Generation Interconnection
Feasibility Study Report

For

PJM Generation Interconnection Request
Queue Position AC2-078

Disputanta - Waverly 115kV
22.8 MW Capacity / 60 MW Energy

October / 2017

Introduction

This Feasibility Study has been prepared in accordance with the PJM Open Access Transmission Tariff, 36.2, as well as the Feasibility Study Agreement between the Interconnection Customer (IC), and PJM Interconnection, LLC (PJM), Transmission Provider (TP). The Interconnected Transmission Owner (ITO) is Virginia Electric and Power Company (VEPCO).

Preface

The intent of the Feasibility Study is to determine a plan, with high level estimated cost and construction time estimates, to connect the subject generation to the PJM network at a location specified by the IC. The IC may request the interconnection of generation as a capacity resource or as an energy-only resource. As a requirement for interconnection, the IC may be responsible for the cost of constructing: (1) Direct Connections, which are new facilities and/or facilities upgrades needed to connect the generator to the PJM network, and (2) Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system.

In some instances a generator interconnection may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection, may also contribute to the need for the same network reinforcement. The possibility of sharing the reinforcement costs with other projects may be identified in the Feasibility Study, but the actual allocation will be deferred until the Impact Study is performed.

The Feasibility Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. The IC is responsible for the right of way, real estate, and construction permit issues. For properties currently owned by ITO, the costs may be included in the study.

General

The IC has proposed a solar generating facility located in Prince George County, Virginia. The installed facilities will have a total capability of 60 MW with 22.8 MW of this output being recognized by PJM as capacity. The proposed in-service date for this project is 12/31/2019. **This study does not imply an ITO commitment to this in-service date.**

Point of Interconnection

AC2-078 will interconnect with the ITO transmission system at one of the following points of interconnection:

Option 1 AC2-078 will connect via a new three breaker ring bus switching station that connects on the Disputanta - Waverly 115kV line.

Option 2 AC2-078 will connect via a new three breaker ring bus switching station that connects on the Bakers Pond - Ivor 115kV line.

Cost Summary

The AC2-078 project will be responsible for the following costs:

Description	Total Cost
Attachment Facilities	$ 1,550,000
Direct Connection Network Upgrades	$ 5,500,000
Non Direct Connection Network Upgrades	$ 800,000
Total Costs	**$ 7,850,000**

In addition, the AC2-078 project may be responsible for a contribution to the following costs:

Description	Total Cost
New System Upgrades	$ 73,000,000
Previously Identified Upgrades	$ 17,500,000
Total Costs	**$ 90,500,000**

Cost allocations for these upgrades will be provided in the System Impact Study Report.

System Reinforcement

Violation #	Upgrade Description	Upgrade Cost
13	Replace the existing transformer at Elmont Substation with a larger unit. The estimated cost is $17,500,000 and it is estimated to 24-30 months to engineer and construct.	$17,500,000
14	Wreck and rebuild a segment of the existing Bristers – Chancellor 500kV line #552 of 22 miles. This will increase normal and emergency ratings to 4453 MVA. Estimated cost $73,000,000 and it is estimated to 36-48 months to engineer, permit and construct (VA CPCN is required). Note: This facility has been identified as an End of Life project. Dominion is working with PJM to address the issue through a RTEP process.	$73,000,000
	Total Network Upgrades	**$90,500,000**

Attachment Facilities

Generation Substation: Install metering and associated protection equipment. The estimated cost is $550,000.

Transmission: Construct approximately one span of 115 kV Attachment line between the generation substation and a new AC2-078 Switching Station. The estimated cost for this work is $1,000,000.

The estimated total cost of the Attachment Facilities is $1,550,000. It is estimated to take 18-24 months to complete this work. These preliminary cost estimates are based on typical engineering costs. A more detailed engineering cost estimates are normally done when the IC provides an exact site plan location for the generation substation during the Facility Study phase. These costs do not include CIAC Tax Gross-up.

Direct Connection Cost Estimate

Substation: Establish the new 115 kV AC2-078 Switching Substation (interconnection substation). The estimated cost of this work scope is $5,500,000. It is estimated to take 24-36 months to complete this work**.**

Non-Direct Connection Cost Estimate

Transmission: Install transmission structure in-line with transmission line to allow the proposed interconnection switching station to be interconnected with the transmission system. The estimated cost is $800,000 and it is estimated to take 24-30 months to complete.

Remote Terminal Work: During the Facilities Study, ITO's System Protection Engineering Department will review transmission line protection as well as anti-islanding required to

accommodate the new generation and interconnection substation. System Protection Engineering will determine the minimal acceptable protection requirements to reliably interconnect the proposed generating facility with the transmission system. The review is based on maintaining system reliability by reviewing ITO's protection requirements with the known transmission system configuration which includes generating facilities in the area. This review may determine that transmission line protection and communication upgrades are required at remote substations.

Interconnection Customer Requirements

ITO's Facility Connection Requirements as posted on PJM's website
http://www.pjm.com/~/media/planning/plan-standards/private-dominion/facility-connection-requirements1.ashx

Voltage Ride Through Requirements - The Customer Facility shall be designed to remain in service (not trip) for voltages and times as specified for the Eastern Interconnection in Attachment 1 of NERC Reliability Standard PRC-024-1, and successor Reliability Standards, for both high and low voltage conditions, irrespective of generator size, subject to the permissive trip exceptions established in PRC-024-1 (and successor Reliability Standards).

Frequency Ride Through Requirements - The Customer Facility shall be designed to remain in service (not trip) for frequencies and times as specified in Attachment 2 of NERC Reliability Standard PRC-024-1, and successor Reliability Standards, for both high and low frequency condition, irrespective of generator size, subject to the permissive trip exceptions established in PRC-024-1 (and successor Reliability Standards).

Reactive Power - The Generation Interconnection Customer shall design its non-synchronous Customer Facility with the ability to maintain a power factor of at least 0.95 leading to 0.95 lagging measured at the generator's terminals.

Revenue Metering and SCADA Requirements

PJM Requirements

The IC will be required to install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Sections 24.1 and 24.2.

Meteorological Data Reporting Requirement

The solar generation facility shall provide the Transmission Provider with site-specific meteorological data including:

- Temperature (degrees Fahrenheit)
- Atmospheric pressure (hectopascals)
- Irradiance
- Forced outage data

Network Impacts

The Queue Project AC2-078 was evaluated as a 60.0 MW (Capacity 22.8 MW) injection tapping the Disputanta - Waverly 115kV line in the ITO area. Project AC2-078 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AC2-078 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Contingency Descriptions

The following contingencies resulted in overloads:

Contingency Name	Description
562T563	CONTINGENCY '562T563' /*CARSON OPEN BRANCH FROM BUS 314902 TO BUS 314923 CKT 1 /*CARSON TO MIDLOTHIAN OPEN BRANCH FROM BUS 314914 TO BUS 314902 CKT 1 /*CARSON 500.00 - 8SEPTA 500.00 END
H2T557	CONTINGENCY 'H2T557' /* ELMONT OPEN BRANCH FROM BUS 314908 TO BUS 314903 CKT 1 /*ELMONT TO CHICKAHOMINY (LINE 557) OPEN BRANCH FROM BUS 314903 TO BUS 314214 CKT 1 /*CHICKAHOMINY 500-230 (TX#1) OPEN BRANCH FROM BUS 314908 TO BUS 314218 CKT 2 /*ELMONT 500-230 (TX#2) END
LN 208-259	CONTINGENCY 'LN 208-259' OPEN BRANCH FROM BUS 314286 TO BUS 314309 CKT 1 /* 6CHSTF A 230.00 - 6IRON208 230.00 OPEN BRANCH FROM BUS 314309 TO BUS 314338 CKT 1 /* 6IRON208 230.00 - 6SOUWEST 230.00 OPEN BUS 314309 /* ISLAND OPEN BRANCH FROM BUS 314276 TO BUS 314287 CKT 1 /* 6BASIN 230.00 - 6CHSTF B 230.00 END
LN 259	CONTINGENCY 'LN 259-2065' OPEN BRANCH FROM BUS 314276 TO BUS 314287 CKT 1 /* 6BASIN 230.00 - 6CHSTF B 230.00
LN 259-2065	CONTINGENCY 'LN 259-2065' OPEN BRANCH FROM BUS 314276 TO BUS 314287 CKT 1 /* 6BASIN 230.00 - 6CHSTF B 230.00 OPEN BRANCH FROM BUS 314276 TO BUS 314339 CKT 1 /* 6BASIN 230.00 - 6SPRUNCE 230.00 END

Contingency Name	Description
H1T581	CONTINGENCY 'H1T581' /* LADYSMITH OPEN BRANCH FROM BUS 314911 TO BUS 314905 CKT 1 /*LADYSMITH TO CHANCELLOR (LINE 581) OPEN BRANCH FROM BUS 314905 TO BUS 314135 CKT 2 /*CHANCELLOR 500-115 (TX#4) OPEN BRANCH FROM BUS 314911 TO BUS 314196 CKT 1 /*LADYSMITH 500-230 (TX#1) END
H1T9033	CONTINGENCY 'H1T9033' /*MORRISVILLE OPEN BRANCH FROM BUS 314934 TO BUS 314916 CKT 1 /*SPOTSYLVANIA TO MORRISVILLE (LINE 9033) OPEN BRANCH FROM BUS 314916 TO BUS 314063 CKT 1 /*MORRISVILLE 500-230 (TX#1) OPEN BRANCH FROM BUS 314916 TO BUS 314897 CKT 1 /*MORRISVILLE CAP BANK END
LN 563	CONTINGENCY 'LN 563' OPEN BRANCH FROM BUS 314902 TO BUS 314914 CKT 1 /* 8CARSON 500.00 - 8MDLTHAN 500.00 END
LN 568	CONTINGENCY 'LN 563' OPEN BRANCH FROM BUS 314902 TO BUS 314914 CKT 1 /* 8CARSON 500.00 - 8MDLTHAN 500.00 END
T672B	CONTINGENCY 'T672B' /*_ BASIN OPEN BRANCH FROM BUS 314276 TO BUS 314260 CKT 1 /*L284 BASIN VARINA OPEN BRANCH FROM BUS 314275 TO BUS 314276 CKT 1 /*L2055 BASIN BELLMEADE REMOVE MACHINE 1 FROM BUS 315053 /*BELMEADE GEN CT-1 REMOVE MACHINE 2 FROM BUS 315054 /*BELMEADE GEN CT-2 REMOVE MACHINE 3 FROM BUS 315055 /*BELMEADE GEN ST OPEN BRANCH FROM BUS 314274 TO BUS 314276 CKT 1 /*BASIN TX5 OPEN BRANCH FROM BUS 314274 TO BUS 314276 CKT 2 /*BASIN TX6 OPEN BRANCH FROM BUS 314276 TO BUS 314287 CKT 1 /*L259 BASIN CHESTERFIELD OPEN BRANCH FROM BUS 314276 TO BUS 314339 CKT 1 /*L2065 BASIN SPRUANCE NUG END

Summer Peak Analysis – 2020

System Reinforcement responsible by ITO

#	Contingency Type	Contingency Name	Affected Area	Facility Description	Bus From	Bus To	Cir.	Power Flow	Loading % Initial	Loading % Final	Rating Type	Rating MVA	MW Contribution	Ref
1	DCTL	LN 208-259	DVP - DVP	6CHARCTY-6LAKESD 230 kV line	314225	314227	1	DC	138.73	140.53	LDR	459	8.28	2
2	LFFB	562T563	DVP - DVP	6CHARCTY-6LAKESD 230 kV line	314225	314227	1	DC	103.36	104.72	LDR	459	6.26	
3	LFFB	T672B	DVP - DVP	6CHARCTY-6LAKESD 230 kV line	314225	314227	1	DC	105.32	106.07	LDR	459	7.91	
4	DCTL	LN 259-2065	DVP - DVP	6CHARCTY-6LAKESD 230 kV line	314225	314227	1	DC	103.76	105.47	LDR	459	7.85	
5	DCTL	LN 208-259	DVP - DVP	6MESSER-6CHARCTY 230 kV line	314228	314225	1	DC	150.45	152.25	LDR	459	8.28	3
6	LFFB	562T563	DVP - DVP	6MESSER-6CHARCTY 230 kV line	314228	314225	1	DC	115.1	116.46	LDR	459	6.26	
7	LFFB	T672B	DVP - DVP	6MESSER-6CHARCTY 230 kV line	314228	314225	1	DC	117.04	117.81	LDR	459	7.91	
8	DCTL	LN 259-2065	DVP - DVP	6MESSER-6CHARCTY 230 kV line	314228	314225	1	DC	115.48	117.19	LDR	459	7.85	
9	DCTL	LN 208-259	DVP - DVP	6CHSTF B-6MESSER 230 kV line	314287	314228	1	DC	150.6	152.41	LDR	459	8.28	4
10	LFFB	562T563	DVP - DVP	6CHSTF B-6MESSER 230 kV line	314287	314228	1	DC	115.23	116.59	LDR	459	6.26	
11	LFFB	T672B	DVP - DVP	6CHSTF B-6MESSER 230 kV line	314287	314228	1	DC	117.17	117.94	LDR	459	7.91	
12	DCTL	LN 259-2065	DVP - DVP	6CHSTF B-6MESSER 230 kV line	314287	314228	1	DC	115.64	117.34	LDR	459	7.85	

Item 1 – 12 PJM **baseline project (b2745)** will eliminate the identified overloads. The scheduled in service date for b2745 is 06/01/2020.

Generator Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

None

Multiple Facility Contingency

(Double Circuit Tower Line, Fault with a Stuck Breaker, and Bus Fault contingencies for the full energy output)

None

Short Circuit

(Summary of impacted circuit breakers)

New circuit breakers found to be over-duty:

None

Contributions to previously identified circuit breakers found to be over-duty:

None

Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

	Contingency		Affected		Bus			Power	Loading %		Rating		MW	
#	Type	Name	Area	Facility Description	From	To	Cir.	Flow	Initial	Final	Type	MVA	Contribution	Ref
13	LFFB	H2T557	DVP - DVP	8ELMONT 500/230 kV transformer	314218	314908	1	DC	118.47	118.99	LD	1051	12.18	1

Steady-State Voltage Requirements

(Summary of the VAR requirements based upon the results of the steady-state voltage studies)

To be determined during Impact Study

Stability and Reactive Power Requirement for Low Voltage Ride Through

(Summary of the VAR requirements based upon the results of the dynamic studies)

To be determined during Impact Study

ITO Analysis Performed by PJM

Critical System Condition – No Surry Unit 1

#	Contingency Type	Contingency Name	Affected Area	Facility Description	Bus From	Bus To	Cir.	Power Flow	Loading % Initial	Loading % Final	Rating Type	Rating MVA	MW Contribution
14	N-1	LN 568	DVP - DVP	8CHANCE-8BRISTER 500 kV line	314905	314900	1	DC	99.98	100.05	N-1	2442	3.98

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. Network Impacts, initially caused by the addition of this project generation)

Violation #	Overloaded Facility	Upgrade Description	Network Upgrade Number	Upgrade Cost
14	8CHANCE-8BRISTER 500 kV line	Wreck and rebuild a segment of the existing Bristers – Chancellor 500kV line of 22 miles. This will increase normal and emergency ratings to 4453 MVA. Estimated cost $73,000,000 and it is estimated to 36-48 months to engineer, permit and construct (VA CPCN is required). Note: This facility has been identified as an End of Life project. Dominion is working with PJM to address the issue through a RTEP process.	Pending	$73,000,000
			Total New Network Upgrades	**$73,000,000**

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study)

Violation #	Overloaded Facility	Upgrade Description	Network Upgrade Number	Upgrade Cost
1	8ELMONT 500/230 kV transformer	Replace the existing transformer with a larger unit. Estimated cost $17,500,000 and it is estimated to 24-30 months to engineer and construct.	Pending	$17,500,000
			Total New Network Upgrades	**$17,500,000**

Potential Congestion due to Local Energy Deliverability

PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The IC can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request.

Note: Only the most severely overloaded conditions are listed below. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which shall study all overload conditions associated with the overloaded element(s) identified.

	Contingency		Affected		Bus			Power	Loading %		Rating		MW
#	Type	Name	Area	Facility Description	From	To	Cir.	Flow	Initial	Final	Type	MVA	Contribution
15	N-1	LN 259	DVP - DVP	6CHARCTY-6LAKESD 230 kV line	314225	314227	1	DC	127.18	128.13	ER	375	7.88
16	N-1	LN 259	DVP - DVP	6MESSER-6CHARCTY 230 kV line	314228	314225	1	DC	141.53	142.47	ER	375	7.88
17	N-1	LN 563	DVP - DVP	6BERMUDA-6CHSTF A 230 kV line	314278	314286	1	DC	114.97	115.74	ER	449	7.67
18	N-1	LN 259	DVP - DVP	6CHSTF B-6MESSER 230 kV line	314287	314228	1	DC	141.69	142.63	ER	375	7.88
19	N-1	LN 563	DVP - DVP	6CHSTF B-6BASIN 230 kV line	314287	314276	1	DC	165.86	167.76	ER	449	8.52

#	Contingency Type	Contingency Name	Affected Area	Facility Description	Bus From	Bus To	Cir.	Power Flow	Loading % Initial	Loading % Final	Rating Type	Rating MVA	MW Contribution
20	N-1	LN 563	DVP - DVP	6HOPEWLL-6BERMUDA 230 kV line	314303	314278	1	DC	114.97	115.74	ER	449	7.67

Light Load Analysis

Light Load Studies to be conducted during later study phases (as required by PJM Manual 14B).

ITO Analysis

ITO assessed the impact of the proposed Queue Project #AC2-078 interconnection of a 60 MW Energy (22.8 MW Capacity) injection into the ITO's Transmission System at a new interconnection switching station located between the Disputanta-Waverly 115kV line for compliance with NERC Reliability Criteria on ITO's Transmission System. The system was assessed using the summer 2020 RTEP case provided to ITO by PJM. When performing a generation analysis, ITO's main analysis will be load flow study results under single contingency (both normal and stressed system conditions). ITO Criteria considers a transmission facility overloaded if it exceeds 94% of its emergency rating under normal and stressed system conditions. A full listing of ITO's Planning Criteria and interconnection requirements can be found in the ITO's Facility Connection Requirements which are publicly available at: http://www.dom.com.

The results of these studies evaluate the system under a limited set of operating conditions and do not guarantee the full delivery of the capacity and associated energy of this proposed generation facility under all operating conditions. NERC Planning and Operating Reliability Criteria allow for the re-dispatch of generating units to resolve projected and actual deficiencies in real time and planning studies. Specifically NERC Category C Contingency Conditions (Bus Fault, Tower Line, N-1-1, and Stuck Breaker scenarios) allow for re-dispatch of generating units to resolve potential reliability deficiencies. For ITO's Planning Criteria the re-dispatch of generating units for these contingency conditions is allowed as long as the projected loading does not exceed 100% of a facility Load Dump Rating.

As part of its generation impact analysis, the ITO routinely evaluates the impact that a proposed new generation resource will have under maximum generation conditions, stress system conditions and import/export system conditions (greater than 20 MW). The results of these studies are discussed in more detail below.

Category B Analysis (Single Contingency):

1. System Normal – Same as PJM
2. Critical System Condition No Surry 230 kV or Possum Point 6 Unit)

- No Surry Unit 1 - Deficiencies Identified
- No Possum Point 6 Unit – No deficiencies identified

Category C Analysis: (Multiple Facility Analysis)

1. Bus Fault – Same as PJM
2. Line Stuck Breaker – Same as PJM
3. Tower Line – Same as PJM

The import and export conditions into and out of the ITO System are evaluated with any new interconnection greater than 20 MW, any new facility that is interconnected with the ITO System should not significantly decrement FCITC between utilities. These studies will be performed during the System Impact Study.

Affected System Analysis & Mitigation

Duke, Progress & TVA Impacts:

Duke Carolina, Progress, & TVA Impacts to be determined during later study phases (as applicable).

Option 2

Network Impacts

The Queue Project AC2-078 was evaluated as a 60 MW (Capacity 22.8 MW) injection tapping the Bakers Pond – Ivor 115 kV line in the ITO area. Project AC2-078 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AC2-078 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Contingency Descriptions

The following contingencies resulted in overloads:

Contingency Name	Description
562T563	CONTINGENCY '562T563' /*CARSON OPEN BRANCH FROM BUS 314902 TO BUS 314923 CKT 1 /*CARSON TO MIDLOTHIAN OPEN BRANCH FROM BUS 314914 TO BUS 314902 CKT 1 /*CARSON 500.00 - 8SEPTA 500.00 END
H2T557	CONTINGENCY 'H2T557' /* ELMONT OPEN BRANCH FROM BUS 314908 TO BUS 314903 CKT 1 /*ELMONT TO CHICKAHOMINY (LINE 557) OPEN BRANCH FROM BUS 314903 TO BUS 314214 CKT 1 /*CHICKAHOMINY 500-230 (TX#1) OPEN BRANCH FROM BUS 314908 TO BUS 314218 CKT 2 /*ELMONT 500-230 (TX#2) END
LN 106	CONTINGENCY 'LN 106' OPEN BRANCH FROM BUS 314262 TO BUS 314280 CKT 1 /* 3NEWBO_1 115.00 - 3NEWBOHE 115.00 OPEN BRANCH FROM BUS 314273 TO BUS 314280 CKT 1 /* 3BAKRS P 115.00 - 3NEWBOHE 115.00 OPEN BRANCH FROM BUS 314280 TO BUS 314329 CKT 1 /* 3NEWBOHE 115.00 - 3POE 115.00 OPEN BRANCH FROM BUS 313879 TO BUS 314273 CKT 1 /* 3SADL_2 115.00 - 3BAKRS P 115.00 OPEN BUS 314262 /* ISLAND OPEN BUS 314273 /* ISLAND OPEN BUS 314280 /* ISLAND END

Contingency Name	Description
LN 208-259	CONTINGENCY 'LN 208-259' OPEN BRANCH FROM BUS 314286 TO BUS 314309 CKT 1 /* 6CHSTF A 230.00 - 6IRON208 230.00 OPEN BRANCH FROM BUS 314309 TO BUS 314338 CKT 1 /* 6IRON208 230.00 - 6SOUWEST 230.00 OPEN BUS 314309 /* ISLAND OPEN BRANCH FROM BUS 314276 TO BUS 314287 CKT 1 /* 6BASIN 230.00 - 6CHSTF B 230.00 END
LN 23_A	CONTINGENCY 'LN 23_A' OPEN BRANCH FROM BUS 314206 TO BUS 314529 CKT 1 /* 3OAKRIDG 115.00 - 3KINGS F 115.00 OPEN BRANCH FROM BUS 314206 TO BUS 314532 CKT Z1 /* 3OAKRIDG 115.00 - 3OAKRI23 115.00 OPEN BRANCH FROM BUS 314528 TO BUS 313879 CKT 1 /* 3IVOR106 115.00 - 3SADL_2 115.00 OPEN BRANCH FROM BUS 314532 TO BUS 314536 CKT 1 /* 3OAKRI23 115.00 - 3SUFFOLK 115.00 OPEN BRANCH FROM BUS 313879 TO BUS 314528 CKT 1 /* 3SADL_2 115.00 - 3IVOR106 115.00 OPEN BUS 314206 /* ISLAND OPEN BUS 314261 /* ISLAND OPEN BUS 314528 /* ISLAND OPEN BUS 314529 /* ISLAND OPEN BUS 314532 /* ISLAND END
LN 259	CONTINGENCY 'LN 259' OPEN BRANCH FROM BUS 314276 TO BUS 314287 CKT 1 /* 6BASIN 230.00 - 6CHSTF B 230.00 END
LN 563	CONTINGENCY 'LN 563' OPEN BRANCH FROM BUS 314902 TO BUS 314914 CKT 1 /* 8CARSON 500.00 - 8MDLTHAN 500.00 END

Contingency Name	Description
T672B	CONTINGENCY 'T672B' /*_ BASIN OPEN BRANCH FROM BUS 314276 TO BUS 314260 CKT 1 /*L284 BASIN VARINA OPEN BRANCH FROM BUS 314275 TO BUS 314276 CKT 1 /*L2055 BASIN BELLMEADE REMOVE MACHINE 1 FROM BUS 315053 /*BELMEADE GEN CT-1 REMOVE MACHINE 2 FROM BUS 315054 /*BELMEADE GEN CT-2 REMOVE MACHINE 3 FROM BUS 315055 /*BELMEADE GEN ST OPEN BRANCH FROM BUS 314274 TO BUS 314276 CKT 1 /*BASIN TX5 OPEN BRANCH FROM BUS 314274 TO BUS 314276 CKT 2 /*BASIN TX6 OPEN BRANCH FROM BUS 314276 TO BUS 314287 CKT 1 /*L259 BASIN CHESTERFIELD OPEN BRANCH FROM BUS 314276 TO BUS 314339 CKT 1 /*L2065 BASIN SPRUANCE NUG END

Summer Peak Analysis - 2020

Generator Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

None

Multiple Facility Contingency

(Double Circuit Tower Line, Fault with a Stuck Breaker, and Bus Fault contingencies for the full energy output)

None

Short Circuit

(Summary of impacted circuit breakers)

New circuit breakers found to be over-duty:

None

Contributions to previously identified circuit breakers found to be over-duty:

None

Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

	Contingency		Affected		Bus			Power	Loading %		Rating		MW	
#	Type	Name	Area	Facility Description	From	To	Cir.	Flow	Initial	Final	Type	MVA	Contribution	Ref
1	LFFB	H2T557	DVP - DVP	8ELMONT 500/230 kV transformer	314218	314908	1	DC	118.45	118.93	LDR	1051	11.21	5
2	DCTL	LN 208-259	DVP - DVP	6CHARCTY-6LAKESD 230 kV line	314225	314227	1	DC	137.97	138.59	LDR	459	6.28	6

#	Contingency Type	Contingency Name	Affected Area	Facility Description	Bus From	Bus To	Cir.	Power Flow	Loading % Initial	Loading % Final	Rating Type	Rating MVA	MW Contribution	Ref
3	LFFB	562T563	DVP - DVP	6CHARCTY-6LAKESD 230 kV line	314225	314227	1	DC	103.38	103.86	LDR	459	4.9	
4	LFFB	T672B	DVP - DVP	6CHARCTY-6LAKESD 230 kV line	314225	314227	1	DC	105.32	105.9	LDR	459	5.95	
5	DCTL	LN 208-259	DVP - DVP	6MESSER-6CHARCTY 230 kV line	314228	314225	1	DC	149.71	150.33	LDR	459	6.28	7
6	LFFB	562T563	DVP - DVP	6MESSER-6CHARCTY 230 kV line	314228	314225	1	DC	115.1	115.58	LDR	459	4.9	
7	LFFB	T672B	DVP - DVP	6MESSER-6CHARCTY 230 kV line	314228	314225	1	DC	117.04	117.62	LDR	459	5.95	
8	DCTL	LN 208-259	DVP - DVP	6CHSTF B-6MESSER 230 kV line	314287	314228	1	DC	149.84	150.46	LDR	459	6.28	8
9	LFFB	562T563	DVP - DVP	6CHSTF B-6MESSER 230 kV line	314287	314228	1	DC	115.23	115.71	LDR	459	4.9	
10	LFFB	T672B	DVP - DVP	6CHSTF B-6MESSER 230 kV line	314287	314228	1	DC	117.17	117.75	LDR	459	5.95	

Steady-State Voltage Requirements

(Summary of the VAR requirements based upon the results of the steady-state voltage studies)

To be determined during the Impact Study

Stability and Reactive Power Requirement for Low Voltage Ride Through

(Summary of the VAR requirements based upon the results of the dynamic studies)

To be determined during the Impact Study

Potential Congestion due to Local Energy Deliverability

PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The IC can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request.

Note: Only the most severely overloaded conditions are listed below. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which shall study all overload conditions associated with the overloaded element(s) identified.

Contingency					Bus			Power	Loading %		Rating		MW
#	Type	Name	Affected Area	Facility Description	From	To	Cir.	Flow	Initial	Final	Type	MVA	Contribution
11	N-1	LN 23_A	DVP - DVP	3SADL_2-3BAKRS P 115 kV line	313879	314273	1	DC	121.53	175.62	ER	111	60
12	N-1	LN 106	DVP - DVP	3SADL_2-3IVOR106 115 kV line	313879	314528	1	DC	121.71	175.8	ER	111	60
13	N-1	LN 259	DVP - DVP	6CHARCTY-6LAKESD 230 kV line	314225	314227	1	DC	127.18	127.89	ER	375	5.93
14	N-1	LN 259	DVP - DVP	6MESSER-6CHARCTY 230 kV line	314228	314225	1	DC	141.55	142.26	ER	375	5.93
15	N-1	LN 23_A	DVP - DVP	3BAKRS P-3NEWBOHE 115 kV line	314273	314280	1	DC	107.28	161.38	ER	111	60
16	N-1	LN 563	DVP - DVP	6BERMUDA-6CHSTF A 230 kV line	314278	314286	1	DC	113.93	114.55	ER	449	6.17
17	N-1	LN 23_A	DVP - DVP	3NEWBOHE-3POE 115 kV line	314280	314329	1	DC	94.93	149.03	ER	111	60
18	N-1	LN 259	DVP - DVP	6CHSTF B-6MESSER 230 kV line	314287	314228	1	DC	141.71	142.42	ER	375	5.93
19	N-1	LN 563	DVP - DVP	6CHSTF B-6BASIN 230 kV line	314287	314276	1	DC	165.86	166.54	ER	449	6.72
20	N-1	LN 563	DVP - DVP	6HOPEWLL-6BERMUDA 230 kV line	314303	314278	1	DC	113.93	114.55	ER	449	6.17
21	N-1	LN 106	DVP - DVP	3IVOR106-3OAKRI23 115 kV line	314528	314532	1	DC	119.82	173.91	ER	111	60
22	N-1	LN 106	DVP - DVP	3OAKRI23-3SUFFOLK 115 kV line	314532	314536	1	DC	98.9	152.99	ER	111	60

Light Load Analysis

Light Load Studies to be conducted during later study phases (as required by PJM Manual 14B).

ITO Analysis

ITO assessed the impact of the proposed Queue Project #AC2-078 interconnection of a 100 MW Energy (68.1 MW Capacity) injection into the ITO's Transmission System at a new interconnection switching station located between the Bakers Pond – Ivor 115 kVline, for compliance with NERC Reliability Criteria on ITO's Transmission System. The system was assessed using the summer 2020 RTEP case provided to ITO by PJM. When performing a generation analysis, ITO's main analysis will be load flow study results under single contingency (both normal and stressed system conditions). ITO Criteria considers a transmission facility overloaded if it exceeds 94% of its emergency rating under normal and stressed system conditions. A full listing of ITO's Planning Criteria and interconnection requirements can be found in the ITO's Facility Connection Requirements which are publicly available at: http://www.dom.com.

The results of these studies evaluate the system under a limited set of operating conditions and do not guarantee the full delivery of the capacity and associated energy of this proposed generation facility under all operating conditions. NERC Planning and Operating Reliability Criteria allow for the re-dispatch of generating units to resolve projected and actual deficiencies in real time and planning studies. Specifically NERC Category C Contingency Conditions (Bus Fault, Tower Line, N-1-1, and Stuck Breaker scenarios) allow for re-dispatch of generating units to resolve potential reliability deficiencies. For ITO's Planning Criteria the re-dispatch of generating units for these contingency conditions is allowed as long as the projected loading does not exceed 100% of a facility Load Dump Rating.

As part of its generation impact analysis, the ITO routinely evaluates the impact that a proposed new generation resource will have under maximum generation conditions, stress system conditions and import/export system conditions (greater than 20 MW). The results of these studies are discussed in more detail below.

Category B Analysis (Single Contingency):

1. System Normal – No deficiencies identified
2. Critical System Condition (No Surry 230 kV or Possum Point 6 Unit) – No deficiencies identified

Category C Analysis: (Multiple Facility Analysis)

1. Bus Fault - No deficiencies identified
2. Line Stuck Breaker - No deficiencies identified
3. Tower Line – No deficiencies identified

The import and export conditions into and out of the ITO System are evaluated with any new interconnection greater than 20 MW, any new facility that is interconnected with the ITO System should not significantly decrement FCITC between utilities. These studies will be performed during the System Impact Study.

Affected System Analysis & Mitigation

Duke, Progress & TVA Impacts:

Duke Carolina, Progress, & TVA Impacts to be determined during later study phases (as applicable).

Appendices

The following appendices contain additional information about each flowgate presented in the body of the report. For each appendix, a description of the flowgate and its contingency was included for convenience. However, the intent of the appendix section is to provide more information on which projects/generators have contributions to the flowgate in question. Although this information is not used "as is" for cost allocation purposes, it can be used to gage other generators impact. When a flowgate is identified in multiple analysis the appendix is presented for only the analysis with the greatest overload.

It should be noted the generator contributions presented in the appendices sections are full contributions, whereas in the body of the report, those contributions take into consideration the commercial probability of each project.

Appendix 1

(DVP - DVP) The 8ELMONT 500/230 kV transformer (from bus 314218 to bus 314908 ckt 1) loads from 118.47% to 119.0% (**DC power flow**) of its load dump rating (1051 MVA) for the line fault with failed breaker contingency outage of 'H2T557'. This project contributes approximately 12.18 MW to the thermal violation.

CONTINGENCY 'H2T557' /* ELMONT
OPEN BRANCH FROM BUS 314908 TO BUS 314903 CKT 1 /*ELMONT TO CHICKAHOMINY (LINE 557)
OPEN BRANCH FROM BUS 314903 TO BUS 314214 CKT 1 /*CHICKAHOMINY 500-230 (TX#1)
OPEN BRANCH FROM BUS 314908 TO BUS 314218 CKT 2 /*ELMONT 500-230 (TX#2)
END

Bus Number	*Bus Name*	*Full Contribution*
315067	*1DARBY 1*	*4.47*
315068	*1DARBY 2*	*4.48*
315069	*1DARBY 3*	*4.53*
315070	*1DARBY 4*	*4.53*
315043	*1FRIVERA*	*6.02*
315044	*1FRIVERB*	*4.66*
315045	*1FRIVERC*	*6.02*
315046	*1FRIVERD*	*4.66*
315047	*1FRIVERE*	*4.66*
315048	*1FRIVERF*	*6.02*
315074	*1HOPCGN1*	*11.03*
315075	*1HOPCGN2*	*10.89*
315134	*1ROAVALA*	*22.59*
315135	*1ROAVALB*	*6.02*
315083	*1SPRUNCA*	*14.8*
315084	*1SPRUNCB*	*14.8*
315085	*1SPRUNCC*	*10.97*
315086	*1SPRUNCD*	*10.97*
315073	*1STONECA*	*9.15*
314784	*1WEYRHSB*	*1.72*
315090	*1YORKTN1*	*30.63*
315091	*1YORKTN2*	*31.78*
314539	*3UNCAMP*	*2.15*
314541	*3WATKINS*	*0.6*
314229	*6MT R221*	*1.42*
314236	*6NRTHEST*	*0.33*
314189	*6PAPERMILL*	*8.8*
314251	*6S PUMP*	*1.62*
931041	*AC2-012 C OP*	*9.48*

931042	*AC2-012 E OP*	*15.47*
931501	*AC2-070 C*	*2.92*
931502	*AC2-070 E*	*1.21*
931531	*AC2-073 C*	*3.09*
931532	*AC2-073 E*	*1.56*
931581	*AC2-078 C OP*	*4.63*
931582	*AC2-078 E OP*	*7.55*
931591	*AC2-079 C OP*	*6.69*
931592	*AC2-079 E OP*	*10.91*
931831	*AC2-110 C*	*1.74*
931832	*AC2-110 E*	*2.84*
292791	*U1-032 E*	*4.77*
297087	*V2-040*	*0.25*
900672	*V4-068 E*	*0.25*
901082	*W1-029 E*	*41.27*
907092	*X1-038 E*	*5.37*
913392	*Y1-086 E*	*1.97*
916042	*Z1-036 E*	*40.07*
916192	*Z1-068 E*	*1.73*
917122	*Z2-027 E*	*0.95*
917332	*Z2-043 E*	*0.8*
917592	*Z2-099 E*	*0.37*
921092	*AA1-049 C*	*2.2*
921093	*AA1-049 E*	*1.03*
921162	*AA1-063AC*	*6.95*
921163	*AA1-063AE*	*3.28*
918512	*AA1-065 E OP*	*3.66*
918562	*AA1-072 E*	*0.13*
921292	*AA1-083*	*6.01*
921532	*AA1-132 C*	*6.79*
921533	*AA1-132 E*	*2.91*
921572	*AA1-138 C*	*8.68*
921573	*AA1-138 E*	*3.72*
921582	*AA1-139 C*	*13.62*
921583	*AA1-139 E*	*5.84*
921622	*AA1-145*	*102.15*
921752	*AA2-053 C*	*6.97*
921753	*AA2-053 E*	*2.99*
921772	*AA2-059 C*	*1.03*
921773	*AA2-059 E*	*0.48*
920022	*AA2-086 E*	*0.2*
921982	*AA2-088 C*	*5.5*
921983	*AA2-088 E*	*8.97*
922512	*AA2-174 C*	*0.32*
922513	*AA2-174 E*	*0.35*

922522	*AA2-177 C*	*12.13*
922523	*AA2-177 E*	*5.2*
922532	*AA2-178 C*	*8.22*
922533	*AA2-178 E*	*3.52*
922602	*AB1-013 C*	*2.48*
922603	*AB1-013 E*	*16.61*
922672	*AB1-026 C*	*2.22*
922673	*AB1-026 E*	*0.95*
922682	*AB1-027 C*	*4.45*
922683	*AB1-027 E*	*1.91*
923262	*AB1-132 C OP*	*11.49*
923263	*AB1-132 E OP*	*4.93*
923272	*AB1-135 C OP*	*3.7*
923273	*AB1-135 E OP*	*1.59*
923572	*AB1-173 C OP*	*1.85*
923573	*AB1-173 E OP*	*0.86*
923582	*AB1-173AC OP*	*1.85*
923583	*AB1-173AE OP*	*0.86*
923801	*AB2-015 C OP*	*7.59*
923802	*AB2-015 E OP*	*6.22*
923831	*AB2-022 C*	*2.07*
923832	*AB2-022 E*	*1.12*
923841	*AB2-024 C*	*3.3*
923842	*AB2-024 E*	*1.48*
923851	*AB2-025 C*	*2.36*
923852	*AB2-025 E*	*1.06*
923861	*AB2-026 C*	*1.95*
923862	*AB2-026 E*	*0.88*
923911	*AB2-031 C OP*	*1.84*
923912	*AB2-031 E OP*	*0.91*
923981	*AB2-039 C OP*	*8.78*
923982	*AB2-039 E OP*	*7.1*
923991	*AB2-040 C OP*	*6.04*
923992	*AB2-040 E OP*	*4.94*
924061	*AB2-050*	*6.01*
924071	*AB2-051 C OP*	*127.*
924072	*AB2-051 E OP*	*17.44*
924241	*AB2-068 OP*	*175.81*
924381	*AB2-087 C*	*0.47*
924382	*AB2-087 E*	*0.22*
924501	*AB2-099 C*	*0.48*
924502	*AB2-099 E*	*0.21*
924511	*AB2-100 C*	*9.75*
924512	*AB2-100 E*	*4.8*
924761	*AB2-128 C*	*8.36*

924762	*AB2-128 E*	*3.29*
924811	*AB2-134 C OP*	*15.56*
924812	*AB2-134 E OP*	*20.8*
924931	*AB2-147 C*	*2.14*
924932	*AB2-147 E*	*3.48*
924941	*AB2-149 C OP*	*3.35*
924942	*AB2-149 E OP*	*5.47*
924951	*AB2-150 C OP*	*2.14*
924952	*AB2-150 E OP*	*3.48*
925051	*AB2-160 C OP*	*7.01*
925052	*AB2-160 E OP*	*11.43*
925061	*AB2-161 C OP*	*3.55*
925062	*AB2-161 E OP*	*5.79*
925121	*AB2-169 C OP*	*5.19*
925122	*AB2-169 E OP*	*4.66*
925141	*AB2-171 C OP*	*4.25*
925142	*AB2-171 E OP*	*6.94*
925171	*AB2-174 C OP*	*5.83*
925172	*AB2-174 E OP*	*5.27*
925281	*AB2-186 C*	*0.54*
925282	*AB2-186 E*	*0.23*
925291	*AB2-188 C OP*	*2.03*
925292	*AB2-188 E OP*	*0.91*
925331	*AB2-190 C*	*27.74*
925332	*AB2-190 E*	*6.93*
925521	*AC1-027 C*	*1.85*
925522	*AC1-027 E*	*1.06*
925691	*AC1-045 C*	*1.65*
925692	*AC1-045 E*	*0.9*
925701	*AC1-046 C*	*1.59*
925702	*AC1-046 E*	*0.87*
925711	*AC1-047 C*	*2.1*
925712	*AC1-047 E*	*1.16*
925811	*AC1-060*	*0.1*
925821	*AC1-061*	*0.05*
925841	*AC1-063*	*0.5*
925861	*AC1-065 C*	*4.35*
925862	*AC1-065 E*	*7.09*
926071	*AC1-086 C*	*16.92*
926072	*AC1-086 E*	*7.7*
926291	*AC1-107 OP*	*265.38*
926411	*AC1-112 C*	*3.46*
926412	*AC1-112 E*	*1.94*
926441	*AC1-115 C*	*1.03*
926442	*AC1-115 E*	*1.67*

926471	*AC1-118 C*	*2.1*
926472	*AC1-118 E*	*1.08*
926551	*AC1-134*	*15.02*
926591	*AC1-142 C*	*11.38*
926592	*AC1-142 E*	*8.59*
926661	*AC1-147 C*	*2.1*
926662	*AC1-147 E*	*1.23*
926741	*AC1-159 C*	*126.03*
926751	*AC1-161 C OP*	*26.81*
926752	*AC1-161 E OP*	*11.44*
926771	*AC1-163 C*	*1.74*
926772	*AC1-163 E*	*0.82*
926781	*AC1-164 C OP*	*36.62*
926782	*AC1-164 E OP*	*16.45*
927041	*AC1-191 C*	*19.88*
927042	*AC1-191 E*	*9.9*
927051	*AC1-193 C*	*3.12*
927052	*AC1-193 E*	*5.09*
927111	*AC1-206 C OP*	*10.48*
927112	*AC1-206 E OP*	*4.96*
927221	*AC1-216 C OP*	*11.87*
927222	*AC1-216 E OP*	*9.34*

Appendix 2

(DVP - DVP) The 6CHARCTY-6LAKESD 230 kV line (from bus 314225 to bus 314227 ckt 1) loads from 138.73% to 140.53% (**DC power flow**) of its load dump rating (459 MVA) for the tower line contingency outage of 'LN 208-259'. This project contributes approximately 8.28 MW to the thermal violation.

CONTINGENCY 'LN 208-259'
OPEN BRANCH FROM BUS 314286 TO BUS 314309 CKT 1 /* 6CHSTF A 230.00 - 6IRON208 230.00
OPEN BRANCH FROM BUS 314309 TO BUS 314338 CKT 1 /* 6IRON208 230.00 - 6SOUWEST 230.00
OPEN BUS 314309 /* ISLAND
OPEN BRANCH FROM BUS 314276 TO BUS 314287 CKT 1 /* 6BASIN 230.00 - 6CHSTF B 230.00
END

Bus Number	*Bus Name*	*Full Contribution*
315065	*1CHESTF6*	*33.42*
315074	*1HOPCGN1*	*6.83*
315075	*1HOPCGN2*	*6.74*
315077	*1HOPHCF1*	*1.94*
315078	*1HOPHCF2*	*1.94*
315079	*1HOPHCF3*	*1.94*
315080	*1HOPHCF4*	*2.94*
315076	*1HOPPOLC*	*1.65*
315134	*1ROAVALA*	*11.3*
315135	*1ROAVALB*	*3.01*
315073	*1STONECA*	*5.67*
314784	*1WEYRHSB*	*0.65*
314539	*3UNCAMP*	*0.86*
314541	*3WATKINS*	*0.25*
314229	*6MT R221*	*-0.33*
931041	*AC2-012 C OP*	*2.94*
931042	*AC2-012 E OP*	*4.79*
931581	*AC2-078 C OP*	*3.15*
931582	*AC2-078 E OP*	*5.13*
931591	*AC2-079 C OP*	*3.12*
931592	*AC2-079 E OP*	*5.09*
931631	*AC2-084 C*	*2.99*
931632	*AC2-084 E*	*1.47*
292791	*U1-032 E*	*2.95*
900672	*V4-068 E*	*0.11*
901082	*W1-029 E*	*13.48*
907092	*X1-038 E*	*2.14*
913392	*Y1-086 E*	*0.63*

914231	*Y2-077*	*0.78*
916042	*Z1-036 E*	*13.58*
916192	*Z1-068 E*	*0.53*
917122	*Z2-027 E*	*0.31*
917332	*Z2-043 E*	*0.34*
917342	*Z2-044 E*	*0.18*
917592	*Z2-099 E*	*0.16*
921162	*AA1-063AC*	*3.19*
921163	*AA1-063AE*	*1.51*
918512	*AA1-065 E OP*	*1.48*
918562	*AA1-072 E*	*0.06*
921562	*AA1-135 C*	*2.95*
921563	*AA1-135 E*	*1.26*
921572	*AA1-138 C*	*3.*
921573	*AA1-138 E*	*1.29*
921752	*AA2-053 C*	*3.25*
921753	*AA2-053 E*	*1.4*
921762	*AA2-057 C*	*2.34*
921763	*AA2-057 E*	*1.17*
921772	*AA2-059 C*	*0.36*
921773	*AA2-059 E*	*0.17*
921862	*AA2-068 C*	*0.76*
921863	*AA2-068 E*	*0.35*
920022	*AA2-086 E*	*0.09*
921982	*AA2-088 C*	*2.33*
921983	*AA2-088 E*	*3.8*
922442	*AA2-165 C*	*0.32*
922443	*AA2-165 E*	*0.15*
922472	*AA2-169 C*	*0.71*
922473	*AA2-169 E*	*0.33*
922512	*AA2-174 C*	*0.15*
922513	*AA2-174 E*	*0.16*
922522	*AA2-177 C*	*6.39*
922523	*AA2-177 E*	*2.74*
922532	*AA2-178 C*	*2.96*
922533	*AA2-178 E*	*1.27*
922602	*AB1-013 C*	*0.89*
922603	*AB1-013 E*	*5.97*
923262	*AB1-132 C OP*	*5.96*
923263	*AB1-132 E OP*	*2.56*
923572	*AB1-173 C OP*	*0.98*
923573	*AB1-173 E OP*	*0.46*
923582	*AB1-173AC OP*	*0.98*
923583	*AB1-173AE OP*	*0.46*
923801	*AB2-015 C OP*	*3.06*

923802	*AB2-015 E OP*	*2.51*
923831	*AB2-022 C*	*0.66*
923832	*AB2-022 E*	*0.35*
923851	*AB2-025 C*	*1.62*
923852	*AB2-025 E*	*0.73*
923911	*AB2-031 C OP*	*0.98*
923912	*AB2-031 E OP*	*0.48*
923981	*AB2-039 C OP*	*4.92*
923982	*AB2-039 E OP*	*3.98*
923991	*AB2-040 C OP*	*3.21*
923992	*AB2-040 E OP*	*2.63*
924071	*AB2-051 C OP*	*39.03*
924072	*AB2-051 E OP*	*5.36*
924381	*AB2-087 C*	*0.19*
924382	*AB2-087 E*	*0.09*
924501	*AB2-099 C*	*0.2*
924502	*AB2-099 E*	*0.09*
924511	*AB2-100 C*	*5.57*
924512	*AB2-100 E*	*2.74*
924761	*AB2-128 C*	*4.77*
924762	*AB2-128 E*	*1.88*
924811	*AB2-134 C OP*	*8.19*
924812	*AB2-134 E OP*	*10.95*
924931	*AB2-147 C*	*1.2*
924932	*AB2-147 E*	*1.96*
924941	*AB2-149 C OP*	*1.58*
924942	*AB2-149 E OP*	*2.59*
924951	*AB2-150 C OP*	*1.2*
924952	*AB2-150 E OP*	*1.96*
925051	*AB2-160 C OP*	*4.18*
925052	*AB2-160 E OP*	*6.83*
925061	*AB2-161 C OP*	*1.99*
925062	*AB2-161 E OP*	*3.24*
925121	*AB2-169 C OP*	*2.01*
925122	*AB2-169 E OP*	*1.81*
925141	*AB2-171 C OP*	*1.75*
925142	*AB2-171 E OP*	*2.85*
925171	*AB2-174 C OP*	*3.17*
925172	*AB2-174 E OP*	*2.87*
925281	*AB2-186 C*	*0.18*
925282	*AB2-186 E*	*0.08*
925291	*AB2-188 C OP*	*0.73*
925292	*AB2-188 E OP*	*0.33*
925331	*AB2-190 C*	*14.6*
925332	*AB2-190 E*	*3.65*

925521	*AC1-027 C*	*0.57*
925522	*AC1-027 E*	*0.32*
925691	*AC1-045 C*	*0.53*
925692	*AC1-045 E*	*0.29*
925821	*AC1-061*	*0.03*
926071	*AC1-086 C*	*8.78*
926072	*AC1-086 E*	*4.*
926201	*AC1-098 C*	*2.1*
926202	*AC1-098 E*	*1.25*
926211	*AC1-099 C*	*0.7*
926212	*AC1-099 E*	*0.41*
926661	*AC1-147 C*	*0.65*
926662	*AC1-147 E*	*0.38*
926741	*AC1-159 C*	*38.73*
926771	*AC1-163 C*	*0.73*
926772	*AC1-163 E*	*0.34*
927051	*AC1-193 C*	*1.28*
927052	*AC1-193 E*	*2.09*
927111	*AC1-206 C OP*	*6.48*
927112	*AC1-206 E OP*	*3.06*
927141	*AC1-208 C*	*3.26*
927142	*AC1-208 E*	*1.45*
927221	*AC1-216 C OP*	*6.25*
927222	*AC1-216 E OP*	*4.92*

Appendix 3

(DVP - DVP) The 6MESSER-6CHARCTY 230 kV line (from bus 314228 to bus 314225 ckt 1) loads from 150.47% to 152.28% (**DC power flow**) of its load dump rating (459 MVA) for the tower line contingency outage of 'LN 208-259'. This project contributes approximately 8.28 MW to the thermal violation.

CONTINGENCY 'LN 208-259'
OPEN BRANCH FROM BUS 314286 TO BUS 314309 CKT 1 /* 6CHSTF A 230.00 - 6IRON208 230.00
OPEN BRANCH FROM BUS 314309 TO BUS 314338 CKT 1 /* 6IRON208 230.00 - 6SOUWEST 230.00
OPEN BUS 314309 /* ISLAND
OPEN BRANCH FROM BUS 314276 TO BUS 314287 CKT 1 /* 6BASIN 230.00 - 6CHSTF B 230.00
END

Bus Number	*Bus Name*	*Full Contribution*
315065	*1CHESTF6*	*33.42*
315074	*1HOPCGN1*	*6.83*
315075	*1HOPCGN2*	*6.74*
315077	*1HOPHCF1*	*1.94*
315078	*1HOPHCF2*	*1.94*
315079	*1HOPHCF3*	*1.94*
315080	*1HOPHCF4*	*2.94*
315076	*1HOPPOLC*	*1.65*
315134	*1ROAVALA*	*11.3*
315135	*1ROAVALB*	*3.01*
315073	*1STONECA*	*5.67*
314784	*1WEYRHSB*	*0.65*
314539	*3UNCAMP*	*0.86*
314541	*3WATKINS*	*0.25*
314229	*6MT R221*	*-0.33*
931041	*AC2-012 C OP*	*2.94*
931042	*AC2-012 E OP*	*4.79*
931581	*AC2-078 C OP*	*3.15*
931582	*AC2-078 E OP*	*5.13*
931591	*AC2-079 C OP*	*3.12*
931592	*AC2-079 E OP*	*5.09*
931631	*AC2-084 C*	*2.99*
931632	*AC2-084 E*	*1.47*
292791	*U1-032 E*	*2.95*
900672	*V4-068 E*	*0.11*
901082	*W1-029 E*	*13.48*
907092	*X1-038 E*	*2.14*
913392	*Y1-086 E*	*0.63*

914231	*Y2-077*	*0.78*
916042	*Z1-036 E*	*13.58*
916192	*Z1-068 E*	*0.53*
917122	*Z2-027 E*	*0.31*
917332	*Z2-043 E*	*0.34*
917342	*Z2-044 E*	*0.18*
917592	*Z2-099 E*	*0.16*
921162	*AA1-063AC*	*3.19*
921163	*AA1-063AE*	*1.51*
918512	*AA1-065 E OP*	*1.48*
918562	*AA1-072 E*	*0.06*
921562	*AA1-135 C*	*2.95*
921563	*AA1-135 E*	*1.26*
921572	*AA1-138 C*	*3.*
921573	*AA1-138 E*	*1.29*
921752	*AA2-053 C*	*3.25*
921753	*AA2-053 E*	*1.4*
921762	*AA2-057 C*	*2.34*
921763	*AA2-057 E*	*1.17*
921772	*AA2-059 C*	*0.36*
921773	*AA2-059 E*	*0.17*
921862	*AA2-068 C*	*0.76*
921863	*AA2-068 E*	*0.35*
920022	*AA2-086 E*	*0.09*
921982	*AA2-088 C*	*2.33*
921983	*AA2-088 E*	*3.8*
922442	*AA2-165 C*	*0.32*
922443	*AA2-165 E*	*0.15*
922472	*AA2-169 C*	*0.71*
922473	*AA2-169 E*	*0.33*
922512	*AA2-174 C*	*0.15*
922513	*AA2-174 E*	*0.16*
922522	*AA2-177 C*	*6.39*
922523	*AA2-177 E*	*2.74*
922532	*AA2-178 C*	*2.96*
922533	*AA2-178 E*	*1.27*
922602	*AB1-013 C*	*0.89*
922603	*AB1-013 E*	*5.97*
923262	*AB1-132 C OP*	*5.96*
923263	*AB1-132 E OP*	*2.56*
923572	*AB1-173 C OP*	*0.98*
923573	*AB1-173 E OP*	*0.46*
923582	*AB1-173AC OP*	*0.98*
923583	*AB1-173AE OP*	*0.46*
923801	*AB2-015 C OP*	*3.06*

923802	*AB2-015 E OP*	*2.51*
923831	*AB2-022 C*	*0.66*
923832	*AB2-022 E*	*0.35*
923851	*AB2-025 C*	*1.62*
923852	*AB2-025 E*	*0.73*
923911	*AB2-031 C OP*	*0.98*
923912	*AB2-031 E OP*	*0.48*
923981	*AB2-039 C OP*	*4.92*
923982	*AB2-039 E OP*	*3.98*
923991	*AB2-040 C OP*	*3.21*
923992	*AB2-040 E OP*	*2.63*
924071	*AB2-051 C OP*	*39.03*
924072	*AB2-051 E OP*	*5.36*
924381	*AB2-087 C*	*0.19*
924382	*AB2-087 E*	*0.09*
924501	*AB2-099 C*	*0.2*
924502	*AB2-099 E*	*0.09*
924511	*AB2-100 C*	*5.57*
924512	*AB2-100 E*	*2.74*
924761	*AB2-128 C*	*4.77*
924762	*AB2-128 E*	*1.88*
924811	*AB2-134 C OP*	*8.19*
924812	*AB2-134 E OP*	*10.95*
924931	*AB2-147 C*	*1.2*
924932	*AB2-147 E*	*1.96*
924941	*AB2-149 C OP*	*1.58*
924942	*AB2-149 E OP*	*2.59*
924951	*AB2-150 C OP*	*1.2*
924952	*AB2-150 E OP*	*1.96*
925051	*AB2-160 C OP*	*4.18*
925052	*AB2-160 E OP*	*6.83*
925061	*AB2-161 C OP*	*1.99*
925062	*AB2-161 E OP*	*3.24*
925121	*AB2-169 C OP*	*2.01*
925122	*AB2-169 E OP*	*1.81*
925141	*AB2-171 C OP*	*1.75*
925142	*AB2-171 E OP*	*2.85*
925171	*AB2-174 C OP*	*3.17*
925172	*AB2-174 E OP*	*2.87*
925281	*AB2-186 C*	*0.18*
925282	*AB2-186 E*	*0.08*
925291	*AB2-188 C OP*	*0.73*
925292	*AB2-188 E OP*	*0.33*
925331	*AB2-190 C*	*14.6*
925332	*AB2-190 E*	*3.65*

925521	*AC1-027 C*	*0.57*
925522	*AC1-027 E*	*0.32*
925691	*AC1-045 C*	*0.53*
925692	*AC1-045 E*	*0.29*
925821	*AC1-061*	*0.03*
926071	*AC1-086 C*	*8.78*
926072	*AC1-086 E*	*4.*
926201	*AC1-098 C*	*2.1*
926202	*AC1-098 E*	*1.25*
926211	*AC1-099 C*	*0.7*
926212	*AC1-099 E*	*0.41*
926661	*AC1-147 C*	*0.65*
926662	*AC1-147 E*	*0.38*
926741	*AC1-159 C*	*38.73*
926771	*AC1-163 C*	*0.73*
926772	*AC1-163 E*	*0.34*
927051	*AC1-193 C*	*1.28*
927052	*AC1-193 E*	*2.09*
927111	*AC1-206 C OP*	*6.48*
927112	*AC1-206 E OP*	*3.06*
927141	*AC1-208 C*	*3.26*
927142	*AC1-208 E*	*1.45*
927221	*AC1-216 C OP*	*6.25*
927222	*AC1-216 E OP*	*4.92*

Appendix 4

(DVP - DVP) The 6CHSTF B-6MESSER 230 kV line (from bus 314287 to bus 314228 ckt 1) loads from 150.6% to 152.41% (**DC power flow**) of its load dump rating (459 MVA) for the tower line contingency outage of 'LN 208-259'. This project contributes approximately 8.28 MW to the thermal violation.

```
CONTINGENCY 'LN 208-259'
  OPEN BRANCH FROM BUS 314286 TO BUS 314309 CKT 1              /* 6CHSTF A
230.00 - 6IRON208 230.00
  OPEN BRANCH FROM BUS 314309 TO BUS 314338 CKT 1              /* 6IRON208
230.00 - 6SOUWEST 230.00
  OPEN BUS 314309                                  /* ISLAND
  OPEN BRANCH FROM BUS 314276 TO BUS 314287 CKT 1              /* 6BASIN 230.00 -
6CHSTF B 230.00
  END
```

Bus Number	*Bus Name*	*Full Contribution*
315065	*1CHESTF6*	*33.42*
315074	*1HOPCGN1*	*6.83*
315075	*1HOPCGN2*	*6.74*
315077	*1HOPHCF1*	*1.94*
315078	*1HOPHCF2*	*1.94*
315079	*1HOPHCF3*	*1.94*
315080	*1HOPHCF4*	*2.94*
315076	*1HOPPOLC*	*1.65*
315134	*1ROAVALA*	*11.3*
315135	*1ROAVALB*	*3.01*
315073	*1STONECA*	*5.67*
314784	*1WEYRHSB*	*0.65*
314539	*3UNCAMP*	*0.86*
314541	*3WATKINS*	*0.25*
314229	*6MT R221*	*-0.33*
931041	*AC2-012 C OP*	*2.94*
931042	*AC2-012 E OP*	*4.79*
931581	*AC2-078 C OP*	*3.15*
931582	*AC2-078 E OP*	*5.13*
931591	*AC2-079 C OP*	*3.12*
931592	*AC2-079 E OP*	*5.09*
931631	*AC2-084 C*	*2.99*
931632	*AC2-084 E*	*1.47*
292791	*U1-032 E*	*2.95*
900672	*V4-068 E*	*0.11*
901082	*W1-029 E*	*13.48*
907092	*X1-038 E*	*2.14*
913392	*Y1-086 E*	*0.63*

914231	*Y2-077*	*0.78*
916042	*Z1-036 E*	*13.58*
916192	*Z1-068 E*	*0.53*
917122	*Z2-027 E*	*0.31*
917332	*Z2-043 E*	*0.34*
917342	*Z2-044 E*	*0.18*
917592	*Z2-099 E*	*0.16*
921162	*AA1-063AC*	*3.19*
921163	*AA1-063AE*	*1.51*
918512	*AA1-065 E OP*	*1.48*
918562	*AA1-072 E*	*0.06*
921562	*AA1-135 C*	*2.95*
921563	*AA1-135 E*	*1.26*
921572	*AA1-138 C*	*3.*
921573	*AA1-138 E*	*1.29*
921752	*AA2-053 C*	*3.25*
921753	*AA2-053 E*	*1.4*
921762	*AA2-057 C*	*2.34*
921763	*AA2-057 E*	*1.17*
921772	*AA2-059 C*	*0.36*
921773	*AA2-059 E*	*0.17*
921862	*AA2-068 C*	*0.76*
921863	*AA2-068 E*	*0.35*
920022	*AA2-086 E*	*0.09*
921982	*AA2-088 C*	*2.33*
921983	*AA2-088 E*	*3.8*
922442	*AA2-165 C*	*0.32*
922443	*AA2-165 E*	*0.15*
922472	*AA2-169 C*	*0.71*
922473	*AA2-169 E*	*0.33*
922512	*AA2-174 C*	*0.15*
922513	*AA2-174 E*	*0.16*
922522	*AA2-177 C*	*6.39*
922523	*AA2-177 E*	*2.74*
922532	*AA2-178 C*	*2.96*
922533	*AA2-178 E*	*1.27*
922602	*AB1-013 C*	*0.89*
922603	*AB1-013 E*	*5.97*
923262	*AB1-132 C OP*	*5.96*
923263	*AB1-132 E OP*	*2.56*
923572	*AB1-173 C OP*	*0.98*
923573	*AB1-173 E OP*	*0.46*
923582	*AB1-173AC OP*	*0.98*
923583	*AB1-173AE OP*	*0.46*
923801	*AB2-015 C OP*	*3.06*

923802	*AB2-015 E OP*	*2.51*
923831	*AB2-022 C*	*0.66*
923832	*AB2-022 E*	*0.35*
923851	*AB2-025 C*	*1.62*
923852	*AB2-025 E*	*0.73*
923911	*AB2-031 C OP*	*0.98*
923912	*AB2-031 E OP*	*0.48*
923981	*AB2-039 C OP*	*4.92*
923982	*AB2-039 E OP*	*3.98*
923991	*AB2-040 C OP*	*3.21*
923992	*AB2-040 E OP*	*2.63*
924071	*AB2-051 C OP*	*39.03*
924072	*AB2-051 E OP*	*5.36*
924381	*AB2-087 C*	*0.19*
924382	*AB2-087 E*	*0.09*
924501	*AB2-099 C*	*0.2*
924502	*AB2-099 E*	*0.09*
924511	*AB2-100 C*	*5.57*
924512	*AB2-100 E*	*2.74*
924761	*AB2-128 C*	*4.77*
924762	*AB2-128 E*	*1.88*
924811	*AB2-134 C OP*	*8.19*
924812	*AB2-134 E OP*	*10.95*
924931	*AB2-147 C*	*1.2*
924932	*AB2-147 E*	*1.96*
924941	*AB2-149 C OP*	*1.58*
924942	*AB2-149 E OP*	*2.59*
924951	*AB2-150 C OP*	*1.2*
924952	*AB2-150 E OP*	*1.96*
925051	*AB2-160 C OP*	*4.18*
925052	*AB2-160 E OP*	*6.83*
925061	*AB2-161 C OP*	*1.99*
925062	*AB2-161 E OP*	*3.24*
925121	*AB2-169 C OP*	*2.01*
925122	*AB2-169 E OP*	*1.81*
925141	*AB2-171 C OP*	*1.75*
925142	*AB2-171 E OP*	*2.85*
925171	*AB2-174 C OP*	*3.17*
925172	*AB2-174 E OP*	*2.87*
925281	*AB2-186 C*	*0.18*
925282	*AB2-186 E*	*0.08*
925291	*AB2-188 C OP*	*0.73*
925292	*AB2-188 E OP*	*0.33*
925331	*AB2-190 C*	*14.6*
925332	*AB2-190 E*	*3.65*

925521	*AC1-027 C*	*0.57*
925522	*AC1-027 E*	*0.32*
925691	*AC1-045 C*	*0.53*
925692	*AC1-045 E*	*0.29*
925821	*AC1-061*	*0.03*
926071	*AC1-086 C*	*8.78*
926072	*AC1-086 E*	*4.*
926201	*AC1-098 C*	*2.1*
926202	*AC1-098 E*	*1.25*
926211	*AC1-099 C*	*0.7*
926212	*AC1-099 E*	*0.41*
926661	*AC1-147 C*	*0.65*
926662	*AC1-147 E*	*0.38*
926741	*AC1-159 C*	*38.73*
926771	*AC1-163 C*	*0.73*
926772	*AC1-163 E*	*0.34*
927051	*AC1-193 C*	*1.28*
927052	*AC1-193 E*	*2.09*
927111	*AC1-206 C OP*	*6.48*
927112	*AC1-206 E OP*	*3.06*
927141	*AC1-208 C*	*3.26*
927142	*AC1-208 E*	*1.45*
927221	*AC1-216 C OP*	*6.25*
927222	*AC1-216 E OP*	*4.92*

Appendix 5

(DVP - DVP) The 8ELMONT 500/230 kV transformer (from bus 314218 to bus 314908 ckt 1) loads from 118.45% to 118.93% (**DC power flow**) of its load dump rating (1051 MVA) for the line fault with failed breaker contingency outage of 'H2T557'. This project contributes approximately 11.21 MW to the thermal violation.

CONTINGENCY 'H2T557' /* ELMONT
OPEN BRANCH FROM BUS 314908 TO BUS 314903 CKT 1 /*ELMONT TO CHICKAHOMINY (LINE 557)
OPEN BRANCH FROM BUS 314903 TO BUS 314214 CKT 1 /*CHICKAHOMINY 500-230 (TX#1)
OPEN BRANCH FROM BUS 314908 TO BUS 314218 CKT 2 /*ELMONT 500-230 (TX#2)
END

Bus Number	*Bus Name*	*Full Contribution*
315067	*1DARBY 1*	*4.47*
315068	*1DARBY 2*	*4.48*
315069	*1DARBY 3*	*4.53*
315070	*1DARBY 4*	*4.53*
315043	*1FRIVERA*	*6.02*
315044	*1FRIVERB*	*4.66*
315045	*1FRIVERC*	*6.02*
315046	*1FRIVERD*	*4.66*
315047	*1FRIVERE*	*4.66*
315048	*1FRIVERF*	*6.02*
315074	*1HOPCGN1*	*11.03*
315075	*1HOPCGN2*	*10.89*
315134	*1ROAVALA*	*22.59*
315135	*1ROAVALB*	*6.02*
315083	*1SPRUNCA*	*14.8*
315084	*1SPRUNCB*	*14.8*
315085	*1SPRUNCC*	*10.97*
315086	*1SPRUNCD*	*10.97*
315073	*1STONECA*	*9.15*
314784	*1WEYRHSB*	*1.72*
315090	*1YORKTN1*	*30.63*
315091	*1YORKTN2*	*31.78*
314539	*3UNCAMP*	*2.15*
314541	*3WATKINS*	*0.6*
314229	*6MT R221*	*1.42*
314236	*6NRTHEST*	*0.33*
314189	*6PAPERMILL*	*8.8*
314251	*6S PUMP*	*1.62*
931041	*AC2-012 C OP*	*9.29*

931042	*AC2-012 E OP*	*15.16*
931501	*AC2-070 C*	*2.92*
931502	*AC2-070 E*	*1.21*
931531	*AC2-073 C*	*3.09*
931532	*AC2-073 E*	*1.56*
931581	*AC2-078 C OP*	*4.26*
931582	*AC2-078 E OP*	*6.95*
931591	*AC2-079 C OP*	*6.71*
931592	*AC2-079 E OP*	*10.95*
931831	*AC2-110 C*	*1.74*
931832	*AC2-110 E*	*2.84*
292791	*U1-032 E*	*4.77*
297087	*V2-040*	*0.25*
900672	*V4-068 E*	*0.25*
901082	*W1-029 E*	*41.27*
907092	*X1-038 E*	*5.37*
913392	*Y1-086 E*	*1.97*
916042	*Z1-036 E*	*40.07*
916192	*Z1-068 E*	*1.73*
917122	*Z2-027 E*	*0.95*
917332	*Z2-043 E*	*0.8*
917592	*Z2-099 E*	*0.37*
921092	*AA1-049 C*	*2.2*
921093	*AA1-049 E*	*1.03*
921162	*AA1-063AC*	*6.95*
921163	*AA1-063AE*	*3.28*
918512	*AA1-065 E OP*	*3.66*
918562	*AA1-072 E*	*0.13*
921292	*AA1-083*	*6.01*
921532	*AA1-132 C*	*6.79*
921533	*AA1-132 E*	*2.91*
921572	*AA1-138 C*	*8.68*
921573	*AA1-138 E*	*3.72*
921582	*AA1-139 C*	*13.62*
921583	*AA1-139 E*	*5.84*
921622	*AA1-145*	*102.15*
921752	*AA2-053 C*	*6.97*
921753	*AA2-053 E*	*2.99*
921772	*AA2-059 C*	*1.03*
921773	*AA2-059 E*	*0.48*
920022	*AA2-086 E*	*0.2*
921982	*AA2-088 C*	*5.5*
921983	*AA2-088 E*	*8.97*
922512	*AA2-174 C*	*0.32*
922513	*AA2-174 E*	*0.35*

922522	*AA2-177 C*	*12.13*
922523	*AA2-177 E*	*5.2*
922532	*AA2-178 C*	*8.22*
922533	*AA2-178 E*	*3.52*
922602	*AB1-013 C*	*2.48*
922603	*AB1-013 E*	*16.61*
922672	*AB1-026 C*	*2.22*
922673	*AB1-026 E*	*0.95*
922682	*AB1-027 C*	*4.45*
922683	*AB1-027 E*	*1.91*
923262	*AB1-132 C OP*	*11.49*
923263	*AB1-132 E OP*	*4.93*
923272	*AB1-135 C OP*	*3.7*
923273	*AB1-135 E OP*	*1.59*
923572	*AB1-173 C OP*	*1.85*
923573	*AB1-173 E OP*	*0.86*
923582	*AB1-173AC OP*	*1.85*
923583	*AB1-173AE OP*	*0.86*
923801	*AB2-015 C OP*	*7.59*
923802	*AB2-015 E OP*	*6.22*
923831	*AB2-022 C*	*2.07*
923832	*AB2-022 E*	*1.12*
923841	*AB2-024 C*	*3.3*
923842	*AB2-024 E*	*1.48*
923851	*AB2-025 C*	*2.36*
923852	*AB2-025 E*	*1.06*
923861	*AB2-026 C*	*1.95*
923862	*AB2-026 E*	*0.88*
923911	*AB2-031 C OP*	*1.84*
923912	*AB2-031 E OP*	*0.91*
923981	*AB2-039 C OP*	*8.78*
923982	*AB2-039 E OP*	*7.1*
923991	*AB2-040 C OP*	*6.04*
923992	*AB2-040 E OP*	*4.94*
924061	*AB2-050*	*6.01*
924071	*AB2-051 C OP*	*127.*
924072	*AB2-051 E OP*	*17.44*
924241	*AB2-068 OP*	*175.81*
924381	*AB2-087 C*	*0.47*
924382	*AB2-087 E*	*0.22*
924501	*AB2-099 C*	*0.48*
924502	*AB2-099 E*	*0.21*
924511	*AB2-100 C*	*9.75*
924512	*AB2-100 E*	*4.8*
924761	*AB2-128 C*	*8.36*

924762	*AB2-128 E*	*3.29*
924811	*AB2-134 C OP*	*15.56*
924812	*AB2-134 E OP*	*20.8*
924931	*AB2-147 C*	*2.14*
924932	*AB2-147 E*	*3.48*
924941	*AB2-149 C OP*	*3.35*
924942	*AB2-149 E OP*	*5.47*
924951	*AB2-150 C OP*	*2.14*
924952	*AB2-150 E OP*	*3.48*
925051	*AB2-160 C OP*	*7.01*
925052	*AB2-160 E OP*	*11.43*
925061	*AB2-161 C OP*	*3.55*
925062	*AB2-161 E OP*	*5.79*
925121	*AB2-169 C OP*	*5.19*
925122	*AB2-169 E OP*	*4.66*
925141	*AB2-171 C OP*	*4.25*
925142	*AB2-171 E OP*	*6.94*
925171	*AB2-174 C OP*	*5.83*
925172	*AB2-174 E OP*	*5.27*
925281	*AB2-186 C*	*0.54*
925282	*AB2-186 E*	*0.23*
925291	*AB2-188 C OP*	*2.03*
925292	*AB2-188 E OP*	*0.91*
925331	*AB2-190 C*	*27.74*
925332	*AB2-190 E*	*6.93*
925521	*AC1-027 C*	*1.85*
925522	*AC1-027 E*	*1.06*
925691	*AC1-045 C*	*1.65*
925692	*AC1-045 E*	*0.9*
925701	*AC1-046 C*	*1.59*
925702	*AC1-046 E*	*0.87*
925711	*AC1-047 C*	*2.1*
925712	*AC1-047 E*	*1.16*
925811	*AC1-060*	*0.1*
925821	*AC1-061*	*0.05*
925841	*AC1-063*	*0.5*
925861	*AC1-065 C*	*4.35*
925862	*AC1-065 E*	*7.09*
926071	*AC1-086 C*	*16.92*
926072	*AC1-086 E*	*7.7*
926291	*AC1-107 OP*	*265.38*
926411	*AC1-112 C*	*3.46*
926412	*AC1-112 E*	*1.94*
926441	*AC1-115 C*	*1.03*
926442	*AC1-115 E*	*1.67*

926471	*AC1-118 C*	*2.1*
926472	*AC1-118 E*	*1.08*
926551	*AC1-134*	*15.02*
926591	*AC1-142 C*	*11.38*
926592	*AC1-142 E*	*8.59*
926661	*AC1-147 C*	*2.1*
926662	*AC1-147 E*	*1.23*
926741	*AC1-159 C*	*126.03*
926751	*AC1-161 C OP*	*26.81*
926752	*AC1-161 E OP*	*11.44*
926771	*AC1-163 C*	*1.74*
926772	*AC1-163 E*	*0.82*
926781	*AC1-164 C OP*	*36.62*
926782	*AC1-164 E OP*	*16.45*
927041	*AC1-191 C*	*19.88*
927042	*AC1-191 E*	*9.9*
927051	*AC1-193 C*	*3.12*
927052	*AC1-193 E*	*5.09*
927111	*AC1-206 C OP*	*10.48*
927112	*AC1-206 E OP*	*4.96*
927221	*AC1-216 C OP*	*11.87*
927222	*AC1-216 E OP*	*9.34*

Appendix 6

(DVP - DVP) The 6CHARCTY-6LAKESD 230 kV line (from bus 314225 to bus 314227 ckt 1) loads from 137.97% to 138.59% (**DC power flow**) of its load dump rating (459 MVA) for the tower line contingency outage of 'LN 208-259'. This project contributes approximately 6.28 MW to the thermal violation.

CONTINGENCY 'LN 208-259'
OPEN BRANCH FROM BUS 314286 TO BUS 314309 CKT 1 /* 6CHSTF A 230.00 - 6IRON208 230.00
OPEN BRANCH FROM BUS 314309 TO BUS 314338 CKT 1 /* 6IRON208 230.00 - 6SOUWEST 230.00
OPEN BUS 314309 /* ISLAND
OPEN BRANCH FROM BUS 314276 TO BUS 314287 CKT 1 /* 6BASIN 230.00 - 6CHSTF B 230.00
END

Bus Number	*Bus Name*	*Full Contribution*
315065	*1CHESTF6*	*33.42*
315074	*1HOPCGN1*	*6.83*
315075	*1HOPCGN2*	*6.74*
315077	*1HOPHCF1*	*1.94*
315078	*1HOPHCF2*	*1.94*
315079	*1HOPHCF3*	*1.94*
315080	*1HOPHCF4*	*2.94*
315076	*1HOPPOLC*	*1.65*
315134	*1ROAVALA*	*11.3*
315135	*1ROAVALB*	*3.01*
315073	*1STONECA*	*5.67*
314784	*1WEYRHSB*	*0.65*
314539	*3UNCAMP*	*0.86*
314541	*3WATKINS*	*0.25*
314229	*6MT R221*	*-0.33*
931581	*AC2-078 C OP*	*2.39*
931582	*AC2-078 E OP*	*3.89*
931591	*AC2-079 C OP*	*3.17*
931592	*AC2-079 E OP*	*5.17*
931631	*AC2-084 C*	*2.99*
931632	*AC2-084 E*	*1.47*
292791	*U1-032 E*	*2.95*
900672	*V4-068 E*	*0.11*
901082	*W1-029 E*	*13.48*
907092	*X1-038 E*	*2.14*
913392	*Y1-086 E*	*0.63*
914231	*Y2-077*	*0.78*
916042	*Z1-036 E*	*13.58*

916192	*Z1-068 E*	*0.53*
917122	*Z2-027 E*	*0.31*
917332	*Z2-043 E*	*0.34*
917342	*Z2-044 E*	*0.18*
917592	*Z2-099 E*	*0.16*
921162	*AA1-063AC*	*3.19*
921163	*AA1-063AE*	*1.51*
918512	*AA1-065 E OP*	*1.48*
918562	*AA1-072 E*	*0.06*
921562	*AA1-135 C*	*2.95*
921563	*AA1-135 E*	*1.26*
921572	*AA1-138 C*	*3.*
921573	*AA1-138 E*	*1.29*
921752	*AA2-053 C*	*3.25*
921753	*AA2-053 E*	*1.4*
921762	*AA2-057 C*	*2.34*
921763	*AA2-057 E*	*1.17*
921772	*AA2-059 C*	*0.36*
921773	*AA2-059 E*	*0.17*
921862	*AA2-068 C*	*0.76*
921863	*AA2-068 E*	*0.35*
920022	*AA2-086 E*	*0.09*
921982	*AA2-088 C*	*2.33*
921983	*AA2-088 E*	*3.8*
922442	*AA2-165 C*	*0.32*
922443	*AA2-165 E*	*0.15*
922472	*AA2-169 C*	*0.71*
922473	*AA2-169 E*	*0.33*
922512	*AA2-174 C*	*0.15*
922513	*AA2-174 E*	*0.16*
922522	*AA2-177 C*	*6.39*
922523	*AA2-177 E*	*2.74*
922532	*AA2-178 C*	*2.96*
922533	*AA2-178 E*	*1.27*
922602	*AB1-013 C*	*0.89*
922603	*AB1-013 E*	*5.97*
923262	*AB1-132 C OP*	*5.96*
923263	*AB1-132 E OP*	*2.56*
923572	*AB1-173 C OP*	*0.98*
923573	*AB1-173 E OP*	*0.46*
923582	*AB1-173AC OP*	*0.98*
923583	*AB1-173AE OP*	*0.46*
923801	*AB2-015 C OP*	*3.06*
923802	*AB2-015 E OP*	*2.51*
923831	*AB2-022 C*	*0.66*

923832	*AB2-022 E*	*0.35*
923851	*AB2-025 C*	*1.62*
923852	*AB2-025 E*	*0.73*
923911	*AB2-031 C OP*	*0.98*
923912	*AB2-031 E OP*	*0.48*
923981	*AB2-039 C OP*	*4.92*
923982	*AB2-039 E OP*	*3.98*
923991	*AB2-040 C OP*	*3.21*
923992	*AB2-040 E OP*	*2.63*
924071	*AB2-051 C OP*	*39.03*
924072	*AB2-051 E OP*	*5.36*
924381	*AB2-087 C*	*0.19*
924382	*AB2-087 E*	*0.09*
924501	*AB2-099 C*	*0.2*
924502	*AB2-099 E*	*0.09*
924511	*AB2-100 C*	*5.57*
924512	*AB2-100 E*	*2.74*
924761	*AB2-128 C*	*4.77*
924762	*AB2-128 E*	*1.88*
924811	*AB2-134 C OP*	*8.19*
924812	*AB2-134 E OP*	*10.95*
924931	*AB2-147 C*	*1.2*
924932	*AB2-147 E*	*1.96*
924941	*AB2-149 C OP*	*1.58*
924942	*AB2-149 E OP*	*2.59*
924951	*AB2-150 C OP*	*1.2*
924952	*AB2-150 E OP*	*1.96*
925051	*AB2-160 C OP*	*4.18*
925052	*AB2-160 E OP*	*6.83*
925061	*AB2-161 C OP*	*1.99*
925062	*AB2-161 E OP*	*3.24*
925121	*AB2-169 C OP*	*2.01*
925122	*AB2-169 E OP*	*1.81*
925141	*AB2-171 C OP*	*1.75*
925142	*AB2-171 E OP*	*2.85*
925171	*AB2-174 C OP*	*3.17*
925172	*AB2-174 E OP*	*2.87*
925281	*AB2-186 C*	*0.18*
925282	*AB2-186 E*	*0.08*
925291	*AB2-188 C OP*	*0.73*
925292	*AB2-188 E OP*	*0.33*
925331	*AB2-190 C*	*14.6*
925332	*AB2-190 E*	*3.65*
925521	*AC1-027 C*	*0.57*
925522	*AC1-027 E*	*0.32*

925691	*AC1-045 C*	*0.53*
925692	*AC1-045 E*	*0.29*
925821	*AC1-061*	*0.03*
926071	*AC1-086 C*	*8.78*
926072	*AC1-086 E*	*4.*
926201	*AC1-098 C*	*2.1*
926202	*AC1-098 E*	*1.25*
926211	*AC1-099 C*	*0.7*
926212	*AC1-099 E*	*0.41*
926661	*AC1-147 C*	*0.65*
926662	*AC1-147 E*	*0.38*
926741	*AC1-159 C*	*38.73*
926771	*AC1-163 C*	*0.73*
926772	*AC1-163 E*	*0.34*
927051	*AC1-193 C*	*1.28*
927052	*AC1-193 E*	*2.09*
927111	*AC1-206 C OP*	*6.48*
927112	*AC1-206 E OP*	*3.06*
927141	*AC1-208 C*	*3.26*
927142	*AC1-208 E*	*1.45*
927221	*AC1-216 C OP*	*6.25*
927222	*AC1-216 E OP*	*4.92*

Appendix 7

(DVP - DVP) The 6MESSER-6CHARCTY 230 kV line (from bus 314228 to bus 314225 ckt 1) loads from 149.71% to 150.33% (**DC power flow**) of its load dump rating (459 MVA) for the tower line contingency outage of 'LN 208-259'. This project contributes approximately 6.28 MW to the thermal violation.

CONTINGENCY 'LN 208-259'
OPEN BRANCH FROM BUS 314286 TO BUS 314309 CKT 1 /* 6CHSTF A 230.00 - 6IRON208 230.00
OPEN BRANCH FROM BUS 314309 TO BUS 314338 CKT 1 /* 6IRON208 230.00 - 6SOUWEST 230.00
OPEN BUS 314309 /* ISLAND
OPEN BRANCH FROM BUS 314276 TO BUS 314287 CKT 1 /* 6BASIN 230.00 - 6CHSTF B 230.00
END

Bus Number	*Bus Name*	*Full Contribution*
315065	*1CHESTF6*	*33.42*
315074	*1HOPCGN1*	*6.83*
315075	*1HOPCGN2*	*6.74*
315077	*1HOPHCF1*	*1.94*
315078	*1HOPHCF2*	*1.94*
315079	*1HOPHCF3*	*1.94*
315080	*1HOPHCF4*	*2.94*
315076	*1HOPPOLC*	*1.65*
315134	*1ROAVALA*	*11.3*
315135	*1ROAVALB*	*3.01*
315073	*1STONECA*	*5.67*
314784	*1WEYRHSB*	*0.65*
314539	*3UNCAMP*	*0.86*
314541	*3WATKINS*	*0.25*
314229	*6MT R221*	*-0.33*
931581	*AC2-078 C OP*	*2.39*
931582	*AC2-078 E OP*	*3.89*
931591	*AC2-079 C OP*	*3.17*
931592	*AC2-079 E OP*	*5.17*
931631	*AC2-084 C*	*2.99*
931632	*AC2-084 E*	*1.47*
292791	*U1-032 E*	*2.95*
900672	*V4-068 E*	*0.11*
901082	*W1-029 E*	*13.48*
907092	*X1-038 E*	*2.14*
913392	*Y1-086 E*	*0.63*
914231	*Y2-077*	*0.78*
916042	*Z1-036 E*	*13.58*

916192	*Z1-068 E*	*0.53*
917122	*Z2-027 E*	*0.31*
917332	*Z2-043 E*	*0.34*
917342	*Z2-044 E*	*0.18*
917592	*Z2-099 E*	*0.16*
921162	*AA1-063AC*	*3.19*
921163	*AA1-063AE*	*1.51*
918512	*AA1-065 E OP*	*1.48*
918562	*AA1-072 E*	*0.06*
921562	*AA1-135 C*	*2.95*
921563	*AA1-135 E*	*1.26*
921572	*AA1-138 C*	*3.*
921573	*AA1-138 E*	*1.29*
921752	*AA2-053 C*	*3.25*
921753	*AA2-053 E*	*1.4*
921762	*AA2-057 C*	*2.34*
921763	*AA2-057 E*	*1.17*
921772	*AA2-059 C*	*0.36*
921773	*AA2-059 E*	*0.17*
921862	*AA2-068 C*	*0.76*
921863	*AA2-068 E*	*0.35*
920022	*AA2-086 E*	*0.09*
921982	*AA2-088 C*	*2.33*
921983	*AA2-088 E*	*3.8*
922442	*AA2-165 C*	*0.32*
922443	*AA2-165 E*	*0.15*
922472	*AA2-169 C*	*0.71*
922473	*AA2-169 E*	*0.33*
922512	*AA2-174 C*	*0.15*
922513	*AA2-174 E*	*0.16*
922522	*AA2-177 C*	*6.39*
922523	*AA2-177 E*	*2.74*
922532	*AA2-178 C*	*2.96*
922533	*AA2-178 E*	*1.27*
922602	*AB1-013 C*	*0.89*
922603	*AB1-013 E*	*5.97*
923262	*AB1-132 C OP*	*5.96*
923263	*AB1-132 E OP*	*2.56*
923572	*AB1-173 C OP*	*0.98*
923573	*AB1-173 E OP*	*0.46*
923582	*AB1-173AC OP*	*0.98*
923583	*AB1-173AE OP*	*0.46*
923801	*AB2-015 C OP*	*3.06*
923802	*AB2-015 E OP*	*2.51*
923831	*AB2-022 C*	*0.66*

923832	*AB2-022 E*	*0.35*
923851	*AB2-025 C*	*1.62*
923852	*AB2-025 E*	*0.73*
923911	*AB2-031 C OP*	*0.98*
923912	*AB2-031 E OP*	*0.48*
923981	*AB2-039 C OP*	*4.92*
923982	*AB2-039 E OP*	*3.98*
923991	*AB2-040 C OP*	*3.21*
923992	*AB2-040 E OP*	*2.63*
924071	*AB2-051 C OP*	*39.03*
924072	*AB2-051 E OP*	*5.36*
924381	*AB2-087 C*	*0.19*
924382	*AB2-087 E*	*0.09*
924501	*AB2-099 C*	*0.2*
924502	*AB2-099 E*	*0.09*
924511	*AB2-100 C*	*5.57*
924512	*AB2-100 E*	*2.74*
924761	*AB2-128 C*	*4.77*
924762	*AB2-128 E*	*1.88*
924811	*AB2-134 C OP*	*8.19*
924812	*AB2-134 E OP*	*10.95*
924931	*AB2-147 C*	*1.2*
924932	*AB2-147 E*	*1.96*
924941	*AB2-149 C OP*	*1.58*
924942	*AB2-149 E OP*	*2.59*
924951	*AB2-150 C OP*	*1.2*
924952	*AB2-150 E OP*	*1.96*
925051	*AB2-160 C OP*	*4.18*
925052	*AB2-160 E OP*	*6.83*
925061	*AB2-161 C OP*	*1.99*
925062	*AB2-161 E OP*	*3.24*
925121	*AB2-169 C OP*	*2.01*
925122	*AB2-169 E OP*	*1.81*
925141	*AB2-171 C OP*	*1.75*
925142	*AB2-171 E OP*	*2.85*
925171	*AB2-174 C OP*	*3.17*
925172	*AB2-174 E OP*	*2.87*
925281	*AB2-186 C*	*0.18*
925282	*AB2-186 E*	*0.08*
925291	*AB2-188 C OP*	*0.73*
925292	*AB2-188 E OP*	*0.33*
925331	*AB2-190 C*	*14.6*
925332	*AB2-190 E*	*3.65*
925521	*AC1-027 C*	*0.57*
925522	*AC1-027 E*	*0.32*

925691	*AC1-045 C*	*0.53*
925692	*AC1-045 E*	*0.29*
925821	*AC1-061*	*0.03*
926071	*AC1-086 C*	*8.78*
926072	*AC1-086 E*	*4.*
926201	*AC1-098 C*	*2.1*
926202	*AC1-098 E*	*1.25*
926211	*AC1-099 C*	*0.7*
926212	*AC1-099 E*	*0.41*
926661	*AC1-147 C*	*0.65*
926662	*AC1-147 E*	*0.38*
926741	*AC1-159 C*	*38.73*
926771	*AC1-163 C*	*0.73*
926772	*AC1-163 E*	*0.34*
927051	*AC1-193 C*	*1.28*
927052	*AC1-193 E*	*2.09*
927111	*AC1-206 C OP*	*6.48*
927112	*AC1-206 E OP*	*3.06*
927141	*AC1-208 C*	*3.26*
927142	*AC1-208 E*	*1.45*
927221	*AC1-216 C OP*	*6.25*
927222	*AC1-216 E OP*	*4.92*

Appendix 8

(DVP - DVP) The 6CHSTF B-6MESSER 230 kV line (from bus 314287 to bus 314228 ckt 1) loads from 149.84% to 150.46% (**DC power flow**) of its load dump rating (459 MVA) for the tower line contingency outage of 'LN 208-259'. This project contributes approximately 6.28 MW to the thermal violation.

CONTINGENCY 'LN 208-259'
OPEN BRANCH FROM BUS 314286 TO BUS 314309 CKT 1 /* 6CHSTF A 230.00 - 6IRON208 230.00
OPEN BRANCH FROM BUS 314309 TO BUS 314338 CKT 1 /* 6IRON208 230.00 - 6SOUWEST 230.00
OPEN BUS 314309 /* ISLAND
OPEN BRANCH FROM BUS 314276 TO BUS 314287 CKT 1 /* 6BASIN 230.00 - 6CHSTF B 230.00
END

Bus Number	*Bus Name*	*Full Contribution*
315065	*1CHESTF6*	*33.42*
315074	*1HOPCGN1*	*6.83*
315075	*1HOPCGN2*	*6.74*
315077	*1HOPHCF1*	*1.94*
315078	*1HOPHCF2*	*1.94*
315079	*1HOPHCF3*	*1.94*
315080	*1HOPHCF4*	*2.94*
315076	*1HOPPOLC*	*1.65*
315134	*1ROAVALA*	*11.3*
315135	*1ROAVALB*	*3.01*
315073	*1STONECA*	*5.67*
314784	*1WEYRHSB*	*0.65*
314539	*3UNCAMP*	*0.86*
314541	*3WATKINS*	*0.25*
314229	*6MT R221*	*-0.33*
931581	*AC2-078 C OP*	*2.39*
931582	*AC2-078 E OP*	*3.89*
931591	*AC2-079 C OP*	*3.17*
931592	*AC2-079 E OP*	*5.17*
931631	*AC2-084 C*	*2.99*
931632	*AC2-084 E*	*1.47*
292791	*U1-032 E*	*2.95*
900672	*V4-068 E*	*0.11*
901082	*W1-029 E*	*13.48*
907092	*X1-038 E*	*2.14*
913392	*Y1-086 E*	*0.63*
914231	*Y2-077*	*0.78*
916042	*Z1-036 E*	*13.58*

916192	*Z1-068 E*	*0.53*
917122	*Z2-027 E*	*0.31*
917332	*Z2-043 E*	*0.34*
917342	*Z2-044 E*	*0.18*
917592	*Z2-099 E*	*0.16*
921162	*AA1-063AC*	*3.19*
921163	*AA1-063AE*	*1.51*
918512	*AA1-065 E OP*	*1.48*
918562	*AA1-072 E*	*0.06*
921562	*AA1-135 C*	*2.95*
921563	*AA1-135 E*	*1.26*
921572	*AA1-138 C*	*3.*
921573	*AA1-138 E*	*1.29*
921752	*AA2-053 C*	*3.25*
921753	*AA2-053 E*	*1.4*
921762	*AA2-057 C*	*2.34*
921763	*AA2-057 E*	*1.17*
921772	*AA2-059 C*	*0.36*
921773	*AA2-059 E*	*0.17*
921862	*AA2-068 C*	*0.76*
921863	*AA2-068 E*	*0.35*
920022	*AA2-086 E*	*0.09*
921982	*AA2-088 C*	*2.33*
921983	*AA2-088 E*	*3.8*
922442	*AA2-165 C*	*0.32*
922443	*AA2-165 E*	*0.15*
922472	*AA2-169 C*	*0.71*
922473	*AA2-169 E*	*0.33*
922512	*AA2-174 C*	*0.15*
922513	*AA2-174 E*	*0.16*
922522	*AA2-177 C*	*6.39*
922523	*AA2-177 E*	*2.74*
922532	*AA2-178 C*	*2.96*
922533	*AA2-178 E*	*1.27*
922602	*AB1-013 C*	*0.89*
922603	*AB1-013 E*	*5.97*
923262	*AB1-132 C OP*	*5.96*
923263	*AB1-132 E OP*	*2.56*
923572	*AB1-173 C OP*	*0.98*
923573	*AB1-173 E OP*	*0.46*
923582	*AB1-173AC OP*	*0.98*
923583	*AB1-173AE OP*	*0.46*
923801	*AB2-015 C OP*	*3.06*
923802	*AB2-015 E OP*	*2.51*
923831	*AB2-022 C*	*0.66*

923832	*AB2-022 E*	*0.35*
923851	*AB2-025 C*	*1.62*
923852	*AB2-025 E*	*0.73*
923911	*AB2-031 C OP*	*0.98*
923912	*AB2-031 E OP*	*0.48*
923981	*AB2-039 C OP*	*4.92*
923982	*AB2-039 E OP*	*3.98*
923991	*AB2-040 C OP*	*3.21*
923992	*AB2-040 E OP*	*2.63*
924071	*AB2-051 C OP*	*39.03*
924072	*AB2-051 E OP*	*5.36*
924381	*AB2-087 C*	*0.19*
924382	*AB2-087 E*	*0.09*
924501	*AB2-099 C*	*0.2*
924502	*AB2-099 E*	*0.09*
924511	*AB2-100 C*	*5.57*
924512	*AB2-100 E*	*2.74*
924761	*AB2-128 C*	*4.77*
924762	*AB2-128 E*	*1.88*
924811	*AB2-134 C OP*	*8.19*
924812	*AB2-134 E OP*	*10.95*
924931	*AB2-147 C*	*1.2*
924932	*AB2-147 E*	*1.96*
924941	*AB2-149 C OP*	*1.58*
924942	*AB2-149 E OP*	*2.59*
924951	*AB2-150 C OP*	*1.2*
924952	*AB2-150 E OP*	*1.96*
925051	*AB2-160 C OP*	*4.18*
925052	*AB2-160 E OP*	*6.83*
925061	*AB2-161 C OP*	*1.99*
925062	*AB2-161 E OP*	*3.24*
925121	*AB2-169 C OP*	*2.01*
925122	*AB2-169 E OP*	*1.81*
925141	*AB2-171 C OP*	*1.75*
925142	*AB2-171 E OP*	*2.85*
925171	*AB2-174 C OP*	*3.17*
925172	*AB2-174 E OP*	*2.87*
925281	*AB2-186 C*	*0.18*
925282	*AB2-186 E*	*0.08*
925291	*AB2-188 C OP*	*0.73*
925292	*AB2-188 E OP*	*0.33*
925331	*AB2-190 C*	*14.6*
925332	*AB2-190 E*	*3.65*
925521	*AC1-027 C*	*0.57*
925522	*AC1-027 E*	*0.32*

925691	*AC1-045 C*	*0.53*
925692	*AC1-045 E*	*0.29*
925821	*AC1-061*	*0.03*
926071	*AC1-086 C*	*8.78*
926072	*AC1-086 E*	*4.*
926201	*AC1-098 C*	*2.1*
926202	*AC1-098 E*	*1.25*
926211	*AC1-099 C*	*0.7*
926212	*AC1-099 E*	*0.41*
926661	*AC1-147 C*	*0.65*
926662	*AC1-147 E*	*0.38*
926741	*AC1-159 C*	*38.73*
926771	*AC1-163 C*	*0.73*
926772	*AC1-163 E*	*0.34*
927051	*AC1-193 C*	*1.28*
927052	*AC1-193 E*	*2.09*
927111	*AC1-206 C OP*	*6.48*
927112	*AC1-206 E OP*	*3.06*
927141	*AC1-208 C*	*3.26*
927142	*AC1-208 E*	*1.45*
927221	*AC1-216 C OP*	*6.25*
927222	*AC1-216 E OP*	*4.92*