FILE ON EDOC'S ✓ YES _____ NO

SITE NAME ____________________

SITE # ____________________

COUNTY __________ TOWN __________

FOILABLE ✓ YES _______ NO

SC/PSA ______ RI/FS ______

RD ______ RA ______

SM ______ OTHER ______

NAME DESCRIPTION:

Report. hw130004.1988-08-01. EPA-EBASCO

RIFS workplan Final

4A1-21 (4/85)

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

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REM III PROGRAM

REMEDIAL PLANNING ACTIVITIES AT SELECTED UNCONTROLLED HAZARDOUS SUBSTANCE DISPOSAL SITES WITHIN EPA REGIONS I-IV

EPA CONTRACT 68-01-7250

EBASCO SERVICES INCORPORATED

EPA WORK ASSIGNMENT NUMBER: 186-24X3
EPA CONTRACT NUMBER: 68-01-7250
EBASCO SERVICES INCORPORATED

FINAL WORK PLAN
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
HOOKER/RUCO SITE
TOWN OF HICKSVILLE
NASSAU COUNTY, NEW YORK

AUGUST, 1988

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7382b

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FINAL WORK PLAN
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
HOOKER/RUCO SITE
TOWN OF HICKSVILLE
NASSAU COUNTY, NEW YORK

AUGUST, 1988

PREPARED BY:

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7382b

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1.0 INTRODUCTION

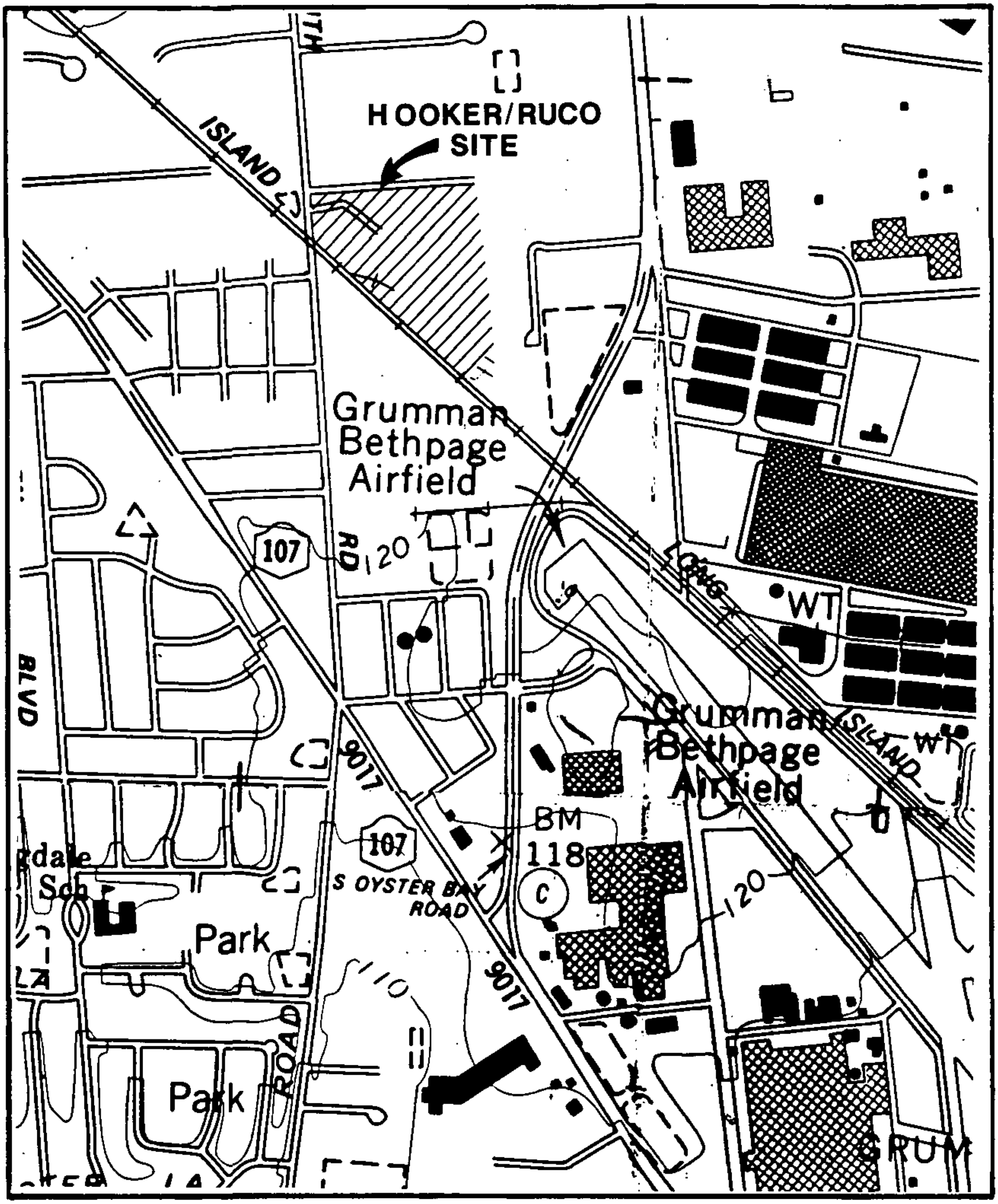
Ebasco Services Incorporated (Ebasco) is submitting this Work Plan to the U.S. Environmental Protection Agency (EPA) in response to Work Assignment Number 186-24X3 under Contract Number 68-01-7250. Preparation of this Work Plan was accomplished pursuant to the Work Plan Memorandum (WPM) for the Hooker/Ruco site (Figure 1-1) dated February 16, 1988 and discussions held with the EPA Region II at meetings on February 3, 1988, March 16, 1988 and March 29, 1988. The Hooker/Ruco site is located in the town of Hicksville, Nassau County, Long Island, New York (Figure 1-2).

This Work Plan presents Ebasco's technical scope of work for the Remedial Investigation/Feasibility Study (RI/FS) as well as an estimated level of effort and schedule for conducting Phase I of the RI. The Work Plan also presents Ebasco's current understanding of the problem at the Site and the rationale for our technical approach.

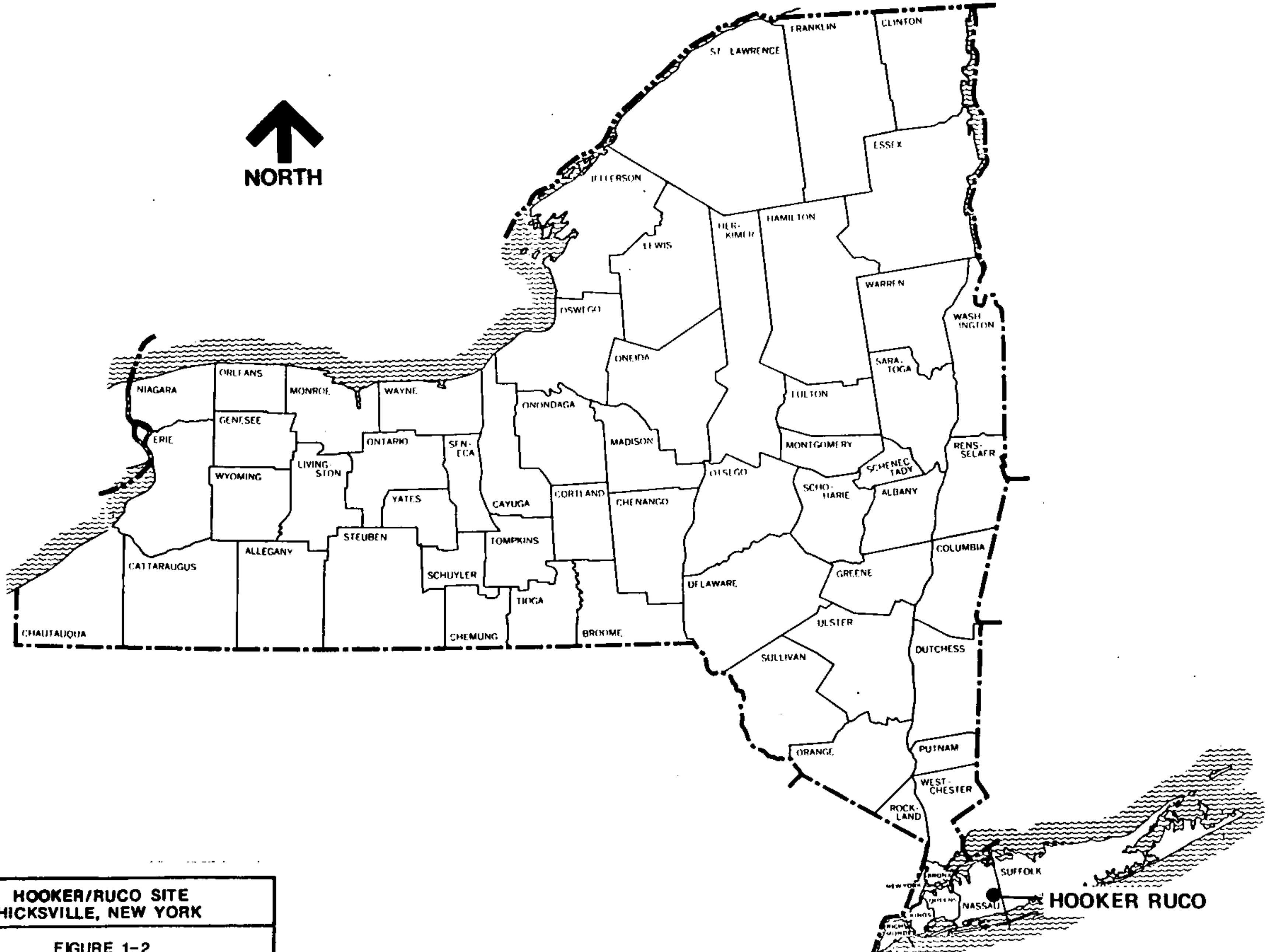
This Work Plan has been prepared in accordance with EPA Guidance. The following are several of the documents specifically applicable to preparation of an RI/FS work plan:

- Guidance on Remedial Investigation Under CERCLA (EPA, 1985)
- Guidance on Feasibility Studies Under CERCLA (EPA, 1985a)
- Data Quality Objectives: Development Guidance for Uncontrolled Hazardous Waste Site Remedial Response Activities (EPA, 1986)
- Interim Guidance on Superfund Selection of Remedy (EPA, 1986a)
- Additional Interim Guidance for FT-87 Records of Decision (EPA, 1987)

This Work Plan contains 6 sections of which this Introduction is Section 1. Section 2 summarizes the site history and existing data on the Hooker/Ruco site. Section 3 presents the RI/FS objectives and identifies the Applicable or Relevant and Appropriate Requirements (ARAR) and Data Quality Objectives (DQOs) for the Remedial Investigation sampling activities. Section 4 presents a discussion of each task and plan of work for this project, which has been divided into 12 major tasks. Section 5 of the Work Plan presents the project management approach, key personnel, coordination of the various activities, and estimated budget and schedule for this work assignment.



HOOKER/RUCO SITE HICKSVILLE, NEW YORK
FIGURE 1-1 SITE LOCATION
EBASCO SERVICES INCORPORATED



HOOKER/RUCO SITE
HICKSVILLE, NEW YORK

FIGURE 1-2

REGIONAL LOCATION

EBASCO SERVICES INCORPORATED

2.0 SUMMARY OF EXISTING DATA

2.1 SITE HISTORY

Facility use and ownership. The Hooker/Ruco site is located in the town of Hicksville, Nassau County, New York. The general site location was shown on Figure 1-1. Based on information from the Nassau County Department of Health (NCDH), industrial activity at the Hooker/Ruco site began in 1946 when two firms occupied the 14 acre site. Prior to 1946, it is believed that the site was not used for industrial purposes. The two firms using the site in 1946 were the Insular Chemical Company and Rubber Corporation of America. The property was divided into two parcels but at times, the companies shared a pilot plant and two private water supply wells. Wastewater was discharged to an open recharge basin on the property of Insular Chemical Company. In approximately 1956 the firms merged and were referred to as Rubber Corporation of America. Prior to, or during 1965 Rubber Corporation of America became a subsidiary of Hooker Chemical Corporation which was in turn owned by Occidential Chemical Corporation. During a portion of that period the site was owned by Hooker Chemical Corporation, the plant was called the Hooker Chemical and Plastics Corporation-Ruco Division (NCDH, 1979). On March 1, 1982, employees of the plant bought the facility from Hooker Chemical and Plastics Corporation, and renamed it the Ruco Polymer Corporation. Ruco Polymer Corporation is the present name of the facility.

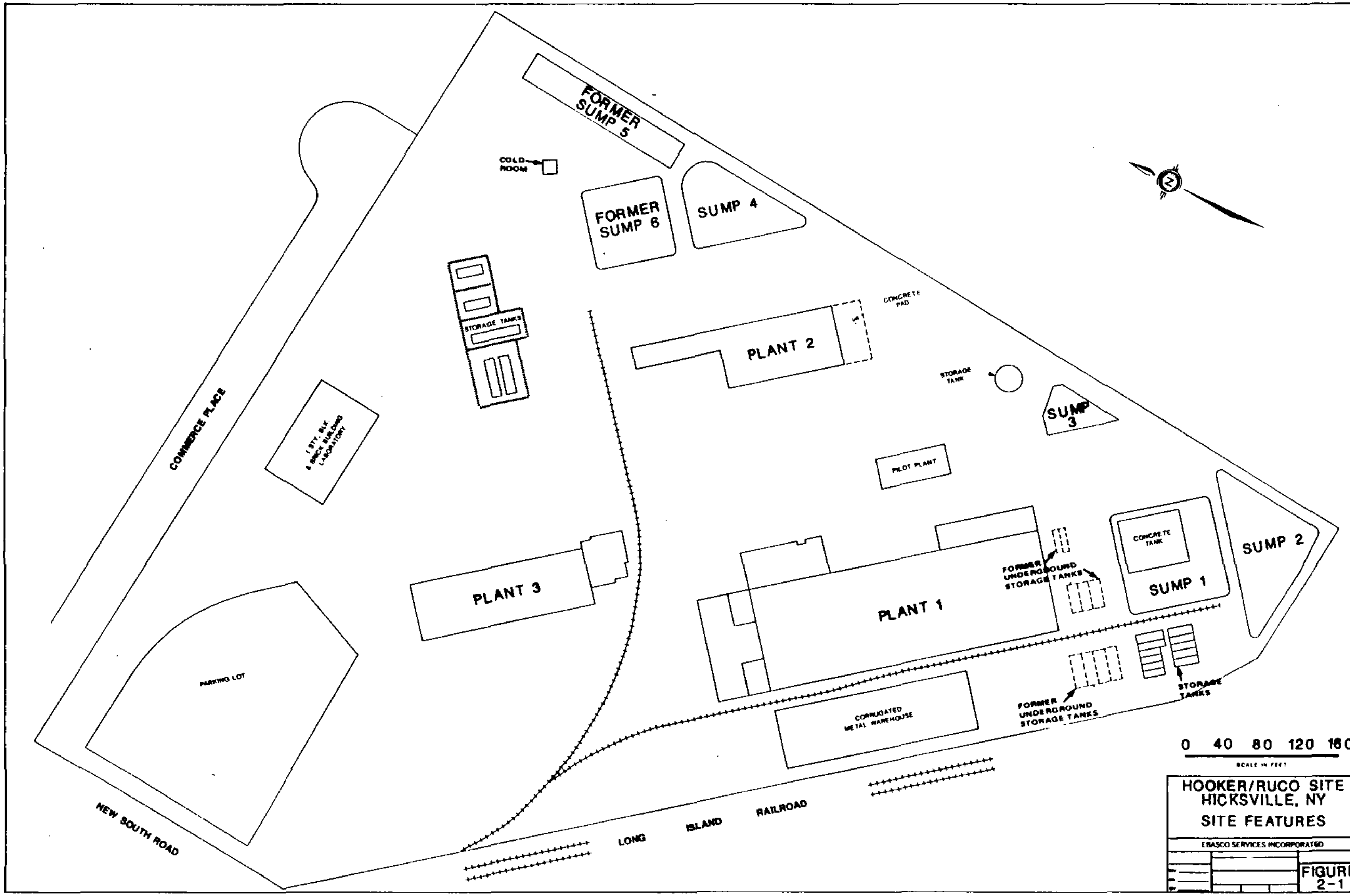
The Ruco Polymer Corporation is a privately held New York State Corporation engaged in the manufacturing of plastic and synthetic materials. Sales in 1982 were approximately 25 million dollars. The plant is presently active, and in operation 24 hours per day, six days a week. Total employment has been about 86 persons with 64 people working within the plant and laboratory. The remaining employees are office support staff. Throughout the life of the facility, production and manufacturing processes have been repeatedly altered, dependant on the supply and demand of their products. The major products produced at the site since 1946 have included polyesters, PVC compounds, polyurethanes, plasticizers, urethane, and phonograph record dry mix blends. Table 2-1 lists the time periods and volumes of the products produced at the site. Figure 2-1 shows a plan of the site, including some features (such as sumps 5 and 6) which have been filled in.

Historical Plant Operation. Prior to 1955, the two firms at the Hooker/Ruco site produced various plastics and synthetic compounds. One manufacturing process that was used prior to 1955 involved a technique for producing polyvinyl chloride (PVC). Wastewater from this process was discharged to a recharge basin. This discharge was estimated at 24,600 gallons per day. Vinyl chloride monomer, the raw material used in the

TABLE 2-1

MAJOR PRODUCTS PRODUCED
HOOKER/RUCO FACILITY
HICKSVILLE, NEW YORK

TIME PERIOD	PRODUCTS PRODUCED
1946 - 1956	PRODUCTION OF VARIOUS PLASTIC AND SYNTHETIC COMPOUNDS INCLUDING FILMS, SHEETING AND RUBBER PRODUCTS.
1956 - 1975	PVC RESIN FACILITY GENERATED VINYL CHLORIDE POLYMER. MAXIMUM PRODUCTION WAS 10 MILLION POUNDS(LBS) PER YEAR.
1955 - PRESENT	PRODUCTION OF VARIOUS POLYESTER PRODUCTS. AVERAGE PRODUCTION WAS 5 TO 10 MILLION LBS PER YEAR.
MID 1950's to PRESENT	PRODUCTION OF DIESTER PRODUCTS. AVERAGE PRODUCTION HAS BEEN LESS THAN 5 MILLION LBS PER YEAR.
EARLY 1960's to PRESENT	PRODUCTION OF VARIOUS POLYURETHANE PRODUCTS. AVERAGE PRODUCTION HAS BEEN 1 MILLION LBS PER YEAR.
CURRENT OPERATIONS	POLYESTER PRODUCTION IS ABOUT 25 MILLION LB PER YEAR. POLYURETHANE PRODUCTION IS ABOUT 2 TO 3 MILLION LBS PER YEAR. SOME SPECIALTY PRODUCTS ARE ALSO PRODUCED.



HOOKER/RUCO SITE
HICKSVILLE, NY
SITE FEATURES

FIGURE 2-1

PVC manufacturing process, was not always completely consumed in the chemical reactions. Vinyl chloride monomer remaining in the wastewater was apparently vacuum stripped prior to discharge (NCDH, 1979). PVC was produced at the site until 1975, at which time PVC operations were ceased.

By 1958 the facility was involved in the manufacture of rubber, plastics, and related products including shower curtains and upholstery materials. Wastewater discharge at this time was approximately 30,000 gallons per day. It is not known if vinyl chloride was part of the discharge. Wastewater was described as containing oily and solid materials. The New York State Water Power and Control Commission asked the site operators to submit plans for a wastewater treatment facility if discharge water was not of drinking water quality. There is no evidence that an application was submitted (NCDH, 1979).

Based on NCDH inspections of the Hooker/Ruco site, it is known that site manufacturing processes included the production of PVC resin, latex, plasticizers, and plastic products, prior to 1978. Wastewater discharges from the manufacturing processes up to this time were apparently not monitored, and as a result, no contaminants were measured in the discharged water. Permits for the discharge were not acquired prior to 1978. The initial application for a State Pollution Discharge Elimination System (SPDES) permit commenced in 1975 and was approved in 1978. Process wastes were being incinerated at the time the SPDES permit was approved. Air quality permits for the incinerator were acquired as early as 1968 (NCDH 1979).

<u>Waste Disposal Practices and Spills</u>. Operations involving disposal of liquid and solid wastes from manufacturing processes at the Hooker/Ruco Site employed a variety of methods (Table 2-2) and wastes (Table 2-3). From approximately 1951 to 1975 on-site disposal of liquid wastes was through the use of on-site sand sumps (Figure 2-1). During this time period, sumps 4, 5, and 6 received wastewater discharge from PVC manufacturing processes at a rate of approximately two million gallons per year. Waste products including PVC resin solids, vinyl chloride at estimated concentrations of 600-1,200 ppm, as well as unknown quantities of trichlorethylene, vinyl acetate, styrene, gelatin, mathocel, stabilizers and butadiene were disposed of in the sumps.

Sumps 1 and 2 received an unknown amount of wastewater discharge from the ester manufacturing processes and were also in operation from 1951 to 1975. The wastewater included chemicals such as glycols, alcohols, perchlorethylene, methanol, and organic acids such as adipic, trimellitic, maleic, and phthalic (NCDH 1979). Other wastes may have entered sumps from plant spills or releases.

The unlined sand sumps were generally scraped once per year and the scrapings (mostly gravel containing resin) were sent to the

TABLE 2-2

METHODS OF WASTE DISPOSAL
HOOKER/RUCO SITE
HICKSVILLE, NEW YORK

1946 - 1968	Solid and liquid waste was disposed of at the Syosset Municipal Landfill.
1968 - 1978	Solid and liquid waste was disposed of at the Bethpage Municipal Landfill.
1973 - 1974	Solid waste was disposed of at the Brentwood Landfill (private).
1971 - 1977	Liquid organic waste was accepted by Rollins Environmental for disposal.
1956 - 1975	Wastewater from the PVC resin facility (Plant 2) was discharged to on-site sand sumps 4, 5, and 6. Sumps were scraped once yearly with solids disposed of at the Syosset, Bethpage and Brentwood Landfills.
1951 - 1974	Wastewater from the ester/plasticizer manufacturing facility (Plant 1) was discharged into on-site sand sumps 1 and 2.
1975 - Present	All ester wastes are incinerated on-site with the exception of the solids which collect within the concrete ester water holding tank. Ester holding tank solids removed by disposal contractor. Other miscellaneous wastes are removed by a disposal contractor (including spent solvents, lab wastes and unwanted inventory).

TABLE 2-3

WASTE GENERATED ON-SITE

<u>PLANT 2 PVC & SBR LATEX SUMPS</u> (SUMPS 4, 5 AND 6)

1. - WASTEWATER CONTAINED 0.1% PVC RESIN SOLIDS, 600-1,200 PPM VINYL CHLORIDE, METHOCEL, STABILIZERS (BARIUM & CADMIUM SOAPS), TRICHLOROETHYLENE, VINYL ACETATE, STYRENE CONDENSATE.

   - 2,000,000 GALLONS/YEAR

   - SUMP #6 WAS SCRAPED ONCE/YEAR & SCRAPINGS WERE SENT TO SYOSSET, BETHPAGE & BRENTWOOD LANDFILLS.

   - SUMPS WERE INACTIVE SINCE 1975

2. <u>PLANT 1 ESTER SUMP</u> (SUMPS 1 & 2)

   - WASTEWATER CONTAINS 1-10% MIXED GLYCOLS AND ALCOHOLS, PERCHLOROETHYLENE, METHANOL, ORGANIC ACIDS (ADIPIC, TRIMELLITIC, PHTHALIC, ISOPHTHALIC)

   - 4,000 GALLONS/DAY

   - SINCE 1975, AN INCINERATION SYSTEM HAS BEEN INSTALLED TO BURN ESTER WASTE.

3. <u>BOILER BLOWDOWN</u> (SUMP 3)

   - 10,800 GALLONS/DAY

   - CONTAINED BOILER TREATMENT CHEMICALS

   - ORGANIC SPILLAGE AND ORGANIC LEAKS FROM WASTE DRUMS COULD GO TO SUMP 3.

4. WASTE DRUMS OF ORGANICS (INCLUDING PERCHLOROETHYLENE, SOLUTION URETHANE, SOLVENTS SUCH AS DMF, TOLUENE, MEK, WASTE PLASTICIZER, ETC.) WERE STORED ADJACENT TO BUILDING 2. NUMEROUS DRUMS WERE LEAKING AND ORGANICS CONTAMINATED THE GROUND. CONCRETE PAD WAS BUILT IN 1979.

5. IN 1962, ONE LATEX TANK TRAILER WAS BURIED IN BETWEEN PLANT 2 SOLVENT FARM AND PVC CATALYST COLD ROOM.

6. THREE BURIED LATEX STORAGE TANKS. THE TANKS WERE FILLED WITH SAND.

7. PCB SPILLED IN FRONT OF PILOT PLANT.

Syosset, Bethpage, and Brentwood Landfills. Commencing in 1973 the Bethpage Landfill would not accept the scrapings. In 1969 and 1970 the scrapings were disposed of by McGhinnigle Cesspool Cleaners who put the scrapings on a barge and disposed of them in the Atlantic Ocean. Sumps 4, 5 and 6 were not used for PVC wastewater after 1975.

Alternative methods for the disposal of chemical wastes at the Hooker/Ruco site were practiced in the mid 1970's. These methods included the drumming of industrial waste with off-site disposal by a contractor, along with the on-site incineration of some liquid (ester) wastes beginning in 1975. Thereafter, no waste was reported as having been sent to the ester sand sumps (Sumps 1 and 2).

In addition to landfill disposal, solid wastes were sent to a variety of environment waste disposal companies that included:

- o Rollins Environmental Services, Logan Township, NJ (1971-1977)
- o Drumco Service Co., Philadelphia, PA. (1975),
- o Chem-Trol, Model City, N.Y. (1974),
- o City Barrel Co., Brooklyn, N.Y. (1960-Present),
- o McGuinnigle Cesspool Cleaners, Island Park, N.Y. (1969-1970)

Items disposed of at the landfills have included miscellaneous trash, pallets, damaged drums, emptied bags of raw materials, waste filter cake containing plasticizer, wood filter cartridges containing polyester, and chemical residues. Wastes disposed of by outside contractors included chemical wastes (sent to Rollins Environmental Services), urethane wastes (sent to Drumco Services), organic waste (sent to Chem-Trol and City Barrel Co.), lubrication oils, and spent caustics (Harrison, 1978).

In terms of on-site spillage, chemical contaminants are reported to have been spilled at waste drum storage areas through accidental spillage or drum leakage. One of the old drum storage areas is now covered with concrete while the other is uncovered. Spillages have also occurred at the Pilot Plant, where the carrier oil Therminol was released from the Pilot Plant heating system. This oil contained PCBs and the spills from the Pilot Plant caused the soils in the area to be contaminated. PCBs have also been detected in Sump 3.

One or more unwanted latex storage tanks were buried in 1974 at the Hooker/Ruco site between the parking lot and railroad right-of way. The tanks were filled with sand prior to burial. There are also one or more buried latex tank trailers located between the Plant 2 solvent tank farm and the PVC catalyst cold room. These trailers were reportedly buried in 1962 (Harrison, 1978).

Government Inspections. Regulatory personnel began interactions with personnel at the plant site beginning in the 1960's regarding the attainment of standards which were in effect at that time or due to be promulgated. Numerous questionnaires, governmental surveys, and applications were completed by site personnel describing the types of air and water discharges, and the storage and disposal of solid and liquid wastes (Harrison, 1978).

Government sampling of waste water began as early as 1956 for analysis of odor and phenols. In 1974, wastewater samples were collected by the EPA for organic analyses. Results indicated 1000 ppb of vinyl chloride and acetic acid and larger amounts of alcohols were present in wastewater discharged from Plant 2. Traces of trichloroethylene, tetrachloroethylene, and 100 ppb of vinyl chloride and alcohol were recorded in wastewater from Plant 1, (NCDH, 1979).

In 1979 the Hooker/Ruco site was listed by the New York State Department of Environmental Conservation (NYSDEC) as a site producing hazardous waste. The site was considered a 'potential problem' by the NCDH. Sampling results eventually led to a NYSDEC Phase 1 investigation conducted by Ecological Analysts Inc. (EAI 1983). The hazardous ranking (HRS) calculated by the investigation was 51 for the Migration Score. The HRS score is used to evaluate the relative potential of uncontrolled hazardous waste sites to damage human health or environment.

In the early 1970's, Grumman Aerospace (Grumman) contacted NCDH claiming that wastes produced at the Hooker/Ruco site were entering the groundwater and contaminating Grumman drinking and production wells. Contamination of other wells by vinyl chloride was confirmed in 1976 when analyses of samples from three Grumman wells showed a maximum concentration of 50 ppm vinyl chloride. Grumman ceased use of these wells by order of the NCDH. At that time, the Hooker/Ruco site was found to be the only user in Nassau County of the vinyl chloride monomer, and as such the Hooker/Ruco site was implicated as being the source of the contaminant. Representatives of the site contested the validity of laboratory testing protocols used in measuring the presence of vinyl chloride in the Grumman wells. (Greenthal, 1980).

The Hooker/Ruco site is presently classified as a small quantity generator of hazardous waste. All hazardous waste is currently disposed of off site by licensed waste disposal operators. Non-hazardous waste is segregated from the hazardous waste and is disposed of off site by licensed waste disposal companies (Ruffing, 1982). There is presently one active sump that receives approximately 11,000 gallons per day of non-contact cooling water with the addition of copper sulfate as a corrosion control agent. This discharge, from the cooling tower filter backwash, is directed to sump 4. The discharge is regulated under an SPDES permit.

2.2 SITE DESCRIPTION

2.2.1 Geology and Soils

The Hooker/Ruco site is located on Long Island, New York, in an area where the near surface geologic features have been shaped by glacial processes. The surface in the site area is generally flat, sloping gently to the south at a grade of approximately 25 feet/mile. The surficial soil deposits at the Hooker/Ruco site are Pleistocene age glacial outwash deposits consisting primarily of brown sand and gravel.

Based on reports prepared by Leggette, Brashears & Graham, Inc. (LBG) the surficial glacial deposits range in thickness from approximately 36 to 47 feet at the site (LBG 1984; LBG 1984a). At the base of these glacial deposits is a zone, approximately 5 feet thick consisting of fine to medium sand which appears to consist of glacially reworked sediments from the underlying Magothy Formation (LBG, 1984).

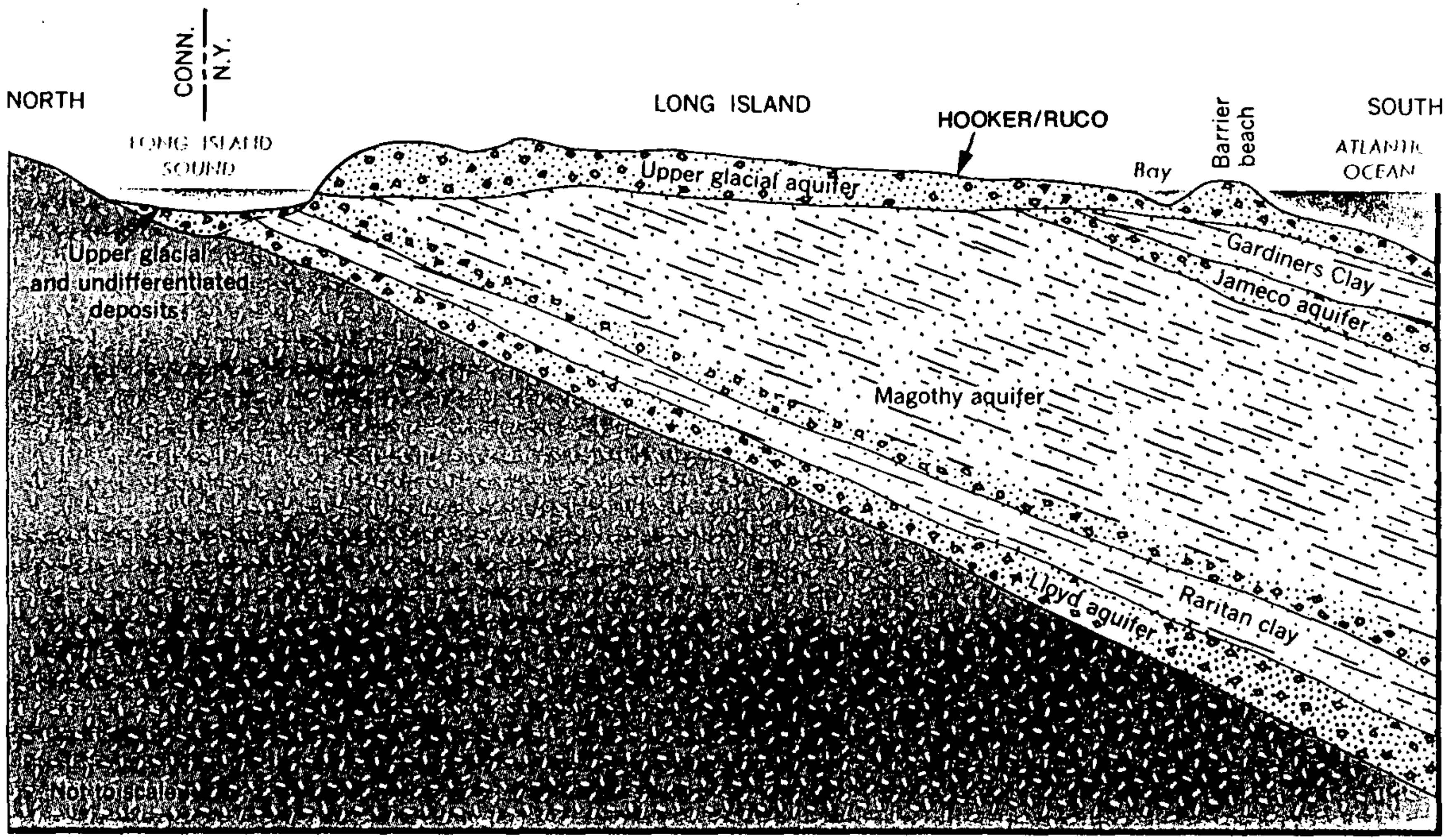
The Cretaceous age Magothy Formation underlies the glacial outwash and reworked sand deposits at the plant site. Based on the LBG reports (LBG, 1984; LBG, 1984a), these soils are typically composed of fine to coarse sand, clayey sand, sandy clay or silt and clay. The exact sequence of these sediments varied within each boring. However, an apparently correlative 20- to 30-foot thick, very fine gray, tan and olive colored sand was found in all of the six well locations at depths varying from approximately 64 to 89 feet below ground surface. Some clay layers were encountered in individual borings. However, no areally extensive clay layers have been identified in the wells drilled at the site.

Based on regional geologic information, the Magothy Formation is approximately 650 to 700 feet thick in the Hicksville Area and is underlain by the Raritan Formation. The upper portion of the Raritan is predominantly clay (USGS 1963). Figure 2-2 shows a generalized geologic cross section of Long Island and the major stratigraphic units present in the area.

2.2.2 Groundwater Hydrology

The primary aquifer in the vicinity of the Hooker/Ruco site is the Magothy aquifer. The aquifer is a sole source aquifer and is locally used for municipal, and industrial water supply purposes. No private wells used for potable water supply were identified in the project area.

The uppermost geologic unit at the site, the glacial deposits, is unsaturated. Water level measurements performed by LBG have



EXPLANATION

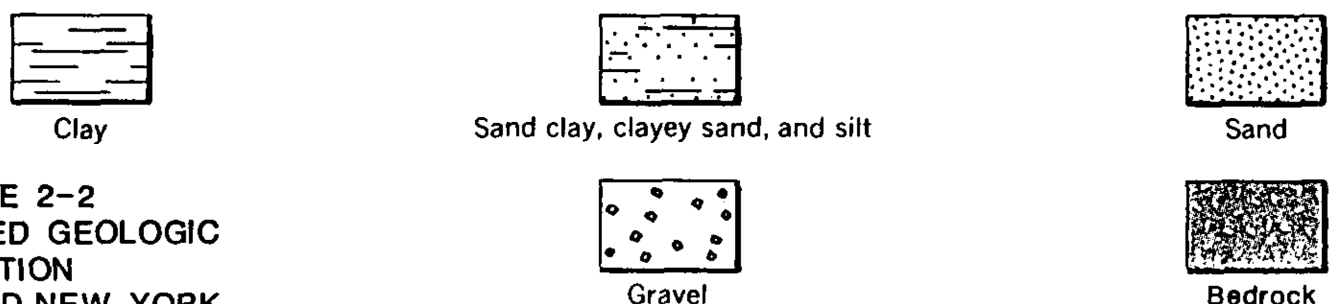


FIGURE 2-2
GENERALIZED GEOLOGIC
CROSS SECTION
LONG ISLAND, NEW YORK

FROM: NEW YORK WATER RESOURCES COMMISSION BULLETIN 62 shown these sediments to be above the water table. During periods of above average precipitation, the water table may locally saturate the glacial sediments since the water table measured by LBG was within several feet of the glacial deposits. This unit is water bearing in other portions of Long Island.

The water table at the site is found at elevations varying from approximately 77 to 82 feet above mean sea level (MSL) in the Magothy Formation, at depths approximately 50 to 60 feet below ground surface. Measured lateral hydraulic gradient at the site is approximately 0.0017 ft/ft to the south. Vertical downward hydraulic gradients of approximately 0.0065 to 0.050 ft/ft have also been measured (LBG, 1984). This indicates that flow at the site has a strong downward component. It is possible that this downward component of flow is due, in part, to pumping in production wells at nearby facilities.

Site and regional studies of the hydraulic properties of the Magothy aquifer have been performed (LBG, 1984; USGS, 1972 and; USGS, 1983). Measured values of hydraulic conductivity varied from approximately 10 to 250 ft/day at the site (LBG, 1984), up to 380 ft/day, in other tests (USGS, 1983). Site and regional values for hydraulic conductivity average approximately 50 to 60 ft/day in the above cited USGS and LBG reports.

Estimated ratios of horizontal to vertical hydraulic conductivity in the Magothy aquifer range from approximately 80:1 based on indirectly calculated values at the site (LBG, 1984) to an average range of 2.4:1 to 7:1, reported by the USGS in 1983. However, the USGS did report individual test results with ratios as high as 164:1.

A total of 44 wells have been identified within 1 mile of the Hooker/Ruco site. Based on the depths of wells, they all appear to be completed in the Magothy aquifer. Table 2-4 and Figure 2-3 describe each of the identified wells outside of the Hooker/Ruco site boundary. The locations of these off-site wells are shown on Figure 2-3. Table 2-5 and Figure 2-4 present information on the existing on-site monitoring wells which have been installed.

Most of the 44 off-site wells are monitoring wells installed as part of an ongoing USGS/NCDH regional groundwater study. However, included on the list are 14 relatively deep (350-700 ft) production wells east and south of the Hooker/Ruco site which are located on the adjacent Grumman facility, and several water supply wells, west and southwest of the Hooker/Ruco site. In 1979 the USGS estimated that Grumman combined pumpage averaged about 10.15 CFS (USGS, 1979). The only identified public supply well potentially downgradient of the Hooker/Ruco site is approximately one mile to the southwest. No other downgradient users of groundwater for potable water supplies were identified.

TABLE 2-4

OFF-SITE WELLS IDENTIFIED WITHIN 1 MILE OF THE SITE

USGS Well Number	Land Surface Elevation	Depth	Elevation of Screen Zone	Owner	Comments*
N8842	+111	570	-408 to -459	Grumman	Grumman Well #1
N8154	+120	520	-304 to -319	Grumman	Grumman Well #2
N8124	+116	543	-367 to -427	Grumman	Grumman Well #3
N1923	+114	359	-179 to -234	Grumman	Grumman Well #4
N7635	+120	394	-194 to -225	Grumman	Grumman Well #5
N7534	+120	366	-168 to -198	Grumman	Grumman Well #6
N7535	+122	357	-159 to -235	Grumman	Grumman Well #8
N7536	+125	436	-250 to -311	Grumman	Grumman Well #9
N7636	+125	373	-187 to -248	Grumman	Grumman Well #10
N7637	+126	490	-303 to -364	Grumman	Grumman Well #11
N8454	+129	560	-370 to -431	Grumman	Grumman Well #13
N8643	+122	467	-294 to -345	Grumman	Grumman Well #14
N8816	+129	500	-320 to -371	Grumman	Grumman Well #15
N7518	+133	375	-181 to -242	Grumman	Grumman Well #16
N10590	+135	76	+65 to +62	USGS/NCDH	Sussex Lane & Evergreen Ave.
N10589	+136	76	+66 to +63	USGS/NCDH	Lee Ave.
N10591	+134	78	+68 to +64	USGS/NCDH	Pine Ave. Floral Lane
N10593	+128	77	+59 to +55	USGS/NCDH	LIRR west of S. Oyster Bay Rd.
N10594	+127	76	+58 to +55	USGS/NCDH	LIRR east of S. Oyster Bay Rd.
N10595	+116	67	+57 to +53	USGS/NCDH	Thomas Ave & 13th St. Well pair with 10629

TABLE 2-4 (Cont'd)

OFF-SITE WELLS IDENTIFIED WITHIN 1 MILE OF THE SITE

USGS Well Number	Land Surface Elevation	Depth	Elevation of Screen Zone	Owner	Comments*
N10596	+118	71	+47 to +44	USGS/NCDH	Washington Ave & Lewis St.
N10597	+110	66	+50 to +47	USGS/NCDH	Schrimpe Ct. Well pair with 10630
N10598	+106	77	+37 to +33	USGS/NCDH	Willis Ct.
N10599	+108	67	+49 to +45	USGS/NCDH	Courtney La.
N10623	+122	72	+54 to +50	USGS/NCDH	Maple Ave. & 11th St.
N10625	+116	67	+53 to +49	USGS/NCDH	11th St. & Railroad Ave.
N10626	+119	67	+56 to +52	USGS/NCDH	5th St. & Grant Ave.
N10629	+117	109	+12 to +8	USGS/NCDH	Well pair within 10595
N10630	+111	300	-169 to -174	USGS/NCDH	Schrimpe Ct. Well repair with 10597
N10812	+136	93	+47 to +43	USGS/NCDH	Karin Lane
N6620	+116	87	+34 to +29	National Metal	625 S Oyster Bay Road, Also referred to as M-9
N7004	+133	150	+9 to -17	Plastics, Materials Polymers, Inc.	New South Road Also referred to as M-22
N9079	+119	70	+54 to +49	Nassau County Dept. of Public Works	Millwood Gate Rd and Broadway, also referred to as M-8
N9920	+146	89	+65 to +60	Nassau County Dept. of Public Works	Also referred to as M-2
N9931	+118	73	+54 to +49	Nassau County Dept. of Public Works	Also referred to as M-7

TABLE 2-4 (Cont'd)

OFF-SITE WELLS IDENTIFIED WITHIN 1 MILE OF THE SITE

USGS Well Number	Land Surface Elevation	Depth	Elevation of Screen Zone	Owner	Comments*
N9932	+142	105	+45 to +40	Nassau County Dept. of Public Works	Also referred to as M-5
N8778	+140	590	-389 to -450	Hicksville Water Dept.	Hicksville Water Supply Well H-1
N8779	+140	585	-384 to -445	Hicksville Water Dept.	Hicksville Water Supply Well H-1
N6192	+130	626	-445 to -495	Hicksville Water Dept.	Hicksville Water Supply Well H-2
N6193	+130	467	-266 to -326	Hicksville Water Dept.	Hicksville Water Supply Well H-2
N9180	+130	630	-415 to -446	Hicksville Water Dept.	Hicksville Water Supply Well H-2
N8525	+117	503	-315 to -365	Hicksville Water Dept.	Hicksville Water Supply Well H-3

*Note: Grumman owned wells are production wells for industrial supply.
USGS/NCDH owned wells are monitorng wells.
Hicksville Water Dept. owned wells are water supply wells.
Other wells are industrial or private wells.

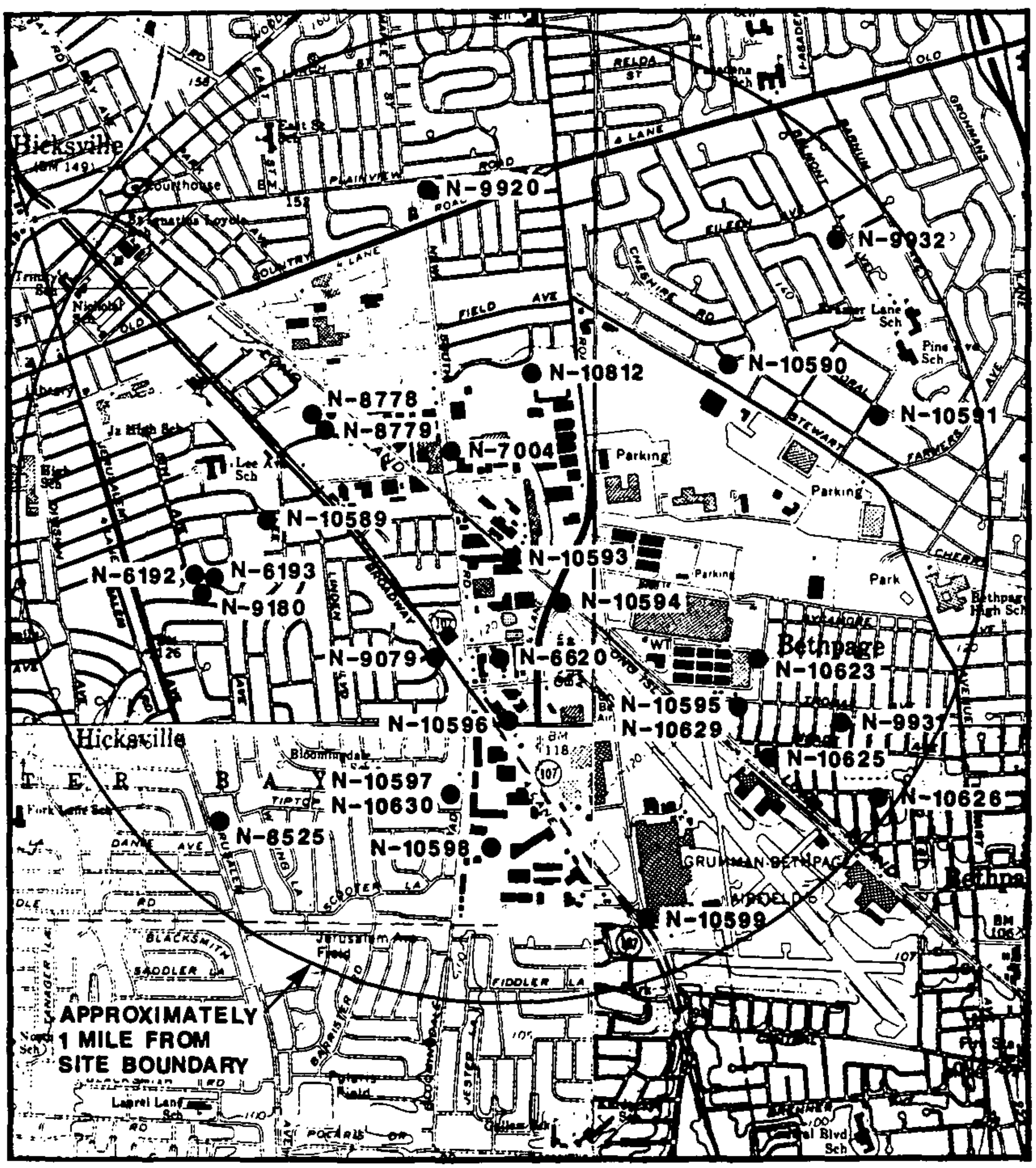
** Elevation above mean sea level

TABLE 2-5

EXISTING ON-SITE MONITORING WELLS

Ebasco Well Number	Prior Well Number*	Sandpack Depth (Feet Below Ground Surface)	Screen Depth (Feet Below Ground Surface)
GW01S	A-1	48-80	54-67
GW01d	A-2	100-115	105-112
GW02S	B-1	44-70	49-59
GW02d	B-2	80-104	88-104
GW03S	C-1	42.5-74	50-70
GW03d	C-2	103-124	114-124
GW04S	D-1	41-65	45-65
GW04d	D-2	81.5-91	86-91
GW05S	E-1	42.8-66	46-66
GW05d	E-2	71-90	75-90
GW06S	F-1	35-71	47.5-67.5
GW06d	F-2	80.5-111	90-110

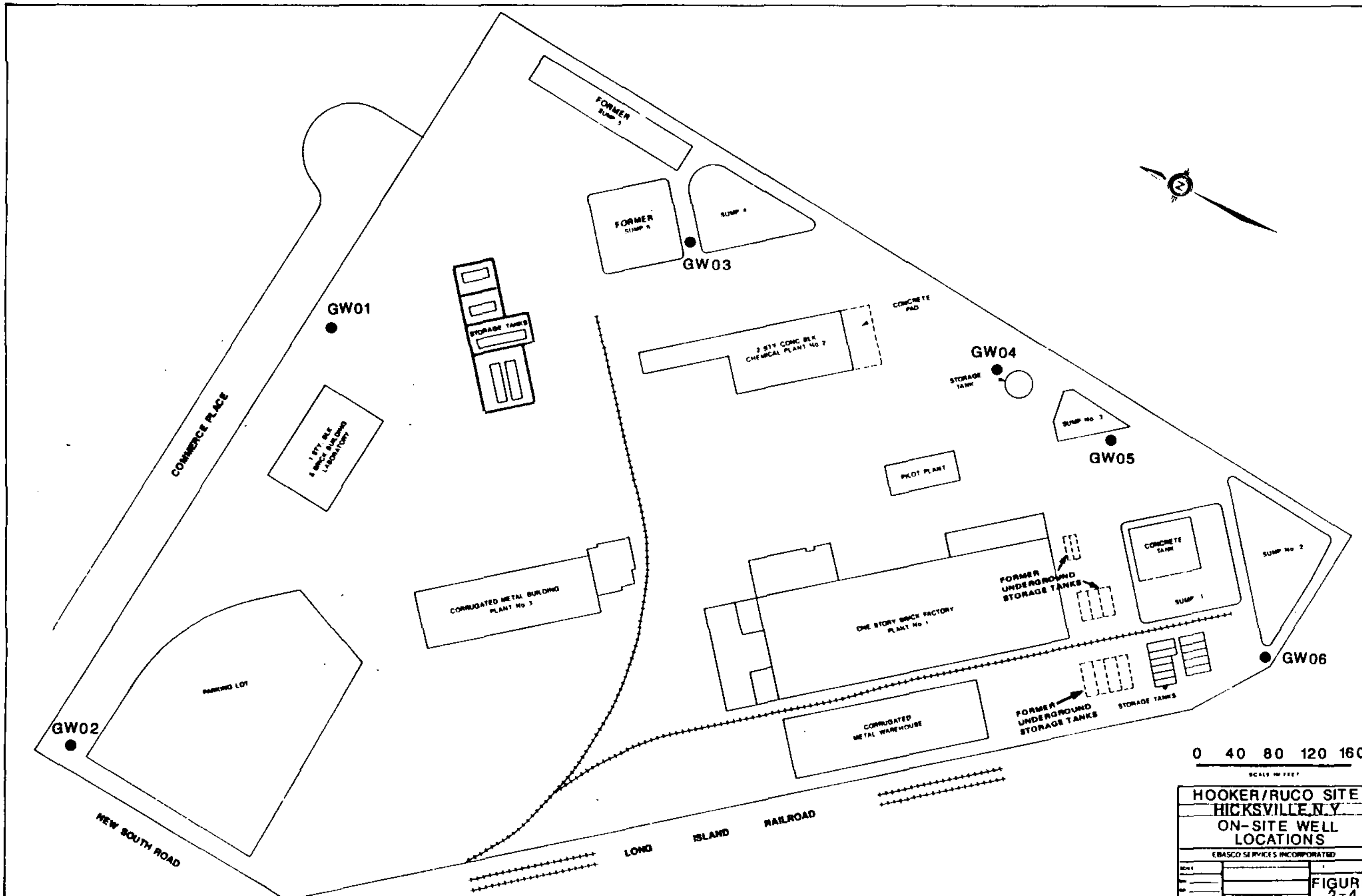
* Data and Well Numbering System From (LBG, 1984)



HOOKER/RUCO SITE HICKSVILLE, NEW YORK
FIGURE 2-3 EXISTING OFF-SITE WELL* LOCATIONS
EBASCO SERVICES INCORPORATED

* DOES NOT INCLUDE GRUMMAN WELLS

ADAPTED FROM U.S.G.S. AMITYVILLE, FREEPORT, HUNTINGTON AND HICKSVILLE, NY, QUADRANGLES, PHOTOREVISED 1979.



FORMER
FORMER
SUMP 4
GW03
CONCRETE PAD
GW01
STORAGE TANKS
2 STY CONC BLK CHEMICAL PLANT No 2
GW04
STORAGE TANK
SUMP No 3
GW05
COMMERCE PLACE
1 STY BLK & BRICK BUILDING LABORATORY
PILOT PLANT
CONCRETE TANK
SUMP No 2
FORMER UNDERGROUND STORAGE TANKS
SUMP 1
CORRUGATED METAL BUILDING PLANT No 3
ONE STORY BRICK FACTORY PLANT No 1
GW06
PARKING LOT
STORAGE TANKS
FORMER UNDERGROUND STORAGE TANKS
CORRUGATED METAL WAREHOUSE
GW02
0 40 80 120 160
NEW SOUTH ROAD
LONG ISLAND RAILROAD
HOOKER/RUCO SITE
HICKSVILLE,N.Y.
ON-SITE WELL
LOCATIONS
EBASCO SERVICES INCORPORATED
FIGURE 2-4

The USGS and the NCHD are in the process of performing a regional groundwater flow and quality study in the Hicksville area. Preliminary chemical testing results from that study have shown various concentrations of volatile organic compounds (VOCs) in the groundwater ranging from levels as low as non-detectable to over 1000 ppb. Many of the wells, both up and downgradient of the site show some VOCs. The compounds detected have varied in their areal distribution.

2.2.3 Environmental Setting

The Hooker/Ruco site lies within the urban complex of Hicksville, Nassau County, New York. The site location was shown on Figure 1-1. The area immediately surrounding the site is zoned as either residential or industrial with Grumman Aerospace as the largest industrial facility in the area. The Grumman facility includes a private airport. The closest schools are Hicksville High School and Bethpage High School located 1 mile west and east, respectively, of the site. The west boundary of the Bethpage State Park is 1.5 miles east of the site and Eisenhower Memorial Park is 2.8 miles southwest of the site. The town of Bethpage is immediately west of the site. The southwest border of the site is adjacent to the Long Island Railroad. The Hooker/Ruco site is accessible from New South Road. South Oyster Bay Road is 200-500 feet east of the site.

Groundwater in the area is utilized for both public and industrial water supply. There are six public supply wells within one mile of the site servicing over 100,000 people (NYSDOH, 1982). There is no existing natural surface water within 3 miles of the Hooker/Ruco site. Small basins have been constructed in the immediate area but their water is not used for drinking purposes. The basins are used primarily for recharge of storm water or water used for industrial purposes.

There are no identified sensitive environments within three miles of the Hooker/Ruco site. Sensitive environments would potentially include wetlands, critical wildlife habitats, locations of endangered, threatened or rare floral or faunal species, and significant habitats (EAI, 1983). Vegetation within the area is primarily grassy turf with scattered tree plantings. There are natural native forests located within Bethpage State Park and in some areas of the Eisenhower Memorial Park but otherwise, native vegetation has been replaced by streets, sidewalks, homes, industries, commercial buildings, and residential lawns.

Annual precipitation in the area is 45 inches. The one year 24 hour rainfall is 2.5 inches (EAI, 1983).

2.2.4 Chemical Characterization of the Site

2.2.4.1 Waste Generated On Site

The Hooker/Ruco site has been used to manufacture polymers such as polyvinyl chloride (PVC), vinyl chloride/vinyl acetate copolymer, styrene/butadiene latex, and polyurethane, as well as ester plasticizers. Table 2-6 is a list of chemicals known to have been used at the Hooker/Ruco site.

The production of polyvinyl chloride, vinyl chloride/vinyl acetate copolymer, as well as styrene/butadiene latex took place in Plant 2. From 1956 to 1975, the wastewater from this plant was discharged into Sumps 4, 5, and 6. According to rough estimates performed by the Works Manager J. B. Harrison in 1978, the wastewater contained about 0.1% PVC resin solids, 600-1,200 ppm vinyl chloride, gelatin, Methocel, stabilizers (barium and cadmium soap), trichloroethylene, considerable vinyl acetate, as well as styrene condensate (Harrison, 1978). The amount of wastewater discharged was approximately 2,000,000 gallons per year. The bottom of the sumps were scraped once per year and the scrapings were sent to Syosset, Bethpage, and Brentwood municipal landfills. Sumps 4 and 5 have been inactive since 1975.

The production of ester plasticizers took place in Plant 1 from approximately 1951 to the present. The wastewater from this operation contained considerable amounts of mixed glycols and alcohols (typically 1-10%), perchloroethylene, and methanol, as well as organic acids such as adipic, trimellitec, phthalic, and isophthalic acids. These wastes totaled approximately 4,000 gallons per day and were discharged directly into Sumps 1 and 2 from 1951 to 1974. Since 1975, a concrete settling basin with four cells has been used to feed the ester waste to an incineration system.

Other wastewater generated at the site included water containing biocides to control algal growth, wastewater generated from manufacturing processes, tower water blowdown, and boiler blowdown. The volume of these waste streams totaling approximately 25,000 gallons per day was historically discharged into Sump 3. These blowdowns contained tower and boiler treatment chemicals including silicate, sodium hydroxide, hexametaphosphate, hydrazine, polyacrylate as well as other chemicals listed in Table 2-6. Sump 4 received accidental overflow from the cooling tower.

In addition to the waste water discharges described above, various other more concentrated wastes were generated and stored in drums. The wastes in the drums included percholoroethylene, solution urethane, solvents such as dimethylformamide, toluene, 2-butanone, waste plasticizer, waste polyester as well as other chemicals. The drums were stored outdoors in an area to the

TABLE 2-6

CHEMICALS USED AT HOOKER/RUCO SITE

o PRODUCTION OF POLY(VINYL CHLORIDE) AND VINYL CHLORIDE/ VINYL ACETATE COPOLYMER

- VINYL CHLORIDE
- VINYL ACETATE
- METHOCEL
- PLASTICIZER (e.g., PHTHALATE)
- STABILIZER (BARIUM-CADMIUM SOAPS)
- TRICHLOROETHYLENE
- CATALYST

o PRODUCTION OF STYRENE-BUTADIENE LATEX

- BUTADIENE
- STYRENE
- ROSIN ACID SOAP

o PRODUCTION OF ESTER PLASTICIZER

- GLYCOLS
- ALCOHOLS
- PERCHLOROETHYLENE
- ADIPIC ANHYDRIDE
- TRIMELLITIC ANHYDRIDE
- MALEIC ANHYDRIDE
- ISOPHTHALIC ANHYDRIDE

TABLE 2-6 (Cont'd)

CHEMICALS USED AT HOOKER RUCO SITE

- o PRODUCTION OF POLYURETHANE
  - ALCOHOLS
  - SOLVENTS (TOLUENE, DMF, MEK)
  - ISOCYANATES
  - MOCA (USED FOR 3 YEARS)
  - PHENYL MERCURIC PROPIONATE (USED FOR 2 YEARS)
- o BOILER SYSTEM
  - DICHROMATE
  - NITRILOTRIACETIC ACID
  - PENTACHLOROPHENOL
  - HYDRAZINE
  - DIETHYLAMINOETHANOL
  - PHOSPHONATE
  - POLYACRYLATE
  - SODIUM LIGNOLSULFONATE
  - DISODIUM ALGINATE
  - ZINC SULFATE
  - HEXAMETAPHOSPHATE
  - DERMA BROWN G DYE
- o PCB IN HEAT TRANSFER FLUID

east of Plant 2 until they were shipped off site for disposal. Numerous drums were reportedly leaking while stored in this area, resulting in contamination of the soil (Harrison, 1978). The drums were later moved to an area adjacent to plant 2. A concrete pad was eventually built in 1979 on the ground adjacent to Plant 2 which may have become contaminated by the leaking drums. There are also reports that one to three buried latex storage tanks, and that at least one latex tank trailer, were also buried onsite.

A PCB spill was also identified. PCB was used in the heat transfer fluid for the Pilot Plant Therminol heating system. The PCB spilled on the roof of the Pilot Plant, from a relief pipe, and eventually contaminated the soil in front of and behind the plant. A part of the contaminated area has since been paved but parts are still not paved. During the groundwater sampling effort by LBG in 1984, an oily material was found at approximately 48 feet below grade while boring monitoring well MW05. Chemical analysis showed this oily material contained very high levels of PCBs and phthalates (LBG, 1984).

2.2.4.2 Analytical Results of Previous Investigations

Four rounds of soil and groundwater sampling have been concluded at Hooker/Ruco site (LBG 1984, 1986, 1987, 1988). The first sampling event took place in 1984, and the results of analyses are listed in Table 2-7. The detection limits of the 1984 analyses are shown on Tables 2-7a and 2-7b. A total of 12 monitoring wells were installed onsite (see Figure 2-5). Wells with postscript "s" (eg. GW01s) are shallow wells, with depths of about 70 ft; whereas wells with postscript "d" (eg. GW01d) are deep wells, with depths of about 130 ft. Based on the direction of groundwater flow (from north to south) the GW01 and GW02 wells are on the upgradient side of the site. Wells GW03, GW04, GW05, and GW06 are downgradient of the site location. Contaminants detected in groundwater samples (LBG, 1984) included trichloroethylene (TCE), tetrachloroethylene (PCE), vinyl chloride, and 1,2-trans-dichloroethylene (see Table 2-7). Most of these contaminants were found in Well GW04s, GW05s, GW06s, and GW06d. Vinyl chloride was detected in water samples from wells GW05s, GW06s, and GW06d at concentrations of 7, 140 and 50 ug/l respectively. PCE was detected in water samples from wells GW03d and GW04d at 50 and 160 ug/l respectively. 1,2-trans-Dichloroethylene was detected in well water samples from wells GW04s, GW05s, GW06s and GW06d at 24, 30, 130 and 200 ug/l respectively. Trichloroethylene was detected in water samples from wells GW01d and GW04d at concentrations 25 and 16 ug/l respectively. In addition, many other materials were detected in NYSDEC split samples and identified as tentatively identified compounds (TICs) in the volatiles and base neutral chromatograms for samples from wells GW03s, GW05s, GW05d, GW06s, and DW06d. Total organic carbon (T.O.C.) and Chemical Oxygen Demand (C.O.D.) were highly elevated in well water samples from wells GW05s, GW05d, GW06s and GW06d compared with the values obtained from the GW01 and GW02 upgradient wells.

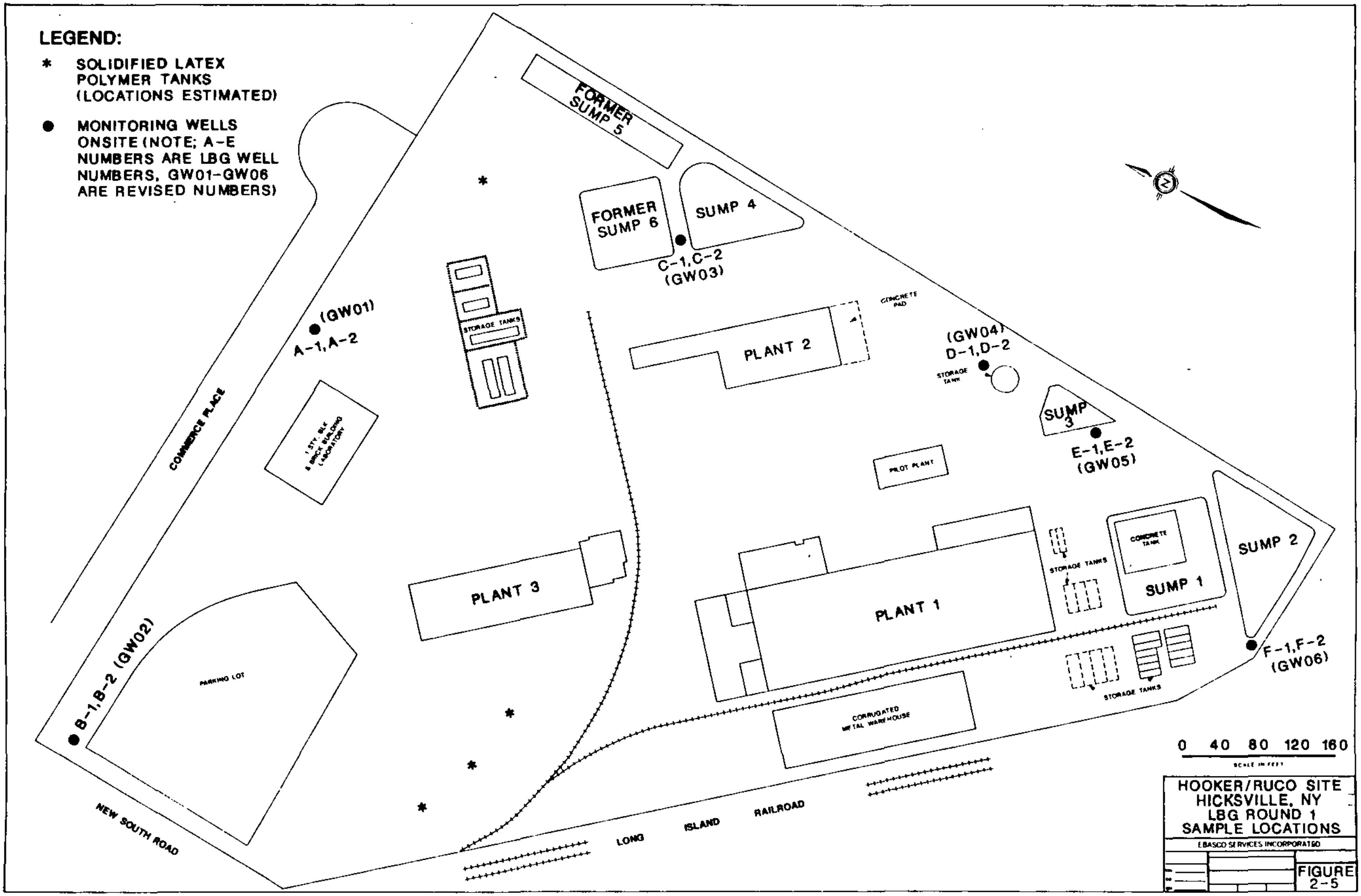

LEGEND:
* SOLIDIFIED LATEX POLYMER TANKS (LOCATIONS ESTIMATED)
● MONITORING WELLS ONSITE (NOTE; A-E NUMBERS ARE LBG WELL NUMBERS, GW01-GW06 ARE REVISED NUMBERS)
FORMER SUMP 5
FORMER SUMP 6
SUMP 4
C-1,C-2 (GW03)
(GW01) A-1,A-2
STORAGE TANKS
PLANT 2
CONCRETE PAD
(GW04) D-1,D-2
STORAGE TANK
SUMP 3
E-1,E-2 (GW05)
PILOT PLANT
COMMERCE PLACE
1 STY. BLK & BRICK BUILDING LABORATORY
PLANT 3
PLANT 1
CONCRETE TANK
SUMP 1
SUMP 2
F-1,F-2 (GW06)
B-1,B-2 (GW02)
PARKING LOT
CORRUGATED METAL WAREHOUSE
NEW SOUTH ROAD
LONG ISLAND RAILROAD
0 40 80 120 160
SCALE IN FEET
HOOKER/RUCO SITE HICKSVILLE, NY LBG ROUND 1 SAMPLE LOCATIONS
EBASCO SERVICES INCORPORATED
FIGURE 2-5

TABLE 2-7

SUMMARY OF 1984 ANALYSES ON HOOKER/RUCO SITE

A. Groundwater

Compounds	Concentration (ug/l) within wells															
	GW01s (A-1)		GW01d (A-2)		GW02S (B-1)		GW02d (B-2)		GW03s (C-1)		GW03d (C-2)		GW04s (D-1)		GW04d (D-2)	
	DEC	Hooker	DEC	Hooker	DEC	Hooker	DEC	Hooker	DEC	Hooker	DEC	Hooker	DEC	Hooker	DEC	Hooker
Methylene chloride	ND	-	36	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-
Trichloroethylene	ND	ND	16	25	ND	ND	ND	ND	ND	ND	<10	ND	<10	16	ND	ND
Tetrachloroethylene	ND	ND	<10	ND	ND	ND	ND	ND	ND	ND	33	50	140	160	<10	ND
Vinyl Chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<10	ND
1,2-Trans-Dichloroethylene	ND	ND	<10	ND	ND	ND	ND	ND	ND	ND	ND	ND	26	24	ND	ND
Styrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl ethyl ketone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N,N-dimethyl formamide	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-
Vinyl acetate	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-
1,1-dichloroethylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	<10	-	ND	-
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-ethylhexanol	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-
2,4-toluene diisocyanate	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-
4,4'-methylene-bis-2chloroaniline (MOCA)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND
Butylbenzylphthalate	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND
Diethylphthalate	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND
Dimethylphthalate	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND
Di-n-butylphthalate	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND
Aroclor 1242	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND
COD (mg/l)	-	3	-	4	-	3	-	4	-	13	-	3	-	9		
TOC (mg/l)	-	1.2	-	1.5	-	1.6	-	1.4	-	4.2	-	1.8	-	2.4	-	1.3
pH																

ND = Undetected
DEC = NYSDEC split sample data

TABLE 2-7 (Cont'd)

SUMMARY OF 1984 ANALYSES ON HOOKER/RUCO SITE

A. Groundwater

Compounds	Concentration (ug/l) within wells							
	GW05s (E-1)		GW05d (E-2)		GW06S (F-1)		GW06d (F-2)	
	DEC	Hooker	DEC	Hooker	DEC	Hooker	DEC	Hooker
Methylene chloride	ND	-	ND	-	ND	-	ND	-
Trichloroethylene	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethylene	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	ND	7	ND	ND	ND	140	ND	50
1,2-Trans-Dichloroethylene	26	30	ND	ND	14	130	ND	200
Styrene	ND	ND	ND	ND	34	ND	ND	ND
Methyl ethyl ketone	ND	ND	ND	ND	43	ND	ND	ND
1,1-dichloroethane	ND	ND	ND	ND	ND	ND	30	ND
N,N-dimethyl formamide	ND	-	ND	-	61	-	60	-
Vinyl acetate	ND	-	ND	-	ND	-	ND	-
1,1-dichloroethylene	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	ND	-	ND	-	ND	-	ND	-
Toluene	ND	ND	ND	ND	ND	ND	ND	ND
2-ethylhexanol	ND	-	ND	-	24	-	ND	-
2,4-toluene diisocyanate	ND	-	ND	-	ND	-	ND	-
4,4'-methylene-bis-2chloroaniline (MOCA)	ND	ND	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate	-	ND	-	ND	-	ND	-	ND
Butylbenzylphthalate	-	ND	-	ND	-	ND	-	ND
Diethylphthalate	-	ND	-	ND	-	ND	-	ND
Dimethylphthalate	-	ND	-	ND	-	ND	-	ND
Di-n-butylphthalate	-	ND	-	ND	-	ND	-	ND
Aroclor 1242	-	ND	-	ND	-	ND	-	ND
COD (mg/l)	-	25	-	15	-	46	-	66
TOC (mg/l)	-	8.2	-	8.7	-	22	-	14
pH	-	6.7	-	8.8 (normal)				

ND = Undetected
DEC = NYSDEC split sample data
COD (upgradient, mg/l) = 3-4 mg/l
TOC (upgradient, mg/l) = 2 mg/l

TABLE 2-7 (Cont'd)

B. Soil

	GW02 B*	GW03 C			GW04 D*	GW05 E*				Below Bottom of Sump 2		
	5'	0-1 1/2' (from sump 6)	25'*	50'*	5'	0.5-2'	5'	5-25'	50'	1'	20'	30'
Compounds												
Trichloroethylene												
Tetrachloroethylene	0.31	0.367				244	1.07	0.164			1.70	0.12
Aroclor 1248			0.53	0.12	0.21	0.94	0.18	0.10	0.27			
Lead										0.26	0.12	0.11

* Soil samples were taken during well drilling

C. Oily Phase At Well E:

Compounds	*Estimated Concentration*
Aroclor 1248	> 100 ug/l
di-n-butylphthalate	1 -3 mg/l
bis(2-ethylhexyl)phthalate	1-3 mg/l

Other unidentified phthalates were also present.

TABLE 2-7a

PARAMETERS ANALYZED AND THEIR DETECTION LIMITS
IN 1984 GROUNDWATER ANALYSES

Parameters	Detection Limit (ug/l) DEC	Hooker/Ruco
Methylene chloride	10	-
Trichlorofluoromethane	10	-
1,2-trans-dichloroethylene	10	10
1,1-dichloroethylene	10	10
1,10dichloroethane	10	-
Tetrachloroethylene	10	10
Trichloroethylene	10	10
Toluene	10	10
Vinyl acetate	5	10
Vinyl chloride	10	5
Styrene	5	10
Methyl ethyl ketone	5	0
Bis(2-ethylehexyl)phthalate	-	10
Butylbenzylphthalate	-	*
Diethylephthalate	-	*
Dimethylphthalate	-	*
Di-n-butylphthalate	-	*
Di-n-octylphthalate	-	10
Moca	-	10
Aroclor 1242	-	10
1254	-	10
1260	-	10
1248	-	10
1232	-	10
1221	-	10
1016	-	10
Cadmium	-	50
Copper	-	200
Lead	-	6
Mercury	-	0.3
Zinc	-	50
Barium	-	1000
Sulfate as SO_4 (mg/l)	-	2
COD (mg/l)	-	2
Nitrate (mg/l)	-	0.1
Phenolics (total) (mg/l)	-	0.05
TOC (mg/l)	-	1

* No detection limit established

8250b

TABLE 2-7b

PARAMETERS ANALYZED AND THEIR DETECTION LIMITS
IN 1984 SOIL ANALYSES

Parameters	Detection Limit (ug/l)
1,1-Dichloroethylene	100
Tetrachloroethylene	100
Toluene	100
1,2-trans-dichloroethylene	100
Trichloroethylene	100
Vinyl chloride	100
Styrene	100
Bis(2-ethylehexyl)phthalate	*
Butylbenzylphthalate	*
Diethylphthalate	*
Dimethylphthalate	*
Di-n-butylphthalate	*
Di-n-octylphthalate	*
Moca	*
Aroclor 1061 (mg/kg)	0.1
1221	0.1
1232	0.1
1242	0.1
1248	0.1
1254	0.1
1260	0.1
Barium (mg/l)	1.0
Cadmium	0.05
Copper	0.02
Lead (ug/l)	5
Mercury (ug/l)	0.3
Zinc (mg/l)	0.05
Nitrate (mg/l)	0.04
Phenolics (total) (mg/l)	0.05
Sulfate as SO_4 (mg/l)	9

* No detection limit established

Soil samples were also obtained from these well locations as they were drilled. PCE was detected at a concentration of 244 mg/kg at 0.5 to 2.0 ft below grade, and 1.07 mg/kg at 5 ft below grade. Arcolor 1248 (PCB) was also present at locations GW03, GW04, GW05, GW06 with concentrations ranging from 0.10 to 0.94 mg/kg. In addition, soil samples were taken from soil borings W, X, Y, and Z in front of the Pilot Plant (Figure 2-6). Arcolor 1248 was found in soil samples at high concentrations at these locations, and ranged from 11,000 to 23,000 mg/kg for the most contaminated samples.

A second round of sampling took place in 1985. Groundwater samples were collected from the same monitoring wells and analyzed for the same parameters as in the first round (tests included seven volatile organic compounds, phthalates and 4,4'-methylene-(bis)-2-chloroaniline (MOCA), six metals, and PCBs). In general, the concentrations of volatile organics in water were lower in the second round of sampling than the first. For example, the concentration of vinyl chloride in well GW06s dropped from 140 to 38 ug/l, and from 50 ug/l to non-detectable in well GW06d between the first and second rounds of sampling. The PCE concentration dropped from 160 ug/l to 15 ug/l in well GW04s. (See Table 2-8)

However, there were exceptions to the general lowering trend between the first and second round of samples. For example, vinyl chloride concentration was increased from 7 to 42 ug/l in well GW05s. There was an increase in C.O.D. (from 46 to 170 mg/l), and T.O.C. (from 22 to 43 mg/l) in well GW06s. The parameters tested for in the analytical program could not account for these increases. In fact, the concentrations of vinyl chloride and 1,2-trans-dichloroethylene (the only organics detected in Well GW06s) decreased. The increase in COD and TOX may be related to the presence of many unidentified compounds and tentatively identified compounds in the samples (Table 2-7). Although pathalates were detected in some water samples, they were also detected in the blank. Thus, they may not be significant.

Soil samples were obtained at different depths in the second phase of sampling from site S, T, U, V (Figure 2-6) and analyzed for PCBs only. Aroclor 1248 was detected in the highest concentrations in the first foot of soil, although at site S, PCB concentration was quite high (310 mg/kg) even at a depth of 3 ft.

Additional soil samples were again collected in 1986 as part of a third sampling effort (LBG report, 1987) to better define the areal extent of PCB contamination. The samples collected from the area adjacent to the southeast side of the Pilot Plant had levels of PCB above 50 mg/kg. Also, in 1988, soil samples were taken from the recharge basin (sump 3) to determine the vertical extent of PCB contamination. PCBs were detected in the sump with a maximum concentration of 176.5 mg/kg in surface soil. PCBs were detected at depths of up to 6.5 feet below the sump bottom. The areal and vertical extent of PCB contamination is shown in Figure 2-6. Summaries of 1986 and 1988 PCB analyses are shown in Table 2-9 and Table 2-10, respectively.

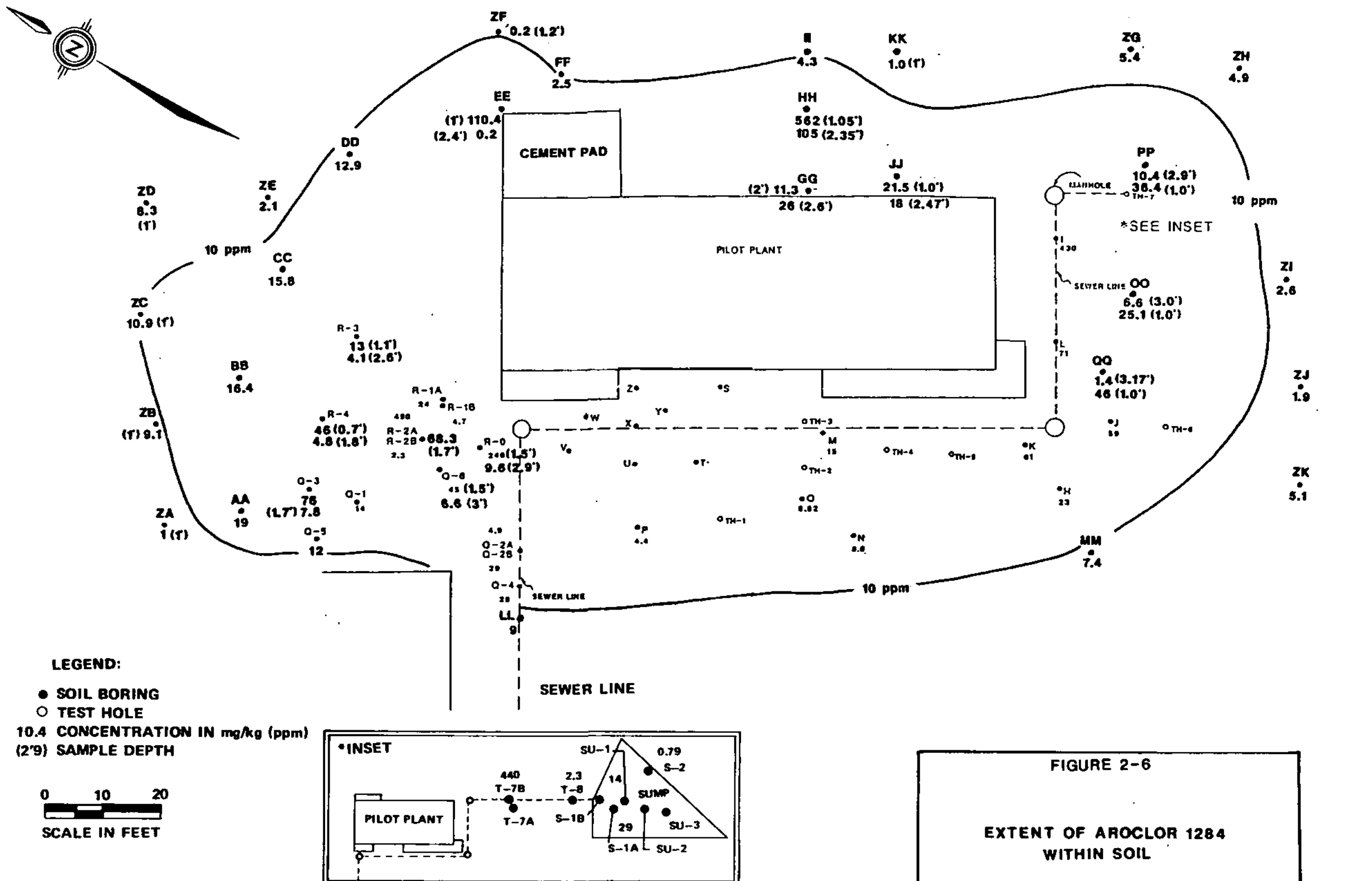


FIGURE 2-6

EXTENT OF AROCLOR 1284 WITHIN SOIL

(VALUES ARE CONCENTRATIONS OF AROCLOR 1248 IN THE SOIL SAMPLES IN MILLGRAMS PER KILOGRAM)

TABLE 2-8
SUMMARY OF 1985 ANALYSES ON HOOKER/RUCO SITE

A. Groundwater

Concentration (ug/l) within Wells

Compounds	GW01s		GW01d		GW02s		GW02d		GW03s		GW03d	
Volatile	Hooker	DEC	Hooker	DEC	Hooker	DEC	Hooker	DEC	Hooker	DEC	Hooker	DEC
TCE			27	17			3		11		4.1	
PCE	12	13	23	24							18	
Vinyl Chloride												
1,2-Trans DCE	3.4		14	8								
1,1-DCE											18	
Tetrahydrofuran												
4-methyl, 2-pentanone												
2-butanone												
No. of Tentatively identified compounds (TICS)												
No. of Unidentified Volatile peaks												
Special Semi-Volatile												
MOCA	-	ND	-	ND					-	ND	-	ND
2-ethylhexanol	-	ND	-	ND					-	ND	-	ND
dimethyl-formamide	-	ND	-	ND					-	ND	-	ND
melic acid	-	3.21	-	0.92					-	<1ppm	-	<1ppm
Ethylene glycol									-	<1ppm	-	<1ppm
bis-(2-ethyl hexyl) phthalate											15	-

Compounds	GW04s		GW04d		GW05s		GW05d		GW06s		GW06d	
Volatile	Hooker	DEC	Hooker	DED	Hooker	DEC	Hooker	DEC	Hooker	DEC	Hooker	DEC
TCE												
PCE	15											
Vinyl Chloride					42	20			38	30		
1,2-Trans DCE					161	210			22	14		
1,1-DCE	15											
Tetrahydrofuran							-	19	-	89	-	40
4-methyl, 2-pentanone									-	430		
2-butanone									-	18	-	11
No. of Tentatively identified compounds (TICS)									-	2		
No. of Unidentified Volatile peaks					-	1			-	1	-	1
Special Semi-Volatile												
MOCA	-	ND	-	ND	-	ND	-	ND	-	ND	-	ND
2-ethylhexanol	-	ND	-	ND	-	ND	-	ND	-	ND	-	6.11
dimethyl-formamide	-	ND	-	ND	-	2.3	-	ND	-	ND	-	8.81
melic acid	-	<1ppm	-	<1ppm	-	<1ppm	-	<1ppm	-	<1ppm	-	<1ppm
Ethylene glycol	-	<1ppm	-	<1ppm	-	<1ppm	-	<1ppm	-	<1ppm	-	<1ppm
bis-(2-ethyl hexyl) phthalate			52	-	11	-			17	-	21	-

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TABLE 2-8 (Cont'd)
SUMMARY OF 1985 ANALYSES ON HOOKER/RUCO SITE

A. Groundwater

Concentration (ug/l) within Wells

Compounds	GW01s		GW01d		GW02s		GW02d		GW03s		GW03d		GW04s		GW04d		GW05s		GW05d		GW06s		GW06d	
Volatile	Hooker	DEC	Hooker	DEC	Hooker	DEC	Hooker	DEC	Hooker	DEC	Hooker	DEC	Hooker	DEC	Hooker	DED	Hooker	DEC	Hooker	DEC	Hooker	DEC	Hooker	DEC
di-n-butyl-phthalatlete	–	8.9	–	ND					–	ND	–	ND	–	ND	–	ND	–	10			–	10		
benzoic acid									–	ND	–	ND	–	ND	–	ND					–	75	–	ND
No. of Tentatively Identified Compounds (TIC)									–	1							–	1			–	1	–	3
No. of Un-identified peaks	–	2	–	4					–	8	–	2	–	1	–	4	–	7	–	8	–	12	–	9
Cadmium								30																
C.O.D. (mg/l)	6		5		4	10		10	<5.0	3	<5.0	9	<5.0	8	5.6	46	41.1	28	18.9	170	201	51	40.7	
T.O.C. (mg/l)	1.4		1.1		1.4				0.64		0.40		0.44		0.65	12	10.4	4.2	3.59	43	51.0		9.48	

C.O.D. (upgradient; mg/l) = 4-10 mg/l
T.O.C. (upgradient; mg/l) = 1.1 - 1.4 mg/l
DEC = NYS DEC split sample data
ND = undetected

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TABLE 2-9

SUMMARY OF 1986 PCB ANALYSES ON HOOKER/RUCO SITE

SAMPLE LOCATION	DEPTH (FT.)	AROCLOR 1248 CONCENTRATION (mg/kg)
R	0 - 1.1	2,900/2,710
Q	0.4 - 1.0	480/1,060
P	0.4 - 1.0	4.4
O	1.6 - 1.9	0.82
N	0.7 - 0.85	8.0
M	1.5 - 1.7	15
L	1.1	71
K	0.9	61
J	0.4 - 1.0	59
I	0.2 - 1.5	430/357
H	0.4 - 0.7	23
G	0.0 - 0.5	0.41

TABLE 2-10

VERTICAL EXTENT OF AROCLOR CONTAMINATION IN SUMP 3

Sump Boring #1		Sump Boring #2		Sump Boring #3	
Depth[1/]	Concentration[2/]	Depth	Concentration	Depth	Concentration
0-1	0.2	0-1	176.5	0-2	94.8
1-2	92.1	1-2	49.7	2-4	NA
2-4	NA[3/]	2-4	1.1	4.5-6.5	49.7
4-6	0.1	4-6	1.2	6.5-8.5	5.2
6.4-8.4	0.1	6.4-8.4	NA	8.5-10.5	0.8
		8.4-10.4	0.2		

1/ Depth in feet below the sump bottom.
2/ Aroclor 1248 in micrograms per gram.
3/ Not analyzed.

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Soil samples were also collected in December 1987 as a fourth sampling event (LBG report, 1988) and analyzed for PCBs only. The results, are included on Figure 2-6.

2.3 PRELIMINARY RISK ASSESSMENT

This section presents a preliminary assessment of public health risks associated with the site. It is based upon information related to site history, hydrogeology, land use, demography, contaminant type and distribution.

2.3.1 Sources of Contamination

Past investigations of the contamination at the site have indicated the presence of:

(1) Volatile and Semi-volatile organics in groundwater and soil samples onsite;

(2) Heavy metals in groundwater samples onsite;

(3) PCB in soil samples within the site boundary, and at especially high concentrations in front (southeast) of the Pilot Plant.

The apparent sources of this contamination include past waste storage and handling practices, the discharge of process water into unlined sand sumps, and the accidental release of PCB's from the heating system of the Pilot Plant. In addition, PCE and TCE detected in the groundwater may be from off-site as well as on-site sources. If anaerobic degradation of the PCE is occurring, it may be degrading to its daughter products including TCE, trans 1,2-dichloroethene, cis 1,2-dichloroethene, vinyl chloride, and 1,1-dichloroethene.

2.3.2 Potential Exposure Pathways

Groundwater: The contaminants associated with the wastes disposed of in the sand sumps, and the contaminants in surface soil resulting from spills have the potential of reaching the groundwater and contaminating the sole source aquifer. The aquifer is used as a public water supply downgradient from the site. This water could become contaminated by discharges from the site. Past groundwater data within the site boundary have shown the presence of various contaminants (Section 2.2.4.2) at levels which exceed the New York State Groundwater Standards. Additional monitoring wells will be installed on-site. Groundwater sampling will be conducted on new on-site wells in addition to existing on-site and off-site wells to evaluate this potential exposure pathway.

Surface Water: There are no surface water bodies in the vicinity of the site. Runoff from on-site storm drains is discharged into infiltration basins and percolates to the groundwater. As part of the RI, surface water in the sumps will be sampled to identify contaminants that have the potential to infiltrate to the groundwater.

Soil: Past soil investigations have collected very limited chemical data except for data on PCBs. PCBs were detected primarily in soil samples in the pilot plant area (Figure 2-6). However, high levels of PCBs were also found in a sample from the boring at Well GW05. The major contaminant detected in soil samples from sand sumps was tetrachloroethylne. In this RI, soil samples will be taken and the potential for contaminated soil to act as a source of groundwater, surface water and air pollution will be addressed.

Air: Since volatile organics and PCB were detected in soil on site, workers and residents nearby could also be exposed to volatile organics vaporized from contaminated soil particularly in the PCB spill area. Since not all PCB contaminated areas are paved, workers onsite and residents nearby could also be exposed to PCBs (and other contaminants, if present) adsorbed on resuspended airborne surface soil particles. No air sampling has been conducted at this site to date. In the first phase of the RI, if volatile organics are detected in the near surface soil samples, their ambient concentrations will be measured by air sampling. Also, the concentration of PCB and other contaminants (if present) adsorbed on resuspended airborne surface soil particles will be measured by sampling of particulates in the PCB spill area.

2.3.3 Preliminary Exposure Assessment

Based on the potential exposure pathways identified in Section 2.3.2, and the result of previous chemical analyses, no emergency remedial action is indicated. A detailed public health risk assessment will be performed in the RI and various remedial alternatives will be evaluated.

2.3.4 Preliminary Environmental Assessment

Since the site is situated in an industrial area, and there are no surface water bodies or sensitive areas nearby, environmental assessment will not be performed. However, if during the conduct of the RI and public health evaluation, environmental risks are identified they will be evaluated. The risk assessment to be performed is described in Section 4.6.

2.3.5 Review of Existing Data

Based on the potential exposure pathways at the Hooker/Ruco site, as described in Section 2.3.2, and a review of the existing data base, the following data gaps and problems with the data base, in terms of characterizing contamination in the study area are:

- Groundwater Pathways: The data indicate that TCE, PCE, vinyl chloride, 1,2-Trans-DCE, and cadmium were present in the groundwater on site during previous sampling activities. However, the parameters in the analytical testing program were very limited, including only 7 volatile organic compounds, 7 extractables, PCBs, and 6 metals. It is possible that other contaminants are also present. The potential presence of other contaminants is supported by the many unidentified peaks in the GC analysis and tentatively identified compounds at GW03, GW05 and GW06. An additional indication of other potential contamination is supported by the high C.O.D. levels reported for Well GW06s in the second round of sampling. C.O.D. and levels of volatile contaminants usually follow similar trends. In addition, sample holding times were not observed in the first round of analyses. Therefore, reported values for the contaminants measured in the first round should be considered only as estimates, probably lower than actual values.

  In addition to the uncertainties in the chemical data, there are uncertainties in the groundwater flow rates and directions in the vicinity of the site. Some maps, such as those prepared by LBG, generally show flow to the south-southwest, while others, such as unpublished draft USGS maps, indicate flow in a southerly direction.

- Soil Pathways:

  There is very little soil data for the site. Except for PCBs, soil analyses were performed only during the first round of sampling. Parameters monitored within the soil samples were limited and sample holding times were not observed during the first round of analyses. Moreover, the EP toxicity extraction procedure was used for soil contaminants characterization in the first round of sampling. Generally, EP toxicity method is used for analysis of potential leachate from soil. It is not the method used for soil contaminants identification. Finally, the detection limits for volatile organics in soil were high. The reported values for the soil contaminants (except PCBs) therefore, are questionable.

- Air Pathways:

  There are no data providing an estimate of the level of contamination in the air (volatile organics or resuspended particulates) based either on actual measurements or estimates derived from modeling the resuspension of contaminated soils at the site.

3.0 SCOPING OF THE RI/FS

Ebasco has developed a two-phased approach to performing a Remedial Investigation (RI) and Feasibility Study (FS) for the Hooker/Ruco site and potentially affected areas. Phase I will evaluate on-site sources of contaminants, types and concentrations of contaminants present, groundwater flow directions and a preliminary evaluation of the extent of contamination, off-site. Phase II will further evaluate the on-site sources (if necessary), the extent of contamination off-site, aquifer properties in contaminated areas, and the properties of the contaminants which may affect the remedial alternatives available. This could include treatability or bench scale testing of remedial technologies.

The following subsections identify the remedial objectives of the RI/FS for the Hooker/Ruco site (Section 3.1); identify remedial alternatives potentially suitable to the Hooker/Ruco site conditions (Section 3.2); provide a listing and discussion of Applicable or Relevant and Appropriate Requirements (ARARs) (Section 3.3) and; summarize the data needed (Section 3.4) and list the data quality objectives (DQOs) (Section 3.5).

3.1 RI/FS OBJECTIVES

The scope of the RI/FS program must be considered in relation to the objectives of the RI/FS. The objectives are determined by understanding the potential risks posed by the site, the environmental setting, and the history of the site. These were each described in Section 2. In summary, Ebasco's basic understanding of the problem to be evaluated as part of the work assignment is as follows:

- o In the past, operations at the Hooker/Ruco site allowed significant discharge of waste liquids into its on-site sumps which drained to the Magothy aquifer. The liquids likely contained various organic compounds, including vinyl chloride, as well as other organic and inorganic compounds including barium and cadmium. The possibility exists that these contaminants have drained to the Magothy aquifer and are migrating away from the site. We recognize, however, that there are other potential sources of contamination which may be contaminating the aquifer.

- o During site operations, PCBs were released to surface soils from a reactor heating system which was operated at the Pilot Plant. The extent of the PCB spill has been partially characterized during prior site investigations.

- If contaminants are migrating in the groundwater, they may impact use or potential use of the groundwater.

In order to evaluate these potential problems, Ebasco has identified the following objectives for performing this RI/FS.

- Perform a Phase I RI focusing on the extent of contaminants still present on the Hooker/Ruco site, but also incorporating limited data collection in surrounding areas to confirm groundwater flow direction(s), identify chemical(s) which may be originating from the site as well as other sources in the area.

- Obtain validated chemical data using standardized data collection and analytical techniques.

- If groundwater contamination potentially attributable to the site is detected in the Phase I RI, perform a Phase-II RI to evaluate the areal extent of contaminant migration. Based on the data, a quantitative evaluation of risk should also be performed.

- Perform a feasibility study to evaluate cost effective remedial alternatives which protect public health and the environment. The feasibility study will evaluate the need for and the effectiveness of the alternatives taking into account site-related conditions and risks.

3.2 PRELIMINARY IDENTIFICATION OF REMEDIAL ALTERNATIVES

As was discussed in Section 2.3.4, the limited groundwater and soil chemical analyses from previous investigations has resulted in the formation of a database which is inadequate to accurately define the threat to public health and the environment. Based upon the historic production operations at the site and the discharge of process wastewater to the recharge basins around the site, the soil in the vicinity of the recharge basins and groundwater downgradient of the recharge basins may be contaminated with chemicals associated with the production operations. The historic releases of the heating fluid from the reactors located in the Pilot Plant building resulted in the soils in the vicinity of this building being contaminated with PCBs.

3.2.1 Remedial Response Objectives

Several preliminary remedial response objectives may be formulated based upon the preliminary Risk Assessment and previous site investigations. After the additional data from the RI/FS study are gathered and evaluated, these preliminary remedial response objectives will be refined and further developed or will be eliminated, as appropriate. Attainment of the RI objectives will provide a basis for the evaluation of these preliminary remedial response objectives. For example, if the extent to which natural or man-made barriers contain contaminants and the adequacy of the barriers are assessed, the potential for direct contact with the contaminants can be addressed. Other RI objectives, including an assessment of contaminant distribution and migration, will assist in defining the risks associated with direct contact with site-related contaminants.

On the basis of the existing data, preliminary remedial response objectives have been identified to mitigate risks associated with the site. These objectives include:

- Minimizing human exposure to contaminants that may be present in soil;
- Minimizing human exposure to contaminants that may be present in groundwater;
- Preventing environmental impacts due to the off-site migration of contaminants via groundwater flow; and
- Assuring that site conditions and remedies meet the ARARs.

3.2.2 Remedial Response Actions and Alternatives

To meet the above preliminary remedial response objectives, a set of general response actions have been identified. These general response actions fall into the following categories:

- Source control actions;
- Migration control actions; and
- No action.

A preliminary list of remedial technologies/alternatives that addresses these actions is identified and discussed in the following paragraphs and are summarized in Tables 3-1 and 3-2.

No Action

The no action alternative will be evaluated to provide a comparative basis for other remedial alternative evaluations.

TABLE 3-1

PRELIMINARY IDENTIFICATION OF REMEDIAL TECHNOLOGIES/ALTERNATIVES FOR CONTAMINATED GROUNDWATER

RESPONSE ACTION	REMEDIAL TECHNOLOGIES	CONTROLLING FACTORS
No Action	o Groundwater Monitoring o Institutional Controls	o Risk Assessment
Containment	o Installation of a capping System o Groundwater Diversion	o Contaminant Characteristics o Geohydrologic Conditions
Groundwater Pumping, Treatment, and Disposal	ON-SITE o Volatile Organics - Air or Steam Stripping - Carbon Adsorption	o Groundwater Characteristics
	o Semi-Volatile Organics (if any) - Carbon Adsorption - Aerobic Biological Degradation - Chemical Oxidation - Reverse Osmosis	o Groundwater Characteristics
	o Metals (if any) - Ion Exchange - Chemical Precipitation - Reverse Osmosis	o Groundwater Characteristics
	OFF-SITE o Treatment Options Same as Above	o Groundwater Characteristics
	DISPOSAL o Recharge Basins o Groundwater Injection o Sanitary Sewer	o Regulatory Requirements, Groundwater Characteristics, and Treatment Facility Limitations

TABLE 3-2

PRELIMINARY IDENTIFICATION OF REMEDIAL TECHNOLOGIES/ ALTERNATIVES FOR CONTAMINATED SOIL

RESPONSE ACTION	REMEDIAL TECHNOLOGIES	CONTROLLING FACTORS
No Action	o Groundwater Monitoring o Institutional Requirements	o Risk Assessment
Containment	o Installation/Maintenance of Capping System	o Risk Assessment, Contaminant Characterization
	o Impermeable Barriers - Grout Curtains and Bottom Sealing	o Geohydrologic Conditions, Contaminant Characterization
Excavation, Treatment and Disposal	ON-SITE o Volatile Organics - Mechanical Aeration - Incineration	o Soil and Contaminant Characteristics
	o Semi-Volatile Organics (if any) - Soil Washing - Incineration - Stabilization/Solidification	o Soil and Contaminant Characteristics
	o Metals (if any) - Soil Washing - Chemical Fixation - Stabilization/Solidification	o Soil and Contaminant Characteristics
	o Polychlorinated Biphenyls (PCBs) - Incineration - KPEG	o Soil and Contaminant Characteristics
	IN SITU	
	o Vitrification	o Soil and Contaminant Characteristics
	o Enhanced Flushing	o Soil and Contaminant Characteristics, Geohydrologic Conditions
	OFF-SITE	
	o Similar to On-Site Treatment	o Soil and Contaminant Characteristics

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TABLE 3-2 (Cont'd)

PRELIMINARY IDENTIFICATION OF REMEDIAL TECHNOLOGIES/
ALTERNATIVES FOR CONTAMINATED SOIL

RESPONSE ACTION	REMEDIAL TECHNOLOGIES	CONTROLLING FACTORS
Excavation, Treatment and DISPOSAL (Cont'd)	DISPOSAL - ON-SITE	
	o May be used as Fill On-Site After Treatment	o Risk Assessment, Regulatory Requirements
	DISPOSAL - OFF-SITE	
	o Landfill (RCRA or other)	o Available Space, Regulatory Requirements
	o Incineration	o Contaminant Characteristics, Regulatory Requirements

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The no action alternative means that remedial actions for soil or groundwater containment or treatment would not be implemented. The no action alternative would include public health and environmental evaluations (including risk assessment), maintenance of existing capping (i.e., pavement), long-term groundwater monitoring, and institutional control (e.g., prohibit the use of private well water for drinking and/or irrigation purposes).

Containment

Containment alternatives may include technologies which attain:

- o Isolation of the contaminated soil from contact with rainfall runoff or groundwater through the use of impermeable barriers and/or caps; or

- o Diversion of groundwater from contact with contaminated soil.

Due to the thickness of the Magothy aquifer (greater than 600 feet) and the location of the Raritan clay (greater than 600 feet below grade) in the vicinity of the site, an impermeable barrier system would likely consist of grout curtains and bottom sealing. Bottom sealing would be accomplished through the injection of grout below areas of the site which exhibit soil contaminants (e.g., recharge basins historically used for the discharge of process wastewaters) to form, in effect, a horizontal grout curtain. If this type of technology is utilized, measures must be taken to control the "bathtub effect" which could result.

Groundwater Treatment and Disposal

The analytical results from previous investigations (LBG, 1984 and 1985) show a slight decrease in the levels of volatile organic contaminants detected in the groundwater from 1984 to 1985. It is unclear based on the information available whether a contaminant plume resulting from disposal practices on the site has migrated off site (downgradient) or if other conditions exist, which include other industrial sources in the area, which have contributed to the contamination of groundwater. In addition, USGS groundwater monitoring data have revealed that groundwater in the vicinity of the site has been contaminated with PCE, TCE, and DCE.

In light of the limited number of samples and chemical parameters analyzed during the previous investigations, there is an insufficient database from which to identify and evaluate remedial technologies. As part of the full TCL analyses to be performed during this RI/FS, it is anticipated that contaminants, other than those previously detected, will be identified. Therefore, preliminary remedial technologies for groundwater treatment have been identified addressing groups of chemical contaminants (see Table 3-1).

Contaminated groundwater at the site may readily be pumped and treated on site. For volatile organic contaminants already identified, air or steam stripping and carbon adsorption have been identified. For the treatment of semi-volatile organics, carbon adsorption, aerobic biological degradation, chemical oxidation (e.g., ozonation, hydrogen peroxide) and reverse osmosis have been identified. Groundwater contaminated with metals may be treated utilizing ion exchange, chemical precipitation, or reverse osmosis. The selection and evaluation of these and other technologies will be dependent upon the level of contaminants detected in the groundwater, site-limiting characteristics, and inherent limitations of the technologies with respect to effectiveness, implementability and cost. Disposal of the treated groundwater may be accomplished via recharge basins, groundwater injection, or to the sanitary sewer (where boiler blowdown water is currently discharged).

Soil Treatment and Disposal

The contaminated soil at the site may be handled by:

- Excavation, on-site treatment and disposal;
- Excavation, off-site treatment and disposal; or
- In situ treatment.

These technologies would entail treatment of contaminated soils to reduce or eliminate the associated potential risks to public health and the environment.

Previous investigations (LBG, 1984 and 1987) have revealed extensive soil contamination with PCBs in the vicinity of the Pilot Plant building. Since many of the soil samples had PCB concentrations at levels greater than 1,000 ppm, incineration may be a viable technology. The KPEG (Potassium hydroxide and polyethylene glycol) technology has been used in the treatment of PCB contaminated soils and has also been identified as a potential remedial technology. Due to the extent of the previous investigations and the Phase I RI activities identified in this area, it is conceivable that the Pilot Plant spill area may be remediated as the first operable unit for the site, apart from the overall site remediation. (If, however, the sampling to be conducted during the Phase I RI does not define the horizontal and vertical extent of PCB contamination, additional investigations (Phase II) will be required and this area will be included as part of the overall FS for the site). As PCBs were the only analyte analyzed for in this area, other contaminants may be present in the soils. The full TCL analyses of the soil samples to be collected in this area will complement the existing database and, based upon the types and levels of contaminants detected and the site characteristics, technology evaluations can be performed.

As previously discussed, there is an inadequate database with which to evaluate remedial technologies. Preliminary remedial technologies for treating contaminated soil have been developed based upon chemical classes (see Table 3-2), and may be modified or eliminated based upon the RI findings. For soils contaminated with volatile organics, mechanical aeration and incineration have been identified. Mechanical (thermal) aeration involves the contact of clean air with heated contaminated soils to transfer the volatile organics from the soil into the air system. Depending upon the concentrations of contaminants, the air stream could be combusted in an afterburner or passed through activated carbon for air pollution control. Soil incineration is a process in which one of a number of thermal technologies is utilized to accomplish different phases of thermal reactions leading progressively to complete oxidation of organic substances.

Treatment of soils contaminated with semi-volatile organics may be accomplished via soil washing, incineration, or chemical fixation. Soil washing involves both chemical and physical processes. The chemical process applies solvent extraction methodologies to remove contaminants, including organics and metals, from the soil. Physical processes may include classification of the contaminated soil prior to extraction, removal of excess moisture from the treated soil after extraction, and recovery of the spent solvent. The wastewater generated from soil washing can be treated in a similar manner to the contaminated groundwater discussed above. Chemical fixation involves the addition of siliceous material combined with setting agents such as lime or cement resulting in a stabilized and solidified product. Commercial proprietary fixation agents and processes can be used for both inorganic and organic contaminated soils.

Treatment for soils contaminated with metals may be accomplished via soil washing or chemical fixation.

Technologies capable of treating contaminated soil in place have been considered. These technologies include enhanced soil flushing and vitrification.

The in situ soil vitrification technology uses an electric current passed between electrodes placed in the ground to convert soil and contaminants into a stable glass material. Heat from the electric current decomposes organic matter, and solubilizes and encapsulates metallic and other inorganic materials in the vitrified mass. When the electric current ceases, the molten mass cools and solidifies. The gas generated from vitrification can be further combusted in an afterburner for air pollution control. Any wastewater generated from scrubbing gaseous emissions can be treated in the groundwater treatment system.

Enhanced soil flushing is the in-place washing of contaminants from the soil with a suitable solvent, such as water, or a surfactant solution. The contaminated elutriate is pumped to the surface for removal or on-site treatment and reinjection. Steps must be taken (i.e., containment) to ensure that the contaminated elutriate can be recovered.

All of the above referenced remedial technologies and any others which will be identified after the site conditions are more fully characterized will be screened during the FS. In general, remedial technologies will be screened by site-limiting characteristics, waste-limiting characteristics, and inherent limitations of the technologies with respect to effectiveness, implementability and cost.

3.3 DETERMINATION OF APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

This section provides a preliminary determination of the Federal and New York State environmental and public health requirements that are applicable or relevant and appropriate to the Hooker/Ruco site and the extent to which other Federal and State criteria, advisories and guidance could be used for evaluating the remedial alternatives.

3.3.1 Determination of ARARs

The requirements preliminarily identified below have been categorized as "applicable or relevant and appropriate," requirements and "to be considered" material, based upon EPA post-Superfund Amendments and Reauthorization Act of 1986 (SARA) interim guidance that addresses development and utilization of ARARs (52 Federal Register 32496, August 27, 1987 and OSWER Directives). ARARs and "to be considered" material are used primarily during the Feasibility Study to evaluate the remedial alternatives during initial screening and detailed evaluation.
SARA defines an ARAR as:

- any standard, requirement, criterion, or limitation under any federal environmental law; and

- any promulgated standard, requirement, criterion, or limitation under a State environmental or facility siting law that is more stringent than any federal standard, requirement, criterion, or limitation.

The purpose of this definition is to make CERCLA responses consistent with both Federal and State environmental requirements.

Within these jurisdictional boundaries, ARARs are further defined according to the activity, contaminants, or location they are expected to effect. ARARs that relate to the level of pollutant allowed are called contaminant-specific; ARARs that relate to the presence of a special geographic or archeologic area are called location-specific; and ARARs that relate to a method of remedial response are called action-specific.

3.3.2 Consideration of ARARs During the RI/FS

Specifically, ARARs will be considered at six key intervals.

(1) Scoping of the RI/FS. Identify chemical-specific and location-specific ARARs on a preliminary basis.

(2) Site characterization phase of the Remedial Investigation, when the public health evaluation is conducted to assess risks at a site. Identify the chemical-specific ARARs and "to be considered" material and location-specific ARARs more comprehensively and use them to help determine the cleanup goals.

(3) Development of remedial alternatives in the Feasibility Study. Identify action-specific ARARs for each of the proposed alternatives and consider them along with other ARARs and "to be considered" material.

(4) Detailed analysis of alternatives. Examine all the ARARs and "to be considered" material for each alternative as a package to determine what is needed to comply with other laws and be protective.

(5) Selection of remedy. The alternative selected must be able to attain all ARARs unless one of the six statutory waivers is invoked.

(6) Remedial design. Ensure that the technical specifications of remedy construction attains ARARs.

Primary consideration should be given to remedial alternatives that attain or exceed the requirements found in ARAR regulations. Note that as the RI/FS process continues, more ARARs will be considered and utilized, particularly as guidances are issued by the State of New York.

The conclusions on ARARs reached at these intervals will be used as a guide to evaluate the appropriate extent of site cleanup; to aid in scoping, formulating and selecting proposed treatment technologies; and to govern the implementation/operation of the selected action. At each interval, ARARs are identified and utilized by taking into account the following:

- o contaminants suspected to be at the site;
- o chemical analyses to be performed;
- o types of media to be sampled;
- o geology and other site characteristics;
- o use of the resource/media;
- o level of exposure and risk;
- o potential transport mechanisms;
- o purpose and application of the potential ARARs; and
- o remedial alternatives that will be considered for the site.

3.3.3 Preliminary Identification of ARARs for the Hooker/Ruco Site

3.3.3.1 Potential Applicable or Relevant and Appropriate Requirements

The National Contingency Plan (NCP) and the SARA/CERCLA Compliance Policy guidance define applicable requirements as the Federal and State requirements for hazardous substances, which would be legally binding at the site, if site response were to be undertaken regardless of CERCLA Section 104. Relevant and appropriate requirements are defined as those Federal and State requirements that, while not applicable, are designed to apply to similar problems to those encountered at this site that their use is well suited. In other words requirements may be relevant and appropriate if they would be applicable except for jurisdictional restrictions associated with the requirement. With respect to the selection of remedial alternatives, relevant and appropriate requirements are to be afforded the same weight and consideration as applicable requirements. The following Federal and New York regulatory requirements are potentially applicable or relevant and appropriate to the Hooker/Ruco site:

1) Contaminant-Specific

Federal

- RCRA Groundwater Protection Standards (40 CFR 264, Subpart F)
- Clean Water Act, Water Quality Criteria (Section 304)
- Safe Drinking Water Act, National Primary Drinking Water Regulations, Maximum Contaminant Levels (MCLs) (40 CFR 141.11-141.16)
- TSCA PCB Spill Cleanup Policy (40 CFR Part 761)

State of New York

- New York Public Water Supplies Requirements, Maximum Contaminant Levels (MCLs) (10 NYCRR 5-2)
- New York Standards for Raw Water Quality (10 NYCRR 170.4)
- New York Standards for Protection of Human Health and Potable Water Supplies (6 NYCRR 701)
- New York State RCRA Groundwater Protection Standards. Maximum Concentration Limits (MCLs) (6 NYCRR 373-2.6)
- New York State Pollutant Discharge Elimination System (SPDES) standards/limitations (Article 7 of ECL, 6 NYCRR 750-758)
- Actual Standards/Limitations of a New York State Pollutant Discharge Elimination System (SPDES) permit
- New York Groundwater Quality Standards (Article 17 of ECL, 6 NYCRR 703)

The TSCA PCB Spill Cleanup Policy, which controls the cleanup of spills resulting from the release of materials containing PCBs at concentrations equal to or greater than 50 ppm, is a potential contaminant-specific ARAR at Hooker/Ruco pending further EPA direction. The following factors argue against using the PCB Spill Cleanup Policy as the only ARAR for PCB cleanup.

- The policy applies only to spills occurring after May 4, 1987 (40 CFR Part 761.120(a)(1)). EPA reasons that existing spills (i.e., those that occurred before, but may involve more pervasive PCB contamination than fresh spills and, therefore, may be more difficult to cleanup;

- The rule states that the TSCA spill cleanup standards do not affect CERCLA Section 121, Clean Water Act, or RCRA cleanup standards existing or under development. In other words, the TSCA spill cleanup standards do not obviate the need, as specified under CERCLA, to consider other requirements or factors in determining appropriate remedial actions.

  EPA explains that the spill clean up policy was designed to address electrical equipment spills containing PCBs. Based on different types of PCB spills and magnitudes of exposure, CERCLA responses may need to consider different cleanup levels; and

2) <u>Location-Specific</u>

<u>Federal</u>

- Safe Drinking Water Act: Sole-Source Aquifer Requirements (Section 1424(e)) (40 CFR 149)

- New York Coastal Zone Management Act

<u>State of New York</u>

- New York SPDES Discharge Groundwater Effluents Standards for Nassau/Suffolk Counties

3) <u>Action-Specific</u>

<u>Federal</u>

- RCRA Hazardous Waste Treatment Facility Standards (landfill, surface impoundments, tanks, containers) (40 CFR 264 and 265)

- RCRA Subtitle C and Subtitle D, Hazardous and Non-Hazardous Waste Management Standards (40 CFR 257, 260-270)

- RCRA Closure and Post-Closure Standards (40 CFR 264, Subpart G)

- RCRA Groundwater Monitoring and Protection Standards (40 CFR 264, Subpart F)

- TSCA, PCB Disposal and Storage Requirements (40 CFR 761 Subpart D)

- Safe Drinking Water Act, Underground Injection Control Requirements (40 CFR 144 and 146)

- RCRA Land Disposal Restrictions (40 CFR 268) (On and offsite Disposal of Excavated Soil)

- Clean Water Act, as amended - NPDES permitting requirements (40 CFR 122-125)

- DOT Rules for Hazardous Materials Transport (49 CFR 107, 171.1-171.500)

- Health and Safety Standards for Federal Service Contracts (29 CFR 1926)

- Occupational Safety and Health Standards for Hazardous Responses (29 CFR 1904, 1910)

State of New York

- New York's General Prohibitions for Air Emissions (6 NYCRR Part 211) (Fugitive Dust Generated During Building Decontamination/Razing, Cap Construction, or implementation of other remedy)

- New York State Effluent Standards/Limitations for Discharges to Water (6 NYCRR 703)

- New York SPDES Discharge to Groundwater Requirements (6 NYCRR 754)

- New York Discharge to Surface Water Requirements (6 NYCRR 754)

- New York RCRA-equivalent Hazardous Waste Management Regulations (6 NYCRR 370)

3.3.3.2 Potential "To Be Considered" Material

When ARARs do not exist for a particular chemical or remedial activity or when the existing ARARs are not protective of human health or the environment, other criteria, advisories and guidance may be useful in designing and selecting a remedial alternative. The following criteria, advisories and guidance were developed by EPA, other Federal agencies and the State of New York.

1) Federal

- Safe Drinking Water Act National Primary Drinking Water Regulations, Maximum Contaminant Level Goals (MCLGs)

- Proposed Maximum Contaminant Levels (50 Federal Register 46902-46933, November 13, 1985)

- Proposed Maximum Contaminant Level Goals (50 Federal Register 46936-47022, November 13, 1985)

- USEPA Drinking Water Health Advisories

- USEPA Health Effects Assessment (HEAs)

- TSCA Health Data

- Toxicological Profiles, Draft, Agency for Toxic Substances and Disease Registry, U.S. Public Health Service

- Policy for the Development of Water-Quality-Based Permit Limitations for Toxic Pollutants (49 Federal Register 9016)

- Cancer Assessment Group (National Academy of Science) Guidance

- Groundwater Classification Guidelines

- Groundwater Protection Strategy

- Waste Load Allocation Procedures

- EPA Effluent Limitation Guidelines for Organic Chemical Facilities (40 CFR 414, 416)

2) State of New York

- Underground Injection/Recirculation of Groundwater, Technical Operating Guidance, April 11, 1987.

- New York Department of Health's Proposed Contaminant Levels for Volatile Organics in Drinking Water (Expected Final January 1989)

Table 3-3 summarizes the specific ARARs and "to be considered" material for some compounds.

3.4 DATA NEEDED FOR CHARACTERIZING CONTAMINATION

Based on the potential exposure pathways at the site (Section 2.3.2), and a review of the existing data base, (Section 2.3.4), the data needed for characterizing contamination in the study area are as follows:

- Identification of on-site groundwater contamination by sampling existing and new monitoring wells;

- Survey of nearby off-site wells for location and usage;

- Investigation of off-site groundwater by sampling new or existing off-site wells to delineate the migration of the contaminants.

TABLE 3-3 (Sheet 1 of 3)

WATER QUALITY CONTAMINANT-SPECIFIC REQUIREMENTS (ARARs)

CHEMICAL	SAFE DRINKING WATER ACT AND NYS[f] MCLs (mg/l)	CLEAN WATER ACT Water Quality Criteria for Human Health — Adjusted for Drinking Water Only a/	SAFE DRINKING WATER ACT Health Advisories (mg/l) 1-Day	10-Day	Longer Term	NEW YORK STATE CLASS GA GROUNDWATER STANDARDS Criteria in Milligrams per Liter Unless Otherwise Specified
Acenaphthene		20 ug/l (Organoleptic)[b/]				
Aldrin		0 (1.2 ng/l)				ND
Antimony		146 ug/l				
Arsenic	0.05	(25 ng/l)				0.025
Barium	1.0					1.0
Benzene	0.005[f/]	0 (0.67 ug/l)		0.23	0.07	ND
Beryllium		0 (3.9 ng/l)				
Cadmium	0.01	10 ug/l				0.01
Carbon tetrachloride	0.005[f/]	0 (0.42 ug/l)	0.2	0.02		5 ug/l
Chlordane		0 (22 ng/l)	0.0625	0.0625	0.0075	0.1 ug/l
1,2-Dichloroethane	0.005[f/]	0 (0.94 ug/l)	Insufficient Data			
1,1,1-Trichloroethane	0.005[f/]	19 mg/l			1.0	
1,1,2-Trichloroethane		0 (0.6 ug/l)				
1,1,2,2-Tetrachloroethane		0 (0.17 ug/l)				
Monochloroethane		Insufficient data				
1,1-Dichloroethane		Insufficient data				
1,1,1,2-Tetrachloroethane		Insufficient data				
2,6-Dichlorophenol		0.2 ug/l (Organoleptic)				
2,4,5-Trichlorophenol		2600 ug/l				
2,4,6-Trichlorophenol		0 (1.8 ug/l)				
3-Methyl-4-chlorophenol		3000 ug/l (Organoleptic)				
bis-(2-Chloroethyl) ether		0 (30 ng/l)				1.0 ug/l
bis-(2-Chloroisopropyl) ether		34.7 ug/l				
Chloroform	0.1[d/]	0 (0.19 ug/l)				100 ug/l
2-Chlorophenol		0.1 ug/l (Organoleptic)				
Chlorophenoxys	0.01-.1					
Chromium Cr^{+6}	0.005[f]	50 ug/l				0.05
Copper		170 mg/l				
DDT		0 (1.2 ng/l)				ND
Dichlorobenzenes (all isomers)	0.005[f/]	470 ug/l				4.7 ug/ml
Dichlorobenzidines		0 (20.7 ng/l)				

TABLE 3-3 (Sheet 2 of 3)

WATER QUALITY CONTAMINANT-SPECIFIC REQUIREMENTS (ARARs)

CHEMICAL	SAFE DRINKING WATER ACT AND NYS(f) MCLs (mg/l)	CLEAN WATER ACT Water Quality Criteria for Human Health -- Adjusted for Drinking Water Only a/	SAFE DRINKING WATER ACT Health Advisories (mg/l) 1-Day	10-Day	Longer Term	NEW YORK STATE CLASS GA GROUNDWATER STANDARDS Criteria in Milligrams per Liter Unless Otherwise Specified
Dichloromethane		See Halomethanes	13	1.3	0.15	
2,4-Dichlorophenoxyacetic	0.05					
2,4-Dichlorophenol		3.09 mg/l				
Dichloropropanes	0.005f/	Insufficient Data				
Dichloropropenes	0.005f/	87 ug/l				
Dieldrin		0 (1.1 ng/l)				ND
2,4-Dimethylphenol		400 ug/l (Organoleptic)				
2,4-Dinitrotoluene		0 (0.11 ug/l)				
Endosulfan		138 ug/l				
Endrin	0.0002	1 ug/l				ND
Ethylbenzene	0.005f/	2.4 mg/l				
Fluoranthene		188 ug/l				
Fluoride	1.4-2.4					
Halomethanes		0 (0.19 ug/l)				
Heptachlor		0 (11 ng/l)				ND
Hexachlorobutadiene	0.005f/	0 (0.45 ug/l)				
Lindane (99% gamma-HCH)	0.004					ND
Hexachlorocyclopentadiene		206 ug/l				
Isophorone		5.2 mg/l				
Lead	0.05	50 ug/l				0.025
Mercury	0.002	10 ug/l				0.002
Methoxychlor	0.05f/					35.0 ug/l
Methyl Ethyl Ketone			7.5	0.750		
Naphthalene		Insufficient Data				
Nickel		15.4 ug/l				
Nitrate	10.0					
Nitrobenzene		19.8 mg/l				
Dinitrophenol		70 ug/l				
Mononitrophenol		Insufficient Data				
n-Nitrosodiphenylamine		0 (7.0 ug/l)				
Pentachlorophenol		1.01 mg/l				21 ug/l
Phenol		3.5 mg/l				0.001
Dimethylphthalate		350 mg/l				
Diethylphthalate		434 mg/l				
Dibutylphthalate		44 mg/l				770 ug/l
Di-2-ethylhexylphthalate		21 mg/l				
Polychlorinated biphenyls (PCBs)		0 (12.6 ng/l)	0.125	0.0125		0.1 ug/l
Polynuclear aromatic hydrocarbons (PAHs)		0 (3.1 ng/l)				

TABLE 3-3 (Sheet 3 of 3)

CHEMICAL	SAFE DRINKING WATER ACT AND NYS[(f)] MCLs (mg/l)	CLEAN WATER ACT Water Quality Criteria for Human Health — Adjusted for Drinking Water Only a/	SAFE DRINKING WATER ACT Health Advisories (mg/l) 1-Day	10-Day	Longer Term	NEW YORK STATE CLASS GA GROUNDWATER STANDARDS Criteria in Milligrams per Liter Unless Otherwise Specified
Selenium	0.01	10 ug/l				0.02
Silver	0.05	50 ug/l				0.05
Sulfate						250
Styrene	0.005[f/]					931 ug/l
2,3,7,8-TCDD		0 (0.00018 ng/l)				3.5×10^{-5} ug/l
2,4,5 T-P Silvex	0.01[f/]					
Tetrachloroethylene		0 (0.88 ug/l)	2.3	0.175	0.02	
Thallium		17.8 ug/l				
Toluene	0.005[f/]	15 mg/l	21.5	2.2	0.34	
Toxaphene	0.005	0 (26 ng/l)				ND
Trichloroethylene	0.005[f/]	0 (2.8 ug/l)	2.0	0.2	0.075	
Trihalomethanes (total)[e/]	0.1					
Vinyl chloride	0.002[f/]	0 (2.0 ug/l)				5.0 ug/l
Xylenes	0.005[f/]		12	1.2	0.62	
Zinc		5 mg/l (organoleptic)				5

a/ These adjusted criteria, for drinking water ingestion only, were derived from published EPA Water Quality Criteria (*Federal Register* 45:79318-79379, November 28, 1980) for combined fish and drinking water ingestion and for fish ingestion alone. The adjusted values are not official EPA Water Quality Criteria, but may be appropriate for Superfund sites with contaminated ground water. In the derivation of these values intake was assumed to be 2 liters/day for drinking water and 6.5 grams/day for fish, and human body weight was assumed to be 60 kilograms. Values for bioconcentration factor carcinogenic potency, and acceptable daily intake were those used for water quality criteria development.

b/ Criteria designated as organoleptic are based on taste and odor effects, not human health effects. Health-based Water Quality Criteria are not available for these chemicals.

c/ The criterion for all carcinogens is zero; the concentration given in parentheses corresponds to a carcinogenic risk of 10^{-6}. Water quality criteria documents present concentrations resulting in carcinogenic risks of 10^{-5} to 10^{-7}. To obtain concentrations corresponding to risks at 10^{-4} and 10^{-5}, the 10^{-6} concentration should be multiplied by 100 and 10, respectively. To obtain concentrations corresponding to risks of 10^{-7} and 10^{-8}, the 10^{-6} concentration should be divided by 10 and 100, respectively.

d/ Chloroform is one of four trihalomethanes whose sum concentration must be less than 0.1 mg/l.

e/ Total trihalomethanes refers to the sum concentration of chloroform, bromodichloromethane, dibromochloromethane, and bromoform.

f/ Proposed NYS MCLs are provided where they are more stringent than existing SDWA MCLs. In addition to specific levels shown, all principal organic contaminants have a proposed MCL of 0.005 mg/l.

ND Not Detectable

MCL Maximum Contaminant Level

* Compounds that are suspected contaminants

- Characterization of on-site soil contamination;
- Survey of on-site air contaminant (estimate of concentration of contaminants from soil data).

3.5 DATA QUALITY OBJECTIVES (DQO) DETERMINATION

Data quality objectives are based on the concept that different data uses may require different levels of data quality. Data quality can be defined as the degree of uncertainty in the data with respect to precision, accuracy, and completeness. The five levels of data quality are:

(1) Screening (Level 1): This provides the lowest data quality but the most rapid results. It is often used for health and safety monitoring at the site, preliminary comparison to ARARs, initial site characterization to locate areas for subsequent and more accurate analyses, and for engineering screening of alternatives (bench-scale tests).

These types of data include those generated on-site through the use of HNu, pH, conductivity, and other real time monitoring equipment at the site.

(2) Field Analyses (Level 2): This provides rapid results and better quality than in Level 1. Analyses include mobile-lab generated data.

(3) Engineering (Level 3): This provides an intermediate level of data quality and is used for site characterization. Engineering analyses may include mobile-lab generated data and CLP analytical lab methods (e.g., CLP-SAS with quick turnaround).

4) Confirmational (Level 4): This provides the highest level of data quality and is used for purposes of risk assessment, engineering design, and cost recovery documentation. These analyses require full CLP analytical and data validation procedures.

5) Non-Standard (Level 5): This refers to analyses by non-standard protocols, for example, when exacting detection limits, or analysis of an unusual chemical compound. These analyses often require method development or adaption.

Ebasco will generate confirmational level as well as non-standard level data for the Hooker/Ruco site and study area. These data will be used for the purposes of conducting risk assessments, engineering design, and cost recovery. Field screening (Level I) for health and safety of work crews and the determination of field chemical parameters (i.e., pH, temperature, conductivity) will also be performed. In addition, the soil gas surveys will be performed at Level 2, for rapid data turnaround required to select samples for analysis. The physical property analyses on soil will be performed at Level 3. Level 4 will be used to achieve lower limits of detection for most chemical tests, but Level 5 will be used for volatile organic compounds.

4.0 TASK PLAN FOR THE HOOKER/RUCO RI/FS

Potential sources of groundwater and soil contamination at the Hooker/Ruco site have been identified by Ebasco based on a review of available site literature. Some data on the likely areal extent of soil contamination are available, but the available data on groundwater contamination are very limited and do not allow for a preliminary determination on the areal extent of groundwater contamination associated with the Hooker/Ruco site. To cost effectively verify the extent of soil contamination on the site and groundwater contamination both on and off site, a phased approach to the Hooker/Ruco RI/FS will be utilized.

The initial phase of the RI (Phase I) will focus on evaluating the contaminants present within the site boundaries, verifing contaminant migration from the site, and evaluating the potential hazards posed by the contaminants. The second phase of the RI (Phase II) will focus on identifying the extent of contamination off site.

After Phase I activities are completed, the need for and scope of Phase II investigations will be identified. At that time, this work plan will be revised. Required Phase II activities (if any) will depend on the results of Phase I. Section 4.3.2 briefly describes the activities and scope of the Phase II field investigation program.

Based on the results of the Remedial Investigation, a Feasibility Study will be conducted for the Hooker/Ruco site. This study will consist of four tasks:

Task 9 - Remedial Alternatives Screening;
Task 10 - Remedial Alternatives Evaluation;
Task 11 - Remedial Investigation/Feasibility Study Report;

In addition to these tasks, Task 2 - Community Relations, will be continued during the FS. Community relations activities will be extended through the public comment period and development of the RI/FS report and Record of Decision (ROD), and into the post RI/FS support task, if required. Throughout the FS process, references including the following will be used:

- EPA Guidance on Feasibility Studies Under CERCLA (1985).

- The National Oil and Hazardous Substance Pollution Contingency Plan: Final Rule, NCP (1985), Compendium of Costs of Remedial Technologies at Hazardous Waste Sites (EPA, 1988).

- J.W. Porter's December 1986 and July 1987 Memoranda on "Interim Guidance on Superfund Selection of Remedy".

- Technology-specific guidance and evaluation documents, as appropriate.

The overall objective of the Hooker/Ruco site FS is to develop and evaluate remedial alternatives that allow the EPA to select a remedial action that:

- is protective of human health and the environment;
- is cost-effective;
- attains ARARs; and
- uses permanent solutions or alternative technologies to the maximum extent practicable

4.1 TASK 1 - PROJECT PLANNING

4.1.1 Phase I Project Planning

The scope of the Phase I project planning activities were described in the Work Plan Memorandum for the Hooker/Ruco site, dated February, 1988. The task includes preparation of this Work Plan document, a Field Operations Plan (FOP), a site visit, meetings with EPA, and a review and evaluation of available site data.

The FOP includes three separate sections; the Site Management Plan (SMP), the Field Sampling and Analysis Plan (FSAP) and the Health and Safety Plan (HASP). The FOP will be prepared after EPA and PRP review of the Work Plan. The three sections provide the following information:

- Site Management Plan (SMP): includes a site description; an operations plan outlining site related project organization and responsibilities; the field operations schedule and; site security measures.

- Field Sampling and Analysis Plan (FSAP): includes sampling and analytical objectives; the number, type, and location of all samples to be collected; the quality assurance requirements, which will be in accordance with the Quality Assurance Project Plan for the REM III Program and the most recent EPA requirements; the Brossman Short Form; detailed sampling and analysis procedures (including well installation and equipment decontamination procedures) and; data management elements.

- o Health and Safety Plan (HASP): includes a description of the site and site specific hazards; a hazard assessment; personnel training requirements; monitoring procedures for site operations; safety considerations and clothing to be worn during site operations and; other requirements in accordance with the Health and Safety Plan for the REM III Program.

4.1.2 Phase II Project Planning

After the Phase I Field Investigation, Sample Analysis and Data Evaluation have been completed, planning for Phase II activities will begin.

4.2 TASK 2 - COMMUNITY RELATIONS

REM III community relations staff will assist EPA in preparing and implementing the approved community relations plan for the Hooker/Ruco site.

4.2.1 Community Relations Plan

REM III Community Relations Staff (CRS) will develop a site-specific draft and final Community Relations Plan (CRP) for the Hooker/Ruco site. The CRP will be based on discussions with federal, state and local officials, as well as with interested citizens identified by EPA. Developing this CRP includes:

- o reviewing existing site information;
- o conducting on-site interviews to identify community concerns;
- o conducting REM III administrative tasks necessary for preparing the community relations plan for this site.

4.2.2 Maintain Information Depositories

Information repositories will be established at a public facility. Site information approved for public release will be available for public review.

4.2.3 Develop Community Contacts

Public officials concerned residents and civic organizations will be updated as requested by EPA concerning site activities, schedule changes, major findings during the RI/FS, and unforseen site developments. REM III community relations staff will also assist EPA in the preparation of news releases to the local media concerning significant event during the RI/FS.

4.2.4 Fact Sheets

One fact sheet will be distributed during the remedial investigation and feasibility study (RI/FS) following finalization of the work plan, and a second fact sheet will be distributed at the termination of the feasibility study. The first fact sheet will describe activities conducted or planned as part of the RI/FS and the remaining fact sheet will describe the remedial alternatives considered in the FS.

4.2.5 Community Meetings

REM III community relations staff will assist EPA at two small public group meetings throughout the RI/FS field activities. The purpose of these sessions is to explain Superfund and the RI/FS to concerned citizens and to answer specific questions from Hicksville area residents. REM III community relations staff will provide the following support:

- *Arrange for meeting locations and room setup;*
- Provide information to EPA personnel about possible questions, issues, and concerns citizens have about the project;
- Attend public sessions/meetings; and
- Provide a summary report of issues identified during public sessions with an action list of appropriate EPA follow-up.

The REM III community relations staff will also assist EPA in conducting two public information meetings on the RI/FS for the Hooker/Ruco site. The first meeting will explain Superfund and the RI/FS process and general objectives developed from the work plan. The second meeting will explain results from the remedial investigation and discuss the remedial alternatives analyzed as part of the feasibility study. The following support will be provided as requested:

- logistical support to arrange the public meeting locations and room set up;

- assist EPA and REM III technical staff with a practice run concerning questions that community members may have about the project; and

- preparation of audio visual materials as requested by EPA.

The community relations staff will attend the public information meetings.

4.2.6 Prepare Responsiveness Summary

REM III community relations staff will prepare a Responsiveness Summary following the public comment period on the draft RI/FS report. The Responsiveness Summary will describe the history of community involvement at the site and summarize key community concerns and EPA's responses and will prepare and update the key contacts list. A hard copy of the mailing list will be provided to EPA.

4.2.7 General Support

REM III community relations staff will provide general planning, management, analytic, and coordination support to EPA and REM III technical staff during the community relations activities at the site. This may include: meeting with EPA to discuss planning and scheduling community relations activities, providing information and analysis about concerns expressed by local officials and residents in the area during the development of the revised community relations plan, and coordination with REM III technical staff in the EPA field office set up for this project. For costing purposes, two meetings are planned.

4.3 TASK 3 - FIELD INVESTIGATIONS

Phase I field activities include: preparatory activities (4.3.1), a geophysical survey (4.3.2), a soil gas survey (4.3.3), surface water sampling (4.3.4), surface and subsurface soil sampling (4.3.5), monitoring well installation (4.3.6) monitoring well sampling (4.3.7) hydrogeologic characterization (4.3.8) and air monitoring (4.3.9). Table 4-1 summarizes the sampling to be performed in Phase I. The following subsections outline field activity objectives and rationale. A second phase will be implemented if data from Phase I reveals the need for further investigation, as described in Section 4.3.9.

TABLE 4-1

SAMPLE SUMMARY OF
HOOKER/RUCO PHASE 1 PROGRAM

TYPE	NUMBER OF LOCATIONS	SAMPLES PER LOCATION SOIL	SAMPLES PER LOCATION WATER	TOTAL SAMPLES SOIL[1]	TOTAL SAMPLES WATER[1]
Shallow Wells (<100')					
Existing on-site[4]	6	-	1	-	6
Existing off-site	6	-	1	-	6
New[4]	14	3[B]	1	18	14
Deep Wells (>100')					
Existing on-site[4]	6	-	1	-	6
Existing off-site	1	3[C]	1	24	1
New[4]	8	-	1	-	8
Surface Water (Sumps)	3	-	1	-	3
Water Levels					
New Shallow Piezometers	4				
Deep (from above wells)	15				
Shallow (from above wells)	26				
Soil Borings					
Sumps[3]	13	3[A]	-	39	-
Tank Areas	7	2	-	14	-
Drum Pad Area	8	2	-	16	-
Old Drum Storage Area	4	2	-	8	-
Pilot Plant, PCB Spill	5	2	-	10	-
Sump 1, Old Drainage Line	2	2	-	4	-
TOTAL[2]				137	44

1 All samples to be analyzed for all TCL Parameters plus tentatively identified compounds. Soils will also be tested for MOCA. Water will be field tested for for pH, specific conductance and temperature.
2 Does not include blanks, or duplicates.
3 Two soil samples from each sump (total of 12 samples) will also be tested for organic content, moisture content and cation exchange capacity.
4 Water samples for shallow and deep wells at GW01, GW03 and GW11 will also be tested for BOD, TOC, oil and grease, alkalinity, TSS, TDS, hardness, chloride, sulfate and COD.

A Three is minimum number of samples. Up to 5 samples per location may be taken in sumps 1, 5, 6.

B Soil samples will be taken at 6 shallow well locations. Additional samples may be taken based on contamination observed in the field.

C Additional samples may be taken based on contamination observed in the field.

4.3.1 Preparatory Activities

A secure storage area is required to provide storage of contaminated protective clothing and expendables, well cuttings from the ground water monitoring well installation and soil sampling, and other potentially contaminated materials generated during field investigations. Other preparatory activities include the procurement of subcontractors, obtaining site access and mobilization.

4.3.2 Geophysical Survey

A geophysical investigation consisting of a magnetometer survey will be conducted on site to locate features such as trailers and tanks which are believed to be presently buried on site.

Data will be referenced to a site grid of approximately 50 foot spacing. Stakes or spray paint (paved areas) will be used to mark each grid point. All underground structures detected by the survey will be marked and staked to avoid encountering these structures during soil sampling and monitoring well installations.

The magnetometer survey will be performed along a series of traverses running east-west across two areas of the site (Figure 4-1) where tanks or trailers are believed to be buried. A total of approximately 1700 magnetometer stations will be occupied using a Geometrics G-816 proton precision magnetometer or equivalent. Line spacings, established from the grid points, will be 10 feet apart. Station spacings will be 10 feet along each traverse, and a diurnal (base) station will be occupied at least twice a day to correct for diurnal variation of the earth's magnetic field.

Data generated from the magnetometer survey will be used to locate two proposed soil sampling and monitoring well locations down gradient of the buried tanks. If they are not located, the two sampling points would be deleted. If the tank locations are found during the magnetometer survey, no further survey would be performed.

4.3.3 Soil Gas Survey

To best locate shallow soil and surficial soil sampling locations a soil gas survey will be conducted at all unpaved areas on the site. The soil gas survey will use a real-time reading instrument (either an *HNu PI-101* or a *Foxboro OVA Model 128*) to identify contamination at each sample location. The results of the survey will identify contamination as a total hydrocarbon as either a benzene or methane equivalent. Specific contaminants will not be identified using this method. The method does identify areas where hydrocarbons contamination is present in the soil. If high concentrations are identified then those areas will be sampled for full TCL analysis.

Soil gas samples will be collected using a slam bar to punch a 3 foot vertical hole at each of the sample locations. A Mine Safety Appliance 3 foot perforated sample pipe, or equivalent, will be placed in the hole and used as a sample post. The location will then be surveyed using a Foxboro OVA Model 128, or a HNU System HNU PI-101. A MSA Explosimeter Model 361 should be used when either the OVA or HNu reads greater than 1,000 and 2,000 ppm respectively. Readings from each instrument will be recorded in a field notebook.

The soil gas survey will be performed along a series of traverses running east-west across the site. Measurements will not be taken inside buildings or in paved areas. The spacing between traverses and the measuring points on each traverse will be 50 feet. In areas where a hydrocarbon reading above 0.2 ppm occurs, a second and possibly third soil gas sample will be taken adjacent to the origin. The additional sampling is used to confirm and to determine the areal extent of the contamination. The soil gas survey will give real time data and will require little post-field interpretation. This will assist in locating surficial sampling locations to help best delineate the lateral extent and levels of near surface contamination. In conjunction with these activities, a visual inspection of the site will be conducted to locate and mark any surficial soil staining, or other anomalous conditions that might require further investigation.

4.3.4 Surface Water Sampling

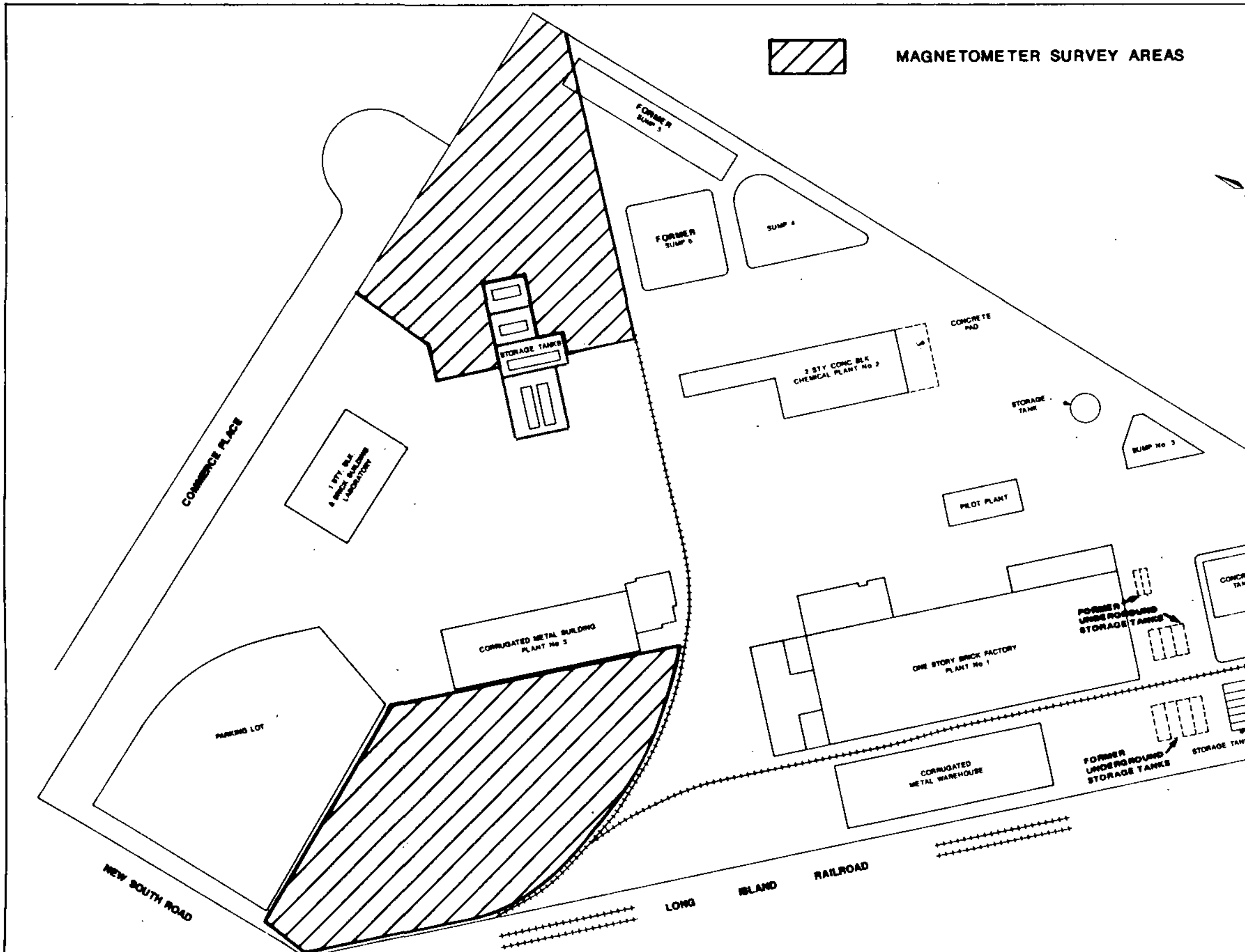
A total of three surface water samples will be collected from the two on-site sumps still containing water, Sumps 3 and 4. Samples will be analyzed for all TCL parameters and up to 30 tentatively identified compounds. Measurements of pH, specific conductance and temperature will be made in the field at the time of sample collection. Data collected will be used to characterize the water currently stored within the lagoons, to evaluate the potential for leaching of contamination in the soil, and to compare the data with that collected from soil and groundwater sampling to help evaluate sources of contamination. Figure 4-2 shows the three sampling locations within the two sumps.

4.3.5 Surface and Subsurface Soil Sampling

Soil samples for analytical testing or geologic characterization will be obtained from 22 soil borings, which will also be completed as monitoring wells; a series of 40 shallow soil borings (5 to 30 foot depth); and approximately 10 surficial soil sampling locations. The three soil sampling programs are described below.

4.3.5.1 Subsurface Soil Sampling (Wells)

A total of 22 borings, each completed as monitoring well, will be drilled on or near the site. The 22 borings will include 14 borings to a depth of approximately 65 feet and 8 borings to a



HOOKER/RUCO SITE
HICKSVILLE, NY
GEOPHYSICAL SURVEY
EBASCO SERVICES INCORPORATED
FIGURE 4-1

depth of approximately 130 feet. Each boring will be completed as a monitoring well. The deep wells will each be adjacent to a shallow well (Section 4.3.6). The boring locations are shown on Figure 4-2 and 4-3 as locations GW07 through GW20. Split-spoon sampling for geologic characterization will be continuous from the surface to a depth of 10 feet and continue at five foot intervals to completion of the boring. Shallow borings adjacent to deep borings do not need to be sampled. Selected soil samples from the borings will be analyzed for MOCA and all Target Compound list (TCL) parameters plus tentatively identified compounds not included in the TCL. (MOCA will be analyzed because it is an animal carcinogen which was used at the Hooker/Ruco site. It is not an usual contaminant such as TCE. If detected, it can be used as a marker for the site). The samples for analytical tests will be taken at the surface (0'-2'), at a depth of approximately 10'-12' and above the water table (approximately 50-52'). A portion of each sample will be tested using a head space analysis and the readings recorded. If elevated (above 5 ppm) HNU or OVA readings are detected or visual observations of stained soil are made while drilling, the extra samples will also be tested.

The drilling technique utilized for the investigation must meet three basic criteria:

i) *Ability to advance the borehole to a minimum depth of* 130 ft.

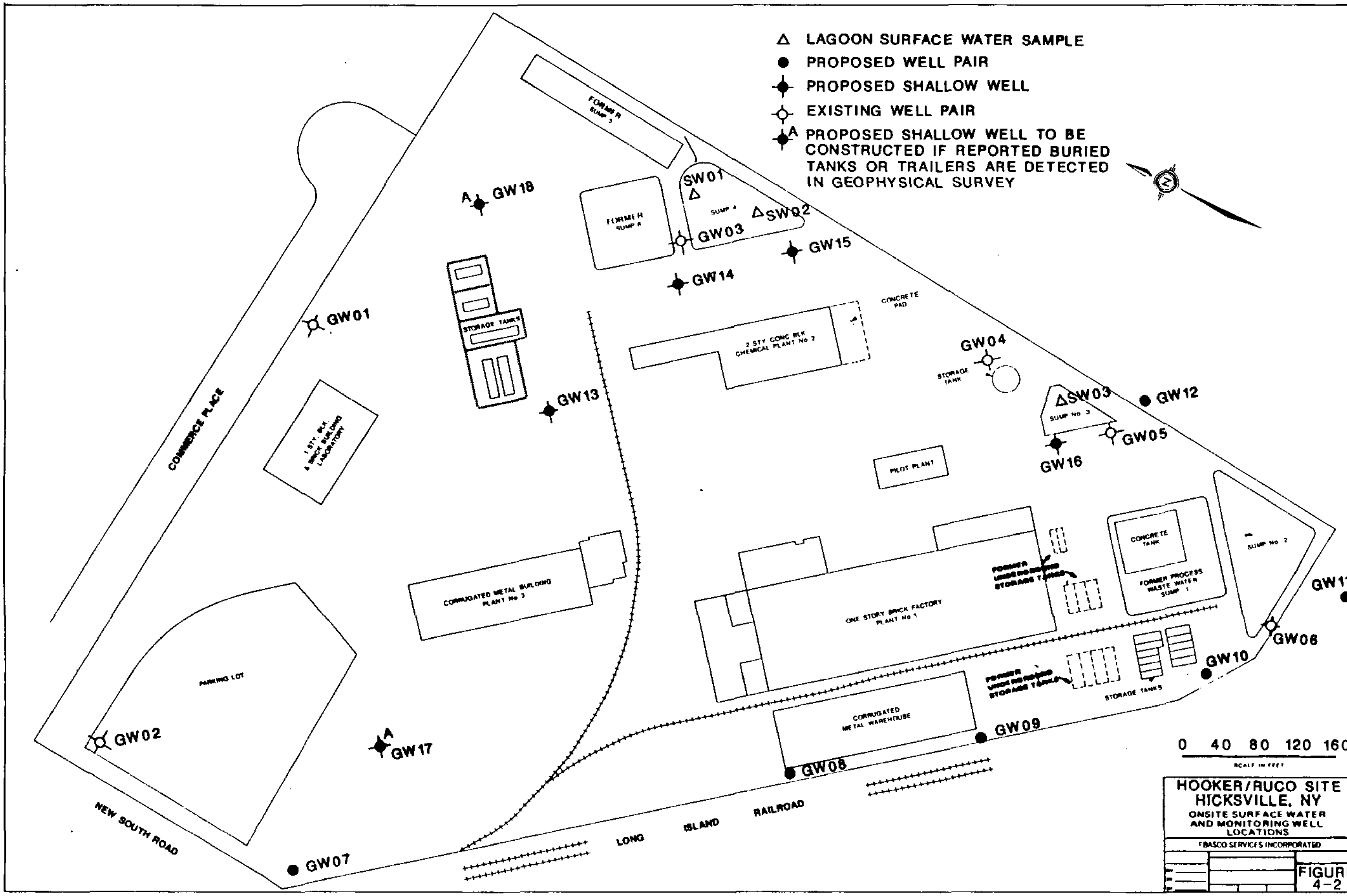
ii) Compatability to monitoring well installation.

iii) Avoidance (if possible) of the introduction of fluids into the boring.

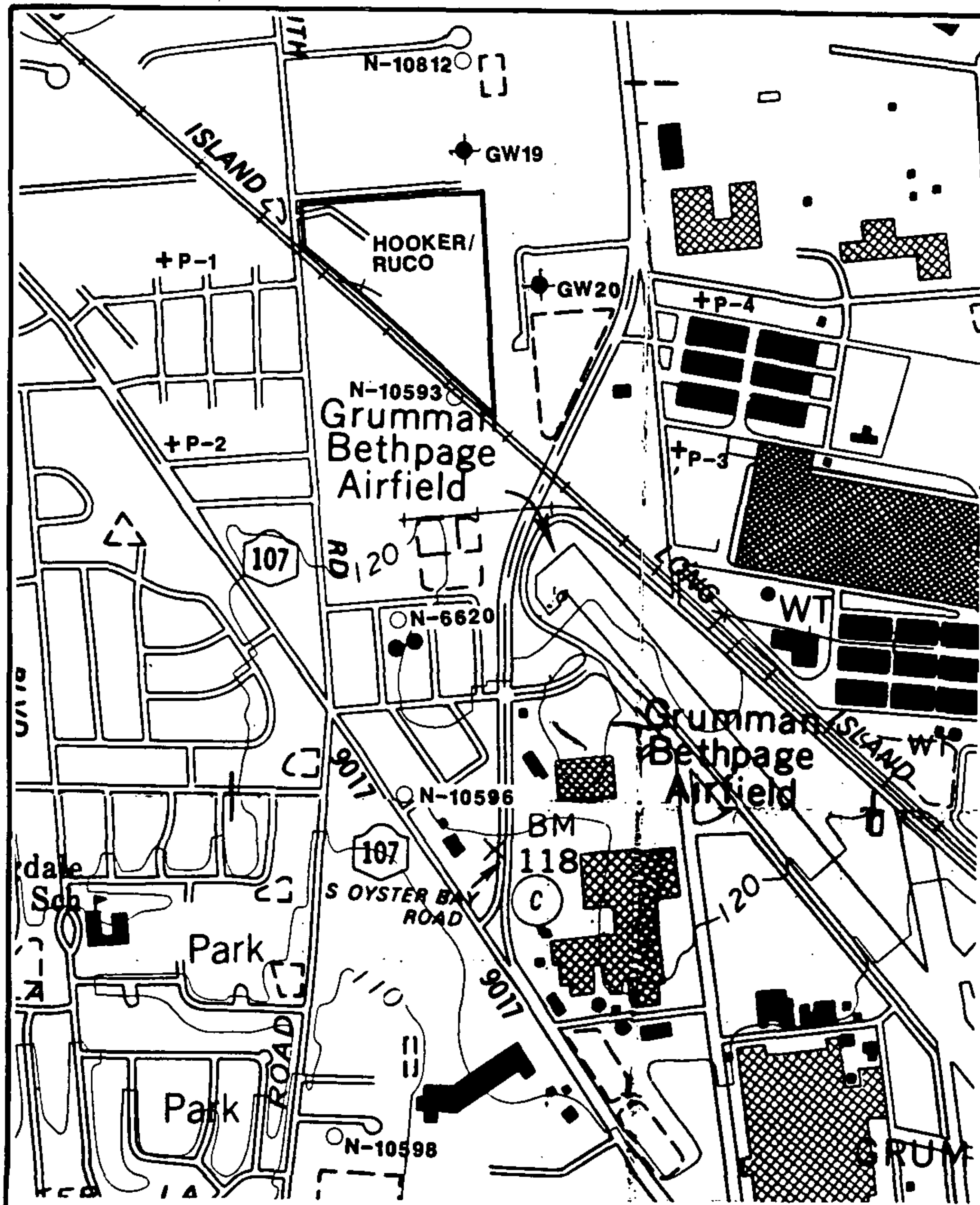
Hollow stem auger (6 inch I.D.) and cable tool drilling (8 inch O.D.) are two acceptable drilling techniques. While cable tool drilling requires the introduction of water into the boring, it is possible that hollow stem auger rigs will not be able to drill to the required depths. Drilling with mud will not be considered acceptable unless running sands are encountered such that the other techniques cannot be successfully used. If mud is used, it must be biodegradable. Three inch diameter split-spoons will be used for the sampling due to the gravelly nature of soils and the use of samples for analytical tests. This will help ensure that an adequate volume of sample is collected. If a sample is to be used for geologic observations only (i.e., samples below the water table) and not analytical testing, a two inch diameter split spoon may be utilized.

4.3.5.2 Subsurface Sampling (Shallow Borings)

In addition to those samples collected from the monitoring well borings, shallow subsurface soil borings will be drilled at 40 on-site locations (Figure 4-4). The borings will vary in depth from 5 to approximately 30 feet. Figure 4-4 also shows the number of samples (two or three) to be obtained for analytical testing at each location. All soil samples to be tested will be



LAGOON SURFACE WATER SAMPLE
PROPOSED WELL PAIR
PROPOSED SHALLOW WELL
EXISTING WELL PAIR
A PROPOSED SHALLOW WELL TO BE CONSTRUCTED IF REPORTED BURIED TANKS OR TRAILERS ARE DETECTED IN GEOPHYSICAL SURVEY
N
FORMER SUMP 5
FORMER SUMP 6
SUMP 4
SW01
SW02
SW03
GW01
GW02
GW03
GW04
GW05
GW06
GW07
GW08
GW09
GW10
GW11
GW12
GW13
GW14
GW15
GW16
GW17
GW18
STORAGE TANKS
CONCRETE PAD
2 STY CONC BLK CHEMICAL PLANT No 2
STORAGE TANK
SUMP No 3
PILOT PLANT
COMMERCE PLACE
1 STY BLK & BRICK BUILDING LABORATORY
CORRUGATED METAL BUILDING PLANT No 3
ONE STORY BRICK FACTORY PLANT No 1
FORMER UNDERGROUND STORAGE TANKS
CONCRETE TANK
FORMER PROCESS WASTE WATER SUMP 1
SUMP No 2
PARKING LOT
CORRUGATED METAL WAREHOUSE
NEW SOUTH ROAD
LONG ISLAND RAILROAD
0 40 80 120 160
SCALE IN FEET
HOOKER/RUCO SITE
HICKSVILLE, NY
ONSITE SURFACE WATER AND MONITORING WELL LOCATIONS
EBASCO SERVICES INCORPORATED
FIGURE 4-2



HOOKER/RUCO SITE BOUNDARY

EXISTING MONITORING WELL

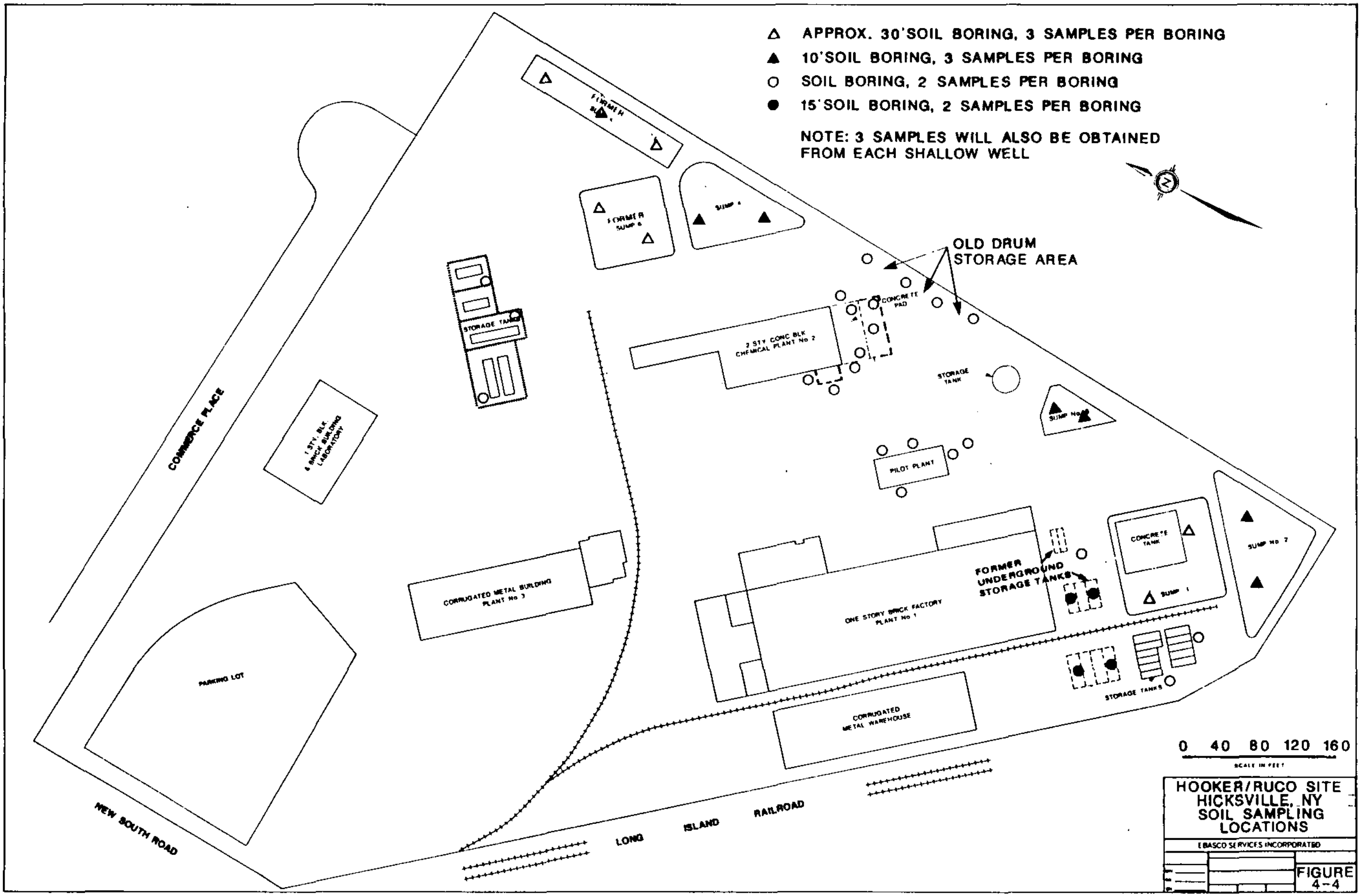
PROPOSED MONITORING WELL (PAIR)

PIEZOMETER

HOOKER/RUCO SITE
HICKSVILLE, NEW YORK

FIGURE 4-3
OFFSITE WELL AND
PIEZOMETER LOCATIONS

EBASCO SERVICES INCORPORATED


APPROX. 30'SOIL BORING, 3 SAMPLES PER BORING
10'SOIL BORING, 3 SAMPLES PER BORING
SOIL BORING, 2 SAMPLES PER BORING
15'SOIL BORING, 2 SAMPLES PER BORING
NOTE: 3 SAMPLES WILL ALSO BE OBTAINED FROM EACH SHALLOW WELL
OLD DRUM STORAGE AREA
FORMER SUMP 6
CONCRETE PAD
2 STY CONC BLK CHEMICAL PLANT No 2
STORAGE TANK
PILOT PLANT
STORAGE TANKS
COMMERCE PLACE
PARKING LOT
CORRUGATED METAL BUILDING PLANT No 3
ONE STORY BRICK FACTORY PLANT No 1
FORMER UNDERGROUND STORAGE TANKS
CONCRETE TANK
SUMP 1
SUMP No 2
CORRUGATED METAL WAREHOUSE
NEW SOUTH ROAD
LONG ISLAND RAILROAD
0 40 80 120 160
HOOKER/RUCO SITE HICKSVILLE, NY SOIL SAMPLING LOCATIONS
EBASCO SERVICES INCORPORATED
FIGURE 4-4

analyzed for MOCA, and all TCL compounds plus the 20 highest non-TCL base neutral/acid compound peaks and the 10 highest non-TCL volatile peaks shall be tentatively identified and their concentration estimated using a foward search of the NBS Mass Spectral Library.

The soil sampling locations have been chosen to provide data in areas of past contaminant discharge, or storage, and in two on-site areas where hazardous materials are currently stored in above ground tanks. In each shallow boring continuous split spoon samples will be taken and subjected to a head space analysis and the readings recorded. The following paragraphs describe the samples to be taken at each boring location.

- Sump 1 has been partially backfilled, but contains a concrete tank used as a settling basin to hold liquid wastes prior to incineration. Two borings will be made in opposite corners of the sump and at least three samples taken at each location. The boring will be completed to a depth of at least 10 feet below the former sump bottom. Samples selected for analyses will include 1) if high OVA readings are encountered the sample with the highest readings, 2) one sample representative of the sediments above the sump bottom, 3) and one sample five feet below the sump bottom and 4) if the sample from 10 feet below sump bottom shows a high OVA reading, it should be tested. If the sump bottom cannot be identified than the boring should be continued to a depth of 45 feet below the surface. Three to five samples should be selected for analytical testing including the three samples with the highest headspace readings, one from below 30 feet, and a visibly stained sample (if any).

- Sumps 2, 3 and 4 have not been backfilled, and Sumps 3 and 4 still contain water. Two borings will be drilled on opposite sides of the base of each sump (in Sump 4, from opposite sides of the internal berm) and drilled to a depth of 10 feet. Samples for analytical testing will be taken at depths of 0'-2', 4'-6' and 8'-10' below the level of the top of sediments in the sumps.

- Sumps 5 and 6 have been completely backfilled. Three borings will be made in Sump 5 and two in Sump 6.

- An area referred to as the Old Drum Storage Area along the fence to the east of Plant 2 was used to store drums. This area may have been scraped to remove contaminated soil. Soil samples will be taken at four locations, to establish contaminant levels in this area approximately 20-30 feet from the eastern boundary of the site. Soil samples will be taken at a depth of 0'-2' and 3'-5' at each location.

- The Concrete Pad immediately east of Plant 2 was used to store waste drums. At one time this area was not paved and it was reported that the drums leaked directly on to the ground and as such, the pad may cover contaminated soil. Soil samples will be taken in four locations through the pad and two locations adjacent to the pad. Samples will be taken at depths of 0'-2' and 3'-5' below ground surface. One of the pad samples will be drilled approximately 60 feet from Plant 2, measured from the center of building. It is believed that a concrete sump was present at this location.

- The concrete pad located southwest of Plant 2 has been observed to be used to store drums. Soil samples will be taken at two locations adjacent to the pad. Samples will be taken at depths of 0'-2' and 8'-10' below ground surface.

- Existing above ground storage tanks are present in two separate areas on the site. At the tank area on the north side of the site, three locations, inside the berms, will be sampled. At the tank area on the south, two locations, southeast and southwest of the concrete pad, will be sampled. At each location, samples will be taken at depths of 0'-2' and 3'-5' below ground surface.

- Underground storage tanks were formerly present near Plant 1. Four soil borings to depths of 10 feet below the base of the former tanks will be made, two in each of the two old tank farm locations. Samples to be analyzed will be taken from below the soil/fill interface, and at a depth of 13'-15'. If the tank bottoms cannot be located then the boring will extend to a depth of 20 feet and samples selected based on head space analyses or visible soil contamination.

- The Pilot Plant released PCB's from its heating system. Soil samples will be taken at five locations surrounding the plant to confirm prior results. Samples will be taken at depths of 0'-2' and 3'-5' below ground surface. The deeper samples will be used to confirm previous findings that contamination, away from the major spill southwest of the plant is limited to shallower depths.

  Samples will be collected at the rear of the Pilot Plant (two sample locations) where limited data is available; the old drain line (two sample locations) where the depth of contamination is not demonstrated; and in the 6' x 6' spill area (one sample location) to verify previously reported levels of contamination.

These locations may be modified, as LBG continues to perform sampling in the area. All soil samples for analytical testing will be taken with 3" diameter split-spoons.

4.3.5.3 Surface Soil Sampling

If elevated levels of volatile organic compounds are detected in the soil gas survey in areas not included in the other phase of the soil sampling program, additional samples will be collected at depths of 0'-2' below ground surface in these areas. For costing purposes it is assumed that ten surface soil samples will be taken at the locations with the highest soil gas measurements.

4.3.6 Monitoring Well Installation

The Phase I groundwater program is designed to characterize and delineate possible contaminant transport, both vertically and horizontally near the Hooker/Ruco site. Data obtained from this program will also be used to characterize aquifer parameters such as groundwater flow direction and subsurface stratigraphic units. Figure 4-2 and 4-3 present the proposed Phase I monitoring well installation locations. Well locations have been chosen to satisfy RI/FS objectives. The purpose of each new well is listed on Table 4-2. All borings described in Section 4.3.5.1 will be completed as monitoring wells.

Six well clusters, each consisting of a shallow well (total depth about 65') and a deep well (total depth about 130') will be installed. Each of the above wells will be installed in a separate borehole. In addition, four shallow monitoring wells will be installed to help detect contamination in the water directly downgradient of former and present waste handling units. Two additional shallow wells, GW17 and GW18 will be installed if reported buried tanks or trailers are detected in the geophysical (magnetometer) survey.

At each cluster location, the deep well will be installed first. Split-spoon sampling in this well will provide the stratigraphic information needed to determine the proper screen depths for the shallow wells. Each shallow well will have a 15 foot screen extending from approximately five feet above the water table, to 10 feet below it. Deep wells will have a ten foot screen from approximately 120-130 feet.

Materials to be used in well construction will include:

- o 2-inch stainless-steel, wire-wound screen, 10-15 ft in length, with .020-inch-slot openings and flush-joint threads, and 2-inch Schedule 304 stainless-steel riser pipe,

- o Graded, clean sand filter pack,

TABLE 4-2

PURPOSE OF MONITORING WELLS

WELL	PURPOSE
GW07 (shallow and deep)	Monitor groundwater quality downgradient of the site
GW08 (Shallow and deep)	Monitor groundwater quality downgradient of the site
GW09 (Shallow and deep)	Monitor groundwater quality downgradient of the site
GW10 (Shallow and deep)	Monitor groundwater quality downgradient of the site
GW11 (Shallow and deep)	Monitor groundwater quality downgradient of the site and sump 2
GW12 (Shallow and deep)	Monitor water quality side - gradient of sump 3 to evaluate offsite influences to water quality
GW13 (Shallow)	Monitor water quality down-gradient of the above ground storage tanks
GW14 (Shallow)	Monitor water quality down-gradient of sump 5
GW15 (Shallow)	Monitor water quality down-gradient of sump 4
GW16 (Shallow)	Monitor water quality down-gradient of sump 3
GW17 (Shallow)	Monitor water quality down-gradient of buried tankers or trailers
GW18 (Shallow)	Monitor water quality down-gradient of buried tankers or trailers
GW19 (Shallow and deep)	Monitor water quality upgradient (off-site)
GW20 (Shallow and deep)	Monitor water quality on Grumman property

- o Bentonite pellet seal,
- o Cement-bentonite grout backfill, and
- o 6-inch security casing and locks.

The shallow and deep wells will be installed in accordance with the following general procedure:

(1) The site geologist(s) will determine monitor well depths based on the stratigraphic log developed from the deep well borehole. The deep well will be screened at a depth of 120-130 feet unless a clay layer over 1 foot thick is detected in the screened interval. If clay is present, the first 10 feet of sand below the clay will be screened. The shallow wells will have a 15 foot screen extending from approximately five feet above the water table to ten feet below it.

(2) The borehole will be advanced to the chosen depth with an appropriate drilling method (six inch I.D. hollow stem auger or eight inch O.D. cable tool).

(3) The stainless steel screen will be set one foot from the bottom of the borehole with sufficient riser pipe to extend from the top of the screen to two feet above the ground surface.

(4) The annular space will be backfilled from the bottom of the well to two feet above the top of the screen with clean sand. A bentonite seal at least two feet thick will be placed above the sand, and the remaining annular space will be backfilled with a bentonite-cement grout. All materials will be placed using Tremie pipe.

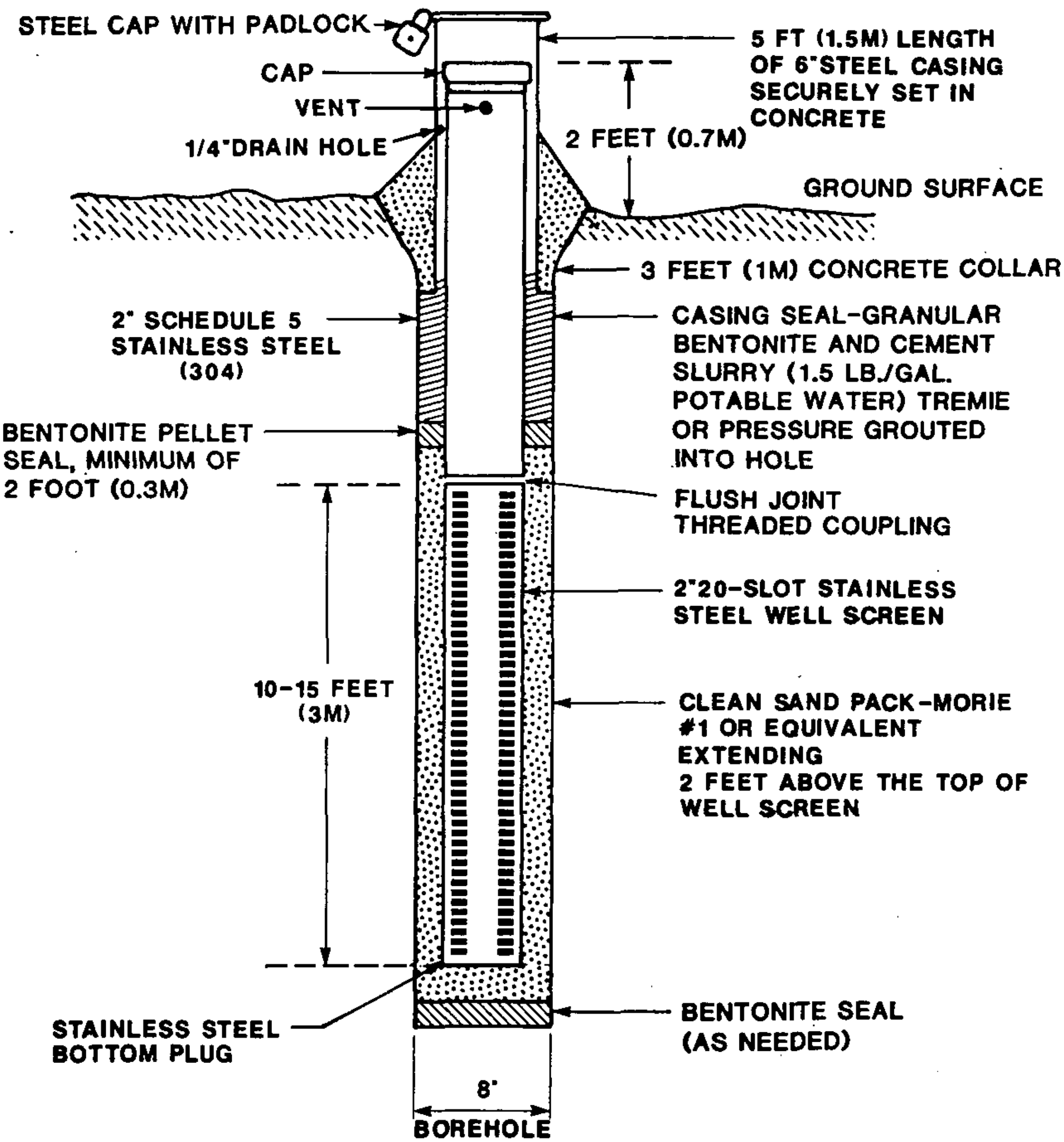
(5) A security casing with locking cap will be installed for each well.

(6) A three to four foot-diameter cement pad will be constructed around the security casing and mounded in such a way as to direct surface runoff from the casing (see Figure 4-5). The security casing will be locked.

The monitoring well construction and installation will not be considered complete until each well is properly developed. Well development is intended to clear the well screen and sandpack of fine material which may clog the screen, and to stabilize the formation material immediately surrounding the well screen. The wells will be developed by pumping and surging. The surging may be done by periodically pumping, or with a surge block. This will help to avoid bridging of the formation materials and will permit a more uniform flow through the well screen.

FIGURE 4-5

TYPICAL GROUNDWATER MONITORING WELL CONSTRUCTION



NOT TO SCALE

EBASCO

Each well will be developed to the satisfaction of the site geologist who will monitor pumping rates, water color and turbidity, pH, and conductivity to determine the effectiveness of the development. Development will continue to the satisfaction of the site geologist. Following installation of wells, the elevations of the ground surface and the tops of the riser pipe and security casing will be surveyed.

4.3.7 Monitoring Well Sampling

Groundwater samples will be obtained from the 41 existing and proposed on-site and off-site wells shown on Figures 4-2 and 4-3. The samples will be analyzed for all TCL parameters plus the tentatively identified compounds. Three on-site wells pairs GW01, GW03 and GW11 will also be analyzed for BOD, TOC, oil and grease, alkalinity, TSS, TDS, hardness, chloride, sulfate, and COD. Field measurements will be made for pH, specific conductance, and temperature. If any of the existing wells to be sampled are damaged, new wells will be constructed.
Phase I groundwater sampling may commence after well development. All wells will be allowed to stabilize for a minimum of 72 hours prior to sampling. The first wells installed will be the first that may be sampled.

Three to five well volumes will be purged from each well prior to sampling. During the well purging operation, pH, specific conductance, and temperature will be measured at the start of purging operations and at the end of each purged well volume. Stabilization of these parameters from successive purged volumes will indicate that the groundwater within the well is at equilibrium. The purge water from all of the wells will be disposed of in accordance with current EPA discharge/disposal regulations.

The wells will be purged with a teflon/stainless steel submersible pump. Pumps will be decontaminated before reusing in subsequent wells. Samples will be obtained with a stainless steel or a teflon bailer.

4.3.8 Hydrogeologic Characterization

A total of four piezometers constructed of PVC will be installed in order to better define groundwater flow direction within the upper water table aquifer. Soil and water samples will not be taken at the piezometer locations. The screened portion of the piezometer will extend from approximately 5 feet above to 10 feet below the water table. The piezometer locations are shown on Figure 4-3. At least two (2) complete rounds of water level measurements will be conducted on all new and existing on-site and off-site wells and piezometers shown on Figure 4-2 and 4-3 corresponding (if feasible) to wet and dry periods. In addition, all piezometers, soil sampling and well locations will be surveyed to determine their location and elevation. For each round of water level measurements, both shallow and deep groundwater contour maps will be generated, for a total of four (4) contour maps. Information on the pumping status of nearby wells, during and prior to the measurement should also be acquired to assist in determining the influence of the pumping on flow direction. The EPA will be asked to request Grumman to provide data on current pumping from their wells.

At least three electronic water level recorders will be installed in shallow wells for a period of at least one month in order to assess day-to-day groundwater fluctuations due to pumping at nearby facilities. Rainfall data will also be obtained on a daily basis during this period.

The records of the NCDH will be reviewed to verify that no private wells are present in the vicinity of the site. If private wells are identified, Ebasco will assist the EPA in contacting the residents to evaluate the use(s) of the water and subsequent sampling if necessary.

4.3.9 Air Monitoring

Ambient 8-hour air monitoring shall be conducted on site in order to identify volatile organics, PCBs, and particulates in the air. In addition to ambient air monitoring direct reading instruments shall be used to monitor the air for volatile organics and dust. The direct reading instrumentations shall be used to identify the Health and Safety levels around active work area on site. Volatile organics (specifically chlorinated hydrocarbons) shall be sampled on charcoal sorbent tubes, PCBs shall be sampled on Florisil sorbent tubes, and respirable dust on a gravemetric sampler using PVC filters. Sampling locations shall include at least one upwind and two downwind locations. All three analytes shall be sampled at each location.

Prior to the commencement of RI work representative background ambient air samples shall be taken for each of the analytes. Samples shall be taken during the RI program for each type of field investigation. In addition, background samples shall be taken after the RI field program in order to assess any changes in ambient air quality.

4.3.10 Phase II Field Investigation

The actual scope of the Phase II field investigation would be determined after the Phase I field investigation, sample analysis and data evaluation have been completed. The program may include installation or sampling of additional downgradient wells and resampling of Phase I wells to identify the areal extent of contaminant plumes in the groundwater. However, the parameters analyzed may be modified based on the Phase 1 results.

If areas with contaminated soil are identified based on the soil gas survey and soil sampling program, additional characterization of these areas may also be recommended.

4.4 TASK 4 - SAMPLE ANALYSIS AND DATA VALIDATION

Ebasco's Regional Laboratory Sample Coordinator (RLSC) will track the samples sent to the CLP to assure the continuity and consistency of data and analyses throughout the sampling program. Tracking will include tabulating the dates samples are obtained, dates shipped, analyses performed, holding times, dates extracted or analyzed, and dates validated. The RLSC will notify the Site Manager in the event of problems with the sample analyses. The QA/QC plan will be followed with respect to all sampling analyses and data validation.

4.4.1 Phase I Sample Analyses and Validation

4.4.1.1 CLP Analyses

Routine Analytical Services (RAS) and Special Analytical Services (SAS) of the CLP will be used for analysis of ground water, surface water, and soil samples for the following (TCL) parameters:

Volatile organics
Semivolatile organics
Inorganics
Pesticides/PCBs

Soil samples will also be tested for MOCA, and soil and water samples for phenols and tentatively identified compounds. Safe Drinking Water Act (SDWA) detection limits will be specified for volatile organics in ground water samples. Toxicity Characteristic Leaching Procedure (TCLP) or EP Toxicity testing will also be performed through the CLP on drummed soil cuttings. The test (TCLP or EP Toxicity) selected shall be in accordance with current regulations.

Six groundwater samples will also be analyzed for sulfate, TDS, TSS, chloride, alkalinity, hardness, TOC, BOD, COD, and oil and grease. Twelve soil samples from the sumps will be tested for organic content, moisture content and cation exchange capacity. This data will be used in to help evaluate remedial alternatives.

Data quality objectives for all parameters will be specified in the field operation plan.

4.4.1.2 Physical Parameter Testing/Field Analyses

Some parameters will be determined in the field. Parameters that may be measured in the field include general volatile organic screening for ground water, surface water, and soil samples. Parameters will also be tested within ground water and surface water samples, including pH, specific conductance and temperature.

4.4.1.3 Data Validation

Data validation on all laboratory chemical analyses will be performed according to current EPA, Region II, Statements of Work for organic and inorganic data validation.

4.4.2 <u>Phase II Sample Analyses/Validation</u>

Sample analysis and validation requirements for Phase II, if required, will be identified in the TDM after Phase I results have been evaluated.

4.5 TASK 5 - DATA EVALUATION

4.5.1 <u>Phase I Data Evaluation</u>

Data collected during Tasks 3 and 4 will be assembled, reviewed, and carefully evaluated to satisfy the objectives of the investigation. When possible, the data evaluation task will be performed concurrently with Tasks 3, 4, and 6.

4.5.1.1 Data Reduction, Tabulation and Graphical Presentation

The data collected to characterize the Hooker/Ruco site will be organized and analyzed to identify the extent and nature of contamination, determine ground water flow direction, and identify potential on-site source(s) of the contaminants. Field data and data resulting from laboratory analysis will be entered into a database. Boring logs will be prepared for all completed borings, and stratigraphic information developed from the site borings will be displayed as cross sections or fence diagrams of the site. Water level elevations measured at the wells will be used to develop plot(s) of the piezometric surface in the Magothy aquifer and variations in flow directions with depth. Both the horizontal and vertical hydraulic gradients will be evaluated.

The water quality data will be evaluated and mapped to illustrate the areal extent of contaminant plume(s) detected. The breakdown products of contaminants detected will be evaluated to help evaluate potential sources of the contaminants and the environmental behavior.

4.5.1.2 Environmental Fate and Transport Assessment

After the data has been assembled and reviewed, contaminant migration will be summarized based on any identified pathways.

Groundwater and atmospheric transport will be considered as potential pathways. Contaminant concentrations in each medium will be assessed, and the direction and rate of contaminant movement will be estimated. Relationships between the media will also be evaluated using transport pathway models. If potential source(s) of contamination can be identified from the field data, contaminant migration will be traced from the source(s) to potential receptors. Pathways that could potentially result in impacts to public health or to the environment will be identified.

It is anticipated that groundwater is the primary pathway for contaminant transport. As such, efforts will focus on ground water migration. Groundwater modeling using regional hydrogeologic data, as well as project specific data will be used in the analyses. The choice of the computer code(s) or analytical models to be used will be discussed with EPA prior to implementation. However, for cost analysis purposes, it is assumed that a two dimensional finite difference groundwater flow and contaminant transport model such as the USGS code MOCMOD will be used. Groundwater modeling efforts will be coordinated with the USGS as directed by the EPA.

4.5.2 Phase II Data Evaluation

Data evaluation requirements will be identified in the TDM if different from those identified for Phase I.

4.6 TASK 6 - RISK ASSESSMENT

After the site investigation information has been evaluated and the data base for the site has been established, a preliminary baseline public health evaluation will be performed for the site. The objective of this assessment is to characterize health and environmental risks, if any, that would prevail if no remedial action is taken.

The basic methodology to be employed is summarized in Figure 4-6. This process will be conducted in accordance with the procedures outlined in the EPA <u>Superfund Public Health Evaluation Manual</u> (EPA, 1986c).

The first step is the selection of indicator chemicals for which quantitative risk analyses will be performed. Indicator chemicals will be selected based on prevalence, concentrations observed, distribution among environmental matrices, toxicity, and environmental behavior as representative of the entire spectrum of compounds found on site.

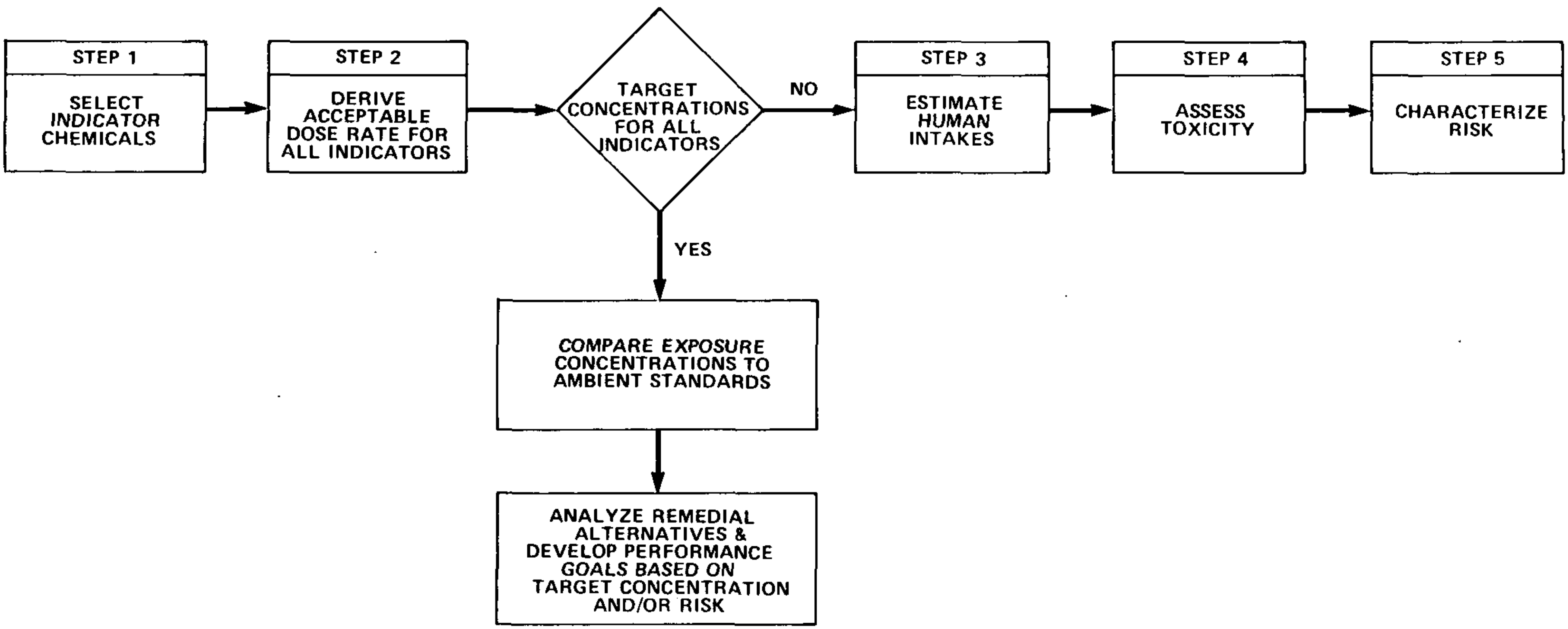
The second step in the public health evaluation is the identification and characterization of potential exposure pathways and receptors. Given the nature of the site, primary emphasis will be placed on human exposure through consumption of contaminated groundwater.

The concentrations of the indicator chemicals in each media (groundwater and soils) at the exposure points will be estimated from the monitoring data using environmental transport and fate analyses, as appropriate. The general basis and guidelines for exposure projections will be in accordance with the Draft Superfund Exposure Assessment Manual (EPA, 1986d). The observed and estimated concentrations will then be compared to the applicable or relevant and appropriate standards and criteria, presented in Section 3.3. ARARs may be available for all of the indicator chemicals on site. If so, no further quantitative analysis of risk will be performed. For certain pollutants and critical exposure pathways where concentrations exceed or nearly exceed standards, additional risk analyses will be performed to confirm that the pollutant transport models that are used adequately reflect conditions at the site and to determine where additional data are needed to characterize risks. If standards and criteria are not available for all of the indicator chemicals, quantitative analyses will be performed, following the general procedures outlined in EPA's Endangerment Assessment Handbook (1985b) and Superfund Public Health Evaluation Manual (1986).

For chemicals of which no ARARs exist, acceptable concentrations in environmental media will be developed based on acceptable daily intakes (for non-carcinogens) and on target risk levels (for carcinogens). The primary sources of toxicological data used in this analysis will be Appendix C of the Superfund Public Health Assessment Manual, EPA's Health Effects Assessments (HEAs) and EPA's Air and Water Quality Criteria Documents. Target risk levels for carcinogens will be selected after consultation with EPA. EPA will also be notified if it is felt that there are valid technical reasons for selecting toxicity values other than those found in the references cited above. In addition, using the references cited, a summary toxicity profile will be developed for each indicator chemical. This toxicity profile will summarize pertinent information regarding the chemical based on EPA contaminant profiles, health effects advisories, and water quality criteria support documents.

FIGURE 4-6

FLOW CHART OF THE PUBLIC HEALTH EVALUATION PROCESS



This assessment will define the exposures and levels of risk to human health associated with soils and groundwater present at the site. The results can also be used to estimate the risk associated with any remedial activity proposed for the site.

4.7 TASK 7 - TREATABILITY STUDY/PILOT TESTING

The preliminary scoping of remedial alternatives (Section 3.2) considered certain developed and innovative technologies for treatment of the contaminated soil and groundwater at the site. Assuming that some of these technologies meet remedial response objectives and that they pass the initial screening, treatability studies (laboratory or field) would be needed to evaluate their applicability to the site and to develop cost information for economical comparison among the technologies.

However, the performance of specific treatability studies are not proposed in this Work Plan due to the following reasons:

- Due to the limited database and targeted compounds analyzed, it is uncertain if the presence of production-related contaminants still exist in the groundwater on site. The cessation of production related discharges to uncontrolled recharge basins in the 1970's and the reduction in contaminants detected in groundwater from 1984 to 1985 may be indicative of a contaminant plume which is migrating off-site.

- The types of contaminants and extent of contamination is not adequately defined. The locations of potential "hot spots", and thus the composition and number of samples to serve as suitable test material are not yet known. Thus specifications for testing incineration, soil washing, in situ vitrification, enhanced flushing, and other treatment alternatives cannot be developed at this stage of the project.

- The groundwater quality at or near the site is not adequately defined. Groundwater samples which have been analyzed to date were limited in the number of parameters monitored. Water quality data from USGS monitoring wells indicates that the Magothy aquifer may be contaminated with several volatile organic compounds. The degree of contamination of the groundwater will impact the identification of remedial technologies relating to this matrix, including air stripping or carbon adsorption. Given the limited groundwater analyses currently available, the unit processes and operations which should be investigated for testing physical/chemical methods to remove any contaminants from the groundwater at this site cannot be determined.

- The hydrogeological conditions at the site are not adequately defined. Due to the industrial development in this area, a more accurate assessment of groundwater flow direction is required to proceed with the FS. Other considerations regarding hydrogeologic conditions at the site include the feasibility of remedial technologies such as enhanced soil flushing and in situ vitrification.

- Conducting treatability studies for certain technologies can be costly. Therefore, treatability studies should not be conducted for those technologies which cannot pass the initial screening.

Ebasco proposes to meet with EPA to discuss the need for the conduct of any treatability tests upon review of the analytical and field results of the RI. If, after this review and the performance of the initial screening of remedial technologies and alternatives indicates the need for such treatability tests to assist in decision-making, the USEPA will be informed of the need, scope, additional budget, and impact on the schedule of the FS Study through a TDM. Upon the USEPA's approval and authorization, these required additional treatability tests will be performed.

4.8 TASK 8 - REMEDIAL INVESTIGATION (RI) REPORT

Following the Phase I investigation, an interim report will be prepared describing the findings of the Phase I investigation. The results of the data collection and evaluation efforts during Phases I and II will be submitted to the EPA in an integrated RI report. The following activities will be involved in preparation of the RI report.

4.8.1 Phase I Interim Remedial Investigation Report

Ebasco will prepare an interim RI Report following completion of the Phase I data collection and evaluation program. The report will generally follow the RI report format described in EPA guidance documents (EPA, 1985) unless otherwise specified in writing by the EPA. This will facilitate combining the Phase I and II data in the final RI Report.

The report will summarize the field investigation performed, laboratory results, data evaluation and an assessment of risks. The report will also identify data which should be obtained during Phase II activities to fully characterize the levels and extent of contamination.

After a draft of this report is submitted to the EPA, it is anticipated that a meeting will be held with the EPA to discuss the results and conclusions of the Phase I investigation, and EPA comments on the draft report. Based on the meeting and EPA comments, a final Interim RI Report will be prepared and submitted to the EPA.

4.8.2 Phase I and II Remedial Investigation Report

When the Phase I and II investigations have been completed a remedial investigation report combining the results of both phases will be prepared. Similar to the Phase I report, this report will follow the EPA format. The draft RI report will be produced by the RI project team and reviewed by Ebasco senior level staff and technical specialists. After the internal Ebasco review, copies of the draft will be produced and delivered to the EPA. A meeting will be scheduled with EPA, to discuss the findings of the RI, and to receive EPA comments on the report. Ebasco will then revise the report, based on the meeting and EPA comments, and prepare a final Remedial Investigation report for submission to the EPA.

4.9 REMEDIAL ALTERNATIVES SCREENING

Based on the results of the Risk Assessment and the remedial response objectives identified for the site, the initial screening of remedial alternatives will be performed consisting of six steps as recommended in the EPA's "Guidance on Feasibility Studies under CERCLA," (EPA, 1985a) and Porter's "Interim Guidance on Superfund Selection of Remedy" and (EPA, 1987).

In the latter guidance memorandum, development of alternatives is initiated in a "Phase I FS" which is performed concurrent with the RI. This Work Plan includes a preliminary identification and discussion of such alternatives, although the process of identifying and screening potential alternatives will be ongoing throughout the RI, as new technological and/or site-specific data emerge. Interim guidance concerning "Phase II FS", initial screening, is reflected in Ebasco's task-activity decision points at the conclusion of the RI. The subtasks comprising Task 9 will accomplish the following objectives:

- Development of remedial response objectives and general response actions;
- Identification and screening of remedial technologies;
- Development and screening of remedial alternatives.

4.9.1 Development of Remedial Objectives and General Response Actions

Based on the data collected in the RI, the remedial response objectives will be developed more fully. Prior to the development of these remedial response objectives, significant site problems and contaminant pathways will be identified. Considering these problems and pathways, the remedial response objectives which would eliminate or minimize substantial risks to public health and the environment will be developed further. This will include a refinement of the ARARs with consideration given to site-specific conditions. Based on the remedial response objectives, general response actions will be delineated to address each of the site problem areas and to meet the clean up goals and objectives. These response actions will form the foundation for the screening of remedial technologies. General response actions considered should include the "no action" alternative as a baseline against which all other alternatives can be measured.

4.9.2 Identification of Applicable Technologies and Development of Alternatives

Based on the remedial response objectives and each identified general response action, potential treatment technologies and their associated containment or disposal requirements will be identified. A pre-screening of these potential treatment technologies for suitability as part of a remedial alternative will be conducted.

Technologies which may prove extremely difficult to implement, may not achieve the remedial response objective in a reasonable time, or are inapplicable and infeasible based on the site conditions, will be eliminated. A preliminary effort of this task has been completed and the results can be found in Section 3.4.3 - Scoping of Remedial Alternatives. It should be noted that this preliminary identification will be finalized based on the results of the RI and the establishment of remedial response objectives. A revised list of potential remedial technologies/ alternatives may be developed, pending the outcome of this analysis.

The formulation of remedial alternatives requires combining appropriate remedial technologies, such as those listed in Tables 3-1 and 3-2, in a manner that will satisfy the site remediation strategies or remedial response objectives established in Section 3.0 which will be refined based on the results of the RI.

As required by SARA, treatment alternatives shall be developed in each of the following categories:

- o An alternative for treatment that would eliminate the need for long-term management (including monitoring) at the site;
- o Alternatives for either a permanent solution, or the use of alternative treatment or resource recovery technologies;

- Alternatives for treatment that, as their principal element, would reduce toxicity, mobility, or volume;
- An alternative that relies on containment, with little or no treatment, and
- A no-action alternative.

4.9.3 Screening of Remedial Alternatives

The list of potential remedial alternatives developed above will be screened. The objective of this effort is to eliminate alternatives principally on the basis of effectiveness and implementability. Cost, as indicated in Porter's (1986) memo, plays little or no role in initial screening unless the last criterion presented below clearly applies. Alternatives will be eliminated, as described in the NCP Section 300.68 (g), that:

- May have significant adverse impact during implementation.
- Do not adequately protect the environment and public health.
- Have technical feasibility which is either difficult or not proven.
- Have costs an order of magnitude greater than other alternative(s) but do not provide greater environmental or public health benefits or greater reliability.

According to the above NCP screening criteria and SARA requirements, the initial screening of remedial alternatives will identify alternatives as acceptable/unacceptable based on the following screening factors:

- Technical Feasibility Screening. Remedial alternatives will be evaluated based on performance, long-term reliability, effectiveness, implementability, operation and maintenance, and safety considerations. Alternatives that are not compatible with site and waste source conditions, including those that might be difficult to construct under existing site conditions, will be eliminated.

  Innovative technologies will be considered through the screening if there is a reasonable belief that they offer potential for better treatment performance or implementability, few or lesser adverse impacts than other available approaches, or lower costs than demonstrated technologies.

- Environmental, Public, and Institutional Screening. The purpose of these screening criteria is to eliminate alternatives with significant adverse impacts or alternatives that do not adequately remove the threat to the environment, public health, or welfare. Each alternative will be evaluated in terms of the effects that compliance with institutional issues will have on the implementation of that alternative.

- Cost Screening. Estimates of the cost of implementing the various alternatives will be developed for comparison of relative magnitude only. The alternatives whose costs are an order of magnitude higher than those of other alternatives but that do not provide significantly greater environmental or public health benefits will be eliminated. The cost screening will not be used to compare treatment and nontreatment alternatives, but will be used for comparison of treatment technologies.

  Costs will be estimated to achieve an accuracy within -50% to +100%. The screening costs of remedial technologies will be based on capital and on operating and maintenance (O&M) costs. After developing screening cost data, a present-worth analysis will be performed for both the capital and other expenditures.

4.9.4 Scoping of Remedial Investigation Phase II~~/Memorandum for Technical Direction~~

The scope of this effort, if required, will be determined by the outcome of Tasks 3 through 6 and the results of the screening of alternatives. Phase II, if necessary, will consist of additional work to address data gaps identified in Phase I. If it is determined that a Phase II site investigation or laboratory bench scale studies are required, a revision to the scope of work will be prepared.

4.10 TASK 10 - REMEDIAL ALTERNATIVES EVALUATION

The remedial alternatives which pass the initial screening will be further evaluated. The evaluation will conform to the requirements of the NCP, in particular, Section 300.68 (h), Subpart F, and will consist of a technical, environmental and cost evaluation as well as an analysis of other factors, as appropriate. As specified in the "EPA Guidance on Feasibility Studies under CERCLA", and updated in J.W. Porter's December 1986 and 1987 Memoranda on "Interim Guidance on Superfund Selection of Remedy", the processes of the detailed evaluation include:

- Effectiveness;
- Implementation;
- Cost Analysis; and
- Evaluation summary.

4.10.1 Effectiveness

The effectiveness of an alternative is determined by evaluating (1) technical reliability and performance; (2) public health evaluation; (3) environmental impact evaluation; and (4) the attainment of Federal and State ARARs.

Technical Reliability and Performance

The technical evaluation examines each of the alternatives for performance and reliability. Safety considerations are also reviewed. The applicability of each alternative will be evaluated based on: (a) its effectiveness in accomplishing the response and cleanup objectives; (b) its durability in maintaining the designated level of effectiveness; and (c) resources required to refurbish any of its short-life components.

The reliability components focus on the evaluation of previous technology applications, and analyze the probability for failure. Unique features of the application are compared with site-specific features. Both on-site and off-site factors are evaluated. Also evaluated are operation and maintenance requirements, in terms of complexity and whether sophisticated and well-trained operators and maintenance people are required. The intensiveness of alternatives in terms of labor and material for O&M is another important evaluation criterion.

Finally, the risks to workers and residents of what and injury during implementation of the remedial alternative and upon its possible failure are considered. The safety evaluation will include both the short and long-term occupational health impacts.

Public Health Evaluation

During the evaluation of public health effects associated with each alternative, two key areas, exposure impact and remedy effect, are evaluated.

For the exposure impact evaluation, a qualitative and/or quantitative exposure assessment in the absence of remedial action are developed based on the information gathered during the baseline site evaluation.

The purpose of the exposure assessments is to estimate the frequency, magnitude, and duration of human exposure to toxic chemical contaminants which might be released from the site. The items which will be addressed in performing these assessments include:

- Identifying chemicals present at the site and selecting indicator chemicals based on toxicity, persistence, mobility, and quantity present;
- Estimating at key exposure points the environmental concentrations of each indicator substance; and
- Characterizing populations potentially at risk;

For the remedy effect evaluation, the public health evaluation will be based upon assessing the level of hazard posed by implementing each remedial alternative and assessing how well each alternative satisfies the established health objectives. Each alternative will be evaluated with regard to its impacts on present and possible future public health risks at the site. This evaluation will be built around the acceptable pollutant concentrations in environmental media developed in the baseline risk analysis.

Environmental Impact Evaluation

The environmental impact evaluation examines each alternative under consideration for their "net" effect on the on-site and off-site environment. The "net" effect includes long-term and short-term effects.

Beneficial effects of each alternative will be evaluated in terms of changes in the release of contaminants and final environmental conditions, improvements in the biological environment and improvements in resources people use. Adverse effects of remedial construction or operations are also identified and evaluated.

Attainment of Federal and State ARARs

The Federal and State ARARs evaluation examines the alternatives for their effectiveness in compliance with institutional requirements, restrictions, permitting and other recommended procedures. The current EPA policy on the use of ARARs and other criteria, guidance, and advisories will be defined for the site and evaluated relative to conformance for each remedial alternative.

4.10.2 Implementation

Each alternative will be evaluated with regard to its potential for implementation. The following factors will be considered during this evaluation:

- o Technical Feasibility

  A technology whose use is clearly precluded by the site characteristics or limited by the waste characteristics should be eliminated from consideration.

- o Availability of Technology

  For the technologies each alternative would employ, the technology development status (commercially available or not) and availability status, (purchase, rent, mobile units available) are evaluated.

- o Ability to monitor, maintain and replace technology over time

  Criteria included in this implementability evaluation cover ease of installation, time required to achieve a given level of response, monitoring requirements, potential for phasing as related to site and external conditions, and availability of sources.

- o Administrative factors

  The administrative feasibility of implementing each alternative will be evaluated, including state and local acceptance of the alternative. The public perception and receptiveness to each alternative also will be assessed and measured.

4.10.3 Cost Analysis

The detailed cost analysis will be performed as specified in the EPA "Guidance on Feasibility Studies under CERCLA" and will consist of the following steps:

- o Estimate capital and operation and maintenance costs;
- o Calculate annual cost and present worth; and
- o Evaluate the sensitivity of cost estimates

The total costs include the direct capital costs and the indirect capital costs. The major direct capital costs are estimated based on the facilities, equipment and construction features. Material quantities, labor, equipment, and installation costs for each alternative are estimated on the basis of available sources and local wage rates. The indirect capital costs include emergency, legal and administration fees and contingency allowances. Operational and maintenance costs will be determined from estimates of labor and material. Maintenance costs will be calculated as a percentage of the direct construction costs on the basis of experience. The cost estimates are accurate to within -30% to +50% of the final project costs as per the EPA "Guidance on Feasibility Studies under CERCLA".

The present worth values will be used for cost comparison among the alternatives. Annual operating costs will be converted and presented as a present worth capital expenditure. Similarly, costs of remedial action alternatives or phases thereof, occurring over different time periods will be converted to present worth value. Discount rates will be estimated in accordance with current market values. Finally, a sensitivity analysis will be conducted for factors that could affect the overall costs of the remedial action.

4.10.4 Evaluation Summary

Upon completion of the detailed evaluation, a description of the process and a series of tables will be prepared presenting a comparison of the findings for each remedial alternative.

4.11 TASK 11 - FEASIBILITY STUDY (FS) REPORT

A Feasibility Study Report will be prepared that will summarize the activities performed and present the results and associated conclusions for Tasks 1 through 10. The report will include a summary of laboratory treatability findings; a description of environmental, regulatory, public health factor; and cost evaluation of the remedial alternatives studied. The FS report will be prepared and presented in accordance with "Guidance on Feasibility Studies under CERCLA", (EPA, 1985a).

This effort includes preparation of the Executive Summary, Introduction and Summary of Alternatives according to Sections 9.1, 9.2, and 9.6 respectively, of the EPA's guidance (EPA, 1985a). The executive summary will be a brief overview of the study and the analyses underlying the evaluated remedial actions. The introduction to the FS report will briefly characterize the site in terms relevant to the analysis of remedial action strategies in three subsections: (1) site background information; (2) the nature and extent of contamination problems; and (3) objective of remedial action. The practicable remedial alternatives will be summarized and the results of the detailed evaluation will be presented using tables and figures.

The screening process used to identify the feasible remedial alternatives (practicable alternatives) for the site to undergo subsequent detailed evaluation will be presented in two subsections. The first subsection will present the feasible technologies identified for the general response actions, the technical criteria including site and waste characteristics that were used in the technology selection process, and results of the remedial technology screening as described in Section 2.3 of the EPA's FS Guidance (EPA, 1985a). The second subsection will present the remedial alternatives developed by combining the technologies identified in the previous screening process, in the five recommended categories (off-site disposal attain ARARs, exceed ARARs, do not attain ARAR's and no action) as specified in Section 2.4 of the EPA's FS Guidance. This subsection will also describe the initial screening.

Each potentially viable alternative will be evaluated in accordance with recent EPA guidance developed since the congressional passage of SARA. These guidance documents to be considered include interim guidance memorandums prepared by EPA (EPA, 1986; EPA, 1987).

After a draft report is prepared by the Ebasco project team it will be reviewed by senior staff. After their comments are incorporated ten copies of the draft report will be submitted to the EPA for review. Based on EPA comments, this report will be revised, and twenty copies of the final FS submitted to the EPA.

5.0 PROJECT MANAGEMENT APPROACH

5.1 ORGANIZATION AND APPROACH

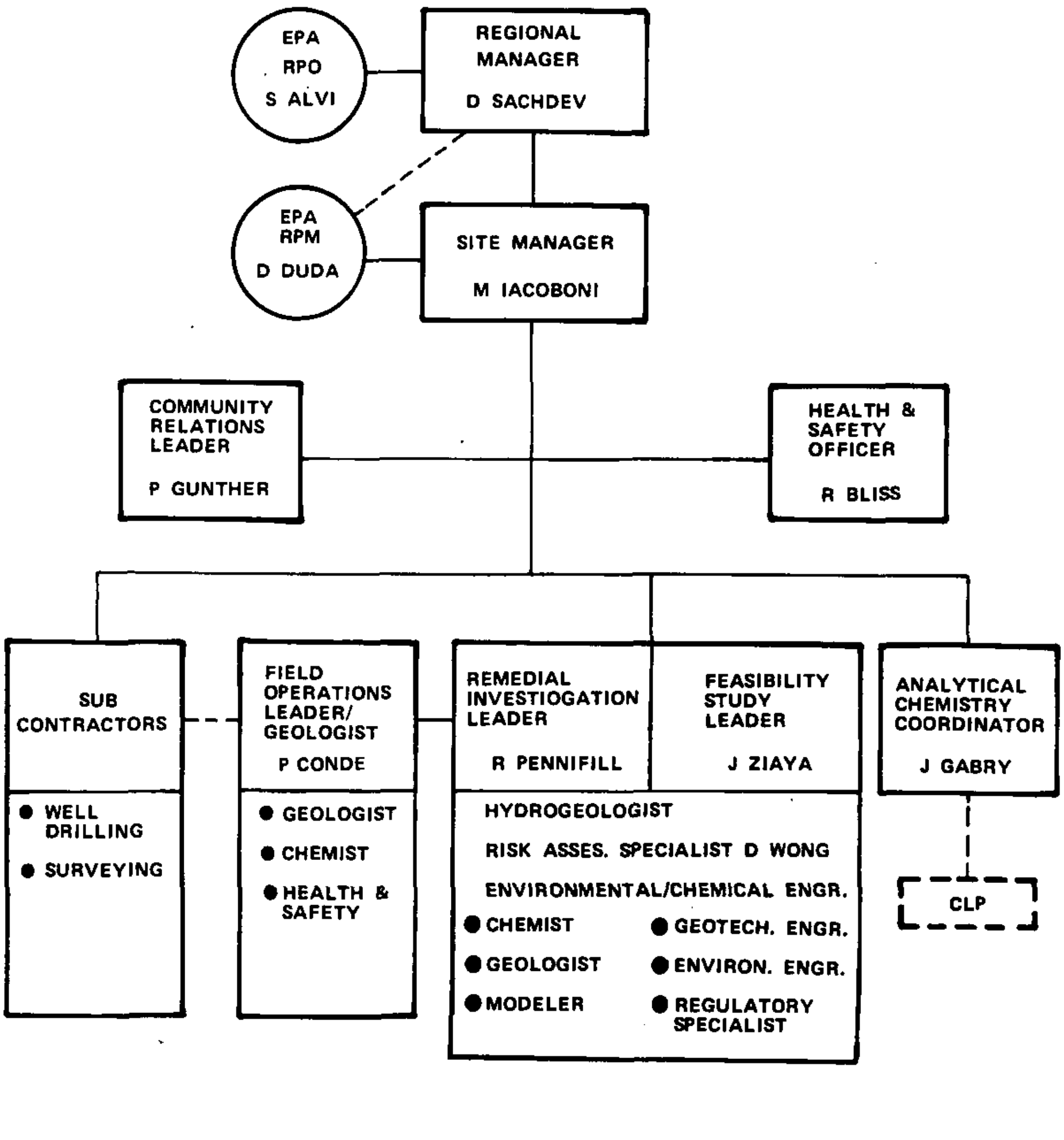
The proposed project organization is shown on Figure 5-1. The Regional Manager (RM), Dr. Dev R. Sachdev is responsible for the quality of all REM III work performed in Regional II. He monitors the progress of each work assignment to ensure adequate resources are available and that major problems are prevented or minimized. Dr. Sachdev implements the program standard of quality for work in the region and makes sure that the Site Manager meets that standard. The RM's review concentrates on the technical quality, schedule, and cost for all work assignments.

The Site Manager (SM), Mr. Mario Iacoboni, has primary responsibility and authority for implementing and executing the RI/FS. Supporting the SM are the RI Leader, Mr. Roger Pennifill; Field Operations Leader (FOL), Mr. Peter Conde; FS Leader, Mr. Joseph Ziaya; and other staff. The FOL is responsible for on-site management for the duration of all activities at the site. The RI Leader is responsible for the RI and for the preparation of the RI report. The FS Leader is responsible for the FS and for the preparation of the FS Report.

The task numbering system for the RI/FS effort is as follows:

- Task 1 Project Planning
- Task 2 Community Relations
- Task 3 Field Investigation
- Task 4 Sample Analyses/Validation
- Task 5 Data Evaluation
- Task 6 Assessment of Risks
- Task 7 Treatability Study/Pilot Testing
- Task 8 Remedial Investigation Reports
- Task 9 Remedial Alternatives Screening
- Task 10 Remedial Alternatives Evaluation
- Task 11 Feasibility Study Report
- Task 12 Post RI/FS Support

FIGURE 5-1
PROJECT ORGANIZATION CHART



The task list, a project schedule and budget comprise the baseline plans which form an integrated management information system against which work assignment progress can be measured. The baseline plans are a precise description of how the work assignment will be executed in terms of work scope, schedule, staffing and cost. The project schedule and the cost estimate are presented in Sections 5.3 and 5.4, respectively.

Each of the RI/FS Tasks (Tasks 1 through 11) have or will be scheduled, budgeted and tracked separately during the course of the RI/FS work. Monthly progress reports will be prepared and submitted to EPA. Project progress review meetings will be held to evaluate project status, discuss current items of interest, and to review project staffing.

5.2 QUALITY ASSURANCE AND DATA MANAGEMENT

The site specific quality assurance requirements will be in accordance with the Quality Assurance Project Plan for the REM III Program, as approved by EPA, and in accordance with the Brossman Guidance.

Data Management aspects of the program pertain to controlling and filing documents. Ebasco has developed a program filing system (Administrative Guideline Number PA-5) that conforms to the requirements of the Environmental Protection Agency and the REM III Program to ensure that the documents are properly stored and filed. This guideline will be implemented to control and file all documents associated with the Hooker/Ruco site RI/FS. The system includes document receipt control procedures, a file review and inspection system, and security measures.

5.3 PROJECT SCHEDULE

The project schedule is shown in Figure 5-2.

The project schedule is based on the following assumptions:

- o Ebasco will have access to the Hooker/Ruco site and adjacent industrial facilities where wells are to be installed or sampled for a minimum of 12 hours a day during the site investigation.

- o Ebasco will be able to establish a field office at the Hooker/Ruco site complete with a trailer and a parking area for all equipment including subcontractor drilling equipment. Electrical power and phone lines will be available for use at the field office.

- o EPA will obtain approval/permits for Ebasco to have access to all wells to be sampled and at sites of proposed new wells and piezometers.

FIGURE 5-2

HOOKER/RUCO
PROJECT SCHEDULE

REVISION 1 - AUGUST, 1988

- After EPA approval of the Work Plan, a 60 day period is scheduled for PRP review.
- EPA approval to proceed with preparation of the Field Operations Plan and subcontracts will take place at the end of the 60 day PRP review period.
- Ebasco will be provided all analytical results (prior to completion of the data validation effort by the CLP) as they are generated. The schedule is also based on a CLP analysis and validation time of approximately 12 weeks.

This schedule was developed to assure completion of the data base necessary to perform the RI; and assure cost-effectiveness and manageability.

Figure 5-2 contains several elements which should be highlighted, as they constitute key decision points and/or critical path items.

The duration of the Hooker/Ruco RI is 92 weeks including 41 weeks for the preparation of the FOP and PRP review of Work Plan. The draft RI report will be submitted to EPA in week 84. Project planning for the site (first 17 weeks of the schedule) include the preparation of the Work Plan, the Field Sampling and Analysis Plan, the Health and Safety Plan and the Site Management Plan.

Subcontracting for well drilling and location surveying is expected to be initiated (with the mailing of RFP's) in week 37, to allow field work to begin as soon as the FOP is approved. The subcontract for disposal of cuttings shall be initiated during the latter part of Task 3.

Key elements in the RI schedule are PRP review, obtaining site access, and installation of monitoring wells. Installation of wells in a timely fashion is required to perform sampling on schedule. To keep the schedule as short as possible, soil sampling and well installation have been scheduled concurrently. It is assumed that two drill rigs would operate concurrently on the site.

Samples will be sent to the laboratories as soon as they are obtained. However, the last samples will have to be analyzed and validated in a period of approximately 12 weeks to meet the schedule.

The FS will be started in week 72 and be completed in week 108. The draft FS report will be submitted in week 101. Work on the FS will start concurrently with the completion of data analysis.

5.4 ESTIMATED PROJECT COSTS

The estimated cost for the Hooker/Ruco Phase RI/FS is $_______. These costs do not include the cost for the CLP analyses and treatability studies. These costs include all workhours, travel, equipment, and subcontract costs for the initial tasks and the tasks described in this Work Plan. A detailed breakdown of the estimated project costs has been provided to the EPA under separate cover. A summary of the project costs are as follows:

- o Labor - $____________
- o Travel - $____________
- o Equipment - $____________
- o Computers - $____________
- o Reports - $____________
- o Miscellaneous - $
- o Subcontracts - $

The level of effort estimated for the Hooker/Ruco site RI/FS is ______ hours. This estimate includes the hours expended on the initial tasks which include: the preparation of project plans; procurement of the well drilling, well installation, soil boring, surveying and additional subcontractors.

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