AEP / DAYTON BASELINE RTEP REPORT

AND

GENERATOR DELIVERABILITY RESULTS

For the 2005 - 2009 Period

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INTRODUCTION

The PJM Regional Transmission Expansion Planning (RTEP) Process requires that cost responsibility for facility enhancements be established. There are three types of facility enhancements for which cost assignment must be made:

- Attachment Facilities required solely to interconnect a new generation project,
- Network Facilities that are required to enhance the network solely or in part because of a proposed project, and
- Network Facilities required to support load growth.

In order to establish a starting point for development of Regional Transmission Expansion Plans and determine cost responsibility for expansion facilities, a 'baseline' analysis of system adequacy and security is necessary. The purpose of this analysis is threefold:

- to identify areas where the system, as planned, is not in compliance with the applicable reliability standards (for purposes of this report, "applicable reliability standards" will be defined as NERC, ECAR, AEP, Dayton and PJM Reliability Planning Criteria). The baseline system will be analyzed using the same criteria and analysis methods that will be used for assessing the impact of proposed new generation projects. This will ensure that the need for system enhancement of the baseline system and enhancements due to generation projects are determined in a consistent and equitable manner.
- to bring those areas into compliance, develop and recommend facility expansion plans, including cost estimates and estimated in-service dates.
- to establish what will be included as baseline costs in the allocation of the costs of expansion for those generation projects proposing to connect to the PJM system.

The system as planned is tested for its compliance with applicable reliability standards and PJM design standards to accommodate the forecast demand, committed resources, and commitments for firm transmission services for a specified time frame. Areas not in compliance with the standards are identified and enhancement plans are developed to achieve compliance.

This 'baseline' analysis and the resulting expansion plans served as the base system for the generator deliverability studies that were conducted for all generation that had an executed Interconnection Agreement with AEP or Dayton as of October 1, 2004.

The focus of this first AEP / Dayton baseline analysis was on the PJM Generator Deliverability test, the PJM Load Deliverability test and a short circuit evaluation. Generators that already had firm transmission rights on the AEP / Dayton system were assumed to be part of the base system. This assumption is based on the fact that AEP / Dayton had previously studied these generators for compliance with NERC, ECAR and their individual Transmission Owner criteria when these generators applied for interconnection and transmission service. A generator deliverability test had not previously been performed since firm rights to transfer the generator MWs within or out of the AEP or Dayton Control Area was provided through network or point to point transmission service respectively. In addition to the PJM Generator Deliverability test, preliminary Load Deliverability analysis and a short circuit evaluation was completed for the AEP and Dayton control areas. This report documents the results of these analyses and the deliverability results for

all generators that had executed an Interconnection Agreement with AEP or Dayton as of October 1, 2004.

The next RTEP Baseline report and analysis will include a review of all applicable ECAR, AEP and Dayton planning criteria along with a re-evaluation of the PJM load and generator deliverability studies. The reference year for analysis will be 2009 and the AEP and Dayton results will be included within the PJM RTEP Baseline Report which will also include results for the existing PJM system. All generation projects in the present AEP and Dayton queue will be merged into the existing PJM queue and studied according to the PJM tariff requirements.

EXECUTIVE SUMMARY

PJM has responsibility for the development of a Regional Transmission Expansion Plan (RTEP) for the PJM system that will meet the needs of the region in a reliable and economic manner. PJM also is responsible for recommending the assignment of any transmission expansion costs to the appropriate parties. In order to carry out these responsibilities, it is necessary to establish a starting point or 'baseline' from which the need and responsibility for enhancements can be determined.

In order to establish the baseline, PJM has defined the five (5) year period from 2005 through 2009 as the initial AEP and Dayton "baseline" planning period. The existing system plus any planned modifications to the transmission system scheduled to be in service prior to the 2009 summer peak period was chosen as the base system. Generators in the AEP and Dayton Control Area were studied in three categories as explained below:

- ✓ Category 1 generators – generators in the AEP and Dayton Control Areas that were in-service and have or had firm delivery rights anytime before July 1, 2004.
- ✓ Category 2 generators – generators in the AEP and Dayton Control Areas that were in-service but never had firm delivery rights.
- ✓ Category 3 generators – generators in the AEP and Dayton Control Areas that had executed an Interconnection Agreement but were not in-service as of July 1, 2004.

Category 1 generators were modeled in the original basecase. This category of generation was considered to have firm delivery rights and the responsibility for any identified reliability impacts and the associated system upgrades would be assigned to AEP or Dayton. This basecase was tested for compliance with applicable reliability standards. Any system problems were documented, upgrades were identified to mitigate all problems and the system model was updated accordingly. This was the reference system by which the category 2 generation was studied.

The generator deliverability analysis was next completed for all Category 2 generators. Since these generators never had firm delivery rights within AEP or Dayton, any Category 2 generators that caused or contributed to an identified system problems was determined to be non-deliverable. All other Category 2 generators that did not cause or contribute to a system problem were found to be deliverable. This was the reference system by which the Category 3 generation was studied.

Category 3 generators were then studied with all Category 1 generators modeled, any required system upgrades to alleviate identified reliability problems, and all deliverable Category 2 generators. If any additional reliability problems were identified, any Category 3 generators that caused or contributed to the reliability problem were deemed non-deliverable. Any Category 3 generators that did not cause or contribute to a reliability problem were found to be deliverable.

Category 2 or 3 non-deliverable generators that want to be studied individually can submit a Feasibility Study request to PJM which will be handled through the existing interconnection processes as identified in the PJM tariff.

A list of all studied generation resources, the MW value studied, and the deliverability results are contained in Attachment 1.

KEY FINDINGS

The following areas of the system were found to be non-compliant with applicable reliability standards without additional system upgrades beyond those currently identified through 2009. These areas are described below along with the identified reinforcements to achieve compliance.

1) In 2009, West Canton – Dale 138 kV is normally overloaded at 101%. The recommended solution is to upgrade both the bus at West Canton and a 1 mile section of the 138 kV circuit. The estimated cost for the upgrades is $150,000.

2) In 2009, the Beatty 345/138 kV #4 transformer is contingency overloaded at 108% of emergency rating for the outage of the parallel Beatty 345/138 kV #3 transformer. In the same area, the Bixby 345/138 kV #1 transformer is contingency overloaded at 105% of the emergency rating for the outage of the parallel Bixby 345/138 kV #2 transformer. The Bixby – LS II 138 kV circuit is normally overloaded at 102% in 2009. The recommended solution to these three problems is to install a new 345/138 kV transformer at Roberts Station, upgrade the 138 kV circuit breakers at Bixby and reconductor the Bixby – LS II 138 kV circuit with larger conductor. The estimated cost for the upgrades is $19 million.

3) In 2009, the Waverly – Sargents 138 kV circuit is normally overloaded at 115%. The recommended solution is to install additional 345/138 kV transformation in the area and reconfigure the 138 kV system in the area. The cost is estimated at $22 million.

4) In 2009, the Hyatt – Delaware 138 kV circuit is normally overloaded at 106%. The recommended system upgrade is to install a 5% series reactor at the Hyatt end of the overloaded circuit and to install a 29 MVAR capacitor at Trent 138 kV. The cost is estimated at $0.9 million.

5) The following breakers were found to be overdutied and will require replacement prior to the date noted.

   - ✓ Three 345 kV breakers at Cook substation (K, K2, M) will require replacement prior to June 2005. The cost is estimated at $4.1 million.
   - ✓ Six 345 kV breakers at Dumont substation (E, E1, E2, F, F1, F2) will require replacement prior to June 2005. The cost is estimated at $3.3 million.
   - ✓ Four 345 kV breakers at Tidd substation (AA, AA1, FF1, FF2) will require replacement prior to June 2005. The cost is estimated at $2.6 million.
   - ✓ Three 345 kV breakers at Cook substation (M2, N, N2) will require replacement prior to June 2009. The cost is estimated at $2.1 million.

OBJECTIVE AND SCOPE

The objectives of this study were as follows:

- To identify areas where the system as planned for the period 2005 through 2009 would not be in compliance with applicable reliability criteria.
- To develop and recommend preliminary facility expansion plans, including cost estimates and estimated in service dates, to bring those areas into compliance.
- To establish what will be included as baseline expansion costs for the allocation of the costs of expansion for future AEP and Dayton generation projects.

The scope of this study included analysis for the period 2005 through 2009 to determine compliance with the PJM Deliverability requirements.

The system was not analyzed under non-peak load flow conditions on the basis that the system can and will be dispatched to remain within first contingency operating limits. Transmission constraints on market dispatch are economic constraints. Economic constraints are not considered violations of reliability criteria as long as the system can be adjusted to remain within reliability limits on a pre-contingency basis. Performance of the planned system under intermediate and light load conditions will be analyzed in the PJM Reliability Assessment to verify that the system as planned can indeed be operated in compliance with applicable reliability criteria. This will include a determination that the generation resources in the PJM footprint are sufficient and are appropriately dispersed so that the generation dispatch can be adjusted to maintain the system within established thermal equipment ratings and voltage criteria limits under intermediate and light load conditions.

DELIVERABILITY ANALYSIS METHODOLOGY

Deliverability analysis was based on a representation of the 2009 forecast peak load with all firm transmission services committed for the 2009 period represented in the base case (see below).

AEP/DPL 2009 INTERCHANGE		
From	**To**	**MW**
AEP/DPL	AMRN	-76
AEP/DPL	CIN	-1381
AEP/DPL	NIPS	40
AEP/DPL	VP	465
AEP/DPL	CPL-E	1260
AEP/DPL	CPL-W	250
AEP/DPL	DLCO	100
AEP/DPL	DUK	263
AEP/DPL	EKPC	-90
AEP/DPL	FE	1906
AEP/DPL	IP	-416
AEP/DPL	MECS	1787
AEP/DPL	TVA	600
AEP/DPL	OVEC	-756
Total		**3952**

This base system was used to evaluate thermal limits including the Generator Deliverability test where a multitude of dispatch patterns were analyzed. A complete description of the Generator Deliverability procedures is contained in Attachment E of PJM Manual M14B.

The 2009 base case was used to analyze network transfer capability. To maintain reliability in a competitive capacity market, resources must contribute to the deliverability of electricity in the Control Area in two ways: 1) energy must be deliverable from the aggregate of resources available to the Control Area to load in portions of the Control Area experiencing a localized capacity emergency, or deficiency, 2) capacity resources within a given electrical area must, in aggregate, be able to be exported to other areas of the Control Area within some bounds that separate the reliability requirements of the Control Area from the reasonable economic function of the market place. PJM has developed two methods for evaluating the adequacy of network transfer capability for each of these deliverability requirements. These methods are described in more detail in Attachment E of PJM Manual M14B.

The CETO/CETL method will be used to determine if the Capacity Emergency Transfer Limit (CETL) to each of the various electrical areas of PJM is sufficient to deliver each respective area's Capacity Emergency Transfer Objective (CETO).

The PJM Generation Deliverability procedure was used to determine if Network Transfer Capability was adequate to deliver all capacity resources out of defined areas to the network.

Category 1 and Category 2 Generator Deliverability Results

Unit Commercial Name	MW	Results
Amos 1	800	Deliverable
Amos 2	800	Deliverable
Amos 3	1300	Deliverable
Andersen 1-3	147	Deliverable
Belleville	42	Deliverable
Berrien Springs 1-12	7.2	Deliverable
Big Sandy 1	260	Deliverable
Big Sandy 2	800	Deliverable
Big Sandy Peaker 1-6	294	Deliverable
Buchanan 1-10	4.1	Deliverable
Buck 1-3 & Byllesby 1-4	30.1	Deliverable
Cardinal 1	585	Deliverable
Cardinal 2	585	Deliverable
Cardinal 3	630	Deliverable
Ceredo 1-6	480	Deliverable
Claytor 1 - 4	76	Deliverable
Clinch River 1	230	Deliverable
Clinch River 2	230	Deliverable
Clinch River 3	230	Deliverable
Conesville 1	115	Deliverable
Conesville 2	115	Deliverable
Conesville 3	165	Deliverable
Conesville 4	780	Deliverable
Conesville 5	375	Deliverable
Conesville 6	375	Deliverable
Constantine 1-4	1.2	Deliverable
Cook 1	1016	Deliverable
Cook 2	1077	Deliverable
Darby 1-6	438	Deliverable
Elkhart 1-3	3.4	Deliverable
Foothills 1-2	335	Deliverable
Garden Creek 1-2	88	Deliverable
Gavin 1	1300	Deliverable
Gavin 2	1300	Deliverable
Glen Lyn 5	90	Deliverable
Glen Lyn 6	235	Deliverable
Greenville 1-4	192	Deliverable
Hanging Rock 1-6	1220	Deliverable
Hutchings 1-7	388	Deliverable

Kammer 1	200	Deliverable
Kammer 2	200	Deliverable
Kammer 3	200	Deliverable
Kanawha River 1	195	Deliverable
Kanawha River 2	195	Deliverable
Killen	600	Deliverable
Killen GT	18	Deliverable
Lawrenceburg 1-6	1150	Deliverable
Leesville 1 & 2	50	Deliverable
London 1-3	14.4	Deliverable
Marmet 1-3	14.4	Deliverable
Mitchell 1	800	Deliverable
Mitchell 2	800	Deliverable
Montpelier 1-4	200	Deliverable
Monument Diesels	12	Deliverable
Mottville 1-4	1.7	Deliverable
Mountaineer 1	1300	Deliverable
Muskingum River 1	190	Deliverable
Muskingum River 2	190	Deliverable
Muskingum River 3	205	Deliverable
Muskingum River 4	205	Deliverable
Muskingum River 5	575	Deliverable
Niagara 1-2	2.4	Deliverable
Philpot Dam	15	Deliverable
Picway 5	90	Deliverable
Racine 1-2	47.5	Deliverable
Reusens 1-5	12.5	Deliverable
Richmond 1-2	72	Deliverable
Riverside 1-3	501	Deliverable
Robert P. Mone 1-3	510	Deliverable
Rockport 1	1300	Deliverable
Rockport 2	1300	Deliverable
Rolling Hills 1-5	850	Deliverable
Sidney Diesels	12	Deliverable
Smith Mountain 1	70	Deliverable
Smith Mountain 2	185	Deliverable
Smith Mountain 3	105	Deliverable
Smith Mountain 4	185	Deliverable
Smith Mountain 5	70	Deliverable
Sporn 1	145	Deliverable
Sporn 2	145	Deliverable
Sporn 3	145	Deliverable

Sporn 4	145	Deliverable
Sporn 5	440	Deliverable
Stuart 1-4	2340	Deliverable
Stuart Diesel	9	Deliverable
Sugar Creek 1-3	565	Deliverable
Summersville 1-2	80	Deliverable
Tait CT 1-7	548	Deliverable
Tait Diesels	10	Deliverable
Tanners Creek 1	140	Deliverable
Tanners Creek 2	140	Deliverable
Tanners Creek 3	200	Deliverable
Tanners Creek 4	500	Deliverable
Twin Branch 1E, 6E, 1-6W	4.8	Deliverable
Washington 1-3	600	Deliverable
Waterford 1-4	850	Deliverable
Winfield 1-3	14.8	Deliverable
Wolf Hills 1-5	235	Deliverable
Yankee 1-7	107	Deliverable

CATEGORY 3 GENERATOR DELIVERABILITY RESULTS

The Category 3 generator deliverability results are projected to be completed in December and will be posted upon completion.