REPORT TO THE VIRGINIA STATE CORPORATION COMMISSION: Congestion in the AEP Service Territory in Virginia

Overview of Congestion Calculations

This report provides details of congestion associated with American Electric Power's (AEP) service territory within the state of Virginia for the periods of October 1, 2004, to September 30, 2005, and October 1, 2005, to September 30, 2006. Congestion calculations are for the entire territory and not for any specific organization; the total congestion calculations are the sum of all the congestion calculations for the organizations with market activity in the area. The report includes congestion event hours for the constraints which had the largest impact on congestion charges in AEP, either positive or negative, and the congestion charges associated with each constraint. [1]

Total congestion costs are comprised of Implicit Congestion, Spot Congestion and Explicit Congestion. Implicit Congestion is the net congestion cost to serve load from generation and contractual energy purchases in a defined area, Spot Congestion is the net congestion cost associated with Spot Market purchases and sales and Explicit Congestion is the net congestion cost associated with point-to-point energy transactions. Each of these categories of congestion costs are, in turn, comprised of day-ahead and balancing congestion costs. Day-ahead congestion is based solely on day-ahead MW while balancing congestion is based on deviations between the day-ahead and real-time MW. If a participant has real-time generation or load that is less than its day-ahead generation or load then the deviation will be negative. If a constraint has a positive impact on the congestion components of locational marginal price (CLMP) at a bus where a deviation is negative, negative balancing congestion costs will result.[2]

Table 1 shows a summary of the congestion costs associated with the Virginia portion of the AEP service territory since its integration into PJM on October 1, 2004.

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[1] Congestion event hours are defined as the sum of all intervals where a transmission constraint is binding. In day ahead, an interval equals one hour. In real time, an interval equals five minutes. Thus, real-time event hours are the number of constrained intervals divided by 12.

[2] See Table 16, "Congestion Definitions," for a summary of relevant definitions.

Table 1 Total Day-Ahead and Balancing Congestion Costs

	Total Congestion Costs		
Period Beginning	Day-Ahead	Balancing	Total
10/1/2004	($28,690,149)	$393,399	($28,296,750)
10/1/2005	$29,339,928	($6,753,193)	$22,586,734

Congestion costs can be both positive and negative as seen in Table 1. Congestion is defined with respect to the unconstrained system marginal price or SMP, which is the single system price that would occur in the absence of any congestion. When a transmission constraint occurs, congestion will generally be positive on one side of the constraint and negative on the other side of the constraint. As a result, the corresponding CLMP will be positive or negative. The congestion component of LMP measures the difference between the actual LMP that results from transmission constraints and the unconstrained SMP. If the AEP service territory experiences lower prices due to a constraint, congestion in the AEP territory will be negative.

Table 3 shows the constraints with the largest impact on total congestion costs in AEP. From October 1, 2004, to September 30, 2005, the East Interface, the Central Interface, the 5004/5005 Interface and the Cloverdale – Lexington 500 kV line all contributed significantly to negative congestion while the Kanawha – Matt Funk line and Bedington – Black Oak contributed to positive congestion. All of these constraints, except for the Cloverdale – Lexington 500 kV line, are located outside of the AEP service territory. From October 1, 2005, to September 30, 2006, Kanawha – Matt Funk and Bedington – Black Oak were again among the top positive contributors to the total congestion costs while the East Interface decreased significantly in both congestion costs and congestion event hours.

Table 2 Day-Ahead and Balancing Congestion Costs by Constraint (10/1/2005 – 9/30/2006)

			Total Congestion Costs 10/2005 - 09/2006			Event-Hours 10/2005 - 09/2006	
Constraint	Type	Location	Day-Ahead	Balancing	Total	Day-Ahead	Real-Time
Kanawha - Matt Funk	Line	AEP	$34,078,469	($6,519,180)	$27,559,289	2,223	919
Bedington - Black Oak	Interface	500	$20,811,840	($3,279,665)	$17,532,175	4,004	1,844
Axton	Transformer	AEP	$9,377,310	($340,799)	$9,036,511	172	35
Cedar Grove - Roseland	Line	PSEG	($8,302,084)	$574,977	($7,727,107)	3,600	601
Cloverdale - Lexington	Line	AEP	($5,971,259)	($483,481)	($6,454,740)	1,063	731
5004/5005 Interface	Interface	500	($5,864,265)	$448,746	($5,415,519)	1,996	343
West	Interface	500	($5,625,878)	$634,366	($4,991,512)	1,305	290
Kammer	Transformer	500	($4,315,063)	($75,437)	($4,390,500)	3,034	1,383
Axton - Jacksons Ferry	Line	AEP	$4,032,386	($93,815)	$3,938,571	283	16
Central	Interface	500	($3,294,398)	$15,333	($3,279,065)	802	17
Alta Vista - Dominion	Line	DOM	$1,971,979	$521,398	$2,493,376	577	168
Mount Storm - Pruntytown	Line	APS	$2,752,078	($332,770)	$2,419,308	723	482
Wylie Ridge	Transformer	APS	($2,087,172)	$191,223	($1,895,949)	2,522	1,592
Branchburg - Readington	Line	PSEG	($2,344,674)	$738,063	($1,606,610)	551	295
Doubs	Transformer	APS	($1,672,414)	$75,390	($1,597,024)	588	324
East	Interface	500	($582,028)	$17,096	($564,932)	205	9

Table 3 Day-Ahead and Balancing Congestion Costs by Constraint (10/1/2004 – 9/30/2005)

			Total Congestion Costs 10/2004 - 09/2005			Event-Hours 10/2004 - 09/2005	
Constraint	Type	Location	Day-Ahead	Balancing	Total	Day-Ahead	Real-Time
Kanawha - Matt Funk	Line	AEP	$2,094,796	($743,437)	$1,351,359	260	246
Bedington - Black Oak	Interface	500	$24,355,331	($4,056,261)	$20,299,070	4,607	2,049
Axton	Transformer	AEP	$203,881	$0	$203,881	16	0
Cedar Grove - Roseland	Line	PSEG	($1,498,443)	$581,160	($917,284)	748	458
Cloverdale - Lexington	Line	AEP	($7,193,569)	($419,614)	($7,613,183)	1,126	702
5004/5005 Interface	Interface	500	($5,168,324)	$1,041,092	($4,127,232)	1,173	748
West	Interface	500	($84,151)	$331,642	$247,491	65	292
Kammer	Transformer	500	($1,825,840)	($383,700)	($2,209,540)	2,387	1,145
Axton - Jacksons Ferry	Line	AEP	$121,229	($25,981)	$95,248	21	4
Central	Interface	500	($6,676,530)	$54,782	($6,621,748)	1,467	127
Alta Vista - Dominion	Line	DOM	$440,151	$43,512	$483,663	87	49
Mount Storm - Pruntytown	Line	APS	$3,412,251	($1,436,921)	$1,975,330	371	964
Wylie Ridge	Transformer	APS	($1,263,147)	$263,780	($999,367)	2,253	1,913
Branchburg - Readington	Line	PSEG	($1,510,796)	$807,535	($703,261)	431	291
Doubs	Transformer	APS	($1,242,629)	$48,064	($1,194,565)	509	447
East	Interface	500	($10,026,764)	$744,610	($9,282,154)	2,038	424

Table 1, Table 2 and Table 3 provided a summary of the total congestion costs in AEP. In order to provide a more detailed analysis of the congestion calculations from which the

total congestion costs were derived, each category of congestion will be defined and a table of the congestion charges or credits associated with each category will be provided.

Net Congestion Bill

The net congestion bill is one component used to calculate Implicit Congestion costs and is calculated by subtracting generating congestion credits from load congestion payments. The logic is that increased congestion payments by load are offset by increased congestion revenues to generation, for the area analyzed. Table 4 shows a summary of load congestion payments and generation congestion credits for the AEP service territory in Virginia.

Table 4 Load Congestion Payments and Generation Congestion Credits.

	Load Congestion Payments		Generation Congestion Credits		Net Congestion Bill		
Period Beginning	Day-Ahead	Balancing	Day-Ahead	Balancing	Day-Ahead	Balancing	Total
10/1/2004	($60,881,170)	($57,692,111)	($32,156,703)	($57,880,238)	($28,724,467)	$188,126	($28,536,341)
10/1/2005	$6,761,447	$10,357,549	($20,635,693)	$13,891,252	$27,397,140	($3,533,702)	$23,863,437

Load congestion payments and generation congestion credits are calculated for both the Day-Ahead and Balancing Energy Markets.

- Day-Ahead Load Congestion Payments – Day-ahead load congestion payments are calculated for all cleared demand, decrement bids, and day-ahead energy sale transactions. (Decrement bids and energy sales can be thought of as scheduled load.) Day-ahead load congestion payments are calculated using MW and the load bus congestion component of LMP (CLMP), decrement bid CLMP, or the CLMP at the source of the sale transaction, as applicable.

- Day-Ahead Generation Congestion Credits – Day-ahead generation congestion credits are calculated for all cleared generation and increment offers and day-ahead energy purchase transactions. (Increment offers and energy purchases can be thought of as scheduled generation.) Day-ahead generation congestion credits are calculated using MW and generator bus CLMP, increment offer CLMP, or the CLMP at the sink of the purchase transaction, as applicable.

- Balancing Load Congestion Payments – Balancing load congestion payments are calculated for all deviations between a PJM member's real-time load and energy sale transactions and their day-ahead cleared demand, decrement bids, and energy sale transactions. Balancing load congestion payments are calculated using MW deviations and the real-time CLMP for each bus where a deviation from its day-ahead scheduled load exists.

- Balancing Generation Congestion Credits – Balancing generation congestion credits are calculated for all deviations between a PJM member's real-time

generation and energy purchase transactions and the day-ahead cleared generation, increment offers and energy purchase transactions. Balancing generation congestion credits are calculated using MW deviations and the real-time CLMP for each bus where a deviation from its day-ahead scheduled generation exists.

Table 4 presents data on load payments and generation credits. From October 1, 2005, to September 30, 2006, the total load congestion payments in the Day–Ahead Market were positive and the total generation congestion credits in the Day-Ahead Market were negative, which result in a positive day-ahead net congestion bill. However, the total load congestion payments in the Balancing Market were positive and total generation congestion credits in the Balancing Market were also positive, but greater than the load payments, resulting in a negative balancing net congestion bill.

Table 5 and Table 6 show the impact of each significant constraint on load payments and generation credits. Bedington –Black Oak and Kanawha – Matt Funk had a large impact on load congestion payments, which was not offset by generation credits, resulting in a significant positive net congestion bill from the two constraints in both periods.

Table 5 Day-Ahead and Balancing Load Congestion Payments and Generation Congestion Credits by Constraint (10/1/2005 – 9/30/2006)

	Load Congestion Payments		Generation Congestion Credits		Net Congestion Bill		
Constraint	Day-Ahead	Balancing	Day-Ahead	Balancing	Day-Ahead	Balancing	Total
Kanawha - Matt Funk	$41,574,305	$50,349,806	$8,512,980	$53,128,785	$33,061,324	($2,778,980)	$30,282,345
Bedington - Black Oak	$24,208,927	$20,832,811	$3,932,725	$24,148,899	$20,276,203	($3,316,089)	$16,960,114
Axton	$9,554,980	$1,264,172	$1,517,113	$1,600,593	$8,037,866	($336,421)	$7,701,445
Cedar Grove - Roseland	($12,292,921)	($8,362,390)	($4,320,625)	($8,865,092)	($7,972,296)	$502,702	($7,469,594)
Cloverdale - Lexington	($8,006,578)	($15,917,656)	($2,173,339)	($15,843,820)	($5,833,239)	($73,837)	($5,907,076)
5004/5005 Interface	($9,540,399)	($3,580,128)	($3,932,869)	($4,020,899)	($5,607,531)	$440,770	($5,166,760)
West	($9,269,035)	($4,557,060)	($3,658,422)	($5,204,660)	($5,610,614)	$647,600	($4,963,014)
Kammer	($11,534,097)	($10,066,030)	($7,427,080)	($9,751,846)	($4,107,017)	($314,184)	($4,421,202)
Axton - Jacksons Ferry	$4,061,637	$420,783	$429,283	$516,806	$3,632,354	($96,023)	$3,536,331
Central	($5,188,344)	($144,229)	($2,133,174)	($157,998)	($3,055,170)	$13,769	($3,041,402)
Alta Vista - Dominion	$1,959,771	$4,424,589	$2,199	$3,900,163	$1,957,572	$524,425	$2,481,998
Mount Storm - Pruntytown	$3,620,562	$5,646,600	$979,124	$6,153,951	$2,641,438	($507,351)	$2,134,087
Wylie Ridge	($4,331,464)	($5,653,660)	($2,425,330)	($5,616,565)	($1,906,134)	($37,095)	($1,943,229)
Branchburg - Readington	($3,370,587)	($6,831,051)	($1,010,752)	($7,538,299)	($2,359,834)	$707,249	($1,652,586)
Doubs	($2,745,012)	($1,016,707)	($1,180,205)	($1,080,930)	($1,564,806)	$64,223	($1,500,583)
East	($917,846)	($102,279)	($341,498)	($119,101)	($576,348)	$16,822	($559,526)

Table 6 Day-Ahead and Balancing Load Congestion Payments and Generation Congestion Credits by Constraint (10/1/2004 – 9/30/2005)

	Load Congestion Payments		Generation Congestion Credits		Net Congestion Bill		
Constraint	Day-Ahead	Balancing	Day-Ahead	Balancing	Day-Ahead	Balancing	Total
Kanawha - Matt Funk	$2,316,024	$10,139,452	$241,809	$10,287,363	$2,074,214	($147,911)	$1,926,303
Bedington - Black Oak	$28,742,935	$22,612,440	$4,535,191	$26,121,229	$24,207,744	($3,508,789)	$20,698,955
Axton	$191,583	$0	($12,075)	$0	$203,658	$0	$203,658
Cedar Grove - Roseland	($1,917,975)	($10,319,031)	($419,277)	($10,805,038)	($1,498,698)	$486,007	($1,012,691)
Cloverdale - Lexington	($9,373,304)	($12,716,359)	($2,142,400)	($12,345,251)	($7,230,904)	($371,108)	($7,602,012)
5004/5005 Interface	($9,218,427)	($10,082,926)	($4,049,079)	($11,027,934)	($5,169,348)	$945,008	($4,224,340)
West	($143,263)	($3,130,768)	($59,015)	($3,415,191)	($84,248)	$284,423	$200,175
Kammer	($6,032,338)	($6,121,787)	($4,197,981)	($5,670,933)	($1,834,357)	($450,853)	($2,285,210)
Axton - Jacksons Ferry	$111,170	$83,587	($8,610)	$109,582	$119,780	($25,995)	$93,785
Central	($10,061,293)	($2,285,046)	($3,515,606)	($2,273,372)	($6,545,687)	($11,675)	($6,557,362)
Alta Vista - Dominion	$415,317	$668,153	($24,344)	$623,480	$439,661	$44,673	$484,334
Mount Storm - Pruntytown	$4,101,838	$14,622,489	$688,896	$16,085,635	$3,412,943	($1,463,147)	$1,949,796
Wylie Ridge	($2,709,633)	($4,186,078)	($1,509,737)	($4,465,383)	($1,199,896)	$279,305	($920,591)
Branchburg - Readington	($2,052,326)	($7,051,426)	($532,382)	($7,558,096)	($1,519,943)	$506,671	($1,013,273)
Doubs	($2,125,535)	($1,204,343)	($883,134)	($1,243,293)	($1,242,401)	$38,950	($1,203,452)
East	($14,873,798)	($6,972,815)	($4,874,989)	($7,492,771)	($9,998,810)	$519,956	($9,478,854)

Spot Market Congestion Costs

Spot Market congestion costs are the second component needed to calculate Implicit Congestion costs. Spot Market congestion costs are those congestion costs incurred by a PJM member's net Spot Market purchases or sales. Net Spot Market purchases or sales are the difference between a participant's total energy resources (including both generation and contractual energy purchases) and its energy demand (including both load and contractual energy sales). If resources exceed demand, there is a net Spot Market sale and if demand exceeds resources there is a net Spot Market purchase.

- Day-Ahead Spot Market congestion charges are calculated based on a participant's net Spot Market position in day ahead. If a participant's position is a net purchaser in an hour then the participant's Spot Market congestion price is a load weighted-average CLMP based on their load position at each bus. Each load weighted-average CLMP is specific to a constraint. For example, if there are three constraints then there will be three unique prices for each constraint, which when summed will add up to the total Spot Market congestion charges for that participant.

- Day-Ahead Spot Market congestion credits are calculated based on a participant's net Spot Market position in day ahead. If a participant's position is a net seller in an hour then the participant's Spot Market congestion price is a generation weighted-average CLMP based on their generation position at each bus. Each generation weighted-average CLMP is specific to a constraint. For example, if there are three constraints then there will be three unique prices for

each constraint, which when summed will add up to the total Spot Market congestion credits for that participant.

- Balancing Spot Market congestion charges are calculated based on a participant's real-time deviations from their day-ahead net hourly Spot Market purchases. The participant's Spot Market congestion price is based on the load deviation weighted-average CLMP based on their real-time load deviations from day ahead at each bus. If no load deviations exist, the Spot Market congestion price is based on a real-time, load weighted-average CLMP using their real-time load at each bus.

- Balancing Spot Market congestion credits are calculated based on a participant's real-time deviations from their day-ahead, net hourly Spot Market sales. The participant's Spot Market congestion price is based on the generation deviation-weighted CLMP based on their real-time generation deviations from day ahead at each bus. If no generation deviations exist, the Spot Market congestion price is based on a real-time, generation-weighted CLMP using their real-time generation at each bus.

Spot Market congestion charges and Spot Market congestion credits for the AEP service territory in Virginia are calculated based on each participant's net interchange MW in the Virginia portion of AEP, or the difference between their load and generation in the Virginia portion of AEP. However, the Spot Market prices used are uniform across all zones and reflect a participant's entire net interchange position in PJM and are not unique to AEP. This is done to be consistent with PJM congestion charges that are calculated on a system-wide basis and not a zonal or state basis.

Total Spot Market congestion costs for AEP are the difference between the sum of all participants' Day-Ahead and Balancing Spot Market congestion charges and the sum of all participants' Day-Ahead and Balancing Spot Market congestion credits within the Virginia portion of AEP.

Table 7 shows the Spot Market congestion charges for both periods. Table 8 shows the impact of specific constraints on Spot Market congestion charges.

Table 7 Total Spot Market Congestion Costs

	Spot Market Congestion Costs		
Period Beginning	Day-Ahead	Balancing	Total
10/1/2004	($86,653,145)	$8,375,521	($78,277,623)
10/1/2005	($85,881,293)	$8,425,283	($77,456,010)

Table 8 Spot Market Congestion Costs by Constraint

	Spot Market Congestion Costs					
	10/2004 - 09/2005			10/2005 - 09/2006		
Constraint	Day-Ahead	Balancing	Total	Day-Ahead	Balancing	Total
Kanawha - Matt Funk	($242,286)	($11,268)	($253,554)	($2,645,100)	($233,685)	($2,878,785)
Bedington - Black Oak	($7,400,390)	$379,748	($7,020,642)	($7,384,117)	$514,852	($6,869,265)
Axton	$35,248	$0	$35,248	($532,309)	($12,392)	($544,701)
Cedar Grove - Roseland	($1,414,634)	$485,603	($929,031)	($7,547,272)	$458,935	($7,088,337)
Cloverdale - Lexington	($3,060,118)	($268,085)	($3,328,203)	($2,890,664)	$135,229	($2,755,435)
5004/5005 Interface	($7,318,675)	$1,382,205	($5,936,469)	($8,052,049)	$639,999	($7,412,050)
West	($103,330)	$239,560	$136,230	($6,423,711)	$788,348	($5,635,364)
Kammer	($10,262,954)	$255,763	($10,007,192)	($18,718,849)	$1,197,969	($17,520,880)
Axton - Jacksons Ferry	$14,071	($1,711)	$12,360	($94,811)	$5,278	($89,533)
Central	($6,290,245)	($43,525)	($6,333,770)	($2,938,574)	$14,067	($2,924,507)
Alta Vista - Dominion	$18,440	$3,709	$22,149	$86,437	($9,730)	$76,707
Mount Storm - Pruntytown	($303,465)	$40,420	($263,045)	($765,614)	$81,266	($684,348)
Wylie Ridge	($7,463,182)	$1,390,286	($6,072,896)	($7,453,377)	$1,121,177	($6,332,200)
Branchburg - Readington	($1,425,337)	$432,784	($992,554)	($2,222,727)	$623,302	($1,599,424)
Doubs	($1,441,651)	$112,373	($1,329,278)	($1,862,131)	$72,468	($1,789,664)
East	($9,420,310)	$400,204	($9,020,106)	($551,154)	$15,928	($535,227)

Implicit Congestion Costs

Implicit Congestion costs are the congestion costs for moving generation to load across a constrained system. Implicit Congestion costs are derived by calculating an hourly net congestion bill for each market participant and subtracting their Spot Market congestion costs. Implicit Congestion costs equal the net congestion bill minus Spot Market congestion costs. If a participant has no Spot Market net interchange, then the Implicit Congestion costs will equal the net congestion bill for that participant.

The total Implicit Congestion costs calculated for the Virginia portion of AEP represent the sum of all congestion costs associated with each participant's load and generation located within Virginia and AEP (net congestion bill) minus the sum of all congestion costs associated with each participant's spot purchases and sales located within Virginia and AEP.

Table 9 shows that total Implicit Congestion costs more than doubled from the period beginning October 1, 2004, to the period beginning October 1, 2005.

Table 10 for example, shows an increase in Implicit Congestion costs associated with the Kanawha – Matt Funk line. The Kanawha – Matt Funk line increased in congestion event hours from 260, for October 2004 to September 2005, to 2,223, for October 2005 – September 2006.

Table 9 Total Implicit Congestion Costs

	Implicit Congestion Costs		
Period Beginning	Day-Ahead	Balancing	Total
10/1/2004	$57,928,678	($8,187,395)	$49,741,283
10/1/2005	$113,278,433	($11,958,985)	$101,319,448

Table 10 Implicit Congestion Costs by Constraint

	Implicit Congestion Costs					
	10/2004 - 09/2005			10/2005 - 09/2006		
Constraint	Day-Ahead	Balancing	Total	Day-Ahead	Balancing	Total
Kanawha - Matt Funk	$2,316,500	($136,643)	$2,179,857	$35,706,424	($2,545,294)	$33,161,130
Bedington - Black Oak	$31,608,135	($3,888,537)	$27,719,598	$27,660,320	($3,830,941)	$23,829,379
Axton	$168,410	$0	$168,410	$8,570,175	($324,029)	$8,246,146
Cedar Grove - Roseland	($84,064)	$404	($83,660)	($425,024)	$43,767	($381,257)
Cloverdale - Lexington	($4,170,786)	($103,023)	($4,273,809)	($2,942,575)	($209,066)	($3,151,641)
5004/5005 Interface	$2,149,326	($437,197)	$1,712,129	$2,444,518	($199,228)	$2,245,290
West	$19,082	$44,863	$63,945	$813,098	($140,748)	$672,350
Kammer	$8,428,598	($706,616)	$7,721,982	$14,611,831	($1,512,153)	$13,099,678
Axton - Jacksons Ferry	$105,710	($24,285)	$81,425	$3,727,165	($101,301)	$3,625,864
Central	($255,442)	$31,850	($223,592)	($116,596)	($299)	($116,895)
Alta Vista - Dominion	$421,221	$40,964	$462,185	$1,871,135	$534,156	$2,405,291
Mount Storm - Pruntytown	$3,716,408	($1,503,567)	$2,212,841	$3,407,052	($588,617)	$2,818,435
Wylie Ridge	$6,263,285	($1,110,981)	$5,152,305	$5,547,244	($1,158,272)	$4,388,972
Branchburg - Readington	($94,606)	$73,887	($20,719)	($137,108)	$83,946	($53,161)
Doubs	$199,250	($73,423)	$125,826	$297,325	($8,245)	$289,081
East	($578,499)	$119,752	($458,747)	($25,194)	$894	($24,299)

Explicit Congestion Costs

Explicit Congestion costs are the congestion costs associated with moving energy from one specific point to another across the transmission system. Point-to-point transactions may be either internal to PJM or be import or export transactions. Explicit Congestion charges equal the difference between source and sink CLMPs for a point-to-point transaction.

- Internal Purchases – For internal purchases the Explicit Congestion charges are calculated based on the difference in CLMPs between the sink bus and source bus of the purchase.

- Import & Export Transactions – For point-to-point and network secondary transmission customers, the Explicit Congestion charges are calculated based on the difference between source and sink CLMP, specific to each constraint.

The Explicit Congestion charges calculated for the Virginia portion of AEP represent the charges associated with point-to-point transactions that either sink in or source from the

Virginia portion of AEP. For example, if a transaction is sourced in PECO and sinks in AEP, the Explicit Congestion charges would be based on the MW of the transaction multiplied by the sink CLMP. Conversely, if a transaction is sourced at AEP and sinks in PECO, the charges are based on the MW of the transaction multiplied by the source CLMP. When calculated using this method, a sink in AEP would resemble a load congestion payment and a source would resemble a generation congestion credit. Congestion is only realized for a specific transaction when both sink and source are combined.

Table 11 Total Explicit Congestion Costs

	Explicit Congestion Costs		
Period Beginning	Day-Ahead	Balancing	Total
10/1/2004	$34,318	$205,273	$239,591
10/1/2005	$1,942,788	($3,219,491)	($1,276,703)

Table 11 shows an increase in Day-Ahead Explicit Congestion costs from the period beginning October 2004 to the period beginning October 2005, but a decrease in total Explicit Congestion costs.

Table 12 shows that a large part of the increase in Day-Ahead Explicit Congestion costs was associated with the Kanawha – Matt Funk line and the Axton transformer located in AEP.

Table 12 Explicit Congestion Costs by Constraint

	Explicit Congestion Costs					
	10/2004 - 09/2005			10/2005 - 09/2006		
Constraint	Day-Ahead	Balancing	Total	Day-Ahead	Balancing	Total
Kanawha - Matt Funk	$20,581	($595,526)	($574,945)	$1,017,145	($3,740,201)	($2,723,056)
Bedington - Black Oak	$147,587	($547,472)	($399,885)	$535,637	$36,424	$572,061
Axton	$224	$0	$224	$1,339,444	($4,378)	$1,335,066
Cedar Grove - Roseland	$255	$95,153	$95,407	($329,788)	$72,275	($257,514)
Cloverdale - Lexington	$37,336	($48,506)	($11,170)	($138,020)	($409,644)	($547,664)
5004/5005 Interface	$1,024	$96,084	$97,109	($256,734)	$7,975	($248,759)
West	$96	$47,219	$47,315	($15,264)	($13,234)	($28,498)
Kammer	$8,517	$67,153	$75,670	($208,046)	$238,747	$30,701
Axton - Jacksons Ferry	$1,449	$15	$1,463	$400,032	$2,207	$402,239
Central	($130,843)	$66,456	($64,387)	($239,228)	$1,564	($237,663)
Alta Vista - Dominion	$490	($1,161)	($671)	$14,406	($3,028)	$11,379
Mount Storm - Pruntytown	($691)	$26,226	$25,534	$110,640	$174,581	$285,221
Wylie Ridge	($63,251)	($15,525)	($78,776)	($181,038)	$228,318	$47,280
Branchburg - Readington	$9,147	$300,865	$310,012	$15,161	$30,815	$45,975
Doubs	($228)	$9,115	$8,886	($107,608)	$11,167	($96,441)
East	($27,954)	$224,654	$196,700	($5,680)	$274	($5,406)

Total Congestion Costs

Table 13, Table 14 and Table 15 present data on total congestion costs by category.

Table 13 Total Congestion Costs by Category

Total Congestion Costs by Category				
Period Beginning	Implicit Congestion Charges	Spot Congestion Charges	Explicit Congestion Charges	Total Congestion Charges
10/1/2004	$ 49,741,283	$ (78,277,623)	$ 239,591	$ (28,296,750)
10/1/2005	$ 101,319,448	$ (77,456,010)	$ (1,276,703)	$ 22,586,734

Table 14 Total Congestion Costs by Category and Constraint (10/1/2005 – 9/30/2006)

Total Congestion Cost by Category (10/1/2005 - 9/30/2006)				
Constraint	Implicit Congestion Charges	Spot Congestion Charges	Explicit Congestion Charges	Total Congestion Charges
Kanawha - Matt Funk	$33,161,130	($2,878,785)	($2,723,056)	$27,559,289
Bedington - Black Oak	$23,829,379	($6,869,265)	$572,061	$17,532,175
Axton	$8,246,146	($544,701)	$1,335,066	$9,036,511
Cedar Grove - Roseland	($381,257)	($7,088,337)	($257,514)	($7,727,107)
Cloverdale - Lexington	($3,151,641)	($2,755,435)	($547,664)	($6,454,740)
5004/5005 Interface	$2,245,290	($7,412,050)	($248,759)	($5,415,519)
West	$672,350	($5,635,364)	($28,498)	($4,991,512)
Kammer	$13,099,678	($17,520,880)	$30,701	($4,390,500)
Axton - Jacksons Ferry	$3,625,864	($89,533)	$402,239	$3,938,571
Central	($116,895)	($2,924,507)	($237,663)	($3,279,065)
Alta Vista - Dominion	$2,405,291	$76,707	$11,379	$2,493,376
Mount Storm - Pruntytown	$2,818,435	($684,348)	$285,221	$2,419,308
Wylie Ridge	$4,388,972	($6,332,200)	$47,280	($1,895,949)
Branchburg - Readington	($53,161)	($1,599,424)	$45,975	($1,606,610)
Doubs	$289,081	($1,789,664)	($96,441)	($1,597,024)
East	($24,299)	($535,227)	($5,406)	($564,932)

Table 15 Total Congestion Costs by Category and Constraint (10/1/2004 – 9/30/2005)

Total Congestion Cost by Category (10/1/2004 - 9/30/2005)				
Constraint	Implicit Congestion Charges	Spot Congestion Charges	Explicit Congestion Charges	Total Congestion Charges
Kanawha - Matt Funk	$2,179,857	($253,554)	($574,945)	$1,351,359
Bedington - Black Oak	$27,719,598	($7,020,642)	($399,885)	$20,299,070
Axton	$168,410	$35,248	$224	$203,881
Cedar Grove - Roseland	($83,660)	($929,031)	$95,407	($917,284)
Cloverdale - Lexington	($4,273,809)	($3,328,203)	($11,170)	($7,613,183)
5004/5005 Interface	$1,712,129	($5,936,469)	$97,109	($4,127,232)
West	$63,945	$136,230	$47,315	$247,491
Kammer	$7,721,982	($10,007,192)	$75,670	($2,209,540)
Axton - Jacksons Ferry	$81,425	$12,360	$1,463	$95,248
Central	($223,592)	($6,333,770)	($64,387)	($6,621,748)
Alta Vista - Dominion	$462,185	$22,149	($671)	$483,663
Mount Storm - Pruntytown	$2,212,841	($263,045)	$25,534	$1,975,330
Wylie Ridge	$5,152,305	($6,072,896)	($78,776)	($999,367)
Branchburg - Readington	($20,719)	($992,554)	$310,012	($703,261)
Doubs	$125,826	($1,329,278)	$8,886	($1,194,565)
East	($458,747)	($9,020,106)	$196,700	($9,282,154)

Conclusion

In conclusion, congestion costs in the AEP service territory of Virginia increased from 2004-2005 to 2005-2006. Implicit Congestion charges more than doubled in 2005-2006 with significant contributions from Kanawha-Matt Funk and Bedington – Black Oak. This increase in Implicit Congestion charges is due to a large increase in day-ahead load congestion payments, from ($60.9) million to $6.8 million. This increase can be attributed to several changes in congestion patterns between the two periods. The East Interface was constrained for 1,833 fewer hours in 2005-2006 than in 2004-2005. This resulted in a reduction of $14 million in Day-Ahead load congestion payments in 2005-2006. The frequency of congestion on the Kanawha – Matt Funk line increased by 1,963 hours and resulted in an increase of $39.3 million in Day-Ahead load congestion payments in 2005-2006. Spot Congestion charges were similar in both years and Explicit Congestion charges decreased in 2005-2006 in large part due to balancing Explicit Congestion charges associated with the Kanawha – Matt Funk line.

ARRs and FTRs are designed to provide a hedge against congestion costs. This report does not include data on either ARRs or FTRs. That information will be provided in a future report. The data on ARRs and FTRs and congestion need to be considered together when evaluating the net impact of congestion on an area.

Congestion Definitions

Table 16 Congestion Definitions

Congestion Category	Calculation
Load Congestion Payments	Demand MWh * CLMP
Generation Congestion Credits	Supply MWh * CLMP
Net Congestion Bill	Load Congestion Payments - Generation Congestion Credits
Spot Market Congestion Credits	Net Interchange * Generation Weighted CLMP
Spot Market Congestion Charges	Net Interchange * Load Weighted CLMP
Spot Market Congestion Costs	Spot Market Congestion Charges - Spot Market Congestion Credits
Implicit Congestion Costs	Net Congestion Bill - Spot Market Congestion Costs
Explicit Congestion Costs	Transaction MW * (Sink CLMP - Source CLMP)
Total Congestion Costs	Implicit Congestion Costs + Spot Congestion Costs + Explicit Congestion Costs

MWh Category	Definition
Day-Ahead Demand MWh	Cleared Demand, Decrement Bids, Energy Sale Transactions
Day-Ahead Supply MWh	Cleared Generation, Increment Bids, Energy Purchase Transactions
Real-Time Demand MWh	Load and Energy Sale Transactions
Real-Time Supply MWh	Generation and Energy Purchase Transactions
Balancing Demand MWh	Real-Time Demand MWh - Day-Ahead Demand MWh
Balancing Supply MWh	Real-Time Supply MWh - Day-Ahead Supply MWh