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May 24, 2004

TO: Sandra Bihn, Sierra Club of Ohio

FROM: Alexander J. Sagady, Environmental Consultant

RE: Mercury Emissions from the Proposed FDS Coke Ovens

You asked me for a memorandum concerning the origin of the my statement to you and Tom Henry that the proposed FDS Coke Oven facility would emit 680 pounds per year of mercury pollution.

The 680 pound emission number came from an admission by the project applicant as contained in their submittal to the Ohio EPA and the Toledo Division of Environmental Services.

The admission was contained in a sheet labeled "HAP Emissions - USCG Toledo Coke Plant." This sheet was found in Appendix B, Emission Calculation Sheets at the end of Applicant's submittal and is attached. To the best of my knowledge, this sheet was prepared by Labyrinth Management Group which the Applicant admits was responsible as the "overall technical lead on source characterization and emission estimation, PTI application development, and analysis of applicable requirements." No revision of this emission estimate by Labyrinth has been filed with the Toledo agency as of the end of last week.

The referenced HAP [Hazardous Air Pollutant] Emission Calculation Sheet indicates mercury emissions would be 3.40E-1 tons per year, or 0.34 tons of mercury. At 2000 lbs/ton that is 680 pounds. This emission estimate is lower than the 719 pounds of mercury emissions reported for year 2001 (the most recent year of readily available data) by a similarly sized facility with similar nonrecovery coke oven technology at the Indiana Harbor Coke Company in East Chicago, IN.

The emission projection for the FDS Coke facility is based on U.S. EPA's Draft AP-42 emission factor for mercury emissions from nonrecovery coke oven combustion stacks of 0.00033 lbs of mercury emissions per ton of coal charged (See section 12.2, metallurgical industry)..

According to the documentation for EPA's AP-42 emission factors:

"An emission factor is a representative value that attempts to relate the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant.Such factors facilitate estimation of emissions from various sources of air pollution. In most cases, these factors are simply averages of all available data of

acceptable quality, and are generally assumed to be representative of long-term averages for all facilities in the source category (i. e., a population average).”

“.....Because emission factors essentially represent an average of a range of emission rates, approximately half of the subject sources will have emission rates greater than the emission factor and the other half will have emission rates less than the factor.“

The emission calculation also depends on the 0.0% emission control efficiency projection for the combustion stack emission control train. Given the implied high burnout of flue gas carbon/VOCs claimed by the applicant, the failure of the applicant to incorporate activated carbon injection mercury emission control, the likely nature of mercury in uncontrolled coke oven flue gas and experience in the electric utility sector for spray dryer/fabric filter control of mercury, the 0.0% control efficiency assumption is reasonable.

At 0.0% emission control efficiency this would be equivalent to an “as charged” coal mercury content of 0.165 parts per million. This can be compared to U.S. Geological Survey information on the mean mercury content of 0.24 ppm, 0.15 ppm and 0.21 ppm respectively for Northern, Central and Southern Appalachian Coal.¹

Finally, the emission estimate assumes the maximum of 14 days of uncontrolled venting of coke oven emissions through one of the bypass vents proposed for installation. Note, however, that the nonrecovery coke oven at East Chicago, IN has been unable to comply with a similar requirement in its original permit and has sought a permit amendment allowing it to vent uncontrolled emissions up to 19% of the time [69 days per year].

The Applicant has submitted no coal analysis information to Ohio EPA and Toledo Environmental Services that could be used to develop an alternative mass balance mercury emission estimate.

Although the Applicant admits 680 lbs of projected mercury emissions, please note that nothing in the proposed permit provides any specific legally enforceable limitation on the amount of mercury that will be emitted. If the plant is built and the presently proposed permit is issued, nothing prevents the applicant from emitting virtually any amount of mercury that they choose short of violating the mass rate limitation for total hazardous air pollutant emissions of 4.78 tons per year. There has been no Ohio Best Available Technology demonstration that the projected mercury emission meets the required Ohio EPA rule requirements for technological controls available for this pollutant. Such a failure violates established Great Lakes protocols for controlling persistent and bioaccumulative airborne toxicants in the Great Lakes basin states.

As proposed, the permit requires only a single stack test within 180 days of commencement of operation for hazardous air pollutants with mercury on the list of metals to be

¹ “Mercury in U.S. Coal – Abundance, Distribution and Modes of Occurrence,” U.S. Geological Survey, USGS Fact Sheet FS-095-01, September, 2001

tested under stack test Method 29 on the main combustion stack and a single stack test for mercury on the venting stacks during the first period of heat recovery generator boiler inspections.² Nothing in the proposed Ohio EPA permit requires testing or limitation of the mercury content of coal to be used at the FDS Coke facility. As a result, any changes or variations of mercury emissions from use of different coal supplies than were used at the first stack test will not be detected under the proposed permit.

Although the expected ambient air quality impact for mercury emissions has been compared to Ohio's non-rule policy requirement for compliance with the Maximum Allowable Ground Level Concentration (MAGLC), this review only reflects a short term screening review of inhalation-only pathways for human health acceptability based on a fraction of occupational health values for Threshold Limit Values.

Neither Ohio EPA, Toledo environmental services, nor the Applicant have conducted a multipathway human health and ecological risk assessment that is necessary to determine the human health and environmental impact of such a large mercury emission source. In this kind of review, both wet and dry deposition of mercury from the proposed facility would be modeled, build-up of mercury in aquatic systems, wetland areas, fish spawning and wildlife areas and their related watersheds would be determined, and the toxicological effects of such mercury and related dose-pathways would be determined. The Michigan Department of Environmental Quality recently required this kind of multi-pathway review for a proposed source emitting as little as 80 pounds of mercury per year.

If you should have any questions about this memorandum, please don't hesitate to contact me at (517)332-5971 or ajs@sagady.com

² Although Method 29 provides a list of hazardous air pollutant metals, the Applicant has not made emission projections of all of the metals on the Method 29 list and other hazardous air pollutants expected to be emitted from the proposed source. In the absence of a clear requirement for mercury testing, the procedure for submission and approval of a stack testing protocol should not be used by Toledo Environmental Services Division to excuse FDS Coke from mercury test requirements implicitly provided by inclusion of mercury in the Method 29 list at provision #1.1.

HAP Emissions - USCG Toledo Coke Plant

Maximum Annual Production = 2,059,600 tons wet coal/year
 Venting = 3.8%
 Tons venting 78,960
 Tons not venting 1,979,640

Compound	AP-42 DRAFT [a] Emission Factor (lb/ton)	Vent Stack Annual Emissions (tons/yr)	Main Stack [b] Spray Dryer/BH Removal (%)	Main Stack Annual Emissions (tons/yr)	Total Stack Annual Emissions (tons/yr)	Charging [c,d] AP-42 DRAFT Emission Factor (lb/ton)	Charging Annual Emissions (tons/yr)	Pushing [d] Test Data Emission Factor (lb/ton)	Pushing Annual Emissions (tons/yr)	Quenching [e] Test Data Emission Factor (lb/ton)	Quenching Annual Emissions (tons/yr)	Total Emissions (tons/yr)
Benzene	4.80E-04	1.30E-02	0%	4.79E-01	4.94E-01	3.80E-05	3.71E-02	NM	3.71E-02	ND	3.71E-02	5.31E-01
Bromobenzene	1.20E-06	4.74E-05	0%	1.18E-03	1.24E-03	ND/NR	ND	NM	ND	ND	ND	1.24E-03
Bromonaphthalene	5.60E-04	2.21E-02	0%	5.54E-01	5.76E-01	ND/NR	ND	NM	ND	ND	ND	5.76E-01
2-Butanone	6.30E-05	2.48E-03	0%	6.24E-02	6.49E-02	ND/NR	ND	NM	ND	ND	ND	6.49E-02
Carbon Disulfide	1.60E-05	6.32E-04	0%	1.58E-02	1.65E-02	2.10E-06	2.16E-03	NM	2.16E-03	ND	2.16E-03	1.85E-02
Chlorobenzene	1.20E-08	4.74E-05	0%	1.18E-03	1.24E-03	ND/NR	ND	NM	ND	ND	ND	1.24E-03
Chloronaphthalene	7.80E-04	3.00E-02	0%	7.52E-01	7.82E-01	2.00E-06	2.06E-03	NM	2.06E-03	ND	2.06E-03	1.24E-03
Chloroform	1.10E-05	4.53E-05	0%	1.09E-02	1.13E-02	ND/NR	ND	NM	ND	ND	ND	1.13E-02
Quinone	1.40E-06	5.89E-05	0%	1.39E-03	1.44E-03	ND/NR	ND	NM	ND	ND	ND	1.44E-03
Ethyl Benzene	3.20E-06	1.28E-04	0%	3.17E-03	3.29E-03	7.30E-07	7.51E-04	NM	7.51E-04	ND	7.51E-04	4.05E-03
Isocyanate	1.60E-05	6.32E-04	0%	6.24E-02	6.49E-02	ND/NR	ND	NM	ND	ND	ND	6.49E-02
Methylene Chloride	6.80E-04	2.61E-02	0%	6.53E-01	6.79E-01	ND/NR	ND	NM	ND	ND	ND	6.79E-01
n-Hexane	1.50E-05	5.82E-04	0%	1.48E-02	1.54E-02	ND/NR	ND	NM	ND	ND	ND	1.54E-02
4-Methyl-2-Pentanone	8.90E-06	3.51E-04	0%	8.81E-03	9.16E-03	ND/NR	ND	NM	ND	ND	ND	9.16E-03
2-Methylphenol	ND/NR	ND/NR	-	ND/NR	ND/NR	ND/NR	ND/NR	NM	ND/NR	ND/NR	ND/NR	ND/NR
4-Methylphenol/3-Methylphenol	ND/NR	ND/NR	-	ND/NR	ND/NR	ND/NR	ND/NR	NM	ND/NR	ND/NR	ND/NR	ND/NR
Phenol	7.10E-05	2.80E-03	0%	7.03E-02	7.31E-02	ND/NR	ND/NR	NM	ND/NR	ND/NR	ND/NR	7.31E-02
Styrene	6.80E-06	2.72E-04	0%	6.83E-03	7.10E-03	ND/NR	ND/NR	NM	7.10E-03	ND	7.10E-03	5.15E-02
tert-Butyl Methyl Ether	4.70E-08	1.86E-06	0%	4.65E-05	4.84E-05	ND/NR	ND	NM	4.84E-05	ND	4.84E-05	7.10E-03
1,2,3-Trichlorobenzene	4.10E-07	1.62E-05	0%	4.08E-04	4.22E-04	ND/NR	ND	NM	4.22E-04	ND	4.22E-04	4.84E-05
1,1,2,2-Tetrachlorobenzene	2.00E-06	7.90E-05	0%	1.98E-03	2.06E-03	ND/NR	ND	NM	2.06E-03	ND	2.06E-03	2.06E-03
Toluene	5.10E-04	2.01E-02	0%	5.05E-01	5.25E-01	1.70E-05	1.75E-02	NM	1.75E-02	ND	1.75E-02	5.42E-01
1,1,1-Trichloroethane	5.80E-07	2.29E-05	0%	2.47E-03	2.57E-03	ND/NR	ND	NM	2.57E-03	ND	2.57E-03	2.57E-03
1,1,2-Trichloroethane	8.70E-06	3.43E-04	0%	8.61E-03	8.95E-03	ND/NR	ND	NM	8.95E-03	ND	8.95E-03	5.97E-04
Trichloroethane	8.70E-06	3.43E-04	0%	8.61E-03	8.95E-03	ND/NR	ND	NM	8.95E-03	ND	8.95E-03	5.97E-04
Vinyl Acetate	6.80E-06	2.72E-04	0%	6.83E-03	7.10E-03	ND/NR	ND	NM	7.10E-03	ND	7.10E-03	8.95E-03
Xylenes	1.62E-05	6.40E-04	0%	1.60E-02	1.67E-02	ND/NR	ND	NM	1.67E-02	ND	1.67E-02	2.36E-02
BSSO	ND/NR	ND/NR	-	ND/NR	ND/NR	ND/NR	ND/NR	NM	ND/NR	ND/NR	ND/NR	ND/NR
Total PAHs	2.71E-04	1.07E-02	0%	2.68E-01	2.79E-01	4.40E-05	4.59E-02	2.10E-04	2.16E-01	1.10E-05	1.14E-02	2.16E-01
Anthracene	part of total PAHs											
Benzo (a,h) fluoranthene	part of total PAHs											
Benzo (a) pyrene	part of total PAHs											
Chrysene	part of total PAHs											
Fluoranthene	part of total PAHs											
Fluorene	part of total PAHs											
2-Methylphenanthrene	part of total PAHs											
Naphthalene	part of total PAHs											
Phenanthrene	part of total PAHs											
Pyrene	part of total PAHs											
Antimony	1.30E-04	5.13E-03	95.0%	6.43E-03	1.18E-02	ND/NR	ND	ND	1.24E-02	1.22E-05	1.26E-02	2.41E-02
Arsenic	1.30E-03	5.13E-02	95.0%	6.43E-02	1.18E-01	2.40E-07	2.47E-04	ND	1.20E-05	2.42E-04	2.49E-01	3.77E-01
Beryllium	2.00E-05	7.90E-04	95.0%	9.80E-04	1.78E-03	6.70E-09	8.35E-06	ND	ND	8.03E-07	8.27E-04	2.61E-01
Calcium	1.80E-04	7.11E-03	95.0%	8.91E-03	1.60E-02	ND/NR	ND	NM	ND	ND	ND	1.80E-02
Chromium	6.30E-04	2.48E-02	95.0%	3.12E-02	5.81E-02	1.00E-07	1.03E-04	ND	ND	ND	4.21E-06	6.05E-02
Cobalt	ND/NR	ND/NR	-	ND/NR	ND/NR	7.10E-08	7.31E-05	ND	1.50E-05	2.29E-06	2.56E-03	2.73E-03
Lead [f]	3.10E-03	1.22E-01	96.0%	1.23E-01	2.43E-01	1.00E-07	1.03E-04	ND	2.10E-06	2.10E-06	2.16E-03	2.87E-01
Manganese	3.00E-04	1.18E-02	95.0%	1.48E-02	2.67E-02	4.80E-10	4.73E-04	ND	ND	ND	4.85E-05	4.99E-02
Mercury [g]	3.30E-04	1.30E-02	0%	3.27E-01	3.40E-01	7.90E-07	8.13E-07	ND	ND	ND	ND	3.40E-01
Nickel	5.80E-04	2.29E-02	95.0%	2.87E-02	5.18E-02	1.50E-07	1.54E-04	ND	ND	ND	6.28E-03	3.80E-01
Phosphorus	1.40E-02	5.53E-01	95.0%	6.83E-01	1.25E-00	ND/NR	ND	ND	ND	1.16E-04	1.19E-01	1.39E+00
Selenium	3.20E-04	1.28E-02	95.0%	1.58E-02	2.85E-02	ND/NR	ND	ND	ND	1.98E-05	2.04E-02	4.89E-02
Total HAPs (tons/yr)	0.98			4.78	5.74	0.11	0.25				0.59	6.69

a - DRAFT Chapter 12.2, "Coke Production," Air Pollutant Emission Factors, AP-42, Fifth Ed., Vol. 1
 b - Estimated 0% removal for organic compounds; 95% removal for all metals except mercury and lead
 c - Controlled emission factors
 d - Jewel test data, October 1989
 e - Jewel test data, January 1989
 f - Estimated lead emissions removal 95%
 g - No mercury removal assumed

0.34 ton
 680 lbs
 2

Tom Henry