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COMMONWEALTH OF KENTUCKY

PUBLIC LARVICE COMMISSION

BEFORE THE

PUBLIC SERVICE COMMISSION OF KENTUCKY

IN THE MATTER OF

AN INVESTIGATION OF THE ENERGY AND)
REGULATORY ISSUES IN SECTION 50 OF) ADMINISTRATIVE
KENTUCKY'S 2007 ENERGY ACT) CASE NO. 2007-00477

KENTUCKY POWER COMPANY

RESPONSE TO COMMISSION STAFF'S FIRST SET OF DATA REQUESTS NUMBER 3

KPSC Administrative Case No. 2007-00477 An Investigation of the Energy and Regulatory Issues in Section 50 of KY's 2007 Energy Act Commission Staff's First Set of Data Requests Order Dated November 20, 2007

Item No. 3
Page 1 of 1

Kentucky Power Company

REQUEST

Provide copies of any internal reports or utility-commissioned studies on renewable capabilities in Kentucky, including capacity for development of integrated gasification combined cycle facilities.

RESPONSE

Confidential treatment in the form a Petition for Confidentiality is being sought for Attachment A and Attachment E.

Attachment A contains four preliminary high level economic screening studies of Biomass at Big Sandy Plant. The four studies include: (1) biomass co-firing (via co-milling) at Big Sandy 1; (2) biomass co-firing (via co-milling) at Big Sandy 2; (3) biomass separate injection at Big Sandy 1 and (4) biomass separate injection at Big Sandy 2. Attachment A, pages 2 through 5 contain the four studies performed in 2005 and pages 6 through 13 contain the same four studies but were updated in 2006. The biomass information is a high level economic screen, taking into account only limited performance and costs. Data varies from year to year based upon updated information and revisions to the spreadsheets. In addition no biomass resource analysis around Big Sandy Plant has been conducted at the present time so no conclusions can be drawn as to the adequacy of biomass resources in sufficient quantities to co-fire. In addition the analysis does not consider the physical limitations at Big Sandy for co-firing.

Attachment B is the initial landfill gas evaluations for the Commonwealth of Kentucky.

Attachment C is the landfill gas evaluations in Kentucky Power Company's service territory.

Attachment D is a copy of the PJM interconnection study relative to KY IGCC facilities. Pertaining to the development of an IGCC facility in Kentucky, AEP performed preliminary screening studies on siting an IGCC facility in West Virginia, Ohio and Kentucky in 2005. These screening studies entailed a site selection study, and a transmission impact study by PJM. No further work was performed on a site in Kentucky after these studies were completed in 2006.

Attachment E is a copy of the IGCC plant siting study performed by Sargent & Lundy which included sites in Kentucky. As stated in the Company's Petition for Confidential Treatment, Kentucky Power is providing those portions of the study that relate to Kentucky or that are necessary to understand the Kentucky-related sections.

WITNESS: Timothy C Mosher/Errol K Wagner

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0000.0								2034		00.0	00.0	0 0	10.0	00.0	00.0	00.0	00.0	00.0			31.6			0.0	0.0	0.0	0.0	0000.0	2034
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2771.0							-	5029		AT.88		1 5	0.2	00.0	8E.O- 8E.O-	SE.0 EE.0	90'S	19'96 21'66			18.2 78.2		2.0	8.0 8.0	0.0	0.0	0.0	201.0 2771.0	5029 2028
0,2109						-		720Z	 	69,78	69.5		0.8	00.0				97.501										6012.0	7502
0.2300							 	2022	 	86.33	60.6	1 6	2.4	00.0	SE.0-	82.0	62.1	92.68	f		07.2	8.0		9.0	0.0	0.0	0.0	0.2300	9202
8052.0							 	2025		24.42	575	i	9.4	00.0	8E.O-	05.0	14.4	18.66		02.2	2.65	8.0		9.0	0.0	0.0	0.0	8052.0	2025
AETZ.O	-						1	2024		81 ES	6Z.S		5.4	00.0		0.30		98.89							0.0			\$£73.0	2024
1862.0								SOZ	1	52,16	65.2	1 1	9.4	00.0	\\ \(\text{.0-} \)	05.0	89.4	103.27			2,55	8.0	1.0	90	(0.0	0.0	0.0	1862.D	2023
0.325.0						_	1	2022		52.30	07.h	1 2	3.9	00.0		97.0		87.68			09°Z	8.0		9.0	0.0	0.0		0326.0	2022
P+SE'0								1202		07.02		1 9	4.1	00.0	26.0-	120	£Z.A	01.79		08.4	2.45	8.0	1.0	9.0	0.0			1156.0	1202
₱98E.0								2020		E7.84	28.4	1 8	10.1	00.0	2£.0-	75.0	91.1	SP.72		15.4	2,40	8.0					0.0	₱98E.0	1020
0.4212								5019		89.84	4.83		4.0	00.0	86.0-	72.0		11.66			2.35	8.0	1.0	9.0	0.0			SIZP.0	610
£651,0								2018		EB.51		1 19	3.4	00.0	16.0-	92°0	3,54	02.88		£8.4	2.26		1.0	9.0	0.0	0.0		£85\$.0	810
8002.0								2017		26.84			3.6	00.0				16.88								10.0	0.0	8003.0	710
091-5:0								2016		96.24	09 7	1 9	9.6	00.0	9£.0-			11,001			77.Z		1.0	9.0	0.0	0.0	0.0	0948.0	910
0,5953						_		2014		77.84		1 1	3.40	00.0	₽£.0- 0€.0-		99'6	106,74	+		21.5	8.0			0.0	0.0	0.0	061-0.0	710
001.0	-					_		2013	+	59.53			9.6	00.0			97.£	71,101											510
12177.0							 	ZIOZ	+	00.64		i F	3.E	OU.U	05.0-		AT.E	102.93			2.10	7.0		9.0	0.0	0.0	0.0	SITT.0	210
2118.0							1	1102	 	45.06		1 9	3.6	00.0	62.0-	82.0	68.£	109.32		3.94	80.Z	7.0	1.0	9.0	0.0	0.0	0.0		110
2719.0						_		2010		21.54			30.8	00.0	02.0-	02.0	3'08	33.88			70.5				0.0	0.0		Z776.0	010
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			cos	XON	ZOS					(UMWS	(WS)		(2W	(WS)	(WS)	(NS)		(GMP)	(%)	(mamws)	(Mawwys)				(WS)	(WS)	(WS)	jobse3	169
V Factors			ע סט	a Prices, 5	Allowanc							1	Var Cos	Cost	IzoO	MAO	Isoo	notienanse	Factor	Fuel Cost	Fuel Cost	IsloT	MAO	Charges	MAO	.enesT	notenanao	sulsV	_
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				 	_	-+	PO.816, PO.	1	= JU-MV	Lerauon, h	Biomass Gen		192			o Capacity, M	genavA launnA linU	SEU	* 102	£ o	= 2 835			NOx Emiss			nucal Units:	Number of Idea	N
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				1			EP. 668, PS1, F		= ul8m		Biomass Hea		1.91			(MY	Co-fired Capacity (FF THE		E	±€03 =	(IDMMMdl)	sion Rate	SO2 Emiss			(%)	Discount Rate	ā
	\Box						20290 Q				uld assmold							0 4		YOUNS				Capacity V		1	Canying Charge Rate (%)		
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				1			278,01 1 · · ·	= qym	g Value, B	nilseH lsc	Biomass + Co		K0.3		1	Penalty (%)	Biomass Heat Rate	0102:393					16	aY MouaR	142	(%) 5	alesi Sgnariog Charge Rale	Sened Sener	ع إد
				1			_18,123,283.1		= utEr	ուր, աա	Annual Heat		18 6 17 11			(UVVIV	Heal Rate (MMBlw	11				4-10-5		FO Joelon9			Esc. (%)	.gnsìT & M&O	의
				-			0.005.01	1			Co-fired Heal		4:03				Capital Cost (5 milli					OZĮ (ŽVXV)	mission Co	anenT weM	00 Z			Generation Esc	
				-			10.01	<u></u>			Hiomass, % b		250.0			(easmoid to	Capital Cost (\$7kW	L DEWNSON				red O&M (\$/kW-year)						Present Value	
				-			D.002.h				BeH seamoid		Dr.o.		 	nYn	Fixed O&M (\$ millin	009/11/1999				St (SAKW)	on vipage	Avoided Ca	2010	J		IA to 168Y Jani A	
				+	—		12,000	<u> </u>	= qyn	Value, Bi	Coal Healing	<u>,</u> 5	0 Z 1			(40	MA2) M&O sidehsV		L			#11 TIME 20/20/20/20 TO	:stao	O beblovA	5002	4		Year of Cost E	
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00000.0						2049		00.0	00.0	D 00.0 0 00.0	00.0	00.0	00.0	00.0	00.0		TE.8	4.26				0.0	0.0			5048
0000.0						2048		00'0		0 00.0	00.0	00.0	00.0	00.0	00.0			81.4		0.0		0.0	0.0		0000.0	3048
0000.0						2047		00.0	00.0	0 00.0	00.0	00.0	00.0	00.0	00.0		98.7 90.8		0.0		0.0	0.0		0.0	0000.0	2042
0000.0						2046	1	00.0	00.0	0 00.0	0.00	0.00		00.0	00.0							0.0			0.000.0	2045
0000.0						2044		00.0	00.0	0 00.0	00.0	00.0	00.0	00.0	00.0		85.7	38.E	0.0	0.0	0.0	0.0				5044
0000.D						2043		00.0	00.0	0 00.0	00.0	00.0	00.0	00.0	00.0		Eb.T	87.6	0.0	0.0	0.0	0.0	0.0	0.0	0.000	2043
0000.0						2042		00.0	(00.0	0 100'0	00.0	00.0	00.0	00.0	00.0		85.T	17.5	0.0	0.0		0.0			0000.0	2042
0000.0						1002		00.0	00.0	0 00.0	00.0	00.0	00.0	00.0	00.00		Ar.T	59.5	0.0	0.0	0.0	0.0			0000,0	1102
0.000						2040		00.0	00.0	0.00	00.0	00.0	00,0	00.0	00.0		00.7	35.E			0.0	0.0		0.0	0.000.0	0102
0000.0						5038		00.0	00.0	0 00.0	00.0	00.0	00.0	100.0	00.0				0.0		0.0	0.0			0000.0	8603
0000.0						2037		00.0	00.0	0 00.0 0 00.0 0 00.0	00.0	00.0	00.0	00.0	00.0		09.9		0.0			0.0			0.000.0	750
0000.0						2032		00.0		0 00.0	00.0		00.0	00.D	00.0		74.8	3.29		0.0	0.0	0.0				920
0000.0						2035			00.0	0 00.0 0 00.0	00.0	00.0	00.0	00°0	00.0		AC.8	62.E		0.0	0.0	0.0		00	0.000	SEO
00000						2034		00.0	00.0	0 100.0	00.0	00.0	00.0	00.0	00.0		6.22	3.16	0.0	0.0	0.0	0.0				034
0000.0						2033			00.0	0 00.0	(00.0	{00.0	00.0	00'0	00.00		60'9	3.10	0.0	0.0	0.0	0.0				EEO
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00000					1	2031		00.0	00.0	0 00.0	00.0	00.0	00.0	00.0	00.0		98.6	2.98	0.0			0.0			0000.0	030
0.000						Z030	 	00.0	00.0	0 00'0	00.0	00.0	00.0	00.0	00.0		47.2	78.5 2.92	0.0	S.0 0.0		0.0			2551,0 0000.0	920
STT1.0				-		2029 2028		S2.72 B2.82		7 0402	00.0	170	10.1	81.81 02.81	\$91.04 £8,83£		29°9		1.2	70	9.1	0.0		0.0	0.1935	820
0.1935						7027			15.61	r S1.71	00.0	81.0 12.0	28.0	60.81	334.63		17.2			5.0		0.0	0.0		0,2109	720
0.2300						9202		29.22	BZ.72	1 81.61	00.0	02.0	58'0	£0.8f	382.50		05.3	07.5				0.0			0.2300	970
8025.0						SZOZ	1	59.65		1 08.B1	00.0	0.20	66.0	79.Tr	382,30		5.20	2.65	1.2	1.0	1.9	0.0	0.0	0.0	B022.0	5202
D.2734	*					2024		88.68	20.94	1 38.81	00.0	0.21	160	IL.T.	20.16£		5.10	09.2				0.0			AETS.0	7074
1862.0						2023		53.33	15.81	f EE.ar	00.0	81.0	18.0	EE.81	345.23		00.8	55.5		1.0	6.1	0.0	0.0		1865.0	220 220
0.3250						2022		17.12		1 57.71	00.0	12.0	06.0	£8.8f	87.68£	100	06.4	2,50		1.0	8.1 8.1	0.0	0.0	0.0	0,325,0	052
0.3544						1202		18.03	67.6t	1 57.71	00.0	12.0			38.685		08.5		· ·			0.0			MARC.0 MARC.0	
0.3864						2020	 	49.04	14 Tr	1 98.31	00.0	81.0	28.0 87.0	20.01 54.41	39.095		17.4			1.0	6.r	0.0			0.4212	020
E6910						2018	 	81.84 M. OA	191 01	f 77.8f	00.0	12.0	129.0	E7.21	86,095		EG"P	2.31	1.Z		6.1	0.0	0.0		0,4593	810
8002.0						2012		48.20		1 4141	00.0	81.0	07.0	13.26	336.14		77.7	92°Z		1.0		0.0			8005.0	410
0352.0						2018	 	09.9>	28.71	1 88.21	00.0	02.0	67.0	68.Ar	S1 58E	1.0	4,35			1.0		0.0	0.0	0.0	091-2.0	910
ES85.0						2015		45.70	£8.71	1 98.21	00.0	12.0	67.0	78.Þf	16.596		72.4	71.2		1.0	6.1	0.0			6263.0	SIC
06490						7014		16.44		15.56	00.0	12.0	177.0	82.21	392.26			2,13		1.0	6.1	0.0	0.0	0.0	06149.0	PLO
9707.0						2013		£8,44	57.81	13.66	00'0	71.0	89.0	18.51	71.52C							0.0				610
B177.0						2012		91.54	16.91	1 SS.A1	00.0	21.0 71.0	\$7.0 P.T.0	18.E1 79.E1	24.18E	100	3.94	2.08		1.0	9.1	0.0			2118.0 2155.0	210
Z116.0						2010	 	42.33	172.01	1 11.21	00.0	21.0	17.0	72.£1	31.68E		38.£	2.07		10	6.1	0.0		0.0	2718.0	OL
5716.0						10100	 	C3 >1	31 31	1	1 1000		1.20	12001	32 005		300	200	-		19.	100	1			-
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	7.0		×ON	zos		 		(WAYUS	(ws)	{W\$J	(WS)	(ivs)	(WS)	(FVS)	(GAND)	(%)		(NEWWYS)		(WS)		(WS)	(WS)		Facion	jea
PV Factors		noT\2	зась Рисез,	EWOILA						Var Cost	Cost	Cost	MAO	JzoO	noitenanaa	10DB7	Fuel Cost	Fuel Cost	latoT .	M80	Charges	MAG	.ensiT	กดปัธาชกรอ	auta∨	
อวเกาอร-เป						Year				IsloT	XON	zos	eldsheV	Puel	Credited	Capacity	WeW	IsnignO		bexin	Carrying	bexJR	1 59	Carrying Charge	Present	4
						<u> </u>					ity Factor	sege3 bates2	able Costs at	ΉBV	 	-	 		<u></u>	1500	120(019		ouleV	Capacity		+
				├ ──				JS02 IE	sunnA lafoT		 		 	 	H	 		 	,		stsoO bas	<u> </u>				+
1	+						+	+	 				 	 	D. 703 (41.26)	(fire)	1-02 Q1 Bnn :	BUBUS XON	Change (i.e., zero if no	noissima	XON BIII-07	+	+			+
+				 	PE'895'26E		# JU-AAL	M 'uonesa	nao esamola	008			W. Yinaaqiso a	ngerayA leunnA linU		,,,,,,		2CK?=			NOx Emissi		al —	Sunce Dulls:	Yumber of Ido	ΝĪ
 	+			 	1	 			T		1		1		010	1			(utdmmtdl) ətsR no	iseim3 \$(S essmois	1	1	T		
1				+-+	38.080,088,6	1	# utBm	m , lugal I	Biomass Hea	99'69			[WI	Co-fired Capacity (A	52Z 0		T. A.		(ui8MMdi)	on Rate (SO2 Emissi	0.6	1	(%) t	Jisconut Rale	0
					£0290'0				Biomass Blu						D in the	4	YONN?			(WW) out	Capacity Va	Z.kt.		(%) eleR egisdO golyneO		
							1						1	1	OZ.					(sheay)	Project Lite	ZSL	<u></u>	ing Charge Rale (%)	ivns2 bajor	넫
					G78,0F	= qyny	8 Value, B	nueaH lec	Biomass + Co	%0°S-1.	\vdash		Penalty (%)	Biomass Heal Rale	5010	4					Retrofit Yea	241	(%) 0	eration Carrying Charge Rate	Seneric Gene	씱-
+					F,888,887,58	 			I 189H ISUNAA	09.6				Heat Rate (MMBILM		 			(AAVIET TO		New Transn Froject Dat		الســـــاق		enert & M&C	
+				 	0.080,01				Co-fired Heal					Capital Cost (\$ millio		 		 	ed O&M (\$/kW-year)				4		Resent Value	
+				 	0.61	4	- 00000	Idniew VI	Biomass, Wea Biomass, % b	250.0		+	feeemoid lo	Capital Cost (\$/kW c	- The said		 				Avoided Cal		1		A to usay lest	
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Landfill Gas Evaluations for the Commonwealth of Kentucky

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Landfill Gas Evaluations for the Commonwealth of Kentucky

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Kentucky

Out of the 18 candidate landfills in the LMOP database, four (4) are in AEP service territory.

Landfill	Location	Potential MW	Available ?
Green Valley	Ashland, Greenup	0.3	No. East KY Co-op
	Co.		is using this site for
			generation.
Cooksey Brothers	Ashland, Boyd Co.	3.6	Possibly. Ceased operations in 2005 due to repeated env. violations.
Perry County	Hazard, Perry Co.	N/A	Possibly. No data located.
Floyd County	Martin, Floyd Co.	0.3	Possibly. Closed in 2003. No other data located.

Cooksey Brothers in Ashland, where AEP has disposed of wastes over the years, is listed as closing in 2004 or 2005. Annual acceptance rate = 132,000 tons; estimated methane generation = 1.7 mmscf/day; potential electrical generation = 5 MW. If this landfill has been closed, then methane production will start decreasing, resulting in poorer LFG project economics over the long term. This landfill does appear available as an LFG project.

No data was located for the Perry County landfill in Hazard, KY, through general Internet, KY state, or USEPA LMOP database searches. This landfill is listed as having closed in 1992, thus methane production is most likely on the decline.

The Green Valley Landfill, Ashland, Greenup County, has already been developed by East Kentucky Power Cooperative. Four (4) small reciprocating engines are in place generating 0.32 MW of electricity.

The Floyd County Landfill, Martin, Floyd County, appears to have been closed in 2003. LMOP data shows only 346,000 tons of waste in place, thus not providing much in the way of methane generation. Project economics are most likely not favorable for electricity generation.

With respect to permitting, Kentucky has a general air quality permit for LFG to energy projects. Specific provisions for this type of permit include:

 Landfill Gas to Energy Projects are regulated by 40 CFR 60 Subpart WWW. The internal combustion engines operate as enclosed combustor type controls as described in Subpart WWW. The engines must achieve 98 weight-percent reduction of nonmethane organic compounds or reduce

Landfill Gas Evaluations in Kentucky Power Company's Service Territory

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outlet nonmethane organic compounds to less than 20 parts per million by volume, dry basis as hexane at 3 percent oxygen.

- Emission factors were obtained from internal combustion engine manufacturers and from AP-42.
- 40 CFR 60 Subpart WWW Standards of Performance for Municipal Solid Waste is applicable.
- EPA Region 4 has approved an alternative monitoring plan to replace the combustion temperature monitoring required by Subpart WWW.



Valley Forge Corporate Center Norristown, PA 19403-2497

VIA FEDERAL EXPRESS

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Confidential

March 30, 2006

Mr. Thomas Fecho AEP Service Corporation 1 Riverside Plaza Columbus, OH 43215

Dear Mr. Fecho:

Hanging Rock - Jefferson 765kV 1200 MW (N43) project Withdraw

This letter severs as confirmation that the Hanging Rock – Jefferson 765kV 1200 MW (N43) project has been withdrawn from the PJM queue, effective 3/28/06.

If you have any further questions, please call me at 610-666-4725.

Sincerely,

Diane Lake

Generation Interconnection Administrator

9. E. Hey Man Lt P. Castro

Tariff Administration Department

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J. C. Baker

M. Jasper B. J. Bockett

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PJM Generator Interconnection Request Queue #N43 Hanging Rock-Jefferson (Carrs) 765kV Impact Study

359006 February 2006

General

AEPSC, as agent for Operating Companies of AEP System (Interconnection Customer) proposes to install two 600 MW Integrated Gasification Combined Cycle (IGCC) generating facilities, each comprised of two combustion turbine generators and one steam turbine generator at their Carrs site. The proposed generating facility site is located adjacent to the Ohio River in Vanceburg, Lewis County, Kentucky. The project has position N43 in the PJM Generation Interconnection queue. The project in-service date is scheduled for the May 1, 2010.

Direct Connection

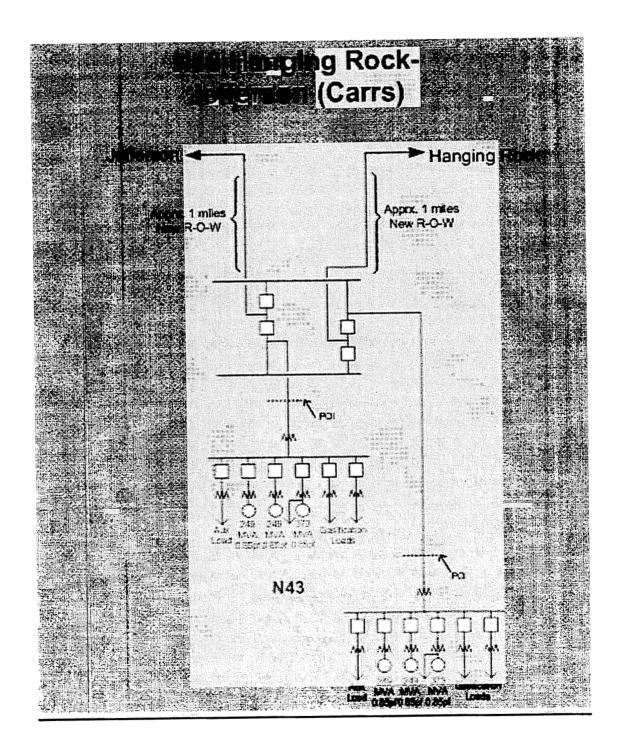
The project was evaluated with both 600 MW plants connected independently to the 765 kV Hanging Rock-Jefferson 765kV transmission line.

To connect the two proposed 600 MW IGCC plants to the Hanging Rock-Jefferson 765kV transmission line a new four breaker ring bus will need to be constructed at the interconnection with the line and two circuits, approximately 1 mile each, on separate rights-of-way, will need to be built from the Carrs generation site to the interconnection. See Figure #1. If only one 600 MW plant is connected to the 765kV, then a three breaker ring bus is sufficient. The estimated direct connection costs for the interconnection of the two 600 MW plants are listed below.

Unit 1 – add three 765 kV circuit breakers, associated bus and relay facilities.	\$ 20,828,000
Unit 2 – add one 765 kV circuit breaker, associated bus and relay facilities.	\$ 5,172,000
765kV substation is Upgrade #n0482.	
Trans. Lines – construct two one-mile long circuits	<u>\$ 11,997,000</u>
Trans. Exit #1 is Upgrade #n0483. Trans. Exit #2 is Upgrade #n0484.	
Total	\$ 37,997,000

It is estimated this work can be completed to meet the May 2010 in-service date.

Figure #1



Network Impacts

The #N43 project was studied as an injection of 1200 MW into a new substation inserted into the Hanging Rock – Jefferson 765 kV circuit. Project #N43 was evaluated for compliance with reliability criteria for summer peak conditions in 2009. Potential network impacts were as follows:

PJM Generator and Load Deliverability Results

 For outage of the Belmont-Harrison 500kV circuit the Kammer 765/500 kV transformer is overloaded at 111.6 % of its emergency rating of 1536 MVA. The N42 project provides 178.3 MW to the overload.

NERC Category A & B Contingency - Load Flow Results

 Under system normal conditions the Waterford-Muskingum 345kV circuit is overloaded to 115.2% of its normal rating. The N42 project contributes 62 MW to the flow on the circuit.

NERC Category C Contingencies - Load Flow Results

No problems identified.

Double Contingincies

No problems identified.

Short Circuit Analysis

No identified problems.

Stability (ECAR Document #1)

Stability analysis was performed at 2009 summer light load conditions and peak load conditions. The maximum generation output is considered. Attachment #1 lists the fault cases evaluated. The range of contingencies evaluated included all that were deemed necessary to assess expected compliance with ECAR criteria.

The study shows that, with all transmission facilities in service in the vicinity of the proposed project, the dynamics performance of the system for the planning criteria contingencies should remain satisfactory. Hence, N43 project will not require system reinforcement for system stability.

When the Hanging Rock – North Proctorville 765 KV line is out of service (Pre-disturbance outage Case T), several contingencies cause instability of several generators in the area. As a remedial measure, for an extended outage of Hanging Rock – North Proctorville 765 KV line (expected to be for extended duration), the N43 project should be removed from service. (Note: Additional generation reductions from other plants would also be needed for stability.)

Note: While the stability analysis has been performed at expected extreme system conditions, there is a potential that evaluation at a different level of generator MW and/or MVAR output at different system load levels and operating conditions would disclose unforeseen stability problems. The regional reliability analysis routinely performed to test all system changes will

include one such evaluation. Any problems uncovered in that or other operating or planning studies will need to be resolved.

Moreover, when the proposed generating station is designed and unit specific dynamics data for the turbine generators and its controls are available, and if it is different than the data provided for this study, a transient stability analysis at a variety of expected operating conditions using the more accurate data shall be performed to verify impact on the dynamic performance of the system. As more accurate or unit specific dynamics data for the proposed facility, as well as Plant layout become available, it must be forwarded to PJM.

New System Reinforcements

There are no new system reinforcements identified for the N43 project.

Contribution to Previously Identified System Reinforcements

The N43 project contributes to the two previously identified upgrades described below.

- The overload of the Kammer transformer can be alleviated by replacing the existing 1500 MVA transformer with three single phase units rated at 600 MVA each and a 600 MVA spare and replacing other substation equipment as required. (Upgrade # n0480) The estimated cost for the replacement is \$ 18,000,000. The estimated lead time for replacement is 24 months.
- The overload on the Waterford-Muskingum 345kV circuit can be alleviated by reconductoring approximately 1 mile of the circuit out of Waterford and changing line risers at Muskingum. (Upgrade # n0479) These changes can be accomplished prior to the in-service date of the IGCC in May 2010. The estimated cost is \$1.2 million.

Cost Allocation

The N43 project is responsible for 100% of the \$37.997 million estimated cost described in the direct connection portion of this report.

The N43 project will have allocations as listed below for network upgrades n0479 and n0480.

)	
479	Reconductor Waterford-Muskingum	AEP	06/01/10	(10%	1,200	72%	28%	158	62
480	Replace Kammer 765/500 kV Transformer	AEP	06/01/10	0%	18.000	15%	85%	32.6	176.3

For network upgrade n0479 the N43 allocation is \$0.34 million. For network upgrade n0480 the N43 allocation is \$15.3 million.

The total estimated cost for the facilites required to interconnect the N43 project is \$53.637 million

Attachment #1

N43

2009 Summer Light/Peak Load Case Stability Faults

BREAKER CLEARING TIMES (CYCLES)

Station	Prin	nary (3ph/slg) Stuck Breaker	(total) Zone 2 (to	tal) re-closing
765 kV	4	14	-	-
345 kV	4	15	-	-

Unstable cases caused by the project are highlighted in Red. Unstable cases due to the baseline problem are highlighted in blue.

With all Transmission Facilities in Service:

- N43-1a: 3ph @ N43Carrs on N43Carrs-Hanging Rock
- N43-1b: slg @ N43Carrs on N43Carrs-Hanging Rock, stuck @ N43Carrs I/o 1 N43 CT/ST
- N43-2a: 3ph @ N43Carrs on N43Carrs-Jefferson
- N43-2b: slg @ N43Carrs on N43Carrs-Jefferson, stuck @ N43Carrs I/o 1 N43 CT/ST
- N43-3a: 3ph @ Hanging Rock on Hanging Rock-Don Marquis
- N43-3b1: slg @ Hanging Rock on Hanging Rock-Don Marquis, stuck @ Hanging Rock, I/o Hanging Rock-Baker
- N43-3b2: slg @ Hanging Rock on Hanging Rock-Don Marquis, stuck @ Hanging Rock, l/o Hanging Rock-Cornu
- N43-4a: 3ph @ Hanging Rock on Hanging Rock-Cornu
- N43-4b: slg @ Hanging Rock on Hanging Rock-Cornu, stuck @ Hanging Rock
- N43-5a: 3ph @ Hanging Rock on Hanging Rock-Baker
- N43-5b: slg @ Hanging Rock on Hanging Rock-Baker, stuck @ Hanging Rock, I/o Hanging Rock-Don Marquis
- N43-6a: 3ph @ Hanging Rock on Hanging Rock-N. Proctorville
- N43-6b1: slg @ Hanging Rock on Hanging Rock-N. Proctorville, stuck @ Hanging Rock, l/o Hanging Rock-Lawrenz
- N43-6b2: slg @ Hanging Rock on Hanging Rock-N. Proctorville, stuck @ Hanging Rock, l/o Hanging Rock-Cornu
- N43-7a: 3ph @ Hanging Rock on Hanging Rock-Lawrenz
- N43-7b: slg @ Hanging Rock on Hanging Rock-Lawrenz, stuck @ Hanging Rock, I/o Hanging Rock N. Proctorville
- N43-8a: 3ph @ Jefferson on Jefferson-Greentown
- N43-8b: sig @ Jefferson on Jefferson-Greentown, stuck @ Jefferson, I/o Jefferson-Rockport
- N43-9a: 3ph @ Jefferson on Jefferson-Rockport
- N43-9b1: slg @ Jefferson on Jefferson-Rockport, stuck @ Jefferson, I/o Jefferson-Greentown
- N43-9b2: slg @ Jefferson on Jefferson-Rockport, stuck @ Jefferson, I/o Jefferson-Clifty Creek
- N43-10n: 3ph @ Jefferson on Jefferson-Clifty Creek 345kV
- N43-10b: slg @ Jefferson on Jefferson-Clifty Creek, stuck @ Jefferson, I/o Jefferson-Rockport

N43-11b1: slg @ Jefferson on Jefferson-N43Carrs, stuck @ Jefferson, I/o Jefferson-Greentown N43-11b2: slg @ Jefferson on Jefferson-N43Carrs, stuck @ Jefferson, I/o Jefferson-Clifty Creek

With N43 Carrs to Jefferson line out of service (Pre-disturbance outage P):

N43P-3a: 3ph @ Hanging Rock on Hanging Rock-Don Marquis

N43P-3b1: slg @ Hanging Rock on Hanging Rock-Don Marquis, stuck @ Hanging Rock, I/o Hanging Rock-Baker

N43P-3b2: slg @ Hanging Rock on Hanging Rock-Don Marquis, stuck @ Hanging Rock, Vo Hanging Rock-Cornu

N43P-4a: 3ph @ Hanging Rock on Hanging Rock-Cornu

N43P-4b: slg @ Hanging Rock on Hanging Rock-Cornu, stuck @ Hanging Rock

N43P-5a: 3ph @ Hanging Rock on Hanging Rock-Baker

N43P-5b: slg @ Hanging Rock on Hanging Rock-Baker, stuck @ Hanging Rock, I/o Hanging Rock-Don Marquis

N43P-6a: 3ph @ Hanging Rock on Hanging Rock-N. Proctorville

N43P-6b1: slg @ Hanging Rock on Hanging Rock-N. Proctorville, stuck @ Hanging Rock, I/o Hanging Rock-Lawrenz

N43P-6b2: slg @ Hanging Rock on Hanging Rock-N. Proctorville, stuck @ Hanging Rock, l/o Hanging Rock-Cornu

N43P-7a: 3ph @ Hanging Rock on Hanging Rock-Lawrenz

N43P-7b: slg @ Hanging Rock on Hanging Rock-Lawrenz, stuck @ Hanging Rock, I/o Hanging Rock N. Proctorville

N43P-8a: 3ph @ Jefferson on Jefferson-Greentown

N43P-8b: slg @ Jefferson on Jefferson-Greentown, stuck @ Jefferson, I/o Jefferson-Rockport

N43P-9a: 3ph @ Jefferson on Jefferson-Rockport

N43P-9b1: slg @ Jefferson on Jefferson-Rockport, stuck @ Jefferson, l/o Jefferson-Greentown

N43P-9b2: slg @ Jefferson on Jefferson-Rockport, stuck @ Jefferson, l/o Jefferson-Clifty Creek 345kV

N43P-10a: 3ph @ Jefferson on Jefferson-Clifty Creek 345kV

N43P-10b: slg @ Jefferson on Jefferson-Clifty Creek, stuck @ Jefferson, I/o Jefferson-Rockport

N43P-11b1: slg @ Jefferson on Jefferson-N43Carrs, stuck @ Jefferson, I/o Jefferson-Greentown

N43P-11b2: slg @ Jefferson on Jefferson-N43Carrs, stuck @ Jefferson, l/o Jefferson-Clifty Creek

With N43 Carrs to Hanging Rock line out of Service (Pre-disturbance outage Q):

N43Q-8a: 3ph @ Jefferson on Jefferson-Greentown

N43O-8b: slg @ Jefferson on Jefferson-Greentown, stuck @ Jefferson, I/o Jefferson-Rockport

N43O-9a: 3ph @ Jefferson on Jefferson-Rockport

N43Q-9b1: slg @ Jefferson on Jefferson-Rockport, stuck @ Jefferson, I/o Jefferson-Greentown

N43Q-9b2: slg @ Jefferson on Jefferson-Rockport, stuck @ Jefferson, l/o Jefferson-Clifty Creek 345kV

N43Q-10a: 3ph @ Jefferson on Jefferson-Clifty Creek 345kV

N43Q-10h: slg @ Jefferson on Jefferson-Clifty Creek, stuck @ Jefferson. Vo Jefferson-Rockport

With Hanging Rock to Don Marquis line out of Service (Pre-disturbance outage R):

- N43R-1a: 3ph @ N43Carrs on N43Carrs-Hanging Rock
- N43R-1b: slg @ N43Carrs on N43Carrs-Hanging Rock, stuck @ N43Carrs I/o 1 N43 CT/ST
- N43R-2a: 3ph @ N43Carrs on N43Carrs-Jefferson
- N43R-2b: slg @ N43Carrs on N43Carrs-Jefferson, stuck @ N43Carrs 1/o 1 N43 CT/ST
- N43R-4a: 3ph @ Hanging Rock on Hanging Rock-Cornu
- N43R-4b: slg @ Hanging Rock on Hanging Rock-Cornu, stuck @ Hanging Rock
- N43R-5a: 3ph @ Hanging Rock on Hanging Rock-Baker
- N43R-5b: slg @ Hanging Rock on Hanging Rock-Baker, stuck @ Hanging Rock, I/o Hanging Rock-Don Marquis
- N43R-6a: 3ph @ Hanging Rock on Hanging Rock-N. Proctorville
- N43R-6b1: slg @ Hanging Rock on Hanging Rock-N. Proctorville, stuck @ Hanging Rock, I/o Hanging Rock-Lawrenz
- N43R-6b2: slg @ Hanging Rock on Hanging Rock-N. Proctorville, stuck @ Hanging Rock, l/o Hanging Rock-Cornu
- N43R-7a: 3ph @ Hanging Rock on Hanging Rock-Lawrenz
- N43R-7b: slg @ Hanging Rock on Hanging Rock-Lawrenz, stuck @ Hanging Rock, I/o Hanging Rock N. Proctorville
- N43R-8a: 3ph @ Jefferson on Jefferson-Greentown
- N43R-8b: slg @ Jefferson on Jefferson-Greentown, stuck @ Jefferson, l/o Jefferson-Rockport
- N43R-9a: 3ph @ Jefferson on Jefferson-Rockport
- N43R-9b1: slg @ Jefferson on Jefferson-Rockport, stuck @ Jefferson, I/o Jefferson-Greentown
- N43R-9b2: slg @ Jefferson on Jefferson-Rockport, stuck @ Jefferson, l/o Jefferson-Clifty Creek 345kV
- N43R-10a: 3ph @ Jefferson on Jefferson-Clifty Creek 345kV
- N43R-10b: slg @ Jefferson on Jefferson-Clifty Creek, stuck @ Jefferson, I/o Jefferson-Rockport
- N43R-11b1: slg @ Jefferson on Jefferson-N43Carrs, stuck @ Jefferson, I/o Jefferson-Greentown
- N43R-11b2: slg @ Jefferson on Jefferson-N43Carrs, stuck @ Jefferson, l/o Jefferson-Clifty Creek

With Hanging Rock to Baker line out of Service (Pre-disturbance outage S):

- N43S-1a: 3ph @ N43Carrs on N43Carrs-Hanging Rock
- N43S-1b: slg @ N43Carrs on N43Carrs-Hanging Rock, stuck @ N43Carrs I/o 1 N43 CT/ST
- N43S-2a: 3ph @ N43Carrs on N43Carrs-Jefferson
- N43S-2b: slg @ N43Carrs on N43Carrs-Jefferson, stuck @ N43Carrs I/o 1 N43 CT/ST
- N43S-3a: 3ph @ Hanging Rock on Hanging Rock-Don Marquis
- N43S-3b1: slg @ Hanging Rock on Hanging Rock-Don Marquis, stuck @ Hanging Rock, I/o Hanging Rock-Baker
- N43S-3b2: slg @ Hanging Rock on Hanging Rock-Don Marquis, stuck @ Hanging Rock, I/o Hanging Rock-Cornu
- N43S-4a: 3ph @ Hanging Rock on Hanging Rock-Cornu
- N43S-4b: slg @ Hanging Rock on Hanging Rock-Cornu, stuck @ Hanging Rock Rock-Don Marquis
- N43S-6a: 3ph @ Hanging Rock on Hanging Rock-N. Proctorville
- N43S-6b1: slg @ Hanging Rock on Hanging Rock-N. Proctorville, stuck @ Hanging Rock, I/o

Hanging Rock-Lawrenz

N43S-6b2: slg @ Hanging Rock on Hanging Rock-N. Proctorville, stuck @ Hanging Rock, l/o Hanging Rock-Cornu

N43S-7a: 3ph @ Hanging Rock on Hanging Rock-Lawrenz

N43S-7b: slg @ Hanging Rock on Hanging Rock-Lawrenz, stuck @ Hanging Rock, I/o Hanging Rock N. Proctorville

N43S-8a: 3ph @ Jefferson on Jefferson-Greentown

N43S-8b: slg @ Jefferson on Jefferson-Greentown, stuck @ Jefferson, I/o Jefferson-Rockport

N43S-9a: 3ph @ Jefferson on Jefferson-Rockport

N43S-9b1: slg @ Jefferson on Jefferson-Rockport, stuck @ Jefferson, I/o Jefferson-Greentown

N43S-9b2: slg @ Jefferson on Jefferson-Rockport, stuck @ Jefferson, l/o Jefferson-Clifty Creek 345kV

N43S-10a: 3ph @ Jefferson on Jefferson-Clifty Creek 345kV

N43S-10b: slg @ Jefferson on Jefferson-Clifty Creek, stuck @ Jefferson, I/o Jefferson-Rockport

N43S-11b1: slg @ Jefferson on Jefferson-N43Carrs, stuck @ Jefferson, I/o Jefferson-Greentown

N43S-11b2: slg @ Jefferson on Jefferson-N43Carrs, stuck @ Jefferson, l/o Jefferson-Clifty Creek

With Hanging Rock to N. Proctorville line out of Service (Pre-disturbance outage T):

N43T-1a: 3ph @ N43Carrs on N43Carrs-Hanging Rock

N43T-1b: slg @ N43Carrs on N43Carrs-Hanging Rock, stuck @ N43Carrs I/o 1 N43 CT/ST

N43T-2a: 3ph @ N43Carrs on N43Carrs-Jefferson

N43T-2b: slg @ N43Carrs on N43Carrs-Jefferson, stuck @ N43Carrs I/o 1 N43 CT/ST

N43T-3a: 3ph @ Hanging Rock on Hanging Rock-Don Marquis

N43T-3b1: slg @ Hanging Rock on Hanging Rock-Don Marquis, stuck @ Hanging Rock, Vo Hanging Rock-Baker

N43T-3b2: slg @ Hanging Rock on Hanging Rock-Don Marquis, stuck @ Hanging Rock, l/o Hanging Rock-Cornu

N43T-4a: 3ph @ Hanging Rock on Hanging Rock-Cornu

N43T-4b: slg @ Hanging Rock on Hanging Rock-Cornu, stuck @ Hanging Rock

N43T-5a: 3ph @ Hanging Rock on Hanging Rock-Baker

N43T-5b: slg @ Hanging Rock on Hanging Rock-Baker, stuck @ Hanging Rock, I/o Hanging Rock-Don Marquis

N43T-7a: 3ph @ Hanging Rock on Hanging Rock-Lawrenz

N43T-7b: slg @ Hanging Rock on Hanging Rock-Lawrenz, stuck @ Hanging Rock, I/o Hanging Rock N. Proctorville

N43T-8a: 3ph @ Jefferson on Jefferson-Greentown

N43T-8b: slg @ Jefferson on Jefferson-Greentown, stuck @ Jefferson, I/o Jefferson-Rockport

N43T-9a: 3ph @ Jefferson on Jefferson-Rockport

N43T-9b1: slg @ Jefferson on Jefferson-Rockport, stuck @ Jefferson, l/o Jefferson-Greentown

N43T-9b2: slg @ Jefferson on Jefferson-Rockport, stuck @ Jefferson, I/o Jefferson-Clifty Creek 345kV

N43T-10a: 3ph @ Jefferson on Jefferson-Clifty Creek 345kV

N43T-10b: slg @ Jefferson on Jefferson-Clifty Creek, stuck @ Jefferson, I/o Jefferson-Rockport

N43T-11b1: slg @ Jefferson on Jefferson-N43Carrs, stuck @ Jefferson, I/o Jefferson-Greentown

N43T-11b2: slg @ Jefferson on Jefferson-N43Carrs, stuck @ Jefferson, I/o Jefferson-Clifty Creek

With Jefferson to Greentown line out of Service (Pre-disturbance outage U):

N43U-1a: 3ph @ N43Carrs on N43Carrs-Hanging Rock

N43U-1b: slg @ N43Carrs on N43Carrs-Hanging Rock, stuck @ N43Carrs I/o 1 N43 CT/ST

N43U-2a: 3ph @ N43Carrs on N43Carrs-Jefferson

N43U-2b: slg @ N43Carrs on N43Carrs-Jefferson, stuck @ N43Carrs 1/o 1 N43 CT/ST

N43U-3a: 3ph @ Hanging Rock on Hanging Rock-Don Marquis

N43U-3b1: slg @ Hanging Rock on Hanging Rock-Don Marquis, stuck @ Hanging Rock, I/o Hanging Rock-Baker

N43U-3b2: slg @ Hanging Rock on Hanging Rock-Don Marquis, stuck @ Hanging Rock, l/o Hanging Rock-Cornu

N43U-4a: 3ph @ Hanging Rock on Hanging Rock-Cornu

N43U-4b: slg @ Hanging Rock on Hanging Rock-Cornu, stuck @ Hanging Rock

N43U-5a: 3ph @ Hanging Rock on Hanging Rock-Baker

N43U-5b: slg @ Hanging Rock on Hanging Rock-Baker, stuck @ Hanging Rock, I/o Hanging Rock-Don Marquis

N43U-6a: 3ph @ Hanging Rock on Hanging Rock-N. Proctorville

N43U-6b1: slg @ Hanging Rock on Hanging Rock-N. Proctorville, stuck @ Hanging Rock, I/o Hanging Rock-Lawrenz

N43U-6b2: slg @ Hanging Rock on Hanging Rock-N. Proctorville, stuck @ Hanging Rock, l/o Hanging Rock-Cornu

N43U-7a: 3ph @ Hanging Rock on Hanging Rock-Lawrenz

N43U-7b: slg @ Hanging Rock on Hanging Rock-Lawrenz, stuck @ Hanging Rock, I/o Hanging Rock N. Proctorville

N43U-9a: 3ph @ Jefferson on Jefferson-Rockport

N43U-9b1: slg @ Jefferson on Jefferson-Rockport, stuck @ Jefferson, l/o Jefferson-Greentown

N43U-9b2: slg @ Jefferson on Jefferson-Rockport, stuck @ Jefferson, l/o Jefferson-Clifty Creek 345kV

N43U-10a: 3ph @ Jefferson on Jefferson-Clifty Creek 345kV

N43U-10b: slg @ Jefferson on Jefferson-Clifty Creek, stuck @ Jefferson, I/o Jefferson-Rockport

N43U-11b1: slg @ Jefferson on Jefferson-N43Carrs, stuck @ Jefferson, I/o Jefferson-Greentown

N43U-11b2: slg @ Jefferson on Jefferson-N43Carrs, stuck @ Jefferson, l/o Jefferson-Clifty Creek

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Eastern States Site Selection Study

Prepared for American Electric Power

November 11, 2004 Final Report – rev.3 S&L Project Number 11488-016

Sargent & Lundy"

Sargent & Lundy LLC 55 East Monroe Street Chicago, IL 60603-5780 USA

AEP Eastern States Site Selection	Sergone & Lundy:	Project No.11488-016 November 11, 2004 Final Report-rev.3

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AEP Eastern States Site Selection



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Eastern States Site Selection Study

Project No. 11488-016

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Revision	10/21/04	Draft Report	Tim Krause/Ron	Ejaz Shameem	Steve Bertheau
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	1000001	Revised Draft	Tim Krause/Ron	Ejaz Shameem	Steve Berthean
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Final	11/2/04	Final Report	Tim Krause/Ron	Ejaz Shameem	Steve Bertheau
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AEP Eastern States Site Selection



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F.	Generic General Arrangement Plan "Site Development, 1,000 to 1,200	MW IGCC"
G.	Site Layout Drawings	•
H.	Interconnection Concept Diagrams	
[.	Site Rating Spreadsheet	

AEP Eastern States Site Selection

Sargent & Lundy"

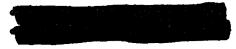
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Executive Summary

American Electric Power Company (AEP) contracted Sargent and Lundy (S&L) to evaluate potential sites for development of an Integrated Gasification Combined Cycle (IGCC) power plant. The sites were evaluated for their potential to support one or two 500-600 MW IGCC units in a 2x2x1 configuration. The objective of the study was to recommend one preferred and one alternate site in each state.

AEP identified the following 15 sites for evaluation by S&L:

Indiana



Kentucky

- Carrs (greenfield site)
- St. Paul (greenfield site)

Ohio



Tennessee



Virginia



West Virginia



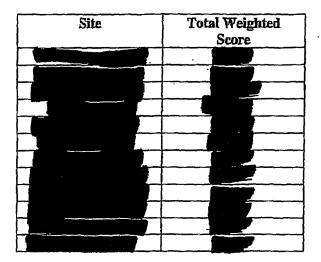
Serpent & Lunch

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S&L evaluated the selected sites for technical and environmental characteristics that affect site suitability. To support the site evaluations, S&L developed the footprint and other basic plant requirements for one and two 500-600 MW units. All evaluations of transmission and related electrical interconnection suitability were performed by AEP.

The sites were evaluated using the evaluation criteria shown in Appendix B. The criteria represent 25 characteristics considered most important in determining the suitability of the identified sites for an IGCC plant. The criteria provide an objective means of assigning numerical scores to the sites for each site characteristic, indicating how well the site satisfies the desired conditions. The criteria also include Importance Weighting Factors, which are used to adjust the numerical scores based on the relative importance of each characteristic.

Based on the total weighted scores (obtained by summing the numerical scores for all characteristics after multiplying each score by its Importance Weighting Factor), the sites rank as follows:





Based on the numerical scores and qualitative evaluations of the advantages and disadvantages of each site, S&L selected one preferred and one alternate site in each state for recommendation to AEP. Our recommendations are listed below. The total weighted score for each site is shown in parentheses, and the states are ranked according to the scores of the preferred sites.

Project No.11488-016 November 11, 2004 AEP Eastern States Site Selection Final Report-rev.3 West Virginia Preferred: Alternate: <u>Ohio</u> Preferred: Alternate: Kentucky Preferred: Alternate: <u>Indiana</u> Preferred: Alternate: Tennessee Preferred: Virginia

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AEP Eastern States Site Selection



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1. Introduction

In September 2004 American Electric Power Company (AEP) contracted Sargent and Lundy (S&L) to evaluate potential sites for development of an Integrated Gasification Combined Cycle (IGCC) power plant. The sites were evaluated for their potential to support one or two 500-600 MW IGCC units in a 2x2x1 configuration. The objective of the study was to recommend one preferred and one alternate site in each state.

AEP identified the following 15 sites for evaluation by S&L:

Indiana

Kentucky



Ohio

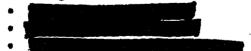
Tennessee

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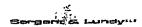
Virginia



West Virginia

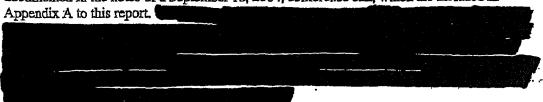


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In order to select these sites, AEP performed preliminary screening of both greenfield and brownfield AEP-owned land in seven eastern states (i.e., Indiana, Kentucky, Michigan, Ohio, Tennessee, Virginia, and West Virginia). In some cases, AEP screened out sites because it was obvious that there were fatal flaws such as inadequate land space. These decisions are documented in the notes of a September 16, 2004, conference call, which are included in



S&L evaluated the selected sites for technical and environmental characteristics that affect site suitability. All evaluations of transmission and related electrical interconnection suitability were performed by AEP.

To support the site evaluations, S&L developed the footprint for a 500-600 MW 2x2x1 IGCC unit and prepared overlays of this footprint on maps of the sites. S&L also established the following basic plant requirements for one or two 500-600 MW units:

Plant Requirement	Component	One 2x2x1 Unit 500-600 MW	Two 2x2x1 Units 1,000-1,200 MW
1 Mile Requirement	Component	200-000 147 44	1,000-1,200 1/1 1/
Coal Consumption	-		
Makeup Water Flow	•		
Acreage			
1		7	
Operating Staff	_		

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AEP Eastern States Site Selection

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The following sections of this report describe the methods and results of the site evaluations.

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2. Evaluation Criteria

The criteria used to evaluate the sites were mutually agreed upon by AEP and S&L at the beginning of the study. These criteria were filtered from more extensive sets of criteria typically used by AEP and S&L. The selected criteria represent 25 characteristics considered most important in determining the suitability of the identified sites for an IGCC plant. The characteristics and evaluation criteria are listed in Appendix B. 14 Page 1875

m - 28 4".

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The criteria are divided into requirements, termed "Musts", and desirable features, termed "Wants". "Musts" are environmental or engineering conditions considered necessary for a site to be feasible to permit and develop, "Wants" are environmental or engineering conditions desired so that a site is readily permittable, economically attractive, and favorable to develop. The criteria provide an objective means of assigning numerical scores to the sites for each "Want", indicating how well the site satisfies the desired conditions. The criteria also include Importance Weighting Factors, which are used to adjust the numerical scores based on the relative importance of each characteristic.

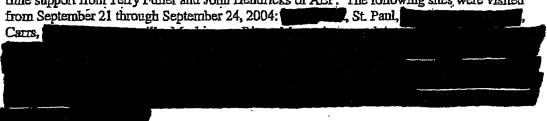


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3. Data Collection and Site Descriptions

Information on the sites was collected from published maps, aerial photographs, and other publicly available data, as well as from previous site studies and environmental investigations performed by AEP. Government agencies were contacted in order to obtain relevant generic information, but AEP requested that no site-specific contacts be made with government agencies.

In order to confirm and supplement the information collected through published sources, field reconnaissance was conducted. The sites were observed from all nearby public roads, and from private roads where access was available. The participants in the site visits were Dilip Bhatt and Daniel Marmer of Sargent and Lundy and Glenn Davis and Mike Dancison of AEP, with partitime support from Terry Fuller and John Hendricks of AEP. The following sites were visited from September 21 through September 24, 2004:

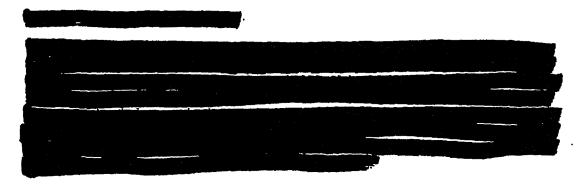


Representative photographs taken during the site visits are included in Appendix C. A list of documents obtained from AEP that were used in the site evaluations is included in Appendix D.

the other thirteen sites are summarized below.

The data collected and observations made for

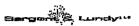
Existing Plant Sites



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AEP Eastern States Site Selection

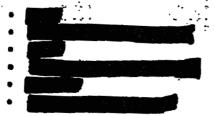


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4. Site Layouts, Constructibility, and Coal Deliverability

Preliminary site layouts were prepared for the sites listed below. The layouts were based on the generic design information included in Appendixes E and F. The site specific layout drawings are included in Appendix G.

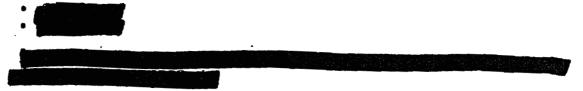
Existing Plant Sites



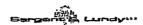
Greenfield Sites

- St Paul
- Carrs

Virginia Sites



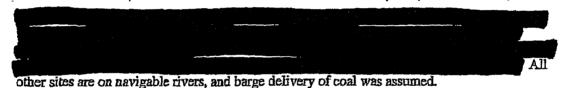
The following paragraphs describe some of the key information that was developed to support the site layouts.



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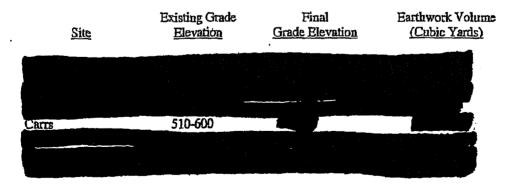
Railroad Loop Track

Sites that would receive coal by rail must be provided with a loop track or a string of ladder tracks for coal unloading. The train assumed for sizing the loop track has 100 cars, each 53.5 feet long, and three engines, each 80 feet long. The total length of the train is 5,600 feet. For a loop track the design basis is to fit the entire length of the train on either side of the car dumper while the train is unloading, and to avoid blocking a surface road with public traffic for more than 10 minutes. For a ladder track the design basis was to add three tracks at about 3,000 linear feet each in addition to the unloading track, for a total of 9,000 linear feet. Two of the tracks would be used to store full cars and the third track would be used to store empty cars. 100-car trains would be placed in the two full car tracks when they arrive at the plant. Cars would be removed in 25 to 50 car strings by a plant switch engine, run through the dumper to unload, and then place in empty car storage.

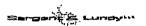


Earthwork

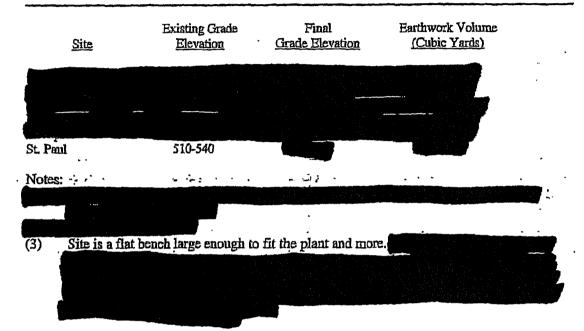
Cut and fill quantities were estimated for each site by identifying an area to be graded and a grade elevation that would balance the cut and fill requirements. To account for space needed for construction laydown and parking, the area to be graded included the area occupied by the generating units, cooling towers, and coal unloading and storage. For sites with rail delivery of coal, the railroad track loop also was assumed to be graded, but the area inside the loop was not. The existing and final grade elevations and earthwork requirements at each site are as follows:



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Constructibility

The site layouts and other factors were considered in evaluating how easily IGCC units could be constructed at each site. Following is a brief description of the criteria used to evaluate the major constructibility issues.

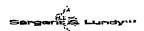
1. Barge Access

The site borders a major navigable waterway and an unloading facility exists, or can be developed, for the off-loading of large, shop fabricated modules. Barge unloading facilities allow the site to receive large assemblies, fabricated in a controlled/shop environment, saving field labor costs.

2. Access from Barge Landing to Plant and Storage Areas

In order to move large modules from the barge facility to the laydown yard and erection area, roads must exist, or be developed, that will allow the movement of large modules. If the roads from the barge facility to the laydown travel up a steep grade, or through congested areas, the size of the module that can be handled will be reduced based on the ability to transport the module. Smaller modules received by barge provide some field labor savings in that they can be further combined on site, if land is available, and smaller modules are preferable to restrictions necessitated by truck shipment.

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3. Rail Access

A railroad spur to the site allows heavier/larger pieces to be shipped to the site without special permits required by large truck shipments. Bridge capacity and other use of the rail lines will determine how effective the rail spur will be.

4. Road Access into the Site

Good quality all-weather roads exists from major highways into the site. The local roads must be able to handle high volumes of truck traffic with minimal maintenance and traffic problems. Difficulties arise when there are seasonal weight restriction, bridge and pavement restrictions, and traffic volume restrictions.

5. Proximity to Major Highway

Good quality all-weather roads are in close proximity to the site, reducing the length of travel on smaller, local roads. Major roads can handle high volumes of truck traffic with minimal maintenance, traffic problems, and impact on the surrounding community.

6. Land Available for Preassembly and Storage Areas

Large land areas are required to ground fabricate and/or store large modules. This land must be relatively flat and free of overhead obstructions. In the absence of large land areas for storage, module delivery must be "just in time" so that it can be moved from the barge to the erection site.

7. Access from Assembly Area to Erection Area

In order to move modules from the storage area to the erection area, adequate roads, and clearances along the roads, must be available.

8. Land Available for Staging and Lifting Large Pieces

Lifting large modules requires large cranes and space to stage the modules for lifting.

Adequate land must be available at the work area for staging lifting equipment and large

These criteria were combined into an overall assessment of constructibility for each site. These assessments used to evaluate Item 24 in the site evaluation criteria (see Appendix B).

Coal Supply Conditions

Although not a site layout issue, the delivery of coal at each site was considered an important site evaluation criteria. Therefore, the factors affecting coal supply conditions were reviewed for each site using the approach described below.

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Sargent & Lundy***

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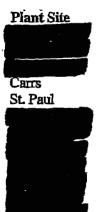
Fuel supplies were categorized into generic regions that could supply Eastern coal to the sites considered in this study. The regions were:

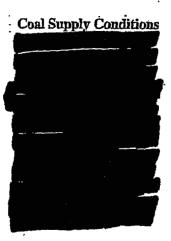
Illinois Basin (Illinois and Indiana) Western Kentucky (Illinois Basin) Virginia Ohio

Eastern Kentucky

West Pennsylvania

Then, the mine location, the estimated shipping distances, and the potential mode of shipping the coal to each site were identified. Based on these three parameters, the sites were ranked as follows:





It should be noted that the rankings are relative to each other. These rankings are useful in comparing the sites, to determine if any site or group of sites is best located to receive coal from a variety of sources that would provide competitive advantages. These relative rankings were used to evaluate item 25 in the site evaluation criteria (see Appendix B).

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5. Transmission Interconnection and Deliverability Analyses

Sargent & Lundy relied on system and transmission planning information prepared by AEP's Generation and Electrical Interconnection Planning group regarding the feasibility of interconnecting each site to the AEP transmission grid. This section of the report summarizes the conceptual and analytical approach adopted by the transmission planning team to evaluate and rank the sites considered for the development of the IGCC power plant. The screening, scoring and ranking of the potential IGCC plant sites from the transmission and system development perspectives was accomplished by integrating the AEP teams prior system planning experience with preliminary power system simulation studies of the generator interconnection plans conceived for each site.

The transmission team also relied on its knowledge of the current state of development of the AEP East region generation and energy delivery systems, including the recent interconnection of many simple- and combined-cycle merchant power plants on the AEP East and neighboring utility power systems. The transmission team also took into consideration, from a strategic planning perspective, the results from AEP's on-going Integrated Resource Planning activity. Finally, it is recognized that detailed power system simulation studies, including power flow, short circuit and system dynamics are required to fully evaluate the feasibility of the project interconnection plans and the need for associated network upgrades. Such studies would be conducted by PJM after the receipt of a formal request for generator interconnection from the power plant project sponsor.

Transmission Interconnection Planning and Screening Process

The process followed by the transmission planning team involved the following steps.

> Data Collection

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 Field inspection of six AEP controlled greenfield sites in three states, namely

and; Carrs and St. Paul in Kentucky;

- o Procurement and review of topographical maps to determine the location of the greenfield sites relative to AEP transmission infrastructure;
- Collection and review of AEP station one-lines for the existing plant site locations and for stations terminating transmission lines that could be affected by the IGCC plant development;

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- o Collection and review of AEP Operating Company transmission line statistics summarized in FERC filed Form 1 reports;
- o Procurement and review of relevant manuals describing the PJM Generator Interconnection process; and
- Collection and review of Draft 2 of NERC Standard 51, Transmission System Adequacy and Security, proposed for implementation on February 8, 2005.

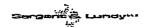
Conceptualization of Plant Interconnection Plans

- One or more interconnection plans were developed for each potential plant site based on a conceptual assessment of the feasible alternatives;
- o The need for the procurement of new rights-of-way associated with the required construction of extra-high voltage and/or high voltage transmission lines were assessed based on the estimated distance between each site and the point of interconnection with the AEP System
- o The scope of station improvements associated with each plan were conceptualized consistent with the assumed IGCC plant layout, i.e. the number of generator step-up transformers and the energy delivery system voltage at the point of interconnection. This included, for example, consideration of the need for double transformation for any plan interconnecting the plant to the 765 or 500 kV transmission system.

> 2010 Summer Power Flow Base Case Development

- o A NERC 2003 series, 2010 Summer base case was used for this study,
- o The representation of the AEP East energy delivery and surrounding systems included in the "off-the-shelf" base case was reviewed and a listing of the merchant generators, including their dispatch status, was prepared;
- The analysis of the locations of the fifteen potential IGCC plant sites with respect to the merchant power plants resulted in the creation of four base cases for use in the preliminary power flow screening study;
- o Each of the four base cases included the modeling of power production from certain IPP combined cycle power plants so as to more heavily load the transmission system in the vicinity of the proposed IGCC plant. For the screening study, the simple cycle IPP plants were noted but not modeled at their full output.

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> 2010 Summer Peak Modeling of the IGCC Plant

- o The conceptualized IGCC plant interconnection plan for each site was modeled on one of the four base cases determined by the application of engineering judgment regarding how the IPP combined cycle power plants could interact with the proposed IGCC plant project.
- o The modeling of the plant at its initial 600 MW net power delivery provided an indicative estimate of the power flow patterns and loadings on the local area transmission system resulting from the introduction of the plant. The results for each site were screened to identify transmission facilities that load to 90% or more of their summer normal thermal capability.
- To further screen the sites, a limited set of single contingencies were evaluated to determine what transmission facilities, if any, load to 100% or more of their summer normal thermal capability.

> 2010 Summer Peak Modeling of the IGCC Plant Expansion

- The IGCC plant sites were further screened to determine which sites, from the transmission interconnection and system integration perspectives, were feasible to consider the addition of a second 600 MW unit;
- The results of the conceptualization of the transmission interconnection plans associated with the IGCC plant expansion were modeled in one of the four base cases consistent with the 600 MW plant approach.
- o The modeling of the two-unit plant with 1,200 MW net power delivered to the grid provided an indicative estimate of the power flow patterns and loadings on the local area transmission system resulting from the introduction of the two unit plant. The results for each site were screened to identify transmission facilities that load to 90% or more of their summer normal thermal capability.
- o To further screen the sites, a limited set of single contingencies were evaluated to determine what transmission facilities, if any, load to 100% or more of their summer thermal capability with the two-unit, 1,200 MW plant modeled.

> Objective Scoring of Plant Sites

o The plant sites were screened and objectively rated according to the three transmission-related evaluation criteria shown in Appendix B, namely Item 7 (Distance from Transmission Connection Point), Item 8 (System Stability) and Item 9 (Feasibility of 2 Unit Transmission Plan).

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AEP Eastern States Site Selection

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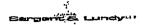
Conceptual Transmission Interconnection Plans

The interconnection plans conceived for the alternative IGCC plant sites are unique from one site to the next and vary in several material respects. The principal issues considered when conceptualizing the alternative plans are the following:

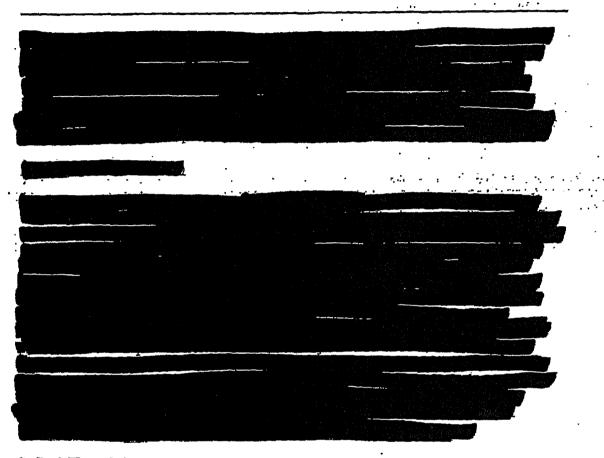
- Adequacy of the planned plant/transmission interface at the point of interconnection
- > Transmission voltage at the point of interconnection (138, 230, 345, 500 or 765 kV)
- > Recognition of additional costs associated with the double transformation to establish the 500 kV and 765 kV interconnections
- > Scope of required transmission infrastructure to establish the interconnection, particularly the need for new transmission line construction on new rights-of-way
- > Scope of station construction and the need to mitigate short circuit duties at older stations,
- > Potential IGCC plant interaction with existing AEP and/or IPP plants in close electrical proximity to the proposed development site.
- > Potential interaction with planned IPP power plant projects in the PIM/AEP queue
- Interface between AEP/PJM and neighboring utilities,

Site Transmission Interconnection Plans

The following paragraphs outline the alternative plans conceived for interconnecting the IGCC plant to the AEP System. The interconnection concepts are illustrated in the diagrams included in Appendix H. For some sites, more than one interconnection plan could be feasible, which is viewed positively at this stage in the site screening process. For one site, the scope of the required transmission improvements and related network upgrades are judged to be so large that the site is rendered incompatible with the proposed scope and timetable for the IGCC project. These attributes are reflected in the objective scoring of the sites and in the discussion of the relative advantages and disadvantages of the portfolio of sites.



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St. Paul (Kentucky)

The plan of interconnection for an IGCC plant development at the St. Paul site would involve the construction of two, ten mile single circuit 765 kV transmission lines on new rights-of-way to intersect the Hanging Rock-Jefferson 765 kV transmission line. The Hanging Rock-Jefferson 765 kV line would be severed at the point of intersection and reconnected with the new line sections so as to form two outlets from the IGCC plant station.

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AEP Eastern States Site Selection



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Carrs (Kentucky)

The plan of interconnection for an IGCC plant development at the Carrs site would involve the construction of two, one mile or less single circuit 765 kV transmission lines on the plant property to intersect the Hanging Rock-Jefferson 765 kV transmission line. The Hanging Rock-Jefferson 765 kV line would be severed at the point of intersection and reconnected with the new line sections so as to form two outlets from the IGCC plant station. Electrically, this plan is similar to the plan of interconnection for the St. Paul site; however, it is significantly less expensive and less uncertain in view of the reduced need for 765 kV transmission line construction on new rights-of-way.

Objective Scoring of the Sites from the Transmission Interconnection Perspective

The conceptualization of the plans of interconnection for each of the sites provided a foundation for objectively scoring the sites from the transmission interconnection perspective according to Items 7, 8 and 9 of the site evaluation criteria, as described more fully in Section 6. Only one plan of interconnection was selected for the objective scoring of each site. However, it is important to also note that several of the sites - most notably.

- provide more flexibility in developing a cost effective and reliable plan of interconnection than several of the other sites, and the several of the other sites, and the several of the other sites, and the transmission interconnection and operations perspectives.



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6. Evaluation and Ranking of Potential Sites

Twelve of the sites identified in Section 1 were numerically evaluated for the 25 site characteristics discussed in Section 2.

. Numerical ratings were assigned to the 12 remaining sites for the 25 site characteristics using the scoring criteria and weighting factors shown in Appendix B. The information for the evaluations was derived from the data collection efforts discussed in Section 3, the site layouts and other assessments discussed in Section 4, and the transmission interconnection and deliverability analyses discussed in Section 5.

Appendix I documents the numerical rating given to each site for each characteristic, the reason for each rating, and the information source used to develop the ratings. Appendix I also shows the total weighted score for each site (obtained by summing the numerical ratings after multiplying each rating by its Importance Weighting Factor) and the total unweighted score for each site (obtained by summing the numerical ratings without applying weighing factors).

The sites were ranked according to their total weighted scores as follows:

Site	Total Weighted Score
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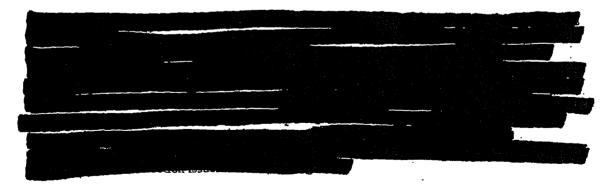
In order to check the impact of the Importance Weighting Factors, the sites also were ranked according to their total unweighted scores. This ranking is as follows:

Site	9	Total Unw Scor	eighted e
		·	
			3 :

It can be seen that the site rankings are very similar according to both the weighted and unweighted scores.

Exhibit 6-1 lists important advantages and disadvantages for each of the sites. These advantages and disadvantages were reviewed in order to identify any significant issues that may not be fully reflected in the numerical scores. Three of the sites were judged to have potentially serious problems that warrant special attention, as summarized below.

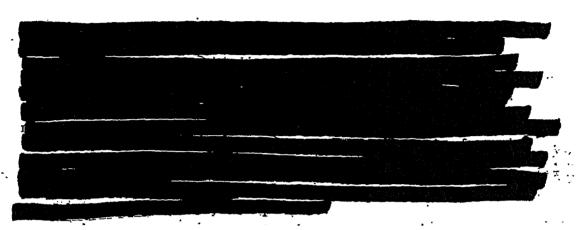
Transmission Interconnection

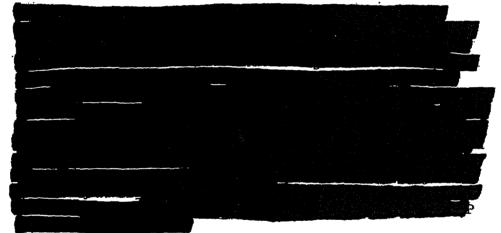


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Class I Areas

The second second sites are within 100 kilometers of a federally designated Class I Area. Very stringent air quality and visibility standards apply in Class I Areas, and experience has shown that baseload power plants located less than 100 kilometers from Class I Areas frequently have problems with air quality permitting. The potential for permitting problems at these sites should be considered before deciding to proceed with any project.



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Site	Primary Advantages	Primary Disadvantages	
Kentucky			ŀ

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7. Selection of Preferred and Alternative Site

Based on the numerical scores and qualitative evaluations of advantages and disadvantages discussed in Section 6, S&L selected one preferred and one alternate site in each state for recommendation to AEP. Our recommendations are listed below. The total weighted score for each site is shown in parentheses, and the states are ranked according to the scores of the preferred sites.

West Virginia

Preferred:	
Alternate:	
01.	
<u>Ohio</u>	
Preferred:	
Alternate:	
Kentucky	
Preferred:	
Alternate:	
Indiana	
	•
Preferred: Alternate:	
Tennessee	
Preferred:	
<u>Virginia</u>	
,	

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Appendix A

Notes of September 16, 2004, Conference Call

Confidential

IGCC Site Selection Meeting Conference Call Minutes (Final w/S&L Comments)
September 16, 2004
2:00pm - 4:30pm

Attendees

AEP

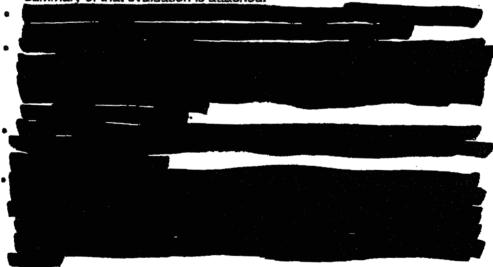
Mike Dancison, Mike Mudd, Glenn Davis, Roger Wheeler (phone from Gahanna), Tom Fecho, Tim Christoff

Sargent & Lundy (Phone from Chicago)

Ejaz Shameem, Tim Krause, Bill Rosenguist, Ron Cook, Dan Marmer

The conference call was held to discuss the status of action items from the initial kickoff meeting, the status of information requested by S&L on 9/10 and the S&L Study Proposal dated September 7, 2004.

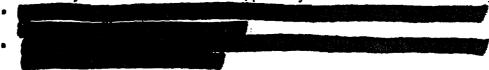
 It was agreed that the initial list of 29 sites in AEP East (19 Brownfield and 10 Greenfield) needed to have a coarse screening. Each site was then evaluated by the group, based on available acreage first and any other known fatal flaws that would remove it from further consideration. A summary of that evaluation is attached.



- Roger Wheeler will forward pdf files of the Greenfield sites to S&L (Ejaz).
 (This has been completed)
- Glenn Davis will determine if aerial photos are available of the existing AEP East sites to be evaluated.
- It was agreed that S&L would provide a listing of the evaluation criterion on a spreadsheet showing the weighting factors. (This has been supplied)
- Tom Fecho will provide the evaluation for transmission system stability for each of the evaluated sites. The input will be part of the S&L evaluation criterion.

Confidential

- Tim Christoff supplied a disk and hard copies of plot plans for all AEP East plant sites. This information is task 4 of the 9/7 S&L proposal. The subject plants for evaluation will be forwarded to S&L by Glenn Davis.
- Previous studies from the Greenfield sites to be evaluated will be assembled in a dataroom to be established by AEP in Columbus for review by S&L as soon as available, probably mid to late next week.



- Ejaz will re-issue the proposal. (This has been completed)
- The sites to be reviewed are shown on the following table:

Confidential

9 Total West Kenlucky BanA solvia2 ni loN X 굅 St. Paul ત્વ X Pig Sendy lusq .18 Kentucky ansO 솀 굄 ena) Kentucky bjelingerb Edjelinwoga --senss State Commenta No Transmission Land **Jesa 93A** sita elai2 After First Cut Jees 43A Evaluation Oriteria Sites Remaining First Cut Evaluation CONFIDENTIAL

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E to & egs9

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Total

61

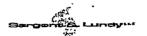
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Appendix B

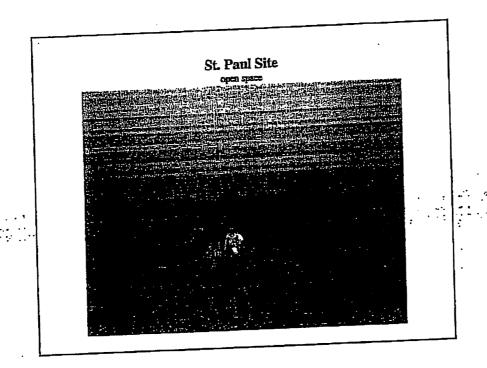
Site Evaluation Criteria

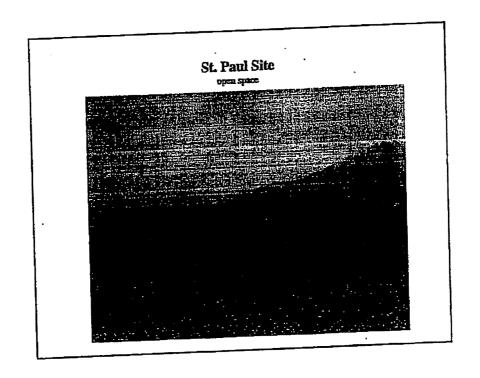


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Appendix C

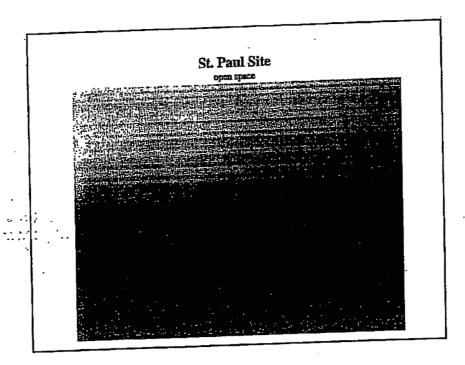
Photographs of Visited Sites

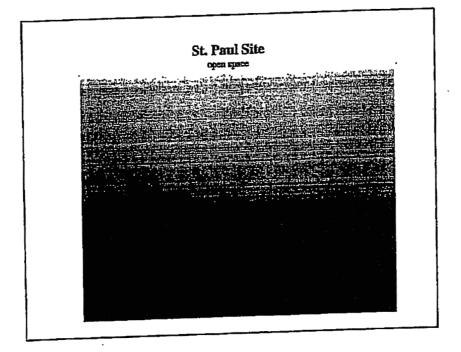


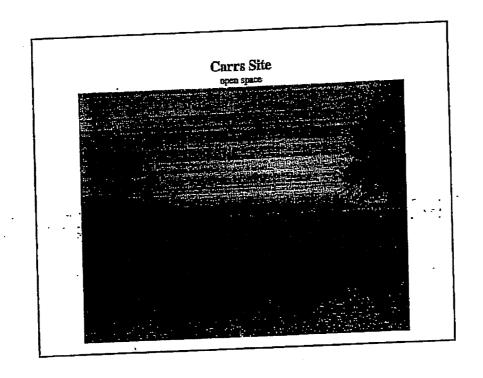


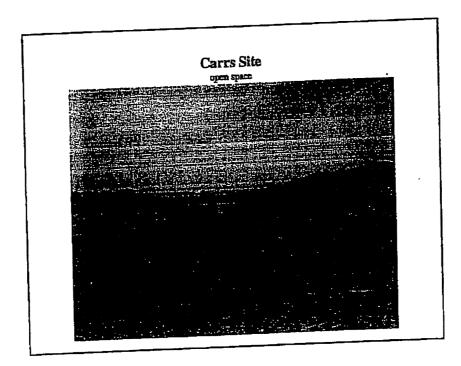
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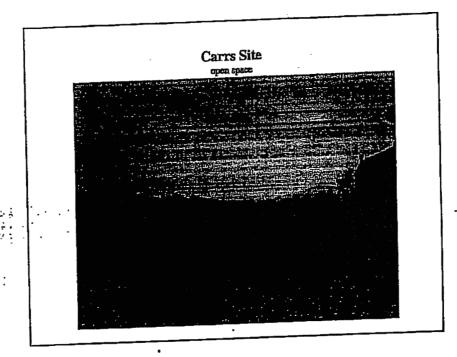


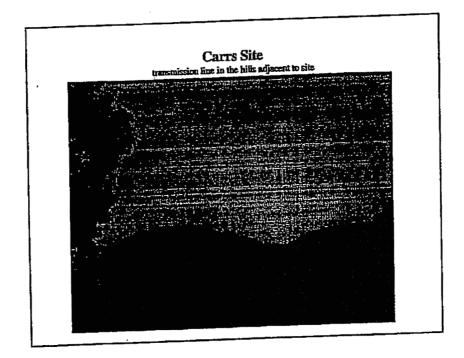


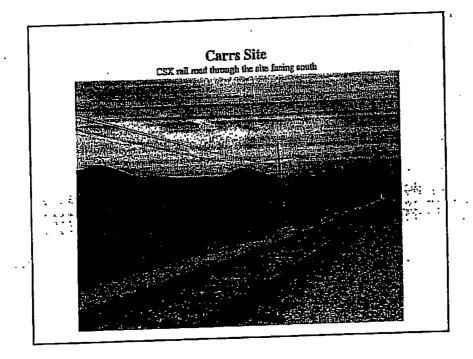


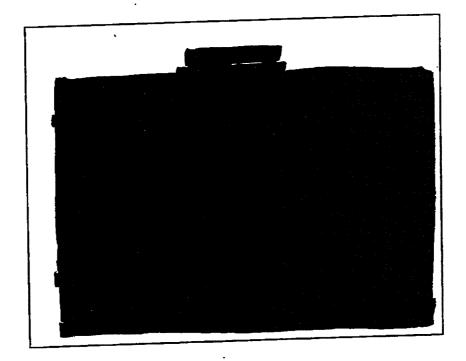


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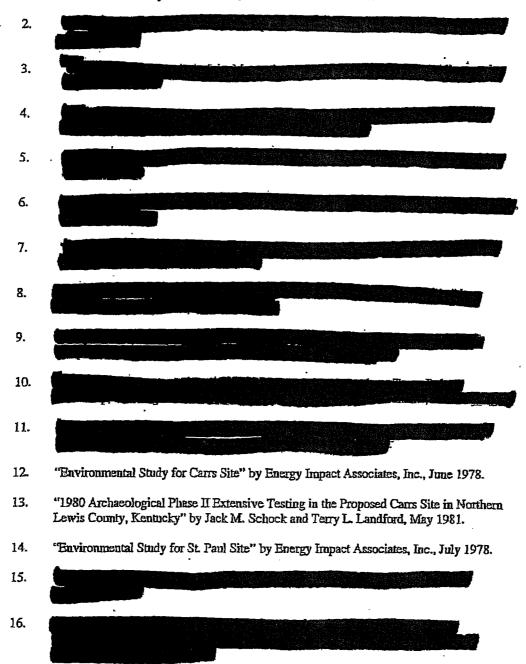
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Appendix D

List of AEP Documents Used in the Site Evaluations

List of AEP Documents Used in the Site Evaluations

1. "Report on the AEP-Owned Sites of Interest for a New AEP-Owned Fossil Fuel-Fired Power Plant with Focus on the States of Indiana, Kentucky, West Virginia, Oklahoma, and Louisiana." by AEP Pro Serv, November 2002.





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Appendix E

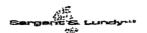
Paper by Sargent and Lundy, titled "Design Information for 1,000 to 1,200 MW (net) Integrated Gasification Combined Cycle Plant"



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Appendix F

Generic General Arrangement Plan, "Site Development, 1,000 to 1,200 MW IGCC"



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Appendix G

Site Layout Drawings



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Appendix H

Interconnection Concept Diagrams

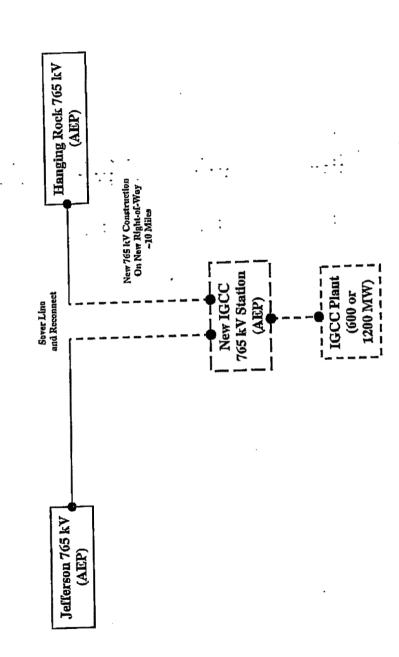
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IGCC Plant Site Selection Study

St. Paul 765 kV Interconnection Concept* - 600 or 1200 MW Plant

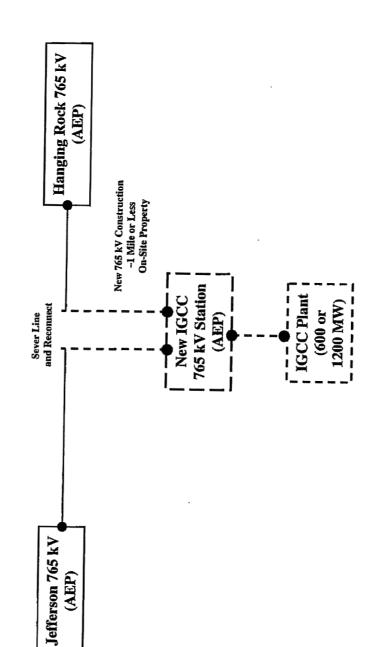


fproceed as planned for interconnection "Minimum interconnection configuration illustrated. The Marquis or Baker station could be a required element of a reliable interconnection plan.

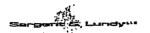


IGCC Plant Site Selection Study

Carrs 765 kV Interconnection Concept* - 600 or 1200 MW Plant



proceed as planned for interconnection to the Hanging Rock station, a third outlet to the Marquis or Baker station could be a required element of a reliable interconnection plan. *Minimum interconnection configuration illustrated.



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Appendix I

Siting Rating Spreadsheet