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December 19, 2007
NTH Project 16-050556

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AIR QUALITY DIV.

Mr. John Vial
Senior Environmental Engineer
Michigan Department of Environmental Quality
Air Quality Division
Permit Section, Thermal Process Unit

**RE: Response to Additional Questions and Clarifications Regarding Application 25-07
Reconsideration of PM₁₀ (filterable and total) Limit
Electronic Correspondence Received November 28, 2007
Holland Board of Public Works**

Dear Mr. Vial:

As a result of information from various boiler and fabric filter vendors, the HBPW requested reconsideration of the PM₁₀ limit that was originally proposed in Application 25-07. This request was submitted to you on October 19, 2007. On November 28, 2007, you requested that we further review not only our recent request, but also our originally proposed limits against recent air permits based on your query of the USEPA RACT/BACT/LAER Clearinghouse and provide further information and technical justification for limits less stringent than those found in the database. Finally, you originally requested that this evaluation be submitted to you by December 5, 2007. Based on subsequent phone conversations with you, you have allowed us to the first week of January 2008 to complete this response, but requested an initial response by December 17, 2007.

NTH, C&B, and the HBPW have been in contact with various fabric filter manufacturers regarding guaranteed limits for filterable and total PM₁₀. In these discussions, it has been determined that a filterable PM₁₀ limit of 0.012 lb/MMBtu will be achievable, but at an increased cost for additional capacity and reduced air-to-cloth ratios. However, while achieving a filterable PM₁₀ limit of 0.010 lb/MMBtu is not impossible, it is cost-prohibitive to achieve this additional level of control based on a base of 0.012 lb/MMBtu. Finally, as we have stated previously, the condensable fraction of the PM₁₀ that contributes to total PM₁₀ varies from boiler to boiler based on operating conditions. A review of both recently issued permits supports this conclusion.

I have included with this letter BACT cost spreadsheets showing cost/ton removal of PM₁₀ at 0.012 lb/MMBtu and the incremental cost to achieve 0.010 lb/MMBtu.

Filterable PM₁₀

In your e-mail, dated November 28, 2007, you provide several recently permitted facilities and the respective filterable PM₁₀ limits contained in the air permits. The range of these permit limits is from 0.011 lb/MMBtu to 0.01 lb/MMBtu. Your analysis indicates that you consider the Reliant Energy – Seward Power facility limit of 0.01 lb/MMBtu is to be interpreted as 0.010 lb/MMBtu. However, this is not the case. This limit should be interpreted to be up to 0.014 lb/MMBtu and is consistent with how other state agencies have interpreted this limit in their BACT review analysis.



Mr. John Vial
December 19, 2007

Therefore, a filterable PM₁₀ limit of 0.012 lb/MMBtu is consistent with most recent permit applications and BACT determinations. Further, this limit is at the low end of the range of limits of recently approved permits.

Total PM₁₀

You also provide several permit limits for total PM₁₀ listed in the RBLC database. The range of limits of the facilities you provided is 0.018 lb/MMBtu to 0.025 lb/MMBtu. As we have discussed previously and mentioned in this letter, predicting the condensable fraction of PM₁₀ is extremely difficult and dependent on boiler operating conditions and use of add-on control technologies for NO_x. Further, USEPA Method 202 has known measurement issues with the impingers that can lead to overstatement of PM₁₀ emissions. This is especially true for boilers utilizing SCR or SNCR technology with ammonia or urea injection.


As mentioned previously, HBPW has been in contact with both boiler and fabric filter vendors regarding the expected outlet concentration of particulate, including PM₁₀. To date, a guarantee has been difficult to obtain absent final engineering drawings and all have expressed concerns regarding condensable fraction estimates. Performing a comparative analysis based on inlet loadings, as you suggest, is nearly impossible given the significant variations in fuels and air quality control systems.

To expedite the review process for this application, HBPW would agree to a total PM₁₀ limit of 0.025 lb/MMBtu, consistent with the range of BACT limits for recently issued boilers.

If you have any further questions, please feel free to contact me at (517) 484-6900.

Very truly yours,

NTH Consultants, Ltd.



Jeffrey P. Jaros
Principal Scientist

Attachment
Enclosures

cc: Mr. David Koster, Holland Board of Public Works
Mr. Steve Yambor, Cummins & Barnard, Inc.
Mr. Chuck Hookham, Cummins & Barnard, Inc.
Mr. Delbert Rector, NTH Consultants, Ltd.

JPJ/mjb



Attachment A-1
 Control Technology Cost Basis for Pulse Jet Fabric Filter (PJFF) for PM/PM₁₀/PM_{2.5} Control
 One (1) 78 MW Circulating Fluidized Bed Boiler

Cost Item	Cost Description	Cost Factor	Cost 2007 \$
DIRECT CAPITAL INVESTMENTS (DCI)			
	Buildings	Included with Purchased Equipment	
	Site Preparation		
	Installation Cost		
	Purchased Equipment		\$ 4,200,000.00
	Taxes	6% on 50% of Purchased Equipment	\$ 126,000.00
	TOTAL DCI		\$ 4,326,000.00
INDIRECT CAPITAL INVESTMENT (ICI)			
	Engineering		\$ 100,000.00
	Construction & Field Expenses		\$ 100,000.00
	Contractor Fees		\$ 50,000.00
	Start-up	Included with Field Expense	\$ -
	Performance Test	Included with Field Expense	\$ -
	Contingencies		
	TOTAL ICI		\$ 250,000.00
TOTAL CAPITAL INVESTMENT (TCI)	DCI + ICI		\$ 4,576,000.00
DIRECT OPERATING COSTS (DOC)			
	Labor		
	- Operator	1 operator @ \$60,000/year	\$ 60,000.00
	- Supervisory	20% of Operator Labor Cost	\$ 12,000.00
	- Maintenance	1 technicians @ \$60,000/year	\$ 60,000.00
	Materials		
	- Maintenance Materials		
	- Reagent		\$ -
	- Limestone		\$ -
	- Water		\$ -
	Utilities		
	- Electricity	5 kW	\$ 2,628.00
	- Fuel		\$ -
	- Pressure Drop	340 kW @ 8" drop	\$ 178,704.00
	- Waste Disposal	13.33 per ton	\$ 606.04
	TOTAL DOC		\$ 313,938.04
INDIRECT OPERATING COSTS (IOC)			
	Overhead	60% of Operator Labor & Maintenance	\$ 79,200.00
	Property Taxes	1% of TCI	\$ 45,760.00
	Insurance	1% of TCI	\$ 45,760.00
	Administrative Charges	2% of TCI	\$ 91,520.00
	Capital Recovery	20 years; 7% interest = 0.0944 CRF	\$ 431,974.40
	TOTAL IOC		\$ 694,214.40
RECOVERY CREDITS (RC)			
	Materials		\$ -
	Energy		\$ -
	TOTAL RC		\$ -
TOTAL ANNUALIZED COSTS (TAC)	DOC + IOC - RC		\$ 1,008,152.44
PM₁₀ EMISSIONS			
	Uncontrolled	12.0 lb/MMBtu	45,464.40
	Controlled	0.012 lb/MMBtu	45.46
	TOTAL REDUCTION		45,418.94
	Cost-Effectiveness	\$ per ton of PM ₁₀ removed	\$ 22.20



Attachment A-2
 Control Technology Cost Basis for Pulse Jet Fabric Filter (PJFF) for PM/PM₁₀/PM_{2.5} Control
 One (1) 78 MW Circulating Fluidized Bed Boiler
 Incremental Cost to achieve 0.010 lb/MMBtu

Cost Item	Cost Description	Cost Factor	Cost 2007 \$
DIRECT CAPITAL INVESTMENTS (DCI)			
	Buildings	Included with Purchased Equipment	
	Site Preparation		
	Installation Cost		
	Purchased Equipment	20% Increase from Base	\$ 840,000.00
	Taxes	6% on 50% of Purchased Equipment	\$ 25,200.00
	TOTAL DCI		\$ 865,200.00
INDIRECT CAPITAL INVESTMENT (ICI)			
	Engineering		\$ 20,000.00
	Construction & Field Expenses		\$ 20,000.00
	Contractor Fees		\$ 10,000.00
	Start-up	Included with Field Expense	\$ -
	Performance Test	Included with Field Expense	\$ -
	Contingencies		
	TOTAL ICI		\$ 50,000.00
TOTAL CAPITAL INVESTMENT (TCI)	DCI + ICI		\$ 915,200.00
DIRECT OPERATING COSTS (DOC)			
	Labor		
	- Operator	1 operator @ \$60,000/year	\$ -
	- Supervisory	20% of Operator Labor Cost	\$ -
	- Maintenance	1 technicians @ \$60,000/year	\$ -
	Materials		
	- Maintenance Materials	Incremental bag/cage replacement	\$ 100,000.00
	- Reagent		\$ -
	- Limestone		\$ -
	- Water		\$ -
	Utilities		
	- Electricity	Replacement Power: 1 day @ \$0.06 x 70 MWt	\$ 100,800.00
	- Fuel		\$ -
	- Pressure Drop	340 kW @ 8" drop - 10%	\$ 35,740.80
	- Waste Disposal	13.33 per ton	\$ 121.21
	TOTAL DOC		\$ 236,662.01
INDIRECT OPERATING COSTS (IOC)			
	Overhead	60% of Operator Labor & Maintenance	\$ -
	Property Taxes	1% of TCI	\$ 9,152.00
	Insurance	1% of TCI	\$ 9,152.00
	Administrative Charges	2% of TCI	\$ 18,304.00
	Capital Recovery	20 years; 7% interest = 0.0944 CRF	\$ 86,394.88
	TOTAL IOC		\$ 123,002.88
RECOVERY CREDITS (RC)			
	Materials		\$ -
	Energy		\$ -
	TOTAL RC		\$ -
TOTAL ANNUALIZED COSTS (TAC)	DOC + IOC - RC		\$ 359,664.89
PM₁₀ EMISSIONS			
	Uncontrolled	0.012 lb/MMBtu	45.46
	Controlled	0.010 lb/MMBtu	37.89
	TOTAL REDUCTION		7.58
	Cost-Effectiveness	\$ per ton of PM ₁₀ removed	\$ 47,465.47