

Longleaf Energy Associates, LLC

c/o LS Power Development, LLC
Two Tower Center, 20th Floor
East Brunswick, New Jersey 08816
(732) 249-6750 Tel.
(732) 249-7290 Fax.

File No. 20.1.2.1

Via Overnight Mail

April 13, 2005

Ms. Michelle Keith
NO_x Unit Manager – Stationary Source Permitting Program
Georgia Environmental Protection Division
4244 International Parkway, Suite 120
Atlanta, Georgia 30354

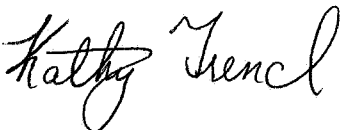
Subject: Longleaf Energy Station Air Permit Application No. 15846 Docket
Information on EPA HF/HCl Removal Memo
Letter No.: LEA-EPD-0005

Dear Ms. Keith:

Thank you for your time on the phone yesterday. As you requested, the document number for the EPA memo cited in my March 31, 2005 letter to Ms. Anna Aponte is Document OAR-2002-0056-5736. Per EPA's instructions, the document can be referenced by performing a Quick Search for the above number at the following EPA website <http://docket.epa.gov/edkpub/index.jsp>. A copy of the memo is attached for your convenience.

Should you have any questions regarding the analysis or any other aspect of the application, I can be reached at 732-249-6750.

Sincerely,



Kathy French

Attachment

OAR-2002-0056

Locker No. A-92-55
Item No. 1-B-72

May 11, 1994

MEMORANDUM

To: William Maxwell, EPA/OAQPS/ISB
From: Jeffrey Cole, RTI
Subject: Emission Factor Output for Systems Application International (SAI)
Reference: Electric Utility Steam Generating Unit HAP and Mercury Study, EPA Contract 68-D1-0118, WA No. 88, ESD Project, 91/41, RTI Project 5538-088

This memorandum is an explanation of the attached printout of the emission modification factors (EMF) and hazardous air pollutant (HAP) concentrations used in the emission factor program. Basically, EMFs are fractions of the amount of a HAP exiting a device (boiler or air pollution control device) divided by the amount of the same HAP entering that device. An EMF of "1" would mean that the device had no effect on the specific HAP passing through it. Organic HAP emissions were addressed by examining the test data and determining the concentration of a particular HAP exiting the boiler.

The printout describes two types of sites: air pollution control devices and boiler/fuel types. Air pollution control devices (baghouses, ESPs, FGDs, spray dryers) are identified by: in the first row of the printout - device type; second row - site location; third row - inlet temperature (and outlet temperature for FGD and spray dryers). The first section of the page deals with trace metals and the second section deals with organic HAPs. All values on air pollution control device pages are EMFs (no organic HAP concentrations). Air pollution control device types are fuel neutral.

The four columns at the right of each page present the arithmetic mean, geometric mean, maximum value, and minimum value. The geometric mean was used in the emission factor program.

Boilers and fuel types can be identified by their titles. For example, CYCLWETNONOX, O-VERTDRYNOX, and G-FRONTDRYNOX, are identified as a coal-fired, wet bottom, cyclone-fired boiler, without NO_x control; an oil-fired, dry bottom, vertical-fired boiler, with NO_x control; and a natural gas-fired, dry bottom, front-fired boiler, without NO_x control, respectively. The trace metal section contains EMFs while the organic HAPs section lists concentrations (coal-fired, kg/10¹² Btu; Oil-fired, kg/10⁶ gallons; natural gas-fired, kg/10⁹ cu.ft.)

One of the emission test reports that analyzed an oil burning, tangentially-fired (with NO_x control) unit contained information on two trace metals. Since this was the only unit of its kind to be tested, it was necessary to substitute the trace metal data of another similar (an oil-fired unit having NO_x control) unit for which more data were collected. The EMFs of the oil burning, front-fired unit (with NO_x control) were averaged (by geometric mean) into the unit along with the two trace metal concentrations found in the tangentially-fired boiler. Since there were organic HAP concentration numbers available for the tangentially-fired boiler, these numbers were maintained without modification.

Hydrochloric acid (HCl) and hydrogen fluoride (HF) emission modification factors were developed from four test site reports that supplied chlorine and fluorine (or chloride and fluoride) levels for coal feed. The four reports also contained HCl and HF concentrations leaving the boiler. Having chloride and fluoride measurements on the inlet (coal feed) and outlet (flue gas) allowed the computation of EMF for the boiler.

Emission modification factors were derived by performing mass balances for chlorine and fluorine, then converting these balances to the equivalent levels of HCl or HF throughout the boiler system. For example, for each part per million of chlorine in the feed coal at one of the test sites, 0.51 pounds per hour of HCl were found in the gas stream leaving the boiler and 0.00145 pounds per hour in the stack gas. Similarly for HF, the boiler emissions were 0.53 pounds per hour for each part per million of fluorine in the coal and 0.00448 pounds per hour in the stack. For the few data points available, no trend was found for HCl level in the gas leaving the boiler as a function of chlorine content of the coal. Because each of the four test sites was different than the others regarding SO_x and particulate control, the emission factors for chlorine and fluorine were maintained separately for the four system types rather than averaging them.

In the absence of test data, and because little chlorine was found in the ash from coal-fired units, the emission factors

developed from coal data were also applied to oil-fired units (which have little ash).

For wet and dry flue-gas desulfurization (FGD) systems the factors were obtained from measurements on systems that bypassed part of the flue gas around the FGD. We have now estimated additional factors for the cases of zero percent bypass and for an estimated industry average quantity of flue gas bypassed.

The existing and additional HCl and HF factors that we developed are given in the following table. Notes to the table explain the origin and assumptions for the FGD factors. As we discussed with you, wet and dry scrubber performance is assumed to be not better than 95 percent (for HCl and HF) based on municipal waste combustor regulations for HCl. This value can be changed as we find more data applicable to utility boilers. At the present time we are planning on using the shaded EMFs to represent wet and dry FGD effects on HCl and HF.

ESPs (all types)	HCl	0.940
	HF	1.000
Baghouse	HCl	0.559
	HF	1.000
FGD (WETSCRUB, 59 % bypass)	HCl	0.407 ¹
	HF	0.819 ²
FGD (WETSCRUB, 17 % bypass)	HCl	0.208 ^{1,3}
	HF	0.725 ^{2,3}
FGD (WETSCRUB, 0 % bypass)	HCl	0.050 ^{1,4}
	HF	0.559 ^{2,4}
Spray Dryer (DRYSCRUB, 14 % bypass)	HCl	0.183 ⁵
	HF	0.183 ⁶
Spray Dryer (DRYSCRUB, 0 % bypass)	HCl	0.050 ⁵
	HF	0.050 ⁶

¹ Based on municipal waste combustor regulations, assumes 95 percent of HCl entering the FGD is absorbed in the FGD water.

² Based on one test series indicating that the FGD system removed 44.1 percent of the entering HF.

³ The 17 percent value represents an estimated industry average obtained by multiplying the fraction of tested wet FGD systems having bypasses (2 of 5), by the average fraction of gas bypassed (0.24 and 0.59), or $0.4 \times 0.415 = 0.166$.

⁴ For operation with no flue gas bypassing the wet FGD. Limited test data suggest that essentially all HCl is absorbed in the FGD water, but only 44.1 percent of the HF is absorbed. However, based on municipal waste combustor regulations, the wet FGD is assumed to capture 95 percent of the HCl.

⁵ Based on one test series indicating that the dry FGD system may remove all entering HCl. While 14 percent of the flue gas bypassed the dry FGD system, 94 percent of the HCl entering the dry FGD/bypass system disappeared before reaching the stack. However, based on municipal waste combustor regulations, the dry FGD is assumed not to remove more than 95 percent of the HCl.

⁶ Based on the test series in note 5. Approximately 97 percent of the HF entering the dry FGD/bypass system was removed before reaching the stack. However, based on municipal waste combustor regulations, the dry FGD is assumed not to remove more than 95 percent of the HF.