

Appendix O

VISTAS CEM Emission Rate Memo

MEMORANDUM

To: VISTAS Point Source State Contacts and VISTAS EGU SIWG
From: Gregory Stella, Alpine Geophysics, LLC
Date: June 24, 2005
Subject: Emission Factor/Rate Development for IPM Post-Processing

The purpose of this memorandum is to document a proposed process for developing base year 2002 emission factor/rate values at EGU sources known to be forecasted to future years using IPM. These factors will be derived only for pollutants not forecasted by IPM; VOC, CO, PM, and NH₃. An earlier memo dated June 13, 2005 details known issues with the application of emission factors to sources forecasted with IPM. It is the objective of the VISTAS EGU SIWG to develop emission factors at a unit specific level which can then be applied to future year forecasts of heat input from IPM to maintain a consistent use of emission factors in both the base and future years.

Unit Level Data

Since IPM forecasts unit level data with a single segment (SCC) fuel assumption, the VISTAS 2002 base year point source emission inventory will be summed to the unit (boiler) level to estimate total emissions for each unique point. This process eliminates the ability of VISTAS to develop the typical fuel-specific emission factors (i.e., lbs/ton) as multiple fuel types are now included in the unit level summary. Instead, VISTAS will calculate pollutant emission rates (lbs/MMbtu) based on the unit's total emissions and heat input. Heat input will be obtained using CEM data previously matched to VISTAS base year for purposes of temporal allocation of emissions. These heat input data are also collected and provided by EPA at a unit level and therefore already match the unit summed emissions. It is expected that this matching will capture the majority of VISTAS EGU sources as documented in previous VISTAS presentations.

Calculations

Using annual emissions and heat input information for sources where CEM matches can be obtained, VISTAS will calculate emission rates for every non-IPM generated pollutant reported in the base year 2002 NIF. These emission rates will then be used to determine future year non-IPM pollutant emissions for these same sources. In cases where CEM data cannot be matched or where data are not available to make these calculations, VISTAS will follow existing IPM post-processing steps to estimate future year non-IPM pollutant emissions.

IPM output includes each unit's predicted heat input estimate in MMBtu. Using this provided value and the emission rates estimated using the base year emissions and heat input, VISTAS will calculate CO, VOC, and PM emissions for the future scenario cases. Because of the unique configuration of NH₃ emission estimates as a result of post-combustion control, an alternate method will be used to determine these emissions.

Ammonia (NH₃) emissions will be estimated only at sources where post-combustion NO_x controls have been identified. Although EPA has published emission factors for uncontrolled emissions of NH₃ at combustion sources, these factors are based on data collected for the 1985 NAPAP effort and have D or lower ratings and therefore will not be used at sources where no post-combustion control is assigned. Methods outlined in EPA's EIIP document *Estimating Ammonia Emissions from Anthropogenic Nonagricultural Sources – Draft Final Report*, April 2004¹ will be used to develop this NH₃ emissions associated with slip.

Sources identified during the NEEDS file review as having post-combustion NO_x control will be reviewed in the base year 2002 EI to determine if NH₃ emissions have been estimated. Table 1 presents those sources initially identified in the VISTAS 2002 EI and NEEDS file that have post-combustion control, yet have no reported NH₃ emissions. VISTAS will calculate NH₃ emission values for these sources and use them in our Base F modeling. Using similar methods, VISTAS will obtain post-combustion control information from the IPM outputs and assign NH₃ emissions associated with slip to those controlled sources in the future year scenarios.

Although no adjustments will be made in the VISTAS base year files, sources listed in Table 2 have annual NH₃ emissions reported in the base year 2002 emissions inventory yet have no or inconclusive post-combustion control applied. Emission rates for ammonia from these sources will be calculated and used in the future year estimates.

Assumptions

It is clear that the use of emission rates vs. emission factors may not fully take into account the fuel specific characteristics for each segment originally reported in the VISTAS EI. For example, a boiler which is primarily coal-fired but has a startup diesel component would now be represented as a single segment instead of the separate coal and oil segments. However, using the unit's emission rate as developed for the unit as a whole preserves some of these characteristics as the heat content and fuel throughput would be represented as the total heat input value used in the emission rate calculation.

Also, due to lack of reported control data in the VISTAS EI, base year emission controls for non-IPM derived pollutants can not be backed out to estimate uncontrolled emission rates. However, as the controls assigned in the future year can only be incremental to the base year technologies, the use of base year controlled emission rates is a valid starting assumption. In other words, the technologies represented in the calculated base year emission rate will also be reflected in the application of the rate in the future years. VISTAS will have to make minor modifications to NH₃ due to slip in the application of some post-combustion controls applied in the future year scenarios.

¹ http://www.epa.gov/ttn/chief/eiip/techreport/volume03/eiip_areasourcesnh3.pdf

Table 1. Sources with post-combustion control but no reported NH3 emissions.

FIPSSST	FIPSCNTY	Plant ID	Point ID	ORISID	BLRID	Plant	Post-Combustion Control
01	033	0010	014	47	5	TVA COLBERT	SCR
01	071	0008	008	50	7	TVA - WIDOWS CREEK	SCR
01	071	0008	009	50	8	TVA - WIDOWS CREEK	SCR
01	073	010730011	001	6002	1	ALABAMA POWER COMPANY (MILLER POWER PLAN	SCR
01	073	010730011	002	6002	2	ALABAMA POWER COMPANY (MILLER POWER PLAN	SCR
01	073	010730011	004	6002	3	ALABAMA POWER COMPANY (MILLER POWER PLAN	SCR
01	073	010730011	005	6002	4	ALABAMA POWER COMPANY (MILLER POWER PLAN	SCR
01	097	1001	007	3	6A	ALABAMA POWER COMPANY - BARRY	SCR
01	097	1001	008	3	6B	ALABAMA POWER COMPANY - BARRY	SCR
01	097	1001	009	3	7A	ALABAMA POWER COMPANY - BARRY	SCR
01	097	1001	010	3	7B	ALABAMA POWER COMPANY - BARRY	SCR
01	097	8073	001	7721	CC1	ALABAMA POWER COMPANY - THEODORE COGEN	SCR
01	117	0005	006	26	5	ALABAMA POWER COMPANY - E C GASTON	SCR
01	127	0001	008	8	10	ALABAMA POWER COMPANY - GORGAS	SCR
12	009	0090180	1	55286	O-1	OLEANDER POWER PROJECT, LP	SCR
12	009	0090180	2	55286	O-2	OLEANDER POWER PROJECT, LP	SCR
12	009	0090180	3	55286	O-3	OLEANDER POWER PROJECT, LP	SCR
12	009	0090180	4	55286	O-4	OLEANDER POWER PROJECT, LP	SCR
12	027	0270016	1	55422	CT1	DESOTO COUNTY GENERATING COMPANY, LLC	SCR
12	027	0270016	2	55422	CT2	DESOTO COUNTY GENERATING COMPANY, LLC	SCR
12	033	0330045	6	641	6	GULF POWER COMPANY CRIST ELECTRIC GENERA	SNCR
12	033	0330045	7	641	7	GULF POWER COMPANY CRIST ELECTRIC GENERA	SCR
12	049	0490043	1	55415	GT101	VANDOLAH POWER COMPANY, LLC	SCR
12	049	0490043	2	55415	GT201	VANDOLAH POWER COMPANY, LLC	SCR
12	049	0490043	3	55415	GT301	VANDOLAH POWER COMPANY, LLC	SCR
12	049	0490043	4	55415	GT401	VANDOLAH POWER COMPANY, LLC	SCR
12	095	0950137	2	564	2	ORLANDO UTILITIES COMMISSION STANTON ENE	SCR
12	097	0970071	3	55192	OSC3	RELIANT ENERGY OSCEOLA, LLC	SCR
12	105	1050004	28	676	5	LAKELAND ELECTRIC C.D. MCINTOSH, JR. POW	SCR
12	105	1050233	3	7242	**3	TAMPA ELECTRIC COMPANY POLK POWER STATIO	SCR
12	105	1050234	1	7302	1A	PROGRESS ENERGY FLORIDA, INC. HINES ENER	SCR
12	105	1050234	2	7302	1B	PROGRESS ENERGY FLORIDA, INC. HINES ENER	SCR
12	113	1130168	1	55242	CT-1	SANTA ROSA ENERGY LLC	SCR
13	015	01500011	SG01	703	1BLR	GEORGIA POWER COMPANY, BOWEN STEAM-ELECT	SCR
13	015	01500011	SG02	703	2BLR	GEORGIA POWER COMPANY, BOWEN STEAM-ELECT	SCR
13	015	01500011	SG03	703	3BLR	GEORGIA POWER COMPANY, BOWEN STEAM-ELECT	SCR
13	015	01500011	SG04	703	4BLR	GEORGIA POWER COMPANY, BOWEN STEAM-ELECT	SCR
13	115	11500003	SG04	708	4	GEORGIA POWER COMPANY, HAMMOND STEAM-ELE	SCR
13	149	14900001	SG01	6052	1	GEORGIA POWER COMPANY, WANSLEY STEAM-ELE	SCR
13	149	14900001	SG02	6052	2	GEORGIA POWER COMPANY, WANSLEY STEAM-ELE	SCR
21	015	2101500029	002	6018	2	CINCINNATI GAS & ELECTRIC EAST BEND STAT	SCR
21	059	2105900027	001	1374	1	OWENSBORO MUNICIPAL UTIL ELMER SMITH STA	SCR
21	111	0127	03	1364	3	LOU GAS & ELEC, MILL CREEK	SCR
21	111	0127	04	1364	4	LOU GAS & ELEC, MILL CREEK	SCR
21	127	2112700003	002	1353	BSU2	KENTUCKY POWER CO BIG SANDY PLANT	SCR
21	157	2115700053	001A	55232	CT1	DUKE ENERGY MARSHALL COUNTY,LLC	SCR
21	157	2115700053	001B	55232	CT2	DUKE ENERGY MARSHALL COUNTY,LLC	SCR

FIPSSST	FIPSCNTY	Plant ID	Point ID	ORISID	BLRID	Plant	Post-Combustion Control
21	157	2115700053	001C	55232	CT3	DUKE ENERGY MARSHALL COUNTY,LLC	SCR
21	157	2115700053	001D	55232	CT4	DUKE ENERGY MARSHALL COUNTY,LLC	SCR
21	157	2115700053	001E	55232	CT5	DUKE ENERGY MARSHALL COUNTY,LLC	SCR
21	157	2115700053	001F	55232	CT6	DUKE ENERGY MARSHALL COUNTY,LLC	SCR
21	157	2115700053	001G	55232	CT7	DUKE ENERGY MARSHALL COUNTY,LLC	SCR
21	157	2115700053	001H	55232	CT8	DUKE ENERGY MARSHALL COUNTY,LLC	SCR
21	161	2116100009	001	6041	1	EAST KY POWER COOP SPURLOCK ST. MAYSVILL	SCR
21	161	2116100009	002	6041	2	EAST KY POWER COOP SPURLOCK ST. MAYSVILL	SCR
21	177	2117700006	001	1378	1	TVA PARADISE STEAM PLANT	SCR
21	177	2117700006	002	1378	2	TVA PARADISE STEAM PLANT	SCR
21	177	2117700006	003	1378	3	TVA PARADISE STEAM PLANT	SCR
21	183	2118300069	001	6823	W1	WESTERN KY ENERGY CORP WILSON STATION	SCR
21	185	2118500036	001	55164	GTG1	BLUEGRASS GENERATION CO	SCR
21	185	2118500036	002	55164	GTG2	BLUEGRASS GENERATION CO	SCR
21	185	2118500036	003	55164	GTG3	BLUEGRASS GENERATION CO	SCR
21	199	2119900005	002	1384	2	EAST KY POWER COOP JOHN SHERMAN COOPER P	SCR
21	223	2122300002	001	6071	1	LOUISVILLE GAS & ELECTRIC TRIMBLE CO GEN	SCR
21	223	2122300002	025	6071	5	LOUISVILLE GAS & ELECTRIC TRIMBLE CO GEN	SCR
21	223	2122300002	026	6071	6	LOUISVILLE GAS & ELECTRIC TRIMBLE CO GEN	SCR
21	233	2123300001 -A	002	1382	H1	HENDERSON STATION 2	SCR
28	007	2800700032	001	55220	A01	ATTALA GENERATING COMPANY, LLC	SCR
28	007	2800700032	002	55220	A02	ATTALA GENERATING COMPANY, LLC	SCR
28	019	2801900011	001A	55076	AA001	CHOCTAW GENERATION LLP, RED HILLS GENERA	SCR
28	019	2801900011	001B	55076	AA002	CHOCTAW GENERATION LLP, RED HILLS GENERA	SCR
28	027	2802700079	001	55395	CT01	CLARKSDALE PUBLIC UTILITIES, CROSSROADS	SCR
28	027	2802700079	002	55395	CT02	CLARKSDALE PUBLIC UTILITIES, CROSSROADS	SCR
28	027	2802700079	003	55395	CT03	CLARKSDALE PUBLIC UTILITIES, CROSSROADS	SCR
28	027	2802700079	004	55395	CT04	CLARKSDALE PUBLIC UTILITIES, CROSSROADS	SCR
37	145	3714500029	G-35A	2712	3A	CP&L - ROXBORO STEAM ELECTRIC PLANT	SCR
37	145	3714500029	G-35B	2712	3B	CP&L - ROXBORO STEAM ELECTRIC PLANT	SCR
45	015	0420-0006	001	3298	WIL1	SCE&G:WILLIAMS	SCR
45	015	0420-0030	001	130	1	SANTEE COOPER CROSS	SCR
45	015	0420-0030	002	130	2	SANTEE COOPER CROSS	SCR
45	021	0600-0081	CA1	7981	1	DUKE ENERGY:MILL CREEK	SCR
45	021	0600-0081	CA2	7981	2	DUKE ENERGY:MILL CREEK	SCR
45	021	0600-0081	CA3	7981	3	DUKE ENERGY:MILL CREEK	SCR
45	021	0600-0081	CA4	7981	4	DUKE ENERGY:MILL CREEK	SCR
45	043	1140-0005	001	6249	1	SANTEE COOPER WINYAH	SCR
45	043	1140-0005	002	6249	2	SANTEE COOPER WINYAH	SCR
45	043	1140-0005	003	6249	3	SANTEE COOPER WINYAH	SCR
45	043	1140-0005	004	6249	4	SANTEE COOPER WINYAH	SCR
45	079	1900-0013	001	3297	WAT1	SCE&G:WATEREE	SCR
45	079	1900-0013	002	3297	WAT2	SCE&G:WATEREE	SCR
47	001	0009	001	3396	1	TVA BULL RUN FOSSIL PLANT	SCR
47	145	0013	001	3407	1	TVA KINGSTON FOSSIL PLANT	SCR
47	145	0013	002	3407	2	TVA KINGSTON FOSSIL PLANT	SCR
47	145	0013	003	3407	3	TVA KINGSTON FOSSIL PLANT	SCR
47	145	0013	004	3407	4	TVA KINGSTON FOSSIL PLANT	SCR
47	145	0013	005	3407	5	TVA KINGSTON FOSSIL PLANT	SCR

FIPSST	FIPSCNTY	Plant ID	Point ID	ORISID	BLRID	Plant	Post-Combustion Control
47	145	0013	006	3407	6	TVA KINGSTON FOSSIL PLANT	SCR
47	145	0013	007	3407	7	TVA KINGSTON FOSSIL PLANT	SCR
47	145	0013	008	3407	8	TVA KINGSTON FOSSIL PLANT	SCR
47	161	0011	001	3399	1	TVA CUMBERLAND FOSSIL PLANT	SCR
47	161	0011	002	3399	2	TVA CUMBERLAND FOSSIL PLANT	SCR
51	065	00001	2	3796	4	DOMINION - BREMO POWER STATION	SNCR
51	153	00002	3	3804	3	DOMINION - POSSUM POINT	SCR
51	153	00002	4	3804	4	DOMINION - POSSUM POINT	SCR
51	670	00058	1	10771	1	HOPEWELL COGENERATION LTD PARTNERSHIP	SNCR
51	670	00058	2	10771	2	HOPEWELL COGENERATION LTD PARTNERSHIP	SNCR
54	033	0015	001	3944	1	MONONGAHELA POWER CO-HARRISON	SCR
54	033	0015	002	3944	2	MONONGAHELA POWER CO-HARRISON	SCR
54	033	0015	003	3944	3	MONONGAHELA POWER CO-HARRISON	SCR
54	061	0001	001	3943	1	MONONGAHELA POWER CO. - FORT MARTIN POWER	SNCR
54	061	0001	002	3943	2	MONONGAHELA POWER CO. - FORT MARTIN POWER	SNCR
54	073	0005	001	6004	1	MONONGAHELA POWER CO-PLEASANTS POWER STA	SCR
54	073	0005	002	6004	2	MONONGAHELA POWER CO-PLEASANTS POWER STA	SCR
54	073	0022	001	55349	1	PLEASANTS ENERGY LLC	SCR
54	073	0022	002	55349	2	PLEASANTS ENERGY LLC	SCR

Table 2. Sources with annual NH3 emissions but none or inconclusive post-combustion control.

FIPSST	FIPSCNTY	Plant ID	Point ID	ORISID	BLRID	Plant	2002 Annual Values		
							NH3 Emiss (Tons)	NH3 Rate (lbs/MMBtu)	Heat Input (MMBtu)
01	001	0008	001	55271	CT1	TENASKA ALABAMA GENERATING STATION	2.140	0.001174	3,645,276
01	039	0001	006	533	**V1	ALABAMA ELECTRIC COOPERATIVE - MCWILLIAM	12.310	0.003218	7,651,684
01	039	0001	007	533	**V2	ALABAMA ELECTRIC COOPERATIVE - MCWILLIAM	9.920	0.003934	5,043,248
01	081	0036	001	7840	1A	GEORGIA POWER COMPANY - FRANKLIN	4.510	0.001671	5,398,934
01	081	0036	002	7840	1B	GEORGIA POWER COMPANY - FRANKLIN	4.330	0.001672	5,179,918
01	097	8066	001	55241	COG01	MOBILE ENERGY LLC - HOG BAYOUR ENERGY CE	5.690	0.002843	4,002,968
12	103	1030011	1	634	1	PROGRESS ENERGY FLORIDA, INC. BARTOW PLA	12.440	0.004286	5,805,143
12	103	1030011	2	634	2	PROGRESS ENERGY FLORIDA, INC. BARTOW PLA	15.050	0.004309	6,984,802
12	103	1030011	3	634	3	PROGRESS ENERGY FLORIDA, INC. BARTOW PLA	26.540	0.004174	12,716,189
13	021	0002	1	699	1	ARKWRIGHT	2.106	0.029488	142,839
13	021	0002	2	699	2	ARKWRIGHT	2.340	0.037032	126,378
13	021	0002	3	699	3	ARKWRIGHT	0.499	0.000842	1,185,096
13	021	0002	4	699	4	ARKWRIGHT	0.093	0.003055	60,874
37	021	0628	1	2706	1	CAROLINA POWER & LIGHT ASHEVILLE STEAM E	2.846	0.000423	13,448,054
37	071	3707100039	G-16	2718	3	DUKE ENERGY CORPORATION - ALLEN STEAM ST	0.311	0.000067	9,225,806
37	071	3707100039	G-17	2718	4	DUKE ENERGY CORPORATION - ALLEN STEAM ST	0.427	0.000068	12,551,792
37	071	3707100039	G-18	2718	5	DUKE ENERGY CORPORATION - ALLEN STEAM ST	0.462	0.000065	14,146,683
37	153	3715300070	G-15	7805	7	CP&L - RICHMOND CNTY COMBUSTN TURBINE	3.862	0.002643	2,922,928
37	153	3715300070	G-9	7805	8	CP&L - RICHMOND CNTY COMBUSTN TURBINE	2.721	0.001717	3,168,714
45	007	0200-0004	001	3264	1	DUKE ENERGY:LEE	0.016	0.000012	2,618,179
45	007	0200-0004	002	3264	2	DUKE ENERGY:LEE	0.016	0.000013	2,495,463
45	007	0200-0004	003	3264	3	DUKE ENERGY:LEE	0.028	0.000011	5,131,805
51	041	00002	3	3797	3	DOMINION - CHESTERFIELD POWER STATION	0.117	0.000067	3,494,532
51	041	00002	4	3797	4	DOMINION - CHESTERFIELD POWER STATION	0.206	0.000038	10,708,221
51	041	00002	6	3797	5	DOMINION - CHESTERFIELD POWER STATION	0.426	0.000038	22,584,280
51	041	00002	8	3797	6	DOMINION - CHESTERFIELD POWER STATION	0.691	0.00003	46,648,052
51	071	00002	1	3776	51	AMERICAN ELECTRIC POWER GLEN LYN	0.110	0.000081	2,714,078
51	071	00002	2	3776	52	AMERICAN ELECTRIC POWER GLEN LYN	0.112	0.000078	2,879,042
51	071	00002	3	3776	6	AMERICAN ELECTRIC POWER GLEN LYN	0.066	0.000011	11,837,961
51	085	00061	1	52019	CT1	DOSWELL LIMITED PARTNERSHIP	13.188	0.020726	1,272,579
51	167	00003	1	3775	1	AMERICAN ELECTRIC POWER-CLINCH RIVER PLA	0.332	0.000049	13,645,102

2002 Annual Values

FIPSST	FIPSCNTY	Plant ID	Point ID	ORISID	BLRID	Plant	2002 Annual Values		
							NH3 Emiss (Tons)	NH3 Rate (lbs/MMBtu)	Heat Input (MMBtu)
51	167	00003	2	3775	2	AMERICAN ELECTRIC POWER-CLINCH RIVER PLA	0.329	0.000046	14,295,031
51	167	00003	3	3775	3	AMERICAN ELECTRIC POWER-CLINCH RIVER PLA	0.358	0.000048	14,931,820
51	175	00051	1	10774	1	DOMINION - SOUTHAMPTON POWER STATION	0.043	0.000042	2,071,747
51	175	00051	2	10774	2	DOMINION - SOUTHAMPTON POWER STATION	0.043	0.000041	2,087,198
51	199	00001	3	3809	3	DOMINION - YORKTOWN POWER STATION	59.923	0.00465	25,772,283
51	550	00026	3	3803	3	DOMINION - CHESAPEAKE	0.246	0.000042	11,600,238
51	550	00026	4	3803	4	DOMINION - CHESAPEAKE	0.274	0.000043	12,880,910
51	760	00389	20	50966	1	DOMINION - BELLEMEADE	0.017	0.000013	2,576,299
51	760	00389	21	50966	2	DOMINION - BELLEMEADE	0.013	0.000011	2,382,091
54	023	0014	001	7537	1A	NORTH BRANCH POWER STATION	0.050	0.000046	2,151,857
54	023	0014	002	7537	1B	NORTH BRANCH POWER STATION	0.050	0.000047	2,150,507
54	039	0006	001	3936	1	APPALACHIAN POWER - KANAWHA RIVER PLANT	0.190	0.000029	13,080,072
54	039	0006	002	3936	2	APPALACHIAN POWER - KANAWHA RIVER PLANT	0.190	0.000031	12,412,111
54	051	0006	001	3947	1	OHIO POWER - KAMMER PLANT	0.180	0.000029	12,334,572
54	051	0006	002	3947	2	OHIO POWER - KAMMER PLANT	0.180	0.000032	11,149,675
54	051	0006	003	3947	3	OHIO POWER - KAMMER PLANT	0.180	0.000029	12,521,657
54	053	0001	001	3938	11	APPALACHIAN POWER CO. -PHILIP SPORN PLANT	0.250	0.000065	7,656,247
54	053	0001	002	3938	21	APPALACHIAN POWER CO. -PHILIP SPORN PLANT	0.240	0.000059	8,130,551
54	053	0001	003	3938	31	APPALACHIAN POWER CO. -PHILIP SPORN PLANT	0.260	0.000062	8,360,645
54	053	0001	004	3938	41	APPALACHIAN POWER CO. -PHILIP SPORN PLANT	0.240	0.000056	8,508,520
54	053	0001	005	3938	51	APPALACHIAN POWER CO. -PHILIP SPORN PLANT	0.480	0.000058	16,584,643