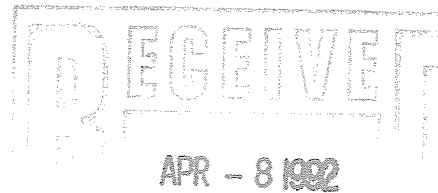


Final Feasibility Study Report

Pfohl Brothers Landfill

***Cheektowaga, New York
Site Number 9-15-043***



Prepared for:

***New York State
Department Of Environmental Conservation
50 Wolf Road, Albany, New York 12233***

***Thomas C. Jorling
Commissioner***

Division Of Hazardous Waste Remediation

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April, 1992



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April 7, 1992

Mr. A. Joseph White, P.E.
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Bureau of Western Remedial Action
Division of Hazardous Waste Remediation
New York State Department of
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50 Wolf Road
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Project: Pfohl Brothers Landfill RI/FS
NYSDEC No. D-001894
CDM No. 897-12-FH-FNFL

Subject: Final Feasibility Study for the Pfohl Brothers Landfill RI/FS

Dear Mr. White:


Please find enclosed 25 copies of an errata to the Pfohl Brothers Landfill Draft Feasibility Study Report, dated April 1992. These errata sheets address comments received as of January 30, 1992. The Draft Feasibility Study and this errata constitute the Final Feasibility Study Report.

Please note that we have revised the observed concentration ranges in Table 2.3-2 to more clearly delineate between landfill soils and the sediments of surface water adjacent to the site. The range of detected concentrations in landfill soils represent data from onsite borings and leachate seep sediments; observed concentration ranges for sediments include data from the drainage ditches and Aero Creek sediments.

If you have any questions or comments, please do not hesitate to call.

Very truly yours,

CAMP DRESSER & McKEE


Lee Guterman
Project Manager

Enclosure

(PBLF4/25)lg

1.2.3 PREVIOUS INVESTIGATIONS

In June 1982, the United States Environmental Protection Agency (EPA) contracted with Fred C. Hart Associates to perform a hazardous ranking of the site. Ten water and four sediment samples were obtained at various seep locations, drainage ditches, and domestic wells and were analyzed for organics, inorganics, sulfide, cyanide, and ammonia. The contaminants detected in water samples obtained from a spring flowing into a drainage ditch along the south side of Aero Lake were most notably chlorobenzene, benzene and N-nitrosodiphenylamine at concentrations of 85, 34, and 11 parts per billion (ppb), respectively.

In February 1984, the property owner's law firm, Hodgson, Russ, Andrews, Woods and Goodyear, commissioned Ecology and Environment, Inc., to perform an additional investigation of the site. The objective of the investigation was to determine if the landfill at the time posed, or had the potential to pose, either an environmental or public health threat according to Superfund and related State legislation and regulations. As part of the investigation, ground water, sediment, and leachate seep samples were collected and analyzed for volatile organics, semi-volatile organics, heavy metals, phenols, PCBs, and oil and grease.

In the western portion of Area B, barium concentrations of 49,600 ppm were detected in a leachate seep sample, and concentrations of chrysene, anthracene, and nickel were detected in the soil at 2.74, 2.08, and 94.1 ppm, respectively. Soil samples obtained at the southeastern corner of Area A had concentrations of fluoranthene and pyrene at 5.21 and 2.39 ppm, respectively. Acenaphthene was detected in the soil at the southeastern corner of Area C at a concentration of 76 ppm. Phenols and oil and grease were detected, but generally at low concentrations. Metal concentrations were high in many of the wells. Elevated concentrations of barium, lead, chromium, and cadmium were detected.

In November 1986, samples of leachate, soil, and waste from surface drums that contained a tar-like material were collected by the NYSDEC and analyzed by the NYSDOH. The contaminants detected in the waste samples from the drums were fluorene and phenanthrene at concentrations of 5,500 and 790 ppm, respectively. Within Area B, along the south side of Aero Lake the PCBs arochlor 1248 and arochlor 1254 were also found in the soil samples at concentrations of 0.07 and 0.03 ppm, respectively. Various heavy metals were also found in the soil, such as arsenic (38.9 ppm), barium (7,400 ppm), cadmium (48 ppm), chromium (60 ppm), lead (1,760 ppm), and mercury (1.4 ppm).

In 1990, CDM conducted the Remedial Investigation for the Pfohl Brothers Landfill site. The investigation consisted primarily of six major field activities. These included:

- Geophysical Survey
- Surface Water, Leachate Seep, and Sediment Sampling
- Gamma Survey - Phases I and II
- Test Pit Investigation
- Soil Boring Investigation
- Ground Water Investigation

Additional studies performed by NYSDEC and/or NYSDOH include:

- Lead Screening Survey
- Sampling and Analysis of Contaminants in Fish
- Radon Sampling of Homes
- Surface Soil Sampling
- Residential Well Survey and Sampling
- Residential Sump Sampling
- Cancer Incidents Investigation
- Health Survey

Additionally, NYSDEC and the NYSDOH collected supplemental data on ground water, surface water, surface soil and sediment quality from April 1989 through July 1991. A list of interim reports are presented in Table 1.2-1.

1.2.4 NATURE AND EXTENT OF CONTAMINATION

As a result of the RI, areas of contamination have been defined and characterized for drummed waste, soils, shallow ground water, bedrock aquifer, and leachate seepage and sediment samples. Complete laboratory results are reported in the Remedial Investigation Report (CDM 1991). The following subsections describe the extent of contamination in each of these media.

greater concentrations in areas B and C than in samples from Area A. Several of the inorganics were detected at higher concentrations in the soil samples as opposed to the drum samples.

The dioxin compound 2,3,7,8-TCDD was detected in residential surface soils at concentrations ranging from 0.0003-0.0009 ppb. Concentration ranges of 0.00026-0.00053 ppb and 0.45-1.8 ppb were detected in Aero Lake path surface soils and drainage ditch sediments, respectively. One sample collected from the property of the truck repair company situated in area C revealed a 2,3,7,8-TCDD concentration of 110 ppb.

The radiologic gamma survey indicated detections several times background levels in isolated locations. NYSDEC and NYSDOH (1990) have reported that the radiological analysis of soils and other objects indicate that radiologic hot spots are disseminated through areas B and C but that a large majority of the elevated gamma readings are in discrete areas of only a few square feet.

Furthermore, the radioactive waste material has become stabilized on the surface and subsurface of the landfill and does not present an airborne environmental hazard (NYSDEC/NYSDOH, 1990). The large variations in radionuclide concentrations present at the site suggest that while there are areas of higher soil activity, it is not uniformly spread throughout the area. The radiological results are thought to be related to radionuclide compounds present in the fly ash that was used as a daily cover material during landfill operations. In addition, radon testing done in homes along Pfohl Road showed that radon levels were consistently below the Federal action level of 4 PCi/L, and were on the low end of the range of levels found within the Town of Cheektowaga.

1.2.4.3 Ground Water of Unconsolidated Aquifer

Organic compounds detected in the drum, wastes and soil samples were also detected, for the most part, in the unconsolidated ground water aquifer. Detected compounds include: halogenated hydrocarbons, aromatics, phenols, dibenzofuran, and several phthalates and PAHs. In addition, one pesticide and PCB isomer were detected in one and two samples, respectively. Many inorganic constituents were detected in the unconsolidated aquifer above background concentrations and several, including antimony, barium, cadmium, copper, iron, lead, magnesium, manganese, mercury, and sodium were detected above ground water quality standards. In addition, common landfill leachate inorganic parameters were found to be elevated above background concentrations.

atmosphere. The wetland conditions and the leachate seep areas would be expected to preclude the release of fugitive particulates into the air from these areas when the ground is moist or when standing or flowing water is present.

1.4 FINDINGS OF THE PUBLIC HEALTH EVALUATION

Exposure scenarios have been evaluated in the Human Baseline Risk Assessment (HBRA, CDM-1991) and include the following components: media (i.e., groundwater, soil), exposure routes/pathways (i.e., ingestion of domestic water supply, dermal absorption while showering), the receptors (i.e., children, workers), and the site uses (i.e., present use or potential future uses of the site). Target cleanup levels are defined in this section as the chemical-specific ARAR per guidance of NYSDEC.

Carcinogenic and non-carcinogenic risks associated with each media for the unremediated site are summarized in Table 1.4-1 for present site uses and Table 1.4-2 for future site uses. The Hazard Index, shown in the tables, quantifies non-carcinogenic risk and is calculated as the ratio of chemical intake and the target reference dose. Carcinogenic risk of 10^{-6} means that there is a one in one million chance or that one out of every one million people is expected to contract cancer if exposed to COCs through the specified pathway. Total carcinogenic or non-carcinogenic risk was calculated in the Risk Assessment as the sum of risks for all exposure pathways and media.

Under present site use, the primary contributor to carcinogenic and non-carcinogenic risks to children and onsite workers at the landfill are exposures to landfill soils.

Under future site use, the primary contributors to carcinogenic and non-carcinogenic risk to the public and on-site workers are ingestion and dermal contact with groundwater from either the bedrock or unconsolidated aquifers. As expected, carcinogenic and non-carcinogenic risks associated with use of the unconsolidated aquifer are an order of magnitude greater than risks associated with use of the bedrock aquifer. Use of the unconsolidated aquifer is unlikely due to its low yield. However, use of the bedrock aquifer is a plausible future scenario.

Future risks attributable to landfill soils are also of risk to the public and onsite workers, as the frequency of exposure would significantly increase if access was unrestricted.

Exposure scenarios which link the exposure routes and media for present and for future site use, as shown in Tables 1.4-1 and 1.4-2 are discussed in detail in the HBRA. Scenarios identified for present uses for surface water are ingestion and dermal absorption while swimming in Aero Lake and dermal absorption by children playing in Ellicott Creek/drainage ditches; for leachate seeps are dermal absorption by children playing and workers clearing brush on the landfill site; for sediments are ingestion and dermal adsorption by children playing in drainage ditches/Aero Creek; and for landfill soils are ingestion and dermal absorption by children playing on the site.

Future use, as defined in the HBRA, is the development of a residence over the existing landfill and use of the ground water aquifer for a potable water supply. For future use, surface water and sediment exposure scenarios, and therefore the risk, are the same as for present uses. Future use exposure scenarios for landfill soils are ingestion and dermal adsorption by children. Future use groundwater exposure scenarios include dermal absorption and inhalation of airborne contaminants while showering, plus ingestion of groundwater water.

TABLE 1.4-1

SUMMATION OF TOTAL ESTIMATED RISKS
FOR THE PRESENT SITE USE EXPOSURE PATHWAYS

EXPOSURE PATHWAYS	EXPOSURE ROUTES	TOTAL ESTIMATED RISK	HAZARD INDEX	INCREMENTAL BLOOD LEAD LEVEL (µg/dl)
PUBLIC				
Landfill Soils	Ingestion	1.7E-05	5.2E-02	2.8
	Dermal	2.4E-05	1.0E-03	
Residential Soils	Ingestion	4.3E-06	2.3E-02	1.6
	Dermal	1.7E-07	—	—
Drainage Ditch and Aero Creek Sediments	Ingestion	8.4E-07	5.4E-03	0.55
	Dermal	1.0E-06	2.9E-04	—
Leachate Seeps	Dermal	6.9E-08	9.2E-03	—
Ellicott Creek Sediments	Ingestion	3.0E-07	3.3E-03	0.12
	Dermal	2.0E-07	9.1E-05	—
Drainage Ditch Surface Water	Dermal	—	1.2E-03	—
Aero Lake (swimming)	Ingestion	9.0E-10	5.9E-05	—
	Dermal	3.3E-07	2.7E-03	—
Ellicott Creek Surface Water	Ingestion	—	—	—
	Dermal	6.3E-08	2.2E-03	—
	TOTAL =	4.8E-05	1.1E-01	5.1
WORKERS				
Landfill Soils (On-site Employees)	Ingestion	1.5E-03	3.4E-02	3.3
	Dermal	8.4E-04	1.9E-03	—
	TOTAL =	2.3E-03	3.6E-02	—
Leachate Seeps (State Employees)	Dermal	2.1E-07	2.0E-02	—
	TOTAL =	2.1E-07	2.0E-02	3.3

TABLE 1.4-2

**SUMMATION OF TOTAL ESTIMATED RISKS
FOR THE FUTURE SITE USE EXPOSURE PATHWAYS**

MEDIA	EXPOSURE ROUTES	TOTAL ESTIMATED RISK	HAZARD INDEX	INCREMENTAL BLOOD LEAD LEVEL (µg/dl)
PUBLIC				
Landfill Soils	Ingestion	1.5E-04	2.6E-01	14
	Dermal	6.4E-06	2.3E-02	—
Drainage Ditch and Aero Creek Sediments	Ingestion	8.4E-07	5.4E-03	0.55
	Dermal	1.0E-06	2.9E-04	—
Ellicott Creek Sediments	Ingestion	3.0E-07	3.3E-03	—
	Dermal	2.0E-07	9.1E-05	—
Leachate Seeps	Dermal	2.2E-06	1.7E-01	—
Drainage Ditch Surface Water	Dermal	—	1.1E-03	—
Aero Lake (swimming)	Ingestion	9.0E-10	5.9E-05	—
	Dermal	3.3E-07	2.7E-03	—
Ellicott Creek Surface Water	Ingestion	—	—	—
	Dermal	6.3E-08	2.2E-03	—
Bedrock Aquifer Groundwater	Ingestion	3.0E-04	1.2	4.7
	Dermal ^a	1.1E-04	2.2E-01	—
	Inhalation ^a	3.9E-10	2.7E-07	—
	TOTAL^b =	5.7E-04	1.9	19.25
Unconsolidated Aquifer Groundwater	Ingestion	2.6E-03	2.0	42
	Dermal ^a	1.6E-03	6.8E-01	—
	Inhalation ^a	2.2E-10	2.6E-05	—
	TOTAL^b =	4.4E-03	3.1	57
WORKERS				
Landfill Soils (On-site Employees)	Ingestion	1.5E-03	3.4E-02	—
	Dermal	8.4E-04	1.9E-03	—
	TOTAL =	2.3E-03	3.6E-02	—
Leachate Seeps (State Employees)	Dermal	2.1E-07	2.0E-02	—
	TOTAL =	2.1E-07	2.0E-02	—

Source: Baseline Risk Assessment Pfohl Brothers Landfill, May 1991.

- ^a The dermal and inhalation pathways are associated with dermal absorption while showering and inhalation of airborne contaminants while showering.
- ^b Total estimated risks for future site use estimated separately for bedrock aquifer use and unconsolidated aquifer use.

Table 3-1

PFOHL BROTHERS LANDFILL - SUMMARY OF ARAR VALUES FOR COCs AND REGULATED COMPOUNDS BY MEDIA AND EXPOSURE PATHWAY

MEDIA	EXPOSURE PATHWAY	COC (Risk-Based)	ARAR (ppb)	Regulated Compound	ARAR (ppb)
Surface Water (Ellicott Creek & Aero Lake)	Ingestion of surface water and dermal contact with Aero Lake surface water while swimming			Chlorobenzene	5 ^a
				Aluminum	100 ^a
Leachate Seeps	Dermal adsorption of drainage ditch surface waters and Ellicott Creek surface water	Bis(2-ethylhexyl)phthalate	50 ^c	Benzene	ND(2) ^c
				Chlorobenzene	5 ^c
				1,2 dichlorobenzene	4.7 ^c
				1,2 trans dichloroethene	5 ^c
				1,4 dichlorobenzene	4.7 ^c
Leachate Seeps	Dermal exposure by children and workers			phenol	1 ^c
				Benzo(a) anthracene	.002 ^c
				Benzo(b) fluoranthene	.002 ^c
				Chrysene	.002 ^c
				Aldrin	ND(0.05) ^c
				4,4 - DDD	ND(0.05) ^c
				Dieldrin	ND
				Endrin	ND
				Barium	1,000 ^c
				Beryllium	3 ^c
				Cadmium	10 ^c
				Chromium	50 ^c
				Copper	200 ^c
				Iron	300 ^c
				Lead	25 ^c
				Magnesium	35,000 ^c
				Manganese	300 ^c
				Mercury	2 ^c
				Selenium	10 ^c
				Sodium	20,000 ^c
Zinc	300 ^c				
Surface Water (Ellicott Creek & Aero Lake)	Ingestion of surface water and dermal contact with Aero Lake surface water while swimming			Chlorobenzene	5 ^a
				Aluminum	100 ^a
				Cadmium	1.7 ^a
				Iron	300 ^a
				Lead	6.3 ^a
				Mercury	0.2 ^a
Zinc	30 ^a				

Table 3-1

PFOHL BROTHERS LANDFILL - SUMMARY OF ARAR VALUES FOR COCs AND REGULATED COMPOUNDS BY MEDIA AND EXPOSURE PATHWAY

MEDIA	EXPOSURE PATHWAY	COC (Risk-Based)	ARAR (ppm)	REGULATED COMPOUND	ARAR (ppm)
Drainage Ditches, Aero Creek & Ellicott Creek Sediments	<ul style="list-style-type: none"> • Dermal absorption • Ingestion 	PAHs (carc)	1.65 ⁹	Diethylphthalate	7.0
				Dibenzofuran	2.0
				Phenanthrene	2.2
				Beta BHC	.010
				All inorganic constituents exceed ARARs except Sb, Ba, and Sl	
Landfill Soils	<ul style="list-style-type: none"> • Dermal absorption • Ingestion 	PAHs (carc) PCBs 2,3,7,8 TCDD TEQ Arsenic Lead	1.98 ⁹ 19	PAHs (non carcinogens)	8.85
				Dibenzofuran	2.0
				Beta BHC	.010
				Arochlor 1254	1-10
				All inorganic constituents exceeded NYSDEC soil cleanup goals except for silver and thallium.	
Residential Soils	• Ingestion	Arsenic	7.5 ⁹		

Table 3-1

PFOHL BROTHERS LANDFILL - SUMMARY OF ARAR VALUES FOR COCs AND REGULATED COMPOUNDS BY MEDIA AND EXPOSURE PATHWAY

MEDIA	EXPOSURE PATHWAY	COC (Risk-Based)	ARAR (ppb)	REGULATED COMPOUND	ARAR (ppb)
Groundwater (Unconsolidated Aquifer)	<ul style="list-style-type: none"> • Ingestion of drinking water • Dermal contact • Inhalation of airborne contaminants 	Benzene	ND (2) ^c	Butylbenzylphthalate	50 ^c
		Chlorobenzene	5 ^c	1,1 dichloroethane	5 ^c
		1,4 dichlorobenzene	4.7 ^c	1,1 dichloroethene	5 ^c
		2,4 Dimethylphenol	50 ^e	1,3 dichlorobenzene	5 ^c
		1,1,1-Trichloroethane	5 ^c	Phenol	1 ^c
		Bis(2-ethylhexyl)phthalate	50 ^c	Toluene	5 ^c
		PCBs	0.1 ^c	Xylenes	5 ^c
		Arsenic	25 ^c	Antimony	3 ^c
		Barium	1000 ^c	Cadmium	10 ^c
		Lead	25 ^c	Chromium	50 ^c
				Copper	200 ^c
				Iron	300 ^c
				Magnesium	35,000 ^c
				Manganese	300 ^c
				Mercury	2 ^c
				Sodium	20,000 ^c
				Zinc	300 ^c

Table 3-1

PFOHL BROTHERS LANDFILL - SUMMARY OF ARAR VALUES FOR COCs AND REGULATED COMPOUNDS BY MEDIA AND EXPOSURE PATHWAY

MEDIA	EXPOSURE PATHWAY	COC (Risk-Based)	ARAR (ppb)	REGULATED COMPOUND	ARAR (ppb)
Bedrock Aquifer	<ul style="list-style-type: none"> • Ingestion of drinking water • Dermal contact while showering • Inhalation of airborne contaminants while showering 	Benzene	ND(2) ^c	1,2-dichloroethene	5 ^c
		Bis(2-ethylhexyl)phthalate	50 ^c	Phenol	1 ^c
		Aldrin	ND(0.05) ^c	Antimony	3 ^c
		Arsenic	25 ^c	Chromium	50 ^c
		Barium	1,000 ^c	Iron	300 ^c
		Cadmium	10 ^c	Manganese	300 ^c
		Nickel	100 ^h	Sodium	20,000 ^c
		Vanadium	--	Zinc	300 ^c

- a 6NYCRR Part 703.5 Class B Standards and Guidance Values
- b 6NYCRR Part 703.5 Class D Standards and Guidance Values
- c 6NYCRR Part 703.5 Class GA Standards and Guidance Values (9/25/90)
- d EPA 1990: Drinking Water Regs and Health Advisories
- e NYSDOH MCL
- f EPA Recommended Cleanup Criteria
- g Draft Soil Cleanup Criteria (TBC's) issued by Technology Section, Division of Hazardous Waste Remediation, NYSDEC (2/28/90).
- h SDWA MCLG
- i Site Background Concentrations

TABLE 2.3-1

COMPILATION OF NUMERICAL SCGs FOR SOILS,
SEDIMENTS AND LANDFILL SOLIDS

PARAMETER	SCGs (ppm)
Acetone	-
Chlorobenzene	1.5
1,2-Dichlorobenzene	1.0
1,4-Dichlorobenzene	1.0
Methylene Chloride	-
Trichloroethylene	1.0
Bis(2-ethyl hexyl) phthalate	4.35
Butylbenzyl phthalate	1.95
Di-n-butyl phthalate	8.0
Diethyl phthalate	7.0
N-nitrosodiphenylamine	
Acenaphthene	1.6
Acenaphthylene	-
Anthracene	7.0
Benzo(a) anthracene	0.33
Benzo(b) fluoranthene	0.33
Benzo(b,k) fluoranthene	-
Benzo(g,h,i) perylene	80.0
Benzo(a) pyrene	0.33
Chrysene	0.33
Dibenzo(a,h) anthracene	0.33
Dibenzofuran	2.0
Fluoranthene	19.0
Indeno(1,2,3-cd) pyrene	0.33
Naphthalene	1.0
Phenanthrene	2.2
Phenol	0.33
Pyrene	6.65

TABLE 2.3-1
 COMPILATION OF NUMERICAL SCGs FOR SOILS,
 SEDIMENTS AND LANDFILL SOLIDS

PARAMETER	SCGs (ppm)
Aldrin	0.041
Beta - BHC	0.010
Gamma-chlordane	0.20
Dioxins/Fieriness	-
PCBs	10 a
Arsenic	7.5
Barium	47.9 ^(b) /54.8 ^(c)
Beryllium	0.14
Cadmium	1.0
Chromium	10.0
Copper	25.0
Lead	32.5
Manganese	228 ^(b) /313 ^(c)
Mercury	0.1
Nickel	13.0
Silver	200.0
Vanadium	21.7 ^(b) /14.6 ^(c)
Zinc	20.0
Cyanide	-

NOTES:

- a** Value shown is subsurface soil guideline values. Value for surface soil criteria is 1 ppm.
- S.B.** Site Background
- SCGs** Shown are based on draft soil cleanup criteria (2/28/90) issued by Technology Section, Bureau of Program Management, Division of Hazardous Waste Remediation, NYSDEC and are guideline values, only.
- b** Background concentrations of landfill soils.
- c** Background concentrations of drainage ditch sediments and Aero Creek sediments.

TABLE 2.3-2

OBSERVED CONTAMINANT RANGES AND GUIDELINE VALUES
FOR SOILS AND SEDIMENTS

Parameter	Range of Detected Concentrations in Landfill Soils (ppm)	Range of Detected Concentrations in Sediments (ppm)	SCGs (ppm)
Acetone	.015 - .770	.015 - .240	---
Chlorobenzene	.010 - .023	.0055 - .087	1.5
Methylene Chloride	.009 - .150	.007 - .120	---
Bis(2-ethyl hexyl) phthalate	1.5 - 3.0	.190 - 4.2	4.35
Diethyl phthalate	.018 - .990	.015 - 8.2	7.0
Di-n-butylphthalate	.075 - .250	.033 - .160	8.0
Acenaphthylene	.017 - .720	.014 - .220	---
Anthracene	.011 - 2.5	.018 - 3.10	7.0
Benzo(a) anthracene	.026 - 6.0	.047 - 1.2	0.33
Benzo(b) fluoranthene	.020 - 9.2	---	0.33
Benzo(g,h,i) perylene	.050 - 2.5	.057 - 3.8	80.0
Benzo(a) pyrene	.021 - 6.0	.059 - 1.3	0.33
Chrysene	.016 - 7.5	.055 - 2.9	0.33
Dibenzofuran	.43 - 13.0	.015 - 2.5	2.0
Fluoranthene	.035 - 13.0	.081 - 5.8	19.0
Indeno(1,2,3-cd) pyrene	.030 - 2.0	.150 - 3.7	0.33
Phenanthrene	.017 - 10.0	.034 - 2.9	2.2
Pyrene	.011 - 15.0	.096 - 5.4	6.65
Aldrin	.032	---	0.041
Beta - BHC	.022 - .075	.019 - .062	0.010
Gamma-chlordane	.0063 - .092	.0053	0.20
Dioxins/Furans	.00002 - 55.0	.00014 - 0.460	---
PCBs	.270 - 19.0	.007	10 (c)
Arsenic	3 - 29.9	2.8 - 29	7.5
Barium	95.9 - 2,220	46.9 - 280	47.9 ^(d) /54.8 ^(e)
Beryllium	0.23 - 0.63	0.36 - 0.89	0.14
Cadmium	2.2 - 27.6	1.7 - 6.2	1.0
Chromium	4.8 - 84.0	5.1 - 49.1	10.0
Copper	14.8 - 1,057	11.4 - 107	25.0
Lead	24.2 - 985	11.5 - 1,180	32.5

TABLE 2.3-2 (cont.)

OBSERVED CONTAMINANT RANGES AND GUIDELINE VALUES
FOR SOILS AND SEDIMENTS

Parameter	Range of Detected Concentrations in Landfill Soils (ppm)	Range of Detected Concentrations in Sediments (ppm)	SCGs (ppm)
Manganese	132 - 1,770	111 - 1,100	228 ^(d) /313 ^(e)
Mercury	0.1 - 6.2	0.2 - 0.6	0.1
Nickel	10 - 125	5.7 - 117	13.0
Silver	1.8 - 4.8	---	200.0
Zinc	69.1 - 2,770	48.4 - 910	20.0
Cyanide	1.5 - 7.3	1.1 - 10	---

NOTES:

SCGs shown are based on draft soil cleanup criteria issued by Technology Section, Bureau of Program Management, Division of Hazardous Waste Remediation, NYSDEC.

- a Landfill soils represent surface samples from leachate seep sediments, Area C marsh sediments and Area B surface soil.
- b Sediments represent drainage ditch sediments and Aero Creek.
- c Value shown is subsurface soil guideline values. Value for surface soil criteria is 1 ppm.
- d Background concentration of landfill soils.
- e Background concentration of ditch sediments.

TABLE 2.3-3

**PFOHL BROTHERS - FEASIBILITY STUDY
 COMPILATION OF NUMERICAL ARARs/SCGs
 FOR GROUND WATER, LEACHATE AND SURFACE WATERS
 (values in $\mu\text{g/L}$)**

PARAMETER	NYSDEC CLASS GA GW	NYSDEC CLASS B SW	NYSDEC CLASS D SW	NYSDOH MCLs (C)
Benzene	ND(2)	6	6	5
Chlorobenzene	5	5	50	5
Chloroethane	-	-	-	5
1,2-Dichlorobenzene	4.7	5	50	5
1,4-Dichlorobenzene	4.7	5	50	5
1,3-Dichlorobenzene	5	5	50	5
1,1-Dichloroethane	5	-	-	5
1,1-Dichloroethylene	5	-	-	5
trans-1,2-Dichloroethylene	5	-	-	5
Ethylbenzene	5	-	-	5
Trichloroethylene	5	11	11	5
1,1,1-Trichloroethane	5	-	-	5
Toluene	5	-	-	5
Xylenes	5	-	-	5 (each)
2-Chlorophenol	-	-	-	50
2,4-Dimethylphenol	-	-	-	50
2-Methylphenol	-	-	-	50
4-Methylphenol	-	-	-	50
N-nitrosodiphenylamine	50	-	-	50
Phenol	1 a	5 b	5 b	50
Dibenzofuran	-	-	-	50
Bis-2,ethylhexylphthalate (DEHP)	50	0.6	-	50
Aldrin	ND(0.05) ^e	0.001	0.001	-
Dieldrin	ND(0.05) ^e	0.001	0.001	-

TABLE 2.3-3 (Cont.)

PFOHL BROTHERS - FEASIBILITY STUDY
 COMPILATION OF NUMERICAL ARARs/SCGs
 FOR GROUND WATER, LEACHATE AND SURFACE WATERS
 (values in $\mu\text{g/L}$)

PARAMETER	NYSDEC CLASS GA GW	NYSDEC CLASS B SW	NYSDEC CLASS D SW	NYSDOH MCLs (C)
DDD	ND(0.05) ^e	0.001	0.001	-
Endrin	ND(0.005) ^e	0.002	0.002	0.0002
Endosulfan II	-	0.009	0.22	50
PAHs	-	-	-	-
PCBs	0.1	0.001	0.001	-
Aluminum	-	100	-	-
Arsenic	25	190	360	-
Barium	1000	-	-	-
Beryllium	3	11	-	-
Cadmium	10	1.7	7	-
Chromium	50	318	2669	-
Cobalt	-	5	29	-
Copper	200	18.5	2688	-
Lead	25	6.3	160.5	-
Manganese	300	-	-	-
Mercury	2	0.2	0.2	-
Nickel	-	142	2748	-
Selenium	10	1.0	-	-
Silver	50	0.1	10	-
Vanadium	-	14	190	-
Zinc	300	30	497	-
Cyanide	100	5.2	22	-

NOTES:

- a - Total phenols
- b - Total unchlorinated phenols
- c - Total organics not to exceed 100 $\mu\text{g/L}$
- d - New Jersey DEP criteria for total volatile organic compounds - 10 $\mu\text{g/L}$
- e - ND=Not detectable; values in parentheses are typical analytical detection limits for these compounds

TABLE 2.3-4

GROUND WATER AND LEACHATE SEEPS: COMPARISON OF OBSERVED CONCENTRATION RANGES WITH CLASS GA STANDARDS

Parameter	Range of Detected Concentrations in Shallow Ground Water	Range of Detected Concentrations in Bedrock Ground Water	Range of Detected Concentrations in Leachate Seeps	Class GA Standards
Benzene	2.7 - 290	23	3 - 8	ND(2)
Chlorobenzene	1,200 - 11,000	---	2 - 140	5
Chloroethane	900	3.7	11 - 31	---
1,2-Dichlorobenzene	4	---	15 - 57	
1,4-Dichlorobenzene	2 - 240	---	2 - 6	4.7
1,3-Dichlorobenzene	82	---	4 - 89	5
1,1-Dichloroethane	5.6 - 4900	4.1	2.3 - 4.9	5
1,1-Dichloroethylene	240	---	---	5
trans-1,2-Dichloroethylene	---	9.2	64 - 85	5
Ethylbenzene	---	---	6	5
1,1,1-Trichloroethane	26 - 15,000	---	---	---
Toluene	4.1 - 43	3	---	5
Xylenes	400	---	---	5
2-Chlorophenol	13	---	---	---
2,4-Dimethylphenol	630 - 940	---	30	---
2-Methylphenol	72	---	---	---
4-Methylphenol	75	---	---	---
Phenol	6 - 4,000	16	7 - 10	1 ^a
Dibenzofuran	15 - 20	---	20 - 63	---
Diethylhexylphthalate (DEHP)	3 - 840	3 - 42	9 - 60	50
Endosulfan II	0.69	---	0.032 - 0.054	---
PCBs	110	---	---	0.1
PAHs	---	---	2 - 11	---
Aldrin	---	0.05	0.007 - 0.008	ND(0.05)
Dieldrin	---	---	.007 - .028	ND(0.05)
DDD	---	---	0.011	ND(0.05)
Endrin	---	---	0.028	ND(0.05)
Aluminum	59.5 - 74,000	56.1 - 1,630	39 - 303,000	---

TABLE 2.3-4 (cont.)

GROUND WATER AND LEACHATE SEEPS: COMPARISON OF OBSERVED
CONCENTRATION RANGES WITH CLASS GA STANDARDS

Parameter	Range of Detected Concentrations in Shallow Ground Water	Range of Detected Concentrations in Bedrock Ground Water	Range of Detected Concentrations in Leachate Seeps	Class GA Standards
Arsenic	2.3 - 22.3	2.4 - 4.7	3.5 - 16.7	25
Barium	52.2 - 1,530	24.9 - 240	80.3 - 10,000	1000
Cadmium	1.3 - 12	1.1 - 4.2	3.7 - 122	10
Chromium	2 - 196	2.4-728	3.5 - 426	50
Cobalt	2 - 46.9	7.1	3.4 - 157	---
Copper	2.7 - 3,060	3.7 - 28.4	13.9 - 784	200
Lead	2.8 - 369	2.3 - 6.8	6.7 - 1,640	25
Manganese	62.1 - 3450	5.9 - 428	123 - 16,100	300
Mercury	0.23 - 3.3	0.48	0.25 - 4.7	2
Nickel	11.8 - 141	10.7 - 198	20.4 - 521	---
Silver	2.1 - 23.7	2	3.4 - 16.6	50
Vanadium	1.4 - 124	1.4 - 35.3	3.3 - 471	---
Zinc	7.5 - 1490	1.1 - 44	66 - 8,270	300
Cyanide	30	---	18 - 31	100

NOTES: Effluent limits from 6NYCRR Parts 702 and 703.
All units in micrograms per liter ($\mu\text{g/L}$).

(a) Total Phenols

TABLE 6.4-2

PFOHL BROTHERS
EXPECTED MASS LOADINGS TO ON-SITE TREATMENT PLANT

CONVENTIONAL PARAMETERS

Parameter	Avg. Conc. (mg/L)	Average Loading (#/day)		Max. Conc. (mg/L)	Max. Loading (#/day)	
		Phase I	Phase II		Phase I	Phase II
Acidity	1.0	1.20	0.24	1.0	1.20	0.24
Alkalinity	598	718.17	143.63	1040	1249.00	249.80
Ammonia	14.7	17.65	3.53	30.5	36.63	7.33
BOD-5	9.2	11.05	2.21	20	24.02	4.80
Ca as CaCO ₃	530	636.51	127.30	1249	1500.00	300.00
Chloride	165	198.16	39.63	877	1053.24	210.65
COD	81.6	98.00	19.60	193	231.79	46.36
Hardness	788	946.36	189.27	1740	2089.67	417.93
MBAS	10.5	12.61	2.52	15	18.01	3.60
Nitrate-Nitrite	9.0	10.81	2.16	4.4	5.28	1.06
NTA	1.12	1.35	0.27	1.0	1.20	0.24
Oil and Grease	3.1	3.72	0.74	5.7	6.85	1.37
Phenol	0.092	0.11	0.02	0.35	0.42	0.08
Phosphate	0.258	0.31	0.06	0.64	0.77	0.15
Sulfate	205	246.20	49.24	700	840.67	168.13
Suspended Solids:						
Total	583	700.16	140.03	4010	4815.85	963.17
Fixed	474	569.26	113.85	3060	3674.94	734.99
Volatile	142	170.54	34.11	950	1140.91	228.18
Sulfide	1.31	1.57	0.31	1.31	1.57	0.31
TKN	14.5	17.41	3.48	32.9	39.51	7.90
TOC	20.7	24.86	4.97	52.4	62.93	12.59
Total Solids	1763	2117.29	423.46	3930	4719.77	943.95
Total Petroleum Hydrocarbons	0.68	0.82	0.16	0.76	0.91	0.18

NOTES:

Phase I: Flow = 100 gpm

Phase II: Flow = 20 gpm

TABLE 6.4-3

PFOHL BROTHERS
SURFACE WATER DISCHARGE LIMITS

Parameter	Effluent Limit ($\mu\text{g/L}$)
Benzene	5
Chlorobenzene	5
Chloroethane	5
1,2-Dichlorobenzene	5
1,4-Dichlorobenzene	5
1,3-Dichlorobenzene	5
1,1-Dichloroethane	5
1,1-Dichloroethylene	5
trans-1,2-Dichloroethylene	5
Ethylbenzene	5
1,1,1-Trichloroethane	5
Trichloroethylene	11
Toluene	5
Xylenes	5
2-Chlorophenol	50
2,4-Dimethylphenol	50
2-Methylphenol	50
4-Methylphenol	50
Phenol	5
Dibenzofuran	50
Bis-2,ethylhexylphthalate (DEHP)	0.6
N-Nitrosodiphenylamine	50
Aldrin	0.001
Dieldrin	0.001
DDD	0.001
Endrin	0.002

TABLE 6.4-3
(continued)

PFOHL BROTHERS
SURFACE WATER DISCHARGE LIMITS

Parameter	Effluent Limit ($\mu\text{g/L}$)
Endosulfan II	0.009
PCBs	0.001
Aluminum	100
Arsenic	190
Barium	1000
Beryllium	11
Cadmium	1.7
Chromium	318
Cobalt	5
Copper	18.5
Lead	6.3
Mercury	0.2
Nickel	142
Selenium	1
Silver	0.1
Vanadium	14
Zinc	30
Cyanide	5.2

Final Feasibility Study Report

Pfohl Brothers Landfill

*Cheektowaga, New York
Site Number 9-15-043*



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