Attachment H

ATTACHMENT H
AIR TOXICS ANALYSIS TO SUPPORT THE PHASE 1A UPGRADE TALLMAN ISLAND WPCP

The Phase 1A upgrade of the Tallman Island WPCP has two air-affecting components. The first is the accommodation of a biological nitrogen removal (BNR) step-feed process which requires creation of oxic and anoxic zones within each aeration tank pass, an increase in aeration tank air flows, and improvement of the return activated sludge (RAS) distribution and pumping system. The second air-affecting component is the re-routing of the centrate from the sludge dewatering to the aeration tanks (Pass A) for subsequent treatment.

Facility-wide emissions of air toxics were limited to wastewater process sources and were assessed using *TOXCHEM+*, Enviromega's environmental fate model for wastewater collection and treatment systems (www.enviromega.com). Air toxics considered in the emissions assessment were based on the three most recent years of DEP aqueous influent analysis. Operating conditions and model input parameters representative of the no-build and build scenarios were conservatively assigned based on data contained in the DEP Fiscal Year summary tables for the plant.

From the emissions assessment, two analyses were performed. The first was a "major-source threshold analysis" for a total of 14 hazardous air pollutants (HAP), in which both the individual and total annual HAP emissions for the facility were compiled and compared to threshold emission rates. The second analysis involved the application of an air dispersion model (USEPA's Industrial Source Complex Short-Term Model or ISCST3) to all air toxics emissions for assessing both short-term (hourly) and annual off-site impacts (both scenarios). A total of 10 air toxics were evaluated with respect to their Short-Term Guideline Concentrations (SGCs), and 18 with respect to their Annual Guideline Concentrations (AGCs), as promulgated by the New York State Department of Environmental Conservation (NYSDEC). All dispersion modeling was performed consistent with applicable USEPA and DEP policies and procedures.

Table H-1 presents results of the major-source analysis for HAP (no-build and build scenarios). Neither any individual HAP threshold (10 tons per year) nor the aggregate HAP threshold (25 tons per year) was exceeded under either scenario. Based on results of this analysis, the facility is not considered "major" in terms of its HAP emissions and, as such, is not required to implement "maximum available control technology" (MACT) as part of the upgrade.

Table H-2 presents the maximum predicted hourly site-perimeter air toxics impacts (no-build and build scenarios) based on the ISCST3 dispersion modeling. There were no predicted exceedances of any SGC under either scenario.

Table H-3 presents the maximum predicted annual site-perimeter air toxics impacts (no-build and build scenarios) based on the ISCST3 dispersion modeling. AGC exceedances were predicted for chloroform and 1,4-dichlorobenzene under the no-build scenario, and for chloroform, 1,4-dichlorobenzene, and tetrachloroethene under the build scenario.

Limited exemptions for complying with AGC exceedances (build scenario) are provided by the NYSDEC under certain conditions, thus obviating the need for emissions control, but only when the AGC exceedance factor is less than 10. Section IV.C.2 of the DEC's Air Guide-1 (1991 edition) states that if an AGC is based on a one-in-a-million risk level (as is the case for the three air toxics of concern), the source, "if it has BACT [best available control technology] installed, may be permitted if the risk associated with the total ambient impact is less than 10^{-5} (one-in-a-hundred-thousand). In this particular case, a 10^{-5} level of risk is associated with a predicted ambient concentration of 10 times the AGC."

"For some sources," as stated in Section III.C.3.a of Appendix A to Air Guide-1, "BACT may be determined to be 'no control' if it is not technically or economically feasible." However, in no case, regardless of whether BACT exists, can a source exceed the 10^{-5} level of risk.

The objective of the DEC's BACT policy is "to achieve the greatest possible emissions reduction to protect public health and the environment without placing an unreasonable financial or technical burden on a source owner." Typically, this evaluation is based on the calculated cost of each ton of pollutant removed, and must be performed separately for each compound of concern.

For this project, a comprehensive BACT analysis was performed in accordance with applicable NYSDEC policies and procedures. This analysis involved performance of a regulatory feasibility study to determine the selection or elimination of control options for each air pollution source based on consideration of technical feasibility, energy requirements, the environment, and economic impact. The sources identified in this analysis were the preliminary settling tanks, the aeration tanks, the final settling tanks, and the effluent drops. Control alternatives considered included covering, thermal and catalytic incineration, carbon adsorption, absorption, and bio-oxidation.

A summary of the BACT analysis results is provided in the following tables. Details of this analysis are provided in the report, "CEQR Air Quality Analysis for Air Toxics for the Tallman Island Water Pollution Control Plant, Phase 1A Upgrade," Revised March 2006.

Table H-4 presents the maximum predicted sole-source annual off-site impact for chloroform, 1,4-dichlorobenzene, and tetrachloroethene -- the regulated compounds which exceeded their AGCs (Table H-3). This dispersion modeling was necessary in order to identify which sources needed to be controlled within the context of the BACT analysis. From this analysis, it was evident that controls for the preliminary settling tanks, the aeration tanks, the final settling tanks, and the effluent drops needed to be considered with respect to chloroform. For 1,4-dichlorobenzene and tetrachloroethene, controls needed to be considered only for the aeration tanks.

Table H-5 presents the evaluated cost per ton of air toxic removed for the selected control technologies. For each source of concern, as discussed above, selection was based on consideration of a full range of potentially viable control options with respect to technology, energy, and the environment. The selected control technologies were: (a) covering, with treatment of the resultant air flow via carbon adsorption, for the aeration tanks; and (b) covering, without any treatment, for the preliminary settling tanks, the final settling tanks, and the effluent drops. For chloroform, the total annualized cost to achieve AGC compliance was determined to be $3.1 million, and the cost per ton removed was $17.2 million. For 1,4-dichlorobenzene, the total annualized cost was $2.4 million, and the cost per ton removed was $24.0 million. For tetrachloroethene, the total annualized cost was $2.4 million, and the cost per ton removed was $3.8 million.

Regardless of whether the annualized cost or the cost per ton removed is considered, the cost to control any of the three air toxics to the levels necessary to achieve AGC compliance would clearly place an unreasonable financial burden on the DEP and the City of New York. Therefore, in accordance with the above NYSDEC guidance, BACT may be defined for this plant as "no control," and further control of air toxics is not required.

TABLE H-1

MAJOR-SOURCE THRESHOLD ANALYSIS FOR HAP

Hazardous Air Pollutant	CAS No.	Facility Emissions			
		No-Build Scenario		Build Scenario	
		lb/yr	TPY	lb/yr	TPY
chloroform (trichloromethane)	00067-66-3	255.31	0.13	664.76	0.33
1,4-dichlorobenzene (p-dichlorobenzene)	00106-46-7	191.37	0.10	574.35	0.29
ethyl benzene	00100-41-4	13.32	0.01	24.48	0.01
methylene chloride (dichloromethane)	00075-09-2	978.26	0.49	2,381.25	1.19
tetrachloroethene (tetrachloroethylene)	00127-18-4	755.58	0.38	2,081.27	1.04
toluene	00108-88-3	80.26	0.04	196.81	0.10
trichloroethene (trichloroethylene)	00079-01-6	30.47	0.02	97.03	0.05
1,2-xylene (o-xylene)	00095-47-6	13.55	0.01	20.79	0.01
1,3-xylene (m-xylene)	00108-38-3	47.60	0.02	151.99	0.08
1,4-xylene (p-xylene)	00106-42-3	37.00	0.02	59.60	0.03
gamma-BHC (hexachlorocyclohexane) (lindane)	00058-89-9	0.00	0.00	0.01	0.00
chlordane	00057-74-9	0.03	0.00	0.09	0.00
bis(2-ethylhexyl)phthalate (dioctyl phthalate)	00117-81-7	4.72	0.00	42.05	0.02
di-n-butylphthalate (dibutyl phthalate)	00084-74-2	0.03	0.00	0.18	0.00
	Total	**2,407.50**	**1.20**	**6,294.66**	**3.15**

TABLE H-2

MAXIMUM PREDICTED HOURLY SITE-PERIMETER AIR TOXICS IMPACTS

Regulated Compound	CAS No.	Predicted Concentration (ug/m^3)		SGC (ug/m^3)	SGC Exceedance Factor	
		No-Build	Build		No-Build	Build
chloroform (trichloromethane)	00067-66-3	9.24966	20.65581	150.0	0.06	0.14
1,2-dichlorobenzene (o-dichlorobenzene)	00095-50-1	0.56570	1.03221	30000.0	0.00	0.00
ethyl benzene	00100-41-4	2.03695	2.68093	54000.0	0.00	0.00
methylene chloride (dichloromethane)	00075-09-2	96.68836	178.73745	14000.0	0.01	0.01
tetrachloroethene (tetrachloroethylene)	00127-18-4	37.50456	146.02895	1000.0	0.04	0.15
toluene	00108-88-3	6.08972	8.65051	37000.0	0.00	0.00
trichloroethene (trichloroethylene)	00079-01-6	1.35836	4.61241	54000.0	0.00	0.00
1,2-xylene (o-xylene)	00095-47-6	2.65631	3.94508	4300.0	0.00	0.00
1,3-xylene (m-xylene)	00108-38-3	8.91481	12.20985	4300.0	0.00	0.00
1,4-xylene (p-xylene)	00106-42-3	8.84802	12.56276	4300.0	0.00	0.00

TABLE H-3

MAXIMUM PREDICTED ANNUAL SITE-PERIMETER AIR TOXICS IMPACTS [a]

Regulated Compound	CAS No.	Predicted Concentration (ug/m^3)		AGC (ug/m^3)	AGC Exceedance Factor	
		No-Build	Build [b]		No-Build	Build
bromodichloromethane	00075-27-4	0.00550	0.00731	0.020	0.28	0.37
chloroform (trichloromethane)	00067-66-3	0.18909	0.33349	0.043	**4.40**	**7.76**
1,2-dichlorobenzene (o-dichlorobenzene)	00095-50-1	0.00561	0.03354	360.0	0.00	0.00
1,4-dichlorobenzene (p-dichlorobenzene)	00106-46-7	0.12317	0.28409	0.090	**1.37**	**3.16**
ethyl benzene	00100-41-4	0.00762	0.02078	1,000.0	0.00	0.00
methylene chloride (dichloromethane)	00075-09-2	0.75522	0.99356	2.1	0.36	0.47
tetrachloroethene (tetrachloroethylene)	00127-18-4	0.46707	1.78529	1.0	0.47	**1.79**
toluene	00108-88-3	0.04551	0.18561	400.0	0.00	0.00
trichloroethene (trichloroethylene)	00079-01-6	0.01936	0.11897	0.50	0.04	0.24
1,2-xylene (o-xylene)	00095-47-6	0.00854	0.01446	100.0	0.00	0.00
1,3-xylene (m-xylene)	00108-38-3	0.02510	0.14837	100.0	0.00	0.00
1,4-xylene (p-xylene)	00106-42-3	0.02099	0.04192	100.0	0.00	0.00
gamma-BHC (lindane)	00058-89-9	0.00000	0.00002	1.2	0.00	0.00
chlordane	00057-74-9	0.00003	0.00012	1.2	0.00	0.00
benzyl butyl phthalate	00085-68-7	0.00008	0.00041	12.0	0.00	0.00
bis(2-ethylhexyl)phthalate	00117-81-7	0.00418	0.04498	0.42	0.01	0.11
di-n-butylphthalate (dibutyl phthalate)	00084-74-2	0.00003	0.00023	12.0	0.00	0.00
diethyl phthalate	00084-66-2	0.00012	0.00031	12.0	0.00	0.00

Notes:

(a) Shaded, bolded entry indicates exceedance of respective AGC.

(b) Conservative, process air-flow and emission-source representations were employed in the TOXCHEM+ modeling. However, more accurate, less-conservative representations of these input parameters were employed for the limiting compounds of bromodichloromethane, chloroform, 1,4-dichlorobenzene, methylene chloride, and tetrachloroethene (build scenario only).

TABLE H-4

MAXIMUM PREDICTED SOLE-SOURCE ANNUAL OFF-SITE IMPACT FOR THE REGULATED COMPOUNDS OF CONCERN

Chloroform				1,4-Dichlorobenzene				Tetrachloroethene			
Predicted Conc. (ug/m^3)	AGC (ug/m^3)	AGC Exceedance Factor [(a)]	Minimum Emissions Reduction for AGC Compliance (%)	Predicted Conc. (ug/m^3)	AGC (ug/m^3)	AGC Exceedance Factor [(a)]	Minimum Emissions Reduction for AGC Compliance (%)	Predicted Conc. (ug/m^3)	AGC (ug/m^3)	AGC Exceedance Factor [(a)]	Minimum Emissions Reduction for AGC Compliance (%)
Preliminary Settling Tanks											
0.07770	0.043	**1.81**	44.7	0.06216	0.090	0.69	NA	0.15658	1.0	0.16	NA
Aeration Tanks											
0.30976	0.043	**7.20**	86.1	0.26411	0.090	**2.93**	65.9	1.73994	1.0	**1.74**	42.5
Final Settling Tanks											
0.05489	0.043	**1.28**	21.7	0.04550	0.090	0.51	NA	0.07295	1.0	0.07	NA
Effluent Drops											
0.07169	0.043	**1.67**	40.0	0.05984	0.090	0.66	NA	0.18604	1.0	0.19	NA

TABLE H-5

EVALUATED COST PER TON OF AIR TOXIC REMOVED FOR THE SELECTED CONTROL TECHNOLOGIES

Cost Element	Preliminary Settling Tanks	Aeration Tanks	Final Settling Tanks	Effluent Drops	Total
annualized capital cost ($)	159,237	1,295,695	387,815	572	1,843,319
annualized recurring cost ($)	56,083	1,054,588	120,050	1,240	1,231,961
total annualized cost ($)	**215,320**	**2,350,283**	**507,865**	**1,812**	**3,075,280**
Chloroform					
emissions (TPY)	0.027	0.118	0.018	0.022	0.185
removal efficiency (%)	99	95	99	99	
removal (TPY)	0.027	0.112	0.018	0.022	0.178
cost per ton removed ($/ton)	**8,100,000**	**21,000,000**	**28,500,000**	**100,000**	**17,200,000**
1,4-Dichlorobenzene					
emissions (TPY)		0.103			0.103
removal efficiency (%)		95			
removal (TPY)		0.098			0.098
cost per ton removed ($/ton)		**24,000,000**			**24,000,000**
Tetrachloroethene					
emissions (TPY)		0.654			0.654
removal efficiency (%)		95			
removal (TPY)		0.621			0.621
cost per ton removed ($/ton)		**3,800,000**			**3,800,000**