

915043

June 1990 Supplemental Sampling

Volume I

Pfohl Brothers Landfill
Cheektowaga, New York, Erie County
Site No. 09-15-043

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OBJECTIVES

As a result of the findings in the Remedial Investigation through May 1990 at the Pfohl Brothers Landfill, it was determined that additional information was necessary to more fully characterize the nature and extent of contamination and possible pathways for contaminant migration off the site.

This report presents the results of site investigations conducted during June of 1990 and designed to provide information to:

1. Determine if off site migration of contaminants has occurred and whether they have accumulated in the sediments in Aero Creek (north of Area B) or the marsh area located along the eastern and southern boundaries of Area C of the site.
2. Determine the water quality and sediment constituents of Ellicott Creek both upstream and downstream of the site vicinity.
3. Provide surface soil composition information for the areas around Aero Lake, in residential yards along Pfohl Road and areas of past roadways on the site.

SAMPLE COLLECTION METHODS

Sediments

All stream sediment samples were collected at locations with as near identical sediments as possible with regard to grain size and stream energy. Sample locations were in slow water, near the banks and behind diversions, where finer grain sediments were likely to settle out and accumulate.

Stream sediment samples were collected using a sediment hand coring tube equipped with liner tubes and core catchers. The sampler was pushed its full length (approximately 20 inches) into the sediment using one smooth motion. Multiple attempts, or stabbing, were not permitted. The sampler was pressed into the sediments at least half way for the sample to be considered representative. This same procedure was used for collection of the marsh sediment samples.

Once the sample location was determined, it was approached from the downstream direction so as to cause the least disturbance. The sampling point furthest downstream was sampled first, working upstream.

After collection, the sample was removed from the liner tube onto a clean sheet of aluminum foil. The core was measured and photographed before handling for compositing. It was then sliced in half length wise, then each half split into four equal parts. Using disposable soil trowels, equal amounts from each of the eight pieces was composited to fill the sample jar. Sample jars were wiped clean and placed in coolers.

In-situ measurements at each sampling location included temperature and pH of the surface water. Readings were recorded on samples sheets (see appendix B). Samples locations were marked with a survey stake, then surveyed with tape and compass using the existing site grid and measurements were recorded in field notebooks.

Surface Soils

Surface soil samples were collected by using a disposable scoop. Each soil samples consisted of the top 1 to 3 inches within a selected one foot square area. In some instances it was necessary to first remove the top layer of vegetative material prior to sampling. Using the same disposable soil scoop the sample was homogenized and placed in a clean 500 ml plastic container. In garden areas the top layer of dirt was removed and a samples was taken at a depth of 9-12 inches.

Groundwater

The monitoring wells were purged using teflon bailers of approximately 3-5 well volumes of water before sampling. The pH at each well was recorded as well as the temperature (see appendix B).

Surface Water

The surface water samples were collected by immersing the sample containers into flowing water by hand. The samples were taken by standing downstream of the container so that disturbance of the streambed was kept to a minimum. The pH and temperature of the water were also recorded.

DECONTAMINATION

The majority of sampling equipment was disposable and did not require decontamination. Such equipment includes sampling trowels, spatulas, and foil. The liner tubes and nose piece for the sampler were decontaminated after each sample. Since the liner tubes and nose piece were the only parts to contact the sample, the rest of the sampler only needed to be decontaminated at the end of each day for clean storage. Excess mud was wiped off the outside of the sampler after each sample.

Decontamination of equipment was with a water and detergent scrub then rinse with water. The primary source of decon water was from the storage tank supplied by the consultant, Camp, Dresser & McKee. The decon water for samples 9, 10 and 11 was collected from Aero Lake. Decon fluid was discharged on the landfill at a point where it would not run off back to the stream.

Decontamination with regard to personal protection was as stated in the site Health and Safety Plan (HASP).

ANALYSIS

The NYSDEC Division of Hazardous Waste Remediation Mobile Laboratory in Saratoga Springs, New York performed all analysis with the exception of dioxins, dibenzofurans and radiation. The dioxin and dibenzofuran analysis were performed by a NYSDEC contract laboratory, Enseco, Inc. The radiation samples were submitted to the NYSDEC Radiation Bureau and the analysis was performed by a contract laboratory, Clean Harbors, Inc. The laboratory analytical results are reported in Appendix C.

SAMPLE LOCATIONS

Table 1 identifies the general location of the supplemental samples collected in June 1990, the media sampled and the general category of analysis requested on these samples. An entry in this table indicates where in Appendix A the data appears. No entry means the samples were not analyzed for that category of chemical compounds. For example: Ellicott Creek sediments were analyzed for volatile compounds and the results appear on Table 2 in Appendix A, while the Aero Lake Path, surface soils were not analyzed for volatile compounds. In addition, Figures 1A and 1B are maps showing the general location of the samples collected.

Monitoring Wells

Samples of groundwater from monitoring wells 3S, 3D, 5S, 9S, 12S were collected to provide additional information on volatile compounds in the groundwater at the site.

Ellicott Creek

Ellicott Creek, which is located about 800 feet from the landfill at its closest point, was sampled both upstream and downstream of the surface drainage outlets leading from the Pfohl Landfill. The sampling of surface water and sediment was to determine if contamination in the downstream area of the creek was significantly higher than that in the upstream locations. The locations of the samples are as follows: (also in Figure 1A)

	<u>Sample No.</u>	<u>Description</u>
Upstream Location	STR-19/SWT-45	West of the Transit Road Bridge
Upstream Location	STR-20/SWT-46	About 50 yards east of the Railroad Bridge
Downstream Location	STR-21/SWT-47	West of the westernmost drainage outlet from the Pfohl Landfill
Downstream Location	STR-22	10 yards east of the Airport creek culverts

TABLE 1 - SAMPLE LOCATIONS AND ANALYSIS

General Location	Media Sampled	Volatiles	Semi-Volatiles	PCB's	Dibenzofurans Dioxin (1)	Inorganics	Radiation	Sample No.'s
Ellicott Creek	Sediments	Table 2	Table 3	Table 4	Table 5	Table 6	NA	19-22
Ellicott Creek	Surface Water	Table 18	Table 19	Table 20	NA	Table 21	Table 30	45-48
Aero Creek	Sediments	Table 7	Table 8	Table 9	Table 10	Table 11	NA	1-17
Aero Lake Path	Surface Soils	NA	NA	Table 15	Table 16	Table 17	NA	37-44
Pfohl Road Residences	Surface Soils	NA	NA	Table 12	Table 13	Table 14	NA	28-36 56-59
On site Area B	Surface Soils	NA	NA	Table 22	Table 23	Table 24	NA	50-55
Area C Marsh	Sediments	Table 25	Table 26	Table 27	Table 28	NA	NA	23-27
Monitoring Wells	Groundwater	Table 29	NA	NA	NA	NA	NA	49 & 60-63

NA - Not Analyzed

Tables of data are contained in Appendix A.

(1) The generic terms "dibenzofuran" and "dioxin" will be used to identify polychlorinated dibenzofurans and dioxin isomers and congeners analyzed.

FIGURE 1B

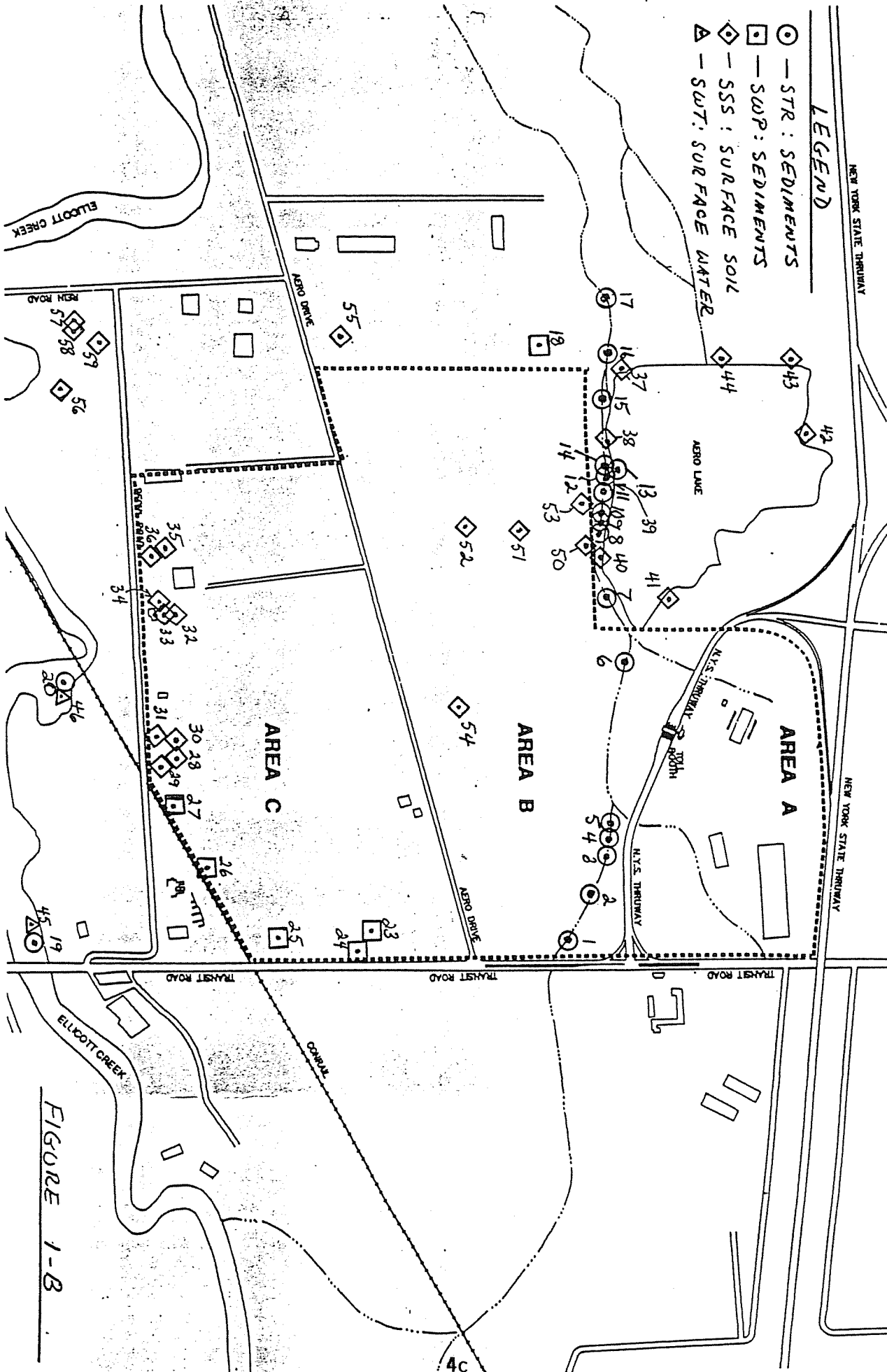


FIGURE 1-B

The review of hydrogeological data during the preparation of the Remedial Investigation report identified the possibility of recharge of Ellicott Creek by the overburden groundwater from the landfill. In order to assess this possible impact on the creek, additional samples were taken approximately 1500 feet east of Transit Road. These samples were taken on December 10, 1990 and have been analyzed by the NYSDEC and are contained in Addendum 2 of this report.

Aero Creek

Sediment samples were taken from seventeen locations in the stream which forms the northern boundary of Area B of the site. This stream will be referred to in this report as Aero Creek. The samples were collected approximately 500 feet apart except at three seep locations (SS-1, 2 and 13) where samples were taken at the seep and immediately upstream and downstream of the seep. The original seep information was reported in the "Interim Report, Leachate, Surface Water and Sediments Investigation Report" issued in March 1990. At the stream/lake connection, samples were taken on both the stream side and the lake side to account for potential flow reversals that could occur seasonally.

The purpose of these samples was to determine if contaminants had migrated from the seeps and collected in the creek sediments adjacent to the seeps as well as, in downstream sediments. The seep locations referenced above are areas where the greatest number and concentration of compounds, including PCBs were detected. It was thought that the PCBs would be an effective measure of the seep impact on stream sediments due to their affinity for soil and sediment particles and that they could have migrated into the creek and accumulated in the sediments or possibly have been transported downstream of the site.

Aero Lake Path

The Aero Lake Path is the footpath which is used by fishermen and others to walk around the lake. These seventeen samples were requested by the Department of Health in order to determine if contaminants were present in this area and to assess potential exposure from direct contact. These samples were collected at locations which appeared to be used by the public and which gave a representative distribution around the perimeter of the lake.

Pfohl Road Residential Properties

Thirteen soil samples were collected at residential properties along Pfohl Road. The locations were selected based on the use of the areas, such as, children's play areas, garden areas, site runoff, or bare spots. These samples were recommended by the NYSDOH in order to characterize off site migration of contaminants adjacent to the southern border of the landfill.

On-Site Surface Soils

Four samples of surface soils were taken from Area B of the site. In addition one background sample of surface soil was taken west of Area B to provide an off site comparison. These samples were selected by the NYSDOH in order to provide information on the type of contaminants in surface soils at the site in areas of historic roadways across the site.

Area C Marsh

Five samples were taken in the marsh and drainage swale to the east and southeast of Area C of the site. These samples were collected to provide information on possible off-site migration of contaminants from Area C and identify any accumulation of materials in quiescent sediment areas. The areas were determined in the field by observation of slow moving or stagnant water areas near known seepage points from the landfill.

DISCUSSION OF SAMPLING RESULTS

The discussion of the sampling results will be separated into categories of similar location and matrix sampled. The categories will be as presented in Table 1.

Monitoring Wells

Monitoring wells 3S, 3D, 5S, 9S, and 12S were sampled to fill in gaps in the data that had been obtained previously. The analysis of these samples was for volatile components as shown in Table 29. All compounds analyzed were "non detect" which indicates that these compounds were at levels below the detection capabilities of the analysis which was 5 parts per billion.

Ellicott Creek Sediments

These sample locations were selected to provide additional information on Ellicott Creek upstream of the site (i.e. STR-19 & 20) where it is unaffected by surface migration from the Pfohl Site and samples downstream of the site (i.e. STR-21 & 22) at a point where all surface water migration pathways from the site had entered the creek. The data is contained in Tables 2 through 6 and the sample locations are shown on Figure 1A.

In general, the analysis of the samples taken in June of 1990 correlate well with the samples taken in April 1989 and reported in the "Interim Report, Leachate, Surface Water and Sediment Investigation" prepared by CDM. The upstream samples, which are intended to be representative of areas not impacted by surface runoff from the Pfohl Brothers Site, show similar compounds and concentrations to the downstream samples. This indicates that any increased contamination in Ellicott Creek due to offsite migration from the surface water at the Pfohl Landfill have not been discovered in the creek.

Additional samples were taken in December of 1990 to indicate if the results obtained would agree with a more eastern sample clearly upstream of any possible groundwater discharges. A surface water sample and sediment sample were taken in Ellicott Creek about 1500 feet east of Transit Road. At the same time repeat surface water samples were taken at locations SWT-46 & 45. The results of these samples are contained in Addendum 2 of this report. These sample results combined with the past sample results support the conclusion that Ellicott Creek does not appear to have been adversely affected by the Pfohl Brothers Site.

The summary of results is as follows:

Ellicott Creek Sediment Results

Compounds	June '90 Results	April '89 Results **Sediments 8, 18 & 19
Volatiles	*(Table 2) Trichloroethene detected at low values i.e. < 10 ppb. The upstream sample STR 20 contained the same level of contaminants as the downstream samples.	Only Actone and Methylene Chloride were found in April '89 at levels less than 54 ppb.
Semi Volatiles	*(Table 3) A number of compounds were detected, mostly phthalates polycyclicaromatic hydrocarbons. Most values were less than 1 ppm. The samples upstream and downstream of the site are very similar with respect to the compounds listed and the concentration of the compounds detected.	The June '90 results show more individual compounds of the same general class detected due to the lower levels of detection used in the NYSDEC laboratory analysis.
PCB's	*(Table 4) All results were non detect.	All results were non detect.
Dibenzofuran & 2378-TCDD	All results for dibenzofuran were less than 1.5 ppt (parts per trillion) the upstream and downstream samples showing the same approximate level. No 2378-TCDD was detected either upstream or downstream of the site.	Dibenzofuran was not analyzed for in the previous sampling in Ellicott Creek. Previous sample analysis results for 2378-TCDD were non detect.
Inorganics	*(Table 6) All of the inorganics analyzed for were detected, as would be expected in stream sediments. The upstream and downstream concentration of these compounds were very similar.	The arsenic, barium, cadmium, and chromium, concentration are higher than in the previous report for Ellicott Creek. The other compounds are at approximately the same level.

* These tables are in Appendix A.

** Sediment results from April '89 are contained in both the "Interim Report: Surface Water, Leachate Seep and Sediments" and the "Remedial Investigation Report".

Ellicott Creek Surface Water

The surface water samples in Ellicott Creek were collected at the same general stream locations as the sediment samples. The surface water was sampled at a different time than the sediment samples so as to minimize suspended solids entering the water samples. The sample locations are as follows:

Surface Water Sample	Corresponding Sediment Sample	Location
SWT-45	STR-19	North side of creek, west of Transit Road bridge.
SWT-46	STR-20	Northeast side of creek, 100 feet upstream of the railroad bridge.
SWT-47	STR-21	20 feet upstream of western most drainage outlet from the Pfohl Landfill and Construct & Demolition debris dump.
SWT-48	No sample	100 feet downstream of Young Road bridge, on the north side of the creek.

The surface water samples were analyzed for the Target Compound List (TCL) parameters, no dioxin or dibenzofuran analysis was performed. The dioxin and dibenzofuran compounds were not analyzed for because it was extremely unlikely that these compounds would be in surface waters. These compounds are relatively insoluble and if present would generally tend to absorb on to particles of soil, therefore, only the sediments were analyzed for these compounds.

A one gallon sample of surface water was taken at locations SWT-45 & 46 and analyzed for Gross Alpha and Gross Beta radiation. It was intended that the result of these upstream samples would provide additional comparative results to the results contained in the "Radiochemical Analysis Report, Addendum No. 1: Groundwater" which was issued in March 1990.

The summary of results are as follows:

Compound	June '90 Results(4 surface water samples)	Comparison to April '89 Results (SW-8); SW-Surface Water**
Volatiles	*(Table 18) All volatile compounds were non detect.	All volatile compounds were non detect.
Semi Volatiles	*(Table 19) Compounds detected were phthalates. The con- centrations upstream & downstream of the site were similar and were < 20 ppb total.	All semivolatiles in SW-8 were non detect.
PCB's	*(Table 20) All compounds were non detect.	All compounds were non detect.
Inorganics	*(Table 21) Barium, cadmium, lead and manganese were detected in the surface water. The barium and manganese were similar both upstream & down- stream of the site. Lead was detected upstream of the site but at con- centrations lower than Class B water standards. Cadmium was detected downstream of the site in sample SWT-48 and contravenes the Class B standards.	The barium levels in SWT 45&46 are much higher than those measured in SW-8. The cadmium level in SWT-48 is the same as measured in SW-8 as were the lead levels and the manganese levels.

* These tables are in Appendix A.

** Surface water results from April '89 are contained in both the "Interim Report: Surface Water, Leachate Seep and Sediments" and the "Remedial Investigation Report".

The results of the radiation testing in the upstream sample locations SWT-45 & 46 can be compared to previously collected data for the monitoring wells at the Pfohl site as well as the drinking water standards. The comparison is as follows:

Table 2

Radioactivity Comparison
All units in pCi/ml

	<u>Ellicott Creek</u> <u>Surface Water</u>	<u>Monitoring Wells</u> <u>(1)</u>	<u>Standard</u> <u>(2)</u>
Gross Alpha			
Min	< 0.003	< 0.0006	
Max	< 0.005	.01 ± 0.006	.015
Gross Beta			
Min	.002 ± .002	.0012 ± 0.0005	
Max	.006 ± .002	.068 ± .007	1.0

- (1) Minimum and maximum values of all samples collected from groundwater monitoring wells in and around Pfohl Brothers Landfill during August and December 1989.
- (2) New York State gross alpha (excluding radon and uranium) and radioactivity standards applicable to Class "GA" groundwaters, for which the best usage is as a drinking water supply and any other usage. Source: NYSDEC 6NYCRR, Part 703, March 1986.

As can be seen from this table gross alpha and beta levels in both the Creek and monitoring wells are below the drinking water standards, however, the monitoring wells are elevated when compared to the surface water of the Creek. The drinking water standard is used as a comparison since it represents the most stringent regulatory level.

Aero Creek Sediments

These sample locations were selected to determine if offsite migration of chemical compounds had occurred at the northern edge of Area B and collected in the sediment areas of Aero Creek. Figure 1B shows the approximate location of these samples.

The summary of results are as follows:

Compounds	June '90 Results (17 samples)	Comparison to April '89 Results at Seeps (Table 3-15 & 3-16)**
Volatiles	<p>*(Table 17) Fourteen of seventeen samples were all non detect. STR-10, 11 & 14 had detection of benzene, chlorobenzene, and dichlorobenzene in the range of 5-50 ppb. The locations of STR-10, 11 & 14 were near seeps SS-1 & SS-2 sampled in April of '89.</p>	<p>Chlorobenzene was detected in the seep water at SP-1&2 and in the seep sediment at SS-14. The sediment criteria of 175 ug/kg for chlorobenzene are not exceeded.</p>
Semi Volatiles	<p>Phthalates and PAHs were detected, as they were in Ellicott Creek. However, the concentrations are higher in this area, especially in STR-4&5. Compounds not detected in Ellicott Creek sediments & probably a result of migration from the landfill are; phenol, dichlorobenzenes, isophorone, benzoic acid and dibenzofuran.</p>	<p>The type of compounds found were similar to those detected in seep sediments nearby. The number of compounds detected were greater in the June '90 results and included compounds found in seep water migrating off the site into Aero Creek.</p>
PCB's	<p>*(Table 9) Sixteen of seventeen samples were non detect. One sample (STR-11) showed 7 ppb of Aroclor 1242.</p>	<p>SS-1,2 and 13 had shown levels between 4000 and 8000 ppb. These samples were taken on the banks of the creek as water was flowing out of the landfill surface. The majority of the June samples did not detect PCB's.</p>
Inorganics	<p>*(Table 11) Only STR-16 and 17 were analyzed for inorganics. The results are consistent with those found in the seep sediments. A</p>	<p>The magnitude of concentrations are within the range of contamination found in Seep Sediments.</p>

	number of fish & wildlife sediment criteria are exceeded in Aero Creek, such as Arsenic, Cadmium, copper, lead, mercury, and zinc. The results, however, are similar to upstream samples of Ellicott Creek.	
Dibenzofurans and Dioxins	*(Table 10) All dioxin and dibenzofuran results are less than 1 ppb. The most toxic isomer, 2,3,7,8 TCDD was approximately 1 part per trillion. The level of 1 ppt is 1/1000 of the "level of concern" for this material. No apparent accumulation of dioxin of dibenzofuran is evidenced by the Aero Creek samples.	The results shown in the June '90 sampling are below the detection limits of the April '89 sampling at seep sediments. This is the result of a high resolution analysis specifically chosen for the Aero Creek samples, so that lower concentration could be detected in the samples collected.

* These tables are in Appendix A.

** Tables 3-15 & 16 are contained in both the "Interim Report: Surface Water, Leachate Seep and Sediments" and the "Remedial Investigation Report".

One of the major goals of the supplemental sampling plan was to determine if PCB's and dioxin (2,3,7,8 TCDD) had entered the Aero Creek area and accumulated at higher concentrations in creek bottom sediments. The data contained in table 9 & 10 do not show evidence of this being the case. However, the results do show that volatiles and semi-volatiles chemical compounds from the site have migrated into the creek area and are present at low levels.

Area C Marsh Sediments

The marsh samples were collected in order to determine if off site migration of chemical compounds had taken place at the western and southwestern perimeter of Area C and collected in the sedimentation areas of the marsh and southwestern drainage swale. The proximity of buried and leaking drums to the marsh raised the issue of possible PCB and dioxin accumulation in the marsh sediments if there was migration of contaminants from the drums.

The summary of results is as follows:

Compounds	June '90 Results (5 samples)	Comparison to April '89 Results **SS-4, 8, 18 or Tables 3-19&3-20
Volatiles	*(Table 25) Trichloroethene was detected at less than 10 ppb.	Acetone, methylene chloride and chlorobenzene were detected in April '89 at the seeps. No significant levels were detected in 1990. This difference is most likely due to the acetone and methylene chloride, common laboratory solvents, having contaminated the laboratory equipment.
Semi Volatiles	*(Table 26) PAH's & phthalates were found in the sediments. Samples SWP -24&25 showed significantly higher levels of polyaromatic hydrocarbons and phthalates. SWP-27 showed low levels of dichlorobenzene.	A similar range of PAH's and concentrations were detected.
PCB's	All non detect.	All non detect.
Dibenzofurans and Dioxins	2,3,7,8 TCDD, was not detected in any of the marsh area. The action level of 1 ppb was not exceeded in the marsh sediments. The isomers of dioxin & dibenzofuran were at higher concentrations in samples SWP-24&25 as were the PAH's discussed above under "Semi Volatiles".	All non detect.

* These tables are in Appendix A.

** Seep Sediments analysis are contained in both the "Interim Report: Surface Water, Leachate Seep and Sediments" and the Remedial Investigation Report".

Although the supplemental investigation was undertaken because of the potential for increased concentrations of contaminants in the marsh area, no evidence of such an occurrence is verified by the results. In fact, the marsh area results are very similar to the seep sediment results of April '89. Therefore, it seems that the material in the seeps has made its way into the marsh area and the drainage area but "pockets" of high concentration have not been discovered. Of the samples collected, SWP-24 & 25 have shown the higher concentrations of PAH's, dibenzofurans and dioxins, though still well below levels of concern for health impacts.

Aero Lake Path Surface Soils

The samples collected on the path around the perimeter of Aero Lake were taken in locations where evidence of heavy use were observed. Large worn areas with no grass, areas where campfires were made, or good fishing areas near the shore were selected. The areas and samples were chosen by NYSDOH in order to assess the potential for direct contact exposure of the public to contaminants that may have possibly migrated to this area. Historically, the lake area was created by a borrow pit for the Thruway construction and there is no evidence of past dumping in the Lake area. No signs of dumping in this area are currently visible.

It was determined that volatiles and semi-volatiles are not a concern along the lake path, since historically there was no dumping of these materials in this area. Since metals are prevalent at the Pfohl dump they were analyzed for at the path. The dioxins, dibenzofurans, and PCB's were selected because they could possibly be carried off the site and onto the pathway by people passing through the landfill area.

The summary of results is as follows:

Compounds	June '90 Results
Inorganics	<p>(8 samples) *(Table 15) All of the surface soil results were very similar. The values detected were in the following ranges:</p> <p>Arsenic 1-10 ppm Barium 103-323 ppm Cadmium 1.9-3.0 ppm Chromium 4.6-7.9 ppm Copper 6.6-12 ppm Lead 1-58 ppm Manganese 59-313 ppm Mercury 0.1-0.2 ppm Zinc 35-110 ppm</p>
PCB's	All non detected.
Dibenzofuran and Dioxins	<p>The compounds and Dioxins concentrations detected were similar for all eight samples. All values were below 1 ppb of total dioxin isomers. These values are very low and indicated that contaminant migration from the landfill is not present at the lake.</p>

Area B Surface Soils

In order to assess the exposure routes to those persons who may have traveled across the site on well recognized pathways, five samples were taken at the direction of the NYSDOH. These samples were intended ascertain which contaminants maybe present in the surface soils along the historic pathways. In addition, to the surface soils on the site, one background sample was taken about 250 feet west of the site (SSS-55). This background site was chosen in a generally upwind location in an undeveloped tract of land and is meant to represent local property near the landfill unaffected by the site.

The summary of results are as follows:

Compounds	June '90 Results
PCB's (Table 22)	<p>PCB's were detected in all of the on site surface soil samples (i.e. SSS-50 - SSS-54) in the range of 0.8 to 20 ppm. No PCB's were detected in the background sample SSS-55.</p> <p>It is important to note that the sample locations SSS-50, 51, and 52 were each separated by about 250 feet and SSS-54 about 1000 feet from the others. This indicates that the PCB's are present in dispersed areas over the surface of the landfill in Area B. These samples were intentionally taken on past roadways on the site and the contamination may be due to past dumping practices or some attempt at controlling dust on the roadways with oils.</p>
Inorganics (Table 24)	<p>As can be seen from Table 24, the inorganics on site are significantly above background. Samples SSS-51 and 52 are generally more contaminated than the other samples, especially with respect to arsenic, lead, copper, mercury and zinc.</p>
2,3,7,8-TCDF 2,3,7,8-TCDD (Table 23)	<p>All results for 2,3,7,8 TCDF and 2,3,7,8 TCDD were non detect.</p>

The surface soil samples taken on Area B were not meant to fully characterize the surface soils of the landfill over the extent of 120 acres. The surface soil of the landfill most likely contain the same range of materials as the soils contained in soil borings and seep sediments. This assumption is based on the type of landfilling procedures used and the type of dumping conducted at the site. In general, it could be said that the materials contained in the site are also present to the same degree on the surface of the site.

Residential Surface Soils

The residential surface soil samples were collected at the direction of the NYSDOH. The samples were taken at properties along Pfohl Road that are adjacent to the landfill and also at properties south of Pfohl Road that wished to participate in the sampling. In garden locations the soil samples were taken at a depth of 9"-12". All other samples were taken at the surface.

Samples SSS-28 through SSS-36 were taken from properties north of Pfohl Road, samples SSS-56 through SSS-59 south of Pfohl Road and sample SSS-55 is a background sample taken in an undeveloped property west of Area B of the site. Samples SSS-34, 57 and 58 were taken at a depth of 9"-12" since sample locations 34 and 58 were identified as former garden areas.

The summary of results is as follows:

Compounds	June '90 Results (13 samples)
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PCB's (Table 12)	All results were non detect.
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Inorganics (Table 13)	The comparative background for these results is sample SSS-55. The properties south of Pfohl Road are similar to these background samples with exception of arsenic (SSS-56), zinc, manganese (SSS-66) and lead.
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The properties north of Pfohl Road show increases above background in mercury and barium in those samples taken near the landfill border (i.e. SSS-30, 32, 33, 35).

Dibenzofurans & Dioxins (Table 14)	The comparative background used for these samples is SSS-55.
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The properties south of Pfohl Road are approximately the same as the referenced background, which is considered to be a low level of contamination.

The properties north of Pfohl Road have results that are both above and at the referenced background. Samples SSS-28, 29, 31 and 34 are similar to the referenced background while SSS-30, 32, 33, 35 and 36 are above background. Those above background are closer to the landfill border than the others.

The dioxin values presented as an equivalent to 2,3,7,8 TCDD, are all below 1 part per billion (ppb).

Three comparative references are available for evaluating the inorganic parameters and they are; local background concentrations, an Estimated Mean-Eastern U.S. concentration and metals concentrations in suburban soils. The local background is contained in SSS-55. Both the suburban soils and Eastern U.S. inorganics concentrations are shown on the following chart.

The following chart shows the comparison for the inorganics which exceed the local background conditions:

Compound	Background Range, ppm (SSS-55)	Residential Soil Range, ppm (SSS-28-36&56-59)	Mean-Eastern U.S., ppm	Suburban Soils, ppm
Arsenic	3	2.5-21	7.4	10-20
Barium	ND	67.2-801	420	100-1000
Cadmium	3.3	1.9-6.2	1.0	0.01-7.0
Chromium	2.3	1.6-14.9	52	1.5-40
Copper	ND	5.4-93.8	22	2-100
Lead	14.5	5.0-339	17	10-350
Manganese	52	99.8-283	640	10-3000
Mercury	ND	0.1-0.9	0.12	0.01-3.4
Zinc	49.6	47-969	52	10-300

This shows that although some of the Residential Soil inorganics exceed the local background range of concentration, the majority of the compounds are within the normal range of concentrations for typical suburban soils. Only zinc and arsenic exceed the range of suburban soils concentrations and the highest arsenic value only marginally exceeds the range.

Generally, the properties south of Pfohl Road have concentrations at levels that are similar to background for this area. The properties north of Pfohl Road show levels slightly elevated above local background closer to the landfill. They are within the range of typical concentrations found in suburban soil. These low level exceedences of local background could be due to the traffic pattern used in dumping at the site and possible dust or particulates dispersed during the dumping operation near the border of the landfill. In Area C of the site, a large amount of ash material was found during the test pit investigation. Property owners also reported ash-like material near their yards and below the surface. It is possible that the ash material may be elevated in the compounds detected in the property samples and that the undefined border of the landfill in this area may extend closer to the neighboring properties. It is currently planned that additional soil borings be installed in this area to better define the limits of the landfill.

Conclusions

Monitoring Wells

- o No volatile compounds were detected in the five monitoring wells sampled. A more complete analysis of the groundwater quality can be found in the "Interim Report: Soil Borings and Groundwater" and the "Remedial Investigation Report".

Ellicott Creek Sediments

- o Ellicott Creek sediments both upstream and downstream of the Pfohl Landfill site surface drainage showed no significant level of contamination.

Ellicott Creek Surface Water

- o The radiological analysis of samples of Ellicott Creek water from the upstream location showed normal levels of radiation, within the regulatory levels for drinking water sources.
- o Ellicott Creek surface water analytical results from locations both upstream and downstream of the Pfohl Landfill Site drainage were similar and showed no significant levels of contamination.

Area C Marsh Sediments

- o Area C Marsh sediments had higher levels of contaminants than the Aero Creek sediments. While no significant accumulation of contaminants in quiescent areas was discovered, it does, however, appear that the drainage from Area C could be impacting this area.

Aero Lake Path Surface Soils

- o Aero Lake Path surface soils showed no evidence of elevated contaminant levels. This indicates that, there has been no significant impact by the Pfohl Landfill site on the lake area soils.

Residential Surface Soils

- o No significant levels of contamination were found on residential properties south of Pfohl Road. These areas exhibit levels similar to the background sample and the Aero Lake Path samples.
- o The properties north of Pfohl Road showed slightly higher levels of contamination near the border of the landfill.
- o The NYSDOH has concluded that the metals found in the residential soils are at levels found in other suburban areas and that the 2,3,7,8 TCDD equivalents for the dioxins and furans were found to be below the Centers for Disease Control's level of concern of 1 ppb for residential soils.

- o Addendum No. 1 to this report characterizes the contamination found in the residential area and states in the conclusion that no threat to human health has been identified as a result of the presence of that contamination.

Area B Surface Soils

- o The surface soil samples from Area B identified PCBs in all five samples. The samples were widely separated from each other on past roadways at the site.

Aero Creek Sediments

- o Aero Creek sediments showed no significant accumulation of contaminants in quiescent areas of the creek. The components detected were similar to those detected in the seeps, however, at very low levels.
- o Evidence of dioxin migration offsite via Aero Creek was not found.

Recommendations

Monitoring Wells

No further action required. The Feasibility Study will evaluate remedial alternatives to address groundwater conditions at the site.

Ellicott Creek Sediments

Samples collected do not identify any significant impact from the site. No further study of the creek is anticipated pending the results of the fish study, currently being conducted by the NYSDEC Division of Fish and Wildlife.

Ellicott Creek Surface Water

No further action required. The Feasibility Study will evaluate remedial alternatives to minimize surface runoff to Ellicott Creek from the site.

Area C Marsh Sediments

The presence of sediment contamination indicates a probable route of migration. The Feasibility Study will need to address seep and surface drainage controls to the west and south of Area C.

Aero Lake Path Surface Soils

No further action required. Pending the results of the fish study no further restrictions are anticipated for this area. The area has been posted with no fishing and no trespassing signs.

Residential Surface Soils

Soil borings will be taken to better define the southern border of the landfill in the area adjacent to homes north of Pfohl Road. No further actions, beyond the additional basement sump and soil sampling that was carried out in October 1990, are recommended at this time based on the health evaluation. The NYSDOH has concluded that the metals found in the residential soils are at levels found in other suburban areas and that the 2,3,7,8 TCDD equivalents for the dioxins and furans were found are below the Centers for Disease Control's level of concern of 1 ppb for residential soils.