MALCOLM PIRNIE

MAMARONECK TAYLOR LANE
LEAF COMPOST SITE

REMEDIAL INVESTIGATION/FEASIBILITY STUDY
WORK PLAN

PREPARED FOR:

VILLAGE OF MAMARONECK
MAMARONECK, NEW YORK

JANUARY 1990

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1.0 INTRODUCTION

1.1 GENERAL OVERVIEW

This Work Plan has been developed to conduct a Remedial Investigation/Feasibility Study (RI/FS) at the Mamaroneck Taylor Lane Leaf Compost Site, located in the Village of Mamaroneck, Westchester County, New York (Figure 1-1). The Work Plan has been prepared in accordance with Administrative Order on Consent, Index No. W-3-0309-89-05, Site No. 3-60-021 between the Village of Mamaroneck and the New York State Department of Environmental Conservation (NYSDEC). The Order on Consent directs the Village to develop and implement a remedial program under Article 27, Title 13, of the Environmental Conservation Law (ECL) of the State of New York.

1.2 PURPOSE AND GOALS

The purpose of the RI/FS is to characterize the nature and extent of hazardous waste contamination present on the site. The data will be used to evaluate potential risks that contamination presents to human health and the environment, and to evaluate feasible remedial alternatives to mitigate any risks that are identified.

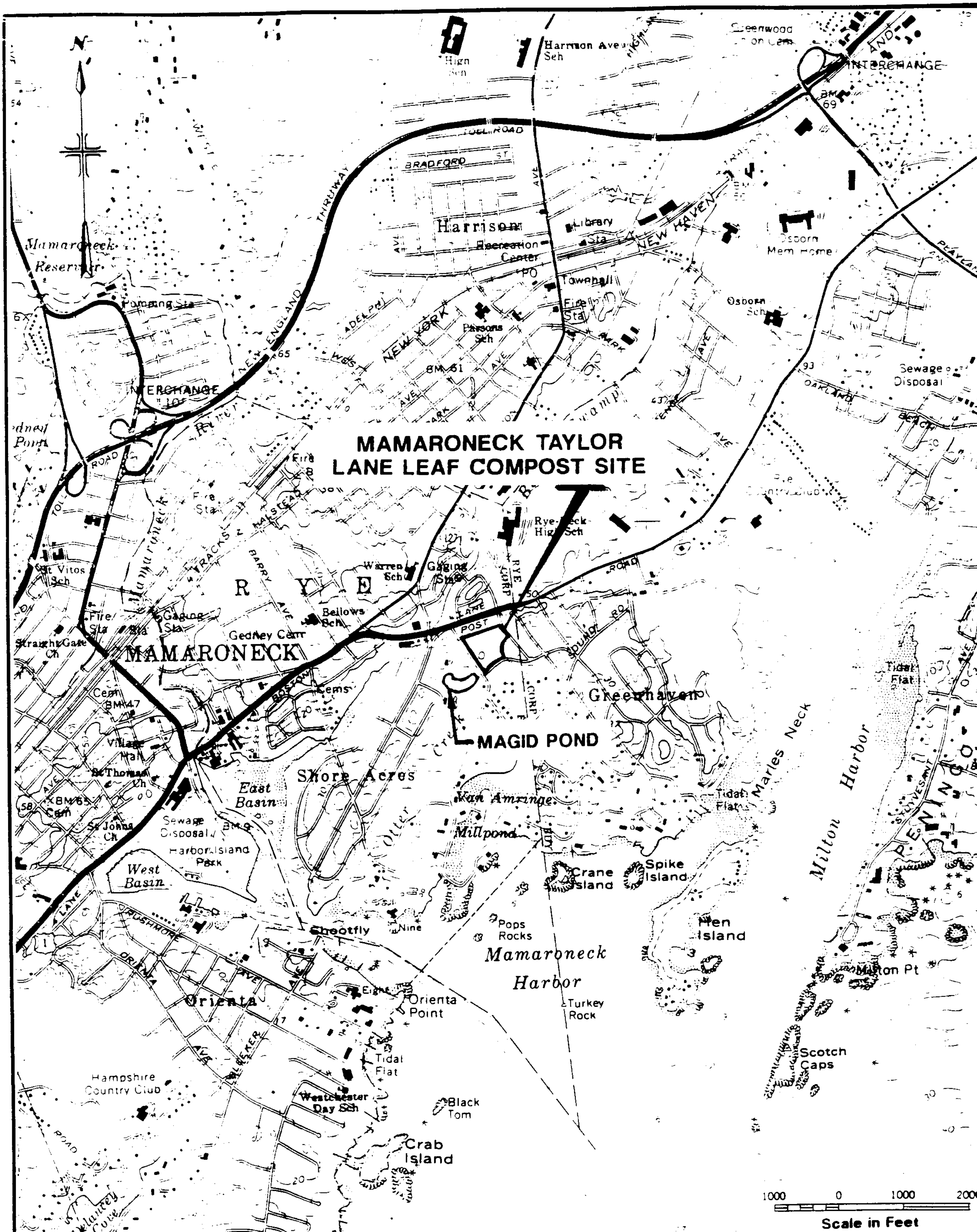
This Work Plan presents the technical scope of work for the RI/FS, including a detailed schedule to conduct the work. The Work Plan has been prepared in accordance with current NYSDEC and U.S. Environmental Protection Agency (USEPA) guidance documents, in which a phased approach to the RI/FS is presented. This phased approach allows for interaction between the site characterization process of the RI and the remedial alternative selection of the FS. The following documents have been used to prepare the RI/FS Work Plan:

- Municipal Assistance Program Hazardous Waste Site Remediation - Procedures Handbook (NYSDEC, August, 1989)

- Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (USEPA, October, 1988)

- Superfund Public Health Evaluation Manual (USEPA, 1986)

- Superfund Exposure Assessment Manual (USEPA, 1986)



SOURCE: U.S.G.S. MAMARONECK, NY - CONN TOPOGRAPHIC MAP

MALCOLM PIRNIE	VILLAGE OF MAMARONECK, NEW YORK MAMARONECK TAYLOR LANE LEAF COMPOST SITE **LOCATION MAP**	MALCOLM PIRNIE, INC. **FIGURE 1-1**

To supplement the Work Plan, the following site-specific plans have been prepared as attachments to this document:

- Field Sampling Plan (FSP);
- Quality Assurance Project Plan (QAPP);
- Health and Safety Plan (HSP); and
- Citizens Participation Plan (CPP).

2.0 SITE BACKGROUND AND PHYSICAL SETTING

2.1 SITE DESCRIPTION

2.1.1 General

The Mamaroneck Taylor Lane Leaf Compost site is located in the Village of Mamaroneck in Westchester County, New York (Figure 1-1). It consists of a 7.85-acre site, situated between Old Boston Post Road to the north, Taylor Lane to the west, Shadow Lane to the south, and Greenhaven Road to the east (Plate 1). A gas station, automobile dealer, and a plant nursery are located immediately north of the site. Along much of the eastern and southern property boundaries are private residences. A wetland area is located west of the site, just west of Taylor Lane, which consists of Magid Pond and Otter Creek.

2.1.2 Climate

The climate in the area of the site is typical of the suburban New York metropolitan region. Precipitation is moderate and distributed fairly evenly throughout the year. Most of the rainfall from May through October comes from thunderstorms which are usually of brief duration and high intensity. During the rest of the year, precipitation generally is associated with widespread storm systems, in which rain or snow occurs all day long.

Table 2-1 presents temperature and precipitation data for the region for the years 1951-1980 (National Climatic Data Center). These measurements were recorded at a Scarsdale, New York, meteorological station located approximately three miles northwest of the site. The lowest mean monthly temperature is 29.6°F which occurs in January and the highest is 74.1°F which occurs in July. March is generally the wettest month with an average precipitation of 4.63 inches; February is generally the driest month, with an average precipitation of 3.27 inches.

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TABLE 2-1

CLIMATOLOGICAL DATA IN VICINITY OF
MAMARONECK TAYLOR LANE LEAF COMPOST SITE
(1951 - 1980)

Month	Mean Temperature (°F)	Mean Precipitation (inches)	Highest Temperature (°F)	Lowest Temperature (°F)	Mean Snow Fall (inches)
January	29.6	3.40	68	-10	8.8
February	31.7	3.27	70	-14	10.3
March	39.5	4.63	80	-3	8.3
April	50.5	4.13	94	18	0.9
May	60.3	3.80	97	30	0.0
June	69.0	3.39	100	38	0.0
July	74.1	4.02	102	46	0.0
August	72.7	4.55	100	39	0.0
September	65.5	3.96	102	30	0.0
October	54.8	3.71	89	21	0.2
November	44.5	4.46	80	14	1.0
December	33.8	4.10	69	-3	6.8

Mean Annual Temperature: 52.2°F

Average Annual Precipitation: 47.42 inches

Average Annual Snowfall: 36.3 inches

Station in Scarsdale, New York

Source: National Climatic Data Center, Asheville, NC

2.1.3 Physiographic Features and Topography

Surface elevations on the site range from about 33 feet above mean sea level (MSL) in the northeast corner, to 12 to 15 feet MSL over the remainder of the site. Several piles of leaves, wood chips, tree trunks, composted organic material, and construction and demolition debris occur on the site. Numerous depressions occur on the site, where surface water collects after precipitation. Four ponds are located on the site (Plate 1). The pond in the northwestern part of the site drains to a ditch located on Taylor Lane, where the water is directed into a storm sewer located at the intersection of Taylor Lane and Shadow Lane, on the west side of Taylor Lane. The storm sewer drains into Magid Pond at two locations (Plate 1). The pond in the southwestern corner of the site receives surface water runoff. The Village believes that a culvert may connect the pond to Magid Pond. However, the culvert cannot be located, and is believed to be buried beneath fill material.

2.1.4 Hydrogeologic Setting

The site is located in the Upland Section of the New England Physiographic Province, which is characterized by interbedded gneiss and pelitic schist with locally abundant pegmatite dikes. The gneiss has been mapped as part of the Harrison Formation. The schist, which contains a basal amphibolite facies, has been identified as part of the Hartland Formation. These rock formations are reported to be Ordovician in age.

Unconsolidated deposits cover the bedrock in most places and range in thickness from a few feet on hills to more than 200 feet in some of the larger valleys. The unconsolidated deposits are products of the late Wisconsin or later glacial scour and periglacial slope processes. The materials consist of till with abundant interbedded lenses of clay, silt, sand and gravel. Local depressions in the till are generally filled with clay, although some sand-filled depressions occur.

Ground water occurs in both the unconsolidated deposits, and in fractures and solution channels in the bedrock. Ground water movement in the vicinity of the site is expected to generally be to the southwest, towards Mamaroneck Harbor and the Long Island Sound.

2.2 SITE HISTORY

2.2.1 Background

The site is owned by the Village of Mamaroneck, and the southern 6 acres of the site have been used since 1970 to compost leaves and to dispose of tree trunks and wood chips. The northeastern corner of the site is currently used as a stockyard for a local plant nursery.

The Washingtonville Housing Alliance, a non-profit organization located in Mamaroneck, New York, proposed to develop a Senior Citizens' housing project on 1.85 acres of the site, located in the northeast corner. As part of the regulatory process before the housing project could be constructed, a draft environmental impact statement (DEIS) was begun by Malcolm Pirnie, pursuant to the New York State Environmental Quality Review Act (SEQR). Discussions with the Village of Mamaroneck and nearby businesses during the preparation of the DEIS, indicated that the site had been used as a landfill prior to 1970. As a result, Malcolm Pirnie conducted field studies on the site between July, 1987, and July, 1988, to assess subsurface environmental conditions.

The Village and nearby businesses reported that the site was a former municipal dump which also allegedly received industrial waste from the 1950's to the early 1970's. Open pits were allegedly dug for the purpose of mining gravel, and drums, industrial liquids and solids were placed in the pits. In addition, incinerator ash was reportedly disposed of on the site.

2.2.2 Previous Investigations

Between July, 1987, and July, 1988, Malcolm Pirnie conducted field studies on the site to assess environmental conditions. The investigations consisted of a soil gas survey conducted in the northeast corner of the site, and magnetometer surveys across the entire site to check for the presence of buried metallic objects, such as drums. Trenches were excavated in areas where metallic objects were suspected. Ground water monitoring wells were installed and water samples were collected for chemical analysis. The results of the investigation are provided in a document entitled "Technical Report on Environmental Subsurface Investigations at the Proposed Senior Citizens' Housing Development Site and Adjacent Leaf Compost Site in the Village of Mamaroneck, New York, August, 1988." The report was provided to NYSDEC on August 8, 1989. The investigations are summarized below.

The soil gas survey was conducted in July, 1987, on the 1.85 acre area proposed for the Senior Citizens' housing project. A grid was set up in the study area by driving stakes into the ground on 25-foot centers. At each location, a 1/2 inch diameter steel rod was driven into the soil, to create a 2 to 3 foot deep hole. An HNu photoionization meter was used to detect the presence of volatile organic gases in the hole and at the surface. The presence of methane was evaluated in the hole and at the surface using an explosimeter.

There were no gas readings above background recorded at the surface with either the HNu meter or the explosimeter. The subsurface HNu readings ranged from 0 to 17 ppm benzene equivalence and the highest readings were concentrated in the southeast corner of the area. The subsurface explosimeter readings ranged from 0 to 100 percent explosive gas, and the highest readings were recorded in the southwest portion of the study area.

Based on the results of the HNu screening, two soil gas samples were collected in tedlar bags, at the locations of the highest HNu readings. The samples were sent to Gollob Analytical Service for analysis of EPA Target Compound List (TCL) volatiles. Results of sample analyses showed no detectable TCL volatiles.

Magnetometer surveys were conducted on the portion of the site proposed for the housing project in August, 1987, and on the 6-acre leaf composting area in December, 1987. The surveys were conducted by making magnetometer readings on 25-foot centers, using a Geometrics G-856 Proton Precision Magnetometer. At each location, three magnetometer readings were made and the average value of the three readings was used to prepare a contour map (Plate 2).

From the magnetometer survey conducted in the northeast corner of the site where the housing project is proposed, three areas were identified where buried metal was suspected. The areas were located primarily in the southwestern part of the study area. Over one dozen areas with magnetic anomalies were detected throughout the six-acre leaf compost area.

In September, 1987, trenches were excavated at three locations in the northeast corner of the site. The three sets of trenches are shown on Plate 3, and are labelled SMA-1, SMA-2 and SMA-3. Drums were uncovered in all of the trenches, except trenches excavated in the center of the proposed housing project site. The drums were all badly corroded and in some instances only fragments of metal remained. Material from three drums and one soil sample were sent to U.S. Testing in Hoboken, New Jersey. The drum samples were analyzed for the RCRA hazardous waste characteristics (ignitability, corrosivity, reactivity, and EP Toxicity), total petroleum hydrocarbons and PCBs. The soil sample was analyzed for full priority pollutants.

In February and May, 1988, additional trenches were dug under the inspection of both Malcolm Pirnie and the NYSDEC (Plate 3), and drums were uncovered in most of the trenches. In February, 1988, four soil samples and four drum samples were collected for analysis from Trenches T-1 to T-7 (Plate 3). In September, 1988, trenches T-8 through T-57 were excavated and eighteen drum samples were collected for analysis. The samples were sent by the NYSDEC to Nanco Laboratory, for analysis of target compound list (TCL) parameters. The analytical results are discussed in Section 3.0.

Three monitoring wells (W-2, W-3 and W-4) were installed in the northeastern part of the site in February, 1988 (Plate 3). Two soil samples were collected for analysis of TCL parameters. The wells were constructed with 2-inch internal diameter PVC casing and 10 feet of 0.02 inch slotted PVC screen. The wells were screened across the water table. Water samples were collected by Malcolm Pirnie in the three wells and an existing well (W-1) on March 9, 1989. A representative of the NYSDEC was present during the sampling. The NYSDEC sent the samples to Nanco for analysis of TCL volatile organics, acid, base/neutral extractables and pesticides.

An additional three monitoring wells (W-5, W-6 and W-7) were installed on the perimeter of the site in April, 1988 (Plate 3). Well installation was inspected by the NYSDEC and Malcolm Pirnie. The wells were constructed with 4-inch internal diameter PVC casing and 0.02-inch slotted PVC screen. The wells were screened across the water table. Well W-5 was constructed with a five-foot length of screen and wells W-6 and W-7 were constructed with 10-foot lengths of screen. Samples were collected by Malcolm Pirnie in May, 1988, in the three wells, and a representative of the NYSDEC was present during the sampling. The NYSDEC sent the samples to Nanco Laboratories for analysis of TCL parameters. The analytical results are discussed in Section 3.0.

2.2.3 Potential Contaminant Sources

Potential contaminant sources at the site include any hazardous waste-bearing drums which may be present, as well as alleged open dumping of hazardous substances into pits which have since been filled. Any releases of these substances may have contaminated surrounding soil and ground water, which are also potential contaminant sources.

3.0 INITIAL EVALUATION

3.1 REVIEW OF EXISTING DATA

3.1.1 Contaminant Characteristics

The drum content samples that were collected in September 1987 from trenches SMA-1, SMA-2 and SMA-3 were analyzed for the RCRA hazardous waste characteristics (ignitability, corrosivity, reactivity and EP toxicity), total petroleum hydrocarbons and PCBs. The samples did not generate hydrogen sulfide. Hydrogen cyanide was generated during testing, which ranged between 0.17 and 0.28 mg/kg, which is well below the federal allowable limit of 250 mg/kg for hydrogen cyanide reactivity. EP toxicity metals were not detected in the samples, and corrosivity ranged from 0.004 to 0.014 inches/year, which is well below the federal allowable limit of 0.25 inches/year. Based on the results of the testing, the samples did not exhibit the characteristics of a RCRA hazardous waste.

The soil sample that was collected in September 1987, was a composite of soil from trenches SMA-1, SMA-2 and SMA-3. The sample was analyzed for full priority pollutants. Three volatile organic compounds were detected, methylene chloride, acetone and 2-butanone in concentrations of 70, 310, and 1,100 ug/kg, respectively. Four semi-volatile compounds were detected: 1,4-dichlorobenzene, naphthalene, 2,6-dinitrotoluene, and bis(2-ethyl hexyl phthalate) in concentrations of 1900 ug/kg, 400 ug/kg, 630 ug/kg and 5,200 ug/kg, respectively. Metals were also detected in the sample, at the following concentrations: cadmium (14 mg/kg), chromium (16 mg/kg), copper (273 mg/kg), lead (569 mg/kg), nickel (26 mg/kg), and zinc (840 mg/kg).

In February 1988, four soil samples (sample numbers 3, 6, 8 and 9 on Plate 3) and four drum samples (sample numbers 1, 2, 4 and 7 on Plate 3) were collected for analysis of TCL parameters. One soil sample was also collected from well boring W-2 and well boring W-4. The soil samples from the trenches contained volatile organic compounds. Methylene chloride ranged from 9 ug/kg in sample 3 to 780 ug/kg in sample 8. Acetone was present in soil sample 6 in a concentration of 280 ug/kg. Several base-neutral extractable compounds that are classified as polynuclear aromatic hydrocarbons (PAHs) were detected in soil samples 8 and 9. The total concentration of PAHs in samples 8 and 9 were 11,750 and 20,840 ug/kg, respectively. Several other base-neutral extractable compounds were detected in the soil samples. 4-methyl phenol and 2,4 dimethyl phenol were detected in sample 8 in concentrations of 15,000 and 1,100 ug/kg, respectively. Di-n-butyl phthalate was present in soil samples 3, 6 and 9 in concentrations of 15,000, 11,000 and 130 ug/kg, respectively. Bis (2-ethyl hexyl phthalate) was present in soil samples 6, 8 and 9 in concentrations of 34,000, 1,000 and 940 ug/kg, respectively.

Several pesticides were detected in the soil samples. Dieldrin was present in soil sample 6 in a concentration of 1,500 ug/kg. 4,4'DDD was present in soil samples 6 and 9 in concentrations of 1,400 and 65 ug/kg. 4,4'DDE was present in soil samples 3 and 9 at concentrations of 710 and 30 ug/kg, respectively.

Several volatile organic compounds were present in the drum samples. Methylene chloride was present in drum samples 4 and 7 in concentrations of 35,000 and 47,000 ug/kg, respectively. Acetone was present in drum samples 1 and 4 in concentrations of 56,000 and 31,000 ug/kg, respectively. Benzene was present in drum sample 7 in a concentration of 5200 ug/kg. One PAH compound was detected in the drum samples; Naphthalene was present in drum sample 1 at a concentration of 76,000 ug/kg. Three additional base-neutral extractable compounds were detected in drum sample 1: 2-methyl naphthalene (42,000 ug/kg), bis (2-ethyl hexyl phthalate) (9,200 ug/kg) and Isophorone (35,000 ug/kg). Several base-neutral extractable compounds were detected in drum 7 at the following concentrations: 4-methyl phenol (59,000 ug/kg), 2,4 dimethyl phenol (43,000 ug/kg), 3 nitroaniline (40,000 ug/kg), phenol (1,700 ug/kg), and benzoic acid (2000 ug/kg).

Several pesticides were detected in the drum content samples. Dieldrin was present in drum samples 1 and 4 in concentrations of 4,300 and 2,000 ug/kg, respectively. Endrin was detected in drum sample 1 in a concentration of 4,500 ug/kg. 4,4'DDD was detected in drum samples 1 and 2 at concentrations of 2,100 and 880 ug/kg, respectively. 4,4'DDT was present in drum sample 1 at a concentration of 6,300 ug/kg. 4,4' DDE was detected in drum samples 2 and 7 at concentrations of 38 and 89 ug/kg.

Alpha BHC was present in drum sample 4 (6,100 ug/kg) and Endrin-Ketone was present in drum sample 7 in a concentration of 194 ug/kg.

Acetone (a volatile organic compound) was detected in borings W-2 and W-4 in concentrations of 230 and 650,000 ug/kg, respectively. Several PAH compounds were detected in boring W-2; the total concentration of PAHs was 1,374,000 ug/kg. Dibenzofuran was detected in boring W-2 at a concentration of 7000 ug/kg.

Several pesticides were detected in boring W-2 at the following concentrations: dieldrin (3,000 ug/kg), endrin (3,800 ug/kg), 4,4'DDD (360 ug/kg), heptachlor (25,000 ug/kg), aldrin (12,000 ug/kg) and Endrin-Ketone (9,300 ug/kg).

Eighteen drum content samples were collected from trenches T-8 through T-57 and the sample locations are labelled with the prefix M on Plate 3. The samples were analyzed for TCL parameters. Volatile organic compounds were present in the samples. Benzene was present in M-8 and M-11 in concentrations of 41,000 and 5,000 ug/kg, respectively. Acetone was present in M-1, M-5 and M-8 in concentrations of 63,000 ug/kg, 92,000 ug/kg and 430,000 ug/kg, respectively. Several pesticides were detected in the samples. Dieldrin was present in M-1, M-6, M-8 and M-11 in concentrations of 2,600, 500, 7,100, and 7,200 ug/kg, respectively. Endrin was present in M-11 in a concentration of 2,300 ug/kg. 4-4'DDE was present in a concentration of 2,600 ug/kg. Lindane was present in M-1 in a concentration of 770 ug/kg. B-BHC (lindane type pesticide) was present in M-5 at a concentration of 210 ug/kg. One PCB, Arochlor 1254 was detected in M-13 in a concentration of 380 ug/kg.

Ground water samples were collected in wells W-1, W-2, W-3 and W-4 in February, 1988. Samples were collected in wells W-5, W-6, and W-7 in May 1988. The samples were analyzed for TCL parameters. Results of ground water analyses showed the presence of Arochor - 1254 (PCB) at 3.1 ug/l and delta-BHC, a lindane related pesticide at .15 ug/l. Several metals were detected in the samples from W-5, W-6 and W-7. The metal results are summarized in Table 3-1. The results of analysis for TCL organics indicated that some phthalates, volatiles and unknown semi-volatiles were detected at low levels (below the detection limits).

3.1.2 Site Geology and Hydrogeology

Most of the native soil on the site has been reworked, removed, or covered with fill material. Soil boring information obtained during the installation of monitoring wells indicates that fine to medium sand occurs to depths of 10 feet or more over most of the site, and to depths of 20 feet or more in the topographically higher northeastern corner. Glass, plastic, grease, wood chips, and concrete have been detected in some of the borings. The depth to bedrock is not known, but it is expected to be shallow, because bedrock outcrops occur near the northeast corner of the site.

Depth to ground water measurements were made in monitoring wells W-1, W-2, W-3, and W-4 on May 13, 1988 (Table 3-2). A contour map was prepared (Figure 3-1) showing the configuration of the water table in the northeast corner of the site. Measuring point elevations were never determined by a licensed surveyor for Wells W-5, W-6 and W-7. Therefore, water level measurements in these wells were not used to prepare the map. The map shows that ground water is moving generally to the south and southwest.

3.2 PRELIMINARY IDENTIFICATION OF APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

The NYSDEC specifies that remedial actions at inactive hazardous waste sites must meet any Federal or State standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate because of conditions at the site. The selection of applicable or relevant and appropriate requirements (ARARs) will be made based on the contaminants detected on the site, physiographic conditions, and the remedial actions that are being considered. A preliminary list of ARARs are given below.

3.2.1 Potential Contaminant-Specific ARARs

The following State and Federal requirements are potentially applicable or relevant and appropriate for specific contaminants:

State:

- New York State Ground Water Quality Standards (6 NYCRR 703).

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TABLE 3-1

ANALYSIS OF METALS
GROUND WATER SAMPLES
MAY 1988

Metal	Well 5 (ug/l)	Well 6 (ug/l)	Well 7 (ug/l)
Arsenic	12.0	24	5.1
Barium	3670.0	328	172
Cadmium	2.0	2.3	2.0
Chromium	19.4	31.4	21.6
Copper	142.0	177	37.6
Iron	38,700	22,500	11,100
Lead	821.0	102	9.9
Manganese	400	420	342
Mercury	0.43	0.43	0.20
Selenium	6.0	1.2	1.4
Silver	2.0	4.1	4.6
Zinc	777	180	31.8
Cyanide	10	10	10

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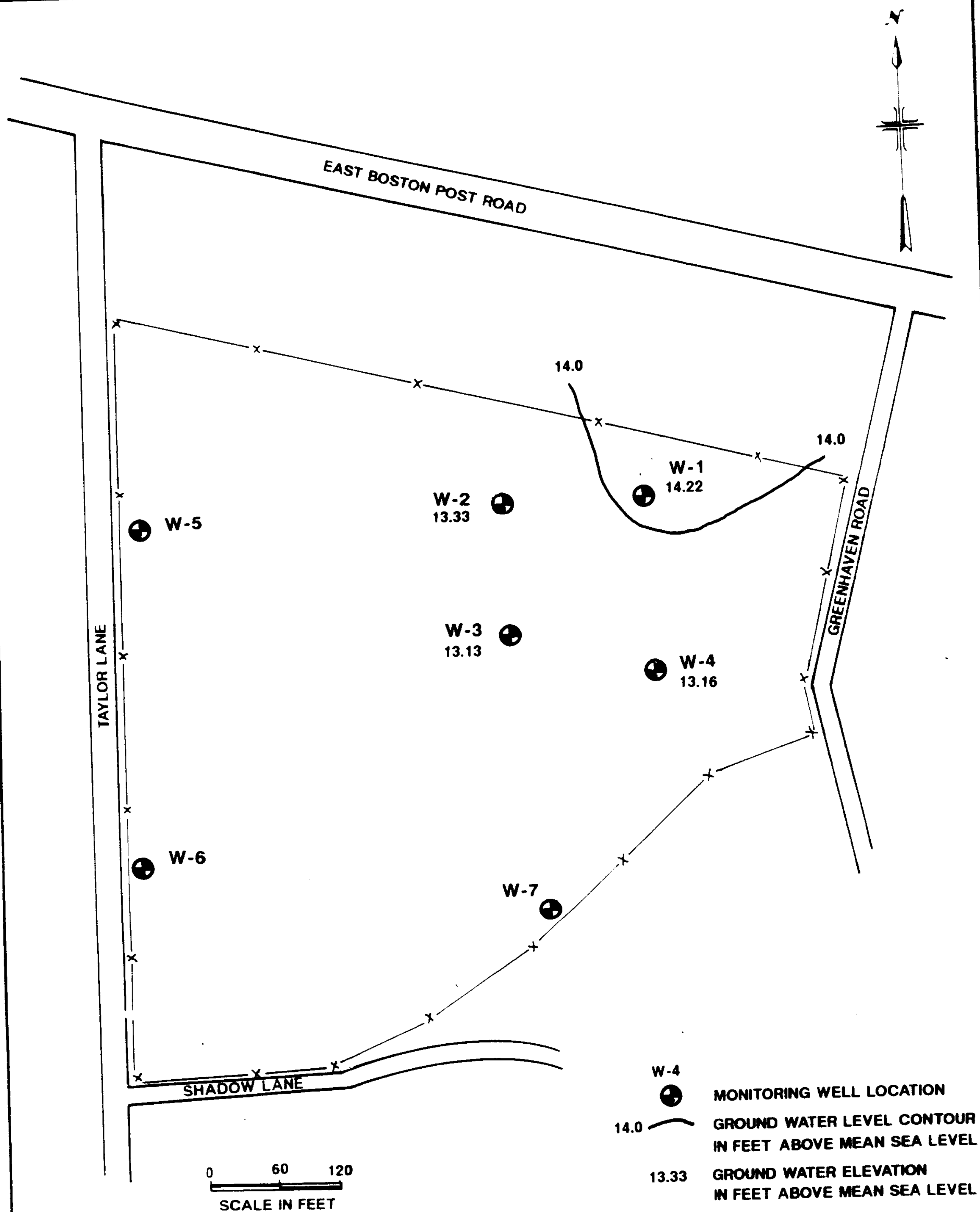
TABLE 3-2

Ground Water Elevations
May 13, 1988

Well No.	Measuring Point Elevation	Ground Water Elevation
W-1	30.30 ft	14.22 ft
W-2	18.53 ft	13.33 ft
W-3	17.35 ft	13.13 ft
W-4	20.02 ft	13.16 ft

Elevations in feet above mean sea level.



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VILLAGE OF MAMARONECK
NEW YORK
MAMARONECK TAYLOR LANE LEAF COMPOST SITE

WATER TABLE CONTOUR MAP - MAY 13, 1988

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FIGURE 3-1

- New York State Safe Drinking Water Act - Maximum Contaminant Levels (MCLs) (10 NYCRR 5).
- New York State Surface Water Quality Standards (6 NYCRR 702).
- New York State Raw Water Quality Standards (10 NYCRR 170.4).
- New York State Ambient Air Quality Standards (6 NYCRR 256 and 257).

Federal:

- Clean Water Act, Water Quality Criteria (Section 304).
- National Ambient Air Quality Standards (NAAQS) (40 CFR 50).
- Safe Drinking Water Act - Maximum Contaminant Levels (40 CFR 141).

3.2.2 Location-Specific ARARs

The following State and Federal requirements are potentially applicable or relevant and appropriate because of the proximity of the site to wetland and coastal environments:

State:

- New York State Freshwater Wetlands Law (ECL Article 24).
- New York State Freshwater Wetlands Permit Requirements and Classification (6 NYCRR 663 and 664).
- New York State Tidal Wetlands Requirements (6 NYCRR 661).
- Endangered and Threatened Species of Fish and Wildlife Requirements (6 NYCRR 182).
- New York State Coastal Zone Management Standards.

Federal:

- Executive Orders on Floodplain Management and Wetlands Protection.
- Fish and Wildlife Coordination Act.
- Coastal Zone Management Act.
- Wetlands Construction and Management Procedures (40 CFR 6).

3.2.3 Remedial Action-Specific ARARs

The following State and Federal requirements are potentially applicable or relevant and appropriate for the types of remedial action that may be proposed at the site:

State:

- New York State Pollution Discharge Elimination System (SPDES) Requirements (Standards for Storm Water Runoff, Surface Water, and Groundwater discharges) (6 NYCRR 750-757).
- New York State RCRA Standards for the Design and Operation of Hazardous Waste Treatment Facilities (i.e., landfills, incinerators, tanks, containers, etc.). Minimum Technology Requirements (6 NYCRR 370-372).
- New York State RCRA Generator and Transporter Requirements for Manifesting Waste for Off-Site Disposal (6 NYCRR 364 and 372).
- New York State Air Emission Requirements (VOC Emission from Air Strippers and Process Vents, General Air Quality) (6 NYCRR 200-212).
- New York State Department of Environmental Conservation, Title 6 of the official compilation of codes, Rules, and Regulations, Solid Waste Management Facilities (6 NYCRR PART 360).

Federal:

- RCRA Generator Requirements for Manifesting Waste for Off-site Disposal (40 CFR 263).
- RCRA Transporter Requirements for Off-Site Disposal (40 CFR 270).
- Safe Drinking Water Act, Underground Injection Control Requirements (40 CFR 144 and 146).
- RCRA Land Disposal Restrictions (40 CFR 268) (On- and off-site disposal of excavated soil).
- Clean Water Act - NPDES Permitting Requirements for Discharge of Treatment System Effluent (40 CFR 122-125).
- Clean Water Act Discharge to Publicly - Owned Treatment Works (POTW) (40 CFR 403).
- National Emission Standards for Hazardous Air Pollutants (NESHAPs) (40 CFR 61).

- DOT Rules for Hazardous Materials Transport (49 CFR 107, 171.1-171.500).
- Occupational Safety and Health Standards for Hazardous Responses and General construction Activities (29 CFR 1904, 1910, 1926).

3.3 INTERIM MITIGATION MEASURES

The Village of Mamaroneck was directed to implement Interim Mitigation Measures (IMMs) at the site, under the terms of the Order on Consent. The purpose of the IMMs is to minimize uncontrolled ponding of surface runoff on the site and to control the discharge of runoff from the site. These Interim Mitigation Measures (IMMs) are to be conducted in two phases.

The first phase, which was completed in the Fall of 1989, involves the regrading and seeding of the central part of the site, to achieve an approximate average slope of 1 percent toward a depression located in the western portion of the site. Water from the depression is directed into a ditch located along the east side of Taylor Lane, and carried to a nearby storm sewer.

The second phase of the IMM will involve regrading of the south central portion of the site utilizing existing composted material in that area. A swale will be constructed in the southwestern part of the site, to direct surface runoff from this area to the storm drainage system. The ditch located along the east side of Taylor Lane, which receives surface water runoff from the Phase I area, will be deepened. This phase will be undertaken in the Spring of 1990.

4.0 WORK PLAN RATIONALE

4.1 DATA QUALITY OBJECTIVES (DQOs)

The objectives of the RI/FS have been developed, based on an evaluation of the existing data base as discussed in Section 3.1. Additional data is required to fully characterize the nature and extent of contamination and to identify present and future risks from the site. The intended uses of the data and types of analyses will dictate the analytical level.

4.2 PRELIMINARY ASSESSMENT OF REMEDIAL ACTION OBJECTIVES

Based on information available from investigations conducted by Malcolm Pirnie in 1987 and 1988, the media that are potentially contaminated are soil, ground water, surface water, sediment and the contents of buried drums. The field investigation and risk assessment will evaluate the extent of contamination and whether the contaminant levels warrant a remedial action.

The ultimate objective of a remedial action is to provide protection to human health and the environment in a manner which is cost-effective, and which utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

A preliminary identification of remedial action objectives is:

- Soil - Prevent or limit exposure to contaminated soil that poses a significant risk as determined by the risk assessment.

- Ground Water - Prevent or limit exposure to contaminated ground water that poses a significant risk. Remediate ground water contamination to achieve State and Federal ARARs and risk-based levels.

- Contents of Drums - Prevent or limit exposure to hazardous waste contained in buried drums at the site. Remediate contamination to achieve State and Federal ARARs and risk-based levels.

4.3 PRELIMINARY RISK ASSESSMENT

This section presents a preliminary risk assessment of the public health and environmental risks associated with the site. This assessment is based on the distribution and concentration of contaminants found during previous sampling, site history, land use, demography, hydrogeology and other data presented in this Work Plan.

4.3.1 Public Health Evaluation

4.3.1.1 Potential Chemicals of Concern

In the development of the risk assessment, the chemicals of concern are identified in order to evaluate the potential health effects. Previous investigations indicated the presence of several polynuclear aromatic hydrocarbons, base-neutral extractable compounds, and pesticides as discussed in Section 3.0. Further sampling and analysis to be conducted in the RI will allow a refinement of the list of chemicals of concern.

4.3.1.2 Potential Source Areas and Release Mechanisms

Previous investigations have shown the presence of buried drums located in at least four areas on site. Drums unearthed during excavations have been severely deteriorated. In addition, ash and liquid waste were allegedly disposed of on the site, and may have contaminated the soil. In their present state, the primary mechanism for release of potential contaminants from the drums is discharge into surrounding soil and ground water. Since the drums are buried, air-borne emission is not a likely release mechanism. However, air-borne emission from contaminated soil is a possible release mechanism.

4.3.1.3 Potential Exposure Pathways and Receptors

There are five potential pathways for exposure to the on-site contaminants. The most obvious are direct exposure to contaminated soil or to drums containing contaminants. The others are a result of indirect exposure, either to contaminated soil as it is released to the atmosphere as dust or volatile emissions, or as exposure to contaminated ground water or finally, from exposure to contaminated surface water or sediment. Since the drums are presently buried, the exposure potential may be minimal because the contamination would be isolated to subsurface depths.

The potential receptors can be classified into two categories, humans and wildlife. The human receptors would be Village personnel, customers and employees of nearby businesses, area residents, and trespassers. Potential wildlife receptors would be: terrestrial wildlife inhabiting either the 7.85 acre site and adjacent wetland; or aquatic wildlife in Magid Pond.

4.3.2 Environmental Evaluation

The primary environmental risk is to wildlife in the adjacent wetland and is associated with exposure to contaminants potentially present in surface water and sediment discharging from the site. In addition, a possible hydraulic ground water connection between the site and adjacent wetland may pose a risk to wildlife. Additional data on the wetland is necessary in order to understand the environmental risks.

5.0 SITE PREPARATION

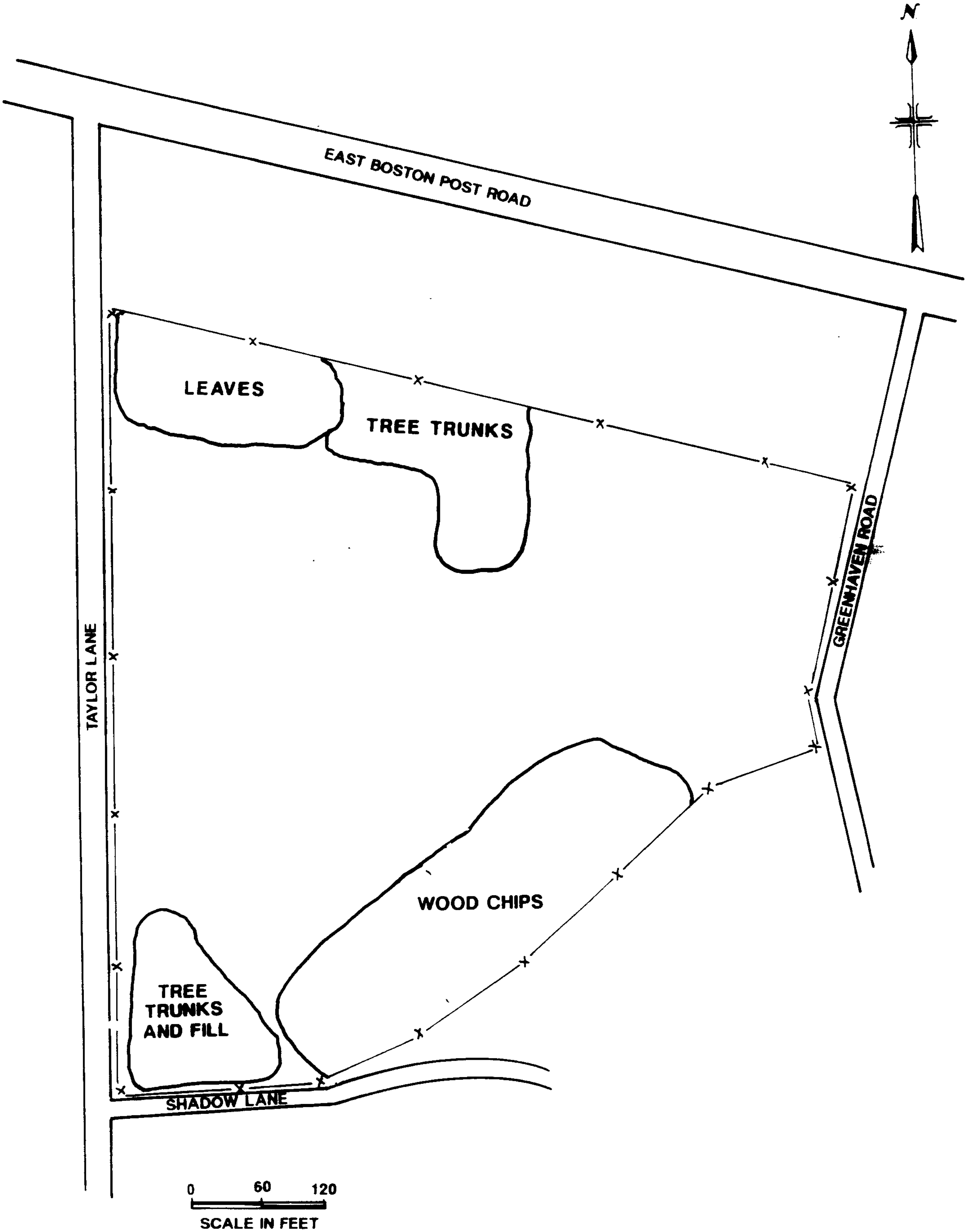
The Mamaroneck Taylor Lane Leaf Compost site was actively receiving leaf and tree debris until the Fall of 1989. Until this time, much of the site was covered with large piles of leaf compost, fresh leaves, tree stumps, wood chips and demolition debris. During the Fall of 1989, Phase I of the Interim Mitigation Measures (IMM) was implemented, and some of the site was regraded using existing composted material. Most of the remaining areas of the site will be regraded in the Spring of 1990 as part of Phase II of the IMM. Figure 5-1 schematically shows the approximate extent of the debris piles, which will remain after Phase II of the IMM is completed.

Portions of the debris piles must be moved during the remedial investigation in order to lay out transects for geophysical and soil gas surveys, and to excavate trenches, drill borings and install monitoring wells.

The following tasks will be completed to prepare the site in order to conduct RI Activities:

- Chipping of Wood Stumps.
- Mobilization of bulldozer to clear areas where geophysical and soil gas surveys will be conducted.
- Mobilization of bulldozer to clear areas where trenches will be excavated, borings will be drilled and monitoring wells will be installed.

A cost estimate has been prepared for preparing the site to conduct field activities.



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VILLAGE OF MAMARONECK
NEW YORK
MAMARONECK TAYLOR LANE LEAF COMPOST SITE
LOCATION OF DEBRIS PILES

MALCOLM PIRNIE, INC.

FIGURE 5-1

6.0 REMEDIAL INVESTIGATION - PHASE I

6.1 INTRODUCTION

The purpose of the Remedial Investigation (RI) is to characterize the nature and extent of soil, sediment, ground water and surface water contamination on the site, and the extent of drum burial. In addition, samples will be collected in the wetland areas adjacent to the site (Magid Pond and Otter Creek) to assess if surface and ground water is draining from the site and adversely impacting the wetland. The data collected during the investigation will be used to evaluate the potential risks (Endangerment Assessment) that contamination presents to human health and the environment and to evaluate feasible remedial alternatives (feasibility study) to mitigate any risks that are identified.

The RI will consist of the following tasks, which are described in detail in the following sections:

- Task 1: Project Reports
- Task 2: Community Relations
- Task 3: Identification of ARARs
- Task 4: Field Investigation
- Task 5: Sample Analysis/Validation
- Task 6: Site Investigation Analysis
- Task 7: Additional Field Activities
- Task 8: Risk Assessment
- Task 9: Preliminary Site Characterization Summary
- Task 10: Draft Remedial Investigation Report
- Task 11: State Assistance Contract Documentation/Accounting

6.2 TASK 1: PROJECT REPORTS

Project planning involves several tasks for the development of plans and schedules required for the execution of the RI/FS. These tasks include the preparation of project plans, a detailed review of existing data, and the submittal of monthly progress reports and task specific deliverables to NYSDEC. The following sections describe the project plans that have been prepared to conduct the remedial investigation, which are attachments to the Work Plan. These plans may be revised as the investigation is conducted and new information if evaluated. The following sections also address the review of existing data and progress reports.

6.2.1 Field Sampling Plan

The Field Sampling Plan (FSP) (Attachment 1) provides a detailed discussion of the procedures that will be followed to conduct field activities during the remedial investigation. Specifically, the FSP will address:

- Sample collection procedures
- Number, locations and types of samples
- Sample analysis
- Field instrument calibration
- Sample packaging and shipment procedures
- Decontamination procedures
- Responsibilities of field personnel

6.2.2 Quality Assurance Project Plan

The Quality Assurance Project Plan (QAPP) (Attachment 2) discusses the specific procedures that will be followed to ensure that the data collected in the remedial investigation is representative and can be used to achieve the quality assurance objectives established for the site.

The QAPP addresses the following items:

- Project description
- Project organization and responsibilities
- Quality assurance objectives for measurement
- Sampling procedures
- Sample custody
- Calibration procedures
- Analytical procedures
- Data reduction, validation, and reporting
- Internal quality control

- Performance and system audits
- Preventive maintenance
- Specific routine procedures used to assess data (precision, accuracy and completeness)

6.2.3 Health and Safety Plan

A Health and Safety Plan (HSP) (Attachment 3) has been developed which establishes the health and safety protocols to be followed during the remedial investigation field activities. These protocols have been developed specifically for this site and are based on previous investigations and guidelines established by the Occupational Safety and Health Administration (OSHA 29 CFR 1910.120). The HSP includes the following:

- A description of contaminants found at the site
- A description of personal protective equipment
- Safety monitoring equipment to be used
- Medical monitoring requirements
- Emergency procedures
- Contingency plans

The procedures set forth in the HSP will be continually reviewed during field activities, and revised, if necessary.

6.2.4 Description of Existing Conditions

A history of the leaf composting site, and a compilation of pertinent information is presented in "Technical Report on Environmental Subsurface Investigations at the Proposed Senior Citizens Housing Development Site and Adjacent Leaf Compost Site in the Village of Mamaroneck, NY, August, 1988." Information will be extracted from this and other documents pertaining to the leaf composting site and will be compiled into a single report that will include:

- Site Background
- Nature and Extent of Problem
- History of Previous Investigations
- Site Description
- Site Map Showing Boundaries and Pertinent Features

In addition, chemical data from previous investigations will be validated following NYSDEC CLP procedures, if all of the documentation for laboratory procedures is obtained from NYSDEC.

6.2.5 Project Reports

Monthly progress reports will be submitted to the NYSDEC. The progress reports will describe the work that has been completed during the reporting period (i.e., number of borings drilled and number of samples collected) and the work projected for the following month. The progress reports will also identify any problems encountered or solved, and any changes proposed for the work scope, or personnel.

Upon completion of Task 6, Site Investigation Analysis, a summary report will be submitted to the NYSDEC, which will contain recommendations for additional work to be conducted on-site or off-site. Inclusive reports will also be submitted upon completion of the following tasks:

Task 8: Preliminary Site Characterization Summary
Task 9: Draft Remedial Investigation Report

6.2.6 Meetings

Meetings will be held as needed, to review results with the NYSDEC, and to discuss future work, or proposed changes in the work scope. A total of five meetings has been budgeted.

6.3 TASK 2: COMMUNITY RELATIONS

A site-specific Citizen Participation Plan (CP) (Attachment 4) has been developed which is consistent with the requirements of the New York State Inactive Hazardous Waste Site Citizen Participation Plan dated August 30, 1988 (NYSDEC, 1988). This CPP will form the basis for citizen participation activities during the RI/FS.

6.4 TASK 3: IDENTIFICATION OF ARARS

Applicable, relevant and appropriate requirements (ARARs) will be identified to assure that all remedial alternatives comply with federal, state, and local regulations. A preliminary list of ARARs is given in Section 3.2.

6.5 TASK 4: FIELD INVESTIGATION

6.5.1 Introduction

The field investigation will consist of the tasks listed below.

- Site map preparation
- Mobilization
- Geophysical surveys
- Soil gas survey
- Inventory of wells within 1/2 mile of site
- Collection of water level measurements in existing wells
- Excavation of soil trenches
- Drilling of soil borings
- Installation of monitoring wells
- Permeability tests
- Collection of water level measurements
- Collection of water samples
- Collection of sediment and surface water samples from ponds located on site
- Sampling and chemical analysis of sediment and surface water from adjacent wetlands (Magid Pond and Otter Creek)

A description of each task is provided below. The procedures that will be followed to collect the samples are described in the Field Sampling Plan. Drill cuttings from monitoring well borings, monitoring well development and purge water from bedrock wells and decontamination water will be placed into 55 gallon drums and will be stored on-site. The cost to dispose of drums has not been estimated as part of the cost proposal for the RI/FS. If the drums must be placed in a secure landfill, this will be an out-of-scope work item.

Once these tasks have been completed, if there is an indication of off-site migration of contaminants, the following activities may be conducted:

- collection of water samples from wells within one-half mile of site.

- collection of water samples from sumps and air samples in basements of nearby residences

These tasks are described in more detail in Section 6.8.

6.5.2 Site Map Preparation

The topographic map of the site that has been prepared to develop the IMM proposal will be revised, after the site has been cleared of brush, tree stumps and leaf piles, and prior to commencing the field investigation. Site boundaries, buildings, roads, surface water boundaries and other notable features will be placed on the map. In addition, the nearby wetlands (Magid Pond) will be located on the map.

6.5.3 Mobilization

The following facilities will be provided prior to the start of the field work:

- Office trailer with electricity, telephone and storage space for samples, equipment and supplies;

- Temporary decontamination pad with a sump, pump and water supply. The proposed location of the decontamination pad is shown on Plate 1.

- Staging area and drums to temporarily store drill cuttings, disposable clothing and equipment and other materials.

- Wind socks - Wind socks will be installed at the three locations shown on Plate 1. Two wind socks will be set up at each location. One sock will be located 5 feet above ground surface and the second will be located 10 feet above ground surface.

The Village of Mamaroneck will make repairs to the wooden fence which surrounds the site to assure that the site is secure.

6.5.4 Geophysical Surveys

A ground penetrating radar (GPR) and seismic refraction survey will be conducted by a subcontractor to Malcolm Pirnie. The objective of the GPR survey is to continuously map near-surface stratigraphy to provide information on the boundaries of abandoned waste pits and to locate buried drums. The purpose of conducting the seismic refraction survey is to estimate the depth to bedrock. The procedures that will be followed are described in the field sampling plan.

A map will be prepared to show the location and thickness of suspected drum burial areas, fill material and waste disposal areas. A contour map will be prepared to show the elevation of the bedrock surface. The results of the surveys will be used to selected the locations of proposed trenches, soil borings and monitoring wells.

6.5.5 Soil Gas Survey

A soil gas survey will be conducted on the southwestern portion of the site (approximately 6 acres), to assess the extent of soil contamination by volatile organic constituents. In previous investigations (Section 2.2.2), a soil gas survey was performed on the 1.85 acre parcel that was intended to be used for the proposed Senior Citizens' Housing Project. Possible sources of contaminants in the 6 acre area include spillage from unloading of drums, waste disposal into open pits, or residuals from subsurface disposal of drums. A grid will be laid out by driving surveying stakes into the ground on 50-foot centers over most of the site. However, because of the shallow depth of the water table, the soil gas survey may be limited to areas where the depth to water table from the surface is greater than 4 feet.

An HNu Systems, Inc. Model PI-101 photoionization meter (HNu), equipped with a 10.2 eV lamp, and an organic vapor analyzer (OVA-128) will be used to qualitatively detect the presence of volatile organic gases. The HNu meter records total volatile organic compounds in parts per million (ppm) benzene equivalence and the OVA records total volatile organic compounds in parts per million (ppm) Methane equivalence. The concentration of combustible gases will be screened using an MSA Model 2A explosimeter. The explosimeter is an instrument which is calibrated to read methane gas, and which indicates that the atmosphere being measured is some percentage of the Lower Explosive Limit (LEL) of methane. The LEL of methane is 5 percent. The explosimeter will read 100 percent explosive gas when there is 5 percent of methane present in the air.

At each grid point, a 1/2 inch diameter steel rod will be driven into the soil, to create a 2 to 3 foot deep hole. After the rod is removed, a hollow steel tube with teflon tubing connected to one end will be lowered 2 to 2.5 feet into the hole. The teflon tube will be connected to the explosimeter and the reading will be recorded. After the explosimeter is disconnected from the teflon tube, the explosimeter will be purged by continuing to drain air remaining in the tube through the instrument. After the purging is completed, an explosimeter reading will be taken at the surface.

The HNu extension probe which is 4 to 5 inches in length and of small diameter, will be connected to the teflon tube and a reading will be recorded. The HNu extension probe will be removed from the tubing, and a reading will be made at the surface. OVA readings will be made by following the procedures described for the HNu. If the HNu or OVA detectors register soil gas readings in the hole or at the surface that are greater than 5 ppm benzene or methane equivalence, respectively, above the background reading, the grid spacing around the sample point will be reduced to 25 feet and additional measurements will be made.

The HNu, OVA and explosimeter readings will be plotted on separate site maps, and will be contoured. The soil gas maps will be used in conjunction with soil gas data obtained from the earlier investigations and the geophysical surveys to locate soil borings, trenches and monitoring wells. The field procedures and instrument calibration procedures that will be followed to conduct the soil gas survey are presented in the attached Field Sampling Plan.

6.5.6 Inventory of Wells

An inventory of wells located within one-half mile of the site will be made by reviewing county and state health department records, NYSDEC records, and United States Geological Survey reports and files. In addition, local well drillers will be contacted for information. The local water company will be contacted to obtain information on the source of their water supply, and to see if they can identify homeowners that are not serviced by the company.

6.5.7 Collection of Water Level Measurements

The existing monitoring wells on the site will be located and inspected. The three wells installed during the April, 1988 investigation (W-5, W-6, and W-7) will be surveyed for location and elevation. A round of water level measurements will be made and a water table map will be prepared to confirm the direction of ground water movement at the site. The water table map will be used to finalize the locations of additional monitoring wells.

6.5.8 Air Monitoring

Air monitoring will be conducted during field operations to measure volatile organic contaminant levels, combustible gas levels and respirable dust and radiation levels. The purpose of the air monitoring is to evaluate contaminant levels in the workers' breathing zone in order to select appropriate personal protective equipment, as described in the HSP prepared for the RI investigation. In addition, monitoring will be conducted along the perimeter of the site during trenching and drilling operations, in order to assess if field activities are creating conditions which may pose a health risk to nearby residents. If contaminant levels along the perimeter exceed the action limits given in the HSP, field activities will be terminated and a contingency plan may be implemented to alert nearby residents if necessary, as described in the HSP.

The HNu photoionization detector or Foxboro Organic Vapor Analyzer will be used to measure levels of volatile organic vapors; an MSA explosimeter will be used to measure explosive gas levels; the MIE Minirad will be used to measure radiation levels and the Miniram will be used to measure dust levels.

6.5.9 Excavation of Soil Trenches

The results of the geophysical survey and the soil gas survey will be evaluated to delineate areas where drum burial and waste disposal are suspected. Trenching will then be conducted to delineate the lateral extent of drum burial areas. Soil and or drum content samples will be collected from selected trenches for analysis. Based on data from investigations conducted in 1987 and 1988, twenty-seven trenching locations are shown on Plate 1, and samples will be collected for analysis in nine of the trenches. However, the trenches may be relocated after the results of the geophysical and soil gas surveys have been received and reviewed. Before trenching begins, Malcolm Pirnie will provide NYSDEC with a revised map showing trench locations, for review and approval. A cost estimate has been provided to excavate a total of 35 trenches and to collect 12 samples for analysis.

In the southeast corner of the site, where drums were uncovered during investigations conducted in 1987 and 1988, trenching will start from a point outside the known contamination area and continue toward the center, until the boundaries of the drum burial area are delineated. In other areas where drums are suspected to be buried, trenching will begin in the center. Trenches will be excavated approximately every 25 feet, moving away from the center, until the boundaries of each area are delineated.

Each trench will be dug with a backhoe, to the water table or to 10 feet below grade, whichever is less. The water table is expected to be less than 4 feet deep over most of the site. Each trench will be approximately 15 feet long, by 3 feet wide. A soil sample or drum content sample will be collected for chemical analysis, from trenches located in the center of drum burial areas (Plate 1). Samples to be analyzed will be selected based on visible signs of contamination, or samples with HNu readings above background. The samples will be transferred to laboratory prepared bottles and sent to a NYSDEC Contract Laboratory Program (CLP) laboratory for analysis for Target Compound List (TCL) and Target Analyte List (TAL) parameters and total petroleum hydrocarbons (Table 6-1). No more than 12 soil or drum content samples will be collected for analysis. Any intact drums will be placed into overpack drums and will be stored on site. The cost for disposal of the overpack drums is not considered in the RI budget. After the trenching is completed, the soil will be placed back into the trench, and a surveying stake labelled with the trench

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Table 6-1

Analytical parameters
Mamaroneck Taylor Lane Leaf Compost Site

Matrix	Parameters

Soil/Sediment
Drum Contents
	- Target Compound List Parameters:
	  - Volatile organic compounds
	  - Acid, Base/Neutral extractable compounds
	  - Pesticides/PCBs
	- Target Analyte List Parameters
	  - Metals
	- Total Petroleum Hydrocarbons

Ground water/
Surface Water
	- Target Compound List Parameters:
	  - Volatile organic compounds
	  - Acid, Base/Neutral extractable compounds
	  - Pesticides/PCBS
	- Target Analyte List Parameters
	  - Metals
	- Landfill Leachate Parameters
	  Alkalinity
	  Ammonia
	  BOD
	  COD
	  Chloride
	  Chromium VI
	  Color
	  Cyanide
	  Hardness
	  Phenols
	  MBAS
	  Nitrates
	  Odor
	  Sulfate
	  TDS
	  Total Kjeldahl-N
	  TOC
	- Total Petroleum Hydrocarbons

number will be placed in the ground at one end of the trench. If the soil appears to be visibly contaminated, 10 to 12 inches of clean fill will be placed over the soil. The specific procedures that will be followed to conduct trenching and collect soil samples is provided in the attached Field Sampling Plan.

6.5.10 Soil Borings

Soil borings are proposed to be drilled in areas where drums are not present, and along the perimeters of drum burial areas (Plate 1). Soil samples will be collected for chemical analysis in each boring. The purpose of the soil borings in areas where drums are not present is to evaluate if soil outside of drum burial areas is contaminated. The soil borings will be drilled on approximately 200 foot centers. If areas are identified from the geophysical surveys, or soil gas surveys, where bulk or liquid waste disposal may have occurred, the boring density will be increased to one boring every 50 to 100 feet. The purpose of the borings drilled along the perimeters of the drum burial areas is to evaluate the thickness of the fill material. Two borings will also be drilled along the northern edge of the site (Plate 1) to assess the potential for contamination to be originating from the nursery, gas station and the car dealer located on the south side of the East Boston Post Road (U.S. Route 1). In addition, one soil sample will be collected for chemical analysis from 6 borings that will be drilled to install monitoring wells (Plate 1).

Based on data from investigations conducted in 1987 and 1988, fourteen borings are proposed at the locations shown on Plate 1. However, the borings may be relocated after the results of the geophysical survey, soil gas and trenching have been received and reviewed. Before drilling begins, Malcolm Pirnie will provide NYSDEC with a revised map showing tentative boring locations, for review and approval. A cost estimate has been provided to drill a total of 20 soil borings.

At each boring location, continuous split-spoon samples will be collected from the ground surface to ten feet below, or to the water table, whichever is greater. In most of the borings, split-spoon samples will then be collected every five feet to a depth five feet below fill material unless refusal on bedrock occurs first. In three borings, drilling will continue to the top of bedrock, and split-spoon samples will continue to be collected very five feet. A labelled surveying stake will be placed in each boring.

If the depth to water is less than 10 feet, the split-spoon sample with the highest HNu value or other signs of contamination will be selected for chemical analysis. If the HNu reading is not above background, or visible signs of contamination are not apparent, the sample will be selected directly above the water table. If the depth to water is greater than 10 feet, two samples will be collected for chemical analysis; one sample will be selected between 0 and 10 feet below grade, based on its response to the HNu, or other signs of visible contamination, and the second sample will be collected directly above the water table.

The samples selected for analysis will be transferred from the sampling spoon to laboratory bottles and sent to a NYSDEC CLP laboratory for analysis of TCL and TAL parameters and total petroleum hydrocarbons (Table 6-1). The detailed procedures for drilling soil borings and collecting samples for analysis are outlined in the attached Field Sampling Plan.

6.5.11 Installation Of Monitoring Wells

Ground water on the site is believed to be moving from the northeast corner of the site, towards the southwest or west. Initially, thirteen monitoring wells will be installed, at the locations shown on Plate 1. One soil sample will be collected for chemical analysis from 6 of the borings that will be drilled to install monitoring wells (Plate 1). At three locations, a cluster of two monitoring wells will be installed. One cluster will be installed in the upgradient portion of the site west of Greenhaven Road. The second cluster will be drilled in the downgradient area of the site near the intersection of Taylor Lane and Shadow Lane. The third cluster will be located in the northeast corner of the site. Each cluster will consist of one well screened across the water table and a second well drilled into the shallow bedrock.

At seven locations, a single well will be installed, which will be screened across the water table (Plate 1). If the saturated overburden is more than 25 feet thick at any cluster location, or at the well location in the center of the site, up to two additional wells screened at intermediate depths may be recommended. The cost for these wells have been provided with the supplemental RI budget estimates.

Each monitoring well will be developed by surging and/or pumping to open the screen to the formation water, and to minimize turbidity. Turbidity will be reduced to a level of 50 Nephelometric Turbidity Units (NTU), if possible.

The protocols that will be followed to install and develop the wells, and the construction methods that will be used are presented in the attached Field Sampling Plan.

6.5.12 Permeability Testing

The hydraulic conductivity of the overburden material at the site will be estimated using slug tests on the overburden monitoring wells. The hydraulic conductivity is a measure of the ease in which water moves through the saturated material. The hydraulic conductivity is estimated by analyzing the rate of decline or rise of water in a monitoring well after a volume of water, or a metal slug is added or removed from the well.

Two slug tests will be conducted in each monitoring well; the first test will be conducted by lowering and completely submerging a solid rod (slug) into the monitoring well. The water level rise in response to submerging the rod, and the subsequent recovery (decline) will be recorded using an electronic data logger and a pressure transducer. After the water recovers to the static level, the second test will be conducted by removing the slug, causing a lowering of the water level. The data logger will record the subsequent recovery.

A method developed by Bouwer and Rice (1976), based on the Theis equation, will be used to analyze the data. The Field Sampling Plan describes the procedures that will be followed to conduct the slug tests.

6.5.13 Measurement of Ground Water Levels

Four rounds of synoptic water level measurements will be made in the monitoring wells and at any other locations determined during the RI. The measurements will be used to define the direction(s) of ground water movement and the vertical hydraulic gradient.

In addition, continuous water level measurements will be collected in each of the wells that are part of the cluster to be installed near the intersection of Shadow Lane and Taylor Lane. The measurements will be collected for a period of one week, using an electronic data logger and pressure transducers. The purpose of collecting continuous measurements is to evaluate if tidal fluctuations in the Long Island Sound are affecting ground water levels.

6.5.14 <u>Ground Water Sampling</u>

One round of ground water samples will be collected for analysis from each well installed during this investigation. The water samples will be sent to a NYSDEC CLP Laboratory to be analyzed for TCL, TAL, landfill leachate parameters and total petroleum hydrocarbons (Table 6-1).

Initially, wells will be purged until three to five volumes of standing water are evacuated or until the well is pumped dry. While the well is being purged, field measurements of pH, temperature and specific conductance will be made. If all three parameters stabilize, the volume of water purged will be recorded and purging will be considered complete. If the parameters do not stabilize, purging will continue until 3 to 5 volumes are purged.

After the purging is completed, the water samples will be collected using dedicated stainless steel bailers which will be decontaminated by the laboratory. Bailers will be lowered slowly into the well to assure that dissolved volatile organic compounds are not driven off. Samples will be transferred from the bailer to laboratory clean sample containers.

Field measurements of pH, specific conductance, and temperature will be made in each well. Both the pH and the specific conductivity meters will be calibrated prior to each use. All field measurements will be recorded on sample logs.

The detailed procedures that will be followed in the field are provided in the attached Field Sampling Plan.

Additional water samples will be collected to confirm the results of the first ground water sampling round. Analysis will be limited to those compounds detected during the first round.

6.5.15 Sediment and Surface Water Samples

One surface water sample and one sediment sample will be collected for chemical analysis from each of the ponds located in the southern part of the site (Plate 1), to characterize the chemical quality of the water and sediment. In addition, one sediment and one surface water sample will be collected for chemical analysis in the ditch located on the east side of Taylor Lane. The ditch carries storm water runoff from the site to storm sewers located near the intersection of Taylor Lane and Shadow Lane. The ditch generally only contains water after a rain event; therefore, every effort will be made to collect the samples after a rain event. The purpose of collecting the sediment sample is to evaluate if the soil in the ditch has been contaminated by surface water runoff. The purpose of collecting the surface water sample is to compare the chemical quality of water leaving the site to water entering Magid Pond. A labelled surveying stake will be placed at each sampling location.

The surface water samples will be analyzed for TCL and TAL parameters, landfill leachate parameters and total petroleum hydrocarbons (Table 6-1). The sediment samples will be analyzed for TCL and TAL parameters and Total Petroleum Hydrocarbons (Table 6-1). The procedures that will be followed to collect the samples are given in the Field Sampling Plan.

Sampling of surface water and sediment on the site will be conducted on the same day as the sampling proposed to be conducted in Magid Pond, on a wet day (Section 6.5.16.3). The sampling will be conducted before the Phase II IMM construction is implemented. A priority turn-around time will be requested for the surface water samples collected in the ponds located in the southern part of the site.

6.5.16 Surface Water and Sediment Sampling in Magid Pond and Otter Creek

6.5.16.1 Introduction

Sampling of surface water and sediment will be conducted in Magid Pond and Otter Creek located directly west of the project site, to evaluate if contamination has migrated from the site and is affecting the environment in these areas. The following sections describe the tasks that will be completed to evaluate the aquatic and wetland environments associated with Magid Pond and Otter Creek.

Magid Pond is classified as an Estuarine Subtidal Open Water (EIOWL) wetland (USFWS, National Wetlands Inventory Mapping), and drains into Otter Creek. Otter Creek is classified as an Estuarine Intertidal Emergent Marsh (E2EM5Pd) (USFWS, NWI). Both Magid Pond and Otter Creek have been designated as a Significant Fish and Wildlife Habitat by the NYSDEC. Additionally, both of these wetland areas have been designated by the Village of Mamaroneck as Critical Environmental Areas.

6.5.16.2 Description of Magid Pond and Otter Creek

A description of the environmental conditions and resources of the site vicinity will be prepared in accordance with Step I of the Draft Habitat Based Assessment (HBA) prepared by the NYSDEC's Division of Fish and Wildlife. This description will include a map of vegetation cover-types within a 0.5-mile radius of the project site. Special Resources such as wetlands, significant habitats and areas of special concern will be included in this inventory. Although the HBA recommends a 2-mile radius for the Special Resources inventory, it was determined that a 0.5-mile radius would be adequate for the project site due to the developed nature of the Mamaroneck area. A 0.5-mile radius will not only include Magid Pond and Otter Creek, but areas such as Guion Creek, Van Arington Mill Pond and the Otter Creek Preserve as well. The use of the site and site vicinity by migratory waterfowl will be investigated, along with Magid Pond and Otter Creek's potential association with rare or endangered species.

A field reconnaissance will also be performed to provide a physical description of Magid Pond and Otter Creek, and to define the limits of the study area. The site description will include an assessment of the type and quality of habitat potentially affected by contamination from the site and an inventory of flora and fauna in the vicinity of the pond and creek. Any readily observed effects potentially attributed to the site, such as stressed or dead vegetation, fish kills or unusual changes in species composition or distribution in Magid Pond and Otter Creek will also be recorded. The reconnaissance will be conducted either during the spring or summer growing season when plant production and biological activity are at a maximum.

6.5.16.3 Surface Water Samples

Surface water samples will be collected in Magid Pond and Otter Creek to evaluate if contaminants have migrated from the leaf compost site to these areas. The basis for this effort is that the site-generated contaminants, if present, may produce conditions that inhibit growth and production of indigenous flora and fauna.

Surface water samples will be collected on both a dry day and a wet day. During each sampling event, five samples will be collected. One of the samples will be collected midway between the point where a storm sewer drains into the pond, and where water drains from the pond into Otter Creek. One sample will be collected at the northernmost portion of the pond, and one will be collected in the southwest portion of the pond. Two samples will be collected in Otter Creek; one just north (upstream) of the Barry Avenue crossing of the Creek, and one midway between this crossing and Magid Pond. Proposed sampling locations are shown in Figure 6-1.

The surface water samples will be collected with a Van Dorn water sampler, which will be decontaminated between sampling locations. Before collecting a water sample, field measurements will be made at various depths of the water temperature, salinity, dissolved oxygen and pH, to evaluate if temperature or salinity stratification is present. Tidal fluctuation, if present, will be recorded as to time and stage. If stratification does not occur, a single sample will be collected at mid-depth. If stratification is present, discrete samples of the water layers above and below the thermocline or halocline will be collected.

SOURCE: KEYSTONE AERIAL PHOTOS, MARCH 1986

LEGEND

⊕ SEDIMENT & SURFACE WATER SAMPLING LOCATIONS

0 ——— 250 FEET

VILLAGE OF MAMARONECK
NEW YORK

MAMARONECK TAYLOR LANE LEAF COMPOST SITE

SAMPLING LOCATIONS

FIGURE 6-1

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The samples will be transferred to laboratory prepared bottles and will be sent to a NYSDEC CLP laboratory for analysis of TCL and TAL parameters, landfill leachate parameters and total petroleum hydrocarbons (Table 6-1).

Each sampling point will be marked with a labelled stake or buoy. The procedures that will be followed to collect the samples are described in the Field Sampling Plan.

6.5.16.4 Sediment Sampling

Samples of the bottom sediment in Magid Pond and Otter Creek will be collected for chemical analysis to assess if contaminants have migrated from the leaf composting site and are incorporated in the sediment matrix. Organic sediments in marshes typically have a high affinity for certain contaminants such as heavy metals. Other compounds such as polynuclear aromatic hydrocarbons (PAHs), and petroleum hydrocarbons readily adsorb to suspended solids, which may eventually settle to the bottom of the pond. The results of the sampling can be used to evaluate if food-chain transfer through benthic infauna and rooted macrophytes represents a potential exposure route to other biotic components.

One sediment sample will be collected at each of the five locations where the surface water samples will be collected. Each sample will be collected with a stainless steel Wildco Gravity Core Sampler equipped with a dedicated 12-inch long polystyrene core liner and core catcher. At each station, the sampler will be pushed into the bottom sediments to a depth of 12-inches. Once collected, the 12-inch core will be extruded from the core tube and into 0-6 and 6-12 inch intervals to assess contaminant stratification, if present.

The samples will be transferred to laboratory bottles and will be sent to a NYSDEC CLP laboratory for analysis of the TCL and TAL parameters and total petroleum hydrocarbons (Table 6-1). The detailed sampling protocols that will be followed are provided in the Field Sampling Plan.

6.5.16.5 Surface Hydrology Investigation

Surface hydrology will be investigated as a potential exposure pathway for site-generated contaminants. Presently, a drainage ditch/

swale flows from the site along Taylor Lane to a discharge pipe directed to Magid Pond. A second ditch, in the southwest corner of the site, terminates at a point near Taylor Lane, but no apparent connection to the Pond has been found to date. Town of Mamaroneck storm sewer maps will be obtained for review, to determine the presence and location of storm sewers which may be discharging into the pond. To confirm any potential connections between on-site drainage ditches, storm sewers and Magid Pond, and to determine the precise point of entry into the pond, a non-toxic fluorescent dye such as Rhodamine will be added to the on-site drainage ditches and storm sewers during a rain event. Depth of the Pond and tidal excursion, if any, will also be noted.

6.5.17 Surveying

A licensed surveyor will locate each monitoring well and the stakes used to site each geophysical transect, trench, soil boring, sediment and surface water sample on a site plan. In addition, the surveyor will determine the location, top of casing elevation and ground surface elevation of each monitoring well.

6.6 TASK 5: SAMPLE VALIDATION

6.6.1 General

Data validation is a process by which sample procedures and laboratory procedures are compared to criteria that have been established as being technically and legally acceptable, in order to assure that the results are representative of actual field conditions, and the results are within the acceptable limits established by the Data Quality Objectives (DQOs). The sampling procedures will first be reviewed to be sure the sampling protocols were adhered to. The laboratory's analytical procedures will then be reviewed.

6.6.2 Field Data Validation

The data collected in the field will be reviewed to determine if the standard operating procedures outlined in the QAPP and the FSP have been adhered to. The following tasks will be completed to validate the field data:

- Review field notes to assure that sample collection procedures were followed and the proper field information was collected (i.e., times of sample collection, field instrumentation calibration checks)
- Conduct field audits of sampling personnel
- Review trip and field blank samples to see if sample contamination has occurred.
- Compare duplicate sample results
- The QA/QC officer will be responsible for the field data validation.

6.6.3 Laboratory Validation

One in five of the soil laboratory data packages and all of the surface water, ground water and sediment samples will be reviewed in accordance with the following guidelines: "Functional Guidelines for Evaluating Organic Analyses" (TDD No. HQ-8410-01, USEPA 1985) and "Evaluation of Metals Data for the Hazardous Waste Site Program" (SOP No. HW-2, USEPA 1985). The validation will be conducted by a subcontractor to Malcolm Pirnie that is acceptable to NYSDEC. The data for each of the samples described above will be inspected in accordance with the protocols referred to above. This evaluation will assure that the analytical data is correct and is an accurate representation of the site conditions.

6.7 TASK 6: SITE INVESTIGATION ANALYSIS

The data collected during the remedial investigation will be tabulated and reviewed to assess the extent of drum burial, and soil, sediment, surface water and ground water contamination. In addition, geologic cross-sections, geophysical profiles, water table contour maps, and potentiometric water level contour maps will be prepared.

If the results indicate that contamination has migrated off-site, field activities may be proposed off-site as discussed in Section 6.8. If additional activities are necessary, a detailed work plan and field sampling plan for the additional work will be prepared and submitted to the NYSDEC for approval, before field activities begin.

If additional information is required to characterize contamination on or off-site, additional field activities will be proposed, as part of a supplemental remedial investigation. Possible supplemental field activities are discussed in Section 6.13. Any additional work that will be proposed, will be discussed in the Draft Remedial Investigation Report that will be submitted to the NYSDEC for review, as described in Section 6.11.

6.8 TASK 7: ADDITIONAL FIELD INVESTIGATION

Once the field investigation has been completed, the following activities may be conducted, if there is an indication that soil on the site is contaminated, and there may be a problem with air-born emissions affecting public health, and if there is an indication of off-site migration of contaminants. A detailed program and sampling procedures would be developed and submitted to NYSDEC for review and approval, before sampling would begin.

Collection of Water Samples in Nearby Wells

Water samples may be collected for chemical analysis in up to 4 private or public wells identified during the well inventory proposed in Section 6.5.6, if contaminants are believed to be migrating from the site in the ground water. The wells would be located within one-half mile of the site, and downgradient of the site. The samples would be analyzed for TCL and TAL parameters, landfill leachate parameters and total petroleum hydrocarbons.

Collection of Air Samples and Water Samples in Nearby Residences

Air samples may be collected in basements and water samples may be collected in sumps in basements in up to 4 nearby residences for chemical analysis. The New York State Department of Health (NYSDOH) will be responsible for contacting homeowners to set up an appointment and to explain the reasons for sampling. A representative of the NYSDOH may accompany Malcolm Pirnie personnel during the sampling event. The NYSDEC will be advised 5 days in advance of the sampling, so that they can have a representative present, if possible.

The sampling would be conducted after a rain event, when the sump would be expected to contain water. Malcolm Pirnie would survey the basement to see if any paints, solvents, petroleum products or other products are kept in the basement, which could affect the results. The homeowner would also be interviewed to see if they engage in any hobbies or activities in the home which use chemicals that could affect the results.

Collection of Surficial Soil Samples

Up to 10 surficial soil samples may be collected on the site, if the results of field activities indicate that there may be a problem with air-borne emissions of contaminants. The samples would be collected from the top six inches of soil; analysis would be for contaminants detected in subsurface soils.

6.9 TASK 8: ASSESSMENT OF RISKS

6.9.1 Public Health and Environmental Assessment

Using information gathered during the field investigations, a baseline risk assessment will be performed. The objective of this assessment is to characterize the potential risks to public health and the environment from exposure to the contaminants at the site, if no further remedial actions are taken.

The public health risk assessment will be conducted in accordance with the USEPA Superfund Public Health Evaluation Manual (USEPA, 1986). The environmental evaluation will generally follow procedures listed in Step I of the NYSDEC's Draft Habitat Based Assessment, and the USEPA's Environmental Evaluation manual (USEPA, 1989). The risk assessment includes the following tasks:

- Identification of hazards
- Characterization of exposure pathways and receptors
- Exposure assessment
- Risk characterization

Each task is described below.

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Identification of Hazards

The first task involves identifying the chemicals of concern, for which a quantitative risk analysis will be performed. The selection of the chemicals will be based on such factors as: the observed concentrations and frequencies; and the contaminant distribution and toxicity.

Characterization of Exposure Pathways and Receptors

The second task is to characterize the potential human and environmental exposure pathways and receptors. Section 4.3 provides a preliminary identification of the potential population at risk and the possible exposure pathways. Based on the current use of the site, possible exposure scenarios will be developed and evaluated to determine those which are most realistic.

Exposure Assessment

The third task in the process is to estimate the potential human, fish and wildlife intake of the chemicals of concern. The USEPA Draft Superfund Exposure Assessment Manual (USEPA, 1986a), will be used as a guideline. When possible, the estimated concentrations will be compared to ARARs. For those chemicals for which ARARs do not exist, a quantitative evaluation of carcinogenic or non-carcinogenic effects will be performed to develop acceptable contaminant concentrations based on target risk levels.

Toxicity Assessment

The fourth task will involve an assessment of toxicity. Published data from the USEPA's "Health Effects Assessments and Toxicological Profiles" prepared by the Agency for Toxic Substances and Disease Registry (ATSDR) will be used as the primary sources of toxicological data.

Risk Characterization

The fifth and final step is a characterization of the nature and extent of potential public health and environmental risks from exposure to contaminants at the site. This characterization will take into account all possible exposure pathways for each type of contaminated media found at the site.

Four separate categories of risk are typically evaluated.

- Carcinogenic human health risk
- Non-carcinogenic human health risk
- Risk to public welfare
- Environmental risk

In summary, the Risk Assessment will follow an orderly progression and will consist of the following elements:

- The site data will be subject to critical evaluation
- Indicator chemicals will be selected
- Probable transport and fate of chemicals will be evaluated
- Potential receptors will be identified
- Exposure levels will be estimated
- The toxicity and potency of the chemicals will be assessed
- Conclusions will be made regarding human health, welfare, and environmental impacts.
- If needed, recommendations will be made for further study on potentially affected wildlife populations, such as vegetation and fish/invertebrate tissue.

The results of the risk assessment will be used to justify any remedial actions that may be proposed.

6.10 TASK 9: PRELIMINARY SITE CHARACTERIZATION SUMMARY

Upon completion of the RI field investigations and the associated data evaluation, a report will be prepared and submitted to the NYSDEC which summarizes the activities conducted on the site and gives a preliminary assessment of the data. The purpose of this report is to serve as a reference during the identification of remedial action objectives and the development of remedial alternatives. The format of the Preliminary Site Characterization Summary will be a draft of Sections 1 through 4 of the RI report presented in Table 6-2. This summary will not include a baseline risk assessment nor will it contain conclusions. Revisions to this summary necessary to satisfy NYSDEC comments will be incorporated into the draft RI report. Eleven copies of the summary will be submitted to the NYSDEC as stipulated in the Order on Consent.

6.11 TASK 10: DRAFT REMEDIAL INVESTIGATION REPORT

A Draft Remedial Investigation report will be prepared and submitted to the NYSDEC for review and comment. Included in this report will be the following:

- Discussion of field investigation activities
- Presentation of analytical tests for all media tested
- QA/QC evaluation of analytical data
- Description of the extent of contamination
- Baseline risk assessment results (i.e. identified receptors, risks associated with the site and ARARs)
- Identification of any further data requirements.

Eleven copies of the draft report will be submitted to the NYSDEC as stipulated in the Order on Consent.

6.12 TASK 11: STATE ASSISTANCE CONTRACT DOCUMENTATION/ACCOUNTING

Malcolm Pirnie will provide monthly cost control reports to provide the Village with a timely, accurate status of the State Assistance Contract and costs incurred. A separate cost control report will be submitted for each task and will include full documentation for labor, direct expenses and subcontractor costs. The costs will be broken out to identify eligible and ineligible costs by task.

A description of the utilization of MBE/WBE firms will also be provided by listing each firm's name, the cost of work performed to date, and the percentage of Total Contract Cost paid to the MBE/WBE firms to date. In addition, information related to affirmative action goals and requirements will be provided.

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Table 6-2

Remedial Investigation (RI)
REPORT FORMAT

Executive summary

1. Introduction
   - 1.1 Purpose of Report
   - 1.2 Site Background
     - 1.2.1 Site Description
     - 1.2.2 Site History
     - 1.2.3 Previous Investigation
   - 1.3 Report Organization

2. Study Area Investigation
   - 2.1 Includes field activities associated with site characterization. These may include physical and chemical monitoring of some, but not necessarily all, of the following:
     - 2.1.1 Surface Features (topographic mapping, etc.), natural and manmade features
     - 2.1.2 Contaminant Source Investigations
     - 2.1.3 Meteorological Investigations
     - 2.1.4 Surface-Water and Sediment Investigations
     - 2.1.5 Geological Investigations
     - 2.1.6 Soil and Vadose Zone Investigations
     - 2.1.7 Groundwater Investigations
     - 2.1.8 Human Population Surveys
     - 2.1.9 Ecological Investigations
   - 2.2 If technical correspondence documenting field activities are prepared, they may be include in an appendix and summarized in this report chapter.

3. Physical characteristics of the Study Area
   - 3.1 Includes results of field activities to determine physical characteristics. These may include some, but not necessarily all, of the following:
     - 3.1.1 Surface Features
     - 3.1.2 Meteorology
     - 3.1.3 Surface Water Hydrology
     - 3.1.4 Geology
     - 3.1.5 Soils
     - 3.1.6 Hydrogeology
     - 3.1.7 Demography and Land Use
     - 3.1.8 Ecology

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Table 6-2
(continued)

Remedial Investigation (RI)
REPORT FORMAT

4. Nature and Extent of Contamination
   4.1 Presents the results of site characterization, both natural chemical components and contaminants in some, but not necessarily all, of the following media:
      4.1.1 Sources (lagoons, sludges, tanks, etc.)
      4.1.2 Soils and vadose Zone
      4.1.3 Ground Water
      4.1.4 Surface Water and Sediments
      4.1.5 Air

5. Contaminant Fate and Transport
   5.1 Potential Routes of Migration (i.e. air, ground water, etc.)
   5.2 Contaminant Persistence
      5.2.1 If they are applicable (i.e. for organic contaminants), describe estimated persistence in the study area environment and physical, chemical, and/or biological factors of importance for the media of interest.
   5.3 Contaminant Migration
      5.3.1 Discuss factors affecting contaminant migration for the media of importance (e.g. sorption onto soils, solubility in water, movement of ground water, etc.)
      5.3.2 Discuss modeling methods and results, if applicable.

6. Baseline Risk Assessment
   6.1 Public Health Evaluation
      6.1.1 Exposure Assessment
      6.1.2 Toxicity Assessment
      6.1.3 Risk Characterization
   6.2 Environmental Assessment

7. Summary and conclusions
   7.1 Summary
      7.1.1 Nature and Extent of contamination
      7.1.2 Fate and Transport
      7.1.3 Risk Assessment
   7.2 Conclusions
      7.2.1 Data Limitations and Recommendations for Future Work
      7.2.2 Recommended Remedial Action Objectives

Appendixes

A. Technical Correspondence on Field Activities (if applicable)
B. Analytical data and QA/QC Evaluation Results
C. Risk Assessment Methods

6.13 SUPPLEMENTAL REMEDIAL INVESTIGATION

Once the field activities have been completed, the results will be evaluated to determine if additional information is needed to assess the extent of contamination on-site. In addition, if there is an indication that landfilling activities extended off-site, or contaminants are migrating off-site, additional field activities may be proposed.

Possible field activities that may be conducted are discussed below. These activities have been budgeted in the cost proposal that will be submitted to the NYSDEC, as part of the work plan documents. If the scope of work is more extensive than what is proposed below, the RI/FS budget in the cost proposal will need to be modified. The need for supplemental remedial activities will be discussed in the Draft Remedial Investigation Report.

6.13.1 On-Site Field Activities

Additional on-site field activities may include:

- Drilling of additional soil borings and collection of soil samples for chemical analysis. No more than 10 borings would be drilled, and up to 10 samples would be collected for analysis of TCL and TAL parameters, and total petroleum hydrocarbons.

- Installation of additional monitoring wells and collection of samples for analysis. No more than 4 overburden wells and 2 bedrock wells would be proposed. Ground water samples would be collected in each well for analysis of TCL and TAL parameters, landfill leachate parameters and total petroleum hydrocarbons.

6.13.2 Off-Site Field Activities

Additional off-site activities may include:

- Additional sampling of surface water, and sediment may be conducted in Otter Creek. No more than 10 surface water and 5 sediment samples would be collected.

- A soil gas survey may be conducted in the yards of nearby homeowners located on Shadow Land and Greenhaven Road. The survey would be conducted following the procedures outlined in Section 6.5.5.

- Up to 10 soil borings may be drilled at locations within 100 feet of the property boundary. Up to 10 soil samples would be collected for analysis of TCL and TAL parameters, and total petroleum hydrocarbons.

6.13.3 Out of Scope Items

If significant concentrations of contaminants are found in surface water and sediment samples taken from Magid Pond and Otter Creek, it may be necessary to collect vegetation and fish/invertebrate tissue samples to more fully evaluate the ecological risk which the project site may pose. This type of analysis is suggested under Step II of the NYSDEC's Habitat Based Assessment (HBA). The number of samples cannot be estimated at this time. Therefore, this item is considered out of scope and is not budgeted in the cost proposal.

7.0 FEASIBILITY STUDY

The Feasibility Study (FS) uses the findings and conclusions of the RI and the endangerment assessment to develop and evaluate remedial alternatives. The process by which the most feasible remedial alternative will be selected for the site involves:

Task 12: Development of Remedial Alternatives
Task 13: Screening of Remedial Alternatives
Task 14: Remedial Investigation - Phase II
Task 15: Detailed Evaluation of Remedial Alternatives
Task 16: Feasibility Study Report

Each task is described in the following sections.

7.1 TASK 12: PHASE I - DEVELOPMENT OF REMEDIAL ALTERNATIVES

The objective of the first phase of the FS is to use data collected during the remedial investigation to develop remedial alternatives that will achieve the remedial action objectives established for the Mamaroneck Taylor Lane Leaf Compost Site. The development of remedial alternatives will be performed concurrently with, and will be interactive with, remedial investigation activities.

The tasks to be performed during the first phase of the FS will be:

- development of remedial action objectives and general response actions;

- identification and screening of remedial technologies; and

- development of remedial alternatives.

7.1.1 Development of Remedial Action Objectives and General Response Actions

Concurrent with the evaluation of data collected during the RI, remedial action objectives will be developed which will minimize or eliminate significant risks to human health and the environment. The remedial action objectives will be based on the following:

- RI data and human health evaluation and environmental assessment;

- State and Federal Applicable or Relevant and Appropriate Requirements (ARARs); and

- Local public health and environmental concerns.

Once the remedial action objectives have been established, a list of general response actions will be developed which will be used to screen remedial technologies. These general response actions will include the no-action alternative which will be compared to all other alternatives. Other response actions to be considered will be: treatment, containment, excavation, extraction, disposal and institutional controls.

During this task, the site specific clean-up criteria will be established. These will be based on State and Federal ARARs as well as human health and environmental risks. An initial estimate of the extent and volume of contamination will be made to which the general response actions will apply.

7.1.2 <u>Identification and Screening of Remedial Technologies</u>

Based on the remedial action objectives and general response actions, a list of potentially applicable remedial technologies will be identified. The list of technologies will be broadly screened for effectiveness, reliability, implementability and cost. Each technology will be evaluated to determine its ability to reduce the toxicity, mobility or volume of the contamination, and therefore its ability to protect human health and the environment. Each technology will also be assessed, to determine if it will perform as designed and intended.

The technical and administrative feasibility of constructing, operating and maintaining a remedial alternative, will be evaluated. Innovative technologies will be considered throughout the screening process if they can offer the potential for better treatment performance and can be easily implemented.

The cost evaluation will involve a preliminary (order-of-magnitude) estimate of capital, annual operation and maintenance costs and will present a worth analysis.

7.1.3 Development of Remedial Alternatives

After the remedial technologies have been screened, a list of potential remedial alternatives will be developed. Individual or combinations of technologies will be used to develop alternatives which satisfy the remedial action objectives.

The Superfund Amendments and Reauthorization Act (SARA) requires that at least four alternatives must be developed which include the following:

- an alternative for treatment that would eliminate or minimize, to the extent feasible, the need for long-term management (including monitoring) at the site;
- an alternative that utilizes treatment as the primary means of reducing the principal threats at the site;
- an alternative that utilizes containment with little or no treatment, but is protective of human health and the environment by limiting or preventing exposure or by reducing mobility of the contaminants; and
- a no-action alternative.

The no-action alternative will be used as a basis for comparison with all other alternatives and will therefore be considered an alternative throughout the screening process.

7.2 TASK 13: PHASE II - SCREENING OF REMEDIAL ALTERNATIVES

The potential remedial alternatives developed previously will undergo an initial or preliminary screening followed by a detailed evaluation. The purpose of this is to reduce the number of alternatives to a manageable group while continuing to maintain a range of options.

This initial screening will be accomplished by evaluating each alternative on the basis of effectiveness, reliability, implementability and cost as specified in the NYSDEC procedures handbook (NYSDEC, 1989). This screening will be similar to that performed on the potential remedial technologies discussed in Section 7.1.2.

The no-action alternative and a containment alternative will be carried through the initial screening to the detailed evaluation.

7.3 TASK 14: REMEDIAL INVESTIGATION - PHASE II

7.3.1 Additional Data Collection

The purpose of the Phase II Remedial Investigation is to provide additional data necessary for the evaluation and selection of remedial alternatives. This additional data may include: ground water, surface water, or soil sampling and chemical analysis, additional geophysical surveys or additional drum sampling and chemical analysis. The need to collect additional data will be determined after completion of the Phase I RI and the initial screening of remedial alternatives. The cost for this work has been estimated as part of the supplemental FS budget.

7.3.2 Treatability Studies/Pilot Testing

The preliminary screening of remedial alternatives includes the identification of both established and innovative technologies. Remedial technologies which pass the initial screening may require treatability studies in order to make a final assessment during the detailed evaluation and to develop operational data for comparison with other technologies.

The specific scope of a treatability study will be dependent upon the treatment technology under investigation, but in general, the study will include the following elements: identification of study objectives; identification of candidate technologies; a search of data regarding similar studies; bench-scale testing; and an analysis of the test results. The cost for treatability studies has been estimated as part of the supplemental FS budget.

The results of this initial screening will be submitted to the NYSDEC for review and approval prior to proceeding with the detailed evaluation of the alternatives.

7.4 Task 15: DETAILED EVALUATION OF REMEDIAL ALTERNATIVES

The remedial alternatives that pass the initial screening will be subjected to a detailed evaluation using seven (7) criteria established by the NYSDEC (NYSDEC, 1989).

The seven evaluation criteria are the following:

- Short-Term Effectiveness
  - Protection of community during remedial actions
  - Protection of workers during remedial actions
  - Time to implement the remedy
  - Environmental Impacts

- Long-Term Effectiveness and Permanence
  - Residual risk after remedial objectives have been achieved
  - Lifetime of remedial actions
  - Adequacy and reliability of controls

- Reduction of Toxicity, Mobility and Volume
  - Volume of hazardous material destroyed or treated
  - Reduction of toxicity, mobility and volume of contaminants
  - Irreversibility of the treatment
  - Type and quantity of treatment residual

- Implementability
  - Technical feasibility
  - Administrative feasibility
  - Availability of services and materials
  - Reliability

- Costs
  - Capital costs
  - Annual operation and maintenance costs
  - Present worth costs

- Compliance with Remedial Goals
  - Ability to achieve State and Federal ARARs
  - Ability to achieve remedial objectives

- Overall Protection of Human Health and the Environment
  - Magnitude of residual public health risk after implementation of the remedy
  - Magnitude of residual environmental risk after implementation of the remedy

Once the alternatives have been evaluated against the above criteria, a comparative analysis will be performed to identify advantages and disadvantages of each alternative.

7.5 TASK 16: FEASIBILITY STUDY REPORT

The results of the Phase I and Phase II Feasibility Studies will be summarized in an FS report. This report will include the following four major sections:

- Introduction
- Identification and Screening of Remedial Technologies
- Development and Screening of Remedial Alternatives
- Detailed Evaluation of Remedial Alternatives

A detailed outline of the FS report format is presented in Table 7-1.

The report will contain an executive summary which will be a brief synopsis of the development and screening of remedial alternatives along with all conclusions and recommendations.

Eleven copies of the draft FS report will be submitted to the NYSDEC for review and comment. It will also be made available for public review and comment. Comments received will be incorporated into the final FS report or addressed in a responsive summary, if appropriate.

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Table 7-1

Feasibility Study (FS) Report Format

Executive Summary

1. Introduction
   1.1 Purpose and Organization of Report
   1.2 Background Information (Summarized from RI Report)
      1.2.1 Site Description
      1.2.2 Site History
      1.2.3 Nature and Extent of Contamination
      1.2.4 Contaminant Fate and Transport
      1.2.5 Baseline Risk Assessment

2. Identification and Screening of Technologies
   2.1 Introduction
   2.2 Remedial Action Objectives -
   Presents the development of remedial action objectives for each medium of interest (i.e., groundwater, soil, surface water, air, etc.) For each medium, the following should be discussed:
      - Contaminants of interest
      - Allowable exposure based on risk assessment (including ARARs)
      - Development of Remedial Action Objectives.
   2.3 General Response Actions -
   For each medium of interest, describes the estimation of areas or volumes to which treatment, containment, or exposure technologies may be applied.
   2.4 Identification and Screening of Remedial Technologies - For each medium of interest describes:
      2.4.1 Identification and Screening of Technologies
      2.4.2 Evaluation of Technologies and Selection of Representative Technologies

3. Development and Screening of Alternatives
   3.1 Development of Alternatives -
   Describes rationale for combination of technologies/media into alternatives.
   3.2 Screening of Alternatives
      3.2.1 Introduction
      3.2.2 Alternative 1
         3.2.2.1 Description
         3.2.2.2 Evaluation
      3.2.3 Alternative 2
         3.2.3.1 Description
         3.2.3.2 Evaluation
      3.2.4 Alternative 3
         3.2.4.1 Description
         3.2.4.2 Evaluation

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Table 7-1
(continued)

Feasibility Study (FS) Report Format

4. Detailed Analysis of Alternatives
   - 4.1 Introduction
   - 4.2 Individual Analysis of Alternatives
     - 4.2.1 Alternative 1
       - 4.2.1.1 Description
       - 4.2.1.2 Assessment
         - Short-Term Effectiveness
         - Long-Term Effectiveness and Permanence
         - Reduction of Toxicity, Mobility and Volume
         - Implementability
         - Costs
         - Compliance with Remedial Goals
         - Overall Protection of Human Health and the Environment
     - 4.2.2 Alternative 2
       - 4.2.2.1 Description
       - 4.2.2.2 Evaluation
     - 4.2.3 Alternative 3
   - 4.3 Comparative Analysis
     - 4.3.1 Short-Term Effectiveness
     - 4.3.2 Long-Term Effectiveness and Permanence
     - 4.3.3 Implementability
     - 4.3.4 Reduction of Toxicity, Mobility and Volume
     - 4.3.5 Costs
     - 4.3.6 Compliance with Remedial Goals
     - 4.3.7 Overall Protection of Human Health and the Environment

Bibliography
Appendices

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8.0 POST RI/FS SUPPORT

Following submittal of the final RI/FS report, a continued effort will be made to provide assistance in post RI/FS activities. These activities may include but are not limited to:

- Preparation of news releases and other informational documents;
- Technical support during public meetings;
- Preparation of a responsiveness summary;
- Record of Decision (ROD) support;
- Pre-design activities.

Malcolm Pirnie will provide post RI/FS support to the Village and NYSDEC to the extent requested.

9.0 PROJECT MANAGEMENT AND SCHEDULE

9.1 PROJECT SCHEDULE

The project schedule for the RI/FS at the Mamaroneck Taylor Lane Leaf Compost Site is given on Plate 4. Time to prepare the site is not included on the schedule. The schedule is intended only to provide a rough approximation of the length of time to complete each task. The time required for items such as review by state agencies and the Village of Mamaroneck are not known, and are not included in the schedule. Refinement of the schedule will be necessary prior to the onset of field activities.

9.2 PROJECT MANAGEMENT

NAME	TITLE	AFFILIATION
John Henningson	Vice President	Malcolm Pirnie
Anthony Russo	Project Manager	Malcolm Pirnie
David Griffin	Quality Assurance Officer	Malcolm Pirnie
Richard Brownell	Technical Director	Malcolm Pirnie
John Isbister	Technical Director	Malcolm Pirnie
To be determined	Data Validation and Assessment	To be determined

FIELD INVESTIGATION

NAME	TITLE	AFFILIATION
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Kerry Gavett	Field Leader	Malcolm Pirnie

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