West has been recognized by NYISO and Con Edison in short-term operational analyses, and operational protocols can and will be used as necessary to avoid overdutying these breakers.

Con Edison is studying several alternatives for relief of the 4 overdutied breakers identified at Astoria West 138kV to ensure continued compliance with Applicable Reliability Requirements, and reliably meet the load growth and changes in projected load patterns. Some of the alternatives under consideration may not require the same circuit breaker upgrades as proposed by the NYISO, and may also eliminate the need to replace these breakers. If these alternative plans are adopted, the plans and any required circuit breaker upgrades will be included in future ATBA analysis.

Note that a comparison of the ATRA vs. ATBA results shows that the Class 2006 projects have negligible affect on fault current at Astoria West, and, therefore, the situation at Astoria does not affect the cost allocation of SUFs to Class 2006 projects.

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Table 4.4.1 - Class 2006 ATBA Short Circuit Study (Study Year 2011)
Fault duties on key buses in NYCA (1)

	Lowest Bkr / Fuse Rating (kA)	3 L-G (kA)	2 L-G (kA)	1 L-G (kA)		Lowest Bkr / Fuse Rating (kA)	3 L-G (kA)	2 L-G (kA)	1 L-G (kA)
Substation 345 kV					Substation 138 kV				
ALPS	40	18.2	17.4	14.0	AST-EAST-E	63 (3)	41.2	44.3	45.0
ATHENS	50	33.4	32.4	29.6	AST-EAST-W	63 (3)	41.6	44.9	45.9
BUCHAN N	63	28.4	27.8	26.1	AST-WEST-N	45 (4)	40.0	44.3	46.1
BUCHAN S	40	37.9	37.1	34.3	AST-WEST-S	45 (4)	40.0	44.3	46.1
CLAY	41.8	34.2	33.5	28.5	BARRETT	57.84	46.7	47.8	47.7
COOPERS CRN	30.3	15.4	14.2	10.5	BRKHAVEN	35.44	23.4	22.7	19.4
DEWITT	40	20.1	19.2	15.9	BUCHANAN	40	15.6	15.0	13.8
DUNWOODIE	63	49.6	49.0	41.8	C.ISLIP	38.88	28.6	27.0	20.7
E FISHKILL	50	39.0	37.3	29.4	CANAL	63	12.5	14.2	14.9
EDIC	41.8	32.7	31.7	27.9	CARLE PL	63	41.0	39.7	32.9
EGC PAR	58.6	25.0	24.9	21.4	CORONA NORTH	63	38.4	43.3	38.6
FARRAGUT	63	45.9	47.1	45.5	CORONA SOUTH	63	38.0	42.6	38.1
FR KILLS	40	22.9	23.8	23.6	DUN NO	40	32.3	32.3	29.0
FRASER	29.1	17.3	16.4	13.7	DUN SO	40	30.1	30.4	29.0
GILBOA 345	40	22.5	22.7	22.3	E 13 ST	63	43.1	44.2	44.2
GOETHL N	40	22.3	23.1	23.2	E 179 ST	63	46.6	48.5	44.2
GOETHL S	63	22.2	23.3	23.6	E.G.C.	80	66.9	72.4	72.5
GOW N	63	18.6	18.9	17.3	ELWOOD 1	57.79	35.9	37.4	35.4
GOW S	40	18.6	19.0	17.3	ELWOOD 2	57.79	35.7	37.2	34.4
HMP HRBR	63	31.2	31.3	26.8	FOXHLS 2	40	33.1	33.6	26.8
HURLEY AVE.	40	17.0	16.2	12.3	FR KILLS	40	35.6	36.0	34.5
INDEPENDENCE	50	37.3	39.1	39.6	FREEPORT	63	31.9	32.3	32.0
LADENTOWN	63	37.6	37.3	33.6	GLNWD GT	57.79	43.7	43.1	39.3
LAFAYETTE	40	18.6	17.7	14.0	GLNWD NO	63	46.1	45.9	42.7
LEEDS	38.8	34.1	33.1	30.1	GLNWD SO	63	45.6	45.3	42.0
MARCY 345	63	31.8	30.9	26.6	GREENLWN	63	29.0	26.9	20.9
MIDDLETN TAP	63	16.7	15.5	12.3	GREENWOOD	45 (5)	48.1	51.5	51.2
MILLWOOD	63	43.8	42.2	33.7	HAUPAGUE	63	21.6	20.9	17.3
MOTT HAVEN	63	40.8	41.8	37.5	HG 6	63	37.6	42.5	40.7
NIAGARA 345	63	31.5	33.2	33.7	HOLBROOK	52.22	43.7	43.6	41.6
NSCOT 99B	41.8	31.3	29.8	24.0	HOLTS GT	57.79	41.5	41.1	39.1
OAKDALE 345	30.5	12.4	12.0	10.9	HOLTS GT2	63	41.6	41.2	39.1
OSWEGO	38.8	30.1	32.1	32.9	HUDSON E	40	39.0	38.8	36.1
PLEASANT VAL	63	40.6	38.5	28.3	JAMAICA	40 (2)	47.6	49.4	45.2
POLETTI	63	36.0	36.7	31.8	LCST GRV	63	38.6	36.5	25.6
RAINEY	63	44.8	45.8	43.7	LKE SCSS	57.79	42.7	42.4	38.0
RAMAPO	40 (2)	40.7	40.4	36.3	MILLR PL	63	14.2	13.4	10.6
REYNOLDS	?	15.5	15.3	14.2	MILLWOOD	20	19.0	18.6	17.2
ROCK TAVERN	38	26.1	24.9	20.0	NEWBRID	80	65.5	71.2	73.5
ROSETON	38.8	34.4	33.5	30.4	NRTHPRT1	57.79 (2)	56.6	58.0	58.6
S080 345kV	40	16.8	16.5	15.4	NRTHPRT2	57.79	40.6	42.7	43.9
S122	40	16.8	16.4	14.8	OAKWOOD	57.79	28.1	26.7	19.5
SCRIBA	50	42.1	47.1	48.7	PILGRIM	56.56 (2)	56.4	57.9	50.1
SHM CRK	63	31.7	31.5	24.3	PT JEFF	63	28.2	30.6	31.6
SHORE RD	63	27.5	27.2	21.2	QUEENSBG	45	39.1	44.5	43.1
SPRN BRK	63	50.8	50.2	42.9	RIVERHD	36.21	15.6	17.1	17.8
STOLLE ROAD	28.8	3.9	3.7	3.3	RNKNKOMA	57.79	35.8	34.2	28.8
VOLNEY	38.8	36.9	37.6	32.6	ROSLYN	57.79	30.2	28.6	22.0
W 49 ST	63	40.9	41.8	38.0	RULND RD	63	46.1	44.8	42.1
W.HAV345	40	27.4	27.2	25.7	SHM CRK	63	44.2	45.2	39.6
WATERCURE345	29.5	7.7	7.4	6.5	SHORE RD	57.79	49.9	50.2	47.0
WAWAYANDA	40	15.9	14.7	11.3	SHOREHAM	52.22	23.4	23.6	23.3
230 kV					SILLSROAD	63	N/A	N/A	N/A
ADIRONDACK	37.7	10.1	9.7	8.0	SYOSSET	38.88	33.5	32.1	25.6
AVOCA GAS	?	5.6	5.2	4.2	VERNON E	40	34.8	36.3	36.9
D-SAWYER77	40	26.3	25.9	24.4	VERNON W	40	31.3	32.3	32.4
DUNKIRK	37.7	14.9	15.0	15.1	VLY STRM	57.79	51.0	52.9	50.7
GARDENVILLE1	37.5	22.1	21.4	19.5	WADNGRV1	56.39	22.4	22.6	22.4
GOETHALS	?	43.2	42.6	41.1	WHAV	42	25.0	24.5	23.3
HILLSIDE 230	25	11.5	11.6	11.5	WILDWOOD	56.39	21.3	21.4	20.9

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Substation	Lowest Bkr / Fuse Rating (kA)	3 L-G (kA)	2 L-G (kA)	1 L-G (kA)	Substation	Lowest Bkr / Fuse Rating (kA)	3 L-G (kA)	2 L-G (kA)	1 L-G (kA)
230 kV					115 kV				
HUNTLEY	37.7	27.1	26.8	25.7	VALLEY	40	8.1	7.5	6.3
MEYER	35.8	6.3	5.9	5.2	WHITMAN	10.5	8.0	7.1	4.7
NIAGRA E 230	63	50.9	55.5	56.8	WILLIS 115	50	10.1	9.3	7.6
NIAGRA W 230	63	50.9	55.5	56.8	WOOD ST.	40	14.1	14.4	14.2
OAKDALE	21.3	6.4	6.3	6.1	69 kV				
PACKARD	50	43.5	43.6	40.4	BRKHAVEN	26.1 (2)	25.2	25.8	26.2
PORTER	25.1	19.6	19.9	19.8	E RIVER	50 (2)	45.4	49.4	51.6
ROBINSON RD.	32.1	14.5	13.7	11.5	E.G.C.1	29.3 (4)	45.3	43.2	33.3
ROTTERDAM77H	25.1	12.5	12.1	11.6	GRUMMANB	31.5 (2)	32.5	30.4	27.1
ROTTERDAM99H	25.1	12.6	12.1	11.6	HOLBRK1	39.5 (2)	42.4	39.5	34.3
S RIPLEY	40	9.0	8.6	6.9	LEVTTOWN	26.1(2)	35.5	33.4	28.5
SHELDON	?	N/A	N/A	N/A	LKE SCSS	40 (4)	43.8	42.8	40.7
ST LAWRN 230	37.7	28.4	32.3	33.3	RULAND	39.9 (4)	47.6	43.2	28.3
STOLLE ROAD	28.8	13.0	12.2	9.8	TBG 5E	31.5 (2)	32.4	30.4	27.1
WATERCURE230	27.5	11.5	11.6	11.4	TBG 5EU-1	31.5 (2)	32.4	30.4	27.1
WILLIS 230	40	9.8	9.5	8.0	TBG 5EU-2	31.5 (2)	32.4	30.4	27.1
115 kV					46 kV				
ALBANY STM1	63	19.0	18.7	18.3	E NORWICH 1	5.5	5.1	4.5	1.5
BALLSTON1	40	6.7	6.3	5.4	34.5 kV				
BATH #4	20	4.9	4.5	3.2	ATLANTA	6	4.9	4.5	4.0
BENNETT	6.6	4.9	4.6	4.1	BENNETT	7.3	6.0	6.5	6.5
BETHLEHEM	50.2	19.5	18.9	16.9	BIG TREE	21	14.1	14.6	14.6
COOPERS CRN4	20.6	12.1	13.8	14.3	BORDER CITY4	14.8	13.5	11.8	4.1
CORTLAND N.	25.1	6.2	5.5	3.7	EELPOT RD	22	6.1	6.5	6.4
DUNKIRK M1	12.6 (5)	18.9	20.3	20.7	FERNDALE	7.65	7.6	6.7	2.1
E WALDEN	17.39 (2)	21.5	20.4	16.6	FOURTEENTH	14.8	14.2	12.5	3.7
FENNER WINDP	40	7.1	6.3	4.1	GREEN ST	7.7 (2)	9.2	8.5	6.6
FLAT ST.	22.7	8.5	7.9	6.3	N GARDENVLLE	21	17.9	15.8	3.9
FRASER	40	11.0	11.6	12.0	NAPLES	6	3.5	3.3	2.7
FUERA BUSH33	40	30.7	29.7	28.4	SENECA FALLS	7.7 (2)	8.5	7.7	5.0
GARDENVILLE1	43	36.9	36.9	36.3	WALLACE	7.4	2.2	2.1	1.3
GOUDEY #8	23.9 (2)	22.9	24.0	24.5	WAYLAND	8.3	4.3	3.8	2.3
GREENBUSH	50.2	39.2	38.4	34.6	Notes:				
GREENIDGE #4	16.2	12.6	11.7	9.5	(1) Case modeled Astoria 3, 4 connected to Astoria West and				
GROOMS RD	40	9.3	8.5	6.5	Astoria 5 connected to Astoria East.				
HARRISON	35.9	25.3	24.4	23.3	(2) IBA indicates that no circuit breaker is overdutied.				
HARRISONIPP1	35.9	23.4	22.5	21.3	(3) The bus fault current will be higher if case modeled Astoria				
HARRISONIPP2	35.9	23.2	22.4	21.2	3 connected to Astoria West and Astoria 4, 5 connected to				
HICKLING #8	7.2 (2)	6.7	7.3	7.4	Astoria East, but will not be higher than the lowest breaker rating.				
HILLSIDE #8	16.2 (4)	16.1	17.2	17.8	(4) Identified circuit breaker(s) at this substation need to be				
INGHAMS99G	25.1	10.0	9.7	8.8	replaced.				
LOCKPORT E	25.1 (5)	30.1	27.8	21.5	(5) TO plans to replace the overdutied breaker(s).				
LONG LANE	40	17.4	16.8	15.4					
MECO	40	5.9	5.6	4.8					
MENANDS 77G	40	32.3	31.0	27.2					
MEYER	18.9	10.2	10.1	9.8					
MONTOUR #8	15	12.4	11.5	9.5					
NGARDENV(NY)	43	36.9	36.9	36.3					
N TROY77G	25.1	17.7	17.0	14.9					
NSCOT33	50	48.7	49.1	48.7					
OAKDALE	40	26.2	28.5	29.2					
ONEIDA	25.1	15.2	14.0	11.2					
PLATTSBURGH	25	14.6	15.1	15.3					
PORTER	43	38.9	41.0	42.1					
REYNOLDS RD	40	39.3	38.4	35.1					
ROBINSON RD.	38	19.9	19.7	19.0					
ROCK TAVERN	30.1	27.2	26.4	24.4					
ROTT99G	40	32.3	32.9	32.9					
S. PERRY	7.1	6.6	6.9	6.8					
SALISBURY 3	?	8.4	7.9	7.0					
SPIER77G	40	17.0	16.9	16.8					
STOLLE ROAD	25	14.7	13.9	12.3					

Table 4.4.2 - ATBA Individual Breaker Analysis

Owner	Station	kV	Breaker	Breaker Rating (kA)	Breaker Duty					
					3LG (kA)	% of Rating	2LG (kA)	% of Rating	1LG (kA)	% of Rating
CH	E WALDEN	115	D-722	17.4	17.18	98.8%	16.29	93.7%	13.66	78.5%
			DW-1071	17.4	14.81	85.2%	14.01	80.5%	11.53	66.3%
			EM-642	20.9	17.99	86.1%	16.96	81.2%	13.48	64.5%
			W-644	20.9	13.58	65.0%	12.78	61.1%	10.18	48.7%
CONED	RAMAPO	345	T-1500-W72-2	40	36.66	91.6%	36.45	91.1%	32.97	82.4%
			T-77-94-2	40	35.65	89.1%	35.47	88.7%	32.12	80.3%
	AST-WEST	138	1N	45	39.97	88.8%	44.31	98.5%	46.03	102.3%
			1S	45	39.92	88.7%	44.28	98.4%	45.94	102.1%
			2N	45	39.97	88.8%	44.31	98.5%	46.03	102.3%
			8N	45	39.97	88.8%	44.31	98.5%	46.03	102.3%
			9N	45	38.20	84.9%	41.86	93.0%	43.40	96.4%
			G1N	45	38.42	85.4%	42.05	93.5%	43.60	96.9%
			G2N	45	38.42	85.4%	42.05	93.5%	43.60	96.9%
			G4WN	45	38.20	84.9%	41.86	93.0%	43.40	96.4%
	GRENWOOD	138	BT	45	This breaker will be replaced by a 63 kA breaker					
	JAMAICA	138	8	40	38.10	95.2%	39.20	98.0%	35.45	88.6%
			13	40	33.60	84.0%	33.88	84.7%	30.30	75.8%
			14	40	34.32	85.8%	34.47	86.2%	30.68	76.7%
			1	45	40.46	89.9%	41.95	93.2%	38.37	85.3%
			3	45	41.62	92.5%	42.90	95.3%	39.31	87.4%
			4	45	39.94	88.7%	41.83	92.9%	37.80	84.0%
			6	45	41.74	92.8%	43.03	95.6%	39.42	87.6%
			7	45	37.23	82.7%	38.16	84.8%	32.37	71.9%
	E RIVER	69	53	50	42.71	85.4%	46.73	93.5%	48.84	97.7%
			63	50	42.71	85.4%	46.73	93.5%	48.84	97.7%
			73	50	42.71	85.4%	46.73	93.5%	48.84	97.7%
			83	50	42.71	85.4%	46.73	93.5%	48.84	97.7%
			GEN6	50	39.55	79.1%	42.69	85.4%	44.49	89.0%
NGRID	DUNKIRK M1	115	R232-Tie	12.6	This breaker will be replaced by a 5000 MVA (25 kA) breaker					
	LOCKPORT E	115	R244-Tie	25.1	This breaker will be replaced by a 10000 MVA (50 kA) breaker					
NYSEG	GOUDEY #8	115	GOU B8-02	23.9	22.62	94.6%	23.45	98.1%	23.83	99.7%
	HICKLING #8	115	HIC B1-22	7.2	6.66	92.5%	6.43	89.4%	5.91	82.0%
	HILLSIDE #8	115	HIL 96012	16.2	16.08	99.2%	16.67	102.9%	17.35	107.1%
	GREEN ST	34.5	GRE 50492	7.7	7.23	93.9%	6.60	85.8%	4.92	63.9%
			GRE 50592	7.7	4.92	63.9%	4.35	56.5%	3.00	39.0%
	SENECA FALLS	34.5	SEN 56172	7.7	7.16	93.0%	6.47	84.0%	4.57	59.3%
			SEN 56272	7.7	7.31	95.0%	6.60	85.7%	4.62	60.0%
			SEN 56772	7.7	3.85	50.0%	3.37	43.8%	1.26	16.3%

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Owner	Station	kV	Breaker	Breaker Rating (kA)	Breaker Duty					
					3LG (kA)	% of Rating	2LG (kA)	% of Rating	1LG (kA)	% of Rating
LIPA	NRTHPRT1	138	1310	57.8/57.8/60.5	50.64	87.6%	50.47	87.3%	48.55	80.2%
			1320	57.8/57.8/60.5	50.62	87.6%	50.48	87.3%	48.50	80.2%
			1450	57.8/57.8/60.5	46.93	81.2%	48.52	83.9%	49.21	81.3%
	PILGRIM	138	1410	56.56/56.56/60.5	53.83	95.2%	55.20	97.6%	47.40	78.4%
	BRKHAVEN	69	6020	26.1/26.1/27.2	25.15	96.4%	25.81	98.9%	26.23	96.4%
			6080	26.1/26.1/27.2	24.02	92.0%	24.84	95.2%	25.30	93.0%
			6500	27.3/27.3/28.6	18.69	68.5%	18.48	67.7%	17.80	62.2%
	E.G.C.1	69	6010	40	42.22	105.5%	40.46	101.1%	31.71	79.3%
			6030	40	42.43	106.1%	40.61	101.5%	31.73	79.3%
			6050	40	40.78	102.0%	38.77	96.9%	29.29	73.2%
			6060	29.3	39.74	135.6%	38.47	131.3%	30.40	103.7%
			6100	40	42.92	107.3%	41.26	103.1%	32.06	80.1%
			6110	40	35.39	88.5%	32.31	80.8%	20.00	50.0%
			6270	40	45.32	113.3%	43.16	107.9%	33.40	83.5%
			6310	43	37.21	86.5%	35.86	83.4%	30.10	70.0%
			6610	40	45.28	113.2%	43.12	107.8%	33.30	83.3%
			6620	41.8	45.32	108.4%	43.16	103.3%	33.40	79.9%
	GRUMMANB	69	610	31.5	28.72	91.2%	27.21	86.4%	24.81	78.8%
			620	31.5	9.72	30.8%	10.29	32.7%	10.24	32.5%
	HOLBRK1	69	6500	43	30.82	71.7%	28.75	66.9%	25.54	59.4%
			6610	39.9/39.9/41.8	34.75	87.1%	32.89	82.4%	30.57	73.1%
			6620	39.9/39.9/41.8	38.95	97.6%	36.51	91.5%	32.75	78.3%
			6700	43	42.43	98.7%	39.50	91.9%	34.31	79.8%
			6900	43	42.43	98.7%	39.50	91.9%	34.31	79.8%
	LEVTTOWN	69	620	26.1/26.1/27.2	26.07	99.9%	24.35	93.3%	20.90	76.8%
			650	27.3/27.3/28.6	20.08	73.6%	19.14	70.1%	17.16	60.0%
	LKE SCSS	69	620	43	35.65	82.9%	34.38	79.9%	34.05	79.2%
			630	40	38.64	96.6%	38.12	95.3%	36.45	91.1%
			640	40	43.78	109.5%	42.83	107.1%	40.69	101.7%
			650	43	43.78	101.8%	42.83	99.6%	40.69	94.6%
			660	43	37.86	88.0%	35.47	82.5%	31.12	72.4%
			670	43	38.00	88.4%	35.58	82.7%	31.19	72.5%
			6500	43	43.78	101.8%	42.83	99.6%	40.69	94.6%
			6600	43	43.78	101.8%	42.83	99.6%	40.69	94.6%
	RULAND	69	6020	39.9/39.9/41.8	40.94	102.6%	36.60	91.7%	19.79	47.3%
			6500	40	30.82	77.0%	27.61	69.0%	15.63	39.1%
			6610	39.9/39.9/41.8	40.68	102.0%	37.24	93.3%	26.45	63.3%
	TBG 5E	69	6630	31.5	31.39	99.7%	29.23	92.8%	25.02	79.4%
			6640	31.5	31.12	98.8%	29.07	92.3%	24.94	79.2%
	TBG 5EU-1	69	6670	31.5	31.38	99.6%	29.22	92.8%	25.00	79.4%
	TBG 5EU-2	69	6660	31.5	31.18	99.0%	29.06	92.2%	24.93	79.2%

4.5 ATRA

The statewide ATRA case is also discussed under Section 4.1. It is essentially the same as the ATBA case, except that it includes all Class 2006 projects and system modifications that go with those projects. The purpose of this case is to identify what incremental impacts these projects bring to the system, and how much it will cost to mitigate those impacts. Class 2006 projects are listed in Table E-1 on page ii. These 20 projects have a total capacity of about 3,896 megawatts.

The ATRA study used the same methodology and monitored the same 207 substations as the ATBA study did. Table 4.5.1 shows the substations' fault current magnitudes when a three phase, double line to ground, and a single line to ground fault are applied at each of the substations. This table also includes the lowest circuit breaker rating at each of these substations for comparison with the substations' fault currents.

Of 207 substations that were selected to monitor, 26 substations that are highlighted in Table 4.5.1 have the fault current exceeded their lowest circuit breaker rating; hence, the IBA was performed for these flagged substations and the results of IBA are showed in Table 4.5.2.

As indicated in Tables 4.5.1 and 4.5.2, of 26 flagged substations, 11 substations have no overdutied breakers and 15 substations have 30 overdutied breakers. Of 30 overdutied breakers, (1) 3 overdutied breakers (e.g., Greenwood 115 BT, Dunkirk 115 R232-Tie, and Lockport 115 R233-Tie) were already identified in previous Class Year studies and the respective TOs (e.g., Con Edison and National Grid) have plans to replace these overdutied breakers, (2) 19 overdutied breakers were the same breakers that were found overdutied in the ATBA case, and (3) the remaining 8 overdutied breakers were caused by the Class 2006 projects.

Note that in addition to 30 overdutied breakers identified above, 44 other breakers identified by NYSEG/RG&E are also overdutied. Details are described in the following Section 4.6.

Table 4.5.3 shows a comparison of ATBA and ATRA fault current results, placed side by side. Only the highest fault currents at each substation are compared. The Delta column shows the incremental impact due to the Class 2006 projects taken all together. This column gives a good indication of the sensitivity of various substations to fault currents coming from the Class 2006 projects. The Farragut 345 kV substation in New York, for example, will see about 8,700 Amperes, whereas the New Scotland 345 kV substation in Albany area will see about 100 Amperes as a result of the Class 2006 projects.

Table 4.5.4 shows the impact of each individual project on some selected substations including those where circuit breakers need to be replaced. A full table is shown in Appendix F.

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Table 4.5.1 - Class 2006 ATRA Short Circuit Study (2011)
Fault duties on key buses in NYCA (1)

Substation	Lowest Bkr / Fuse Rating (kA)	3 L-G (kA)	2 L-G (kA)	1 L-G (kA)	Substation	Lowest Bkr / Fuse Rating (kA)	3 L-G (kA)	2 L-G (kA)	1 L-G (kA)
345 kV					138 kV				
ALPS	40	18.2	17.4	14.0	AST-EAST-E	63 (3)	41.2	44.3	45.1
ATHENS	50	33.5	32.5	29.6	AST-EAST-W	63 (3)	41.7	45.0	46.0
BUCHAN N	63	28.5	27.9	26.1	AST-WEST-N	45 (4)	40.1	44.4	46.1
BUCHAN S	40	38.1	37.3	34.4	AST-WEST-S	45 (4)	40.1	44.4	46.1
CLAY	41.8	34.3	33.6	28.6	BARRETT	57.84	47.2	48.3	48.1
COOPERS CRN	30.3	15.4	14.2	10.6	BRKHAVEN	35.44	26.7	26.2	23.0
DEWITT	40	20.1	19.2	15.9	BUCHANAN	40	15.6	15.0	13.8
DUNWOODIE	63	50.7	50.2	42.9	C.ISLIP	38.88	30.1	28.3	21.4
E FISHKILL	50	39.1	37.4	29.5	CANAL	63	13.0	14.8	15.4
EDIC	41.8	33.0	32.1	28.3	CARLE PL	63	41.7	40.3	33.2
EGC PAR	58.6	25.3	25.2	21.6	CORONA NORTH	63	38.5	43.3	38.6
FARRAGUT	63	53.7	55.8	54.5	CORONA SOUTH	63	38.0	42.7	38.1
FR KILLS	40	24.2	25.4	25.4	DUN NO	40	32.4	32.4	29.2
FRASER	29.1	17.3	16.5	13.8	DUN SO	40	30.2	30.5	29.1
GILBOA 345	40	22.5	22.7	22.3	E 13 ST	63	45.1	46.3	46.5
GOETHL N	40	25.2	27.1	27.7	E 179 ST	63	46.8	48.7	44.4
GOETHL S	63	25.2	27.1	27.7	E.G.C.	80	69.0	74.5	74.3
GOW N	63	20.2	20.7	18.9	ELWOOD 1	57.79	36.3	37.8	35.7
GOW S	40	20.2	20.8	18.7	ELWOOD 2	57.79	36.1	37.6	34.7
HMP HRBR	63	31.7	31.7	27.2	FOXHLS 2	40	34.7	35.4	28.1
HURLEY AVE.	40	17.0	16.2	12.3	FR KILLS	40 (4)	38.8	40.2	40.0
INDEPENDENCE	50	37.3	39.2	39.6	FREEPORT	63	32.4	32.8	32.3
LADENTOWN	63	37.7	37.4	33.7	GLNWD GT	57.79	44.1	43.4	39.5
LAFAYETTE	40	18.6	17.7	14.0	GLNWD NO	63	46.5	46.3	43.0
LEEDS	38.8	34.2	33.1	30.2	GLNWD SO	63	46.0	45.7	42.3
MARCY 345	63	32.1	31.2	26.9	GREENLWN	63	29.3	27.1	21.0
MIDDLETN TAP	63	16.7	15.5	12.3	GRENWOOD	45 (5)	50.1	53.5	52.9
MILLWOOD	63	44.3	42.6	34.0	HAUPAGUE	63	22.2	21.4	17.6
MOTT HAVEN	63	46.7	48.1	43.2	HG 6	63	37.7	42.6	40.7
NIAGARA 345	63	31.6	33.2	33.7	HOLBROOK	52.22	48.5	48.4	46.0
NSCOT 99B	41.8	31.3	29.9	24.0	HOLTS GT	57.79	46.0	45.6	43.1
OAKDALE 345	30.5	12.4	12.0	10.9	HOLTS GT2	63	46.1	45.7	43.1
OSWEGO	38.8	30.2	32.2	32.9	HUDSON E	40	39.2	39.1	36.4
PLEASANT VAL	63	40.8	38.6	28.4	JAMAICA	40 (2)	47.9	49.7	45.4
POLETTI	63	40.6	41.6	35.8	LCST GRV	63	39.3	37.2	25.8
RAINEY	63	52.3	54.0	52.2	LKE SCSS	57.79	43.1	42.7	38.1
RAMAPO	40 (2)	40.7	40.4	36.2	MILLR PL	63	14.7	13.9	10.8
REYNOLDS	?	15.5	15.3	14.2	MILLWOOD	20	19.0	18.6	17.2
ROCK TAVERN	38	26.1	24.9	20.0	NEWBRID	80	68.1	73.6	75.8
ROSETON	38.8	34.5	33.6	30.4	NRTHPRT1	57.79 (2)	58.3	59.5	59.9
S080 345kV	40	16.9	16.5	15.4	NRTHPRT2	57.79	41.1	43.1	44.3
S122	40	16.9	16.4	14.8	OAKWOOD	57.79	28.4	27.0	19.6
SCRIBA	50	42.2	47.2	48.7	PILGRIM	56.56 (4)	58.6	59.9	51.4
SHM CRK	63	32.2	31.9	24.6	PT JEFF	63	29.1	31.3	32.4
SHORE RD	63	27.8	27.5	21.4	QUEENSBG	45	39.1	44.5	43.1
SPRN BRK	63	51.9	51.4	44.0	RIVERHD	36.21	16.5	18.0	18.7
STOLLE ROAD	28.8	3.9	3.7	3.3	RNKNKOMA	57.79	38.7	36.9	30.5
VOLNEY	38.8	37.0	37.7	32.6	ROSLYN	57.79	30.4	28.9	22.1
W 49 ST	63	47.6	49.0	45.3	RULND RD	63	51.1	50.4	49.0
W.HAV345	40	27.4	27.2	25.7	SHM CRK	63	44.4	45.4	39.8
WATERCURE345	29.5	7.7	7.4	6.6	SHORE RD	57.79	50.4	50.6	47.3
WAWAYANDA	40	15.9	14.7	11.3	SHOREHAM	52.22	24.8	25.0	24.4
230 kV					SILLSROAD	63	33.1	33.3	32.3
ADIRONDACK	37.7	10.2	9.8	8.1	SYOSSET	38.88	33.9	32.6	25.8
AVOCA GAS	?	6.1	6.1	6.0	VERNON E	40	35.1	36.5	37.1
D-SAWYER77	40	26.4	26.0	24.5	VERNON W	40	31.5	32.5	32.6
DUNKIRK	37.7	14.9	15.0	15.1	VLV STRM	57.79	51.7	53.6	51.2
GARDENVILLE1	37.5	22.6	21.9	20.1	WADNGRV1	56.39	23.7	23.8	23.4
GOETHALS	?	43.7	43.5	42.4	WHAV	42	25.0	24.5	23.3
HILLSIDE 230	25	11.7	11.8	11.7	WILDWOOD	56.39	22.5	22.5	21.8

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	Lowest Bkr / Fuse Rating (kA)	3 L-G (kA)	2 L-G (kA)	1 L-G (kA)		Lowest Bkr / Fuse Rating (kA)	3 L-G (kA)	2 L-G (kA)	1 L-G (kA)
Substation					Substation				
230 kV					115 kV				
HUNTLEY	37.7	27.3	27.0	25.8	VALLEY	40	8.4	7.9	7.1
MEYER	35.8	6.8	6.7	6.6	WHITMAN	10.5	8.3	7.6	5.7
NIAGRA E 230	63	51.1	55.7	57.0	WILLIS 115	50	10.9	10.0	7.9
NIAGRA W 230	63	51.1	55.7	57.0	WOOD ST.	40	14.1	14.4	14.2
OAKDALE	21.3	6.4	6.4	6.1	69 kV				
PACKARD	50	43.7	43.7	40.5	BRKHAVEN	26.1 (4)	26.4	26.9	27.1
PORTER	25.1	20.2	20.7	20.7	E RIVER	50 (2)	45.8	49.9	52.1
ROBINSON RD.	32.1	14.7	13.9	11.6	E.G.C.1	29.3 (4)	45.5	43.4	33.4
ROTTERDAM77H	25.1	12.8	12.5	12.0	GRUMMANB	31.5 (2)	32.7	30.7	27.2
ROTTERDAM99H	25.1	12.8	12.5	12.0	HOLBRK1	39.5 (4)	43.6	40.5	34.8
S RIPLEY	40	9.0	8.6	6.9	LEVTTOWN	26.1 (4)	35.8	33.6	28.6
SHELDON	?	9.1	9.0	8.8	LKE SCSS	40 (4)	43.9	43.0	40.8
ST LAWRN 230	37.7	29.5	33.3	34.4	RULAND	39.9 (4)	48.7	44.2	28.5
STOLLE ROAD	28.8	13.7	13.1	11.4	TBG 5E	31.5 (4)	32.7	30.6	27.2
WATERCURE230	27.5	11.6	11.7	11.6	TBG 5EU-1	31.5 (4)	32.7	30.6	27.2
WILLIS 230	40	12.2	11.5	9.2	TBG 5EU-2	31.5 (2)	32.7	30.6	27.2
115 kV					46 kV				
ALBANY STM1	63	19.0	18.7	18.3	E NORWICH 1	5.5	5.4	4.7	1.5
BALLSTON1	40	6.7	6.4	5.4	34.5 kV				
BATH #4	20	4.9	4.5	3.2	ATLANTA	6	4.9	4.5	4.0
BENNETT	6.6	5.0	4.7	4.1	BENNETT	7.3	6.0	6.5	6.5
BETHLEHEM	50.2	19.5	18.9	16.9	BIG TREE	21	14.1	14.6	14.6
COOPERS CRN4	20.6	12.1	13.8	14.3	BORDER CITY4	14.8	13.5	11.8	4.1
CORTLAND N.	25.1	6.2	5.6	3.8	EELPOT RD	22	6.1	6.5	6.4
DUNKIRK M1	12.6 (5)	18.9	20.3	20.8	FERNDALE	7.65	7.6	6.6	2.1
E WALDEN	17.39 (2)	21.5	20.4	16.6	FOURTEENTH	14.8	14.2	12.5	3.7
FENNER WINDP	40	7.3	6.6	4.7	GREEN ST	7.7 (2)	9.2	8.5	6.6
FLAT ST.	22.7	8.5	7.9	6.3	N GARDENVLLE	21	18.0	15.8	3.9
FRASER	40	11.0	11.7	12.0	NAPLES	6	3.5	3.3	2.7
FUERA BUSH33	40	30.7	29.7	28.4	SENECA FALLS	7.7 (2)	8.5	7.7	5.0
GARDENVILLE1	43	37.6	37.5	36.9	WALLACE	7.4	2.2	2.1	1.3
GOUDEY #8	23.9 (2)	23.0	24.0	24.5	WAYLAND	8.3	4.3	3.8	2.3
GREENBUSH	50.2	39.3	38.4	34.6					
GREENIDGE #4	16.2	12.6	11.7	9.5	Notes:				
GROOMS RD	40	9.3	8.5	6.5	(1) Case modeled Astoria 3, 4 connected to Astoria West and				
HARRISON	35.9	25.4	24.5	23.3	Astoria 5 connected to Astoria East.				
HARRISONIPP1	35.9	23.4	22.5	21.3	(2) IBA indicates that no circuit breaker is overdutied.				
HARRISONIPP2	35.9	23.2	22.4	21.3	(3) The bus fault current will be higher if case modeled Astoria				
HICKLING #8	7.2 (2)	6.7	7.3	7.4	3 connected to Astoria West and Astoria 4, 5 connected to				
HILLSIDE #8	16.2 (4)	16.3	17.4	17.9	Astoria East, but will not be higher than the lowest breaker rating.				
INGHAMS99G	25.1	10.5	10.4	10.1	(4) Identified circuit breaker(s) at this substation need to be				
LOCKPORT E	25.1 (5)	30.2	27.8	21.6	replaced.				
LONG LANE	40	17.4	16.8	15.4	(5) TO plans to replace the overdutied breaker(s).				
MECO	40	6.0	5.7	4.8					
MENANDS 77G	40	32.3	31.0	27.2					
MEYER	18.9	10.6	10.8	10.8					
MONTOUR #8	15	12.5	11.6	9.6					
NGARDENV(NY)	43	37.6	37.5	36.9					
N TROY77G	25.1	17.7	17.0	14.9					
NSCOT33	50	48.8	49.2	48.8					
OAKDALE	40	26.3	28.6	29.3					
ONEIDA	25.1	15.6	14.5	12.1					
PLATTSBURGH	25	16.3	16.7	16.7					
PORTER	43	39.6	41.8	42.9					
REYNOLDS RD	40	39.4	38.4	35.1					
ROBINSON RD.	38	19.9	19.7	19.0					
ROCK TAVERN	30.1	27.2	26.4	24.4					
ROTT99G	40	32.6	33.4	33.5					
S. PERRY	7.1	6.7	6.9	6.8					
SALISBURY 3	?	9.1	9.8	10.0					
SPIER77G	40	17.0	17.0	16.8					
STOLLE ROAD	25	14.8	14.0	12.4					

Table 4.5.2 – ATRA Individual Breaker Analysis

Owner	Station	kV	Breaker	Breaker Rating (kA)	Breaker Duty					
					3LG (kA)	% of Rating	2LG (kA)	% of Rating	1LG (kA)	% of Rating
CH	E WALDEN	115	D-722	17.4	17.19	98.8%	16.30	93.7%	13.67	78.6%
			DW-1071	17.4	14.82	85.2%	14.02	80.6%	11.54	66.3%
			EM-642	20.9	18.01	86.2%	16.97	81.2%	13.48	64.5%
			W-644	20.9	13.58	65.0%	12.78	61.2%	10.19	48.7%
CONED	RAMAPO	345	T-1500-W72-2	40	36.91	92.3%	36.67	91.7%	33.12	82.8%
			T-77-94-2	40	35.89	89.7%	35.69	89.2%	32.27	80.7%
	AST-WEST	138	1N	45	40.03	89.0%	44.37	98.6%	46.09	102.4%
			1S	45	39.99	88.9%	44.34	98.5%	46.00	102.2%
			2N	45	40.03	89.0%	44.37	98.6%	46.09	102.4%
			8N	45	40.03	89.0%	44.37	98.6%	46.09	102.4%
			9N	45	38.27	85.0%	42.18	93.7%	43.82	97.4%
			G1N	45	38.49	85.5%	42.12	93.6%	43.66	97.0%
			G2N	45	38.49	85.5%	42.12	93.6%	43.66	97.0%
			G4WN	45	38.27	85.0%	41.92	93.2%	43.46	96.6%
	FR KILLS	138	4	40	32.85	82.1%	34.13	85.3%	34.64	86.6%
			5	40	32.66	81.7%	33.88	84.7%	34.35	85.9%
			BT1-4	40	38.91	97.3%	40.37	100.9%	40.13	100.3%
			TA1	40	35.08	87.7%	36.42	91.0%	36.08	90.2%
	GRENWOOD	138	BT	45	This breaker will be replaced by a 63 kA breaker					
	JAMAICA	138	8	40	38.29	95.7%	39.38	98.4%	35.58	88.9%
			13	40	33.78	84.4%	34.05	85.1%	30.42	76.1%
			14	40	34.49	86.2%	34.62	86.6%	30.79	77.0%
			1	45	40.70	90.4%	42.19	93.8%	38.56	85.7%
			3	45	41.95	93.2%	43.21	96.0%	39.55	87.9%
			4	45	40.16	89.2%	42.05	93.4%	37.97	84.4%
			6	45	42.07	93.5%	43.34	96.3%	39.66	88.1%
			7	45	37.41	83.1%	38.32	85.2%	32.48	72.2%
	E RIVER	69	53	50	43.14	86.3%	47.18	94.4%	49.31	98.6%
			63	50	43.14	86.3%	47.18	94.4%	49.31	98.6%
			73	50	43.14	86.3%	47.18	94.4%	49.31	98.6%
			83	50	43.14	86.3%	47.18	94.4%	49.31	98.6%
			GEN6	50	40.07	80.1%	43.23	86.5%	45.07	90.1%
NGRID	DUNKIRK M1	115	R232-Tie	12.6	This breaker will be replaced by a 5000 MVA (25 kA) breaker					
	LOCKPORT E	115	R244-Tie	25.1	This breaker will be replaced by a 10000 MVA (50 kA) breaker					
NYSEG	GOUDEY #8	115	GOU B8-02	23.9	22.70	95.0%	23.51	98.4%	23.88	99.9%
	HICKLING #8	115	HIC B1-22	7.2	6.68	92.8%	6.45	89.6%	5.92	82.2%
	HILLSIDE #8	115	HIL 96012	16.2	16.21	100.1%	17.09	105.5%	17.49	108.0%
	GREEN ST	34.5	GRE 50492	7.7	7.23	93.9%	6.60	85.7%	4.92	63.9%
			GRE 50592	7.7	4.92	63.9%	4.35	56.5%	3.00	39.0%
SENECA FALLS		34.5	SEN 56172	7.7	7.16	93.0%	6.47	84.0%	4.57	59.3%
			SEN 56272	7.7	7.31	95.0%	6.60	85.7%	4.62	60.0%
			SEN 56772	7.7	3.85	49.9%	3.37	43.8%	1.26	16.3%

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Owner	Station	kV	Breaker	Breaker Rating (kA)	Breaker Duty					
					3LG (kA)	% of Rating	2LG (kA)	% of Rating	1LG (kA)	% of Rating
LIPA	NRTHPRT1	138	1310	57.8/57.8/60.5	52.33	90.5%	51.99	89.9%	49.65	82.1%
			1320	57.8/57.8/60.5	52.32	90.5%	52.00	90.0%	49.59	82.0%
			1450	57.8/57.8/60.5	49.15	85.0%	50.48	87.3%	50.88	84.1%
	PILGRIM	138	1410	56.56/56.56/60.5	55.64	98.4%	56.88	100.6%	48.44	80.1%
	BRKHAVEN	69	6020	26.1/26.1/27.2	26.38	101.1%	26.88	103.0%	27.09	99.6%
			6080	26.1/26.1/27.2	25.16	96.4%	25.83	99.0%	26.12	96.0%
			6500	27.3/27.3/28.6	19.28	70.6%	18.95	69.4%	18.14	63.4%
	E.G.C.1	69	6010	40	42.43	106.1%	40.64	101.6%	31.79	79.5%
			6030	40	42.64	106.6%	40.80	102.0%	31.81	79.5%
			6050	40	40.98	102.5%	38.94	97.4%	29.36	73.4%
			6060	29.3	39.92	136.3%	38.64	131.9%	30.47	104.0%
			6100	40	43.13	107.8%	41.44	103.6%	32.14	80.3%
			6110	40	35.55	88.9%	30.62	76.6%	20.03	50.1%
			6270	40	45.55	113.9%	43.35	108.4%	33.40	83.5%
			6310	43	37.33	86.8%	35.96	83.6%	30.15	70.1%
			6610	40	45.52	113.8%	43.33	108.3%	33.39	83.5%
			6620	41.8	45.55	109.0%	43.35	103.7%	33.40	79.9%
	GRUMMANB	69	610	31.5	28.92	91.8%	27.38	86.9%	24.91	79.1%
			620	31.5	9.72	30.9%	10.30	32.7%	10.25	32.5%
	HOLBRK1	69	6500	43	31.31	72.8%	29.16	67.8%	25.75	59.9%
			6610	39.9/39.9/41.8	35.32	88.5%	33.37	83.6%	30.85	73.8%
			6620	39.9/39.9/41.8	39.82	99.8%	37.24	93.3%	33.14	79.3%
			6700	43	43.58	101.4%	40.47	94.1%	34.79	80.9%
			6900	43	43.58	101.4%	40.47	94.1%	34.79	80.9%
	LEVTTOWN	69	620	26.1/26.1/27.2	26.20	100.4%	24.46	93.7%	20.96	80.3%
			650	27.3/27.3/28.6	20.14	73.8%	19.19	70.3%	17.18	60.1%
	LKE SCSS	69	620	43	35.78	83.2%	35.54	82.6%	34.13	79.4%
			630	40	38.78	97.0%	38.25	95.6%	36.54	91.3%
			640	40	43.95	109.9%	42.97	107.4%	40.79	102.0%
			650	43	43.95	102.2%	42.97	99.9%	40.79	94.8%
			660	43	38.00	88.4%	35.59	82.8%	31.19	72.5%
			670	43	38.71	90.0%	36.39	84.6%	32.17	74.8%
			6500	43	43.95	102.2%	42.97	99.9%	40.79	94.8%
			6600	43	43.95	102.2%	42.97	99.9%	40.79	94.8%
	RULAND	69	6020	39.9/39.9/41.8	41.89	105.0%	37.44	93.8%	19.93	47.7%
			6500	40	31.27	78.2%	28.01	70.0%	15.70	39.2%
			6610	39.9/39.9/41.8	41.25	103.4%	37.74	94.6%	26.60	63.6%
	TBG 5E	69	6630	31.5	31.65	100.5%	29.45	93.5%	25.12	79.8%
			6640	31.5	31.45	99.8%	29.28	93.0%	25.05	79.5%
	TBG 5EU-1	69	6670	31.5	31.64	100.5%	29.44	93.5%	25.11	79.7%
	TBG 5EU-2	69	6660	31.5	31.44	99.8%	29.27	92.9%	25.04	79.5%

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Table 4.5.3 - Comparison of Class 2006 ATBA and ATRA Results (1)

Substation	Max Fault Current				Substation	Max Fault Current			
	Lowest Bkr / Fuse Rating (kA)	ATBA (kA)	ATRA (kA)	Delta (kA)		Lowest Bkr / Fuse Rating (kA)	ATBA (kA)	ATRA (kA)	Delta (kA)
345 kV					138 kV				
ALPS	40	18.2	18.2	0.0	AST-EAST-E	63 (3)	45.0	45.1	0.0
ATHENS	50	33.4	33.5	0.1	AST-EAST-W	63 (3)	45.9	46.0	0.0
BUCHAN N	63	28.4	28.5	0.1	AST-WEST-N	45 (4)	46.1	46.1	0.1
BUCHAN S	40	37.9	38.1	0.2	AST-WEST-S	45 (4)	46.1	46.1	0.1
CLAY	41.8	34.2	34.3	0.1	BARRETT	57.84	47.8	48.3	0.5
COOPERS CRN	30.3	15.4	15.4	0.0	BRKHAVEN	35.44	23.4	26.7	3.3
DEWITT	40	20.1	20.1	0.0	BUCHANAN	40	15.6	15.6	0.0
DUNWOODIE	63	49.6	50.7	1.1	C.ISLIP	38.88	28.6	30.1	1.5
E FISHKILL	50	39.0	39.1	0.2	CANAL	63	14.9	15.4	0.5
EDIC	41.8	32.7	33.0	0.3	CARLE PL	63	41.0	41.7	0.7
EGC PAR	58.6	25.0	25.3	0.3	CORONA NORTH	63	43.3	43.3	0.0
FARRAGUT	63	47.1	55.8	8.7	CORONA SOUTH	63	42.6	42.7	0.0
FR KILLS	40	23.8	25.4	1.7	DUN NO	40	32.3	32.4	0.1
FRASER	29.1	17.3	17.3	0.0	DUN SO	40	30.4	30.5	0.1
GILBOA 345	40	22.7	22.7	0.0	E 13 ST	63	44.2	46.5	2.3
GOETHL N	40	23.2	27.7	4.5	E 179 ST	63	48.5	48.7	0.2
GOETHL S	63	23.6	27.7	4.1	E.G.C.	80	72.5	74.5	2.0
GOW N	63	18.9	20.7	1.9	ELWOOD 1	57.79	37.4	37.8	0.4
GOW S	40	19.0	20.8	1.8	ELWOOD 2	57.79	37.2	37.6	0.4
HMP HRBR	63	31.3	31.7	0.4	FOXHLS 2	40	33.6	35.4	1.7
HURLEY AVE.	40	17.0	17.0	0.0	FR KILLS	40 (4)	36.0	40.2	4.2
INDEPENDENCE	50	39.6	39.6	0.0	FREEPORT	63	32.3	32.8	0.4
LADENTOWN	63	37.6	37.7	0.1	GLNWD GT	57.79	43.7	44.1	0.4
LAFAYETTE	40	18.6	18.6	0.0	GLNWD NO	63	46.1	46.5	0.4
LEEDS	38.8	34.1	34.2	0.1	GLNWD SO	63	45.6	46.0	0.4
MARCY 345	63	31.8	32.1	0.3	GREENLWN	63	29.0	29.3	0.3
MIDDLETN TAP	63	16.7	16.7	0.0	GRENWOOD	45 (5)	51.5	53.5	2.0
MILLWOOD	63	43.8	44.3	0.5	HAUPAGUE	63	21.6	22.2	0.6
MOTT HAVEN	63	41.8	48.1	6.4	HG 6	63	42.5	42.6	0.1
NIAGARA 345	63	33.7	33.7	0.1	HOLBROOK	52.22	43.7	48.5	4.8
NSCOT 99B	41.8	31.3	31.3	0.1	HOLTS GT	57.79	41.5	46.0	4.5
OAKDALE 345	30.5	12.4	12.4	0.0	HOLTS GT2	63	41.6	46.1	4.5
OSWEGO	38.8	32.9	32.9	0.0	HUDSON E	40	39.0	39.2	0.3
PLEASANT VAL	63	40.6	40.8	0.2	JAMAICA	40 (2)	49.4	49.7	0.3
POLETTI	63	36.7	41.6	4.9	LCST GRV	63	38.6	39.3	0.8
RAINEY	63	45.8	54.0	8.2	LKE SCSS	57.79	42.7	43.1	0.3
RAMAPO	40 (2)	40.7	40.7	0.0	MILLR PL	63	14.2	14.7	0.5
REYNOLDS	?	15.5	15.5	0.0	MILLWOOD	20	19.0	19.0	0.0
ROCK TAVERN	38	26.1	26.1	0.0	NEWBRID	80	73.5	75.8	2.3
ROSETON	38.8	34.4	34.5	0.1	NRTHPRT1	57.79 (2)	58.6	59.9	1.2
S080 345kV	40	16.8	16.9	0.0	NRTHPRT2	57.79	43.9	44.3	0.4
S122	40	16.8	16.9	0.0	OAKWOOD	57.79	28.1	28.4	0.3
SCRIBA	50	48.7	48.7	0.1	PILGRIM	56.56 (4)	57.9	59.9	2.0
SHM CRK	63	31.7	32.2	0.4	PT JEFF	63	31.6	32.4	0.7
SHORE RD	63	27.5	27.8	0.3	QUEENSBG	45	44.5	44.5	0.1
SPRN BRK	63	50.8	51.9	1.1	RIVERHD	36.21	17.8	18.7	0.8
STOLLE ROAD	28.8	3.9	3.9	0.0	RNKNKOMA	57.79	35.8	38.7	2.9
VOLNEY	38.8	37.6	37.7	0.1	ROSLYN	57.79	30.2	30.4	0.3
W 49 ST	63	41.8	49.0	7.2	RULND RD	63	46.1	51.1	4.9
W.HAV345	40	27.4	27.4	0.0	SHM CRK	63	45.2	45.4	0.2
WATERCURE345	29.5	7.7	7.7	0.0	SHORE RD	57.79	50.2	50.6	0.4
WAWAYANDA	40	15.9	15.9	0.0	SHOREHAM	52.22	23.6	25.0	1.4
230 kV					SILLSROAD	63	N/A	33.3	N/A
ADIRONDACK	37.7	10.1	10.2	0.1	SYOSSET	38.88	33.5	33.9	0.5
AVOCA GAS	?	5.6	6.1	0.5	VERNON E	40	36.9	37.1	0.2
D-SAWYER77	40	26.3	26.4	0.2	VERNON W	40	32.4	32.6	0.2
DUNKIRK	37.7	15.1	15.1	0.0	VLV STRM	57.79	52.9	53.6	0.7
GARDENVILLE1	37.5	22.1	22.6	0.5	WADNGRV1	56.39	22.6	23.8	1.2
GOETHALS	?	43.2	43.7	0.5	WHAV	42	25.0	25.0	0.0
HILLSIDE 230	25	11.6	11.8	0.2	WILDWOOD	56.39	21.4	22.5	1.1

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Max Fault Current					Max Fault Current				
Substation	Lowest Bkr / Fuse Rating (kA)	ATBA (kA)	ATRA (kA)	Delta (kA)	Substation	Lowest Bkr / Fuse Rating (kA)	ATBA (kA)	ATRA (kA)	Delta (kA)
230 kV					115 kV				
HUNTLEY	37.7	27.1	27.3	0.2	VALLEY	40	8.1	8.4	0.3
MEYER	35.8	6.3	6.8	0.5	WHITMAN	10.5	8.0	8.3	0.3
NIAGRA E 230	63	56.8	57.0	0.2	WILLIS 115	50	10.1	10.9	0.8
NIAGRA W 230	63	56.8	57.0	0.2	WOOD ST.	40	14.4	14.4	0.0
OAKDALE	21.3	6.4	6.4	0.0	69 kV				
PACKARD	50	43.6	43.7	0.2	BRKHAVEN	26.1 (4)	26.2	27.1	0.9
PORTER	25.1	19.9	20.7	0.8	E RIVER	50 (2)	51.6	52.1	0.5
ROBINSON RD.	32.1	14.5	14.7	0.1	E.G.C.1	29.3 (4)	45.3	45.5	0.2
ROTTERDAM77H	25.1	12.5	12.8	0.2	GRUMMANB	31.5 (2)	32.5	32.7	0.3
ROTTERDAM99H	25.1	12.6	12.8	0.2	HOLBRK1	39.5 (4)	42.4	43.6	1.2
S RIPLEY	40	9.0	9.0	0.0	LEVTTOWN	26.1 (4)	35.5	35.8	0.3
SHELDON	?	N/A	9.1	N/A	LKE SCSS	40 (4)	43.8	43.9	0.2
ST LAWRN 230	37.7	33.3	34.4	1.1	RULAND	39.9 (4)	47.6	48.7	1.1
STOLLE ROAD	28.8	13.0	13.7	0.7	TBG 5E	31.5 (4)	32.4	32.7	0.3
WATERCURE230	27.5	11.6	11.7	0.2	TBG 5EU-1	31.5 (4)	32.4	32.7	0.3
WILLIS 230	40	9.8	12.2	2.4	TBG 5EU-2	31.5 (2)	32.4	32.7	0.3
115 kV					46 kV				
ALBANY STM1	63	19.0	19.0	0.0	E NORWICH 1	5.5	5.1	5.4	0.2
BALLSTON1	40	6.7	6.7	0.0	34.5 kV				
BATH #4	20	4.9	4.9	0.0	ATLANTA	6	4.9	4.9	0.0
BENNETT	6.6	4.9	5.0	0.0	BENNETT	7.3	6.5	6.5	0.0
BETHLEHEM	50.2	19.5	19.5	0.0	BIG TREE	21	14.6	14.6	0.0
COOPERS CRN4	20.6	14.3	14.3	0.0	BORDER CITY4	14.8	13.5	13.5	0.0
CORTLAND N.	25.1	6.2	6.2	0.0	EELPOT RD	22	6.5	6.5	0.0
DUNKIRK M1	12.6 (5)	20.7	20.8	0.0	FERNDALE	7.65	7.6	7.6	0.0
E WALDEN	17.39 (2)	21.5	21.5	0.0	FOURTEENTH	14.8	14.2	14.2	0.0
FENNER WINDP	40	7.1	7.3	0.2	GREEN ST	7.7 (2)	9.2	9.2	0.0
FLAT ST.	22.7	8.5	8.5	0.0	N GARDENVLLE	21	17.9	18.0	0.0
FRASER	40	12.0	12.0	0.0	NAPLES	6	3.5	3.5	0.0
FUERA BUSH33	40	30.7	30.7	0.0	SENECA FALLS	7.7 (2)	8.5	8.5	0.0
GARDENVILLE1	43	36.9	37.6	0.7	WALLACE	7.4	2.2	2.2	0.0
GOUDEY #8	23.9 (2)	24.5	24.5	0.1	WAYLAND	8.3	4.3	4.3	0.0
GREENBUSH	50.2	39.2	39.3	0.0	Notes:				
GREENIDGE #4	16.2	12.6	12.6	0.0	(1) Case modeled Astoria 3, 4 connected to Astoria West and Astoria 5 connected to Astoria East.				
GROOMS RD	40	9.3	9.3	0.0	(2) IBA indicates that no circuit breaker is overdutied.				
HARRISON	35.9	25.3	25.4	0.0	(3) The bus fault current will be higher if case modeled Astoria 3 connected to Astoria West and Astoria 4, 5 connected to Astoria East, but will not be higher than the lowest breaker rating.				
HARRISONIPP1	35.9	23.4	23.4	0.0	(4) Identified circuit breaker(s) at this substation need to be replaced.				
HARRISONIPP2	35.9	23.2	23.2	0.0	(5) TO plans to replace the overdutied breaker(s).				
HICKLING #8	7.2 (2)	7.4	7.4	0.0					
HILLSIDE #8	16.2 (4)	17.8	17.9	0.1					
INGHAMS99G	25.1	10.0	10.5	0.5					
LOCKPORT E	25.1 (5)	30.1	30.2	0.1					
LONG LANE	40	17.4	17.4	0.0					
MECO	40	5.9	6.0	0.0					
MENANDS 77G	40	32.3	32.3	0.0					
MEYER	18.9	10.2	10.8	0.6					
MONTOUR #8	15	12.4	12.5	0.1					
NGARDENV(NY)	43	36.9	37.6	0.7					
N TROY77G	25.1	17.7	17.7	0.0					
NSCOT33	50	49.1	49.2	0.1					
OAKDALE	40	29.2	29.3	0.1					
ONEIDA	25.1	15.2	15.6	0.4					
PLATTSBURGH	25	15.3	16.7	1.4					
PORTER	43	42.1	42.9	0.9					
REYNOLDS RD	40	39.3	39.4	0.0					
ROBINSON RD.	38	19.9	19.9	0.0					
ROCK TAVERN	30.1	27.2	27.2	0.0					
ROTT99G	40	32.9	33.5	0.6					
S. PERRY	7.1	6.9	6.9	0.0					
SALISBURY 3	?	8.4	10.0	1.6					
SPIER77G	40	17.0	17.0	0.0					
STOLLE ROAD	25	14.7	14.8	0.1					

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Table 4.5.4 - Fault Contribution Impact of Projects

Take one project out of service at a time to measure its fault contribution impact on previous Class Year SUFs Headroom or ATRA Class 2006 substations with overdutied breaker(s)

Substation	Highest Bus Fault (A) (1)	Fault Type	Spagnoli	Fortistar VP	Fortistar VAN	PSEG	TransGas	Caithness	Linden VFT	Munnsville	Canandaigua	High Sheldon
Class 2001 Headroom												
<u>345 kV</u>												
FARRAGUT	55799	2LG	14	29	29	3138	5656	1	98	0	0	0
RAINEY	53998	2LG	13	26	26	2503	5796	1	68	0	0	0
SPRN BRK	51937	3LG	91	4	4	395	665	11	-4	0	0	0
<u>138 kV</u>												
AST-EAST-E	45079	1LG	6	0	0	15	25	0	-4	0	0	0
AST-EAST-W	45956	1LG	6	0	0	16	26	0	-4	0	0	0
AST-WEST	46145	1LG	0	6	6	21	44	0	-9	0	0	0
CORONA (N)	43296	2LG	7	0	0	17	28	0	-4	0	0	0
CORONA (S)	42682	2LG	7	0	0	16	28	0	-4	0	0	0
E 13 ST	46485	1LG	2	6	6	843	1361	0	-1	0	0	0
GREWOOD	53460	2LG	0	828	828	51	100	0	111	0	0	0
QUEENSBG	44520	2LG	0	7	7	22	44	0	-9	0	0	0
SHM CRK	45430	2LG	13	1	1	69	122	1	-6	0	0	0
<u>69kV</u>												
E RIVER	52107	1LG	0	2	2	196	335	0	-17	0	0	0
Catch-up Class Year (2003-2005) Headroom												
<u>138 kV</u>												
E.G.C	74474	2LG	1683	1	1	58	98	208	-6	0	0	0
<u>69 kV</u>												
RULAND	48660	3LG	904	0	0	7	11	124	-2	0	0	0
ATRA Class 2006 Substations with Overdutied Breaker(s)												
<u>138 kV</u>												
FR KILLS	40214	2LG	0	1992	1992	33	62	0	111	0	0	0
PILGRIM	59914	2LG	1162	0	0	8	13	818	-2	0	0	0
<u>69 kV</u>												
BRKHAVEN	27085	1LG	16	0	0	1	1	838	0	0	0	0
HOLBRK1	43581	3LG	85	0	0	1	2	1053	-1	0	0	0
LEVTTOWN	35794	3LG	274	0	0	4	7	35	-2	0	0	0
TBG 5E	32670	3LG	217	0	0	4	6	28	-2	0	0	0
TBG 5EU-1	32659	3LG	217	0	0	4	6	28	-2	0	0	0

Notes:

(1) All projects are in service, ATRA case.

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Substation	Highest Bus Fault (A) (1)	Fault Type	West Hill	Fairfield	Marble River II	Marble River I	Noble Clinton	Bliss I	Altona	Ellenburg I	Gilboa	Jordanville
Class 2001 Headroom												
<u>345 kV</u>												
FARRAGUT	55799	2LG	0	0	0	0	0	0	0	0	0	0
RAINEY	53998	2LG	0	0	0	0	0	0	0	0	0	0
SPRN BRK	51937	3LG	0	1	1	0	0	0	0	0	0	2
<u>138 kV</u>												
AST-EAST-E	45079	1LG	0	0	0	0	0	0	0	0	0	0
AST-EAST-W	45956	1LG	0	0	0	0	0	0	0	0	0	0
AST-WEST	46145	1LG	0	0	0	0	0	0	0	0	0	0
CORONA (N)	43296	2LG	0	0	0	0	0	0	0	0	0	0
CORONA (S)	42682	2LG	0	0	0	0	0	0	0	0	0	0
E 13 ST	46485	1LG	0	0	0	0	0	0	0	0	0	0
GREWOOD	53460	2LG	0	0	0	0	0	0	0	0	0	0
QUEENSBG	44520	2LG	0	0	0	0	0	0	0	0	0	0
SHM CRK	45430	2LG	0	0	0	0	0	0	0	0	0	0
<u>69kV</u>												
E RIVER	52107	1LG	0	0	0	0	0	0	0	0	0	0
Catch-up Class Year (2003-2005) Headroom												
<u>138 kV</u>												
E.G.C	74474	2LG	0	0	0	0	0	0	0	0	0	0
<u>69 kV</u>												
RULAND	48660	3LG	0	0	0	0	0	0	0	0	0	0
ATRA Class 2006 Substations with Overdutied Breaker(s)												
<u>138 kV</u>												
FR KILLS	40214	2LG	0	0	0	0	0	0	0	0	0	0
PILGRIM	59914	2LG	0	0	0	0	0	0	0	0	0	0
<u>69 kV</u>												
BRKHAVEN	27085	1LG	0	0	0	0	0	0	0	0	0	0
HOLBRK1	43581	3LG	0	0	0	0	0	0	0	0	0	0
LEVTTOWN	35794	3LG	0	0	0	0	0	0	0	0	0	0
TBG 5E	32670	3LG	0	0	0	0	0	0	0	0	0	0
TBG 5EU-1	32659	3LG	0	0	0	0	0	0	0	0	0	0

Notes:

(1) All projects are in service, ATRA case.

4.6 NYSEG/RG&E ATBA and ATRA Assessment

Note that the NYSEG/RG&E short circuit methodology assumes an operating voltage of 1.05 PU to rate their total current rated circuit breakers. [A high operating voltage assumption could result in a lower circuit breaker interrupting capability than a low operating voltage assumption.] In addition, as indicated in Section 4.3, NYSEG/RG&E short circuit methodology assumes a higher pre-fault voltage than the pre-fault voltage assumed in the “NYISO Guideline for Fault Current Assessment”. [A high pre-fault voltage assumption would result in a higher bus fault current than a low pre-fault voltage assumption.] Furthermore, NYSEG/RG&E short circuit methodology, which follows the ANSI/IEEE standards, takes the E/X multiplier factor into account when they calculate the fault currents. [Taking the E/X multiplier factor into account would result in a higher bus fault current than not taking the E/X multiplier factor into account. This multiplier factor is dependent on the system X/R ratio and breaker contact parting time, and reflects the effect of fault current asymmetry and decay.]

Because of these differences between the NYSEG/RG&E and NYISO methodologies, several additional circuit breakers at various NYSEG/RG&E substations were identified to be overdutied by the NYSEG/RG&E short circuit methodology. These overdutied circuit breakers are listed in Table 4.6.1.

Table 4.6.1 – ATBA/ATRA Assessment using NYSEG/RG&E Rating Methodology

Station	Breaker	ATBA Duty %	ATRA Duty %	Estimated Cost	New Rating (kA)	Comments (1)
GOUDEY #4 115.KV	GOU 95202	130.9	131.2	185K	40	Being Replaced 2007
GOUDEY #4 115.KV	GOU B6-02	126.2	126.6	185K	40	Being Replaced 2007
GOUDEY #4 115.KV	GOU B7-02	117.7	118.1	TBD	TBD	Owned by AES
GOUDEY #4 115.KV	GOU T4-02	108.3	108.6	185K	40	Being Replaced 2007
GOUDEY #4 115.KV	GOU 93902	99.7	100.1	185K	40	Being Replaced 2007
GOUDEY #8 115.KV	GOU 94002	126.2	126.5	185K	40	Being Replaced 2007
GOUDEY #8 115.KV	GOU B5-02	119.0	119.3	185K	40	Being Replaced 2007
GOUDEY #8 115.KV	GOU B8-02	108.6	108.9	TBD	TBD	Owned by AES
HICKLING #4 115.KV	HIC B2-22	107.6	107.9	TBD	TBD	Owned by AES
HILLSIDE #8 115.KV	HIL 96012	121.9	122.9	185K	31.5	Being Replaced 2008 (2)
E NORWICH 1 46.KV	ENO 80962	97.5	99.2	N/A	N/A	
E NORWICH 1 46.KV	ENO 82062	96.4	98.2	N/A	N/A	
EAST AURORA 34.5KV	EAU 55022	107.9	108.0	110K	16	Being Replaced 2008
EAST AURORA 34.5KV	EAU 51822	100.1	100.2	110K	16	Being Replaced 2011
FERNDAL 34.5KV	FER 34942	103.7	103.7	110K	16	Being Replaced 2008
GOUDEY 34.5KV	GOU 6B-02	106.0	106.1	110K	31.5	Being Replaced 2009
GOUDEY 34.5KV	GOU 5B-02	105.9	106.0	110K	31.5	Being Replaced 2009
N GARDENVILLE 34.5KV	GNE 54212	105.6	106.3	110K	31.5	Being Replaced 2009
N GARDENVILLE 34.5KV	GNE 51712	104.1	104.8	110K	31.5	Being Replaced 2009
N GARDENVILLE 34.5KV	GNE 53612	101.8	102.5	110K	31.5	Being Replaced 2010
OAKDALE 34.5KV	OAK 41782	119.5	119.6	110K	31.5	Being Replaced 2008
OAKDALE 34.5KV	OAK 41082	109.4	109.5	110K	31.5	Being Replaced 2008
OAKDALE 34.5KV	OAK B5-82	102.1	102.2	110K	31.5	Being Replaced 2010

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Station	Breaker	ATBA Duty %	ATRA Duty %	Estimated Cost	New Rating (kA)	Comments (1)
OAKDALE 34.5KV	OAK B6-82	102.1	102.2	110K	31.5	Being Replaced 2010
OAKDALE 34.5KV	OAK 40782	101.3	101.4	110K	31.5	Being Replaced 2011
OAKDALE 34.5KV	OAK 40882	101.2	101.3	110K	31.5	Being Replaced 2011
HILLSIDE#4 34.5KV	HIL GB-12	122.2	122.6	110K	25	Being Replaced 2008
LANGNER RD 12.5KV	LAG 43422	102.9	102.9	75K	20	Being Replaced 2009
LANGNER RD 12.5KV	LAG 43522	102.9	102.9	75K	20	Being Replaced 2009
LANGNER RD 12.5KV	LAG 43622	102.9	102.9	75K	20	Being Replaced 2009
LANGNER RD 12.5KV	LAG 43122	101.8	101.8	75K	20	Being Replaced 2011
LANGNER RD 12.5KV	LAG 43022	101.4	101.5	75K	20	Being Replaced 2011
LANGNER RD 12.5KV	LAG 43222	101.4	101.5	75K	20	Being Replaced 2011
LANGNER RD 12.5KV	LAG 43322	100.3	100.4	75K	20	Being Replaced 2011
WEBBS CROSS 12.5KV	WEB 36012	109.8	109.8	75K	12.5	Being Replaced 2008
WENDE 12.5KV	WEN 44222	118.4	118.4	75K	12.5	Being Replaced 2008
WOODS CORNER 8.32KV	WOO 22	106.9	107.5	75K	12.5	Being Replaced 2008
HIGH FALLS 6.6KV	HIG 01-41	119.4	119.6	N/A	N/A	(3)
HIGH FALLS 6.6KV	HIG 02-41	119.4	119.6	N/A	N/A	(3)
HIGH FALLS 6.6KV	HIG 03-41	112.4	112.6	N/A	N/A	(3)
HIGH FALLS 6.6KV	HIG 1B-41	100.9	101.0	N/A	N/A	(3)
HIGH FALLS 6.6KV	HIG 2B-41	100.9	101.0	N/A	N/A	(3)
BIRDSALL ST2 4.8KV	BIR 22	108.7	109.7	75K	20	Being Replaced 2010 (4)
BIRDSALL ST2 4.8KV	BIR 42	108.7	109.7	75K	20	Being Replaced 2010 (4)
BIRDSALL ST2 4.8KV	BIR 72	108.7	109.7	75K	20	Being Replaced 2010 (4)
PIERCE AVE 4.8KV	PIE 12	103.5	103.6	N/A	N/A	(5)
PIERCE AVE 4.8KV	PIE 32	103.2	103.3	N/A	N/A	(5)
SILVER CREEK 4.8KV	SIL 18012	102.2	102.2	75K	20	Being Replaced 2010
SWAN LAKE 4.8KV	SWA 15882	102.4	102.4	N/A	N/A	(5)
WAYLAND 4.8KV	WAY 23112	107.3	107.5	75K	20	Being Replaced 2009

Notes:

- (1) Schedule for replacement may be modified depending on available funds.
- (2) Overduty breaker was also identified by using the NYISO methodology.
- (3) Rating being confirmed in 2007.
- (4) Breaker is still overdutied by 102% even though the intelligent reclosing control scheme that blocks reclosing for high level faults is implemented.
- (5) Breaker is not overdutied since the intelligent reclosing control scheme, which blocks reclosing for high level faults, reduces the fault currents below the breaker rating.

Based on the study results, 44 breakers of various NYSEG/RG&E substations ranging from 4.8 kV to 115 kV were identified to be overdutied in the ATBA. Of 44 overdutied breakers, (1) the rating of 5 breakers is being investigated to confirm if the breakers are overdutied, and (2) NYSEG/RG&E has contacted AES, and asked them to evaluate and respond to the 3 AES-owned breakers that NYSEG/RG&E shows as overdutied.

The study results also indicated that 45 breakers were identified to be overdutied in the ATRA. Of 45 overdutied breakers, 44 overdutied breakers were the same breakers that were found overdutied in the ATBA, and the remaining 1 overdutied breakers was caused by the Class 2006 projects; however, the remaining overdutied breaker at Goudey #4 115 kV substation will be the responsibility of NYSEG/RG&E since none of

Class 2006 projects has the fault current impact on the Goudey #4 115kV substation more than de minimus impact.

4.7 LIPA Transmission Upgrade Planning

The overdutied circuit breakers identified in the ATBA and/or ATRA could be a result of LIPA's plans to upgrade their transmission system to reliably serve their growing load. LIPA is currently evaluating several alternatives to serve their load. Some of the alternatives under consideration may not require the identified circuit breakers to be upgraded.

NYISO noted that re-evaluating of LIPA's transmission plans may affect the SUFs identified in the ATBA and/or ATRA. In the event that the SUFs and their associated costs identified in this report may change as a result of changes in LIPA's transmission plans, any impacts of such changes on cost responsibility for SUFs shall be determined in accordance with Attachment S.

5 System Upgrade Facilities

The Short Circuit Assessment of the ATBA and ATRA cases described in the previous section indicated that several circuit breakers will be overdutied and must be remedied in order for the system to operate reliably. In addition to the SUFs identified in the Short Circuit Assessment, other SUFs identified in the Attachment Facilities studies must also be replaced, upgraded or built in order for Class 2006 projects to reliably interconnect into the system.

The following paragraphs will discuss the SUFs cost allocation.

5.1 SUFs Identified in the ATBA Short Circuit Assessment

Tables 4.4.2 and 4.6.1 identify sixty-five circuit breakers that will see fault duties higher than their rating. Some of these circuit breakers identified in Table 4.4.2 are already in the plans to be replaced by the respective TOs and some identified in Table 4.6.1 are being investigated to confirm if they are actually overdutied. These circuit breakers are not counted in the cost allocation process. For other identified circuit breakers, they need to be replaced with a higher rating breaker. Tables 4.6.1 and 5.1.1 summarize the overdutied circuit breakers along with their estimated replacement cost.

Table 5.1.1 - SUFs needed as a result of ATBA

Station	kV	Breaker	Breaker Rating (kA)	Max Fault (kA)	Fault Type	% of Rating	Replaced Rating (kA)	Estimated Replaced Cost (\$)
AST-WEST	138	1N	45	46.03	1LG	102.3%	(1)	N/A
		1S	45	45.94	1LG	102.1%	(1)	N/A
		2N	45	46.03	1LG	102.3%	(1)	N/A
		8N	45	46.03	1LG	102.3%	(1)	N/A
ConEd Cost:								N/A
E.G.C.1	69	6010	40	42.22	3LG	105.5%	63	\$ 180,000
		6030	40	42.43	3LG	106.1%	63	\$ 180,000
		6050	40	40.78	3LG	102.0%	63	\$ 180,000
		6060	29.3	39.74	3LG	135.6%	63	\$ 180,000
		6100	40	42.92	3LG	107.3%	63	\$ 180,000
		6270	40	45.32	3LG	113.3%	63	\$ 180,000
		6610	40	45.28	3LG	113.2%	63	\$ 180,000
LKE SCSS	69	6620	41.8	45.32	3LG	108.4%	63	\$ 180,000
		640	40	43.78	3LG	109.5%	63	\$ 180,000
		650	43	43.78	3LG	101.8%	63	\$ 180,000
		6500	43	43.78	3LG	101.8%	63	\$ 180,000
RULAND	69	6600	43	43.78	3LG	101.8%	63	\$ 180,000
		6020	39.9	40.94	3LG	102.6%	63	\$ 180,000
		6610	39.9	40.68	3LG	102.0%	63	\$ 180,000
LIPA Cost:								\$ 2,520,000

Notes:

- (1) Con Edison is aware of the overdutied breakers issue and is currently looking at various options to provide a reliable solution; as shown in Table 4.5.3, this does not affect any of the Class 2006 projects.

Table 4.6.2 shows that NYSEG/RG&E cost is \$3,885,000. Table 5.1.1 shows that LIPA cost is \$2,520,000. The total ATBA cost estimate is \$6,405,000. This ATBA cost estimate does not include the cost estimate of replacement of some breakers by Con Edison and AES. In addition, it does not include the cost of replacement of some NYSEG/RG&E potential overdutied breakers.

5.2 *SUFs Identified in the ATRA Short Circuit Assessment*

Tables 4.5.2 and 4.6.1 identify seventy-six circuit breakers that will see fault duties higher than their rating. Of 76 overdutied breakers, 65 breakers are the same breakers that are found overdutied in the ATBA case, and their cost responsibility lies with the respective TOs; hence, the remaining 11 circuit breakers become the responsibility of the Class 2006 Project Developers.

Of 9 circuit breakers, as discussed Section 4.6, one breaker at Goudey #4 115 kV substation will be the responsibility of NYSEG/RG&E since none of Class 2006 projects has the fault current impact on the Goudey #4 115kV substation more than de minimus impact. The cost replacement of the Goudey circuit breaker is \$185,000.

Table 5.2.1 below summarizes the other remaining 8 overdutied circuit breakers and their replacement cost.

Table 5.2.1 - SUFs needed as a result of ATRA

Station	kV	Breaker	Breaker Rating (kA)	Max Fault (kA)	Fault Type	% of Rating	Replaced Rating (kA)	Estimated Replaced Cost (\$)
FR KILLS	138	BT1-4	40	40.37	2LG	100.9%	63	\$ 630,000
PILGRIM	138	1410	56.56	56.88	2LG	100.6%	80	\$ 550,000
BRKHAVEN	69	6020	26.1	26.88	2LG	103.0%	43	\$ 120,000
HOLBRK1	69	6700	43	43.58	3LG	101.4%	63	\$ 180,000
		6900	43	43.58	3LG	101.4%	63	\$ 180,000
LEVTTOWN	69	620	26.1	26.20	3LG	100.4%	43	\$ 120,000
TBG 5E	69	6630	31.5	31.65	3LG	100.5%	43	\$ 120,000
TBG 5EU-1	69	6670	31.5	31.64	3LG	100.5%	43	\$ 120,000
Total Estimated Replacement Cost:								\$ 2,020,000

Based on the above discussion, the total cost estimate that the Class 2006 projects are responsible for is \$2,020,000.

Following the rules under Attachment S, this cost responsibility is shared among all those Project Developers that have at least a de minimus (100 Amperes) impact on that SUF. Further, the cost is shared according to each project's pro rata impact on that SUF. Table 5.2.2 below shows the fault current contribution of each of the Class 2006 projects and their dollar impact on the affected substations.

**Table 5.2.2 - Impact of projects on the affected substations and their cost allocation
(Developers responsibility)**

Fresh Kills 138 kV

		Breaker ID
Total circuit breakers to be replaced:	1	BT1-4
Developers responsibility:	1	
Estimated Cost / Circuit Breaker	\$630,000	to install 63 kA circuit breaker
Total Cost: Developers responsibility:	\$630,000	

Cost Allocation using 100 amps De Minimus rule

Project	Contribution (Amps)	% Contribution	Cost (\$)
Fortistar VP	1992	48.65	\$306,468
Fortistar VAN	1992	48.65	\$306,468
Linden VFT	111	2.71	\$17,064
Total	4095	100.00	\$630,000

Pilgrim 138 kV

		Breaker ID
Total circuit breakers to be replaced:	1	1410
Developers responsibility:	1	
Estimated Cost / Circuit Breaker	\$550,000	to install 80 kA circuit breaker
Total Cost / Developers responsibility:	\$550,000	

Cost Allocation using 100 amps De Minimus rule

Project	Contribution (Amps)	% Contribution	Cost (\$)
Spagnoli	1162	58.67	\$322,699
Caithness	818	41.33	\$227,301
Total	1980	100.00	\$550,000

Brook Haven 69 kV

		Breaker ID
Total circuit breakers to be replaced:	1	6020
Developers responsibility:	1	
Estimated Cost / Circuit Breaker	\$120,000	to install 43 kA circuit breaker
Total Cost: Developers responsibility:	\$120,000	

Cost Allocation using 100 amps De Minimus rule

Project	Contribution (Amps)	% Contribution	Cost (\$)
Caithness	838	100.00	\$120,000
Total	838	100.00	\$120,000

Holbrook 69 kV

		Breaker ID
Total circuit breakers to be replaced:	2	6700, 6900
Developers responsibility:	2	
Estimated Cost / Circuit Breaker	\$180,000	to install 63 kA circuit breaker
Total Cost: Developers responsibility:	\$360,000	

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Cost Allocation using 100 amps De Minimus rule

Project	Contribution (Amps)	% Contribution	Cost (\$)
Caithness	1053	100.00	\$360,000
Total	1053	100.00	\$360,000

Levittown 69 kV

Total circuit breakers to be replaced:	1	Breaker ID 620
Developers responsibility:	1	
Estimated Cost / Circuit Breaker	\$120,000	to install 43 kA circuit breaker
Total Cost: Developers responsibility:	\$120,000	

Cost Allocation using 100 amps De Minimus rule

Project	Contribution (Amps)	% Contribution	Cost (\$)
Spagnoli	274	100.00	\$120,000
Total	274	100.00	\$120,000

TBG 5E 69 kV

Total circuit breakers to be replaced:	1	Breaker ID 6630
Developers responsibility:	1	6630
Estimated Cost / Circuit Breaker	\$120,000	to install 43 kA circuit breaker
Total Cost: Developers responsibility:	\$120,000	

Cost Allocation using 100 amps De Minimus rule

Project	Contribution (Amps)	% Contribution	Cost (\$)
Spagnoli	217	100.00	\$120,000
Total	217	100.00	\$120,000

TBG 5EU-1 69 kV

Total circuit breakers to be replaced:	1	Breaker ID 6630
Developers responsibility:	1	6630
Estimated Cost / Circuit Breaker	\$120,000	to install 43 kA circuit breaker
Total Cost: Developers responsibility:	\$120,000	

Cost Allocation using 100 amps De Minimus rule

Project	Contribution (Amps)	% Contribution	Cost (\$)
Project	Contribution (Amps)	% Contribution	Cost (\$)
Spagnoli	217	100.00	\$120,000
Total	217	100.00	\$120,000

5.3 *SUFs Identified via Attachment Facilities Studies*

As identified early, Part 1 of the Class 2006 Facilities Study addresses the Attachment Facilities required for each Class Year project. While performing the Attachment Facilities studies, some studies also identify SUFs that are required to be replaced, upgraded or built in order for Class Year projects to reliably interconnect into the system.

Following paragraph will discuss SUFs required for each Class 2006 project.

5.3.1 *KeySpan Spagnoli Rd*

KeySpan Spagnoli Rd project will be interconnected to the Ruland substation. As a result, upgrading the protection system at the remote end to be identical to Ruland 138 kV substation will be required. LIPA estimated that these SUFs will cost \$535,800. For more details of the cost estimate, see the Spagnoli Attachment Facilities report, Spagnoli Road TOAF & SUF Report 4-9-07 (Final).pdf. Based on the information provided in the report, the SUFs cost is solely responsible by the KeySpan Spagnoli Rd project.

5.3.2 *Fortistar VP, Fortistar VAN, PSEG Cross Hudson, and NYPA Gilboa Uprate*

The Attachment Facilities studies for Fortistar VP, Fortistar VAN and PSEG Cross Hudson are not completed, yet; however, preliminary assessment indicated that no SUFs are required for these projects.

Note that NYPA Gilboa Uprate project also does not have any SUFs required for this project.

5.3.4 *TransGas Energy*

TransGas Energy project will loop the feeders 61, 62 and 63 between Rainey and Farragut 345 kV substations into a new substation. As a result, modifications to Rainey and Farragut 345 kV substations will be required in order to accommodate the new routings.

NYISO hired a consultant to perform the Attachment Facilities study. The Attachment Facilities study is not completed, yet, but the cost estimate of the SUFs at Rainey and Farragut 345 kV substations is completed, and their cost is \$2,128,000. For more details of the cost estimate, see the cost estimate of TransGas SUFs report, Transgas System Upgrade Study rev 1.pdf. Based on the information provided in the report, the SUFs cost is solely responsible by the TransGas Energy project.

5.3.5 Caithness Bellport

Caithness Bellport project will loop two 138 kV circuits, Brookhaven-Holbrook and Brookhaven-Hostville, into a new substation. As a result, modifications to Brookhaven, Holbrook, and Hostville 138 kV substations will be required in order to accommodate the new routings. LIPA estimated that these SUFs will cost \$3,062,000. For more details of the cost estimate, see the Caithness Attachment Facilities report, Caithness LI TOAF & SUF Report 4-9-07 (Final).pdf. Based on the information provided in the report, the SUFs cost is solely responsible by the Caithness Bellport project.

5.3.6 East Coast Power Linden VFT

Linden VFT project elected to upgrade the Goethals North and South 345 kV straight-buses into a ring bus substation. As a result, modifications to Goethals North and South 345 kV buses will be required in order to upgrade them to the ring bus substation. NYISO hired a consultant to perform the SUFs study. The SUFs study is not completed, yet, but the cost estimate of upgrading the Goethals substation is completed, and their cost is \$10,465,000. For more details of the cost estimate of upgrading the Goethals substation, Goethals Basis of Estimate_Rev.1_4.10.07.doc. Based on the information provided in the report, the SUFs cost is solely responsible by the Linden VFT project.

5.3.7 Airtricity Munnsville

Munnsville will tap the Brothertown-Hamilton Municipal 46 kV circuit to create a new substation. As a result, modifications to the remote ends will be required in order to accommodate the new substation. NYSEG/RG&E estimated that these SUFs will cost \$30,000. For more details of the cost estimate, see the Attachment Facilities report, Munnsville Facilities Study Draft r12 15-06_Final JPR.doc. Based on the information provided in the report, the SUFs cost is solely responsible by the Munnsville project.

5.3.8 UPC Canandaigua I and Invenergy High Sheldon

UPC Canandaigua I project will tap the Meyer-Avoca-Hillside 230 kV circuit to create a new substation. Invenergy High Sheldon will tap the Stolle Rd-Meyer 230 kV circuit to create a new substation. As a result, modifications to Stolle Rd, Meyer, and Hillside 230 kV substation will be required in order to accommodate the new substations.

NYSEG/RG&E and NYISO's consultant were working together to complete the Attachment Facilities studies for the projects. NYSEG/RG&E estimated that the SUFs cost at Stolle Rd, Meyer and Hillside 230 kV substations will be \$1,639,000, \$2,588,000, and \$995,000, respectively. For more details of the cost estimate, see the Canandaigua I and High Sheldon Attachment Facilities reports, 070327 CS Facilities Study.pdf and 070327 HS Facilities Study.pdf.

Based on the information provided in the reports, the SUFs cost at Stolle Rd 230 kV substation is solely responsible by the High Sheldon project. The SUFs cost at Hillside 230 kV substation is solely responsible by the Canandaigua I project. Some of the SUFs

cost at the Meyer 230 kV substation will be shared among the two projects and some of the SUFs cost will be solely responsible by a particular project.

Of \$2,588,000 SUFs cost at Meyer 230 kV substation, \$523,000 will be solely responsible by the Canandaigua I project and \$523,000 will be solely responsible by the High Sheldon project. The remaining \$1,542,000 will be shared equally between the two projects.

Based on the above discussion, Canandaigua I project will be responsible for \$2,289,000 and High Sheldon project will be responsible for \$2,933,000.

5.3.9 NY Windpower West Hill

West Hill project will tap the Oneida-Fenner 115 kV circuit to create a new substation. As a result, modifications to the Oneida and Fenner 115 kV substations will be required in order to accommodate the new substation. NGrid estimated that these SUFs will cost \$371,439. For more details of the cost estimate, see the West Hill Attachment Facilities report, INTERCON FAC RPT 020607 withcmnts.doc. Based on the information provided in the report, the SUFs cost is solely responsible by the West Hill project.

5.3.10 PPM/Atlantic Renewable Fairfield

Fairfield project will tap the Valley-Inghams 115 kV circuit to create a new substation. As a result, modifications to the Valley and Inghams 115 kV substations will be required in order to accommodate the new substation. NGrid estimated that these SUFs will cost \$1,081,219. For more details of the cost estimate, see the initial Fairfield Attachment Facilities report, INTERCONNECTION FACILITIES REPORT 121206.doc. Based on the information provided in the report, the SUFs cost is solely responsible by the Fairfield project.

5.3.11 Marble River I, Marble River II, Noble Clinton, Noble Altona and Noble Ellenburg I

Marble River I, Marble River II, Horizon Clinton, Noble Clinton, Noble Altona, and Noble Ellenburg I projects (Northern wind farm projects) will tap the Willis-Plattsburg 230 kV double circuits (WP-1 and WP-2 lines). As a result, modifications to the Willis and Plattsburg 230 substations will be required in order to accommodate these projects. NYPA estimated that these SUFs will cost \$11,900,660. For more details of the cost estimate, see the NYPA SUFs report, 2007-04-06 SWA Report Rev. 1- System Upgrade Facilities.pdf.

Of \$11,900,660 SUFs cost, \$250,000 will be responsible by the Noble Northern wind farm projects. The remaining \$11,650,660 will be shared equally among the Northern wind farm projects or each will be responsible for a cost of \$2,330,132 ($\$11,650,660 / 5$).

Based on the above discussion, Marble River I, Marble River II, Noble Clinton, Noble Altona and Noble Ellenburg I projects will be responsible for \$2,330,132, \$2,330,132, \$2,413,466, \$2,413,465, and \$2,413,465, respectively.

5.3.12 Noble Bliss I

Noble Bliss I will interconnect into the Village of Arcade municipal electric system. As a result, modifications to the Arcade substation (i.e., upgrading the tap bus substation to become a three-breaker ring bus substation) and other remote substations will be required in order to reliably connect this project. NGrid has not completed the SUFs study yet, but NGrid estimated that the SUFs that are required to accommodate only the Noble Bliss I project will be \$6,851,976.

5.3.13 Community Energy Jordanville

Jordanville will tap the Porter-Rotterdam 230 kV circuit to create a new substation. As a result, modifications to Porter and Rotterdam 230 kV substations will be required in order to reliably connect this project. NGrid estimated that these SUFs will cost \$2,125,457. For more details of the cost estimate, see the Jordanville Attachment Facilities report, INTERCON FAC RPT Final 01122007.doc. Based on the information provided in the report, the SUFs cost is solely responsible by the Jordanville project.

6 Headroom Usage

Class 2001 and Catch-up Class 2003-2005 Project Developers purchased many SUFs including 345 kV series reactors and 138 kV circuit breakers to reliably interconnect their projects into the NYCA system. Studies have indicated that with these SUFs in the system, the fault levels at many substations have decreased significantly, and at locations where new circuit breakers are installed, additional fault capability is now available. The net result of these SUFs is that many substations now have additional fault current capability or “Headroom” that can be used by future Class Year projects.

Attachment S requires that future Class Year projects must pay “Headroom usage” to owners of the Headroom. The NYISO has calculated Headroom usage and cost responsibility in accordance with the terms of the settlement of the Class 2001 litigation [17] and applicable rules under Attachment S.

Tables 6.0 and 6.1 show the Class 2001 and the Catch-up Class 2003-2005 Headroom accounts, respectively. Note that the Astoria West non-breaker SUFs Headroom account of the Class 2001 Headroom account is closed due to its electrical value reduced to zero.

Table 6.2 shows this \$/Amp value along with the fault current contribution from each of the Class 2006 projects at Headroom substations. If the fault current contribution is equal to or higher than de minimus (100 Amperes), the Project Developer is responsible for reimbursement of the Headroom used. Table 6.2 also shows the cost responsibility of each project based on this de minimus criterion. Several projects pay zero dollars because their fault current impact is less than de minimus. The total Headroom usage cost that the Class 2006 projects are responsible for is \$16,173,671.

Table 6.0 - Class 2001 Depreciated Headroom data

Substation	Total Plan Cost (\$)	Developers Share (Overage Cost) (\$ (1))	Annual Depreciation rate (%) (2)	Years in service	Depreciation as of 1/1/07 (\$) E =B*C/100*D	Net value as of 1/1/07 (\$) F =B-E	Total Headroom (Amps) (1)	Headroom Expired (1=No, 0=Yes)	Value of Hdrm (\$/Amp) I = H*F/G
345 kV		Ratio							
Non Bkr SUF		0.571603677							
FARRAGUT	\$29,361,700	\$16,783,256	2.4	2	\$805,596	\$15,977,659	14384	1	\$1,110.79
RAINEY	\$19,085,100	\$10,909,113	2.4	2	\$523,637	\$10,385,476	15983	1	\$649.78
SPRN BRK	\$20,553,200	\$11,748,285	2.4	2	\$563,918	\$11,184,367	15749	1	\$710.16
Sub-total	\$69,000,000	\$39,440,654			\$1,893,151	\$37,547,502			
138 kV									
Non Bkr SUF									
AST-EAST-E	\$7,421,100	\$4,241,928	2.4	0	\$0	\$4,241,928	30829	1	\$137.60
AST-EAST-W	\$7,421,100	\$4,241,928	2.4	0	\$0	\$4,241,928	28714	1	\$147.73
AST-WEST(3)	\$5,771,900	\$3,299,239	2.4	0	\$0	\$3,299,239	19286	0	\$0.00
CORONA (N)	\$7,421,000	\$4,241,871	2.4	0	\$0	\$4,241,871	29296	1	\$144.79
CORONA (S)	\$6,596,500	\$3,770,584	2.4	0	\$0	\$3,770,584	30926	1	\$121.92
QUEENSBG	\$9,894,700	\$5,655,847	2.4	0	\$0	\$5,655,847	19290	1	\$293.20
SHM CRK	\$2,473,700	\$1,413,976	2.4	0	\$0	\$1,413,976	6093	1	\$232.07
Sub-total	\$47,000,000	\$26,865,373	2.4		\$0	\$26,865,373			
138 kV									
Bkr SUF									
AST-EAST-E	\$750,000	\$428,703	2.4	4	\$41,155	\$387,547	30829	1	\$12.57
AST-EAST-W	\$750,000	\$428,703	2.4	4	\$41,155	\$387,547	28714	1	\$13.50
E 13 ST	\$1,500,000	\$857,406	2.4	4	\$82,311	\$775,095	22209	1	\$34.90
GRENWOOD	\$500,000	\$285,802	2.4	4	\$27,437	\$258,365	17780	1	\$14.53
Sub-total	\$3,500,000	\$2,000,613			\$192,059	\$1,808,554			
69kV									
E RIVER	\$4,500,000	\$2,572,217	2.7	4	\$274,713	\$2,297,504	21875	1	\$105.03
Total Cost (\$)	\$124,000,000	\$70,878,856				\$68,518,933			

Notes:

- (1) Obtained from the Settlement Agreement and Class 2002 Cost Allocation Study Reports
- (2) Provided by Con Edison for the Catch-up Class 2003-2005 Cost Allocation Study Report
- (3) Headroom value is expired due its electrical value reduced to zero

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Table 6.1 - Catch-up Class Year (2003-2005) Depreciated Headroom data									
Substation	Total Plan Cost (\$)	Developers Share (Overage Cost) (\$)	Annual Depreciation rate (%) (1)	Years in service	Depreciation as of 1/1/07 (\$) E =B*C/100*D	Net value as of 1/1/07 (\$) F =B-E	Total Headroom (Amps) G	Headroom Expired (1=No, 0=Yes) H	Value of Hdrm (\$/Amp) I =H*F/G
	A	B	C	D					
<u>138 kV</u>									
<u>Bkr SUF</u>									
E.G.C.	\$600,000	\$600,000	2.4	0	\$ -	\$600,000	17000	1	\$35.29
<u>69kV</u>									
RULAND	\$155,000	\$155,000	2.7	0	\$ -	\$155,000	23100	1	\$6.71
Total Cost (\$)	\$755,000	\$755,000				\$755,000			

Notes:

(1) Use the Catch-up Class 2003-2005 annual depreciation rate

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Table 6.2 - Cost of Using Headroom (1) (2)

Substation	Value of Hdrm (\$/A)	Spagnoli (A)	(\$)	Fortistar VP (A)	(\$)	Fortistar VAN (A)	(\$)	PSEG (A)	(\$)	TransGas (A)	(\$)
Cost of Using Class 2001 Headroom											
<u>345 kV</u>											
FARRAGUT	\$1,110.79	0	\$0	0	\$0	0	\$0	3138	\$3,485,782	5656	\$6,282,206
RAINEY	\$649.78	0	\$0	0	\$0	0	\$0	2503	\$1,626,471	5796	\$3,766,335
SPRN BRK	\$710.16	0	\$0	0	\$0	0	\$0	395	\$280,231	665	\$472,472
<u>138 kV</u>											
AST-EAST-E	\$150.17	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
AST-EAST-W	\$161.23	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
AST-WEST	\$0.00	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
CORONA (N)	\$144.79	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
CORONA (S)	\$121.92	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
E 13 ST	\$34.90	0	\$0	0	\$0	0	\$0	843	\$29,410	1361	\$47,481
GRENWOOD	\$14.53	0	\$0	828	\$12,029	828	\$12,029	0	\$0	0	\$0
QUEENSBG	\$293.20	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
SHM CRK	\$232.07	0	\$0	0	\$0	0	\$0	0	\$0	122	\$28,289
<u>69kV</u>											
E RIVER	\$105.03	0	\$0	0	\$0	0	\$0	196	\$20,533	335	\$35,132
Cost of Using Catch-up Class Year (2003-2005) Headroom											
<u>138 kV</u>											
E.G.C	\$35.29	1683	\$59,404	0	\$0	0	\$0	0	\$0	0	\$0
<u>69 kV</u>											
RULAND	\$6.71	904	\$6,067	0	\$0	0	\$0	0	\$0	0	\$0
Total Cost			\$65,471		\$12,029		\$12,029		\$5,442,427		\$10,631,915

Notes:

(1) Projects with fault contribution less than de minimus (100 Amperes) have been assigned zero cost in accordance with Attachment S rules

(2) Headroom usage calculation could be impacted by subsequent changes in LIPA's transmission plans

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Substation	Value of Hdrm (\$/A)	Caithness (A)	Caithness (\$)	Linden VFT (A)	Linden VFT (\$)	Munnsville (A)	Munnsville (\$)	Canandaigua (A)	Canandaigua (\$)	High Sheldon (A)	High Sheldon (\$)	West Hill (A)	West Hill (\$)
Cost of Using Class 2001 Headroom													
<u>345 kV</u>													
FARRAGUT	\$1,110.79	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
RAINEY	\$649.78	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
SPRN BRK	\$710.16	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
<u>138 kV</u>													
AST-EAST-E	\$150.17	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
AST-EAST-W	\$161.23	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
AST-WEST	\$0.00	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
CORONA (N)	\$144.79	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
CORONA (S)	\$121.92	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
E 13 ST	\$34.90	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
GREWOOD	\$14.53	0	\$0	111	\$1,616	0	\$0	0	\$0	0	\$0	0	\$0
QUEENSBG	\$293.20	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
SHM CRK	\$232.07	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
<u>69kV</u>													
E RIVER	\$105.03	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
Cost of Using Catch-up Class Year (2003-2005) Headroom													
<u>138 kV</u>													
E.G.C	\$35.29	208	\$7,355	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
<u>69 kV</u>													
RULAND	\$6.71	124	\$829	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
Total Cost			\$8,184		\$1,616		\$0		\$0		\$0		\$0

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Substation	Value of Hdrm (\$/A)	Fairfield (A)	(A)	Marble River II (A)	(A)	Marble River I (A)	(A)	Noble Clinton (A)	(A)	Bliss	(A)	Altona (A)	(A)
Cost of Using Class 2001 Headroom													
<u>345 kV</u>													
FARRAGUT	\$1,110.79	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
RAINEY	\$649.78	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
SPRN BRK	\$710.16	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
<u>138 kV</u>													
AST-EAST-E	\$150.17	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
AST-EAST-W	\$161.23	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
AST-WEST	\$0.00	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
CORONA (N)	\$144.79	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
CORONA (S)	\$121.92	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
E 13 ST	\$34.90	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
GRENWOOD	\$14.53	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
QUEENSBG	\$293.20	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
SHM CRK	\$232.07	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
<u>69kV</u>													
E RIVER	\$105.03	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
Cost of Using Catch-up Class Year (2003-2005) Headroom													
<u>138 kV</u>													
E.G.C	\$35.29	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
<u>69 kV</u>													
RULAND	\$6.71	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0	0	\$0
Total Cost			\$0		\$0		\$0		\$0		\$0		\$0

DRAFT

Substation	Value of Hdrm (\$/A)	Ellenburg (A)	(S)	Gilboa (A)	(S)	Jordanville (A)	(S)	Total Cost
Cost of Using Class 2001 Headroom								
<u>345 kV</u>								
FARRAGUT	\$1,110.79	0	\$0	0	\$0	0	\$0	\$9,767,988
RAINEY	\$649.78	0	\$0	0	\$0	0	\$0	\$5,392,806
SPRN BRK	\$710.16	0	\$0	0	\$0	0	\$0	\$752,702
<u>138 kV</u>								
AST-EAST-E	\$150.17	0	\$0	0	\$0	0	\$0	\$0
AST-EAST-W	\$161.23	0	\$0	0	\$0	0	\$0	\$0
AST-WEST	\$0.00	0	\$0	0	\$0	0	\$0	\$0
CORONA (N)	\$144.79	0	\$0	0	\$0	0	\$0	\$0
CORONA (S)	\$121.92	0	\$0	0	\$0	0	\$0	\$0
E 13 ST	\$34.90	0	\$0	0	\$0	0	\$0	\$76,892
GRENWOOD	\$14.53	0	\$0	0	\$0	0	\$0	\$25,674
QUEENSBG	\$293.20	0	\$0	0	\$0	0	\$0	\$0
SHM CRK	\$232.07	0	\$0	0	\$0	0	\$0	\$28,289
<u>69kV</u>								
E RIVER	\$105.03	0	\$0	0	\$0	0	\$0	\$55,665
Cost of Using Catch-up Class Year (2003-2005) Headroom								
<u>138 kV</u>								
E.G.C	\$35.29	0	\$0	0	\$0	0	\$0	\$66,759
<u>69 kV</u>								
RULAND	\$6.71	0	\$0	0	\$0	0	\$0	\$6,896
Total Cost			\$0		\$0		\$0	\$16,173,671

7 Project Cost Allocation

There are three groups involved in the Class 2006 Project Cost Allocation:

- TOs are responsible for the SUFs costs identified in the ATBA and some SUFs costs identified in the ATRA;
- Class 2006 Project Developers are responsible for incremental SUFs costs and Headroom usage identified through the ATRA;
- Class 2001 and Catch-up Class 2003-2005 Project Developers are entitled for reimbursement of the Headroom usage.

Each of these costs is identified below:

7.1 Transmission Owner Cost

Table 5.1.1 identified that (1) Con Edison is responsible to replace four circuit breakers at Astoria West 138 kV substation and (2) LIPA is responsible to replace eight circuit breakers at East Garden City 69 kV substation, four circuit breakers at Lake Success 69 kV substation and two circuit breakers at Ruland substation. Table 4.6.1 identified that NYSEG/RG&E is responsible to replace thirty-seven circuit breakers at various substations. This number does not include the 3 overdutied breakers owned by AES and the 5 overdutied breakers owned by NYSEG/RG&E that are being confirmed.

The estimated total cost to replace these circuit breakers is \$6,590,000. Of which, NYSEG's share is \$4,070,000 and LIPA's share is \$2,520,000. Note that this cost estimate does not include the cost estimate of replacement of some breakers by Con Edison and AES. In addition, it does not include the cost of replacement of some NYSEG/RG&E potential overdutied breakers.

7.2 Project Developer Cost

Project Developers are responsible for use of the Headroom and replacement cost of the overdutied circuit breakers at various substations within East Norwich, New York City and Long Island. In addition, they are also responsible for "other" SUFs identified via the Attachment Facilities studies that are required to be replaced, upgraded or built in order for Class 2006 projects to reliably interconnect into the system.

The Project Developers' total cost is \$61,967,222. Of which, the estimated replacement cost of circuit breakers is \$2,020,000, the Headroom usage cost is \$16,173,671, and the "other" SUFs cost is \$43,773,551. Note that the "other SUFs cost does not include the SUFs cost that is required for the Noble Bliss I project.

A summary of their cost share is shown in Table 7.2.1.

7.3 Headroom Cost Reimbursement

Class 2001 Project Developers (East River, NYPA and SCS Astoria) own Headroom at 13 substations in Con Edison system. Neptune, a Catch-up Class 2003-2005 Project Developer, owns Headroom at 2 substations in LIPA system. Class 2006 Project Developers must pay for Headroom that they use if it is above de minimus, and based on \$/Amp value at each substation.

Table 6.2 identifies the Headroom cost owed by each Class 2006 Project Developers. This amount is to be distributed to Class 2001 and Catch-up Class 2003-2005 Project Developers according to their SUFs ownership percentage at each substation. Note that the Class 2001 SUFs ownership percentage was determined and settled in the Class 2001 Settlement Agreement approved by FERC. Table 7.3.1 below shows how much Headroom money is collected and how it is distributed among the Headroom owners.

Table 7.2.1 – Project Developer Cost Allocation Summary

Project Developer	2001 Headrm Usage (\$)	Catch- up Headrm Usage (\$)	Circuit Breaker at Fresh Kills 138 kV (\$)	Circuit Breaker at Pilgrim 138 kV (\$)	Circuit Breaker at Brkhven 69 kV (\$)	Circuit Brks at Holbrk 69 kV (\$)	Circuit Breaker at Levtwn kV (\$)	Circuit Breaker at TBG 5E 69 kV (\$)	Circuit Breaker at TBG 5EU-1 69 kV (\$)	Circuit Brks at E Norwich 46 kV (\$)	“Other” SUFs identified via AF studies (\$)	Total Cost (\$)
Spagnoli	\$0	\$65,471	\$0	\$322,699	\$0	\$0	\$120,000	\$120,000	\$120,000	\$0	\$535,800	\$1,283,970
Fortistar VP	\$12,029	\$0	\$306,468	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$318,497
Fortistar VAN	\$12,029	\$0	\$306,468	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$318,497
PSEG	\$5,442,427	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$5,442,427
TransGas	\$10,631,915	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2,128,000	\$12,759,915
Caithness	\$0	\$8,184	\$0	\$227,301	\$120,000	\$360,000	\$0	\$0	\$0	\$0	\$3,062,000	\$3,777,485
Linden VFT	\$1,616	\$0	\$17,064	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$10,465,000	\$10,483,680
Munnsville	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$30,000	\$30,000
Canandaigua	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2,289,000	\$2,289,000
High Sheldon	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2,933,000	\$2,933,000
West Hill	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$371,439	\$371,439
Fairfield	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,081,219	\$1,081,219
Marble River II	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2,330,132	\$2,330,132
Marble River I	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2,330,132	\$2,330,132
Noble Clinton	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2,413,466	\$2,413,466
Bliss I	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$6,851,976	\$6,851,976
Altona	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2,413,465	\$2,413,465
Ellenburg I	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2,413,465	\$2,413,465
Gilboa	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Jordanville	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$2,125,457	\$2,125,457
Total Cost :	\$16,100,016	\$73,655	\$630,000	\$550,000	\$120,000	\$360,000	\$120,000	\$120,000	\$120,000	\$182,000	\$36,921,575	\$61,967,222

Table 7.3.1 – Headroom Reimbursement

Project Developer	2001 Headroom Reimbursement				Catch-up Hdrm Reimbursement		Total (\$)
	(\$)	To East River	To NYPA	To SCS Astoria	(\$)	To Neptune	
		46.1232%	31.0934%	22.7834%		100.0000%	
Spagnoli	\$0	\$0	\$0	\$0	\$65,471	\$65,471	\$65,471
Fortistar VP	\$12,029	\$5,548	\$3,740	\$2,741	\$0	\$0	\$12,029
Fortistar VAN	\$12,029	\$5,548	\$3,740	\$2,741	\$0	\$0	\$12,029
PSEG	\$5,442,427	\$2,510,222	\$1,692,236	\$1,239,970	\$0	\$0	\$5,442,427
TransGas	\$10,631,915	\$4,903,780	\$3,305,824	\$2,422,312	\$0	\$0	\$10,631,915
Caithness	\$0	\$0	\$0	\$0	\$8,184	\$8,184	\$8,184
Linden VFT	\$1,616	\$745	\$502	\$368	\$0	\$0	\$1,616
Munnsville	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Canandaigua	\$0	\$0	\$0	\$0	\$0	\$0	\$0
High Sheldon	\$0	\$0	\$0	\$0	\$0	\$0	\$0
West Hill	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Fairfield	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Marble River II	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Marble River I	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Noble Clinton	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Bliss I	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Altona	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ellenburg I	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Gilboa	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Jordanville	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Payments		\$7,425,843	\$5,006,042	\$3,668,131		\$73,655	\$16,173,671

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APPENDICES

Facilities Study for Class 2006 Part 2 – System Upgrade Facilities

A. Fault Current Contribution from Class 2006 Projects

Prepared by:

NYISO Staff

June 15, 2007

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Appendix A

Fault Current Contribution from Class 2006 Projects—Round 2

BUS NAME	NOM. KV	ATRA Max (A)	Type	X Hudson	Caithness	Linden VFT	Munnsville	Canandaigua	West Hill	Fairfield	Marble River II	Marble River I	Noble Clinton	Bliss	Altona	Ellensburg	Gilboa	Jordanville
				Δ (A)	Δ (A)	Δ (A)	Δ (A)	Δ (A)	Δ (A)	Δ (A)	Δ (A)	Δ (A)	Δ (A)	Δ (A)	Δ (A)	Δ (A)	Δ (A)	Δ (A)
ADIRONDACK	230	10202	3LG	0	0	0	0	0	1	3	7	3	2	0	2	2	0	35
ALBANY STM1	115	19034	3LG	1	0	0	0	0	0	2	1	0	0	0	0	0	0	8
ALPS	345	18190	3LG	1	0	0	0	0	0	2	1	0	0	0	0	0	0	6
AST-EAST-E	138	45987	1LG	18	0	-4	0	0	0	0	0	0	0	0	0	0	0	0
AST-EAST-W	138	46769	1LG	19	0	-4	0	0	0	0	0	0	0	0	0	0	0	0
AST-WEST-N	138	46091	1LG	27	0	-10	0	0	0	0	0	0	0	0	0	0	0	0
AST-WEST-S	138	46091	1LG	27	0	-10	0	0	0	0	0	0	0	0	0	0	0	0
ATHENS	345	33476	3LG	17	0	-2	2	0	1	5	2	0	0	0	0	0	0	15
ATLANTA	34.5	4856	3LG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AVOCA GAS	230	5581	3LG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BALLSTON1	115	6693	3LG	0	0	0	0	0	0	1	0	0	0	0	0	0	0	5
BARRETT	138	47878	2LG	26	53	-4	0	0	0	0	0	0	0	0	0	0	0	0
BATH #4	115	4901	3LG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BENNETT	34.5	6529	1LG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BENNETT	115	4936	3LG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BETHLEHEM	115	19483	3LG	1	0	0	0	0	0	2	1	0	0	0	0	0	0	9
BIG TREE	34.5	14597	1LG	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0
BORDER CITY4	34.5	13485	3LG	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
BRKHAVEN	69	27068	1LG	1	844	-1	0	0	0	0	0	0	0	0	0	0	0	0
BRKHAVEN	138	26630	3LG	1	3278	-1	0	0	0	0	0	0	0	0	0	0	0	0
BUCHAN N	345	28370	3LG	60	1	-2	0	0	0	0	0	0	0	0	0	0	0	0
BUCHAN S	345	37921	3LG	125	3	-3	0	0	0	0	1	0	0	0	0	0	0	1
BUCHANAN	138	15562	3LG	11	0	-2	0	0	0	0	0	0	0	0	0	0	0	0
C.ISLIP	138	29916	3LG	2	1322	-1	0	0	0	0	0	0	0	0	0	0	0	0
CANAL	138	15437	1LG	0	529	0	0	0	0	0	0	0	0	0	0	0	0	0
CARLE PL	138	41121	3LG	33	80	-4	0	0	0	0	0	0	0	0	0	0	0	0
CLAY	345	34309	3LG	1	0	0	5	0	21	12	5	2	1	0	1	1	0	39
COOPERS CRN	345	15408	3LG	6	0	0	2	0	1	2	1	0	0	0	0	0	0	4
COOPERS CRN4	115	14280	1LG	2	0	0	0	0	0	0	1	-1	0	0	0	0	0	0
CORONA N.	138	44296	2LG	20	0	-4	0	0	0	0	0	0	0	0	0	0	0	0
CORONA S.	138	43814	2LG	20	0	-4	0	0	0	0	0	0	0	0	0	0	0	0
CORTLAND N.	115	6203	3LG	0	0	0	4	0	20	0	0	0	0	0	0	0	0	0
DEWITT	345	20126	3LG	0	0	0	4	0	12	4	2	0	0	0	0	0	0	10
D-SAWYER77	230	26298	3LG	0	0	0	0	0	0	0	0	0	0	38	0	0	0	0
DUN NO	138	32315	3LG	67	1	-6	0	0	0	0	0	0	0	0	0	0	0	0
DUN SO	138	30451	2LG	60	1	-5	0	0	0	0	0	0	0	0	0	0	0	0
DUNKIRK	230	15097	1LG	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0
DUNKIRK M1	115	20771	1LG	0	0	0	0	0	0	0	0	0	0	29	0	0	0	0
DUNWOODIE	345	50021	3LG	453	13	-4	0	0	0	1	1	0	0	0	0	0	0	2
E 13 ST	138	45109	1LG	990	0	3	0	0	0	0	0	0	0	0	0	0	0	0

E 179 ST	138	48628	2LG	91	1	-7	0	0	0	0	0	0	0	0	0	0	0	0
E FISHKILL	345	39013	3LG	80	2	-3	1	0	0	1	1	0	0	0	0	0	0	4
E NORWICH 1	46	5354	3LG	0	0	0	222	0	0	0	0	0	0	0	0	0	0	0
E RIVER	69	51769	1LG	239	0	-18	0	0	0	0	0	0	0	0	0	0	0	0
E WALDEN	115	21513	3LG	5	0	-1	0	0	0	0	1	0	0	0	0	0	0	0
E.G.C.	138	72721	2LG	70	207	-7	0	0	0	0	0	0	0	0	0	0	0	0
E.G.C.1	69	45353	3LG	16	24	-4	0	0	0	0	0	0	0	0	0	0	0	0
EDIC	345	32990	3LG	2	0	0	7	0	28	52	13	15	8	0	7	8	0	182
EELPOT RD	34.5	6468	2LG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EGC PAR	345	25101	3LG	98	8	-4	0	0	0	0	0	0	0	0	0	0	0	0
ELWOOD 1	138	37514	2LG	6	115	-2	0	0	0	0	0	0	0	0	0	0	0	0
ELWOOD 2	138	37307	2LG	5	113	-2	0	0	0	0	0	0	0	0	0	0	0	0
FARRAGUT	345	50082	2LG	3141	2	102	0	0	0	0	0	0	0	0	0	0	0	0
FENNER WINDP	115	7338	3LG	0	0	0	1	0	219	1	1	0	0	0	0	0	0	1
FERNDAL	34.5	7578	3LG	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FLAT ST.	115	8456	3LG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FOURTEENTH	34.5	14218	3LG	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
FOXHLS 2	138	33699	2LG	33	0	52	0	0	0	0	0	0	0	0	0	0	0	0
FR KILLS	138	36181	2LG	40	0	114	0	0	0	0	0	0	0	0	0	0	0	0
FR KILLS	345	25020	2LG	115	0	1186	0	0	0	0	0	0	0	0	0	0	0	0
FRASER	115	11990	1LG	1	0	0	25	0	0	4	1	-1	0	0	0	0	0	1
FRASER	345	17300	3LG	2	0	0	14	0	2	6	2	0	0	0	0	0	0	9
FREEPORT	138	32400	2LG	14	47	-3	0	0	0	0	0	0	0	0	0	0	0	0
FUERA BUSH33	115	30742	3LG	2	0	-1	0	0	0	5	1	-1	0	0	0	0	0	19
GARDENVILLE1	115	37271	3LG	0	0	0	0	0	0	0	0	0	0	351	0	0	0	0
GARDENVILLE1	230	22244	3LG	0	0	0	0	0	0	0	0	0	0	115	0	0	0	0
GILBOA 345	345	22705	2LG	3	0	-1	3	0	1	3	2	0	0	0	0	0	0	8
GLNWD GT	138	43773	3LG	59	33	-6	0	0	0	0	0	0	0	0	0	0	0	0
GLNWD NO	138	46218	3LG	66	36	-6	0	0	0	0	0	0	0	0	0	0	0	0
GLNWD SO	138	45716	3LG	66	35	-6	0	0	0	0	0	0	0	0	0	0	0	0
GOETHALS	230	43627	3LG	56	0	732	0	0	0	0	0	0	0	0	0	0	0	0
GOETHL N	345	27199	1LG	131	0	3948	0	0	0	0	0	0	0	0	0	0	0	0
GOETHL S	345	27199	1LG	131	0	3553	0	0	0	0	0	0	0	0	0	0	0	0
GOUDEY #4	115	25170	1LG	1	0	0	29	0	1	1	1	-1	0	0	0	0	0	1
GOUDEY #8	115	24489	1LG	1	0	0	27	0	1	1	1	-1	0	0	0	0	0	0
GOW N	345	20442	2LG	105	0	1499	0	0	0	0	0	0	0	0	0	0	0	0
GOW S	345	20451	2LG	105	0	1417	0	0	0	0	0	0	0	0	0	0	0	0
GREEN ST	34.5	9156	3LG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GREENBUSH	115	39270	3LG	2	0	-1	0	0	0	7	2	-1	0	0	0	0	0	28
GREENIDGE #4	115	12569	3LG	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
GREENLWN	138	29109	3LG	5	81	-2	0	0	0	0	0	0	0	0	0	0	0	0
GRENWOOD	138	51638	2LG	64	0	128	0	0	0	0	0	0	0	0	0	0	0	0
GROOMS RD	115	9322	3LG	0	0	0	0	0	0	2	1	0	0	0	0	0	0	7
GRUMMANB	69	32492	3LG	5	32	-2	0	0	0	0	0	0	0	0	0	0	0	0

HARRISON	115	25340	3LG	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0
HARRISONIPP1	115	23374	3LG	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0
HARRISONIPP2	115	23158	3LG	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0
HAUPAGUE	138	22082	3LG	2	470	-1	0	0	0	0	0	0	0	0	0	0	0	0
HG 6	138	42550	2LG	25	0	-9	0	0	0	0	0	0	0	0	0	0	0	0
HICKLING #4	115	7413	1LG	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
HICKLING #8	115	7415	1LG	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
HILLSIDE #4	115	17831	1LG	0	0	0	6	13	0	0	1	0	0	0	0	0	0	0
HILLSIDE #8	115	17820	1LG	0	0	0	6	13	0	0	1	0	0	0	0	0	0	0
HILLSIDE 230	230	11654	2LG	0	0	0	5	18	0	0	0	0	0	0	0	0	0	0
HMP HRBR	345	31412	2LG	171	8	-3	0	0	0	0	0	0	0	0	0	0	0	0
HOLBRK1	69	43494	3LG	2	1066	-1	0	0	0	0	0	0	0	0	0	0	0	0
HOLBROOK	138	48144	3LG	3	4481	-1	0	0	0	0	0	0	0	0	0	0	0	0
HOLTS GT	138	45701	3LG	3	4199	-1	0	0	0	0	0	0	0	0	0	0	0	0
HOLTS GT2	138	45834	3LG	3	4204	-1	0	0	0	0	0	0	0	0	0	0	0	0
HUDSON E	138	39152	3LG	120	4	-9	0	0	0	0	0	0	0	0	0	0	0	0
HUNTLEY	230	27106	3LG	0	0	0	0	0	0	0	0	0	0	42	0	0	0	0
HURLEY AVE.	345	17029	3LG	8	0	-1	0	0	0	1	1	0	0	0	0	0	0	2
INDEPENDENCE	345	39591	1LG	1	0	0	2	0	8	6	3	0	1	0	0	1	0	18
INGHAMS 99G	115	10510	3LG	0	0	0	7	0	2	472	1	-1	0	0	0	0	0	13
JAMAICA	138	49706	2LG	100	9	-8	0	0	0	0	0	0	0	0	0	0	0	0
LADENTOWN	345	37541	3LG	83	1	-1	0	0	0	0	1	0	0	0	0	0	0	1
LAFAYETTE	345	18607	3LG	0	0	0	5	0	9	3	2	0	0	0	0	0	0	7
LCST GRV	138	38704	3LG	18	114	-3	0	0	0	0	0	0	0	0	0	0	0	0
LEEDS	345	34128	3LG	17	0	-2	2	0	1	5	2	0	0	0	0	0	0	16
LEVTTOWN	69	35515	3LG	6	41	-2	0	0	0	0	0	0	0	0	0	0	0	0
LKE SCSS	69	43812	3LG	25	14	-6	0	0	0	0	0	0	0	0	0	0	0	0
LKE SCSS	138	42823	3LG	59	26	-6	0	0	0	0	0	0	0	0	0	0	0	0
LOCKPORT E	115	30114	3LG	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0
LONG LANE	115	17413	3LG	1	0	0	0	0	0	2	1	0	0	0	0	0	0	6
MARCY 345	345	32131	3LG	2	0	0	6	0	25	45	14	16	9	0	7	9	0	158
MECO	115	5969	3LG	0	0	0	1	0	0	41	1	0	0	0	0	0	0	5
MENANDS 77G	115	32307	3LG	1	0	-1	0	0	0	8	1	-1	0	0	0	0	0	34
MEYER	115	10240	3LG	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0
MEYER	230	6272	3LG	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
MIDDLETN TAP	345	16727	3LG	10	0	-1	1	0	0	1	1	0	0	0	0	0	0	2
MILLR PL	138	14679	3LG	1	483	0	0	0	0	0	0	0	0	0	0	0	0	0
MILLWOOD	138	19020	3LG	17	0	-2	0	0	0	0	0	0	0	0	0	0	0	0
MILLWOOD	345	43980	3LG	216	6	-4	0	0	0	1	1	0	0	0	0	0	0	2
MONTOUR #4	115	12418	3LG	0	0	0	7	0	1	0	0	0	0	0	0	0	0	0
MONTOUR #8	115	12448	3LG	0	0	0	7	0	1	0	0	0	0	0	0	0	0	0
MOTT HAVEN	345	43612	2LG	1992	1	49	0	0	0	0	0	0	0	0	0	0	0	0
N GARDENVLLE	34.5	17962	3LG	0	0	0	0	0	0	0	0	0	0	21	0	0	0	0
N TROY77G	115	17706	3LG	0	0	0	0	0	0	1	1	0	0	0	0	0	0	5

NAPLES	34.5	3521	3LG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NEWBRID	138	73830	1LG	58	255	-7	0	0	0	0	0	0	0	0	0	0	0	0
NGARDENV(NY)	115	37255	3LG	0	0	0	0	0	0	0	0	0	351	0	0	0	0	0
NIAGARA 345	345	33687	1LG	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0
NIAGRA E 230	230	56857	1LG	0	0	0	0	0	0	0	0	0	30	0	0	0	0	0
NIAGRA W 230	230	56857	1LG	0	0	0	0	0	0	0	0	0	30	0	0	0	0	0
NRTHPRT1	138	59143	1LG	8	504	-3	0	0	0	0	0	0	0	0	0	0	0	0
NRTHPRT2	138	43991	1LG	6	126	-2	0	0	0	0	0	0	0	0	0	0	0	0
NSCOT 99B	345	31320	3LG	7	0	-1	3	0	3	10	3	1	1	0	0	1	0	35
NSCOT33	115	49219	2LG	3	0	-1	1	0	1	16	3	-1	0	0	0	0	0	63
OAKDALE	115	29215	1LG	1	0	0	43	1	1	2	2	-1	0	0	0	0	0	1
OAKDALE	230	6421	3LG	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
OAKDALE 345	345	12403	3LG	1	0	0	15	0	1	2	1	0	0	0	0	0	0	2
OAKWOOD	138	28146	3LG	6	71	-2	0	0	0	0	0	0	0	0	0	0	0	0
ONEIDA	115	15591	3LG	0	0	0	1	0	386	9	2	-1	0	0	0	0	0	12
OSWEGO	345	32909	1LG	0	0	0	2	0	7	4	3	0	0	0	0	0	0	11
PACKARD	230	43601	2LG	0	0	0	0	0	0	0	0	0	0	29	0	0	0	0
PILGRIM	138	58742	2LG	11	838	-3	0	0	0	0	0	0	0	0	0	0	0	0
PLATTSBURGH	115	16705	2LG	0	0	0	0	0	0	0	173	261	154	0	297	154	0	0
PLEASANT VAL	345	40657	3LG	76	2	-3	1	0	1	2	1	0	0	0	0	0	0	5
POLETTI	345	38462	2LG	1854	1	45	0	0	0	0	0	0	0	0	0	0	0	0
PORTER	115	42921	1LG	1	0	0	4	0	105	253	11	1	2	0	1	2	0	406
PORTER	230	20703	2LG	1	0	0	1	0	16	44	6	2	1	0	1	1	0	652
PT JEFF	138	32343	1LG	1	697	-1	0	0	0	0	0	0	0	0	0	0	0	0
QUEENSBG	138	44466	2LG	27	0	-9	0	0	0	0	0	0	0	0	0	0	0	0
RAINEY	345	48146	2LG	2549	1	74	0	0	0	0	0	0	0	0	0	0	0	0
RAMAPO	345	40573	3LG	89	1	1	0	0	0	1	1	0	0	0	0	0	0	1
REYNOLDS	345	15526	3LG	1	0	0	0	0	0	1	1	0	0	0	0	0	0	4
REYNOLDS RD	115	39353	3LG	2	0	-1	0	0	0	8	2	-1	0	0	0	0	0	33
RIVERHD	138	18667	1LG	1	825	0	0	0	0	0	0	0	0	0	0	0	0	0
RNKNKOMA	138	38458	3LG	3	2650	-1	0	0	0	0	0	0	0	0	0	0	0	0
ROBINSON RD.	115	19892	3LG	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0
ROBINSON RD.	230	14549	3LG	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0
ROCK TAVERN	115	27196	3LG	10	0	-1	0	0	0	0	1	0	0	0	0	0	0	0
ROCK TAVERN	345	26095	3LG	24	0	-1	1	0	0	1	1	0	0	0	0	0	0	3
ROSETON	345	34425	3LG	43	1	-2	1	0	0	1	1	0	0	0	0	0	0	4
ROSLYN	138	30210	3LG	24	28	-4	0	0	0	0	0	0	0	0	0	0	0	0
ROTT99G	115	33547	1LG	1	0	0	1	0	1	48	3	-1	0	0	0	0	0	339
ROTTERDAM77H	230	12783	3LG	0	0	0	1	0	1	16	1	0	0	0	0	0	0	221
ROTTERDAM99H	230	12800	3LG	0	N/A	0	0	0	1	16	1	0	0	0	0	0	0	219
RULAND	69	47747	3LG	9	138	-3	0	0	0	0	0	0	0	0	0	0	0	0
RULND RD	138	46536	3LG	18	404	-3	0	0	0	0	0	0	0	0	0	0	0	0
S RIPLEY	230	9036	3LG	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
S. PERRY	115	6876	2LG	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0

S080 345KV	345	16851	3LG	0	0	0	0	0	1	1	1	0	0	1	0	0	0	1
S122	345	16853	3LG	0	0	0	1	0	2	1	1	0	0	0	0	0	0	2
SALISBURY 3	115	10006	1LG	0	0	0	3	0	1	1594	1	-1	0	0	0	0	0	6
SCRIBA	345	48741	1LG	1	0	0	3	0	13	10	5	1	1	0	1	1	0	30
SENECA FALLS	34.5	8528	3LG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SHELDON	230	8189	3LG	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0
SHM CRK	138	45392	2LG	85	1	-7	0	0	0	0	0	0	0	0	0	0	0	0
SHM CRK	345	31894	3LG	181	5	-4	0	0	0	0	0	0	0	0	0	0	0	1
SHORE RD	138	50274	2LG	81	34	-6	0	0	0	0	0	0	0	0	0	0	0	0
SHORE RD	345	27636	3LG	123	7	-4	0	0	0	0	0	0	0	0	0	0	0	0
SHOREHAM	138	24979	2LG	1	1373	0	0	0	0	0	0	0	0	0	0	0	0	0
SILLS ROAD	138	33249	2LG	1	13171	-1	0	0	0	0	0	0	0	0	0	0	0	0
SPIER77G	115	16986	3LG	0	0	0	0	0	0	1	1	-1	0	0	0	0	0	5
SPRN BRK	345	51216	3LG	468	13	-4	0	0	0	1	1	0	0	0	0	0	0	2
ST LAWRN 230	230	34392	1LG	0	0	0	0	0	2	3	139	252	137	0	116	137	0	16
STOLLE ROAD	115	14764	3LG	0	0	0	0	0	0	0	0	0	0	30	0	0	0	0
STOLLE ROAD	230	13034	3LG	0	0	0	0	0	0	0	0	0	0	22	0	0	0	0
STOLLE ROAD	345	3898	3LG	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0
SYOSSET	138	33577	3LG	9	98	-2	0	0	0	0	0	0	0	0	0	0	0	0
TBG 5E	69	32448	3LG	5	32	-2	0	0	0	0	0	0	0	0	0	0	0	0
TBG 5EU-1	69	32437	3LG	5	32	-2	0	0	0	0	0	0	0	0	0	0	0	0
TBG 5EU-2	69	32437	3LG	5	32	-2	0	0	0	0	0	0	0	0	0	0	0	0
VALLEY	115	8430	3LG	0	0	0	2	0	2	294	1	-1	0	0	0	0	0	9
VERNON E	138	36950	1LG	77	0	-13	0	0	0	0	0	0	0	0	0	0	0	0
VERNON W	138	32439	1LG	54	0	-13	0	0	0	0	0	0	0	0	0	0	0	0
VLY STRM	138	53032	2LG	36	73	-5	0	0	0	0	0	0	0	0	0	0	0	0
VOLNEY	345	37647	2LG	1	0	0	3	0	12	8	4	1	1	0	1	1	0	27
W 49 ST	345	44917	2LG	3229	1	65	0	0	0	0	0	0	0	0	0	0	0	0
W.HAV345	345	27365	3LG	42	1	-1	0	0	0	0	0	0	0	0	0	0	0	0
WADNGRV1	138	23755	2LG	1	1161	0	0	0	0	0	0	0	0	0	0	0	0	0
WALLACE	34.5	2241	3LG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WATERCURE230	230	11604	2LG	0	0	0	5	14	0	0	0	0	0	0	0	0	0	0
WATERCURE345	345	7698	3LG	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
WAWAYANDA	345	15903	3LG	9	0	-1	1	0	0	1	1	0	0	0	0	0	0	2
WAYLAND	34.5	4257	3LG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WHAV	138	24997	3LG	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WHITMAN	115	8292	3LG	0	0	0	1	0	311	2	1	-1	0	0	0	0	0	2
WILDWOOD	138	22516	2LG	1	1109	0	0	0	0	0	0	0	0	0	0	0	0	0
WILLIS 115	115	10903	3LG	0	0	0	0	0	0	0	127	209	110	0	102	110	0	0
WILLIS 230	230	12184	3LG	0	0	0	0	0	0	0	332	720	372	0	316	371	0	1
WOOD ST.	115	14360	2LG	7	2175	-2	0	0	0	0	0	0	0	0	0	0	0	0



Addendum to
Facilities Study for Class 2006
Part 2 – System Upgrade Facilities

*First Revised Part 2 – System Upgrade Facilities
Annual Transmission Reliability Assessment*

Prepared by:

NYISO Staff

June 25, 2007

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Table Of Contents

	Executive Summary	i
1	Introduction	1-1
	1.1 Status of Class 2006 Projects	1-1
2	Summary of Revised Analysis	2-1
	2.1 Impact of Non Accepting Developers	2-1
	2.2 ATRA	2-1
	2.3 Fault Current Contribution from Class 2006 projects	2-7
	2.4 System Upgrade Facilities	2-8
	2.5 Headroom Usage	2-10
	2.6 Project Cost Allocation	2-12
	2.7 Headroom Cost Reimbursement	2-13
3	Appendices	3-1
	A. Fault Current contribution from Catch-up Class-Round 2 projects	

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Executive Summary

This Addendum to the original Facilities Study for Class 2006: Part 2 – System Upgrade Facilities is issued to satisfy Attachment S requirement that if any Class Year Project Developer does not accept its cost allocation, the NYISO staff shall issue a revised ATRA along with the new cost allocation for the remaining Class Year Project Developers. Four Project Developers owning five projects did not accept the NYISO's cost allocation of their projects. These Developers/Projects are:

1. KeySpan Spagnoli Road	250 MW
2. Fortistar VP	79.9 MW
3. Fortistar VAN	79.9 MW
4. TransGas Energy	1100 MW
5. Invenergy High Sheldon Wind Farm	129 MW

Consequently, the NYISO staff created a revised ATRA Base case by removing these projects and associated system upgrades from the original database and re-run the study.

As reflected in this report, the remaining Class 2006 Project Developers will be responsible for SUFs cost of approximately \$44.9 million to securely interconnect their projects into the New York grid as compared to \$62.0 million identified in the original study. Almost all of this cost (\$38.8 million out of \$44.9 million) still consists of upgrading the substations. About \$5.6 million out of this \$44.9 million is the Headroom reimbursement amount that 3 of the remaining Class 2006 Project Developers will pay to the Class 2001 and the Catch-up Class 2003-2005 Project Developers for the Headroom usage. This cost went down from \$16,173,671 as identified in the original study. About \$0.5 million out of this \$44.9 million is the amount that will cost to replace the overdutied circuit breakers in Long Island area, and it's solely responsible by the Caithness project. This cost went down from \$2,020,000 as identified in the original study since Class 2006 projects are now responsible for only three overdutied circuit breakers instead of eight overdutied circuit breakers.

In addition to the above costs, as identified in the original study Transmission Owners (e.g., Con Edison, LIPA and NYSEG/RG&E) and Generation Owner (e.g., AES) will be responsible for the replacement of fifty-eight circuit breakers identified as overdutied in the ATBA and/or ATRA at an approximate cost of \$6.6 million. Note that this cost estimate does not include the cost estimate of replacement of some breakers by Con Edison and AES. In addition to the fifty-eight overdutied circuit breakers, 5 circuit breakers owned by NYSEG/RG&E are being confirmed to be overdutied or not.

1 Introduction

The study report, Facilities Study for Class 2006: Part 2 – System Upgrade Facilities dated May 2, 2007, which was approved by the Operating Committee (OC) on May 10, 2007, described the cost allocation of the Class 2006 projects. Since some of the Project Developers did not accept their cost allocation during the “Initial Decision Period” (30 Calendar days after the NYISO notice), it was required, under the Attachment S rules, that the NYISO staff revise the study by removing those projects from the original database and re-determine the cost allocation for the remaining Project Developers. Therefore, this report is an addendum report to the original report and provides the revised results and the new cost allocation numbers.

The summary tables in this report have been numbered in the same way as in the original report except that the suffix “R2” has been added to indicate the results of “Round 2”. This will make it easy when comparing results with the original study.

1.1 Status of Class 2006 Projects

Following the approval of the original report by the OC and a formal notice from the NYISO informing the Project Developers of their cost allocation, the Project Developers responded whether or not they accept the cost allocation of their projects. Their response has been summarized in Table 1.1 below.

Table 1.1
Cost Allocation Acceptance/Non-Acceptance Notice from Project Developers

Project Name	Cost Allocation	
KeySpan Spagnoli Road		Not Accepted
Fortistar VP		Not Accepted
Fortistar VAN		Not Accepted
Cross Hudson	Accepted	
TransGas Energy		Not Accepted
Caithness Bellport	Accepted	
East Coast Power Linden VFT	Accepted	
Airtricity Munnsville	Accepted	
UPC Canandaigua I	Accepted	
Invenergy High Sheldon		Not Accepted
NY Windpower West Hill	Accepted	
PPM/Atlantic Renewable Fairfield	Accepted	
Marble River II	Accepted	
Marble River I	Accepted	
Noble Clinton	Accepted	
Noble Bliss	Accepted	
Noble Altona	Accepted	
Noble Ellenburg I	Accepted	
NYPA Gilboa Uprate	Accepted	
Community Energy Jordanville	Accepted	

Those projects that did not accept their cost allocation were, in accordance with Attachment S rules, removed from the original database to create a revised “base case” without those projects. The projects that did accept their cost allocation are re-listed in Table 1.2 below. These projects were kept in the database and were the subject of this revised study.

Table 1.2
Projects that still remain in Class 2006 ATRA-Round 2

Cross Hudson
Caithness Bellport
East Coast Power Linden VFT
Airtricity Munnsville
UPC Canandaigua I
NY Windpower West Hill
PPM/Atlantic Renewable Fairfield
Marble River II
Marble River I
Noble Clinton
Noble Bliss
Noble Altona
Noble Ellenburg I
NYPA Gilboa Uprate
Community Energy Jordanville

2 Summary of Revised Analysis

2.1 Impact of Non Accepting Developers

Based on the results of the original cost allocation report and review of the individual project System Reliability Impact Studies, the NYISO staff has determined that with the remaining Class 2006 projects included in the second round, the New York State Bulk Power System still meets all Applicable Reliability Requirements.

2.2 ATRA

The revised ATRA Short Circuit Base case was created by removing the non-accepting project data and any system modification data that came with that project, one by one, from the original short circuit ATRA database. The revised base case was then re-run for fault currents at the same selected buses in the original case. The results are summarized in Tables 4.5.1-R2 and 4.5.2-R2 below.

Note that 29 substations that are highlighted in Table 4.5.1-R2 have the fault current exceeded their lowest circuit breaker rating; hence, the individual breaker analysis (IBA) was performed for these flagged substations and the results of IBA are showed in Table 4.5.2-R2.

As indicated in Tables 4.5.1-R2 and 4.5.2-R2, of 29 flagged substations, 16 substations have no overdutied breakers and 13 substations have 26 overdutied breakers. Of 26 overdutied breakers, (1) 3 overdutied breakers (e.g., Greenwood 115 BT, Dunkirk 115 R232-Tie, and Lockport 115 R233-Tie) were already identified in previous Class Year studies, Con Edison has replaced the identified overdutied breaker, and National Grid has plan to replace their overdutied breakers, (2) 20 overdutied breakers were the same breakers that were found overdutied in the ATBA case, and (3) the remaining 3 overdutied breakers were caused by the Class 2006 projects.

Note that in addition to 26 overdutied breakers identified above, 43 other breakers identified by NYSEG/RG&E are also overdutied, and they are described and showed in Section 4.6 and Table 4.6.1 of the original study report.

Table 4.5.1-R2 - Class Year 2006 ATRA Short Circuit Study (2011)

Fault duties on key buses in NYCA (1)

Substation	Lowest Bkr / Fuse Rating (kA)	3 L-G (kA)	2 L-G (kA)	1 L-G (kA)	Substation	Lowest Bkr / Fuse Rating (kA)	3 L-G (kA)	2 L-G (kA)	1 L-G (kA)
345 kV					138 kV				
ALPS	40	18.2	17.4	14.0	AST-EAST-E	63 (3)	42.9	45.8	46.0
ATHENS	50	33.5	32.4	29.6	AST-EAST-W	63 (3)	43.2	46.3	46.8
BUCHAN N	63	28.4	27.8	26.1	AST-WEST-N	45 (4)	40.0	44.3	46.1
BUCHAN S	40	37.9	37.1	34.3	AST-WEST-S	45 (4)	40.0	44.3	46.1
CLAY	41.8	34.3	33.6	28.6	BARRETT	57.84	46.8	47.9	47.8
COOPERS CRN	30.3	15.4	14.2	10.5	BRKHAVEN	35.44	26.6	26.2	23.0
DEWITT	40	20.1	19.2	15.9	BUCHANAN	40	15.6	15.0	13.8
DUNWOODIE	63	50.0	49.4	42.2	C.ISLIP	38.88	29.9	28.2	21.3
E FISHKILL	50	39.0	37.3	29.4	CANAL	63	13.0	14.8	15.4
EDIC	41.8	33.0	32.1	28.2	CARLE PL	63	41.1	39.8	33.0
EGC PAR	58.6	25.1	25.0	21.5	CORONA NORTH	63	39.6	44.3	39.2
FARRAGUT	63	48.6	50.1	48.7	CORONA SOUTH	63	39.3	43.8	38.7
FR KILLS	40	23.8	25.0	25.0	DUN NO	40	32.3	32.3	29.1
FRASER	29.1	17.3	16.5	13.8	DUN SO	40	30.1	30.5	29.0
GILBOA 345	40	22.5	22.7	22.3	E 13 ST	63	43.8	44.9	45.1
GOETHL N	40	24.8	26.6	27.2	E 179 ST	63	46.8	48.6	44.3
GOETHL S	63	24.8	26.6	27.2	E.G.C.	80	67.2	72.7	72.7
GOW N	63	19.9	20.4	18.6	ELWOOD 1	57.79	36.0	37.5	35.5
GOW S	40	19.9	20.5	18.5	ELWOOD 2	57.79	35.9	37.3	34.5
HMP HRBR	63	31.4	31.4	27.0	FOXHLS 2	40	33.2	33.7	26.9
HURLEY AVE.	40	17.0	16.2	12.3	FR KILLS	40	35.7	36.2	34.7
INDEPENDENCE	50	37.3	39.2	39.6	FREEPORT	63	31.9	32.4	32.0
LADENTOWN	63	37.5	37.3	33.6	GLNWD GT	57.79	43.8	43.2	39.3
LAFAYETTE	40	18.6	17.7	14.0	GLNWD NO	63	46.2	46.0	42.8
LEEDS	38.8	34.1	33.1	30.2	GLNWD SO	63	45.7	45.4	42.1
MARCY 345	63	32.1	31.2	26.9	GREENLWN	63	29.1	26.9	21.0
MIDDLETN TAP	63	16.7	15.5	12.3	GRENEWOOD	45 (5)	48.3	51.6	51.4
MILLWOOD	63	44.0	42.3	33.8	HAUPAGUE	63	22.1	21.3	17.5
MOTT HAVEN	63	42.6	43.6	39.0	HG 6	63	37.6	42.6	40.7
NIAGARA 345	63	31.6	33.2	33.7	HOLBROOK	52.22	48.1	48.1	45.8
NSCOT 99B	41.8	31.3	29.9	24.0	HOLTS GT	57.79	45.7	45.3	42.9
OAKDALE 345	30.5	12.4	12.0	10.9	HOLTS GT2	63	45.8	45.4	43.0
OSWEGO	38.8	30.2	32.2	32.9	HUDSON E	40	39.2	38.9	36.2
PLEASANT VAL	63	40.7	38.5	28.3	JAMAICA	40 (2)	47.9	49.7	45.4
POLETTI	63	37.6	38.5	33.3	LCST GRV	63	38.7	36.6	25.6
RAINEY	63	47.0	48.1	45.9	LKE SCSS	57.79	42.8	42.5	38.0
RAMAPO	40 (2)	40.6	40.3	36.1	MILLR PL	63	14.7	13.9	10.8
REYNOLDS	?	15.5	15.3	14.2	MILLWOOD	20	19.0	18.6	17.2
ROCK TAVERN	38	26.1	24.8	20.0	NEWBRID	80	65.9	71.5	73.8
ROSETON	38.8	34.4	33.5	30.4	NRTHPRT1	57.79 (2)	57.3	58.6	59.1
S080 345kV	40	16.9	16.5	15.4	NRTHPRT2	57.79	40.7	42.8	44.0
S122	40	16.9	16.4	14.8	OAKWOOD	57.79	28.1	26.8	19.6
SCRIBA	50	42.2	47.2	48.7	PILGRIM	56.56 (2)	57.4	58.7	50.6
SHM CRK	63	31.9	31.6	24.4	PT JEFF	63	29.1	31.3	32.3
SHORE RD	63	27.6	27.3	21.3	QUEENSBG	45	39.1	44.5	43.1
SPRN BRK	63	51.2	50.6	43.3	RIVERHD	36.21	16.5	18.0	18.7
STOLLE ROAD	28.8	3.9	3.7	3.3	RNKNKOMA	57.79	38.5	36.7	30.4
VOLNEY	38.8	37.0	37.6	32.6	ROSLYN	57.79	30.2	28.7	22.0
W 49 ST	63	43.8	44.9	41.7	RULND RD	63	46.5	45.2	42.3
W.HAV345	40	27.4	27.2	25.7	SHM CRK	63	44.4	45.4	39.7
WATERCURE345	29.5	7.7	7.4	6.5	SHORE RD	57.79	50.0	50.3	47.1
WAWAYANDA	40	15.9	14.7	11.3	SHOREHAM	52.22	24.8	25.0	24.4
230 kV					SILLSROAD	63	33.0	33.2	32.2
ADIRONDACK	37.7	10.2	9.8	8.1	SYOSSET	38.88	33.6	32.2	25.7
AVOCA GAS	?	5.6	5.4	5.1	VERNON E	40	34.9	36.3	36.9
D-SAWYER77	40	26.3	25.9	24.5	VERNON W	40	31.3	32.4	32.4

Substation	Lowest Bkr / Fuse Rating (kA)	3 L-G (kA)	2 L-G (kA)	1 L-G (kA)	Substation	Lowest Bkr / Fuse Rating (kA)	3 L-G (kA)	2 L-G (kA)	1 L-G (kA)
230 kV					138 kV				
DUNKIRK	37.7	14.9	15.0	15.1	VLV STRM	57.79	51.1	53.0	50.8
GARDENVILLE1	37.5	22.2	21.5	19.6	WADNGRV1	56.39	23.7	23.8	23.4
GOETHALS	?	43.6	43.4	42.3	WHAV	42	25.0	24.5	23.2
HILLSIDE 230	25	11.5	11.7	11.6	WILDWOOD	56.39	22.5	22.5	21.8
HUNTLEY	37.7	27.1	26.8	25.7	115 kV				
MEYER	35.8	6.3	6.1	5.7	OAKDALE	40	26.3	28.5	29.2
NIAGRA E 230	63	50.9	55.5	56.9	ONEIDA	25.1	15.6	14.5	12.1
NIAGRA W 230	63	50.9	55.5	56.9	PLATTSBURGH	25	16.3	16.7	16.7
OAKDALE	21.3	6.4	6.4	6.1	PORTER	43	39.6	41.8	42.9
PACKARD	50	43.5	43.6	40.4	REYNOLDS RD	40	39.4	38.4	35.1
PORTER	25.1	20.2	20.7	20.7	ROBINSON RD.	38	19.9	19.7	19.0
ROBINSON RD.	32.1	14.5	13.7	11.5	ROCK TAVERN	30.1	27.2	26.4	24.4
ROTTERDAM77H	25.1	12.8	12.5	12.0	ROTT99G	40	32.6	33.4	33.5
ROTTERDAM99H	25.1	12.8	12.5	12.0	S. PERRY	7.1	6.6	6.9	6.8
S RIPLEY	40	9.0	8.6	6.9	SALISBURY 3	?	9.1	9.8	10.0
SHELDON	?	8.2	7.6	5.8	SPIER77G	40	17.0	17.0	16.8
ST LAWRN 230	37.7	29.5	33.3	34.4	STOLLE ROAD	25	14.8	14.0	12.3
STOLLE ROAD	28.8	13.0	12.2	9.9	VALLEY	40	8.4	7.9	7.1
WATERCURE230	27.5	11.5	11.6	11.5	WHITMAN	10.5	8.3	7.6	5.7
WILLIS 230	40	12.2	11.5	9.2	WILLIS 115	50	10.9	10.0	7.9
115 kV					WOOD ST.	40	14.1	14.4	14.2
ALBANY STM1	63	19.0	18.7	18.3	69 kV				
BALLSTON1	40	6.7	6.4	5.4	BRKHAVEN	26.1 (4)	26.4	26.9	27.1
BATH #4	20	4.9	4.5	3.2	E RIVER	50 (2)	45.5	49.6	51.8
BENNETT	6.6	4.9	4.6	4.1	E.G.C.1	29.3 (4)	45.4	43.2	33.3
BETHLEHEM	50.2	19.5	18.9	16.9	GRUMMANB	31.5 (2)	32.5	30.5	27.1
COOPERS CRN4	20.6	12.1	13.8	14.3	HOLBRK1	39.5 (4)	43.5	40.4	34.8
CORTLAND N.	25.1	6.2	5.6	3.8	LEVTTOWN	26.1 (2)	35.5	33.4	28.5
DUNKIRK M1	12.6 (5)	18.9	20.3	20.8	LKE SCSS	40 (4)	43.8	42.8	40.7
E WALDEN	17.39 (2)	21.5	20.4	16.6	RULAND	39.9 (4)	47.7	43.4	28.3
FENNER WINDP	40	7.3	6.6	4.7	TBG 5E	31.5 (2)	32.4	30.4	27.1
FLAT ST.	22.7	8.5	7.9	6.3	TBG 5EU-1	31.5 (2)	32.4	30.4	27.1
FRASER	40	11.0	11.7	12.0	TBG 5EU-2	31.5 (2)	32.4	30.4	27.1
FUERA BUSH33	40	30.7	29.7	28.4	46 kV				
GARDENVILLE1	43	37.3	37.2	36.5	E NORWICH 1	5.5	5.4	4.7	1.5
GOUDEY #4	23.9 (2)	23.6	24.7	25.2	34.5 kV				
GOUDEY #8	23.9 (2)	22.9	24.0	24.5	ATLANTA	6	4.9	4.5	4.0
GREENBUSH	50.2	39.3	38.4	34.6	BENNETT	7.3	6.0	6.5	6.5
GREENIDGE #4	16.2	12.6	11.7	9.5	BIG TREE	21	14.1	14.6	14.6
GROOMS RD	40	9.3	8.5	6.5	BORDER CITY4	14.8	13.5	11.8	4.1
HARRISON	35.9	25.3	24.4	23.3	EELPOT RD	22	6.1	6.5	6.4
HARRISONIPP1	35.9	23.4	22.5	21.3	FERNDAL	7.65	7.6	6.6	2.1
HARRISONIPP2	35.9	23.2	22.4	21.2	FOURTEENTH	14.8	14.2	12.5	3.7
HICKLING #4	7.2 (4)	6.7	7.3	7.4	GREEN ST	7.7 (2)	9.2	8.5	6.6
HICKLING #8	7.2 (2)	6.7	7.3	7.4	N GARDENVLLE	21	18.0	15.8	3.9
HILLSIDE #4	21.1	16.2	17.3	17.8	NAPLES	6	3.5	3.3	2.7
HILLSIDE #8	16.2 (4)	16.1	17.3	17.8	SENECA FALLS	7.7 (2)	8.5	7.7	5.0
INGHAM99G	25.1	10.5	10.4	10.1	WALLACE	7.4	2.2	2.1	1.3
LOCKPORT E	25.1 (5)	30.1	27.8	21.5	WAYLAND	8.3	4.3	3.8	2.3
LONG LANE	40	17.4	16.8	15.4	Notes:				
MECO	40	6.0	5.7	4.8	(1) Case modeled Astoria 3, 4 connected to Astoria West and Astoria 5 connected to Astoria East.				
MENANDS 77G	40	32.3	31.0	27.2	(2) IBA indicates that no circuit breaker is overdutied.				
MEYER	18.9	10.2	10.2	10.2	(3) The bus fault current will be higher if case modeled Astoria 3 connected to Astoria West and Astoria 4, 5 connected to Astoria East, but will not be higher than the lowest breaker rating.				
MONTOUR #4	22.3	12.4	11.5	9.5	(4) Identified circuit breaker(s) at this substation need to be replaced.				
MONTOUR #8	15	12.4	11.5	9.5	(5) TO plans to replace or already replaced the overdutied breaker(s).				
N TROY77G	25.1	17.7	17.0	14.9					
NGARDENV(NY)	43	37.3	37.1	36.5					
NSCOT33	50	48.8	49.2	48.8					

**Table 4.5.2-R2
Individual Breaker Analysis –ATRA-- ROUND 2**

Owner	Station	kV	Breaker	Breaker Rating (kA)	ATRA					
					3LG (kA)	% of Rating	2LG (kA)	% of Rating	1LG (kA)	% of Rating
CH	E WALDEN	115	D-722	17.4	Nothing changed in the Round 2 ATRA base case would result in overdutying these breakers					
			DW-1071	17.4						
			EM-642	20.9						
			W-644	20.9						
CONED	RAMAPO	345	T-1500-W72-2	40	Nothing changed in the Round 2 ATRA base case would result in overdutying these breakers					
			T-77-94-2	40						
	AST-WEST	138	1N	45	These breakers were identified to be overdutied in the ATBA base case					
			1S	45						
			2N	45						
			8N	45						
			9N	45	Nothing changed in the Round 2 ATRA base case would result in overdutying these breakers					
			G1N	45						
			G2N	45						
			G4WN	45						
	GRENWOOD	138	BT	45	This breaker was replaced by a 63 kA breaker					
	JAMAICA	138	8	40	Nothing changed in the Round 2 ATRA base case would result in overdutying these breakers					
			13	40						
			14	40						
			1	45						
			3	45						
			4	45						
			6	45						
			7	45						
	E RIVER	69	53	50	Nothing changed in the Round 2 ATRA base case would result in overdutying these breakers					
			63	50						
			73	50						
			83	50						
			GEN6	50						
NGRID	DUNKIRK M1	115	R232-Tie	12.6	Will be replaced by a 5000 MVA (25 kA) breaker					
	LOCKPORT E	115	R244-Tie	25.1	Will be replaced by a 10000 MVA (50 kA) breaker					
LIPA	NRTHPRT1	138	1310	57.8/57.8/60.5	Nothing changed in the Round 2 ATRA base case would result in overdutying these breakers					
			1320	57.8/57.8/60.5						
			1450	57.8/57.8/60.5						
	PILGRIM	138	1410	56.56/56.56/60.5	54.42	96.2%	55.74	98.5%	47.72	78.9%
	BRKHAVEN	69	6020	26.1/26.1/27.2	26.35	101.0%	26.85	102.9%	27.07	99.5%

		6080	26.1/26.1/27.2	Nothing changed in the Round 2 ATRA base case would result in overdutying these breakers					
		6500	27.3/27.3/28.6						
E.G.C.1	69	6010	40	These breakers were identified to be overdutied in the ATBA base case					
		6030	40						
		6050	40						
		6060	29.3						
		6100	40						
		6110	40	Nothing changed in the Round 2 ATRA base case would result in overdutying this breaker					
		6270	40	This breaker was identified to be overdutied in the ATBA base case					
		6310	43	Nothing changed in the Round 2 ATRA base case would result in overdutying this breaker					
		6610	40	These breakers were identified to be overdutied in the ATBA base case					
		6620	41.8						
GRUMMANB	69	610	31.5	Nothing changed in the Round 2 ATRA base case would result in overdutying these breakers					
		620	31.5						
HOLBRK1	69	6500	43	Nothing changed in the Round 2 ATRA base case would result in overdutying these breakers					
		6610	39.9/39.9/41.8						
		6620	39.9/39.9/41.8						
		6700	43	43.49	101.1%	40.40	94.0%	34.76	80.8%
		6900	43	43.49	101.1%	40.40	94.0%	34.76	80.8%
LEVTTOWN	69	620	26.1/26.1/27.2	26.08	99.9%	24.35	93.3%	20.90	80.1%
		650	27.3/27.3/28.6	Nothing changed in the Round 2 ATRA base case would result in overdutying this breaker					
LKE SCSS	69	620	43	Nothing changed in the Round 2 ATRA base case would result in overdutying these breakers					
		630	40						
		640	40	These breakers were identified to be overdutied in the ATBA base case					
		650	43						
		660	43	Nothing changed in the Round 2 ATRA base case would result in overdutying these breakers					
		670	43						
		6500	43	These breakers were identified to be overdutied in the ATBA base case					
		6600	43						
RULAND	69	6020	39.9/39.9/41.8	This breaker was identified to be overdutied in the ATBA base case					
		6500	40	Nothing changed in the Round 2 ATRA base case would result in overdutying this breaker					
		6610	39.9/39.9/41.8	This breaker was identified to be overdutied in the ATBA base case					
TBG 5E	69	6630	31.5	31.42	99.7%	29.25	92.9%	25.02	79.4%
		6640	31.5	Nothing changed in the Round 2 ATRA base case would result in overdutying this breaker					
TBG 5EU-1	69	6670	31.5	31.41	99.7%	29.24	92.8%	25.01	79.4%

	TBG 5EU-2	69	6660	31.5	Nothing changed in the Round 2 ATRA base case would result in overdutying this breaker					
NYSEG	GOUDEY #4	115	GOU B7-02	23.9	Nothing changed in the Round 2 ATRA base case would result in overdutying this breaker					
	GOUDEY #8	115	GOU B8-02	23.9	Nothing changed in the Round 2 ATRA base case would result in overdutying this breaker					
	HICKLING #4	115	HIC 95822	7.2	Nothing changed in the Round 2 ATRA base case would result in overdutying this breaker					
			HIC B2-22	7.2	This breaker was identified to be overdutied in the ATBA base case					
	HICKLING #8	115	HIC B1-22	7.2	Nothing changed in the Round 2 ATRA base case would result in overdutying this breaker					
	HILLSIDE #8	115	HIL 96012	16.2	This breaker was identified to be overdutied in the ATBA base case					
	GREEN ST	34.5	GRE 50492	7.7	Nothing changed in the Round 2 ATRA base case would result in overdutying these breakers					
			GRE 50592	7.7						
	SENECA FALLS	34.5	SEN 56172	7.7	Nothing changed in the Round 2 ATRA base case would result in overdutying these breakers					
			SEN 56272	7.7						
			SEN 56772	7.7						

2.3 Fault Current Contribution from Class 2006 Projects

Table 4.5.4-R2 below shows the change in fault current at selected buses when Class 2006 projects are removed one at a time. This table illustrates the individual project's fault contribution on these selected buses that contain "Headroom" or where circuit breakers need to be replaced. Detailed analysis is included in Appendix A.

Table 4.5.4-R2 - Fault Contribution Impact of Projects

Take one project out of service at a time to measure its fault contribution impact on previous Class Year SUFs' Headroom or Class Year 2006 substations with overdutied breaker(s)

Substation	Highest Bus Fault (A) (1)	Fault Type	Cross Hudson	Caithness	Linden VFT	Munnsville	Canandaigua	West Hill	Fairfield	Marble River II	Marble River I	Noble Clinton	Bliss	Altona	Ellensburg	Gilboa	Jordanville
Class Year 2001 Headroom																	
<u>345 kV</u>																	
FARRAGUT	50082	2LG	3141	2	102	0	0	0	0	0	0	0	0	0	0	0	0
RAINEY	48146	2LG	2549	1	74	0	0	0	0	0	0	0	0	0	0	0	0
SPRN BRK	51216	468	468	13	-4	0	0	0	1	1	0	0	0	0	0	0	2
<u>138 kV</u>																	
AST-EAST-E	45987	1LG	18	0	-4	0	0	0	0	0	0	0	0	0	0	0	0
AST-EAST-W	46769	1LG	19	0	-4	0	0	0	0	0	0	0	0	0	0	0	0
AST-WEST	46091	1LG	27	0	-10	0	0	0	0	0	0	0	0	0	0	0	0
CORONA (N)	44296	2LG	20	0	-4	0	0	0	0	0	0	0	0	0	0	0	0
CORONA (S)	43814	2LG	20	0	-4	0	0	0	0	0	0	0	0	0	0	0	0
E 13 ST	45109	1LG	990	0	3	0	0	0	0	0	0	0	0	0	0	0	0
GRENWOOD	51638	2LG	64	0	128	0	0	0	0	0	0	0	0	0	0	0	0
QUEENSBG	44466	2LG	27	0	-9	0	0	0	0	0	0	0	0	0	0	0	0
SHM CRK	45392	2LG	85	1	-7	0	0	0	0	0	0	0	0	0	0	0	0
<u>69kV</u>																	
E RIVER	51769	1LG	239	0	-18	0	0	0	0	0	0	0	0	0	0	0	0
Catch-up Class Year (2003-2005) Headroom																	
<u>138 kV</u>																	
E.G.C	72721	2LG	70	207	-7	0	0	0	0	0	0	0	0	0	0	0	0
<u>69 kV</u>																	
RULAND	47747	3LG	9	138	-3	0	0	0	0	0	0	0	0	0	0	0	0
ATRA Class Year 2006 Substations with Overdutied Breaker(s)																	
<u>69 kV</u>																	
BRKHAVEN	27068	1LG	1	844	-1	0	0	0	0	0	0	0	0	0	0	0	0
HOLBRK1	43494	3LG	2	1066	-1	0	0	0	0	0	0	0	0	0	0	0	0

Notes:

(1) All projects are in service, ATRA case.

2.4 System Upgrade Facilities

2.4.1 SUFs identified in the ATRA Short Circuit Assessment

Table 4.5.2-R2 and Table 4.6.1 of the original study report identify 69 circuit breakers that will see fault duties higher than their rating. Of 69 overdutied breakers, 65 breakers are the same breakers that are found overdutied in the ATBA case, and their cost responsibility lies with the respective TOs; hence, the remaining 4 circuit breakers become the responsibility of the Class 2006 Project Developers.

Of 4 circuit breakers, as discussed in Section 4.6 of the original study report, one breaker at Goudey #4 115 kV substation will be the responsibility of NYSEG/RG&E since none of Class 2006 projects has the fault current impact on the Goudey #4 115kV substation more than de minimus impact. The cost replacement of the Goudey circuit breaker is \$185,000.

Table 5.2.1-R2 below summarizes the other remaining 3 overdutied circuit breakers and their replacement cost.

Table 5.2.1 - SUFs needed as a result of ATRA

Station	kV	Breaker	Breaker Rating (kA)	Max Fault (kA)	Fault Type	% of Rating	Replaced Rating (kA)	Estimated Replaced Cost (\$)
BRKHAVEN	69	6020	26.1	26.88	2LG	103.0%	43	\$ 120,000
HOLBRK1	69	6700	43	43.58	3LG	101.4%	63	\$ 180,000
		6900	43	43.58	3LG	101.4%	63	\$ 180,000
Total Estimated Replacement Cost:								\$ 480,000

Based on the above discussion, the total cost estimate that the Class 2006 projects are responsible for is \$480,000. Note that this total cost estimate that Class 2006 projects are responsible for is less than the cost estimate (\$2,020,000) provided in the original study since Class 2006 projects are now responsible for only three overdutied circuit breakers instead of eight overdutied circuit breakers.

Following the rules under Attachment S, this cost responsibility is shared among all those Project Developers that have at least a de minimus (100 Amperes) impact on that SUF. Further, the cost is shared according to each project's pro rata impact on that SUF. Table 5.2.2-R2 below shows the fault current contribution of each of the Class 2006 projects and their dollar impact on the affected substations.

**Table 5.2.2-R2 - Impact of projects on the affected substations and their cost allocation
(Developers responsibility)**

Brook Haven 69 kV

Total circuit breakers to be replaced:	1	Breaker ID 6020
Developers responsibility:	1	
Estimated Cost / Circuit Breaker	\$120,000	to install 43 kA circuit breaker
Total Cost: Developers responsibility:	\$120,000	

Cost Allocation using 100 amps De Minimus rule

Project	Contribution (Amps)	% Contribution	Cost (\$)
Caithness	844	100.00	\$120,000
Total	844	100.00	\$120,000

Holbrook 69 kV

Total circuit breakers to be replaced:	2	Breaker ID 6700, 6900
Developers responsibility:	2	
Estimated Cost / Circuit Breaker	\$180,000	to install 63 kA circuit breaker
Total Cost: Developers responsibility:	\$360,000	

Cost Allocation using 100 amps De Minimus rule

Project	Contribution (Amps)	% Contribution	Cost (\$)
Caithness	1066	100.00	\$360,000
Total	1066	100.00	\$360,000

2.4.2 SUFs Identified via Attachment Facilities Studies

Since some of the Project Developers did not accept their cost allocation during the “Initial Decision Period”, the cost allocation of SUFs that are required to be replaced, upgraded or built in order for Class Year projects to reliably interconnect into the system will be changed for the Canandaigua I project. As identified in the Canandaigua I Attachment Facilities report, 070327 CS Facilities Study.pdf, Canandaigua I is solely responsible for the SUFs cost at Hillside and Meyer 230 kV substations. Their cost responsibility will be \$3,060,000 instead of \$2,289,000 as described in the original study.

Note that based on the update information from National Grid, the SUFs cost associated with the modifications of the Valley and Inghams 115 kV substations for the PPM/Atlantic Renewable Fairfield project to reliably interconnect to the National Grid system will be \$872,194, instead of \$1,081,219. This SUFs cost is solely responsible by the PPM/Atlantic Renewable Fairfield project. For more details of the cost estimate, see the Fairfield Attachment Facilities report, INTERCONNECTION FACILITIES REPORT 121206.pdf.

In addition, the SUFs cost associated with the modifications to the Arcade substation and other remote substations to accommodate the Noble Bliss I project will be \$6,876,834 instead of \$6,851,976. This SUFs cost is solely responsible by the Noble Bliss I project. For more details of the cost estimate, see the Noble Bliss I Facilities study report, INTERCON FAC STUDY RPT FOR NobleBliss June 8 07.pdf.

Based on the changes described above, the SUFs cost identified via the Attachment Facilities studies will be \$38,763,584 instead of \$43,773,551.

2.5 Headroom Usage

Each of the Headroom substations identified in Table 4.5.4-R2 carries a certain \$/Amp cost based on Class 2001 and Catch-up Class 2003-2005 cost allocation studies and modified with appropriate depreciation factors (see Table 6.0 in the original report for more details). The fault current contribution multiplied by \$/Amp cost determines the value of Headroom usage at each of these substations. If the fault current contribution is less than *de minimus value* (100 Amperes), then the cost is assumed to be zero according to Attachment S rules.

Table 4.5.4-R2 identifies the fault current impact of each of the remaining Class 2006 projects on Headroom substations. Note that 12 of the remaining Class 2006 projects have the fault contribution from each of the Class 2006 projects less than *de minimus value* at the Headroom substations, and therefore, their cost of Headroom usage is zero dollars. The cost of using Headroom for each of the three other remaining Class 2006 projects is identified in Table 6.2-R2 below.

Note that the Headroom usage cost (\$5,640,538) is substantially less than the Headroom usage cost (\$16,173,671) identified in the original study since TransGas project is dropped out. Of the original \$16,173,671 Headroom usage cost, TransGas was identified to be responsible for \$10,631,915.

It's also noted that dropping out of TransGas project has altered the system network impedance resulted in Linden VFT project would increase its fault current impact at the Farragut 345 kV substation from 98 Amperes to 102 Amperes; hence, the Linden VFT project is now responsible for a Headroom usage cost of \$113,745 at the Farragut 345 kV substation instead of \$0 as identified in the original study.

Table 6.2-R2 - Cost of Using Headroom (1) (2)

Substation	Value of Hdrrm (\$/A) (3)	Cross Hudson		Caithness		Linden VFT		Total Cost
		(A)	(\$)	(A)	(\$)	(A)	(\$)	
Cost of Using Class Year 2001 Headroom								
<u>345 kV</u>								
FARRAGUT	\$1,110.79	3141	\$3,488,448	0	\$0	102	\$113,745	\$3,602,194
RAINEY	\$649.78	2549	\$1,656,101	0	\$0	0	\$0	\$1,656,101
SPRN BRK	\$710.16	468	\$332,641	0	\$0	0	\$0	\$332,641
<u>138 kV</u>								
AST-EAST-E	\$150.17	0	\$0	0	\$0	0	\$0	\$0
AST-EAST-W	\$161.23	0	\$0	0	\$0	0	\$0	\$0
AST-WEST	\$0.00	0	\$0	0	\$0	0	\$0	\$0
CORONA (N)	\$144.79	0	\$0	0	\$0	0	\$0	\$0
CORONA (S)	\$121.92	0	\$0	0	\$0	0	\$0	\$0
E 13 ST	\$34.90	0	\$0	0	\$0	0	\$0	\$0
GREWOOD	\$14.53	990	\$14,383	0	\$0	128	\$1,854	\$16,237
QUEENSBG	\$293.20	0	\$0	0	\$0	0	\$0	\$0
SHM CRK	\$232.07	0	\$0	0	\$0	0	\$0	\$0
<u>69kV</u>								
E RIVER	\$105.03	239	\$25,144	0	\$0	0	\$0	\$25,144
Cost of Using Catch-up Class Year (2003-2005) Headroom								
<u>138 kV</u>								
E.G.C	\$35.29	0	\$0	207	\$7,295	0	\$0	\$7,295
<u>69 kV</u>								
RULAND	\$6.71	0	\$0	138	\$927	0	\$0	\$927
Total Cost			\$ 5,516,717		\$ 8,222		\$ 115,599	\$5,640,538

Notes:

- (1) Projects with fault contribution less than de minimus have been assigned zero cost in accordance with Attachment S rules
- (2) Headroom usage calculation could be impacted by subsequent changes in LIPA's transmission plans
- (3) Value of Headroom is obtained from Table 6.0 of the original Class 2006 Facilities Study

2.6 Project Cost Allocation

The Transmission Owner cost was identified in the ATBA in the original report and is approximately \$6,590,000 to replace various breakers at various substations, and this cost estimate does not include the cost estimate of replacement of some breakers by Con Edison and AES generation owner. In addition, it does not include the cost of replacement of some potential NYSEG/RG&E overdutied breakers.

The Project Developer cost is summarized in Table 7.2.1-R2 below:

Table 7.2.1-R2 – Project Developer Cost Allocation Summary

Project Developer	2001 Headrm Usage (\$)	Catch-up Headrm Usage (\$)	Circuit Breaker at Brkhven 69 kV (\$)	Circuit Brks at Holbrk 69 kV (\$)	“Other” SUFs identified via AF studies (\$)	Total Cost (\$)
Cross Hudson	\$5,516,717	\$0	\$0	\$0	\$0	\$5,516,717
Caithness	\$0	\$8,222	\$120,000	\$360,000	\$3,062,000	\$3,550,222
Linden VFT	\$115,599	\$0	\$0	\$0	\$10,465,000	\$10,580,599
Munnsville	\$0	\$0	\$0	\$0	\$30,000	\$30,000
Canandaigua	\$0	\$0	\$0	\$0	\$3,060,000	\$3,060,000
West Hill	\$0	\$0	\$0	\$0	\$371,439	\$371,439
Fairfield	\$0	\$0	\$0	\$0	\$872,194	\$872,194
Marble River II	\$0	\$0	\$0	\$0	\$2,330,132	\$2,330,132
Marble River I	\$0	\$0	\$0	\$0	\$2,330,132	\$2,330,132
Noble Clinton	\$0	\$0	\$0	\$0	\$2,413,466	\$2,413,466
Bliss I	\$0	\$0	\$0	\$0	\$6,876,834	\$6,876,834
Altona	\$0	\$0	\$0	\$0	\$2,413,465	\$2,413,465
Ellensburg I	\$0	\$0	\$0	\$0	\$2,413,465	\$2,413,465
Gilboa	\$0	\$0	\$0	\$0	\$0	\$0
Jordanville	\$0	\$0	\$0	\$0	\$2,125,457	\$2,125,457
Total Cost :	\$5,632,316	\$8,222	\$120,000	\$360,000	\$38,763,584	\$44,884,122

2.7 Headroom Cost Reimbursement

Table 6.2-R2 reveals that 3 of the remaining Class 2006 projects use more than the *de minimus* value (100 Amperes) of Headroom at the identified Headroom substations. Table 7.3.1-R2 below shows how much Headroom money is collected and how it is distributed among the Headroom owners.

Table 7.3.1-R2 – Headroom Reimbursement

Project Developer	2001 Headroom Reimbursement				Catch-up Hdrm Reimbursement		Total (\$)
	(\$)	To	To	To	(\$)	To	
		East River	NYPA	SCS Astoria		Neptune	
		46.12%	31.09%	22.78%		100.00%	
Cross Hudson	\$5,516,717	\$2,544,486	\$1,715,335	\$1,256,896	\$0	\$0	\$5,516,717
Caithness	\$0	\$0	\$0	\$0	\$8,222	\$8,222	\$8,222
Linden VFT	\$115,599	\$53,318	\$35,944	\$26,337	\$0	\$0	\$115,599
Munnsville	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Canandaigua	\$0	\$0	\$0	\$0	\$0	\$0	\$0
West Hill	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Fairfield	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Marble River II	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Marble River I	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Noble Clinton	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Bliss I	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Altona	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Ellenburg I	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Gilboa	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Jordanville	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Payments		\$2,597,804	\$1,751,279	\$1,283,233		\$8,222	\$5,640,538

3 Appendices

Appendix A—Fault Current Contribution from Class 2006-Round 2 Projects

CROSS HUDSON PROJECT

ENVIRONMENTAL MANAGEMENT AND CONSTRUCTION PLAN

ATTACHMENT K

CABLE DESIGN SPECIFICATIONS

Land Cable

Table 1-1. Constructional Data of Fluid-Filled Cable

No.	Item		Unit	Specification	
1	Oil passage diameter		in (mm)	Nom.0.55 (14.0)	
2	Galvanized steel spiral (thickness)		mils (mm)	Approx. 31.5 (0.8)	
3	Copper conductor	Size	sq.mm	2000	
		Shape	-	Compacted 6 segmental	
		Outer diameter	inch (mm)	Approx.2.27 (57.6)	
4	Separator Tapes between segments		-	Applied	
5	Binder tape thickness (Stainless steel tape intercalated carbon black paper tape)		mils	Approx. 10 in total	
6	Conductor screen thickness (Carbon black paper tapes and metalized paper tape)		mils	Approx. 15 in total	
7	Insulation paper thickness, min. average	Inner kraft paper tape, approx.	mils (mm)	Min. Ave. 708.7 (18.0)	19.7 (0.5)
		PPLP, approx.	mils (mm)		531 (13.5)
		Outer kraft paper tape, approx.	mils (mm)		157 (4.0)
8	Insulation screen (Carbon black paper tape and metalized paper tape intercalated carbon black paper tape)		mils	Approx. 16 in total	
9	Binder (Copper woven fabric tape)		mils (mm)	Approx. 12 (0.3)	
10	Corrugated aluminum sheath	Thickness	mils (mm)	Min. Ave. 94.5 (2.4)	
		Shape of corrugate	-	Helical	
		Outside diameter	inch (mm)	Approx. 4.49 (114)	
11	Anti corrosion compound		-	Bitumen compound	
12	Anti-corrosion jacket (Black Polyethylene)		mils (mm)	Min. Ave 177 (4.50)	
13	Graphite coating		-	Applied	
Performance Data					
	Overall diameter		inch (mm)	Approx. 4.92 (125)	
	Weight		lbs/ft (kg/m)	Approx. 20.8 (31)	
	Max. D.C. conductor resistance at 20°C		Ohm/km	0.009	
	Max. electrical capacitance of insulation		μ F/km	0.35	
	Cable fluid volume of completed cable approx.		Lr/km	3,310	
	Maximum allowable conductor temperature		°C	90 (Continuous) 105 (Emergency over load)	
	Maximum allowable pressure		kg/cm2	8.0 (Static) 14.0 (Transient)	
	Minimum allowable bending radius		mm	2,170 (85") (Set) 2,700 (106") (during pulling)	
	Maximum allowable side wall pressure		kN/m	4.9	
	Maximum allowable pulling tension		kN	137.2	

Redacted as Proprietary Information

Figure 1 Cross section of 345kV PPLP-SCFF Cable

In-Water Cable

Table 1-1. Constructional Data of Fluid-Filled Cable

No.	Item		Unit	Specification	
1	Oil passage	(diameter)	in (mm)	Nom.0.71 (18.0±1.0)	
2	Galvanized steel spiral thickness		mils (mm)	Approx. 31.5 (0.8)	
3	Copper conductor	Size	sq.mm	2500	
		Shape	-	Compacted 6 segmental	
		Outer diameter	inch (mm)	Approx.2.56 (65.1)	
4	Separator Tapes between segments		-	Applied	
5	Binder tape thickness (Stainless steel tape intercalated carbon black paper tape)		Mils	Approx. 10 in total	
6	Conductor screen thickness (Carbon black paper tapes and metalized paper tape)		Mils	Approx. 15 in total	
7	Insulation paper thickness Minimum average	Inner kraft paper tape, approx.	mils (mm)	Min. ave. 748.0 (19.0)	19.7 (0.5)
		PPLP, approx.	mils (mm)		551 (14.0)
		Outer kraft paper tape, approx	mils (mm)		177 (4.5)
8	Insulation screen (Carbon black paper tape and metalized paper tape intercalated carbon black paper tape)		Mils	Approx. 16 in total	
9	Binder (Copper woven fabric tape)		mils (mm)	Approx. 12 (0.3)	
10	Lead alloy sheath	Thickness	mils (mm)	Min. Ave. 157 (4.0)	
		Outside diameter	inch (mm)	Approx. 4.49 (114)	
11	Reinforcement thickness (Fibrous tapes and stainless tapes)		Mils	Approx. 43 in total	
12	Return conductor total area (2 layers of copper flat tape)		(sq.mm)	Approx. 2,310	
13	Binder tape thickness (Rubber coated fabric tape)		mils (mm)	Approx. 24 (0.6)	
14	Anti-corrosion jacket (Black Polyethylene)		mils (mm)	Min. Ave 177 (4.50)	
15	Optical fiber unit diameter		mils (mm)	Approx. 157 (4.0)	
16	Binder Tape thickness		Mils (mm)	Approx. 20 (0.5)	
17	Bedding (polypropylene yarn)		mils (mm)	Approx. 59 (1.5)	
18	Galvanized steel wire armour diameter		mils (mm)	Nom. 315 (8.0)	
19	Serving (polypropylene yarn)		mils (mm)	Approx. 161 (4.1)	
Performance Data					
Overall diameter			inch (mm)	Approx. 7.28 (185)	
Weight			lbs/ft (kg/m)	Approx. 70.6 (105)	
Max. D.C. conductor resistance at 20°C			ohm/km	0.00732	
Max. electrical capacitance of insulation			μ F/km	0.37	
Cable fluid volume of completed cable approx.			Lr/km	2,810	
Maximum allowable conductor temperature			°C	90 (Continuous) 105 (Emergency over load)	
Maximum allowable pressure			kg/cm2	6.0 (Static) 11.0 (Transient)	
Minimum allowable bending radius			mm	4,570 (180")	

Redacted as Proprietary Information

19. Serving

Figure 1 Cross section of 345kV PPLP-SCFF Submarine Cable

Cable Oil Properties

MATERIAL SAFETY DATA SHEET

Note: Read and understand Material Safety Data Sheet before handling or disposing of product.

Issued date: 22 March 2006

MSDS No. 44047

SECTION 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

COMPANY IDENTIFICATION

NIPPON OIL CORPORATION

3-12, Nishi Shimbashi 1-chome, Minato-ku, Tokyo, 105-8412
Japan

EMERGENCY TELEPHONE NUMBER:

+81-3-3502-9168

TELEPHONE NUMBER FOR INFORMATION:

+81-3-3502-1111

FAX NUMBER FOR INFORMATION:

+81-3-3502-9365

PRODUCT NAME:

EHV CABLE OIL (LAB)

PRODUCT USE:

Cable oil

SECTION 2. COMPOSITION / INFORMATION ON INGREDIENTS

COMPOSITION

<u>Components</u>	<u>Amount(%)</u>	<u>Limit</u>
Linear alkyl benzene	100	

Hazardous information

No OSHA exposure standard or TLV has been established for this material.

SECTION 3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Warning statement:

Caution! Prolonged or repeated contact with skin may cause irritation in some cases.

Precautionary Measures:

Avoid breathing vapor and mist. Keep container closed.

Avoid contact with eyes, skin, and clothing.

Wash thoroughly after handling. Keep away from heat.

Potential health effect:

Eyes: May cause minor irritation.

Skin: May cause minimal skin irritation.

Inhalation: Vapor or mist, in excess of permissible concentrations, or in unusually high concentrations generated from spraying, heating the material, or as from exposure in poorly ventilated areas or confined spaces, may cause irritation of the nose and throat, headache, nausea, and drowsiness.

Ingestion: May cause abdominal discomfort, nausea, or diarrhea.

Sensitization properties: Unknown

Chronic Properties: If prolonged exposure occurs, nausea, headache, diarrhea, and physical discomfort.

Other remarks: None

SECTION 4. FIRST AID MEASURES

Eyes: Flush immediately with water for at least 15 minutes. Get immediate medical attention.
Skin: Wash with soap and water. Get medical attention if irritation develops.
Launder contaminated clothing before reuse.
Inhalation: Remove exposed person to fresh air if adverse effects are observed.
Ingestion: Do not make person vomit unless directed to do so by medical personnel.
Note to physician: Treat symptomatically.

SECTION 5. FIRE FIGHTING MEASURES

Flash point (Typical), °C 146 (PM)
Autoignition temp., °C Not Determined.
Flammability limits: Not Determined.
Extinguishing media: CO₂, dry chemical, or foam.
Special fire fighting procedures: Recommend wearing self-contained breathing apparatus. Water may cause splattering. Material will float on water.
Unusual fire & explosion hazards: Toxic fumes, gases or vapors may evolve on burning.
Autoignition temperature: Not determined.
Explosion data: Material does not have explosive properties.

SECTION 6. ACCIDENTAL RELEASE MEASURES**Procedures in Case of Accidental Release, Breakage or Leakage:**

Stop the source of the leak or release. Clean up releases as soon as possible. Contain liquid to prevent further contamination of soil, surface water or groundwater. Clean up small spills using appropriate techniques such as sorbent materials or pumping. Where feasible and appropriate, remove contaminated soil. Follow prescribed procedures for reporting and responding to larger releases.

SECTION 7. HANDLING AND STORAGE

Do not weld, heat or drill container. Replace cap or bung. Emptied container still contains hazardous material which may ignite with explosive violence if heated sufficiently.
Minimum feasible handling temperatures should be maintained.
Periods of exposure to high temperatures should be minimized.
Water contamination should be avoided.
CAUTION: Do not use pressure to empty drum or drum may rupture with explosive force.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Eye Protection: Chemical type goggles or face shield optional.
Skin Protection: Avoid prolonged or frequently repeated skin contact by wearing impervious protective clothing including gloves.
Respiratory Protection: Wear a breathing mask.
Ventilation: No special ventilation is usually necessary. However, if operating conditions create high air borne concentrations of this material, special ventilation may be needed.
Other clothing and Equipment: No special clothing or equipment is usually necessary.
Work practices, hygienic practices: No information is available.
Other handling and storage requirements: No information is available.
Protective measures during maintenance of contaminated equipment: No Data Available.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Odor		No odor
Appearance		Transparent liquid
Boiling point	°C	No Data Available
Solubility		Insoluble in water
Density	@15°C, g/cm ³	0.861
Pour point	°C	< -50
DMSO Extract	mass % (IP 346)	No Data Available

SECTION 10. STABILITY AND REACTIVITY

Stability:	Stable
Conditions to Avoid:	See the Handling and storage section for further details.
Incompatibility (materials to avoid):	Acids, Oxidizing agents, Halogens and halogenated compounds.
Hazardous Polymerization:	Will not occur

SECTION 11. TOXICOLOGICAL INFORMATION

Acute Oral:	No Data Available:	Believed to be greater than 5 g/kg (rat) Practically non-toxic
Dermal:	No Data Available:	Believed to be greater than 3 g/kg (rabbit) Practically non-toxic
Carcinogen:	No Data Available:	

SECTION 12. ECOLOGICAL INFORMATION

Biodegradation:	Linear alkyl benzene is more biodegradable than branched alkyl benzene. ³⁾ Sturm Method (Linear dodecyl benzene) : Degradation (pass level) for 28 days. ⁴⁾
Environmental fate:	This material is not expected to present any environmental problems other than those associated with oil spills.

SECTION 13. DISPOSAL CONSIDERATIONS**Waste Disposal Method:**

Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations. Contact local environmental or health authorities for approved disposal of this material.

SECTION 14. TRANSPORT INFORMATION

The description shown may not apply to all shipping situations.

DOT Proper Shipping Name:	Not applicable.
IMDG Proper Shipping Name:	Not applicable.
ICAO Proper Shipping Name:	Not applicable.
TDG Proper Shipping Name:	Not applicable.
NFPA Proper name:	Class 1.
UN Number:	Not applicable.

SECTION 15. REGULATION INFORMATION

The U.S. TSCA inventory:	All components of this material are on the US TSCA inventory.
The EC EINECS inventory:	All components of this material are on the EC EINECS inventory.
The CANADA DSL inventory:	All components of this material are on the DSL inventory.
The AUSTRALIA AICS inventory:	All components of this material are on the AICS inventory.
The KOREA TCCL inventory:	All components of this material are on the TCCL inventory.
The PHILIPPINE PICCS inventory:	All components of this material are on the PICCS inventory.

SECTION 16. OTHER INFORMATION

None

References:

1. Handbook of Toxic and Hazardous Chemicals and Carcinogens (2nd ed.)
2. Registry of Toxic Effects of Chemical Substances (NIOSH, 1983)
3. 12695 Chemical Products (The Chemical Daily Co., Ltd, 1995)
4. Comparison of Methods for the Biodegradability Evaluation of Soluble and Insoluble Organochemicals, Ecotoxicol. Environ. Safety 8, 275-279 (1984)

Material safety data sheets are provided as reference information on the safe handling of hazardous or harmful materials to companies using such materials. When referring to this data sheet, companies should remember that they must take responsibility for implementing the proper measures for their own particular situations. This data sheet is not a guarantee of safety.

Typical Properties

KANSAI BRANCH OFFICE
NIPPON MITSUBISHI OIL CORPORATION

Brand Name	EHV CABLE OIL (LAB)	Unit	Test Method
Appearance	Clear	—	IEC867
Density	0.858	kg/l	ISO3675
Flash Point	144	°C	ISO2719
Kinetic Viscosity @20°C	7.7	mm ² /s	ISO3104
Kinetic Viscosity @40°C	4.2	mm ² /s	ISO3104
Kinetic Viscosity @70°C	2.0	mm ² /s	ISO3104
Pour Point	Below 50	°C	ISO3016
Coefficient of Volume Expansion	0.00080	—	ASTM D1903
Water Content	20	mg/kg	IEC733
Corrosive Sulfur @140°C×19hr	Non Corrosive	—	ISO5662
Neutralisation Value	0.00	mg KOH/g	IEC60296
Breakdown Voltage spherical electrodes	Above 70	kV/2.5mm	IEC60156
Volume Resistivity	901 x 10 ¹²	Ω.m	IEC60247
Power Factor @90°C	0.00002	—	IEC60247
Biodegradability	60% (Figure 1 & Table 1)	after 28 day	OECD301C

Figure 1 : Biochemical Oxygen Demand Chart

2000/28/03

Test No. 0003 (EHV Cable Oil(LAB))

Test Equipment : A-6

Test Condition :

Test Substance Concentration 100mg/l

Sludge Concentration 30mg/l

Temperature 25±1°C

Test Period 28 days

Test Compound	Biochemical Oxygen Demand (BOD) [mg]			
	7 days	14 days	21 days	28 days
1. Sludge + aniline	63.3	71.1	72.5	73.6
2. Basal metabolism	3.9	5.5	6.7	7.5
3. Sludge + Test Substance	9.4	30.5	51.9	65.0
4. Sludge + Test Substance	7.1	21.5	42.0	55.3
5. Sludge + Test Substance	10.8	33.3	59.9	82.4
6. Water + Test Substance	0.0	0.0	0.0	0.0

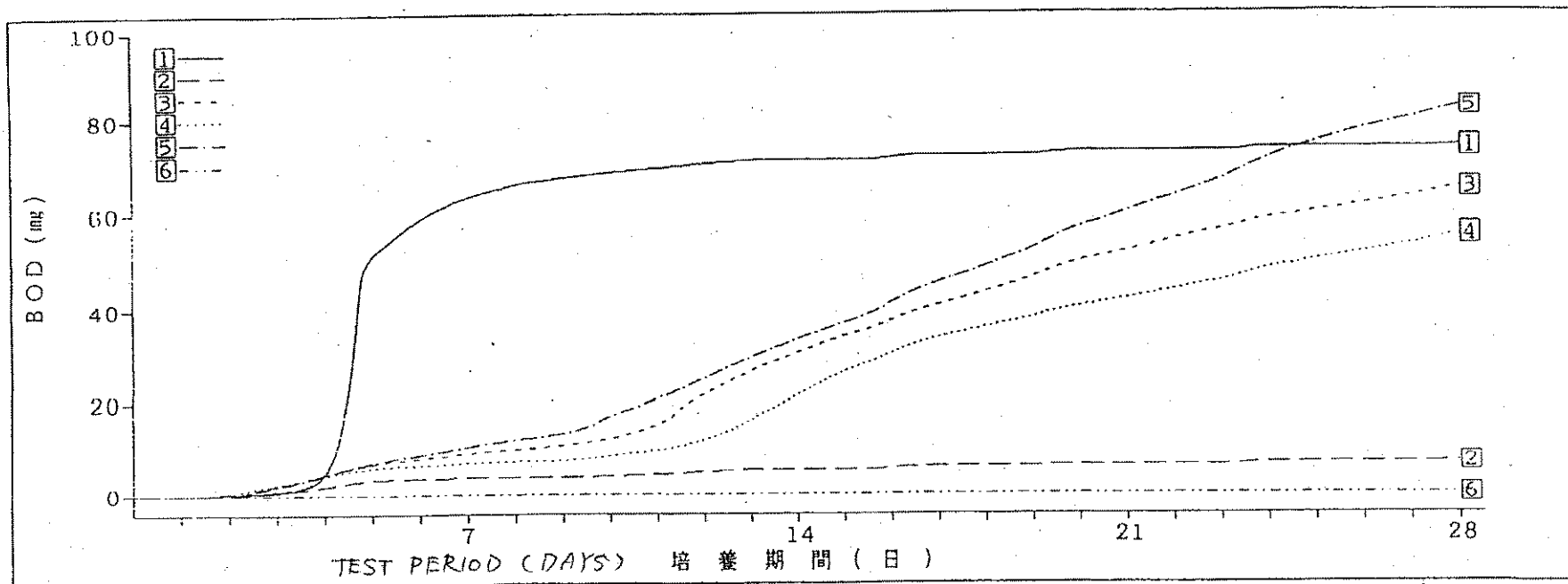


Table 1 : Percentage of Biodegradation (Test No. 0003 - 28 days test period)

Sample (Test Compound)	Content [mg]	TOD [mg]	7 days		14 days		28 days		Average Biodegrad ation [%]
			BOD [mg]	Biodegrad ation [%]	BOD [mg]	Biodegrad ation [%]	BOD [mg]	Biodegrad ation [%]	
1. Sludge + aniline	30.0	90.3	63.3	66	71.1	73	73.6	73	
2. Basal metabolism	—	-	3.9	-	5.5	-	7.5	-	
3. Sludge + Test Substance	30.0	99.6	9.4	6	30.5	25	65.0	58	60
4. Sludge + Test Substance	30.0	99.6	7.1	3	21.5	16	55.3	48	
5. Sludge + Test Substance	30.0	99.6	10.8	7	33.3	28	82.4	75	
6. Water + Test Substance	30.0	99.6	0.0	-	0.0	-	0.0	-	

TOD : Theoretical Oxygen Demand (mg) is the total amount of oxygen required to oxidise a chemical completely; it is calculated from the molecular formula and is also expressed as mg oxygen required per mg test compound.

BOD : Biochemical oxygen demand (mg) is the amount of oxygen consumed by micro-organisms when metabolising a test compound; also expressed as mg mg oxygen uptake per mg test compound.

$$\text{Biodegradation } [\%] = [\text{BOD} - \text{Base metabolism}] / \text{TOD} \times 100$$

$$1) \text{ TOD of Test Substance : } \text{C}_{7.34}\text{H}_{12.4} + 10.44 \text{ O}_2 \Rightarrow 7.34 \text{ CO}_2 + 6.2 \text{ H}_2\text{O}$$

$$10.44 \text{ O}_2 / \text{C}_{7.34}\text{H}_{12.4} = 334.07 / 100.66 = 3.32$$

$$\text{TOD} = \text{Concentration} \times 3.32 = 99.6 \text{ mg}$$

$$2) \text{ TOD of aniline : } \text{C}_6\text{H}_7\text{N} + 8.75 \text{ O}_2 \Rightarrow 6\text{CO}_2 + 3.5\text{H}_2\text{O} + \text{NO}_2$$

$$8.75\text{O}_2 / \text{C}_6\text{H}_7\text{N} = 279.99 / 93.13 = 3.01$$

$$\text{TOD} = 30\text{mg} \times 3.01 = 90.3 \text{ mg}$$

CROSS HUDSON PROJECT

ENVIRONMENTAL MANAGEMENT AND CONSTRUCTION PLAN

ATTACHMENT L

EMF CERTIFICATION

EMF Certificate of Compliance

Certification:

In accordance with Conditions 8 and 28 (q) of the Certificate I hereby certify that:

With final design completed and with construction carried out in accordance with the attached preliminary design documents and criteria for final design, the Cross Hudson underground transmission system facilities will comply with the electromagnetic field (EMF) standards established by the Commission in Opinion No. 78-13 (issued on June 19, 1978) and the Statement of Interim Policy on Magnetic Fields of Major Electric Transmission Facilities (issued September 11, 1990), respectively.

Specifically, the increase in existing electromagnetic field (EMF) intensities measured at the centerline of the underground transmission system facilities at a height of 1 meter above ground level will be less than 200 milliGauss when the transmission cable system is operating at its full rated 670 MVA power capacity at phase imbalances of 4 percent or less.

Jalal Gohair, P.E.

Name of Professional Engineer

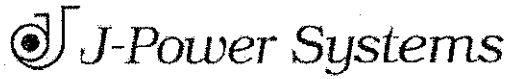
063783

New York State / License Number of Registration

Seal below.



2007 Sept. 28



Mita 43 MT Bldg. 8F, 3-13-16 Mita, Minato-ku Tokyo 108-0073, JAPAN
TEL: +81-3-5232-4711, FAX: +81-3-5232-4715

No. JTD23-F0740D

Date Sept 25, 2007

TECHNICAL DATA

PLELIMINARY STUDY ON MAGNETIC FIELD INTENSITY
OF
345kV PPLP-SCFF CABLE SYSTEM
FOR
GENERATOR LEAD FACILITY

Signed by

Kenichiro Tanimoto
Manager, Second Engineering Group
Project Engineering Dept.,

History of Revisions

Revision	Date issued	Revised Points	Design	Approval
-	30/03/07	Original Issue	S. Mashio	K.Tanimoto
A	27/04/07	Calculation conditions are mentioned in Paragraph 2. Table 2-2" Wide duct bank for section b/w #4 and #6 has been deleted. Table 4, Table 5 and Table 6 are added for the study of trefoil formation of joints. Paragraph 4 has been revised accordingly.	S. Mashio	K.Tanimoto
B	21/05/07	Duct ID/OD was changed from 6.0"/6.5" to 7.75"/8.86" in accordance with KCC's request.	S. Mashio	K.Tanimoto
C	08/06/07	In clause 4.2. (4), calculation results of EMF for Transition joint manhole was added according to the proposed civil design. (Fig 9)	S. Mashio	K.Tanimoto
D	25/09/07	The following note was added on Table 2-Table 6. "Configuration of civil design (depth and cable spacing) under Shaded Data should be avoided to expect the EMF value under 200mG." Appendix for ampacity calculation was attached for cross reference	S. Mashio	K.Tanimoto

1. Preface

This paper covers the preliminary study on magnetic field intensity of 345kV PPLP SCFF cable system.

2. Basic Calculation Formula and Assumptions employed

The study is made based on numerical calculation with assumptions as shown below:

2.1 Assumptions employed:

The following major assumptions are employed for the EMF calculations from the cables:

- (1) The magnetic permeability of surrounding medium of cables is uniform and same as that of vacuum (μ_0) regardless of nature of surrounding soil, concrete and so on.
- (2) The cable route is assumed to be straight, and the shapes of cables are all expressed by straight lines in each different cable arrangement portion, including joint portions and off-set portions in manholes.
- (3) Geometric distance between cables is designed value and does not contain deviation of duct bank construction from the designed values. (i.e. ideal trefoil formation)
- (4) Influence of metallic structures installed or buried close to the cables on the EMF distribution is not (can not be) taken into consideration.
- (5) EMF generated by other sources is not taken into consideration.

2.2 Calculation Formula:

Based on the assumptions described in Paragraph 2.1, the following calculation formulas of EMF distribution are derived:

(1) Basic formula of Magnetic field intensity (H) due to limited length of current (L)

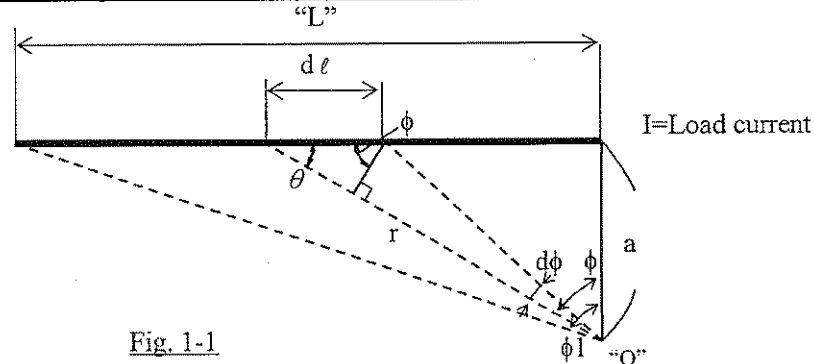


Fig. 1-1

Magnetic field at point "O" due to a small section dl is governed by Biot-Savart Law and it is integrated for the distance "L" as follows:

$$H = \int_{-L}^0 \frac{I \cdot \sin \theta}{4\pi \cdot r^2} d\ell \text{ --- (1)}$$

$$\sin \theta = \cos \phi \text{ --- (2)}$$

$$d\ell \cos \phi = r \cdot d\phi \text{ --- (3)}$$

Substituting Equations (2) and (3) into Equation (1),

$$\begin{aligned} H &= \int_{-\phi_1}^0 \frac{I \cdot \cos \theta}{4\pi \cdot r^2} \frac{r}{\cos \phi} d\phi \\ &= \int_{-\phi_1}^0 \frac{I \cdot d\phi}{4\pi r} \text{ --- (4)} \end{aligned}$$

where,

$$r = \frac{a}{\cos \phi} \text{ --- (5)}$$

Substituting equation (5) into equation (4),

$$\begin{aligned} H &= \int_{-\phi_1}^0 \frac{I \cdot \cos \phi}{4\pi \cdot a} d\phi \\ &= \frac{I}{4\pi \cdot a} [\sin \phi]_{-\phi_1}^0 \\ &= \frac{I}{4\pi \cdot a} \{ \sin(0) - \sin(-\phi_1) \} \\ &= \frac{I}{4\pi \cdot a} \sin \phi_1 \text{ --- (6)} \end{aligned}$$

when taking $L \gg a$, ϕ_1 becomes $\frac{\pi}{2}$,

$$H = \frac{I}{4\pi a} \text{ --- (7)}$$

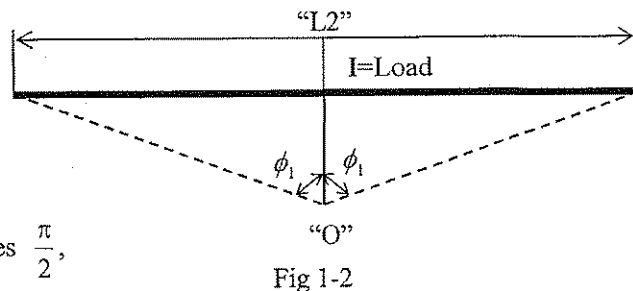


Fig 1-2

Referring to Fig. 1-2 above, the total magnetic field in the enough long length of straight line portion becomes double of (7),

$$H_1 = \frac{I}{2\pi a} \text{ --- (8)}$$

Equation (8) is equal to the standard formula in case with infinite length of straight line current.

(2) Magnetic Flux Density (B)

Magnetic Flux Density (B), hereafter referred to as EMF, is given by "Permeability" × "Magnetic field (H)" by the following formula. Magnetic permeability of surrounding

medium of cables is assumed to be uniform and same as that of vacuum (μ_0), and it is assumed that the cable is enough long and straight to approximate the direction of magnetic flux to be perpendicular to the load current (i.e. vector of circumference) as illustrated below.

$$B = \mu_0 \times H = \mu_0 \frac{I}{2\pi \cdot r} [T] = \frac{2I}{r} \times \frac{1}{10} [\mu T] = \frac{2I}{r} [mG] \quad \text{---(9)}$$

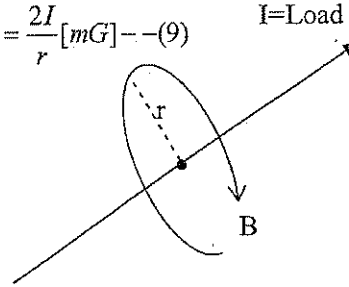
where,

B : Magnetic field intensity [mG]

I : Load current [A]

r : distance from cable axis [m]

μ_0 : magnetic permeability = $4 \pi \times 10^{-7}$



3. Calculation Conditions

3.1 Load Conditions

Three-phase symmetrical currents and asymmetrical currents with maximum 4% of zero sequence current were studied. It is noted that the meaning of “four (4) percent phase imbalance” stipulated in Clause 3.3.7 “Facility Performance Requirements” in EPC Contractor’s SCOPE OF THE WORK is understood as 4 % zero sequence current as defined below.

Where,

$$\begin{bmatrix} I_a \\ I_b \\ I_c \end{bmatrix} = \begin{bmatrix} 1 & 1 & 1 \\ 1 & a^2 & a \\ 1 & a & 1 \end{bmatrix} \begin{bmatrix} I_0 \\ I_1 \\ I_2 \end{bmatrix}$$

I_0 : Zero sequence current [A]

I_1 : Positive sequence current [A]

I_2 : Negative sequence current [A]

a : phaser = $-\frac{1}{2} + j\frac{\sqrt{3}}{2}$

Phase Imbalance [%]	0%	1%	2%	3%	4%
Three phase currents [A]	Symmetrical current	Asymmetrical current			
I_a	$I = 1122A$	$I + I \times 1/3\%$	$I + I \times 2/3\%$	$I + I \times 3/3\%$	$I + I \times 4/3\%$
I_b	$a^2 I$	$a^2 I + I \times 1/3\%$	$a^2 I + I \times 2/3\%$	$a^2 I + I \times 3/3\%$	$a^2 I + I \times 4/3\%$
I_c	$a I$	$a I + I \times 1/3\%$	$a I + I \times 2/3\%$	$a I + I \times 3/3\%$	$a I + I \times 4/3\%$
$I_0 (=I_a + I_b + I_c)$	0 A	$I \times 1\%$ (11.22A)	$I \times 2\%$ (22.44A)	$I \times 3\%$ (33.66A)	$I \times 4\%$ (44.88A)

Note : 1122 A is equivalent to the full load of 670MVA.

3.2 Cable Configurations

The following cable configurations are designed and studied based on the instruction by KCC.

As for joint manhole, vertical and trefoil formations are studied.

Case 1 – Duct Bank (Trefoil formation)

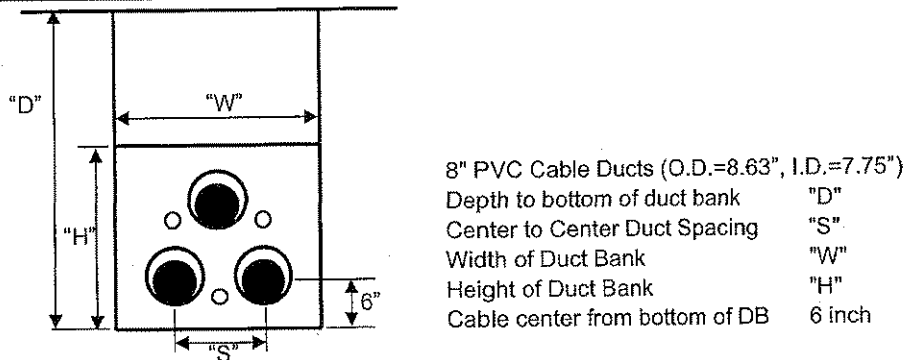


Fig 2. Trefoil Duct bank Configuration in Trench

Case 2 – Joint Vault (manhole) with vertical formation

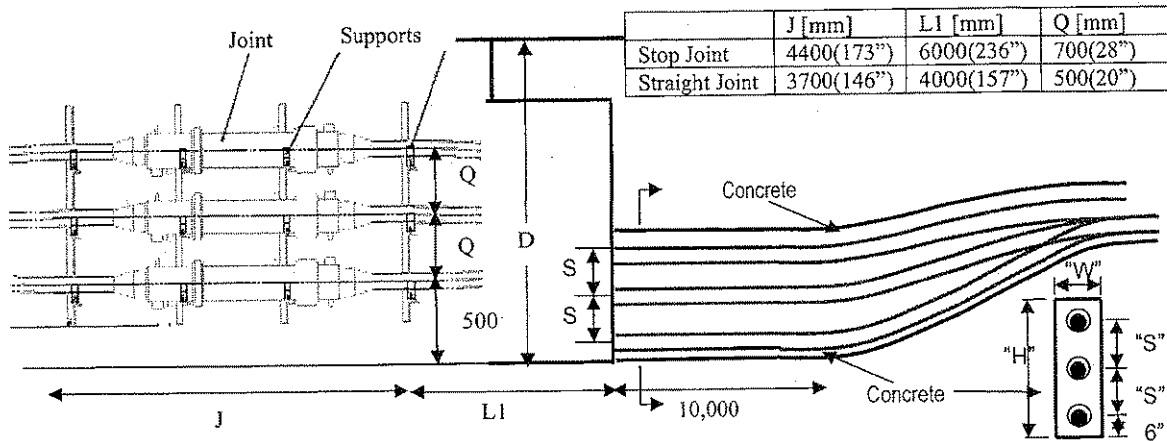


Fig 3. Joint Vault (Manhole) with vertical formation

Case 3 – Joint Vault (manhole) with Trefoil formation

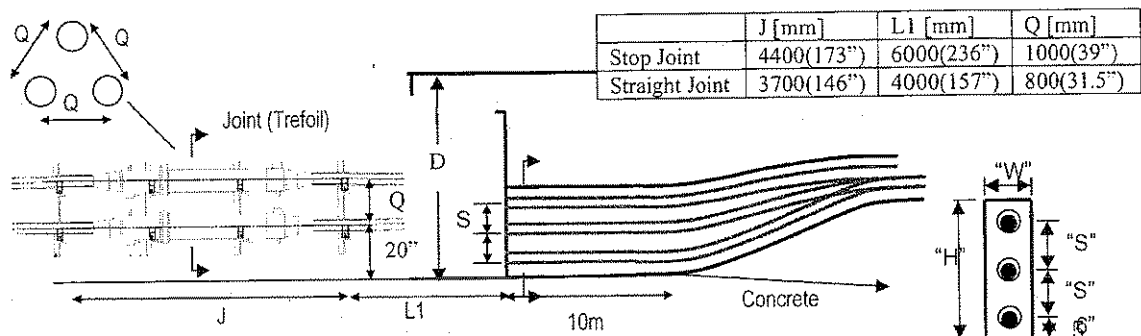


Fig 4. Joint Vault (Manhole) with trefoil formation

3.3 Calculation Results

According to the Clause 3.3.7 c of "Facility Performance Requirements" in EPC Contractor's SCOPE OF THE WORK, magnetic flux density (so called EMF) at one (1) meter above ground level have been calculated as shown in Tables below.

In addition to Case 3 (Trefoil formation at deep & vertical entry), Case 4 (Trefoil formation at shallow & vertical entry) and Case 5 (Trefoil formation at shallow & trefoil entry) were also studied, in order to estimate the affection of the shape of vault inlet.

- Case 1 : Trefoil duct bank trench (Fig 2) : Table 2
Case 2 : Typical joint manhole with vertical formation (Fig 3) : Table 3
Case 3 : Joint manhole with trefoil formation (Fig 4) : Table 4
Case 4 : Joint manhole with trefoil formation (shallow and vertical inlet) : Table 5
Case 5 : Joint manhole with trefoil formation (shallow and trefoil inlet) : Table 6

Table 2. Trefoil Duct Bank (Case 1)

Depth (D) (inch)	Spacing (S) (inch)	Magnetic Field Intensity [mG]				
		Phase imbalance				
		0%	1%	2%	3%	4%
57	9	127	134	142	151	159
58	10	139	146	154	162	171
59	11	150	158	166	174	182
60	12	161	169	177	185	193
61	13	172	180	187	195	203
62	14	182	190	198	206	214
63	15	193	200	208	216	224
96 (8')	9	61	66	72	77	83
108 (9')	9	51	55	61	66	71
120 (10')	9	43	47	52	57	62
150 (12.5')	9	30	34	38	42	46

(Note)

Configuration of civil design (depth and cable spacing) under Shaded Data (Highlighted lines) should be avoided to expect the EMF value under 200mG.

Table 3 Typical Joint Manhole and Vault Entry (Case 2 – Not applicable design)

Depth (D) [inch]	Entry Spacing(S) [inch]	Magnetic Field Intensity [mG] (Straight Through Joint Vault)					Magnetic Field Intensity [mG] (Stop Joint Vault)				
		Phase imbalance					Phase imbalance				
		0%	1%	2%	3%	4%	0%	1%	2%	3%	4%
85	12	434	444	454	464	474	828	839	851	863	875
87	13	414	424	434	443	453	779	790	802	813	825
89	14	396	405	415	424	434	734	746	757	768	779
91	15	379	388	397	406	416	694	705	716	727	738
93	16	363	372	381	390	399	657	668	678	689	700
95	17	348	357	366	375	384	623	634	644	654	665
97	18	335	343	352	361	370	592	602	612	622	633
99	19	322	331	339	348	356	564	574	583	593	603
101	20	311	319	327	336	344	538	547	557	566	576
103	21	300	308	316	325	333	513	523	532	541	550
130	9	167	173	179	186	192	283	289	296	303	310
150	12	130	138	146	155	163	203	208	214	220	226

(Note) Cable arrangement in MH is assumed as straight shape neglecting off-set shape.
 Since the length of MH is long enough compared to the burial depth, magnetic field due to normal trench duct section or vault entry does not so much affect on the total magnetic field intensity as shown below. (Fig 5 and Fig 6)
 Configuration of civil design (depth and cable spacing) under Shaded Data (Highlighted lines) should be avoided to expect the EMF value under 200mG.

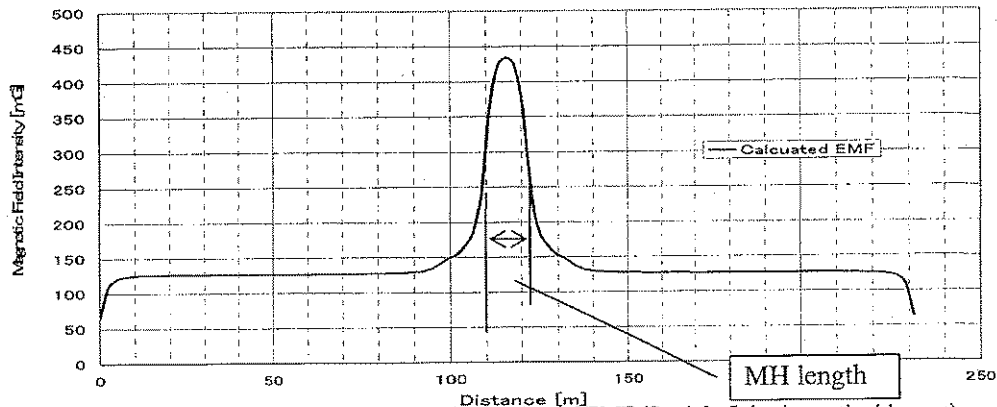


Fig.5 Calculation Example of Distribution of EMF (Straight Joint in vertical layout)
 (D= 85 inch , S= 12 inch , 0% phase imbalance)

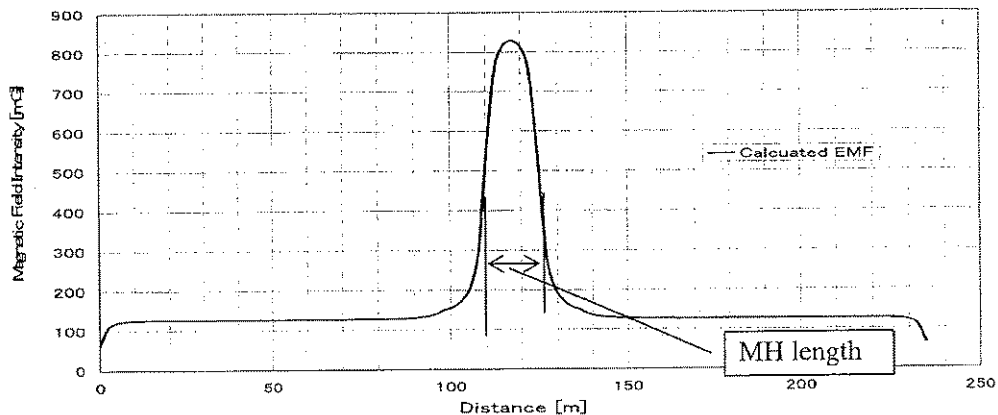


Fig.6 Calculation Example of Distribution of EMF (Stop Joint in Vertical layout)
 (D= 85 inch , S=12 inch, 0% phase imbalance)

Table 4 Joint Manhole (Trefoil formation - deep & vertical vault entry) (Case 3)

Depth (D) [inch]	Entry Spacing(S) [inch]	Magnetic Field Intensity [mG] (Straight Through Joint Vault)					Magnetic Field Intensity [mG] (Stop Joint Vault)				
		Phase imbalance					Phase imbalance				
		0%	1%	2%	3%	4%	0%	1%	2%	3%	4%
85	12	366	374	382	390	398	489	497	506	514	522
91	15	327	334	342	349	357	430	438	446	454	462
97	18	295	302	309	316	323	382	389	396	404	411
103	21	269	276	282	289	296	344	351	358	365	372
130	9	156	161	166	172	177	207	212	218	223	229
150	12	130	138	146	155	163	156	161	166	170	175
150	9	128	136	144	153	161	154	159	163	168	173

(Note)

Configuration of civil design (depth and cable spacing) under Shaded Data (Highlighted lines) should be avoided to expect the EMF value under 200mG.

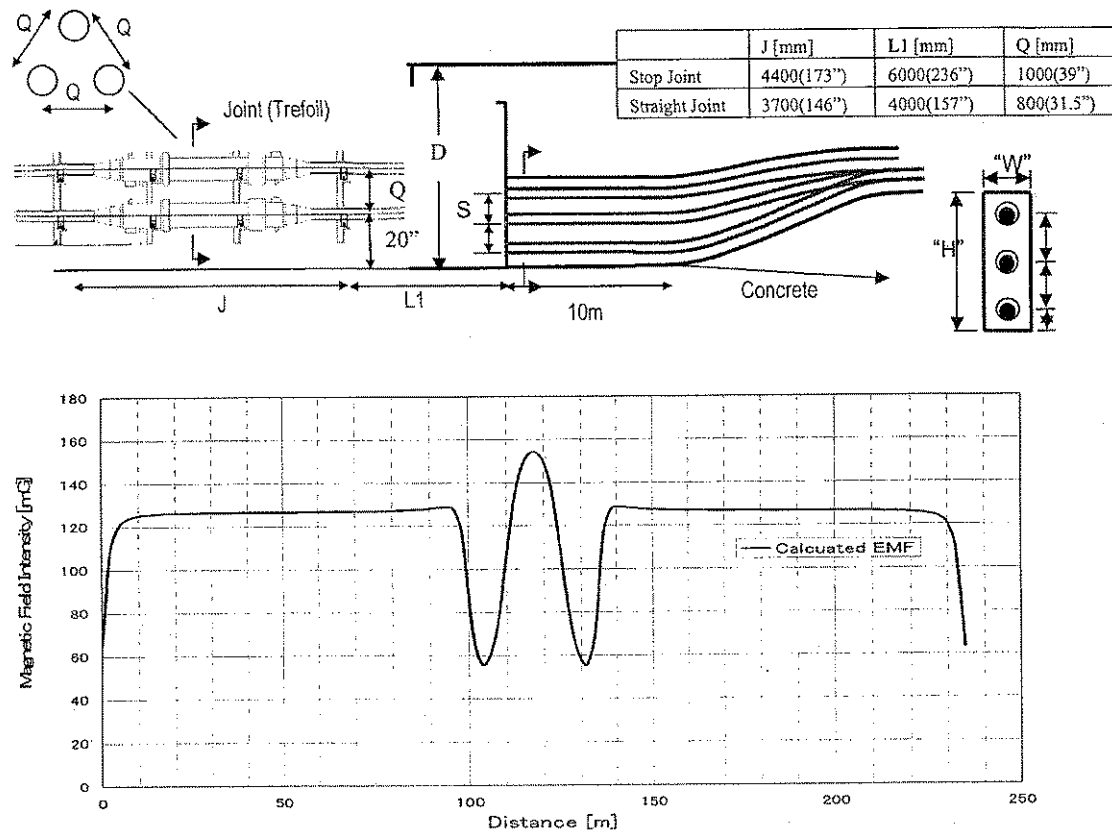


Fig 7. Calculation Example of Distribution of EMF (Stop Joint in Trefoil layout)
(D= 150 inch, S=9 inch, 0% phase imbalance)

Table 5 Joint Manhole and Vault Entry (Case 4 Trefoil Formation - shallow & vertical entry)

Depth (D) [inch]	Entry Spacing(S) [inch]	Magnetic Field Intensity [mG] (Straight Through Joint Vault)					Magnetic Field Intensity [mG] (Stop Joint Vault)				
		Phase imbalance					Phase imbalance				
		0%	1%	2%	3%	4%	0%	1%	2%	3%	4%
85	12	366	374	382	390	398	489	497	505	514	522
91	15	325	332	339	347	354	430	438	446	453	461
97	18	294	301	308	315	322	383	390	397	404	412
103	21	268	275	281	288	295	344	350	357	364	371
130	9	158	163	168	174	179	208	213	219	224	229
150	12	150	157	164	171	179	160	167	174	181	188
150	9	132	140	148	157	166	156	160	165	169	174

(Note)

Configuration of civil design (depth and cable spacing) under Shaded Data (Highlighted lines) should be avoided to expect the EMF value under 200mG.

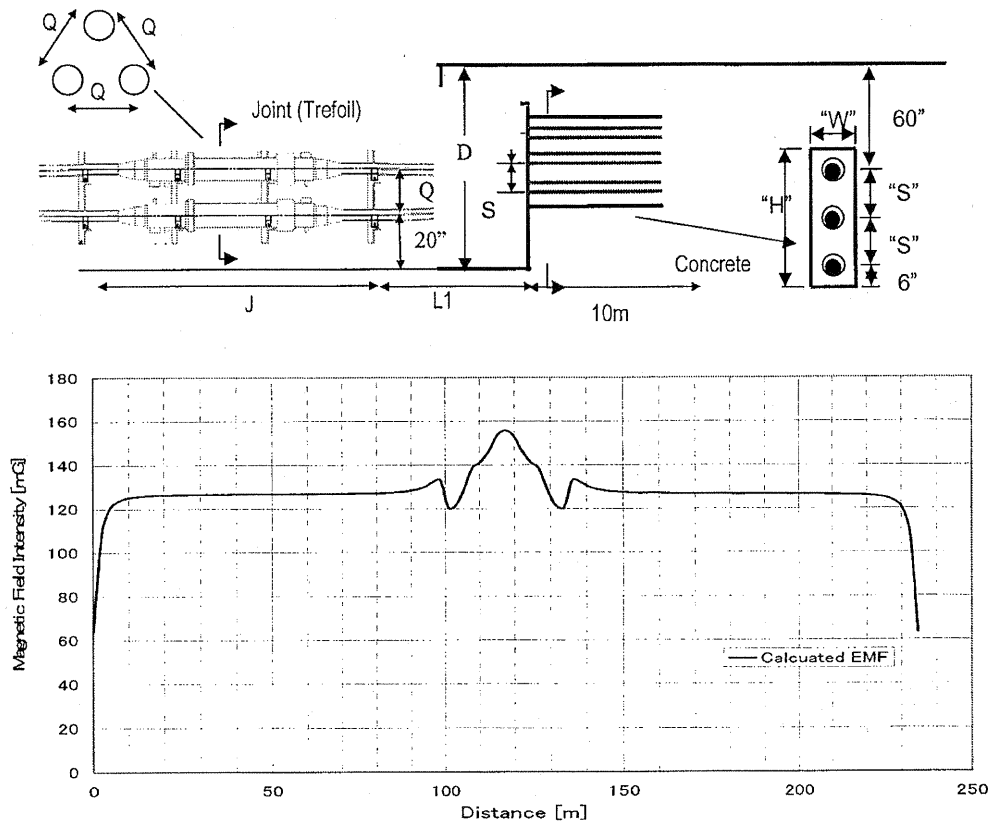


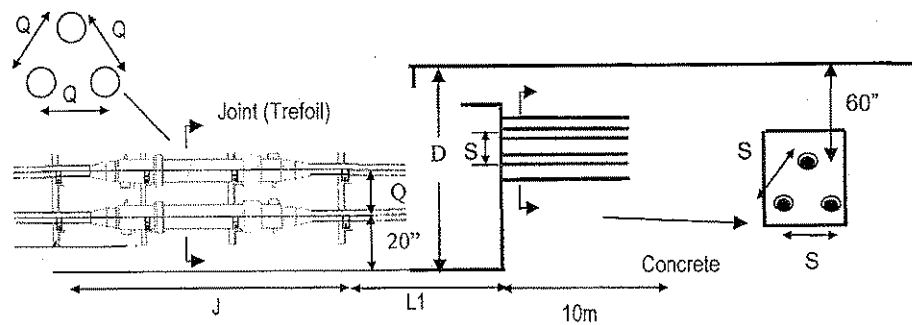
Fig 8. Calculation Example of Distribution of EMF (Stop Joint in Trefoil layout)
(D= 150 inch, S=9 inch, 0% phase imbalance)

Table 6 Joint Manhole and Vault Entry (Case 5, Trefoil Formation- shallow & trefoil vault entry)

Depth (D) [inch]	Entry Spacing(S) [inch]	Magnetic Field Intensity [mG] (Straight Through Joint Vault)					Magnetic Field Intensity [mG] (Stop Joint Vault)				
		Phase imbalance					Phase imbalance				
		0%	1%	2%	3%	4%	0%	1%	2%	3%	4%
85	12	360	368	376	383	391	485	493	502	510	518
91	15	319	326	333	340	348	425	433	441	448	456
97	18	284	291	298	305	312	376	384	391	398	405
103	21	256	263	269	275	282	336	343	349	356	363
130	9	154	159	164	169	174	208	211	216	221	226
150	12	131	138	146	155	163	155	159	163	168	172
150	9	145	149	154	158	162	153	158	162	166	171

(Note)

Configuration of civil design (depth and cable spacing) under Shaded Data (Highlighted lines) should be avoided to expect the EMF value under 200mG.





5-5-23 Torishima, Konohana-ku, Osaka, 554-0051, JAPAN

TEL: +81-6-6462-5761, FAX: +81-6-6462-5792

Ref. No. 07KK1-T-001

April 9, 2007

TECHNICAL DATA

PRELIMINARY CABLE PULLING TENSION CALCULATION

OF

345KV PPLP-SCFF LAND CABLE

FOR

GENERATOR LEAD FACILITY

Signed by

A handwritten signature in black ink, appearing to be 'TF' or similar, written over a horizontal line.

Takuro Fukuda

Manager

Overseas Power Cables Department

Power Cables Construction Group 1

J-Power Systems Corporation

ISSUE AND REVISION RECORD

Rev. No.	Issue date	Item	Prepared By	Approved By
PRELIMINARY CABLE PULLING TENSION CALCULATION OF 345KV PPLP-SCFF LAND CABLE FOR GENERATOR LEAD FACILITY				
-	April 24, 2007	Original Issue	T. Fukuda	T. Fukuda

1. Preface

This document covers the Land Section Pulling Tension Calculation for 345kV PPLP-SCFF Land Cable. The tensions are calculated according to the DM&JM Route Layout Drawings No. C-01 to C-29 copyright on 2003, received on Feb. 16th, 2007 from KIEWIT at the Project Kick-off Meeting.

Since it is necessary for calculating the pulling tension to determine the horizontal and vertical configuration such as bending radius, bending angles, profile and slopes along the scheduled route, the route configurations were measured on the above drawings as shown in the attached Appendix. 1.

2. Calculation Conditions

2.1 Calculation Formula

The calculation is conducted in accordance with the formulas as shown in the attached Appendix. 2.

2.2 Cable Pulling Factor and Permissible Value

The factor and criteria for cable pulling operation are as shown bellows:

Factor for Cable Pulling Calculation and Criteria

No	Description		Factor			Technique of Control
			General Requirement	Requirement on this Project	English Units	
1	Cable	Type	_____	345kV SCFF		_____
		Conductor Size	_____	1x2,000 mm ²		_____
		Outer Diameter of Cable	_____	125 mm	4.92 (inch)	_____
		Cable Weight	_____	31.0 kg/m	20.8 (Lb/ft)	_____
2	Permissible Cable Bending Radius		20D	2,500 mm above	above 8.2 (ft)	Curve Ruler
3	Permissible Cable Pulling Tension		7x2,000x9.8	137,293 N below	below 30,865 (Lbf)	Tension meter
4	Permissible Side Wall Pressure	In duct		4,900 N/m below	below 336 (Lb/ft)	Cable tension / Bending radius
		Cable Visible location		14,700 N/m below	below 1,008 (Lb/ft)	Ditto
5	Permissible Twisting Cable		below 90° at 5m cable length	below 90° at 5 m cable length	below 90° at 16.4 ft cable length	Visual Inspection
6	Permissible Pulling Velocity		below 10 m/min	below 10 m/min	below 32 ft/min	Speed meter
7	Snaking	Width	_____	_____	_____	_____
		Pitch	_____	_____	_____	_____

2.3 Cable Pulling Friction Coefficient

Coefficient of Friction between cable and duct has been evaluated by Test-piece cable Pulling Demonstration and several actual cable pulling operations as shown in the attached **Appendix**.

3. Based on this record, the recommended coefficient of friction applied in this Calculation is set as 0.3, under the application of lubricant such as Poly-Water in conduit; prior to pulling operation; lubricant shall be applied onto the conduit's internal surface, and lubricant shall be applied directly onto the cables during pulling operation.

For reference purpose only, the Coefficient of Friction of 0.25 and 0.20 were added in the calculation additionally.

2.4 Cable Pulling Direction

In order to evaluate which cable pulling direction can be decreased cable pulling tension, the calculation was conducted in both pulling directions at each pulling manhole sections.

2.5 Calculation of Cable Pulling in Tunnel

At the tunnel section, the cable pulling tension was calculated under the condition of pulling the cables into an open pit using cable rollers, thus means the friction coefficient of 0.15 was specially applied on the tunnel section in this calculation, instead of 0.3, which should be applied on the conduit section.

And also at the tunnel section, it was assumed for the pulling tension calculation that the cable drum position at the No.6 Manholes to pull into the Transition Joint Manhole, and the calculation of reverse direction was conducted as the drum position at the HDD Pit in the Edge Water Parking Lot, where was shown in the DM&JM drawing of No. C-14, instead of positioning the drum on the ship moored in Hudson River, in this calculation.

2.6 Cable Pulling Method

Two cable pulling methods were considered as shown below. The second option method is generally adopted in longer span length cable laying operation of Japanese projects in order to reduce the pulling tension, obtain high-quality of pulling installation and ensure human's safety.

i) Nose pull method with Pulling wire and winch: Lubricant application and Cable nose pulling with pulling winch at the end of the pulling end.— showing in the tension calculation file as without Ball Roller

ii) Nose pull method and assisting Linear Cable Hauling Machine & Motor driven roller — showing in the tension calculation file as with Ball Roller

3. Calculation Result

The results of the calculation are summarized as below: See attached Appendix. 4A “Schematic Route Configuration and Pulling Layout without Ball Roller, and Appendix 4B “Schematic Route Configuration and Pulling Layout with Ball Roller”.

3.1 Cable Pulling Tension without Ball Roller

3.1.1 Summary of Total Pulling Tension

The accumulated total cable pulling tension at the pulling point is summarized in the Table 1.

Table 1 Summary of the Calculated Pulling Tension without Ball Roller

(Unit in Pound & Feet)				Without Ball Roller				μ =Friction Coefficient between Duct & SCFF Cable					Judge	Note
Pulling Section & Pulling Direction			Back Tension	Pulling Tension(Lbf)				Side Wall Pressure (Lbf/ft)						
				Permissible Value	Calculated Pulling Tension(Lbf)			Permissible Value	Calculated SWP(Lbf/ft)					
					$\mu=0.3$	$\mu=0.25$	$\mu=0.2$		$\mu=0.3$	$\mu=0.25$	$\mu=0.2$			
Bergen S/S	→	No.1	W	30,865	19,134	15,739	12,437	336	56	46	36	○	Pull in Duct	
Bergen S/S	←	No.1	BT=	30,865	18,979	15,636	12,376	336	50	41	32	○	Pull in Duct	
No.1	→	No.4	W	30,865	25,189	19,487	14,560	336	141	107	79	○	Pull in Duct	
No.1	←	No.4	BT=	30,865	31,566	23,510	16,875	336	283	208	147	×	Pull in Duct	
No.4	→	No.6	W	30,865	20,906	16,710	12,880	336	72	58	45	○	Pull in Duct	
No.4	←	No.6	BT=	30,865	25,204	19,477	14,478	336	207	158	115	○	Pull in Duct	
No. 6	→	TJ MH	W	30,865	31,083	28,093	25,296	336	309	280	262	×	Pull in Pit	
No. 6	←	HDD PYT	BT=	30,865	37,624	32,392	28,040	336	166	123	89	×	Pull in Pit	
NY TJ	→	ConED	W	30,865	17,959	12,985	9,077	336	531	380	262	×	Pull in Duct	
NY TJ	←	ConED	BT=	30,865	12,285	9,574	7,244	336	136	109	85	○	Pull in Duct	
Legend		W : Winch		H/M : Linear Cable Hauling Machine				Note: Applied 0.15 of Friction Coefficient Value to the Tunnel Section.						
		BT : Back Tension (N)		B/R : Ball Roller Cable Hauling Machine										

Note: In the column of Judge: Showing the evaluation of the calculated value by comparing comparison Permissible Value of Cable pulling tension and/or Side Wall Pressure.

“x”: Exceeding the permissible value. “o”: Within the permissible value.

3.1.2 Pulling tension along the route configuration

The calculated tension at every route configuration in each pulling sections are summarized in the Graph 1 below:

The calculation value is as shown in the attached Appendix. 5 “Tension along Route Configuration without Ball Roller” including the Graph 1.

3.2 Cable Pulling Tension with Ball Roller

3.2.1 Summary of Total Pulling Tension

The accumulated total cable pulling tension at the pulling point is summarized in the Table 2.

Table 2 Summary of the Calculated Pulling Tension with Ball Roller

(Unit in Pound & Feet)				With Ball Roller									
Pulling Section & Pulling Direction			Back Tension	Pulling Tension (Lbf)				Side Wall Pressure (Lbf/Feet)				Judge	Note
				Permissible Value	Calculated Pulling Tension(N)			Permissible Value	Calculated Pulling Tension(N)				
					$\mu=0.3$	$\mu=0.25$	$\mu=0.2$		$\mu=0.3$	$\mu=0.25$	$\mu=0.2$		
Bergen S/S	→	No.1	BT=0	30,865	14,596	11,336	8,172	336	34	24	15	○	Pull in Duct
Bergen S/S	←	No.1	BT=0	30,865	14,466	11,262	8,140	336	28	19	11	○	Pull in Duct
No.1	→	No.4	BT=0	30,865	10,348	6,461	3,141	336	50	28	11	○	Pull in Duct
No.1	←	No.4	BT=0	30,865	11,801	6,775	3,104	336	85	40	9	○	Pull in Duct
No.4	→	No.6	BT=0	30,865	10,154	6,955	3,978	336	21	12	4	○	Pull in Duct
No.4	←	No.6	BT=0	30,865	9,840	5,736	2,525	336	54	28	15	○	Pull in Duct
No. 6	→	TJ MH	BT=0	30,865	10,732	8,638	6,687	336	106	85	66	○	Pull in Pit
No. 6	←	HDD PIT	BT=0	30,865	11,032	8,481	6,151	336	22	6	4	○	Pull in Pit
NY TJ	→	ConED	BT=0	30,865	4,988	2,555	727	336	158	81	23	○	Pull in Duct
NY TJ	←	ConED	BT=0	30,865	9,294	7,092	5,161	336	94	72	52	○	Pull in Duct
Legend				W : Winch				H/M : Linear Cable Hauling Machine				Note: Applied 0.15 of Friction Coefficient Value to the Tunnel Section.	
				BT : Back Tension (N)				B/R : Ball Roller Cable Hauling Machine					

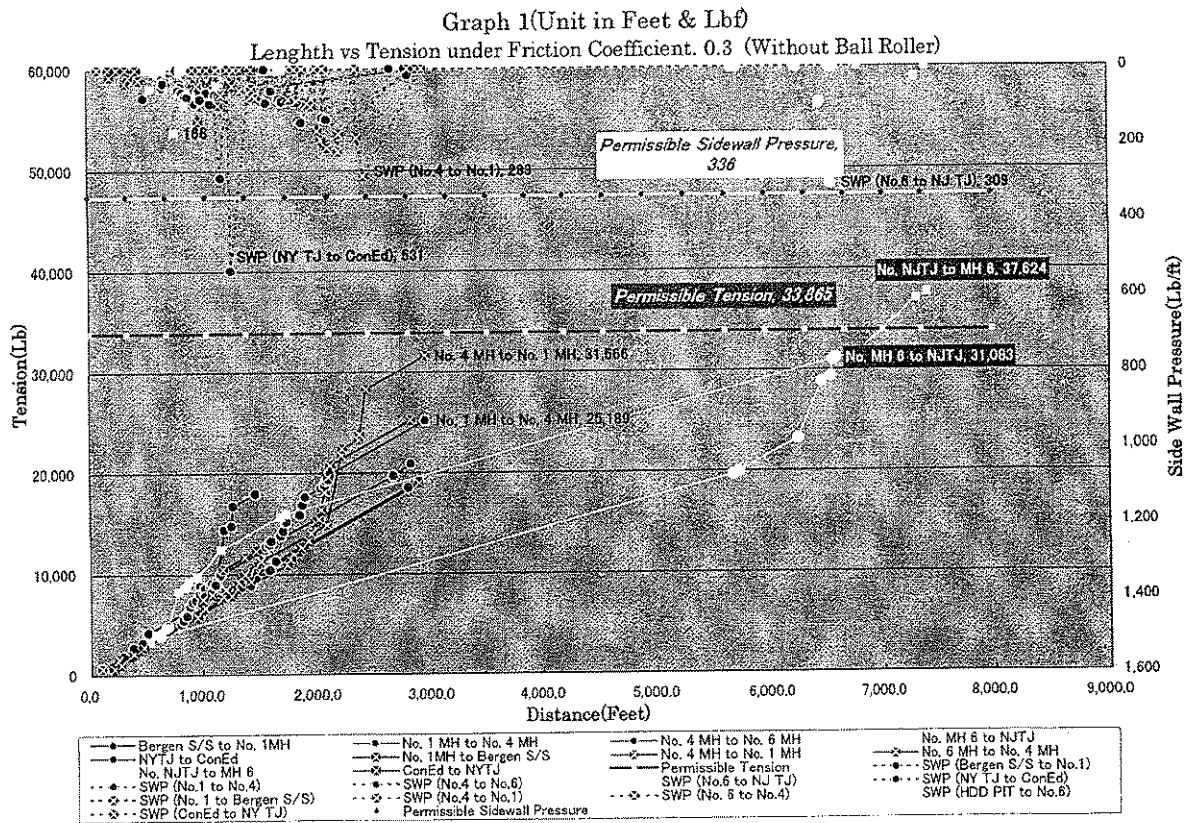
Note: In the column of Judge: Showing the evaluation of the calculated value by comparing comparison Permissible Value of Cable pulling tension and/or Side Wall Pressure.

"x": Exceeding the permissible value. "o": Within the permissible value.

3.2.2 Pulling tension along the route configuration

The calculated tension at every route configuration in each pulling sections are summarized in the Graph 2 bellows:

The calculation value is as shown in the attached Appendix. 6 "Tension along Route Configuration without Ball Roller" including the Graph 2.



The graph displays Tension (Lb) on the left Y-axis (ranging from -5,500 to 54,500) and Side Wall Pressure (Lb/ft) on the right Y-axis (ranging from 0 to 1,600) against Distance (Feet) on the X-axis (ranging from 0.0 to 9,000.0). The graph shows various data series representing different tunnel sections and permissible values.

Key Data Points and Labels:

- SWP (NY TJ to ConEd), 158** (Left Y-axis)
- SWP (No. 6 to NJ TJ), 106** (Right Y-axis)
- Permissible Side Wall Pressure, 336** (Right Y-axis)
- Permissible Tension, 33,865** (Left Y-axis)
- No. 1MH to Bergen S/S, 14,466** (Left Y-axis)
- No. MH 6 to NJTJ, 10,732** (Right Y-axis)
- No. HDD PIT to MH 6, 11,031** (Right Y-axis)
- No. 1MH to Bergen S/S, 10,340** (Left Y-axis)
- No. 1MH to ConEd, 4,872** (Left Y-axis)

Legend:

- Bergen S/S to No. 1MH
- NYTJ to ConEd
- No. HDD PIT to MH 6
- SWP (No. 1 to No. 4)
- SWP (No. 1 to Bergen S/S)
- SWP (ConEd to NY TJ)
- No. 1 MH to No. 4 MH
- No. 1MH to Bergen S/S
- ConEd to NYTJ
- SWP (No. 4 to No. 6)
- SWP (No. 4 to No. 1)
- Permissible Side Wall Pressure
- No. 4 MH to No. 6 MH
- No. 4 MH to No. 1 MH
- Permissible Tension
- SWP (No. 6 to NJ TJ)
- SWP (No. 6 to No. 4)
- No. MH 6 to NJTJ
- No. 6 MH to No. 4 MH
- SWP (Bergen S/S to No. 1)
- SWP (NY TJ to ConEd)
- SWP (HDD PIT to No. 6)

Note

- i) At the cable drum side, the 1ton cable linear hauling machine must be set on to reduce the back tension, thus means the drum support shall be designed to reduce the mechanical friction at the shaft portion and the drum shall be apply a breaking mechanism to prevent over rotate and loosening the wound cable on the cable drum.
- For your reference, the table 4 shows the size of cable drum.

Table 4 Cable Drum Size

SCFF Cable 1 x 2,000sqmm Land cable

No	Cable Length wound on Drum	Drum Rim Diameter (inch)	Drum Width (inch)	Inner Diameter (inch)	Cable Net weight (ton)	Gross weight (ton)
1	Cable length less than 2,950ft	141.7	122.0	86.6	28.8	32.0
2	Cable length less than 1,475ft	141.7	72.8	86.6	14.4	17.4
3	Cable length less than 5,970ft	151.6	193.0	86.8	58.2	65.0

Since the drum width for tunnel section is wider, the cable shall be lead into the linear hauling machine using traverse mechanism on the cable drum.

- ii) At the cable pulling section between ConEd Substation and NY side Transition Joint manhole, it is judged that the cable shall be pulled from the ConEd substation to Transition Joint manholes to obtain the pulling tension and the side wall pressure lower than the permissible value/criteria. Therefore, the feasibility for delivery and set the cable drum in the ConEd substation shall be studied to maintain the cable pulling direction.
- iii) Even apply 0.15 of friction coefficient in the tunnel section by taking consideration a open pit formation in this section, the calculated result shows that the pulling tension and side wall pressure exceeds the permissible value in both pulling direction. And, even application of the ball rollers take into the calculation, the number of the Ball Roller shall be expected more than 15. It means that utilization of the ball roller for the option of pulling the cables into conduits in the tunnel section might be not so feasible due to the increment of the required number of Ball Roller. Therefore, we would like to propose the alternative method using motor driven roller in the tunnel is as mentioned in the Item 5 of this document.

4.2 Conduit construction at the portion of Cable Bridge

The conduit bending radius at the transition portion to the conduit on the cable bridge shall be greater than the adopted value in the tension calculation. See Appendix 4A sheet of "2 Layout No.1 – No.4" and "3 Layout No.4 – No.6". And also the other curved portion of conduit section

shall be applied greater curved radius based on the route configuration to be adopted in this calculation. See Appendix 1.

4.3 Proposed Cable Laying Method

1) The calculation result of pulling tension without Ball Roller shows the value within the permissible value, however the value are in too high level such as almost limitation of the permissible value.

Since the pulling tension will be pulsed and its tendency will be increasing according to the level of the pulling tension, and it is assumed for reducing a tension pulsing that the pulling tension shall be lower than 5 to 6 ton. So, we would like to recommend that the scheduled maximum tension shall be reduced to prevent the tension pulsing phenomenon and to obtain some margin against the permissible value by means of applying Ball Roller in the cable supply Manhole, pulling Manhole as shown in the schematic pulling layout formation in the Appendix 4b.

Note

Lubricant remover will be required at the entrance of the Ball Roller and re-apply the Lubricant at the entrance of the conduit for preventing mechanical slip on the ball roller type cable hauling machine.

Table 4 Required Laying Equipment for Sections (with Ball Roller)

Pulling Section & Pulling Direction	Tension(Lbf)		Side Wall Pressure (Lbf/ft)		Ball Roller Cable Hauling Machine	Winch Capacity	Lubricant Injector	Lubricant Remover for Ball Roller	Caterpillar type Hauling Machine
	Calculate	Permissible	Calculate	Permissible					
	$\mu=0.3$	Value	$\mu=0.3$	Value					
BERGEN → No.1MH	14,596	30,844	34	336	3	8t	1		1
BERGEN ← No.1MH	14,466	30,844	28	336	3	8t	1		1
No.1MH → No.4MH	10,343	30,844	50	336	7	8t	3	2	1
No.1MH ← No.4MH	11,801	30,844	85	336	7	8t	3	2	1
No.4MH → No.6MH	10,154	30,844	21	336	6	8t	2	1	1
No.4MH ← No.6MH	9,840	30,844	54	336	7	8t	2	1	1
No.6MH → TJ	10,732	30,844	106	336	10	8t	2	1	1
No.6MH ← TJ(HDDpit)	11,032	30,844	22	336	15	8t	3	2	1
NY TJ → CON ED	4,988	30,844	158	336	8	3t	1	1	1
NY TJ ← CON ED	9,294	30,844	94	336	1	5t	1		1

5. Proposed Cable Laying Method and Layout in the Tunnel Section

As shown in the attached Appendix. 7, we propose to adopt Motor Driven Roller to reduce the total cable pulling tension in the tunnel section. The outline of this method is as follows:

- i) Because the pulling tension calculated approx. 17 ton under one continuous conduit formation, only the nose pull method will exceed the permissible value of the cable (14ton), thus it is required other apparatus for reducing pulling tension except nose pulling apparatus.
- ii) As shown in the schematic layout of pulling operation using motor rollers, outline of pulling operation is as follows:

- (1) The cable will pulled into the tunnel from [A] until point [C] with the winch at the No.6 MH. Then the ball rollers grip the cable to pull the cable from [A] to [C] through No.7 MH.
- (2) After passing the cable through the Ball Roller, the Motor Driven Rollers will convey the cable to the point [D].
- (3) The cable in the conduit between [D] and [E] by Ball Rollers under assisting the pulling winch.
- (4) The cable between the [E] and [F] will be conveyed by the Motor Rollers.
- (5) The cable between the [F] and [G] will be pulled by the winch.

NOTE:

- (1) Since the motor roller system will perform to convey the cable, where the motor rollers will be applied, like as conveyer, the cable pulling tension can be eliminate from the tension of the winch, thus can be reduced the nose pull tension. So it can be possible to reduce the total pulling tension until lower value than the permissible value.
- (2) According to the calculation result, it is assumed that 70 numbers of Motor Roller (35 Numbers Motor Roller in two tentative open pit sections of approx. 300m & 330m), and 8 numbers of Ball Rollers (in the Manhole and the Tunnel) are to be required in total as shown in the Fig. 1.
- (3) The section, where will be installed the Motor Rollers and the Ball Rollers in the tunnel, half-split type of conduits shall be set after pulling cables.

Fig. 1 Schematic cable pulling Layout with Motor driven roller

