RECORD OF DECISION

Hooker Chemical/Ruco Polymer National Priorities List
(NPL) Site

Town of Oyster Bay, Nassau County, New York

OU 1

NYSDEC Site #1-30-004

United States Environmental Protection Agency
Region II
New York, New York
January, 1994

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Hooker Chemical/Ruco Polymer Site

Town of Oyster Bay, Hicksville

Nassau County, New York

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Hooker Chemical/Ruco Polymer Site, which was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision document explains the factual and legal basis for selecting the remedy for this Site.

The New York State Department of Environmental Conservation (NYSDEC) concurs with the selected remedy. A letter of concurrence from the NYSDEC is attached to this document (Appendix IV).

The information supporting this remedial action decision is contained in the administrative record for this Site. The index for the administrative record is attached to this document (Appendix III).

DESCRIPTION OF THE SELECTED REMEDY

This operable unit (operable unit one) is the first of two (and possibly three) operable units for the Site. Operable unit two addressed specific areas of the Site with PCB contaminated soils. Operable unit two was completed and approved as an early action in March 1993 to remediate the greatest risk to workers at the Site. (A potential third operable unit will address the downgradient groundwater contamination.) Operable unit one (the subject of this Record of Decision) at the Hooker Chemical/Ruco Polymer Site will address the contaminants in the soils that were not remediated as part of operable unit two and present the largest threat to the groundwater as continued sources of contamination. The remaining soil contamination is being addressed to eliminate its potential contribution to groundwater contamination and further reduce potential risks to Site workers from exposure to surficial soils contaminants. This operable unit will also address groundwater contamination beneath the Ruco facility through a pump and treat system to prevent further downgradient migration of contaminants. Operable unit one will require long-term management to maintain the groundwater pump and treat systems and periodically measure the success of the deep soil flushing.

The major components of the selected remedy include the following:

- Installation of groundwater extraction wells to control the flow of contaminated groundwater from leaving the Ruco property and migrating downgradient. The conceptual groundwater modeling performed in the Feasibility Study Report estimated that approximately 100 gallons per minute (gpm) will be required to control the groundwater flow. The exact number, depth, size and pumping rates of the extraction wells will be determined through tests conducted in the Remedial Design.

- Installation of a groundwater treatment system to treat the extracted groundwater. Treatment of the extracted groundwater with an on-site treatment system will be expected to achieve the appropriate discharge standards. The exact combination and type of treatment technologies (i.e., granulated activated carbon, ultraviolet oxidation, flocculation, etc.), and their effectiveness on tentatively identified compounds (TICs) will be determined in the design phase through the performance of treatability studies. Additional analyses of the TICs in the groundwater will be required to identify the classes of chemical compounds that comprise the TICs. If the results of the treatability studies indicate the discharge standards can not be achieved, the selected remedy will have to be revisited.

- Installation of a discharge system, either off-site or on the Ruco property, to dispose of the majority of the treated groundwater. If an acceptable location can not be found off-site for the placement of a recharge basin, the treated groundwater will be discharged to a sump to be constructed on the Ruco property. The majority of the discharge volume will be required to be diverted to this proposed sump to avoid overloading sumps one and two (see soil flushing below) and the groundwater extraction system. The discharged groundwater is expected to meet the appropriate discharge criteria through treatment (see treatment above).

- Additional soil testing in the bottom of sump two to determine if contaminants are present in the deep soils and to compare the levels present to the soil cleanup criteria that are considered protective of groundwater quality. **If** contaminants are present at levels above the protection of groundwater criteria, the soils in sump two will be addressed in the same manner as the soils in sump one.

- Soil flushing for the deep soils in sump one, and possibly sump two (based on the results of additional soil testing). The soils will be flushed by the discharge of treated groundwater. The contaminants flushed out by this process will be recaptured by groundwater extraction wells. The exact location, depth, size and pumping rates of the wells will be determined during the design phase of the selected remedy. Additional analyses of the tentatively identified compounds (TICs) in the soil will be required to identify the classes of chemical compounds that comprise the TICs. Treatability studies (e.g., soil column tests) will also be performed on the soils to evaluate the effectiveness of soil flushing on TICs. The contaminant levels in the sumps will be re-evaluated during periodic monitoring and at the five-year review to measure the progress of the flushing. A portion of the groundwater discharge (approximately 10 gallons per minute) will be circulated to sump one (and possibly sump two, depending on subsequent soil boring results) to flush the soil contaminants. The exact delineation of the areas to be flushed will be performed during the design phase of the remedial action. In order to install a flushing system in sump one, the existing concrete storage tanks in that sump will be removed.

- Additional soil testing in the area around monitoring well E to determine if contaminants are present. **If** contaminants are present, the concentrations will be compared to the soil criteria considered to be protective of groundwater quality to determine whether a significant potential contaminant source to the groundwater exists. **If** the contaminants are present above the protection of groundwater quality criteria, and exist in the shallow soils, the area around well E will be addressed in the same manner as the former drum storage area (see excavation below). **If** the contaminants are present in the deeper soils, further evaluation of potential remedial alternatives will be required.

- Excavation of the soils in the former drum storage area and possibly the area around monitoring well E (to be determined by subsequent soil borings). The excavated soils will then be disposed of off-site. The approximate volume of the soils to be excavated in former drum storage area is 445 cubic yards (and 265 cubic yards for the area around monitoring well E). The extent of the excavation in the former drum storage area, and possibly the area around monitoring well E, will be based on the results of soil samples collected during the design phase.

- Periodic monitoring of the groundwater extraction system to assure adequate control is maintained; periodic sampling of the groundwater treatment system discharge, to assure treatment standards are achieved; and periodic sampling of the soils in sump one and possibly sump two to measure the progress of the selected remedy in achieving the cleanup standards. Existing monitoring wells on the Ruco property will be used to monitor the performance of the groundwater extraction system and establish that sufficient control occurs. Additional monitoring wells may be required. The need for additional monitoring wells will be determined during the design and implementation of the groundwater extraction system.

- The use of institutional controls in the form of deed restrictions and groundwater use restrictions at the Ruco property. The purpose of the deed restrictions are to restrict the use of the Ruco property to industrial development **only**, as long as contaminants remain on the property and the treatment systems are in place. Groundwater use restrictions, in addition to the existing Nassau County Ordinance, will be implemented through deed restrictions as well. The use of groundwater will be restricted until such time as the groundwater beneath the Site has been determined to be fully remediated.

DECLARATION OF STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. The selected remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable, and it satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as their principal element.

Because this remedy will result in hazardous substances remaining on-site above healthbased levels, a review will be conducted within five years after commencement of remedial action, and every five years thereafter, to ensure that the remedy continues to provide adequate protection of human health and the environment.

__________________________________ ______________

William J. Muszynski, P.E. — Date
Acting Regional Administrator

ROD FACT SHEET

SITE

Site name: Hooker Chemical/Ruco Polymer Site

Site location: Hicksville, Town of Oyster Bay, Nassau County, New York

HRS score: 41.60

ROD

Selected remedy: Groundwater pump and treat combined with soil flushing and soil excavation.

Capital cost: Between $ 5,246,000 and $ 5,531,000

O & M cost: Between $ 550,000 and $ 552,000

Present-worth cost:

- 10-year present-worth cost: between $ 9,012,000 and $ 9,031,000
- 30-year present-worth cost: between $ 13,222,000 and $ 13,250,000

LEAD

United States Environmental Protection Agency

Primary Contact: Dale J. Carpenter, (212) 264-9342

Secondary Contact: Kevin M. Lynch (212) 264-6194

Main PRPs: Occidental Chemical Corporation, Ruco Polymer Corporation

WASTE

Waste type: Various volatile, semi-volatile, inorganics and tentatively identified compounds (TICs)

Waste origin: Chemical manufacturing and processing.

Estimated waste quantity: Groundwater: Estimated volume to be pumped and treated annually is 53,000,000 gal. Deep Soils: between 20,000 and 30,340 cubic yds. Shallow Soils: between 445 cubic yds. and 710 cubic yds.

Contaminated medium: Groundwater, deep soils (below 10 feet) and surficial soils.

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SITE NAME, LOCATION AND DESCRIPTION

The Hooker Chemical/Ruco Polymer Site (Hooker/Ruco) is located in Hicksville, Township of Oyster Bay, Nassau County, New York, approximately 25 miles east of New York City (see Figure 1). The Site is an active chemical manufacturing facility in a heavily industrialized section of Hicksville. The plant, currently owned and operated by the Ruco Polymer Corporation (Ruco), contains six buildings for the manufacture and storage of chemical products (Plants 1,2,3, the Pilot Plant, a warehouse, and an administration building)(see Figure 2). The remainder of the 14 acre Site contains parking areas, chemical storage tanks, four recharge basins (sumps) and small ancillary buildings. The facility currently employs 96 personnel and manufactures polyester, polyols and powder coating resins.

The major facilities in the industrial zone near the Ruco facility are the Grumman Aerospace Corporation (Grumman), Bethpage manufacturing facility and airport, and the Naval Weapons Industrial Reserve Plant (NWIRP). There are other small industries, commercial operations, utilities, and transportation corridors and stormwater management basins in the area. Residential neighborhoods are in close proximity to, and surround the industrial area. The Hooker/Ruco Site is physically bounded by the Long Island Railroad (LIRR) tracks to the southwest, New South Road to the West, Commerce Street to the north and the Grumman facility to the east and south.

The 14 acre triangular shaped Hooker/Ruco facility is composed of parking areas, undeveloped land, industrial buildings and chemical storage structures. As shown on Figure 2, Commerce Street and adjacent industrial development comprise the 880 foot northern Site boundary. Along the facility's 1,000 foot eastern side is a large warehouse building owned by Grumman. A small portion of undeveloped Grumman land abuts the facility's 250 foot southern property boundary. Two active tracks of the LIRR parallel the facility's 940 foot southwestern property boundary. The facility is bounded on the 270 foot western boundary by New South Road. The property line is demarcated by a chain-link fence which completely encompasses the Hooker/Ruco facility.

Vehicular access to the Site is via New South Road. South and southeast of the parking lot area is approximately 3 acres of undeveloped land. Access to the active plant site is along a paved roadway passing a security building and freight scales. The paved roadway extends to the central, eastern and southern portions of the Site.

In addition to vehicular traffic, a spur of the LIRR enters the property's southwestern boundary. The rail spur, once on the facility, splits into two diverging sidings, one that progresses east toward the corners of Plants 2 and 3, and the other siding angling south between Plant 1 and the warehouse.

Plant 1, located in the south/central portion on the facility, is the largest structure, comprising approximately 44,800 square feet. The single story brick building, built in 1945, consists of manufacturing and latex storage.

A small office complex was added to the building's front side in 1964 and houses the plant's engineering division. The northern portion of Plant 1 contains a small laboratory.

Adjacent to, but south of Plant 1, is a warehouse, constructed of sheet metal, installed in 1952 covering approximately 12,000 square feet. The warehouse is used for storage of raw and finished stock. A loading dock for shipping and receiving is located in the northern portion of the building.

Northeast of Plant 1 is a small, approximately 2,300 square foot, brick and sheet metal structure, termed the Pilot Plant. The Pilot Plant, installed in 1945, is an independent facility used to pilot test new/emerging products prior to full production.

South of Plant 1 is the ester tank farm which has been inactive since 1982. The tank farm consists of five 10,000 gallon and eight 5,000 gallon horizontal storage tanks housed in concrete saddles. The entire tank farm is surrounded by a concrete dike. The storage of product, however, has been discontinued in the tank farm and storage of esters and higher alcohols is currently in four silos adjacent to Plant 1.

The Plant 2 complex is located in the north/central portion of the Site and is composed of Plant 2, the adjacent tank farm and cold room building. Plant 2, built in 1956, is composed of the filter storage and reactor buildings covering approximately 11,000 square feet. The filter storage building in the southern portion of Plant 2 contains offices, a small laboratory and maintenance, with the rotary drier associated with production in the rear of the building. Adjacent, in the northern half of Plant 2, are a series of chemical reactors used in the production stages of manufacturing. Because of the reactor's dimensions, the northern half of Plant 2 is a two story building.

North of Plant 2 is an above-ground tank farm, previously used to store raw plastic stocks, and currently storing solvents and alcohols. The tank farm consists of a 30,000 gallon, two 25,000 gallon and three 15,000 gallon above-ground horizontal storage tanks. These storage tanks are surrounded and separated by a 5 foot earthen dike. Just to the east of the tank farm is a small, 300 square foot refrigerated building, termed the cold room. The cold room was an integral part of the discontinued plastic manufacturing process.

Plant 3 is an approximately 10,800 square foot, two story, sheet metal building, located in the central portion of the facility. Plant 3 is primarily used for raw and finished stock storage. Adjacent to Plant 3, along the building's south side, are five 100,000 gallon silos used for product storage.

The administration building is approximately 7,700 square feet and is located along the Site's northern boundary. The administration building, formerly the plastic research and development complex, has been converted from a laboratory to offices for corporate accounting and production personnel. The rear of the building was discontinued in 1975. With the exception of the ester tank farm, all of the structures on the facility are currently in use.

Four surfacewater sump basins are located along the facility's eastern property boundary. Sumps one and two are located in the southern portion of the facility, southeast of Plant 1. Sump one is approximately 5 feet deep, has been partially backfilled and contains a series of six concrete settling basins. Sump 2 is adjacent to sump 1. Sump three, installed in 1968, is located east of the pilot plant and contains surface water derived from plant runoff. Sump four, located east of Plant 2, also contains standing surface water. The interior of sump four has been subdivided into three substructures by an earthen dike.

Sumps five and six have been backfilled to grade surface and are not topographically represented. Sump five was approximately 5,000 square feet and square in shape. The sump was located adjacent to sump four in the area between Plant 2 and the cold room. Sump six was a rectangular shaped sump along the Site's northeastern-most boundary and covered approximately 8,000 square feet.

Water supply at the Site is now derived from city water mains running beneath the Site from New South Road. A 150,000 gallon tank and two 400 square feet cooling water towers are located along the facility's eastern boundary. Miscellaneous structures, including a pump house and two maintenance garages, are located in the vicinity adjacent to sump three. Off-site electrical power is brought on-site via above-ground utility poles and below grade electrical lines. Three transformer vaults distribute the electricity to individual buildings. The transformer vault, adjacent to Plant 1, consists of a bank of three 333KVA transformer banks. The facility is currently served by a public sanitary sewer system. In the past, septic waste was discharged to on-site septic systems.

The relatively level surface of the Site slopes gently to the south. The Site surface is primarily permeable except for the presence of the buildings and limited paved areas. Surface water from precipitation drains from the buildings, paved areas and other areas of the Site into a recharge basin (sump three) located along the eastern edge of the Site.

There are three major aquifers underlying the Site. These are: the unconfined Upper Glacial aquifer; the semi-confined Magothy aquifer; and, the confined Lloyd Sand aquifer. The total thickness of these three aquifers beneath the Site is approximately 1,200 feet. The two aquifers of environmental concern for this Site are the Upper Glacial and the Magothy, since the Lloyd Sand is a deep aquifer (1000 feet) and not hydrogeologically connected to the above aquifers. Studies have indicated that the Upper Glacial and Magothy aquifers are hydrogeologically connected under the Site. The Magothy aquifer is totally dependent upon downward percolating rainfall and recharge from the overlying Upper Glacial deposits for its surface replenishment.

The Raritan Formation is an Upper Cretaceous age coastal plain deposit which lies unconformably on the bedrock below and consists of two members. The lower member is the Lloyd Sand, the top of which is about 750 below sea level. This is a stratified deposit of sand, gravel, sandy clay, silt and clay generally occurring in discontinuous and lenticular beds. The upper member is the Raritan Clay, which is composed of primarily silt and clay, but which has some lenses of sand and clayey sand. The Raritan Clay functions as an aquiclude, separating the ground water within the Lloyd Sand from the ground water within the overlying Magothy Formation. Beneath the Site, the Lloyd Sand is approximately 200 to 300 feet thick and the relatively impermeable Raritan Clay is approximately 160 feet thick. The total formation thickness ranges from 300 to 600 feet and is the deepest unconsolidated deposit beneath the Site.

The Magothy Formation is a thick sequence of Upper Cretaceous age sediments which were deposited upon the underlying Raritan Formation. At the Site the Magothy Formation is approximately 680 feet thick and is composed of marine and terrestrially deposited, stratified, coastal plain sediments. The sediments are primarily fine sand, clayey sand, silt and clay, but may also contain discontinuous lenses of coarse sand and gravel.

Lying unconformably on the Magothy Formation are glacio-fluvial outwash deposits of Quaternary Age. These Pleistocene deposits which comprise the Upper Glacial aquifer deposits are approximately 30 to 50 feet thick directly under the Site. The Upper Glacial sediments consist of horizontally stratified beds of fine to coarse sands and gravel. The Magothy and the Upper Glacial aquifers have historically been distinguished by differences in sediment color, texture and composition.

The direction and relatively rapid rate of shallow (near the water table) groundwater flow beneath the Site is southerly. The water table at the Site was found to be between 50 to 60 feet below the surface. Deeper in to the Magothy aquifer, the groundwater flow is to the south with an easterly component of flow that results from the influence of high pumping rates at the Grumman facility adjacent to the Site.

Ground water supplies the public and private needs of the entire population of Nassau County. The two most commonly tapped aquifers for water supply purposes are the Upper Glacial and the Magothy. The Magothy aquifer is the primary source of potable drinking water in the area of the Site. Water is pumped from municipal supply wells to the homes and businesses in the vicinity of the Site. The Hicksville, Bethpage and Levittown Water Districts supply the businesses and residents in the vicinity of the Site as well as areas to the south. All of the local public supply wells are advanced to and completed within the Magothy aquifer. The nearest municipal well field is located upgradient at 2,000 feet to the north of the Site (Hicksville supply wells). The ground-water flow is to the south. Other municipal supply wells are located 3,500 feet to the west (Hicksville supply well) and 6,000 feet to the east (Bethpage supply well) of the Site. Municipal well fields located downgradient are 5,500 feet southwest (Hicksville and Levittown) and approximately 10,000 feet south-southeast (Bethpage supply wells) of the Site.

The industrial area, including the Site, as well as the surrounding residential areas are above the groundwater aquifer that supplies the surrounding communities with water. The aquifer on Long Island is designated a sole source aquifer.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Hooker/Ruco Site, located off of New South Road in Hicksville, was developed by the Rubber Corporation of America, a small privately held company. Operations at the Site began in 1945 and included natural latex storage, concentration and compounding. Five years later the company began producing small volumes of plasticizers. These activities were expanded and modified through the years. In 1956, a polyvinyl chloride plant was built and was initially operated under the name of Insular Chemical Corporation. At that time the two companies, Insular Chemical Corporation and the Rubber Company of America occupied the Site. Although they were two separate corporations, they shared the same pilot plant. The two companies eventually merged into the Rubber Corporation of America. In 1965, the company was purchased by the

Hooker Chemical Company and was known and operated as the Ruco Division. The Hooker Chemical Company has since undergone several name changes, with the current name being Occidental Chemical Corporation (Occidental or OCC). In 1982, the employees of the Ruco Division bought the company from Occidental and it became known as the Ruco Polymer Corporation (not affiliated with Occidental Chemical Company).

Since 1946, the facility was used for the production of various polymers, including polyvinyl chloride (PVC), styrene/butadiene latex, vinyl chloride/vinyl acetate copolymer, and polyurethane, as well as ester plasticizers. This facility is currently active, and manufactures such products as polyester, polyols and powder coating resins.

During Site operations between 1956 and 1975, industrial process wastewater and stormwater runoff from the facility was discharged to six (6) on-site recharge basins or sumps. This wastewater contained, among other things, vinyl chloride, trichloroethylene, barium and cadmium soap, vinyl acetate, organic acids, and styrene condensate. Drums containing various chemicals were also stored on-site where occasional spills would occur. As a result of these releases, groundwater beneath and downgradient from the Site has been contaminated. Limited areas of residual soils contamination exist above levels that would be considered protective of groundwater quality. Currently, only non-contact cooling water is discharged into sump four and sump three collects surfacewater runoff. From 1975 to 1991 a concrete settling basin was used to store ester waste prior to being incinerated on-site. Ester wastes are presently stored in an on-site, above ground tank prior to off-site disposal or incineration on-site. Hazardous wastes are stored in drums on-site until they are disposed of at a permitted off-site facility.

From 1946 to 1978, the pilot plant used a heat transfer fluid called Therminol, which contained PCBs. During the operation of the facility, there was a release of PCBs to the soil adjacent to the pilot plant. Some of this contaminated soil was spread to surrounding areas by surfacewater run-off, sediment transport, and truck traffic. Occidental has conducted several investigations, since 1984, to determine the extent of PCB and other soils and groundwater contamination at the Ruco Polymer plant. In 1989, an underground fuel oil storage tank adjacent to Plant 1 was removed, and the soils surrounding the tank were excavated, sampled, and found to be contaminated with PCBs. These excavated soils were covered with plastic sheeting, pending the remediation of the other PCB-contaminated soils on the Site.

Initial investigations were started at the Hooker/Ruco Site in 1978. Originally efforts were directed towards understanding past manufacturing processes, waste generation and disposal. A Site background report was prepared in 1981. This report presented the Site in the context of its surroundings and examined waste disposal, regional geology and hydrogeology, and regional water withdrawals and water quality. At that time the New York State Department of Environmental Conservation (NYSDEC) was the lead government agency. A work plan for conducting a soils and groundwater investigation was submitted to the NYSDEC in 1983. This work plan was approved in 1983 and the investigation commenced. The investigation consisted of installing and sampling six groundwater monitoring well clusters at locations downgradient of suspected areas of waste disposal, the drilling and sampling of two deep test borings in formerly active sumps, and drilling and sampling four shallow borings in the vicinity of the reported Therminol spill. The results of this study were presented in a report entitled "Report of Groundwater & Soils Investigation at the Former Ruco Division Plant Site, Hicksville, New York", dated August 1984.

These initial investigations led to the Site being placed on the National Priorities List (NPL) in 1984.

In March 1985, four additional borings were drilled and sampled in the Therminol spill area, and in May 1985, a second round of groundwater samples were obtained. The results of these investigations were presented in a report entitled "Report of Groundwater & Soils Investigation at the Former Ruco Division Plantsite, Hicksville, New York: Second Round of Sampling", dated February 1986.

From 1986 through September 1988, several sampling programs were undertaken to further define the extent of PCBs in the shallow soils around the pilot plant, and in soils excavated during the underground storage tank removal. The results of these programs were presented in progress reports dated January 1987, July 1987, December 1987, February 1988 and June 1988. These data are summarized in the "Focused Feasibility Study for Remediation of Soils Containing Aroclor 1248" dated August 1989.

In July 1988, EPA sent OCC a request for information on the Hooker/Ruco Site. A response to the EPA request for information was submitted in September 1988.

Initially, negotiations by NYSDEC and EPA failed to reach a settlement with the potentially responsible parties (Occidental Chemical and Ruco Polymer) to conduct the Remedial Investigation/Feasibility Study (RI/FS) for the Site. Therefore, EPA issued a work assignment to its contractor, Ebasco Services Inc., to prepare a work plan and conduct the RI/FS. However, in September 1988, after the work plan was finalized, Occidental agreed to perform the work. OCC entered into an Administrative Order on Consent with EPA in September 1988. Subsequently, a Field Operations Plan, based on the Ebasco Work Plan, was submitted for EPA review in October 1988. In September 1989, RI/FS field work commenced. Field work was completed in February 1990 and a draft RI Report was submitted in April 1990. Portions of the RI Report pertaining to the PCB contaminated areas were approved to expedite the remediation of those areas. The final, complete RI report was approved in December of 1992.

An FS outline for operable unit 1 (OU 1) was submitted December 18, 1992 containing the preliminary groundwater and soils treatment alternatives. The Draft FS was received April 17, 1993 and reviewed by the EPA and NYSDEC. The Revised FS Report was received on July 18, 1993 and the Final FS report was approved in August 1993. The RI Report, the FS Report, Proposed Plan and Responsiveness Summary, along with other Site related documents, provide the basis for this Record Of Decision.

In order to expedite action to deal with the most immediate human health threats at the Site first, separate distinct phases or "operable units (OUs)" were established. The Ous for this Site are divided as follows:

" OU 1: Covers the majority of the Ruco property; soil and groundwater contamination from previous disposal activities.

" OU 2: Addressed the PCB-contaminated soils.

" A third area of concern is the contaminated groundwater, downgradient of the Ruco property boundary.

Occidental proposed to perform an early action to remediate the PCB contaminated areas separately in 1989 (while the RI was underway). To support such an action, Occidental prepared a Focused Feasibility Study (FFS) which analyzed alternatives to address the PCB-contaminated areas on the Site. Given that the PCB-contaminated areas had been defined by previous investigations, and the technologies for treatment were different from the rest of the Site, the PCB excavation was designated as OU 2.

OU 2 for this Site covered an area surrounding the pilot plant building and a portion of sump three which was contaminated by PCBs. A ROD addressing OU 2 was issued on September 28, 1990. The Special Notice letter for the implementation of the remedial design/remedial action (RD/RA) and the draft Consent Decree were sent to OCC and Ruco Polymer on December 20, 1990. A Good Faith Offer to perform the RD/RA and to enter into a Consent Decree was received from Occidental on February 27, 1991. A response was also received from Ruco Polymer, expressing their willingness to cooperate with EPA and Occidental (Occidental has assumed responsibility for environmental matters at the Site).

Occidental formally rejected EPA's offer to enter into a Consent Decree in a letter dated June 5, 1991. A Unilateral Administrative Order was signed by the Regional Administrator on June 27, 1991. Notices of Intent to Comply with the order were submitted by both Occidental and Ruco Polymer (both letters are dated July 16, 1991) and were received by EPA on July 17, 1991. Due to deficiencies in its original submittal, Ruco Polymer submitted a revised Notice of Intent to Comply (dated July 26, 1991).

The RD/RA Work Plan Outline was received on May 13, 1991, followed by the RD/RA Work Plan (Remedial Design) in July, 1991. Final RD/RA Work Plan approval was given on April 24, 1992. Mobilization for the execution of the Remedial Action of OU 2 took place on May 4, 1992. All operations of the work were monitored by an EPA oversight contractor. Notice from Occidental for Final Inspection was received on July 22, 1992. An Inspection visit was made on September 3, 1992 at which time all restoration was completed.

Occidental's Remedial Action Report was received on October 19, 1992 and final approval was issued on March 12, 1993. This concluded the activities associated with OU 2.

Upon completion of the Remedial Action of OU 2, four areas of PCB contaminated soils surrounding the pilot plant were addressed. They were: 1) the direct spill area; 2) transport related areas; 3) the previously excavated soils; and, 4) the impacted recharge basin (sump three) (See Figure 3).

The volumes of PCB-contaminated soils that were removed during the Remedial Action of OU 2 were as follows:

10 ppm - 500 ppm = 3,230 tons (1,957 cu.yds.)

500+ ppm = 85.2 tons (52 cu.yds)

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The RI report, FS report, and the Proposed Plan for the Site were released to the public for comment on August 23, 1993. These documents were made available to the public in the administrative record file at the EPA Docket Room in Region II, New York and the information repository at the Hicksville Public Library, 169 Jerusalem Avenue, Hicksville, New York. The notice of availability for the above-referenced documents was published in the Nassau County edition of "Newsday" on August 23, 1993. The public comment period on these documents was held from August 23, 1993 to September 22, 1993. As per a request, the comment period was extended 30 days to October 22, 1993.

On September 8, 1993, EPA and NYSDEC conducted a public meeting at the Hicksville Elks Lodge, No. 1931, 80 East Barclay Street, Hicksville, New York to inform local officials and interested citizens about the Superfund process, to review current and planned remedial activities at the Site, and to respond to any questions from area residents and other attendees.

Responses to the comments received at the public meeting and in writing during the public comment period are included in the Responsiveness Summary (see Appendix V).

SCOPE AND ROLE OF OPERABLE UNIT

As discussed previously, this Site has been separated into two (and possibly three) operable units or OUs.

- OU 1: Covers the majority of the Site; soils and groundwater contamination from previous disposal activities.

- OU 2: PCB-contaminated soils surrounding the pilot plant and in sump three.

- A third area of concern that has not been officially designated as an OU: Contaminated groundwater, downgradient of the Ruco property boundary.

This decision document addresses the first OU. The RI Report for OU 1 was approved in December 1992 by EPA. The RI identified groundwater beneath the Ruco property above New York State groundwater quality standards, NYS drinking water standards and Federal MCLs. The RI has also identified limited areas of soils on the property that need to be remediated to protect the groundwater quality. Additional limited areas of soils have been identified that may potentially need to be remediated to protect groundwater quality. Therefore, OU 1 will address the control (and remediation) of the groundwater beneath the Ruco property and the soils in the following areas: 1) the soils beneath sump one, 2) the surficial soils in the former drum storage area; and, based on additional sampling, possibly 3) the soils beneath sump 2, and 4) the surficial soils around monitoring well E. The FS Report, which identifies and describes various alternatives for addressing the contamination in the areas identified above, was approved in August of 1993.

As mentioned above, the second OU has been completed.

The larger problem associated with this Site and the adjacent sites (Grumman and the Navy), is the existence of downgradient groundwater contamination. This is the third area of concern stated above. The EPA and NYSDEC are currently coordinating activities concerning the RI/FS of the groundwater contamination that has migrated downgradient from the Ruco property boundary and the Grumman and Navy facilities. The EPA and NYSDEC have identified three sites that have and are currently contributing to the groundwater contamination including: the Hooker/Ruco (EPA lead), Grumman (NYS lead) and the Navy (NYS lead with involvement of EPA's Federal Facilities and RCRA Divisions) sites. The agencies are managing their sites by using source control measures at each site (e.g., OU 1 and OU 2 for the Hooker/Ruco Site), then addressing the downgradient groundwater contamination problem separately, and in addition to, the source control. A regional approach to the groundwater contamination problem is being applied. NYSDEC and the EPA are coordinating the downgradient contamination investigation and remedial actions for the three sites to avoid duplication of efforts. Much of the investigation field work has been completed already. It is expected that it will be approximately one year before EPA and NYSDEC select a remedy for the groundwater problem. In the interim, actions have been taken to provide protection of the public water supply. A treatment system has been installed at one of the Bethpage Water District's (BWD) supply plants, additional treatment systems are being designed for two other BWD supply plants and monitoring wells are being installed to detect contaminants as they approach other supply wells. Sampling of the water supply is being conducted on a quarterly basis at most of the wells. The BWD is testing their water on a more frequent basis (approximately on a monthly basis).

Other actions on the Ruco property are being initiated to address potential buried materials in the soil. The electromagnetic survey conducted during the RI indicated the presence of magnetic anomalies in the subsurface soils. The presence of such anomalies may indicate buried metallic objects such as a tank or drum. A Work Plan was submitted by Occidental and approved by the EPA in August 1993, to further investigate these anomalies and remove any buried objects that may present a potential source of contamination. The field work to investigate the magnetic anomalies began in September of 1993. At one of the three anomaly locations, three buried tanks were uncovered. The EPA is currently waiting for the analytical results from samples collected in the tanks to execute proper disposal of the tanks. Additionally, investigations of buried materials in the soils between the Pilot Plant and Plant 2, not associated with the magnetic anomalies, will be conducted which may involve the excavation of test pits or trenches. A Work Plan to address these areas is expected to be approved in February of 1994. These actions are not being conducted as part of a specific OU. Instead, they are being treated as removal-type response actions to facilitate quick action.

The EPA has been the lead agency for this Site with support from the NYSDEC since 1988.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives are specific goals to protect human health and the environment. These objectives are based on available information and standards such as applicable, or relevant and appropriate requirements (ARARs) and risk-based levels established in the risk assessment.

The following remedial action objectives were established:

Groundwater

The Risk Assessment has identified a number of contaminants of concern (COCs) in the groundwater. These contaminants are listed in the Risk Assessment Summary Section. The contaminants in the groundwater pose a **future** carcinogenic and noncarcinogenic health risk to residents who may reside at the downgradient (southern) Ruco property fenceline. These contaminants in groundwater are subject to a number of regulations for cleanup and discharge. These regulations include the New York State Water Quality Regulations, specifically, 6 NYCRR and 10 NYCRR as well as Federal Maximum Contaminant Levels (MCLs). A complete list of the ARARs is included in Table 1. The specific ARARs identifying the groundwater cleanup and discharge criteria are presented in Tables 2 and 3 respectively. The treatment of groundwater will also address compounds which are not COCs, but exceed the ARARs.

Therefore, the specific Remedial Action Objectives for groundwater are the reduction of risks to human health associated with potential exposure to Site related compounds by controlling the migration of groundwater downgradient from the Ruco property and attaining the groundwater cleanup criteria established by ARARs beneath the Ruco facility.

Deep and Shallow Soils

Risks associated with direct exposure to the contaminants remaining in Site soils were within the acceptable risk range for the exposure scenarios considered. However, contaminant concentrations in the soils of the former drum storage area, sump one and possibly the area around monitoring well E and sump two are, or are suspected to be, above levels that would be protective of the groundwater quality. This means that, unless remediated, the soil could continue to act as a source of contamination to the groundwater. The NYSDEC has developed soil cleanup criteria that they consider to be protective of groundwater quality. This criteria, established in NYSDEC's Technical and Administrative Guidance Memorandum (TAGM), will be used as a to-be-considered (TBC) goal in cleaning up soils at the Site (Table 4). The TBC values are not promulgated regulations and therefore, are not considered ARARs. As TBCs, they are not enforceable standards but may be used as one of the criteria in determining whether the remedial action objectives have been met. The EPA has also identified the shallow (0'- 5') soils in the former drum storage area as a potential hazard that would require remediation. These soils, particularly the area around soil boring TB-10, displayed high concentrations of TICs. The risk to Site workers and others from these TICs is unknown (can not be quantified), however, the combined risk of the TICs with the quantified soils risk identified in the Risks Assessment provides additional justification for remedial action.

Therefore, the Remedial Action Objectives for soils at the Site are the protection of the sole source aquifer groundwater quality, and ultimately human health, as well as limiting exposure to surficial soil contaminants.

SUMMARY OF SITE CHARACTERISTICS

The RI, combined with previous studies, resulted in the characterization of the environmental conditions on the Ruco property. Sampling of all media including air, soil vapor, soils, surface water, sediment and groundwater has identified areas of potential environmental concern. The following briefly summarizes the results of the sampling conducted during the RI:

<u>Soil Vapor:</u> Soil-vapor sampling and analysis for volatile organics was performed at 80 locations throughout the Site (See Figure 4) using a photoionization detector (PID) with gas chromatograph (GC) confirmation. The results of the soil-vapor analysis did not reveal any area of soils with levels of volatile organic vapors above background, or additional areas of the plant soils requiring further environmental sampling.

<u>Electromagnetic Survey:</u> A geophysical investigation consisting of an electromagnetic(EM)-terrain conductivity survey was conducted in the northwestern and northeastern areas of the Site based on historical information indicating the possible presence of buried objects (tanks or tanker cars or drums) in these areas. Both in-phase and quadraphase conductivity results were collected during the investigation. The results of the survey indicated that two anomalies were detected in the northwestern section of the Site. One anomaly was located approximately 100 to 180 feet south of the parking lot area oriented in an east to west direction. This location corresponds with the historical description of the location of three buried latex tanks. A second anomaly was located 60 to 80 feet south of plant 3. This anomaly however, was less pronounced with readings that did not conclude an axial trend or distinctive shape. This may be more indicative of subtle geological changes (e.g., fill) at this location rather than a subsurface conductor (see Figure 5).

Two negative anomalies were also detected in the northeastern area of the Site during the investigation. The location of the first anomaly in the northeast corner corresponds with the general description of the location of the latex trailer buried in 1962. Quadraphase readings, however, failed to show a significant axial trend of the buried conductor. The second anomaly was indicative of below-ground piping. The axial trend of this anomaly was northeast-southwest. Further review of the plan's engineering drawings showed that the readings correspond with the presence of two 6 inch water mains (See Figure 6).

<u>Sump Sediments:</u> The sediments from sumps three and four contained low levels of chemicals associated with the Site's past and current activities. Sump three contained phthalates, toluene, xylene, ethylbenzene, trichloroethylene (TCE) and polyaromatic hydrocarbons (PAH)s all below levels considered protective of groundwater quality. PCBs were also detected in the sediments of sump three. These PCB contaminated soils were subsequently removed as part of the remedial action for OU 2. Sump four sediments contained PAH's, phthalates, xylene, toluene, ethylbenzene, benzoic acid and 1,2-dichloroethylene (1,2-DCE) at levels below concentrations considered protective of groundwater. (i.e., The concentrations of the compounds detected in the soil were below the TBC criteria, and therefore, do not pose a threat to the groundwater. Concentrations of contaminants in soils which exceed the TBC criteria would not be considered to be protective of groundwater.) These sediments also contained tentatively identified compounds or TICs.

These sumps received surface water runoff from active areas of the plant and process wastewaters from production processes which contained low levels of chemicals. Currently sump three receives surface water run-off from active areas of the plant which can contain low levels of chemical compounds, as evidenced in the surface water analyses. Low-level accumulation of these chemicals in the sediments is a continuing process related to current plant activity. Sump four currently receives the "blowdown" from the non-contact cooling water tower. Both of these outfalls are State Pollutant Discharge Elimination System (SPDES) permitted.

Shallow Soils: Soil borings were performed at approximately 50 locations across the Ruco property with over 150 samples collected and analyzed (see Figures 7 & 8). The investigation identified sporadic, low-level occurrences of chemicals in the surficial soil throughout the active plant areas including the fill in former sumps five and six. Shallow soils in the former drum storage area, particularly in the area of boring number 10 (TB-10) (Figure 7), contained TICs at levels that were of some concern. Because very little or no risk information exists for these compounds, and TICs have been detected in the groundwater, the soils in this area have been identified as requiring remediation. In 1984, a soil boring performed in the area of monitoring well E indicated the presence of tetrachloroethylene (PCE) at 244 ppm at the surface (Figure 9). This level is not considered to be protective of groundwater. However, since the boring was performed some time ago, additional boring(s) will be required to confirm the presence of PCE in this area. The occurrence of PCBs in shallow soils was completely defined and was the subject of a FFS, Proposed Plan and ROD. These soils were remediated as part of the remedial action executed for OU 2.
Deep Soils: The deep soils (below 12 feet) beneath former sump five did **not** reveal the presence of contaminants above concentrations considered protective of groundwater. The deep soils beneath sump six also contained volatile organics, toluene and ethylbenzene below concentrations considered protective of groundwater. The deep soils beneath sumps three and four did not detect elevated levels of contaminants (see Figure 10).

The deep soils beneath sump one contained compounds such as TCE, PCE, 1,2-DCE, phthalates, ethylbenzene, toulene, xylene and phenols at levels that could potentially continue to go into solution and enter the groundwater system. TICs were also detected at elevated levels in the soils. The soils beneath sump one represent a "hot spot" or a concentrated area of elevated contaminant levels.

The analytical information obtained during the RI did not indicate the presence of chemicals in the surficial (0' - 10') soils of sump two above levels that are considered protective of groundwater. However, additional sampling will be required for the deeper soils of sump two to confirm the presence or absence of potential contaminants.

Groundwater: A total of 32 monitoring wells have been installed at the Site (see Figure 9). Some of these wells were installed prior to the RI and some were installed as part of the RI. The wells are located on, or in the immediate vicinity of the Ruco property and monitor the upper portions of the Magothy aquifer (135' below the water table) and the unconfined Upper Glacial aquifer (water table). Based on the sampling conducted prior to, and during the RI, the evidence indicates that groundwater beneath the Ruco property contains chemical constituents above the New York State (NYS) drinking water standards, NYS groundwater quality standards and EPA maximum contaminant levels (MCLs). Ground-water containing vinyl chloride monomer (VCM), PCE, DCE, TCE, TICs and arsenic, is moving downgradient from the Ruco property. Available information from the RI and other investigations indicates there are regional occurrences of chloroethylenes and that additional sources of these contaminants are present. Low levels of some of the chloroethylenes have been detected upgradient from the Ruco property. (See Figures 11,12,13.)

Surface Water: The surface water existing in sump three contained no chemicals except for low levels of bis-2-ethylhexyl phthalate which is related to the surface water runoff from the active plant areas. Sump four contained TICs and PCBs which are most likely related to surface water run-off at the Site as PCBs were not detected in the sediments of sump four.

Air: Air sampling was conducted at the Site on two separate occasions during the Remedial Investigation at both upwind and downwind locations (see Figure 14). Samples were analyzed for specific volatile organics which were PCE, TCE, 1,2-DCE and VCM. These compounds were not detected. Analysis was also performed for respirable particulates which were below the ACGIH threshold limit values of 0.15 mg/m^3. Samples were collected and analyzed for aroclor on particulates. Aroclor 1248 was detected at 0.00005 mg/m^3 at one upwind location. The other samples collected showed no detections during either sampling event.

In summation, the results of the Remedial Investigation conducted at the Hooker/Ruco Site indicate the past disposal practices of discharging process wastewater to the sumps has contaminated the soils and groundwater on the Ruco property. Sampling at the Site indicates the presence of volatile and semi-volatile organic contaminants in the deep soils beneath sump one and the surface soils in the former drum storage area above levels considered protective of groundwater quality. Two additional areas of the property have been identified as potential sources of contamination. These areas are the soils beneath sump two and the surface soils near monitoring well E. Additional sampling will be required to verify the presence of contaminants in these areas and determine if concentrations are above levels protective of groundwater. If this is the case, the soils beneath sump two and surface soils around well E will also be addressed by this remedy.

SUMMARY OF SITE RISKS

The following Tables are included in Appendix II for the risk assessment discussion below:

Table a:

Contaminants of concern which indicate the frequency of detection are included in Table a. The range of concentrations detected, 95% upper confidence levels (95% UCL), concentration value used in the risk assessment (if other than 95% UCL) are included in Table g.

Table b:

Exposure pathways considered, pathways quantitatively evaluated clearly distinguishing between current and future land-uses, populations evaluated (i.e., children, adults) and the rationale for selection or exclusion of a pathway.

Table c:

Noncarcinogenic toxicity values-oral and inhalation and subchronic, if applicable.

Table d:

Noncarcinogenic risk estimates for each exposure pathway and receptor assessed. Total Site risk.

Table e:

Carcinogenic toxicity values - oral and inhalation, if applicable.

Table f:

Carcinogenic risk estimates for each exposure pathway and receptor assessed. Total Site risk.

Table g:

Contaminant concentration data, by medium, used in the environmental evaluation (assessment of risk to non-human receptors).

Table h:

List of exposure assumptions.

Table i:

List of cumulative Site risks.

EPA conducted a baseline risk assessment to evaluate the potential risks to human health and the environment associated with the Hooker Chemical/Ruco Polymer Site in its current and future states. The Risk Assessment focused on contaminants in the air, sediment, surface water, soils and groundwater which are likely to pose significant risks to human health and the environment. The summary of the contaminants of concern (COC) in sampled matrices are listed in Tables a and g for human health and the environmental receptors, respectively.

EPA's baseline risk assessment addressed the potential risks to human health by identifying several potential exposure pathways by which the public may be exposed to contaminant releases at the Site under current and future land-use conditions. Air, soil, sediment, surface water, and groundwater exposures were assessed for both potential present and future land use scenarios. The current land use scenario evaluated the surface water pathway for Site workers and child trespassers (ages 10-18) through dermal contact. Sediment ingestion, inhalation and dermal contact by Site workers and child trespassers was also evaluated under the current land use scenario. The surface soil medium evaluation included the ingestion, inhalation and dermal contact pathways for Site workers and child trespassers. Off-site residents were also included for the inhalation pathway under the current land-use scenario. Finally, the current land-use scenario considered the air inhalation exposure pathway for Site workers, child trespassers and off-site residents. The future land-use scenarios evaluated the groundwater ingestion, inhalation and dermal contact pathways for adult and child residents. Dermal contact of surface water by Site workers and child trespassers was also considered in the future scenario. The ingestion, inhalation and dermal contact of Site sediments (sumps three and four) by Site workers and child trespassers was evaluated. For the surface soils, ingestion, inhalation and dermal contact were considered for construction workers (future construction at the Site), Site workers, and child trespassers. The future land-use also evaluated the inhalation of surface soils pathway for off-site residents. The subsurface soils were evaluated under the future land-use scenario for ingestion, inhalation and dermal contact by construction workers. The final pathway considered for the future-use scenario was the air inhalation exposure pathway for Site workers, child trespassers, off-site residents, and construction workers. The exposure pathways considered under current and future uses are listed in Table b. The reasonable maximum exposure was evaluated.

Under current EPA guidelines, the likelihood of carcinogenic (cancer-causing) and noncarcinogenic effects due to exposure to Site chemicals are considered separately. It was assumed that the toxic effects of the Site-related chemicals would be additive. Thus, carcinogenic and noncarcinogenic risks associated with exposures to individual compounds of concern were summed to indicate the potential risks associated with mixtures of potential carcinogens and noncarcinogens, respectively.

Noncarcinogenic risks were assessed using a hazard index (HI) approach, based on a comparison of expected contaminant intakes and safe levels of intake (Reference Doses). Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects. RfDs, which are expressed in units of mg/kg-day, are estimates of daily exposure levels for humans which are thought to be safe over a lifetime (including sensitive individuals). Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) are compared to the RfD to derive the hazard quotient for the contaminant in the particular medium. The HI is obtained by adding the hazard quotients for all compounds across all media that impact a particular receptor population.

An HI greater than 1.0 indicates that the potential exists for noncarcinogenic health effects to occur as a result of Site-related exposures. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media. The reference doses for the compounds of concern at the Site are presented in Table c. A summary of the noncarcinogenic risks associated with these chemicals across various exposure pathways is found in Table d.

It can be seen from Table d that the HI for noncarcinogenic effects from groundwater ingestion under the reasonable maximum exposure for children and adults is 1.02 x 10^1 and 4.89 respectively. Therefore, noncarcinogenic effects may occur from the exposure routes evaluated in the Risk Assessment. The noncarcinogenic risk was attributable to several compounds including antimony and arsenic.

Potential carcinogenic risks were evaluated using the cancer slope factors developed by EPA for the contaminants of concern. Cancer slope factors (SFs) have been developed by EPA's Carcinogenic Risk Assessment Verification Endeavor for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. SFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to generate an upper-bound estimate of the excess lifetime cancer risk associated with exposure to the compound at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the SF. Use of this approach makes the underestimation of the risk highly unlikely. The SF for the compounds of concern are presented in Table e.

For known or suspected carcinogens, EPA considers excess upper-bound individual lifetime cancer risks of between 10^{-4} to 10^{-6} to be acceptable. This level indicates that an individual has not greater than a one in ten thousand to one in a million chance of developing cancer as a result of Site-related exposure to a carcinogen over a 70-year period under specific exposure conditions at the Site. Under the future land-use scenario, the excess lifetime cancer risk for a child exposed to the highest levels of contaminants by ingesting the contaminated groundwater is 8.84 x 10^{-4}, which is above EPA's acceptable risk range. Under the same scenario, adult residents had an excess lifetime cancer risk of 2.21 x 10^{-3} attributable to ingestion of contaminated groundwater, and a risk of 5.06 x 10^{-4}, attributable to inhalation of the same contaminated groundwater.

Table i presents the reasonable maximum exposure pathway cumulative risk for present and future use scenarios at the Hooker/Ruco Site. Adult and child residents off-site (at the downgradient Ruco fenceline), Site workers, potential future construction workers and child trespassers are considered the populations with potential multiple pathways of exposure.

The present and future off-site resident exposures were assessed for the soil ingestion and inhalation scenarios. The future existence of residents at the fenceline exposure scenario was evaluated for all pathways including groundwater via the ingestion, inhalation and dermal contact routes, and inhalation and ingestion of airborne soil dust.

The combining of risk levels across pathways resulted in the greatest cumulative upper-bound cancer risk at the Site. For carcinogens, the combined reasonable maximum exposure to all adult (off-site and fenceline) residents yielded a potential carcinogenic risk of 2.83 x 10^{-3}. Potential noncarcinogenic health effects were exhibited, with an HI of 5.15. Similar results were obtained for child off-site resident exposures. Cumulative carcinogenic risk was estimated at 1.01 x 10^{-3}, and the noncarcinogenic HI was 1.04 x 10^1. These risks for carcinogens at the Site are above the EPA's acceptable risk range of 10^{-4} to 10^{-6} (see Table f). It should be noted that future fenceline resident adult potential carcinogenic risks were calculated at 2.21 x 10^{-3}, 5.06 x 10^{-4} and 1.12 x 10^{-4} for the groundwater ingestion, inhalation and dermal contact pathways, respectively. The risks for children are similar. These future, not current, scenarios constitute the majority of risks to residents. The estimated total risks are primarily due to vinyl chloride, tetrachloroethene, arsenic, berylium and bis(2-ethylhexyl)phthalate.

The risk calculations were based on the contaminants detected in on-site soils and groundwater monitoring wells. It was assumed that in the future groundwater supply wells would be installed at the downgradient Ruco fenceline and used for residential purposes. Exposure of residents to groundwater contaminants while showering (inhalation and dermal contact) and ingestion, utilizing reasonable maximum exposure conditions, contributed to the majority of the total cancer risk. Reasonable maximum exposure conditions due to inhalation of contaminated soil dust from the Site soils contributed very little to the total cancer risk. These estimates were developed by taking into account various conservative assumptions about the likelihood of a person being exposed to these media. For example, it was assumed that the Site's contaminant plume will migrate downgradient to a well installed by a resident who utilizes the well for potable water supply. This assumption would require the future development of the downgradient property, currently zoned industrial, to be residentially developed, and the installation of a private groundwater supply well which is currently prohibited by County regulations.

The results of the baseline risk assessment indicated that the current use of groundwater **at/beneath** the Ruco property was not a risk since no one uses the groundwater for domestic purposes. On the Ruco property, the soil pathway **alone** was also determined not to be a human health risk in both the current and future-use scenarios. However, the combined soil, sediment and surface water pathway for an on-site worker was estimated to be 2.05×10^{-4} which is near the upper limit of the risk range. The risks associated with the TICs in the on-site shallow soils could not be quantified due to the lack of existing toxicity information for these compounds. The risks to on-site workers from the TICs is therefore unknown. This unknown risk, combined with the cumulative cross-media quantified risks to Site workers is cause for potential concern.

Potential risks to the environmental receptors associated with the Hooker Ruco Polymer Site were identified in the ecological risk assessment. The ecological risk assessment identified no species, sensitive environments/resources as potential receptors threatened by the Site contaminants under current Site conditions. The reasonable maximum environmental exposure is evaluated. A four-step process is utilized for assessing Site-related ecological risks for a reasonable maximum exposure scenario: *Problem Formulation*--a qualitative evaluation of contaminant release, migration, and fate; identification of contaminants of concern, receptors, exposure pathways, and known ecological effects of the contaminants; and selection of endpoints for further study. *Exposure Assessment*--a quantitative evaluation of contaminant release, migration, and fate; characterization of exposure pathways and receptors; and measurement or estimation of exposure point concentrations. *Ecological Effects Assessment*--literature reviews, field studies, and toxicity tests, linking contaminant concentrations to effects on ecological receptors. *Risk Characterization*--measurement or estimation of both current and future adverse effects.

The ecological risk assessment began with evaluating the contaminants associated with the Site in conjunction with the Site-specific biological species/habitat information. The contaminants of concern at this Site are not expected to significantly impact any ecological receptors (plant or animal species or habitat).

The Site is fully developed as an industrial facility, and is surrounded by similar types of land use. There are no natural surface water bodies or wetlands within the Site vicinity. The contaminants of concern are found in the soils and groundwater which do not appear to be a habitat for any wildlife that may impact the food chain. The only observed animal life at the Site were transient Canadian geese, which are not expected to be part of the higher food chain, and therefore, any impacts to the geese from the Site are not expected to affect the area wildlife population. The risk assessment also considered whether there were present visible signs of impairment to the geese that were attributable to the contamination found at the Site. No visible signs were observed.

The results of the ecological risk assessment indicate that the contaminated soils and groundwater at the Site do not pose an unacceptable ecological risk.

Uncertainties

The procedures and inputs used to assess risks in this evaluation, as in all such assessments, are subject to a wide variety of uncertainties. In general, the main sources of uncertainty include:

- environmental chemistry sampling and analysis
- environmental parameter measurement
- fate and transport modeling
- exposure parameter estimation
- toxicological data.

Uncertainty in environmental sampling arises in part from the potentially uneven distribution of chemicals in the media sampled. Consequently, there is significant uncertainty as to the actual levels present. Environmental chemistry-analysis error can stem from several sources including the errors inherent in the analytical methods and characteristics of the matrix being sampled.

Uncertainties in the exposure assessment are related to estimates of how often an individual would actually come in contact with the chemicals of concern, the period of time over which such exposure would occur, and in the models used to estimate the concentrations of the chemicals of concern at the point of exposure.

Uncertainties in toxicological data occur in extrapolating both from animals to humans and from high to low doses of exposure, as well as from the difficulties in assessing the toxicity of a mixture of chemicals. These uncertainties are addressed by making conservative assumptions concerning risk and exposure parameters throughout the assessment. As a result, the Risk Assessment provides upper-bound estimates of the risks to populations near the Site, and is highly unlikely to underestimate actual risks related to the Site.

More specific information concerning public health risks, including a quantitative evaluation of the degree of risk associated with various exposure pathways, is presented in the Risk Assessment Report.

Actual or threatened releases of hazardous substances from this Site, if not addressed by the selected alternative or one of the other remedial measures considered, may present an imminent and substantial endangerment to the public health, welfare, and the environment.

DESCRIPTION OF REMEDIAL ALTERNATIVES

CERCLA requires that each selected Site remedy be protective of human health and the environment, be cost-effective, comply with other statutory laws, and utilize permanent solutions, alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. In addition, the statute includes a preference for the use of treatment as a principal element for the reduction of toxicity, mobility, or volume of the hazardous substances.

This Record of Decision evaluates in detail, four groundwater alternatives, four deep soil alternatives and three shallow soil remedial alternatives for addressing the contamination associated with the Hooker Chemical/Ruco Polymer Site.

Construction time refers to the time required to physically construct the remedial alternative. This does not include the time required to negotiate with the responsible parties for the remedial design and remedial action, or design the remedy.

GROUNDWATER

The remedial alternatives to address the groundwater medium are as follows:

Alternative 1: No Action

Capital Cost: $ 0
O & M Cost: $ 0
Present Worth Cost: $ 0
Construction Time: No construction is required for the no action alternative.

The Superfund program requires that the "no-action" alternative be considered as a baseline for comparison of other alternatives. This alternative has been included in order to provide a datum from which to evaluate the other alternatives. The no action alternative assumes no additional actions will be taken at the Hooker/Ruco Site to address groundwater contamination. Contaminated groundwater beneath the Ruco property would continue to move uncontrolled, downgradient and threaten public water supply wells. Contaminated soils at the Site would not be addressed by this alternative either. This would allow contaminants to contribute to the degradation of the groundwater quality by leaching from the soils. No institutional controls would be implemented which would provide no controls for groundwater use in the area or well restrictions. This alternative would not treat any quantity of the contaminated groundwater, requires no engineering components, treatment components, and has no costs associated with its implementation. The no action alternative is easily implemented as no effort would be required. The groundwater ARARs would not be met for this alternative.

Because this alternative would result in contaminants remaining on-site above health-based levels, CERCLA requires that the Site be reviewed every five years. If justified by the review, further remedial actions may be implemented to remove, treat or otherwise address the wastes.

Alternative 2: Deed Restrictions with Monitoring

Capital Cost: $ 39,000
O & M Cost: $ 37,000/year
Present Worth Cost:
- 10-year - $ 325,000
- 30-year - $ 608,000.

Construction Time: The time to implement this alternative reflects only the time required to obtain the necessary deed restrictions and well restrictions. This would require less than one year to implement.

Alternative 2 involves the use of institutional controls by obtaining deed restrictions or notations to limit the land use activities at the Ruco property, well permitting to restrict groundwater use and groundwater monitoring. Deed restrictions would be applied to restrict the development of the Ruco property to commercial/industrial uses only. This would be intended to prevent the future development of the Site for residential purposes and thereby reduce the potential for groundwater exposure beneath the Ruco facility. Deed restrictions would also be focused on preventing the drilling of groundwater supply wells or requiring treatment if wells were drilled. This would provide some degree of control on the groundwater use, well construction activities and control development of the Ruco property. Annual sampling of the existing monitoring wells on the Ruco property would provide an assessment of the groundwater contaminant concentrations and mobility. Annual status reports would be filed with the appropriate regulatory agencies. Implementation of the institutional controls might require the cooperation of the current property owner, Ruco Polymer Corporation, and mechanisms to ensure the future enforcement of such institutional controls. Controls for water use and well construction restrictions are currently in place in the form of a permit and approval process, Article IV of the Nassau County Public Health Ordinance, at the county level. Monitoring the status of the impacted groundwater by collection and analysis of samples is a standard technology that is easily implementable. This alternative does not involve the treatment of any portion of the contaminated groundwater or soils. Therefore, no engineering or treatment components are part of this alternative. ARARs would not be achieved for the groundwater with this alternative. Capital costs consist of legal fees for obtaining the deed notations and well permitting, while the O&M costs consist of annual monitoring costs.

Because this alternative would result in contaminants remaining on-site above health-based levels, CERCLA requires that the Site be reviewed every five years. If justified by the review, further remedial actions may be implemented to remove, treat or otherwise address the wastes.

Alternative 3: Groundwater Extraction and Treatment with Discharge to an On-Site Recharge Basin

Capital Cost: $ 4,748,000
O & M Cost: $ 549,000/year
Present Worth Cost:
- 10-year - $ 8,986,000
- 30-year - $ 13,185,000.
Construction Time: It is estimated that the time required to install the groundwater extraction wells, water treatment and discharge systems would be less than one year.

Under this alternative, groundwater would be pumped from extraction (recovery) wells and piped to a treatment system utilizing applicable technologies. The exact number of extraction wells and quantity of water to be pumped would be determined in the design phase of OU 1. Sufficient extraction rates to achieve a capture area capable of preventing contamination in the groundwater from moving beyond the Ruco property boundary would have to be established. This will require the performance of pump tests to measure the drawdown response in various monitoring wells. For the purposes of the FS, three 8 inch diameter extraction wells, at depths of 125 feet below grade (bg), screened from 40 bg to the bottom, and pumping at a combined rate of 100 gpm were used in the development of the groundwater extraction alternatives. The optimum technology or technologies to treat the pumped groundwater would also be determined during the design phase. Treatability studies will be required to evaluate which technologies will be most effective in treating the contaminants in the groundwater. However, for the purpose of evaluating this potential remedy, the FS Report was required to make some reasonable assumptions. These assumptions were based on groundwater modeling, current knowledge of existing waste treatment practices, availability, and standard engineering principles. At 100 gpm, this alternative would treat approximately 53,000,000 gallons of groundwater per year. The effluent from the groundwater treatment process would be discharged to sump three on the Ruco property. Deed restrictions and monitoring would also be applied as described in Alternative 2 above. The O&M would include electric power, servicing of pumps and motors, periodic well development, treatment system operation and annual monitoring.

The effectiveness of the proposed extraction wells was evaluated using the computer model described in Appendix B of the FS Report. According to the conceptual model, the recovery wells will prevent the downgradient migration of impacted groundwater. The treatment of the groundwater at the Ruco property would be expected to reduce the toxicity, mobility and volume of the waste permanently through treatment. Installing the extraction wells and treatment system is technically feasible as the necessary equipment, services and materials are readily available for constructing the systems. The groundwater treatment would comply with the substantive requirements of the ARARs for groundwater discharge criteria (SPDES permit process). The extraction and treatment systems would potentially be able to obtain the groundwater quality criteria in the aquifer or at least achieve upgradient contaminant levels.

This alternative is considered a long-term response action which may require up to 30 years or more to implement. Because this alternative may result in contaminants remaining on-site above health-based levels during it's implementation, CERCLA requires that the Site be reviewed every five years. If justified by the review, further remedial actions may be implemented to remove, treat or otherwise address the wastes.

Alternative 4: Groundwater Extraction and Treatment with Discharge to Leaching Galleries

Capital Cost: $ 4,867,000
O & M Cost: $ 549,000/year
Present Worth Cost:
- 10-year - $ 9,105,000
- 30-year - $ 13,304,000

Construction Time: The estimated time to construct this alternative would be less than one year.

The extraction and treatment of groundwater in this alternative is the same as described in Alternative 3 above. The only difference between Alternative 3 and this alternative would be the point of discharge for the treated groundwater. Under this alternative the treated groundwater would be discharged to leaching galleries on the Ruco property. The proposed leaching gallery area would be approximately 75 by 75 feet, would be completed to a depth of 5 feet, and be located behind the administration building on the Site. The effectiveness for this alternative is similar to Alternative 3. Leaching galleries are a proven means of water recharge and the geology in this area would be compatible to the use of this technology.

This alternative is technically feasible, with the implementation of the extraction and treatment processes being the same as Alternative 3. Additional piping and trenching would be required as well as the construction of the leaching galleries.

Because this alternative may result in contaminants remaining on-site above health-based levels during its implementation, EPA policy calls for the Site to be reviewed every five years until health-based levels are met. If justified by the review, further remedial actions may be implemented to remove, treat, or otherwise address the wastes.

Deep Soils

The FS also examined alternatives to address the deep and shallow soil contaminants remaining at the Site that would be potentially contributing to the degradation of the groundwater quality. All of the alternatives to address the soils in sump one, with the exception of the no action alternative, would require the existing concrete settling tanks to be removed. Prior to removal, the tanks would be cleaned and then subjected to waste characterization tests followed by disposal in a RCRA regulated Subtitle C landfill if necessary, or a Subtitle D landfill. The alternatives to address the deeper soils also include two scenarios based on the results of additional soil sampling to be conducted in the pre-design/design phase of OU 1. The alternatives present the costs for sump one alone and the costs for sump one and sump two based on the results of the soil sampling performed in sump two.

The alternatives for the deep soils are as follows:

Alternative 1: No Action

Capital Cost: $ 0

O & M Cost: $ 0/yr
Present Worth Cost: $ 0
Construction Time: This alternative does not require construction.

The Superfund program requires that the "no-action" alternative be considered as a baseline for comparison of other alternatives. The no action alternative requires no changes to be made to the existing Site conditions. Therefore, there would be no technical, engineering or treatment components of this alternative. The TBC criteria (soil cleanup values that would protect groundwater), would not be achieved by implementing this alternative. Precipitation would continue to infiltrate the soils and most likely flush the soluble contaminants into the groundwater. Eventually, over a long period of time, the soluble compounds would be flushed from the soil and not leach into the groundwater at levels above the groundwater criteria. The insoluble contaminants in the soil would not be expected to readily leach from the soil into the groundwater and would remain sorbed to soil particles.

Because this alternative would result in contaminants remaining on-site above health-based levels, CERCLA requires that the Site be reviewed every five years. If justified by the review, further remedial actions may be implemented to remove, treat or otherwise address the wastes.

Alternative 2: Capping of Sump One (and Possibly Sump Two)

Capital Cost:
Sump One alone - $ 213,000
Sump One and Sump Two - $ 345,000
O & M Cost:
Sump One - $ 5,000/yr
Sump One and Sump Two - $ 7,000/yr
Present Worth Cost:
For Sump One alone;
- 10-year - $ 251,000
- 30-year - $289,000
For Sump One and Sump Two;
- 10-year - $ 396,000
- 30-year present - $ 446,000.
Construction Time: This alternative would require approximately two to three months to construct.

This alternative involves installing a cap over the potential soil remediation area, sump one, in accordance with modified RCRA Subtitle C performance specifications. The proposed cap would occupy an area of approximately 13,500 square feet. Based on the results of additional post-ROD soil borings in sump two, the area of the proposed cap would be extended. If contaminants are found to be present in sump two above the protection of groundwater criteria, sump two would also require capping. This would require the size of the proposed cap to be approximately 20,500 square feet. The associated costs of the extended cap would also increase as have been indicated above. The proposed cap would consist of the following layers above the existing soil: a geosynthetic clay liner (comprised of geotextile outer layers with an inner layer of low permeability sodium bentonite), a 60-mil high-density polyethylene (HDPE) geomembrane liner, 6 inches of gravel acting as a drainage layer, a 20-mil filter fabric, 12 inches of gravel subbase and 6 inches of asphalt.

The cap would provide for the protection of groundwater quality by removing the exposure of the contaminants in the soils to the infiltration of precipitation. The downward movement of water through the soils (percolation) would not occur with the cap in place. Leaching of contaminants from the soil into the groundwater would be greatly reduced. Capping would not reduce the concentration of the compounds in the soils, but would reduce their mobility. The TBC criteria for soils would not be met, however, groundwater quality would be somewhat protected by removing the migration pathway to the groundwater.

The installation of a cap would require a moderate design effort followed by approximately two to three months of construction and moderate effort in reporting and documentation. Periodic inspections to ensure the integrity of the cap would be required as part of the O&M.

Because this alternative would result in contaminants remaining on-site above health-based levels, CERCLA requires that the Site be reviewed every five years. If justified by the review, further remedial actions may be implemented to remove, treat or otherwise address the wastes.

Alternative 3: Soil Vapor Extraction and Capping

Capital Cost:
Sump One alone - $ 332,000
Sump One and Sump Two - $ 515,000
O & M Cost:
Sump One - $ 48,000/yr
Sump One and Sump Two - $ 56,000/yr
Present Worth Cost:
Sump One alone;
- 10-year - $ 703,000
- 30-year - $ 1,070,000
For Sump One and Sump Two;
- 10-year - $ 948,000
- 30-year - $ 1,378,000
Construction Time: It is estimated that the time to construct the soil vapor extraction system and cap would be less than one year.

Alternative 3 for the deep soils is the same as Alternative 2 above, with the addition of the soil vapor extraction (SVE) system. This alternative involves the installation of soil vapor extraction wells in sump one (and possibly sump two, based on subsequent soil sampling) and treating the collected vapor prior to discharge to the atmosphere. Air inlet wells would be installed at the cap perimeter to enhance the availability of air to the soils and the vapor removal. The SVE and air inlet wells would be drilled to an approximate depth of 50 feet below ground (bg), be approximately 4 inches in diameter, and be screened from 20 feet bg to the bottom. The SVE piping would be installed beneath the cap (described in Alternative 2). The SVE wells would be joined by a common header pipe located in the treatment shed. This pipe would be connected to a vapor phase separator (demister) where moisture would be removed from the air stream. The demister would be connected to a positive displacement blower, which provides a negative vapor pressure gradient to the subsurface soil. For the purposes of the FS, it was conservatively assumed that the discharge from the blower would undergo treatment using vapor-phase carbon prior to being vented to the atmosphere. The cap would act as a seal to prevent air from entering near the extraction wells (where the pressure gradient is greatest) and would promote a radial horizontal subsurface air flow. A radial flow forces air to be drawn over a greater distance, thereby contacting a greater volume of soil. The actual system parameters would be determined in the remedial design phase.

SVE has been a proven technology for soils impacted by volatile organic carbon (VOCs) contaminants. This process has been employed at many sites at both small and large-scale field applications. The effectiveness of SVE is highly dependent upon the volatility of a particular contaminant as measured by Henry's constant (generally a Henry's constant of greater than 0.001 atmosphere cubic meter/mole or atm-m^3/mol is required for SVE to be effective). Based on the Henry's constants for the Site specific compounds, SVE would be effective for treating PCE, TCE and 1,2-DCE but not for phenol, di-n-butyl phthalate and TICs. It is expected then, SVE may be effective for some of the contaminants, but not for others as indicated above. The effectiveness of SVE on removing low-levels of VOC contaminants from the soils has not been fully demonstrated. SVE would probably not be able to remove VOCs below the low ppm range. Therefore, the protection of groundwater criteria may not be achieved. The SVE system would be required to meet the substantive requirements for air emission discharge criteria which is considered an ARAR. Because the soil in the potential remediation area consists of medium to coarse sand and fine to coarse gravel, SVE is well suited for the geologic conditions at the Site. The necessary equipment is readily available and the process is easily implemented.

Because this alternative may result in contaminants remaining on-site above health-based levels, CERCLA requires that the Site be reviewed every five years. If justified by the review, further remedial actions may be implemented to remove, treat or otherwise address the wastes.

Alternative 4: Soil Flushing

Capital Cost:
Sump One - $ 16,000
Sump One and Sump Two - $ 25,000
O & M Cost:
Sump One - $ 1,000/yr
Sump One and Sump Two - $ 3,000
Present Worth Cost:
Sump One;
- 10-year - $ 26,000
- 30-year - $ 37,000

Sump One and Sump Two;
- 10-year - $ 45,000
- 30-year - $ 65,000.

Construction Time: It is estimated that the time to construct the soil flushing system would be less than one year.

This alternative would consist of flushing the contaminants from the soils in sump one, and possibly sump two, by the deliberate discharge of water to the sumps. The discharged water would then percolate down through the contaminated soil and flush out the soluble contaminants. The contaminant compounds, now dissolved in the water, would be recovered through the use of extraction wells. This alternative requires the use of a groundwater or vadose zone recovery system which could be either a separate extraction system designed for the soils only, or, in this case, as part of the extraction and treatment system described in the alternatives to treat the groundwater. This type of system would essentially be an injection and recirculation process. In this case, treated groundwater from the groundwater extraction and treatment system would be discharged to sump one. Sump two would also be included if the results of subsequent soil borings indicate the presence of soil contamination in excess of the soil cleanup criteria that is considered protective of groundwater. The conceptual model developed in the FS, for the purposes of evaluating this alternative, estimated that a total of approximately 10 gpm could be discharged to sump one and sump two without overloading the groundwater recovery system. In comparison with the estimated rate of extraction (100 gpm), the rate of recharge to sumps one and two is about 10% of the extraction rate. The discharged water, after percolation through the sump soils, would be recovered by the groundwater extraction wells and treated by the same method as the extracted groundwater. The type of discharge system and placement of the extraction wells would be determined during the design process.

This alternative would be effective for those contaminants that are relatively soluble, or likely to dissolve in water. The contaminants that are most soluble, such as the VOCs (e.g., TCE, PCE, VCM, phenol, 1,2-DCE and, based on preliminary information, the TICs) would be readily dissolved and flushed from the soil. These compounds have all been observed in the groundwater beneath the Site. The more insoluble compounds, such as the phthalates, would not dissolve as easily, or in some cases, not at all. These insoluble compounds tend to adsorb onto small soil particles and be persistent in the soil. The soil flushing alternative for these compounds would be less effective. However, the flushing of the soil would recover some of these adsorbed contaminants through the movement and capture of these small soil particles. Any contaminants that could not be dissolved, or particles that could not be mobilized through the soil flushing would not be expected to enter the groundwater system in sufficient quantity to degrade the future groundwater quality.

The technology and materials to implement this technology are readily available and not difficult to install. Achievement of the TBC soil criteria would be evaluated as part of the five year review process.

Because this alternative may require more than five years to complete and result in contaminants remaining on-site above health-based levels during it's implementation, EPA policy calls for the Site to be reviewed every five years until health-based levels are met. If justified by the review, further remedial actions may be implemented to remove, treat or otherwise address the wastes.

Shallow Soils

The alternatives identified in the FS to address the shallow soils examined two potential scenarios. The first scenario would involve addressing the soils in the former drum storage area only. The second scenario would include the soils around monitoring well E as well as the former drum storage area based on the results of pre-design soil sampling.

The alternatives to address the shallow soils are:

Alternative 1: No Action

Capital Cost: $ 0
O & M Cost: $ 0/yr
Present Worth Cost:
- 10-year - $ 0
- 30-year - $ 0 respectively.
Construction Time: No construction is required for this alternative.

The Superfund program requires that the "no-action" alternative be considered as a baseline for comparison of other alternatives. The no action alternative requires no changes to be made to the existing Site conditions. Therefore, there would be no technical, engineering or treatment components of this alternative. The TBC criteria (soil cleanup values that are considered protective of groundwater), would not be achieved by implementing this alternative. Precipitation would continue to infiltrate the soils and most likely flush the soluble contaminants into the deeper soils and eventually, the groundwater. Workers at the Ruco Polymer Site would potentially be exposed to contaminants in the surficial soils.

Because this alternative would result in contaminants remaining on-site above health-based levels, CERCLA requires that the Site be reviewed every five years. If justified by the review, further remedial actions may be implemented to remove, treat or otherwise address the wastes.

Alternative 2: Capping

Capital Cost:
Former Drum Storage Area Only - $ 86,000
Drum Storage Area plus Well E Area - $ 95,000
O & M Cost:
Drum Storage Area - $ 3,000/yr
Drum Storage Area plus Well E Area - $ 3,000/yr
Present Worth Cost:
Former Drum Storage Area;
- 10-year - $ 107,000
- 30-year - $ 128,000
Drum Storage Area plus the Well E Area;

- 10-year - $ 121,000
- 30-year - $ 146,000

Construction Time: It is estimated that the time to construct the cap(s) would be two to three months.

This alternative involves installing a cap over the potential soil remediation area, the former drum storage area, in accordance with modified RCRA Subtitle C performance specifications. The proposed cap would occupy an area of approximately 3,850 square feet. Based on the results of additional post-ROD soil borings to be performed in the area near monitoring well E, a cap may be required. If contaminants are found to be present in the surficial soils around monitoring well E above levels considered protective of groundwater, this area would also require capping. Additional soil sampling may be required to delineate the extent of the cap. This would require an additional area to be capped of approximately 1,160 square feet. The proposed cap would consist of the following layers above the existing soil: a geosynthetic clay liner (comprised of geotextile outer layers with an inner layer of low permeability sodium bentonite), a 60-mil high-density polyethylene (HDPE) geomembrane liner, 6 inches of gravel acting as a drainage layer, a 20-mil filter fabric, 12 inches of gravel subbase and 6 inches of asphalt.

The cap would provide for the protection of groundwater quality by removing the exposure of the contaminants in the soils to precipitation. The downward movement of water through the soils (percolation) would not occur with the cap in place. Leaching of contaminants from the soil into the groundwater would be greatly reduced. The cap would also eliminate any potential exposure of Site workers to surficial soil contaminants. Capping would not reduce the concentration of the compounds in the soils, but would reduce their mobility. The TBC criteria for soils would not be met, however, groundwater quality would be somewhat protected by removing the migration pathway to the groundwater.

The installation of a cap would require a moderate design effort followed by approximately two to three months of construction and moderate effort in reporting and documentation. Periodic inspections to ensure the integrity of the cap would be required as part of the O&M.

Because this alternative would result in contaminants remaining on-site above health-based levels, CERCLA requires that the Site be reviewed every five years. If justified by the review, further remedial actions may be implemented to remove, treat or otherwise address the wastes.

Alternative 3: Excavation and Off-Site Disposal in a Landfill

Capital Cost:
Former Drum Storage Area only - $ 482,000
Drum Storage Area plus Monitoring Well E Area - $ 758,000
O & M Cost: There are no O&M costs associated with excavation and off-site disposal
Present Worth Cost:
Former Drum Storage Area;

- 10-year - $ 482,000
- 30-year - $ 482,000 This represents the one-time investment of the capital costs.

Drum Storage Area plus Monitoring Well E Area;

- 10-year - $ 758,000
- 30-year - $ 758,000 This represents the one-time investment of the capital costs.

Construction Time: It is estimated that the time to construct the soil flushing system would be less than one year.

This alternative would require the excavation of the surficial soils in the former drum storage area, specifically the area around TB-10. The proposed excavation would remove an estimated total soil volume of 445 cubic yards from the former drum storage area. Based on the results of additional post-ROD soil borings in the area near monitoring well E, an additional area of excavation may be required. If contaminants are found to be present in the area around monitoring well E above the protection of groundwater criteria, this area would also require excavation. This would increase the total volume of the soil to be excavated by approximately 265 cubic yards. Additional soil sampling in the area of monitoring well E may be required to delineate the extent of the soils to be removed.

The excavated soils would then be tested to determine if they could be classified as a characteristic hazardous waste. If the soils were determined to be a characteristic hazardous waste the RCRA Land Ban restrictions would be an ARAR. This would mean the soils would require treatment before disposal. For the purposes of evaluating this alternative in the FS, the assumption was made that the soils would not require treatment prior to disposal. Therefore, the costs cited above do not reflect any potential treatment costs.

This alternative would be effective in permanently removing the contaminants from the Site, thereby eliminating the potential for the contaminants to migrate to the groundwater and removing any risks associated with direct contact with the soils. Excavation is easily implemented through the use of standard construction equipment and would require one or two months of field work to complete. No O&M requirements are involved with the excavation of the shallow soils alternative.

This alternative would result in the complete removal of contaminants in the shallow soils identified as the former drum storage area and the area around monitoring well E. Therefore, the Site would not require a five year review.

SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

During the detailed evaluation of remedial alternatives, each alternative was assessed utilizing nine evaluation criteria as set forth in the NCP and OSWER Directive 9355.3-01. These criteria were developed to address the requirements of Section 121 of CERCLA to ensure all important considerations are factored into remedy selection decisions.

The following "threshold" criteria are the most important, and must be satisfied by any alternative in order to be eligible for selection:

1. *Overall protection of human health and the environment* addresses whether or not a remedy provides adequate protection and describes how risks posed through each exposure pathway (based

on a reasonable maximum exposure scenario) are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

2. *Compliance with ARARs* addresses whether or not a remedy would meet all of the applicable, or relevant and appropriate requirements of federal and state environmental statutes and requirements or provide grounds for invoking a waiver.

The following "primary balancing" criteria are used to make comparisons and to identify the major trade-offs between alternatives:

3. *Long-term effectiveness and permanence* refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met. It also addresses the magnitude and effectiveness of the measures that may be required to manage the risk posed by treatment residuals and/or untreated wastes.

4. *Reduction of toxicity, mobility, or volume through treatment* is the anticipated performance of a remedial technology, with respect to these parameters, that a remedy may employ.

5. *Short-term effectiveness* addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation periods until cleanup goals are achieved.

6. *Implementability* is the technical and administrative feasibility of a remedy, including the availability of materials and services needed.

7. *Cost* includes estimated capital and operation and maintenance costs, and the present-worth costs.

The following "modifying" criteria are considered fully after the formal public comment period on the Proposed Plan is complete:

8. *State acceptance* indicates whether, based on its review of the RI/FS and the Proposed Plan, the State supports, opposes, and/or has identified any reservations with the preferred alternative.

9. *Community acceptance* refers to the public's general response to the alternatives described in the Proposed Plan and the RI/FS reports. Factors of community acceptance to be discussed include support, reservation, and opposition by the community.

A comparative analysis of the remedial alternatives based upon the evaluation criteria noted above follows.

- o Overall Protection of Human Health and the Environment

Groundwater:

Alternative 1, no action, would not provide for the protection of human health for the future potential residential use of the area at the Ruco Polymer downgradient fenceline. Contaminated groundwater would continue to migrate downgradient degrading the aquifer. Exposure to the contaminants in the groundwater would present an unacceptable health risk to the users. Alternative 2, Deed Restrictions with Monitoring, would provide some level of protection to the potential users of groundwater at the Ruco property by restricting groundwater uses beneath the Ruco facility. However, future risks to the public would still remain as described for Alternative 1, above. Alternatives 3 and 4 would provide the greatest level of protection to potential downgradient residents by controlling the migration of groundwater contaminants. Groundwater beneath the Ruco property would be captured and treated before downgradient receptors could be exposed. Groundwater pump and treat also has the potential to prevent further degradation to a sole source aquifer and restore the aquifer beneath the Ruco property to its beneficial use.

Deep Soils:

The no action alternative (Alternative 1) would not provide protection of human health because the contaminants in the soil would continue to leach into the groundwater and therefore, degrade the groundwater quality. The potential for exposure through the groundwater migration pathway would then present a human health risk. Alternatives 2, 3 and 4 all offer protection by either, limiting the mobility of the contaminants, as is the case with capping, or by removing and capturing the contaminants through SVE or soil flushing. This would eliminate the potential contribution of the contaminants in these areas to the degradation of the groundwater (sole source aquifer) quality.

Shallow Soils:

The no action alternative for the shallow soils would most likely not be protective of human health due to the existence of a potential exposure pathway. While this exposure pathway is somewhat limited (to workers at the Ruco plant) and unquantifiable (risk information for the TICs does not exist), the potential for exposure still exists. More importantly, the contaminants in these areas present a potential source of future groundwater contamination. The resultant groundwater contamination would then present potential human health risks. Alternative 2, capping, would provide the necessary level of protection to the groundwater and human health by eliminating the potential migration and exposure pathways. Alternative 3, excavation, would provide the greatest level of protection by
removing the contaminants from the Site permanently.

- o <u>Compliance with ARARs</u>

Groundwater:

Alternatives 1 and 2 would not meet the chemical-specific ARARs that have been identified for this Site, namely the NYS Groundwater Quality Criteria and Federal MCLs. Contaminants in the groundwater would remain in the aquifer at levels above established ARARs. Alternatives 3 and 4 would be expected to achieve the groundwater chemical-specific ARARs through the application of extraction and treatment. Regional occurrences of volatile organics in the groundwater upgradient of this Site however, may make this goal unachieveable. The extraction and treatment of the groundwater beneath the Ruco property would be expected to, at a minimum, achieve upgradient groundwater quality levels. The extraction and treatment of the groundwater would, of course, require the discharge of the treated water on the Ruco property. The appropriate discharge standards, identified in Table 3, would be expected to be achieved through the treatment process. The substantive requirements of any State Pollutant Discharge Elimination System (SPDES) permit would be met for these alternatives. If the treatment of groundwater should require the application of air stripping technology, the appropriate air emissions ARARs, National Ambient Air Quality Standards (NAAQS) and New York State regulations 6 NYCRR (identified in Table 5), would be met. TBC criteria for air emissions, NYS Draft Guidelines for Air Emissions and EPA's Air Stripper Directive, would also be used to regulate air emissions at the Site from groundwater treatment.

There are no action-specific or location-specific ARARs identified for the groundwater alternatives.

Deep Soils:

There are currently no promulgated standards for contaminant levels in soils at the Federal or State level. For this Site, EPA is using the soil cleanup values developed by NYSDEC that are considered protective of groundwater quality, as TBC criteria for organic chemicals in soil. The TBC values, as discussed above, are taken from NYSDEC's TAGM (Table 4).
Alternative 1, no action, would not meet the TBC soil criteria. Contaminants in the soil would not be treated or contained in any manner, resulting in continued leaching into the groundwater system. Alternative 2, capping, would not meet the TBC criteria either. However, the mobility of the contaminants would be reduced by eliminating the exposure to infiltrating precipitation. Alternatives 3 and 4 would not be expected to achieve the TBC criteria for all the contaminants in the soil. Some of the compounds would be remediated to the TBC levels. Contaminants with low solubility would not be removed by flushing while contaminants with low volatility would not be removed by SVE. Based on the chemical characteristics of the compounds at the Site (more soluble compounds than volatile compounds), the soil flushing alternative would have a greater potential to achieve the TBC criteria than SVE.

Shallow Soils:

Alternatives 1 and 2 would not meet the TBC soil criteria as the contaminants would remain in the soil. Alternative 1 would pose a potential threat to groundwater quality. Alternative 2, however, would reduce the mobility of the contaminants by eliminating the exposure to precipitation. Alternative 3, excavation, would meet the TBC criteria by removing the contaminated soil from the Site.

- o <u>Long-Term Effectiveness and Permanence</u>

Groundwater:

Alternative 1 would not be effective or permanent in providing protection to public health over the long-term. Contaminated groundwater would continue to migrate from the Site posing a risk to potential receptors. Alternative 2 would provide some degree of effectiveness by limiting the potential groundwater exposure pathway through institutional restrictions. However, the ability to enforce such restrictions over the long-term is considered unreliable. Therefore, the permanence of this alternative is questionable. EPA's policy is not to rely on the use of institutional controls alone to address contamination at a site. Monitoring would be required to track the presence and concentration of contaminants in groundwater entering and leaving the Ruco property. Contaminants would remain in the groundwater posing a potential risk to a receptor. Alternatives 3 and 4 would be expected to be effective in providing protection to human health by controlling the migration of contaminants in the groundwater. Permanence of protection would be achieved by removal of the contaminants from the groundwater through treatment. These alternatives also have the potential to restore the groundwater to usable quality or, at a minimum, clean up the aquifer under the Ruco property to upgradient contaminant levels. The ability of the treatment system to meet the remedial action objectives has not yet been proven. However, based on current knowledge of remedial technologies, it is expected that a treatment system can be designed to achieve the necessary performance specifications. Operation and maintenance of the extraction and treatment system would be required including the servicing of pumps and motors, periodic well development and treatment operation. The extraction and treatment system would be monitored to measure its performance. A five-year review would also be required to evaluate the effectiveness of these alternatives.

Deep Soils:

While the deep soils at the Site have not been identified as a direct risk to human health or the environment, they are evaluated here for their potential to be a continuing source of contamination to the groundwater.

Alternative 1 would not provide any long-term effectiveness or permanence. Contaminants in the soil would continue to enter the groundwater system and pose a risk to potential receptors. Alternative 2 would reduce contaminant mobility and, therefore, be effective in greatly reducing the migration of contaminants into the groundwater. The effectiveness of capping for contaminants in the deeper soils near the groundwater table and capillary fringe, contains a degree of uncertainty. It is possible that the seasonal fluctuations (rise and fall) in the groundwater table, or the lateral migration of infiltrating precipitation, could potentially flush contaminants from the soil and into the groundwater system. The installation of a cap would require operation and maintenance to insure the integrity of the cap. A five-year review would also be required since contaminants would remain on the Ruco property. Alternative 3, SVE, would provide long-term effectiveness for some of the compounds by permanently removing them from the soil. However, other contaminants at the Site are not effectively removed by SVE due to their low volatility. These remaining contaminants may possess solubilities that would allow them to be transported into the groundwater. Following the application of the SVE, capping of the sumps would be applied to reduce or eliminate the mobility of the remaining contaminants. A degree of uncertainty exists for the effectiveness of capping as discussed for Alternative 2, above. O&M would be required to operate the SVE system and maintain the cap. Periodic monitoring would be required to evaluate the performance of the SVE. A five-year review would be required to determine the alternative's effectiveness in protecting the groundwater quality. Alternative 4 would be expected to be effective in the long-term by removing the contaminant compounds that are most soluble and, therefore, most likely to be transported into the groundwater. By capturing the contaminants once they have been flushed out of the soil, they are permanently removed from the Site through treatment (See discussion of the effectiveness of groundwater pump and treat, above and implementability, below). Any remaining contaminants would not be expected to leach from the soils due to their low solubility. This alternative would require the O&M of the extraction, treatment and recharge systems. Periodic monitoring would be involved to check the functioning of the systems. A five-year review would be required to evaluate the effectiveness of the soil flushing and determine if further steps would be required to protect the groundwater quality.

Shallow Soils:

No action, Alternative 1, would not provide long-term effectiveness or permanent protection of the groundwater quality. Soluble contaminants would be able to leach into the groundwater system by exposure to precipitation. Alternative 2 would be effective in addressing the surficial soils by greatly reducing the mobility of the contaminants and thus, their ability to enter the groundwater system. This is expected to be effective in the long-term provided the cap is maintained permanently. The maintenance of any structure permanently has inherent uncertainties such as the ability to enforce and regulate. O&M would ensure the cap's structural integrity. Alternative 3 would provide long-term effectiveness and permanence through the removal of the contaminants from the Site. Disposal of the soil in an off-site landfill would be required. No O&M or five-year review would be involved with the excavation alternative.

o Reduction in Toxicity, Mobility, or Volume

Groundwater:

Alternatives 1 and 2 do not reduce the toxicity, mobility or volume of contaminants present in the groundwater. The movement of contaminated groundwater would be unrestricted allowing downgradient migration and the existence of a potential exposure pathway. Such an exposure pathway would create an unacceptable risk to human health. Also, these alternatives do not satisfy the statutory preference for treatment that reduces toxicity, mobility or volume as a principal element. Alternatives 3 and 4 would both reduce the mobility of the contaminants by controlling the movement of the groundwater beneath the Ruco property through a pumping system. (The conceptual design developed in the FS estimated that a minimum of 100 gal/min would be required to prevent the migration of contaminated groundwater beneath the Ruco Property. At 100 gal/min, the pump and treat alternatives would treat approximately 53,000,000 gal/year.) Migration of the contaminants in the groundwater to downgradient potential receptors would be eliminated. The extraction and treatment of the groundwater would also reduce the volume of the contaminants present in the groundwater system. The volume and toxicity of the actual contaminant compounds may or may not be reduced depending of the type of technology employed by the treatment system. A technology such as Ultra Violet (UV) oxidation would physically destroy some of the contaminant compounds resulting in a reduction of volume and toxicity, while a technology such as Granulated Activated Carbon (GAC) would merely filter and collect the contaminants. The exact type of technology to be used in the treatment system would be determined in the design phase through the use of treatability studies. The primary objective of Alternatives 3 and 4 would be to reduce the mobility of the contaminants. This would address the primary objective of preventing further contribution to downgradient groundwater contamination and eliminate the exposure pathway to potential receptors. These alternatives also have the potential to restore the groundwater beneath the Ruco facility (a sole source aquifer) to a usable quality through extraction and treatment.

Deep Soils:

Alternative 1 would not result in the reduction of the toxicity, mobility or volume of the contaminants present at the Site. If no action were taken at the Site, contaminants in the sump(s) would continue to leach into the groundwater resulting in greater mobility. While the contaminant concentrations would decrease in the soil the resultant volume of contaminated material would also increase as contaminants spread through the groundwater. Alternative 2 would not decrease the toxicity or volume of the contaminant compounds in the soil, but would reduce the mobility of most contaminants in the soil. Capping would prevent the infiltration of precipitation and the resultant leaching of compounds into the groundwater. This would meet the primary objective of protecting groundwater quality. Alternatives 3 and 4 would initially increase the mobility of some of the contaminant compounds in the process of extracting them. In the process of recovering and treating the contaminants, these alternatives would reduce contaminant mobility and volume of contaminated media. Alternative 3 would increase the mobility of compounds with a higher volatility through vaporization, then capture the contaminants through vacuum extraction. If necessary, the vapor would be treated through GAC which would not reduce the actual contaminant compound volume. As part of Alternative 3, a cap would be installed to enhance the operation of the SVE system. This would also reduce the mobility of any contaminants remaining in the soil after completion of the SVE operation. Alternative 4 would also increase the mobility of the more soluble compounds initially so that they may be recovered through extraction of groundwater. The extraction and treatment of the water flushed through the soil would reduce the volume of contaminated soil. The volume and toxicity of contaminant compounds may also be reduced depending on the type of treatment technologies selected in the remedial design (see Groundwater Alternatives above). Alternatives involving the generation of treatment residuals would require that the generated material be disposed of in an appropriate off-site disposal facility. This would be determined by conducting a TCLP test on the residuals. Both Alternatives 3 and 4 would meet the primary criteria of protecting groundwater quality.

Shallow Soils:

Alternative 1 would not reduce contaminant toxicity, mobility or volume. Contaminant compounds would remain in the soils and act as potential sources to groundwater contamination and contribute an unknown, unquantifiable risk to Site workers. Alternative 2, which does not include treatment, would reduce only the mobility of the contaminants by eliminating their exposure to the elements. This would require the construction of a cap to cover an area of approximately 3,850 square feet for the Former Drum Storage Area and 1,160 square feet for the Well E Area. The volume of contaminated media and volume of the contaminant compounds would remain the same. The toxicity of the compounds in the soil would also remain unchanged. Although Alternative 2 would not reduce the volume or toxicity of contaminant compounds, the emplacement of a cap would achieve the primary objective of protecting groundwater quality and eliminate a potential exposure pathway as well. Alternative 3 would reduce the mobility of the contaminant compounds in the shallow soils at the Site by excavating the soils and disposing of them off-site. The toxicity and volume of the contaminant compounds **at the Site** would be reduced by off-site disposal. The relative toxicity and volume of the contaminants **in the soil** to be disposed of would not change. Excavation would remove the contaminated soil from the Site, but, would not reduce the actual levels of contaminant compounds in the soil being disposed of. Before disposal the soil would have to be tested to determine if it qualifies as a characteristic hazardous waste as defined by RCRA. If it is not a hazardous waste, it would not be subject to the Land Disposal Restrictions (LDRs). If it was determined to be a hazardous waste, treatment would be required prior to off-site disposal. Such treatment might reduce the toxicity or volume of the contaminants in the soil. Alternative 3 would also result in achieving the primary objective of protecting the groundwater quality.

o Short-Term Effectiveness

Groundwater:

No immediate risks to human health have been identified through exposure of contaminated groundwater beneath the Ruco property because there is currently no use of the groundwater beneath the Ruco property. Therefore, all of the groundwater alternatives should be effective in protecting human health and the environment in the short-term (until construction is complete). For Alternatives 3 and 4, no short term risks to the public are expected to be created by constructing the groundwater extraction and treatment systems. The time required to construct these alternatives and render them operational and functional, should be less than one year. Once operational, Alternatives 3 and 4 should be effective in controlling the migration of contaminated groundwater downgradient of the Ruco property. Longer-term effectiveness and protection is provided by these alternatives as the systems operate over time to remove contaminants from the aquifer. The operation of the extraction and treatment systems are expected to be long-term activities which are not anticipated to present a risk to the public. Depending on exactly which technologies are selected for the treatment system, wastes may be generated that have to be treated (e.g., vapors from air stripping) or disposed of off-site (e.g., sludge from filtering processes). The generation of vapors would be regulated and controlled through the application of vapor control technology such as a carbon absorption unit. The off-site disposal of generated wastes would not create a significant increase in the vehicular traffic in the area as only small quantities would be generated. These activities would be conducted in a manner that would not present a risk to the public.

Deep Soils:

Alternative 1, no action, would not present any short-term risk due to the fact that the contaminants are present at depth which leaves no opportunity for immediate exposure. However, beyond the immediate future, the no action alternative presents the potential for groundwater degradation as well as the potential for future human exposure. Alternatives 2 and 4 are not expected to present any short-term risks through the construction and implementation of the remedies. Alternative 2 may involve a slight increase in truck traffic in the area to transport in materials to construct the cap. This impact is expected to be minimal as the area is industrial and truck traffic is a routine occurrence. Alternative 2 would require only a few months to construct and would therefore provide the most rapid short-term level of protection. However, the immediate benefit of protection is off-set by uncertainties in capping's long-term effectiveness and the ability of Alternatives 3 and 4 to be more permanent. Alternative 3 would not present any risks during construction (which would require less than one year), however, the operation of the SVE system would generate volatile organic vapors by extracting them from the soil. These vapors, depending on their concentration, may require treatment in the form of carbon adsorption or a burn unit to destroy the vapors. The SVE system is not expected to present a risk when properly monitored and operated. Alternatives 3 and 4 would require slightly longer construction times than Alternative 2, and would therefore, take a greater amount of time than Alternative 2 to provide protection. However, Alternatives 3 and 4 would be more effective in actually removing contaminants through treatment in the short-term which would provide a greater level of protection in the long-term.

Shallow Soils:

Alternatives 1 and 2 are not expected to create any short-term hazards or risks through their implementation. As discussed above, capping may slightly increase the truck traffic at the Site though this would not be a significant problem. Alternative 3 may present some low level, short-term risks through the excavation activities. Excavation would create the potential for the generation of fugitive dust emissions. However, such emissions could be controlled through simple dust suppression techniques. Off-site transport of excavated materials may also present a potential risk to residents along the transport route, although such a risk would be considered minimal. Alternatives 2 and 3 would both provide immediate short-term effectiveness in achieving protection as both require very little time to implement. Alternative 3 would achieve the greatest short-term protection as well as long-term protection by permanently removing the contaminants from the Site.

- o <u>Implementability</u>

Groundwater:

The no action alternative, Alternative 1, would not involve construction or the use of technologies of any kind. No modifications to the Site would be required to be made. Therefore, this alternative would be easily implemented. However, the downgradient migration of contaminants in the groundwater would continue to occur, creating a potential risk to receptors.

Alternative 2 would require the development and implementation of deed restrictions and well permitting restrictions (i.e., institutional controls), in conjunction with a groundwater monitoring program. Monitoring the status of the aerial extent of impacted groundwater by collection and analysis of groundwater samples is a standard technology that is easily implementable. Monitoring could be conducted through a series of existing wells. The implementation of institutional controls would not be as easy or reliable as the monitoring aspect of this alternative. Currently, well construction for the purposes of drinking water supply is regulated through Article IV, Nassau County Public Health Ordinance, regulating the installation of private drinking systems. Further institutional controls to restrict the construction of water wells on the Ruco property would be required to further reduce the risk of exposure to contaminated groundwater. This would require the development and implementation of some sort of well permitting and approval process controlled by the NYSDEC or Nassau County, and/or the specification of some type of deed restriction (to prevent well construction). Additional institutional controls would require obtaining deed notations to limit the land use activities at the Ruco property. Obtaining the deed restrictions might require the cooperation of the current property owner, Ruco Polymer Corporation. Historically, the enforcement of institutional controls has been considered unreliable. The EPA would attempt to enhance the reliability of the institutional controls and improve their effectiveness by seeking to ensure that mechanisms would be put in place to guarantee the future enforcement of the institutional controls. While Alternative 2 would be easy to implement technically, the administrative requirements would not be as easily achieved.

Alternatives 3 and 4 involve the extraction and treatment of groundwater. This type of technology has been applied at a variety of sites with mixed results. From a geologic and hydrologic viewpoint, the groundwater aquifer under Long Island would be the optimum type of aquifer in which to operate a pump and treat system with a high degree of confidence in success. The aquifer possesses good characteristics (e.g., homogeneous, and isotropic) that would allow for a relatively simple and straight-forward design. Adequate control of groundwater beneath the Ruco property could be established and monitored through the use of a system of extraction and monitoring wells. The treatment systems required in these two alternatives would be the same. Many standard water treatment technologies exist that have been employed at other sites. It would be expected that these same technologies would be able to treat the groundwater at this Site. However, because of the presence of the TICs in the groundwater, there exists a degree of uncertainty in the application of standard technologies. Therefore, treatability studies would be required to determine the optimum technology or combination of technologies to treat all the contaminants in the groundwater. This factor makes the groundwater pump and treat alternatives slightly more difficult technically than non-treatment alternatives to implement.

Deep Soils:

Alternative 1 has no technical or construction requirements making it the easiest alternative to physically implement. Alternative 2, capping is also a very easy technology to implement and has been used at many sites across the country. The cap would require long term maintenance and periodic inspections by the agencies to ensure its integrity. This would certainly restrict any future potential uses of the property. Alternatives 3 and 4 would be only slightly more difficult to implement from a technical stand-point. With Alternative 3, the same long-term requirements for the maintenance of the cap would exist that have been identified for Alternative 2, above. Alternative 4 would require some additional testing (e.g., pump tests) to ensure sufficient recapture of the water being flushed through the sump(s). If properly designed and constructed, this alternative would be expected to reliably recapture this water. Alternative 4 would also have to be integrated with the groundwater extraction and treatment (Alternative 3 or 4 for groundwater) system, therefore, any difficulties in implementing those alternatives would be applicable here. These alternatives would require more design and construction work but both use well established technologies. Construction of either alternative is not expected to be a problem.

Shallow Soils:

Alternative 1, no action, would be the technically simplest alternative. No design, construction, or monitoring requirements are involved. Alternative 2 would be easy to design and construct, however, long-term maintenance, inspection and therefore, agency involvement would be required. Alternative 3 could be completed using simple, widely utilized excavation techniques, with some minor modifications to ensure the proper dust suppression was executed. Once excavation was complete, no agency involvement would be required in the shallow soil areas.

- o <u>Cost</u>

Groundwater:

Looking at the various groundwater alternatives, Alternative 1, no action, presents the lowest costs at $ 0 for capital, present-worth and O&M. This alternative provides a baseline to compare the costs of other alternatives. Alternative 2 is the next least expensive alternative to implement with a capital cost of $ 39,000, 10-year and 30-year present worth costs of $ 325,000 and $ 608,000 respectively, and an O&M cost of $37,000 annually. The costs associated with Alternatives 3 and 4 are very similar. The capital costs are $ 4,748,000 for Alternative 3 and $4,867,000 for Alternative 4. The O&M costs are
$ 549,000 for both alternatives. Alternative 4 has slightly higher costs for the present worth analysis at $ 9,105,000 for the 10-year estimate and $13,304,000 for the 30-year estimate. Alternative 3 has estimated 10 and 30-year present worth costs at $ 8,986,000 and
$ 13,185,000 respectively. A list of the alternatives assembled in increasing order of cost indicates that Alternative 1 is the least expensive, followed by Alternatives 2, 3, and 4.

Deep Soils:

Alternative 1 is the least expensive alternative evaluated with $ 0 capital costs, $ 0 O&M costs and $ 0 present worth costs. Alternatives 2, 3 and 4 have two sets of costs associated with each alternative based on the need for addressing sump one alone, or sump one and sump two together. Alternative 2, capping, has an associated capital cost of
$ 213,000, an O&M cost of $ 5,000 per year and 10 and 30-year present worth costs of $ 251,000 and $ 289,000 for sump one. If sump two is added to this alternative, the costs are: $ 345,000 capital cost, $ 7,000 annual O&M cost and 10-year and 30-year present worth costs of $ 396,000 and $ 446,000. Alternative 3 would be the highest cost alternative with a capital cost of $ 332,000, O&M cost of $ 48,000 and 10-year and 30-year present worth costs of $ 703,000 and $ 1,070,000 for sump one alone. For sump one and sump two, Alternative 3 would have the following costs: capital cost of $ 515,000, annual O&M cost of $ 56,000, a 10-year present worth cost of $ 948,000 and a 30-year present worth cost of $ 1,378,000. Alternative 4 was the least expensive alternative that incurred any costs. To address sump one, Alternative 4 was estimated to require a capital cost investment of $ 16,000 and an annual O&M cost of $ 1,000, and incur 10 and 30-year present worth costs of $ 26,000 and $ 37,000. To address sump one and sump two the capital cost of Alternative 4 would be $ 25,000. The annual O&M cost would be $ 3,000 and the 10-year, 30-year costs would be $ 45,000 and $ 65,000 respectively.

Shallow Soils:

The costs developed for the shallow soils alternatives show that the no action alternative, Alternative 1, has $ 0 capital costs, $ 0 O&M costs, and $ 0 present worth costs. Alternatives 2 and 3 generated two sets of costs for each alternative based on addressing the former drum storage area alone, or the former drum storage area and the area around monitoring well E as well. The costs required for the construction and operation of Alternative 2 in the former drum storage are only are $ 86,000 capital costs, $ 3,000 per year O&M costs, and $ 107,000 and $ 128,000 10-year and 30-year present worth costs. If the area around monitoring well E is also included Alternative 2 would then cost
$ 95,000 for capital cost, $ 3,000 annual O&M cost, $ 121,000 10-year present worth cost and $ 146,000 30-year present worth cost. Alternative 3, excavation and off-site disposal, was the most expensive alternative. To address the former drum storage area alone, a capital cost of $ 482,000 would be incurred. This alternative would not require annual O&M cost, which would therefore be $ 0. The present 10-year and 30-year present worth costs would represent a one-time investment cost of $ 482,000. To include the area around monitoring well E in the excavation and disposal, the capital cost would be $ 758,000, with annual O&M costs again equalling $ 0. The 10 and 30-year present worth costs would be $ 758,000 representing the one-time investment cost.

o State Acceptance

After review of all available information the NYSDEC has indicated that they concur with the selected remedy. NYSDEC's letter of concurrence presented in Appendix IV of this document.

o Community Acceptance

Community acceptance of the preferred alternative has been assessed in the Responsiveness Summary portion of this ROD following review of the public comments received on the RI/FS report and the Proposed Plan. All comments submitted during the public comment period were evaluated and are addressed in the attached Responsiveness Summary (Appendix V). Many of the public's concerns were unrelated to OU 1 and instead pertained to air quality issues that are the result of current operations at the Ruco facility. In general, the public was supportive of EPA's proposed remedy.

SELECTED REMEDY

The US EPA has determined, upon consideration of the requirements of CERCLA, the detailed analysis of the various alternatives, and public comments, that Alternative 3 (with

minor modifications) for the groundwater in combination with Alternative 4 for the deep soils, and Alternative 3 for the shallow soils is the appropriate remedy for the Site.

The major components of the selected remedy are as follows:

- Installation of groundwater extraction wells to control the flow of contaminated groundwater from leaving the Ruco property and migrating downgradient (see Figure 15). The exact location, number, size, depth and pumping rates of the extraction wells will be determined through tests conducted in the remedial design phase of the selected alternative. Existing monitoring wells on the Ruco property will be used to monitor the performance of the groundwater extraction system and establish that sufficient control occurs. Additional monitoring wells may be required. The need for additional monitoring wells will be evaluated and determined during the design and implementation of the groundwater extraction system.

- Installation of a groundwater treatment system. Treatment of the extracted groundwater with an on-site treatment system will occur to achieve the appropriate discharge standards. The exact combination and type of treatment technologies (i.e., granulated activated carbon, ultraviolet oxidation, flocculation, etc.), and their effectiveness on TICs will be determined in the design phase through treatability studies. Additional analyses of the tentatively identified compounds (TICs) in the groundwater will be required to identify the classes of chemical compounds that comprise the TICs. If the results of the treatability studies indicate the discharge standards can not be achieved, the selected treatment alternative will have to be revisited.

- Installation of a discharge system either off-site, if a suitable location can be found, or on-site (that is, with the effluent being discharged to a sump on the Ruco property), to dispose of the majority of the treated groundwater. The majority of the volume of the treated discharge will be required to be diverted as far as possible from the groundwater extraction wells to avoid overloading the groundwater extraction system. A small portion of the treated groundwater will be diverted to sump one and possibly sump two for the soils flushing portion of the selected remedy (see soil flushing below). Discharged groundwater is expected to meet the appropriate discharge criteria through treatment (see treatment above).

- Additional soil testing (the bottom of sump two to the water table) to determine if contaminants are present in the soils, and compare the levels present to the soil cleanup criteria that are considered protective of groundwater quality. **If** contaminants are present above levels considered protective of the groundwater, the soils in sump two will be addressed in the same manner as the soils in sump one.

- Soil flushing for the deep soils in sump one, and possibly sump two (based on the results of the soil testing). The exact delineation of the areas to be flushed will be performed during the design phase of the remedial action. The soils will be flushed by a portion of the discharge of treated groundwater. The method of discharging the treated water will be determined in the design phase. The contaminants flushed out by this process will be recaptured by groundwater extraction wells. The exact location, depth, size and pumping rates of the groundwater extraction wells will be determined during the design phase of the preferred alternative. Additional analyses of the tentatively identified compounds (TICs) in the soil will be required to identify the classes of chemical compounds that comprise the TICs. Treatability studies (e.g., soil column tests) will also be performed on the soils to evaluate the effectiveness of soil flushing on TICs. The contaminant levels in the sumps will be re-evaluated during periodic monitoring and at the five-year review to measure the progress of the flushing. In order to install the flushing system in sump one, the existing concrete storage tanks in that sump will be removed and disposed of. (See Figure 16 for the areas of soils to be addressed.)

- Additional soil testing in the area around monitoring well E to determine if contaminants are present. **If** contaminants are present above concentrations considered to be protective of groundwater quality, and exist in the shallow soils, the area around well E will be addressed in the same manner as the former drum storage area. **If** the contaminants are present in the deeper soils, further evaluation of potential remedial alternatives will occur.

- Excavation of the soils in the former drum storage area and possibly the area around monitoring well E, to be determined by subsequent soil borings. Excavated soils will be disposed of off-site. The extent of the excavation in the former drum storage area, and possibly the area around monitoring well E, will be based on the results of the soil samples collected during the Remedial Investigation and further sampling to be conducted during the pre-design or design phase. (See Figure 16 for the areas of soils to be addressed.)

- Periodic monitoring of the groundwater extraction system to assure adequate control is maintained; periodic sampling of the groundwater treatment system discharge, to assure treatment standards are achieved; and periodic sampling of the groundwater and soils in sump one and possibly sump two to measure the progress of the selected remedy in achieving the cleanup standards.

- Institutional controls in the form of deed restrictions and groundwater use restrictions at the Ruco property. The deed restrictions will be required to restrict the Ruco property to industrial/commercial development only, as long as contaminants remain on the property above levels considered appropriate for residential development and the treatment systems are in place. Groundwater use restrictions in addition to the existing Nassau County Ordinance, will be implemented through deed restrictions as well. The use of groundwater will be restricted until such time as the groundwater beneath the Site has been determined to be fully remediated.

The goal of the remedial action is to restore the groundwater to its beneficial use, which is, at this Site, a sole source drinking water aquifer. Based on information obtained during the remedial investigation, and the analysis of all remedial alternatives, EPA and NYSDEC believe that the selected remedy may be able to achieve this goal. However, sporadic low-level regional groundwater contamination may be especially persistent upgradient of the Ruco facility. Therefore, the ability to achieve cleanup goals in the groundwater beneath the Ruco facility, cannot be determined until the extraction and treatment systems have been implemented, modified as necessary, and plume response monitored over time.

Recent studies have indicated that pumping and treatment technologies may contain uncertainties in achieving the ppb concentrations required under ARARs over a reasonable period of time. However, these studies also indicate significant decreases in contaminant concentrations are attained early in the system implementation, followed by a leveling out. For these reasons, this remedy stipulates contingency measures, whereby the groundwater extraction and treatment system's performance will be monitored on a regular basis and adjusted as warranted by the performance data collected during operation. Modifications may include any or all of the following:

a) at individual wells where cleanup goals have been attained, pumping may be discontinued;

b) alternating pumping at wells to eliminate stagnation points;

c) pulse pumping to allow aquifer equilibration and encourage adsorbed contaminants to partition into groundwater; and

d) installation of additional extraction wells to facilitate or accelerate cleanup of the contaminant plume.

If it is determined, on the basis of the preceding criteria and the system performance data, that certain portions of the aquifer cannot be restored to their beneficial use in a reasonable time frame, all or some of the following measures involving long-term management may occur, for an indefinite period of time, as modification of the existing system:

a) engineering controls such as physical barriers, source control measures, or long term gradient control provided by low level pumping, as containment measures;

b) chemical-specific ARARs may be waived for the cleanup of those portions of the aquifer based on the technical impracticability of achieving further contaminant reduction;

c) institutional controls, in the form of local zoning ordinances, for example, may be recommended to be implemented and maintained to restrict access to those portions of the aquifer which remain above remediation goals;

d) continued monitoring of specified wells; and

e) periodic reevaluation of remedial technologies for groundwater restoration.

The decision to invoke any or all of these measures may be made during a periodic review of the remedial action, which will occur at intervals of no less than every five years. At that time the State of New York will be given the opportunity to review, comment and concur
on all contingency decisions.

The estimated costs for the selected remedy are as follows:

- Groundwater extraction and treatment; capital cost $ 4,748,000, annual O&M costs of $549,000, with 10-year and 30-year present worth costs of $ 8,986,000 and $ 13,185,000.
Note: These costs are calculated for discharge to an on-site sump. Discharge to an off-site location is not expected to significantly affect the costs of this portion of the selected remedy.

- Soil flushing of Sump one only: capital cost $ 16,000, annual O&M costs of $ 1,000, and 10-year and 30-year present worth costs of $ 26,000 and $ 37,000.

- Soil flushing of Sump one and Sump two: capital cost of $ 25,000, annual O&M costs of $ 3,000, and 10-year and 30-year present worth costs of $ 45,00 and $ 65,000.

- Excavation of the shallow soils in the former drum storage area only: capital cost $ 482,000, annual O&M costs $ 0, and 10-year and 30-year present worth costs of $ 482,000 which represents a one-time investment cost.

- Excavation of the shallow soils in the former drum storage area and the area around monitoring well E: capital cost $ 758,000, annual O&M costs of $ 0, and 10-year and 30-year present worth costs of $ 758,000 which represents a one-time investment cost.

If all the targeted areas mentioned in the selected remedy above require remediation (i.e., Sump two and the area around monitoring well E are included), the total estimated cost of the selected remedy would be approximately:

Capital Cost: $ 5,531,000

Annual O&M Costs: $ 552,000

10-year Present Worth Cost: $ 9,031,000

30-year Present Worth Cost: $ 13,250,000

STATUTORY DETERMINATIONS

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that when complete the selected remedial action for this Site must comply with applicable, or relevant and appropriate environmental standards established under federal and state environmental laws unless a statutory waiver is justified. The selected remedy also must be cost-effective and utilize permanent solutions and alternative treatment technologies or resource-recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous substances, as available. The following sections discuss how the selected remedy meets these statutory requirements.

Protection of Human Health and the Environment

The selected remedy is protective of human health and the environment. Contaminated groundwater will be prevented from migrating downgradient of the Ruco property and further degrading the aquifer quality. Potential exposure to contaminated groundwater will be controlled through the extraction and treatment of the groundwater. Contaminants in the groundwater will be removed through treatment with the potential to restore the sole source aquifer beneath the Site to its beneficial use. The deep soils representing potential sources of contamination to the groundwater will be treated through soil flushing. These contaminants will then be recaptured through groundwater extraction removing them from the environment. The deep soil contaminant sources will then be eliminated. The shallow soils representing potential sources of groundwater contamination and potential human health risks will be removed from the Site through excavation. This will permanently remove the threat created by the contaminants in the shallow soils.

The selected remedy addresses the threats posed by contaminated groundwater beneath the Ruco property and at the downgradient property boundary, which are; the potential human health risk and prevention of further groundwater contamination downgradient (source control). The implementation of the groundwater remedy also has the potential to return the aquifer to a usable quality. Although EPA acknowledges that groundwater ARARs may be unattainable, by actively removing and treating contaminants in the groundwater aquifer, human health and the environment are protected under the chosen remedy. The selected remedy also combines the groundwater remediation with the soils remediation to address the principal threat posed by the soils, which is; the further contribution to groundwater degradation from contaminants in the soil. By addressing the shallow soils the preferred alternative also provides an unquantifiable, but added level of protection to Site workers from potential exposure to contaminants and reduces the potential contribution to groundwater contamination.

Groundwater extraction and treatment, soil flushing and excavation would provide long-term effectiveness in the protection of human health and the environment.

It is not anticipated that any significant short-term impacts on human health or the environment would occur during the construction and implementation of the preferred alternative.

Compliance with ARARs

The groundwater extraction and treatment portion of the selected remedy is expected to meet the discharge to groundwater ARARs (6NYCRR), however, some uncertainty does exist due to the presence of TICs. The ARARs for groundwater quality (State groundwater quality standards and Federal MCLs) would also be expected to be achieved with the preferred alternative, although the presence of groundwater contaminants upgradient of the Site may make this goal impossible to reach. As indicated in the selected remedy section above, the EPA may invoke contingency measures if implementation of the selected remedy indicates that reaching the groundwater ARARs beneath the Ruco facility is technically impracticable due to the presence of persistent upgradient sources.

The flushing of the soils in the sump(s) is also is expected to achieve soil contaminant concentration levels that are considered to be protective of groundwater (TBC criteria) for the soluble contaminants in the soils. The effectiveness of flushing on the more insoluble contaminants is unknown at this time, however, a small portion of these insoluble contaminants will (or may) be removed through flushing. Remaining insoluble contaminants are **not** expected to readily leach from the soils and mobilize into the groundwater. Excavation of the shallow soils will achieve soil cleanup levels considered protective of groundwater (TBC criteria) by removing the contaminants from the Site. A reduction in the toxicity, mobility and volume of the contaminants will be achieved and the leaching of contaminants into the groundwater will be prevented. The applicability of the LDR's will be evaluated and complied with during the implementation of the selected remedy.

Cost-Effectiveness

The selected remedy is cost-effective because it has been demonstrated to provide the best overall effectiveness proportional to its cost.

The selected remedy achieves the ARARs more quickly, or as quickly, and at less cost than the other options except for the shallow soils where excavation will cost more than the other alternatives. However, the excavation will be more permanent, require no O&M and will not require a five-year review. No contaminants in the shallow soil areas targeted will be left on-site. Therefore, the selected remedy will provide the best balance of trade-offs among alternatives with respect to the evaluating criteria.

Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

By employing treatment for the groundwater and the deep soils, the selected remedy utilizes permanent solutions and treatment technologies to the maximum extent practicable.
It is anticipated that the groundwater extraction and treatment portion of the preferred alternative will effectively reduce the mobility and volume of the contaminated groundwater. Uncertainty does exist concerning the ability of the treatment system to achieve the appropriate treatment standards. The ability to achieve the standards through treatment will be determined in the pre-design phase by treatability tests. Depending on the treatment technology chosen, the toxicity of the contaminants may also be reduced through destruction. The contaminants in the deep soils will initially become more mobile as they are flushed out of the soils reducing the volume of the compounds in the soil. The contaminants will then be recaptured and treated in the groundwater treatment system, permanently reducing their volume, mobility and potentially their toxicity. Excavation of the shallow soils will permanently remove the contaminants from the Site.

Preference for Treatment as a Principal Element

This remedy also satisfies the statutory preference for treatment as a principal element to reduce the toxicity, mobility and volume of contaminants at the Site.

Groundwater extraction and treatment, soil flushing and excavation will provide long-term effectiveness in the protection of human health and the environment. The extraction and treatment of groundwater and the flushing of the soils in the sump(s) and excavation of shallow soils will also be permanent solutions through the removal of contaminants in the affected media. The application of groundwater pump and treat combined with the soil flushing will utilize treatment technologies to address the contaminants present at the Site. Soil excavation will not involve the use of treatment unless the soils to be excavated fail the hazardous waste characterization tests. If the soils were to fail the tests, treatment would be required prior to off-site disposal.

DOCUMENTATION OF SIGNIFICANT CHANGES

There are no significant changes from the preferred alternative presented in the Proposed Plan except that this ROD provides more flexibility with respect to the location of a discharge point for the treated groundwater.

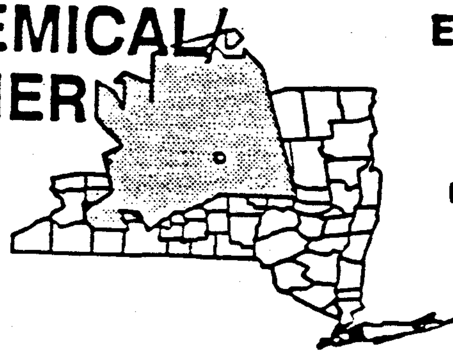
<u>APPENDIX I</u>

FIGURES

HOOKER CHEMICAL/ RUCO POLYMER CORP.

NEW YORK

EPA ID# NYD002920312

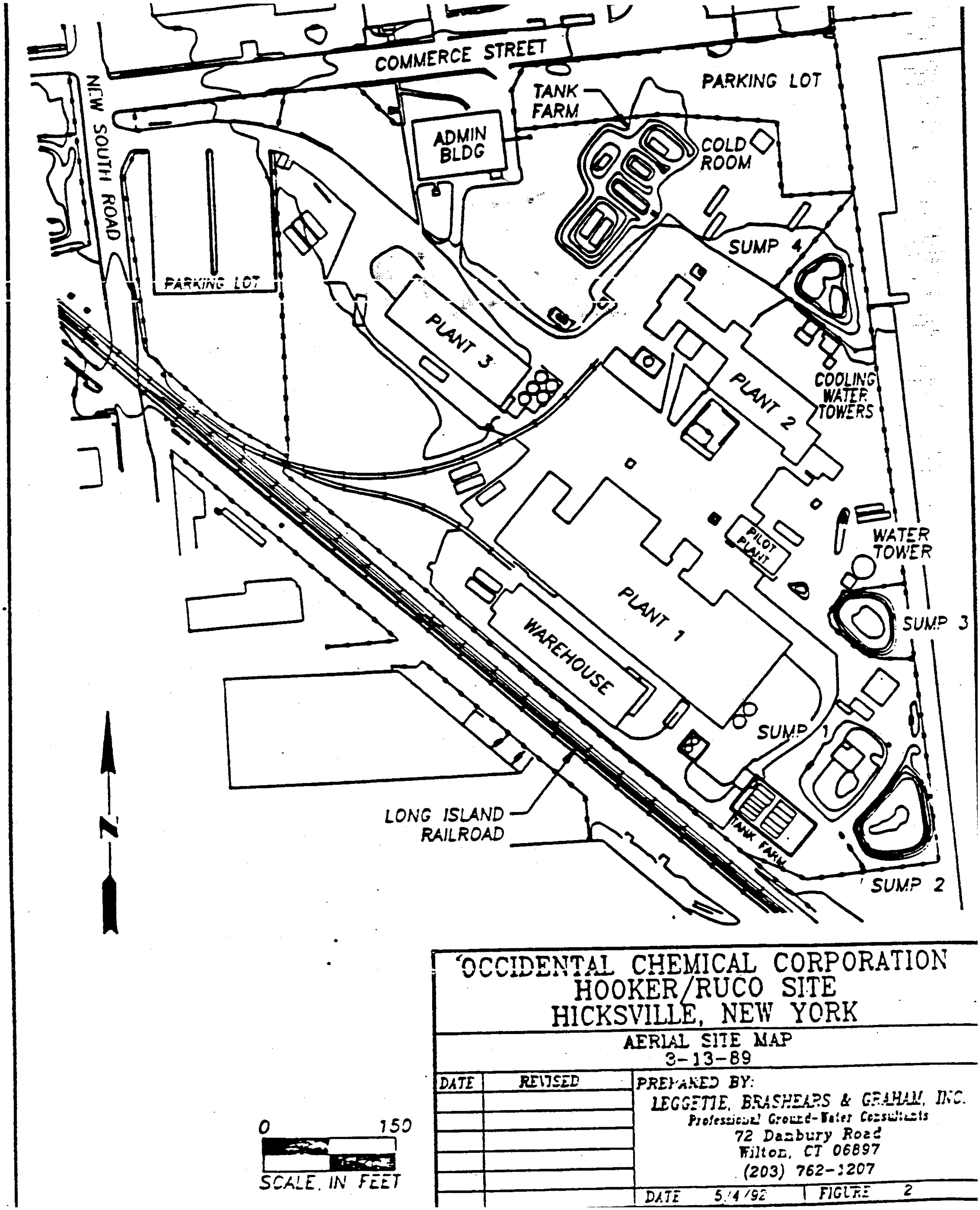


EPA REGION 2

Nassau County
Hicksville

Other Names:
Ruco Polymer Corp.

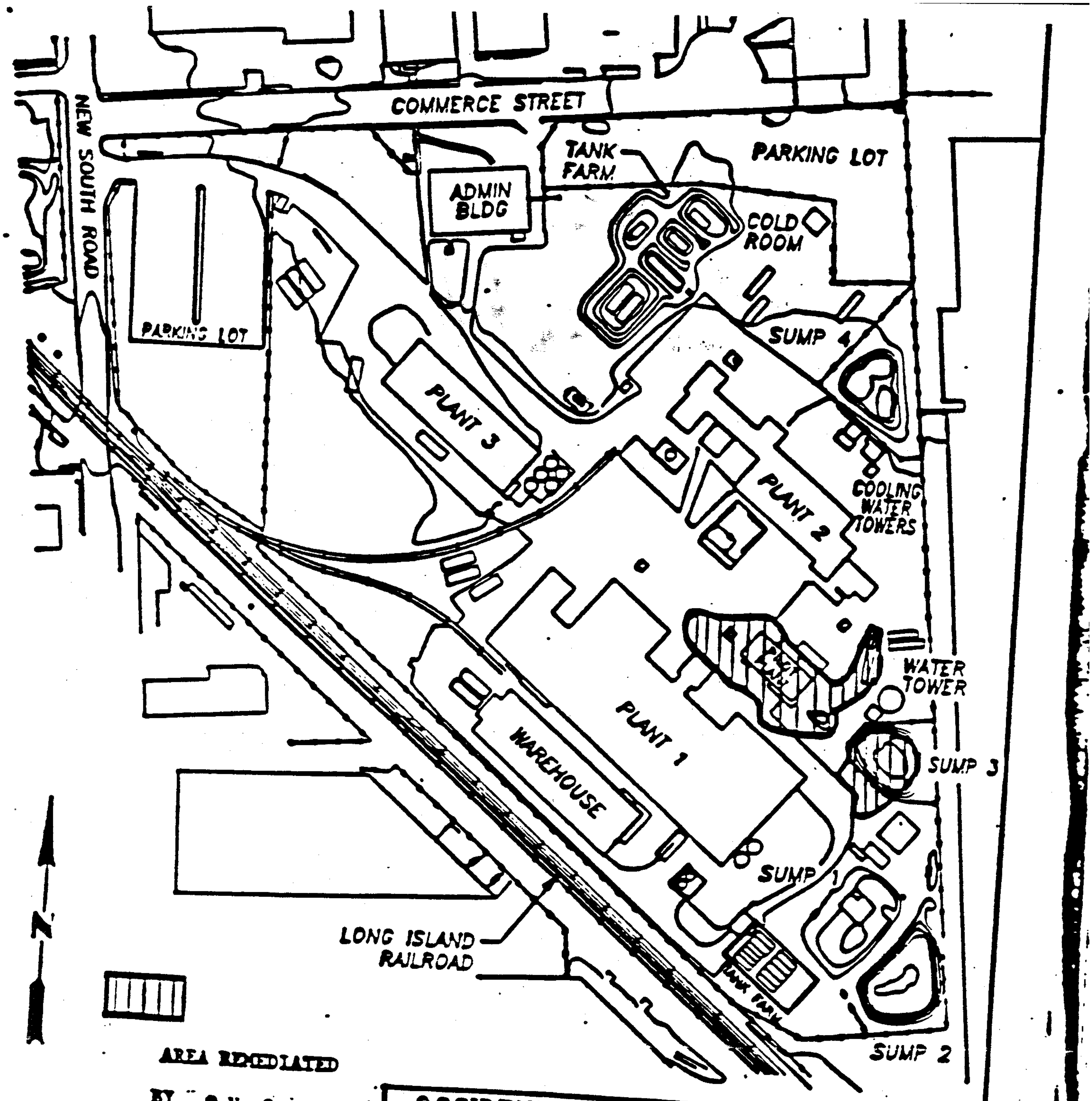
FIGURE 1



OCCIDENTAL CHEMICAL CORPORATION
HOOKER/RUCO SITE
HICKSVILLE, NEW YORK

AERIAL SITE MAP
3-13-89

DATE	REVISED	PREPARED BY:
		LEGGETTE, BRASHEARS & GRAHAM, INC.
		Professional Ground-Water Consultants
		72 Danbury Road
		Wilton, CT 06897
		(203) 762-1207
		DATE 5/4/92 FIGURE 2



AREA REMEDIATED BY O U 2 REMEDIAL ACTION

0 150
SCALE IN FEET

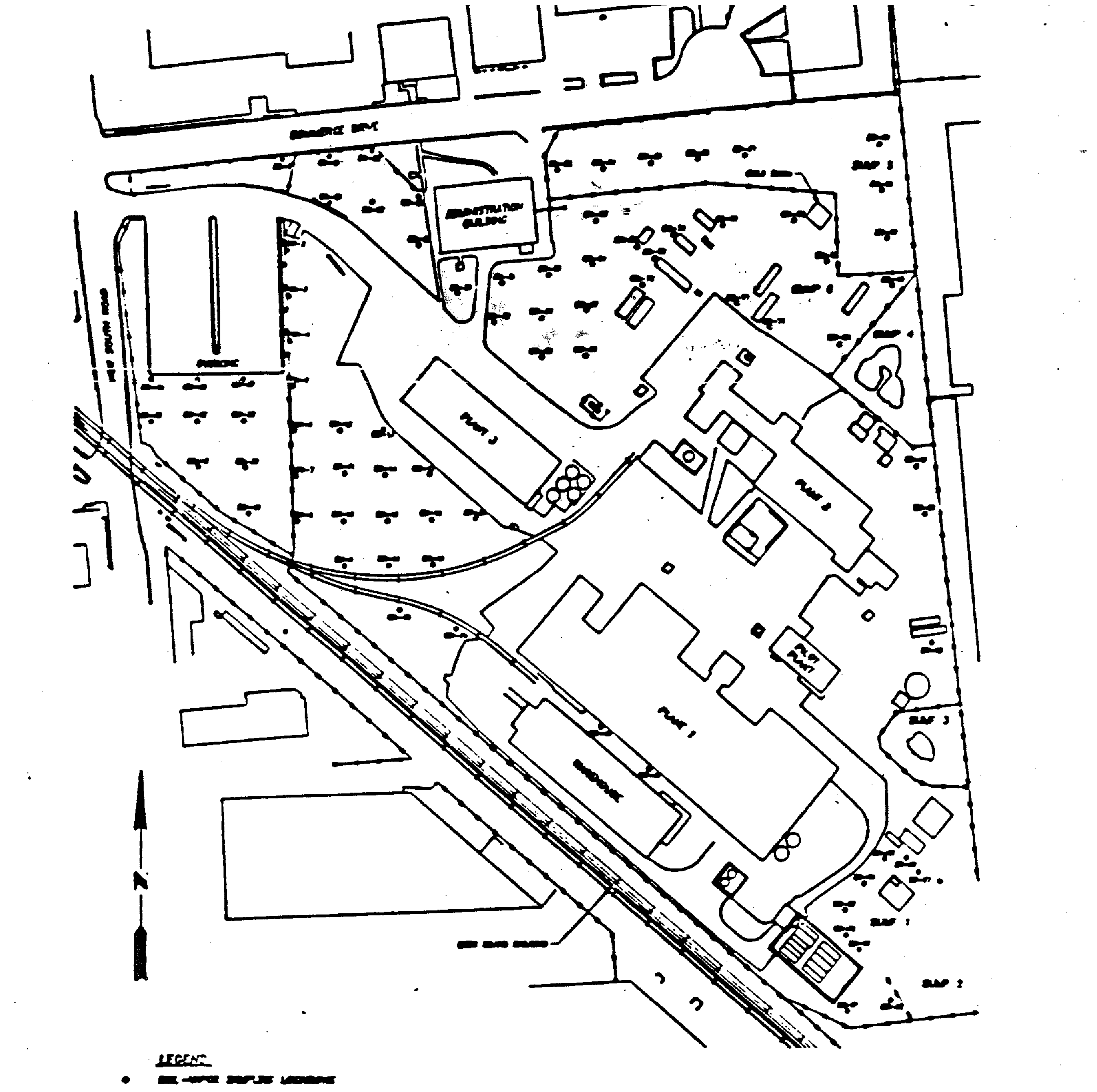
OCCIDENTAL CHEMICAL CORPORATION
HOOKER/RUCO SITE
HICKSVILLE, NEW YORK

AERIAL SITE MAP
3-13-89

DATE	REVISED

PREPARED BY:
LEGGETTE, BRASHEARS & GRAHAM, INC.
Professional Ground-Water Consultants
72 Danbury Road
Wilton, CT 06897
(203) 762-1207

DATE 5/4/92 FIGURE 3



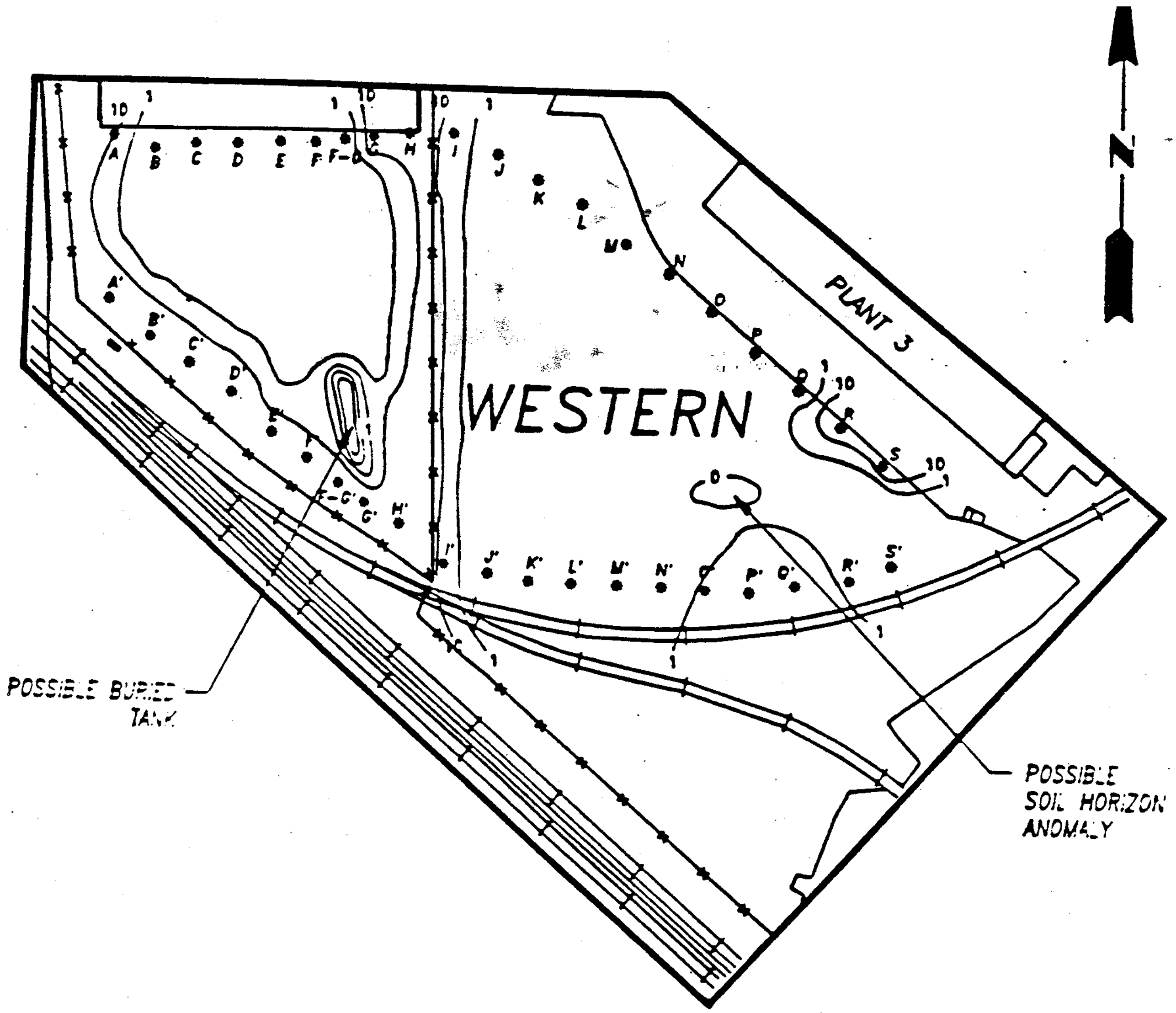
OCCIDENTAL CHEMICAL CORPORATION
HOOKER/RUCO SITE
HICKSVILLE, NEW YORK

SOIL-VAPOR SAMPLING LOCATION MAP

DATE	REVISED
	-

PREPARED BY:
LEGGETTE, BRASHEARS & GRAHAM, INC.
Professional Ground-Water and Environmental Services
72 Danbury Road
Wilton, CT 06897
(203) 762-1207

DATE 8/4/92 FIGURE 4



LEGEND

CONTOUR VALUE ABOVE AND BELOW BACKGROUND READING IN mmho/m

• E-M TRAVERSE END POINTS

0 80

SCALE IN FEET

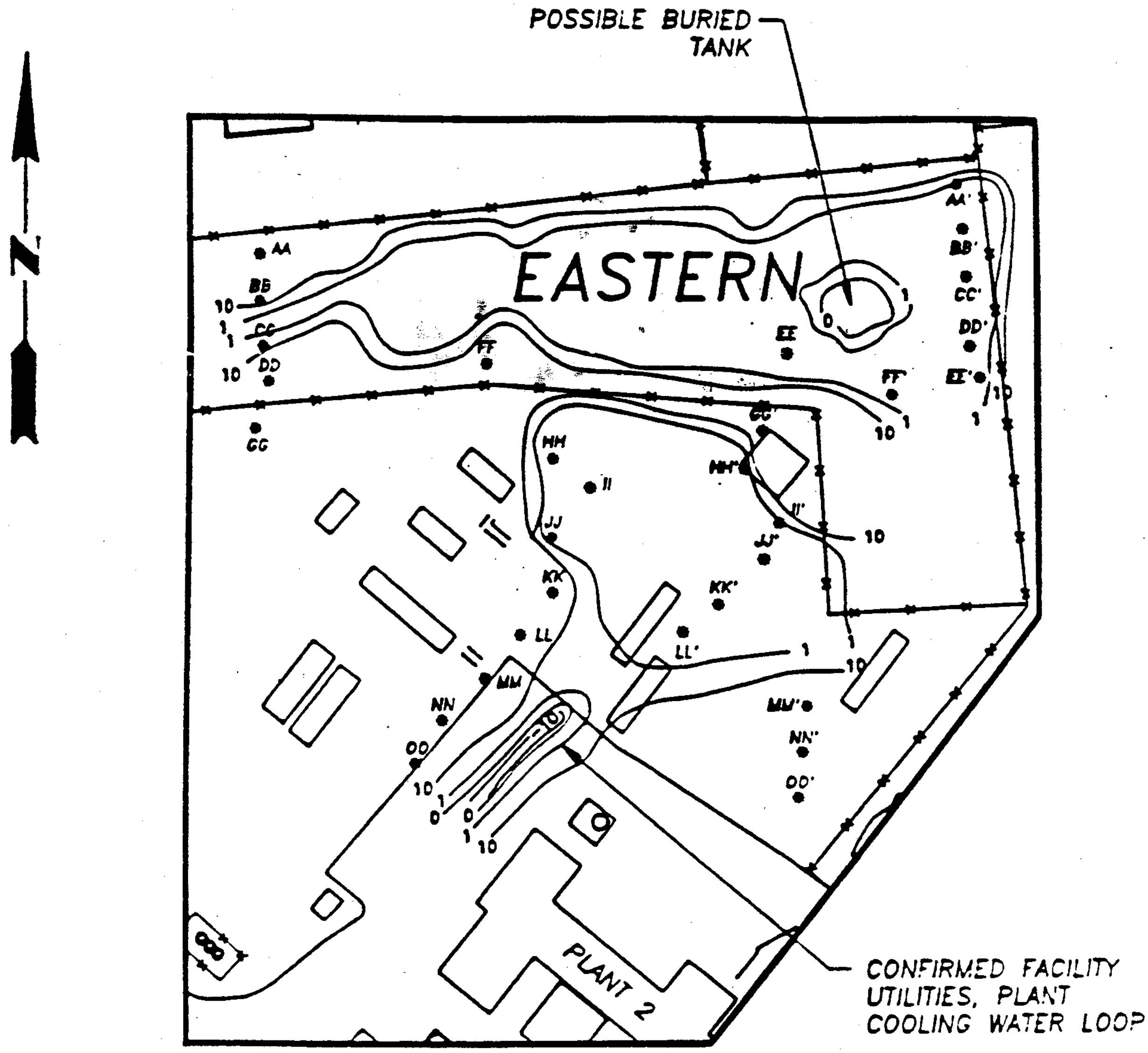
OCCIDENTAL CHEMICAL CORPORATION
HOOKER/RUCO SITE
HICKSVILLE, NEW YORK

E-M CONDUCTIVITY CONTOUR MAP OF THE WESTERN STUDY AREA

DATE	REVISED

PREPARED BY:
LEGGETTE, BRASHEARS & GRAHAM, INC.
Professional Ground-Water Consultants
72 Danbury Road
Wilton, CT 06897
(203) 762-1207

DATE 7/31/92 | FIGURE 5



LEGEND

CONTOUR VALUE ABOVE AND BELOW BACKGROUND READINGS IN mmho/m

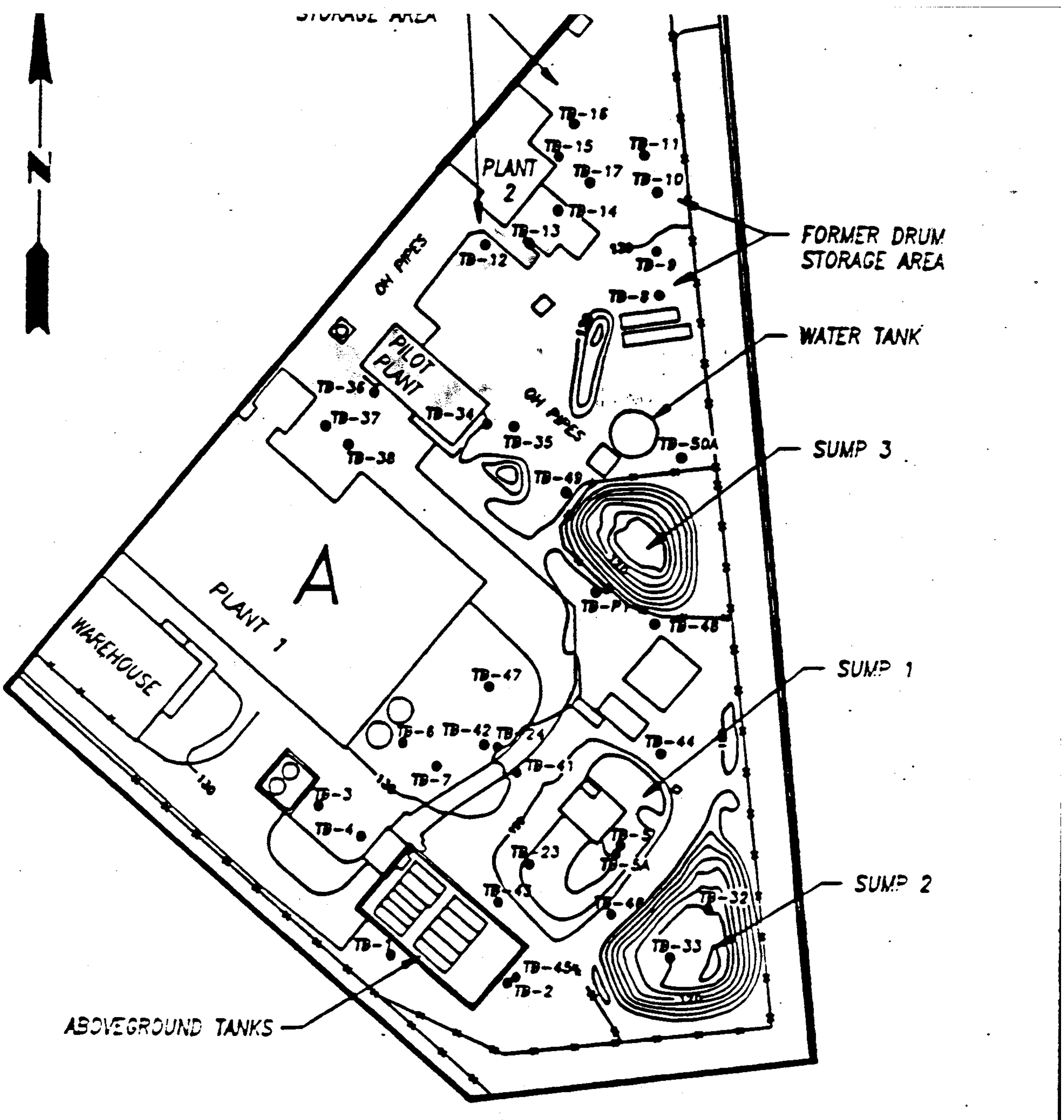
• E-M TRAVERSE END POINT

0 80
SCALE IN FEET

OCCIDENTAL CHEMICAL CORPORATION
HOOKER/RUCO SITE
HICKSVILLE, NEW YORK

E-M CONDUCTIVITY CONTOUR MAP OF THE EASTERN STUDY AREA

DATE	REVISED	PREPARED BY:
		LEGGETTE, BRASHEARS & GRAHAM INC. Professional Ground-Water Consultants 72 Danbury Road Wilton, CT 06897 (203) 762-1207
		DATE: 7/31/92 FIGURE 6



LEGEND

● TEST BORING LOCATIONS

0 100

SCALE IN FEET

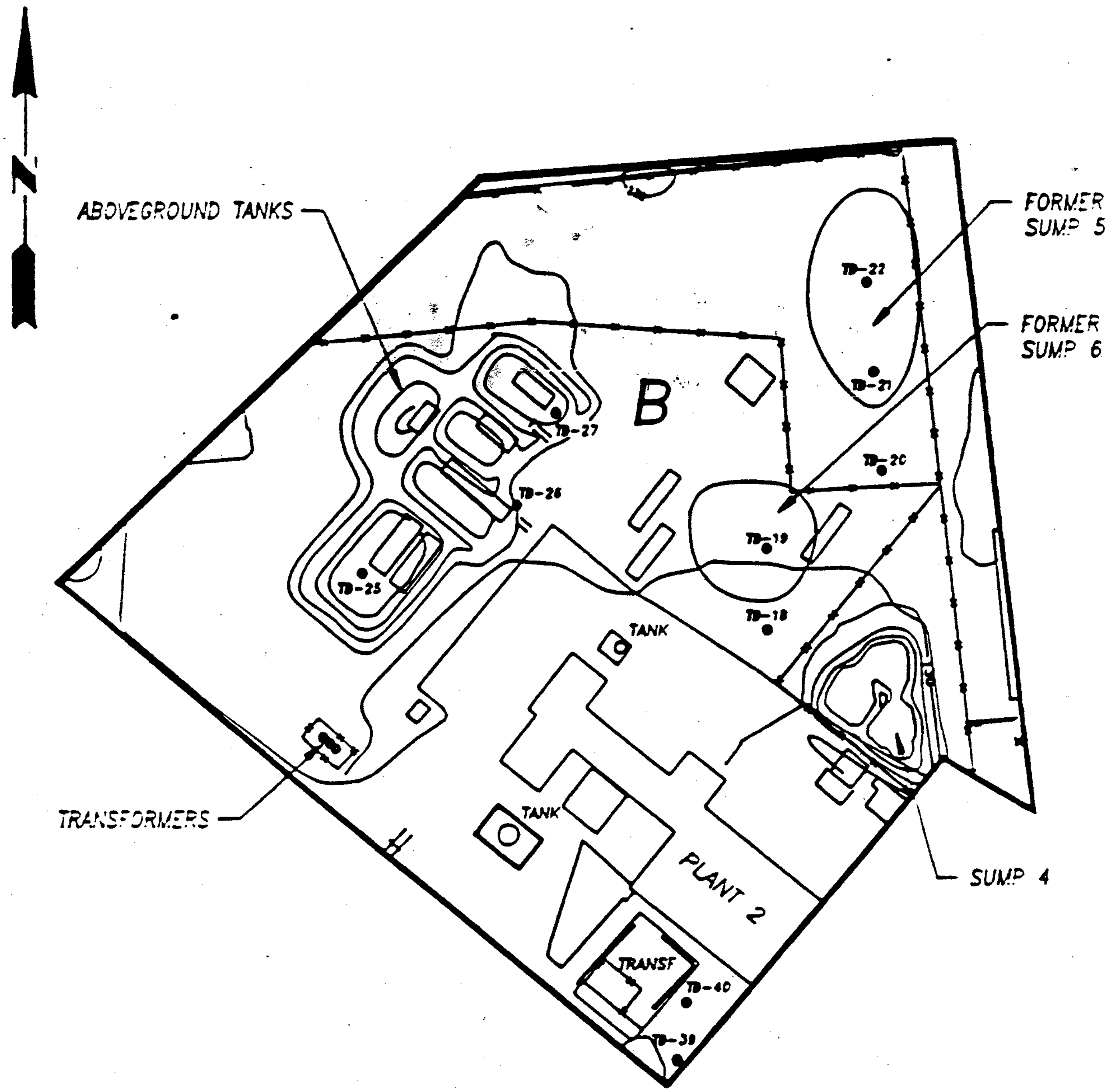
OCCIDENTAL CHEMICAL CORPORATION
HOOKER/RUCO SITE
HICKSVILLE, NEW YORK

TEST BORING LOCATIONS SOUTH

DATE	REVISED

PREPARED BY:
LEGGETTE, BRASHEARS & GRAHAM, INC.
Professional Ground-Water Consultants
72 Danbury Road
Wilton, CT 06897
(203) 762-1207

DATE: 7/29/92 | FIGURE 7



LEGEND

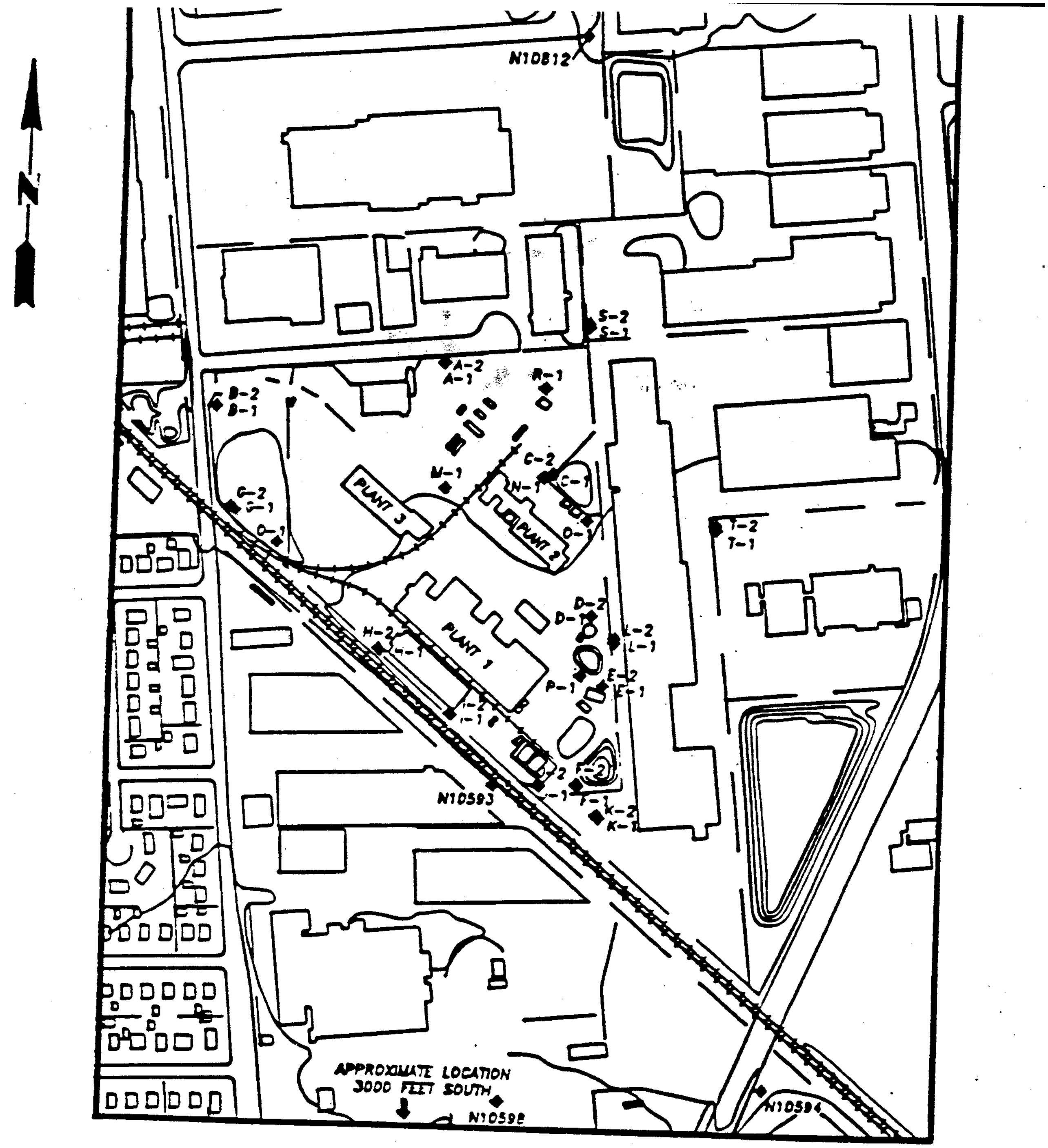
• TEST BORING LOCATION

0 100
SCALE IN FEET

OCCIDENTAL CHEMICAL CORPORATION
HOOKER/RUCO SITE
HICKSVILLE, NEW YORK

TEST BORING LOCATION NORTH

DATE	REVISED	PREPARED BY:
		LEGGETTE, BRASHEARS & GRAHAM, INC. Professional Ground-Water Consultants 72 Danbury Road Wilton, CT 06897 (203) 762-12
		DATE 7/29/92 FIG. 8



LEGEND

◆ WELL LOCATION

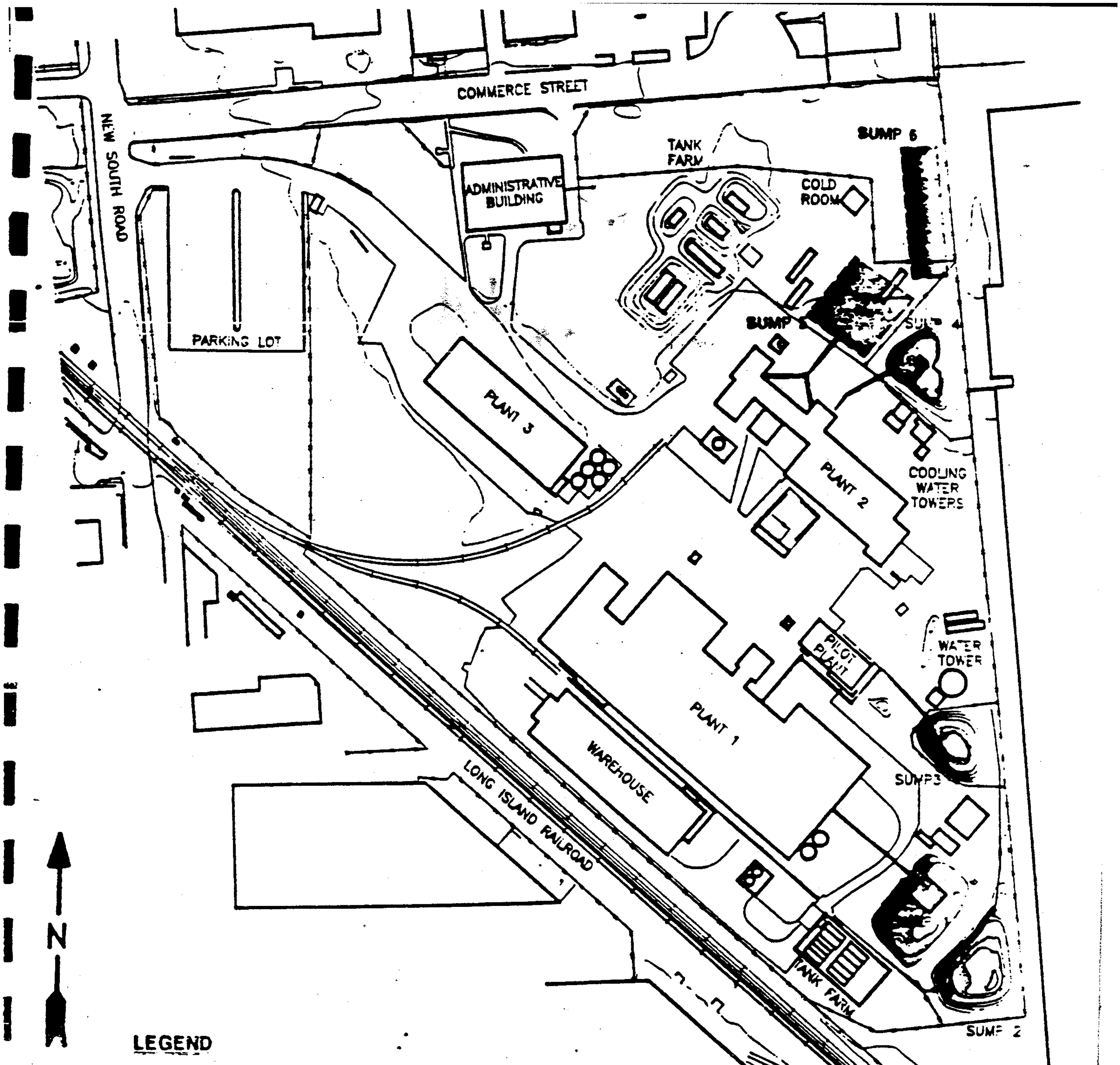
0 360'

SCALE IN FEET

OCCIDENTAL CHEMICAL CORPORATION
HOOKER/RUCO SITE
HICKSVILLE, NEW YORK

GROUND-WATER SAMPLING LOCATION

DATE	REVISED	
	1	PREPARED BY: LEGGETTE, BRASHEARS & GRAHAM, INC. Professional Ground-Water Consultants 72 Danbury Road Wilton, CT 06897 (203) 762-1207
		DATE 7/30/92 FIGURE 9



LEGEND

EXISTING PIPING, TRENCHES OR DITCHES

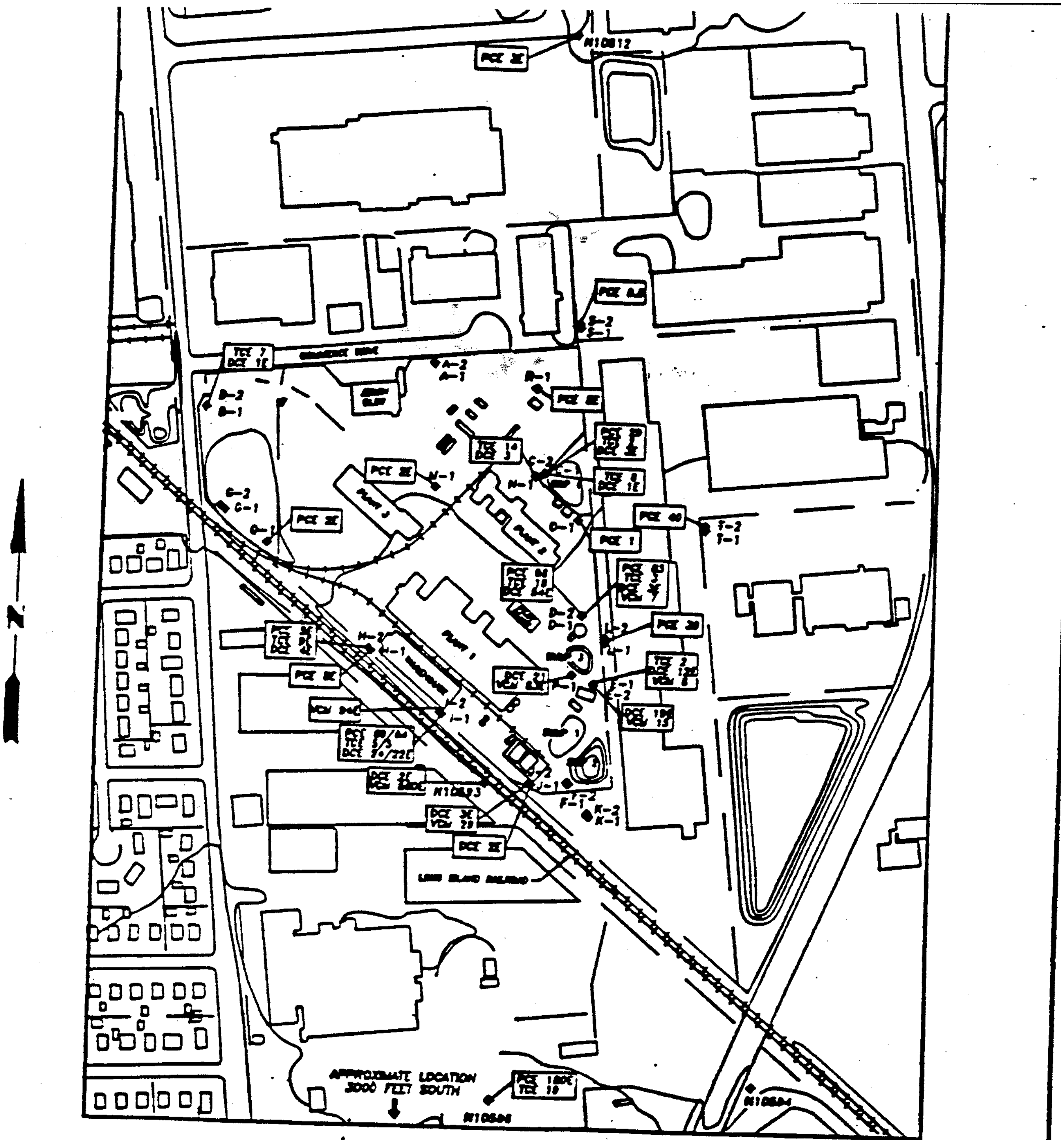
PREVIOUS LOCATIONS OF TRENCHING, DITCHES OR SUMPS THAT ARE NO LONGER ACTIVE

0 50
SCALE IN FEET

OCCIDENTAL CHEMICAL CORPORATION
HOOKER/RUCO SITE
HICKSVILLE, NEW YORK

WASTE-WATER DISPOSAL NETWORKS AT THE HOOKER/RUCO SITE

DATE	REVISIONS	PREPARED BY:
		LEGGETTE, BRASHEARS & GRAHAM, INC. Professional Ground-Water Consultants 72 Danbury Road Wilton, CT 06897 (2[illegible]) 762-1207
		DATE
		FIGURE 10



OCCIDENTAL CHEMICAL CORPORATION
HOOKER/RUCO SITE
HICKSVILLE, NEW YORK

CONCENTRATIONS OF CHLOROETHYLENES IN GROUND WATER, RESULTS IN ug/l

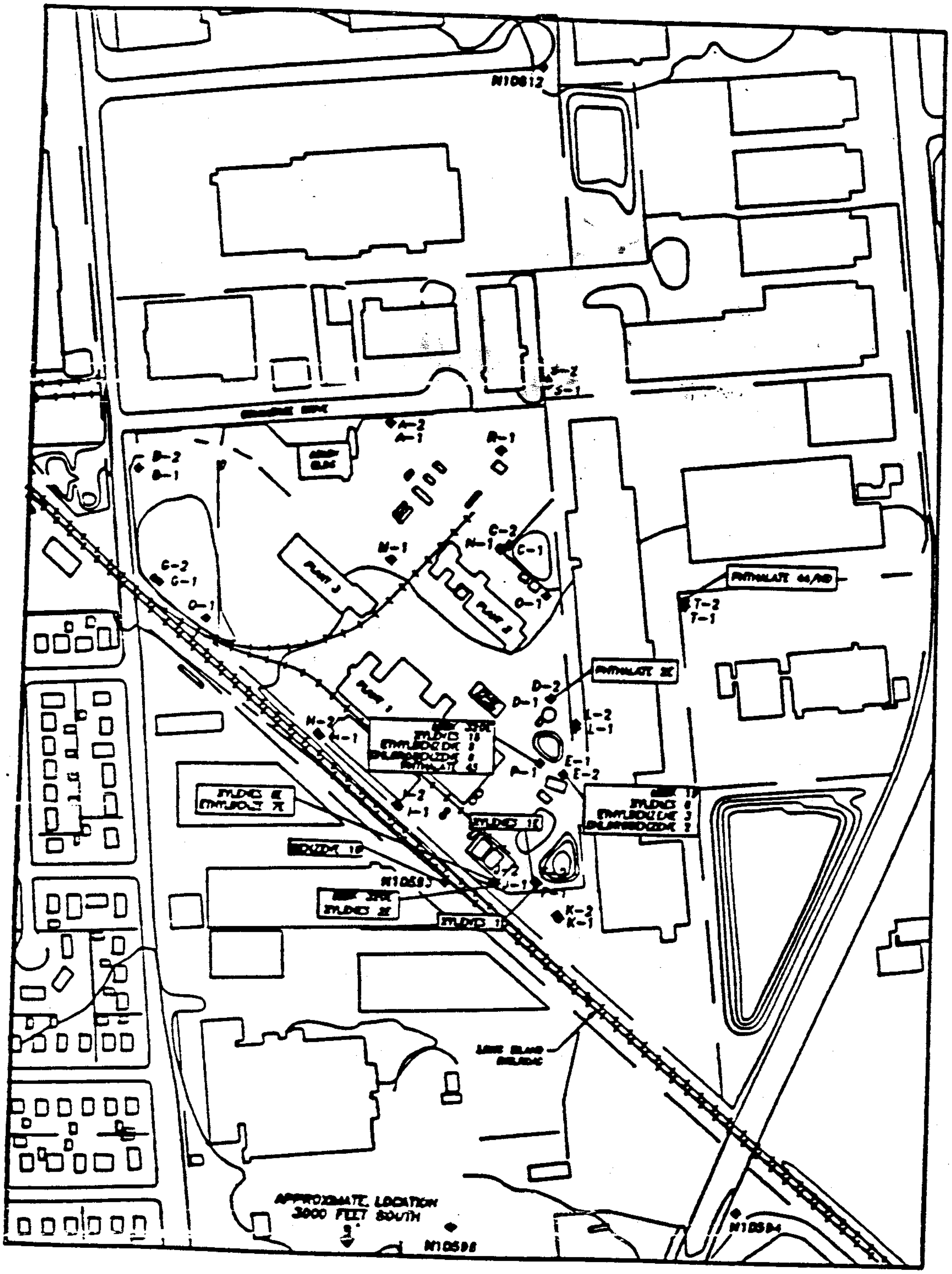
LEGEND

◆ WELL LOCATION

DATE	REVISED

PREPARED BY:
LEGGETTE, BRASHEARS & GRAHAM, INC.
Professional Ground-Water and Environmental Services
72 Danbury Road
Wilton, CT 06897
(203) 762-1207

DATE: 8/4/92 | FIGURE: 11



LEGEND

◆ WELL LOCATION

0 150
SCALE IN FEET

OCCIDENTAL CHEMICAL CORPORATION
HOOKER/RUCO SITE
HICKSVILLE, NEW YORK

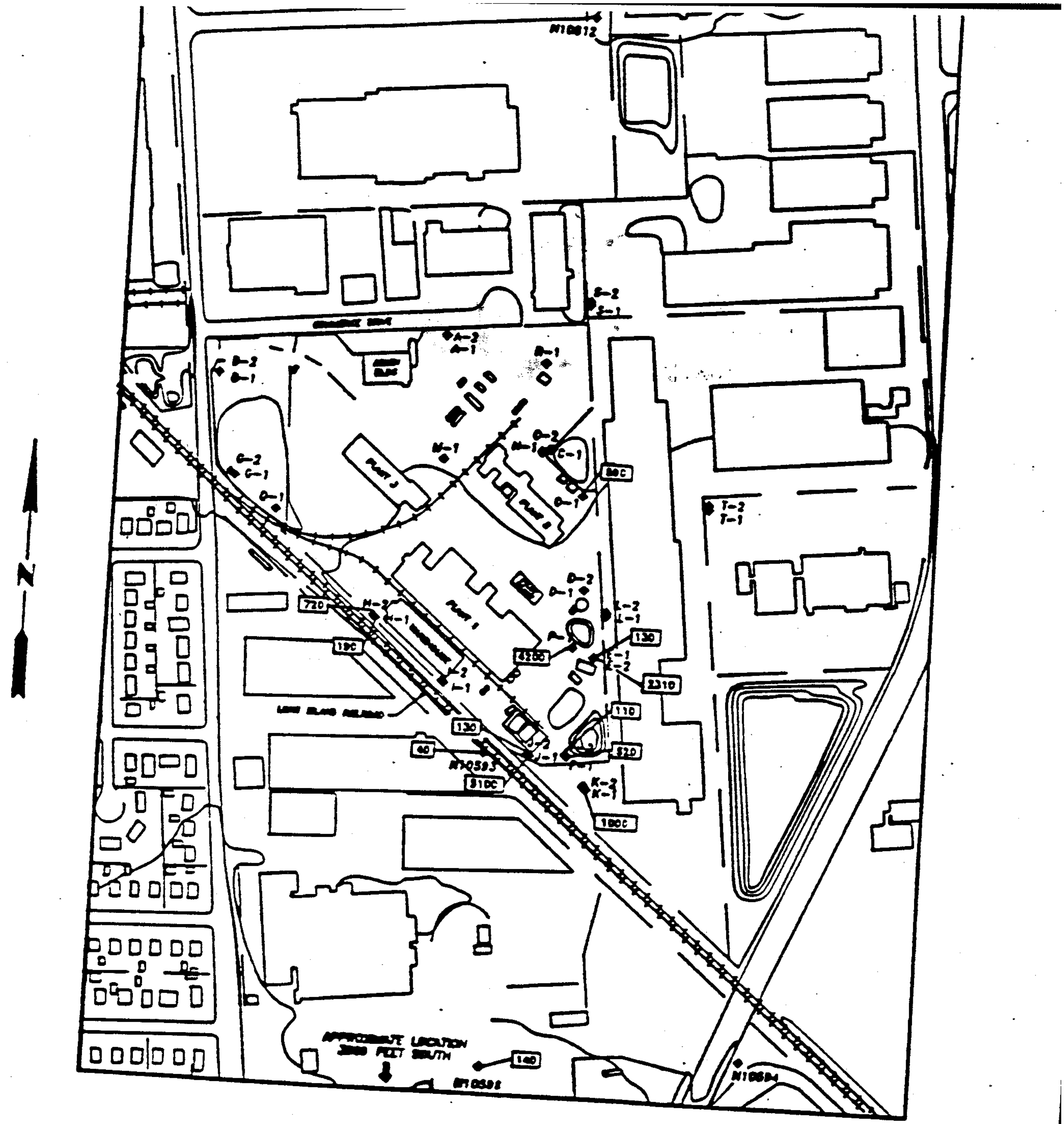
CONCENTRATIONS OF VOLATILE ORGANICS AND PHTHLATES IN GROUND WATER, RESULTS IN ug/l

DATE	REVISED

PREPARED BY:

LEGGETTE, BRASHEARS & GRAHAM, INC.
Professional Ground- ter and Environmental Services
72 . abury R d
Wilt . CT 06 7
(20) 762-12

DATE: 8/4/92 | FIGURE 12



LEGEND

◆ WELL LOCATION

OCCIDENTAL CHEMICAL CORPORATION
HOOKER/RUCO SITE
HICKSVILLE, NEW YORK

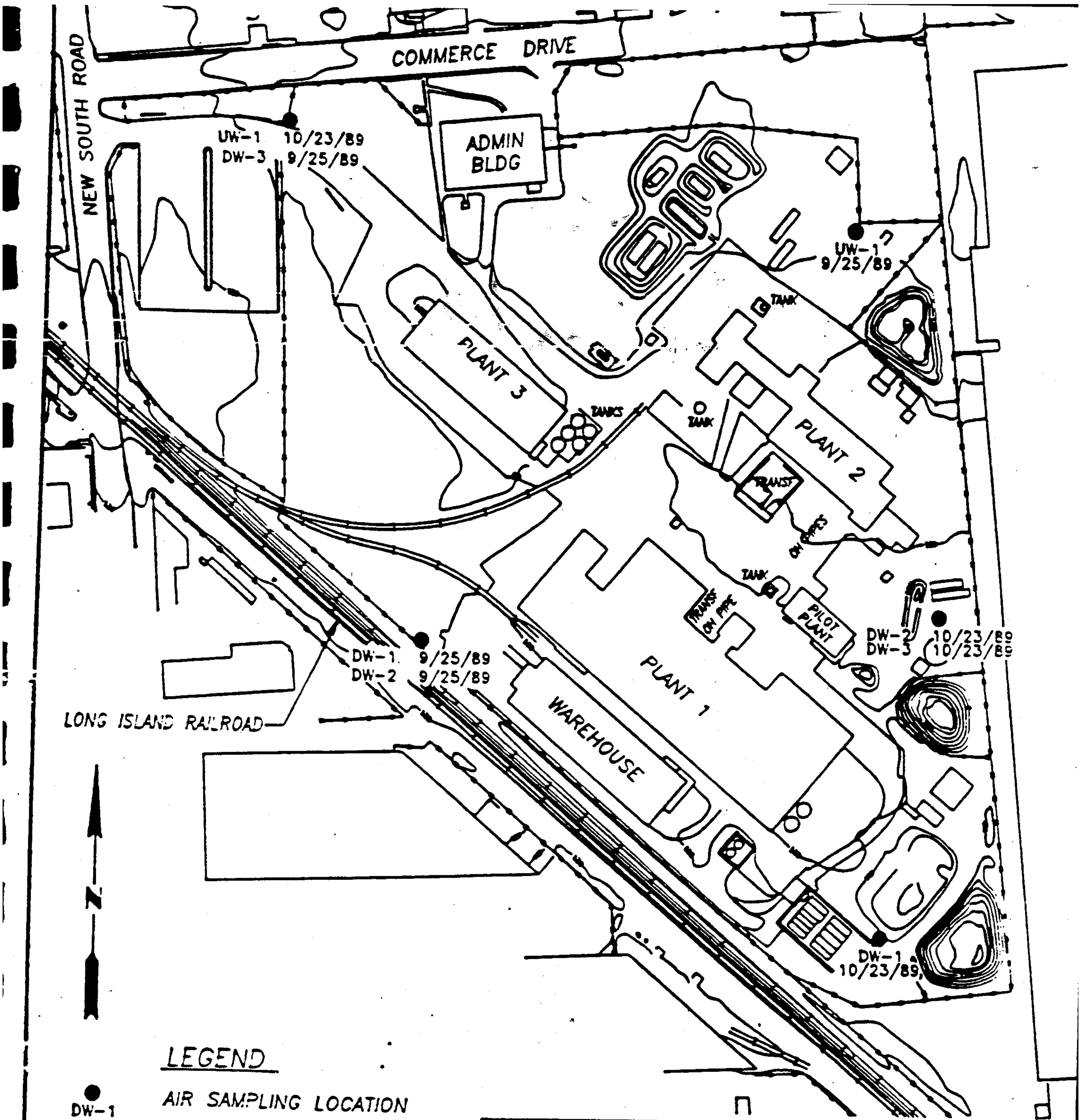
CONCENTRATIONS OF TENTATIVELY IDENTIFIED COMPOUNDS IN GROUND WATER, RESULTS IN ug/l

DATE	REVISED

PREPARED BY:

LEGGETTE, BRASHEARS & GRAHAM, INC.
Professional Ground-Water and Environmental Services
72 Danbury Road
Wilton, CT 06897
(203) 762-1207

DATE: 12/11/91 | FIGURE 13



LEGEND

DW-1 AIR SAMPLING LOCATION

10/23/89 DATE SAMPLED

WIND DIRECTION

310 10/23/89

SSE6 9/25/89

0 150

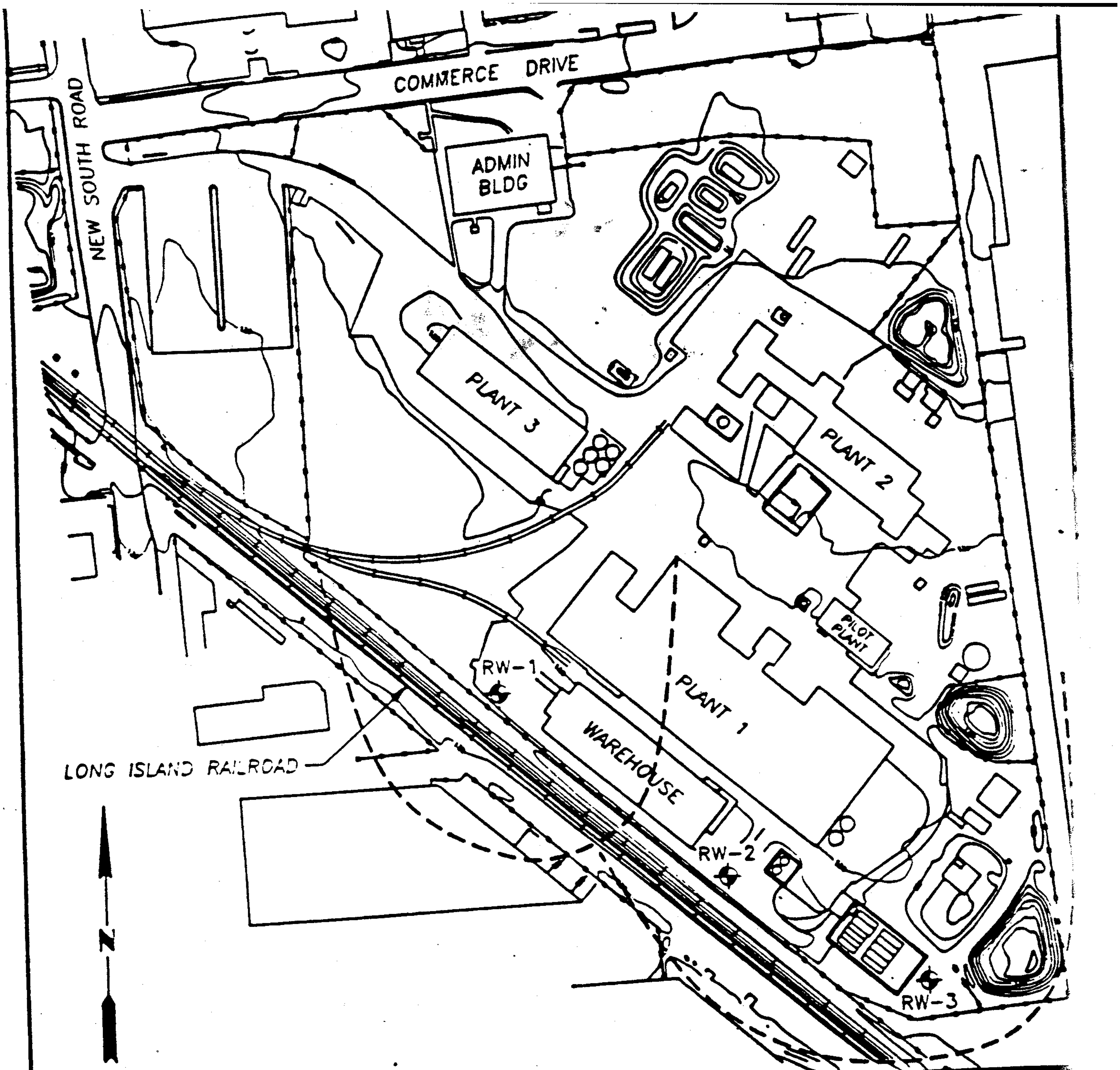
SCALE IN FEET

OCCIDENTAL CHEMICAL CORPORATION
HOOKER/RUCO SITE
HICKSVILLE, NEW YORK

AIR SAMPLING LOCATIONS

DATE	REVISED	PREPARED BY:
		LEGGETTE, BRASHEARS & GRAHAM, INC.
		Professional Ground-Water Consultants
		72 Danbury Road
		Wilton, CT 06897
		(203) 762-1207

DATE 7 9 92 | FIGURE 14



LEGEND

RW-1 RECOVERY WELL

- - - - CAPTURE ZONE

0 150

SCALE IN FEET

OCCIDENTAL CHEMICAL CORPORATION
HOOKER/RUCO SITE
HICKSVILLE, NEW YORK

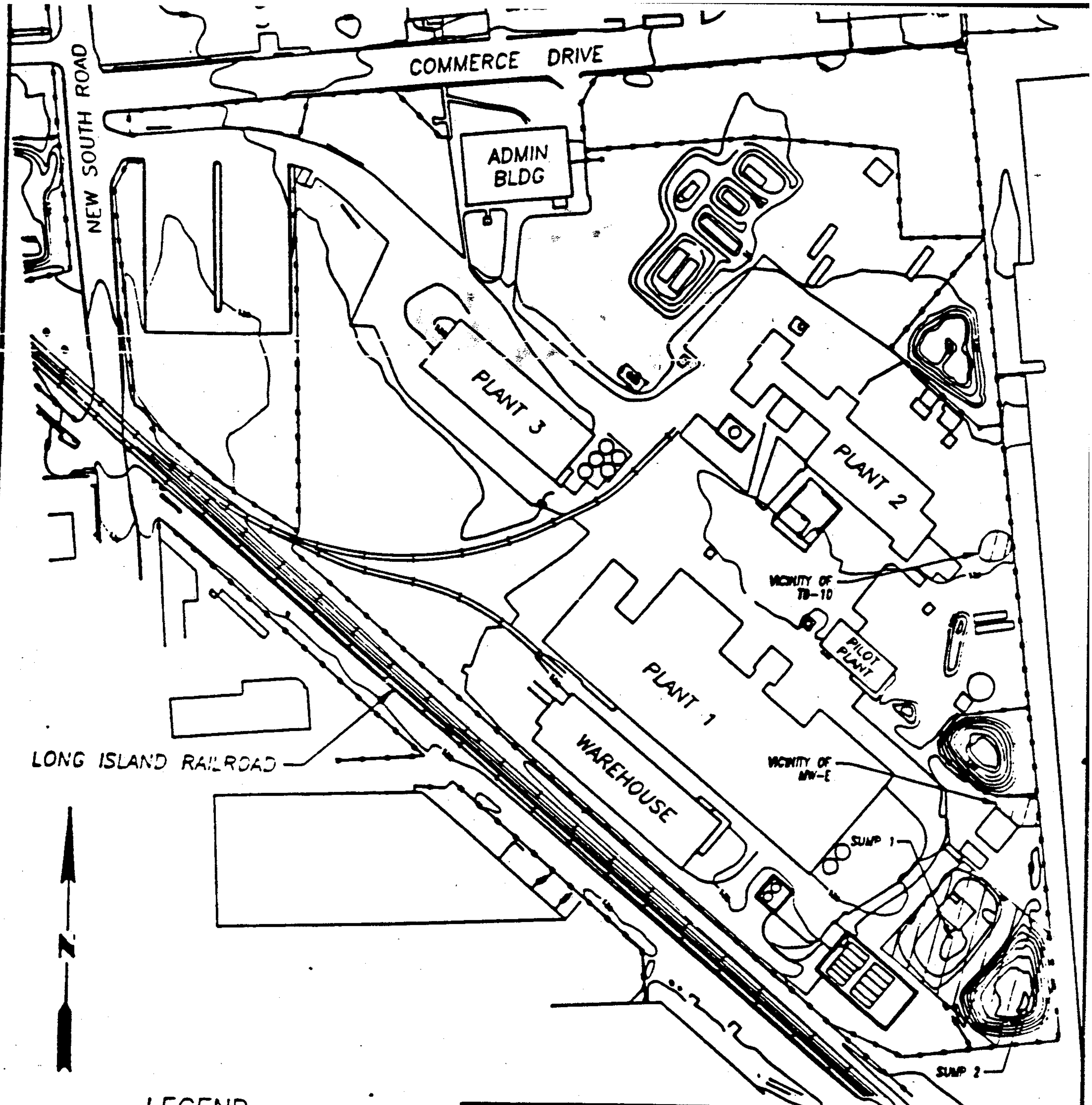
RECOVERY WELL LOCATIONS AND CAPTURE ZONES

DATE	REVISED

PREPARED BY:

LBG ENGINEERING SERVICES, INC.
Professional Environmental and Civil Engineers
72 Danbury Road
Wilton, CT 06897
(203) 762-5502

DATE 3/9/93 FIGURE 15



LEGEND

▨ AREAL EXTENT OF SOILS TO BE ADDRESSED

0 150
SCALE IN FEET

OCCIDENTAL CHEMICAL CORPORATION
HOOKER/RUCO SITE
HICKSVILLE, NEW YORK

AREAL EXTENT OF SOILS TO BE ADDRESSED

DATE	REVISED

PREPARED BY:
LBG ENGINEERING SERVICES, INC.
Professional Environmental and Civil Engineers
72 Danbury Road
Wilton, CT 06897
(203) 762-5502

DATE 8/2/93 | FIGURE 16

APPENDIX II

TABLES

NOT INCLUDED IN THIS DOCUMENT
CONTACT
Syed Quadri, USEPA
(212) 637-4233

APPENDIX III

ADMINISTRATIVE RECORD INDEX

NOT INCLUDED IN THIS DOCUMENT
CONTACT USEPA
(Syed Quadri [212] 637-4233)

APPENDIX IV

RESPONSIVENESS SUMMARY

NOT INCLUDED IN THIS DOCUMENT
CONTACT USEPA
(Syed Quadri [212] 637-4233)