PENNSYLVANIA AVENUE LANDFILL

LEACHATE TREATABILITY STUDY FINAL REPORT

Prepared for:

NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION

Prepared by:

URS CONSULTANTS, INC.
PARAMUS, NJ 07652

JULY 1996

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1.0 INTRODUCTION

1.1 Project Background

The Pennsylvania Avenue Landfill (PAL) is located adjacent to Jamaica Bay in Brooklyn, New York. Since 1983, there has been oil seepage from the landfill on its western side along the Fresh Creek shoreline. The results of the Remedial Investigation (RI)/Feasibility Study (FS) for PAL, completed by URS for the New York City Department of Environmental Protection (NYCDEP) in September 1994, concluded that this oil is a source of contamination to the surface water and localized sediments in Fresh Creek, as well as to the groundwater in the leachate mound beneath the site. As stated in the site's Record of Decision (ROD), issued by the New York State Department of Environmental Conservation (NYSDEC) in February 1995, the waste oil in addition to containing volatile and semi-volatile compounds is contaminated with PCBs at levels that classify it as a hazardous waste.

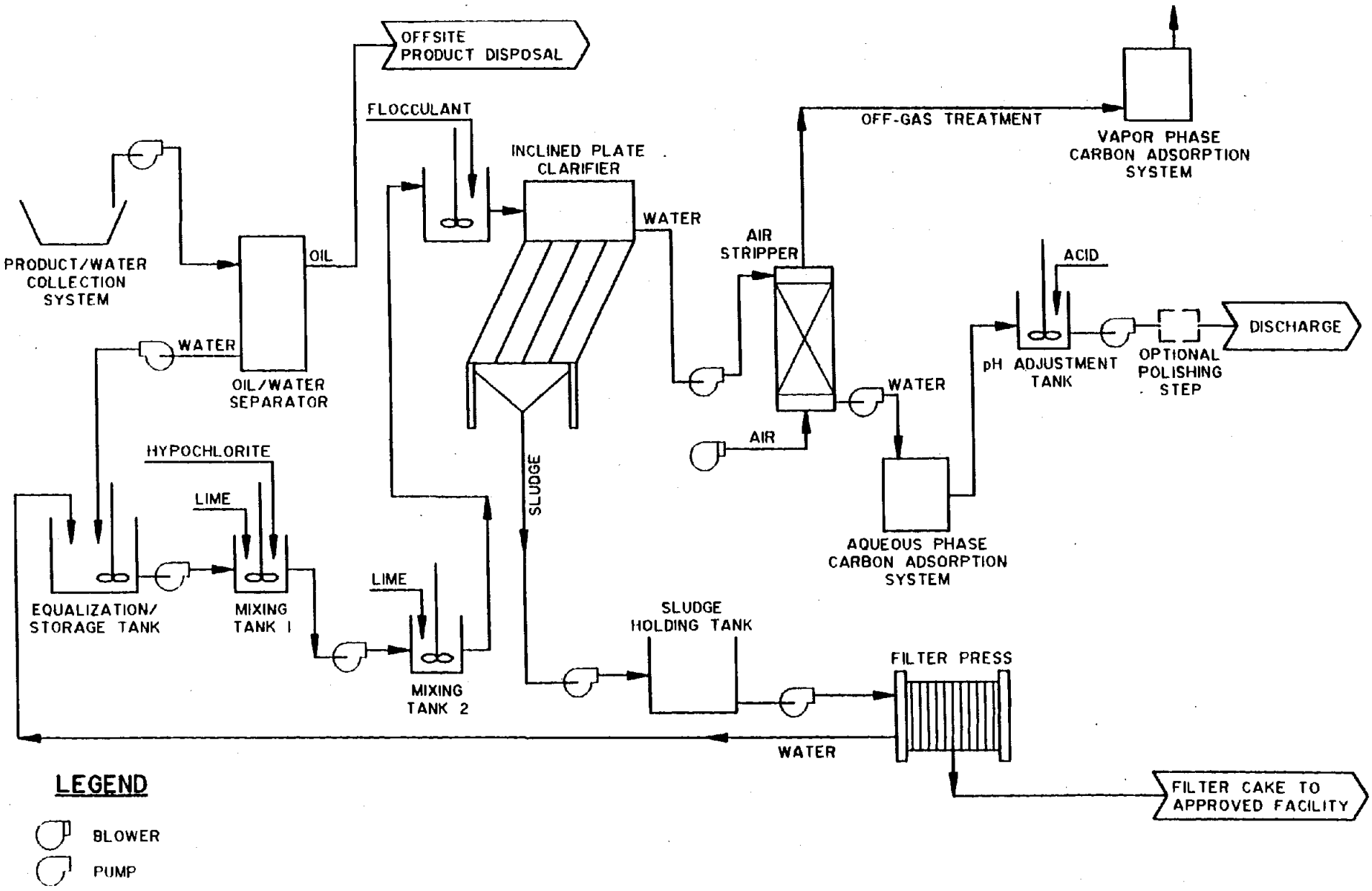
The ROD selected active leachate collection only in this oil seepage area, rather than along the full perimeter of the site, because it was estimated that approximately 90% of the site's contaminant releases to Jamaica Bay are from this area.

Leachate treatment alternatives originally were evaluated in the PAL FS using data collected during the RI. The leachate treatment system, depicted in Figure 1-1, was recommended based on the evaluation in the FS. Based on this treatment system, NYCDEP submitted a treatability study work plan to NYSDEC in December 1994.

In a March 3, 1995 letter, NYSDEC informed NYCDEP that discharge limitations for ammonia would be in effect for the PAL leachate. In August 1995 NYSDEC informed NYCDEP that the 30-day average effluent ammonia discharge standard would be 10 mg/l and that the work plan should be modified to address ammonia treatment to this standard. A revised treatability study work plan, which addressed NYSDEC concerns about ammonia, was submitted by NYCDEP to NYSDEC on September 11, 1995. On September 28, 1995, NYSDEC sent a letter to NYCDEP which presented the final NYSDEC standards for discharge of treated PAL leachate to Jamaica Bay. In that letter, NYSDEC indicated that its Division of Water would review the results of the PAL Leachate Treatability Study and possibly adjust the ammonia discharge limit accordingly. On October 2, 1995, NYSDEC sent a letter to NYCDEP approving the September 11, 1995 treatability study work plan. In October 1995, NYCDEP prepared draft bid specifications for the treatability study, which were reviewed and approved by NYSDEC. Copies of the above-referenced correspondence are presented in Attachment 1.

Because of the stringent 10 mg/l ammonia discharge standard, NYCDEP's Bureau of Environmental Engineering contacted NYCDEP's Bureau of Clean Water (now Bureau of Wastewater Pollution Control) on November 22, 1995 to discuss its requirements for discharge of PAL leachate into the 26th Ward Water Pollution Control Plant (WPCP). The Bureau responded that the leachate might be acceptable at the 26th Ward WPCP provided it was pretreated for polychlorinated biphenyls (PCB's), toluene, chloroform, tetrachloroethylene, and flashpoint. The correspondence concerning this issue is found in Attachment 1.

On November 8, 1995, Requests for Quotations were issued for the treatability study, and seven were received by URS by November 21. After bid review and recommendations for



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PENNSYLVANIA AVENUE LANDFILL
TREATMENT SYSTEM FOR DISCHARGE TO FRESH CREEK
PROPOSED IN PALFS

FIGURE 1-1

award by URS, NYCDEP and NYSDEC approved the award of this work to Waste Stream Technologies, Inc. (WST) on December 20, 1995. The subcontract between URS and WST was signed in January 1996, and after an improvement in weather and site conditions, the study was initiated in mid-February 1996.

1.2 Project Objectives

Bench-scale testing was used to evaluate three different methods of leachate management, as shown in Figure 1-2. Treatment Trains 1 and 2 were used to evaluate treatment required for discharge to Jamaica Bay, whereas Treatment Train 3 addressed pretreatment prior to discharge to the 26th Ward WPCP.

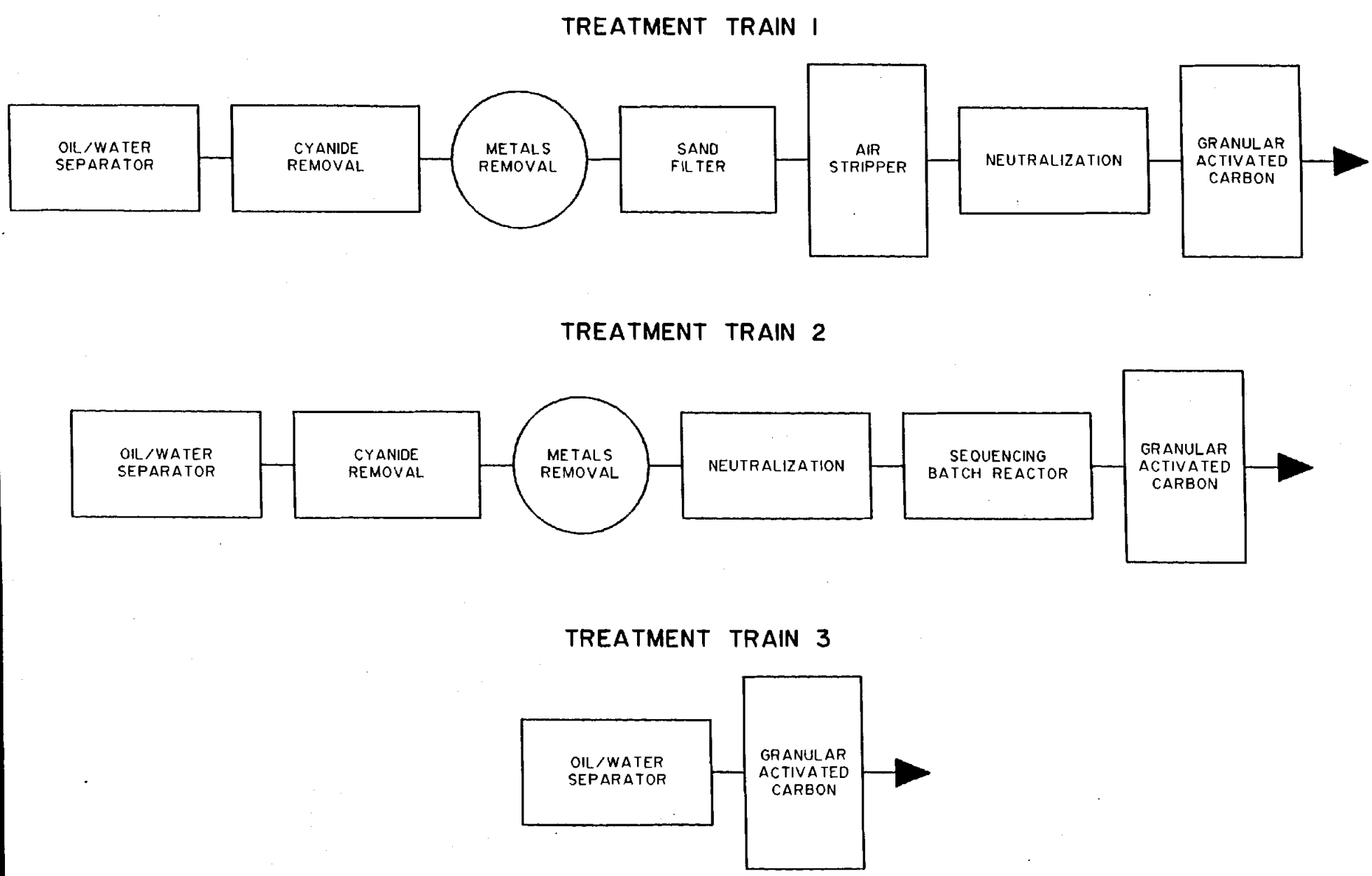
The major difference between the first two treatment trains is that in Treatment Train 1, ammonia is treated by physical/chemical processes, whereas in Treatment Train 2, it is treated through a biological process. Treatment Trains 1 and 2 were included in the original treatability study work plan and bid specifications. Treatment Train 3 was added to the study scope of work after selection of WST. The additional scope of work was approved in writing by both NYCDEP and NYSDEC prior to its commencement by WST.

The major objective of the treatability study for Treatment Trains 1 and 2 was to define a process, comprised of appropriate unit operations, that would reduce the concentrations of contaminants in the leachate to levels that consistently meet the NYSDEC limits for discharge to Jamaica Bay. The major objective for Treatment Train 3 was to define a pretreatment system that would reduce concentrations of PCBs, toluene, chloroform, tetrachloroethylene and flashpoint to appropriate levels before discharge to the 26th Ward WPCP.

The specific objectives of the treatability study (identified in the work plan) were to:

- Evaluate candidate treatment technologies capable of reducing or removing contaminants of concern to appropriate levels
- Identify critical physical and chemical parameters having major effects on technology performance
- Select a treatment scenario, comprised of cost-effective candidate technologies which has the ability to meet discharge criteria
- Develop conceptual design criteria for those candidate treatment technologies.
- Develop a conceptual design, with associated Feasibility Study level cost estimates, for the selected treatment scenario.

Although this treatability study report will be used as an aid for design, it is not intended to be used as a final design or contract document. Further development will be required for preparation of a Design Analysis Report and/or performance specification.



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PENNSYLVANIA AVENUE LANDFILL
TREATABILITY STUDY TREATMENT TRAIN ALTERNATIVES

FIGURE 1-2

1.3 Description of Work

The following work was implemented to address the project objectives, consistent with the approved work plan and the subsequent addition of Treatment Train 3:

- Field sampling to collect a representative sample for treatability testing (described in Section 2.0)
- Bench-scale testing performed by WST (summarized in Section 4.0. Complete results of the bench scale study are presented as Appendix A)
- Development of preliminary design criteria (presented in Section 5.0)
- Evaluation of treatment train options (presented in Section 6.0)
- Recommendation for a treatment method (presented in Section 7.0)

2.0 LEACHATE ANALYSIS

Based on discussions between NYSDEC and URS, it was decided that the wells to be sampled for the leachate treatability study should extend beyond the north-south range of the thirteen monitoring wells used in the leachate treatment analysis (LTA) presented in the Feasibility Study for the landfill. It was felt that this expanded geographic range of wells would provide a more representative sample of the combined liquid anticipated to be collected by an upgraded active oil/leachate collection trench version of the existing passive trench.

Eight of the thirteen wells used in the LTA were again sampled for the leachate treatability study. These included HP-OW-2A, HP-102U-A, HP-320A, HP-OW3A, HP-319, HP-OW4A, HP-OW5A, and HP-107. Three of them (HP-102U-A, HP-320A, and HP-319) were also evaluated in the oil plume investigation conducted as part of the Feasibility Study. In addition to these eight wells, five others were sampled including ORW-2, HP-320, HP-OW3, ORW-1, and HP-OW6A.

For this treatability study, URS collected equal aliquots of eight gallons of leachate from each of the thirteen wells. These wells are indicated in Figure 2-1. All wells are screened in the shallow (water table) aquifer. URS shipped six small containers of leachate, totaling 104 gallons, to WST which then composited the contents into two 55-gallon drums. To verify analytical results of the two larger composites, a sample of leachate composited in the field by URS also was shipped to WST.

The analytical results for these three composite samples are presented in Table 2-1. This table also presents a summary of data collected during the RI which was used for the conceptual design of the leachate treatment system in the Feasibility Study. RI data includes sampling results from thirteen monitoring wells in the area of the oil seepage. In the Feasibility Study, analytical results from the thirteen monitoring wells were used to estimate leachate concentrations of all parameters except biological oxygen demand (BOD), oil and grease (O&G), and petroleum hydrocarbons. These wells included HP-102U-A, HP-107, HP-313, HP-317A, HP-319, HP-320A, HP-402, HP-404, HP-OW-1A, HP-OW-2A, HP-OW-3A, HP-OW-4A, and HP-OW-5A. The wells evaluated during the oil investigation at PAL were used to estimate concentrations of BOD, petroleum hydrocarbons, and O&G in the Feasibility Study. These include HP-309, HP-404, HP-319, HP-102U-A, HP-320A, and HP-317. Monitoring well locations used in the Feasibility Study are shown in Figure 2-1.

Comparison of the treatability study and RI total volatile organic compounds (VOCs) analyses revealed that treatability study composite samples were similar to the average total VOC concentration developed from RI data, although the compounds detected and the concentrations of individual compounds were not identical. The total concentrations of semivolatile organic compounds (SVOCs) in the treatability study composite samples were considerably less than total SVOCs developed from RI data. This difference primarily was due to 2-methylnaphthalene (not detected in treatability study composites), naphthalene, and bis(2-ethylhexyl)phthalate (BEHP).

Pesticides were not detected in treatability study composite samples, but were detected infrequently at low concentrations during the RI and, therefore, their absence in the composites was not unusual. PCB concentrations in treatability study composite samples were comparable to those of the RI. Antimony, beryllium, cobalt, copper, lead, nickel, silver, and vanadium were

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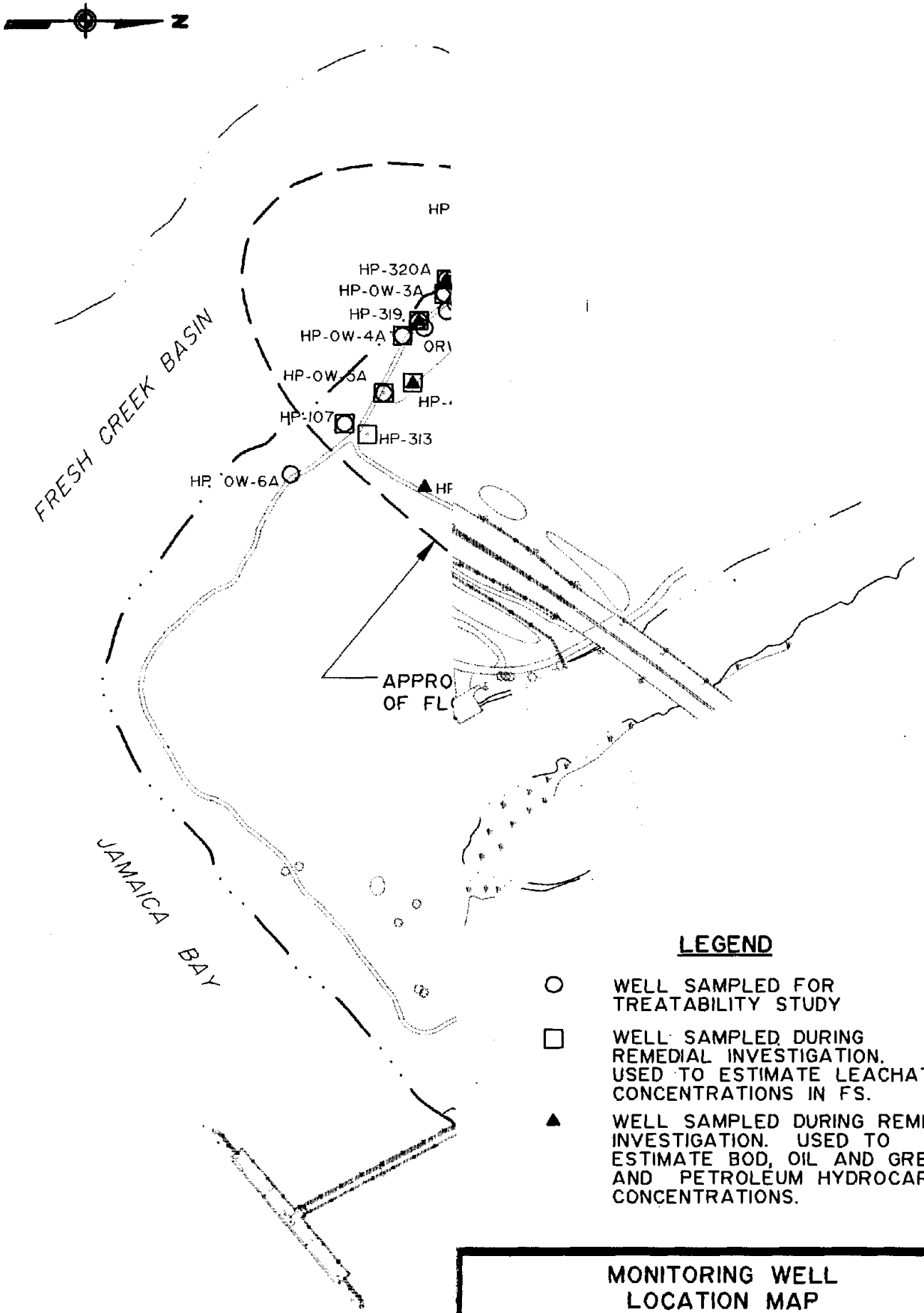

NOTE: ALL WELLS SCREENED IN SHAL

MONITORING WELL LOCATION MAP

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FIGURE 2-1

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TABLE 2-1
PENNSYLVANIA AVENUE LANDFILL
LEACHATE CHARACTERISTICS

PARAMETER	Type	Units	RI DATA			TREATABILITY STUDY DATA			Discharge Limit for Direct Discharge
			Average Detected Concentration	Maximum Detected Concentration	Design Concentration	Field Comp.	Drum 1	Drum 2	
Vinyl Chloride	VOC	ug/L	14.6	130	58.5				50
Acetone	VOC	ug/L	21.9	130	87.7				
Carbon Disulfide	VOC	ug/L	2.8	5	5				
1,1-Dichloroethene	VOC	ug/L	36.6	380	146.5				
1,2-Dichloroethene (Total)	VOC	ug/L	135.4	1700	541.5				30
1,1,1-Trichloroethane	VOC	ug/L	23.1	240	92.3				10
Methylene Chloride	VOC	ug/L				3.8	44	46	10
1,1-Dichloroethane	VOC	ug/L				6.3	43	37	30
1,2-Dichloroethane	VOC	ug/L				2.1			
1,3-Dichlorobenzene	VOC	ug/L				3.0			
1,4-Dichlorobenzene	VOC	ug/L				11.5	19	15	
1,2-Dichlorobenzene	VOC	ug/L				29.7	108	88	
Trichloroethene	VOC	ug/L	24.6	260	98.5				11
Benzene	VOC	ug/L	146.2	1100	584.9	57.8	166	152	6
Tetrachloroethene	VOC	ug/L	14.6	130	58.5				1
Toluene	VOC	ug/L	1,549.9	17000	6,199.4	330	5180	3890	10
Chlorobenzene	VOC	ug/L	202.8	580	580	49.2	114	101	5
Ethylbenzene	VOC	ug/L	299.7	2500	1,198.7	78.1	571	429	10
Xylene (Total)	VOC	ug/L	1,587.3	16000	6,349.2				10
TOTAL VOCs		ug/L	4,059.5	40155	16,000.7	571.5	6245	4758	
1,3-Dichlorobenzene	Semi	ug/L	7	18	18	4.0	3.6	2.6	50 (1)
1,4-Dichlorobenzene	Semi	ug/L	12.02	35	35	14.9	19.3	13.2	50 (1)
1,2-Dichlorobenzene	Semi	ug/L	438.6	5600	1,754.5	61.4	121.0	81.7	50 (1)
4-Methylphenol	Semi	ug/L	4.9	3.5	3.5				
1,2,4-Trichlorobenzene	Semi	ug/L	430.8	5500	1,723.1	29.8	71.9	21.6	2
Naphthalene	Semi	ug/L	1,330.1	16000	5,320.3	202	325	196	
2-Methylnaphthalene	Semi	ug/L	1,110.2	14000	4,440.8				
2,4-Dimethylphenol	Semi	ug/L						12.7	
Dimethylphthalate	Semi	ug/L	5.5	12	12				
Acenaphthylene	Semi	ug/L	4.8	2.9	2.9				
Acenaphthene	Semi	ug/L	245.1	3000	980.2	12	24.8	6.3	
Dibenzofuran	Semi	ug/L	6	18.5	18.5				
Diethylphthalate	Semi	ug/L	7.2	33	28.6				
Fluorene	Semi	ug/L	240.96	3000	963.8	8.8	20.8	4.8	
Isophorone	Semi	ug/L				4.6			
4-Nitroaniline	Semi	ug/L	142.3	1700	569.2				
N-Nitrosodiphenylamine	Semi	ug/L	715.8	8800	2,863.2	54.7	101	56	
Phenanthrene	Semi	ug/L	611.9	7800	2,447.5	19.6	53.1	7.7	
Anthracene	Semi	ug/L	4.7	8	8	5.6	10.6	3.5	
Carbazole	Semi	ug/L	5.9	17	17				
Di-n-butylphthalate	Semi	ug/L	220	2800	880	4.2	3.9		
Fluoranthene	Semi	ug/L	230.5	2900	921.8	7.1	21.3		
Pyrene	Semi	ug/L	213.9	2600	855.4	6	18.5		
Benzo(a)anthracene	Semi	ug/L	6.2	20	20		7.2		
Chrysene	Semi	ug/L	4.8	2.0	2.0	2.3	8.2		
bis(2-Ethylhexyl)phthalate	Semi	ug/L	1,139.5	14000	4558	52.3	75.5	7.2	800
Di-n-octylphthalate	Semi	ug/L	5.4	12	12		4.8		
Benzo(b)fluoranthene	Semi	ug/L	6.2	20	20		4.9		
Benzo(k)fluoranthene	Semi	ug/L					4.0		
Benzo(a)pyrene	Semi	ug/L	5.1	6.5	6.5		4.4		0.6
Benzo(g,h,i)perylene	Semi	ug/L	4.9	3.5	3.5				
TOTAL Semi		ug/L	7,159.9	87,911.9	28,485.5	489.3	903.8	413.3	
alpha-BHC	Pest	ug/L	0.19	2.2	0.77				0.01
Aldrin	Pest	ug/L	0.08	0.68	0.30				0.02 (2)
Dieldrin	Pest	ug/L	0.05	0.04	0.04				0.02 (2)
Endosulfan Sulfate	Pest	ug/L	0.05	0.05	0.05				0.3
Methoxychlor	Pest	ug/L	0.03	0.05	0.05				0.4
Endrin Aldehyde	Pest	ug/L	0.08	0.39	0.31				
alpha-Chlordane	Pest	ug/L	0.06	0.45	0.23				0.6
TOTAL Pest		ug/L	0.5	3.9	1.8				
Aroclor - 1248	PCB	ug/L	17.28	200	69.13				ND (3)
Aroclor - 1254	PCB	ug/L	17.42	200	69.66	4.38	2.46		ND (3)
Aroclor - 1260	PCB	ug/L	31.48	370	125.92	7.83	4.52		ND (3)
TOTAL PCBs			66.18	770	264.71	12.21	6.98		

TABLE 2-1
PENNSYLVANIA AVENUE LANDFILL
LEACHATE CHARACTERISTICS

PARAMETER	Type	Units	RI DATA			TREATABILITY STUDY DATA			Discharge Limit for Direct Discharge
			Average Detected Concentration	Maximum Detected Concentration	Design Concentration	Field Comp.	Drum 1	Drum 2	
Aluminum	Met	mg/L	1.008	8.240	4.033	0.615			
Antimony	Met	mg/L	0.031	0.041	0.041				
Arsenic	Met	mg/L	0.006	0.014	0.014	0.008		0.006	0.150
Barium	Met	mg/L	0.425	0.934	0.934	0.542	0.149	0.182	
Beryllium	Met	mg/L	0.002	0.001	0.001				
Cadmium	Met	mg/L	0.002	0.002	0.002				0.003
Calcium	Met	mg/L	205.546	332	332	126	125	124	
Chromium	Met	mg/L	0.016	0.045	0.045	0.017	0.029	0.018	0.50
Cobalt	Met	mg/L	0.019	0.050	0.050				
Copper	Met	mg/L	0.023	0.055	0.055				0.03
Iron	Met	mg/L	12.431	38.7	38.7	7.8	7.2	9.9	
Lead	Met	mg/L	0.020	0.1	0.081				0.086
Magnesium	Met	mg/L	201.769	610	610	124	124	131	
Manganese	Met	mg/L	0.244	0.433	0.433	0.330	0.758	0.396	
Nickel	Met	mg/L	0.024	0.041	0.041				0.071
Potassium	Met	mg/L	134.854	277	277	141	136	145	
Silver	Met	mg/L	0.005	0.004	0.004				0.023
Sodium	Met	mg/L	1,020.538	6470	4,082.154	658	652	708	
Vanadium	Met	mg/L	0.030	0.059	0.059				
Zinc	Met	mg/L	0.049	0.203	0.196	0.091	0.028	0.027	0.400
Cyanide	Misc	mg/L	0.043	0.149	0.149	0.040	0.040	0.050	0.010 (4)
Alkalinity	Misc	mg/L	1,850.700	3420	3420	2120	2030	1930	
Ammonia-Nitrogen	Misc	mg/L	135.561	517	517	231	239.5	241.5	10 (5)
Chloride	Misc	mg/L	1,586.077	11600	6,344.308				
Hardness	Misc	mg/L	1,488.100	3620	3620				
Nitrate-Nitrogen	Misc	mg/L	30.900	0.8	0.8				
Phenols	Misc	mg/L	0.153	0.496	0.496				
Sulfate	Misc	mg/L	388.869	1470	1470				
Total Dissolved Solids	Misc	mg/L	4,781.538	21600	19,126.154	3363	3205	3279	
Total Suspended Solids	Misc	mg/L				83.6	82.4	33.6	50
Total Kjeldahl Nitrogen	Misc	mg/L	236.854	934	934				
Biological Oxygen Demand (5 day)	Misc	mg/L	252.167	1390	1,008.668	98.5	547.8	92	
Chemical Oxygen Demand	Misc	mg/L				599	729	555	
Petrolium Hydrocarbons	Misc	mg/L	41,175.917	247000	164,703.670	329	81.5	6.6	500
Oil and Grease	Misc	mg/L	77,011.950	462000	308047.8	493	170	24.840	15

NOTES: 1. Discharge limitation for Total Dichlorobenzene = 50 µg/L.
2. Discharge limitation for sum of Aldrin and Dieldrin = 0.02 µg/L.
3. Non-detect at minimum detection limit (MDL). The laboratory must make all reasonable attempts to achieve and MDL at 0.065 µg/L, and to analyze PCBs using USEPA Method 608.
4. Limitation is for free Cyanide.
5. Limitation is 10 mg/L average and 20 mg/L maximum.

not detected in treatability study composite samples, although they were reported during the RI. This was not unusual since the metals were detected infrequently and/or at low concentrations during the RI. Other metals detected in the composite samples were at concentrations similar to average concentrations derived from the RI data. Average RI and treatability study concentrations were comparable for cyanide and all conventional parameters, except petroleum hydrocarbons and O&G. Petroleum hydrocarbon and O&G concentrations would not be expected to be similar, since the samples used to compute the average concentration in the Feasibility Study were from samples that were largely oil product.

In general, the raw leachate data from the treatability study were similar to RI data used for the Feasibility Study. As noted above, eight of the 13 RI wells were used to collect samples for the treatability study. The other five wells sampled for the treatability study, although in the same general location, could have concentrations of the parameters of concern that would account for the relatively small variability between the RI and treatability study raw leachate data. Also, the treatability study samples were collected 2½ years after monitoring wells were sampled during the RI and, therefore, some variation would be expected as a result of changing conditions over time.

3.0 TREATMENT GOALS

The treatment goals for Treatment Trains 1 and 2 were the preliminary discharge criteria developed by NYSDEC and submitted to NYCDEP on September 28, 1995 (Attachment 1). They are presented in Table 2-1.

The treatment goals for Treatment Train 3 were based on input from NYCDEP Bureau of Clean Water. A December 12, 1995 internal memo from that Bureau identified four contaminants of concern: PCBs, toluene, chloroform, and tetrachloroethylene. A flash point greater than 140°F and pH between 5 and 11 were also mentioned.

4.0 SUMMARY OF TREATABILITY STUDY RESULTS

The treatability testing was performed in WST's facility between February and May 1996. A detailed description of the test procedures and results are presented in its report *Pennsylvania Avenue Landfill Leachate Treatability Study* dated May 28, 1996 (Appendix A).

Two types of tests were performed: jar and flow-through. Jar tests were used for preliminary evaluation of technologies and to develop conditions for subsequent flow-through tests. Flow-through tests were used to evaluate performances of individual unit operations and the abilities of treatment trains to meet treatment goals. Unit operations in flow-through tests were tested individually using raw leachate or leachate treated by previous processes in the treatment train.

Jar tests were used to evaluate oil/PCB removal, cyanide removal, metals removal, ammonia removal by air stripping, and the adsorptive capacity of activated carbon. Flow-through tests were used to evaluate Treatment Train 1 (i.e., physical/chemical treatment using unit processes for oil/water separation, cyanide removal, metals removal, filtration, air stripping, neutralization, and activated carbon adsorption), and Treatment Train 3 (i.e., physical/chemical treatment using unit processes for oil/water separation and activated carbon adsorption).

Flow-through tests also were planned for Treatment Train 2 (a treatment train similar to Treatment Train 1, except biological treatment is substituted for air stripping). These tests were not performed, however, because the significant number of development tests used to evaluate biological treatment were unfavorable.

Testing scenarios and procedures are summarized in the subsections below. Results for jar tests, the Treatment Train 1 flow-through test, the Treatment Train 3 flow-through test, and biological treatment tests are summarized in Tables 4-1, 4-2, 4-3, and 4-4, respectively. The results also are discussed in the subsections below.

4.1 Oil/Water Separator

Both jar test and flow-through studies were conducted to determine the effectiveness of oil/water separation in removing O&G and PCBs from the raw leachate. Additional analytical tests were run during the flow-through testing phase to evaluate the possible removal of other leachate constituents (TPH, BOD, COD, and cyanide). Results of oil/water separation tests are included in pages 24-27 of Appendix A.

4.1.1 Testing Scenarios

The following tests were completed as part of the oil/water separation phase of the treatability study:

Jar Tests - Gravity Separation (Separatory Funnel)

a. Untreated Leachate - Coarse Filtered
b. pH 4.5 - pH lowered with sulfuric acid, solids settled and filtered
c. pH 2.0 - pH lowered with sulfuric acid, solids settled and filtered

TABLE 4-1 (PAGE 1 OF 2)
PENNSYLVANIA AVENUE LANDFILL
DATA SUMMARY - JAR TESTS

Unit Operation	Test Conditions	Results						
		Oil & Grease		PCBs		Cyanide		
						Total	WAD	
		ppm		ppb		ppb		
Oil - Water Separator	a.Separatory Funnel	Drum 1	Drum 2	Drum 1	Drum 2	Drum 1	Drum 2	
	Unfiltered, Untreated	387	11.8	45.7	<0.065	NA	NA	
	Filtered, Untreated	16.7	22.4	<0.065	<0.065	NA	NA	
	Reduce pH to 4.5	10.1	11.2	<0.065	<0.065	44	59	
	Reduce pH to 2	11.8	11.8	<0.065	<0.065	NA	NA	
	b. Air Flotation (Composite of Drum 1 & 2)	pH =7	pH =4.5	pH =7	pH =4.5			
	Initial Composite	193	39.6					
	0 min	193	39.6					
	15 min	191	28.9					
	30 min	90.4	26.0	<0.065	<0.065			
Cyanide Removal	a. Alkaline Chlorination							
	Untreated[1]					45		26
	pH(max)=9					41		NA
	pH(max)=11.5					43		27
	b. Peroxide Oxidation							
	Untreated					37		NA
	0.1% Peroxide					34		NA
	0.5% Peroxide					32		NA
	1.0% Peroxide					31		NA
	c. Ferric Sulfate							
	0% Ferric Sulfate					31		13
	0.05% Ferric Sulfate pH=7; [polymer 4330]=4ppm					26		14
	0.1% Ferric Sulfate pH=6; [polymer 4330]=4ppm					20		10
	0.2% Ferric Sulfate pH=3; [polymer 4330]=8ppm					22		9
	0.4% Ferric Sulfate pH=<3; [polymer 4330]=12ppm					19		9
	0.5% Ferric Sulfate pH=<3; [polymer 4330]=12ppm					14		10

Unit Operation	Test Conditions	Results								
		Metals [2]								
		Ba	Ca	Cr	Fe	Mg	Mn	Hg	K	Na
		ppb								
Metals Removal [2]	pH=8.2 Untreated[1]	194	153000	28	7400	132000	514	<DL	147000	757000
	pH=11.5 Untreated	23	6500	NA	NA	29800	22	<DL	173000	998000
	pH=11.5 Polymer: Calloway 4330	39	1900	NA	NA	14800	<DL	<DL	168000	981000
	pH=11.5 Polymer: Calloway 4300	32	3300	NA	NA	28000	<DL	1	173000	981000
	pH=11.5 Polymer: Calloway 4579	37	3800	NA	NA	22700	10	<DL	173000	981000
	pH=11.5 Polymer: Calloway 4300	23	3700	NA	NA	17000	7	<DL	157000	981000
	Polymer: Vinmet 1140 Untreated	194	153000	28	7400	132000	514	<DL	147000	757000
	0.1 ppm	87	95600	13	1000	128000	185	<DL	152000	770000
	1 ppm	91	101000	15	989	133000	210	<DL	153000	743000
	5 ppm	99	104000	14	1000	132000	249	<DL	154000	755000
	1000 ppm	87	92700	14	1000	133000	159	<DL	152000	863000

TABLE 4-1 (PAGE 2 OF 2)
PENNSYLVANIA AVENUE LANDFILL
DATA SUMMARY - JAR TESTS

Unit Operation	Test Conditions		Results	
			Ammonia ppm	COD mgO2/L
Air Stripping	a. Batch Air Stripping			
	pH=7 T=70° F	0 Hour	183	
		1 Hour	223	
		3 Hours	188	
		5 Hours	217	
		20 Hours	205	
	pH=7 T=100° F	0 Hour	183	
		1 Hour	183	
		3 Hours	201	
		5 Hours	211	
		20 Hours	207	
	pH=11.5 T=70° F	0 Hour	169	
		1 Hour	182	
		3 Hours	177	
		5 Hours	161	
		20 Hours	82.9	
	pH=11.5 T=100° F	0 Hour	169	
		1 Hour	150	
		3 Hours	119	
		5 Hours	111	
		20 Hours	17.3	
	b. Air Stripping Column Studies			
	pH=11.5; T=140° F; Initial NH3: 199 ppm	After 1 pass	112	
		After 6 passes	4.6	
	pH=11.5; T=120° F; Initial NH3: 199 ppm	After 1 pass	136	
		After 6 passes	NA	
	pH=11.5; T=100° F; Initial NH3: 199 ppm	After 1 pass	96	
		After 6 passes	13.4 [3]	
	pH=11.5; T=72° F; Initial NH3: 196 ppm	After 1 pass	135	
		After 6 passes	16.1	
Activated Carbon / Organic Removal	Isotherm Study GAC(mg/100mL):	0		4938
		10		1293
		50		1163
		100		903
		500		489
		1000		5
		10000		29

Notes: DL - Detection Limit
NA - Not Analyzed
WAD - Weak Acid Dissociable

[1] - Based on untreated influent composite data
[2] - During the metals removal studies, the following metals were also analyzed for but they were not detected in any analysis:
Calloway and Vinment screening: Al, Sb, Be, Co, V
Vinment screening: Cd, Pb
[3] - Ammonia concentration of less than 10 mg/L achieved after 7 passes.

TABLE 4-2
PENNSYLVANIA AVENUE LANDFILL
DATA SUMMARY - TREATMENT TRAIN 1

Unit Operation	Stream Desig-nation	Test Conditions	Results																															
			VOCs	O&G	SVOCs	PCBs		Cyanide		Metals [2]										Ammonia	COD	TPH	Total Solids	TSS	TDS	TOC	Alkalinity	Ignitability	BOD	TKN
						1254	1260	Total	WAD	Ba	Ca	Cr	Fe	Mg	Mn	Hg	K	Na													
			ppb	ppm	ppb	ppb		ppb		ppb										ppm	mgO2/L	ppm	%	ppm	ppm	ppm	ppm		ppm	ppm
Influent	A	pH=8.2 Treated Leachate Volume: 30 L Flow Rate:100 mL/min	1,1-DCE:28 Benzene:81 Toluene:841 Chloro-benzene:17	109	Dichlorobenzene:26.4 Dimethylphenol:19.6 Trichlorobenzene:26.3 Naphthalene:9.6 Acenaphthene:27.8 Fluorene:21.4 N-Nitrosodiphenyl-amine:70.4 Phenanthrene:48.1 Anthracene:15.9 Di-n-butylphthalate:5.1 Fluoranthene:26.1 Pyrene:20.5 Benzo(a)anthracene:8.5 Chrycene:9.5 Benzo(b,k)fluor-anthene:12 Benzo(a)pyrene:4.8	9.18	15.1	45	26	194	153000	28	7400	132000	514	<DL	147000	757000	296	1206	59.4		265	3205	0.22	2030	>200° F	67	280
Oil - Water Separator Product	B	pH=7.01	Note 1		Note 1	8.32	16.5																					>200° F		
Oil - Water Separator Effluent	C	pH=8.11		28.4		<0.065	3.46	29	11												276	16.6						NA		
Cyanide Removal Effluent	D	pH=9 Treated Leachate Volume: 26 L (131ppm NaOH were added to increase the pH from 8.2 to 9). 0.1% v/v ferric sulfate and 10.4 mL Callaway 4330 were added. Precipitated Solids=1.25L				<0.065	<0.065	27	9												90									
Metals Removal Effluent	E	pH=11.5 Treated Leachate Volume: 22 L (750ppm NaOH was added to increase the pH to 11.5). pH=11.19 Effluent	1,1-DCE=5.38 Toluene=1.38 m,p-xylene=1.49 o-xylene=52.7		1,2-dichlorobenzene=4 2-methylphenol=5.4 3&4-methylphenol=2.6 2,4-dimethylphenol=5.7 1,2,4-trichlorobenzene=3 2-methylnaphthalene=2.8 n-nitrosodiphenyl-amine=4.8 bis(2-ethylhexyl)-phthalate=4					<DL	14900	<DL	130	39300	<DL	<DL	154000	1000000	192	194			66.8						
Metals Removal Solids	D1/D2	pH=11.1	Note 1		Note 1	Note 1	Note 1			<DL	305000	<DL	78400	4470000	6300	<DL	151000	2300000				22.4					>200° F		
Sand Filtration Effluent	F	pH=7.25	1,1-DCE=3.71 Toluene=1.62 m,p-xylene=1.49 o-xylene=32																				<4						
Air Stripping	G	pH=11.5 adjusted prior to Air Stripping pH=9.69 Effluent	<DL		<DL	<DL	<DL	NA											Note 3	481			24.4	NA	200	1775	NA		
Activated Carbon / Organic Removal	H	pH=7 adjusted prior to Activated Carbon pH=8.78 Effluent	<DL	<4	<DL	<DL	<DL	<5	<5	62	11200	<DL	30.2	1500	34	<DL	114000	943000	16.3	6.85	<4		4.8	4863	3	1060	Negative(		

Notes:

[1] - Non detect for TCLP VOCs, SVOCs, and pesticides except for Metal removal - solids (stream D2) where 1,4-dichlorobenzene=11.6 ppb was detected.
[2] - The following metals were also analyzed for: Al, Sb, Be, Co, V. They were not detected in any analysis.
[3] -Ammonia concentration below 10 mg/L in column test. Not analyzed in flow through test.

O&G - Oil and Grease
DL - Detection Limit
WAD - Weak Acid Dissociable

O&G - Oil and Grease
DL - Detection Limit
WAD - Weak Acid Dissociable

TABLE 4-3
PENNSYLVANIA AVENUE LANDFILL
DATA SUMMARY - TREATMENT TRAIN 3

Unit Operation	Stream Designation	Test Conditions	Results																											
			VOCs	O&G	SVOCs	PCBs		Cyanide		Metals [2]										Ammonia	COD	TPH	Total Solids	TSS	TDS	TOC	Alkalinity	Ignitability	BOD	TKN
						1254	1260	Total	WAD	Ba	Ca	Cr	Fe	Mg	Mn	Hg	K	Na												
			ppb	ppm	ppb	ppb		ppb		ppb										ppm	mgO2/L	ppm	%	ppm	ppm	ppm	ppm		ppm	ppm
Influent	A	pH=8.2 Treated Leachate Volume 10 Flow Rate:100 mL/min	1,1-DCE:28 Benzene 81 Toluene 841 Chloro-benzene:17	109	Dichlorobenzene:26.4 Dimethylphenol:19.6 Trichlorobenzene:26.3 Naphthalene:9.6 Acenaphthene 27.8 Fluorene:21.4 N-Nitrosodiphenyl-amine:70.4 Phenanthrene:48.1 Anthracene:15.9 Di-n-butylphthalate 5.1 Fluoranthene:26.1 Pyrene:20.5 Benzo(a)anthracene 8.5 Chrycene:9.5 Benzo(b,k)fluor-anthenene 12 Benzo(a)pyrene:4.8	9.18	15.1	45	26	194		28	7400	132000	514	<DL	147000		296	1206	59.4		265	3205	0.22	2030	>200° F	67	280
Oil - Water Separator Product	B	pH=6.44	Note 1		Note 1	<0.3	<0.3																					>200° F		
Oil - Water Separator Effluent	C	pH=7.5		15.3		<0.065	<0.065	29	13											341	1119	<4						NA		
Activated Carbon / Organic Removal	H	pH=8.12 Effluent	<DL	<4	<DL	<0.065	<0.065	<5	<5	376		<DL	634	117000	301	<DL	146000			213	22	<4		<4	4863	3	1060	Negative(>		

Notes:
O&G - Oil and Grease
DL - Detection Limit
WAD - Weak Acid Dissociable

[1] - Non detect for TCLP VOCs, SVOCs, and pesticides
[2] - The following metals were also analyzed for: Al, Sb, Be, Co, V. They were not detected in any analysis.

TABLE 4-4

PENNSYLVANIA AVENUE LANDFILL
DATA SUMMARY - BIOLOGICAL TREATMENT

Time	Dilution	50 ppm ammonia + nitrifiers	195 ppm ammonia + nitrifiers	1 part leachate +3 parts water +nitrifiers	Leachate+ PAC+nitrifiers	Leachate +nitrifiers	50 ppm ammonia
0 hr	None	50[1]	195	80	243	262	48
2 hr	None	38.5	195	75.5	243	262	48
4 hr	None	16.5	190	54	244	257	49
6 hr	None	4.7	138	29.5	168	209	49
20 hr	None	0.5	122	11.5	141	154	49
24 hr	None	0	129	10	136	140	44
2 days	100 ml leachate + 100 ml DI water	63	–	118	CD	–	CD
2 days	200 ml DI water	–	51	–	–	64	CD
3 days	None	53	43	210	CD	64	CD
4 days	200 ml leachate + 200 ml DI water	87	72	210[2]	CD	92	CD
5 days	None	70	78	110	CD	80	CD
6 days	400 ml leachate + 400 ml DI water	79[2]	78	188[3]	CD	139	CD
7 days	None	42[4]	51	79	CD	89	CD
8 days	None	46	22	117	CD	132	CD
9 days	None	45	17	108	CD	133	CD
10 days	None	198	22	232	CD	270	CD

CD: Culture discontinued
PAC: Powdered Activated Carbon

1. All values are ppm ammonia
2. No dilution
3. 200 ml leachate + 200 ml DI water
4. 400 ml leachate + 400 ml DI water

Jar Tests - Air Floatation (Separatory Funnel and Air Stone)

a. pH 7.0 - 30 minutes of air supplied
b. pH 4.5 - pH lowered with sulfuric acid, 30 minutes of air supplied

Flow-Through Tests - Gravity Separation [Bench-Scale (30 cm L x 5 cm H) Apparatus]

a. pH 8.2 - untreated leachate

4.1.2 Results Summary

Gravity separation jar tests were run under untreated and acidic pH conditions in order to determine whether acidification of the leachate would serve to break any oil/water emulsions and improve O&G removal. Testing using leachate from Drum 1 showed good O&G and PCB removal for both untreated and acidified samples.

O&G levels below the discharge limit (15 mg/l) were not achieved in the untreated sample, although values were sufficiently low (less than 17 mg/l) to allow the resultant waste stream to serve as the influent to subsequent treatment steps. Acidification to pH 4.5 and 2.0 reduced O&G to below the discharge limit, but O&G removal was small compared to removal by separation alone.

The acidification step (pH 4.5) required the addition of 2 ml of reagent-grade sulfuric acid per 1 liter of leachate. Subsequent neutralization of this waste stream to pH 7.0 would require base addition. Therefore, due to the minimal treatment benefit, and additional capital and chemical costs associated with dual pH adjustment steps, acidification was eliminated as an option in the O&G treatment process.

Air floatation jar tests were conducted to determine whether a fine bubble air stream would improve O&G removal. O&G removal efficiencies were less than those from the gravity separation tests at neutral pH after 30 minutes aeration. Therefore, due to the minimal treatment benefits, and the additional capital and energy costs associated with air floatation, air floatation was eliminated as an O&G removal treatment option.

Based on the results of the above-noted jar tests, flow-through tests were conducted with untreated leachate using a small flow-through unit simulating a coalescing plate oil/water separator. O&G was removed by the flow-through unit to a concentration of 28 mg/l. Some PCBs were detected in the effluent from the unit, although significant PCB removal was achieved. Based on these tests, gravity separation appears to be a feasible option since performance is expected to be better in a full-scale unit and additional removal of O&G and PCBs will occur in downstream unit operations. It should be noted that removal of weak acid dissociable (WAD) cyanide was appreciable (50%) in the flow-through unit.

4.2 Cyanide Removal

Both jar tests and a flow-through test were conducted to evaluate cyanide removal, primarily WAD cyanide, from leachate previously treated for O&G removal. Results of these tests are included in pages 28-32 of Appendix A.

4.2.1 Testing Scenarios

The following tests were completed as a part of the cyanide removal phase of the treatability study:

Jar Tests
a. Alkaline chlorination (pH 9 and pH > 11)
b. Peroxide oxidation (0.1% - 1% peroxide addition)
c. Ferric sulfate (.0025% to 5.0% ferric sulfate addition)

Flow-Through Test
a. Ferric sulfate (0.1% ferric sulfate addition)

4.2.2. Results Summary

Jar tests showed that chemical oxidation (alkaline chlorination and peroxide oxidation), was not effective as a removal mechanism for cyanide. Jar tests indicated that ferric sulfate could more effectively reduce cyanide concentrations than alkaline chlorination or peroxide oxidation.

Based on the above results, a flow-through test was conducted using a ferric sulfate dose of 0.1% (approximately 1,000 ppm), and 10.4 ml of Calloway 4330 anionic polymer (4 ppm). The test also required the addition of 8.5 ml of 10 N sodium hydroxide per 13 liter (260 ppm) to offset the drop in pH from the ferric sulfate addition.

The flow-through test showed minimal removal of WAD, total, or amenable cyanide. WAD cyanide was reduced to below the discharge limit, from 11 μg/l to 9 μg/l. A sludge volume of 1.25 liter was generated from 26 liters of treated leachate during this test.

4.3 Metals Removals

Both jar tests and a flow-through test were conducted to evaluate potential treatment options for removing metals from leachate pretreated for O&G and cyanide removal. Metals removal steps consisted of pH adjustment, coagulation, and settling. The effectiveness of various polymers to improve settleability also was evaluated. Results of these tests are included in pages 32-36 of Appendix A.

4.3.1 Testing Scenarios

The following tests were completed as a part of the metals removal phase of the treatability study:

Jar Tests
a. pH screening - pH 9 to pH 11.5
b. pH 11.5, no polymer
c. pH 11.5, Calloway 4330 anionic polymer
d. pH 11.5, Calloway 4300 neutral polymer
e. pH 11.5, Calloway 4579 cationic polymer

f. Vinmet 1140 polymer screening (0.1 ppm - 1,000 ppm)

Flow-Through Test

a. pH 11.5, Calloway 4330 anionic polymer, centrifugation of solids

4.3.2 Results Summary

Jar testing studies indicated that all Calloway polymers were effective in improving settleability. Calloway polymer 4330 has been recommended for use due to its ability to form a stronger floc. Based on the fact that metals regulated in the draft SPDES discharge permit were not present in the influent to the metals removal step, removal efficiencies for these metals could not be determined.

Testing showed the metals removal step to require 21.5 ml of 10 N sodium hydroxide per 11.5 liter (750 ppm) to raise the pH of the leachate to 11.5. A polymer dose of 7 mg/l was required to improve settleability of the floc.

A sludge volume of approximately 1 liter was generated per 20 liters of treated leachate during the batch test. Results of toxicity characteristics leaching procedure (TCLP) analysis of the sludge showed it to be non-hazardous.

4.4 Sand Filtration

Sand filtration of effluent from the metals removal step was conducted to determine its effectiveness in removing suspended solids from the waste stream. The purpose of this step was to pretreat the leachate prior to air stripping in order to minimize clogging of the air stripper column, and to reduce suspended solids to discharge limitations.

A 1.5-inch diameter flow-through column filled with green sand was used as the testing apparatus. Results of the test showed removal of total suspended solids (TSS) to less than 5 mg/l. Results are included in pages 37-38 of Appendix A.

4.5 Air Stripping

Air stripping tests were conducted to determine the effectiveness of this process in removing ammonia, volatile organics, and semi-volatile organics from leachate previously treated for O&G, cyanide, metals, and suspended solids removal. Results of these tests are included in pages 38-42 of Appendix A.

4.5.1 Testing Scenarios

The following tests were completed as a part of the air stripping phase of the treatability study:

Jar Tests (1 liter, continuously aerated, samples)

a. pH 7, 70°F
b. pH 7, 10°F
c. pH 11.5, 70°F
d. pH 11.5, 100°F

Column Tests (3-inch diameter by 5-foot-long packed column)

a. pH 11.5, 140°F
b. pH 11.5, 120°F
c. pH 11.5, 100° F
d. pH 11.5, 72°F

Flow-Through Test (3-inch diameter by 5-foot-long packed column)

a. pH 11.5, 100°F

4.5.2 Results Summary

Jar tests showed no reduction in ammonia at pH 7, at either 70° or 100°F. At pH 11.5, ammonia was reduced by approximately 50% at 70°F and by approximately 90% at 100°F after 20 hours.

Air stripping column tests showed good removal of ammonia at all temperatures tested. At an air-to-water ratio of 150 ft^3/gal, removal to less than 10 mg/l ammonia was achieved after six passes through the column at 140°F. Seven passes were required at a temperature of 100°F to drop the ammonia level to less than 10 mg/l. A final ammonia concentration of 16.7 mg/l was achieved after six passes at 72°F at an air-to-water ratio of 300 ft^3/gal. Complete removal of volatile and semi-volatile organics was achieved in the flow-through test.

4.6 Biological Treatment

Biological treatment was evaluated as a treatment option for the removal of ammonia from neutralized leachate previously treated for O&G, cyanide, and metals removal. The objective of biological testing was to evaluate treatment under different operating conditions in order to optimize the system prior to final flow-through testing. However, developmental testing indicated that biological treatment of the leachate was unreliable and, consequently, a flow-through test was not performed. Results of biological testing are included in pages 42-49 of Appendix A.

4.6.1 Environmental Requirements for Nitrification

Biological treatment for the removal of ammonia from wastewater (nitrification) requires that a viable biomass of a specific type of bacteria be developed. These bacteria, denoted as "nitrifiers," remove ammonia from wastewater by oxidizing it to nitrate. In order for the nitrifiers to grow, the environmental condition in the reactor must be strictly maintained within the following limits:

pH: 6 to 9

Temperature:	> 15°C
Dissolved Oxygen (DO):	> 2 mg/l

The reactor also requires an excess of alkalinity (buffering capacity), since conversion of ammonia to nitrate consumes alkalinity, and thereby causes the pH to drop. Growth of nitrifiers also has been known to be inhibited by various organic compounds and metals. Concentrations of these constituents, therefore, must be below threshold concentrations.

4.6.2 Results Summary

In order to initiate the acclimation with a known population of nitrifiers, a special nitrifying culture designed by Interbio/MicroMasters was used as the initial seed. The culture was added to leachate and maintained under the following environmental conditions:

pH:	7 to 8 SU
Temperature:	approx. 30°C
DO:	> 5 mg/l
Alkalinity:	excess through addition of buffering solution

Initial acclimation attempts, however, were unsuccessful in maintaining a biomass which consistently removed ammonia. Concentrations of ammonia initially would drop before rising and stabilizing. In order to evaluate the possible reasons for these effects, a controlled experiment was run by seeding six different reactors at varying dilutions of leachate and ammonia concentrations with nitrifying bacteria cultures. The results of these tests are presented in Table 4-4.

The table shows that, for the first 24 hours of the test, ammonia concentrations decreased continuously in all five of the seeded reactors. The positive control reactor (50 ppm ammonia solution plus nitrifiers) contained no leachate and was able to oxidize the ammonia completely. These results show that the nitrifying cultures and the environmental conditions of the test were adequate.

The negative control reactor (50 ppm ammonia without nitrifiers) showed that ammonia removal does not occur in a sterile solution. The consistent measured ammonia concentration for this control also indicated that the precision of the ammonia test was sound.

Based on the results from the first 24 hours of the study, fresh leachate was added to several of the reactors to provide more food and help grow more nitrifiers. However, as additional leachate was added to the reactors, consistent removal of ammonia was no longer attainable. In some of the reactors, the level of ammonia actually rose, similar to the initial acclimation work.

The cause of the inconsistent ammonia removal is not obvious from the results of the above- described tests. It is unclear as to whether organic compounds or metals in the leachate are inhibiting the growth of the nitrifiers, or whether some other phenomenon is causing the nitrification process to stop.

Based on these unfavorable results, it appeared that biological treatment of leachate prior to discharge to Jamaica Bay was unreliable, and that it would not be prudent to implement this technology for leachate treatment. Consequently, a final biological flow-through test was not performed.

4.7 Activated Carbon

Activated carbon treatment for the removal of organics was tested on two different waste streams:

a. Leachate pretreated by oil/water separation (Treatment Train 3)
b. Leachate pretreated by oil/water separation, ferric sulfate, sodium hydroxide, (pH adjusted), filtration, air stripping, and neutralization (Treatment Train 1)

Each test was conducted on a 1.5-inch wide by 5-foot-long column. The effluent from the column was tested for all parameters of concern, since in each of the treatment trains it would be the final point of discharge for the overall system. Due to the inability to develop a biomass which consistently removed ammonia from the leachate, tests of activated carbon following biological treatment were not performed. Jar tests also were completed to develop isotherms to estimate the carbon usage. The results of these tests are included in pages 49-54 of Appendix A.

4.7.1 Results Summary - Activated Carbon Following Oil/Water Separation

Column tests indicated that activated carbon following oil/water separation is effective in removing VOCs, SVOCs, pesticides, chemical oxygen demand (COD), TSS, cyanide (WAD), total petroleum hydrocarbons, and O&G. All compounds of concern were reduced to non-detect levels. The flash point of the effluent was greater than 200°F.

4.7.2 Results Summary - Activated Carbon Following Air Stripping

Testing showed the effluent from the column to meet all SPDES discharge requirements. Significant total organic compounds and COD removal also were observed.

4.7.3 Results Summary - Batch Isotherms

The effect of granulated carbon on COD removal was measured for six different carbon concentrations. These results were used to estimate carbon usage in the economic evaluation presented in Section 6.0.

4.8 Summary of Treatment Trains

Treatability study results are summarized with respect to the three treatment trains (Figure 1-2) as follows:

- Treatment Train 1 is an effective method of leachate treatment that will meet the treatment goals for discharge to Jamaica Bay.

- The performance of biological systems in testing were unreliable, and indicate that Treatment Train 2 is not likely to be an effective method of treatment for discharge to Jamaica Bay.

- Treatment Train 3 is an effective method of pretreatment that will meet the requirements for discharge to the 26th Ward WPCP.

5.0 PRELIMINARY DESIGN CRITERIA

5.1 Process Flow Rate

Based on modeling presented in the Feasibility Study, the estimated steady-state collection rate in the yet-to-be-designed active leachate collection trench is 3 gpm. For the Feasibility Study, this 24-hour per day collection rate was converted to a process flow rate of 20 gpm to account for a 40-hour per week operation and to account for system downtime, storm events, and other unknowns. For the system to operate continuously, (i.e., 24 hours per day, 7 days per week), the recommended design process flow rate is 5 gpm. The 20 gpm process flow rate was used as the basis for conceptual design and for the economic analysis which is presented in Section 6.0.

5.2 Oil/Water Separator

The design objective for the oil/water separator is to remove floating product and reduce levels of O&G (estimated at 100 to 500 ppm) to required discharge levels (Section 3.0). Although O&G concentrations were reduced to near acceptable concentrations in jar tests, these levels were not achieved in the flow-through test, probably due to short-circuiting or the small area available for physical separation. The performance likely would be better in a manufactured, full-scale oil/water separator, such as a coalescing plate or tube type which actively promotes separation and has a more efficient mechanism for collection than the flow-through system. It therefore would be prudent to include provision for minor pH adjustment (e.g., an in-line mixer) as a safety measure. It was noted that additional removal of O&G also would occur in the carbon system to ensure compliance with discharge limitations.

PCBs would likely be reduced to acceptable concentrations if floating product is removed Complete PCB removal is unnecessary, however, at the oil/water separator, since carbon adsorption will follow downstream to insure compliance with PCB limitations.

5.3 Cyanide Removal

The design objective for the cyanide removal system was to reduce the concentration of free cyanide to the required discharge limitation (Section 3.0). Three methods for cyanide removal were evaluated in the treatability study, but none was totally successful. Ferric sulfate produced the best results and reduced the concentration of WAD cyanide to below the discharge criteria of 10 ppb in the flow-through test. However, better removal of WAD cyanide was achieved by oil/water separation and carbon adsorption. Based on these results, it appears that cyanide could be reduced to acceptable concentrations without a specific treatment step addressing cyanide removal. Therefore, a cyanide removal step is not included in the preliminary conceptual design.

5.4 Metals Removal (pH adjustment)

The design objective for the metals removal system was to reduce concentrations of heavy metals, (i.e., arsenic, cadmium, chromium, copper, lead, nickel, silver, and zinc) to required discharge levels (Section 3.0). Data from the bench-scale study indicated that these metals were below discharge limitations in the influent. In addition, the average concentrations

of these metals determined from monitoring well data in the Feasibility Study also were below discharge limitations. Based on maximum concentrations detected in monitoring wells, only copper exceeded the discharge limitation. On this basis, the need for metals removal was questionable. However, metals removal was included in preliminary design since metals concentrations will vary over time and could exceed discharge limitations at some point.

Regardless of the need for heavy metals removal, pH adjustment will be required to raise the pH of the leachate before air stripping. This pH adjustment will result in metals precipitation. pH adjustment is discussed further in Section 5.6.

5.5 Filtration

The primary design objective of filtration was to reduce to the concentration of suspended solids to the discharge limitation of 50 ppm. A secondary design objective for physical/chemical treatment (Treatment Train 1) was to reduce suspended solids prior to the air stripper to prevent clogging of the packing. Successful results were achieved at a hydraulic loading rate of 2 gpm/ft^2 which served as the basis for preliminary conceptual design.

5.6 Air Stripping

The design objective for air stripping was to reduce concentrations of ammonia and regulated VOCs (i.e., vinyl chloride, 1,2-dichloroethene, 1,1,1-trichloroethane, methylene chloride, 1,1-dichloroethane, trichloroethene, benzene, toluene, chlorobenzene, ethylbenzene, and xylene) to required discharge levels (Section 3.0).

Ammonia removal required pH adjustment to 11 or greater to promote the reaction that converts ammonium ions to ammonia gas. Ammonia removal also required a high air-to-water ratio which was strongly dependent on the system temperature. Preliminary design criteria developed from bench-scale testing include the following:

Influent pH: 11.5
Base (Sodium Hydroxide) Dose: 750 ppm (as sodium hydroxide)
Minimum Leachate Temperature in Column: 100°F
Hydraulic Loading Rate: 2 gpm/ft^2
Air-to-Water Ratio: 150 ft^3/gal
Packing Height: 35 ft.

In order to effectively accomplish ammonia removal, additional equipment will be required upstream of the air stripper. This equipment includes: a reactor vessel to add base and increase the pH of the leachate, a clarifier to remove precipitated metals, a filter press to dewater solids, and a boiler and heat exchanger to provide heat and increase the temperature of the influent.

Preliminary design criteria were based on ammonia removal. The high air-to-water ratio and increased temperature required for ammonia removal will ensure removal of VOCs.

Although air stripping is a feasible method for ammonia removal, there are environmental and design impacts that should be considered before the process is selected. These considerations are discussed in Section 6.2.

5.7 Biological Treatment

During the treatability study, a viable biomass of nitrifiers which consistently removed ammonia from the leachate could not be developed. The only positive results were achieved after the leachate was diluted to below one third the original concentration with deionized water. In general, the results indicated that consistent removal to less than 10 mg/l is questionable with a full-scale reactor, and at the very least, the addition of purchased nitrifying cultures and significant operator attention may be required. Based on these concerns, biological treatment is not recommended as a full-scale treatment option.

Although biological treatment is not recommended for treatment prior to discharge to Jamaica Bay, some positive results after leachate dilution indicated that leachate is expected to be readily amenable to treatment at the 26th Ward WPCP, especially considering that leachate will be pretreated by an oil/water separator and carbon adsorption before discharge.

5.8 Activated Carbon

The design objective for carbon adsorption treatment prior to discharge to Jamaica Bay was to reduce concentrations of regulated semivolatile compounds (i.e., 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2,4-trichlorobenzene, bis(2-ethylhexyl)phthalate, and benzo(a)pyrene), pesticides, and PCBs to required discharge levels (Section 3.0). The design objective for carbon adsorption treatment prior to discharge to the 26th Ward WPCP was to reduce concentrations of PCBs and three VOCs of concern to less than the detection limit.

Based on the flow through bench-scale testing (conducted at 100°F for the stripping tower), semivolatiles are expected to be completely removed in the Treatment Train 1 scheme prior to carbon adsorption, and PCBs are expected to be largely, if not completely removed by the oil/water separator for both Treatment Train 1 and 3. Therefore, the carbon adsorption system may act as a polishing unit in both Treatment Trains to ensure compliance with discharge limitations.

Preliminary design criteria for carbon adsorption developed from bench-scale testing include the following:

Configuration: two carbon units operated in series.
Hydraulic Loading Rate: 2 gpm/ft^2
Contact Time: 30 minutes

6.0 TREATMENT TRAIN OPTIONS

6.1 Description

Three treatment trains were tested for the treatability study (Figure 1-2). Results of the treatability study indicated that Treatment Train 2, which includes biological treatment, is not a reliable technology for treatment of the Pennsylvania Avenue Landfill leachate. The other options are Treatment Train 1 - physical/chemical treatment and discharge to Jamaica Bay; and Treatment Train 3 - oil/water separation, carbon adsorption, and discharge to the 26th Ward WPCP. Conceptual flow diagrams for Treatment Train 1 and Treatment Train 3 are presented in Figures 6-1 and 6-2, respectively.

6.2 Analysis

The treatability study showed that Treatment Train 1 is a feasible option. However, Treatment Train 1 would be much more difficult and costly to implement than Treatment Train 3. Some difficulties associated with implementation of Treatment Train 1 that would not be encountered with Treatment Train 3 are discussed below.

6.2.1 Temperature

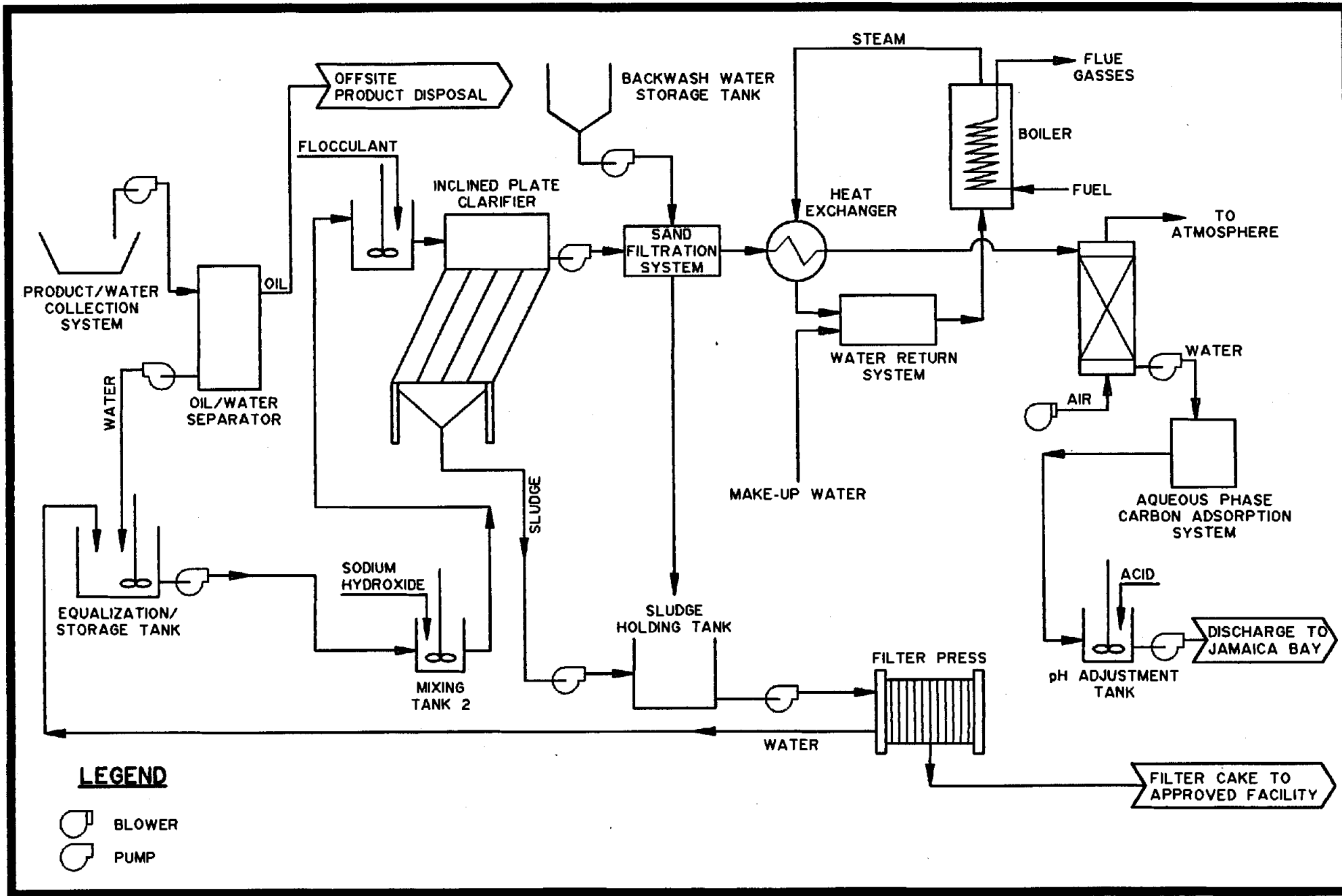
As water temperature decreases, the solubility of ammonia in water increases and it becomes more difficult to remove by air stripping. Influent to an air stripper would therefore have to be heated to meet effluent criteria for ammonia. Water is cooled considerably at the high air flow rates required for ammonia stripping. Cooling is faster at colder temperatures. Considerable energy is thus required to maintain water at temperatures sufficient to produce the high removal rate (95%) required. As ambient temperatures drop to freezing or below, required ammonia removal rates may not be achievable.

6.2.2 Air Emissions

Air emissions represent potential environmental and community concerns. Preliminary calculations were performed to evaluate air emissions from the air stripper (Appendix B). Based on treatability study test data, VOCs and ammonia did not exceed NYSDEC air emissions standards.

Preliminary calculations also were performed using RI monitoring well data as a conservative approach to evaluating air emissions. Based on average RI concentrations, emissions did not exceed NYSDEC air emissions standards. Based on more conservative design concentrations presented in the Feasibility Study (i.e., 4 times the average concentration or the maximum concentration), only 1,1-dichloroethene exceeded NYSDEC air emissions standards.

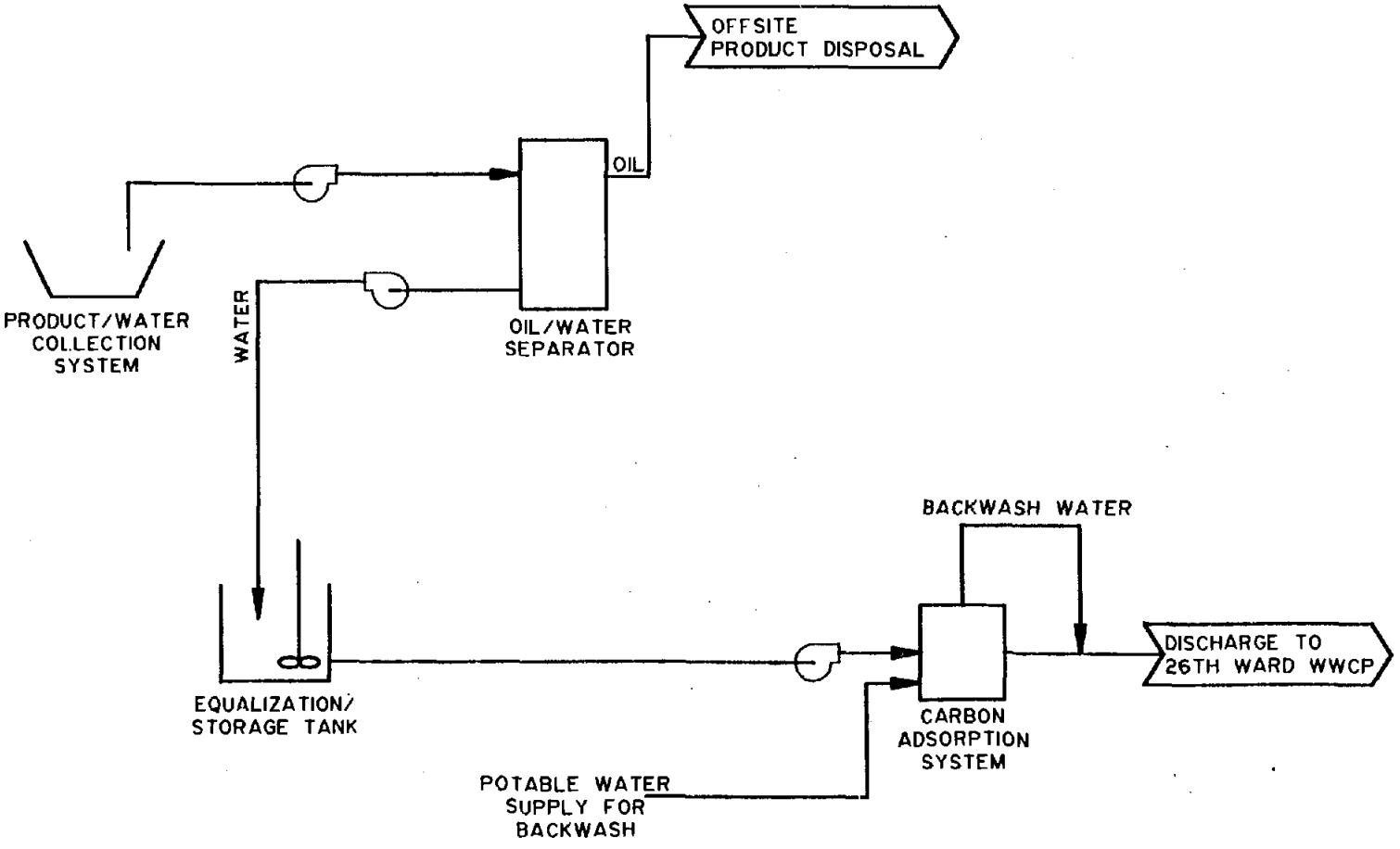
Based on these preliminary calculations, air emissions control would be required only under the most conservative assumptions. When additional VOC data are collected by NYSDEC after the trench pump test, air emissions may be evaluated further in the Final Design. For the cost estimate, it has been conservatively assumed that air emissions control for the air stripper would be required.



URS CONSULTANTS, INC.

PENNSYLVANIA AVENUE LANDFILL TREATMENT TRAIN 1

FIGURE 6-1



LEGEND

PUMP

URS CONSULTANTS, INC.

PENNSYLVANIA AVENUE LANDFILL
TREATMENT TRAIN 3

FIGURE 6-2

Although ammonia emissions are expected to comply with the air emissions standard, ammonia emissions are a potential concern with respect to odor and washout from the atmosphere. Ammonia is expected to exceed the odor threshold at the top of the air stripper. The impact of odor on potential downgradient receptors was not evaluated, being outside the scope of this study. In addition, ammonia can be returned to earth by precipitation. In this way, ammonia may be redeposited into the aquatic environment by runoff or direct deposition in Jamaica Bay.

6.2.3 Stripping Tower Maintenance

Stripping tower efficiency may be significantly impacted by scaling or fouling. It is difficult to predict the extent of scaling or fouling without pilot or full-scale experience. Scaling or fouling may require extensive maintenance for packing cleaning or the use of chemicals to inhibit scaling or fouling, thereby increasing the complexity of system operation.

6.2.4 Solids Handling

Solids generated by pH adjustment must be dewatered, stored on site until tested, and then transported off site for disposal. This process is labor intensive and will require significant operator attention. Significant operator attention also will be required for the chemical addition (i.e., polymer and sodium hydroxide) required for pH adjustment.

6.3 Costs

In the Feasibility Study, the capital and operation and maintenance (O&M) costs for a physical/chemical leachate treatment system, similar to Treatment Train 1, were estimated to be $1,068,000 and $201,500 per year, respectively. However, these costs were not based on a system designed for ammonia removal. These cost estimates, therefore, have been increased to $1,146,000 for capital and $238,300 per year for O&M based on the treatability study results.

Table 6-1 presents an equipment list and preliminary equipment specifications for Treatment Train 1. Equipment specifications are based on preliminary design criteria presented in Section 5.0. The capital cost estimate presented in the Feasibility Study has been revised based on this equipment list and is presented in Table 6-2.

The operation and maintenance (O&M) cost presented in the Feasibility Study for the physical/chemical treatment also has been revised to reflect additional requirements for ammonia removal, based on treatability study results. The basis for O&M costs and the O&M cost estimate for Treatment Train 1 are presented in Tables 6-3 and 6-4, respectively.

Capital and O&M costs for Treatment Train 3 are presented in Tables 6-5 and 6-6 respectively.

TABLE 6-1
PENNSYLVANIA AVENUE LANDFILL
EQUIPMENT SIZING & DESIGN CRITERIA
TREATMENT TRAIN 1

Equipment Description	Design Criteria	Size
Average Leachate Flow	24 hour/day flow + down time	5 gpm
Process Flow	40 hour/week flow + down time	20 gpm
Oil/Water Separator		20 gpm
Equalization/Storage Tank	3 day retention time	28,800 gal
Equalization Tank Agitator	0.15 HP per 1,000 gallons	5 HP
Mixing Tank 1	30 minute retention time	600 gal
Mixing Tank 1 Agitator	2 HP per 1,000 gallons	2 HP
Flocculating Tank	10 minute retention time	200 gal
Flocculating Tank Agitator	2 HP per 1,000 gallons	2 HP
Inclined Plate Clarifier	Overflow rate = 0.25 gpm/sf	80 sf
Sludge Tank	Sludge flow rate = 1 gpm 24 hour retention time	1500 gal
Filter Press	Suspended Solids = 1,000 mg/l 40 % solids in Filter Cake Cake Density = 70 pcf	9 cf
Media Filtration	2 gpm/sf	3.5 ft dia.
Vapor Phase Activated Carbon		3,000 cfm
Fuel Storage Tank	1 month fuel storage	2,000 gal
Boiler	Raise Water Temperature to a minimum 100°F in Air Stripper	1,000,000 BTU/hr
Heat Exchanger	Raise Water Temperature to a minimum 100°F in Air Stripper	15.4 sf
Air Stripper	Minimum Water Temp = 100°F Air to Water Ratio = 150 cfm/gal	4 ft dia. 35 ft of packing
Blower	Same as Above	3000 cfm
Air Preheater	Preheat air to = 40°F	3000 cfm
pH Adjust Tank	10 minute retention time	200 gal
pH Adjust Tank Agitator	2 HP per 1,000 gallons	2 HP
Aqueous phase carbon		1,000 lbs Carbon
Backwash Storage Tank		3000 gal
2 Process Feed Pumps *		20 gpm
10 Process pumps *		20 gpm
2 Backwash Pumps		200 gpm
2 Sludge pumps (clarifier) *		1 gpm
2 Feed pumps (filter press) *		1.5 gpm
6 Chemical metering pumps *		1.5 gph
Compressor		5 HP

* - It is assumed that standby pumps are installed.

TABLE 6-2
PENNSYLVANIA AVENUE LANDFILL
CAPITAL COST ESTIMATE
TREATMENT TRAIN 1

Item	Unit	Quantity	Unit Cost	Source	Total Cost
1. EQUIPMENT COSTS*					
Oil - Water Seperator	EA	1	$8,280	2	$8,280
Equalization/Storage Tank	GAL	28,800	$0.65	3	$18,720
Equalization Tank Agitator	EA	1	$13,700	4	$13,700
Mixing Tank 1	EA	1	$1,750	1	$1,750
Mixing Tank 1 Agitator	EA	1	$2,580	4	$2,580
Sludge Tank	EA	1	$4,350	2	$4,350
Filter Press	EA	1	$25,500	2	$25,500
Flocculating Tank	EA	1	$470	1	$470
Flocculating Tank Agitator	EA	1	$1,775	4	$1,780
Inclined Plate Clarifier	EA	1	$16,900	2	$16,900
Fuel Storage Tank	EA	1	$4,000	1	$4,000
Boiler/Heat Exchanger	EA	1	$10,475	4,7	$10,480
Water Return System	EA	1	$5,600	1	$5,600
Air Pre-heater	EA	1	$5,000	2	$5,000
Air Stripper with Blower	EA	1	$28,500	2	$28,500
Compressor	EA	1	$5,290	4	$5,290
Media Filtration	EA	1	$6,020	6	$6,020
Backwash Tank	EA	1	$3,200	1	$3,200
Aqueous Phase Carbon Adsorption	EA	2	$6,300	2	$12,600
Vapor Phase Carbon	EA	1	$23,800	2	$23,800
pH Adjust Tank	EA	1	$470	1	$470
pH Adjust Tank Agitator	EA	1	$1,775	4	$1,780
Process Feed Pumps	EA	2	$8,190	2	$16,380
Process Pumps	EA	10	$2,480	4	$24,800
Backwash Pumps	EA	2	$3,100	3	$6,200
Sludge Pumps	EA	2	$1,163	5	$2,330
Metering Pumps	EA	6	$415	4	$2,490
SUBTOTAL EQUIPMENT					$252,970
2. ADDITIONAL DIRECT COSTS					
Equipment Installation (50% of Equipment)					$126,490
Instrumentation and Controls (20% of Equipment)					$50,590
Piping (60% of Equipment)					$151,780
Electrical (10% of Equipment)					$25,300
Buildings (40% of Equipment)					$101,190
Service Facilities and Yard Improvements (20% of Equipment)					$50,590
SUBTOTAL OF DIRECT COSTS					$758,910
INDIRECT COSTS:					
Mobilization (5% of Direct)					$37,950
Contractor Markup (15% of Direct)					$113,840
Contingencies (10% of Direct)					$75,890
Change Order Contingencies (10% of Direct)					$75,890
Bonds and Insurance (1% of Direct)					$7,590
Escalation to Midpoint of Construction (10% of Direct)					$75,890
SUBTOTAL INDIRECT COSTS					$387,050
TOTAL					$1,145,960
				SAY	**$1,146,000**

1-Means, 1993 (6.5% escalation included)
2-Vendor Quote
3-URS Estimate
4-Richardson, 1994 (3.7% escalation included)
5-McMaster-Carr, 1992 (11% escalation included)
6-ECHOS, 1995
7-Grainger, 1996

* - Capital Cost based on Process Flow Rate of 20 GPM. Process Flow Rate based on Operation of Treatment Plant for 40 hours per week.

TABLE 6-3
PENNSYLVANIA AVENUE LANDFILL
O & M COST ESTIMATE BASIS
TREATMENT TRAIN 1

Item	Basis
O & M Labor	1 man 8 hours per day 5 days per week
Maintenance	3% of Capital Costs
Insurance and Taxes	1% of Capital Costs
Maintenance Reserve and Contingency Costs	1% of Capital Costs
Energy	
-Electricity	HP x .747 x Hours of Operation
Water	200 gal/day average
Fuel	80 gal/day average
Chemicals	
-Sodium Hydroxide	750 mg/l
-Sulfuric Acid	1600 mg/l
-Polymer	7mg/l
Activated Carbon	3 lbs per 1,000 gallons
Product Disposal	1 gal per 1,000 gallons
Filter Cake Disposal	33 cf per week
Monitoring Costs	
-Conventional Parameters	2/month
-TCL Parameters	2/month

TABLE 6-4
PENNSYLVANIA AVENUE LANDFILL
ANNUAL O & M COST ESTIMATE
TREATMENT TRAIN 1

Item	Units	Quantity	Unit Cost	Total Cost
O&M Labor	HRS	2,080	$27.00	$56,160
Maintenance		1,145,960	3%	$34,380
Insurance and Taxes		1,145,960	1%	$11,460
Maintenance Reserve & Contingency Cost		1,145,960	1%	$11,460
Energy				
-Electricity	kWhr	85,500	$0.11	$9,410
-Fuel	GAL	21000	$1.00	$21,000
Water	GAL	50,000	$0.001	$50
Chemicals				
-Sodium-Hydroxide	LB	16,000	$0.365	$5,840
-Sulfuric Acid	LB	33,300	$0.13	$4,329
-Polymer	LB	145	$1.30	$189
Product Disposal	GAL	2,500	$10	$25,000
Activated Carbon	LB	7,500	$1.25	$9,380
Filter Cake Disposal	CY	64	$250	$16,000
Monitoring Costs				
-Conventional Parameters	EA	24	$300	$7,200
-TCL Parameters	EA	24	$1,100	$26,400

TOTAL		$238,258
	SAY	**$238,300**

TABLE 6-5
PENNSYLVANIA AVENUE LANDFILL
CAPITAL COST ESTIMATE
TREATMENT TRAIN 3

Item	Unit	Quantity	Unit Cost	Source	Total Cost
1. EQUIPMENT COSTS*					
Oil - Water Seperator	EA	1	$8,280	2	$8,280
Equalization/Storage Tank	GAL	28,800	$0.65	3	$18,720
Equalization Tank Agitator	EA	1	$13,700	4	$13,700
Aqueous Phase Carbon Adsorption	EA	2	$6,300	2	$12,600
Process Feed Pumps	EA	2	$8,190	2	$16,380
Process Pumps	EA	4	$2,480	4	$9,920
Backwash Pumps	EA	2	$3,100	3	$6,200
Backwash Tank	EA	1	$3,200	1	$3,200
Media Filtration	EA	1	$6,020	6	$6,020
SUBTOTAL EQUIPMENT					$95,020
2. ADDITIONAL DIRECT COSTS					
Equipment Installation (50% of Equipment)					$47,510
Instrumentation and Controls (20% of Equipment)					$19,000
Piping (60% of Equipment)					$57,010
Electrical (10% of Equipment)					$9,500
Buildings (40% of Equipment)					$38,010
Servicer Facilities and Yard Improvements (20% of Equipment)					$19,000
SUBTOTAL OF DIRECT COSTS					$285,050
INDIRECT COSTS:					
Mobilization (5% of Direct)					$14,250
Contractor Markup (15% of Direct)					$42,760
Contingencies (10% of Direct)					$28,510
Change Order Contingencies (10% of Direct)					$28,510
Bonds and Insurance (1% of Direct)					$2,850
Escalation to Midpoint of Construction (10% of Direct)					$28,510
SUBTOTAL INDIRECT COSTS					$145,390
TOTAL					$430,440
				SAY	**$430,000**

* - Capital Cost based on Process Flow Rate of 20 GPM. Process Flow Rate based on Operation of Treatment Plant for 40 hours per week.

TABLE 6-6
PENNSYLVANIA AVENUE LANDFILL
ANNUAL O & M COST ESTIMATE
TREATMENT TRAIN 3

Item	Units	Quantity	Unit Cost	Total Cost
O&M Labor[1]	HRS	1,040	$27.00	$28,080
Maintenance		430,000	3%	$12,900
Insurance and Taxes		430,000	1%	$4,300
Maintenance Reserve & Contingency Cost		430,000	1%	$4,300
Energy -Electricity	kWhr	16,000	$0.11	$1,760
Product Disposal	GAL	2,500	$10	$25,000
Activated Carbon[2]	LB	15,000	$1.25	$18,750
Monitoring Costs				
-Conventional Parameters	EA	24	$300	$7,200
-TCL Parameters	EA	24	$1,100	$26,400

TOTAL		$128,690
	SAY	**$128,700**

1. Based on 20 hours per week.
2. Based on 6 lb carbon/1,000 gallons.
3. Basis of all other values same as Treatment Train 1.

7.0 RECOMMENDATION

Treatability study results indicate that Treatment Train 1 (physical/chemical treatment) is the better leachate treatment for direct discharge to Jamaica Bay. Therefore, this method is recommended only if the Bureau of Wastewater Pollution Control does not accept pretreated leachate.

Treatability study results also demonstrated that Treatment Train 3 (oil/water separation and carbon adsorption) can meet pretreatment requirements for discharge to the 26th Ward WPCP and will produce an effluent amenable to treatment. Treatment Train 3 has advantages over Treatment Train 1, because: 1) the system will produce considerably less air emissions; 2) the system will be much easier to construct and operate; and 3) both capital and O&M costs will be substantially lower. On this basis, we recommend continued pursuit of approval for discharge of pretreated leachate to the 26th Ward WPCP.

ATTACHMENT 1

PERTINENT CORRESPONDENCE

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233-7010

March 3, 1995

Post-it™ brand fax transmittal memo 7671 | # of pages ▸

To Tom Lawson	From Geo. Dakes
Co. Buffalo	Co. Paramus
Dept.	Phone #
Fax # x Craig Pawlewski	Fax #

Mr. Martin Gelfand, P.E., Chief
Facilities Design South
Bureau of Environmental Engineering
NYC Department of Environmental Protection
96-05 Horace Harding Expressway, 5th Floor
Corona, NY 11373-5107

Dear Mr. Gelfand:

Re: Pennsylvania/Fountain Avenue Landfills (Sites #224002/3)
Pre-Design Work Plans

DEC has reviewed the letter amendments submitted by URS Consultants pertaining to the treatability study, shoreline protection and landfill gas pre-design studies at the Pennsylvania and Fountain Avenue Landfills. Upon review, the revised budgets for the shoreline protection studies are acceptable and fully eligible for EQBA Title 3 reimbursement.

The justification, scope of work, and budget for the treatability study is acceptable, with one exception. Ammonia should be added to the Table 1 list of contaminants for analysis at sample locations A, F and G (and elsewhere at URS' discretion). Ammonia will be regulated in the final discharge through toxicity testing of the effluent. The treatability study should evaluate whether the air stripper will reduce ammonia concentrations to acceptable levels (approximately 1.5 ppm). Also, this will confirm that the project budget (Table 3) includes sufficient manhours to complete Project Objectives 1 through 5, which includes generatine preliminary design criteria and developing the preliminary design and cost estimate.

The objective of the Landfill Gas Study is stated as "to obtain information about the gas quality in relation to landfill gas recovery". As indicated in prior correspondence, DEC cannot use EQBA monies to fund studies or subsidize construction of alternative end uses of landfill gas collected as part of a remedial program. The cost of this study is therefore not eligible for EQBA reimbursement. In keeping with the ROD's committment to provide technical assistance in this matter, DEC recommends adding CO and CO_2 to the list of analytes for Tedlar bag samples. This will help DEP evaluate their landfill fire monitoring data by providing CO and CO_2 levels in "normal" landfill gas samples, or potentially identify whether any of these wells are impacted by subsurface fires. Additionally, DEP should consider whether temperature readings should be taken as part of this study to increase your thermocouple database.

If you have any questions before our March 8, 1995 meeting, please call me at (518) 457-1641.

Sincerely,

George W. Heitzman, P.E.
Senior Environmental Engineer
Division of Hazardous Waste
Remediation

cc: L. Klein, DEP
L. Kan, DEP
G. Leahy, URS
G. Dakes, URS

GWH\A:\PREDESOK.P&F

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233-7010

Michael D. Zagata
Commissioner

October 2, 1995

Mr. Martin Gelfand, P.E., Chief
Facilities Design South
Bureau of Environmental Engineering
NYC Department of Environmental Protection
96-05 Horace Harding Expressway, 5th Floor
Corona, NY 11373-5107

Dear Mr. Gelfand:

Re: Pennsylvania Avenue Landfill (Site #224002)
Treatability Study Work Plan

Upon review, the treatability study work plan submitted with your September 11, 1995 letter to me is approved, with one comment. Another purpose for monitoring the air stripper influent and effluent is to estimate contaminant loadings to the air. In the sampling plan summarized in Figure 1 and Table 2 of the work plan, VOCs will be sampled prior to the sand filter and after the neutralization step. Will these samples be sufficient for URS to estimate air loadings through mass balance calculations? This estimate will be necessary to determine the need for air emissions controls and to properly design such a device.

The estimated budget for the project appears to be reasonable, provided that five bids are received for subcontracted services. Please call me at (518) 457-1641 if you have any questions or concerns.

Sincerely,

George W. Heitzman, P.E.
Senior Environmental Engineer
Division of Hazardous Waste
Remediation

cc: L. Klein, DEP
L. Kan, DEP
G. Leahy, URS
G. Dakes, URS

GWH\a:TSWPOK.PAL

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233-7010

Michael D. Zagata
Commissioner

via facsimile

September 28, 1995

Mr. Martin Gelfand, P.E., Chief
Facilities Design South
Bureau of Environmental Engineering
NYC Department of Environmental Protection
96-05 Horace Harding Expressway, 5th Floor
Corona, NY 11373-5107

Dear Mr. Gelfand:

Re: Pennsylvania Avenue Landfill (Site #224002)
Treatment Plant Effluent Standards

As a follow up to our September 21, 1995 progress meeting, enclosed are the final stanadrds for discharge of treated effluent from the leachate collection system to Jamaica Bay. These standards are provided to DEP and URS for analysis of the treatability study, with the expectation that discharge from the completed plant will not commence until approximately August 1997. DEC's Division of Water will review the results of the treatability study and may adjust the ammonia discharge limit accordingly.

With regard to your September 11, 1995 letter and your request to meet with DEC's Water and Remediation staff, we are available to discuss our basis for including the ammonia standard in the effluent limits. Such a meeting may be more productive, however, after the results of the treatability study are available. This would enable us to consider the removal efficiency of physical/chemical processes and the estimated costs of adding biological treatment for ammonia removal. Alternatively, we could have a conference call for preliminary discussions and meet in person after the treatability study is complete.

Enclosed is an abstract of a pilot air stripping treatment system for the removal of chloroform which achieved 83% removal of ammonia based on influent levels of 100 ppm. This was obtained from the USEPA RREL Treatability Database.

Please call me at (518) 457-1641 if you wish to discuss this further.

Sincerely,

George W. Heitzman, P.E.
Senior Environmental Engineer
Division of Hazardous Waste
Remediation

cc: L. Klein, DEP
L. Kan, DEP
G. Leahy, URS
G. Dakes, URS, via fax

GWH\a:EFFSTDS.PAL

DHWR Site ID No.:224002

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning Initiation of pump test
and lasting until Termination of pump test

the discharges from the permitted facility shall be limited and monitored by the permittee as specified below:

Outfall Number & Effluent Parameter	Discharge Limitations Daily Avg.	Daily Max.	Units	Minimum Monitoring Requirements Measurement Frequency	Sample Type
Outfall 001 - Pump Test Effluent					
Flow	Monitor	Monitor	GPM	Continuous	Meter
pH (Range)	(6.0 - 9.0)		SU	Daily	Grab
Oil & Grease	Monitor	15	mg/l	Daily	Grab
Solids, Total Suspended	Monitor	50	mg/l	Daily	Grab
Solids, Total Dissolved	Monitor	Monitor	mg/l	Daily	Grab
Ammonia, as NH3	10	20	mg/l	Daily	Grab
BOD, 5 day	Monitor	Monitor	mg/l	Daily	Grab
Aroclor-1242	NA	ND[1]	µg/l	Daily	Grab
Aroclor-1242	NA	Monitor	gal/d	Daily	Grab
Aroclor-1248	NA	ND[1]	µg/l	Daily	Grab
Aroclor-1248	NA	Monitor	gal/d	Daily	Grab
Aroclor-1254	NA	ND[1]	µg/l	Daily	Grab
Aroclor-1254	NA	Monitor	gal/d	Daily	Grab
Aroclor-1260	NA	ND[1]	µg/l	Daily	Grab
Aroclor-1260	NA	Monitor	gal/d	Daily	Grab
Vinyl Chloride	Monitor	0.05	mg/l	Daily	Grab
Methylene Chloride	Monitor	0.01	mg/l	Daily	Grab
1,1-Dichloroethane	Monitor	0.03	mg/l	Daily	Grab
1,2-Dichloroethene (Total)	Monitor	0.03	mg/l	Daily	Grab
1,1,1-Trichloroethane	Monitor	0.01	mg/l	Daily	Grab
Trichloroethene	Monitor	0.011	mg/l	Daily	Grab
Tetrachloroethene	Monitor	0.001	mg/l	Daily	Grab
Benzene	Monitor	0.006	mg/l	Daily	Grab
Toluene	Monitor	0.01	mg/l	Daily	Grab
Xylenes (Total)	Monitor	0.01	mg/l	Daily	Grab
Chlorobenzene	Monitor	0.005	mg/l	Daily	Grab
Ethylbenzene	Monitor	0.01	mg/l	Daily	Grab
Dichlorobenzene, Total (1,2-,1,3-,1,4-)	Monitor	0.05	mg/l	Daily	Grab
1,2,4-Trichlorobenzene	Monitor	0.002	mg/l	Daily	Grab
Benzo(a)pyrene	Monitor	0.0006	µg/l	Daily	Grab
Bis(2-Ethylhexyl)phthalate	Monitor	0.8	mg/l	Daily	Grab
Arsenic, Dissolved	Monitor	0.15	mg/l	Daily	Grab
Cadmium, Total	Monitor	0.003	mg/l	Daily	Grab
Chromium, Total	Monitor	0.5	mg/l	Daily	Grab
Copper, Total	Monitor	0.03	mg/l	Daily	Grab
Copper, Dissolved	Monitor	Monitor	mg/l	Daily	Grab
Lead, Total	Monitor	0.086	mg/l	Daily	Grab
Mercury, Total	Monitor	0.0008	mg/l	Daily	Grab
Nickel, Total	Monitor	0.071	mg/l	Daily	Grab
Silver, Total	Monitor	0.023	mg/l	Daily	Grab
Zinc, Total	Monitor	0.4	mg/l	Daily	Grab
Zinc, Dissolved	Monitor	Monitor	mg/l	Daily	Grab

DHWR Site ID No.: 224002

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning Initiation of pump test
and lasting until Termination of pump test

the discharges from the permitted facility shall be limited and monitored by the permittee as specified below:

Outfall Number & Effluent Parameter	Discharge Limitations Daily Avg.	Daily Max.	Units	Minimum Monitoring Requirements Measurement Frequency	Sample Type
Outfall 001 - Pump Test Effluent					
Cyanide, free, sum of HCN and CN	Monitor	0.01	mg/l	Daily	Grab
Total Petroleum Hydrocarbons	Monitor	500	mg/l	Daily	Grab
Aldrin & Dieldrin, sum	Monitor	0.02	µg/l	Daily	Grab
alpha- BHC	Monitor	0.01	µg/l	Daily	Grab
beta-BHC	Monitor	0.02	µg/l	Daily	Grab
gamma-BHC (Lindane)	Monitor	0.02	µg/l	Daily	Grab
Chlordane, sum of alpha and gamma	Monitor	0.06	µg/l	Daily	Grab
4,4'-DDD	Monitor	0.04	µg/l	Daily	Grab
4,4'-DDE	Monitor	0.02	µg/l	Daily	Grab
4,4'-DDT	Monitor	0.05	µg/l	Daily	Grab
Endosulfan	Monitor	0.06	µg/l	Daily	Grab
Endosulfan II	Monitor	0.02	µg/l	Daily	Grab
Endosulfan sulfate	Monitor	0.3	µg/l	Daily	Grab
Endrin	Monitor	0.02	µg/l	Daily	Grab
Endrin aldehyde	Monitor	0.1	µg/l	Daily	Grab
Methoxychlor	Monitor	0.4	µg/l	Daily	Grab

Notes:

(1) a. NYCDEP or the treatment plant operator must monitor this discharge for PCBs using USEPA laboratory method 608. The laboratory must make all reasonable attempts to achieve an MDL of 0.065 µg/l. Requirements to use method 608 may not be modified for a period of four years. The requirements to use method 608 may be modified after four years if the Department approves a method different from 608. As a function of its enforcement discretion, the Department has determined, at this time, not to pursue ECL violations for discharges with PCB concentrations of less than 0.3 µg/l per Aroclor. Exercise of this discretion does not in any way limit the State's ability to maintain a natural resource damage claim attributable to such discharges.

b. Non-detect at the Minimum Detection Level (MDL) is the discharge goal. NYCDEP or the treatment plant operator shall report all values above the MDL of 0.065 µg/l per Aroclor. If the level of any Aroclor is above the MDL, NYCDEP or the treatment plant operator must evaluate the treatment system and identify the cause of the detectable level of PCBs in the discharge. Following three consecutive months that include analytical results above the MDL, NYCDEP or the treatment plant operator shall prepare a report identifying the cause of the discharge and outlining measures undertaken to eliminate a recurrence of the discharge. This report shall be submitted to the Department within 28 days of receiving the sample results from the third monthly monitoring period.

c. If the Department determines that effluent monitoring results above the MDL can be prevented by the implementation of additional measures as proposed in Note 1.b above, and approved by the Department, NYCDEP shall implement such additional measures.

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - continued

d. This limit is a phased Total Maximum Daily Loading limit, prepared in accordance with 6 NYCRR 702.16(b).

e. The treatment technology for this discharge constitutes the maximum feasible treatment technology for treatment of PCBs. As treatment technology improvements become available, the treatment plant operator shall, at its own initiative or the department's request, review the available technology and/or Best Management Practices employed to remove the maximum feasible amount of PCBs from the wastewater discharge.

(2) Discharge is not authorized until such time as an engineering submission showing the method of treatment is approved by the Department. The discharge rate may not exceed the effective treatment system capacity. All monitoring data, engineering submissions and modification requests must be submitted to the following DHWR contact person: _____.

(3) Only site generated wastewater is authorized for treatment and discharge.

(4) Authorization to discharge is valid only for the period noted above but may be renewed if appropriate. A request for renewal must be received 6 months prior to the expiration date to allow for a review of monitoring data and reassessment of monitoring requirements.

(5) Both concentration (mg/l or µg/l) and mass loadings (lbs/day) must be reported to the Department for all parameters except Flow and pH.

(6) Samples and measurements, to comply with the monitoring requirements specified above, shall be taken from the effluent of the treatment system prior to discharge to Jamaica Bay.

DEP

NOV 2 2 1995

MEMORANDUM

TO: Philip Heckler, P.E.,
Deputy Director, Bureau of Clean Water

FROM: Robert Adamski, P.E.
Deputy Director, Bureau of Environmental Engineering

RE: Leachate from the Pennsylvania Avenue Landfill

The Bureau of Environmental Engineering, under the auspices of NYSDEC, is managing the design of the closure plan for the Fountain Avenue landfill (FAL) and Pennsylvania Avenue Landfill (PAL) in Brooklyn. These closure designs are pursuant to the selected remedial alternatives set forth in the NYSDEC's Record of Decision (ROD) for each landfill. Based on the cost-effective analysis presented in the FAL Feasibility Study, NYSDEC concluded in the FAL ROD that the collection of leachate from the FAL is not warranted. The PAL ROD, however, requires the collection, and proper disposal, of leachate from only a small area on PAL's western border along Fresh Creek.

From hydrogeologic information obtained during the PAL Remedial Investigation (RI), it is estimated that the leachate flow to be collected at this site will be on the order of approximately 10 gpm. The Bureau of Environmental Engineering is currently evaluating the cost effectiveness of various options for the ultimate disposal of this small leahate flow, which after capping of the PAL is complete in mid to late 1998, will decrease significantly due to the reduction of infiltration into the landfill. One of the options is for discharging the leachate into the 26th Ward Water Pollution Control Plant.

To assist you in your initial assessment of this option, I have attached Tables 1 and 2 which summarize the average and maximum concentrations of conventional and target compound/target analyte parameters, respectively, which were obtained from leachate samples during the PAL RI. These tables list those parameters for which analytical results exceeded test method detection limits. These tables also show the projected average and maximum loadings for each parameter based on a raw leachate flow of 10 gpm.

I would like the opportunity to meet with you and your staff to discuss this option. Once you have reviewed the attached information, please contact me regarding your initial assessment and the possibility of a follow-up meeting.

xc: Adamski
Gelfand
[redacted]

New York City Department of Environmental Protection

Bureau of Environmental Engineering

96-05 Horace Harding Expressway
Corona, NY
11368-5107
718-595-6001

MARILYN GELBER
Commissioner

GLEN E. VOGEL, P.E.
Deputy Commissioner

TABLE 1
PENNSYLVANIA AVENUE LANDFILL
CONCENTRATIONS FOR FRESH CREEK/WATER TREATMENT
CONVENTIONAL PARAMETERS

Parameter	Avg. Detected Concentration (mg/l)	Max. Detected Concentration (mg/l)	Average Loading (lb/day)	Maximum loading (lb/day)
pH	NT	NT	NT	NT
Oil/Grease	14	27	1.7	3.2
Ammonia, as NH_3	135.6	517	16.3	62.1
BOD, 5 day	25	67	3.0	8.0
Solids, Total Suspended	NT	NT	NT	NT
Solids, Total Dissolved	4781.5	21,600	574	2,594
Total Petroleum Hydrocarbons	11	19	1.3	2.3
Alkalinity	1,850.7	3420.0	222	411
Chloride	1,586.1	11,600.0	190	1,393
Hardness	1,488.1	3,620.0	179	435
Nitrate-Nitrogen	0.3	0.8	0.04	0.10
Phenols	0.2	0.5	0.02	0.06
Sulfate	388.9	1,470.0	46.7	177
Total Kjeldahl Nitrogen	236.9	934.0	28.5	112

NT = Not tested in remedial investigation

— = No discharge limit specified in draft final standards for site

TABLE 2

PENNSYLVANIA AVENUE LANDFILL
CONCENTRATIONS FOR FRESH CREEK PRODUCT/WATER TREATMENT
VOLATILES, SEMI-VOLATILES, PESTICIDES, PCBS AND METALS

PARAMETER	Avg.Detected Concentration	Max. Detected Concentration	Average Loading	Maximum Loading
	µg/l	µg/l	10^{-3} lb/d	10^{-3} lb/d
Vinyl Chloride	14.6	130.0	1.8	16
Methylene Chloride	ND	ND	ND	ND
1,1 Dichlocloroethane	36.6	380.0	4.4	46
1,2 Dichloroethene (Total)	135.4	1,700.0	16	204
1,1,1 Trichloroethane (Total)	23.1	240.0	2.8	29
Trichloroethene	24.6	260.0	3.0	31
Benzene	146.2	1,100.0	18	132
Tetrachloroethene	14.6	130.0	1.8	16
Toluene	1,549.9	17,000.0	186	2,042
Chlorobenzene	202.8	580.0	24	70
Ethylbenzene	299.7	2,500.0	36	300
Xylenes (Total)	1,587.3	16,000.0	191	1,922
1,2 Dichlorobenzene	438.6	5,600.0	53	673
1,3 Dichlorobenzene	7.0	18.0	0.84	2.2
1,4 Dichlorobenzene	12.0	35.0	1.4	4.2
1,2,4 Trichlorobenzene	430.8	5,500.0	52	661
Benzo(a)pyrene	5.1	6.5	0.61	0.78
Bis(2-Ethylhexyl)phthalate	1,139.5	14,000.0	137	1,681
Aldrin	0.08	0.68	0.010	0.082
Dieldrin	0.04	0.05	0.005	0.006
alpha-BHC	0.19	2.2	0.023	0.26
beta-BHC	ND	ND	ND	ND
gamma-BHC (Lindane)	NT	NT	NT	NT

TABLE 2

PENNSYLVANIA AVENUE LANDFILL
CONCENTRATIONS FOR FRESH CREEK PRODUCT/WATER TREATMENT
VOLATILES, SEMI-VOLATILES, PESTICIDES, PCBS AND METALS

PARAMETER	Avg.Detected Concentration	Max. Detected Concentration	Average Loading	Maximum Loading
	μg/l	μg/l	10^{-3} lb/d	10^{-3} lb/d
alpha Chlordane	0.06	0.45	0.007	0.054
gamma Chlordane	ND	ND	ND	ND
4,4'-DDD	ND	ND	ND	ND
4,4'-DDE	ND	ND	ND	ND
4,4'-DDT	ND	ND	ND	ND
Endosulfan	NT	NT	NT	NT
Endosulfan II	ND	ND	ND	ND
Endosulfan Sulfate	0.05	0.05	0.006	0.006
Endrin	ND	ND	ND	ND
Endrin aldehyde	0.08	0.39	0.010	0.047
Methoxychlor	0.03	0.05	0.004	0.006
Aroclor 1242	NT	NT	NT	NT
Aroclor 1248	17.28	200.0	2.1	24
Aroclor 1254	17.42	200.0	2.1	24
Aroclor 1260	31.48	370.0	3.8	44
Arsenic, Dissolved	NT	NT	NT	NT
Arsenic, Total	6.4	13.5	0.77	1.6
Cadmium, Total	2.2	2.4	0.26	0.29
Chromium, Total	16	45	1.9	5.4
Copper, Total	23.1	54.9	2.8	6.6
Copper, Dissolved	NT	NT	NT	NT
Lead, Total	20.3	100	2.4	12
Mercury, Total	ND	ND	ND	ND
Nickel, Total	23.8	40.6	2.9	4.9
Silver, Total	3.6	4.6	0.43	0.59
Zinc, Total	49.1	203.0	5.9	24
Zinc, Dissolved	NT	NT	NT	NT
Cyanide,Free,sum of HCN & CN	NT	NT	NT	NT
Cyanide, Total	43.4	149.0	5.2	18
Acetone	21.9	130	2.6	16

TABLE 2

PENNSYLVANIA AVENUE LANDFILL
CONCENTRATIONS FOR FRESH CREEK PRODUCT/WATER TREATMENT
VOLATILES, SEMI-VOLATILES, PESTICIDES, PCBS AND METALS

PARAMETER	Avg.Detected Concentration	Max. Detected Concentration	Average Loading	Maximum Loading
	µg/l	µg/l	10^{-3} lb/d	10^{-3} lb/d
Carbon Disulfide	2.8	5.0	0.34	0.60
4-Methylphenol	3.5	4.9	0.42	0.59
Naphthalene	1,330.1	16,000	160	1,922
2, Methylnaphthalene	1,110.2	14,000	133	1,681
Dimethylphthalate	5.5	12	0.66	1.4
Acenaphthylene	2.9	4.8	0.35	0.58
Acenaphthene	245.1	3,000.0	29	360
Dibenzofuran	6.0	18.5	0.72	2.2
Diethylphthalate	7.2	33.0	0.86	4.0
Fluorene	241.0	3,000.0	29	360
4,Nitroaniline	142.3	1,700.0	17	204
N-Nitrosodiphenylamine	715.8	8,800.0	86	1,057
Phenanthrene	611.9	7,800.0	73	937
Anthracene	4.7	8.0	0.56	0.96
Carbazole	5.9	17.0	0.71	2.0
Di-n-butylphthalate	220.0	2,800.0	26	336
Fluoranthene	230.5	2,900.0	28	348
Pyrene	213.9	2,600.0	26	312
Benzo(a)anthracene	6.2	20.0	0.74	2.4
Chrysene	2.0	4.8	0.24	0.58
Di-n-octylphthalate	5.4	12.0	0.65	1.4
Benzo(b)fluoranthene	6.2	20.0	0.74	2.4
Benzo(g,h,i)perylene	3.5	4.9	0.4	0.59
Aluminum	1,008.1	8,240.0	121	990
Antimony	30.9	40.6	3.7	4.9
Barium	425.5	934.0	51	112
Beryllium	0.24	1.2	0.029	0.14
Calcium	205,546	332,000	24,685	39,872
Cobalt	18.9	50	2.3	6.0
Iron	12,432	38,700	1,493	4,648
Magnesium	201,769	610,000	24,232	73,259

TABLE 2

PENNSYLVANIA AVENUE LANDFILL
CONCENTRATIONS FOR FRESH CREEK PRODUCT/WATER TREATMENT
VOLATILES, SEMI-VOLATILES, PESTICIDES, PCBS AND METALS

PARAMETER	Avg.Detected Concentration	Max. Detected Concentration	Average Loading	Maximum Loading
	µg/l	µg/l	10^{-3} lb/d	10^{-3} lb/d
Manganese	243.6	433.0	29	52
Potassium	134,854	277,000	16,195	33,267
Sodium	1,020,539	6,470,000	122,563	777,021
Vanadium	30.2	59.0	3.6	7.1

NT = Not tested in Remedial Investigation
ND = Not detected in Remedial Investigation
ND' = Non-Detect at the Minimum Detection Level (MDL). The laboratory must make all reasonable attempts to achieve an MDL of 0.065 µg/l, and to analyze for PCBs, using USEPA Laboratory Method 608.
-- = No discharge limit specified in Draft Final Standards for site.

DRAFT

THE CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF CLEAN WATER
INTRA-DIVISIONAL MEMORANDUM

December 12, 1995

To: Philip J. Grande

From: Vincent Sapienza VMS

Subject: **Pennsylvania Avenue Landfill Leachate: Proposed Discharge to 26th Ward**

The Program Development Section has completed its preliminary review of a proposal to discharge leachate from the Pennsylvania Avenue Landfill to the 26th Ward Water Pollution Control Plant. Information contained in a November 22, 1995 memorandum from Bob Adamski to Phil Heckler (attached), concerning pollutant concentrations in the leachate, was used to determine if the proposed discharges would significantly contribute to regulatory exceedances at the treatment plant. PCBs were a primary concern.

Last week, we provided you with data indicating that the additional PCB loadings to 26th Ward due to the leachate could potentially be significant. You had then asked that we compare the leachate PCB contributions to citywide plant influent loadings. Tables 1 and 2 provide, by plant, the PCB concentrations and loadings reported in our March 21 and July 10, 1995 reports to USEPA. Focusing on the Table 1 dry-weather data, we find that the 14 plants received 1.45 and 1.12 lbs/day of PCBs during two days of sampling. (Average of 1.29 lbs/day.)

The November 22nd memo indicates that the leachate contains an average of 0.008 lbs/day of PCBs, with a maximum daily loading of 0.092 pounds. The leachate would thus contribute an additional 0.6%, on average, to the citywide loading [i.e., 0.008 ÷ 1.29]. On the worst (maximum) days, the added load would be [0.092 ÷ 1.29] or 7.2%.

At out meeting last week, you had also asked that we evaluate the impact on Jamaica Bay. The influent PCB loading to Coney Island, Rockaway, Jamaica and 26th Ward, based upon the two dry-weather samples, is 0.21 lbs/day. Thus, the additional contribution from leachate PCBs would be an average of [0.008 ÷ 0.21], or 3.8%. In the maximum case, the added load would be [0.092 ÷ 0.21], or 43.4%.

Other than PCBs, there are a handful of other toxic organic pollutants that are also an issue. Our 26th Ward SPDES permit contains effluent "action levels" for chloroform (8.4 lbs/day), perc (14 lbs/day), and toluene (25 lbs/day). The November 22nd memo does not provide analytical data for either chloroform (also referred to as trichloromethane) or perc (tetrachloroethylene). We thus cannot gauge the effect of the leachate on complying with these SPDES action levels; further analyses may consequently be warranted. For toluene, the reported leachate loadings are 0.186 lbs/day on average, and 2.042 lbs/day max.

Another piece of analytical data that we should obtain is a flammability test. Some of the volatile and semi-volatile organics results were quite high, indicating that the leachate could, at times, violate our sewer use flash point limit of 140°F. We need to get some data on this parameter before making a final judgement.

We should also do some pH monitoring, although I suspect it would be within our 5 to 11 sewer use criteria.

You had also asked us to inquire about the duration of the leachate discharge. Larry Klein told me that the flow rate would be about 10 gpm, until the landfill is capped. That job will begin during early to mid 1998. Once capped, the leachate flow will be reduced to a minimal level.

I have asked Pete Garofalis to provide some information about the cost of treating the leachate, if that is found to be necessary. If we conclude that the additional toxic organics loadings are objectionable, an oil-water separator and activated-carbon absorption unit would be needed for pretreatment. Larry Klein gave me a recent URS Treatability Study, indicating that a number of different pretreatment units might also be necessary, including cyanide removal, sand filtration, air stripping, pH neutralization, and metals removal. (A schematic from that report is attached.) I believe, based upon the data, that these particular devices would not be necessary, except perhaps for neutralization; we need pH data to make that determination.

Pete's preliminary rough estimate of the capital cost for a 10 gpm pretreatment system (o/w separator and carbon absorber) is $150,000. Before Pete does more work on this, I think we should get the additional samples/analyses, noted above, to fill in the blanks.

Attachments: (1) Pollutant data contained in Nov 22, 1995 memo REA to PCH
(2) Tables 1 and 2: Dry- and Wet-Weather PCB Loadings to the 14 Plants
(3) URS Treatability Study: Pretreatment Schematic

cc: Heckler, Klinsky, Sapienza

VS/

table 1

DRY WEATHER PLANT-INFLUENT(EVENT I)

Actual Data

PLANTS	CONC(NG/L)	FLOW(MGD)	PCB (LBS/DAY)
ROC	51.27	28	1.20E-02
N.R.	115.58	159	1.53E-01
C.I.	118.37	111	1.10E-01
W.I.	155.58	264	3.43E-01
R.H	212.49	39	6.92E-02
O.B.	111.62	29	2.70E-02
O.H.	114.28	124	1.18E-01
T.I.	192.26	55	8.82E-02
H.P.	79.75	147	9.78E-02
P.R.	93.94	35	2.74E-02
26 WRD	74.13	64	3.96E-02
JAM	102.26	92	7.85E-02
N.C.	80	282	1.88E-01
B.B.	92.91	124	9.61E-02
TOTAL PCB(LBS/DAY)			1.45E+00

Issue Chem Corrections

PCB (LBS/DAY)	VARIATIONS
9.25E-03	0.00
1.50E-01	0.00
9.35E-02	0.02
3.41E-01	0.00
6.88E-02	0.00
2.07E-02	0.01
1.10E-01	0.01
8.92E-02	0.00
8.52E-02	0.01
2.11E-02	0.01
3.71E-02	0.00
5.84E-02	0.02
1.81E-01	0.01
8.76E-02	0.01
1.35E+00	0.10

DRY WEATHER PLANT-INFLUENT(EVENTI I)

PLANTS	CONC(NG/L)	FLOW(MGD)	PCB CONC(LBS/DAY)
ROC	35.01	25	7.30E-03
N.R.	58.5	162	7.91E-02
C.I.	91.71	118	9.03E-02
W.I.	65.4	252	1.38E-01
R.H	159.6	43	5.73E-02
O.B.	97.4	24	1.95E-02
O.H.	202.91	124	2.10E-01
T.I.	108.95	55	5.00E-02
H.P.	11.78	149	1.46E-02
P.R.	96.08	34	2.73E-02
26 WRD	53.18	69	3.06E-02
JAM	95.24	70	5.56E-02
N.C.	99.13	290	2.40E-01
B.B.	90.15	128	9.63E-02
TOTAL PCB(LBS/DAY)			1.12E+00

PCB CONC(LBS/DAY)	VARIATIONS
6.04E-03	0.00
5.51E-02	0.02
4.78E-02	0.04
1.04E-01	0.03
5.07E-02	0.01
1.60E-02	0.00
4.21E-02	0.17
2.84E-02	0.02
9.54E-02	0.08
1.91E-02	0.01
2.88E-02	0.00
3.69E-02	0.02
1.22E-01	0.12
6.53E-02	0.03
7.18E-01	0.40

Table 2

WET WEATHER PLANT-INFLUENT(EVENT I)

Actual Data

PLANTS	CONC(NG/L)	FLOW(MGD)	PCB CONC(LBS/DAY)
ROC	131.08	32	3.50E-02
N.R.	448.57	318	1.19E+00
C.I.	129.39	151	1.63E-01
W.I.	229.25	421	8.05E-01
R.H	79.06	53	3.50E-02
O.B.	332.56	44	1.22E-01
O.H.	260.07	250	5.43E-01
T.I.	122.66	97	9.93E-02
H.P.	111.75	267	2.49E-01
P.R.	205.22	70	1.20E-01
26 WRD	347.36	153	4.44E-01
JAM	271.77	140	3.18E-01
N.C.	106.75	373	3.32E-01
B.B.	118.81	276	2.74E-01
TOTAL PCB (LBS/DAY)			4.73E+00

Issue Clean conversion

PCB CONC(LBS/DAY)	VARIATIONS
3.75E-02	-0.00
1.13E+00	0.06
7.26E-02	0.09
7.19E-01	0.09
3.64E-02	-0.00
6.48E-02	0.06
5.72E-01	-0.03
9.04E-02	0.01
2.70E-01	0.02
1.23E-01	0.00
4.67E-01	0.02
2.90E-01	0.03
2.95E-01	0.04
2.67E-01	0.01
4.43E+00	0.29

WET WEATHER PLANT-INFLUENT(EVENTI I)

PLANTS	CONC(NG/L)	FLOW(MGD)	PCB CONC(LBS/DAY)
ROC	60.69	22	1.11E-02
N.R.	207.89	279	4.84E-01
C.I.	238	187	3.71E-01
W.I.	253.51	483	1.02E+00
R.H	211.99	82	1.45E-01
O.B.	104.34	26	2.26E-02
O.H.	77.73	149	9.66E-02
T.I.	145.28	101	1.22E-01
H.P.	112.12	130	1.22E-01
P.R.	166.16	97	1.35E-01
26 WRD	120.82	147	1.48E-01
JAM	157.32	122	1.60E-01
N.C.	266.94	541	1.21E+00
B.B.	197.43	270	4.45E-01
TOTAL PCB (LBS/DAY)			4.49E+00

PCB CONC(LBS/DAY)	VARIATIONS
9.01E-03	0.00
5.09E-01	-0.02
3.94E-01	-0.02
1.03E+00	-0.01
1.28E-01	0.02
1.98E-02	0.00
8.95E-02	0.01
1.24E-01	-0.00
1.04E-01	0.02
1.26E-01	0.01
1.55E-01	-0.01
1.60E-01	0.00
1.20E+00	0.01
4.54E-01	-0.01
4.50E+00	-0.01

APPENDIX A

PENNSYLVANIA AVENUE LANDFILL
LEACHATE TREATABILITY STUDY REPORT

Pennsylvania Avenue Landfill Leachate

Treatability Study

Prepared For: URS Facilities Design, Inc.
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May 28, 1996

WASTE STREAM TECHNOLOGY

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I. Executive Summary

Waste Stream Technology Inc. (WST), in response to URS Consultants, Inc. (URS) request for proposals (RFP), submitted a treatability study work plan designed to evaluate treatment of leachate collected from the Pennsylvania Avenue Landfill. Specifically, treatment methodologies addressed removal of oil & grease, PCBs, cyanide, metals, suspended solids, ammonia, and organic contaminants. Jar studies were delineated by URS and WST in order to optimize treatment unit operations. The jar studies developed a data base that would be applicable to three treatment trains. Treatment Train 1 would evaluate physical/chemical removal of all contaminants. Treatment Train 2 would evaluate contaminant removal with the exception of employment of a biological versus physical/chemical step to eliminate ammonia. Treatment Train 3 would evaluate effects of an oil/water separation followed by granular activated carbon treatment.

This report reflects the efforts of the jar and flow-through studies performed by WST through an approximately 14 week period. The experiments support an ability to effectively treat the leachate to meet the requirements for discharge. This report includes this executive summary, as well as an introduction, procedures and methods, results, conclusions, recommendations, analytical data, laboratory notes, and any associated quality control information.

II. Introduction

The intention of the laboratory studies is to attempt to evaluate and subsequently optimize physical, chemical, and biological unit operations applicable to the remediation of Pennsylvania Avenue Landfill leachate prior to discharge in Jamaica Bay.

Two distinct series of experiments were performed: jar studies and flow-through studies. Jar studies were designed to evaluate the optimal conditions for subsequent flow-through, treatment train testing. The treatment train and associated analyses, provided in the Work Plan, are presented in the accompanying Table and Figure.

All procedures and methods employed are presented in Section III, according to each task, as follows: Sample Receipt and Compositing; Oil and PCB Removal; Cyanide Removal; Metals Removal; Filtration; Biological Treatment; Air Stripping; and, Activated Carbon/Organic Removal.

An additional study, Treatment Train 3 involving oil/water separation and passage through granular activated carbon, agreed upon through URS on January 30, 1996, was completed. Results of these analyses are presented in Section VII, and discussed in Section IV.

Completion of jar experimentation allowed flow-through studies to be performed for Treatment Train 1 during the week of April 22, 1996. Results of these analyses are presented in Section VII, and discussed in Section IV.

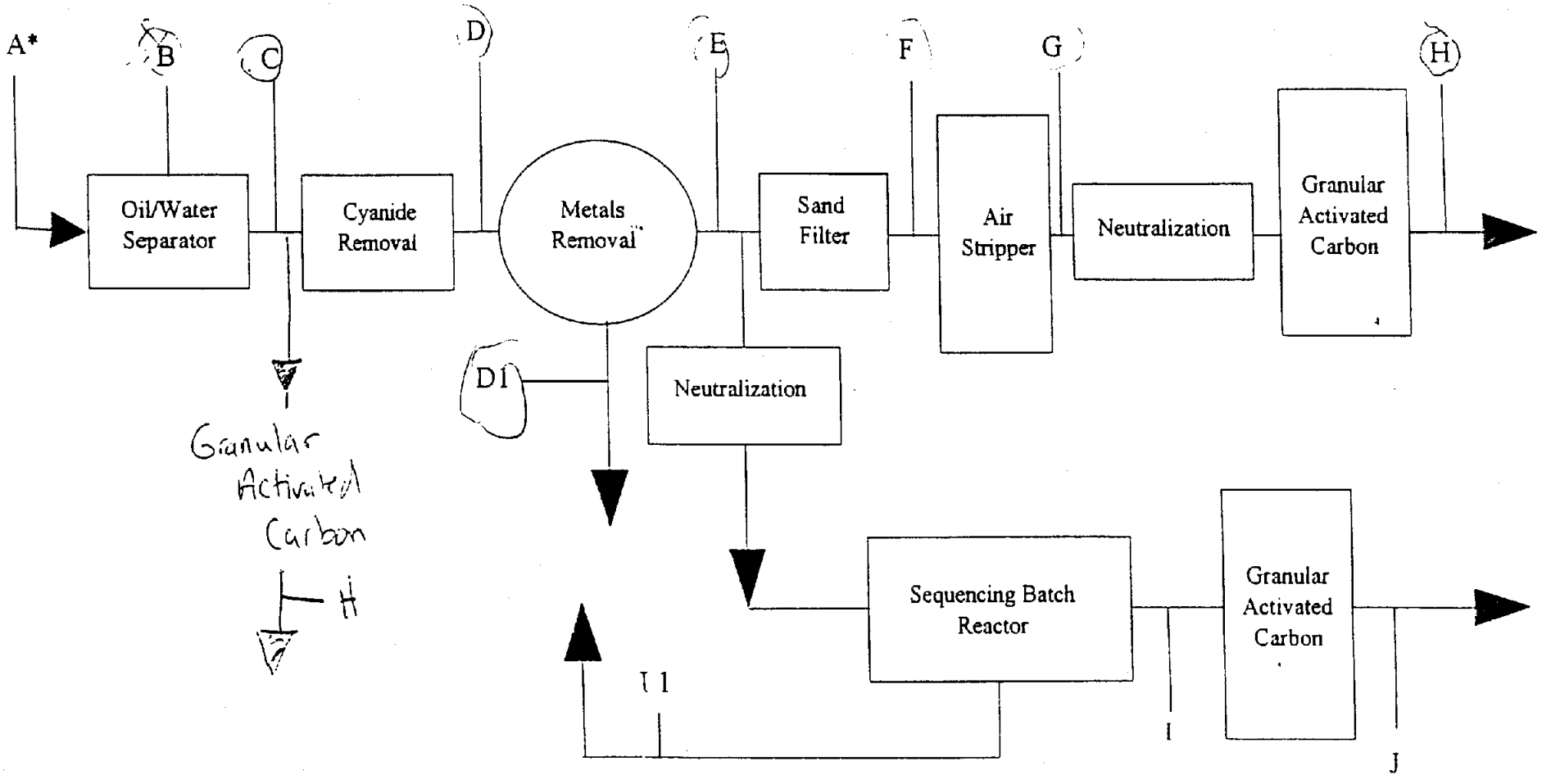
Treatment Train 2 flow-through testing was performed through May 14. Experimentation included acclimation and subsequent evaluation of Nitrifying bacteria to utilize ammonia in leachate. The results of these analyses are presented in Section VII, and discussed in Section IV.

III. Procedures and Methods

A. Sample Receipt, Compositing and Characterization

A sample of landfill leachate was composited in the field by URS, and received at the Waste Stream Technology (WST) analytical laboratory on February 9, 1996. The sample was analyzed according to the parameters outlined by URS, including: volatile and semivolatile organics, pesticides/PCBs, total metals, cyanide, total suspended solids (TSS), total dissolved solids (TDS), pH, alkalinity, biochemical oxygen demand (BOD), ammonia, total Kjeldahl nitrogen (TKN), Total Organic Carbon (TOC), total petroleum

FIGURE 1
UNIT OPERATIONS
PENNSYLVANIA LANDFILL TREATABILITY STUDY



* Letters denote sampling loccations

TABLE 4
PROPOSED ANALYTICAL SCHEDULE FOR TREATABILITY STUDY ACTIVITIES
(SAMPLE LOCATIONS IDENTIFIED IN FIGURE 1)

Analytical Parameter	— Sample Location —												
	A	B	C	D	D1	D2	E	F	G	H	I	H	J
VOCs	X						X	X	X	X	X		X
Semivolatiles	X						X		X	X	X		X
Pesticides	X						X		X	X	X		X
PCBs	X	X	X	X			X		X	X	X		X
Metals *	X				X		X			X	X		X
Cyanide (total)	X		X	X						X	X		X
Cyanide (free)	X		X	X						X	X		X
TSS	X						X	X	X	X	X		X
TDS	X									X			X
pH	X	X	X	X	X	X	X	X	X	X	X	X	X
Alkalinity	X						X		X	X	X		
BOD	X		X	X			X		X	X	X		X
COD	X		X	X			X		X	X	X		X
TOC	X						X		X	X	X		X
Ammonia	X						X	X	X	X	X		X
TKN	X						X	X	X	X	X		X
TPH	X		X							X	X		X
Oil and Grease	X		X							X	X		X
TCLP - VOCs		X				X						X	
TCLP - BNA		X				X						X	
TCLP - Pesticides		X				X						X	
TCLP -PCB		X				X						X	
TCLP - Metals		X				X						X	
Ignitability/Reactivity		X				X						X	
Total Solids		X				X						X	

* Analyses will be performed for only those metals, and species thereof (i.e. total, dissolved) for which a NYSDEC discharge limit is presented in Table 1.

hydrocarbons (TPH), oil & grease, and chemical oxygen demand (COD).

Six, 30 gallon drums were received from URS Consultants from Pennsylvania Avenue Landfill wells sampled on February 7 and 8, 1996. The composite samples were designated: 35331.16. The drum composites were analyzed for the same parameters as the Field Composite sample. Results of these analyses, presented in Section VII, and discussed in Section IV.

The six drum samples were designated by URS as: HP-OW-3A (2/8/96); HP-319 (2/8/96); ORW-1 (2/8/96); HP-OW-4A (2/7/96); HP-OW-5A (2/7/96); HP-107 (2/7/96); HP-OW-6A (2/7/96); HP-OW-2A (2/8/96); HP-102-UA (2/8/96); ORW-2 (2/8/96); HP-320 (2/8/96); HP-320A (2/8/96); HP-OW-3 (2/8/96). Waste Stream Technology Inc. (WST) composited the six drums together into two, 55-gallon drums for further experimentation. These drum composites were subsequently used for all experimentation, and designated Drum #1 and Drum #2. Further composites were prepared by mixing the contents of these two drums.

B. Oil and PCB Removal

1. **Jar Studies**

a. **Separatory Funnel** - Drums 1 and 2 were analyzed separately due to the visible differences of the two drums. Specifically, drum 1 appeared to have more free product floating on its surface. The following treatment train was performed in series to remove oil and PCB contaminants from the water:

Untreated Water
↓
Step 1
Coarse Filtered to Remove
Particulates and Globules
↓
Step 2
pH to 4.5 Using 2 mL/L(Comp#1) or 2.6 mL/L(Comp#2) H_2SO_4
Solids Allowed to Settle & Filter
↓
Step 3
pH to 2.0 Using 1 mL/L(Comp #1) or 1.5 mL/L(Comp#2) H_2SO_4
Solids Allowed to Settle & Filter

Step 1 filtration was performed using Whatman #41 (Fisher Scientific) filled with glass wool prior to addition of sample. Step 2 was performed as

follows: Drum 1 required 2 mL reagent grade sulfuric acid (J.T. Baker, Phillipsburg, NJ) per 1 L leachate; Drum 2 required 2.6 mL reagent grade sulfuric acid per 1 L leachate. Step 3 was performed as follows: Drum 1 required 1 mL reagent grade sulfuric acid per 1 L leachate; Drum 2 required 1.5 mL reagent grade sulfuric acid per 1 L leachate.

b. **Air Flotation** - Composites of Drum 1 and Drum 2 were used in air flotation experiments in an attempt to remove O&G and PCBs. Initial O&G levels were compared to 3 time points (0 minutes, 15 minutes, and 30 minutes air flotation) in either pH=7 (no pH correction needed) or pH=4.5 leachate, achieved by adding 1 mL sulfuric acid per 1 L leachate. Two liters of untreated leachate were added into 2-liter separatory funnels and an air stone with supplied air allowed to bubble for the indicated time intervals. One liter of the leachate was subsequently drained from the funnel and tested for O&G. In addition, PCBs were tested in samples obtained after 30 minutes of air flotation at pH 7 and pH 4.5.

2. **Flow Through Studies**

a. **Oil/Water Separator Preparation** - A bench-scale oil/water separator was designed to remove oil and solids from the untreated leachate. The apparatus consisted of a fiberglass tray 30 cm length X 5 cm height, with a centered internal platform that is 15 cm length X 15 cm width X 2.5 cm height. The platform was fitted with a 15 cm X 15 cm X 4 cm reticulated urethane foam media that provided a surface area of 400 ft^2/ft^3. This provided a surface area of approximately 13 ft^2. A wooden bar was inserted 1 cm beyond the platform, resting 1.5 cm below the surface and rising approximately 1 cm above the surface of the apparatus. In addition, three sheets of slant rib oil coalescing PVC media, 7.5 cm X 5cm, was placed beyond the wooden bar to entrap any free oil prior to leachate retrieval at the far end of the apparatus. The media was provided by Great Lakes Environmental Inc., Addison, IL. The media consists of closely spaced inclined plates, resulting in a surface area of 168 ft^2/ft^3 PVC, or an additional approximately 8 ft^2 of surface area.

b. **Flow-through Test** - A flow through study for

treatment train 3 was performed on March 8 using a composited sample from Drum 1 and Drum 2. WST subsequently analyzed samples from locations A and C as described in the Work Plan.

The bench-scale apparatus was subsequently used in flow through testing for Treatment Train 1 and 2 to evaluate the removal of solids, oil & grease, and PCBs.

The sample was composited from Drum 1 and Drum 2, the same sample used in the March 8 experiments. The pH of the 30 L sample was not adjusted.

The sample was introduced to the oil/water separator via a peristaltic pump through clean tygon tubing into the first reservoir of the apparatus at a flow rate of 100 mL/minute. The reservoir was capable of entrapping/settling solids and oil & grease. Flow was allowed to continue until the level of the fluid reached just below the top of the wooden dam placed after the urethane media. At this point, a second peristaltic pump was used to remove treated leachate from a second reservoir at the opposite end of the apparatus at an identical flow rate of 100 mL/minute. Treated leachate was collected in two clean 20 liter polypropylene pails and volume recorded. The entrapped solids, and oil & greases were collected from the apparatus as well as from the original sample containers in a pre-weighed, pre-cleaned, glass sample container, and the weight of the contents determined.

Samples were obtained and analyzed according to the analytical schedule for sample locations B and C presented in the Work Plan.

a. Treatment Train 3 Study

A treatment train consisting of oil/water separation followed by Granular Activated Carbon adsorption was performed. Briefly, 20L of the leachate was adjusted to pH to 4.5 by slowly adding 40 mL (2 mL/L) of concentrated sulfuric acid while stirring. Subsequently, the solids were allowed to settle for 1 hour, and the supernatant filtered through Whatman #41 filled with glass wool prior to addition of sample. Samples were obtained and analyzed according to the analytical schedule for sample

locations A, B and C presented in the Work Plan.

C. Cyanide Removal

Total cyanide refers to all of the cyanide groups in cyanide compounds that can be determined as the cyanide ion. The compounds from which cyanide can be obtained are classified as simple and complex cyanides.

Simple cyanides are represented by the formula A(CN)x, where A is an alkali (sodium, potassium, ammonium) or a metal, and x, the valence of A, is the number of CN groups. In aqueous solutions, the CN group is present as CN- and molecular HCN, and the ration depends on pH and pKa (~9.2). In the case of simple metal cyanides, the CN group may occur in the form of complex metal-cyanide anions of varying stability. Many are sparingly soluble or insoluble [AgCN, CuCN, $Zn(CN)_2$], but form a variety of highly soluble, complex metal cyanides in the presence of alkali cyanides.

There were three cyanide analyses performed in these studies; total, amenable, and weak acid dissociable. Total cyanide after distillation measures all species of cyanide. Measured are the almost non-dissociable cyanide, as well as cyanide bound in complexes that are readily dissociable and complexes of intermediate stability.

Cyanide compounds that are amenable to chlorination include free cyanide as well as those complex cyanides that are potentially dissociable. Amenable cyanide is determined by analyzing two samples, one that has been chlorinated to destroy all amenable cyanide present and the other unchlorinated.

The free and potentially dissociable cyanides also may be estimated when using the weak acid dissociable procedure. The methods utilize rigorous distillation, but the solution is only slightly acidified. Free cyanide may also be estimated by performing the method to measure total cyanide with no distillation step.

Several experiments were performed (1) to evaluate a method to remove cyanide from the leachate, and (2) measure cyanide in the leachate before and after the treatment.

1. **Jar Studies** - Cyanide removal was investigated using a 50:50 composite of drums 1 and 2.

    a. **Alkaline Chlorination** - These experiments investigated whether chlorination of the leachate

would remove cyanide. Two trials were performed, as described in the following figures:

1. Trial 1 - The first experiments followed the physicochemical technique for industrial waste treatment of cyanide compounds, as cited in Standard Methods for the Examination of Water and Wastewater. Briefly, this trial was performed in 400 mL beakers, pH 9 maximum, using 250 mL leachate:

Untreated Water
↓
Coarse Filtered to Remove Particulates and Globules
Filter Out Solids
↓
250 mL Initial Sample
↓
pH to 9.0 using 10 - 15 mL of 0.1N NaOH
↓
Hypochlorite Added dropwise until Positive Oxidation
(2 ml/250ml sample)
↓
Mix 1 Hour
↓
pH Dropped to 7.0 using H_2SO_4, 2 drops chlorine remover (Sodium thiosulfate) added until KI paper indicator is Negative
↓
Filtered and Analyzed for Total Cyanide

2. Trial 2 - The second set of experiments were performed following discussions with URS that utilized a higher pH and excess chlorine over a longer time period. Briefly, this trial was performed in 1 L beakers, pH 11.5 maximum, using 1L leachate:

Untreated Water
↓
Coarse Filtered to Remove
Particulates and Globules
↓
Filter Out Solids
↓
1000 mL Initial Sample
↓
pH to 11 - 11.5 using 2 mL of 10N NaOH
↓
Excess Calcium Hypochlorite Added (1 g/1 L sample),
excess measured using KI paper
↓
Mix 15 Hour
↓
pH Dropped to 7.5 - 9 using 0.2 mL H_2SO_4 concentrate
↓
Mix 2 Hour
↓
Filtered and Analyzed for Total, Amenable and Weak acid
dissociable Cyanide

b. **Peroxide oxidation** - This procedure was performed in 400 mL beakers, as follows:

Untreated Water
↓
Coarse Filtered to Remove
Particulates and Globules
↓
Filter Out Solids
↓
250 mL Initial Sample
↓
pH to 9.0 Using 10 mL 0.1N NaOH
↓
Peroxide Added (0.1%, 0.5%, 1.0% v/v)
using 30% Reagent Grade Peroxide
(0.8mL, 4.0 mL, and 8 mL, respectively)
↓
pH to 7.0 Using 7 mL 0.1N H_2SO_4
↓
Flocculate Using 10 ppm (0.6 mL) Calloway Polymer 4330
↓
Filter to Remove Particulates
↓
Analyze for Total Cyanide

c. **Ferric Sulfate Treatment** - multiple trials were performed using ferric sulfate (Callaway Chemical Co., Columbus, GA) in order to optimize the conditions of this reagent:

1. Trial 1: 0.05% to 5% v/v Ferric sulfate plus polymer 4330 (polymer 4310 failed to act on floc in previous experiments). In addition, one trial was attempted at pH 9, and total cyanide evaluated only.

a. Screening:

Untreated Water
↓
Coarse Filtered to Remove Particulates and Globules
↓
Filter Out Solids
↓
250 mL Initial Sample
↓
pH to 9.0 Using 10 mL 0.1N NaOH
↓
Ferric Sulfate Added (0.05%, 0.5%, 2.5%, 5% v/v)
↓
Flocculate Using Calloway Polymer 4330 (12 ppm)
↓
Filter to Remove Particulates
↓
Analyze for Total Cyanides

2. Trial 1 Optimization

Untreated Water
↓
Coarse Filtered to Remove Particulates and Globules
↓
Filter Out Solids
↓
250 mL Initial Sample
↓
Ferric Sulfate Added (0.05%, 0.5%, 2.5%, 5% v/v)
↓
Flocculate Using Calloway Polymer 4330 (4-12 ppm)
↓
Filter to Remove Particulates
↓
Analyze for Total Cyanides

3. Trial 2 Optimization: Tests with ferric sulfate (FS) plus anionic polymer 4330 demonstrated a significant removal of both CN(total) and CN(wad). Additional tests were performed using 8 concentrations of FS (0.0025%, 0.005%, 0.025%, 0.05%, 0.1%, 0.2%, 0.4%, and 0.5%) plus appropriate

concentrations of polymer proportionate to the FS amendments.

d. **Evaluation of Analysis Methods:** This series of analyses were performed to evaluate the accuracy of data concerning amenable cyanide and weak acid dissociable cyanide. Briefly, each sample will be analyzed for weak acid dissociable cyanide using Standard Method 4500-CN I and/or "free" cyanide as determined by EPA Method 335.2 **without using the distillation step.**

1. Protocol: The following table describes the samples used for this study and associated analyses:

Sample	WAD[a]	335.2[b]
dI water spiked at ~70 ppb	yes	yes
Parameter H leachate	yes	yes
Parameter H leachate spiked at ~70 ppb	yes	yes
Parameter E leachate	yes	yes
Parameter E leachate spiked at ~70 ppb	yes	yes
Parameter C leachate	yes	yes
Parameter C leachate spiked at ~70 ppb	yes	yes

a Weak acid dissociable cyanide
b Method 335.2 without distillation

2. **Flow Through Study**

a. A flow through test was initiated using two, 13 L aliquots (total 26 L) of leachate previously treated through the oil/water separator apparatus. The pH was adjusted to 9.0 since this would favor cyanate formation, which could be complexed by the iron. The pH was adjusted from 8.2 to 9.0 using 8.5 mL of 10 N NaOH per 13 L of leachate. Subsequently, 26 mL of a 50% concentrate of Ferric Sulfate solution per 13 L leachate was slowly added while mixing (0.1% v/v). To promote settling, 10.4 mL of Callaway polymer 4330 (Callaway Chemical Co., Columbus, GA) was added slowly while mixing. The flocculent was allowed to settle over a two hour time period, and the liquid phase was separated by decanting. Treated leachate was collected in two clean 20 liter polypropylene pails and volume recorded. The solids were collected in pre-cleaned, plastic sample containers, and the volume of the contents determined.

Samples were obtained and analyzed according to the analytical schedule for sample location D presented in the Work Plan.

D. Metals Removal

1. **Jar Studies**

a. **pH Screen** - Evaluation of pH 9 - pH 11.5 effect on precipitation of metals. 5N NaOH was added to 250 mL samples of leachate previously treated to remove floating product, as follows:

Untreated Water
↓
Coarse Filtered to Remove Particulates and Globules
↓
Filter Out Solids
↓
250 mL Initial Sample
↓
pH to 9, 10, 11, 11.5
(Using 0.5, 1.5, 2.5, and 3.5 mL 5N NaOH, respectively)
↓
Evaluate precipitate
↓
Flocculate Using Calloway Polymer 4330
(per Manufacturer's recommendation - 12 ppm)
↓
Filter to Remove Particulates
↓
Analyze for Total Metals

b. **Polymer Screen** - An evaluation of Calloway anionic polymer 4330, neutral polymer 4300, and cationic polymer 4579, versus NaOH treatment to pH 11.5, were determined as follows:

Untreated Water
↓
Coarse Filtered to Remove
Particulates and Globules
↓
Filter Out Solids
↓
250 mL Initial Sample
↓
pH to 11.5 Using 3.5 mL 5N NaOH
↓
Flocculate Using Calloway Polymers
(per Manufacturer's recommendation ~12 ppm)
↓
Denote observations of supernatant clarity, floc strength
Analyze for Metals

Vinmet: In addition, Vinmet 1140 polymer, sodium dithiocarbamate, was used to specifically target removal of transition metals without causing precipitation of iron, calcium, potassium and magnesium. This would lead to the removal of metals without producing a large sludge comprised of calcium, iron, etc., metal precipitates. This polymer was evaluated at four concentrations (0.1, 1, 5, and 1000 ppm), as follows:

Untreated Water
↓
Coarse Filtered to Remove
Particulates and Globules
↓
Filter Out Solids
↓
250 mL Initial Sample
pH at 7
↓
Treat Using Vinmet 1140 Polymer
(0.1, 1, 5, and 1000 ppm)
↓
Filter
↓
Analyze for Metals in Supernatant

c. **Large-Scale Screen** - An evaluation of metals precipitation in a 15 L batch of leachate (which has undergone previous treatment for oil/PCB removal) was performed as follows:

Untreated Water
↓
Coarse Filtered to Remove Particulates and Globules
↓
Filter Out Solids
↓
15 L Initial Sample
↓
pH to 11.5 Using 120 mL 4N NaOH
↓
Flocculate Using Calloway Polymer 4330 (20 mL 0.5% Stock Solution)
↓
Denote observations of supernatant clarity, floc strength
Analyze for Metals

2. **Flow Through Study**

A flow through test was initiated using two, 11.5 L aliquots (total 22 L) of leachate previously treated through the oil/water separator apparatus and 0.1% (v/v) ferric sulfate. The treatment took place in 20 L polypropylene pails. The pH was adjusted from 6.8 to 11.5 by adding 21.5 mL of 10 N NaOH per 11.5 L of leachate. The pH change was monitored using a pH meter. The flocculent was allowed to settle over a one hour time period, and the liquid phase was separated by decanting. Treated leachate was collected in a clean 20 liter polypropylene pail and volume recorded. The solids were collected in pre-cleaned, plastic sample containers, and the volume of the contents determined after settling. The flocculent was further compacted by centrifugation at 2000 rpm for 1 minute.

Samples were obtained and analyzed according to the analytical schedule for sample locations D1 and E, presented in the Work Plan.

E. Filtration

1. **Flow Through Study**

This study was used to evaluate removal of suspended solids in the leachate prior to the air stripping.

a. **Column Preparation -** The matrix used in this process was Manganese Green Sand (Iversand Company, Sewell, NJ), an oxidizing mineral useful for removal of iron, manganese, and hydrogen sulfide, as well as particulates that would foul the air stripper. The relative size of the sand is 0.3-0.35 mm, with a density of 85 pounds/ft^3. A PVC column, 1.5" diameter X 5 ft. length, was loaded with the green sand. The capacity of the column was 0.0492 ft^3 or 4 pounds of green sand.

b. **Flow-through** - Approximately 17.5 L of leachate previously treated through metals removal was then passed through the column at a flow rate of 100 mL per minute via a peristaltic pump, resulting in a contact time of approximately 15 minutes. The pass-through was collected in a clean, 20 L polypropylene pail.

Samples were analyzed according to the analytical schedule for sample location F, presented in the Work Plan.

F. Air Stripping

1. **Physical/Chemical Treatment**

The jar studies and column studies described in this section were conducted to determine the operating conditions for required ammonia removal. The analyses for determining the effectiveness of air stripping for VOC removal was conducted in the flow through test discussed in Section IV.

a. **Jar Studies**

1. Batch Air Stripping: Prior to using the air stripping column, jar studies were performed with leachate treated to pH 4.5 and O&G removed to evaluate ammonia removal. The initial ammonia nitrogen level was determined to be 346 ppm. Subsequently, 1 L samples were pH adjusted to either pH=7 or pH=11.5. Air was bubbled into the samples at 70°F or 100°F. Samples were collected 1, 3, 5, and 20 hours after aeration began, and samples were analyzed for ammonia.

b. **Air Stripping Column Studies**

1. Batch Studies: Batch studies were conducted using 1 L of leachate adjusted to pH 11.5 using 2 ml of 10 N NaOH/L leachate. An air stripping column was subsequently used to evaluate this technology's ability to remove ammonia from the leachate previously treated for removal of oil, PCBs, cyanide, and metals.

2. Column Preparation - The air stripper column was constructed of PVC. The column is 3" diameter X 5' length, containing three, 3" diameter X 3" length, slant rib PVC media bundles. The media consists of closely spaced inclined plates, resulting in a surface area of 168 ft^2/ft^3 PVC, or 2.1 ft^2 of surface area per bundle. Air flow was established using compressed air introduced at three points, i.e. just below each bundle, and the regulator adjusted to provide flow as measured by a Model 8380 VelociCalc Plus flow meter (TSI Incorporated, Environmental Measurements and Controls Division, St. Paul, MN). Leachate was introduced at pre-determined flow rates using a peristaltic pump. Leachate was fed onto the surface over a polypropylene tower stacking ball to aid in dispersement. All liquid was collected in clean tygon tubing, through a 0.25" opening at the bottom of the column using a peristaltic pump set at the influent flow rate to prevent accumulation of fluids. All fluids were kept at specified temperatures using a pre-set water bath.

3. Air Stripping Studies - The studies were performed with an air flow rate at 16 ft^3/min and hydraulic loading rate of 400 mL/min. Experiments were performed at three temperatures. After one passage of a 1 L sample through the 5' column at 140°F, the volume was brought up to the initial volume with 40 mL of dI water. Subsequently, two additional passes through the column were performed, and additional passes until reaching an endpoint $\leq$10 ppm. Thereafter, studies were performed at an influent flow rate of 400 mL/minute, at several temperatures and associated air flow rates. The column was first equilibrated at the process temperature by passing through equilibrated deionized water (dI water) for

several passes prior to starting the flow of leachate. After passage through the 5' column, the volume was brought up to the initial volume with dI water.

b. **Flow Through Studies**

The treatment train air stripping step followed sand filtration. Since the air stripping was capable of removing the ammonia to the desired discharge levels, the air stripping was used to evaluate volatile and semivolatile organic compound removal. Studies were performed at the parameters previously established: an influent flow rate of 400 mL/minute, at 100°F, with an air flow rate of 16 ft^3/min. The column was first equilibrated at the process temperature by passing through equilibrated deionized water (dI water) for several passes prior to starting the flow of leachate. 14 L of leachate was pH adjusted to 11.5 by adding 28 mL of 10 N NaOH. The leachate was preheated to 100°F before each passage through the column. After passage through the 5' column, the volume was brought up to initial volume with dI water in a clean polypropylene pail.

Samples were subsequently taken according to analytical scheme G, presented in the Work Plan.

G. Biological Treatment

a. **Jar Studies**

Nitrifying bacteria are obligate chemolithotrophs, capable of growing with inorganic salts, oxidizing ammonia and nitrite and fixing CO_2 to fulfill energy and carbon needs. They are strict aerobes, and grow very slowly with a doubing time of 15 hours under ideal conditions.

Maximum growth is at 25-30°C (77-86°F), and the growth rate is reduced by 50% at 18°C (64.4°F) at temperatures of 8-10°C (46-50°F) the growth rate is 30% of maximum growth rate. Since they are substrate (food) dependent, levels of ammonia can affect their growth and survival. Their sensitivity to pH requires operation in pH between 7 and 8, and 7.14 grams of alkalinity needs to be available for each gram of ammonia oxidized. Oxygen concentrations need to be maintained above 80% of saturation to achieve maximum nitrification rates.

The following experiments were performed to evaluate the effectiveness of bacterial nitrification to treat

ammonia in the leachate. Studies attempted to optimize the culture conditions as described above.

1. Activated Sludge Acclimation: WST used activated sludge obtained from the Buffalo Sewer Authority to evaluate removal of ammonia from leachate previously treated to remove oil & grease, PCBs, CN, and metals.

A batch system was prepared by adding 15 grams of sludge to 1.5 L of leachate in a 2 L separatory funnel. This amount of inoculum was calculated to attain a TSS of 4000 ppm. The system was aerated with air supplied through an air stone. The reactor was sampled and analyzed for ammonia at time 0 hours, 3 hours, 15 hours, and 65 hours.

The reactor was allowed to incubate for three more weeks. Air flow in the reactor was adjusted to attain a dissolved oxygen (DO) concentration of 2-5 ppm. The DO was measured daily. pH was measured daily with a meter; twice daily with pH paper, and meter measurements were repeated if the pH dipped below 7. The sample volume was measured and logged after each sampling event. When sampling, the suspension was allowed to settle and the supernatant was then decanted and the sludge returned to reactor. Daily ammonia nitrogen levels were also determined.

2. Specialized Bacteria Acclimation: A special nitrifying bacterial culture, designed by InterBio/MicroMasters (Baton Rouge, LA), was used as an inoculant for the biological system and to evaluate the conditions that would be required to biologically remove ammonia from the leachate through oxidation to nitrate. The supplied cultures contained a mixed population of nitrifying bacteria that convert ammonia to nitrite (*Nitrosomonas Sp.*), and nitrate to nitrate (*Nitrobacter sp.*).

a. **Ammonia Utilization Screening:** The following study designs were used to establish the initial conditions for the treatment train.

Two microcosms served as positive controls (Flasks 1 and 2), while Flask 6 served as a negative control, where no changes in ammonia were expected.

1. All experiments were performed in a 30°C water bath, and microcosms were established in 250 mL Erlenmeyer Flasks

containing air supplied through air stones to saturate oxygen levels.

2. Six microcosms containing 250 mL dI water plus 2.5 mL of a pH buffer (Tris Buffer, pH 8) were prepared as follows:

a. Flask 1 (50 ppm + nitrifiers) was prepared by adding ammonia stock solution to 50 ppm plus a ten mL syringe. The syringe contained a mixed culture of nitrifiers. (Control flask).

b. Flask 2 (195 ppm + nitrifiers) was prepared by adding ammonia stock solution to 195 ppm plus a ten mL syringe. (Control flask).

c. Flask 3 (1:3 leach + nitrifiers) was prepared by adding leachate treated through cyanide treatment and diluted to approximately 100 ppm with dI water, plus a ten mL syringe.

d. Flask 4 (leach + PAC + nitrifiers) was prepared by adding leachate treated through cyanide treatment plus 7000 ppm powdered activated carbon (PAC), plus a ten mL syringe.

e. Flask 5 (leach + nitrifiers) was prepared by adding leachate treated through cyanide treatment plus a ten mL syringe.

f. Flask 6 (50 ppm ammonia) was prepared by adding ammonia stock solution to 50 ppm. This flask served as a negative control.

3. The flasks were incubated at 30°C and sampled after 2, 4, 6, 20, and 24 hours to determine ammonia concentrations.

b. **Culture Acclimation:** The bacterial cultures in the 250 mL flasks were subsequently renamed in order to expand the bacterial cultures, as shown in the following table:

Nomenclature for Culture Acclimation

Old Nomenclature	New Nomenclature
50 ppm + nitrifiers	Culture #1
195 ppm + nitrifiers	Culture #2
1:3 leach + nitrifiers	Culture #3
leach + nitrifiers	Culture #5

Leachate, previously treated through metals removal, was used as an ammonia source for the cultures (#1, 2, 3, 5) during the acclimation period. The ammonia and nitrate nitrogen levels were analyzed in each culture daily from 5/2 through 5/10/96. Volume changes were also recorded as cultures were expanded. Culture #1 was also sampled for mixed liquor suspended solids (MLSS) and mixed liquor volatile suspended solids (MLVSS) analyses on 5/10/96.

On 5/13, 50 mL of Leachate was diluted with 100 mL of dI water, and subsequently added to 250 mL of a 5/9/96 subculture of acclimated Culture #1. The initial ammonia level was determined, and the culture allowed to incubate overnight in a 30°C water bath, while being aerated through air stones. On 5/14, this culture was analyzed for ammonia, then diluted with fresh leachate diluted with dI water such that the initial ammonia level would be ≤70 ppm. Ammonia levels were then determined at 0 hours, 1 hour, 2 hours, 4 hours, 8 hours and 24 hours. The MLSS and MLVSS concentrations were also determined at 24 hours.

H. Activated Carbon/Organic Removal

1. **Flow Through Studies**

a. **Column Preparation** - The matrix used in this process was granular activated carbon (GAC) D/S React-C (Calgon Carbon Corp., Pittsburgh, PA). The density of the GAC is 30.8 pounds/ft^3. Two, PVC columns, 1.5" diameter X 5 ft. length, were loaded with the GAC. The capacity of each column was 0.0492 ft^3. Therefore, each column was filled with 1.5 pounds of GAC; a total of 3 pounds of GAC were used for two columns. At a flow rate of 92.9 mL/minute, each column provided a contact time of 15 minutes; passage through two columns resulted in 30 minutes contact time.

b. **Flow-through** - Approximately 8.5 L of leachate previously treated through ammonia removal post sand filtration and air stripping was neutralized to pH 7 by adding 4 mL of concentrated H_2SO_4 while mixing in a clean polypropylene pail. The leachate was then passed through the first column then into the second column in series at a flow rate of 92.9 mL per minute via a peristaltic pump. The pass-through was collected in a clean, 20 L polypropylene pail.

Samples were obtained and analyzed according to the analytical schedule for sample location H, presented in the Work Plan.

1. Treatment Train 3 Study

A treatment train consisting of oil/water separation followed by Granular Activated Carbon (GAC) adsorption was performed. Approximately 10 L of oil/water separated leachate was pumped through GAC columns as previously described. Samples were obtained and analyzed according to the analytical schedule for sample locations H presented in the Work Plan.

c. **Isotherm Study**

An isotherm study was established to determine the capacity of GAC to adsorb organic contaminants in the leachate treated only through an Oil/Water Separator. Six flasks were filled with 100 mL of the Oil/Water Separator treated leachate with a known COD concentration. Subsequently, GAC was added to each flask, in the following amounts: 10 mg, 50 mg, 100 mg, 500 mg, 1,000 mg, and 10,000 mg. The contents were mixed with a magnetic stir bar for 30 minutes at 72°F, and allowed to settle. The supernatants were then analyzed for COD.

IV. Results

A. Initial Leachate Characterizations

1. **Field Composite** - The field composite sample provided by URS was analyzed according to the analytical schedule for sample location A presented in the Work Plan. Heavy metals were most noticeably absent. The organic contamination included volatile hydrocarbons (BETX, and chlorinated hydrocarbons), and semivolatile hydrocarbons (chlorobenzene derivatives, naphthalene, and other 4- and 5- ring PAHs). PCB analyses indicated the presence of Arochlors 1254 and 1260. Cyanide was determined to be 35 µg/L. The biological oxygen demand (BOD) was measured at 98.5 ppm, and the chemical oxygen demand (COD) was reported as 599 ppm. The results of these analyses are presented in Section VII.

2. **Laboratory Composite** - A sample composited from Drum 1 and a sample from Drum 2 was analyzed according to the analytical schedule for sample location A presented in the Work Plan. The results of these analyses are presented in the following table and in Section VII.

Untreated Influent Composite Data

Parameter	A (untreated influent)
pH	8.2
PCBs	1254: 9.18ppb; 1260: 15.1ppb
COD	1206 mg O_2/L
Metals	Aluminum < DL; Antimony < DL; Barium 194 ppb; Beryllium < DL; Calcium 153,000 ppb; Chromium 28 ppb; Cobalt < DL; Iron 7400 ppb; Magnesium 132,000 ppb; Manganese 514 ppb; Mercury < DL; Potassium 147,000 ppb; Sodium 757,000 ppb; Vanadium < DL
TSS	265 ppm
TDS	3205 ppm
VOCs	1,1-DCE: 28 ppb; benzene: 81 ppb chlorbenzene: 17 ppb toluene: 841 ppb
Semi-VOCs	Dichlorobenzene: 26.4 ppb Dimethylphenol: 19.6 ppb Trichlorobenzene: 26.3 ppb Naphthalene: 9.6 ppb Acenaphthene: 27.8 ppb Fluorene: 21.4 ppb N-Nitrosodiphenylam: 70.4 ppb Phenanthrene: 48.1 ppb Anthracene: 15.9 ppb Di-n-butylphthal: 5.1 ppb Fluoranthene: 26.1 ppb Pyrene: 20.5 ppb Benzo[a]anthracene: 8.5 ppb Chrysene: 9.5 ppb Benzo[b,k]fluoran: 12.0 ppb Benzo[a]pyrene: 4.8 ppb
Ammonia	296 ppm
Pesticides	< Detection Limits
Cyanide-wad	26 ppb
TOC[a]	0.22%
TKN	280 ppm
BOD	67 ppm
Ignitability	>200°F
Alkalinity	2030 ppm
Cyanide-Total	45 ppb
TPH	59.4 ppm
Oil & Grease	109 ppm

a Substituted with a Percent Organic Matter analysis

B. Oil and PCB Removal

1. **Jar Studies**

a. **Separatory Funnel** - Following the addition of acid to pH 4.5, the leachate began to bubble and froth at the surface. Drum 1 was observed to have some oil globule coalescence that slowly raised to the surface as pH dropped from 4.5 to 2.0. A decision was made to filter this rather than wait for it to rise. The results of these treatments sampled on 2/26/96 were as follows:

Drum 1 Oil Separation Jar Study

Sample	Oil and Grease	PCBs	Total Cyanide	Metals
Unfiltered, Untreated	387 ppm	45.7 ppb	NA[1]	NA
Filtered, Untreated	16.7 ppm	<0.065 ppb	NA	NA
pH to 4.5 Using H_2SO_4	10.1 ppm	< 0.065 ppb	44 ppb	Unchanged from initial analyses
pH to 2.0 Using H_2SO_4	11.8 ppm	< 0.065 ppb	NA	NA

1 NA; Not Analyzed

Drum 2 Oil Separation Jar Study

Sample	Oil and Grease	PCBs	Cyanide	Metals
Unfiltered, Untreated	11.8 ppm	< 0.065 ppb	NA[2]	NA
Filtered, Untreated	22.4 ppm	< 0.065 ppb	NA	NA
pH to 4.5 Using H_2SO_4	11.2 ppm	< 0.065 ppb	59 ppb	No Change
pH to 2.0 Using H_2SO_4	11.8 ppm	< 0.065 ppb	NA	NA

1 NA; Not Analyzed
2 ND; Not Detected

b. **Air Flotation** - Results indicated that after 30 minutes air flotation at neutral pH approximately 50% of the O&G floated to the surface. There was less of an apparent affect of air flotation at pH 4.5. PCBs in 30' water samples at pH 7 and pH 4.5 were determined.

Air Flotation Experiments-Oil & Grease

TIME	Composite @pH=7.0 Oil & Grease (ppm)	Composite @pH=4.5 Oil & Grease (ppm)
initial composite	193	39.6
0 min. air flotation	193	39.6
15 min. air flotation	191	28.9
30 min. air flotation	90.4	26.0

Air Flotation Experiments-PCBs

TIME	Composite @pH=7.0 PCBs	Composite @pH=4.5 PCBs
30 min. air flotation	<0.065 ppb	<0.065 ppb

2.**Flow Through Studies**

Treatment Train 2: A flow through test on March 8 indicated that the oil & grease levels could be reduced by 81%, from 109 ppm to 21 ppm; PCBs by >99%, from 24 ppb to less than 0.2 ppb; and total suspended solids by >98%, from 265 ppm to less than 4 ppm. This full scale flow through test utilized Drum 1 + Drum 2 composited sample. Thirty liters of the sample was pumped through the test apparatus at a flow rate of 100 mL/minute, and the treated effluent and trapped solids were collected. The following observations were made:

Flow Through O&G Separator
Recovery and Observation Data

Matrix	Volume or Weight	Observations
Treated Leachate	30 L	Floating product no longer present; brown color present
Oil (floating product)	32 grams	Oil and gritty particulates

Reported are results of the analytical schedule for sample locations B and C, referred in the Work Plan:

Flow Through O&G Separator
Sample Locations A, B, C Data

Parameter	A (influent)	B (oil)	C (effluent)
pH	8.2	7.01	8.11
PCBs	1254: 9.18ppb 1260: 15.1ppb	1254:8.32ppb[a] 1260:16.5ppb[a]	1254: <0.065ppb 1260: 3.46ppb[b]
COD	1206 mg O_2/L	Not Analyzed	276 mg O_2/L
TCLP VOCs	Not Analyzed	<DL	Not Analyzed
TCLP Semi-VOCs	Not Analyzed	<DL	Not Analyzed
TCLP Pesticides	Not Analyzed	<DL	Not Analyzed
Ignitability	>200°F	>200°F	Not Analyzed
Reactive CN	Not Analyzed	<4 ppm	Not Analyzed
Reactive Sulf	Not Analyzed	44.8 ppm	Not Analyzed
TPH	59.4 ppm	Not Analyzed	16.6 ppm
Oil & Grease	109 ppm	Not Analyzed	28.4 ppm

a PCBs reported as totals since TCLP on oil is performed by waste dilution.

b PCBs present due to breakthrough of overloaded apparatus.

The oil & grease levels were reduced by 74%, from 109 ppm to 28 ppm; PCB Aroclor 1254 by >99%, from 9 ppb to less than 0.1 ppb; PCB Aroclor 1260 by ~80% (due to breakthrough since the unit was overloaded), from 15 ppb to 3.5 ppb; COD by 77%, from 1200 mg O_2/L to 276 mg O_2/L; and, TPH by 72%, from 59 to 17 ppm. The PCBs were found in the entrapped oil & grease.

Additional data is presented in the analytic report in Section VII.

Treatment Train 3: A 22 L composite of 1C + 2C sample was filtered to remove oil & grease, and particulates, and the treated effluent and trapped solids were collected. The analytical schedule for sample locations listed in categories B and C, referred in the Work Plan, were analyzed. Several of these are compared with initial the analytical schedule for sample locations in category A in the following table:

Treatment Train #3
Flow Through O&G Separator
Sample Location A, B, C Data

Parameter	A	B	C
pH	8.2	6.44	7.50
PCBs	1254: 9.18ppb 1260: 15.1ppb	1254: <0.3ppb 1260: <0.3ppb	1254:<0.065ppb 1260:<0.065ppb
COD	1206 mgO2/L	Not Analyzed	1119 mgO2/L
Metals	<Discharge Limits	<TCLP Detection Limits	<Discharge Limits
TSS	265 ppm	Not Analyzed	Not Analyzed
TDS	3205 ppm	Total Solids: 4500 ppm	Not Analyzed
VOCs	1,1-DCE:28ppb benzene:81ppb chlorbenz:17ppb toluene:841ppb	<TCLP Detection Limits	Not Analyzed
Semi-VOCs	<Discharge Limit	<TCLP Detection Limits	Not Analyzed
Ammonia	296 ppm	Not Analyzed	341 ppm
Pesticides	<Detection Limits	<TCLP Detection Limits	Not Analyzed
Cyanide-wad	26 ppb	Not Analyzed	13 ppb
Alkalinity	2030 ppm	Not Analyzed	Not Analyzed
BOD	67 ppm	Not Analyzed	73 ppm
TPH	59.4 ppm	Not Analyzed	<4 ppm
Oil & Grease	109 ppm	Not Analyzed	15.3 ppm

Analyses showed that in the leachate: the oil & grease levels could be reduced by 86%, from 109 ppm to 15.3 ppm; PCBs by >99%, to less than 0.1 ppb (detection limit); ppb; TPH by >93%, from 59 to <4 ppm. Ammonia, BOD, and COD remained unchanged. The weak acid dissociable cyanide appeared to decrease by 50%, from 26 ppb to 13 ppb.

Additional data is presented in the analytic report in Section VII.

c. Cyanide Removal

1. **Jar Studies**

a. **Alkaline Chlorination** - These experiments investigated whether chlorination of the leachate would remove cyanide. The first experiments followed the physicochemical technique for industrial waste treatment of cyanide compounds, as cited in Standard Methods for the Examination of Water and Wastewater.

Chlorination at pH 9

Sample	CN tot	CN amen	CN wad
Chlorination @ pH 9 maximum	41 ppb	NA[1]	NA
Chlorination Duplicate @ pH 9	39 ppb	NA	NA

1 NA; not analyzed

Chlorination at pH >11

Sample	CN tot	CN amen	CN wad
Untreated @ pH 4.5	26 ppb	53 ppb	13 ppb
Chlorination @ pH 11.5 maximum	43 ppb	56 ppb[1]	27 ppb

1 Interferences

Standard Methods cites two possible reasons (listed below) for having a total cyanides from a chlorinated sample that is greater than a total cyanide from an non-chlorinated sample, thus yielding a negative value for cyanides amenable to chlorination. These are quoted directly out of method 4500-CN G. Cyanides Amenable to Chlorination after Distillation.

1. Some unidentified organic chemicals may oxidize or form breakdown products during chlorination, giving higher results for cyanide after chlorination than before chlorination. This may lead to a negative value for cyanides amenable to chlorination after distillation of wastes from, for example, the steel industry, petroleum refining, and pulp and paper processing. Where such interferences are encountered use Method 4500-CN^-.I for determining dissociable cyanide.

2. For samples containing significant quantities of iron cyanides, it is possible that the second distillation will give a higher value for CN^- than the test for total cyanide, leading to a negative result. When

the difference is within the precision limits of the method, report "no determinable quantities of cyanide amenable to chlorination". If the difference is greater than the precision limit, ascertain the cause such as presence of interferences, manipulation of the procedure, etc.

b. **Peroxide Oxidation** - The results of these experiments are summarized in the following table:

Effects on Cyanide Following Peroxide Oxidation

Sample	CN tot	CN amen	CN wad
Untreated	37 ppb	NA[1]	NA
0.1% Peroxide	34 ppb	NA	NA
0.5% Peroxide	32 ppb	NA	NA
1.0% Peroxide	31 ppb	NA	NA

1 NA; not analyzed

c. **Ferric Sulfate**

1. Preliminary Studies - screening was performed in an attempt to identify the range of reagent required. The results are summarized in the following table:

Ferric Sulfate Screening Study

Sample	Total Cyanide (ppm)
pH 9.0, 0.05% $Fe_2(SO_4)_3$ + polymer 4330	0.037 ppm
pH 9.0, 0.5% $Fe_2(SO_4)_3$ + polymer 4330	< 0.016 ppm
pH 9.0, 2.5% $Fe_2(SO_4)_3$ + polymer 4330	0.024 ppm
pH 9.0, 5% $Fe_2(SO_4)_3$ + polymer 4330	< 0.016 ppm

2. Trial 1 Optimization - Optimization of ferric sulfate dosing showed that pH decreased when using ≥0.2% ferric sulfate. The pH was adjusted to 6 using a few drops of 5N NaOH in each solution. Settling after polymer addition occurred in <10 minutes at ferric sulfate ≤0.1%; <20 minutes at ferric sulfate 0.2%; and, <30 minutes at ferric sulfate ≥0.4%.

Ferric Sulfate Optimization Studies
(0.05% - 0.5% Ferric Sulfate)

Parameter	0% FS	.05% FS	0.1% FS	0.2% FS	0.4% FS	0.5% FS
pH[1]	NA	7	6	3[2]	<3[2]	<3[2]
final conc. 4330 (ppm)	NA	4	4	8	12	12
CN(total)	31 ppb	26 ppb	20 ppb	22 ppb	19 ppb	14 ppb
CN(wad)	13 ppb	14 ppb	10 ppb	9 ppb	9 ppb	10 ppb
Acidity	501000	30,000	500	200	100	200
Alkalinity	NA	610	140	220	100	210
Fe(total)	1.4ppm	1.8ppm	1.3ppm	171ppb	1.3ppm	165ppb
Ba(total)	133ppb	75ppb	96ppb	44ppb	92ppb	40 ppb

1 pH due to Ferric Sulfate
2 pH adjusted to 6

Further optimization of cyanide removal was attempted at ferric sulfate concentrations from 0.0025% to 0.025%. The results of these studies are summarized in the following table:

Ferric Sulfate (FS) Studies
(0.0025% - 0.025% Ferric Sulfate)

Parameter	.0025% FS	0.005% FS	0.025% FS
pH[1]	7	6	6
final conc. of polymer 4330 (ppm)	4	4	4
CN(total)	35 ppb	37 ppb	31 ppb
CN(wad)	22 ppb	22 ppb	19 ppb
CN(amenable)	22 ppb	22 ppb	17 ppb

1 pH due to Ferric Sulfate

These studies indicated that weak acid dissociable cyanide could be removed to ≤10 ppb at a 0.1% v/v ferric sulfate concentration. The addition of ferric sulfate at higher concentrations did not improve its removal. There was virtually no CN removal observed at the three low concentrations (0.0025%, 0.005%, and 0.025%) of ferric sulfate.

d. **Evaluation of Analysis Methods:** A series of analyses were performed to evaluate the accuracy

of data concerning amenable cyanide and weak acid dissociable cyanide. Weak acid dissociable cyanide was analyzed using Standard Method 4500-CN⁻I, and "free" cyanide was determined by EPA Method 335.2 **without using the distillation step.** The following table describes the samples used in this study, and subsequent results of analyses:

Sample	WAD[a] (ppb)	335.2[b] (ppb)
dI water spiked	43.5	71
Parameter H leachate	<8.5	<8.5
Parameter H leachate spiked	55	34
Parameter E leachate	12	<8.5
Parameter E leachate spiked	81	18
Parameter C leachate	13	14
Parameter C leachate spiked	75	21

a Weak acid dissociable cyanide
b Method 335.2 without distillation

These results showed that both analyses determined the cyanide concentrations were below 8.5 ppb after Treatment Train #1 through GAC. The results also showed that the analysis after Oil/Water Separator treatment showed virtually no change in the concentrations. After cyanide and metals removal (E), the levels were 12 ppb and <8.5 ppb for Weak acid dissociable cyanide and Method 335.2 without distillation, respectively. The spike recovery was 100% when analyzed by method 335.2 without distillation, as the true value (71 ppb) and experimental value were identical in the spiked dI water blank. However, the spike recovery using the wad method was ~60%. The spike appeared to be affected by the leachate using both test methods.

2. **Flow Through Studies**

A flow through test was initiated on April 26 using two, 13 L aliquots (total 26 L) of leachate previously treated through the oil/water separator apparatus. The pH was adjusted from 8.2 to 9.0 using 8.5 mL of 10 N NaOH per 13 L of leachate. Subsequently, 26 mL of a 50% concentrate of Ferric Sulfate solution per 13 L leachate (0.1% v/v) was slowly added while mixing. To promote settling, 10.4 mL of Callaway polymer 4330 (Callaway Chemical Co., Columbus, GA) was added slowly while mixing. The following observations were made:

Flow Through Cyanide Removal
Recovery and Observation Data

Matrix	Volume or Weight	Observations
Treated Leachate	26 L	Pale brown/yellow
Precipitated solids	1.25 L	Brown, granular, packed precipitate

The analytical schedule for sample locations listed in categories D, referred in the Work Plan, was followed. Several of these results are compared for pH, Total, Amenable, and Weak Acid Dissociable Cyanides, and PCBs in the following table:

Flow Through Ferric Sulfate Treatment
Sample Location C and D Data

Parameter	C (influent)	D (effluent)
pH	8.11	7.56
PCBs	1254: <0.065ppb 1260: 3.46ppb	1254: <0.065 ppb 1260: <0.065 ppb
Cyanide (total)	29 ppb	27 ppb
Cyanide (amenable)	36 ppb	37 ppb
Cyanide (weak acid dissociable)	11 ppb	9 ppb

The PCB Aroclor 1260 was reduced by >99%, from 3.5 ppb to <0.065 ppb, below discharge limits; and, weak acid dissociable cyanide, from 11 to 9 ppb, below the discharge limit of 10 ppb. Since the samples may contain significant quantities of iron cyanides, it is possible that the second distillation will give a higher value for amenable cyanide than the test for total cyanide.

Additional data is presented in the analytic report in Section VII.

D. Metals Removal

1. **Jar Studies**

a. **pH Screen** - Evaluation of pH 9 - pH 11.5 showed that the best removal was found at pH 11.5.

b. **Polymer Screen** - An evaluation of Calloway anionic polymer 4330, neutral polymer 4300, and cationic polymer 4579, versus NaOH treatment to pH 11.5, showed that all polymers tested had an ability to precipitate the flocculent formed at pH 11.5. Although the supernatant was more clarified after addition of the cationic polymer 4579, the

manufacturer stated that the anionic polymer 4330 yields a higher mechanical strength flocculent. Although the neutral polymer 4300 worked, it is much higher priced than the Calloway 4330. It should be noted that another neutral polymer, Jayfloc #846 (ammonia nitrogen-based) was inappropriate due to its ammonia base.

Metals Removal - Calloway Polymer Screening

Metal Detected	pH 11.5 Untreated	pH 11.5 + 4330	pH 11.5 + 4300	pH 11.5 + 4579	pH 11.5 + 4300
Aluminum	<DL	<DL	<DL	<DL	<DL
Antimony	<DL	<DL	<DL	<DL	<DL
Barium	23 ppb	39 ppb	32 ppb	37 ppb	23 ppb
Beryllium	<DL	<DL	<DL	<DL	<DL
Calcium	6500 ppb	1900 ppb	3300 ppb	3800 ppb	3700 ppb
Cobalt	<DL	<DL	<DL	<DL	<DL
Magnesium	29800 ppb	14800 ppb	28000 ppb	22700 ppb	17000 ppb
Manganese	22 ppb	<DL	<DL	10 ppb	7 ppb
Mercury	<DL	<DL	1 ppb	<DL	<DL
Potassium	173000 ppb	168000 ppb	173000 ppb	173000 ppb	157000 ppb
Sodium	998000 ppb	981000 ppb	981000 ppb	981000 ppb	981000 ppb
Vanadium	<DL	<DL	<DL	<DL	<DL

Metals Removal - Vinmet Polymer Screening

Metal Detected	Untreated	0.1 ppm 1140	1 ppm 1140	5 ppm 1140	1000 ppm 1140
Aluminum	<DL	<DL	<DL	<DL	<DL
Antimony	<DL	<DL	<DL	<DL	<DL
Barium	194 ppb	87 ppb	91ppb	99 ppb	87 ppb
Beryllium	<DL	<DL	<DL	<DL	<DL
Cadmium	<DL	<DL	<DL	<DL	<DL
Calcium	153000 ppb	95600 ppb	101000ppb	104000 ppb	92700ppb
Chromium	28 ppb	13 ppb	15ppb	14 ppb	14 ppb
Cobalt	<DL	<DL	<DL	<DL	<DL
Iron	7400 ppb	1000 ppb	989ppb	1000 ppb	1000 ppb
Lead	<DL	<DL	<DL	<DL	<DL
Manganese	514 ppb	185 ppb	210ppb	249 ppb	159 ppb
Magnesium	132000 ppb	128000 ppb	133000ppb	132000 ppb	133000ppb
Mercury	<DL	<DL	<DL	<DL	<DL
Potassium	147000 ppb	152000 ppb	153000ppb	154000 ppb	152000ppb
Sodium	757000 ppb	770000 ppb	743000ppb	755000 ppb	863000ppb
Vanadium	<DL	<DL	<DL	<DL	<DL

The Vinmet polymer 1140 (sodium dithiocarbamate), which is capable of functioning at pH 4-12, was able to reduce the concentrations of barium and chromium by 50%, however, this effect was not dose dependent. In addition, carbamates, even at extremely low concentrations, are known to inhibit bacterial nitrification, and would not be useful in future bacteriological treatment of ammonia.

c. **Large-Scale Screen** - In preparation of a flow through study, an evaluation of metals precipitation in a 15 L batch of leachate (which has undergone previous treatment for oil/PCB removal) resulted in the following observations:

Supernatant was brownish yet clear, closely resembling the coloration following oil removal and did not match the green tinted, ferric sulfate-treated material (cyanide removal). Supernatant had a slight ammonia odor at this pH 11.5. Fine metal precipitate appears to pass through the Whatman #41 filter paper, yielding a fine white precipitate in the filtered solution.

Analysis of the untreated versus treated supernatant showed that the treatment effectively removed metals of interest, and had virtually no effect on removal of potassium and sodium. Approximately 75% of the calcium was also removed.

Metals Removal - Large-Scale Study

Metal Detected	Untreated	pH 11.5 + Polymer 4330
Aluminum	<DL	<DL
Antimony	<DL	<DL
Barium	194 ppb	51 ppb
Beryllium	<DL	<DL
Cadmium	<DL	<DL
Calcium	153000 ppb	39200 ppb
Chromium	28 ppb	<Detection Limit
Iron	7400 ppb	<Detection Limit
Lead	<DL	<DL
Manganese	514 ppb	<Detection Limit
Magnesium	132000 ppb	1500 ppb
Mercury	<DL	<DL
Potassium	147000 ppb	135000 ppb
Sodium	757000 ppb	884000 ppb
Vanadium	<DL	<DL

2. **Flow Through Study**

A flow through test was conducted using two, 11.5 L aliquots (total 22 L) of leachate previously treated through the oil/water separator apparatus and 0.1% (v/v) ferric sulfate. The treatment took place in a batch mode in 20 L polypropylene pails. The pH was adjusted from 7.56 to 11.5 by adding 21.5 mL of 10 N NaOH per 11.5 L of leachate. No polymer was added. The flocculent was allowed to settle over a one hour time period, and the liquid phase was separated by decanting. Twenty two liters of treated leachate was collected in two clean 20 liter polypropylene pails. One liter of solids were collected in three, pre-cleaned, plastic sample containers. The flocculent was further compacted by centrifugation at 2000 rpm for 1 minute to a final volume of 200 mL prior to metals analyses. The total solids of the precipitate was 22.4%.

Samples were obtained and analyzed according to the analytical schedule for sample locations D1 and E, presented in the Work Plan. Presented is a table showing the levels of metals in the original sample (The analytical schedule for sample location A) versus the analytical schedule for sample locations D1 (solid phase of treated leachate) and E (aqueous phase of treated leachate).

The data showed that prior to the analytical schedule for sample location D analyses, the barium and chromium were removed to levels less than the detection limits. The pH 11.5 treatment did remove the manganese below detection limits, and more than 98% of the iron was removed, from 7.4 ppm to 0.1 ppm. Over 90% of the calcium was removed, from 153 to 15 ppm. Approximately 70% of the magnesium was removed, from 132 ppm to 39 ppm. The decrease in the concentrations of these metals are seen as increases in the precipitate (D1). This process, however, had no apparent affect on potassium and sodium levels.

Metals Removal - Sample location A, D1, and E Metals

Metal	A Metals (influent)	D1 Metals (sludge)	E Metals (effluent)
Aluminum	<DL	< DL	< DL
Antimony	< DL	< DL	< DL
Barium	194 ppb	< DL	< DL
Beryllium	< DL	< DL	< DL
Calcium	153000 ppb	305000 ppb	14900 ppb
Chromium	28 ppb	< DL	< DL
Cobalt	< DL	< DL	< DL
Iron	7400 ppb	78400 ppb	130 ppb
Magnesium	132000 ppb	4470000 ppb	39300 ppb
Manganese	514 ppb	6300 ppb	< DL
Mercury	< DL	< DL	< DL
Potassium	147000 ppb	151000 ppb	154000 ppb
Sodium	757000 ppb	2300000 ppb	1000000 ppb
Vanadium	< DL	< DL	< DL

Metals Removal - Sample location D2

Parameter	D2 (sludge)
pH	11.1
TCLP VOCs	< DL[a]
TCLP SVOCs	1,4-Dichlorobenzene: 11.6 ppb
TCLP Pesticides	< DL
TCLP PCBs	< DL
TCLP Metals	< DL
Ignitability	> 200°F
Reactive Cyanide	< DL
Reactive Sulfide	< 32.4 ppm
Total Solids	22.4 %

a DL; Detection Limit

E. Sand Filtration

1. **Flow Through Study**

Approximately 17.5 L of leachate previously treated through metals removal was pumped through a packed sand column at a flow rate of 100 mL per minute via a peristaltic pump. The pass-through was collected in a clean, 20 L polypropylene pail.

Samples were obtained and analyzed according to the analytical schedule for sample location F, presented in the Work Plan. Presented is a table showing the levels of total suspended solids (TSS), pH, and volatile organic compounds in The analytical schedule for sample location E versus the analytical schedule for sample location F.

The data summarized in the following table show that prior to the analytical schedule for sample location F analyses, the total suspended solids were greater than 66 ppm. After filtration, total suspended solids decreased below the 4 ppm detection limit. Of the volatiles that were detected, DCE levels decreased by 31% from 5.38 ppb to 3.71 ppb; and, o-xylene levels decreased by 39% from 52.7 ppb to 32 ppb. There was a decrease in pH, from 11.19 to 7.25.

Flow Through Sand Filtration
Sample Location E & F Data

Parameter	E (influent)	F (effluent)
pH	11.19	7.25
TSS	66.8 ppm	< 4 ppm
VOCs	1,1-DCE: 5.38 ppb toluene: 1.38 ppb m,p-xylene:1.49 ppb o-xylene: 52.7 ppb	1,1-DCE: 3.71 ppb toluene: 1.62 ppb m,p-xylene:1.49 ppb o-xylene: 32.0 ppb

F. Air Stripping

1. **Physical/Chemical Treatment**

a. **Jar Studies**

1. Batch Air Stripping - The batch air stripping experiments were performed to determine the ability to remove ammonia from the leachate in a batch versus column mode. The 1 L samples were treated at either 70°F or 100°F at pH 7 or 11.5 over a 20 hour period. Samples were tested for ammonia after 0 hours, 1 hour, 3 hours, 5 hours, and 20 hours of treatment. The results of this study are summarized in the following table:

Batch Air Stripping - Ammonia Removal

Treatment	0 Hours	1 Hour	3 Hours	5 Hours	20 Hours
pH=7; 70°F	183 ppm	223 ppm	188 ppm	217 ppm	205 ppm
pH=7; 100°F	183 ppm	183 ppm	201 ppm	211 ppm	207 ppm
pH=11.5; 70°F	169 ppm	182 ppm	177 ppm	161 ppm	82.9 ppm
pH=11.5; 100°F	169 ppm	150 ppm	119 ppm	111 ppm	17.3 ppm

Treatment at pH 7, at either 70°F or 100°F led to no reduction in ammonia levels. Following pH adjustment to 11.5, there was slight bubbling. There was a 50% decrease in the concentration of ammonia in the pH 11.5 sample incubated at 70°F for 20 hours. There was a faster and more distinct decrease in ammonia in the pH 11.5 sample at 100°F. After just 5 hours, the ammonia level decreased by 34%, from 169 ppm to 111 ppm. After 20 hours, the ammonia level decreased to 17.3 ppm, a 90% decrease from time 0.

2. Air Stripping Column Studies:

a. Based on the batch studies, it was determined that pH 11.5 at an elevated temperature would be optimal for ammonia removal. Subsequent experiments using a stripping column were performed at appropriate loading and air flow rates determined in collaboration with URS.

The following experimentation indicated that pH 11.5, air flow 16 ft^3/min and loading rate 400 mL/min was effective at various temperatures:

140°F: The column was equilibrated at 140°F prior to starting the flow. This was performed since a significant temperature differential of 50°F was previously noted at the bottom (effluent at 90°F) versus top (influent at 140°F) of the column. After passage through the 5′ column, the volume was brought up to initial volume with dI water. The following results were obtained:

Ammonia Air Stripping - Multiple Passes
High Flow Experiments - 140°F

INITIAL	FIRST PASS	THIRD PASS	FIFTH PASS	SIXTH PASS
199 ppm	112 ppm	41 ppm	17 ppm	4.6 ppm

These results indicated that between 5 and 6 passes through the five foot column results in an ammonia level below 10 ppm.

120°F: Using the same hydraulic loading rate and air flow, a study was performed to evaluate ammonia removal at 120°F. The column was equilibrated at 120°F prior to starting the flow. After one passage through the 5′ column, the volume was brought up to initial volume with dI water and sampled for ammonia. The following results were obtained:

Ammonia Air Stripping - First Pass @120°F

INITIAL AMMONIA	FIRST PASS AMMONIA
199 ppm	136 ppm

Additional passes through the column were not performed since the results showed that data were comparable with the single pass at 140°F. The air stripping experiments were subsequently performed at 100°F.

100°F: Experiments were repeated at the hydraulic loading rate and air flow rate conditions previously described, however the column was equilibrated at 100°F prior to running the experiment at 100°F. After each passage through the 5′ column, the volume was brought up to initial volume with dI water. The following table summarizes the results of these studies:

Ammonia Air Stripping - @100°F

INITIAL	FIRST PASS	SIXTH PASS	SEVENTH PASS
199 ppm	96 ppm	13.4 ppm	6.2 ppm

These results indicated that between 6 and 7 passes through the five foot column resulted in an ammonia level below 10 ppm. The following volume adjustments were made after each pass:

Ammonia Air Stripping - Volume Adjustments @100°F

FIRST	SECOND	THIRD	FOURTH	FIFTH	SIXTH	SEVENTH
30 mL	30 mL	25 mL	15 mL	13 mL	13 mL	30 mL

Air stripping efficiency was also evaluated at room temperature (72°F). Air stripping was performed at 400 mL/minute hydraulic loading rate, with the air flow increased to 35 ft^3/min. at 72°F. The following results were obtained:

Air Stripping - First Pass @72°F

INITIAL AMMONIA	FIRST PASS AMMONIA
196 ppm	135 ppm

The results indicated that approximately 31% of the ammonia is removed under these conditions following one pass through the column. Subsequently, 5 additional passes through the column

were performed under identical conditions. After each pass, volume was replaced to initial volume with dI water. The following results were obtained:

Ammonia Air Stripping - Multiple Passes @72°F

INITIAL	FIRST PASS	SIXTH PASS
196 ppm	135 ppm	16.1 ppm

These results indicated that after 6 passes through the five foot column, the ammonia level did not fall below 10 ppm. The following volume adjustments were made after each pass:

Ammonia Air Stripping - Volume Adjustments @72°F

FIRST	SECOND	THIRD	FOURTH	FIFTH	SIXTH
33 mL	15 mL	15 mL	0 mL	0 mL	35 mL

b. **Flow Through**

After 14 L of leachate were passed through the column in five cycles, as described in the previous section, 1 L total volume had to be replaced with dI water. The following table summarizes the results of the process (G) compared with similar the analytical schedule for sample locations prior to treatment (F). Since the air stripper studies indicated that ammonia would be removed to concentrations below the discharge limits, ammonia was not analyzed until after GAC treatment. The drop in pH would coincide with the additional loss of ammonia. Volatile organic analyses were performed after five and six passes; data were identical. The data indicated that all volatiles previously present were air stripped to levels below the compound detection limit (DL). The semivolatile compounds (data presented in Section VII) that were detected after metals removal (analytical schedule for sample location E), were not detected after air stripping, as shown in the accompanying table.

Flow Through Air Stripping
Sample Location F & G Data

Parameter	F (influent)	G (effluent)
pH	11.5 (adjusted prior to air stripping)	9.69
VOCs	1,1-DCE: 3.71 ppb toluene: 1.62 ppb m,p-xylene: 1.49 ppb o-xylene: 32.0 ppb	1,1-DCE: <DL[a] toluene: <DL m,p-xylene: <DL o-xylene: <DL
TSS	<4 ppm	24.4 ppm

a DL; Detection Limit

Flow Through Air Stripping
Semivolatiles Data
Sample Location E & G Data

Parameter	E (influent) (ppb)	G (effluent) (ppb)
SVOCs	1,2-Dichlorobenzene: 4.0 2-Methylphenol: 5.4 3&4-Methylphenol: 2.6 2,4-Dimethylphenol: 5.7 1,2,4-Trichlorobenzene: 3.0 2-Methylnaphthalene: 2.8 n-Nitrosodiphenylamine: 4.8 bis(2-Ethylhexyl)phthalate: 4.0	1,2-Dichlorobenzene: <DL[a] 2-Methylphenol: <DL 3&4-Methylphenol: <DL 2,4-Dimethylphenol: <DL 1,2,4-Trichlorobenzene: <DL 2-Methylnaphthalene: <DL n-Nitrosodiphenylamine: <DL bis(2Ethylhex)phthalate: <DL

a DL; Detection Limit

G. Biological Treatment

1. **Jar Studies**

a. Activated Sludge Acclimation: WST used activated sludge obtained from the Buffalo Sewer Authority to evaluate removal of ammonia from leachate previously treated to remove oil & grease, PCBs, CN, and metals.

A batch system was sampled and analyzed for ammonia at time 0 hours, 3 hours, 15 hours, and 65 hours. The results of the analyses are presented in the following table:

Ammonia Levels in Acclimating Activated Sludge Bioreactor

0 hours	3 hours	15 hours	65 hours
260 ppm	220 ppm	190 ppm	171 ppm

Results indicated that the sludge could utilize the ammonia. This was seen as a 35% reduction,

from 260 ppm to 171 ppm, after 65 hours of acclimation. The reactor was subsequently monitored daily for pH, dissolved oxygen and ammonia. The level of ammonia decreased to approximately 50% of the initial concentration after two weeks, but did not drop below 85 ppm. The DO did not fall below 6 ppm, and remained near saturation since the sludge was mixed through air agitation. The pH remained between ~7 and ~8 pH units.

In an attempt to enhance bacterial activity, an inoculum of WST Bioblends known to utilize ammonia nitrogen as a source for growth was added to the reactor. This doubled the ammonia concentration since there was 100 ppm ammonia as ammonium sulfate in the culture media. Thereafter, the ammonia concentration did not appear to decrease. This augmentation step failed to enhance the process for selecting bacteria capable of nitrifying the ammonia in the leachate.

Activated Sludge Bioreactor Log

Date	pH1	pH2	pH^{meter}	DO	NH_3 ppm	- mL	+ mL	Vol
3/27	7	7	7.8	8	171			1500
3/28	7	7	7.74	7.68	121	45		1455
3/29	7	7	7.44	7.97	195	45		1410
4/1	7	6-7	6.99	7.36	97.1	45		1365
4/1	7	6-7	6.99	7.36	91.0	50		1315
4/2	6-7	6-7	7	10.25	120/162	90		1225
4/3	7	7	6.96	7.47	85.4	90		1135
4/3	7	7	7.02	8.31	127	140		1045
4/4[a]	7	7	7.06	7.46	228[a]	45		1000
4/5	7	7	7.06	6.35	280	50		950
4/8	7	7	6.99	7.65	214	40		910
4/9	7	7	6.97	8.59	233	40		870
4/10	7	7	6.91	6.73	192	40		830
4/11	7	7	6.86	6.69	226	40		790
4/12	7	7	6.78	7.17	284	40		750
4/16	7	7	7.17	7.56	196	35		715

a A 50 mL culture of WST Bioblends was added to the reactor. ~100 ppm ammonia was added since the culture contained 100 ppm ammonia/50 mL.

b. Specialized Bacteria Acclimation: These studies were designed to determine the effectiveness of using specialized nitrifying bacteria cultures to treat the ammonia in the leachate.

1. **Ammonia Utilization Screening:** The results of an ammonia utilization test, established to determine under which conditions the leachate could be biologically treated, is summarized in the following table.

There were two control flasks 1 and 2 were prepared with an ammonia solution at an initial concentration of 50 ppm and 195 ppm, respectively. Flask 1 ammonia levels rapidly decreased: by 20% after 2 hours; by 67% after 4 hours; by 91% after 6 hours; by 99% after 20 hours; and, after 24 hours there was virtually no measurable ammonia. However, the flask prepared with a 195 ppm initial ammonia concentration responded very slowly: ammonia decreased by 30% after 6 hours, and ammonia only slightly decreased to a final concentration of 129 ppm after 24 hours. A third control flask containing 50 ppm ammonia without any bacteria (Flask 6), demonstrated no change in ammonia levels throughout the same time period. These data indicated that high initial ammonia concentrations would only slowly be utilized by these bacteria.

The flasks containing leachate (3-5) were comparable with the control flasks (1 and 2). Data indicated that nitrifying bacteria were capable of decreasing the ammonia level within a 24 hour period by 87%, from 80 ppm to 10 ppm, in the diluted leachate (Flask 3). Levels of ammonia in water at an initial ammonia concentration of ~250 ppm (Flask 5) decreased by 35% to approximately 130 ppm after 24 hours. Leachate ± powdered activated carbon (Flask 4) at an initial ammonia concentration of ~250 ppm decreased by 45% to approximately 140 ppm after 24 hours. Flasks 4 and 5 appeared to mimic the same ammonia utilization rates, which were also observed in the control Flask 2.

Nitrification Study: Ammonia Levels
Ammonia Utilization Test - 5/1 through 5/2/96

Time	Flask 1	Flask 2	Flask 3	Flask 4	Flask 5	Flask 6
0 hr	50 ppm	195 ppm	80 ppm	243 ppm	262 ppm	48 ppm
2 hr	38.5 ppm	195 ppm	75.5 ppm	243 ppm	262 ppm	48 ppm
4 hr	16.5 ppm	190 ppm	54 ppm	244 ppm	257 ppm	49 ppm
6 hr	4.7 ppm	138 ppm	29.5 ppm	168 ppm	209 ppm	49 ppm
20hr	0.5 ppm	122 ppm	11.5 ppm	141 ppm	154 ppm	49 ppm
24hr	0 ppm	129 ppm	10 ppm	136 ppm	140 ppm	44 ppm

2. **Culture Acclimation:** Based on the screening assay, it was determined that optimal initial ammonia levels for biological treatment of the leachate would require dilution with dI water to initial ammonia concentrations less than 80 ppm. Initial ammonia levels were therefore targeted to start at ~80 ppm while expanding culture volumes for flow through testing. In the first stage, after 24 hours of growth in the 5/1 - 5/2 nitrification study, approximately 200 mL of each culture were diluted to a total volume of 400 mL, and the ammonia levels determined, as follows:

Culture	Diluent	Ammonia
Culture #1	100 mL leachate + 100 mL dI water	63 ppm
Culture #2	200 mL dI water	51 ppm
Culture #3	100 mL leachate + 100 mL dI water	118 ppm
Culture #5	200 mL dI water	64 ppm

Cultures were incubated in a 30°C water bath, while being aerated through air stones. Ammonia and nitrate levels were determined, and dilutions were made with fresh leachate at indicated time intervals. The following tables summarize the monitoring data concerning each culture:

Culture #1 Acclimation
5/2 - 5/10

Date	Dilution	Ammonia (ppm)	Nitrate (ppm)
5/2	None	63	7.3
5/3	None	53	17.9
5/4	200mL leach+200 mL dI H_2O	87	28.9
5/5	None	70	Not Analyzed
5/6	None	79	23
5/7	400mL leach+400 mL dI H_2O	42	7.3
5/8	None	46	9.3
5/9	None	45	10.3
5/10	None	198	24

Culture #1 - MLSS & MLVSS Analyses

Sample Date	MLSS	MLVSS
5/10/96	620 ppm	56 ppm

Data show that ammonia was not being removed at the same rate as during the initial screening tests. By the fourth day of acclimation the ammonia levels remained unchanged, and even started increasing, indicating that the nitrifiers were not active. MLSS and MLVSS were determined on 5/10/96 after approximately 48 hours of treatment following a previous 1:1 dilution in Culture #1. MLVSS was approximately 10% of the MLSS.

Culture #2 Acclimation: 5/2 - 5/10

Date	Dilution	Ammonia (ppm)	Nitrate (ppm)
5/2	None	51	7.3
5/3	None	43	11.6
5/4	200mL leach+200 mL dI H_2O	72	Not Analyzed
5/5	None	78	22
5/6	400mL leach+400 mL dI H_2O	78	13
5/7	None	51	7
5/8	None	22	8.7
5/9	None	17	8.3
5/10	None	22	13.8

Data show ammonia not being removed at the same rate as the initial culture. The culture was not able to remove ammonia to the discharge limit.

Culture #3 Acclimation: 5/2 - 5/10

Date	Dilution	Ammonia (ppm)	Nitrate (ppm)
5/2	None	118	7.3
5/3	None	210	Not Analyzed
5/4	None	210	54
5/5	None	110	17.4
5/6	200mL leach+200 mL dI H_2O	188	Not Analyzed
5/7	None	79	5.7
5/8- @9am @3pm	None	131 117	6.5 7.1
5/9	None	108	7.7
5/10	None	232	17.8

Data show ammonia not being removed at the same rate as the initial culture. The culture was not able to remove ammonia to the discharge limit.

Culture #5 Acclimation: 5/2 - 5/10

Date	Dilution	Ammonia (ppm)	Nitrate (ppm)
5/2	None	64	7.3
5/3	None	64	32
5/4	200mL leach+200 mL dI H_2O	92	7.2
5/5	None	80	Not Analyzed
5/6- @3pm @5pm	None 400mL leach+400 mL dI H_2O	72.5 139	28 Not Analyzed
5/7	None	89	7.6
5/8- @9am @3pm	None	145 132	9.9 10.3
5/9	None	133	12.7
5/10	None	270	21

Data show ammonia not being removed at the same rate as the initial culture. The culture was not able to remove ammonia to the discharge limit.

3. **24 Hour Growth Study:** A 24-hour growth study was performed to determine the rate of ammonia utilization and final MLSS and MLVSS concentrations of an active culture. This information could be applied to reactor sizing and operations. The active culture was derived from Culture #1 that was subcultured on 5/9 and diluted with Tris-buffered dI water. The culture was sampled and analyzed for ammonia concentrations at 0 hours, 1 hour, 2 hours, 4 hours, 8 hours and 24 hours. The MLSS and MLVSS concentrations were also determined at 24 hours. The following table summarizes the results of this experiment:

24 Hour Study Results - Ammonia and Final MLSS & MLVSS Concentrations

Parameter	0 Hours	1 Hour	2 Hour	4 Hours	8 Hours	24 Hours
Ammonia	61 ppm	54 ppm	49 ppm	44 ppm	33 ppm	38 ppm
MLSS	NA[1]	NA[1]	NA[1]	NA[1]	NA[1]	278 ppm
MLVSS	NA[1]	NA[1]	NA[1]	NA[1]	NA[1]	20 ppm

1 NA; Not Analyzed

These data showed that leachate diluted approximately 1:4 with dI water, which resulted in an initial ammonia concentration of approximately 60 ppm, led to a 40% decrease in ammonia concentration over a 24 hour period. This was

consistent with previous observations.

The MLSS and MLVSS data was consistent with previous analyses that showed an approximate 1:10 ratio of MLSS:MLVSS. The 24 hour growth revealed an approximately 3-fold higher concentration of both MLSS (620 ppm) and MLVSS (56 ppm) in the 48-hour culture.

H. Activated Carbon/Organic Removal

1. **Flow Through Studies**

Treatment Train #2: After 8.5 L of leachate were passed through the two GAC columns, as described in the previous section, samples were obtained for analyses. As discussed in the air stripping results describing the necessity to perform one additional air stripping event, that treated leachate was re-tested for ammonia and volatile organic compounds. The following table summarizes the results of the process (H) compared with similar parameters prior to treatment.

The GAC treated leachate data showed that there were no discharge parameters exceeded. The data indicated that all volatiles previously present were air stripped to levels below the compound detection limit (DL). There were no semivolatile compounds detected.

Treatment Train #2
Flow Through GAC Adsorption Data

Parameter	G (influent)	H (effluent)
pH	7 (adjusted)	8.78
Volatile Organics	< Discharge Limits	< Discharge Limits
Semivol. Organics	< Discharge Limits	< Discharge Limits
Metals	< Discharge Limits	< Discharge Limits
PCBs	< Discharge Limits	< Discharge Limits
Pesticides	< Discharge Limits	< Discharge Limits
TOC	200 ppm	3 ppm
Oil & Grease	< Discharge Limit	< Discharge Limit
Ammonia	< Discharge Limit	< Discharge Limit
TSS	24.4 ppm	4.8 ppm
Alkalinity	1775 ppm	1060 ppm
Total Dissolved Solids	Not Analyzed	4863 ppm
Ignitability	Not Analyzed	Negative (>200°F)
COD	481 mg O_2/L	6.85 mg O_2/L
Cyanide[1]	Not Analyzed	<5 ppb

1 Total, Amenable, Weak Acid Dissociable Cyanides

After GAC, the total suspended solids were reduced to 4.8 ppm, and total organic carbon (TOC) decreased to 3 mg O_2/L. Chemical oxygen demand decreased by 99%, from 481 mg O_2/L to 6.9 mg O_2/L. There was no evidence of ammonia, cyanide, volatile or semivolatile organic compounds, PCBs, petroleum hydrocarbons, or metals at detection limits within the criteria established for discharge. There was a flash point of >200°F, demonstrating that the sample was not ignitable.

Treatment Train 3: A 20 L composite of 1C + 2C sample was filtered to remove oil & grease, and particulates, and the treated effluent and trapped solids were collected. The analytical schedule for sample locations listed in category H, referred in the Work Plan, were analyzed. Several of these are compared with initial the analytical schedule for sample locations in categories A and C in the following table:

Treatment Train 3
Flow Through GAC
The analytical schedule for sample location A, C & H Data

Parameter	A (influent)	C	H (effluent)
pH	8.2	7.50	8.12
PCBs	1254: 9.18ppb 1260: 15.1ppb	1254:<0.065ppb 1260:<0.065ppb	1254:<0.065ppb 1260:<0.065ppb
COD	1206 mgO2/L	1119 mgO2/L	22 mgO2/L
Metals	<Discharge Limits	<Discharge Limits	<Discharge Limits
TSS	265 ppm	Not Analyzed	<4 ppm
TDS	3205 ppm	Not Analyzed	4428 ppm
Ignitability	>200°F	Not Analyzed	>200°F
VOCs	1,1-DCE:28ppb benzene:81ppb chlorbenz:17ppb toluene:841ppb	Not Analyzed	<Discharge Limits
Semi-VOCs	<Discharge Limit	Not Analyzed	<Discharge Limits
Ammonia	296 ppm	341 ppm	213 ppm
Pesticides	<Detection Limits	Not Analyzed	<Discharge Limits
Cyanide-wad	26 ppb	13 ppb	<5 ppb
Alkalinity	2030 ppm	Not Analyzed	456 ppm
BOD	67 ppm	73 ppm	44 ppm
TPH	59.4 ppm	<4 ppm	<4 ppm
Oil & Grease	109 ppm	15.3 ppm	<4 ppm

Analyses showed that in the treated leachate, all parameters except ammonia fell below discharge limits. This supported a need to complete ammonia removal testing.

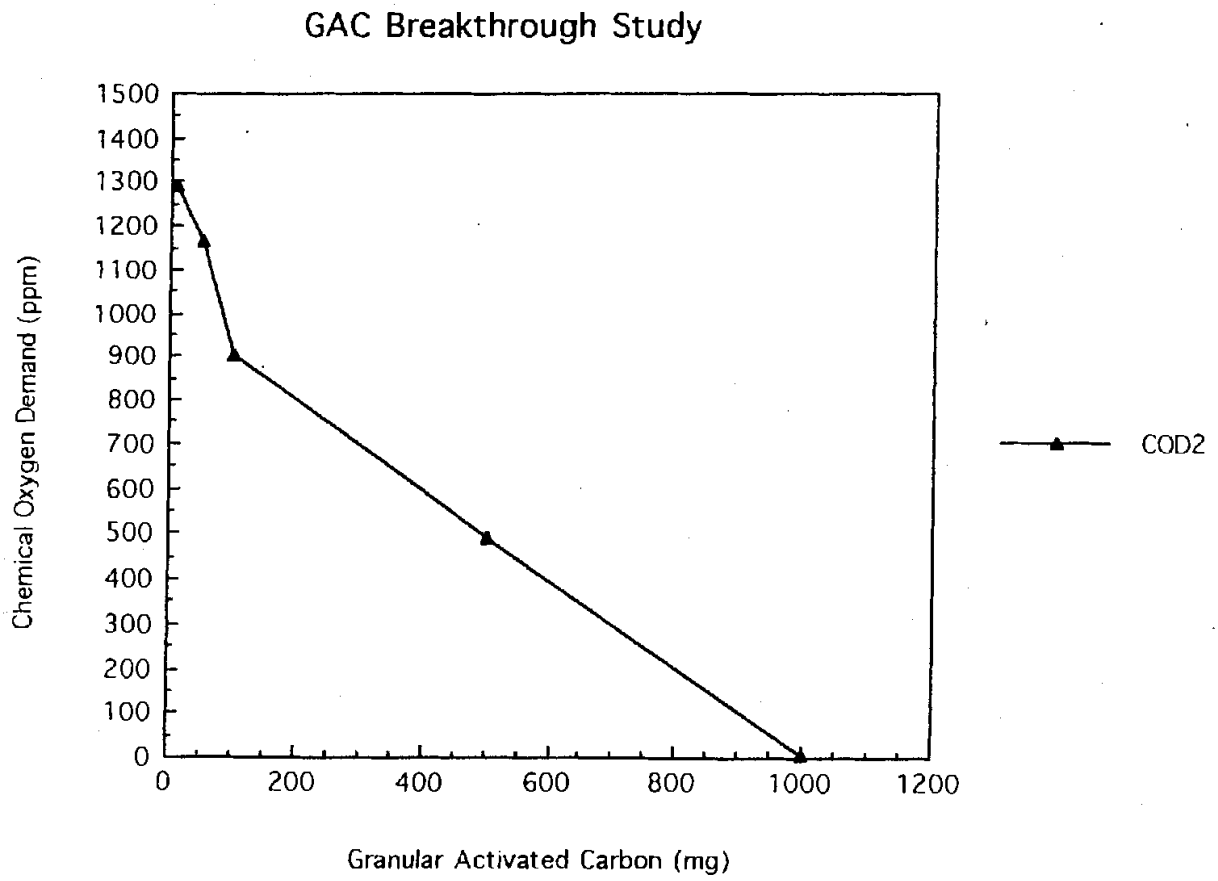
Additional data is presented in the analytic report in Section VII.

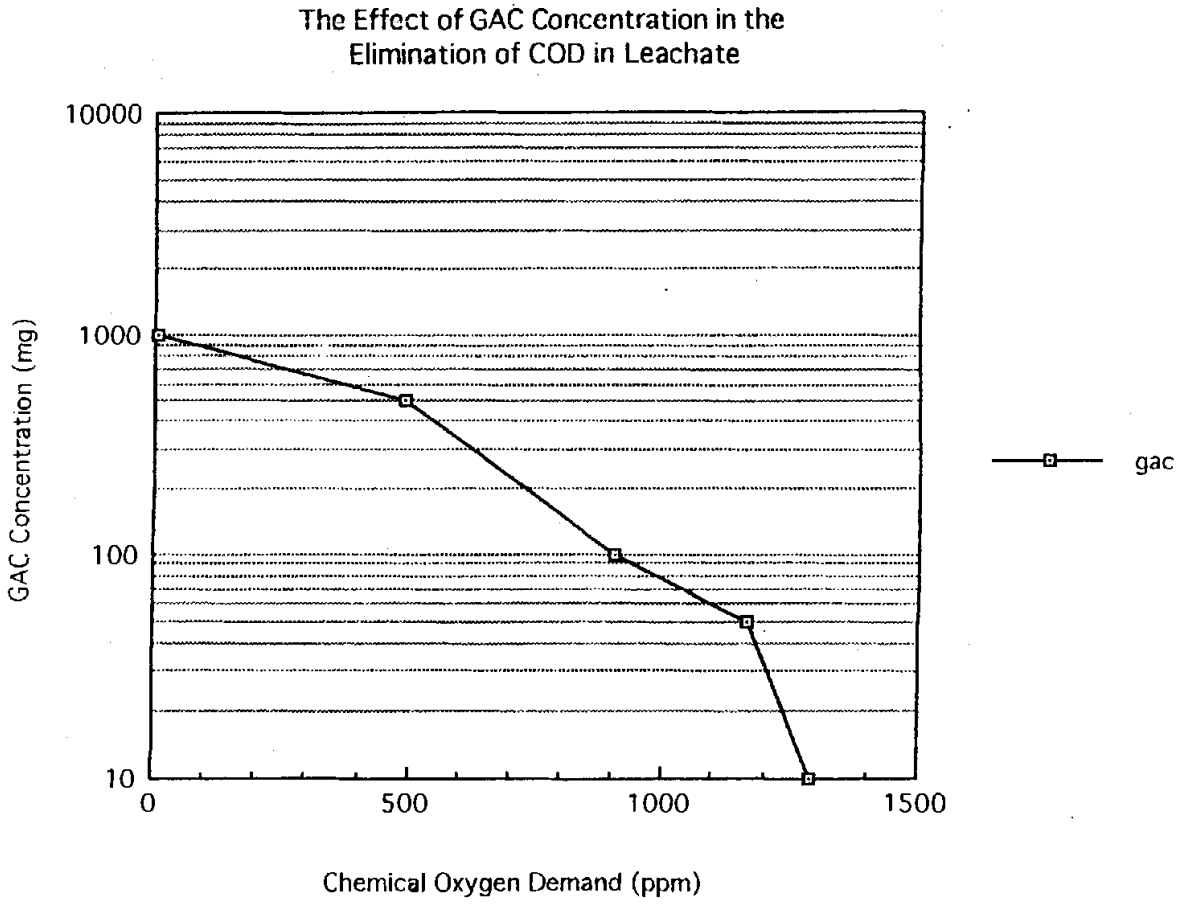
2. **Isotherm Study**

The results of the isotherm study are presented in the following table and figures:

GAC Isotherm Study for Oil/Water Separator Treated Leachate

Amount of GAC (mg)	Chemical Oxygen Demand (mg O_2/L)
0	4,938
10	1,293
50	1,163
100	903
500	489
1,000	5
10,000	29


GAC Breakthrough Study
Chemical Oxygen Demand (ppm)
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
0
200
400
600
800
1000
1200
Granular Activated Carbon (mg)
COD2


The Effect of GAC Concentration in the Elimination of COD in Leachate
10000
1000
100
10
GAC Concentration (mg)
0
500
1000
1500
Chemical Oxygen Demand (ppm)
gac

V. Conclusions

The intention of the laboratory studies was to evaluate and then optimize physical, chemical, and biological modalities applicable to the remediation of Pennsylvania Avenue Landfill leachate prior to discharge in its receiving waters. The results of the jar and flow-through studies indicated that the leachate could be remediated to levels within the limits established for discharge. The conclusions of the study performed at Waste Stream Technology are addressed in the order presented in the Results section (Section IV).

A. Oil/Water Separator Treatment

An oil/water separation process was found to be capable of removing non-emulsified oils, grease, and solid particles. This process, when not allowed to break through, led to non-detectable levels of PCBs in treated leachate. Greater than 80% removal of Oil & Grease was achieved in flow through tests. Performance would be expected to be improved at full scale because of the limitations of small scale units.

This treatment did not remove the volatile organic compounds, ammonia, or cyanide to the levels required for discharge. Therefore, additional treatment would be required.

B. Cyanide Remediation

Chlorination and peroxide treatment are not able to remove cyanide from the leachate. Ferric sulfate treatment showed no significant effect on the weak acid dissociable cyanide concentration. However, greater reductionof weak acid dissociable cyanide were actually achieved by oil/water separation and carbon adsorption. The concentration of weak acid dissociable cyanide was brought below 5 ppb after carbon treatment. Results show cyanide treatment may not be required to meet discharge limits.

C. Metals Removal

The metals with limitations listed in Table 1 of the Work Plan were either not detected or below limit levels in the initial influent sample. Thereby, indicating metals removal was not required. The experiments showed, however, that adjusting pH to 11.5 by adding 1.9 mL of 10 N Sodium hydroxide per liter of leachate resulted in the precipitation of the metals. After the precipitate was allowed to settle over a one hour period, the supernatant was analyzed for TAL list metals. This process removed 70-90% of the initial metal concentrations.

D. Sand Filtration

The intention of sand filtration was to remove suspended solids prior to discharge. Treatment consisted of passing the leachate through a 1.5 inch diameter column of sand at a rate of 100 mL per minute. This process reduced the total suspended solids (TSS) from 67 ppm to below 4 ppm. This process led to a >94% decrease of TSS.

E. Air Stripping

Physical removal of ammonia is possible by pH adjustment and air stripping. The pH 11.5 leachate was air stripped at various loading rates, air flows, and temperatures. The discharge criteria of 10 ppm was accomplished through a 3 inch diameter air stripper column under the following conditions:

1. At 140°F, with a loading rate of 400 mL/minute in a 30′ column and air flow at 16 ft^3/minute.

2. At 100°F, with a loading rate of 400 mL/minute in a 35′ column and air flow at 16 ft^3/minute.

Air stripping of the leachate decreased concentrations of volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs) in the air stripper influent to below detection limits.

F. Biological Treatment

An activated sludge obtained from the Buffalo Sewer Authority was not able to be acclimated to the leachate ammonia levels. Subsequent screening and trials with a purchased nitrifying bacterial culture demonstrated that cleanup levels of 10 ppm ammonia are possible within 24 hours when the leachate influent was diluted to below 80 ppm. However, during testing a culture could not be maintained that consistently removed ammonia to below 10 mg/L. The inability to grow and develop a large biomass precluded the ability to run a large scale test.

G. Granular Activated Carbon Treatment

The GAC treatment was found to be effective in reducing the final effluent to below required discharge levels for both treatment trains. GAC treatment in combination with oil/water separator reduced VOCs, SVOCs and PCBs to below detection limits. There was a flash point of the effluent from treatment train 3 >200°F, demonstrating that the sample was not ignitable.

VI. Recommendations

Recommendations based on the results of these studies will be presented by URS.

VII. Analytical Data

Analytical data was summarized in the Laboratory Chronicles presented in Appendix A.

VIII. Laboratory Notes

Laboratory notes were presented in Appendix B.

IX. Quality Control Information

Quality control information was incorporated in the Laboratory Chronicles, Analytical Data Section VII, as presented in Appendix A.

APPENDIX A

LABORATORY CHRONICLES

WASTE STREAM TECHNOLOGY

Laboratory Chronicle

Report Date : 04/01/96
Group Number : 9604-026

Prepared For :
Mr. George Leahy
URS Facilities Design,Inc.
Mack Centre II
Mack Centre Drive
Paramus, NJ 07652

Site: Pennsylvania Ave.

Field and Laboratory Information

Client Id	WST Lab #	Matrix	Date Sampled	Date Received	Time
Untreated/Comp 1B & 2B	WS25594	Aqueous	3/8/96	3/8/96	1200
Sample Status Upon Receipt : No irregularities.					

Analytical Parameters	Number of Samples	Turnaround Time
624	1	Standard
625	1	Standard
Total Metals	1	Standard
Total Suspended Solids	1	Standard
Total Dissolved Solids	1	Standard
Ammonia Nitrogen	1	Standard
Alkalinity	1	Standard
COD	1	Standard
Total Petroleum Hydrocarbons	1	Standard
Oil & Grease	1	Standard
Cyanide-Weak Acid Dissociable	1	Standard
pH	1	Standard
Method 608 PCBs	1	Standard
BOD	1	Standard

Report Released By : B S Sakpal

ENVIRONMENTAL LABORATORY ACCREDITATION
CERTIFICATION NUMBER (ELAP) 11179

WASTE STREAM TECHNOLOGY

METHODOLOGIES

The specific methodologies employed in obtaining the analytical data reported are indicated on each of the result forms. The method numbers shown refer to the following analytical method references:

Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020, March 1979, Revised 1983, U.S. Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.

Federal Register, 40 CFR Part 136: Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. Revised July 1992.

Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. Third Edition, Revised September 1994, United States EPA SW-846.

Annual Book of ASTM Standards, Volume II. ASTM, 1916 Race Street, Philadelphia, Pennsylvania 19103.

Standard Methods for the Examination of Water and Wastewater. (18th Edition). American Public Health Association, 1105 18th Street, NW, Washington, D.C. 20036.

ORGANIC DATA QUALIFIERS

U - Indicates compound was analyzed for but not detected.

J - Indicates an estimated value. This flagged is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed, or when the mass spectral data indicates the presence of a compound that meets identification criteria, but the result is less than the sample quantitation limit but greater than zero.

C - This flag applies to pesticide results where the identification has been confirmed by GC/MS.

B - This flag is used when the analyte is found in the associated blank as well as the sample.

E - This flag identifies all compounds whose concentrations exceed the calibration range of the GC/MS instrument or that specific analysis

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.

G - Matrix spike recovery is greater than the expected upper limit of analytical performance.

L - Matrix spike recovery is less than the expected lower limit of analytical performance.

- Indicates that a surrogate recovery was found to be outside the expected limits of analytical performance.

$ - Indicates that the surrogate compound was diluted out because the sample had to be diluted to obtain analytical results and a recovery could not be calculated.

(%) Indicates that the compound is a surrogate and the values reported for these compounds are in percent recovery. The quality control recovery limits (QC Limits) are indicated in the detection limit column.

Waste Stream Technology Inc.
40 CFR Part 136 Method 624
EPA 624

Site: URS-PENN LANDFILL
Date Sampled: 03/08/96
Date Received: 03/08/96

Group Number: 9604-026
Report Units: ug/L
Matrix: AQUEOUS

Lab ID Number	WS25594	
Client ID	UNTREATED/COMP1B&2B	
Date Extracted	NA	
Date Analyzed	03/11/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
chloromethane	2.0	2.0	U
vinyl chloride	2.0	2.0	U
bromomethane	2.0	2.0	U
chloroethane	2.0	2.0	U
Trichlorofluoromethane	2.0	2.0	U
1,1-dichloroethene	1.0	1.0	U
methylene chloride	2.8	6.1	B
trans-1,2-dichloroethene	1.0	1.0	U
1,1-dichloroethane	1.0	28.1	
chloroform	1.0	1.0	U
1,1,1-trichloroethane	1.0	1.0	U
carbon tetrachloride	1.0	1.0	U
benzene	1.0	81.2	
1,2-dichloroethane	1.0	2.9	
trichloroethene	1.0	1.0	U
1,2-dichloropropane	1.0	1.0	U
bromodichloromethane	1.0	1.0	U
2-chloroethylvinyl ether	2.0	2.0	U
cis-1,3-dichloropropene	1.0	1.0	U
toluene	1.0	841.0	D
trans-1,3-dichloropropene	1.0	1.0	U
1,1,2-trichloroethane	1.0	1.0	U
tetrachloroethene	1.2	1.2	
dibromochloromethane	1.0	1.0	U
chlorobenzene	1.0	17.0	
ethylbenzene	1.0	1.0	U
bromoform	1.0	1.0	U
1,1,2,2-tetrachloroethane	1.0	1.0	U
1,3-dichlorobenzene	1.0	1.0	U
1,4-dichlorobenzene	1.0	4.2	
1,2-dichlorobenzene	1.0	28.6	
Bromofluorobenzene (%)	86-115	100.0	
1,2-Dichloroethane-d4 (%)	76-114	103.0	
Toluene-d8 (%)	88-110	102.0	
Dilution Factor	1		

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.
Method 624 Method Blank Results
EPA 624

Site: URS-PENN LANDFILL
Date Sampled: NA
Date Received: NA

Group Number: 9604-026
Report Units: PPB

Lab ID Number	IB031296	
Client ID	NA	
Date Extacted	NA	
Date Analyzed	03/12/96	

Compound	Detection Limit/ QC Limits (%)	Result	Q
chloromethane	2.0	2.0	U
vinyl chloride	2.0	2.0	U
bromomethane	2.0	2.0	U
chloroethane	2.0	2.0	U
trichlorofluoromethane	2.0	2.0	U
1,1-dichloroethene	1.0	1.0	U
methylene chloride	2.8	3.5	
1,2-dichloroethene(total)	1.0	1.0	U
1,1-dichloroethane	1.0	1.0	U
chloroform	1.0	1.0	U
1,1,1,-trichloroethane	1.0	1.0	U
carbon tetrachloride	1.0	1.0	U
benzene	1.0	1.0	U
1,2-dichloroethane	1.0	1.0	U
trichloroethene	1.0	1.0	U
1,2-dichloropropane	1.0	1.0	U
bromodichloromethane	1.0	1.0	U
2-chloroethylvinyl ether	2.0	2.0	U
cis-1,3-dichloropropene	1.0	1.0	U
toluene	1.0	1.0	U
trans-1,3-dichloropropene	1.0	1.0	U
1,1,2-trichloroethane	1.0	1.0	U
tetrachloroethene	1.2	1.2	U
dibromochloromethane	1.0	1.0	U
chlorobenzene	1.0	1.0	U
ethylbenzene	1.0	1.0	U
bromoform	1.0	1.0	U
1,1,2,2-tetrachloroethane	1.0	1.0	U
1,3-dichlorobenzene	1.0	1.0	U
1,4-dichlorobenzene	1.0	1.0	U
1,2-dichlorobenzene	1.0	1.0	U
Bromofluorobenzene (%)	86-115	105.0	
1,2-Dichloroethane-d4 (%)	76-114	102.0	
Toluene-d8 (%)	88-110	106.0	

Dilution Factor 1

IB denotes Instrument Blank.
NA denotes Not Applicable.

Waste Stream Technology Inc.

40 CFR 136 Method 625 SVOCs

EPA 625

Site: URS-PENN LANDFILL
Date Sampled: 03/08/96
Date Received: 03/08/96

Group Number: 9604-026
Report Units: ug/L
Matrix: AQUEOUS

Lab ID Number	WS25594	
Client ID	UNTREATED/COMP1B&2B	
Date Extracted	03/11/96	
Date Analyzed	03/11/96	

Compound	Detection Limit/ QC Limits (%)	Result	Q
n-nitrosodimethylamine	2.0	2.0	U
Bis(2-chloroethyl)ether	2.0	2.0	U
Phenol	2.0	2.0	U
2-Chlorophenol	2.0	2.0	U
1,3-Dichlorobenzene	2.0	2.0	U
1,4-Dichlorobenzene	2.0	3.7	
1,2-Dichlorobenzene	2.0	26.4	
Bis(2-chloroisopropyl)ether	2.0	2.0	U
Hexachloroethane	2.0	2.0	U
N-nitroso-di-n-propylamine	2.0	2.0	U
Nitrobenzene	2.0	2.0	U
Isophorone	2.0	2.0	U
2-Nitrophenol	2.0	2.0	U
2,4-Dimethylphenol	2.0	19.6	
Bis(2-chlorethoxy)methane	2.0	2.0	U
2,4-Dichlorophenol	2.0	2.0	U
1,2,4-Trichlorobenzene	2.0	26.3	
Naphthalene	2.0	9.6	
Hexachlorocyclopentadiene	2.0	2.0	U
2,4,6-Trichlorophenol	2.0	2.0	U
2-Chloronaphthalene	2.0	2.0	U
Acenaphthylene	2.0	2.0	U
Dimethylphthalate	2.0	2.0	U
2,6-Dinitrotoluene	2.0	2.0	U
Acenaphthene	2.0	27.8	
2,4-Dinitrophenol	10.0	10.0	U
2,4-Dinitrotoluene	2.0	2.0	U
4-Nitrophenol	10.0	10.0	U
Fluorene	2.0	21.4	
4-Chlorophenyl-phenylether	2.0	2.0	U
Diethylphthalate	2.0	2.0	U
4,6-Dinitro-2-methylphenol	10.0	10.0	U
N-Nitrosodiphenylamine	2.0	70.4	
4-Bromophenyl-phenylether	2.0	2.0	U
Hexachlorobenzene	2.0	2.0	U
Pentachlorophenol	10.0	10.0	U
Phenanthrene	2.0	48.1	

WASTE STREAM TECHNOLOGY

	Lab ID Number	WS25594	
	Client ID	UNTREATED/COMP1B&2B	
	Date Extracted	03/11/96	
	Date Analyzed	03/11/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
Anthracene	2.0	15.9	
Di-n-butylphthalate	2.0	5.1	
Fluoranthene	2.0	26.1	
Pyrene	2.0	20.5	
Benzidine	20.0	20.0	U
Butylbenzylphthalate	2.0	2.0	U
3,3-Dichlorobenzidine	4.0	4.0	U
Benzo[a]anthracene	2.0	8.5	
Chrysene	2.0	9.5	
Bis(2-ethylhexyl)phthalate	2.0	88.1	B
Di-n-octylphthalate	2.0	6.9	
Benzo[b]fluoranthene	2.0	6.3	
Benzo[k]fluoranthene	2.0	5.7	
Benzo[a]pyrene	2.0	4.8	
Indeno[1,2,3-cd]pyrene	2.0	2.0	U
Dibenz[a,h]anthracene	2.0	2.0	U
Benzo[g,h,i]perylene	2.0	2.0	U
Hexachlorobutadiene	2.0	2.0	U
4-Chloro-3-methylphenol	4.0	4.0	U
2-Fluorophenol (%)	21-100.	58.0	
Phenol-d6 (%)	10-94 .	51.0	
Nitrobenzene-d5 (%)	35-114.	97.0	
2-Fluorobiphenyl (%)	43-116.	92.0	
2,4,6-Tribromophenol (%)	10-123.	90.0	
Terphenyl-d14 (%)	33-141.	65.0	
Dilution Factor	1		

Waste Stream Technology Inc.
Method 625 Method Blank Analysis
EPA 625 Report

Site: URS-PENN LANDFILL
Date Sampled: NA
Date Received: NA

Group Number: 9604-026
Report Units: PPB

Lab ID Number	MB031196	
Client ID	NA	
Date Extracted	03/11/96	
Date Analyzed	03/11/96	

Compound	Detection Limit/ QC Limits (%)	Result	Q
n-nitrosodimethylamine	2.0	2.0	U
Bis(2-chloroethyl)ether	2.0	2.0	U
Phenol	2.0	2.0	U
2-Chlorophenol	2.0	2.0	U
1,3-Dichlorobenzene	2.0	2.0	U
1,4-Dichlorobenzene	2.0	2.0	U
1,2-Dichlorobenzene	2.0	2.0	U
Bis(2-chloroisopropyl)ether	2.0	2.0	U
Hexachloroethane	2.0	2.0	U
N-nitroso-di-n-propylamine	2.0	2.0	U
Nitrobenzene	2.0	2.0	U
Isophorone	2.0	2.0	U
2-Nitrophenol	2.0	2.0	U
2,4-Dimethylphenol	2.0	2.0	U
Bis(2-chlorethoxy)methane	2.0	2.0	U
2,4-Dichlorophenol	2.0	2.0	U
1,2,4-Trichlorobenzene	2.0	2.0	U
Naphthalene	2.0	2.0	U
Hexachlorobutadiene	2.0	2.0	U
4-Chloro-3-methylphenol	4.0	4.0	U
Hexachlorocyclopentadiene	2.0	2.0	U
2,4,6-Trichlorophenol	2.0	2.0	U
2-Chloronaphthalene	2.0	2.0	U
Acenaphthylene	2.0	2.0	U
Dimethylphthalate	2.0	2.0	U
2,6-Dinitrotoluene	2.0	2.0	U
Acenaphthene	2.0	2.0	U
2,4-Dinitrophenol	10.0	10.0	U
2,4-Dinitrotoluene	2.0	2.0	U
4-Nitrophenol	10.0	10.0	U
Fluorene	2.0	2.0	U
4-Chlorophenyl-phenylether	2.0	2.0	U
Diethylphthalate	2.0	2.0	U
4,6-Dinitro-2-methylphenol	10.0	10.0	U
N-Nitrosodiphenylamine	2.0	2.0	U
4-Bromophenyl-phenylether	2.0	2.0	U
Hexachlorobenzene	2.0	2.0	U

WASTE STREAM TECHNOLOGY

	Lab ID Number	MB031196
	Client ID	NA
	Date Extracted	03/11/96
	Date Analyzed	03/11/96

Compound	Detection Limit/ QC Limits (%)	Result	Q
Pentachlorophenol	10.0	10.0	U
Phenanthrene	2.0	2.0	U
Anthracene	2.0	2.0	U
D-n-butylphthalate	2.0	2.0	U
Fluoranthene	2.0	2.0	U
Pyrene	2.0	2.0	U
Benzidine	20.0	20.0	U
Butylbenzylphthalate	2.0	2.0	U
3,3-Dichlorobenzidine	4.0	4.0	U
Benzo[a]anthracene	2.0	2.0	U
Chrysene	2.0	2.0	U
Bis(2-ethylhexyl)phthalate	2.0	2.1	
Di-n-octylphthalate	2.0	2.0	U
Benzo[b]fluoranthene	2.0	2.0	U
Benzo[k]fluoranthene	2.0	2.0	U
Benzo[a]pyrene	2.0	2.0	U
Indeno[1,2,3-cd]pyrene	2.0	2.0	U
Dibenz[a,h]anthracene	2.0	2.0	U
Benzo[g,h,i]perylene	2.0	2.0	U
2-Fluorophenol (%)	21-100 .	50.0	
Phenol-d6 (%)	10-94 .	35.0	
Nitrobenzene-d5 (%)	35-114 .	84.0	
2-Fluorobiphenyl (%)	43-116 .	91.0	
2,4,6-Tribromophenol (%)	10-123 .	74.0	
Terphenyl-d14 (%)	33-141 .	94.0	

Dilution Factor 1

MB denotes Method Blank
NA denotes Not Applicable.

Waste Stream Technology Inc.

Metals Analysis Result Report

Site: URS-PENN LANDFILL
Date Sampled: 03/08/96
Date Received: 03/08/96

Group Number: 9604-026
Report Units: mg/L
Matrix: AQUEOUS

Lab ID Number:	WS25594	
Client ID:	UNTREATED/COMP1B&2B	
Date Extracted:	03/11/96	

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Zinc by ICP	0.019	0.041	03/12/96	EPA 200.7
Lead by ICP	0.120	< 0.120	03/12/96	EPA 200.7
Cadmium by ICP	0.015	< 0.015	03/12/96	EPA 200.7
Cobalt by ICP	0.030	< 0.030	03/12/96	EPA 200.7
Nickel by ICP	0.032	< 0.032	03/12/96	EPA 200.7
Barium by ICP	0.011	0.194	03/12/96	EPA 200.7
Manganese by ICP	0.003	0.514	03/12/96	EPA 200.7
Iron by ICP	0.063	7.400	03/12/96	EPA 200.7
Chromium by ICP	0.011	0.028	03/12/96	EPA 200.7
Magnesium by ICP	0.153	132.000	03/12/96	EPA 200.7
Vanadium by ICP	0.040	< 0.040	03/12/96	EPA 200.7
Aluminum by ICP	0.120	< 0.120	03/12/96	EPA 200.7
Beryllium by ICP	0.003	< 0.003	03/12/96	EPA 200.7
Calcium by ICP	0.224	153.000	03/12/96	EPA 200.7
Copper by ICP	0.011	< 0.011	03/12/96	EPA 200.7
Silver by ICP	0.015	< 0.015	03/12/96	EPA 200.7
Potassium by ICP	1.250	147.000	03/13/96	EPA 200.7
Sodium by ICP	0.157	757.000	03/13/96	EPA 200.7
Arsenic by GFAA	0.005	< 0.005	03/11/96	EPA 206.2
Antimony by GFAA	0.009	< 0.009	03/11/96	EPA 204.2
Selenium by GFAA	0.003	< 0.003	03/11/96	EPA 270.2
Thallium by GFAA	0.003	< 0.003	03/11/96	EPA 279.2
Mercury by Cold Vapor	0.001	< 0.001	03/13/96	EPA 245.2

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

Metals Method Blank Analysis Result Report

Site: URS-PENN LANDFILL
Date Sampled: NA
Date Received: NA

Group Number: 9604-026
Report Units: PPM

Lab ID Number:	MB031196
Client ID:	NA
Date Extracted:	03/11/96

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Se water Method Blank	0.003	< 0.003	03/11/96	EPA 270.2
Tl water Method Blank	0.003	< 0.003	03/11/96	EPA 279.2
Zn water Method Blank	0.019	< 0.019	03/12/96	EPA 200.7
Pb water Method Blank	0.120	< 0.120	03/12/96	EPA 200.7
Cd water Method Blank	0.015	< 0.015	03/12/96	EPA 200.7
Co water Method Blank	0.030	< 0.030	03/12/96	EPA 200.7
Ni water method blank	0.032	< 0.032	03/12/96	EPA 200.7
Ba water Method Blank	0.011	< 0.011	03/12/96	EPA 200.7
Mn water Method Blank	0.003	< 0.003	03/12/96	EPA 200.7
Fe water Method Blank	0.063	< 0.063	03/12/96	EPA 200.7
Cr water Method Blank	0.011	< 0.011	03/12/96	EPA 200.7
Mg water Method Blank	0.153	< 0.153	03/12/96	EPA 200.7
V water Method Blank	0.040	< 0.040	03/12/96	EPA 200.7
Al water method blank	0.120	< 0.120	03/12/96	EPA 200.7
Be water Method Blank	0.003	< 0.003	03/12/96	EPA 200.7
Ca water Method Blank	0.224	< 0.224	03/12/96	EPA 200.7
Cu water Method Blank	0.011	< 0.011	03/12/96	EPA 200.7
Ag water Method Blank	0.015	< 0.015	03/12/96	EPA 200.7
K water Method Blank	1.250	< 1.250	03/13/96	EPA 200.7
Na water Method Blank	0.157	< 0.157	03/13/96	EPA 200.7
As water Method Blank	0.005	< 0.005	03/11/96	EPA 206.2
Sb water method blank	0.009	< 0.009	03/11/96	EPA 204.2

MB denotes Method Blank.
NA denotes Not Application.

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

Analysis Result Report

Site: URS-PENN LANDFILL
Date Sampled: 03/08/96
Date Received: 03/08/96
Matrix: AQUEOUS

Group Number: 9604-026
Report Units: mg/L
BOD & COD Units: mg O2/L
Alkalinity Units: mg/L as CaCO3

Lab ID Number:	WS25594	
Client ID:	UNTREATED/COMP1B&2B	

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Total Suspended Solids	4.000	265.000	03/13/96	EPA 160.2
Total Dissolved Solids	4.000	3205.000	03/13/96	EPA 160.1
Alkalinity	5.000	2030.000	03/13/96	EPA 310.1
Total Petroleum Hydrocarbons	4.000	59.380	03/11/96	EPA 418.1
Oil & Grease	4.000	109.080	03/11/96	EPA 413.2
Biochemical Oxygen Demand	1.000	67.000	03/13/96	EPA 405.1
Chemical Oxygen Demand	500.000	1206.000	03/12/96	ASTM D1252B
Ammonia Nitrogen	10.000	296.000	03/11/96	EPA 350.3
Cyanide-Weak acid dissociable	0.005	0.026	03/12/96	4500 CN-I

Waste Stream Technology Inc.

Method 150.1

Site: URS-PENN LANDFILL
Date Sampled: 03/08/96
Date Received: 03/08/96

Group Number: 9604-026
Report Units: pH UNITS
Matrix: AQUEOUS

WST Lab ID	Client ID	Analysis Date	pH RESULT
WS25594	UNTREATED/COMP1B&2B	03/12/96	7.55

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

40 CFR 136 Method 608 Pest-PCBs

EPA 608

Site: URS-PENN LANDFILL
Date Sampled: 03/08/96
Date Received: 03/08/96

Group Number: 9604-026
Report Units: ug/L
Matrix: AQUEOUS

Lab ID Number	WS25594	
Client ID	UNTREATED/COMP1B&2B	
Date Extracted	03/08/96	
Date Analyzed	03/08/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
alpha-BHC	0.03	0.03	U
beta-BHC	0.06	0.06	U
gamma-BHC	0.03	0.03	U
delta-BHC	0.09	0.09	U
heptachlor	0.20	0.20	U
aldrin	0.17	0.17	U
heptachlor epoxide	0.08	0.08	U
endosulfan I	0.05	0.05	U
dieldrin	0.05	0.05	U
4,4-DDE	0.05	0.05	U
endrin	0.11	0.11	U
endosulfan II	0.06	0.06	U
4,4'-DDD	0.05	0.05	U
endrin aldehyde	0.08	0.08	U
endosulfan sulfate	0.60	0.60	U
4,4'-DDT	0.18	0.18	U
chlordane	0.69	0.69	U
toxaphene	3.10	3.10	U
aroclor 1016	2.70	2.70	U
aroclor 1221	2.30	2.30	U
aroclor 1232	3.80	3.80	U
aroclor 1242	1.80	1.80	U
aroclor 1248	0.92	0.92	U
aroclor 1254	0.10	9.18	D
aroclor 1260	0.12	15.10	D
Tetrachloro-m-xylene (%)	60-150.	0.00	$
Decachlorobiphenyl (%)	60-150.	0.00	$

Dilution Factor 10

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.
Method 608 Method Blank Results
EPA 608 Report

Site: URS-PENN LANDFILL
Date Sampled: NA
Date Received: NA

Group Number: 9604-026
Report Units: PPB

	Lab ID Number	MB96068	
	Client ID	NA	
	Date Extracted	03/08/96	
	Date Analyzed	03/08/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
alpha-BHC	0.003	0.003	U
beta-BHC	0.006	0.006	U
gamma-BHC	0.003	0.003	U
delta-BHC	0.009	0.009	U
heptachlor	0.020	0.020	U
aldrin	0.017	0.017	U
heptachlor epoxide	0.008	0.008	U
endosulfan I	0.005	0.005	U
dieldrin	0.005	0.005	U
4,4'-DDE	0.005	0.005	U
endrin	0.011	0.011	U
endosulfan II	0.006	0.006	U
4,4'-DDD	0.005	0.005	U
endrin aldehyde	0.008	0.008	U
endosulfan sulfate	0.060	0.060	U
4,4'-DDT	0.018	0.018	U
chlorodane	0.069	0.069	U
toxaphene	0.310	0.310	U
aroclor 1016	0.270	0.270	U
aroclor 1221	0.230	0.230	U
aroclor 1232	0.380	0.380	U
aroclor 1242	0.180	0.180	U
aroclor 1248	0.092	0.092	U
aroclor 1254	0.052	0.052	U
aroclor 1260	0.060	0.060	U
Tetrachloro-*m*-xylene (%)	60-150	93.800	
Decachlorobiphenyl (%)	60-150	111.000	

Dilution Factor 1

MB denotes Method Blank
NA denotes Not Applicable.

WASTE STREAM TECHNOLOGY

302 GROTE STREET
BUFFALO, NY 14207
(716) 876-5290

9604 - 026
9605 - 033 lab

113

CHAIN OF CUSTODY RECORD

PROJECT NO: SITE NAME: 4RS - PENN AVE.

SAMPLERS (SIGNATURE): Greg Symanski

SAMPLE NO.	DATE	TIME	COMP	GRAB	MATRIX	SAMPLE LOCATION	SIZE & NO. OF CONTAINERS	VOC	METALS TAL	CN⁻ (TOTAL) (FREE)	TSS	TDS	pH	ALKALINITY	TOC	PRESERVATIVES	REMARKS
	3/8/96	1200	1B+2B			UNTREATED / COMP 1B+2B	2x40 ML	X									WS05594
						"	1x500		X								
						"	1x1L			X							
						"	1x1L				X	X	X	X			
						ON TREATED TRIAL 1 / COMP 1A+2B	2x40 ML	X									WS05595
						"	1x500		X								
						"	1x1L			X							
						"	1x1L				X	X		X	X		
						"	1x1L			X							
						CN TREATED TRIAL 1 / COMP 1B+2B	1x1L			X							WS05596
						"							X				

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
Greg Symanski	3/8/96 1200	Kelli Mace			
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)

SPECIAL INSTRUCTIONS:

TURNAROUND TIME _____

LAB: REFRIGERATOR # _____ SHELF # _____ GROUP # _____ DUE DATE _____

WASTE STREAM TECHNOLOGY

302 GROTE STREET
BUFFALO, NY 14207
(716) 876-5290

9604 - 026
9605-033 kdm

2/3

CHAIN OF CUSTODY RECORD

PROJECT NO: SITE NAME: URS - PEN AVE

SAMPLERS (SIGNATURE): Greg Ignaszek

SAMPLE NO.	DATE	TIME	COMP	GRAB	MATRIX	SAMPLE LOCATION	SIZE & NO. OF CONTAINERS	SEMI-VOL	PCB	PESTICIDE	TPH	BOD	COD	NH3 as N	PRESERVATIVES	REMARKS
	3/8/96	1200	1B+2B			UNTREATED/COMP TRIAL 1 / 1B+2B	1X1L					X	X	X		WS25594
						"	1X1L		X	X						
						"	1X1L	X								
						"	1X1L				X					
						OIL TREATED/COMP TRIAL 1 / 1B+2B	1X1L					X	X			WS25595
						"	1X1L	X								
						"	1X1L		X	X						
						"	1X1L				X					
						CN TREATED/COMP TRIAL 1 / 1B+2B	1X1L		X							WS25596
						"	1X1L					X	X			↓

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
Greg Ignaszek	3/8/96 1200	K DeMarco			
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)

SPECIAL INSTRUCTIONS:

TURNAROUND TIME _____

LAB: REFRIGERATOR # _____ SHELF # _____ GROUP # _____ DUE DATE _____

WASTE STREAM TECHNOLOGY

302 GROTE STREET
BUFFALO, NY 14207
(716) 876-5290

9604-026
9605-033

3/3

CHAIN OF CUSTODY RECORD

PROJECT NO: URS - KEH AVE. SITE NAME:

SAMPLERS (SIGNATURE):

SAMPLE NO.	DATE	TIME	COMP	GRAB	MATRIX	SAMPLE LOCATION	SIZE & NO. OF CONTAINERS	O+G	TOC	TKN	REACTIVITY	IGNITABILITY			PRESERVATIVES	REMARKS
	3/8/96	1200	1B+2B			UNTREATED TRIAL 1 / COMP 1B+2B	1X1L		X	X						WS055594
						"	1X1L	X								↓
						OIL TREATED TRIAL 1 / COMP 1B+2B	1X500				X	X				WS055595
						"	1X1L	X								↓
						CN TREATED TRIAL 1 / COMP 1B+2B										WS055596

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
	3/8/96 1200				
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)

SPECIAL INSTRUCTIONS:

TURNAROUND TIME _____

LAB: REFRIGERATOR # _____ SHELF # _____ GROUP # _____ DUE DATE _____

WASTE STREAM TECHNOLOGY

302 Grote Street
Buffalo, NY 14207
(716) 876-5290

Analytical Data Report
Report Date : 05/28/96
Group Number : 9605-086

Prepared For :
Mr. George Leahy
URS Facilities Design,Inc.
Mack Centre II
Mack Centre Drive
Paramus, NJ 07652

Site: URS PENN Landfill

Field and Laboratory Information

Client Id	WST Lab #	Matrix	Date Sampled	Date Received	Time
"A"	WS27241	Aqueous	5/23/96	5/23/96	1000
Sample Status Upon Receipt : No irregularities.					

Analytical Services

Analytical Parameters	Number of Samples	Turnaround Time
% Organic Matter	1	Standard

Report Released By : Daniel W. Van

ENVIRONMENTAL LABORATORY ACCREDITATION CERTIFICATION NUMBER (ELAP) 11179

WASTE STREAM TECHNOLOGY

METHODOLOGIES

The specific methodologies employed in obtaining the analytical data reported are indicated on each of the result forms. The method numbers shown refer to the following analytical method references:

Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020, March 1979, Revised 1983, U.S. Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.

Federal Register, 40 CFR Part 136: Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. Revised July 1992.

Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. Third Edition, Revised September 1994, United States EPA SW-846.

Annual Book of ASTM Standards, Volume II. ASTM, 1916 Race Street, Philadelphia, Pennsylvania 19103.

Standard Methods for the Examination of Water and Wastewater. (18th Edition). American Public Health Association, 1105 18th Street, NW, Washington, D.C. 20036.

WASTE STREAM TECHNOLOGY

% Organic Matter

Site : URS-PENN Landfill
Group Number : 9605-086
Date Received : 5/23/96

Result Units : % Organic Matter
Matrix : Aqueous

WST Lab ID	Client ID	Sample Date	Analysis Date	Result
WS27241	"A"	5/23/96	5/24/96	0.22

WASTE STREAM TECHNOLOGY

WASTESTREAM TECHNOLOGY
302 GROTE STREET
BUFFALO, NY 14207
(716) 876-5290

9605-086

CHAIN OF CUSTODY RECORD

PROJECT NO: SITE NAME: URS Pcan

SAMPLERS (SIGNATURE):

SAMPLE NO.	DATE	TIME	COMP	GRAB	MATRIX	SAMPLE LOCATION	SIZE & NO. OF CONTAINERS	Organic matter	PRESERVATIVES	REMARKS
	5/6/96			X	As	"A"			WS 2 7 2 11	

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)

SPECIAL INSTRUCTIONS:

TURNAROUND TIME _____

LAB USE: REFRIGERATOR # _____ SHELF # _____ GROUP # _____ DUE DATE _____

6

PROJECT _____ Notebook No. _____

Continued From Page _____

Date Init	Analysis: WSTIO		Ignits.	2mins (cm)	cm/min
4/15/96	DOT Ignits	WS26142	NO	NONE	0
DC		143	38secs.	<2cm (.25)	1.98 0.63 below
		145	3secs	<2cm (1cm)	0.5
		158	3secs	10cm	5.0
		175	4secs	5cm	2.5
		196	2sec	3cm	1.5
		207	3sec	5cm	2.5
		213	3sec	5cm	25
		215	3sec	5cm	2.5
		200ppm	3sec	5cm	25

- all very difficult to get out of mold. samples are very

5/23/96 % Organic matter DC

Train A sample WS 28241

~~92.36g~~ DC	~~100.23g~~	~~91.27g~~	~~1.09g~~	~~12.1369g~~	~~PC 12.1216g~~
Crucible wt.	Sample wt	Final wt	Residue	Crucible +	
90.18	100.23g	91.27g	1.09g	12.1369	

Continued on Page

Read and Understood By

Signed Date Signed Date

PROJECT _____ Notebook No. _____

Continued From Page _____

P/E

P	no liquid noted or produced				
P	burned 12 sec after removing ignition source				
P	" 30 sec	"	"	"	
P	burned 2 min+	"	"	"	lots of liquid after burn
P	"	"	"	"	
P	" 40 sec	"	"	"	
P	" 2 mins	"	"	"	lots of liquid produced
P	"	"	"	"	
P	"	"	"	"	
P	"	"	"	"	lots of liquid produced

sticky lots of splattering & popping occurred DC

~~12.4216g~~ ~~12.1936~~ ~~DC 0.08%~~

Crucible + Sample wt	Final wt	C%	Total g lost	T DC
12.4216g	12.1936	00.08%	0.228	0.22%

Continued on Page

Read and Understood By

Signed Date Signed Date

WASTE STREAM TECHNOLOGY

Laboratory Chronicle

Report Date : 05/03/96
Group Number : 9604-082

Prepared For :
Mr. George Leahy
URS Facilities Design,Inc.
Mack Centre II
Mack Centre Drive
Paramus, NJ 07652

Site: URS PENN AVE

Field and Laboratory Information

Client Id	WST Lab #	Matrix	Date Sampled	Date Received	Time
Parameter B	WS26625	Oil	4/26/96	4/26/96	1430
Sample Status Upon Receipt : No irregularities.					

Analytical Parameters	Number of Samples	Turnaround Time
8270 TCLP List	1	Standard
8240 TCLP List	1	Standard
PCBs	1	Standard
Reactive Sulfide	1	Standard
Reactive Cyanide	1	Standard
pH	1	Standard
Pesticides TCLP List	1	Standard
Total Metals	1	Standard

Report Released By : David W. Voss

ENVIRONMENTAL LABORATORY ACCREDITATION CERTIFICATION NUMBER (ELAP) 11179

WASTE STREAM TECHNOLOGY

METHODOLOGIES

The specific methodologies employed in obtaining the analytical data reported are indicated on each of the result forms. The method numbers shown refer to the following analytical method references:

Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020, March 1979, Revised 1983, U.S. Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.

Federal Register, 40 CFR Part 136: Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. Revised July 1992.

Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. Third Edition, Revised September 1994, United States EPA SW-846.

Annual Book of ASTM Standards, Volume II. ASTM, 1916 Race Street, Philadelphia, Pennsylvania 19103.

Standard Methods for the Examination of Water and Wastewater. (18th Edition). American Public Health Association, 1105 18th Street, NW, Washington, D.C. 20036.

ORGANIC DATA QUALIFIERS

U - Indicates compound was analyzed for but not detected.

J - Indicates an estimated value. This flagged is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed, or when the mass spectral data indicates the presence of a compound that meets identification criteria, but the result is less than the sample quantitation limit but greater than zero.

C - This flag applies to pesticide results where the identification has been confirmed by GC/MS.

B - This flag is used when the analyte is found in the associated blank as well as the sample.

E - This flag identifies all compounds whose concentrations exceed the calibration range of the GC/MS instrument or that specific analysis.

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.

G - Matrix spike recovery is greater than the expected upper limit of analytical performance.

L - Matrix spike recovery is less than the expected lower limit of analytical performance.

- Indicates that a surrogate recovery was found to be outside the expected limits of analytical performance.

$ - Indicates that the surrogate compound was diluted out because the sample had to be diluted to obtain analytical results and a recovery could not be calculated.

(%) Indicates that the compound is a surrogate and the values reported for these compounds are in percent recovery. The quality control recovery limits (QC Limits) are indicated in the detection limit column.

Waste Stream Technology Inc.

8270 Waste Dilution - TCLP List

SW-846 8270

Site: URS-PENN LANDFILL
Date Sampled: 04/26/96
Date Received: 04/26/96

Group Number: 9604-082
Report Units: mg/kg
Matrix: Oil

	Lab ID Number	WS26625	
	Client ID	PARAMETER B	
	Date Extracted	04/30/96	
	Date Analyzed	05/01/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
pyridine	10	10	U
1,4-dichlorobenzene	10	10	U
total cresols (o,m & p)	30	30	U
nitrobenzene	10	10	U
hexachloroethane	10	10	U
hexachlorobutadiene	10	10	U
2,4,6-trichlorophenol	10	10	U
2,4,5-trichlorophenol	10	10	U
2,4-dinitrotoluene	10	10	U
hexachlorobenzene	10	10	U
pentachlorophenol	50	50	U
2-Fluorophenol (%)	25-121	91	
Phenol-d6 (%)	24-113	99	
Nitrobenzene-d5 (%)	23-120	120	
2-Fluorobiphenyl (%)	30-115	117	#
2,4,6-Tribromophenol (%)	19-122	105	
Terphenyl-d14 (%)	18-137	167	#

Dilution Factor 1

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.
8270 Method Blank-Waste Dilution
SW-846 8270 Report

Site: URS-PENN LANDFILL
Date Sampled: NA
Date Received: NA

Group Number: 9604-082
Report Units: PPB

Lab ID Number	MB043096	
Client ID	NA	
Date Extracted	04/30/96	
Date Analyzed	05/01/96	

Compound	Detection Limit/ QC Limits (%)	Result	Q
pyridine	10	10	U
1,4-dichlorobenzene	10	10	U
total cresols	30	30	U
nitrobenzene	10	10	U
hexachloroethane	10	10	U
hexachlorobutadiene	10	10	U
2,4,6-trichlorophenol	10	10	U
2,4,5-trichlorophenol	10	10	U
2,4-dinitrotoluene	10	10	U
hexachlorobenzene	10	10	U
pentachlorophenol	50	50	U
2-Fluorophenol (%)	25-121	84	
Phenol-d6 (%)	24-113	92	
Nitrobenzene-d5 (%)	23-120	102	
2-Fluorobiphenyl (%)	30-115	99	
2,4,6-Tribromophenol (%)	19-122	83	
Terphenyl-d14 (%)	18-137	129	

Dilution Factor 1

MB denotes Method Blank
NA denotes Not Applicable.

Waste Stream Technology Inc.
8240 Waste Dilution - TCLP List
SW-846 8240

Site: URS-PENN LANDFILL
Date Sampled: 04/26/96
Date Received: 04/26/96

Group Number: 9604-082
Report Units: ug/kg
Matrix: Oil

Lab ID Number	WS26625	
Client ID	PARAMETER B	
Date Extracted	04/29/96	
Date Analyzed	04/29/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
vinyl chloride	5000	5000	U
1,1-dichloroethene	2500	2500	U
chloroform	2500	2500	U
2-butanone	50000	50000	U
1,2-dichloroethane	2500	2500	U
carbon tetrachloride	2500	2500	U
trichloroethene	2500	2500	U
benzene	2500	2500	U
tetrachloroethene	2500	2500	U
chlorobenzene	2500	2500	U
1,4-dichlorobenzene	2500	1340	J
Bromofluorobenzene (%)	74-121	103	
1,2-Dichloroethane-d4 (%)	70-121	93	
Toluene-d8 (%)	81-117	95	
Dilution Factor	4		

Waste Stream Technology Inc.
8240 Method Blank-Waste Dilution
SW-846 8240

Site: URS-PENN LANDFILL
Date Sampled: NA
Date Received: NA

Group Number: 9604-082
Report Units: PPB

Lab ID Number	IB042996	
Client ID	NA	
Date Extacted	NA	
Date Analyzed	04/30/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
vinyl chloride	1250	1250	U
1,1-dichloroethene	625	625	U
chloroform	625	625	U
2-butanone	12500	12500	U
1,2-dichloroethane	625	625	U
carbon tetrachloride	625	625	U
trichloroethene	625	625	U
benzene	625	625	U
tetrachloroethene	625	625	U
chlorobenzene	625	625	U
1,4-dichlorobenzene	625	625	U
Bromofluorobenzene (%)	74-121	106	
1,2-Dichloroethane-d4 (%)	70-121	98	
Toluene-d8 (%)	81-117	101	

Dilution Factor 1

IB denotes Instrument Blank.
NA denotes Not Applicable.

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

PCBs in Oil

SW-846 8080

Site: URS-PENN LANDFILL
Date Sampled: 04/26/96
Date Received: 04/26/96

Group Number: 9604-082
Report Units: mg/Kg
Matrix: Oil

Lab ID Number	WS26625	
Client ID	PARAMETER B	
Date Extracted	04/26/96	
Date Analyzed	04/26/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
Aroclor 1016	1.000	1.000	U
Aroclor 1221	1.000	1.000	U
Aroclor 1232	1.000	1.000	U
Aroclor 1242	1.000	1.000	U
Aroclor 1248	1.000	1.000	U
Aroclor 1254	1.000	8.320	
Aroclor 1260	1.000	16.500	
Tetrachloro-m-xylene (%)	60-150 .	62.400	
Decachlorobiphenyl (%)	60-150 .	107.000	

Dilution Factor 1

Waste Stream Technology Inc.
Section 7.3.4.2 Reactive Sulfide
SW-846 9030

Site: URS-PENN LANDFILL
Date Sampled: 04/26/96
Date Received: 04/26/96

Group Number: 9604-082
Report Units: mg/Kg
Matrix: Oil
Detection Limit: 3.6

WST Lab ID	Client ID	Analysis Date	Result
WS26625	PARAMETER B	04/29/96	44.8

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.
Section 7.3.3.2 Reactive Cyanide
SW-846 9010

Site: URS-PENN LANDFILL
Date Sampled: 04/26/96
Date Received: 04/26/96

Group Number: 9604-082
Report Units: mg/Kg
Matrix: Oil
Detection Limit: 4.0

WST Lab ID	Client ID	Analysis Date	Result
WS26625	PARAMETER B	04/29/96	< 4.0

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

Waste Dilution TCLP Pesticides

SW-846 8080A

Site: URS-PENN LANDFILL
Date Sampled: 04/26/96
Date Received: 04/26/96

Group Number: 9604-082
Report Units: ug/kg
Matrix: Oil

	Lab ID Number	WS26625
	Client ID	PARAMETER B
	Date Extracted	04/30/96
	Date Analyzed	05/01/96

Compound	Detection Limit/ QC Limits (%)	Result	Q
gamma-BHC	16.0	16.0	U
heptachlor	97.0	97.0	U
heptachlor epoxide	42.0	42.0	U
endrin	55.0	55.0	U
methoxychlor	31.0	31.0	U
chlordane	350.0	350.0	U
toxaphene	1550.0	1550.0	U
Tetrachloro-m-xylene (%)	60-150	69.2	
Decachlorobiphenyl (%)	60-150	79.2	

Dilution Factor 1

Waste Stream Technology Inc.
Waste Dilution Pesticide Blank
SW-846 8080 Report

Site: URS-PENN LANDFILL
Date Sampled: NA
Date Received: NA

Group Number: 9604-082
Report Units: PPB

Lab ID Number	MB96121	
Client ID	NA	
Date Extracted	04/30/96	
Date Analyzed	04/30/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
gamma-BHC	16.0	16.0	U
heptachlor	97.0	97.0	U
heptachlor epoxide	42.0	42.0	U
endrin	55.0	55.0	U
methoxychlor	31.0	31.0	U
chlordane	350.0	350.0	U
toxaphene	1550.0	1550.0	U
Tetrachloro-m-xylene (%)	60-150 .	104.0	
Decachlorobiphenyl (%)	60-150 .	112.0	

Dilution Factor 1

MB denotes Method Blank
NA denotes Not Applicable.

Waste Stream Technology Inc.

Metals Analysis Result Report

Site: URS-PENN LANDFILL
Date Sampled: 04/26/96
Date Received: 04/26/96

Group Number: 9604-082
Report Units: mg/Kg
Matrix: Oil

	Lab ID Number:	WS26625		
	Client ID:	PARAMETER B		
	Date Digested:	04/29/96		
Analyte	**Detection Limit**	**Result**	**Date Analyzed**	**Analysis Method**
Lead by ICP	24.000	< 24.000	04/29/96	SW-846 6010
Cadmium by ICP	3.000	< 3.000	04/29/96	SW-846 6010
Barium by ICP	2.200	152.000	04/29/96	SW-846 6010
Chromium by ICP	2.200	16.400	04/29/96	SW-846 6010
Silver by ICP	3.000	< 3.000	04/29/96	SW-846 6010
Arsenic by GFAA	1.000	2.616	04/29/96	SW-846 7060
Selenium by GFAA	0.600	< 0.600	04/29/96	SW-846 7740
Mercury by Cold Vapor	0.028	0.059	05/01/96	SW-846 7471

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

Metals Method Blank Analysis Result Report

Site: URS-PENN LANDFILL
Date Sampled: NA
Date Received: NA

Group Number: 9604-082
Report Units: PPM

Lab ID Number:	MB042996
Client ID:	NA
Date Digested:	04/29/96

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Pb soil Method Blank	24.000	< 24.000	04/29/96	SW 846 6010
Cd soil Method Blank	3.000	< 3.000	04/29/96	SW-846 6010
Ba soil Method Blank	2.200	< 2.200	04/29/96	SW-846 6010
Cr soil Method Blank	2.200	< 2.200	04/29/96	SW-846 6010
Ag soil Method Blank	3.000	< 3.000	04/29/96	SW-846 6010
As soil Method Blank	1.000	< 1.000	04/29/96	SW-846 7060
Se soil Method Blank	0.600	< 0.600	04/29/96	SW-846 7740
Hg soil Method Blank	0.014	< 0.014	05/01/96	SW-846 7471

MB denotes Method Blank.
NA denotes Not Application.

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.
Method 9045

Site: URS-PENN LANDFILL
Date Sampled: 04/26/96
Date Received: 04/26/96

Group Number: 9604-082
Report Units: pH UNITS

WST Lab ID	Client ID	Analysis Date	Matrix	pH RESULT
WS26625	PARAMETER B	05/01/96	Oil	7.01

WASTE STREAM TECHNOLOGY

WASTESTREAM TECHNOLOGY
302 GROTE STREET
BUFFALO, NY 14207
(716) 876-5290

CHAIN OF CUSTODY RECORD

9600-082

PROJECT NO: SITE NAME: URS PENN AVE

SAMPLERS (SIGNATURE): D. Smagala

SAMPLE NO.	DATE	TIME	COMP	GRAB	MATRIX	SAMPLE LOCATION	SIZE & NO. OF CONTAINERS	PCB (40 CFR 761)	PRESERVATIVES	REMARKS
	9/26	1430		X	OIL	PARAMETER B	1x250	X	W 2662 25	OIL COLLECTED FROM SEPARATOR EQUIPMENT (40.13g)

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
D. Smagala	9/26 1430				
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)

SPECIAL INSTRUCTIONS:

TURNAROUND TIME _____

LAB USE: REFRIGERATOR #_____ SHELF #_____ GROUP #_____ DUE DATE _____

WASTE STREAM TECHNOLOGY

Laboratory Chronicle

Report Date : 05/03/96
Group Number : 9604-075

Prepared For :
Mr. George Leahy
URS Facilities Design,Inc.
Mack Centre II
Mack Centre Drive
Paramus, NJ 07652

Site: URS PENN AVE

Field and Laboratory Information

Client Id	WST Lab #	Matrix	Date Sampled	Date Received	Time
Analytical Param. 'C'	WS26576	Aqueous	4/24/96	4/24/96	1658
Analytical Param. 'D'	WS26577	Aqueous	4/24/96	4/24/96	1658
Analytical Param. 'E'	WS26578	Aqueous	4/24/96	4/24/96	1658
Analytical Param. 'F'	WS26579	Aqueous	4/24/96	4/24/96	1658

Sample Status Upon Receipt : No irregularities.

Analytical Parameters	Number of Samples	Turnaround Time
8240	2	Standard
8270	1	Standard
PCB	2	Standard
8080	1	Standard
Total Metals	1	Standard
pH	4	Standard
BOD	3	Standard
Cyanide	2	Standard
Cyanide-Weak acid dissociable	2	Standard
Cyanide-Ammenable to Cl.	2	Standard
COD	3	Standard
TPH	1	Standard
TSS	2	Standard
Alkalinity	1	Standard
Ammonia Nitrogen	2	Standard

Report Released By : David W. Voce

ENVIRONMENTAL LABORATORY ACCREDITATION
CERTIFICATION NUMBER (ELAP) 11179

WASTE STREAM TECHNOLOGY

METHODOLOGIES

The specific methodologies employed in obtaining the analytical data reported are indicated on each of the result forms. The method numbers shown refer to the following analytical method references:

Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020, March 1979, Revised 1983, U.S. Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.

Federal Register, 40 CFR Part 136: Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. Revised July 1992.

Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. Third Edition, Revised September 1994, United States EPA SW-846.

Annual Book of ASTM Standards, Volume II. ASTM, 1916 Race Street, Philadelphia, Pennsylvania 19103.

Standard Methods for the Examination of Water and Wastewater. (18th Edition). American Public Health Association, 1105 18th Street, NW, Washington, D.C. 20036.

ORGANIC DATA QUALIFIERS

U - Indicates compound was analyzed for but not detected.

J - Indicates an estimated value. This flagged is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed, or when the mass spectral data indicates the presence of a compound that meets identification criteria, but the result is less than the sample quantitation limit but greater than zero.

C - This flag applies to pesticide results where the identification has been confirmed by GC/MS.

B - This flag is used when the analyte is found in the associated blank as well as the sample.

E - This flag identifies all compounds whose concentrations exceed the calibration range of the GC/MS instrument or that specific analysis.

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.

G - Matrix spike recovery is greater than the expected upper limit of analytical performance.

L - Matrix spike recovery is less than the expected lower limit of analytical performance.

- Indicates that a surrogate recovery was found to be outside the expected limits of analytical performance.

$ - Indicates that the surrogate compound was diluted out because the sample had to be diluted to obtain analytical results and a recovery could not be calculated.

(%) Indicates that the compound is a surrogate and the values reported for these compounds are in percent recovery. The quality control recovery limits (QC Limits) are indicated in the detection limit column.

Waste Stream Technology Inc.
Volatile Organics Analysis
Method 8240

Site: URS-PENN LANDFILL
Date Sampled: 04/24/96
Date Received: 04/24/96

Group Number: 9604-075
Report Units: ug/L
Matrix: Aqueous

Lab ID Number	WS26578	
Client ID	ANALYTICAL PARAM. 'E'	
Date Extracted	NA	
Date Analyzed	04/25/96	

Compound	Detection Limit/ QC Limits (%)	Result	Q
chloromethane	10	10	U
bromomethane	10	10	U
vinyl chloride	10	10	U
chloroethane	10	10	U
methylene chloride	5	12	B
acetone	100	46	J
carbon disulfide	5	5	U
1,1-dichloroethene	5	5	U
1,1-dichloroethane	5	5	
trans-1,2-dichloroethene	5	5	U
chloroform	5	5	U
2-butanone	100	100	U
1,2-dichloroethane	5	5	U
1,1,1-trichloroethane	5	5	U
carbon tetrachloride	5	5	U
vinyl acetate	50	50	U
bromodichloromethane	5	5	U
1,2-dichloropropane	5	5	U
cis-1,3-dichloropropene	5	5	U
trichloroethene	5	5	U
benzene	5	5	U
dibromochloromethane	5	5	U
trans-1,3-dichloropropene	5	5	U
1,1,2-trichloroethane	5	5	U
2-chloroethylvinyl ether	10	10	U
bromoform	5	5	U
4-methyl-2-pentanone	50	50	U
2-hexanone	50	50	U
tetrachloroethene	5	5	U
1,1,2,2-tetrachloroethane	5	5	U
toluene	5	1	J
chlorobenzene	5	5	U
ethylbenzene	5	5	U
styrene	5	5	U
m,p-xylene	5	1	J
o-xylene	5	53	
1,2-Dichloroethane-d4 (%)	76-114	99	
Toluene-d8 (%)	88-110	99	
Bromofluorobenzene (%)	86-115	97	
Dilution Factor	1		

Waste Stream Technology Inc.
Volatile Organics Analysis
Method 8240

Site: URS-PENN LANDFILL
Date Sampled: 04/24/96
Date Received: 04/24/96

Group Number: 9604-075
Report Units: ug/L
Matrix: Aqueous

Lab ID Number	WS26579	
Client ID	ANALYTICAL PARAM. 'F'	
Date Extracted	NA	
Date Analyzed	04/25/96	

Compound	Detection Limit/ QC Limits (%)	Result	Q
chloromethane	10	10	U
bromomethane	10	10	U
vinyl chloride	10	10	U
chloroethane	10	10	U
methylene chloride	5	11	B
acetone	100	104	
carbon disulfide	5	5	U
1,1-dichloroethene	5	5	U
1,1-dichloroethane	5	4	J
trans-1,2-dichloroethene	5	5	U
chloroform	5	5	U
2-butanone	100	28	J
1,2-dichloroethane	5	5	U
1,1,1-trichloroethane	5	5	U
carbon tetrachloride	5	5	U
vinyl acetate	50	50	U
bromodichloromethane	5	5	U
1,2-dichloropropane	5	5	U
cis-1,3-dichloropropene	5	5	U
trichloroethene	5	5	U
benzene	5	5	U
dibromochloromethane	5	5	U
trans-1,3-dichloropropene	5	5	U
1,1,2-trichloroethane	5	5	U
2-chloroethylvinyl ether	10	10	U
bromoform	5	5	U
4-methyl-2-pentanone	50	50	U
2-hexanone	50	50	U
tetrachloroethene	5	5	U
1,1,2,2-tetrachloroethane	5	5	U
toluene	5	2	J
chlorobenzene	5	5	U
ethylbenzene	5	5	U
styrene	5	5	U
m,p-xylene	5	4	J
o-xylene	5	32	
1,2-Dichloroethane-d4 (%)	76-114	100	
Toluene-d8 (%)	88-110	105	
Bromofluorobenzene (%)	86-115	106	
Dilution Factor	1		

Waste Stream Technology Inc.
VOC Water Method Blank Results
Method 8240

Site: URS-PENN LANDFILL
Date Sampled: NA
Date Received: NA

Group Number: 9604-075
Report Units: PPB

Lab ID Number	IB042596	
Client ID	NA	
Date Extacted	NA	
Date Analyzed	04/25/96	

Compound	Detection Limit/ QC Limits (%)	Result	Q
chloromethane	10	10	U
bromomethane	10	10	U
vinyl chloride	10	10	U
chloroethane	10	10	U
methylene chloride	5	6	
acetone	100	100	U
carbon disulfide	5	5	U
1,1-dichloroethene	5	5	U
1,1-dichloroethane	5	5	U
trans-1,2-dichloroethene	5	5	U
chloroform	5	5	U
1,2-dichloroethane	5	5	U
2-butanone	100	100	U
1,1,1-trichloroethane	5	5	U
carbon tetrachloride	5	5	U
vinyl acetate	50	50	U
bromodichloromethane	5	5	U
1,2-dichloropropene	5	5	U
cis-1,3-dichloropropene	5	5	U
trichloroethene	5	5	U
benzene	5	5	U
dibromochloromethane	5	5	U
trans-1,3-dichloropropene	5	5	U
1,1,2-trichloroethane	5	5	U
2-chloroethylvinyl ether	10	10	U
bromoform	5	5	U
4-methyl-2-pentanone	50	50	U
2-hexanone	50	50	U
tetrachloroethene	5	5	U
1,1,2,2-tetrachloroethane	5	5	U
toluene	5	5	U
chlorobenzene	5	5	U
ethylbenzene	5	5	U
styrene	5	5	U
m,p-xylene	5	5	U
o-xylene	5	5	U
Bromofluorobenzene (%)	86-115	101	
1,2-Dichloroethane-d4 (%)	76-114	95	
Toluene-d8 (%)	88-110	100	

Dilution Factor 1

IB denotes Instrument Blank.
NA denotes Not Applicable.

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

Semivolatile Organics in Water

3510/8270

Site: URS-PENN LANDFILL
Date Sampled: 04/24/96
Date Received: 04/24/96

Group Number: 9604-075
Report Units: ug/L
Matrix: Aqueous

Lab ID Number	WS26578	
Client ID	ANALYTICAL PARAM. 'E'	
Date Extracted	04/25/96	
Date Analyzed	04/26/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
n-nitrosodimethylamine	10	10	U
bis(2-Chloroethyl)ether	10	10	U
Phenol	10	10	U
2-Chlorophenol	10	10	U
1,3-Dichlorobenzene	10	10	U
1,4-Dichlorobenzene	10	10	U
1,2-Dichlorobenzene	10	4	J
Benzyl alcohol	20	20	U
bis(2-chloroisopropyl)ether	10	10	U
2-Methylphenol	10	5	J
Hexachloroethane	10	10	U
N-Nitroso-di-n-propylamine	10	10	U
3 & 4-methylphenol	10	3	J
Benzoic acid	50	50	U
Nitrobenzene	10	10	U
Isophorone	10	10	U
2-Nitrophenol	10	10	U
2,4-Dimethylphenol	10	6	J
bis(2-Chloroethoxy)methane	10	10	U
2,4-Dichlorophenol	10	10	U
1,2,4-Trichlorobenzene	10	3	J
Naphthalene	10	10	U
4-Chloroaniline	20	20	U
Hexachlorobutadiene	10	10	U
4-Chloro-3-methylphenol	20	20	U
2-Methylnaphthalene	10	3	J
Hexachlorocyclopentadiene	10	10	U
2,4,6-Trichlorophenol	10	10	U
2,4,5-Trichlorophenol	10	10	U
2-Chloronaphthalene	10	10	U
2-Nitroaniline	50	50	U
Acenaphthylene	10	10	U
Dimethylphthalate	10	10	U
2,6-Dinitrotoluene	10	10	U
Acenaphthene	10	10	U
3-Nitroaniline	50	50	U

	Lab ID Number Client ID Date Extracted Date Analyzed	WS26578 ANALYTICAL PARAM. 'E' 04/25/96 04/26/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
2,4-Dinitrophenol	50	50	U
Dibenzofuran	10	10	U
2,4-Dinitrotoluene	10	10	U
4-Nitrophenol	50	50	U
Fluorene	10	10	U
4-Chlorophenyl-phenylether	10	10	U
Diethylphthalate	10	10	U
4-Nitroaniline	20	20	U
4,6-Dinitro-2-methylphenol	50	50	U
n-Nitrosodiphenylamine	10	5	J
4-Bromophenyl-phenylether	10	10	U
Hexachlorobenzene	10	10	U
Pentachlorophenol	50	50	U
Phenanthrene	10	10	U
Anthracene	10	10	U
Di-n-butylphthalate	10	10	U
Fluoranthene	10	10	U
Carbazole	10	10	U
Pyrene	10	10	U
Benzidine	100	100	U
Butylbenzylphthalate	10	10	U
3,3'-Dichlorobenzidine	20	20	U
Benzo[a]anthracene	10	10	U
Chrysene	10	10	U
bis(2-Ethylhexyl)phthalate	10	4	J
Di-n-octylphthalate	10	10	U
Benzo[b]fluoranthene	10	10	U
Benzo[k]fluoranthene	10	10	U
Benzo[a]pyrene	10	10	U
Indeno[1,2,3-cd]pyrene	10	10	U
Dibenz[a,h]anthracene	10	10	U
Benzo[g,h,i]perylene	10	10	U
2-Fluorophenol (%)	21-100	79	
Phenol-d6 (%)	10-94	44	
Nitrobenzene-d5 (%)	35-114	114	
2-Fluorobiphenyl (%)	43-116	132	#
2,4,6-Tribromophenol (%)	10-123	117	
Terphenyl-d14 (%)	33-141	157	#
Dilution Factor	1		

Waste Stream Technology Inc.
Method 8270 Water Method Blank
SW-846 8270 Report

Site: URS-PENN LANDFILL
Date Sampled: NA
Date Received: NA

Group Number: 9604-075
Report Units: PPB

Lab ID Number	MB042596
Client ID	NA
Date Extracted	04/25/96
Date Analyzed	04/26/96

Compound	Detection Limit/ QC Limits (%)	Result	Q
n-nitrosodimethylamine	10	10	U
bis(2-Chloroethyl)ether	10	10	U
Phenol	10	10	U
2-Chlorophenol	10	10	U
1,3-Dichlorobenzene	10	10	U
1,4-Dichlorobenzene	10	10	U
1,2-Dichlorobenzene	10	10	U
Benzyl alcohol	20	20	U
bis(2-chloroisopropyl)ether	10	10	U
2-Methylphenol	10	10	U
Hexachloroethane	10	10	U
N-nitroso-di-n-propylamine	10	10	U
3 & 4 Methylphenol	10	10	U
Nitrobenzene	10	10	U
Isophorone	10	10	U
2-Nitrophenol	10	10	U
2,4-Dimethylphenol	10	10	U
bis(2-Chloroethoxy)methane	10	10	U
2,4-Dichlorophenol	10	10	U
1,2,4-Trichlorobenzene	10	10	U
Naphthalene	10	10	U
4-Chloroaniline	20	20	U
Hexachlorobutadiene	10	10	U
4-Chloro-3-methylphenol	20	20	U
2-Methylnaphthalene	10	10	U
Hexachlorocyclopentadiene	10	10	U
2,4,6-Trichlorophenol	10	10	U
2,4,5-Trichlorophenol	10	10	U
2-Chloronaphthalene	10	10	U
2-Nitroaniline	50	50	U
Acenaphthylene	10	10	U
Dimethylphthalate	10	10	U
2,6-Dinitrotoluene	10	10	U
Acenaphthene	10	10	U
3-Nitroaniline	50	50	U
2,4-Dinitrophenol	50	50	U
Dibenzofuran	10	10	U

WASTE STREAM TECHNOLOGY

Lab ID Number	MB042596	
Client ID	NA	
Date Extracted	04/25/96	
Date Analyzed	04/26/96	

Compound	Detection Limit/ QC Limits (%)	Result	Q
2,4-Dinitrotoluene	10	10	U
4-Nitrophenol	50	50	U
Fluorene	10	10	U
4-Chlorophenyl-phenylether	10	10	U
Diethylphthalate	10	10	U
4-Nitroaniline	20	20	U
4,6-Dinitro-2-methylphenol	50	50	U
n-Nitrosodiphenylamine	10	10	U
4-Bromophenyl-phenylether	10	10	U
Hexachlorobenzene	10	10	U
Pentachlorophenol	50	50	U
Phenanthrene	10	10	U
Anthracene	10	10	U
Di-n-butylphthalate	10	10	U
Fluoranthene	10	10	U
Pyrene	10	10	U
Butylbenzylphthalate	10	10	U
3,3'-Dichlorobenzidine	20	20	U
Benzo[a]anthracene	10	10	U
Chrysene	10	10	U
bis(2-Ethylhexyl)phthalate	10	10	U
Di-n-octylphthalate	10	10	U
Benzo[b]fluoranthene	10	10	U
Benzo[k]fluoranthene	10	10	U
Benzo[a]pyrene	10	10	U
Indeno[1,2,3-cd]pyrene	10	10	U
Dibenz[a,h]anthracene	10	10	U
Benzo[g,h,i]perylene	10	10	U
Benzidine	100	100	U
Benzoic acid	50	50	U
Carbazole	10	10	U
2-Fluorophenol (%)	21-100	67	
Phenol-d6 (%)	10-94	38	
Nitrobenzene-d5 (%)	35-114	102	
2-Fluorobiphenyl (%)	43-116	108	
2,4,6-Tribromophenol (%)	10-123	102	
Terphenyl-d14 (%)	33-141	144	#

Dilution Factor 1

MB denotes Method Blank
NA denotes Not Applicable.

Waste Stream Technology Inc.

PCBs in Water

SW-846 8080A

Site: URS-PENN LANDFILL
Date Sampled: 04/24/96
Date Received: 04/24/96

Group Number: 9604-075
Report Units: ug/L
Matrix: Aqueous

	Lab ID Number	WS26576
	Client ID	ANALYTICAL PARAM. 'C'
	Date Extracted	04/25/96
	Date Analyzed	04/26/96

Compound	Detection Limit/ QC Limits (%)	Result	Q
aroclor 1016	0.270	0.270	U
aroclor 1221	0.230	0.230	U
aroclor 1232	0.380	0.380	U
aroclor 1242	0.180	0.180	U
aroclor 1248	0.090	0.090	U
aroclor 1254	0.050	1.610	
aroclor 1260	0.060	2.760	
Tetrachloro-m-xylene (%)	60-150	68.600	
Decachlorobiphenyl (%)	60-150	88.500	

Dilution Factor 1

Waste Stream Technology Inc.

PCBs in Water

SW-846 8080A

Site: URS-PENN LANDFILL
Date Sampled: 04/24/96
Date Received: 04/24/96

Group Number: 9604-075
Report Units: ug/L
Matrix: Aqueous

Lab ID Number	WS26577	
Client ID	ANALYTICAL PARAM. 'D'	
Date Extracted	04/25/96	
Date Analyzed	04/26/96	

Compound	Detection Limit/ QC Limits (%)	Result	Q
aroclor 1016	0.270	0.270	U
aroclor 1221	0.230	0.230	U
aroclor 1232	0.380	0.380	U
aroclor 1242	0.180	0.180	U
aroclor 1248	0.090	0.090	U
aroclor 1254	0.050	0.050	U
aroclor 1260	0.060	0.060	U
Tetrachloro-m-xylene (%)	60-150	87.200	
Decachlorobiphenyl (%)	60-150	99.800	

Dilution Factor 1

Waste Stream Technology Inc.

Pesticides and PCBs in Water

SW-846 8080

Site: URS-PENN LANDFILL
Date Sampled: 04/24/96
Date Received: 04/24/96

Group Number: 9604-075
Report Units: ug/L
Matrix: Aqueous

	Lab ID Number	WS26578
	Client ID	ANALYTICAL PARAM. 'E'
	Date Extracted	04/25/96
	Date Analyzed	04/26/96

Compound	Detection Limit/ QC Limits (%)	Result	Q
Alpha-BHC	0.003	0.003	U
Beta-BHC	0.006	0.006	U
Gamma-BHC (Lindane)	0.003	0.003	U
Delta-BHC	0.009	0.009	U
Heptachlor	0.019	0.019	U
Aldrin	0.017	0.017	U
Heptachlor Epoxide	0.008	0.008	U
Endosulfan I	0.005	0.005	U
Dieldrin	0.005	0.005	U
4,4'-DDE	0.005	0.005	U
Endrin	0.011	0.011	U
Endosulfan II	0.006	0.006	U
4,4'-DDD	0.005	0.005	U
Endrin Aldehyde	0.008	0.008	U
Endosulfan Sulfate	0.060	0.060	U
4,4'-DDT	0.017	0.017	U
Endrin Ketone	0.012	0.012	U
Methoxychlor	0.006	0.006	U
Toxaphene	0.310	0.310	U
Chlordane	0.069	0.069	U
Aroclor 1016	0.273	0.273	U
Aroclor 1221	0.225	0.225	U
Aroclor 1232	0.380	0.380	U
Aroclor 1242	0.175	0.175	U
Aroclor 1248	0.092	0.092	U
Aroclor 1254	0.052	0.052	U
Aroclor 1260	0.060	0.060	U
Decachlorobiphenyl (%)	60-150	85.800	
Tetrachloro-m-xylene (%)	60-150	64.800	

Dilution Factor 1

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.
PCB & Pesticides Method Blank
SW-846 8080 Report

Site: URS-PENN LANDFILL
Date Sampled: NA
Date Received: NA

Group Number: 9604-075
Report Units: PPB

Lab ID Number	MB96116	
Client ID	NA	
Date Extracted	04/25/96	
Date Analyzed	04/25/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
Alpha-BHC	0.003	0.003	U
Beta-BHC	0.006	0.006	U
Gamma-BHC (Lindane)	0.003	0.003	U
Delta-BHC	0.009	0.009	U
Heptachlor	0.019	0.019	U
Aldrin	0.017	0.017	U
Heptachlor Epoxide	0.008	0.008	U
Endosulfan I	0.005	0.005	U
Dieldrin	0.005	0.005	U
4,4'-DDE	0.005	0.005	U
Endrin	0.011	0.011	U
Endosulfan II	0.006	0.006	U
4,4'-DDD	0.005	0.005	U
Endrin Aldehyde	0.008	0.008	U
Endosulfan Sulfate	0.060	0.060	U
4,4'-DDT	0.017	0.017	U
Endrin Ketone	0.012	0.012	U
Methoxychlor	0.006	0.006	U
Toxaphene	0.310	0.310	U
Chlordane	0.069	0.069	U
Aroclor 1016	0.273	0.273	U
Aroclor 1221	0.225	0.225	U
Aroclor 1232	0.380	0.380	U
Aroclor 1242	0.175	0.175	U
Aroclor 1248	0.092	0.092	U
Aroclor 1254	0.052	0.052	U
Aroclor 1260	0.060	0.060	U
Decachlorobiphenyl (%)	60-150 .	113.000	
Tetrachloro-m-xylene (%)	60-150 .	104.000	

Dilution Factor 1

MB denotes Method Blank
NA denotes Not Applicable.

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

Metals Analysis Result Report

Site: URS-PENN LANDFILL
Date Sampled: 04/24/96
Date Received: 04/24/96

Group Number: 9604-075
Report Units: mg/L
Matrix: Aqueous

Lab ID Number:	WS26578
Client ID:	ANALYTICAL PARAM. 'E'
Date Digested:	04/25/96

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Zinc by ICP	0.019	< 0.019	04/26/96	EPA 200.7
Lead by ICP	0.120	< 0.120	04/26/96	EPA 200.7
Cadmium by ICP	0.015	< 0.015	04/26/96	EPA 200.7
Cobalt by ICP	0.030	< 0.030	04/26/96	EPA 200.7
Nickel by ICP	0.032	< 0.032	04/26/96	EPA 200.7
Barium by ICP	0.011	< 0.011	04/26/96	EPA 200.7
Manganese by ICP	0.003	< 0.003	04/26/96	EPA 200.7
Iron by ICP	0.063	0.070	04/26/96	EPA 200.7
Chromium by ICP	0.011	< 0.011	04/26/96	EPA 200.7
Magnesium by ICP	0.153	39.300	04/26/96	EPA 200.7
Vanadium by ICP	0.040	< 0.040	04/26/96	EPA 200.7
Aluminum by ICP	0.120	< 0.120	04/26/96	EPA 200.7
Beryllium by ICP	0.003	< 0.003	04/26/96	EPA 200.7
Calcium by ICP	0.224	14.900	04/26/96	EPA 200.7
Copper by ICP	0.011	< 0.011	04/26/96	EPA 200.7
Silver by ICP	0.015	< 0.015	04/26/96	EPA 200.7
Potassium by ICP	1.250	154.000	04/26/96	EPA 200.7
Sodium by ICP	0.157	1000.000	04/26/96	EPA 200.7
Arsenic by GFAA	0.005	0.008	04/26/96	EPA 206.2
Antimony by GFAA	0.009	< 0.009	04/26/96	EPA 204.2
Selenium by GFAA	0.003	< 0.003	04/30/96	EPA 270.2
Thallium by GFAA	0.003	< 0.003	04/30/96	EPA 279.2
Mercury by Cold Vapor	0.001	< 0.001	04/25/96	EPA 245.2

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

Metals Method Blank Analysis Result Report

Site: URS-PENN LANDFILL
Date Sampled: NA
Date Received: NA

Group Number: 9604-075
Report Units: PPM

Lab ID Number:	MB042596-W1
Client ID:	NA
Date Digested:	04/25/96

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Zn water Method Blank	0.019	< 0.019	04/26/96	EPA 200.7
Pb water Method Blank	0.120	< 0.120	04/26/96	EPA 200.7
Cd water Method Blank	0.015	< 0.015	04/26/96	EPA 200.7
Co water Method Blank	0.030	< 0.030	04/26/96	EPA 200.7
Ni water method blank	0.032	< 0.032	04/26/96	EPA 200.7
Ba water Method Blank	0.011	< 0.011	04/26/96	EPA 200.7
Mn water Method Blank	0.003	< 0.003	04/26/96	EPA 200.7
Fe water Method Blank	0.063	< 0.063	04/26/96	EPA 200.7
Cr water Method Blank	0.011	< 0.011	04/26/96	EPA 200.7
Mg water Method Blank	0.153	< 0.153	04/26/96	EPA 200.7
V water Method Blank	0.040	< 0.040	04/26/96	EPA 200.7
Al water method blank	0.120	< 0.120	04/26/96	EPA 200.7
Be water Method Blank	0.003	< 0.003	04/26/96	EPA 200.7
Ca water Method Blank	0.224	< 0.224	04/26/96	EPA 200.7
Cu water Method Blank	0.011	< 0.011	04/26/96	EPA 200.7
Ag water Method Blank	0.015	< 0.015	04/26/96	EPA 200.7
K water Method Blank	1.250	< 1.250	04/26/96	EPA 200.7
Na water Method Blank	0.157	< 0.157	04/26/96	EPA 200.7
As water Method Blank	0.005	< 0.005	04/26/96	EPA 206.2
Sb water method blank	0.009	< 0.009	04/26/96	EPA 204.2
Se water Method Blank	0.003	< 0.003	04/26/96	EPA 270.2
Tl water Method Blank	0.003	< 0.003	04/26/96	EPA 279.2

MB denotes Method Blank.
NA denotes Not Application.

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.
Method 150.1

Site: URS-PENN LANDFILL
Date Sampled: 04/24/96
Date Received: 04/24/96

Group Number: 9604-075
Report Units: pH UNITS
Matrix: Aqueous

WST Lab ID	Client ID	Analysis Date	pH RESULT
WS26576	ANALYTICAL PARAM. 'C'	04/25/96	8.11
WS26577	ANALYTICAL PARAM. 'D'	04/25/96	7.11
WS26578	ANALYTICAL PARAM. 'E'	04/25/96	11.19
WS26579	ANALYTICAL PARAM. 'F'	04/25/96	7.25

Waste Stream Technology Inc.
Biochemical Oxygen Demand
EPA 405.1

Site: URS-PENN LANDFILL
Date Sampled: 04/24/96
Date Received: 04/24/96

Group Number: 9604-075
Report Units: mg O2/L
Matrix: Aqueous
Detection Limit: 5.0

WST Lab ID	Client ID	Analysis Date	Result
WS26576	ANALYTICAL PARAM. 'C'	04/30/96	48.7
WS26577	ANALYTICAL PARAM. 'D'	04/30/96	28.4

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

Analysis Result Report

Site: URS-PENN LANDFILL
Date Sampled: 04/24/96
Date Received: 04/24/96
Matrix: Aqueous

Group Number: 9604-075
Report Units: mg/L
COD Units: mg O2/L

Lab ID Number:	WS26576
Client ID:	ANALYTICAL PARAM. 'C'

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Cyanide in Water	0.005	0.029	04/26/96	EPA 335.2
Cyanide-Weak acid dissociable	0.016	0.011	04/26/96	EPA 335.2
Cyanide-Ammenable to Cl.	0.016	0.036	04/26/96	EPA 335.2
Chemical Oxygen Demand	50.000	276.800	04/25/96	ASTM D1252B
Oil & Grease	4.000	28.440	04/26/96	EPA 413.1
Total Petroleum Hydrocarbons	4.000	16.610	04/26/96	EPA 418.1

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

Analysis Result Report

Site: URS-PENN LANDFILL
Date Sampled: 04/24/96
Date Received: 04/24/96
Matrix: Aqueous

Group Number: 9604-075
Report Units: mg/L
COD Units: mg O2/L

Lab ID Number:	WS26577	
Client ID:	ANALYTICAL PARAM. 'D'	

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Cyanide in Water	0.005	0.027	04/26/96	EPA 335.2
Cyanide-Weak acid dissociable	0.016	0.009	04/26/96	EPA 335.2
Cyanide-Ammenable to Cl.	0.016	0.037	04/26/96	EPA 335.2
Chemical Oxygen Demand	50.000	90.200	04/25/96	ASTM D1252B

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

Analysis Result Report

Site: URS-PENN LANDFILL
Date Sampled: 04/24/96
Date Received: 04/24/96
Matrix: Aqueous

Group Number: 9604-075
Report Units: mg/L
COD Units: mg O2/L

Lab ID Number:	WS26578
Client ID:	ANALYTICAL PARAM. 'E'

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Total Suspended Solids	4.000	66.800	04/25/96	EPA 160.2
Alkalinity	5.000	3888.000	04/25/96	EPA 310.1
Chemical Oxygen Demand	50.000	194.400	04/25/96	ASTM D1252B
Ammonia Nitrogen	1.000	192.000	04/25/96	EPA 350.3

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

Analysis Result Report

Site: URS-PENN LANDFILL
Date Sampled: 04/24/96
Date Received: 04/24/96
Matrix: Aqueous

Group Number: 9604-075
Report Units: mg/L
COD Units: mg O2/L

Lab ID Number:	WS26579	
Client ID:	ANALYTICAL PARAM. 'F'	

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Total Suspended Solids	4.000	< 4.000	04/25/96	EPA 160.2
Ammonia Nitrogen	0.100	4.090	04/25/96	EPA 350.3

Waste Stream Technology Inc.
Biochemical Oxygen Demand
EPA 405.1

Site: URS-PENN LANDFILL
Date Sampled: 04/24/96
Date Received: 04/24/96

Group Number: 9604-075
Report Units: mg O2/L
Matrix: Aqueous
Detection Limit: 5.0

WST Lab ID	Client ID	Analysis Date	Result
WS26576	ANALYTICAL PARAM. 'C'	04/30/96	48.7
WS26577	ANALYTICAL PARAM. 'D'	04/30/96	28.4
WS26578	ANALYTICAL PARAM. 'E'	04/30/96	< 2.0

WASTE STREAM TECHNOLOGY

WASTE STREAM TECHNOLOGY
302 GROTE STREET
BUFFALO, NY 14207
(716) 876-5290

9601-075

CHAIN OF CUSTODY RECORD

PROJECT NO: SITE NAME: UR's PENN AVE

SAMPLERS (SIGNATURE): D Symanski

SAMPLE NO.	DATE	TIME	COMP	GRAB	MATRIX	SAMPLE LOCATION	SIZE & NO. OF CONTAINERS	AS PER TABLE 4	PRESERVATIVES	REMARKS
	4/24	1650	X		A-Q	ANALYTICAL PARAM. "C"	4x1L		WS265	76
						" " "D"	3x1L			77
						" " "E"	5x1L			78
						" " "E"	2x40ml			
						" " "E"	1x500			
						" " "F"	2x1L			
						" " "F"	2x40ml			79

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
	4/24 1650				
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)

SPECIAL INSTRUCTIONS:

TURNAROUND TIME _____

LAB: REFRIGERATOR #_____ SHELF #_____ GROUP #_____ DUE DATE _____

DATA VALIDATION CHECKLIST

Date : 4/29/96 Checked By: D. Vollmer
Sample Group Number(s) : 9605-064; 9604-075; 9601-18
Sample Number(s): WS26422; WS26578+79; WS26477
Method: 1311 + 420/8240 Analyst: R. Williams
QA/QC Batch #: 8240042S+042696(W)-1 Ext Tech: R. Moss

REPORT FORMS Tclp

Y	Analytical Work Form	Y	~~Soil/Water~~ Extraction Log
—	Waste Dilution Log	Y	Analysis Log (Injection)
Y	Continuing Calibration	Y	Reference Sample Recovery
Y	Surrogate Recovery	—	MS/MSD Recovery
Y	Internal Standard Sum.	Y	GC/MS Tune Report
Y	Results Report	Y	Batch complete?

QC DATA REVIEW

1. Sample holding time summary:
   Date sampled: 4/19, 4/22 + 4/24/96 Date received: 4/19, 4/22 + 4/24/96
   Date extracted: Tclp: 4/23/96 Date analyzed: 4/25 + 4/24/96
   Extracted w/i holding time Y Analyzed w/i hold time Y
2. Method blank summary:
   MB extracted w/batch? N IB MB analysis acceptable? Y(A)/Y
3. Analysis log complete? Y Proper sequence followed? Y
4. Extraction Log complete? Y matrix Tclp/H2O level —
5. Continuing calibration check:
   Y/1 C.C.C. ran for a 2-12hr sample sequences
   Percent difference of CCC Y/ acceptable ___ unacceptable
6. Reference sample recovery: % recovery acceptable Y/
   recoveries not acceptable Cr(III) % rec: 830%.
7. Surrogate recovery summary: % recovery acceptable Y
   Recoveries not in range —
8. Spike recovery summary: acceptable MS — acceptable MSD —
   RPD of MS/MSD acceptable —
   Unacceptable results comments —
9. Duplicate analysis summary: RPD of duplicates acceptable —
10. Internal standard area summary:
    Internal stds acceptable Y Sample Int. stds acceptable Y
    unacceptable results comments —
11. GC/MS tune results acceptable Y/Y
    samples analyzed w/i 12 hour tune period Y/Y
12. Date of last initial calibration 4/25/96 (5932B)
13. Metals Analysis; Interference check acceptable —

DATA VALIDATION SUMMARY (A) VBLK 042596 Contained MeCl2 = 6.3 ppb
Flag MeCl2 results for WS26578 +79 w/ B qualifiers. Results acceptable

D. Vollmer 4/29/96

DATA VALIDATION CHECKLIST

Date : 4/29/96 Checked By: D. Vollmer
Sample Group Number(s) : 9604 - 075
Sample Number(s): WS26578
Method: 3510/8270 Analyst: S. Tyrell
QA/QC Batch #: 8270 042596 Mec-3510 Ext Tech: M. Cochran

REPORT FORMS

Y	Analytical Work Form	Y	Soil/Water Extraction Log
—	Waste Dilution Log	Y	Analysis Log (Injection)
Y	Continuing Calibration	—	Reference Sample Recovery
Y	Surrogate Recovery	—	MS/MSD Recovery
Y	Internal Standard Sum.	Y	GC/MS Tune Report
Y	Results Report	Y	Batch complete?

QC DATA REVIEW

1. Sample holding time summary:
   Date sampled: 4/24/96 Date received: 4/24/96
   Date extracted: 4/25/96 Date analyzed: 4/26/96
   Extracted w/i holding time Y Analyzed w/i hold time Y
2. Method blank summary:
   MB extracted w/batch? Y MB analysis acceptable? Y
3. Analysis log complete? Y Proper sequence followed? Y
4. Extraction Log complete? Y matrix water level —
5. Continuing calibration check:
   1 C.C.C. ran for a 12hr sample sequence
   Percent difference of CCC Y acceptable ____ unacceptable
6. Reference sample recovery: % recovery acceptable NA
   recoveries not acceptable ____
7. Surrogate recovery summary: % recovery acceptable Y+N
   Recoveries not in range Terphenyl-d14 - high due to WS26578 2 surrogates high due to matrix effects (A)
8. Spike recovery summary: acceptable MS — acceptable MSD —
   RPD of MS/MSD acceptable —
   Unacceptable results comments —
9. Duplicate analysis summary: RPD of duplicates acceptable —
10. Internal standard area summary:
    Internal stds acceptable Y Sample Int. stds acceptable Y+N
    unacceptable results comments WS26578 had low areas for IS# 3,4,5+6 (A)
11. GC/MS tune results acceptable Y
    samples analyzed w/i 12 hour tune period Y
12. Date of last initial calibration 4/24/96 (5132)
13. Metals Analysis; interference check acceptable —

DATA VALIDATION SUMMARY (A) WS26578 was initially analyzed on 4/25/96 and 2 IS# 4+6 areas were <50% and 4 surrogate recoveries were outside limits (high). Sample was re-analyzed on 4/26/96 and 4 IS areas <50% but only 2 surrogate recoveries were high. The 4/26/96 analysis was reported. Laboratory technician also observed that pH of Sample = 11, therefore no pH adjustment made for BN extraction and that sample had a yellow-green color to it. Low IS areas are probably due to matrix effects. Results acceptable D. Vollmer 4/29/96

WASTE STREAM TECHNOLOGY

Laboratory Chronicle

Report Date : 04/30/96
Group Number : 9604-078

Prepared For :
Mr. George Leahy
URS Facilities Design,Inc.
Mack Centre II
Mack Centre Drive
Paramus, NJ 07652

Site: URS PENN AVE

Field and Laboratory Information

Client Id	WST Lab #	Matrix	Date Sampled	Date Received	Time
Analy: Parameter "D1" metals sludge	WS26594	Sludge	4/25/96	4/25/96	0900
Sample Status Upon Receipt : No irregularities.					

Analytical Parameters	Number of Samples	Turnaround Time
pH	1	Standard
Total Metals	1	Standard

Report Released By : Daniel W. Voce

ENVIRONMENTAL LABORATORY ACCREDITATION
CERTIFICATION NUMBER (ELAP) 11179

WASTE STREAM TECHNOLOGY

METHODOLOGIES

The specific methodologies employed in obtaining the analytical data reported are indicated on each of the result forms. The method numbers shown refer to the following analytical method references:

Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020, March 1979, Revised 1983, U.S. Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.

Federal Register, 40 CFR Part 136: Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. Revised July 1992.

Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. Third Edition, Revised September 1994, United States EPA SW-846.

Annual Book of ASTM Standards, Volume II. ASTM, 1916 Race Street, Philadelphia, Pennsylvania 19103.

Standard Methods for the Examination of Water and Wastewater. (18th Edition). American Public Health Association, 1105 18th Street, NW, Washington, D.C. 20036.

Waste Stream Technology Inc.
Method 9045

Site: URS-PENN LANDFILL
Date Sampled: 04/25/96
Date Received: 04/25/96

Group Number: 9604-078
Report Units: pH UNITS

WST Lab ID	Client ID	Analysis Date	Matrix	pH RESULT
WS26594	ANAL PARAMETER D1	04/29/96	Sludge	11.10

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

Metals Analysis Result Report

Site: URS-PENN LANDFILL
Date Sampled: 04/25/96
Date Received: 04/25/96

Group Number: 9604-078
Report Units: mg/Kg
Matrix: Sludge

Lab ID Number:	WS26594
Client ID:	ANAL PARAMETER D1
Date Digested:	04/25/96

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Zinc by ICP	1.900	< 1.900	04/29/96	SW-846 6010
Lead by ICP	12.000	< 12.000	04/29/96	SW-846 6010
Cadmium by ICP	1.500	< 1.500	04/29/96	SW-846 6010
Cobalt by ICP	3.000	< 3.000	04/29/96	SW-846 6010
Nickel by ICP	3.200	< 3.200	04/29/96	SW-846 6010
Barium by ICP	1.100	< 1.100	04/29/96	SW-846 6010
Manganese by ICP	0.300	6.300	04/29/96	SW-846 6010
Iron by ICP	6.300	78.400	04/29/96	SW-846 6010
Chromium by ICP	1.100	< 1.100	04/29/96	SW-846 6010
Magnesium by ICP	15.000	4470.000	04/29/96	SW-846 6010
Vanadium by ICP	4.000	< 4.000	04/29/96	SW-846 6010
Aluminum by ICP	12.000	< 12.000	04/29/96	SW-846 6010
Beryllium by ICP	0.300	< 0.300	04/29/96	SW-846 6010
Calcium by ICP	22.000	305.000	04/29/96	SW-846 6010
Copper by ICP	1.100	< 1.100	04/29/96	SW-846 6010
Silver by ICP	1.500	< 1.500	04/29/96	SW-846 6010
Potassium by ICP	125.000	151.000	04/29/96	SW-846 6010
Sodium by ICP	16.000	2300.000	04/29/96	SW-846 6010
Arsenic by GFAA	0.500	< 0.500	04/29/96	SW-846 7060
Antimony by GFAA	0.900	< 0.900	04/30/96	SW-846 7041
Selenium by GFAA	0.300	< 0.300	04/29/96	SW-846 7740
Thallium by GFAA	0.300	< 0.300	04/30/96	SW-846 7841

WASTE STREAM TECHNOLOGY

WASTESTREAM TECHNOLOGY
302 GROTE STREET
BUFFALO, NY 14207
(716) 876-5290

4604-078

SEE TABLE 4:

CHAIN OF CUSTODY RECORD

PROJECT NO: SITE NAME: URS PENN AVE

SAMPLERS (SIGNATURE): B. Lynagh

SAMPLE NO.	DATE	TIME	COMP	GRAB	MATRIX	SAMPLE LOCATION	SIZE & NO. OF CONTAINERS	METALS	PH				PRESERVATIVES	REMARKS
	4/25	0900	X	X	AQ	ANALYZE PARAMETER "D1" METALS SLUDGE	1X1L	23	26594					ANALYZE SOLIDS THAT ARE IN SUSPENSION IN 1 LITER SAMPLE

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
B. Lynagh	4/25 0900				
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)

SPECIAL INSTRUCTIONS:

TURNAROUND TIME _____

LAB USE: REFRIGERATOR # _____ SHELF # _____ GROUP # _____ DUE DATE _____

WASTE STREAM TECHNOLOGY

302 Grote Street
Buffalo, NY 14207
(716) 876-5290

Analytical Data Report
Report Date : 05/28/96
Group Number : 9604-078

Prepared For :
Mr. George Leahy
URS Facilities Design,Inc.
Mack Centre II
Mack Centre Drive
Paramus, NJ 07652

Site: URS PENN AVE

Field and Laboratory Information

Client Id	WST Lab #	Matrix	Date Sampled	Date Received	Time
ANAL PARAMETER D2	WS26594	Sludge	4/25/96	4/25/96	0900
Sample Status Upon Receipt : No irregularities.					

Analytical Services

Analytical Parameters	Number of Samples	Turnaround Time
TCLP 8240	1	Standard
TCLP 8270	1	Standard
TCLP Pesticides	1	Standard
PCB	1	Standard
Reactive Cyanide	1	Standard
Reactive Sulfide	1	Standard
Ignitability	1	Standard
TCLP Metals	1	Standard

Report Released By : David W. Voss

ENVIRONMENTAL LABORATORY ACCREDITATION CERTIFICATION NUMBER (ELAP) 11179

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.
TCLP 8240 Volatile Organics
1311/8240

Site: URS-PENN LANDFILL
Date Sampled: 04/25/96
Date Received: 04/25/96

Group Number: 9604-078
Report Units: ug/L
Matrix: TCLP Extract

	Lab ID Number	WS26594
	Client ID	ANAL PARAMETER D1
	TCLP Date	05/20/96
	Date Analyzed	05/23/96

Compound	Detection Limit/ QC Limits (%)	Result	Q
vinyl chloride	100	100	U
1,1-dichloroethene	50	50	U
chloroform	50	50	U
2-butanone	1000	1000	U
1,2-dichloroethane	50	50	U
carbon tetrachloride	50	50	U
trichloroethene	50	50	U
benzene	50	50	U
tetrachloroethene	50	50	U
chlorobenzene	50	50	U
Bromofluorobenzene (%)	74-121	96	
1,2-Dichloroethane-d4 (%)	70-121	90	
Toluene-d8 (%)	81-117	94	

Dilution Factor 1

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

8270 TCLP Semivolatile Organics
1311/8270

Site: URS-PENN LANDFILL
Date Sampled: 04/25/96
Date Received: 04/25/96
TCLP Extraction Date: 05/22/96

Group Number: 9604-078
Report Units: ug/L
Matrix: TCLP Extract

	Lab ID Number Client ID Date Extracted Date Analyzed	WS26594 ANAL PARAMETER D1 05/23/96 05/23/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
pyridine	10	10	U
1,4-dichlorobenzene	10	12	
Total cresols(o,m & p)	30	30	U
nitrobenzene	10	10	U
hexachloroethane	10	10	U
hexachlorobutadiene	10	10	U
2,4,6-trichlorophenol	10	10	U
2,4,5-trichlorophenol	10	10	U
2,4-dinitrotoluene	10	10	U
hexachlorobenzene	10	10	U
pentachlorophenol	50	50	U
2-Fluorophenol (%)	21-100	70	
Phenol-d6 (%)	10-94	45	
Nitrobenzene-d5 (%)	35-114	106	
2-Fluorobiphenyl (%)	43-116	101	
2,4,6-Tribromophenol (%)	10-123	153	#
Terphenyl-d14 (%)	33-141	137	
Dilution Factor	1		

Waste Stream Technology Inc.
Method Blank-TCLP Semivolatiles
1311/8270

Site: URS-PENN LANDFILL
Date Sampled: NA
Date Received: NA
TCLP Extraction Date: 05/22/96

Group Number: 9604-078
Report Units: PPB

	Lab ID Number	MB052396	
	Client ID	NA	
	Date Extracted	05/23/96	
	Date Analyzed	05/24/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
Pyridine	10	10	U
1,4-Dichlorobenzene	10	10	U
Total Cresols(o,m,&p)	30	30	U
Nitrobenzene	10	10	U
Hexachloroethane	10	10	U
Hexachlorobutadiene	10	10	U
2,4,6-Trichlorophenol	10	10	U
2,4,5-trichlorophenol	10	10	U
2,4-Dinitrotoluene	10	10	U
Hexachlorobenzene	10	10	U
Pentachlorophenol	50	50	U
2-Fluorophenol (%)	21-100	67	
Phenol-d6 (%)	10-94	43	
Nitrobenzene-d5 (%)	35-114	102	
2-Fluorobiphenyl (%)	43-116	93	
2,4,6-Tribromophenol (%)	10-123	147	#
Terphenyl-d14 (%)	33-141	122	

Dilution Factor 1

MB denotes Method Blank
NA denotes Not Applicable.

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

TCLP Pesticide Analysis
1311/8080

Site: URS-PENN LANDFILL
Date Sampled: 04/25/96
Date Received: 04/25/96
TCLP Extraction Date: 05/22/96

Group Number: 9604-078
Report Units: ug/L
Matrix: TCLP Extract

	Lab ID Number	WS26594	
	Client ID	ANAL PARAMETER D1	
	Date Extracted	05/23/96	
	Date Analyzed	05/23/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
chlordane	0.140	0.140	U
endrin	0.022	0.022	U
gamma-BHC (Lindane)	0.006	0.006	U
heptachlor	0.039	0.039	U
heptachlor epoxide	0.016	0.016	U
methoxychlor	0.012	0.012	U
toxaphene	0.620	0.620	U
Tetrachloro-m-xylene (%)	60-150 .	87.000	
Decachlorobiphenyl (%)	60-150 .	85.200	
Dilution Factor	1		

Waste Stream Technology Inc.

PCBs in Water

SW-846 8080A

Site: URS-PENN LANDFILL
Date Sampled: 04/25/96
Date Received: 04/25/96

Group Number: 9604-078
Report Units: ug/L
Matrix: Sludge

Lab ID Number	WS26594	
Client ID	ANAL PARAMETER D1	
Date Extracted	05/23/96	
Date Analyzed	05/23/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
aroclor 1016	0.56	0.56	U
aroclor 1221	0.48	0.48	U
aroclor 1232	0.76	0.76	U
aroclor 1242	0.36	0.36	U
aroclor 1248	0.20	0.20	U
aroclor 1254	0.12	0.12	U
aroclor 1260	0.12	0.12	U
Tetrachloro-m-xylene (%)	60-150	87.00	
Decachlorobiphenyl (%)	60-150	85.20	

Dilution Factor 1

Waste Stream Technology Inc.

Analysis Result Report

Site: URS-PENN LANDFILL
Date Sampled: 04/25/96
Date Received: 04/25/96
Matrix: Sludge

Group Number: 9604-078
Report Units: mg/kg

	Lab ID Number:	WS26594		
	Client ID:	ANAL PARAMETER D1		
Analyte	**Detection Limit**	**Result**	**Date Analyzed**	**Analysis Method**
Section 7.3.3.2 Reactive Cyanide	4.000	< 4.000	05/24/96	SW-846 9010
Section 7.3.4.2 Reactive Sulfide	3.600	32.440	05/24/96	SW-846 9030

Waste Stream Technology Inc.
Method 1010- Ignitability Report

Site: URS-PENN LANDFILL
Date Sampled: 04/25/96
Date Received: 04/25/96
Group Number: 9604-078
Matrix: Sludge

WST Lab ID	Client ID	Analysis Date	Result
WS26594	ANAL PARAMETER D1	05/24/96	> 200

> 200 = No flash detected at a temperature up to 200 degrees Fahrenheit.

Waste Stream Technology Inc.

TCLP Metals Analysis Result Report

Site: URS-PENN LANDFILL
Date Sampled: 04/25/96
Date Received: 04/25/96

Group Number: 9604-078
Report Units: mg/L
Matrix: TCLP Extract
TCLP Extraction Date: 05/22/96

Lab ID Number: WS26594
Client ID: ANAL PARAMETER D1
Date Digested: 05/23/96

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Lead by ICP	0.120	< 0.120	05/24/96	SW-846 6010
Cadmium by ICP	0.015	< 0.015	05/24/96	SW-846 6010
Barium by ICP	0.011	< 0.011	05/24/96	SW-846 6010
Chromium by ICP	0.011	< 0.011	05/24/96	SW-846 6010
Silver by ICP	0.015	< 0.015	05/24/96	SW-846 6010
Arsenic by GFAA	0.005	< 0.005	05/24/96	SW-846 7060
Selenium by GFAA	0.003	< 0.003	05/24/96	SW-846 7740
Mercury by Cold Vapor	0.001	< 0.001	05/24/96	SW-846 7470

WASTE STREAM TECHNOLOGY

WASTE STREAM TECHNOLOGY

Laboratory Chronicle

Report Date : 05/03/96
Group Number : 9604-080

Prepared For :
Mr. George Leahy
URS Facilities Design,Inc.
Mack Centre II
Mack Centre Drive
Paramus, NJ 07652

Site: URS PENN AVE

Field and Laboratory Information

Client Id	WST Lab #	Matrix	Date Sampled	Date Received	Time
Analytical Parameter "G"	WS26599	Aqueous	4/25/96	4/26/96	1730
Sample Status Upon Receipt : No irregularities.					

Analytical Parameters	Number of Samples	Turnaround Time
8240	1	Standard
8270	1	Standard
PCBs/Pesticides	1	Standard
pH	1	Standard
TSS	1	Standard
Alkalinity	1	Standard
Ammonia Nitrogen	1	Standard
TOC	1	Standard
TKN	1	Standard
COD	1	Standard
BOD	1	Standard

Report Released By : Daniel W. Voe

ENVIRONMENTAL LABORATORY ACCREDITATION CERTIFICATION NUMBER (ELAP) 11179

WASTE STREAM TECHNOLOGY

METHODOLOGIES

The specific methodologies employed in obtaining the analytical data reported are indicated on each of the result forms. The method numbers shown refer to the following analytical method references:

Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020, March 1979, Revised 1983, U.S. Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.

Federal Register, 40 CFR Part 136: Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. Revised July 1992.

Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. Third Edition, Revised September 1994, United States EPA SW-846.

Annual Book of ASTM Standards, Volume II. ASTM, 1916 Race Street, Philadelphia, Pennsylvania 19103.

Standard Methods for the Examination of Water and Wastewater. (18th Edition). American Public Health Association, 1105 18th Street, NW, Washington, D.C. 20036.

ORGANIC DATA QUALIFIERS

U - Indicates compound was analyzed for but not detected.

J - Indicates an estimated value. This flagged is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed, or when the mass spectral data indicates the presence of a compound that meets identification criteria, but the result is less than the sample quantitation limit but greater than zero.

C - This flag applies to pesticide results where the identification has been confirmed by GC/MS.

B - This flag is used when the analyte is found in the associated blank as well as the sample.

E - This flag identifies all compounds whose concentrations exceed the calibration range of the GC/MS instrument or that specific analysis.

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.

G - Matrix spike recovery is greater than the expected upper limit of analytical performance.

L - Matrix spike recovery is less than the expected lower limit of analytical performance.

- Indicates that a surrogate recovery was found to be outside the expected limits of analytical performance.

$ - Indicates that the surrogate compound was diluted out because the sample had to be diluted to obtain analytical results and a recovery could not be calculated.

(%) Indicates that the compound is a surrogate and the values reported for these compounds are in percent recovery. The quality control recovery limits (QC Limits) are indicated in the detection limit column.

Waste Stream Technology Inc.
Volatile Organics Analysis
Method 8240

Site: URS-PENN LANDFILL
Date Sampled: 04/25/96
Date Received: 04/26/96

Group Number: 9604-080
Report Units: ug/L
Matrix: Aqueous

Lab ID Number	WS26599	
Client ID	ANALYTICAL PARAMETER G	
Date Extracted	NA	
Date Analyzed	04/30/96	

Compound	Detection Limit/ QC Limits (%)	Result	Q
chloromethane	10	10	U
bromomethane	10	10	U
vinyl chloride	10	10	U
chloroethane	10	10	U
methylene chloride	5	2	J,B
acetone	100	100	U
carbon disulfide	5	5	U
1,1-dichloroethene	5	5	U
1,1-dichloroethane	5	5	U
trans-1,2-dichloroethene	5	5	U
chloroform	5	5	U
2-butanone	100	100	U
1,2-dichloroethane	5	5	U
1,1,1-trichloroethane	5	5	U
carbon tetrachloride	5	5	U
vinyl acetate	50	50	U
bromodichloromethane	5	5	U
1,2-dichloropropane	5	5	U
cis-1,3-dichloropropene	5	5	U
trichloroethene	5	5	U
benzene	5	5	U
dibromochloromethane	5	5	U
trans-1,3-dichloropropene	5	5	U
1,1,2-trichloroethane	5	5	U
2-chloroethylvinyl ether	10	10	U
bromoform	5	5	U
4-methyl-2-pentanone	50	50	U
2-hexanone	50	50	U
tetrachloroethene	5	5	U
1,1,2,2-tetrachloroethane	5	5	U
toluene	5	5	U
chlorobenzene	5	5	U
ethylbenzene	5	5	U
styrene	5	5	U
m,p-xylene	5	5	U
o-xylene	5	5	U
1,2-Dichloroethane-d4 (%)	76-114	95	
Toluene-d8 (%)	88-110	102	
Bromofluorobenzene (%)	86-115	102	
Dilution Factor	1		

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.
VOC Water Method Blank Results
Method 8240

Site: URS-PENN LANDFILL
Date Sampled: NA
Date Received: NA

Group Number: 9604-080
Report Units: PPB

Lab ID Number		IB043096
Client ID		NA
Date Extacted		NA
Date Analyzed		04/30/96
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
chloromethane	10	10	U
bromomethane	10	10	U
vinyl chloride	10	10	U
chloroethane	10	10	U
methylene chloride	5	7	
acetone	100	100	U
carbon disulfide	5	5	U
1,1-dichloroethene	5	5	U
1,1-dichloroethane	5	5	U
trans-1,2-dichloroethene	5	5	U
chloroform	5	5	U
1,2-dichloroethane	5	5	U
2-butanone	100	100	U
1,1,1-trichloroethane	5	5	U
carbon tetrachloride	5	5	U
vinyl acetate	50	50	U
bromodichloromethane	5	5	U
1,2-dichloropropene	5	5	U
cis-1,3-dichloropropene	5	5	U
trichloroethene	5	5	U
benzene	5	5	U
dibromochloromethane	5	5	U
trans-1,3-dichloropropene	5	5	U
1,1,2-trichloroethane	5	5	U
2-chloroethylvinyl ether	10	10	U
bromoform	5	5	U
4-methyl-2-pentanone	50	50	U
2-hexanone	50	50	U
tetrachloroethene	5	5	U
1,1,2,2-tetrachloroethane	5	5	U
toluene	5	5	U
chlorobenzene	5	5	U
ethylbenzene	5	5	U
styrene	5	5	U
m,p-xylene	5	5	U
o-xylene	5	5	U
1,2-Dichloroethane-d4 (%)	76-114	98	
Toluene-d8 (%)	88-110	98	
Bromofluorobenzene (%)	86-115	100	

Dilution Factor 1

IB denotes Instrument Blank.
NA denotes Not Applicable.

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

Semivolatile Organics in Water

3510/8270

Site: URS-PENN LANDFILL
Date Sampled: 04/25/96
Date Received: 04/26/96

Group Number: 9604-080
Report Units: ug/L
Matrix: Aqueous

	Lab ID Number	WS26599	
	Client ID	ANALYTICAL PARAMETER G	
	Date Extracted	04/29/96	
	Date Analyzed	05/02/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
n-nitrosodimethylamine	10	10	U
bis(2-Chloroethyl)ether	10	10	U
Phenol	10	10	U
2-Chlorophenol	10	10	U
1,3-Dichlorobenzene	10	10	U
1,4-Dichlorobenzene	10	10	U
1,2-Dichlorobenzene	10	10	U
Benzyl alcohol	20	20	U
bis(2-chloroisopropyl)ether	10	10	U
2-Methylphenol	10	5	J
Hexachloroethane	10	10	U
N-Nitroso-di-n-propylamine	10	10	U
3 & 4-methylphenol	10	3	J
Benzoic acid	50	50	U
Nitrobenzene	10	10	U
Isophorone	10	10	U
2-Nitrophenol	10	8	J
2,4-Dimethylphenol	10	9	J
bis(2-Chloroethoxy)methane	10	10	U
2,4-Dichlorophenol	10	10	U
1,2,4-Trichlorobenzene	10	10	U
Naphthalene	10	10	U
4-Chloroaniline	20	20	U
Hexachlorobutadiene	10	10	U
4-Chloro-3-methylphenol	20	20	U
2-Methylnaphthalene	10	10	U
Hexachlorocyclopentadiene	10	10	U
2,4,6-Trichlorophenol	10	10	U
2,4,5-Trichlorophenol	10	10	U
2-Chloronaphthalene	10	10	U
2-Nitroaniline	50	50	U
Acenaphthylene	10	10	U
Dimethylphthalate	10	10	U
2,6-Dinitrotoluene	10	10	U
Acenaphthene	10	10	U
3-Nitroaniline	50	50	U

WASTE STREAM TECHNOLOGY

	Lab ID Number	WS26599	
	Client ID	ANALYTICAL PARAMETER G	
	Date Extracted	04/29/96	
	Date Analyzed	05/02/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
2,4-Dinitrophenol	50	50	U
Dibenzofuran	10	10	U
2,4-Dinitrotoluene	10	10	U
4-Nitrophenol	50	50	U
Fluorene	10	10	U
4-Chlorophenyl-phenylether	10	10	U
Diethylphthalate	10	10	U
4-Nitroaniline	20	20	U
4,6-Dinitro-2-methylphenol	50	50	U
n-Nitrosodiphenylamine	10	10	U
4-Bromophenyl-phenylether	10	10	U
Hexachlorobenzene	10	10	U
Pentachlorophenol	50	50	U
Phenanthrene	10	10	U
Anthracene	10	10	U
Di-n-butylphthalate	10	10	U
Fluoranthene	10	10	U
Carbazole	10	10	U
Pyrene	10	10	U
Benzidine	100	100	U
Butylbenzylphthalate	10	10	U
3,3'-Dichlorobenzidine	20	20	U
Benzo[a]anthracene	10	10	U
Chrysene	10	10	U
bis(2-Ethylhexyl)phthalate	10	8	J,B
Di-n-octylphthalate	10	10	U
Benzo[b]fluoranthene	10	10	U
Benzo[k]fluoranthene	10	10	U
Benzo[a]pyrene	10	10	U
Indeno[1,2,3-cd]pyrene	10	10	U
Dibenz[a,h]anthracene	10	10	U
Benzo[g,h,i]perylene	10	10	U
2-Fluorophenol (%)	21-100	58	
Phenol-d6 (%)	10-94	46	
Nitrobenzene-d5 (%)	35-114	103	
2-Fluorobiphenyl (%)	43-116	87	
2,4,6-Tribromophenol (%)	10-123	103	
Terphenyl-d14 (%)	33-141	144	#

Dilution Factor 1

Waste Stream Technology Inc.
Method 8270 Water Method Blank
SW-846 8270 Report

Site: URS-PENN LANDFILL
Date Sampled: NA
Date Received: NA

Group Number: 9604-080
Report Units: PPB

Lab ID Number	MB042996	
Client ID	NA	
Date Extracted	04/29/96	
Date Analyzed	05/02/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
n-nitrosodimethylamine	10	10	U
bis(2-Chloroethyl)ether	10	10	U
Phenol	10	10	U
2-Chlorophenol	10	10	U
1,3-Dichlorobenzene	10	10	U
1,4-Dichlorobenzene	10	10	U
1,2-Dichlorobenzene	10	10	U
Benzyl alcohol	20	20	U
bis(2-chloroisopropyl)ether	10	10	U
2-Methylphenol	10	10	U
Hexachloroethane	10	10	U
N-nitroso-di-n-propylamine	10	10	U
3 & 4 Methylphenol	10	10	U
Nitrobenzene	10	10	U
Isophorone	10	10	U
2-Nitrophenol	10	10	U
2,4-Dimethylphenol	10	10	U
bis(2-Chloroethoxy)methane	10	10	U
2,4-Dichlorophenol	10	10	U
1,2,4-Trichlorobenzene	10	10	U
Naphthalene	10	10	U
4-Chloroaniline	20	20	U
Hexachlorobutadiene	10	10	U
4-Chloro-3-methylphenol	20	20	U
2-Methylnaphthalene	10	10	U
Hexachlorocyclopentadiene	10	10	U
2,4,6-Trichlorophenol	10	10	U
2,4,5-Trichlorophenol	10	10	U
2-Chloronaphthalene	10	10	U
2-Nitroaniline	50	50	U
Acenaphthylene	10	10	U
Dimethylphthalate	10	10	U
2,6-Dinitrotoluene	10	10	U
Acenaphthene	10	10	U
3-Nitroaniline	50	50	U
2,4-Dinitrophenol	50	50	U
Dibenzofuran	10	10	U

WASTE STREAM TECHNOLOGY

Lab ID Number	MB042996
Client ID	NA
Date Extracted	04/29/96
Date Analyzed	05/02/96

Compound	Detection Limit/ QC Limits (%)	Result	Q
2,4-Dinitrotoluene	10	10	U
4-Nitrophenol	50	50	U
Fluorene	10	10	U
4-Chlorophenyl-phenylether	10	10	U
Diethylphthalate	10	10	U
4-Nitroaniline	20	20	U
4,6-Dinitro-2-methylphenol	50	50	U
n-Nitrosodiphenylamine	10	10	U
4-Bromophenyl-phenylether	10	10	U
Hexachlorobenzene	10	10	U
Pentachlorophenol	50	50	U
Phenanthrene	10	10	U
Anthracene	10	10	U
Di-n-butylphthalate	10	10	U
Fluoranthene	10	10	U
Pyrene	10	10	U
Butylbenzylphthalate	10	10	U
3,3'-Dichlorobenzidine	20	20	U
Benzo[a]anthracene	10	10	U
Chrysene	10	10	U
bis(2-Ethylhexyl)phthalate	10	3	J
Di-n-octylphthalate	10	10	U
Benzo[b]fluoranthene	10	10	U
Benzo[k]fluoranthene	10	10	U
Benzo[a]pyrene	10	10	U
Indeno[1,2,3-cd]pyrene	10	10	U
Dibenz[a,h]anthracene	10	10	U
Benzo[g,h,i]perylene	10	10	U
Benzidine	100	100	U
Benzoic acid	50	50	U
Carbazole	10	10	U
2-Fluorophenol (%)	21-100	49	
Phenol-d6 (%)	10-94	35	
Nitrobenzene-d5 (%)	35-114	99	
2-Fluorobiphenyl (%)	43-116	92	
2,4,6-Tribromophenol (%)	10-123	73	
Terphenyl-d14 (%)	33-141	117	

Dilution Factor 1

MB denotes Method Blank
NA denotes Not Applicable.

Waste Stream Technology Inc.

Pesticides and PCBs in Water

SW-846 8080

Site: URS-PENN LANDFILL
Date Sampled: 04/25/96
Date Received: 04/26/96

Group Number: 9604-080
Report Units: ug/L
Matrix: Aqueous

Lab ID Number	WS26599	
Client ID	ANALYTICAL PARAMETER G	
Date Extracted	04/29/96	
Date Analyzed	05/01/96	

Compound	Detection Limit/ QC Limits (%)	Result	Q
Alpha-BHC	0.003	0.003	U
Beta-BHC	0.006	0.006	U
Gamma-BHC (Lindane)	0.003	0.003	U
Delta-BHC	0.009	0.009	U
Heptachlor	0.019	0.019	U
Aldrin	0.017	0.017	U
Heptachlor Epoxide	0.008	0.008	U
Endosulfan I	0.005	0.005	U
Dieldrin	0.005	0.005	U
4,4'-DDE	0.005	0.005	U
Endrin	0.011	0.011	U
Endosulfan II	0.006	0.006	U
4,4'-DDD	0.005	0.005	U
Endrin Aldehyde	0.008	0.008	U
Endosulfan Sulfate	0.060	0.060	U
4,4'-DDT	0.017	0.017	U
Endrin Ketone	0.012	0.012	U
Methoxychlor	0.006	0.006	U
Toxaphene	0.310	0.310	U
Chlordane	0.069	0.069	U
Aroclor 1016	0.273	0.273	U
Aroclor 1221	0.225	0.225	U
Aroclor 1232	0.380	0.380	U
Aroclor 1242	0.175	0.175	U
Aroclor 1248	0.092	0.092	U
Aroclor 1254	0.052	0.052	U
Aroclor 1260	0.060	0.060	U
Decachlorobiphenyl (%)	60-150	91.600	
Tetrachloro-m-xylene (%)	60-150	125.000	

Dilution Factor 1

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.
PCB & Pesticides Method Blank
SW-846 8080 Report

Site: URS-PENN LANDFILL
Date Sampled: NA
Date Received: NA

Group Number: 9604-080
Report Units: PPB

Lab ID Number	MB96210	
Client ID	NA	
Date Extracted	04/29/96	
Date Analyzed	04/30/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
Alpha-BHC	0.003	0.003	U
Beta-BHC	0.006	0.006	U
Gamma-BHC (Lindane)	0.003	0.003	U
Delta-BHC	0.009	0.009	U
Heptachlor	0.019	0.019	U
Aldrin	0.017	0.017	U
Heptachlor Epoxide	0.008	0.008	U
Endosulfan I	0.005	0.005	U
Dieldrin	0.005	0.005	U
4,4'-DDE	0.005	0.005	U
Endrin	0.011	0.011	U
Endosulfan II	0.006	0.006	U
4,4'-DDD	0.005	0.005	U
Endrin Aldehyde	0.008	0.008	U
Endosulfan Sulfate	0.060	0.060	U
4,4'-DDT	0.017	0.017	U
Endrin Ketone	0.012	0.012	U
Methoxychlor	0.006	0.006	U
Toxaphene	0.310	0.310	U
Chlordane	0.069	0.069	U
Aroclor 1016	0.273	0.273	U
Aroclor 1221	0.225	0.225	U
Aroclor 1232	0.380	0.380	U
Aroclor 1242	0.175	0.175	U
Aroclor 1248	0.092	0.092	U
Aroclor 1254	0.052	0.052	U
Aroclor 1260	0.060	0.060	U
Decachlorobiphenyl (%)	60-150 .	101.000	
Tetrachloro-m-xylene (%)	60-150 .	91.900	

Dilution Factor 1

MB denotes Method Blank
NA denotes Not Applicable.

Waste Stream Technology Inc.
Method 150.1

Site: URS-PENN LANDFILL
Date Sampled: 04/25/96
Date Received: 04/26/96

Group Number: 9604-080
Report Units: pH UNITS
Matrix: Aqueous

WST Lab ID	Client ID	Analysis Date	pH RESULT
WS26599	ANALYTICAL PARAMETER G	04/29/96	9.69

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

Total Suspended Solids

EPA 160.2

Site: URS-PENN LANDFILL
Date Sampled: 04/25/96
Date Received: 04/26/96

Group Number: 9604-080
Report Units: mg/L
Matrix: Aqueous
Detection Limit: 4.0

WST Lab ID	Client ID	Analysis Date	Result
WS26599	ANALYTICAL PARAMETER G	04/29/96	24.4

Waste Stream Technology Inc.

Alkalinity

EPA 310.1

Site: URS-PENN LANDFILL
Date Sampled: 04/25/96
Date Received: 04/26/96

Group Number: 9604-080
Report Units: mg/L as CaCO3
Matrix: Aqueous
Detection Limit: 2.5

WST Lab ID	Client ID	Analysis Date	Result
WS26599	ANALYTICAL PARAMETER G	04/29/96	1775.0

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.
Chemical Oxygen Demand
ASTM D1252B

Site: URS-PENN LANDFILL
Date Sampled: 04/25/96
Date Received: 04/26/96

Group Number: 9604-080
Report Units: mg O2/L
Matrix: Aqueous
Detection Limit: 5.0

WST Lab ID	Client ID	Analysis Date	Result
WS26599	ANALYTICAL PARAMETER G	04/29/96	480.7

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.
Biochemical Oxygen Demand
EPA 405.1

Site: URS-PENN LANDFILL
Date Sampled: 04/25/96
Date Received: 04/26/96

Group Number: 9604-080
Report Units: mg O2/L
Matrix: Aqueous
Detection Limit: 5.0

WST Lab ID	Client ID	Analysis Date	Result
WS26599	ANALYTICAL PARAMETER G	05/02/96	41.9

URS Penn

DATE: / /

Upstate Laboratories, Inc.
Analysis Results
Report Number: 12196110
Client I.D.: WASTE STREAM TECHNOLOGY, INC.

APPROVAL:
QC:
Lab I.D.: 10170
Sampled by: Client

ID:12196110 Mat:Water E 1650H 04/24/96

PARAMETERS	RESULTS	DATE ANAL.	KEY	FILE#
Total Kjeldahl Nitrogen	220mg/l	05/01/96		WB2711
TOC	260mg/l	05/01/96		WB2702

ID:12196111 Mat:Water F 1650H 04/24/96

PARAMETERS	RESULTS	DATE ANAL.	KEY	FILE#
Total Kjeldahl Nitrogen	9.1mg/l	05/01/96		WB2711

ID:12196112 Mat:Water G 04/25/96

PARAMETERS	RESULTS	DATE ANAL.	KEY	FILE#
Total Kjeldahl Nitrogen	33mg/l	05/01/96		WB2711
TOC	200mg/l	05/01/96		WB2702

ID:12196113 Mat:Water H 1100H 04/26/96

PARAMETERS	RESULTS	DATE ANAL.	KEY	FILE#
Total Kjeldahl Nitrogen	22mg/l	05/01/96		WB2711
TOC	3mg/l	05/01/96		WB2702

Post-it® Fax Note 7671 Dawn Carpenter

To	Paul Morrow	Date	# of pages ▶
Co./Dept.	Waste Stream Tech	From	Wendy
Phone #		Co.	UTS
Fax #	(716) 876-2412	Phone #	
		Fax #	

WASTE STREAM TECHNOLOGY
302 GROTE STREET
BUFFALO, NY 14207
(716) 876-5290

9604-080

AS ON TABLE 4

CHAIN OF CUSTODY RECORD

PROJECT NO: 4RS SITE NAME: PENN AVE

SAMPLERS (SIGNATURE): A. Synnaeve

SAMPLE NO.	DATE	TIME	COMP	GRAB	MATRIX	SAMPLE LOCATION	SIZE & NO. OF CONTAINERS	PRESERVATIVES	REMARKS
						ANALYTICAL PARAMETER HIGH	40ml X2		WS26599
						"	1LX1		
						"	1LX1		
						"	1LX1		
						"	1LX1		
						"	1LX1		

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)

SPECIAL INSTRUCTIONS:

TURNAROUND TIME _____

LAB USE: REFRIGERATOR # _____ SHELF # _____ GROUP # _____ DUE DATE _____

WASTE STREAM TECHNOLOGY

Laboratory Chronicle

Report Date : 05/03/96
Group Number : 9604-081

Prepared For :
Mr. George Leahy
URS Facilities Design,Inc.
Mack Centre II
Mack Centre Drive
Paramus, NJ 07652

Site: URS PENN AVE

Field and Laboratory Information

Client Id	WST Lab #	Matrix	Date Sampled	Date Received	Time
Analytical Parameter "H"	WS26600	Aqueous	4/26/96	4/26/96	1100
Sample Status Upon Receipt : No irregularities.					

Analytical Parameters	Number of Samples	Turnaround Time
8240	1	Standard
8270	1	Standard
PCBs/Pesticides	1	Standard
pH	1	Standard
TSS	1	Standard
Alkalinity	1	Standard
Ammonia Nitrogen	1	Standard
TOC	1	Standard
TKN	1	Standard
COD	1	Standard
TPH	1	Standard
Oil & Grease	1	Standard
TDS	1	Standard
Cyanide	1	Standard
Cyanide-Weak acid dissociable	1	Standard
Cyanide-Ammenable to Cl.	1	Standard
Total Metals	1	Standard
BOD	1	Standard

Report Released By : David W. Vor

ENVIRONMENTAL LABORATORY ACCREDITATION CERTIFICATION NUMBER (ELAP) 11179

WASTE STREAM TECHNOLOGY

ORGANIC DATA QUALIFIERS

U - Indicates compound was analyzed for but not detected.

J - Indicates an estimated value. This flagged is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed, or when the mass spectral data indicates the presence of a compound that meets identification criteria, but the result is less than the sample quantitation limit but greater than zero.

C - This flag applies to pesticide results where the identification has been confirmed by GC/MS.

B - This flag is used when the analyte is found in the associated blank as well as the sample.

E - This flag identifies all compounds whose concentrations exceed the calibration range of the GC/MS instrument or that specific analysis.

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.

G - Matrix spike recovery is greater than the expected upper limit of analytical performance.

L - Matrix spike recovery is less than the expected lower limit of analytical performance.

- Indicates that a surrogate recovery was found to be outside the expected limits of analytical performance.

$ - Indicates that the surrogate compound was diluted out because the sample had to be diluted to obtain analytical results and a recovery could not be calculated.

(%) Indicates that the compound is a surrogate and the values reported for these compounds are in percent recovery. The quality control recovery limits (QC Limits) are indicated in the detection limit column.

METHODOLOGIES

The specific methodologies employed in obtaining the analytical data reported are indicated on each of the result forms. The method numbers shown refer to the following analytical method references:

Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020, March 1979, Revised 1983, U.S. Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.

Federal Register, 40 CFR Part 136: Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. Revised July 1992.

Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. Third Edition, Revised September 1994, United States EPA SW-846.

Annual Book of ASTM Standards, Volume II. ASTM, 1916 Race Street, Philadelphia, Pennsylvania 19103.

Standard Methods for the Examination of Water and Wastewater. (18th Edition). American Public Health Association, 1105 18th Street, NW, Washington, D.C. 20036.

Waste Stream Technology Inc.

Semivolatile Organics in Water

3510/8270

Site: URS-PENN LANDFILL
Date Sampled: 04/26/96
Date Received: 04/26/96

Group Number: 9604-081
Report Units: ug/L
Matrix: Aqueous

	Lab ID Number	WS26600	
	Client ID	ANALYTICAL PARAMETER H	
	Date Extracted	04/29/96	
	Date Analyzed	05/01/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
n-nitrosodimethylamine	10	10	U
bis(2-Chloroethyl)ether	10	10	U
Phenol	10	10	U
2-Chlorophenol	10	10	U
1,3-Dichlorobenzene	10	10	U
1,4-Dichlorobenzene	10	10	U
1,2-Dichlorobenzene	10	10	U
Benzyl alcohol	20	20	U
bis(2-chloroisopropyl)ether	10	10	U
2-Methylphenol	10	10	U
Hexachloroethane	10	10	U
N-Nitroso-di-n-propylamine	10	10	U
3 & 4-methylphenol	10	10	U
Benzoic acid	50	50	U
Nitrobenzene	10	10	U
Isophorone	10	10	U
2-Nitrophenol	10	10	U
2,4-Dimethylphenol	10	10	U
bis(2-Chloroethoxy)methane	10	10	U
2,4-Dichlorophenol	10	10	U
1,2,4-Trichlorobenzene	10	10	U
Naphthalene	10	10	U
4-Chloroaniline	20	20	U
Hexachlorobutadiene	10	10	U
4-Chloro-3-methylphenol	20	20	U
2-Methylnaphthalene	10	10	U
Hexachlorocyclopentadiene	10	10	U
2,4,6-Trichlorophenol	10	10	U
2,4,5-Trichlorophenol	10	10	U
2-Chloronaphthalene	10	10	U
2-Nitroaniline	50	50	U
Acenaphthylene	10	10	U
Dimethylphthalate	10	10	U
2,6-Dinitrotoluene	10	10	U
Acenaphthene	10	10	U
3-Nitroaniline	50	50	U

Lab ID Number	WS26600	
Client ID	ANALYTICAL PARAMETER H	
Date Extracted	04/29/96	
Date Analyzed	05/01/96	

Compound	Detection Limit/ QC Limits (%)	Result	Q
2,4-Dinitrophenol	50	50	U
Dibenzofuran	10	10	U
2,4-Dinitrotoluene	10	10	U
4-Nitrophenol	50	50	U
Fluorene	10	10	U
4-Chlorophenyl-phenylether	10	10	U
Diethylphthalate	10	10	U
4-Nitroaniline	20	20	U
4,6-Dinitro-2-methylphenol	50	50	U
n-Nitrosodiphenylamine	10	10	U
4-Bromophenyl-phenylether	10	10	U
Hexachlorobenzene	10	10	U
Pentachlorophenol	50	50	U
Phenanthrene	10	10	U
Anthracene	10	10	U
Di-n-butylphthalate	10	10	U
Fluoranthene	10	10	U
Carbazole	10	10	U
Pyrene	10	10	U
Benzidine	100	100	U
Butylbenzylphthalate	10	10	U
3,3'-Dichlorobenzidine	20	20	U
Benzo[a]anthracene	10	10	U
Chrysene	10	10	U
bis(2-Ethylhexyl)phthalate	10	10	U
Di-n-octylphthalate	10	10	U
Benzo[b]fluoranthene	10	10	U
Benzo[k]fluoranthene	10	10	U
Benzo[a]pyrene	10	10	U
Indeno[1,2,3-cd]pyrene	10	10	U
Dibenz[a,h]anthracene	10	10	U
Benzo[g,h,i]perylene	10	10	U
2-Fluorophenol (%)	21-100	37	
Phenol-d6 (%)	10-94	28	
Nitrobenzene-d5 (%)	35-114	71	
2-Fluorobiphenyl (%)	43-116	79	
2,4,6-Tribromophenol (%)	10-123	76	
Terphenyl-d14 (%)	33-141	116	

Dilution Factor 1

Waste Stream Technology Inc.
Volatile Organics Analysis
Method 8240

Site: URS-PENN LANDFILL
Date Sampled: 04/26/96
Date Received: 04/26/96

Group Number: 9604-081
Report Units: ug/L
Matrix: Aqueous

Lab ID Number	WS26600	
Client ID	ANALYTICAL PARAMETER H	
Date Extracted	NA	
Date Analyzed	04/29/96	

Compound	Detection Limit/ QC Limits (%)	Result	Q
chloromethane	10	10	U
bromomethane	10	10	U
vinyl chloride	10	10	U
chloroethane	10	10	U
methylene chloride	5	7	B
acetone	100	100	U
carbon disulfide	5	5	U
1,1-dichloroethene	5	5	U
1,1-dichloroethane	5	5	U
trans-1,2-dichloroethene	5	5	U
chloroform	5	5	U
2-butanone	100	100	U
1,2-dichloroethane	5	5	U
1,1,1-trichloroethane	5	5	U
carbon tetrachloride	5	5	U
vinyl acetate	50	50	U
bromodichloromethane	5	5	U
1,2-dichloropropane	5	5	U
cis-1,3-dichloropropene	5	5	U
trichloroethene	5	5	U
benzene	5	5	U
dibromochloromethane	5	5	U
trans-1,3-dichloropropene	5	5	U
1,1,2-trichloroethane	5	5	U
2-chloroethylvinyl ether	10	10	U
bromoform	5	5	U
4-methyl-2-pentanone	50	50	U
2-hexanone	50	50	U
tetrachloroethene	5	5	U
1,1,2,2-tetrachloroethane	5	5	U
toluene	5	5	U
chlorobenzene	5	5	U
ethylbenzene	5	5	U
styrene	5	5	U
m,p-xylene	5	5	U
o-xylene	5	5	U
1,2-Dichloroethane-d4 (%)	76-114	99	
Toluene-d8 (%)	88-110	99	
Bromofluorobenzene (%)	86-115	100	
Dilution Factor	1		

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.
VOC Water Method Blank Results
Method 8240

Site: URS-PENN LANDFILL
Date Sampled: NA
Date Received: NA

Group Number: 9604-081
Report Units: PPB

	Lab ID Number	IB042996
	Client ID	NA
	Date Extacted	NA
	Date Analyzed	04/29/96
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
chloromethane	10	10	U
bromomethane	10	10	U
vinyl chloride	10	10	U
chloroethane	10	10	U
methylene chloride	5	37	
acetone	100	100	U
carbon disulfide	5	5	U
1,1-dichloroethene	5	5	U
1,1-dichloroethane	5	5	U
trans-1,2-dichloroethene	5	5	U
chloroform	5	5	U
1,2-dichloroethane	5	5	U
2-butanone	100	100	U
1,1,1-trichloroethane	5	5	U
carbon tetrachloride	5	5	U
vinyl acetate	50	50	U
bromodichloromethane	5	5	U
1,2-dichloropropene	5	5	U
cis-1,3-dichloropropene	5	5	U
trichloroethene	5	5	U
benzene	5	5	U
dibromochloromethane	5	5	U
trans-1,3-dichloropropene	5	5	U
1,1,2-trichloroethane	5	5	U
2-chloroethylvinyl ether	10	10	U
bromoform	5	5	U
4-methyl-2-pentanone	50	50	U
2-hexanone	50	50	U
tetrachloroethene	5	5	U
1,1,2,2-tetrachloroethane	5	5	U
toluene	5	5	U
chlorobenzene	5	5	U
ethylbenzene	5	5	U
styrene	5	5	U
m,p-xylene	5	5	U
o-xylene	5	5	U
1,2-Dichloroethane-d4 (%)	76-114	98	
Toluene-d8 (%)	88-110	104	
Bromofluorobenzene (%)	86-115	104	

Dilution Factor 1

IB denotes Instrument Blank.
NA denotes Not Applicable.

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

Pesticides and PCBs in Water

SW-846 8080

Site: URS-PENN LANDFILL
Date Sampled: 04/26/96
Date Received: 04/26/96

Group Number: 9604-081
Report Units: ug/L
Matrix: Aqueous

	Lab ID Number Client ID Date Extracted Date Analyzed	WS26600 ANALYTICAL PARAMETER H 04/29/96 05/01/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
Alpha-BHC	0.003	0.003	U
Beta-BHC	0.006	0.006	U
Gamma-BHC (Lindane)	0.003	0.003	U
Delta-BHC	0.009	0.009	U
Heptachlor	0.019	0.019	U
Aldrin	0.017	0.017	U
Heptachlor Epoxide	0.008	0.008	U
Endosulfan I	0.005	0.005	U
Dieldrin	0.005	0.005	U
4,4'-DDE	0.005	0.005	U
Endrin	0.011	0.011	U
Endosulfan II	0.006	0.006	U
4,4'-DDD	0.005	0.005	U
Endrin Aldehyde	0.008	0.008	U
Endosulfan Sulfate	0.060	0.060	U
4,4'-DDT	0.017	0.017	U
Endrin Ketone	0.012	0.012	U
Methoxychlor	0.006	0.006	U
Toxaphene	0.310	0.310	U
Chlordane	0.069	0.069	U
Aroclor 1016	0.273	0.273	U
Aroclor 1221	0.225	0.225	U
Aroclor 1232	0.380	0.380	U
Aroclor 1242	0.175	0.175	U
Aroclor 1248	0.092	0.092	U
Aroclor 1254	0.052	0.052	U
Aroclor 1260	0.060	0.060	U
Decachlorobiphenyl (%)	60-150 .	94.800	
Tetrachloro-m-xylene (%)	60-150 .	90.900	

Dilution Factor 1

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

Alkalinity

EPA 310.1

Site: URS-PENN LANDFILL
Date Sampled: 04/26/96
Date Received: 04/26/96

Group Number: 9604-081
Report Units: mg/L as CaCO3
Matrix: Aqueous
Detection Limit: 2.5

WST Lab ID	Client ID	Analysis Date	Result
WS26600	ANALYTICAL PARAMETER H	04/29/96	1060.0

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

Ammonia Nitrogen

EPA 350.3

Site: URS-PENN LANDFILL
Date Sampled: 04/26/96
Date Received: 04/26/96

Group Number: 9604-081
Report Units: mg/L
Matrix: Aqueous
Detection Limit: 0.50

WST Lab ID	Client ID	Analysis Date	Result
WS26600	ANALYTICAL PARAMETER H	04/29/96	16.3

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

Method 150.1

Site: URS-PENN LANDFILL
Date Sampled: 04/26/96
Date Received: 04/26/96

Group Number: 9604-081
Report Units: pH UNITS
Matrix: Aqueous

WST Lab ID	Client ID	Analysis Date	pH RESULT
WS26600	ANALYTICAL PARAMETER H	04/29/96	8.78

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

Analysis Result Report

Site: URS-PENN LANDFILL
Date Sampled: 04/26/96
Date Received: 04/26/96
Matrix: Aqueous

Group Number: 9604-081
Report Units: mg/kg

	Lab ID Number:	WS26600
	Client ID:	ANALYTICAL PARAMETER H

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Cyanide in Water	0.005	< 0.005	04/29/96	EPA 335.2
Cyanide-Weak acid dissociable	0.005	< 0.005	04/29/96	EPA 335.2
Cyanide-Ammenable to Cl.	0.005	< 0.005	04/29/96	EPA 335.2
Total Suspended Solids	4.000	4.800	04/29/96	EPA 160.2
Total Dissolved Solids	4.000	4863.000	04/29/96	EPA 160.1
Chemical Oxygen Demand	5.000	6.850	04/29/96	ASTM D1252B
Total Petroleum Hydrocarbons	4.000	< 4.000	04/30/96	EPA 418.1
Oil & Grease	4.000	< 4.000	04/30/96	EPA 413.1

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.
Biochemical Oxygen Demand
EPA 405.1

Site: URS-PENN LANDFILL
Date Sampled: 04/26/96
Date Received: 04/26/96

Group Number: 9604-081
Report Units: mg O2/L
Matrix: Aqueous
Detection Limit: 5.0

WST Lab ID	Client ID	Analysis Date	Result
WS26600	ANALYTICAL PARAMETER H	05/02/96	430.0

WASTE STREAM TECHNOLOGY

URS Penn

DATE: / /

Upstate Laboratories, Inc.
Analysis Results
Report Number: 12196110
Client I.D.: WASTE STREAM TECHNOLOGY, INC.

APPROVAL:
QC:
Lab I.D.: 10170
Sampled by: Client

ID:12196110 Mat:Water E 1650H 04/24/96

PARAMETERS	RESULTS	DATE ANAL.	KEY	FILE#
Total Kjeldahl Nitrogen	220mg/l	05/01/96		WB2711
TOC	260mg/l	05/01/96		WB2702

ID:12196111 Mat:Water F 1650H 04/24/96

PARAMETERS	RESULTS	DATE ANAL.	KEY	FILE#
Total Kjeldahl Nitrogen	9.1mg/l	05/01/96		WB2711

ID:12196112 Mat:Water G 04/25/96

PARAMETERS	RESULTS	DATE ANAL.	KEY	FILE#
Total Kjeldahl Nitrogen	33mg/l	05/01/96		WB2711
TOC	200mg/l	05/01/96		WB2702

ID:12196113 Mat:Water H 1100H 04/26/96

PARAMETERS	RESULTS	DATE ANAL.	KEY	FILE#
Total Kjeldahl Nitrogen	22mg/l	05/01/96		WB2711
TOC	3mg/l	05/01/96		WB2702

Dawn Carpenter

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To Paul Morrow	From Wendy
Co./Dept. Waste Stream Tech	Co. UTC
Phone #	Phone #
Fax # (716) 876-2412	Fax #

Waste Stream Technology Inc.

Metals Analysis Result Report

Site: URS-PENN LANDFILL
Date Sampled: 04/26/96
Date Received: 04/26/96

Group Number: 9604-081
Report Units: mg/L
Matrix: Aqueous

Lab ID Number:	WS26600
Client ID:	ANALYTICAL PARAMETER H
Date Digested:	04/29/96

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Silver by ICP	0.015	< 0.015	04/29/96	EPA 200.7
Aluminum by ICP	0.120	0.133	04/29/96	EPA 200.7
Arsenic by GFAA	0.005	0.093	04/29/96	EPA 206.2
Barium by ICP	0.011	0.062	04/29/96	EPA 200.7
Beryllium by ICP	0.003	< 0.003	04/29/96	EPA 200.7
Calcium by ICP	0.224	11.200	04/29/96	EPA 200.7
Cadmium by ICP	0.015	< 0.015	04/29/96	EPA 200.7
Cobalt by ICP	0.030	< 0.030	04/29/96	EPA 200.7
Chromium by ICP	0.011	< 0.011	04/29/96	EPA 200.7
Copper by ICP	0.011	< 0.011	04/29/96	EPA 200.7
Iron by ICP	0.063	0.302	04/29/96	EPA 200.7
Mercury by Cold Vapor	0.001	< 0.001	04/29/96	EPA 245.2
Potassium by ICP	1.250	114.000	04/29/96	EPA 200.7
Magnesium by ICP	0.153	1.500	04/29/96	EPA 200.7
Manganese by ICP	0.003	0.034	04/29/96	EPA 200.7
Sodium by ICP	0.157	943.000	04/29/96	EPA 200.7
Nickel by ICP	0.032	< 0.032	04/29/96	EPA 200.7
Lead by ICP	0.120	< 0.120	04/29/96	EPA 200.7
Antimony by GFAA	0.009	0.010	04/30/96	EPA 204.2
Selenium by GFAA	0.003	< 0.003	04/30/96	EPA 270.2
Thallium by GFAA	0.003	0.006	04/30/96	EPA 279.2
Vanadium by ICP	0.040	< 0.040	04/29/96	EPA 200.7
Zinc by ICP	0.019	2.700	04/29/96	EPA 200.7

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

Metals Method Blank Analysis Result Report

Site: URS-PENN LANDFILL
Date Sampled: NA
Date Received: NA

Group Number: 9604-081
Report Units: PPM

Lab ID Number:	MB042996
Client ID:	NA
Date Digested:	04/29/96

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Zn water Method Blank	0.019	< 0.019	04/29/96	EPA 200.7
Pb water Method Blank	0.120	< 0.120	04/29/96	EPA 200.7
Cd water Method Blank	0.015	< 0.015	04/29/96	EPA 200.7
Co water Method Blank	0.030	< 0.030	04/29/96	EPA 200.7
Ni water method blank	0.032	< 0.032	04/29/96	EPA 200.7
Ba water Method Blank	0.011	< 0.011	04/29/96	EPA 200.7
Mn water Method Blank	0.003	< 0.003	04/29/96	EPA 200.7
Fe water Method Blank	0.063	< 0.063	04/29/96	EPA 200.7
Cr water Method Blank	0.011	< 0.011	04/29/96	EPA 200.7
Mg water Method Blank	0.153	< 0.153	04/29/96	EPA 200.7
V water Method Blank	0.040	< 0.040	04/29/96	EPA 200.7
Al water method blank	0.120	< 0.120	04/29/96	EPA 200.7
Be water Method Blank	0.003	< 0.003	04/29/96	EPA 200.7
Ca water Method Blank	0.224	< 0.224	04/29/96	EPA 200.7
Cu water Method Blank	0.011	< 0.011	04/29/96	EPA 200.7
Ag water Method Blank	0.015	< 0.015	04/29/96	EPA 200.7
K water Method Blank	1.250	< 1.250	04/29/96	EPA 200.7
Na water Method Blank	0.157	< 0.157	04/29/96	EPA 200.7
As water Method Blank	0.005	< 0.005	04/29/96	EPA 206.2
Sb water method blank	0.009	< 0.009	04/29/96	EPA 204.2
Se water Method Blank	0.003	< 0.003	04/29/96	EPA 270.2
Tl water Method Blank	0.003	< 0.003	04/29/96	EPA 279.2

MB denotes Method Blank.
NA denotes Not Application.

WASTE STREAM TECHNOLOGY

WASTE STREAM TECHNOLOGY

302 GROTE STREET
BUFFALO, NY 14207
(716) 876-5290

9604-081

SEE TABLE 4

CHAIN OF CUSTODY RECORD

PROJECT NO: SITE NAME: URS PENN AVE

SAMPLERS (SIGNATURE): G. Smagal

SAMPLE NO.	DATE	TIME	COMP	GRAB	MATRIX	SAMPLE LOCATION	SIZE & NO. OF CONTAINERS	PRESERVATIVES	REMARKS
	4/26	1100		X	AQ	ANALYTICAL PARAM. "H"	2x40ml		US26600
							1x1L		
							1x1L		
							1x500ml		
							1x1L		
							1x1L		
							1x1L		
							1x1L		
							1x1L		

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
G. Smagal	4/26/96 1100				
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)

SPECIAL INSTRUCTIONS:

TURNAROUND TIME _____

LAB: REFRIGERATOR # _____ SHELF # _____ GROUP # _____ DUE DATE _____

WASTE STREAM TECHNOLOGY

Laboratory Chronicle

Report Date : 04/01/96
Group Number : 9604-031

Prepared For :
Mr. George Leahy
URS Facilities Design,Inc.
Mack Centre II
Mack Centre Drive
Paramus, NJ 07652

Site: Pennsylvania Ave.

Field and Laboratory Information

Client Id	WST Lab #	Matrix	Date Sampled	Date Received	Time
Treatment Train 3 Series C	WS25628	Aqueous	3/12/96	3/12/96	1030
Treatment Train 3 Series B	WS25629	Aqueous	3/12/96	3/12/96	1030
Sample Status Upon Receipt : No irregularities.					

Analytical Parameters	Number of Samples	Turnaround Time
TCLP Metals	1	Standard
Ignitability	1	Standard
Reactive Sulfide	1	Standard
Reactive Cyanide	1	Standard
Total Solids	1	Standard
COD	1	Standard
Total Petroleum Hydrocarbons	1	Standard
Oil & Grease	1	Standard
Cyanide-Weak Acid Dissociable	1	Standard
pH	2	Standard
Method 608 PCBs	2	Standard
TCLP PCBs	1	Standard
TCLP Pesticides	1	Standard
TCLP 8240	1	Standard
TCLP 8270	1	Standard
Total Cyanide	1	Standard
BOD	1	Standard

Report Released By : _____

ENVIRONMENTAL LABORATORY ACCREDITATION
CERTIFICATION NUMBER (ELAP) 11179

WASTE STREAM TECHNOLOGY

ORGANIC DATA QUALIFIERS

U - Indicates compound was analyzed for but not detected.

J - Indicates an estimated value. This flagged is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed, or when the mass spectral data indicates the presence of a compound that meets identification criteria, but the result is less than the sample quantitation limit but greater than zero.

C - This flag applies to pesticide results where the identification has been confirmed by GC/MS.

B - This flag is used when the analyte is found in the associated blank as well as the sample.

E - This flag identifies all compounds whose concentrations exceed the calibration range of the GC/MS instrument or that specific analysis.

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.

G - Matrix spike recovery is greater than the expected upper limit of analytical performance.

L - Matrix spike recovery is less than the expected lower limit of analytical performance.

- Indicates that a surrogate recovery was found to be outside the expected limits of analytical performance.

$ - Indicates that the surrogate compound was diluted out because the sample had to be diluted to obtain analytical results and a recovery could not be calculated.

(%) Indicates that the compound is a surrogate and the values reported for these compounds are in percent recovery. The quality control recovery limits (QC Limits) are indicated in the detection limit column.

METHODOLOGIES

The specific methodologies employed in obtaining the analytical data reported are indicated on each of the result forms. The method numbers shown refer to the following analytical method references:

Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020, March 1979, Revised 1983, U.S. Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.

Federal Register, 40 CFR Part 136: Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. Revised July 1992.

Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. Third Edition, Revised September 1994, United States EPA SW-846.

Annual Book of ASTM Standards, Volume II. ASTM, 1916 Race Street, Philadelphia, Pennsylvania 19103.

Standard Methods for the Examination of Water and Wastewater. (18th Edition). American Public Health Association, 1105 18th Street, NW, Washington, D.C. 20036.

Waste Stream Technology Inc.

40 CFR 136 Method 608 Pest-PCBs

EPA 608

Site: URS-PENN LANDFILL
Date Sampled: 03/12/96
Date Received: 03/12/96

Group Number: 9604-031
Report Units: ug/L
Matrix: AQUEOUS

Lab ID Number	WS25628	
Client ID	TREAT TRAIN #3 SERIES C	
Date Extracted	03/13/96	
Date Analyzed	03/14/96	

Compound	Detection Limit/ QC Limits (%)	Result	Q
aroclor 1016	0.270	0.270	U
aroclor 1221	0.230	0.230	U
aroclor 1232	0.380	0.380	U
aroclor 1242	0.180	0.180	U
aroclor 1248	0.092	0.092	U
aroclor 1254	0.052	0.052	U
aroclor 1260	0.060	0.060	U
Tetrachloro-m-xylene (%)	60-150.	64.000	
Decachlorobiphenyl (%)	60-150.	67.800	

Dilution Factor 1

Waste Stream Technology Inc.

40 CFR 136 Method 608 Pest-PCBs

EPA 608

Site: URS-PENN LANDFILL
Date Sampled: 03/12/96
Date Received: 03/12/96

Group Number: 9604-031
Report Units: ug/L
Matrix: AQUEOUS

Lab ID Number	WS25629	
Client ID	TREAT TRAIN #3 SERIES B	
Date Extracted	03/13/96	
Date Analyzed	03/14/96	

Compound	Detection Limit/ QC Limits (%)	Result	Q
aroclor 1016	0.270	0.270	U
aroclor 1221	0.230	0.230	U
aroclor 1232	0.380	0.380	U
aroclor 1242	0.180	0.180	U
aroclor 1248	0.092	0.092	U
aroclor 1254	0.052	0.052	U
aroclor 1260	0.060	0.060	U
Tetrachloro-m-xylene (%)	60-150.	63.800	
Decachlorobiphenyl (%)	60-150.	66.200	

Dilution Factor 1

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

Analysis Result Report

Site: URS-PENN LANDFILL
Date Sampled: 03/12/96
Date Received: 03/12/96
Matrix: AQUEOUS

Group Number: 9604-031
Report Units: mg O2/L
COD Units: mg O2/L

Lab ID Number:	WS25628
Client ID:	TREAT TRAIN #3 SERIES C

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Chemical Oxygen Demand	5000.000	16830.000	03/15/96	ASTM D1252B
Total Petroleum Hydrocarbons	4.000	< 4.000	03/14/96	EPA 418.1
Oil & Grease	4.000	15.290	03/14/96	EPA 413.2
Cyanide-Weak acid dissociable	0.005	0.013	03/13/96	4500 CN-1
Cyanide in Water	0.005	0.028	03/14/96	EPA 335.2
Biochemical Oxygen Demand	50.000	73.000	03/13/96	EPA 405.1

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.
Method 150.1

Site: URS-PENN LANDFILL
Date Sampled: 03/12/96
Date Received: 03/12/96

Group Number: 9604-031
Report Units: pH UNITS
Matrix: AQUEOUS

WST Lab ID	Client ID	Analysis Date	pH RESULT
WS25628	TREAT TRAIN #3 SERIES C	03/12/96	7.50
WS25629	TREAT TRAIN #3 SERIES B	03/12/96	6.44

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

8270 TCLP Semivolatile Organics
1311/8270

Site: URS-PENN LANDFILL
Date Sampled: 03/12/96
Date Received: 03/12/96
TCLP Extraction Date: 03/13/96

Group Number: 9604-031
Report Units: ug/L
Matrix: TCLP Extract

	Lab ID Number Client ID Date Extracted Date Analyzed	WS25629 TREAT TRAIN #3 SERIES B 03/13/96 03/13/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
pyridine	10	10	U
1,4-dichlorobenzene	10	10	U
Total cresols(o,m & p)	30	12	J
nitrobenzene	10	10	U
hexachloroethane	10	10	U
hexachlorobutadiene	10	10	U
2,4,6-trichlorophenol	10	10	U
2,4,5-trichlorophenol	10	10	U
2,4-dinitrotoluene	10	10	U
hexachlorobenzene	10	10	U
pentachlorophenol	50	50	U
2-Fluorophenol (%)	21-100	60	
Phenol-d6 (%)	10-94	46	
Nitrobenzene-d5 (%)	35-114	93	
2-Fluorobiphenyl (%)	43-116	95	
2,4,6-Tribromophenol (%)	10-123	79	
Terphenyl-d14 (%)	33-141	78	

Dilution Factor 1

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.
TCLP 8240 Volatile Organics
1311/8240

Site: URS-PENN LANDFILL
Date Sampled: 03/12/96
Date Received: 03/12/96

Group Number: 9604-031
Report Units: ug/L
Matrix: TCLP Extract

	Lab ID Number	WS25629	
	Client ID	TREAT TRAIN #3 SERIES B	
	TCLP Date	03/12/96	
	Date Analyzed	03/12/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
vinyl chloride	100	100	U
1,1-dichloroethene	50	50	U
chloroform	50	50	U
2-butanone	1000	1000	U
1,2-dichloroethane	50	50	U
carbon tetrachloride	50	50	U
trichloroethene	50	50	U
benzene	50	50	U
tetrachloroethene	50	50	U
chlorobenzene	50	50	U
1,4-dichlorobenzene	50	50	U
Bromofluorobenzene (%)	74-121	104	
1,2-Dichloroethane-d4 (%)	70-121	107	
Toluene-d8 (%)	81-117	97	

Dilution Factor 1

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

TCLP Pesticide Analysis
1311/8080

Site: URS-PENN LANDFILL
Date Sampled: 03/12/96
Date Received: 03/12/96
TCLP Extraction Date: 03/13/96

Group Number: 9604-031
Report Units: ug/L
Matrix: TCLP Extract

	Lab ID Number	WS25629	
	Client ID	TREAT TRAIN #3 SERIES B	
	Date Extracted	03/13/96	
	Date Analyzed	03/14/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
chlordane	0.350	0.350	U
endrin	0.055	0.055	U
gamma-BHC (Lindane)	0.016	0.016	U
heptachlor	0.097	0.097	U
heptachlor epoxide	0.042	0.042	U
methoxychlor	0.031	0.031	U
toxaphene	1.540	1.540	U
Tetrachloro-m-xylene (%)	60-150	62.500	
Decachlorobiphenyl (%)	60-150	70.100	

Dilution Factor 1

Waste Stream Technology Inc.

TCLP PCBs

SW-846 8080A

Site: URS-PENN LANDFILL
Date Sampled: 03/12/96
Date Received: 03/12/96
TCLP Extraction Date: 03/13/96

Group Number: 9604-031
Report Units: ug/L
Matrix: TCLP Extract

	Lab ID Number	WS25629	
	Client ID	TREAT TRAIN #3 SERIES B	
	Date Extracted	03/13/96	
	Date Analyzed	03/14/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
aroclor 1016	1.40	1.40	U
aroclor 1221	1.20	1.20	U
aroclor 1232	1.90	1.90	U
aroclor 1242	0.90	0.90	U
aroclor 1248	0.50	0.50	U
aroclor 1254	0.30	0.30	U
aroclor 1260	0.30	0.30	U
Tetrachloro-m-xylene (%)	60-150 .	62.50	
Decachlorobiphenyl (%)	60-150 .	70.10	

Dilution Factor 1

Waste Stream Technology Inc.

Analysis Result Report

Site: URS-PENN LANDFILL
Date Sampled: 03/12/96
Date Received: 03/12/96
Matrix: AQUEOUS

Group Number: 9604-031
Report Units: mg/L

	Lab ID Number:	WS25629
	Client ID:	TREAT TRAIN #3 SERIES B

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Section 7.3.4.2 Reactive Sulfide	3.600	< 3.600	03/14/96	SW-846 9030
Section 7.3.3.2 Reactive Cyanide	5.000	< 5.000	03/14/96	SW-846 9010
Total Solids	4.000	4353.000	03/13/96	EPA 160.3

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

TCLP Metals Analysis Result Report

Site: URS-PENN LANDFILL
Date Sampled: 03/12/96
Date Received: 03/12/96

Group Number: 9604-031
Report Units: mg/L
Matrix: TCLP Extract
TCLP Extraction Date: 03/13/96

Lab ID Number:	WS25629
Client ID:	TREAT TRAIN #3 SERIES B
Date Extracted:	03/13/96

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Lead by ICP	0.120	< 0.120	03/14/96	SW-846 6010
Cadmium by ICP	0.015	< 0.015	03/14/96	SW-846 6010
Barium by ICP	0.011	0.194	03/14/96	SW-846 6010
Chromium by ICP	0.011	0.013	03/14/96	SW-846 6010
Silver by ICP	0.015	< 0.015	03/14/96	SW-846 6010
Arsenic by GFAA	0.005	< 0.005	03/14/96	SW-846 7060
Selenium by GFAA	0.003	< 0.003	03/14/96	SW-846 7740
Mercury by Cold Vapor	0.001	< 0.001	03/13/96	SW-846 7470

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

Method Blank For TCLP Metals

Site: URS-PENN LANDFILL
Date Sampled: NA
Date Received: NA

Group Number: 9604-031
Report Units: PPM
TCLP Extraction Date: 03/13/96

Lab ID Number:	MBRR3103	
Client ID:	TREAT TRAIN #3 SERIES	
Date Extracted:	03/13/96	

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Pb TCLP Method Blank	0.120	< 0.120	03/14/96	SW-846 6010
Cd TCLP Method Blank	0.015	< 0.015	03/14/96	SW-846 6010
Ba TCLP Method Blank	0.011	< 0.011	03/14/96	SW-846 6010
Cr TCLP Method Blank	0.011	< 0.011	03/14/96	SW-846 6010
Ag TCLP Method Blank	0.015	< 0.015	03/14/96	SW-846 6010
As TCLP Method Blank	0.005	< 0.005	03/14/96	SW-846 7060
Se TCLP Method Blank	0.003	< 0.003	03/14/96	SW-846 7740

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.
Method 1010- Ignitability Report

Site: URS-PENN LANDFILL
Date Sampled: 03/12/96
Date Received: 03/12/96

Group Number: 9604-031
Matrix: AQUEOUS

WST Lab ID	Client ID	Analysis Date	Result
WS25629	TREAT TRAIN #3 SERIES B	03/14/96	> 200

> 200 = No flash detected at a temperature up to 200 degrees Fahrenheit.

WASTE STREAM TECHNOLOGY

WASTESTREAM TECHNOLOGY
302 GROTE STREET
BUFFALO, NY 14207
(716) 876-5290

9684-071 (1/2)

CHAIN OF CUSTODY RECORD

PROJECT NO: SITE NAME: URS - PENN AVE

SAMPLERS (SIGNATURE): Peggy J Tymczyk

SAMPLE NO.	DATE	TIME	COMP	GRAB	MATRIX	SAMPLE LOCATION	SIZE & NO. OF CONTAINERS	CN TOTAL AMENABLE	PH	BOD	COD	PCB	TPH	D+G	PRESERVATIVES	REMARKS
	3/12/96	1030				TREAT. TRAIN 3 SERIES C	1X1L	X								
	3/12/96	1030				↓	1X1L		X	X	X					W525628
	3/12/96	1030				↓	1X1L					X				
	3/12/96	1030				↓	1X1L						X	X		

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
Peggy Tymczyk	3/13/96 1030				
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)

SPECIAL INSTRUCTIONS:

TURNAROUND TIME _____

LAB USE: REFRIGERATOR # _____ SHELF # _____ GROUP # _____ DUE DATE _____

WASTESTREAM TECHNOLOGY

302 GROTE STREET
BUFFALO, NY 14207
(716) 876-5290

9604-032 (2/2)

CHAIN OF CUSTODY RECORD

PROJECT NO: URS — SITE NAME: PENN AVE

SAMPLERS (SIGNATURE): Gregg Szymczyk

SAMPLE NO.	DATE	TIME	COMP	GRAB	MATRIX	SAMPLE LOCATION	SIZE & NO. OF CONTAINERS	PCB	TCLP-VOC's	TCLP BNA's + ACID VOLS	TCLP PESTICIDES + PCB	TCLP METALS	IGNITABILITY & REACTIVITY	PH	TS (TOTAL SOLIDS)	PRESERVATIVES	REMARKS
	3/12/96	1030	X 1C+2C			TREAT TRAIN 3 SERIES B	1x1L	X									
	3/12/96	1030	X			"	1x40ML		X								
	3/12/96	1030	X			"	1x1L			X							WS25629
	3/12/96	1030	X			"	1x1L				X						
	3/12/96	1030	X			"	1x500					X					
	3/12/96	1030	X			"	1x1L						X	X	X		

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
Gregg Szymczyk	3/12/96 1030				
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)

SPECIAL INSTRUCTIONS:

TURNAROUND TIME _____

LAB USE: REFRIGERATOR # _____ SHELF # _____ GROUP # _____ DUE DATE _____

Waste Stream Technology Inc.

Analysis Result Report

Site: URS-PENN LANDFILL
Date Sampled: 03/12/96
Date Received: 03/12/96
Matrix: AQUEOUS

Group Number: 9604-031
Report Units: mg/L
BOD Units: mg O2/L

Lab ID Number:	WS25628	
Client ID:	TREAT TRAIN #3 SERIES C	

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Total Petroleum Hydrocarbons	4.000	< 4.000	03/14/96	EPA 418.1
Oil & Grease	4.000	15.290	03/14/96	EPA 413.1
Cyanide-Weak acid dissociable	0.006	0.013	03/13/96	EPA 335.2
Cyanide in Water	0.005	0.028	03/14/96	EPA 335.2
Biochemical Oxygen Demand	50.000	73.000	03/13/96	EPA 405.1

Waste Stream Technology Inc.

Analysis Result Report

Site: URS-PENN LANDFILL
Date Sampled: 05/07/96
Date Received: 05/07/96
Matrix: AQUEOUS

Group Number: 9604-109
Report Units: mg/L
COD Units: mg O2/L

Lab ID Number:	WS26881	
Client ID:	BEFORE COLUMN C GAC	

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Chemical Oxygen Demand	500.000	1119.000	05/07/96	ASTM D1252B
Ammonia Nitrogen	0.500	341.000	05/07/96	EPA 350.3

WASTE STREAM TECHNOLOGY

URS Penn

DATE: / /

Upstate Laboratories, Inc.
Analysis Results
Report Number: 12196110
Client I.D.: WASTE STREAM TECHNOLOGY, INC.

APPROVAL:
QC:
Lab I.D.: 10170
Sampled by: Client

ID:12196110 Mat:Water — E 1650H 04/24/96

PARAMETERS	RESULTS	DATE ANAL.	KEY	FILE#
Total Kjeldahl Nitrogen	220mg/l	05/01/96		WB2711
TOC	260mg/l	05/01/96		WB2702

ID:12196111 Mat:Water — F 1650H 04/24/96

PARAMETERS	RESULTS	DATE ANAL.	KEY	FILE#
Total Kjeldahl Nitrogen	9.1mg/l	05/01/96		WB2711

ID:12196112 Mat:Water — G 04/25/96

PARAMETERS	RESULTS	DATE ANAL.	KEY	FILE#
Total Kjeldahl Nitrogen	33mg/l	05/01/96		WB2711
TOC	200mg/l	05/01/96		WB2702

ID:12196113 Mat:Water — H 1100H 04/25/96

PARAMETERS	RESULTS	DATE ANAL.	KEY	FILE#
Total Kjeldahl Nitrogen	22mg/l	05/01/96		WB2711
TOC	3mg/l	05/01/96		WB2702

Dawn Campagna

Post-it® Fax Note 7671 | Date | # of pages ▸

To Paul Morrow	From Wendy
Co./Dept. Waste Stream Tech	Co. UL
Phone #	Phone #
Fax # (716) 876-2412	Fax #

WASTE STREAM TECHNOLOGY

Laboratory Chronicle

Report Date : 03/27/96

Group Number : 9604-030

Prepared For :
Mr. George Leahy
URS Facilities Design,Inc.
Mack Centre II
Mack Centre Drive
Paramus, NJ 07652

Site: Pennsylvania Ave.

Field and Laboratory Information

Client Id	WST Lab #	Matrix	Date Sampled	Date Received	Time
Treatment Train #2 Analysis I & I1	WS25621	Aqueous	3/12/96	3/12/96	1034
Treatment Train #3 Analysis H	WS25622	Aqueous	3/12/96	3/12/96	1034
Sample Status Upon Receipt : No irregularities.					

Analytical Parameters	Number of Samples	Turnaround Time
Total Dissolved Solids	1	Standard
Total Suspended Solids	2	Standard
Alkalinity	2	Standard
Biochemical Oxygen Demand	2	Standard
Chemical Oxygen Demand	2	Standard
Ammonia Nitrogen	2	Standard
Total Petroleum Hydrocarbons	2	Standard
Oil & Grease	2	Standard
Total Solids	2	Standard
Reactive Cyanide	2	Standard
Total Cyanide	2	Standard
Reactive Sulfide	2	Standard
Cyanide-Weak Acid Dissociable	2	Standard
Ignitability	1	Standard
Total Kjeldahl Nitrogen	2	Standard
pH	2	Standard
624	2	Standard
625	2	Standard
608	2	Standard
TCLP Pesticides	1	Standard
TCLP PCBs	1	Standard
TCLP 8240	1	Standard
TCLP 8270	1	Standard
Total Metals	2	Standard
TCLP Metals	1	Standard
Total Organic Carbon	2	Standard

Report Released By : Daniel W. Voe

ENVIRONMENTAL LABORATORY ACCREDITATION
CERTIFICATION NUMBER (ELAP) 11179

WASTE STREAM TECHNOLOGY

METHODOLOGIES

The specific methodologies employed in obtaining the analytical data reported are indicated on each of the result forms. The method numbers shown refer to the following analytical method references:

Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020, March 1979, Revised 1983, U.S. Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.

Federal Register, 40 CFR Part 136: Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. Revised July 1992.

Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. Third Edition, Revised September 1994, United States EPA SW-846.

Annual Book of ASTM Standards, Volume II. ASTM, 1916 Race Street, Philadelphia, Pennsylvania 19103.

Standard Methods for the Examination of Water and Wastewater. (18th Edition). American Public Health Association, 1105 18th Street, NW, Washington, D.C. 20036.

Waste Stream Technology Inc.

Analysis Result Report

Site: URS-PENN LANDFILL
Date Sampled: 03/12/96
Date Received: 03/12/96
Matrix: AQUEOUS

Group Number: 9604-030
Report Units: mg/L
BOD & COD Units: mg O2/L
Alkalinity: mg/L as CaCO3

Lab ID Number:	WS25621
Client ID:	TRMT TRAIN #2 ANALYSIS I&I1

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Cyanide in Water	0.005	0.027	03/14/96	EPA 335.2
Total Suspended Solids	4.000	92.800	03/13/96	EPA 160.2
Alkalinity	5.000	640.000	03/13/96	EPA 310.1
Biochemical Oxygen Demand	50.000	96.000	03/18/96	EPA 405.1
Chemical Oxygen Demand	100.000	614.400	03/15/96	ASTM D1252B
Ammonia Nitrogen	0.100	644.000	03/13/96	EPA 350.3
Total Petroleum Hydrocarbons	4.000	< 4.000	03/14/96	EPA 418.1
Oil & Grease	4.000	12.380	03/14/96	EPA 413.2
Total Solids	4.000	4585.000	03/13/96	EPA 160.3
Section 7.3.3.2 Reactive Cyanide	5.000	< 5.000	03/14/96	SW-846 9010
Section 7.3.4.2 Reactive Sulfide	3.600	97.700	03/14/96	SW-846 9030
Cyanide-Weak acid dissociable	0.005	0.012	03/13/96	4500 CN-I

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

Analysis Result Report

Site: URS-PENN LANDFILL
Date Sampled: 03/12/96
Date Received: 03/12/96
Matrix: AQUEOUS

Group Number: 9604-030
Report Units: mg/L
BOD & COD Units: mg O2/L
Alkalinity: mg/L as CaCO3

Lab ID Number:	WS25622
Client ID:	TRMT TRAIN #3 ANALYSIS H

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Cyanide in water	0.005	< 0.005	03/14/96	EPA 335.2
Total Suspended Solids	4.000	< 4.000	03/13/96	EPA 160.2
Total Dissolved Solids	4.000	4428.000	03/13/96	EPA 160.1
Alkalinity	0.500	456.000	03/13/96	EPA 310.1
Biochemical Oxygen Demand	50.000	44.000	03/18/96	EPA 405.1
Chemical Oxygen Demand	5.000	4.690	03/15/96	ASTM D1252B
Ammonia Nitrogen	0.100	766.000	03/13/96	EPA 350.3
Total Petroleum Hydrocarbons	4.000	< 4.000	03/14/96	EPA 418.1
Oil & Grease	4.000	< 4.000	03/14/96	EPA 413.2
Cyanide-Weak acid dissociable	0.005	< 0.005	03/13/96	4500 CN-I

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.
Method 1010- Ignitability Report

Site: URS-PENN LANDFILL
Date Sampled: 03/12/96
Date Received: 03/12/96

Group Number: 9604-030
Matrix: AQUEOUS

WST Lab ID	Client ID	Analysis Date	Result
WS25621	TRMT TRAIN #2 ANALYSIS I&I1	03/14/96	> 200

> 200 = No flash detected at a temperature up to 200 degrees Fahrenheit.

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

Method 150.1

Site: URS-PENN LANDFILL
Date Sampled: 03/12/96
Date Received: 03/12/96

Group Number: 9604-030
Report Units: pH UNITS
Matrix: AQUEOUS

WST Lab ID	Client ID	Analysis Date	pH RESULT
WS25621	TRMT TRAIN #2 ANALYSIS I&I1	03/12/96	7.43
WS25622	TRMT TRAIN #3 ANALYSIS H	03/12/96	8.12

Waste Stream Technology Inc.
40 CFR Part 136 Method 624
EPA 624

Site: URS-PENN LANDFILL
Date Sampled: 03/12/96
Date Received: 03/12/96

Group Number: 9604-030
Report Units: ug/L
Matrix: AQUEOUS

	Lab ID Number	WS25621
	Client ID	TRMT TRAIN #2 ANALYSIS I&I1
	Date Extracted	NA
	Date Analyzed	03/12/96

Compound	Detection Limit/ QC Limits (%)	Result	Q
chloromethane	2.0	2.0	U
vinyl chloride	2.0	2.0	U
bromomethane	2.0	2.0	U
chloroethane	2.0	2.0	U
Trichlorofluoromethane	2.0	2.0	U
1,1-dichloroethene	1.0	1.0	U
methylene chloride	2.8	8.5	B
trans-1,2-dichloroethene	1.0	1.0	U
1,1-dichloroethane	1.0	1.0	U
chloroform	1.0	1.0	U
1,1,1-trichloroethane	1.0	1.0	U
carbon tetrachloride	1.0	1.0	U
benzene	1.0	1.0	U
1,2-dichloroethane	1.0	1.0	U
trichloroethene	1.0	1.0	U
1,2-dichloropropane	1.0	1.0	U
bromodichloromethane	1.0	1.0	U
2-chloroethylvinyl ether	2.0	2.0	U
cis-1,3-dichloropropene	1.0	1.0	U
toluene	1.0	1.0	U
trans-1,3-dichloropropene	1.0	1.0	U
1,1,2-trichloroethane	1.0	1.0	U
tetrachloroethene	1.2	1.2	U
dibromochloromethane	1.0	1.0	U
chlorobenzene	1.0	1.0	U
ethylbenzene	1.0	1.0	U
bromoform	1.0	1.0	U
1,1,2,2-tetrachloroethane	1.0	1.0	U
1,3-dichlorobenzene	1.0	1.0	U
1,4-dichlorobenzene	1.0	1.0	U
1,2-dichlorobenzene	1.0	1.0	U
1,2-Dichloroethane-d4 (%)	76-114	108.0	
Toluene-d8 (%)	88-110	94.0	
Bromofluorobenzene (%)	86-115	106.0	

Dilution Factor 1

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.
40 CFR Part 136 Method 624
EPA 624

Site: URS-PENN LANDFILL
Date Sampled: 03/12/96
Date Received: 03/12/96

Group Number: 9604-030
Report Units: ug/L
Matrix: AQUEOUS

	Lab ID Number	WS25622
	Client ID	TRMT TRAIN #3 ANALYSIS H
	Date Extracted	NA
	Date Analyzed	03/12/96

Compound	Detection Limit/ QC Limits (%)	Result	Q
chloromethane	2.0	2.0	U
vinyl chloride	2.0	2.0	U
bromomethane	2.0	2.0	U
chloroethane	2.0	2.0	U
Trichlorofluoromethane	2.0	2.0	U
1,1-dichloroethene	1.0	1.0	U
methylene chloride	2.8	4.2	B
trans-1,2-dichloroethene	1.0	1.0	U
1,1-dichloroethane	1.0	1.0	U
chloroform	1.0	1.0	U
1,1,1-trichloroethane	1.0	1.0	U
carbon tetrachloride	1.0	1.0	U
benzene	1.0	1.0	U
1,2-dichloroethane	1.0	1.0	U
trichloroethene	1.0	1.0	U
1,2-dichloropropane	1.0	1.0	U
bromodichloromethane	1.0	1.0	U
2-chloroethylvinyl ether	2.0	2.0	U
cis-1,3-dichloropropene	1.0	1.0	U
toluene	1.0	1.0	U
trans-1,3-dichloropropene	1.0	1.0	U
1,1,2-trichloroethane	1.0	1.0	U
tetrachloroethene	1.2	1.2	U
dibromochloromethane	1.0	1.0	U
chlorobenzene	1.0	1.0	U
ethylbenzene	1.0	1.0	U
bromoform	1.0	1.0	U
1,1,2,2-tetrachloroethane	1.0	1.0	U
1,3-dichlorobenzene	1.0	1.0	U
1,4-dichlorobenzene	1.0	1.0	U
1,2-dichlorobenzene	1.0	1.0	U
1,2-Dichloroethane-d4 (%)	76-114	104.0	
Toluene-d8 (%)	88-110	106.0	
Bromofluorobenzene (%)	86-115	107.0	

Dilution Factor 1

Waste Stream Technology Inc.
Method 624 Method Blank Results
EPA 624

Site: URS-PENN LANDFILL
Date Sampled: NA
Date Received: NA

Group Number: 9604-030
Report Units: PPB

	Lab ID Number	IB031296	
	Client ID	NA	
	Date Extacted	NA	
	Date Analyzed	03/12/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
chloromethane	2.0	2.0	U
vinyl chloride	2.0	2.0	U
bromomethane	2.0	2.0	U
chloroethane	2.0	2.0	U
trichlorofluoromethane	2.0	2.0	U
1,1-dichloroethene	1.0	1.0	U
methylene chloride	2.8	3.5	
1,2-dichloroethene(total)	1.0	1.0	U
1,1-dichloroethane	1.0	1.0	U
chloroform	1.0	1.0	U
1,1,1,-trichloroethane	1.0	1.0	U
carbon tetrachloride	1.0	1.0	U
benzene	1.0	1.0	U
1,2-dichloroethane	1.0	1.0	U
trichloroethene	1.0	1.0	U
1,2-dichloropropane	1.0	1.0	U
bromodichloromethane	1.0	1.0	U
2-chloroethylvinyl ether	2.0	2.0	U
cis-1,3-dichloropropene	1.0	1.0	U
toluene	1.0	1.0	U
trans-1,3-dichloropropene	1.0	1.0	U
1,1,2-trichloroethane	1.0	1.0	U
tetrachloroethene	1.2	1.2	U
dibromochloromethane	1.0	1.0	U
chlorobenzene	1.0	1.0	U
ethylbenzene	1.0	1.0	U
bromoform	1.0	1.0	U
1,1,2,2-tetrachloroethane	1.0	1.0	U
1,3-dichlorobenzene	1.0	1.0	U
1,4-dichlorobenzene	1.0	1.0	U
1,2-dichlorobenzene	1.0	1.0	U
Bromofluorobenzene (%)	86-115	105.0	
1,2-Dichloroethane-d4 (%)	76-114	102.0	
Toluene-d8 (%)	88-110	106.0	

Dilution Factor 1

IB denotes Instrument Blank.
NA denotes Not Applicable.

Waste Stream Technology Inc.

40 CFR 136 Method 625 SVOCs

EPA 625

Site: URS-PENN LANDFILL
Date Sampled: 03/12/96
Date Received: 03/12/96

Group Number: 9604-030
Report Units: ug/L
Matrix: AQUEOUS

Lab ID Number	WS25621	
Client ID	TRMT TRAIN #2 ANALYSIS I&I1	
Date Extracted	03/13/96	
Date Analyzed	03/13/96	

Compound	Detection Limit/ QC Limits (%)	Result	Q
n-nitrosodimethylamine	2.0	2.0	U
Bis(2-chloroethyl)ether	2.0	2.0	U
Phenol	2.0	2.0	U
2-Chlorophenol	2.0	2.0	U
1,3-Dichlorobenzene	2.0	2.0	U
1,4-Dichlorobenzene	2.0	2.0	U
1,2-Dichlorobenzene	2.0	2.0	U
Bis(2-chloroisopropyl)ether	2.0	2.0	U
Hexachloroethane	2.0	2.0	U
N-nitroso-di-n-propylamine	2.0	2.0	U
Nitrobenzene	2.0	2.0	U
Isophorone	2.0	2.0	U
2-Nitrophenol	2.0	2.0	U
2,4-Dimethylphenol	2.0	2.0	U
Bis(2-chlorethoxy)methane	2.0	2.0	U
2,4-Dichlorophenol	2.0	2.0	U
1,2,4-Trichlorobenzene	2.0	2.0	U
Naphthalene	2.0	2.0	U
Hexachlorocyclopentadiene	2.0	2.0	U
2,4,6-Trichlorophenol	2.0	2.0	U
2-Chloronaphthalene	2.0	2.0	U
Acenaphthylene	2.0	2.0	U
Dimethylphthalate	2.0	2.0	U
2,6-Dinitrotoluene	2.0	2.0	U
Acenaphthene	2.0	2.0	U
2,4-Dinitrophenol	10.0	10.0	U
2,4-Dinitrotoluene	2.0	2.0	U
4-Nitrophenol	10.0	10.0	U
Fluorene	2.0	2.0	U
4-Chlorophenyl-phenylether	2.0	2.0	U
Diethylphthalate	2.0	15.4	
4,6-Dinitro-2-methylphenol	10.0	10.0	U
N-Nitrosodiphenylamine	2.0	2.0	U
4-Bromophenyl-phenylether	2.0	2.0	U
Hexachlorobenzene	2.0	2.0	U
Pentachlorophenol	10.0	10.0	U
Phenanthrene	2.0	2.0	U

WASTE STREAM TECHNOLOGY

	Lab ID Number	WS25621	
	Client ID	TRMT TRAIN #2 ANALYSIS I&I1	
	Date Extracted	03/13/96	
	Date Analyzed	03/13/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
Anthracene	2.0	2.0	U
Di-n-butylphthalate	2.0	2.0	U
Fluoranthene	2.0	2.0	U
Pyrene	2.0	2.0	U
Benzidine	20.0	20.0	U
Butylbenzylphthalate	2.0	2.0	U
3,3-Dichlorobenzidine	4.0	4.0	U
Benzo[a]anthracene	2.0	2.0	U
Chrysene	2.0	2.0	U
Bis(2-ethylhexyl)phthalate	2.0	4.5	
Di-n-octylphthalate	2.0	2.0	U
Benzo[b]fluoranthene	2.0	2.0	U
Benzo[k]fluoranthene	2.0	2.0	U
Benzo[a]pyrene	2.0	2.0	U
Indeno[1,2,3-cd]pyrene	2.0	2.0	U
Dibenz[a,h]anthracene	2.0	2.0	U
Benzo[g,h,i]perylene	2.0	2.0	U
Hexachlorobutadiene	2.0	2.0	U
4-Chloro-3-methylphenol	4.0	4.0	U
2-Fluorophenol (%)	21-100.	48.0	
Phenol-d6 (%)	10-94	39.0	
Nitrobenzene-d5 (%)	35-114.	90.0	
2-Fluorobiphenyl (%)	43-116.	94.0	
2,4,6-Tribromophenol (%)	10-123.	72.0	
Terphenyl-d14 (%)	33-141.	82.0	
Dilution Factor	1		

Waste Stream Technology Inc.

40 CFR 136 Method 625 SVOCs

EPA 625

Site: URS-PENN LANDFILL
Date Sampled: 03/12/96
Date Received: 03/12/96

Group Number: 9604-030
Report Units: ug/L
Matrix: AQUEOUS

Lab ID Number	WS25622
Client ID	TRMT TRAIN #3 ANALYSIS H
Date Extracted	03/13/96
Date Analyzed	03/13/96

Compound	Detection Limit/ QC Limits (%)	Result	Q
n-nitrosodimethylamine	2.0	2.0	U
Bis(2-chloroethyl)ether	2.0	2.0	U
Phenol	2.0	2.0	U
2-Chlorophenol	2.0	2.0	U
1,3-Dichlorobenzene	2.0	2.0	U
1,4-Dichlorobenzene	2.0	2.0	U
1,2-Dichlorobenzene	2.0	2.0	U
Bis(2-chloroisopropyl)ether	2.0	2.0	U
Hexachloroethane	2.0	2.0	U
N-nitroso-di-n-propylamine	2.0	2.0	U
Nitrobenzene	2.0	2.0	U
Isophorone	2.0	2.0	U
2-Nitrophenol	2.0	2.0	U
2,4-Dimethylphenol	2.0	2.0	U
Bis(2-chlorethoxy)methane	2.0	2.0	U
2,4-Dichlorophenol	2.0	2.0	U
1,2,4-Trichlorobenzene	2.0	2.0	U
Naphthalene	2.0	2.0	U
Hexachlorocyclopentadiene	2.0	2.0	U
2,4,6-Trichlorophenol	2.0	2.0	U
2-Chloronaphthalene	2.0	2.0	U
Acenaphthylene	2.0	2.0	U
Dimethylphthalate	2.0	2.0	U
2,6-Dinitrotoluene	2.0	2.0	U
Acenaphthene	2.0	2.0	U
2,4-Dinitrophenol	10.0	10.0	U
2,4-Dinitrotoluene	2.0	2.0	U
4-Nitrophenol	10.0	10.0	U
Fluorene	2.0	2.0	U
4-Chlorophenyl-phenylether	2.0	2.0	U
Diethylphthalate	2.0	2.0	U
4,6-Dinitro-2-methylphenol	10.0	10.0	U
N-Nitrosodiphenylamine	2.0	2.0	U
4-Bromophenyl-phenylether	2.0	2.0	U
Hexachlorobenzene	2.0	2.0	U
Pentachlorophenol	10.0	10.0	U
Phenanthrene	2.0	2.0	U

WASTE STREAM TECHNOLOGY

	Lab ID Number	WS25622	
	Client ID	TRMT TRAIN #3 ANALYSIS H	
	Date Extracted	03/13/96	
	Date Analyzed	03/13/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
Anthracene	2.0	2.0	U
Di-n-butylphthalate	2.0	2.0	U
Fluoranthene	2.0	2.0	U
Pyrene	2.0	2.0	U
Benzidine	20.0	20.0	U
Butylbenzylphthalate	2.0	2.0	U
3,3-Dichlorobenzidine	4.0	4.0	U
Benzo[a]anthracene	2.0	2.0	U
Chrysene	2.0	2.0	U
Bis(2-ethylhexyl)phthalate	2.0	2.0	U
Di-n-octylphthalate	2.0	2.0	U
Benzo[b]fluoranthene	2.0	2.0	U
Benzo[k]fluoranthene	2.0	2.0	U
Benzo[a]pyrene	2.0	2.0	U
Indeno[1,2,3-cd]pyrene	2.0	2.0	U
Dibenz[a,h]anthracene	2.0	2.0	U
Benzo[g,h,i]perylene	2.0	2.0	U
Hexachlorobutadiene	2.0	2.0	U
4-Chloro-3-methylphenol	4.0	4.0	U
2-Fluorophenol (%)	21-100.	36.0	
Phenol-d6 (%)	10-94 .	28.0	
Nitrobenzene-d5 (%)	35-114.	74.0	
2-Fluorobiphenyl (%)	43-116.	84.0	
2,4,6-Tribromophenol (%)	10-123.	70.0	
Terphenyl-d14 (%)	33-141.	91.0	
Dilution Factor	1		

Waste Stream Technology Inc.
40 CFR 136 Method 608 Pest-PCBs
EPA 608

Site: URS-PENN LANDFILL
Date Sampled: 03/12/96
Date Received: 03/12/96

Group Number: 9604-030
Report Units: ug/L
Matrix: AQUEOUS

Lab ID Number	WS25621	
Client ID	TRMT TRAIN #2 ANALYSIS I&I1	
Date Extracted	03/13/96	
Date Analyzed	03/14/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
alpha-BHC	0.003	0.003	U
beta-BHC	0.006	0.006	U
gamma-BHC	0.003	0.003	U
delta-BHC	0.009	0.009	U
heptachlor	0.020	0.020	U
aldrin	0.017	0.017	U
heptachlor epoxide	0.008	0.008	U
endosulfan I	0.005	0.005	U
dieldrin	0.005	0.005	U
4,4-DDE	0.005	0.005	U
endrin	0.011	0.011	U
endosulfan II	0.006	0.006	U
4,4'-DDD	0.005	0.005	U
endrin aldehyde	0.008	0.008	U
endosulfan sulfate	0.060	0.060	U
4,4'-DDT	0.018	0.018	U
chlordane	0.069	0.069	U
toxaphene	0.310	0.310	U
aroclor 1016	0.270	0.270	U
aroclor 1221	0.230	0.230	U
aroclor 1232	0.380	0.380	U
aroclor 1242	0.180	0.180	U
aroclor 1248	0.092	0.092	U
aroclor 1254	0.052	0.052	U
aroclor 1260	0.060	0.060	U
Tetrachloro-m-xylene (%)	60-150.	61.600	
Decachlorobiphenyl (%)	60-150.	80.800	
Dilution Factor	1		

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

40 CFR 136 Method 608 Pest-PCBs

EPA 608

Site: URS-PENN LANDFILL
Date Sampled: 03/12/96
Date Received: 03/12/96

Group Number: 9604-030
Report Units: ug/L
Matrix: AQUEOUS

Lab ID Number	WS25622	
Client ID	TRMT TRAIN #3 ANALYSIS H	
Date Extracted	03/13/96	
Date Analyzed	03/14/96	

Compound	Detection Limit/ QC Limits (%)	Result	Q
alpha-BHC	0.003	0.003	U
beta-BHC	0.006	0.006	U
gamma-BHC	0.003	0.003	U
delta-BHC	0.009	0.009	U
heptachlor	0.020	0.020	U
aldrin	0.017	0.017	U
heptachlor epoxide	0.008	0.008	U
endosulfan I	0.005	0.005	U
dieldrin	0.005	0.005	U
4,4-DDE	0.005	0.005	U
endrin	0.011	0.011	U
endosulfan II	0.006	0.006	U
4,4'-DDD	0.005	0.005	U
endrin aldehyde	0.008	0.008	U
endosulfan sulfate	0.060	0.060	U
4,4'-DDT	0.018	0.018	U
chlordane	0.069	0.069	U
toxaphene	0.310	0.310	U
aroclor 1016	0.270	0.270	U
aroclor 1221	0.230	0.230	U
aroclor 1232	0.380	0.380	U
aroclor 1242	0.180	0.180	U
aroclor 1248	0.092	0.092	U
aroclor 1254	0.052	0.052	U
aroclor 1260	0.060	0.060	U
Tetrachloro-m-xylene (%)	60-150.	138.000	
Decachlorobiphenyl (%)	60-150.	107.000	

Dilution Factor 1

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

TCLP Pesticide Analysis
1311/8080

Site: URS-PENN LANDFILL
Date Sampled: 03/12/96
Date Received: 03/12/96
TCLP Extraction Date: 03/13/96

Group Number: 9604-030
Report Units: ug/L
Matrix: TCLP Extract

	Lab ID Number	WS25621	
	Client ID	TRMT TRAIN #2 ANALYSIS	
	Date Extracted	03/13/96	
	Date Analyzed	03/14/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
chlordane	0.350	0.350	U
endrin	0.055	0.055	U
gamma-BHC (Lindane)	0.016	0.016	U
heptachlor	0.097	0.097	U
heptachlor epoxide	0.042	0.042	U
methoxychlor	0.031	0.031	U
toxaphene	1.540	1.540	U
Tetrachloro-m-xylene (%)	60-150 .	68.100	
Decachlorobiphenyl (%)	60-150 .	80.700	

Dilution Factor 1

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

PCBs in Water
SW-846 8080A

Site: URS-PENN LANDFILL
Date Sampled: 03/12/96
Date Received: 03/12/96
TCLP Extraction Date: 03/13/96

Group Number: 9604-030
Report Units: ug/L
Matrix: TCLP Extract

	Lab ID Number	WS25621	
	Client ID	TRMT TRAIN #2 ANALYSIS	
	Date Extracted	03/13/96	
	Date Analyzed	03/14/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
aroclor 1016	1.40	1.40	U
aroclor 1221	1.20	1.20	U
aroclor 1232	1.90	1.90	U
aroclor 1242	0.90	0.90	U
aroclor 1248	0.50	0.50	U
aroclor 1254	0.30	0.30	U
aroclor 1260	0.30	0.30	U
Tetrachloro-m-xylene (%)	60-150 .	68.10	
Decachlorobiphenyl (%)	60-150 .	80.70	

Dilution Factor 1

Waste Stream Technology Inc.

8270 TCLP Semivolatile Organics
1311/8270

Site: URS-PENN LANDFILL
Date Sampled: 03/12/96
Date Received: 03/12/96
TCLP Extraction Date: 03/13/96

Group Number: 9604-030
Report Units: ug/L
Matrix: TCLP Extract

	Lab ID Number	WS25621
	Client ID	TRMT TRAIN #2 ANALYSIS
	Date Extracted	03/13/96
	Date Analyzed	03/13/96

Compound	Detection Limit/ QC Limits (%)	Result	Q
pyridine	10	10	U
1,4-dichlorobenzene	10	10	U
Total cresols(o,m & p)	30	25	J
nitrobenzene	10	10	U
hexachloroethane	10	10	U
hexachlorobutadiene	10	10	U
2,4,6-trichlorophenol	10	10	U
2,4,5-trichlorophenol	10	10	U
2,4-dinitrotoluene	10	10	U
hexachlorobenzene	10	10	U
pentachlorophenol	50	50	U
2-Fluorophenol (%)	21-100	58	
Phenol-d6 (%)	10-94	49	
Nitrobenzene-d5 (%)	35-114	97	
2-Fluorobiphenyl (%)	43-116	90	
2,4,6-Tribromophenol (%)	10-123	77	
Terphenyl-d14 (%)	33-141	78	

Dilution Factor 1

Waste Stream Technology Inc.
TCLP 8240 Volatile Organics
1311/8240

Site: URS-PENN LANDFILL
Date Sampled: 03/12/96
Date Received: 03/12/96

Group Number: 9604-030
Report Units: ug/L
Matrix: TCLP Extract

Lab ID Number	WS25621	
Client ID	TRMT TRAIN #2 ANALYSIS	
TCLP Date	03/13/96	
Date Analyzed	03/12/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
vinyl chloride	100	100	U
1,1-dichloroethene	50	50	U
chloroform	50	50	U
2-butanone	1000	1000	U
1,2-dichloroethane	50	50	U
carbon tetrachloride	50	50	U
trichloroethene	50	50	U
benzene	50	50	U
tetrachloroethene	50	50	U
chlorobenzene	50	50	U
1,4-dichlorobenzene	50	50	U
Bromofluorobenzene (%)	74-121	103	
1,2-Dichloroethane-d4 (%)	70-121	107	
Toluene-d8 (%)	81-117	98	

Dilution Factor 1

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

Metals Analysis Result Report

Site: URS-PENN LANDFILL
Date Sampled: 03/12/96
Date Received: 03/12/96

Group Number: 9604-030
Report Units: mg/L
Matrix: AQUEOUS

	Lab ID Number:	WS25621		
	Client ID:	TRMT TRAIN #2 ANALYSIS I&I1		
	Date Extracted:	03/12/96		
Analyte	**Detection Limit**	**Result**	**Date Analyzed**	**Analysis Method**
Zinc by ICP	0.019	< 0.019	03/14/96	EPA 200.7
Lead by ICP	0.120	< 0.120	03/14/96	EPA 200.7
Cadmium by ICP	0.015	< 0.015	03/14/96	EPA 200.7
Cobalt by ICP	0.030	< 0.030	03/14/96	EPA 200.7
Nickel by ICP	0.032	< 0.032	03/14/96	EPA 200.7
Barium by ICP	0.011	0.027	03/14/96	EPA 200.7
Manganese by ICP	0.003	0.088	03/14/96	EPA 200.7
Iron by ICP	0.063	0.332	03/14/96	EPA 200.7
Chromium by ICP	0.011	0.014	03/14/96	EPA 200.7
Magnesium by ICP	0.153	88.600	03/14/96	EPA 200.7
Vanadium by ICP	0.040	< 0.040	03/14/96	EPA 200.7
Aluminum by ICP	0.120	< 0.120	03/14/96	EPA 200.7
Beryllium by ICP	0.003	< 0.003	03/14/96	EPA 200.7
Calcium by ICP	0.224	115.000	03/14/96	EPA 200.7
Copper by ICP	0.011	0.095	03/14/96	EPA 200.7
Silver by ICP	0.015	< 0.015	03/14/96	EPA 200.7
Potassium by ICP	1.250	387.000	03/13/96	EPA 200.7
Sodium by ICP	0.157	777.000	03/13/96	EPA 200.7
Arsenic by GFAA	0.005	< 0.005	03/14/96	EPA 206.2
Antimony by GFAA	0.009	< 0.009	03/14/96	EPA 204.2
Selenium by GFAA	0.003	< 0.003	03/14/96	EPA 270.2
Thallium by GFAA	0.003	< 0.003	03/14/96	EPA 279.2
Mercury by Cold Vapor	0.001	< 0.001	03/13/96	EPA 245.2

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

Metals Analysis Result Report

Site: URS-PENN LANDFILL
Date Sampled: 03/12/96
Date Received: 03/12/96

Group Number: 9604-030
Report Units: mg/L
Matrix: AQUEOUS

Lab ID Number:	WS25622
Client ID:	TRMT TRAIN #3 ANALYSIS H
Date Extracted:	03/12/96

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Zinc by ICP	0.019	< 0.019	03/12/96	EPA 200.7
Lead by ICP	0.120	< 0.120	03/12/96	EPA 200.7
Cadmium by ICP	0.015	< 0.015	03/12/96	EPA 200.7
Cobalt by ICP	0.030	< 0.030	03/12/96	EPA 200.7
Nickel by ICP	0.032	< 0.032	03/12/96	EPA 200.7
Barium by ICP	0.011	0.376	03/12/96	EPA 200.7
Manganese by ICP	0.003	0.301	03/12/96	EPA 200.7
Iron by ICP	0.063	0.634	03/12/96	EPA 200.7
Chromium by ICP	0.011	< 0.011	03/12/96	EPA 200.7
Magnesium by ICP	0.153	117.000	03/12/96	EPA 200.7
Vanadium by ICP	0.040	< 0.040	03/12/96	EPA 200.7
Aluminum by ICP	0.120	< 0.120	03/12/96	EPA 200.7
Beryllium by ICP	0.003	< 0.003	03/12/96	EPA 200.7
Calcium by ICP	0.224	126.000	03/12/96	EPA 200.7
Copper by ICP	0.011	< 0.011	03/12/96	EPA 200.7
Silver by ICP	0.015	< 0.015	03/12/96	EPA 200.7
Potassium by ICP	1.250	146.000	03/13/96	EPA 200.7
Sodium by ICP	0.157	985.000	03/13/96	EPA 200.7
Arsenic by GFAA	0.005	0.026	03/13/96	EPA 206.2
Antimony by GFAA	0.009	< 0.009	03/12/96	EPA 204.2
Selenium by GFAA	0.003	< 0.003	03/13/96	EPA 270.2
Thallium by GFAA	0.003	< 0.003	03/13/96	EPA 279.2
Mercury by Cold Vapor	0.001	< 0.001	03/13/96	EPA 245.2

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

TCLP Metals Analysis Result Report

Site: URS-PENN LANDFILL
Date Sampled: 03/12/96
Date Received: 03/12/96

Group Number: 9604-030
Report Units: mg/L
Matrix: TCLP Extract
TCLP Extraction Date: 03/13/96

Lab ID Number:	WS25621
Client ID:	TRMT TRAIN #2 ANALYSIS I&I1
Date Extracted:	03/13/96

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Lead by ICP	0.120	< 0.120	03/14/96	SW-846 6010
Cadmium by ICP	0.015	< 0.015	03/14/96	SW-846 6010
Barium by ICP	0.011	0.087	03/14/96	SW-846 6010
Chromium by ICP	0.011	0.015	03/14/96	SW-846 6010
Silver by ICP	0.015	< 0.015	03/14/96	SW-846 6010
Arsenic by GFAA	0.005	< 0.005	03/14/96	SW-846 7060
Selenium by GFAA	0.003	< 0.003	03/14/96	SW-846 7740
Mercury by Cold Vapor	0.001	< 0.001	03/13/96	SW-846 7470

WASTE STREAM TECHNOLOGY

Upstate Laboratories inc.

Shipping: 6034 Corporate Dr. • E. Syracuse, NY 13057-1017 • (315) 437-0255 • Fax (315) 437-1209
Mailing: Box 289 • Syracuse, NY 13206
Albany (518) 459-3134
Binghamton (607) 724-0478
Buffalo (716) 662-2118
Rochester (716) 436-9070
New Jersey (201) 703-1324

March 18, 1996

RECEIVED
MAR 2 0 1996

Mr. Paul Morrow
Laboratory Manager
Waste Stream Technology, Inc.
302 Grote St.
Buffalo, NY 14207-2496

Re: Analysis Report #07396122 - 9604 URS-Penn

Dear Mr. Morrow:

Please find enclosed the results for your samples which were received on March 13, 1996.

We have included the Chain of Custody Record as part of your report. You may need to reference this form for a more detailed explanation of your sample. Samples will be disposed of approximately one month from final report date.

Should you have any questions, please feel free to give us a call.

Thank you for your patronage.

Sincerely,

UPSTATE LABORATORIES, INC.

Anthony J. Scala
Director

AJS/lw

Enclosures: report, methodology

cc/encs: N. Scala, ULI
file

Note: Faxed results were given to your office on 3/15 and 3/18/96. AJS

Disclaimer: The test results and procedures utilized, and laboratory interpretations of data obtained by ULI as contained in this report are believed by ULI to be accurate and reliable for sample(s) tested. In accepting this report, the customer agrees that the full extent of any and all liability for actual and consequential damages of ULI for the services performed shall be equal to the fee charged to the customer for the services as liquidated damages.

DATE: 03/18/96

Upstate Laboratories, Inc.
Analysis Results
Report Number: 07396122
Client I.D.: WASTE STREAM TECHNOLOGY, INC.

APPROVAL:
QC:
Lab I.D.: 10170
Sampled by: Client

ID:07396122 Mat:Water 9604 URS-PENN TREATMENT TRAIN 2 ANALYSIS I AND I1 03/12/96 G 0930H

PARAMETERS	RESULTS	KEY	FILE#
Total Kjeldahl Nitrogen	220mg/1		WB2133
TOC	190mg/1		WB2134

ID:07396123 Mat:Water 9604 URS-PENN TREATMENT TRAIN 3 ANALYSIS H 1015H 03/12/96 G

PARAMETERS	RESULTS	KEY	FILE#
Total Kjeldahl Nitrogen	230mg/1		WB2133
TOC	3mg/1		WB2134

UPSTATE LABORATORIES, INC.

WASTE STREAM TECHNOLOGY, INC.

KEY TO ANALYSIS REPORT #07396122:

ULI I.D.s: 07396122-123

Parameter	Method	Reference
Total Kjeldahl Nitrogen	351.3	1
TOC	415.1	1

Method Reference Key:

1 = "Methods for the Chemical Analysis of Water and Waste," USEPA, Environmental Monitoring Systems Laboratory, Cincinnati, EPA 600/4-79-020, revised March 1993.

TECHNOLOGY

BUFFALO, NY 14207
(716) 876-5290

9604 - 030

3/18 HDD

CHAIN OF CUSTODY RECORD

PROJECT NO: 9604 SITE NAME: URS - Penn

SAMPLERS (SIGNATURE): James B. Hoo

SAMPLE NO.	DATE	TIME	COMP	GRAB	MATRIX	SAMPLE LOCATION	SIZE & NO. OF CONTAINERS	TOC	TCN	PRESERVATIVES	REMARKS
122	3/12/96	930		X	aq.	Treatment Train #2, Analysis I and I1	5 Gal	+	+	USO5621 ①	Sample through CSX
123	3/12/96	1015		X	aq	Treatment Train #3, Analysis H	1x2l 6x1e	+	+	42 ①	was not nutrient amended.
											- fax results by 5pm 3/15 - 2 samples

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
James B. Hoo	3/13/96	Kelli Mauck	Kelli Mauck	3/12/96 14:00	Shipping
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
Fed Exp					
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	DATE/TIME	REMARKS	
		K. K	3/13/96 0830	Due 12 Noon, 3/15/96	cc/UPS

Distribution Original accompanies shipment. Copy to coordinator field files

LAB USE: REFRIGERATOR # _____ SHELF # _____

WASTESTREAM TECHNOLOGY

302 GROTE STREET
BUFFALO, NY 14207
(716) 876-5290

9604 - 030

Column H
Column I1
Column H

CHAIN OF CUSTODY RECORD

PROJECT NO: 9604 SITE NAME: URS - Penn

SAMPLERS (SIGNATURE): James B. [signature]

SAMPLE NO.	DATE	TIME	COMP	GRAB	MATRIX	SAMPLE LOCATION	SIZE & NO. OF CONTAINERS	SEE ATTACHED	See Attached	See Attached				PRESERVATIVES	REMARKS
	3/12/96	930		X	aq.	Treatment Train #2, Analysis I and I1	5 Gal	+	+				WS25621		Sample through SBR
	3/12/96	1015		X	aq	Treatment Train #3, Analysis H	1x2l 6x1e			X			"		was not nutrient amended.

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
James B. [signature]	3/12/96 1034	K DeMarco			
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	DATE/TIME	REMARKS	
				Due 12 Noon, 3/15/96	

Distribution Original accompanies shipment. Copy to coordinator field files

LABORATORY USE: REFRIGERATOR # _____ SHELF # _____

WASTE STREAM TECHNOLOGY

Laboratory Chronicle

Report Date : 03/26/96
Group Number : 9604-027

Prepared For :
Mr. George Leahy
URS Facilities Design,Inc.
Mack Centre II
Mack Centre Drive
Paramus, NJ 07652

Site: Pennsylvania Ave.

Field and Laboratory Information

Client Id	WST Lab #	Matrix	Date Sampled	Date Received	Time
Metals Treated Trial 1/Comp 1B&2B	WS25607	Aqueous	3/11/96	3/11/96	1500
Sample Status Upon Receipt : No irregularities.					

Analytical Parameters	Number of Samples	Turnaround Time
624	1	Standard
625	1	Standard
608	1	Standard
TSS	1	Standard
Alkalinity	1	Standard
BOD	1	Standard
COD	1	Standard
Ammonia Nitrogen	1	Standard
pH	1	Standard
Total Metals	1	Standard

Report Released By : David W Vow

ENVIRONMENTAL LABORATORY ACCREDITATION
CERTIFICATION NUMBER (ELAP) 11179

WASTE STREAM TECHNOLOGY

METHODOLOGIES

The specific methodologies employed in obtaining the analytical data reported are indicated on each of the result forms. The method numbers shown refer to the following analytical method references:

Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020, March 1979, Revised 1983, U.S. Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.

Federal Register, 40 CFR Part 136: Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act. Revised July 1992.

Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. Third Edition, Revised September 1994, United States EPA SW-846.

Annual Book of ASTM Standards, Volume II. ASTM, 1916 Race Street, Philadelphia, Pennsylvania 19103.

Standard Methods for the Examination of Water and Wastewater. (18th Edition). American Public Health Association, 1105 18th Street, NW, Washington, D.C. 20036.

Waste Stream Technology Inc.
40 CFR Part 136 Method 624
EPA 624

Site: URS-PENN LANDFILL
Date Sampled: 03/11/96
Date Received: 03/11/96

Group Number: 9604-027
Report Units: ug/L
Matrix: AQUEOUS

Lab ID Number	WS25607	
Client ID	METALS TREATED TRIAL 1/COMP 1B&2B	
Date Extracted	NA	
Date Analyzed	03/12/96	

Compound	Detection Limit/ QC Limits (%)	Result	Q
chloromethane	2.0	2.0	U
vinyl chloride	2.0	2.0	U
bromomethane	2.0	2.0	U
chloroethane	2.0	2.0	U
Trichlorofluoromethane	2.0	2.0	U
1,1-dichloroethene	1.0	1.0	U
methylene chloride	2.8	15.6	B
trans-1,2-dichloroethene	1.0	1.0	U
1,1-dichloroethane	1.0	1.1	
chloroform	1.0	1.0	U
1,1,1-trichloroethane	1.0	1.0	U
carbon tetrachloride	1.0	1.0	U
benzene	1.0	2.8	
1,2-dichloroethane	1.0	1.0	U
trichloroethene	1.0	1.0	U
1,2-dichloropropane	1.0	1.0	U
bromodichloromethane	1.0	1.0	U
2-chloroethylvinyl ether	2.0	2.0	U
cis-1,3-dichloropropene	1.0	1.0	U
toluene	1.0	35.6	
trans-1,3-dichloropropene	1.0	1.0	U
1,1,2-trichloroethane	1.0	1.0	U
tetrachloroethene	1.2	1.2	U
dibromochloromethane	1.0	1.0	U
chlorobenzene	1.0	1.1	
ethylbenzene	1.0	1.0	U
bromoform	1.0	1.0	U
1,1,2,2-tetrachloroethane	1.0	1.0	U
1,3-dichlorobenzene	1.0	1.0	U
1,4-dichlorobenzene	1.0	1.0	U
1,2-dichlorobenzene	1.0	1.0	U
1,2-Dichloroethane-d4 (%)	76-114	104.0	
Toluene-d8 (%)	88-110	106.0	
Bromofluorobenzene (%)	86-115	105.0	
Dilution Factor	1		

Waste Stream Technology Inc.

40 CFR 136 Method 625 SVOCs

EPA 625

Site: URS-PENN LANDFILL
Date Sampled: 03/11/96
Date Received: 03/11/96

Group Number: 9604-027
Report Units: ug/L
Matrix: AQUEOUS

Lab ID Number	WS25607	
Client ID	METALS TREATED TRIAL 1/COMP 1B&2B	
Date Extracted	03/12/96	
Date Analyzed	03/12/96	

Compound	Detection Limit/ QC Limits (%)	Result	Q
n-nitrosodimethylamine	2.0	2.0	U
Bis(2-chloroethyl)ether	2.0	2.0	U
Phenol	2.0	2.0	U
2-Chlorophenol	2.0	2.0	U
1,3-Dichlorobenzene	2.0	2.0	U
1,4-Dichlorobenzene	2.0	2.0	U
1,2-Dichlorobenzene	2.0	2.0	U
Bis(2-chloroisopropyl)ether	2.0	2.0	U
Hexachloroethane	2.0	2.0	U
N-nitroso-di-n-propylamine	2.0	2.0	U
Nitrobenzene	2.0	2.0	U
Isophorone	2.0	2.4	
2-Nitrophenol	2.0	2.0	U
2,4-Dimethylphenol	2.0	16.7	
Bis(2-chlorethoxy)methane	2.0	2.0	U
2,4-Dichlorophenol	2.0	2.0	U
1,2,4-Trichlorobenzene	2.0	2.0	U
Naphthalene	2.0	2.0	U
Hexachlorocyclopentadiene	2.0	2.0	U
2,4,6-Trichlorophenol	2.0	2.0	U
2-Chloronaphthalene	2.0	2.0	U
Acenaphthylene	2.0	2.0	U
Dimethylphthalate	2.0	2.0	U
2,6-Dinitrotoluene	2.0	2.0	U
Acenaphthene	2.0	2.0	U
2,4-Dinitrophenol	10.0	10.0	U
2,4-Dinitrotoluene	2.0	2.0	U
4-Nitrophenol	10.0	10.0	U
Fluorene	2.0	2.0	U
4-Chlorophenyl-phenylether	2.0	2.0	U
Diethylphthalate	2.0	2.0	U
4,6-Dinitro-2-methylphenol	10.0	10.0	U
N-Nitrosodiphenylamine	2.0	13.7	
4-Bromophenyl-phenylether	2.0	2.0	U
Hexachlorobenzene	2.0	2.0	U
Pentachlorophenol	10.0	10.0	U
Phenanthrene	2.0	2.0	

WASTE STREAM TECHNOLOGY

Lab ID Number	WS25607
Client ID	METALS TREATED TRIAL 1/COMP 1B&2B
Date Extracted	03/12/96
Date Analyzed	03/12/96

Compound	Detection Limit/ QC Limits (%)	Result	Q
Anthracene	2.0	2.0	U
Di-n-butylphthalate	2.0	2.0	U
Fluoranthene	2.0	2.0	U
Pyrene	2.0	2.0	U
Benzidine	20.0	20.0	U
Butylbenzylphthalate	2.0	2.0	U
3,3-Dichlorobenzidine	4.0	4.0	U
Benzo[a]anthracene	2.0	2.0	U
Chrysene	2.0	2.0	U
Bis(2-ethylhexyl)phthalate	2.0	2.0	U
Di-n-octylphthalate	2.0	2.0	U
Benzo[b]fluoranthene	2.0	2.0	U
Benzo[k]fluoranthene	2.0	2.0	U
Benzo[a]pyrene	2.0	2.0	U
Indeno[1,2,3-cd]pyrene	2.0	2.0	U
Dibenz[a,h]anthracene	2.0	2.0	U
Benzo[g,h,i]perylene	2.0	2.0	U
Hexachlorobutadiene	2.0	2.0	U
4-Chloro-3-methylphenol	4.0	4.0	U
2-Fluorophenol (%)	21-100.	58.0	
Phenol-d6 (%)	10-94 .	40.0	
Nitrobenzene-d5 (%)	35-114.	95.0	
2-Fluorobiphenyl (%)	43-116.	89.0	
2,4,6-Tribromophenol (%)	10-123.	82.0	
Terphenyl-d14 (%)	33-141.	66.0	

Dilution Factor 1

Waste Stream Technology Inc.
Method 625 Method Blank Analysis
EPA 625 Report

Site: URS-PENN LANDFILL
Date Sampled: NA
Date Received: NA

Group Number: 9604-027
Report Units: PPB

Lab ID Number	MB031296	
Client ID	NA	
Date Extracted	03/12/96	
Date Analyzed	03/12/96	

Compound	Detection Limit/ QC Limits (%)	Result	Q
n-nitrosodimethylamine	2.0	2.0	U
Bis(2-chloroethyl)ether	2.0	2.0	U
Phenol	2.0	2.0	U
2-Chlorophenol	2.0	2.0	U
1,3-Dichlorobenzene	2.0	2.0	U
1,4-Dichlorobenzene	2.0	2.0	U
1,2-Dichlorobenzene	2.0	2.0	U
Bis(2-chloroisopropyl)ether	2.0	2.0	U
Hexachloroethane	2.0	2.0	U
N-nitroso-di-n-propylamine	2.0	2.0	U
Nitrobenzene	2.0	2.0	U
Isophorone	2.0	2.0	U
2-Nitrophenol	2.0	2.0	U
2,4-Dimethylphenol	2.0	2.0	U
Bis(2-chlorethoxy)methane	2.0	2.0	U
2,4-Dichlorophenol	2.0	2.0	U
1,2,4-Trichlorobenzene	2.0	2.0	U
Naphthalene	2.0	2.0	U
Hexachlorobutadiene	2.0	2.0	U
4-Chloro-3-methylphenol	4.0	4.0	U
Hexachlorocyclopentadiene	2.0	2.0	U
2,4,6-Trichlorophenol	2.0	2.0	U
2-Chloronaphthalene	2.0	2.0	U
Acenaphthylene	2.0	2.0	U
Dimethylphthalate	2.0	2.0	U
2,6-Dinitrotoluene	2.0	2.0	U
Acenaphthene	2.0	2.0	U
2,4-Dinitrophenol	10.0	10.0	U
2,4-Dinitrotoluene	2.0	2.0	U
4-Nitrophenol	10.0	10.0	U
Fluorene	2.0	2.0	U
4-Chlorophenyl-phenylether	2.0	2.0	U
Diethylphthalate	2.0	2.0	U
4,6-Dinitro-2-methylphenol	10.0	10.0	U
N-Nitrosodiphenylamine	2.0	2.0	U
4-Bromophenyl-phenylether	2.0	2.0	U
Hexachlorobenzene	2.0	2.0	U

WASTE STREAM TECHNOLOGY

Lab ID Number	MB031296	
Client ID	NA	
Date Extracted	03/12/96	
Date Analyzed	03/12/96	

Compound	Detection Limit/ QC Limits (%)	Result	Q
Pentachlorophenol	10.0	10.0	U
Phenanthrene	2.0	2.0	U
Anthracene	2.0	2.0	U
D-n-butylphthalate	2.0	2.0	U
Fluoranthene	2.0	2.0	U
Pyrene	2.0	2.0	U
Benzidine	20.0	20.0	U
Butylbenzylphthalate	2.0	2.0	U
3,3-Dichlorobenzidine	4.0	4.0	U
Benzo[a]anthracene	2.0	2.0	U
Chrysene	2.0	2.0	U
Bis(2-ethylhexyl)phthalate	2.0	79.6	
Di-n-octylphthalate	2.0	2.0	U
Benzo[b]fluoranthene	2.0	2.0	U
Benzo[k]fluoranthene	2.0	2.0	U
Benzo[a]pyrene	2.0	2.0	U
Indeno[1,2,3-cd]pyrene	2.0	2.0	U
Dibenz[a,h]anthracene	2.0	2.0	U
Benzo[g,h,i]perylene	2.0	2.0	U
2-Fluorophenol (%)	21-100	53.0	
Phenol-d6 (%)	10-94	36.0	
Nitrobenzene-d5 (%)	35-114	87.0	
2-Fluorobiphenyl (%)	43-116	91.0	
2,4,6-Tribromophenol (%)	10-123	75.0	
Terphenyl-d14 (%)	33-141	91.0	

Dilution Factor 1

MB denotes Method Blank
NA denotes Not Applicable.

Waste Stream Technology Inc.

40 CFR 136 Method 608 Pest-PCBs

EPA 608

Site: URS-PENN LANDFILL
Date Sampled: 03/11/96
Date Received: 03/11/96

Group Number: 9604-027
Report Units: ug/L
Matrix: AQUEOUS

Lab ID Number	WS25607
Client ID	METALS TREATED TRIAL 1/COMP 1B&2B
Date Extracted	03/12/96
Date Analyzed	03/14/96

Compound	Detection Limit/ QC Limits (%)	Result	Q
alpha-BHC	0.003	0.003	U
beta-BHC	0.006	0.006	U
gamma-BHC	0.003	0.003	U
delta-BHC	0.009	0.009	U
heptachlor	0.020	0.122	
aldrin	0.017	0.017	U
heptachlor epoxide	0.008	0.008	U
endosulfan I	0.005	0.005	U
dieldrin	0.005	0.005	U
4,4-DDE	0.005	0.005	U
endrin	0.011	0.011	U
endosulfan II	0.006	0.006	U
4,4'-DDD	0.005	0.005	U
endrin aldehyde	0.008	0.008	U
endosulfan sulfate	0.060	0.060	U
4,4'-DDT	0.018	0.018	U
chlordane	0.069	0.069	U
toxaphene	0.310	0.310	U
aroclor 1016	0.270	0.270	U
aroclor 1221	0.230	0.230	U
aroclor 1232	0.380	0.380	U
aroclor 1242	0.180	0.180	U
aroclor 1248	0.092	0.092	U
aroclor 1254	0.052	0.052	U
aroclor 1260	0.060	0.060	U
Tetrachloro-m-xylene (%)	60-150.	47.700	#
Decachlorobiphenyl (%)	60-150.	88.500	

Dilution Factor 1

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.
Method 608 Method Blank Results
EPA 608 Report

Site: URS-PENN LANDFILL
Date Sampled: NA
Date Received: NA

Group Number: 9604-027
Report Units: PPB

Lab ID Number	MB96073	
Client ID	NA	
Date Extracted	03/13/96	
Date Analyzed	03/14/96	
Compound	**Detection Limit/ QC Limits (%)**	**Result**	**Q**
alpha-BHC	0.003	0.003	U
beta-BHC	0.006	0.006	U
gamma-BHC	0.003	0.003	U
delta-BHC	0.009	0.009	U
heptachlor	0.020	0.020	U
aldrin	0.017	0.017	U
heptachlor epoxide	0.008	0.008	U
endosulfan I	0.005	0.005	U
dieldrin	0.005	0.005	U
4,4'-DDE	0.005	0.005	U
endrin	0.011	0.011	U
endosulfan II	0.006	0.006	U
4,4'-DDD	0.005	0.005	U
endrin aldehyde	0.008	0.008	U
endosulfan sulfate	0.060	0.060	U
4,4'-DDT	0.018	0.018	U
chlorodane	0.069	0.069	U
toxaphene	0.310	0.310	U
aroclor 1016	0.270	0.270	U
aroclor 1221	0.230	0.230	U
aroclor 1232	0.380	0.380	U
aroclor 1242	0.180	0.180	U
aroclor 1248	0.092	0.092	U
aroclor 1254	0.052	0.052	U
aroclor 1260	0.060	0.060	U
Tetrachloro-m-xylene (%)	60-150	98.000	
Decachlorobiphenyl (%)	60-150	113.000	

Dilution Factor 1

MB denotes Method Blank
NA denotes Not Applicable.

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

Method 150.1

Site: URS-PENN LANDFILL
Date Sampled: 03/11/96
Date Received: 03/11/96

Group Number: 9604-027
Report Units: pH UNITS
Matrix: AQUEOUS

WST Lab ID	Client ID	Analysis Date	pH RESULT
WS25607	METALS TREATED TRIAL 1/COMP 1B&2B	03/12/96	11.47

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

Analysis Result Report

Site: URS-PENN LANDFILL
Date Sampled: 03/11/96
Date Received: 03/11/96
Matrix: AQUEOUS

Group Number: 9604-027
Report Units: mg/L
BOD & COD Units: mg O2/L
Alkalinity: mg/L as CaCO3

	Lab ID Number:	WS25607
	Client ID:	METALS TREATED TRIAL 1/COMP 1B&2B

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Total Suspended Solids	4.0	< 4	03/13/96	EPA 160.2
Alkalinity	5.0	1020	03/13/96	EPA 310.1
Biochemical Oxygen Demand	50.0	< 50	03/18/96	EPA 405.1
Chemical Oxygen Demand	100.0	311	03/15/96	ASTM
Ammonia Nitrogen	0.1	732	03/13/96	EPA 350.3

WASTE STREAM TECHNOLOGY

Waste Stream Technology Inc.

Metals Analysis Result Report

Site: URS-PENN LANDFILL
Date Sampled: 03/11/96
Date Received: 03/11/96

Group Number: 9604-027
Report Units: mg/L
Matrix: AQUEOUS

Lab ID Number:	WS25607
Client ID:	METALS TREATED TRIAL 1/COMP 1B&2B
Date Extracted:	03/12/96

Analyte	Detection Limit	Result	Date Analyzed	Analysis Method
Zinc by ICP	0.019	< 0.019	03/12/96	EPA 200.7
Lead by ICP	0.120	< 0.120	03/12/96	EPA 200.7
Cadmium by ICP	0.015	< 0.015	03/12/96	EPA 200.7
Cobalt by ICP	0.030	< 0.030	03/12/96	EPA 200.7
Nickel by ICP	0.032	< 0.032	03/12/96	EPA 200.7
Barium by ICP	0.011	0.051	03/12/96	EPA 200.7
Manganese by ICP	0.003	< 0.003	03/12/96	EPA 200.7
Iron by ICP	0.063	< 0.063	03/12/96	EPA 200.7
Chromium by ICP	0.011	< 0.011	03/12/96	EPA 200.7
Magnesium by ICP	0.153	1.500	03/12/96	EPA 200.7
Vanadium by ICP	0.040	< 0.040	03/12/96	EPA 200.7
Aluminum by ICP	0.120	< 0.120	03/12/96	EPA 200.7
Beryllium by ICP	0.003	< 0.003	03/12/96	EPA 200.7
Calcium by ICP	0.224	39.200	03/12/96	EPA 200.7
Copper by ICP	0.011	< 0.011	03/12/96	EPA 200.7
Silver by ICP	0.015	< 0.015	03/12/96	EPA 200.7
Potassium by ICP	1.250	135.000	03/13/96	EPA 200.7
Sodium by ICP	0.157	884.000	03/13/96	EPA 200.7
Arsenic by GFAA	0.005	< 0.005	03/13/96	EPA 206.2
Antimony by GFAA	0.009	< 0.009	03/14/96	EPA 204.2
Selenium by GFAA	0.003	< 0.003	03/13/96	EPA 270.2
Thallium by GFAA	0.003	< 0.003	03/13/96	EPA 279.2
Mercury by Cold Vapor	0.001	< 0.001	03/13/96	EPA 245.2

WASTE STREAM TECHNOLOGY

Upstate Laboratories inc.

Shipping: 6034 Corporate Dr. • E. Syracuse, NY 13057-1017 • (315) 437-0255 • Fax (315) 437-1209
Mailing: Box 289 • Syracuse, NY 13206
Albany (518) 459-3134
Binghamton (607) 724-0478
Buffalo (716) 662-2118
Rochester (716) 436-9070
New Jersey (201) 703-1324

March 18, 1996

Mr. Paul Morrow
Laboratory Manager
Waste Stream Technology, Inc.
302 Grote St.
Buffalo, NY 14207-2496

Re: Analysis Report #07296016 - URS-Penn Ave

Dear Mr. Morrow:

Please find enclosed the results for your samples which were received on March 12, 1996.

We have included the Chain of Custody Record as part of your report. You may need to reference this form for a more detailed explanation of your sample. Samples will be disposed of approximately one month from final report date.

Should you have any questions, please feel free to give us a call.

Thank you for your patronage.

Sincerely,

UPSTATE LABORATORIES, INC.

Anthony J. Scala
Director

AJS/lw

Enclosures: report, methodology

cc/encs: N. Scala, ULI
file

Note: Faxed results were given to your office on 3/15/96. AJS

Disclaimer: The test results and procedures utilized, and laboratory interpretations of data obtained by ULI as contained in this report are believed by ULI to be accurate and reliable for sample(s) tested. In accepting this report, the customer agrees that the full extent of any and all liability for actual and consequential damages of ULI for the services performed shall be equal to the fee charged to the customer for the services as liquidated damages.

DATE: 03/18/96

Upstate Laboratories, Inc.
nalysis Results
eport Number: 07296016
Client I.D.: WASTE STREAM TECHNOLOGY, INC.

APPROVAL:
QC:
Lab I.D.: 10170
Sampled by: Client

ID:07296016 Mat:Water URS-PENN AVE METALS TREATED TRIAL 1/COMP 1B & 2B 03/11/96 C 1500H

PARAMETERS	RESULTS	KEY	FILE#
Total Kjeldahl Nitrogen	210mg/l		WB2133

ID:07296017 Mat:Water PEN AVE UNTREATED TRIAL 1/COMP 1B & 2B 1200H 03/08/96 C

PARAMETERS	RESULTS	KEY	FILE#
Total Kjeldahl Nitrogen	280mg/l		WB2133

UPSTATE LABORATORIES, INC.

WASTE STREAM TECHNOLOGY, INC.

KEY TO ANALYSIS REPORT #07296016:

ULI I.D.s: 07296016-017

Parameter	Method	Reference
Total Kjeldahl Nitrogen	351.3	1

Method Reference Key:

1 = "Methods for the Chemical Analysis of Water and Waste," USEPA, Environmental Monitoring Systems Laboratory, Cincinnati, EPA 600/4-79-020, revised March 1993.

WASTESTREAM TECHNOLOGY

302 GROTE STREET
BUFFALO, NY 14207
(716) 876-5290

9604-27 DT 3/27/96
~~9605~~ - 034

3/15 #DD

CHAIN OF CUSTODY RECORD

PROJECT NO: | SITE NAME: URS - PENN AVE

SAMPLERS (SIGNATURE): Greg Ignagni

SAMPLE NO.	DATE	TIME	COMP	GRAB	MATRIX	SAMPLE LOCATION	SIZE & NO. OF CONTAINERS	TSS	pH	METALS	TOC	TKN	PRESERVATIVES	REMARKS
	3/11/96	1500	X 1B+2B			METALS TREATED TRIAL 1 / COMP. 1B+2B	1x1L	X	X	X				WS257607
16						11	1x1L				X (15 MIN TC)	X		

- FAX RESULTS BY FRI 3/15

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
Greg Ignagni	3/11/96 1500	Kelli Mauer	Kelli Mauer	3/11/96 14:00	
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
	3/12/96 0945	K. [illegible]			

SPECIAL INSTRUCTIONS:

cc/UPS

TURNAROUND TIME _____

LAB USE: REFRIGERATOR # _____ SHELF # _____ GROUP # _____ DUE DATE _____

WASTESTREAM TECHNOLOGY
302 GROTE STREET
BUFFALO, NY 14207
(716) 876-5290

9604-020 ON 3/27/96
9605-033

3/15 HDD

CHAIN OF CUSTODY RECORD

PROJECT NO: [redacted] - REH AVE.

SITE NAME:

SAMPLERS (SIGNATURE):

SAMPLE NO.	DATE	TIME	COMP	GRAB	MATRIX	SAMPLE LOCATION	SIZE & NO. OF CONTAINERS	OFG	TOC	TKN	REACTIVITY	IGNITABILITY	PRESERVATIVES	REMARKS
	3/8/96	1200	1BX 2B			UNTREATED COMP. TRIAL 1 / 1BT2B	(1)X|L	X	X					W5255 94 (1)
	↓	↓	↓			"	1X|L							↓
						OIL TREATED / COMP TRIAL 1 / 1BT2B	1X|L			X	X			[redacted]
						"	1X|L							↓
						CHEMICALLY / COMP TRIAL 1 / 1BT2B	1X|L							[redacted]

- FAX RESULTS by Fri. 3/15

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
[signature]	3/8/96 1200	[signature]	[signature]	3/11/96 14:45	
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
				3/12/96 ~~945~~ 1445	[signature]

SPECIAL INSTRUCTIONS:

TURNAROUND TIME _____ cc WES

LAB USE: REFRIGERATOR # _____ SHELF # _____ GROUP # _____ DUE DATE _____

WASTE STREAM TECHNOLOGY

302 GROTE STREET
BUFFALO, NY 14207
(716) 876-5290

9604 - 027
~~9605 - 034~~

CHAIN OF CUSTODY RECORD

PROJECT NO: SITE NAME: URS - PENN AVE

SAMPLERS (SIGNATURE): Gregory Lenard

SAMPLE NO.	DATE	TIME	COMP	GRAB	MATRIX	SAMPLE LOCATION	SIZE & NO. OF CONTAINERS	VOC's	SEMI-VOC's	PCB's	PESTICIDES	METALS	BOD	COD	NH_3 NO_3 PRESERVATIVES	REMARKS
	3/11/96	500	X 3+2B			METALS TREATED/COMP TRIAL 1 3+2B	2X40mL	X								WD95607
						"	1X1L		X							
						"	1X1L			X	X					
						"	1X500					X				
						"	1X1L						X	X	X	
						~~BLK~~										

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
Gregory Lenard	3/11/96 500	Kim Marcy			
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)

SPECIAL INSTRUCTIONS:

TURNAROUND TIME _____

LAB USE: REFRIGERATOR # _____ SHELF # _____ GROUP # _____ DUE DATE _____

WASTE STREAM TECHNOLOGY
302 GROTE STREET
BUFFALO, NY 14207
(716) 876-5290

4604 - 027
4605 - 034

CHAIN OF CUSTODY RECORD

PROJECT NO:	SITE NAME: LRS - PENN AVE
SAMPLERS (SIGNATURE):	

SAMPLE NO.	DATE	TIME	COMP	GRAB	MATRIX	SAMPLE LOCATION	SIZE & NO. OF CONTAINERS	TSS	PH	ALKALINITY	TOC	TKN			PRESERVATIVES	REMARKS
	3/11/96	1500	X 1B+2B			METALS TREATED / COMP TRIAL 1 / 1B+2B	1x1L	X	X	X						
						11	1x1L				X	X				

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
	3/11/96 1500				
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)

SPECIAL INSTRUCTIONS:

TURNAROUND TIME _____

LAB USE: REFRIGERATOR # _____ SHELF # _____ GROUP # _____ DUE DATE _____

APPENDIX B

AIR EMISSIONS CALCULATIONS

URS CONSULTANTS, INC.

PROJECT Pennsylvania Ave. Landfill
SUBJECT Estimate of Contaminant Emissions from Air Stripper

PAGE ..... OF .....
SHEET NO. ..... OF .....
JOB NO. 35331.07
MADE BY KEP DATE 5/22/96
CHKD. BY CWP DATE 5/22/96

REF. PAGE

OBJECTIVE: Estimate the contaminant emissions from the proposed groundwater treatment and compare them with NYSDEC Air Guide-1 guidelines to evaluate both annual and short-term air quality impacts.

ASSUMPTIONS:

1. The only source of contaminant emissions from the groundwater treatment system will be the air stripper.
2. The air stripper operates at a rate of 30 gpm groundwater treatment.
3. The system is assumed to operate 40 hrs/week and 52 weeks/year.

REFERENCES:

1. Feasibility Study Report for the Pennsylvania Avenue Landfill, URS Consultants, Final September 1994

2. NYSDEC Air Guide-1 Guidelines for the Control of Toxic Ambient Air Contaminants, Appendix B April 1994

The following is an explanation and sample calculation made in the attached Tables.

AIR STRIPPER INFLUENT DESIGN (ug/L)

The concentration of the contaminants in the off-gas from the air stripper is estimated based on the level of contamination present in the groundwater. Air emissions were calculated for three levels of contamination: 1. Average detected concentration; 2. Design Concentration and; 3. Actual leachate.

The results of the groundwater levels are summarized in Reference 1.

Actual Contaminant Emissions (lb/h)

To be conservative in the estimation of concentrations of the contaminants in the air stripper off-gas, it is assumed that 100% of the contamination is removed from the water and emitted to the atmosphere. Based on the water flow rate, a material balance is performed:

Vinyl Chloride = 14.6 ug/l

$$14.6 \frac{\mu g}{l} \left| \frac{1\ g}{10^6 \mu g} \right| \frac{1\ lb}{454\ g} \left| \frac{3.785\ l}{gal} \right| \frac{20\ gal}{min} \left| \frac{60\ min}{hr} \right| = 1.46 \times 10^{-4} \frac{lb}{hr}$$

Annual Emissions: Assuming system operates 40 hr/wk and 52 wks/yr

$$1.46 \times 10^{-4} \frac{lb}{hr} \left| \frac{40\ hr}{week} \right| \frac{52\ wk}{yr} \left| = 0.30 \frac{lb}{yr} \right.$$

Air Guide - 1 Guidelines: (Ref 2)

Actual Annual Impact. The maximum Actual Annual Impact, Ca, from air stripper off-gas is calculated using the effective stack height, he, and the annual emission rate, Qa, in the following equation:

$$Ca\ (\mu g/m^3) = \frac{6.0 \times Qa}{he^{2.25}} \quad \text{where Qa is in lb/yr and he in feet.}$$

$$Ca = \frac{6.0\ (0.30\ lb/yr)}{35^{2.25}} = 6.04 \times 10^{-4}\ \mu g/m^3$$

Potential Annual Impact: The maximum Potential Annual Impact, Cp, from air stripper off-gas is calculated using the effective stack height, he, and the hourly emission rate, Q, in the following equation:

$$Cp\ (\mu g/m^3) = \frac{52500 \times Q}{he^{2.25}} \quad \text{where Q is in lb/hr; he in feet.}$$

$$Cp = \frac{52500\ (1.46 \times 10^{-4}\ lb/hr)}{35^{2.25}} = 2.57 \times 10^{-3}\ \mu g/m^3$$

Reduction of Impacts

In this case, the building and stack height are assumed to be equal (35 ft). Therefore, the stack height to building ratio is equal to one and Ca and Cp are multiplied by a factor of 1.0. This is a conservative assumption

Short-Term Impact: the maximum Short-Term Impact, C_{ST}, from the air stripper off-gas is calculated from the following:

$C_{ST}\ (\mu g/M^3) = Cp \times 65$ where Cp is the maximum Potential Annual Impact as adjusted by the above reduction factor.

$$C_{ST} = 2.57 \times 10^{-3}\ \mu g/m^3\ (65) = 1.67 \times 10^{-1}\ \mu g/m^3$$

Annual Guideline Concentration (AGC) and Short-Term Guideline Conc. (SGC):

The calculated annual impacts Ca and Cp are evaluated against its AGC (Ref 2) and C_{ST} is compared to SGCs to determine the acceptability of the source

For Vinyl Chloride:

Ca	Cp	AGC	Exceed AGC (Y/N)	C_{ST}	SGC	Exceed SGC (Y/N)
6.04×10^{-4}	2.57×10^{-3}	2.0×10^{-2}	N	1.67×10^{-1}	1300	N

Other compounds that may be found in the air stripper off-gas are compared to their associated AGC and SGC in the attached Tables

TABLE B-1

Pennsylvania Avenue Landfill

Estimate of Contaminant Emissions from Air Stripper
Using Average Detected Concentration Values from PAL RI Data

CHEMICAL	CAS Registry Number	Air Stripper Influent Concentration (µg/l) (Avg Detect Conc.)	Contaminant Emissions (lb/h)	Contaminant Emissions (lb/yr)	Calculated Max. Actual Annual Impact (µg/m³) Ca	AGC (µg/m³)	% of Allowable Emissions	Calculated Max. Potential Annual Impact (µg/m³) Cp	AGC (µg/m³)	% of Allowable Emissions	Calculated Max. Short Term Impact (µg/m³) Cst	SGC (µg/m³)	% of Allowable Emissions
Vinyl Chloride	75-01-4	14.6	1.46E-04	0.30	6.1E-04	2.0E-02	3.058973%	2.6E-03	2.0E-02	12.87%	1.7E-01	1300	0.012668%
Acetone	67-64-1	21.9	2.19E-04	0.46	9.2E-04	14,000	0.000007%	3.9E-03	14,000	0.00%	2.5E-01	140,000	0.000179%
Carbon Disulfide	75-15-0	2.8	2.80E-05	0.06	1.2E-04	7	0.001676%	4.9E-04	7	0.01%	3.2E-02	710	0.004519%
1,1-Dichloroethene	75-35-4	36.6	3.66E-04	0.78	1.5E-03	2.0E-02	7.668364%	6.5E-03	2.0E-02	32.26%	4.2E-01	2,000	0.020988%
1,2-Dichloroethene (total)	540-59-0	135.4	1.35E-03	2.82	5.7E-03	1,900	0.000299%	2.4E-02	1,900	0.00%	1.6E+00	180,000	0.000817%
1,1,1-Trichloroethane	71-55-6	23.1	2.31E-04	0.48	9.7E-04	1,000	0.000097%	4.1E-03	1,000	0.00%	2.6E-01	450,000	0.000059%
Trichloroethene	79-01-6	24.6	2.46E-04	0.51	1.0E-03	4.5E-01	0.229074%	4.3E-03	4.5E-01	0.96%	2.8E-01	33,000	0.000854%
Benzene	71-43-2	148.2	1.48E-03	3.04	6.1E-03	1.2E-01	5.105272%	2.6E-02	1.2E-01	21.48%	1.7E+00	30	5.583891%
Tetrachloroethene	127-18-4	14.8	1.48E-04	0.30	6.1E-04	7.5E-02	0.815728%	2.6E-03	7.5E-02	3.43%	1.7E-01	81,000	0.000207%
Toluene	108-88-3	1,549.9	1.55E-02	32.25	6.5E-02	2,000	0.003247%	2.7E-01	2,000	0.01%	1.8E+01	89,000	0.019954%
Chlorobenzene	108-90-7	202.6	2.03E-03	4.22	8.5E-03	20	0.042490%	3.6E-02	20	0.18%	2.3E+00	11,000	0.021124%
Ethylbenzene	100-41-4	299.7	3.00E-03	6.24	1.3E-02	1,000	0.001258%	5.3E-02	1,000	0.01%	3.4E+00	100,000	0.003434%
Ammonia	7664-41-7	135.6	1.36E-03	2.82	5.7E-03	360	0.001578%	2.4E-02	360	0.01%	1.6E+00	4,000	0.038832%
Xylene (total)	1330-20-7	1,587.3	1.59E-02	33.03	6.7E-02	300	0.022171%	2.8E-01	300	0.09%	1.8E+01	100,000	0.018187%

1. Air Stripper Influent Concentration - The level of contaminant assumed to be in the influent water stream to the air stripper
   This number is the average detected value based on PAL RI data.
2. Contaminant Emissions - Assumes that 100% of the volatile contaminants in the water are removed by the air stripper
   Assume 20 gpm groundwater flow rate and 3,000 cfm air flow rate.
3. Assumed height of stack (ft.): 35 Assume building height of 35 ft

TABLE B-2

Estimate of Contaminant Emissions from Air Stripper
Using Design Concentration Values Developed in PAL FS

CHEMICAL	CAS Registry Number	Air Stripper Influent Concentration (µg/l) (Design Conc.)	Contaminant Emissions (lb/h)	Contaminant Emissions (lb/yr)	Calculated Max. Actual Annual Impact (µg/m³) Ca	AGC (µg/m³)	% of Allowable Emissions	Calculated Max. Potential Annual Impact (µg/m³) Cp	AGC (µg/m³)	% of Allowable Emissions	Calculated Max. Short Term Impact (µg/m³) Cst	SGC (µg/m³)	% of Allowable Emissions
Vinyl Chloride	75-01-4	58.5	5.85E-04	1.22	2.5E-03	2.0E-02	12.256843%	1.0E-02	2.0E-02	51.56%	6.7E-01	1300	0.051561%
Acetone	67-64-1	87.7	8.77E-04	1.82	3.7E-03	14,000	0.000026%	1.5E-02	14,000	0.00%	1.0E+00	140,000	0.000718%
Carbon Disulfide	75-15-0	5.0	5.00E-05	0.10	2.1E-04	7	0.002993%	8.6E-04	7	0.01%	5.7E-02	710	0.008069%
1,1-Dichloroethene	75-35-4	148.5	1.47E-03	3.05	6.1E-03	2.0E-02	30.694488%	2.8E-02	2.0E-02	129.12%	1.7E+00	2,000	0.083930%
1,2-Dichloroethene (total)	540-59-0	541.5	5.42E-03	11.27	2.3E-02	1,900	0.001194%	9.5E-02	1,900	0.01%	6.2E+00	190,000	0.003266%
1,1,1-Trichloroethane	71-55-6	92.3	9.23E-04	1.92	3.9E-03	1,000	0.000387%	1.6E-02	1,000	0.00%	1.1E+00	450,000	0.000235%
Trichloroethene	79-01-6	98.5	9.85E-04	2.05	4.1E-03	4.5E-01	0.917226%	1.7E-02	4.5E-01	3.68%	1.1E+00	33,000	0.003420%
Benzene	71-43-2	584.9	5.85E-03	12.17	2.5E-02	1.2E-01	20.424580%	1.0E-01	1.2E-01	85.92%	6.7E+00	30	22.339385%
Tetrachloroethene	127-18-4	58.5	5.85E-04	1.22	2.5E-03	7.5E-02	3.268492%	1.0E-02	7.5E-02	13.75%	6.7E-01	81,000	0.000828%
Toluene	108-88-3	6,189.4	6.20E-02	129.00	2.6E-01	2,000	0.012988%	1.1E+00	2,000	0.05%	7.1E+01	89,000	0.079812%
Chlorobenzene	108-90-7	580.0	5.80E-03	12.07	2.4E-02	20	0.121521%	1.0E-01	20	0.51%	6.6E+00	11,000	0.060415%
Ethylbenzene	100-41-4	1,198.7	1.20E-02	24.94	5.0E-02	1,000	0.005023%	2.1E-01	1,000	0.02%	1.4E+01	100,000	0.013735%
Xylene (total)	1330-20-7	6,349.2	6.35E-02	132.12	2.7E-01	300	0.088685%	1.1E+00	300	0.37%	7.3E+01	100,000	0.072749%
Ammonia	7664-41-7	517.0	5.17E-03	10.76	2.2E-02	360	0.006018%	9.1E-02	360	0.03%	5.9E+00	4,000	0.148095%

1. Air Stripper Influent Concentration - The level of contaminant assumed to be in the influent water stream to the air stripper
   This number is the design concentration. Value developed in the PAL FS for the conceptual sizing & cost estimate of a PAL oil/leachate treatment system.
2. Contaminant Emissions - Assumes that 100% of the volatile contaminants in the water are removed by the air stripper.
   Assume 20 gpm groundwater flow rate and 3,000 cfm air flow rate.
3. Assumed height of stack (ft.): 35 Assume building height of 35 ft

TABLE B-3

Estimate of Contaminant Emissions from Air Stripper
Using Leachate Treatability Study Data

CHEMICAL	CAS Registry Number	Air Stripper Influent Concentration (µg/l) (leachate)	Contaminant Emissions (lb/h)	Contaminant Emissions (lb/yr)	Calculated Max. Actual Annual Impact (µg/m³) Ca	AGC (µg/m³)	% of Allowable Emissions	Calculated Max. Potential Annual Impact (µg/m³) Cp	AGC (µg/m³)	% of Allowable Emissions	Calculated Max. Short Term Impact (µg/m³) Cst	SGC (µg/m³)	% of Allowable Emissions
1,1-Dichloroethene	75-35-4	3.71	3.71E-05	0.08	1.6E-04	2.0E-02	0.777314%	6.5E-04	2.0E-02	3.27%	4.3E-02	2,000	0.002125%
Toluene	108-88-3	1.62	1.62E-05	0.03	6.8E-05	2,000	0.000003%	2.9E-04	2,000	0.00%	1.9E-02	89,000	0.000021%
Ammonia	7664-41-7	300,000.0	3.00E+00	6,242.75	1.3E+01	360	3.491978%	5.3E+01	360	14.69%	3.4E+03	4,000	85.935400%
Xylene (total)	1330-20-7	33.49	3.35E-04	0.70	1.4E-03	300	0.000468%	5.9E-03	300	0.00%	3.8E-01	100,000	0.000384%

1. Air Stripper Influent Concentration - The level of contaminant assumed to be in the influent water stream to the air stripper This number is the concentration measured in the air stripper influent during the PAL leachate treatability study.
2. Contaminant Emissions - Assumes that 100% of the volatile contaminants in the water are removed by the air stripper. Assume 20 gpm groundwater flow rate and 3,000 cfm air flow rate.
3. Assumed height of stack (ft.): 35 Assume building height of 35 ft

3533I/CAD 1=300 5/30/96-4 ETM

N

BELT PARKWAY

FRESH CREEK BASIN

HP-0W-1A
HP-317A
HP-0W-2A
HP-320A
HP-102UA
HP-320
HP-0W-3A
ORW-2
HP-319
HP-0W-3
HP-0W-4A
ORW-1
HP-402
HP-0W-5A
HP-404
HP-107
HP-313
HP-0W-6A
HP-309

APPROXIMATE EXTENT
OF FLOATING PRODUCT

JAMAICA BAY

HENDRIX CREEK

NOTE: ALL WELLS SCREENED IN SHALLOW (WATER TABLE) AQUIFER.

LEGEND

- ○ WELL SAMPLED FOR TREATABILITY STUDY
- □ WELL SAMPLED DURING REMEDIAL INVESTIGATION. USED TO ESTIMATE LEACHATE CONCENTRATIONS IN FS.
- ▲ WELL SAMPLED DURING REMEDIAL INVESTIGATION. USED TO ESTIMATE BOD, OIL AND GREASE AND PETROLEUM HYDROCARBON CONCENTRATIONS.

300 0 300
SCALE IN FEET

MONITORING WELL
LOCATION MAP

URS CONSULTANTS, INC.

FIGURE 2-1

CC-3868