Generation Interconnection Feasibility Study Report

For

PJM Generation Interconnection Request Queue Position AD2-143 Richland - East Leipsic 138 kV

December 2018

Preface

The intent of the feasibility study is to determine a plan, with ballpark cost and construction time estimates, to connect the subject generation to the PJM network at a location specified by the Interconnection Customer. The Interconnection Customer may request the interconnection of generation as a capacity resource or as an energy-only resource. As a requirement for interconnection, the Interconnection Customer 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.

For Local and Network Upgrades which are required due to overloads associated with the System Impact Studies of an individual New Services Queue, and have a cost less than $5,000,000, the cost of the Local and Network Upgrades will be shared by all proposed projects which have been assigned a Queue Position in the New Services Queue in which the need for the Local and Network Upgrades was identified. The Load Flow Cost Allocation methods discussed in this manual, including cutoffs, still apply to the individual projects.

For Local and Network Upgrades which are required due to the overloads associated with the System Impact Studies of an individual New Services Queue, and have a cost of $5,000,000 or greater, the cost of the Local and Network Upgrades will be allocated according to the order of the New Service Requests in the New Services Queue and the MW contribution of each individual Interconnection Request for those projects which cause or contribute to the need for the Local or Network Upgrades. The Load Flow Cost Allocation methods discussed in this manual, including cutoffs, still apply to the individual projects.

Cost allocation rules can be found in PJM Manual 14A, Attachment B. 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.

PJM utilizes manufacturer models to ensure the performance of turbines is properly captured during the simulations performed for stability verification. Turbine manufacturers provide such models to their customers. The list of manufacturer models PJM has already validated is contained in Attachment G-2 of Manual 14A. Manufacturer models may be updated from time to time, for various reasons such as to reflect changes to the control systems or to more accurately represent the capabilities turbines and controls which are currently available in the field. Additionally, as new turbine models are developed, turbine manufacturers provide such new models which must be used in the conduct of these studies. PJM needs adequate time to evaluate the new models in order to reduce delays to the System Impact Study process timeline for the Interconnection Customer as well as other Interconnection Customers in the study group. Therefore, PJM will require that any Interconnection Customer with a new manufacturer model must supply that model to PJM, along with a $10,000 fully refundable deposit, no later than three (3) months prior to the starting date of the System Impact Study (See Section 2.2.2. of Manual

14A for starting dates) for the Interconnection Request which shall specify the use of the new model. The Interconnection Customer will be required to submit a completed dynamic model study request form (Attachment G-1 of Manual 14A) in order to document the request for the study.

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 project developer is responsible for the right of way, real estate, and construction permit issues. For properties currently owned by Transmission Owners, the costs may be included in the study.

General

NextEra Energy Bluff Point, LLC proposes to install PJM Project #AD2-143, a 150.0 MW (26.4 MW Capacity) Wind generating facility in Putnam County, Ohio (see Figure 1). The Primary point of interconnection is to the Richland (FE) - East Leipsic (AEP) 138 kV circuit. The Secondary point of interconnection will be a direct connection to AEP's Fostoria Central – East Lima 345 kV circuit (see Figure 3).

The requested in service date is December 31, 2020.

The objective of this Feasibility Study is to determine budgetary cost estimates and approximate construction timelines for identified transmission facilities required to connect the proposed generating facilities to the AEP transmission system. These reinforcements include the Attachment Facilities, Local Upgrades, and Network Upgrades required maintaining the reliability of the AEP transmission system. Stability analysis is not included as part of this study.

Attachment Facilities

Primary Point of Interconnection (Richland – East Leipsic 138 kV)

To accommodate the interconnection on the Richland– East Leipsic138 kV circuit, a new three (3) circuit breaker 138 kV switching station physically configured in a breaker and half bus arrangement but operated as a ring-bus will be constructed (see Figure 1). Installation of associated protection and control equipment, 138 kV line risers, SCADA, and 138 kV revenue metering will also be required. AEP reserves the right to specify the final acceptable configuration considering design practices, future expansion, and compliance requirements.

<u>New Switching Station Work and Cost:</u>

- Construct a new three (3) circuit breaker 138 kV switching station physically configured in a breaker and half bus arrangement but operated as a ring-bus. Installation of associated protection and control equipment, 138 kV line risers, SCADA, and 138 kV revenue metering will also be required (see Figure 1).
    - **Estimated Station Cost: $6,000,000**

Direct Connection Cost Estimate

The total preliminary cost estimate for Direct Connection work is given in the following tables below.

For AEP building Direct Connection cost estimates:

Description	Total Cost
Richland– East Leipsic 138 kV T-Line Cut In	$1,000,000
Total	**$1,000,000**

Table 1

Non-Direct Connection Cost Estimate

The total preliminary cost estimate for Non-Direct Connection work is given in the following table below:

For AEP building Non-Direct Connection cost estimates:

Description	Estimated Cost
138 kV Revenue Metering	$250,000
Upgrade line protection and controls at the Richland 138 kV substation.	$250,000
Upgrade line protection and controls at the East Leipsic138 kV substation.	$250,000
Total	**$750,000**

Table 2

Secondary Point of Interconnection (Fostoria Central – East Lima 345 kV)

To accommodate the interconnection at the Fostoria Central – East Lima 345 kV circuit, a new three (3) circuit breaker 345 kV switching station physically configured in a breaker and half bus arrangement but operated as a ring-bus will be constructed (see Figure 1). Installation of associated protection and control equipment, 138 kV line risers, SCADA, and 345 kV revenue metering will also be required. AEP reserves the right to specify the final acceptable configuration considering design practices, future expansion, and compliance requirements.

Interconnection Customer Requirements

It is understood that NextEra Energy Bluff Point is responsible for all costs associated with this interconnection. The cost of NextEra Energy Bluff Point's generating plant and the costs for the line connecting the generating plant to the Richland – East Leipsic substation are not included in this report; these are assumed to be NextEra Energy Bluff Point's responsibility.

The Generation Interconnection Agreement does not in or by itself establish a requirement for American Electric Power to provide power for consumption at the developer's facilities. A separate agreement may be reached with the local utility that provides service in the area to ensure that infrastructure is in place to meet this demand and proper metering equipment is

installed. It is the responsibility of the developer to contact the local service provider to determine if a local service agreement is required.

Requirement from the PJM Open Access Transmission Tariff:

1. An Interconnection Customer entering the New Services Queue on or after October 1, 2012 with a proposed new Customer Facility that has a Maximum Facility Output equal to or greater than 100 MW shall install and maintain, at its expense, phasor measurement units (PMUs). See Section 8.5.3 of Appendix 2 to the Interconnection Service Agreement as well as section 4.3 of PJM Manual 14D for additional information.

2. The Interconnection Customer may be required to install and/or pay for metering as necessary to properly track real time output of the facility as well as installing metering which shall be used for billing purposes. See Section 8 of Appendix 2 to the Interconnection Service Agreement as well as Section 4 of PJM Manual 14D for additional information.

Revenue Metering and SCADA Requirements

PJM Requirements

The Interconnection Customer 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.

AEP Requirements

The Interconnection Customer will be required to comply with all AEP Revenue Metering Requirements for Generation Interconnection Customers. The Revenue Metering Requirements may be found within the "Requirements for Connection of New Facilities or Changes to Existing Facilities Connected to the AEP Transmission System" document located at the following link:

http://www.pjm.com/~/media/planning/plan-standards/private-aep/aep-interconnection-requirements.ashx

Network Impacts – Options 1

The Queue Project AD2-143 was evaluated as a 150.0 MW (Capacity 26.4 MW) injection tapping the Richland to East Leipsic 138kV line section in the AEP area. Project AD2-143 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AD2-143 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Base Case Used

Summer Peak Analysis – 2021 Case

Contingency Descriptions

The following contingencies resulted in overloads:

Option 1	
Contingency Name	**Description**
AEP_P1-2_#8097	CONTINGENCY 'AEP_P1-2_#8097' OPEN BRANCH FROM BUS 242993 TO BUS 247000 CKT 1 / 242993 05E.LPSC 138 247000 05YELLWC 138 1 END
ATSI-P1-2-SYS-345-809	CONTINGENCY 'ATSI-P1-2-SYS-345-809' /* LINE 02HAYES TO 02BEAVER 345 CK 1 DISCONNECT BRANCH FROM BUS 239289 TO BUS 238569 CKT 1 /* 02HAYES 345 02BEAVER 345 END
ATSI-P2-3-OEC-345-023	CONTINGENCY 'ATSI-P2-3-OEC-345-023' /* BEAVER 345KV BRK B-121 DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 1 /* 02BEAVER 345 02LAKEAVE 345 DISCONNECT BRANCH FROM BUS 238569 TO BUS 238607 CKT 1 /* 02BEAVER 345 02CARLIL 345 END
ATSI-P2-3-OEC-345-031	CONTINGENCY 'ATSI-P2-3-OEC-345-031' /* HAYES 345KV BRK B-3_6_ 12 DISCONNECT BRANCH FROM BUS 239289 TO BUS 238654 CKT 1 /* 02HAYES 345 02DAV-BE 345 DISCONNECT BRANCH FROM BUS 239289 TO BUS 238569 CKT 1 /* 02HAYES 345 02BEAVER 345 DISCONNECT BRANCH FROM BUS 239289 TO BUS 239290 CKT 1 /* 02HAYES 345 02HAYES 138 END

Option 1	
Contingency Name	**Description**
ATSI-P7-1-OEC-345-001	CONTINGENCY 'ATSI-P7-1-OEC-345-001' /* BEAVER-LAKAVE 345 CK 1 & 2 DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 1 /* 02BEAVER 345 02LAKEAVE 345 DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 2 /* 02BEAVER 345 02LAKEAVE 345 END

Table 3

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

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)

AD2-143 Contribution to Previously Identified Overloads															
	Contingency		Affected	Facility	Bus				Loading		Rating		MW	FG
#	Type	Name	Area	Description	From	To	Cir.	PF	Initial	Final	Type	MVA	Con.	App.
1	DCTL	ATSI-P7-1-OEC-345-001	FE - FE	02BEAVER-02CARLIL 345 kV line	238569	238607	1	DC	115.53	116.11	ER	1243	15.62	1
2	LFFB	ATSI-P2-3-OEC-345-023	FE - FE	02BEAVER-02LAKEAVE 345 kV line	238569	239725	2	DC	116.4	116.96	ER	1646	20.06	2
3	LFFB	ATSI-P2-3-OEC-345-031	FE - FE	X1-027A TAP-02BEAVER 345 kV line	907060	238569	1	DC	107.51	107.99	ER	1742	18.18	3

Steady-State Voltage Requirements

None

Short Circuit

(Summary of impacted circuit breakers)

New circuit breakers found to be over-duty:

None

Affected System Analysis & Mitigation

LGEE Impacts:

LGEE Impacts to be determined during later study phases (as applicable)

MISO Impacts:

MISO Impacts to be determined during later study phases (as applicable).

Duke, Progress & TVA Impacts:

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

OVEC Impacts:

OVEC Impacts to be determined during later study phases (as applicable).

Delivery of Energy Portion of Interconnection Request

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 developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request.
Only the most severely overloaded conditions are listed. 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 will study all overload conditions associated with the overloaded element(s) identified.

AD2-143 Delivery of Energy Portion of Interconnection Request

	Contingency		Affected		Bus				Loading		Rating		MW
#	Type	Name	Area	Facility Description	From	To	Cir.	PF	Initial	Final	Type	MVA	Con.
1	N-1	AEP_P1-2_#8097	AEP - AEP	05E.LPSC 138/69 kV transformer	242993	245792	1	DC	126.86	173.86	ER	69	32.43
2	Non	Non	AEP - AEP	05E.LPSC 138/69 kV transformer	242993	245792	1	DC	97.42	108.62	NR	59	14.66
3	N-1	AEP_P1-2_#8097	AEP - AEP	05E.LEIPSC-05NLEIP SW 69 kV line	245792	245810	1	DC	99.7	138.27	ER	73	28.16

AD2-143 Delivery of Energy Portion of Interconnection Request														
	Contingency		Affected		Bus				Loading		Rating		MW
#	Type	Name	Area	Facility Description	From	To	Cir.	PF	Initial	Final	Type	MVA	Con.
4	N-1	AEP_P1-2_#8097	AEP - AEP	05LEIPSIC-05E OTTAWA 69 kV line	245805	245743	1	DC	79.83	118.41	ER	73	28.16
5	N-1	AEP_P1-2_#8097	AEP - AEP	05DSCHLERT-05LEIPSIC 69 kV line	245806	245805	1	DC	83.39	121.97	ER	73	28.16
6	N-1	AEP_P1-2_#8097	AEP - AEP	05NLEIP SW-05DSCHLERT 69 kV line	245810	245806	1	DC	91.34	129.92	ER	73	28.16
7	N-1	ATSI-P1-2-SYS-345-809	FE - FE	X1-027A TAP-02BEAVER 345 kV line	907060	238569	1	DC	104.23	104.69	ER	1742	17.5

Table 4

New System Reinforcements

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

None

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)
(Summary form of Cost allocation for transmission lines and transformers will be inserted here if any)

1. (FE - FE) The 02BEAVER-02CARLIL 345 kV line (from bus 238569 to bus 238607 ckt 1) loads from 115.53% to 116.11% (**DC power flow**) of its emergency rating (1243 MVA) for the tower line contingency outage of 'ATSI-P7-1-OEC-345-001'. This project contributes approximately 15.62 MW to the thermal violation.

ATSI:

1. **Upgrade the Beaver-Carlisle 345kV line relay, the line limiting element. The relay upgrade project will increase the Beaver-Carlisle 345kV circuit thermal rating from 1243MVA/SE to 1424MVA/SE**
2. **Upgrade the Carlisle 345kV 2000A wavetrap on Beaver-Carlisle 345kV line to 3000A.**

The estimated cost to upgrade the Beaver-Carlisle 345kv line relay and wavetrap is $470,000 (without tax). The project requires 10 months to complete after the execution of CSA, assuming no ROW or permitting delays.

2. (FE - FE) The 02BEAVER-02LAKEAVE 345 kV line (from bus 238569 to bus 239725 ckt 2) loads from 116.4% to 116.96% (**DC power flow**) of its emergency rating (1646 MVA) for the line fault with failed breaker contingency outage of 'ATSI-P2-3-OEC-345-023'. This project contributes approximately 20.06 MW to the thermal violation.

ATSI:

1. **The proposed upgrade is 3500 SAC line drops at Beaver substation. The estimated cost to upgrade the substation conductor at Beaver is $45,000(without tax).**
2. **The proposed upgrade is to reconductor the Beaver to Lake Ave #2 345kV transmission line with (2) 954 kcmil ACSS conductors. The estimated cost to reconductor the Beaver-Lake Ave #2 345kV line $5,396,900(without tax).**

The project requires 18 months to complete after the execution of CSA; assuming no ROW or permitting delays.

3. (FE - FE) The X1-027A TAP-02BEAVER 345 kV line (from bus 907060 to bus 238569 ckt 1) loads from 107.51% to 107.99% (**DC power flow**) of its emergency rating (1742 MVA) for the line fault with failed breaker contingency outage of 'ATSI-P2-3-OEC-345-031'. This project contributes approximately 18.18 MW to the thermal violation.

ATSI:
Add a second Hayes 345/138kV transformer. (PJM Upgrade Id: n3308) The estimated cost to add the second Hayes 345/138kV transformer is $6,605,5000 (without tax). The scheduled in-service date is 10/23/2020.

Schedule

It is anticipated that the time between receipt of executed agreements and Commercial Operation may range from 12 to 18 months if no line work is required. If line work is required, construction time would be between 24 to 36 months after signing an interconnection agreement.

Conclusion

Based upon the results of this Feasibility Study, the construction of the 150.0 MW (26.4 MW Capacity) Wind generating facility of NextEra Energy Bluff Point (PJM Project #AD2-143) will require the following additional interconnection charges. This plan of service will interconnect the proposed Wind generating facility in a manner that will provide operational reliability and flexibility to both the AEP system and the NextEra Energy Bluff Point generating facility.

Cost breakdown for Point of Interconnection (Richland – East Leipsic 138kV)		
Attachment Cost	New 138 kV Switching Station and installation of associated protection and controls equipment.	$6,000,000
Direct Connection Cost Estimate	Richland–East Leipsic138 kV T-Line Cut In	$1,000,000

Cost breakdown for Point of Interconnection (Richland – East Leipsic 138kV)		
Non-Direct Connection Cost Estimate	138 kV Revenue Metering	$250,000
	Upgrade line protection and controls at the Richland138 kV substation.	$250,000
	Upgrade line protection and controls at the East Leipsic138 kV substation.	$250,000
Contribution to Previously Identified System Reinforcements		$12,517,400
	Total Estimated Cost for Project AD2-143	**$20,267,400**

Table 5

The estimates are preliminary in nature, as they were determined without the benefit of detailed engineering studies. Final estimates will require an on-site review and coordination to determine final construction requirements.

Network Impacts – Option 2

The Queue Project AD2-143 was evaluated as a 150.0 MW (Capacity 26.4 MW) injection at the Fostoria Central – East Lima 345kV substation in the AEP area. Project AD2-143 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AD2-143 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Base Case Used

Summer Peak Analysis – 2021 Case

Contingency Descriptions

The following contingencies resulted in overloads:

Option 2	
Contingency Name	**Description**
AEP_P1-3_#5063	CONTINGENCY 'AEP_P1-3_#5063' OPEN BRANCH FROM BUS 242917 TO BUS 242942 CKT 1 / 242917 05SBERW EQ 999 242942 05SBERWI 345 1 OPEN BRANCH FROM BUS 242917 TO BUS 243180 CKT 1 / 242917 05SBERW EQ 999 243180 05SBERWICK 69.0 1 OPEN BRANCH FROM BUS 242917 TO BUS 243199 CKT 1 / 242917 05SBERW EQ 999 243199 05SBERW1-L 12.0 1 OPEN BRANCH FROM BUS 238745 TO BUS 242942 CKT 1 / 238745 02GALION 345 242942 05SBERWI 345 1 OPEN BRANCH FROM BUS 242936 TO BUS 242942 CKT 1 / 242936 05FOSTOR 345 242942 05SBERWI 345 1 END
ATSI-P1-2-SYS-345-810	CONTINGENCY 'ATSI-P1-2-SYS-345-810' /* LINE 02HAYES TO 02DAV-BE 345 CK 1 DISCONNECT BRANCH FROM BUS 239289 TO BUS 238654 CKT 1 /* 02HAYES 345 02DAV-BE 345 END
ATSI-P2-3-OEC-345-023	CONTINGENCY 'ATSI-P2-3-OEC-345-023' /* BEAVER 345KV BRK B-121 DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 1 /* 02BEAVER 345 02LAKEAVE 345 DISCONNECT BRANCH FROM BUS 238569 TO BUS 238607 CKT 1 /* 02BEAVER 345 02CARLIL 345 END
ATSI-P2-3-OEC-345-031	CONTINGENCY 'ATSI-P2-3-OEC-345-031' /* HAYES 345KV BRK B-3_6_ 12 DISCONNECT BRANCH FROM BUS 239289 TO BUS 238654 CKT 1 /* 02HAYES 345 02DAV-BE 345

Option 2	
Contingency Name	**Description**
	DISCONNECT BRANCH FROM BUS 239289 TO BUS 238569 CKT 1 /* 02HAYES 345 02BEAVER 345 DISCONNECT BRANCH FROM BUS 239289 TO BUS 239290 CKT 1 /* 02HAYES 345 02HAYES 138 END
ATSI-P7-1-OEC-345-001	CONTINGENCY 'ATSI-P7-1-OEC-345-001' /* BEAVER-LAKAVE 345 CK 1 & 2 DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 1 /* 02BEAVER 345 02LAKEAVE 345 DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 2 /* 02BEAVER 345 02LAKEAVE 345 END

Table 6

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

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)

AD2-143 Contribution to Previously Identified Overloads															
	Contingency		Affected	Facility	Bus				Loading		Rating		MW	FG
#	Type	Name	Area	Description	From	To	Cir.	PF	Initial	Final	Type	MVA	Con.	App.
1	DCTL	ATSI-P7-1-OEC-345-001	FE - FE	02BEAVER-02CARLIL 345 kV line	238569	238607	1	DC	115.33	115.91	ER	1243	15.77	1
2	LFFB	ATSI-P2-3-OEC-345-023	FE - FE	02BEAVER-02LAKEAVE 345 kV line	238569	239725	2	DC	116.2	116.77	ER	1646	20.26	2
3	LFFB	ATSI-P2-3-OEC-345-031	FE - FE	X1-027A TAP-02BEAVER 345 kV line	907060	238569	1	DC	107.51	108	ER	1742	18.62	3

Steady-State Voltage Requirements

None

Short Circuit

(Summary of impacted circuit breakers)

New circuit breakers found to be over-duty:

None

Affected System Analysis & Mitigation

LGEE Impacts:

LGEE Impacts to be determined during later study phases (as applicable).

MISO Impacts:

MISO Impacts to be determined during later study phases (as applicable).

Duke, Progress & TVA Impacts:

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

OVEC Impacts:

OVEC Impacts to be determined during later study phases (as applicable).

Delivery of Energy Portion of Interconnection Request

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 developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request.
Only the most severely overloaded conditions are listed. 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 will study all overload conditions associated with the overloaded element(s) identified.

AD2-143 Delivery of Energy Portion of Interconnection Request														
		Contingency	Affected	Facility	Bus				Loading		Rating		MW
#	Type	Name	Area	Description	From	To	Cir.	PF	Initial	Final	Type	MVA	Con.
1	N-1	ATSI-P1-2-SYS-345-810	FE - FE	X1-027A TAP-02BEAVER 345 kV line	907060	238569	1	DC	106.82	107.3	ER	1742	17.81
2	N-1	AEP_P1-3_#5063	AEP - AEP	AD2-143 TAP-05E LIMA 345 kV line	937080	242935	1	DC	94.73	100.2	NR	1409	78.83

Table 7

Figure 1: Primary Point of Interconnection (Richland – East Leipsic 138 kV)

Single-Line Diagram

Figure 2: Primary Point of Interconnection (Richland - East Leipsic 138 kV)

Figure 3: Secondary Point of Interconnection (Fostoria Central – East Lima 345 kV)

Appendices – Primary POI

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. All New Service Queue Requests, through the end of the Queue under study, that are contributors to a flowgate will be listed in the Appendices. Please note that there may be contributors that are subsequently queued after the queue under study that are not listed in the Appendices. Although this information is not used "as is" for cost allocation purposes, it can be used to gage the impact of other projects/generators.

It should be noted the project/generator MW contributions presented in the body of the report and appendices sections are full contributions, whereas the loading percentages reported in the body of the report, take into consideration the commercial probability of each project as well as the ramping impact of "Adder" contributions.

Appendix 1

(FE - FE) The 02BEAVER-02CARLIL 345 kV line (from bus 238569 to bus 238607 ckt 1) loads from 115.53% to 116.11% (**DC power flow**) of its emergency rating (1243 MVA) for the tower line contingency outage of 'ATSI-P7-1-OEC-345-001'. This project contributes approximately 15.62 MW to the thermal violation.

CONTINGENCY 'ATSI-P7-1-OEC-345-001' /* BEAVER-LAKAVE 345 CK 1 & 2
DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 1 /* 02BEAVER 345 02LAKEAVE 345
DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 2 /* 02BEAVER 345 02LAKEAVE 345
END

Bus Number	*Bus Name*	*Full Contribution*
238564	*02BAYSG1*	*22.53*
240968	*02BG2 GEN*	*1.12*
240969	*02BG4 G1*	*0.28*
240970	*02BG4 G2&3*	*0.56*
240971	*02BG4 G4&5*	*0.56*
240950	*02BG5*	*3.44*
240973	*02BG6 AMPO*	*5.01*
238670	*02DVBSG1*	*36.51*
238979	*02NAPMUN*	*5.36*
240975	*02PGE GEN*	*7.76*
239171	*02WLORG-2*	*5.81*
239172	*02WLORG-3*	*5.97*
239173	*02WLORG-4*	*5.96*
239174	*02WLORG-5*	*5.98*
932051	*AC2-015 C*	*4.99*
932052	*AC2-015 E*	*5.82*
932791	*AC2-103 C*	*11.44*
932792	*AC2-103 E*	*76.56*
934251	*AD1-052 C1*	*0.84*
934261	*AD1-052 C2*	*0.84*
934461	*AD1-070 C O1*	*4.33*
934462	*AD1-070 E O1*	*20.34*
LTF	*AD1-092*	*4.7*
LTF	*AD1-093*	*8.07*
LTF	*AD1-094*	*1.54*
934761	*AD1-103 C O1*	*19.23*
934762	*AD1-103 E O1*	*128.7*
934891	*AD1-118*	*11.51*
937021	*AD2-136 C O1*	*5.4*

937022	*AD2-136 E O1*	*36.11*
937081	*AD2-143 C O1*	*2.75*
937082	*AD2-143 E O1*	*12.87*
937381	*AD2-191 C*	*3.*
937382	*AD2-191 E*	*20.06*
LTF	*CARR*	*1.39*
LTF	*CBM-S1*	*7.59*
LTF	*CBM-S2*	*2.39*
LTF	*CBM-W1*	*74.17*
LTF	*CBM-W2*	*56.02*
LTF	*CIN*	*9.21*
LTF	*CPLE*	*0.33*
LTF	*G-007*	*2.59*
LTF	*IPL*	*5.93*
940241	*J419*	*8.35*
981121	*J444*	*19.71*
938021	*J793*	*97.09*
938351	*J799*	*15.79*
938881	*J833*	*8.35*
LTF	*LGEE*	*1.61*
LTF	*MEC*	*18.63*
LTF	*MECS*	*41.52*
LTF	*O-066*	*16.72*
LTF	*RENSSELAER*	*1.09*
LTF	*ROSETON*	*7.9*
247551	*U4-028 C*	*1.5*
247940	*U4-028 E*	*10.03*
247552	*U4-029 C*	*1.5*
247941	*U4-029 E*	*10.03*
247567	*V2-006 C*	*1.78*
247961	*V2-006 E*	*11.93*
247548	*V4-010 C*	*3.24*
247947	*V4-010 E*	*21.66*
LTF	*WEC*	*3.06*
907061	*X1-027A C1*	*0.89*
907064	*X1-027A C2*	*0.89*
907066	*X1-027A C3*	*0.89*
907068	*X1-027A C4*	*0.89*
907062	*X1-027A E1*	*32.16*
907065	*X1-027A E2*	*32.16*
907067	*X1-027A E3*	*32.16*
907069	*X1-027A E4*	*32.16*
LTF	*Y3-032*	*35.13*
LTF	*Z1-043*	*11.77*

931951	*AB1-107 1*	*44.12*
931961	*AB1-107 2*	*101.83*
LTF	*AB2-013*	*6.73*
925751	*AC1-051 C*	*0.71*
925752	*AC1-051 E*	*4.75*
926941	*AC1-181*	*0.58*

Appendix 2

(FE - FE) The 02BEAVER-02LAKEAVE 345 kV line (from bus 238569 to bus 239725 ckt 2) loads from 116.4% to 116.96% (**DC power flow**) of its emergency rating (1646 MVA) for the line fault with failed breaker contingency outage of 'ATSI-P2-3-OEC-345-023'. This project contributes approximately 20.06 MW to the thermal violation.

CONTINGENCY 'ATSI-P2-3-OEC-345-023' /* BEAVER 345KV BRK B-121
DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 1 /* 02BEAVER 345 02LAKEAVE 345
DISCONNECT BRANCH FROM BUS 238569 TO BUS 238607 CKT 1 /* 02BEAVER 345 02CARLIL 345
END

Bus Number	*Bus Name*	*Full Contribution*
241902	*02_Y1-069 GE*	*32.38*
238564	*02BAYSG1*	*28.44*
240968	*02BG2 GEN*	*1.42*
240969	*02BG4 G1*	*0.36*
240970	*02BG4 G2&3*	*0.71*
240971	*02BG4 G4&5*	*0.71*
240950	*02BG5*	*4.35*
240973	*02BG6 AMPO*	*6.34*
239276	*02COLLW 11*	*-4.25*
239297	*02CPPW41*	*-5.22*
238670	*02DVBSG1*	*46.27*
238979	*02NAPMUN*	*6.81*
240975	*02PGE GEN*	*9.81*
239171	*02WLORG-2*	*7.38*
239172	*02WLORG-3*	*7.58*
239173	*02WLORG-4*	*7.57*
239174	*02WLORG-5*	*7.59*
932051	*AC2-015 C*	*6.32*
932052	*AC2-015 E*	*7.38*
932791	*AC2-103 C*	*14.51*
932792	*AC2-103 E*	*97.13*
934251	*AD1-052 C1*	*1.04*
934261	*AD1-052 C2*	*1.04*
934461	*AD1-070 C O1*	*5.51*
934462	*AD1-070 E O1*	*25.88*
LTF	*AD1-092*	*6.35*
LTF	*AD1-093*	*10.9*
LTF	*AD1-094*	*2.08*
934761	*AD1-103 C O1*	*24.4*

934762	*AD1-103 E O1*	*163.29*
934891	*AD1-118*	*14.61*
937021	*AD2-136 C O1*	*6.8*
937022	*AD2-136 E O1*	*45.54*
937081	*AD2-143 C O1*	*3.53*
937082	*AD2-143 E O1*	*16.53*
937381	*AD2-191 C*	*3.78*
937382	*AD2-191 E*	*25.3*
LTF	*CARR*	*2.24*
LTF	*CBM-S1*	*10.8*
LTF	*CBM-S2*	*3.98*
LTF	*CBM-W1*	*97.45*
LTF	*CBM-W2*	*77.86*
LTF	*CIN*	*12.63*
LTF	*CPLE*	*0.65*
LTF	*G-007*	*3.37*
LTF	*IPL*	*8.13*
938021	*J793*	*120.29*
LTF	*LGEE*	*2.25*
LTF	*MEC*	*25.34*
LTF	*MECS*	*53.18*
LTF	*O-066*	*21.82*
LTF	*RENSSELAER*	*1.75*
LTF	*ROSETON*	*12.65*
247551	*U4-028 C*	*1.89*
247940	*U4-028 E*	*12.65*
247552	*U4-029 C*	*1.89*
247941	*U4-029 E*	*12.65*
247567	*V2-006 C*	*2.3*
247961	*V2-006 E*	*15.41*
247548	*V4-010 C*	*4.06*
247947	*V4-010 E*	*27.19*
LTF	*WEC*	*4.12*
907061	*X1-027A C1*	*1.13*
907064	*X1-027A C2*	*1.13*
907066	*X1-027A C3*	*1.13*
907068	*X1-027A C4*	*1.13*
907062	*X1-027A E1*	*40.81*
907065	*X1-027A E2*	*40.81*
907067	*X1-027A E3*	*40.81*
907069	*X1-027A E4*	*40.81*
LTF	*Y3-032*	*44.75*
LTF	*Z1-043*	*15.87*
918401	*AA1-056*	*1.86*

931951	*AB1-107 1*	*55.72*
931961	*AB1-107 2*	*129.15*
LTF	*AB2-013*	*9.08*
925751	*AC1-051 C*	*0.9*
925752	*AC1-051 E*	*6.02*
926941	*AC1-181*	*0.75*

Appendix 3

(FE - FE) The X1-027A TAP-02BEAVER 345 kV line (from bus 907060 to bus 238569 ckt 1) loads from 107.51% to 107.99% (**DC power flow**) of its emergency rating (1742 MVA) for the line fault with failed breaker contingency outage of 'ATSI-P2-3-OEC-345-031'. This project contributes approximately 18.18 MW to the thermal violation.

CONTINGENCY 'ATSI-P2-3-OEC-345-031' /* HAYES 345KV BRK B-3_6_ 12
DISCONNECT BRANCH FROM BUS 239289 TO BUS 238654 CKT 1 /* 02HAYES 345 02DAV-BE 345
DISCONNECT BRANCH FROM BUS 239289 TO BUS 238569 CKT 1 /* 02HAYES 345 02BEAVER 345
DISCONNECT BRANCH FROM BUS 239289 TO BUS 239290 CKT 1 /* 02HAYES 345 02HAYES 138
END

Bus Number	*Bus Name*	*Full Contribution*
241902	*02_Y1-069 GE*	*31.6*
238564	*02BAYSG1*	*24.97*
240968	*02BG2 GEN*	*1.25*
240969	*02BG4 G1*	*0.31*
240970	*02BG4 G2&3*	*0.62*
240971	*02BG4 G4&5*	*0.62*
240950	*02BG5*	*3.82*
240973	*02BG6 AMPO*	*5.54*
239276	*02COLLW 11*	*-3.19*
239297	*02CPPW41*	*-3.9*
238670	*02DVBSG1*	*48.85*
238885	*02LEMOG1*	*5.98*
238886	*02LEMOG2*	*5.98*
238887	*02LEMOG3*	*5.98*
238888	*02LEMOG4*	*5.98*
238979	*02NAPMUN*	*6.22*
240975	*02PGE GEN*	*8.6*
932791	*AC2-103 C*	*20.34*
932792	*AC2-103 E*	*136.11*
934461	*AD1-070 C O1*	*4.62*
934462	*AD1-070 E O1*	*21.7*
LTF	*AD1-092*	*5.8*
LTF	*AD1-093*	*9.95*
LTF	*AD1-094*	*1.9*
934761	*AD1-103 C O1*	*34.19*
934762	*AD1-103 E O1*	*228.81*
934891	*AD1-118*	*14.07*

937081	*AD2-143 C O1*	*3.2*
937082	*AD2-143 E O1*	*14.98*
LTF	*CARR*	*1.79*
LTF	*CBM-S1*	*9.68*
LTF	*CBM-S2*	*3.55*
LTF	*CBM-W1*	*90.99*
LTF	*CBM-W2*	*70.37*
LTF	*CIN*	*11.4*
LTF	*CPLE*	*0.58*
LTF	*G-007*	*2.84*
LTF	*IPL*	*7.34*
938021	*J793*	*117.62*
LTF	*LGEE*	*2.01*
LTF	*MEC*	*23.08*
LTF	*MECS*	*50.65*
LTF	*O-066*	*18.38*
LTF	*RENSSELAER*	*1.4*
LTF	*ROSETON*	*10.12*
247567	*V2-006 C*	*2.07*
247961	*V2-006 E*	*13.83*
LTF	*WEC*	*3.77*
907061	*X1-027A C1*	*1.59*
907064	*X1-027A C2*	*1.59*
907066	*X1-027A C3*	*1.59*
907068	*X1-027A C4*	*1.59*
907062	*X1-027A E1*	*57.18*
907065	*X1-027A E2*	*57.18*
907067	*X1-027A E3*	*57.18*
907069	*X1-027A E4*	*57.18*
LTF	*Y3-032*	*42.85*
LTF	*Z1-043*	*14.5*
918401	*AA1-056*	*1.82*
931951	*AB1-107 1*	*49.04*
931961	*AB1-107 2*	*126.07*
LTF	*AB2-013*	*8.29*
926941	*AC1-181*	*0.68*

Appendices – Alternate POI

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. All New Service Queue Requests, through the end of the Queue under study, that are contributors to a flowgate will be listed in the Appendices. Please note that there may be contributors that are subsequently queued after the queue under study that are not listed in the Appendices. Although this information is not used "as is" for cost allocation purposes, it can be used to gage the impact of other projects/generators.

It should be noted the project/generator MW contributions presented in the body of the report and appendices sections are full contributions, whereas the loading percentages reported in the body of the report, take into consideration the commercial probability of each project as well as the ramping impact of "Adder" contributions.

Appendix 1

(FE - FE) The 02BEAVER-02CARLIL 345 kV line (from bus 238569 to bus 238607 ckt 1) loads from 115.33% to 115.91% (**DC power flow**) of its emergency rating (1243 MVA) for the tower line contingency outage of 'ATSI-P7-1-OEC-345-001'. This project contributes approximately 15.77 MW to the thermal violation.

CONTINGENCY 'ATSI-P7-1-OEC-345-001' /* BEAVER-LAKAVE 345 CK 1 & 2
DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 1 /* 02BEAVER 345 02LAKEAVE 345
DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 2 /* 02BEAVER 345 02LAKEAVE 345
END

Bus Number	*Bus Name*	*Full Contribution*
238564	*02BAYSG1*	*22.53*
240968	*02BG2 GEN*	*1.12*
240969	*02BG4 G1*	*0.28*
240970	*02BG4 G2&3*	*0.56*
240971	*02BG4 G4&5*	*0.56*
240950	*02BG5*	*3.44*
240973	*02BG6 AMPO*	*5.01*
238670	*02DVBSG1*	*36.51*
238979	*02NAPMUN*	*5.36*
240975	*02PGE GEN*	*7.76*
239171	*02WLORG-2*	*5.81*
239172	*02WLORG-3*	*5.97*
239173	*02WLORG-4*	*5.96*
239174	*02WLORG-5*	*5.98*
932051	*AC2-015 C*	*4.99*
932052	*AC2-015 E*	*5.82*
932791	*AC2-103 C*	*11.44*
932792	*AC2-103 E*	*76.56*
934251	*AD1-052 C1*	*0.84*
934261	*AD1-052 C2*	*0.84*
934461	*AD1-070 C O1*	*4.33*
934462	*AD1-070 E O1*	*20.34*
LTF	*AD1-092*	*4.7*
LTF	*AD1-093*	*8.07*
LTF	*AD1-094*	*1.54*
934761	*AD1-103 C O1*	*19.23*
934762	*AD1-103 E O1*	*128.7*
934891	*AD1-118*	*11.51*
937021	*AD2-136 C O2*	*4.64*

937022	*AD2-136 E O2*	*31.04*
937081	*AD2-143 C O2*	*2.78*
937082	*AD2-143 E O2*	*12.99*
937381	*AD2-191 C*	*3.*
937382	*AD2-191 E*	*20.06*
LTF	*CARR*	*1.39*
LTF	*CBM-S1*	*7.59*
LTF	*CBM-S2*	*2.39*
LTF	*CBM-W1*	*74.17*
LTF	*CBM-W2*	*56.02*
LTF	*CIN*	*9.21*
LTF	*CPLE*	*0.33*
LTF	*G-007*	*2.59*
LTF	*IPL*	*5.93*
940241	*J419*	*8.35*
981121	*J444*	*19.71*
938021	*J793*	*97.09*
938351	*J799*	*15.79*
938881	*J833*	*8.35*
LTF	*LGEE*	*1.61*
LTF	*MEC*	*18.63*
LTF	*MECS*	*41.52*
LTF	*O-066*	*16.72*
LTF	*RENSSELAER*	*1.09*
LTF	*ROSETON*	*7.9*
247551	*U4-028 C*	*1.5*
247940	*U4-028 E*	*10.03*
247552	*U4-029 C*	*1.5*
247941	*U4-029 E*	*10.03*
247567	*V2-006 C*	*1.78*
247961	*V2-006 E*	*11.93*
247548	*V4-010 C*	*3.24*
247947	*V4-010 E*	*21.66*
LTF	*WEC*	*3.06*
907061	*X1-027A C1*	*0.89*
907064	*X1-027A C2*	*0.89*
907066	*X1-027A C3*	*0.89*
907068	*X1-027A C4*	*0.89*
907062	*X1-027A E1*	*32.16*
907065	*X1-027A E2*	*32.16*
907067	*X1-027A E3*	*32.16*
907069	*X1-027A E4*	*32.16*
LTF	*Y3-032*	*35.13*
LTF	*Z1-043*	*11.77*

931951	*AB1-107 1*	*44.12*
931961	*AB1-107 2*	*101.83*
LTF	*AB2-013*	*6.73*
925751	*AC1-051 C*	*0.71*
925752	*AC1-051 E*	*4.75*
926941	*AC1-181*	*0.58*

Appendix 2

(FE - FE) The 02BEAVER-02LAKEAVE 345 kV line (from bus 238569 to bus 239725 ckt 2) loads from 116.2% to 116.77% (**DC power flow**) of its emergency rating (1646 MVA) for the line fault with failed breaker contingency outage of 'ATSI-P2-3-OEC-345-023'. This project contributes approximately 20.26 MW to the thermal violation.

CONTINGENCY 'ATSI-P2-3-OEC-345-023' /* BEAVER 345KV BRK B-121
DISCONNECT BRANCH FROM BUS 238569 TO BUS 239725 CKT 1 /* 02BEAVER 345 02LAKEAVE 345
DISCONNECT BRANCH FROM BUS 238569 TO BUS 238607 CKT 1 /* 02BEAVER 345 02CARLIL 345
END

Bus Number	*Bus Name*	*Full Contribution*
241902	*02_Y1-069 GE*	*32.38*
238564	*02BAYSG1*	*28.44*
240968	*02BG2 GEN*	*1.42*
240969	*02BG4 G1*	*0.36*
240970	*02BG4 G2&3*	*0.71*
240971	*02BG4 G4&5*	*0.71*
240950	*02BG5*	*4.35*
240973	*02BG6 AMPO*	*6.34*
239276	*02COLLW 11*	*-4.25*
239297	*02CPPW41*	*-5.22*
238670	*02DVBSG1*	*46.27*
238979	*02NAPMUN*	*6.81*
240975	*02PGE GEN*	*9.81*
239171	*02WLORG-2*	*7.38*
239172	*02WLORG-3*	*7.58*
239173	*02WLORG-4*	*7.57*
239174	*02WLORG-5*	*7.59*
932051	*AC2-015 C*	*6.32*
932052	*AC2-015 E*	*7.38*
932791	*AC2-103 C*	*14.51*
932792	*AC2-103 E*	*97.13*
934251	*AD1-052 C1*	*1.04*
934261	*AD1-052 C2*	*1.04*
934461	*AD1-070 C O1*	*5.51*
934462	*AD1-070 E O1*	*25.88*
LTF	*AD1-092*	*6.35*
LTF	*AD1-093*	*10.9*
LTF	*AD1-094*	*2.08*
934761	*AD1-103 C O1*	*24.4*

934762	*AD1-103 E O1*	*163.29*
934891	*AD1-118*	*14.61*
937021	*AD2-136 C O2*	*5.87*
937022	*AD2-136 E O2*	*39.26*
937081	*AD2-143 C O2*	*3.57*
937082	*AD2-143 E O2*	*16.69*
937381	*AD2-191 C*	*3.78*
937382	*AD2-191 E*	*25.3*
LTF	*CARR*	*2.24*
LTF	*CBM-S1*	*10.8*
LTF	*CBM-S2*	*3.98*
LTF	*CBM-W1*	*97.45*
LTF	*CBM-W2*	*77.86*
LTF	*CIN*	*12.63*
LTF	*CPLE*	*0.65*
LTF	*G-007*	*3.37*
LTF	*IPL*	*8.13*
938021	*J793*	*120.29*
LTF	*LGEE*	*2.25*
LTF	*MEC*	*25.34*
LTF	*MECS*	*53.18*
LTF	*O-066*	*21.82*
LTF	*RENSSELAER*	*1.75*
LTF	*ROSETON*	*12.65*
247551	*U4-028 C*	*1.89*
247940	*U4-028 E*	*12.65*
247552	*U4-029 C*	*1.89*
247941	*U4-029 E*	*12.65*
247567	*V2-006 C*	*2.3*
247961	*V2-006 E*	*15.41*
247548	*V4-010 C*	*4.06*
247947	*V4-010 E*	*27.19*
LTF	*WEC*	*4.12*
907061	*X1-027A C1*	*1.13*
907064	*X1-027A C2*	*1.13*
907066	*X1-027A C3*	*1.13*
907068	*X1-027A C4*	*1.13*
907062	*X1-027A E1*	*40.81*
907065	*X1-027A E2*	*40.81*
907067	*X1-027A E3*	*40.81*
907069	*X1-027A E4*	*40.81*
LTF	*Y3-032*	*44.75*
LTF	*Z1-043*	*15.87*
918401	*AA1-056*	*1.86*

931951	*AB1-107 1*	*55.72*
931961	*AB1-107 2*	*129.15*
LTF	*AB2-013*	*9.08*
925751	*AC1-051 C*	*0.9*
925752	*AC1-051 E*	*6.02*
926941	*AC1-181*	*0.75*

Appendix 3

(FE - FE) The X1-027A TAP-02BEAVER 345 kV line (from bus 907060 to bus 238569 ckt 1) loads from 107.51% to 108.0% (**DC power flow**) of its emergency rating (1742 MVA) for the line fault with failed breaker contingency outage of 'ATSI-P2-3-OEC-345-031'. This project contributes approximately 18.62 MW to the thermal violation.

CONTINGENCY 'ATSI-P2-3-OEC-345-031' /* HAYES 345KV BRK B-3_6_ 12
DISCONNECT BRANCH FROM BUS 239289 TO BUS 238654 CKT 1 /* 02HAYES 345 02DAV-BE 345
DISCONNECT BRANCH FROM BUS 239289 TO BUS 238569 CKT 1 /* 02HAYES 345 02BEAVER 345
DISCONNECT BRANCH FROM BUS 239289 TO BUS 239290 CKT 1 /* 02HAYES 345 02HAYES 138
END

Bus Number	*Bus Name*	*Full Contribution*
241902	*02_Y1-069 GE*	*31.6*
238564	*02BAYSG1*	*24.97*
240968	*02BG2 GEN*	*1.25*
240969	*02BG4 G1*	*0.31*
240970	*02BG4 G2&3*	*0.62*
240971	*02BG4 G4&5*	*0.62*
240950	*02BG5*	*3.82*
240973	*02BG6 AMPO*	*5.54*
239276	*02COLLW 11*	*-3.19*
239297	*02CPPW41*	*-3.9*
238670	*02DVBSG1*	*48.85*
238885	*02LEMOG1*	*5.98*
238886	*02LEMOG2*	*5.98*
238887	*02LEMOG3*	*5.98*
238888	*02LEMOG4*	*5.98*
238979	*02NAPMUN*	*6.22*
240975	*02PGE GEN*	*8.6*
932791	*AC2-103 C*	*20.34*
932792	*AC2-103 E*	*136.11*
934461	*AD1-070 C O1*	*4.62*
934462	*AD1-070 E O1*	*21.7*
LTF	*AD1-092*	*5.8*
LTF	*AD1-093*	*9.95*
LTF	*AD1-094*	*1.9*
934761	*AD1-103 C O1*	*34.19*
934762	*AD1-103 E O1*	*228.81*
934891	*AD1-118*	*14.07*

937081	*AD2-143 C O2*	*3.28*
937082	*AD2-143 E O2*	*15.35*
LTF	*CARR*	*1.79*
LTF	*CBM-S1*	*9.68*
LTF	*CBM-S2*	*3.55*
LTF	*CBM-W1*	*90.99*
LTF	*CBM-W2*	*70.37*
LTF	*CIN*	*11.4*
LTF	*CPLE*	*0.58*
LTF	*G-007*	*2.84*
LTF	*IPL*	*7.34*
938021	*J793*	*117.62*
LTF	*LGEE*	*2.01*
LTF	*MEC*	*23.08*
LTF	*MECS*	*50.65*
LTF	*O-066*	*18.38*
LTF	*RENSSELAER*	*1.4*
LTF	*ROSETON*	*10.12*
247567	*V2-006 C*	*2.07*
247961	*V2-006 E*	*13.83*
LTF	*WEC*	*3.77*
907061	*X1-027A C1*	*1.59*
907064	*X1-027A C2*	*1.59*
907066	*X1-027A C3*	*1.59*
907068	*X1-027A C4*	*1.59*
907062	*X1-027A E1*	*57.18*
907065	*X1-027A E2*	*57.18*
907067	*X1-027A E3*	*57.18*
907069	*X1-027A E4*	*57.18*
LTF	*Y3-032*	*42.85*
LTF	*Z1-043*	*14.5*
918401	*AA1-056*	*1.82*
931951	*AB1-107 1*	*49.04*
931961	*AB1-107 2*	*126.07*
LTF	*AB2-013*	*8.29*
926941	*AC1-181*	*0.68*