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RCRA FACILITY INVESTIGATION PROPOSAL
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

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VOLUME 2 OF 6

CURRENT ASSESSMENT SUMMARY REPORT

Submitted by:

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NOTE: (1) RFA refers to the RCRA Facility Assessment which is also referred to herein as the Facility Assessment.
PRFI refers to the Preliminary RCRA Facility Investigation which is also referred to herein as the Preliminary Investigation.

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NOTE: (1) RFA refers to the RCRA Facility Assessment also referred to herein as the Facility Assessment.
PRFI refers to the Preliminary RCRA Facility Investigation also referred to herein as the Preliminary Investigation.

Section One

SECTION 1
INTRODUCTION

The purpose of the Current Assessment Summary Report is to summarize and present information that is pertinent to the RCRA Facility Investigation (Facility Investigation) of the CIBA-GEIGY facility in Cranston, Rhode Island (the facility or the site). The Current Assessment Summary Report includes information on the Environmental Setting, the Facility History, the RCRA Investigation History, the Solid Waste Management Units and Areas of Concern, and the Environmental Characterization.

The Current Assessment Summary Report presented herein is based on literature review, personnel contacts and site reconnaissance. The literature review involved contacting state and federal agencies, and reviewing CIBA-GEIGY files to determine the existence of data pertinent to the Facility Investigation and interpreting the data in the context of the Facility Investigation. In addition, agency and CIBA-GEIGY personnel were asked for personal knowledge pertinent to the Facility Investigation. A list of contacted sources and the nature of the data and/or publications provided by them are summarized in Table 1-1. Although reconnaissance were conducted as part of the Preliminary RCRA Facility Investigation (Preliminary Investigation), site reconnaissance was also conducted as part of the Current Assessment Summary Report.

TABLE 1-1

SUMMARY OF DATA SOURCES AND DATA OBTAINED FOR THE CURRENT ASSESSMENT SUMMARY REPORT
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

Agency Contacted/Information Source	Publication* and/or Type of Information
United States Environmental Protection Agency	• Draft Consent Orders • RCRA Facility Assessment (report obtained through CIBA-GEIGY) • Surficial soil sampling results • Public meeting notes and general public submissions
United States Geological Survey	• Quadrangle maps depicting topography, surficial geology and bedrock geology. • "Ground Water Resources of the Providence Quadrangle Rhode Island" (1959)
United States Fish and Wildlife Service	• National Wetlands Inventory Map: Providence Quadrangle (map obtained through Statewide Planning Program office)
Federal Emergency Management Agency	• Flood Insurance Rate Maps (maps obtained through Statewide Planning Program office)
Rhode Island Department of Environmental Management: Division of Water Resources	• "Water Quality Regulations for Water Pollution Control" (1988) • "A Study of the Water Quality of the Pawtuxet River: Chemical Monitoring and Computer Modeling of Pollutants - Volume I: Chemical Monitoring of Pollutants in the Pawtuxet River" (1985) • "Pawtuxet River Basin Water Quality Management Plan" (1977)
Rhode Island Department of Administration Statewide Planning Program	• "Pawtuxet River, Rhode Island: Use Attainability Study" (1983) • "Pawtuxet River Basin: Non-Point Water Quality Standards Review and Management Plan" (1987) • Flood Insurance Rate Maps for Cranston (1984) and Warwick (1982) Rhode Island

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TABLE 1-1 (continued)

SUMMARY OF DATA SOURCES AND DATA OBTAINED FOR THE CURRENT ASSESSMENT SUMMARY REPORT
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

Agency Contacted/Information Source	Publication* and/or Type of Information
Rhode Island Department of Transportation Division of Public Works	• Boring logs associated with the reconstruction of the Warwick Avenue Bridge
CIBA-GEIGY Corporation	• "RCRA Part B Permit Application Submission" (1985) • "Final RFA Report CIBA-GEIGY RCRA Facility Assessment" (1988) • "Organic Compounds in an Industrial Wastewater: A Case Study of their Environmental Impact (1979) • Boring logs associated with proposed on-site construction activities • Maps depicting property lines, easements, right-of-ways, utilities, plant layout, surrounding land use, waterways and floodplain. • Data from the Preliminary RCRA Facility Investigation
GEOD Corporation	• Base maps for the facility and surrounding area were generated using photogrammetric techniques. New aerial photographs were taken during April 1989. Most of the maps presented herein were produced using the new base maps.

* = See Section 8 for a complete list of references

Section Two

SECTION 2
ENVIRONMENTAL SETTING

The environmental setting of the facility and environs includes geography, climate, geology, hydrogeology and hydrology. Each is discussed below.

2.1 GEOGRAPHIC SETTING

The facility is located along the north and south banks of the Pawtuxet River in Cranston (Providence County) and Warwick (Kent County) Rhode Island (Figure 2-1). The universal coordinates of latitude and longitude for the approximate center of the facility are 41 degrees, 46 minutes, 5 seconds north latitude; and 71 degrees, 24 minutes 43 seconds west longitude (USGS, 1975). The equivalent Rhode Island Plane Coordinate System latitude and longitude are approximately easting 524,200 ft and northing 249,000 ft. The defined area of the facility is about 31 acres, 13 acres north of the Pawtuxet River in Cranston and 18 acres south of the river in Warwick.

Based on the geographic setting and the former plant layout, the facility has been divided into three study areas: the Production Area, the Waste Water Treatment Area and the Warwick Area. The defined facility boundaries for each on-site area are depicted on the appropriate figures included herein. Because investigations will also be conducted outside the defined facility boundaries, two additional study areas have been defined: the Off-Site Area and the Pawtuxet River Area.

Surrounding land use is depicted on Figure 2-2. Generally, the facility is bordered to the north and south by residential areas; to the east by commercial areas; and to the west by one open space area (Former Atlantic Tubing Property) and one mixed industrial area. That industrial area was formerly utilized by the Atlantic Tubing and Rubber Company which manufactured rubber and plastic, including polyvinyl chloride.

Property lines (legal boundaries) and on-site buildings are also depicted on Figure 2-2. Above ground and underground utilities, paved areas, easements, and rights-of-way are depicted on Figure 2-3. No water supply wells were identified within one-half mile of the facility.

Topography, waterways, wetlands and flood plains are depicted on Figure 2-4. The facility is relatively flat lying with gentle slopes towards the Pawtuxet River. The facility elevation ranges from about 25 ft to 10 ft above mean sea level. The residential area to the north of the Waste Water Treatment Area occupies an elevated terrace which is about 20 ft above that area and is approximately 35 ft above mean sea level. A major waterway, the Pawtuxet River, is associated with the facility and flows from west to east through the site. Bellefont Pond is located northwest and west of the Production Area. The pond drains to the south by way of a partially culverted stream. That stream enters the Pawtuxet River along its north bank about 300 ft upstream of the Production Area. Wetlands do not occur on site but two wetlands areas are adjacent to the site: the Pawtuxet River and Bellefont Pond (U.S. Fish & Wildlife Service, 1975). The Pawtuxet River is designated as R2OW which indicates an open water, lower perennial riverine system; Bellefont Pond is designated as POW which indicates an open water palustrine system. Adjacent to the northern section of Bellefont Pond is a wetland designated as PFO1 which indicates a broad leaved deciduous forested palustrine system.

Some sections of the facility are within the one hundred year flood plain (FEMA, 1982 and 1984). The entire Warwick Area and a large section of the Waste Water Treatment Area (about 50 percent) are within the one hundred year flood plain. A small section of the Production Area along the river (about 10 percent of that area) is within the one hundred year flood plain.

2.2 CLIMATIC SETTING

The climate in the vicinity of the facility is greatly influenced by Narragansett Bay and the Atlantic Ocean and can be characterized as marine. In general the winters are short and mild and the summers are long and warm.

Based on a 51 year period of record, the mean annual temperature at Providence is 50.6°F. Providence is located about 4 miles north of the facility. February is the coldest month, with a mean temperature of about 29°F, and July is the hottest, with a mean of about 73°F. The lowest temperature of record in Providence is -17°F and the highest is 102°F (USGS, 1959).

The annual precipitation during the 51 year period averaged 39.89 inches, having ranged from 29.50 inches to 58.57 inches. Monthly precipitation is evenly distributed throughout the year, but there are occasional periods of extreme drought or excessive rainfall. In general, October receives the least rainfall and August the greatest; the mean monthly precipitation is 2.91 inches and 3.80 inches, respectively (USGS, 1959).

2.3 GEOLOGIC SETTING

The geologic setting of the facility is discussed on a regional, local and site specific basis. The regional and local geology described herein is based on published literature. The site specific (facility) geology is based on geotechnical and hydrogeologic investigations conducted at the facility.

2.3.1 Regional Geology

The facility is located in the southern portion of the geologic province known as the Narragansett Basin. That basin is partly fault bounded and extends from southeastern Rhode Island northward into Massachusetts. Rocks in the basin are Carboniferous in age (about 300 million years) and consist of continental clastic

sediments that primarily include conglomerates, sandstones, and shales. Those rocks were multiply deformed and moderately metamorphosed during the Permian period. The Narragansett Pier Granite, exposed in the southern portion of the basin, was emplaced during the Permian period.

The southern portions of the basin underwent the most intense deformation during the Permian. The deformation resulted in the formation of major tight isoclinal to recumbent north-to-northeast trending folds and numerous north-to-northwest trending faults (Barosh and Hermes, 1981).

Underlying this basin, and exposed several miles west of the facility are rocks of the Avalon terrain. Those rocks are high-grade metaigneous rocks that were emplaced and subsequently metamorphosed during late Precambrian time (about 600 million years before present).

The overburden in the region consists primarily of glacial outwash that includes layers of silt, sand and gravel (Moultrop, 1956). The thickness of the outwash is generally not more than 100 ft (Halberg et al., 1961). The Pawtuxet River flows along the boundary between the Providence outwash plain to the north and the Warwick outwash plain to the south.

2.3.2 Local Geology

The facility vicinity is underlain (at depths ranging from 40-280 ft) by consolidated sedimentary rocks of the Rhode Island Formation, a unit that is widespread in the Narragansett Basin. That formation generally consists of conglomerates, sandstones, shales, and minor coal seams (Skehan and Murray, 1980). Surface exposures of the formation do not occur near the CIBA-GEIGY facility.

The unconsolidated deposits in the vicinity of the facility generally have thicknesses that range between 50 to 100 ft (Bierschenk, 1959). The typical

stratigraphy in areas near the facility, as described by Bierschenk (1959), consists of a layer of fill that is underlain by a layer of sand and gravel of variable thickness, which is underlain by a layer of silt.

Scattered pockets of recent alluvial deposits occur in areas east of the site. Those deposits consist of stratified clays, silts, sand, and gravels which typically represent outwash material that was reworked by the Pawtuxet River (Moultrop, 1956). West of the site, small, isolated pockets of material having a high organic content occur adjacent to the Pawtuxet River. Those deposits are found in low, marshy areas where the water table is near the ground surface. The underlying soils, however, are generally similar to the typical outwash found in surrounding areas (Moultrop, 1956).

2.3.3 Facility Geology

Information on the geology of the facility was obtained during the Preliminary Investigation. Additional geologic information was obtained from geotechnical investigation data on file with CIBA-GEIGY and the Rhode Island Department of Transportation, and ground water resources data published by the USGS.

Preliminary Investigation Data. Site specific information regarding the type, thickness, and continuity of the subsurface deposits were investigated using conventional boring techniques. Soil borings logged during the advancement of boreholes for piezometer and monitoring well installation were used to interpret the local stratigraphy. Boring logs from the Preliminary Investigation are presented in Appendix A.

Four main subsurface strata were encountered during drilling and they are described below:

FILL - composed of silt and fine to medium sand with fragments of wood, brick, concrete, fiberglass and reworked soils. In the Production Area, coal fragments were observed on the surface. Fill, up to 12.5 ft in thickness, is located in the southern section of the Production Area adjacent to the bulkhead. Fill thicknesses up to 10 ft were encountered in the Waste Water Treatment Area.

UNCONSOLIDATED DEPOSITS - consist of three units as described below.

o SILT, SANDY SILT and SAND - contains occasional peat lenses and was generally encountered below the fill. The thickness and lateral continuity of this unit is variable and could not be quantified from the existing boring data.

o CLAYEY SILT and SILTY CLAY - is believed to be contemporaneous (i.e. deposited at the same time) with the silt, sandy silt, sand unit(s). The thickness and lateral continuity of this unit is variable and could not be quantified from the existing boring data. It is believed that these units represent different facies deposited by glaciofluvial and fluvial processes, including reworking by the Pawtuxet River.

o TILL - a dense unit consisting of clay, silt, sand and gravel was encountered below the clayey silt/silty clay unit in one boring (P-14D: see Appendix A) located in the northern section of the Production Area. In that boring a till thickness of 11.5 ft was encountered before the boring was terminated. Other file data (i.e. non-Preliminary Investigation data) suggest that this till mantles the underlying bedrock but the lateral continuity of the till is uncertain.

Although bedrock was not encountered in any of the Preliminary Investigation borings, the other file and published data indicate that bedrock (the Rhode Island Formation) occurs beneath the facility at depths ranging from about 52 ft to 65 ft below ground surface. Bedrock beneath the location of the Warwick Avenue

bridge (located about 300 ft east of the facility) occurs about 83 ft below ground surface.

File and Published Data. Geotechnical data from previous site investigations were reviewed as part of this study. Specifically, data from geotechnical borings taken in two areas of the facility (the Production Area and the Waste Water Treatment Area) were examined and correlated with borings from the Preliminary Investigation. Within the northern section of the Production Area, 13 soil borings ranging in depth from 51 ft to 73.5 ft were drilled during 1955 and 1959. Although some variations of the thickness, depth, and color of the subsurface materials were observed, good stratigraphic correlation was apparent within this section of the site. Till, up to 14 ft in thickness, was encountered in some of the borings. Bedrock was encountered in two borings at depths of 53 ft and 58 ft below ground surface.

Seventeen additional boring logs were reviewed. Those logs are for borings advanced in the southern section of the Production Area during 1955, 1956 and 1958. Good stratigraphic correlation was apparent between those boring logs and the Preliminary Investigation boring logs. Bedrock was encountered in two of the borings at depths of 52.5 ft and 56 ft below ground surface.

Boring logs for 16 geotechnical borings drilled during 1969 and one boring drilled during 1970 within the Waste Water Treatment Area were reviewed and correlated with soil borings from the Preliminary Investigation. The '1969' borings ranged in depth from 30.0 ft to 31.5 ft below ground surface. The '1970' boring was terminated at 60.5 ft when bedrock was encountered. In general, a good correlation of the local stratigraphy was observed based on the boring data but minor variations in the color, thickness and depth of the subsurface materials did exist.

Logs of test borings advanced at the facility in 1953 and 1955 and documented by the USGS (1959) were also reviewed. The soil descriptions in those

boring logs are inadequate for comparison to the descriptions in the Preliminary Investigation boring logs. However, bedrock was encountered in one boring at a depth of 65 ft below ground surface. The exact location of those borings is unclear. Apparently the borings were advanced in the Production Area.

Logs of test borings advanced at the location of the Warwick Avenue bridge (located about 300 ft east of the facility) were obtained from the Rhode Island Department of Transportation. Those logs indicate that bedrock occurs about 83 ft below ground surface.

Geologic Cross Sections. Cross sections of the facility geology are presented as Figures 2-5 and 2-6. Those cross sections are based primarily on data from the Preliminary Investigation and secondarily on the other file and published geologic data. The locations of the geologic cross sections are shown on Figure 2-7.

2.4 HYDROGEOLOGIC SETTING

Locally, ground water occurs in unconsolidated fluvial and glaciofluvial sediments, and underlying consolidated sedimentary, metamorphic and igneous rocks. The fluvial deposits are thin and discontinuous, and would not yield adequate water to wells. The glaciofluvial sediments vary from moderate and high yield deposits (outwash deposits) to poor yield deposits (till deposits). The outwash deposits afford most of the water currently pumped and potentially available. The yield of consolidated rocks is variable depending on such factors as fracture/joint density and size, interconnection of fractures/joints, and the nature and thickness of overlying deposits.

Conceptually, ground water flow in the unconsolidated deposits follows topography and ultimately the ground water discharges to creeks, rivers and bays. Some of the water in the unconsolidated deposits recharges the underlying consolidated rocks. Ground water flow in consolidated rock is complicated and is dependent on fracture/joint orientation, size and density. Taken together ground

water in the unconsolidated deposits and consolidated rocks conceptually have three flow components: (1) shallow flow, ultimately discharging to local streams, (2) intermediate flow, ultimately discharging to regional streams and (3) deep flow, ultimately discharging to global base level, that is either Narragansett Bay or the ocean.

The depth to water in consolidated rock wells reflects the configuration of the land surface (i.e. topography) and the level apparently has little relation to the depth at which the water-bearing fractures/joints are encountered. That condition suggests that there is an interconnection between the unconsolidated deposits and the underlying consolidated rocks.

Ground water levels are generally above stream levels indicating that streams such as the Pawtuxet River are gaining streams (USGS, 1959). That is, along most reaches of their courses, the streams are being fed by ground water thus maintaining base flow in the streams during periods of no rainfall.

Ground water underneath the facility occurs in fill material and the natural unconsolidated deposits and consolidated rocks. Data on ground water features of the site were collected and interpreted as part of the Preliminary Investigation. Most of that data is based on shallow (less than 20 ft in depth) piezometers and monitoring wells that are screened across the lower fill and the upper natural unconsolidated deposits. Three deep (40 ft to 50 ft) piezometers and one deep monitoring well screened across lower to intermediate elevations within the unconsolidated deposits also provided hydrogeologic data. Piezometer and monitoring well construction details are presented in Appendix A and summarized in Table 2-1. Ground water elevations are presented in Table 2-2. Piezometer and monitoring well locations are depicted on Figure 2-8.

Based on two synoptic measurements of ground water elevations, ground water contour maps were constructed (Figures 2-9 and 2-10). The inferred direction of ground water flow is towards the river. Horizontal gradients across

the facility range from 0.005 to 0.016. The average horizontal gradient for the Production Area is about 0.005 which is based on the change in ground water elevation in the northern section of the area. Ground water levels in the southern section of the Production Area are elevated due to the bulkhead along the Pawtuxet River. Those levels were not used to calculate gradient. The average horizontal gradients for the Waste Water Treatment Area and the Warwick Area are about 0.016 and 0.010, respectively.

Based on permeability data from published information on sands and silty sands, the horizontal gradients, and an assumed porosity of 0.3, the inferred rates of ground water movement were calculated. They are: 2 to 180 feet per year for the Production Area, 6 to 190 feet per year for the Waste Water Treatment Area, and 4 to 120 feet per year for the Warwick Area.

Vertical gradients were evaluated based on water level elevations from three nested piezometer pairs: P-14S and P-14D, P-1S and P-1D, and MW-1S and MW-1D. The data indicate that an upward vertical gradient of about 0.4 ft exists between the lower and upper unconsolidated deposits in the northern section of the Production Area. That upward gradient probably indicates a semi-confined condition in the till and/or bedrock. The data also indicate that an average downward vertical gradient of about 0.9 ft exists between the lower and upper unconsolidated deposits in the southern section of the Production Area. That downward gradient is not characteristic of ground water conditions in unconsolidated deposits adjacent to a gaining stream. The damming effect created by the bulkhead along the Pawtuxet River is probably responsible for the phenomena observed.

2.5 HYDROLOGIC SETTING

The site is adjacent to and extends both north and south of the Pawtuxet River and, as such, is located within the Pawtuxet River basin (Figure 2-11). The

basin has a total land area of about 230 square miles (147,200 acres) and is the largest drainage basin in Rhode Island (Metcalf & Eddy, 1983).

The 11.7 mile long main stem of the Pawtuxet River is formed near River Point in West Warwick by the confluence of the north branch and south branch of the Pawtuxet River. The north branch originates at the outlet of the Situate Reservoir and flows in a southeasterly direction for about 6 miles to the confluence with the south branch. Releases to the north branch from the Situate Reservoir, which is a water supply reservoir owned and operated by the City of Providence, are dependent on the water supply needs of Providence.

The south branch originates at the outlet of the Flat River Reservoir which has its releases regulated by the Quidneck Reservoir Company based on downstream water requirements. The south branch flows 9 miles through Coventry and West Warwick before joining the north branch.

The western portion of the drainage basin is relatively undeveloped but the lower reaches of both branches, and especially the main stem of the Pawtuxet River, flow through highly developed residential, industrial and commercial areas. In addition to the two reservoir dams and the Pawtuxet Cove Dam at the river's mouth, there are small mill dams along both branches and the main stem of the Pawtuxet River.

There are two USGS gaging stations on the Pawtuxet River; one at Washington on the south branch, and one at Cranston on the main stem (Figure 2-11). The one year in ten average seven day low flow (7Q-10) at the Cranston gage is approximately 74 cubic feet per second (cfs) which is equivalent to 48 million gallons per day (mgd). That gage receives the drainage of 200 square miles with a period of record from 1941 to 1968 used to calculate that low flow. A time duration curve for the Pawtuxet River discharge during 1941 to 1953 is presented as Figure 2-12. The one year in ten year average seven-day low flow at the Washington gage is approximately 16 cfs (10 mgd) for the period of record

from 1942 to 1967. The flow measured by that gage is from a drainage area of 64 square miles (Rhode Island Statewide Planning Program and Department of Health, 1972). Mean monthly discharges for the Pawtuxet River at the Cranston gage ranged from 101 cfs in September to 701 cfs in April. Those data are based on a period of record from October 1979 through September 1980 (Metcalf & Eddy, 1983).

what Cmpd?

Sedimentation rates for the main stem of the Pawtuxet River have been estimated based on the occurrence of anthropogenic marker compounds detected in river sediment. A sedimentation rate of 2.1 centimeters per year (0.8 inches per year) based on a core taken near the CIBA-GEIGY facility is reported by Avila and Hites (1979). Sedimentation rates of 3.0 centimeters per year (1.2 inches per year) and 3.4 centimeters per year (1.3 inches per year) are reported based on sediment cores taken about 1 mile downstream of the facility (Avila and Hites, 1979).

Sedimentation rates of 2.4 centimeters per year (0.9 inches per year) and 2.6 centimeters per year (1.0 inch per year) are reported by Quinn et al. (1985). Those rates are believed to be representative of sedimentation during the 1960s. Rates of 0.6 centimeters per year (0.2 inches per year) and 0.9 centimeters per year (0.4 inches per year) also reported by Quinn et. al. (1985) are believed to be representative of sedimentation during the 1970s. The rates are based on data from a sediment core which was obtained about one mile downstream of the facility. The change in apparent sedimentation rate may be related to highway construction activities during the 1960s.

The sediment cores analyzed by Avila and Hites (1979) and Quinn et. al. (1985) were obtained from areas of fine grained sedimentation along the channel margin. Therefore, the associated sedimentation rates indicate net sedimentation along the margins. Information on sedimentation rates within the center of the channel was not revealed during the literature review activities associated with the Current Assessment Summary Report.

Sedimentation rates based on the occurrence of anthropogenic marker compounds in sediment is complicated by several factors including bioturbation, resuspension and redeposition. The rates presented above should be viewed as "order-of-magnitude" rates associated with the last 20 to 30 years. Spatial and temporal variations should be expected. Human activities (e.g., bridge construction), climatic conditions and morphologic river changes can be expected to contribute to those variations.

The Pawtuxet River has been divided into sections according to water quality standards and classifications established by the Rhode Island Department of Environmental Management (1988). The sections may be classified as freshwater Class A, B, C, D or E (Figure 2-11).

Class A waters are suitable for drinking water supply and all other water uses. Class B waters are suitable for public water supply with appropriate treatment; agricultural uses; bathing and other primary contact recreational activities; and fish and wildlife habitat. Class C waters are suitable for boating and other secondary contact recreational activities; fish and wildlife habitat; and industrial processes and cooling.

Class D waters are suitable for the migration of fish and have good aesthetic value. Class E denotes nuisance conditions. Class E water use is limited to certain industrial processes and cooling; power and navigation. Class D and E are used to describe existing conditions and are not considered an acceptable goal for classification of any water.

The Situate Reservoir and its tributaries are Class A waters. The north branch of the Pawtuxet River, beginning at the outlet of the Situate Reservoir, is Class A, changing to Class B 0.5 miles downstream of the dam. The river maintains the B classification to the Fiskeville Dam in Hope. From the Fiskeville Dam to the confluence with the south branch, the north branch is Class C.

The Big River and its tributaries are Class A waters. The Big River flows into the Flat River Reservoir which, along with its tributaries, is Class B. Tributaries to the south branch of the Pawtuxet River are Class B. The south branch becomes Class C just downstream of the Flat River Reservoir Dam and remains Class C to its confluence with the north branch. The main stem of the Pawtuxet River has a Class C standard but is considered Class D downstream of the Cranston Sewage Treatment Plant (river mile 4.5). The Meshanticut Brook is classified as B. The Pocasset River is mainly Class B changing to Class C downstream of Print Works Pond. Mashapaug Brook from Spectacle Pond including Mashapaug Pond and all ponds in Roger Williams Park to its confluence with the Pawtuxet River are Class C. Spectacle Pond is Class B. Aldrich Brook to its confluence with the Pawtuxet River is Class B.

TABLE 2-1

SUMMARY OF PIEZOMETER AND MONITORING WELL CONSTRUCTION DETAILS
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

		Elevation Data		Boring Data		Monitoring Well/Piezometer Data					
						Bottom of Monitoring Zone		Top of Monitoring Zone			
Well Number	Month/Year of Installation	Ground Surface	Top of Riser Pipe	Depth	Bottom Elevation	Depth	Elevation	Depth	Elevation	Length of Screen	Strata Monitored
P-1S	4/88	13.73	16.48	10	3.73	10	3.73	7	6.73	3	Fill
P-1D	4/88	13.73	16.38	49.5	-35.77	43	-29.27	40	-26.27	3	UD
P-2S	4/88	12.78	14.71	11	1.78	11	1.78	8	4.78	3	Fill
P-3S	4/88	14.45	16.33	11.5	2.95	11.5	2.95	8.5	5.95	3	Fill
P-4S	4/88	19.08	19.99	18	1.08	18	1.08	15	4.08	3	UD
P-5S	4/88	18.48	21.27	16	2.48	16	2.48	13	5.48	3	UD
P-6S	4/88	21.61	23.71	18	3.61	18	3.61	15	6.61	3	UD
P-6M	4/88	21.39	22.01	40	-18.61	40	-18.61	37	-15.61	3	UD
P-7S-A	4/88	10.98	12.55	9	1.98	9	1.98	6	4.98	3	UD
P-7S-B	4/88	10.98	11.99	14	-3.02	14	-3.02	11	-0.02	3	UD
P-8S	4/88	14.99	16.93	11.5	3.49	11.5	3.49	8.5	6.49	3	UD
P-9S	4/88	14.65	16.16	12	2.65	12	2.65	9	5.65	3	UD
P-10S	4/88	12.69	14.20	12	0.69	12	0.69	9	3.69	3	UD
P-11S	4/88	14.45	18.29	10	4.45	10	4.45	7	7.45	3	NE
P-12S-A	4/88	14.17	16.00	12	2.17	12	2.17	9	5.17	3	NE
P-12S-B	4/88	14.17	18.24	26.5	-12.33	15	-0.83	12	2.17	3	NE
P-13S	4/88	23.89	28.43	15	8.89	14	9.89	11	12.89	3	NE
P-14S	4/88	23.51	24.16	13	10.51	13	10.51	10	13.51	3	UD
P-14D	4/88	23.51	24.00	58.5	-34.99	50	-26.49	47	-23.49	3	Till
MW-1S	5/88	13.74	15.67	15	-1.26	13	0.74	3	10.74	10	Fill
MW-1D	5/88	13.74	16.34	50	-36.26	48	-34.26	38	-24.26	10	UD
MW-2S	5/88	12.68	14.50	20	-7.32	18	-5.32	8	4.68	10	Fill
MW-3S	5/88	14.52	16.67	20	-5.48	18	-3.48	8	6.52	10	UD/Fill
MW-4S	5/88	18.36	21.34	19	-0.64	16	2.36	6	12.36	10	UD/Fill
MW-5S	5/88	23.82	26.23	18	5.82	16	7.82	6	17.82	10	UD
MW-6S	5/88	11.62	14.04	30	-18.38	13.5	-1.88	3.5	8.12	10	UD
MW-7S	5/88	13.04	15.18	20	-6.96	18	-4.96	8	5.04	10	NE
MW-8S	5/88	15.00	17.53	30	-15.00	15.5	-0.50	5.5	9.5	10	UD/Fill
MW-9S	5/88	15.41	17.84	34	-18.59	13	2.41	3	12.41	10	UD/FILL

TABLE 2-1 (continued)

SUMMARY OF PIEZOMETER AND MONITORING WELLS CONSTRUCTION DETAILS
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

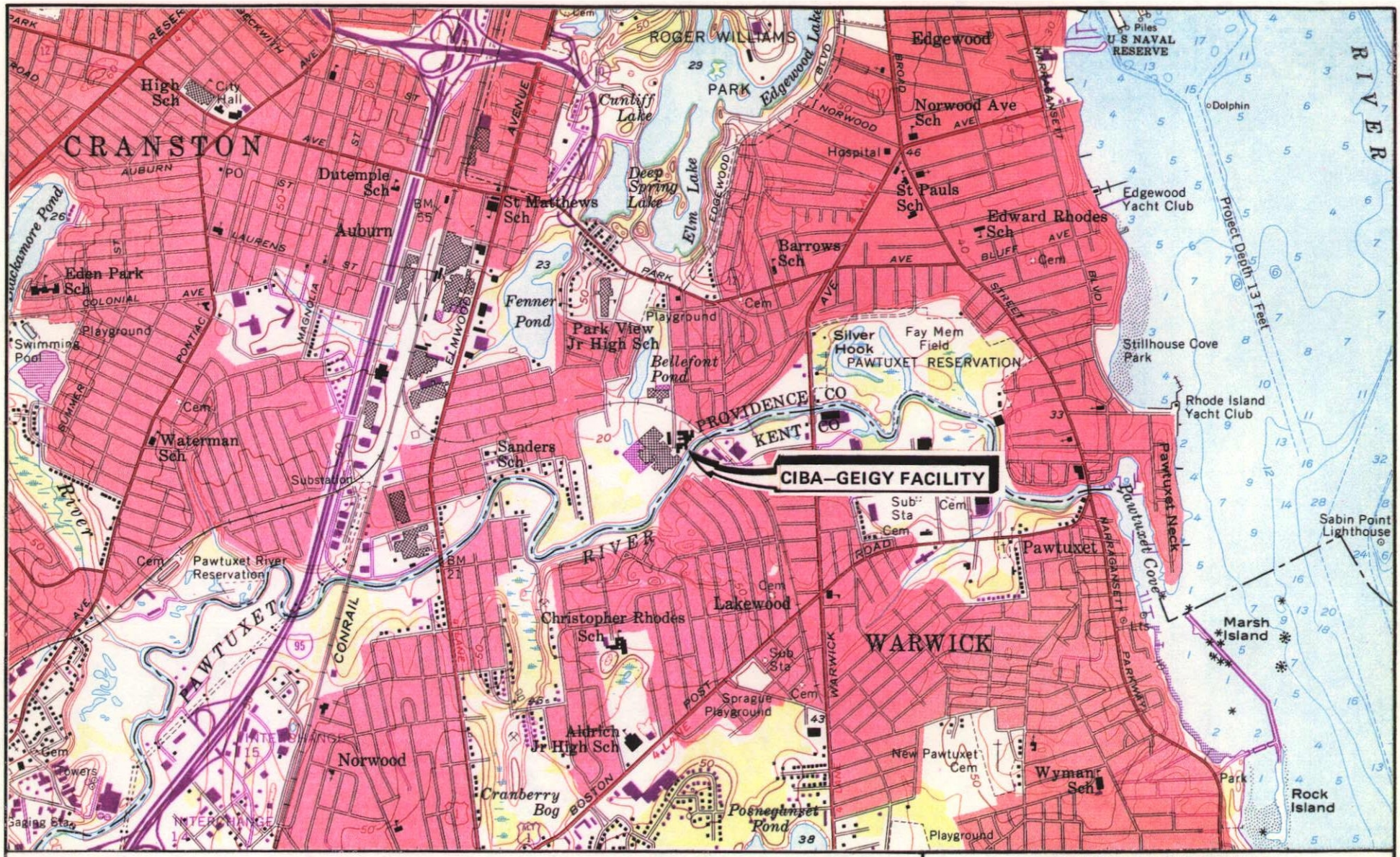
		Elevation Data		Boring Data		Monitoring Well/Piezometer Data					
						Bottom of Monitoring Zone		Top of Monitoring Zone			
Well Number	Month/Year of Installation	Ground Surface	Top of Riser Pipe	Depth	Bottom Elevation	Depth	Elevation	Depth	Elevation	Length of Screen	Strata Monitored
EP-1	--	21.82	22.98	--	--	--	--	--	--	--	--
EP-2	--	22.95	24.59	--	--	--	--	--	--	--	--
EP-5	--	12.60	15.94	--	--	--	--	--	--	--	--
EP-6	--	10.00	11.06	--	--	--	--	--	--	--	--
EP-7	--	13.81	14.51	--	--	--	--	--	--	--	--
EP-8	--	18.59	20.02	--	--	--	--	--	--	--	--

Notes: Elevations and depths reported in feet. Elevations referenced to Mean Sea Level Datum.
UD = Unconsolidated Deposits.
-- = Indicates information not available.
NE = Not evaluated.
Elevation data based on surveys by Waterman Engineering Company of East Providence, Rhode Island and Woodward-Clyde Consultants of Wayne, New Jersey.

TABLE 2-2
SUMMARY OF GROUND WATER ELEVATION
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

Piezometer/ Well No.	Water Level Elevation 26 April 1988	Water Level Elevation 7 June 1988	Water Level Elevation 19 April 1989	Water Level Elevation 1 June 1989
P-1S	8.88	NM	10.16	9.57
P-1D	8.28	NM	9.48	8.68
P-2S	8.01	NM	9.34	8.54
P-3S	7.43	NM	8.28	6.66
P-4S	11.79	NM	12.81	12.11
P-5S	11.22	NM	12.06	11.51
P-6S	11.36	NM	12.34	11.74
P-6M	11.51	NM	12.47	11.93
P-7S-A	6.25	NM	7.44	6.75
P-7S-B	6.24	NM	7.39	6.76
P-8S	6.13	NM	7.12	6.65
P-9S	7.86	NM	9.34	8.40
P-10S	6.25	NM	7.20	6.69
P-11S	11.79	NM	12.33	12.16
P-12S-A	7.80	NM	9.12	8.23
P-12S-B	8.69	NM	10.19	10.20
P-13S	13.68	NM	14.73	NM
P-14S	14.91	NM	15.85	15.39
P-14D	15.10	NM	16.20	15.79
EP-1	10.48	NM	11.41	10.86
EP-2	13.79	NM	14.82	14.23
EP-5	7.49	NM	8.83	8.45
EP-6	6.11	NM	7.33	NM
EP-7	7.66	NM	9.91	9.16
EP-8	13.22	NM	14.27	13.60
MW-1S	NM	9.57	10.82	9.99
MW-1D	NM	9.97	9.74	9.13
MW-2S	NM	8.70	10.06	9.35
MW-3S	NM	8.27	9.10	8.53
MW-4S	NM	11.58	12.27	11.87
MW-5S	NM	14.85	15.80	15.39
MW-6S	NM	6.55	7.52	6.86
MW-7S	NM	6.97	8.03	7.33
MW-8S	NM	6.07	6.95	6.50
MW-9S	NM	11.33	12.52	11.86

Notes:
NM = Not Measured
Elevations are reported in feet and referenced to Mean Sea Level Datum
The Pawtuxet River elevation was recorded at the location of the railroad bridge on 19 April 1989 and 1 June 1989. The elevations are 6.96 and 6.46, respectively.



BASE MAP SOURCE:
USGS 7.5 MINUTE PROVIDENCE, RI QUADRANGLE, PHOTOREVISED 1970, 1975.

0 2000 4000 FT
SCALE

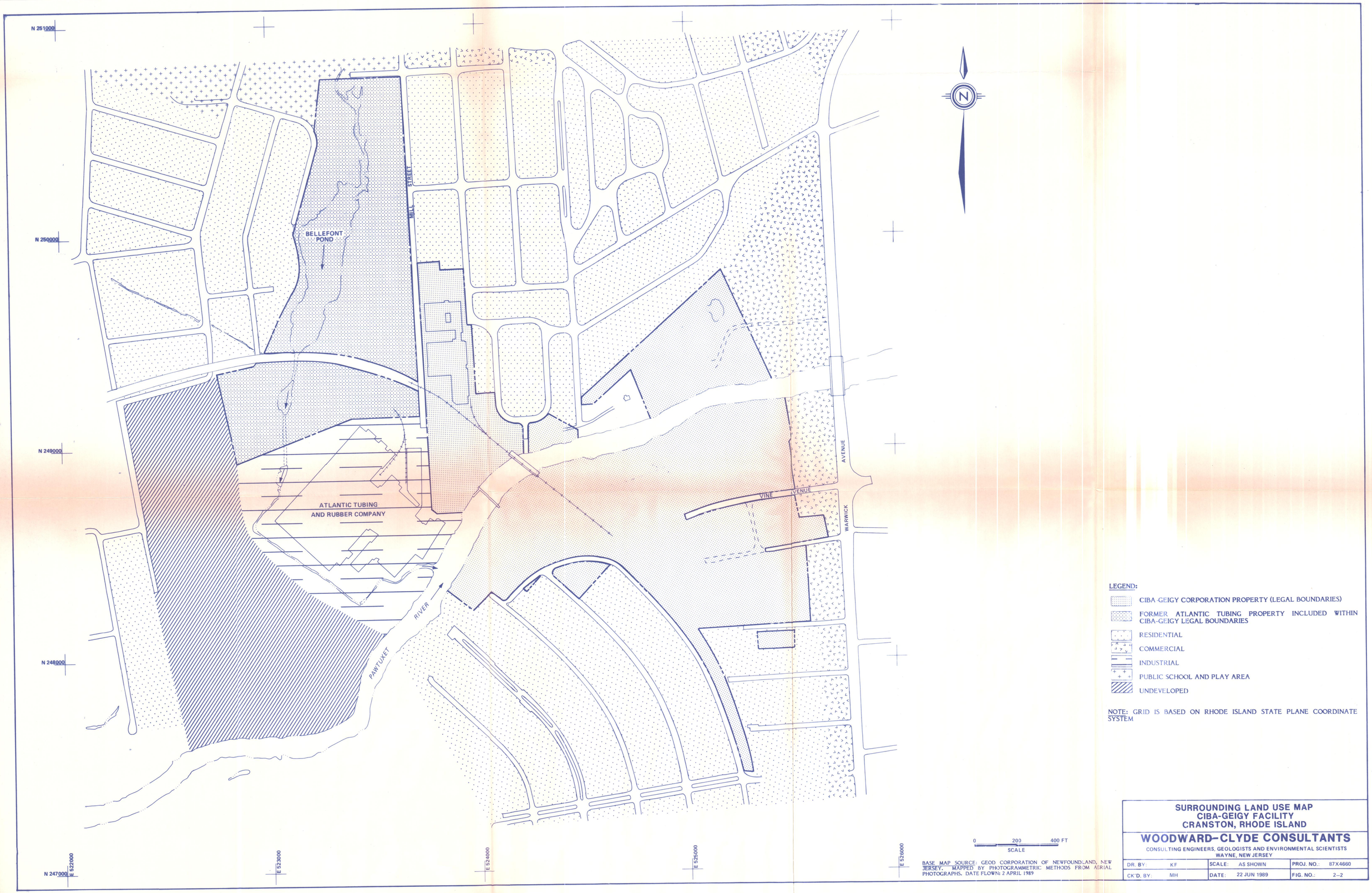
QUADRANGLE LOCATION

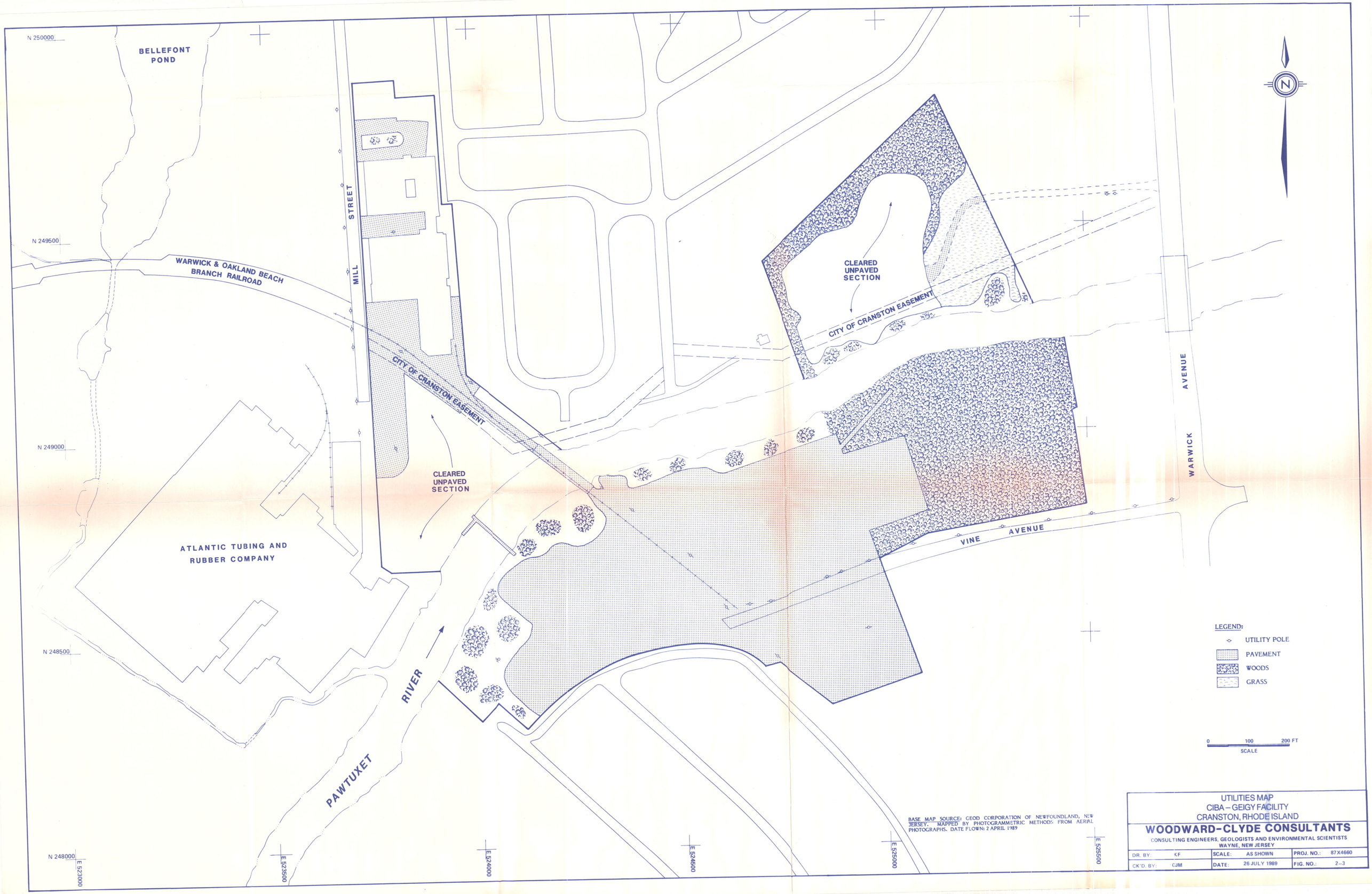
N

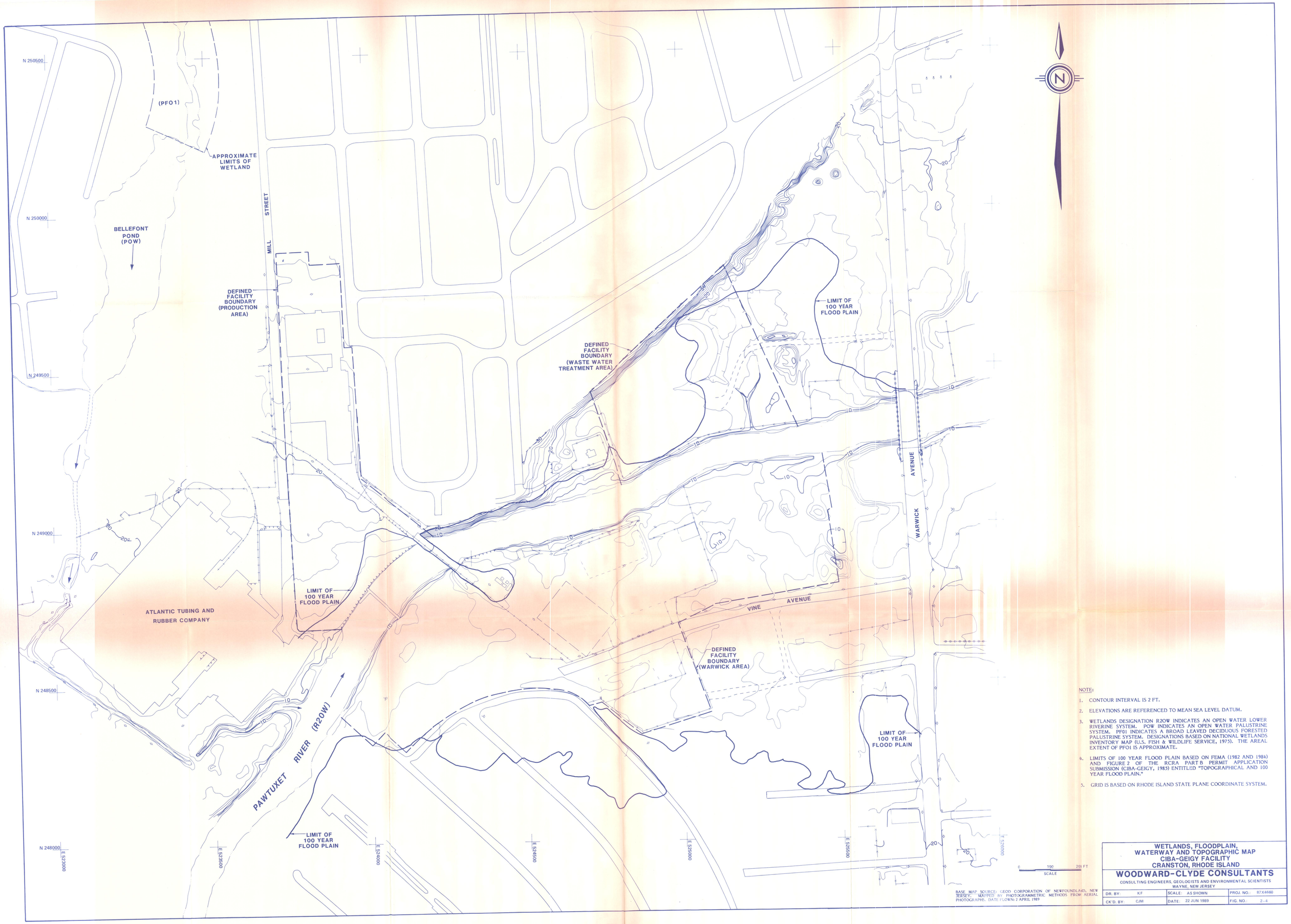
FACILITY LOCATION MAP
CIBA–GEIGY FACILITY
CRANSTON, RHODE ISLAND

WOODWARD—CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS
WAYNE, NEW JERSEY

DR. BY:	RTL	SCALE:	AS SHOWN	PROJ. NO.:	87X4660
CK'D. BY:	TGC	DATE:	5 FEB 1988	FIG. NO.:	2–1


N 251000
N 250000
N 249000
N 248000
N 247000
E 522000
E 523000
E 524000
E 525000
E 526000
BELLEFONT POND
MILL STREET
ATLANTIC TUBING AND RUBBER COMPANY
PAWTUXET RIVER
VINE AVENUE
WARWICK AVENUE
N
LEGEND:
CIBA-GEIGY CORPORATION PROPERTY (LEGAL BOUNDARIES)
FORMER ATLANTIC TUBING PROPERTY INCLUDED WITHIN CIBA-GEIGY LEGAL BOUNDARIES
RESIDENTIAL
COMMERCIAL
INDUSTRIAL
PUBLIC SCHOOL AND PLAY AREA
UNDEVELOPED
NOTE: GRID IS BASED ON RHODE ISLAND STATE PLANE COORDINATE SYSTEM
0 200 400 FT
SCALE
BASE MAP SOURCE: GEOD CORPORATION OF NEWFOUNDLAND, NEW JERSEY. MAPPED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHS. DATE FLOWN: 2 APRIL 1989
SURROUNDING LAND USE MAP
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND
WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS
WAYNE, NEW JERSEY
DR. BY: KF
SCALE: AS SHOWN
PROJ. NO.: 87X4660
CK'D. BY: MH
DATE: 22 JUN 1989
FIG. NO.: 2-2


N 250000
N 249500
N 249000
N 248500
N 248000
E 523000
E 523500
E 524000
E 524500
E 525000
E 525500
BELLEFONT POND
WARWICK & OAKLAND BEACH BRANCH RAILROAD
MILL STREET
CITY OF CRANSTON EASEMENT
CLEARED UNPAVED SECTION
CLEARED UNPAVED SECTION
CITY OF CRANSTON EASEMENT
WARWICK AVENUE
VINE AVENUE
ATLANTIC TUBING AND RUBBER COMPANY
PAWTUXET RIVER
N
LEGEND:
UTILITY POLE
PAVEMENT
WOODS
GRASS
0 100 200 FT
SCALE
BASE MAP SOURCE: GEOD CORPORATION OF NEWFOUNDLAND, NEW JERSEY. MAPPED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHS. DATE FLOWN: 2 APRIL 1989
UTILITIES MAP
CIBA – GEIGY FACILITY
CRANSTON, RHODE ISLAND
WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS
WAYNE, NEW JERSEY
DR. BY: KF
SCALE: AS SHOWN
PROJ. NO.: 87X4660
CK'D. BY: CJM
DATE: 26 JULY 1989
FIG. NO.: 2–3



NOTE:

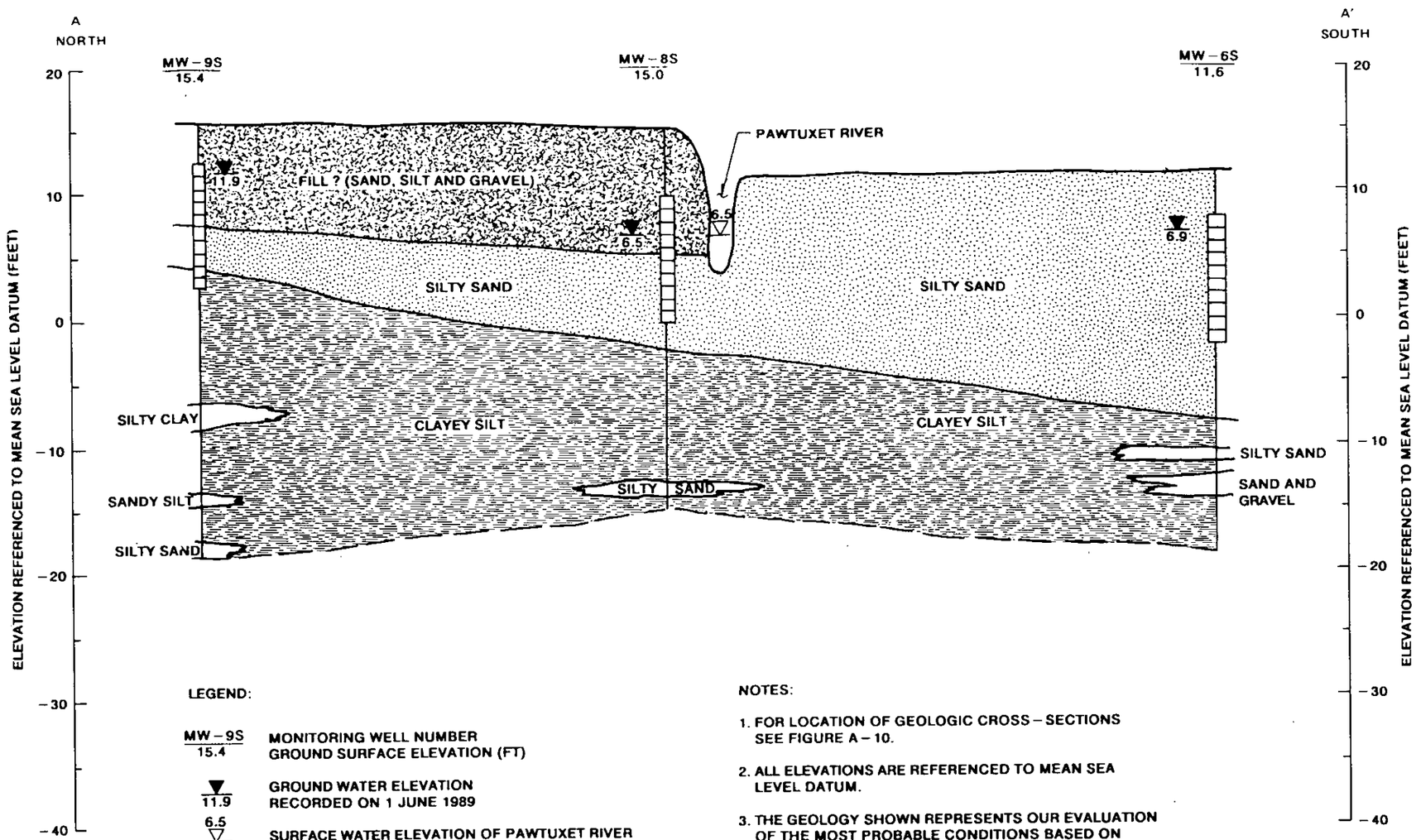
1. CONTOUR INTERVAL IS 2 FT.
2. ELEVATIONS ARE REFERENCED TO MEAN SEA LEVEL DATUM.
3. WETLANDS DESIGNATION R2OW INDICATES AN OPEN WATER LOWER RIVERINE SYSTEM. POW INDICATES AN OPEN WATER PALUSTRINE SYSTEM. PFO1 INDICATES A BROAD LEAVED DECIDUOUS FORESTED PALUSTRINE SYSTEM. DESIGNATIONS BASED ON NATIONAL WETLANDS INVENTORY MAP (U.S. FISH & WILDLIFE SERVICE, 1975). THE AREAL EXTENT OF PFO1 IS APPROXIMATE.
4. LIMITS OF 100 YEAR FLOOD PLAIN BASED ON FEMA (1982 AND 1984) AND FIGURE 2 OF THE RCRA PART B PERMIT APPLICATION SUBMISSION (CIBA-GEIGY, 1985) ENTITLED "TOPOGRAPHICAL AND 100 YEAR FLOOD PLAIN."
5. GRID IS BASED ON RHODE ISLAND STATE PLANE COORDINATE SYSTEM.

BASE MAP SOURCE: GEOD CORPORATION OF NEWFOUNDLAND, NEW JERSEY; MAPPED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHS. DATE FLOWN: 2 APRIL 1989

WETLANDS, FLOODPLAIN, WATERWAY AND TOPOGRAPHIC MAP
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS
WAYNE, NEW JERSEY

DR. BY: KF	SCALE: AS SHOWN	PROJ. NO.: 87X4660	
CK'D. BY: CJM	DATE: 22 JUN 1989	FIG. NO.: 2-4	



LEGEND:

MW-9S / 15.4	MONITORING WELL NUMBER GROUND SURFACE ELEVATION (FT)
▼ 11.9	GROUND WATER ELEVATION RECORDED ON 1 JUNE 1989
6.5 ▽	SURFACE WATER ELEVATION OF PAWTUXET RIVER RECORDED ON 1 JUNE 1989
	SCREENED INTERVAL

NOTES:

1. FOR LOCATION OF GEOLOGIC CROSS-SECTIONS SEE FIGURE A-10.
2. ALL ELEVATIONS ARE REFERENCED TO MEAN SEA LEVEL DATUM.
3. THE GEOLOGY SHOWN REPRESENTS OUR EVALUATION OF THE MOST PROBABLE CONDITIONS BASED ON INTERPRETATION OF PRESENTLY AVAILABLE DATA. SOME VARIATIONS FROM THESE CONDITIONS MUST BE EXPECTED.

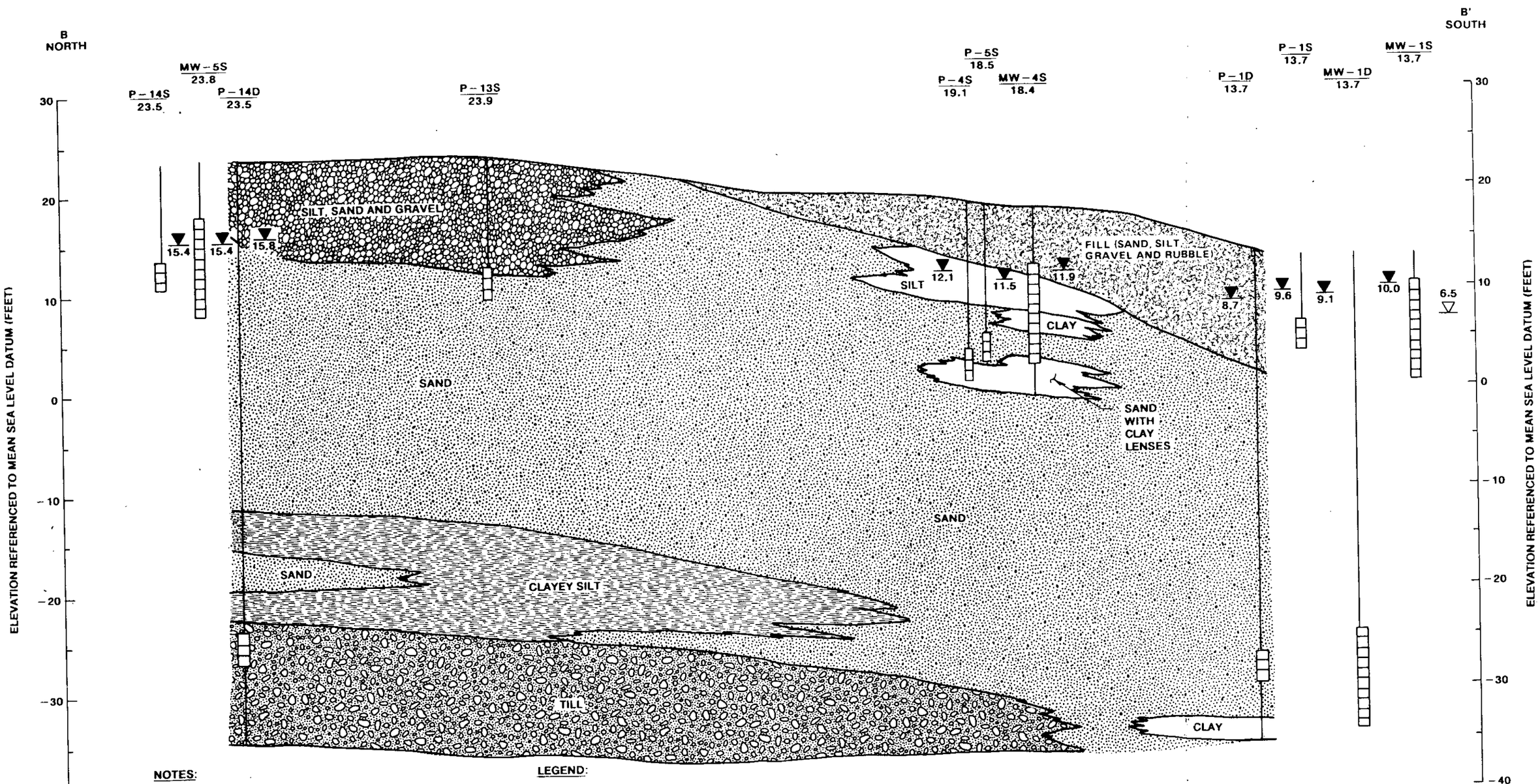
0 100 200 FT
HORIZONTAL SCALE

0 10 20 FT
VERTICAL SCALE

GEOLOGIC CROSS SECTION A-A'
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS
WAYNE, NEW JERSEY

DR. BY	KF	SCALE:	AS SHOWN	PROJ NO:	87X4660
CK'D BY	CJM	DATE	28 JUNE 1989	FIG NO	2-5



NOTES:

1. FOR LOCATION OF GEOLOGIC CROSS-SECTIONS SEE FIGURE A-10.
2. ALL ELEVATIONS ARE REFERENCED TO MEAN SEA LEVEL DATUM.
3. THE GEOLOGY SHOWN REPRESENTS OUR EVALUATION OF THE MOST PROBABLE CONDITIONS BASED ON INTERPRETATION OF PRESENTLY AVAILABLE DATA. SOME VARIATIONS FROM THESE CONDITIONS MUST BE EXPECTED.
4. P-13S PROJECTED 80 FEET WEST.
   P-4S PROJECTED 90 FEET WEST.
   P-5S PROJECTED 60 FEET EAST.

LEGEND:

MW-5S / 23.8 — MONITORING WELL NUMBER / GROUND SURFACE ELEVATION (FT)

15.4 — GROUND WATER ELEVATION RECORDED ON 1 JUNE 1989

6.5 — SURFACE WATER ELEVATION OF PAWTUXET RIVER RECORDED ON 1 JUNE 1989

SCREENED INTERVAL

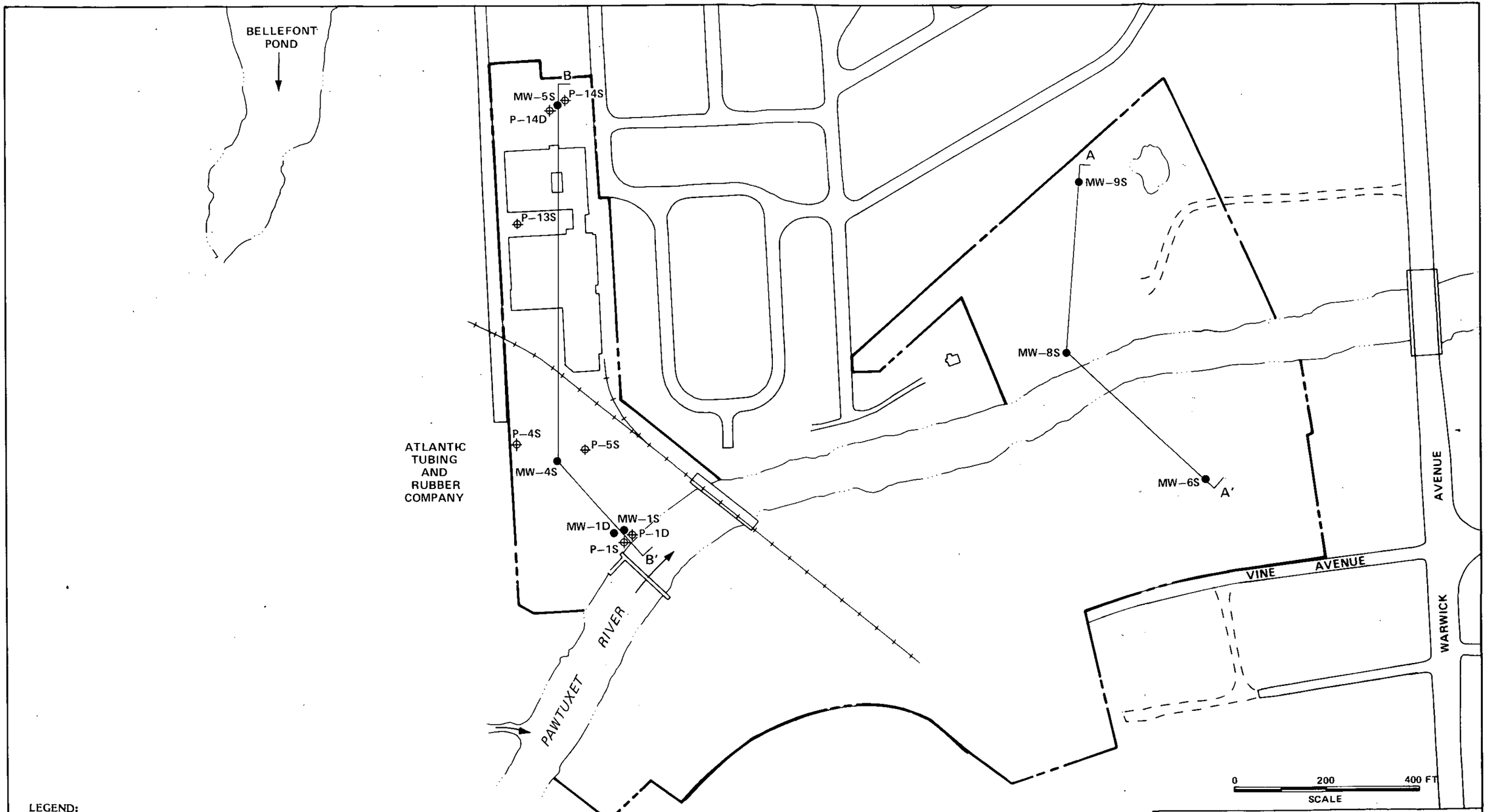
0 100 200 FT
HORIZONTAL SCALE

0 10 20 FT
VERTICAL SCALE

GEOLOGIC CROSS SECTION B-B'
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS
WAYNE, NEW JERSEY

DR. BY:	KF	SCALE:	AS SHOWN	PROJ. NO.:	87X4660
CK'D BY	CJM	DATE	28 JUNE 1989	FIG. NO.	2-6



LEGEND:

MW-5S ● EXISTING MONITORING WELL

P-14D ⊕ EXISTING PIEZOMETER

B B' TREND OF GEOLOGIC CROSS SECTION

NOTE: MONITORING WELL AND PIEZOMETER LOCATIONS BASED ON SURVEY BY WATERMAN ENGINEERING COMPANY OF EAST PROVIDENCE, RHODE ISLAND

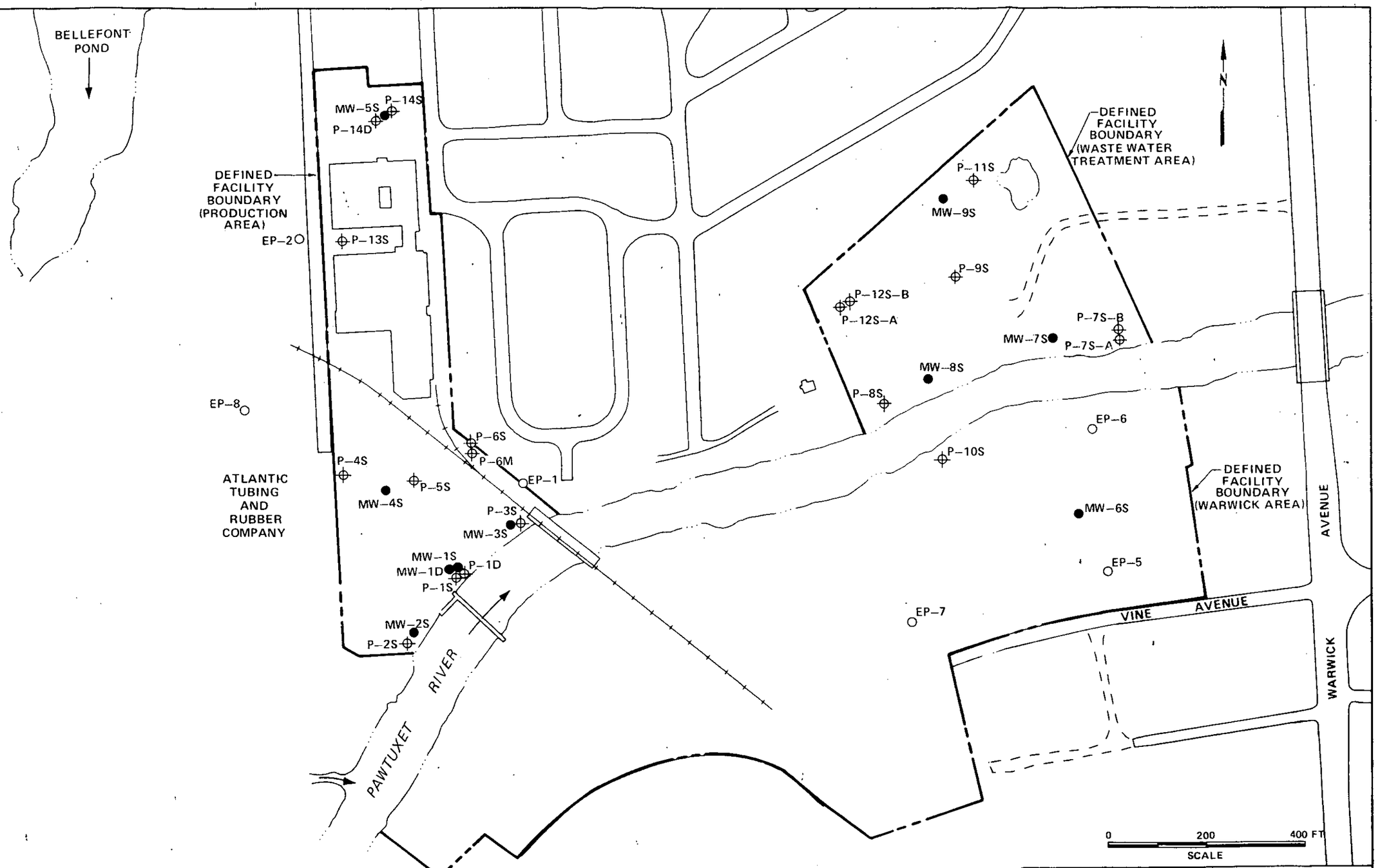
BASE MAP SOURCE: GEOD CORPORATION OF NEWFOUNDLAND, NEW JERSEY. MAPPED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHS. DATE FLOWN: 2 APRIL 1989

LOCATION OF GEOLOGIC CROSS SECTIONS
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

WOODWARD - CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS
WAYNE, NEW JERSEY

DR. BY:	KF	SCALE:	AS SHOWN	PROJ. NO.:	87X4660
CK'D. BY:	CJM	DATE:	1 AUG 1989	FIG. NO.:	2-7



LEGEND:

MW-2 ● EXISTING MONITORING WELL (INSTALLED BY WCC)

P-1S ⊕ EXISTING PIEZOMETER (INSTALLED BY WCC)

EP-4 ○ EXISTING PIEZOMETER (INSTALLED BY CIBA-GEIGY)

NOTE: MONITORING WELL AND PIEZOMETER LOCATIONS BASED ON SURVEY BY WATERMAN ENGINEERING COMPANY OF EAST PROVIDENCE, RHODE ISLAND.

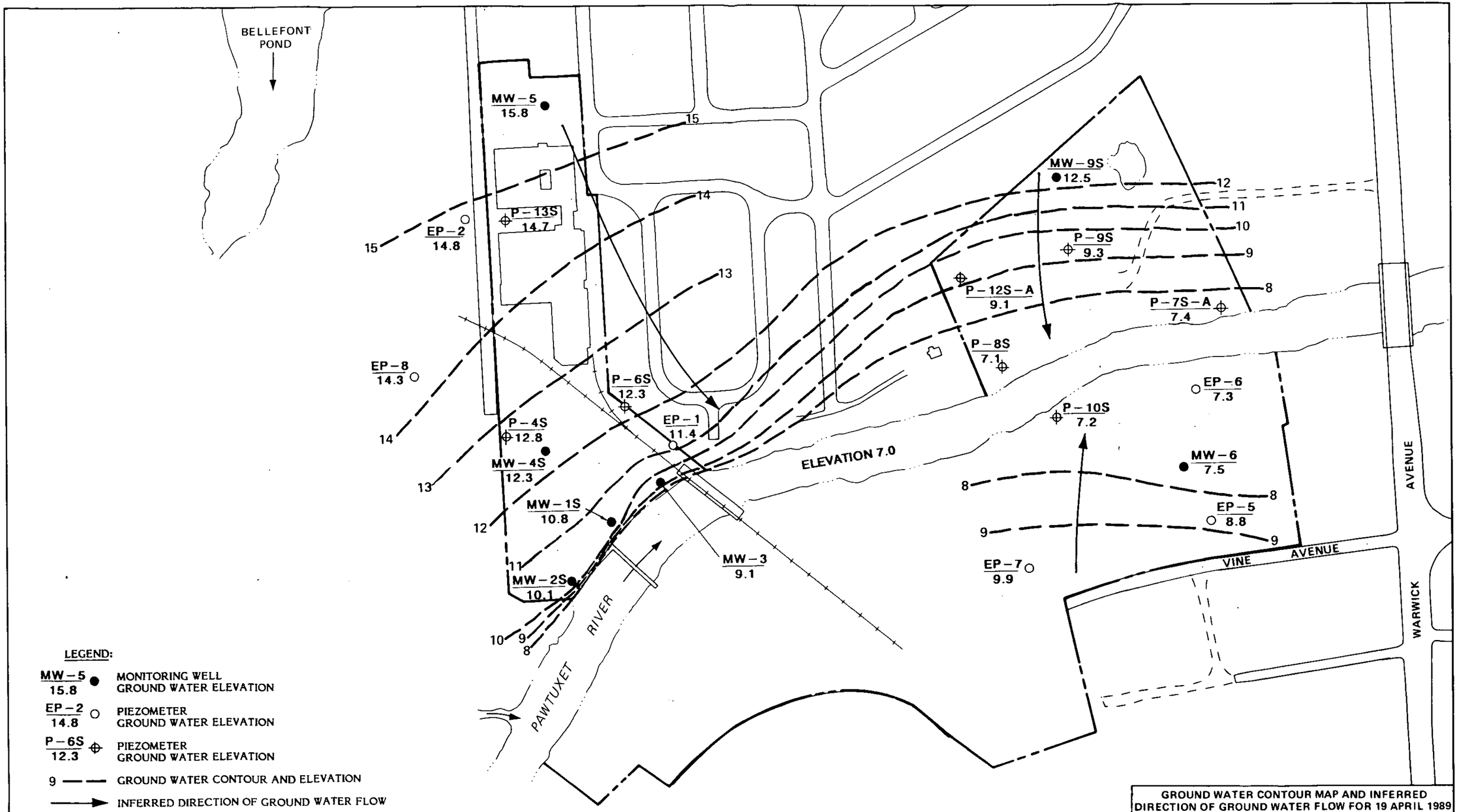
BASE MAP SOURCE: GEOD CORPORATION OF NEWFOUNDLAND, NEW JERSEY. MAPPED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHS. DATE FLOWN: 2 APRIL 1989

MONITORING WELL AND PIEZOMETER LOCATIONS
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

WOODWARD - CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS
WAYNE, NEW JERSEY

DR. BY: KF	SCALE: AS SHOWN	PROJ. NO.: 87X4660	
CK'D BY: MH	DATE: 22 JUN 1989	FIG NO. 2-8	



LEGEND:

MW-5 / 15.8 ● MONITORING WELL GROUND WATER ELEVATION

EP-2 / 14.8 ○ PIEZOMETER GROUND WATER ELEVATION

P-6S / 12.3 ⊕ PIEZOMETER GROUND WATER ELEVATION

9 — — GROUND WATER CONTOUR AND ELEVATION

⟶ INFERRED DIRECTION OF GROUND WATER FLOW

NOTE

1. THE GROUND WATER CONTOURS SHOWN REPRESENT OUR EVALUATION OF THE MOST PROBABLE CONDITIONS BASED UPON INTERPRETATION OF PRESENTLY AVAILABLE DATA.

2. ELEVATIONS ARE REPORTED IN FEET AND REFERENCED TO MEAN SEA LEVEL DATUM.

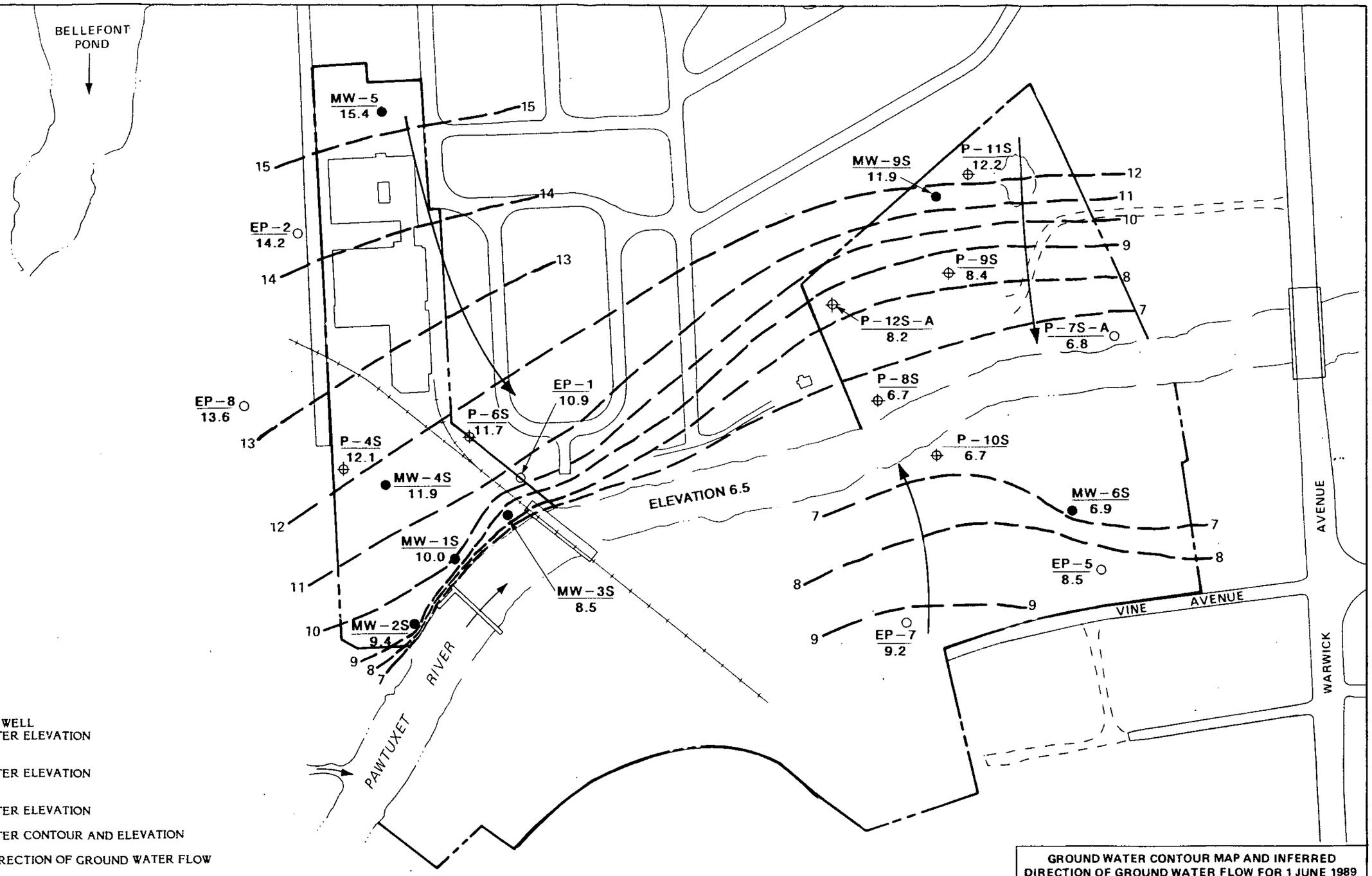
BASE MAP SOURCE: GEOD CORPORATION OF NEWFOUNDLAND, NEW JERSEY. MAPPED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHS. DATE FLOWN: 2 APRIL 1989

GROUND WATER CONTOUR MAP AND INFERRED DIRECTION OF GROUND WATER FLOW FOR 19 APRIL 1989
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

WOODWARD - CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS
WAYNE, NEW JERSEY

DR. BY:	KF	SCALE:	AS SHOWN	PROJ. NO.:	87X4660
CK'D. BY:	CJM	DATE:	7 JULY 1989	FIG. NO.:	2-9



LEGEND:

- MW-5 / 15.4 ● MONITORING WELL GROUND WATER ELEVATION
- EP-2 / 14.2 ○ PIEZOMETER GROUND WATER ELEVATION
- P-6S / 11.7 ⊕ PIEZOMETER GROUND WATER ELEVATION
- 9 — — GROUND WATER CONTOUR AND ELEVATION
- ⟶ INFERRED DIRECTION OF GROUND WATER FLOW

NOTE

1. THE GROUND WATER CONTOURS SHOWN REPRESENT OUR EVALUATION OF THE MOST PROBABLE CONDITIONS BASED UPON INTERPRETATION OF PRESENTLY AVAILABLE DATA.
2. ELEVATIONS ARE REPORTED IN FEET AND REFERENCED TO MEAN SEA LEVEL DATUM.

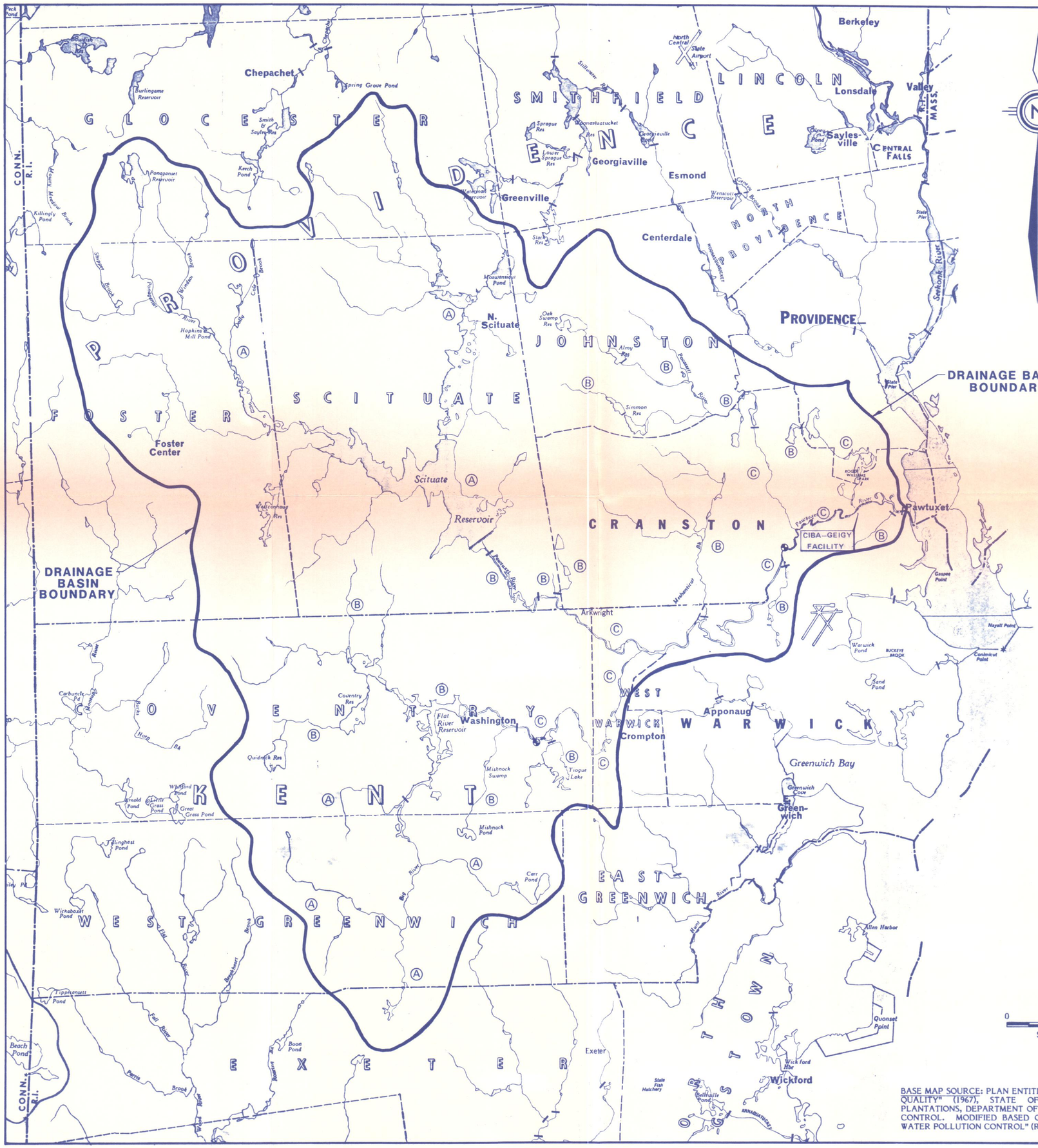
0 200 400 FT
SCALE

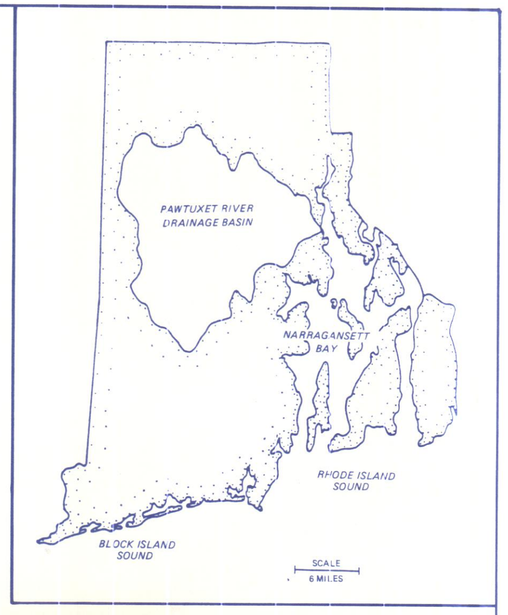
BASE MAP SOURCE: GEOD CORPORATION OF NEWFOUNDLAND, NEW JERSEY. MAPPED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHS. DATE FLOWN: 2 APRIL 1989

GROUND WATER CONTOUR MAP AND INFERRED DIRECTION OF GROUND WATER FLOW FOR 1 JUNE 1989
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

WOODWARD - CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS
WAYNE, NEW JERSEY

DR. BY:	KF	SCALE	AS SHOWN	PROJ NO	87X4660
CK'D BY	CJM	DATE:	6 JULY 1989	FIG NO	2-10





LEGEND

(A) WATER QUALITY CLASS

LOCATION OF USGS GAGING STATION

NOTE: THE MAIN STEM OF THE PAWTUXET RIVER HAS A CLASS C STANDARD BUT IS CONSIDERED CLASS D DOWNSTREAM OF RIVER MILE 4.5.

BASE MAP SOURCE: PLAN ENTITLED "PRESENT CLASSIFICATION OF WATER QUALITY" (1967), STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS, DEPARTMENT OF HEALTH, DIVISON OF WATER POLLUTION CONTROL. MODIFIED BASED ON "WATER QUALITY REGULATIONS FOR WATER POLLUTION CONTROL" (RIDEM, 1988).

PAWTUXET RIVER DRAINAGE BASIN,
WATER CLASSIFICATION
AND LOCATION OF USGS GAGING STATIONS
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

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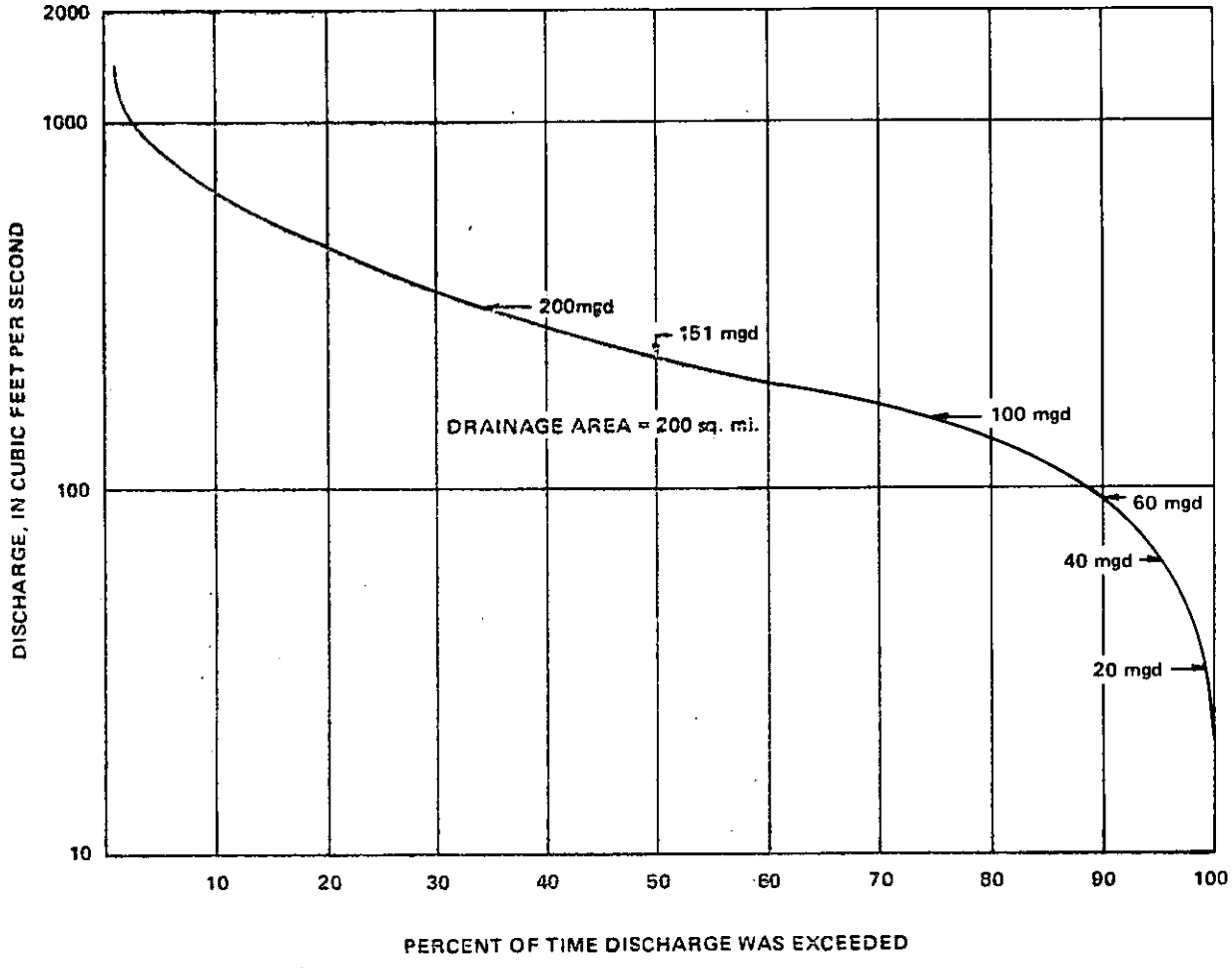
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS
WAYNE, NEW JERSEY

DR. BY:	KF	SCALE:	AS SHOWN	PROJ. NO.:	87X4660
CK'D. BY:	CJM	DATE:	21 JUN 1989	FIG. NO.:	2-11



NOTES:

1. PERIOD OF RECORD IS FROM 1941–1953.
2. mgd = million gallons per day
3. sq. mi. = square miles

SOURCE:

USGS, 1959

TIME DURATION CURVE FOR
PAWTUCKET RIVER DISCHARGE
CIBA–GEIGY FACILITY
CRANSTON, RHODE ISLAND

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WAYNE, NEW JERSEY

DR. BY:	ACK	SCALE:	AS SHOWN	PROJ. NO.:	87X4660
CK'D. BY:	CJM	DATE:	21 JULY 1989	FIG. NO.:	2–12

Section Three

SECTION 3
FACILITY HISTORY

Early industrial activity at the facility occurred from 1930 to 1954, when the Alrose Chemical Company occupied part of the present plant site in Cranston, Rhode Island, now known as the CIBA-GEIGY facility. In 1954, the Geigy Chemical Company of New York purchased the facility from the Alrose Chemical Company and operated the facility as the new chemical manufacturing headquarters for the Geigy Chemical Company. Over the years, the plant was expanded in terms of production capacity as well as process and product development capability. Eventually demand rose beyond the capacity of the plant and production was transferred to other major Geigy Chemical Company facilities.

In 1970, the Geigy Chemical Company merged with Ciba Corporation of Summit, New Jersey, to form CIBA-GEIGY Corporation, which is incorporated in the State of New York. After the merger, the Cranston plant was used as a pilot/start up facility designed and built for manufacturing organic chemicals on a batch type basis. In January 1984, CIBA-GEIGY Corporation announced plans for a gradual phase out of the Cranston plant as part of an overall consolidation of CIBA-GEIGY's chemical manufacturing operations. As of May 1986, CIBA-GEIGY had ceased all chemical manufacturing operations at the facility and began decommissioning and razing of the plant. Existing and former structures at the facility are depicted on Figure 3-1.

As part of decommissioning and razing of the facility, significant environmental and waste management activities occurred. Those activities were conducted in accordance with (1) the closure plan developed by CIBA-GEIGY and submitted to the USEPA and to the Rhode Island Department of Environmental Management (RIDEM) in the RCRA Part B Permit Application Submission, and (2) the Phase-Down Plan developed by CIBA-GEIGY.

Decommissioning included the removal of materials, residues and wastes, and proper disposal of hazardous wastes. In addition, decommissioning included cleaning or otherwise preparing equipment and structures for removal and/or demolition.

Razing included removing and properly disposing of equipment and fixtures, and demolition of buildings. Rubble was disposed of off-site at an approved landfill. Usable equipment was sold.

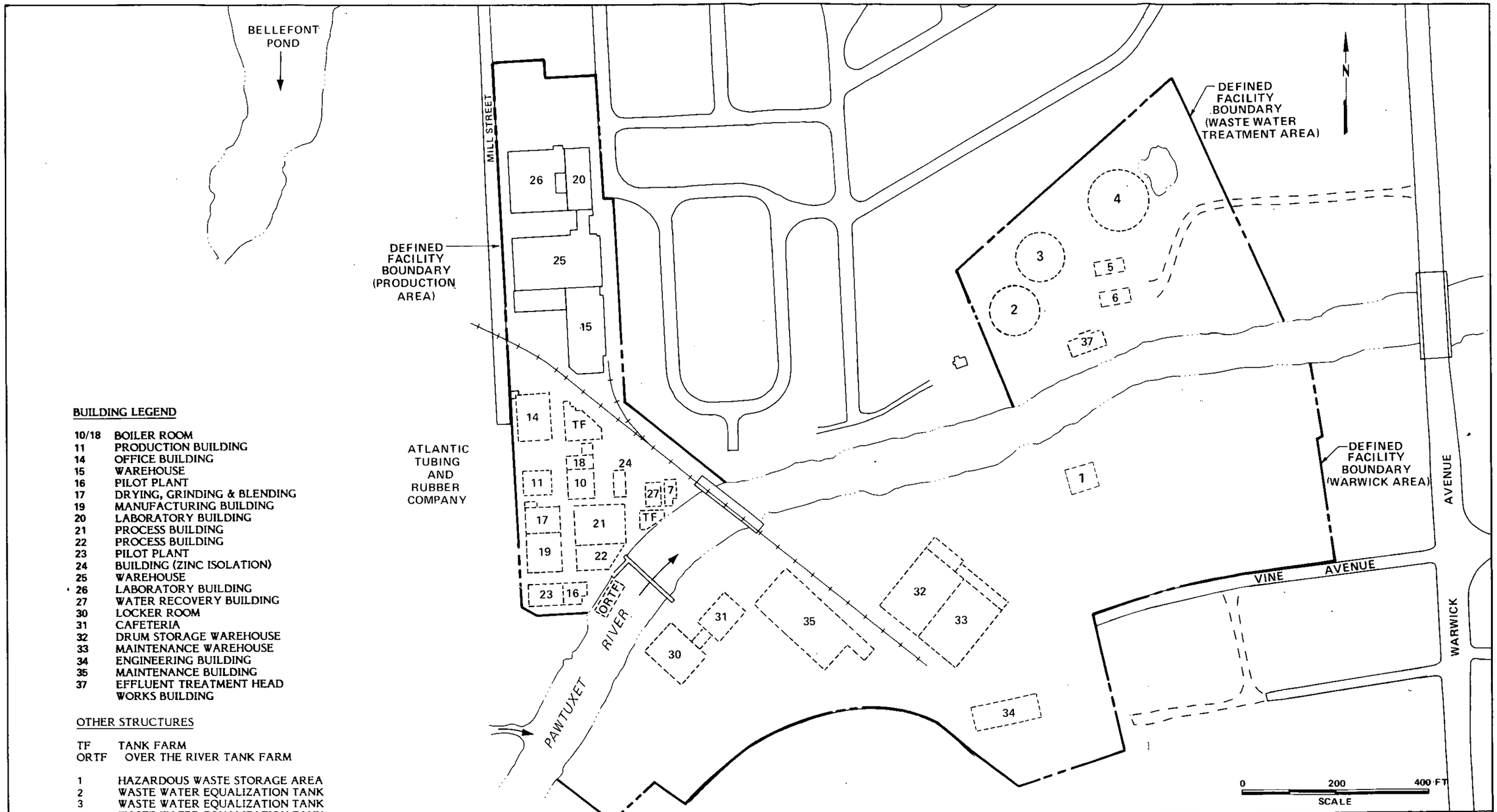
The decommissioning and razing was certified by documentation of activities, results and proper management of hazardous and non-hazardous materials. Supporting documentation (including waste manifest forms) was assembled and transmitted to the appropriate regulatory agencies.

After reviewing the submitted documents and conducting the final closure inspection, the Rhode Island Department of Environmental Management determined that the facility is closed as a storage facility of hazardous waste. That determination was transmitted to CIBA-GEIGY by way of letter, dated 13 August 1987, from the Division of Air and Hazardous Materials.

Since the Geigy Chemical Company began operation at the site, the practice of supplying small volumes of specialized products grew to supplying a vast array of products. Major products and production dates were:

1950s -	agricultural products, and leather and textile auxiliaries
1960s -	plastics, additives, optical brighteners and pharmaceuticals
1970s -	pharmaceuticals, agricultural products, plastics and additives
1980s -	pharmaceuticals, plastics and additives

CIBA-GEIGY Corporation is a diversified company that is engaged principally in the discovery, development, manufacturing, and marketing of a wide variety of special purpose chemicals and chemical products throughout the United States.



BUILDING LEGEND

10/18	BOILER ROOM
11	PRODUCTION BUILDING
14	OFFICE BUILDING
15	WAREHOUSE
16	PILOT PLANT
17	DRYING, GRINDING & BLENDING
19	MANUFACTURING BUILDING
20	LABORATORY BUILDING
21	PROCESS BUILDING
22	PROCESS BUILDING
23	PILOT PLANT
24	BUILDING (ZINC ISOLATION)
25	WAREHOUSE
26	LABORATORY BUILDING
27	WATER RECOVERY BUILDING
30	LOCKER ROOM
31	CAFETERIA
32	DRUM STORAGE WAREHOUSE
33	MAINTENANCE WAREHOUSE
34	ENGINEERING BUILDING
35	MAINTENANCE BUILDING
37	EFFLUENT TREATMENT HEAD WORKS BUILDING

OTHER STRUCTURES

TF	TANK FARM
ORTF	OVER THE RIVER TANK FARM
1	HAZARDOUS WASTE STORAGE AREA
2	WASTE WATER EQUALIZATION TANK
3	WASTE WATER EQUALIZATION TANK
4	WASTE WATER EQUALIZATION TANK
5	TRICKLING TOWER
6	TRICKLING TOWER
7	COOLING TOWER

NOTE: DASHED LINE INDICATES FORMER STRUCTURE. SOLID LINE INDICATES EXISTING STRUCTURE. LOCATIONS SHOWN ARE APPROXIMATE.

BASE MAP SOURCE: GEOD CORPORATION OF NEWFOUNDLAND, NEW JERSEY. MAPPED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHS. DATE FLOWN: 2 APRIL 1989

EXISTING AND FORMER STRUCTURES
CIBA–GEIGY FACILITY
CRANSTON, RHODE ISLAND

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WAYNE, NEW JERSEY

DR. BY	KF	SCALE	AS SHOWN	PROJ. NO.	87X4660
CK'D BY	MH	DATE:	22 JUN 1989	FIG. NO.	3–1

Section Four

SECTION 4
RCRA INVESTIGATION HISTORY

The RCRA corrective action program, which applies to all operating and closed facilities regulated under Subtitle C (Hazardous Waste Management) of RCRA, consists of three major stages: the RCRA Facility Assessment (Facility Assessment), the RCRA Facility Investigation (Facility Investigation) and the Corrective Measures Study (CMS).

The Facility Assessment is intended to identify and gather information on releases or potential releases; evaluate Solid Waste Management Units (SWMUs) and other Areas/Media of Concern; and make preliminary determinations regarding conditions of concern and the need for further action including interim measures. Those measures are designed to mitigate potential or actual releases that could endanger human health and/or the environment.

The Facility Investigation is conducted to characterize the impact of known and/or potential releases that were determined to require further action during the Facility Assessment. The Facility Investigation includes the Public Health and Environmental Risk Evaluation (Risk Evaluation). The Risk Evaluation is designed to identify the human populations and environmental systems that may be impacted by conditions of concern associated with the facility. The Media Protection Standards (MPS) are then established for each media of concern. The media Protection Standards are based on the Risk Evaluation, promulgated standards and non-promulgated criteria.

The Corrective Measures Study determines the potential engineering solutions to the facility problems as indicated by the Media Protection Standard. The solutions (corrective measures) are evaluated based on performance, reliability, ease of implementation, timeliness, protectiveness of human health and the environment, and cost effectiveness.

The USEPA conducted the Facility Assessment of the CIBA-GEIGY facility during 1987. The Facility Assessment included a preliminary review, a visual site inspection and a sampling visit. Those three tasks are designed to collect and analyze data in support of initial release and/or potential release determinations from SWMUs and other Areas/Media of Concern. The document entitled "Final RFA Report, CIBA-GEIGY, RCRA Facility Assessment," and dated 20 January 1988, is on file with the USEPA and CIBA-GEIGY. The Facility Assessment is summarized in the context of this Current Assessment Summary Report in Section 6.

CIBA-GEIGY conducted a Preliminary Investigation of the facility during 1988. A Preliminary Investigation is generally not part of the RCRA corrective action program and, in fact, is unique to this investigation. Work plans prepared for the Preliminary Investigation were submitted to the USEPA for review prior to implementing the work. That investigation, as the name suggests, was a limited and preliminary effort designed to gather and interpret information on the environmental setting and characterization of the facility. The Preliminary Investigation included borings, soil sampling, piezometer and monitoring well installations, and ground water sampling.

The Preliminary Investigation data are on file with CIBA-GEIGY and are summarized in the context of this Current Assessment Summary Report in Sections 2 and 6.

In summary, within the RCRA corrective action program two investigations have been completed, the Facility Assessment and the Preliminary Investigation. Those investigations contain the bulk of the environmental characterization data available for the facility.

Data collected and evaluated for the facility as part of the Facility Assessment and Preliminary Investigation have shown no endangerment to human health and/or the environment that warrant interim measures.

On 30 September 1988, a draft Administrative Order on Consent (No. I-88-1088) was issued to CIBA-GEIGY by the USEPA. After several negotiating sessions, and public comments, the final Administrative Order on Consent was issued by USEPA. That Order was signed by CIBA-GEIGY on 9 June 1989, and became effective on 16 June 1989.

Section Five

SECTION 5
SOLID WASTE MANAGEMENT UNITS, AREAS OF CONCERN AND ADDITIONAL AREAS OF INVESTIGATION

Based on information submitted by CIBA-GEIGY to the USEPA and information gathered by the USEPA (including the Facility Assessment), 12 SWMUs and two Areas of Concern have been identified at the facility. In the context of the Facility Investigation, a SWMU is any unit which contained solid or hazardous wastes from which hazardous wastes or hazardous constituents could have potentially migrated. SWMUs include media (e.g., soil) which are known to or suspected of containing hazardous constituents that could have potentially migrated. An Area of Concern is an area at which a release of hazardous waste or hazardous constituent has been identified.

Information on the SWMUs and Areas of Concern is presented in Table 5-1. The locations of SWMUs and Areas of Concern, and the media to be investigated for each SWMU are presented on Figure 5-1.

CIBA-GEIGY has identified two Additional Areas of Investigation (AAOI). Those AAOIs have been identified for completeness of study. No releases from those AAOIs are known or suspected. The Additional Areas of Investigation have been designated, AAOI-15, the laboratory waste water sump, and AAOI-16, the maintenance department cleaning area (Table 5-1 and Figure 5-1).

TABLE 5-1
SOLID WASTE MANAGEMENT UNITS, AREAS OF CONCERN AND ADDITIONAL AREAS OF INVESTIGATION
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

SWMU Number	Type	Study Area	Active Dates	Description
1	Hazardous waste storage area	Warwick Area	1981-1986	The hazardous waste storage area was designed for a maximum capacity storage of 768 55-gallon drums. Typically, this unit contained 300 to 400 drums. Various wastes were stored within this unit including: flammable liquids and solids, corrosive solids, organic mixtures and solids, non-hazardous organic mixtures and chloroform. The area was asphalt lined, diked and surrounded by a 6 ft high chain-link fence. The storage area was approximately 42 ft by 58 ft.
2	6000 gallon hazardous waste storage tank	Production Area	1981-1986	The 6000 gallon above ground tank was used to provide storage of process wastes. The tank contained a variety of liquid solvent solutions including: waste acetone, toluene, monochlorobenzene, isopropanol, naptha, xylene, heptane and methanol. The carbon steel tank was 17 ft high, had a diameter of 8 ft, and was enclosed by an 8000 gallon capacity dike (14.5 ft x 19 ft x 4 ft high).
3	7500 gallon, 90-day accumulation tank	Production Area	1985-1986	The vertical above ground tank, which had a capacity of 7500 gallons, was used to store flammable liquids for periods of less than 90 days. The stainless steel tank was 17 ft high, had a diameter of 8.5 ft, and was enclosed by a 25,000 gallon dike (approximately 28 ft x 29 ft x 4 ft high).

TABLE 5-1 (Continued)
SOLID WASTE MANAGEMENT UNITS, AREAS OF CONCERN AND ADDITIONAL AREAS OF INVESTIGATION
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

SWMU Number	Type	Study Area	Active Dates	Description
4	Trash compactor	Production Area	1972-1986	The trash compactor, which had a 55 cubic yard capacity, only handled packaging material and paper wastes. The trash compactor area (21 ft x 36 ft) was concrete lined and drained to the waste water treatment plant.
5	River sediment storage area	Warwick Area	1971-1976	Approximately 6634 cubic yards of sediment dredged from the River was piled in this area. The sediment was removed from the site in 1976. The natural grade of this area was restored in 1977.
6	Zinc oxide soil pile	Warwick Area	Late 1960's	Approximately 25 cubic yards of soil containing zinc oxide residue exists on site. The zinc oxide residue was from an incident involving a broken railcar.
7	Chlorosulfonic acid spill area	Production Area	1961	Approximately 500 gallons of chlorosulfonic acid were spilled over an area about 10 ft x 20 ft.
8	Prussian blue spill area	Production Area	1956	Blue stained soil, believed to be from Prussian Blue, resulted from a spill of unknown quantity. About 306 cubic yards of that soil were excavated and subsequently removed.
9	Waste water pipeline break	Warwick Area	7 September 1983	A break in the main raw waste transfer line resulted in the discharge of about 24,000 gallons of waste water to the soil and Pawtuxet River

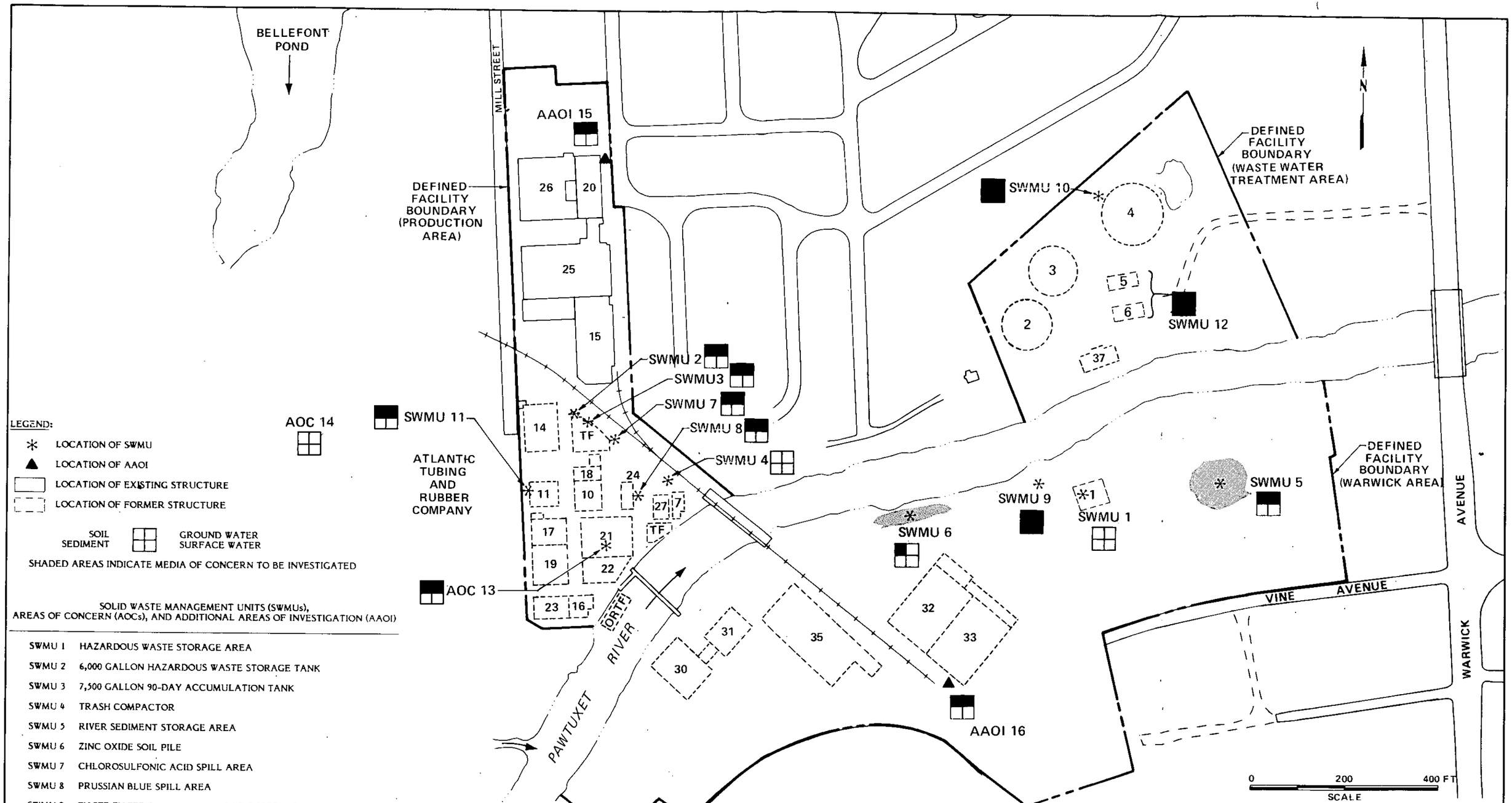
TABLE 5-1 (Continued)
SOLID WASTE MANAGEMENT UNITS, AREAS OF CONCERN AND ADDITIONAL AREAS OF INVESTIGATION
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

SWMU Number	Type	Study Area	Active Dates	Description
10	Waste water pipeline break	Waste Water Treatment Area	12 January 1982	A break in an underground waste water line resulted in a discharge of about 50,000 gallons to the surrounding soil and Pawtuxet River.
11	Toluene spill area (Building No. 11)	Production Area	1983	The calculated loss of toluene associated with this SWMU is between 9 and 90 pounds over a two year period.
12	Waste water treatment plant	Waste Water Treatment Area	1972-1983	Area formerly occupied by the waste water treatment plant.
Area of Concern				
13	Process building area	Production Area	1971-1986	Area in which most of the production activities occurred.
14	Atlantic Tubing & Rubber Company property	Adjacent to and west of the Production Area	1981-present	Property was never used or developed by CIBA-GEIGY.

TABLE 5-1 (Continued)
SOLID WASTE MANAGEMENT UNITS, AREAS OF CONCERN AND ADDITIONAL AREAS OF INVESTIGATION
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

SWMU Number	Type	Study Area	Active Dates	Description
Additional Area of Investigation				
15 (1)	Laboratory building waste water sump	Production Area	1961-1987	The sump functioned as part of normal operations within the laboratory building. The gravity sump drained to sewerage lines that discharged to the POTW.
16 (1)	Maintenance department cleaning area	Warwick Area	mid 1960s-1986	Area in which steam cleaning of maintenance equipment occurred.

NOTE: (1) CIBA-GEIGY has identified these two Additional Areas of Investigation; no releases are known or suspected.



LEGEND:

- ✳ LOCATION OF SWMU
- ▲ LOCATION OF AAOI
- LOCATION OF EXISTING STRUCTURE
- LOCATION OF FORMER STRUCTURE

SOIL / SEDIMENT — GROUND WATER / SURFACE WATER

SHADED AREAS INDICATE MEDIA OF CONCERN TO BE INVESTIGATED

SOLID WASTE MANAGEMENT UNITS (SWMUs), AREAS OF CONCERN (AOCs), AND ADDITIONAL AREAS OF INVESTIGATION (AAOI)

SWMU 1	HAZARDOUS WASTE STORAGE AREA
SWMU 2	6,000 GALLON HAZARDOUS WASTE STORAGE TANK
SWMU 3	7,500 GALLON 90-DAY ACCUMULATION TANK
SWMU 4	TRASH COMPACTOR
SWMU 5	RIVER SEDIMENT STORAGE AREA
SWMU 6	ZINC OXIDE SOIL PILE
SWMU 7	CHLOROSULFONIC ACID SPILL AREA
SWMU 8	PRUSSIAN BLUE SPILL AREA
SWMU 9	WASTE WATER PIPELINE BREAK OF 7 SEPTEMBER 1983
SWMU 10	WASTE WATER PIPELINE BREAK OF 12 JANUARY 1982
SWMU 11	TOLUENE SPILL AREA (BUILDING NO. 11)
SWMU 12	WASTE WATER TREATMENT PLANT (TRICKLING TOWERS)
AOC 13	PROCESS BUILDING AREA
AOC 14	ATLANTIC TUBING AND RUBBER COMPANY PROPERTY
AAOI 15	LABORATORY WASTE WATER SUMP
AAOI 16	MAINTENANCE DEPARTMENT CLEANING AREA

NOTES

1. STRUCTURE LEGEND IS INCLUDED ON FIGURE 3-1.
2. CIBA-GEIGY HAS IDENTIFIED TWO ADDITIONAL AREAS OF INVESTIGATION (AAOI). THOSE AAOIs HAVE BEEN DESIGNATED AAOI-15 AND AAOI-16.

BASE MAP SOURCE: GEOD CORPORATION OF NEWFOUNDLAND, NEW JERSEY, MAPPED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHS. DATE FLOWN: 2 APRIL 1989

MEDIA TO BE INVESTIGATED FOR SOLID WASTE MANAGEMENT UNITS, AREAS OF CONCERN, AND ADDITIONAL AREAS OF INVESTIGATION
CIBA–GEIGY FACILITY, CRANSTON, RHODE ISLAND

WOODWARD – CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS
WAYNE, NEW JERSEY

DR. BY:	KF	SCALE:	AS SHOWN	PROJ. NO.:	87X4660
CK'D. BY:	MH	DATE:	22 JUN 1989	FIG. NO.:	5–1

Section Six

SECTION 6
ENVIRONMENTAL CHARACTERIZATION

Environmental characterization has been divided into three sections: On-Site Characterization, Off-Site Characterization and Pawtuxet River Characterization. The Facility Assessment and the Preliminary Investigation produced environmental characterization data for the facility. Quality assurance/quality control associated with the Facility Assessment and Preliminary Investigation is discussed in Section 7.

The purpose and objectives of the Facility Assessment are discussed in Section 4. The purpose and objectives of the Preliminary Investigation were to (1) collect and analyze on-site soil and ground water samples that best represent environmental conditions, (2) verify and augment the sampling and analysis program implemented as part of the Facility Assessment, (3) provide data on the hydrogeologic conditions on site, and (4) provide data needed to negotiate a comprehensive and site specific Order, and to develop a Facility Investigation Proposal.

6.1 ON-SITE CHARACTERIZATION

On-site sampling and analysis of ground water and soil were conducted as part of the Facility Assessment. Seven ground water samples were analyzed for metals, volatile and semi-volatile organic compounds, and pesticides/PCBs. The samples were obtained from piezometers installed in test pit excavations which were backfilled. The piezometers clearly are not constructed according to RCRA specifications. However, they were deemed appropriate by the USEPA for sampling in the context of the Facility Assessment. Because of those conditions, the ground water data from the Facility Assessment are viewed as qualitative rather than quantitative and the reported concentrations are viewed as "order-of-magnitude" values. CIBA-GEIGY collected split samples during the Facility

Assessment sampling visit. The results of ground water analysis conducted as part of the Facility Assessment and split-sample analyses are summarized in Table 6-1.

Four subsurface soil samples were collected at depths ranging from 1 ft to 3 ft. All four samples were analyzed for volatile and semi-volatile organics and pesticides/PCBs; two samples were also analyzed for metals. CIBA-GEIGY collected split soil samples during the Facility Assessment sampling visit. The results of soil analysis conducted as part of Facility Assessment and split-sample analyses are summarized in Table 6-2. Sampling locations associated with the Facility Assessment are shown on Figure 6-1.

The Preliminary Investigation included sampling and analysis of soil and ground water samples from the three on-site study areas. Samples obtained from the Production Area, Waste Water Treatment Area and the Warwick Area were analyzed for Targeted Compound List parameters plus a 30 compound library search (TCL+30) and Appendix IX parameters. One soil and one ground water sample from each of the three on-site study areas was analyzed for Appendix IX parameters. An additional Appendix IX analysis was performed on one surficial soil sample from the Warwick Area. Five surficial soil samples, nine subsurface soil samples from borings and ten ground water samples from newly installed monitoring wells were collected. Field blank samples and trip blank samples were also analyzed (Table 6-4 and 6-5, respectively). The sampling and analysis program implemented as part of the Preliminary Investigation is summarized in Table 6-3. Sampling locations associated with the Preliminary Investigation are shown on Figure 6-1.

In the Production Area, five soil and six ground water samples were collected and analyzed. Most of the buildings in the Production Area have been razed and the area has been regraded. Because of those conditions, only subsurface soil samples were collected. Subsurface soil samples were obtained from borings advanced as part of monitoring well installations. Generally, those samples were taken from vertical intervals that span the water table. One sample (from

monitoring well MW-5S) was taken from just above the water table. Four of the six monitoring wells in the Production Area were installed downgradient of the SWMUs, the Areas of Concern and the location of the former manufacturing buildings. Those wells are adjacent to the bulkhead along the Pawtuxet River and include MW-1S, MW-1D, MW-2S, and MW-3S. Monitoring well MW-1S is screened across the fill, MW-1D is screened across the lower unconsolidated deposits, MW-2S is screened across the fill and MW-3S is screened across the upper unconsolidated deposits and the fill. Monitoring well MW-4S was installed to investigate soil and ground water quality near SWMU-11. That well is screened across the upper unconsolidated deposits and the fill. Monitoring well MW-5S, located in the northern section of the Production Area, is an upgradient (background) well screened across the upper unconsolidated deposits. The Preliminary Investigation analytical data for the Production Area are summarized in Tables 6-6, 6-7, 6-8 and 6-9.

In the Waste Water Treatment Area, three soil and three ground water samples were collected and analyzed. That area has been affected by demolition and regrading activities. Therefore, only subsurface soil samples were obtained during the Preliminary Investigation. Two of the soil samples were taken from just above the water table and one soil sample was taken from the vertical interval that spans the water table. Two of the three monitoring wells (MW-7S and MW-8S) serve as downgradient wells and are located adjacent to the Pawtuxet River. One monitoring well, MW-9S, was installed to investigate upgradient conditions associated with SWMU-10, in particular, and the Waste Water Treatment Area in general. The Preliminary Investigation analytical data for the Waste Water Treatment Area area summarized in Tables 6-6, 6-7, 6-10 and 6-11.

The eastern section of the Warwick Area has not been impacted by demolition activities. Consequently, surficial soil samples were collected to investigate SWMU-5 and SWMU-9. At SWMU-5, four soil samples were collected (one sample per quadrant). At SWMU-9, one soil sample was collected. Additionally, one shallow monitoring well (MW-6S) screened across the upper unconsolidated

deposits was installed at SWMU-5 to evaluate ground water quality. A subsurface soil sample was collected from the soil boring advanced for the installation of MW-6S. The Preliminary Investigation analytical data for the Warwick Area are summarized in Tables 6-6, 6-7, 6-12 and 6-13.

Most of the organic constituents of concern observed in on-site soil and ground water samples are consistent with the materials used during past facility operations. That is, the constituents detected and the concentrations reported for those constituents indicate residual impact from former activities. Consistent with the decommissioning and razing of the facility, which included the removal of materials, residues and waste, there are no indications that any hazardous waste remains on site. Furthermore, with the exception of SWMU-6 (the zinc oxide soil pile), there are no indications that other non-hazardous waste occurs on site.

Some of the organic constituents of concern (e.g., polynuclear aromatic hydrocarbons) may not be the direct result of manufacturing/ processing at the plant. The possibility exists that some or all of the polynuclear aromatic hydrocarbons (PAHs) observed in soil samples may be from particulates generated during the burning of coal off site. In addition, coal fragments and coal slag have been observed in the surficial fill material in the Production Area. It is possible that coal fragments and coal slag constitute an appreciable volume (in terms of organic chemical analysis) of the fill material. Chunks of coal currently exist in some of the gardens around the warehouse and laboratory buildings. Apparently, the coal was used as decorative stone or served to anchor plastic sheeting. Coal particulates and fragments of coal and/or coal slag in soil samples may be responsible for the PAHs observed in on-site soil samples. The PAHs observed in ground water samples may also be associated with the condition described above.

Because metals occur naturally, their presence in environmental media does not necessarily indicate a release. Both the presence and concentration of metals need to be considered and compared to natural background samples (i.e. samples

presumably unimpacted by human activities). In addition, the metals data and other organic data must be compared to site background samples (i.e., samples presumably unimpacted by CIBA-GEIGY activities). However, background sampling has not been completely addressed. Background conditions will be investigated as part of the Facility Investigation.

Regardless of their origin, some hazardous constituents have been observed in soil and ground water samples. However, based on their concentration and occurrence, and based on ground water and surface water use in the site vicinity, those constituents do not pose an imminent threat to human health or the environment.

6.2 OFF-SITE CHARACTERIZATION

The Rhode Island Department of Environmental Management (RIDEM) conducted surficial soil sampling in the facility vicinity on three dates: 23 July 1986, 12 November 1986 and 15 April 1987. The soil analyses included metals, volatile organic compounds, polynuclear aromatic hydrocarbons, phthalates, benzotriazoles and pesticides. The RIDEM off-site sampling and analysis program is presented and discussed in the Facility Assessment. From a data acquisition standpoint, that program is considered part of the Facility Assessment.

The analytical results of the soil sampling are presented in Tables 6-14, 6-15 and 6-16 and the sampling locations are shown on Figure 6-2. Based on those results, RIDEM concluded that there is no widespread impact of soil by past emissions from the facility and that the constituents observed do not present an imminent threat to human health or the environment. In addition, RIDEM concluded that the concentrations of the constituents of concern in the soil samples are within the normal range for urban soil.

The USEPA conducted surficial soil sampling in the facility vicinity on 19 May 1988. Four samples were collected from Fay Field, located about 0.6 miles northeast of the facility, and two samples were collected from the Park View Junior High School ball field, located about 0.4 miles northwest of the facility. Soil analyses included volatile and semi-volatile organic compounds, and pesticides/PCBs. The analtyical results are on file with the USEPA and CIBA-GEIGY.

A USEPA toxicologist calculated the total potential lifetime cancer risk level associated with constituents of concern observed in the soil samples. Those constituents include polynuclear aromatic hydrocarbons and pesticides/PCBs. The potential lifetime cancer risk level was calculated to be one in one million (a one in one million cancer risk is a risk which corresponds to one additional potential cancer occurrence per one million persons continually exposed to the constituent(s) of concern during their lifetimes). It is the USEPA's opinion that the one in one million cancer risk represents an insignificant risk.

6.3 PAWTUXET RIVER CHARACTERIZATION

The literature review conducted as part of the Current Assessment Summary Report indicates that water from the Pawtuxet River has not been sampled since May 1986 when chemical manufacturing operations at the facility ceased. There are many water quality reports for the Pawtuxet River that pre-date the cessation of operations at the facility. Those reports characterize water quality primarily in terms of physical parameters, microbiological and inorganic constituents, and parameters such as COD, BOD and dissolved oxygen. Because of the dynamic nature of surface water, past sampling is not indicative of current conditions. The surface water investigation to be conducted as part of the Facility Investigation will address the impact, if any, that current site conditions are having on surface water quality. In cooperation with the USEPA and RIDEM, applicable or relevant and appropriate Media Protection Standards will be identified for the Pawtuxet River. The Media Protection Standards will be proposed at the end of Phase II of the Facility Investigation.

As part of the Facility Assessment, sediment quality was investigated. Four sediment samples were collected from the Pawtuxet River adjacent to the site (Figure 6-1) and analyzed for metals, volatile and semi-volatile organic compounds, and pesticides/PCBs. Two of those samples were also analyzed for dioxin (TCDD) and furan (TCDF). The depth intervals for the samples are not reported. The analytical data for those samples are presented in Table 6-17. CIBA-GEIGY collected split sediment samples. The analytical data for those samples are also presented in Table 6-17.

The Pawtuxet River has received discharges from many industries and several sewerage treatment plants since the beginning of the industrial revolution. Prior to the industrial revolution and dating back to the 1700's, forges and textile mills discharged to the Pawtuxet River, and privies, serving up to 3,000 employees were positioned directly over the river.

Some compounds observed in sediment samples from the Pawtuxet River are attributable to past operations at the facility. However, many compounds may have been contributed from other sources. Those conditions will be investigated as part of the Facility Investigation.

Regardless of their origin, constituents of concern occur in the sediment underlying the Pawtuxet River. However, the existing data do not indicate that those constituents pose an imminent threat to human health or the environment.

TABLE 6-1

RFA: SUMMARY OF CONSTITUENTS DETECTED IN GROUND WATER SAMPLES
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

	GW-1 (EPA)	GW-4 (CG)	GW-6 (EPA)	GW-14 (CG)	GW-5 (EPA)	GW-6 (CG)	GW-4 (EPA)	GW-9 (CG)	GW-8 (EPA)	GW-12 (CG)	GW-2 (EPA)	GW-2A (EPA)	GW-8 (CG)	GW-8D (CG)	GW-3 (EPA)	GW-7 (CG)
Metals (ppb)																
antimony	<58	ND	<58	ND	<58	ND	<58	ND	<58	ND	<58	<58	ND	ND	<58	ND
arsenic	<2.8	ND	4.0	10	395	<19	<2.8	ND	<2.8	ND	609	365	19	<38	6.1	ND
barium	43	NA	87	NA	242	NA	<30	NA	<30	NA	48	<30	NA	NA	187	NA
beryllium	NA	ND	NA	ND	NA	<1.9	NA	ND	NA	ND	NA	NA	ND	<2.6	NA	ND
cadmium	<4.7	5.8	<4.7	ND	<4.7	<4.2	<4.7	9.6	<4.7	<9.3	<4.7	<4.7	5.1	10	<4.7	<3.9
chromium	<9.4	<13	<9.4	<8.9	21	<51	15	<29	<9.4	<15	13	<9.4	<28	<98	<9.4	<4.4
copper	NA	<22	NA	<12	NA	74	NA	28	NA	26	NA	NA	58	111	NA	<13
lead	1.7	27	2.3	9.8	93	186	178	24	5.18	13	17	<1.7	57	247	<1.7	5.9
manganese	1060	NA	5470	NA	838	NA	64	NA	18	NA	593	577	NA	NA	<6.5	NA
mercury	<0.18	ND	<0.18	ND	<0.18	ND	<0.18	ND	<0.18	ND	<0.18	<0.18	ND	ND	<0.18	ND
nickel	<28	ND	<28	ND	<28	<39	<28	<21	<28	<16	<28	<28	<16J	<33	<28	ND
selenium	1.3	ND	<1.7	ND	<3.3	ND	<1.7	ND	<1.7	ND	1.0	0.25	ND	ND	<1.7	ND
silver	<7.7	ND	<7.7	ND	<7.7	ND	<7.7	ND	<7.7	ND	<7.7	<7.7	ND	ND	<7.7	ND
zinc	13800	17700	1000	<1510	12600	18800	2510	4040	5360	<7630	13600	195	25520	<43000	<20	<1050
Volatile Organics (ppb)																
methylene chloride	ND	6J	1J	6J	ND	4J	ND	ND	2J	ND	7J	8J	ND	ND	11J	ND
acetone	ND	7JB	ND	57B	ND	5JB	ND	12B	2J	ND	190	240	ND	75B	ND	ND
toluene	2J	ND	ND	ND	27J	ND	ND	ND	ND	ND	22J	ND	23	31	ND	1J
tetrachloroethylene	2J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3J	4J	ND	120
total xylenes	94	62	ND	ND	46J	11	ND	21	ND	ND	780	460	2923D	2377D	1300	2887D
chlorobenzene	ND	ND	ND	ND	1100	ND	ND	2J	ND	ND	14J	ND	38	31	1800	1735D
ethylbenzene	27	15	ND	ND	ND	ND	ND	5	ND	ND	540	ND	778D	610D	ND	333D

TABLE 6-1 (continued)

RFA: SUMMARY OF CONSTITUENTS DETECTED IN GROUND WATER SAMPLES

CIBA-GEIGY FACILITY

CRANSTON, RHODE ISLAND

	GW-1 (EPA)	GW-4 (CG)	GW-6 (EPA)	GW-14 (CG)	GW-5 (EPA)	GW-6 (CG)	GW-4 (EPA)	GW-9 (CG)	GW-8 (EPA)	GW-12 (CG)	GW-2 (EPA)	GW-2A (EPA)	GW-8 (CG)	GW-8D (CG)	GW-3 (EPA)	GW-7 (CG)
1,2-dichloro-ethylene	ND	ND	ND	ND	210	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
vinyl chloride	ND	ND	ND	ND	66J	12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4J	24J	32
trichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6
trans-1,2-dichloroethene	ND	ND	ND	ND	ND	130	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Semi-Volatile Organics (ppb)																
2,4-dimethylphenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	21	ND
1,2-dichlorobenzene	10	ND	ND	ND	230	120	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-dichlorobenzene	ND	ND	ND	ND	24	26	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-chlorophenol	ND	ND	ND	ND	29	ND	ND	ND	ND	ND	ND	ND	ND	ND	13	ND
phenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2000	2400	230	ND	25	ND
fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	2J	ND	ND	ND	ND	ND	ND
pyrene	ND	ND	ND	2J	ND	ND	ND	ND	ND	2J	ND	ND	ND	2J	ND	ND
butyl benzylphthalate	ND	ND	ND	2J	ND	ND	ND	ND	ND	2J	ND	ND	ND	ND	ND	ND
bis(2-ethyl hexyl) phthalate	ND	36B	ND	50B	15	52B	24	36B	ND	26B	ND	ND	310	56B	ND	24B
4-chloroaniline	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	130	ND
dibenzofuran	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
di-n-octyl phthalate	ND	ND	ND	10J	ND	ND	ND	ND	ND	2J	ND	ND	ND	ND	ND	ND
naphthalene	ND	ND	ND	ND	ND	4J	ND	ND	ND	ND	ND	ND	6J	4J	ND	ND
diethyl phthalate	ND	ND	ND	ND	ND	ND	ND	2J	ND	2J	ND	ND	ND	ND	ND	ND
di-n-butyl phthalate	ND	ND	ND	ND	ND	ND	ND	2J	ND	2J	ND	ND	ND	2J	ND	ND
fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	2J	ND	ND	ND	ND	ND	ND
3,3-dichlorobenzidine	ND	ND	ND	ND	ND	ND	ND	ND	ND	36	ND	ND	ND	ND	ND	ND
benzo(a)anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	8J	ND	ND	ND	2J	ND	ND

TABLE 6-1 (continued)

RFA: SUMMARY OF CONSTITUENTS DETECTED IN GROUND WATER SAMPLES

CIBA-GEIGY FACILITY

CRANSTON, RHODE ISLAND

	GW-1 (EPA)	GW-4 (CG)	GW-6 (EPA)	GW-14 (CG)	GW-5 (EPA)	GW-6 (CG)	GW-4 (EPA)	GW-9 (CG)	GW-8 (EPA)	GW-12 (CG)	GW-2 (EPA)	GW-2A (EPA)	GW-8 (CG)	GW-8D (CG)	GW-3 (EPA)	GW-7 (CG)
chrysene	ND	ND	ND	ND	ND	ND	ND	ND	ND	10J	ND	ND	ND	ND	ND	ND
benzo(k)fluoranthene	ND	ND	ND	ND	ND	ND	ND	ND	ND	18J	ND	ND	ND	ND	ND	ND
benzo(a)pyrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	10J	ND	ND	ND	ND	ND	ND
dibenzo(a,b)anthracene	ND	ND	ND	ND	ND	ND	ND	ND	ND	4J	ND	ND	ND	ND	ND	ND
PCBs (ppb)	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	ND	NA	NA	ND	NA
Pesticides (ppb)	ND	NA	ND	NA	ND	NA	ND	NA	ND	NA	ND	ND	NA	NA	ND	NA

NOTES:
ppb = Part Per Billion
ND = Not Detected.
< = Less than. Number indicates detection limit.
(CG) = CIBA-GEIGY sample
(EPA) = United States Environmental Protection Agency sample collected by Versar Inc.
B = Analyte was found in the blank.
Table based on data reported by Versar (1988) and CIBA-GEIGY file data.
J = Presence of compound detected, value estimated (Versar, 1988).
J = Estimated value based on QA/QC review or the compound is present below the specified detection limit (CIBA-GEIGY)
Split samples were obtained during ground water sampling. The samples and splits are as follows: GW-1 (EPA) and GW-4 (CG), GW-6 (EPA) and GW-14 (CG), GW-5 (EPA) and GW-6 (CG), GW-4 (EPA) and GW-9 (CG), GW-8 (EPA and GW-12 (CG), GW-2 (EPA) and GW-8 (CG), GW-2A (EPA) and GW-8D (CG), GW-3 (EPA) and GW-7 (CG).
Sample GW-2A (EPA) is a field duplicate of sample GW-2 (EPA). Sample GW-8D (CG) is a field duplicate of sample GW-8 (CG).
Samples collected on 11 June 1987.
D = Calculated from 10X dilution.

TABLE 6-2

RFA: SUMMARY OF CONSTITUENTS DETECTED IN SOIL SAMPLES
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

	SS-1 (EPA)	SS-1A (EPA)	SS-4 (CG)	SS-4D (CG)	SS-2 (EPA)	SS-2 (CG)	SS-3 (EPA)	SS-1 (CG)	BG1 (EPA)	SS-3 (CG)
Metals (ppm)	NA	NA	NA	NA	NA	NA				
antimony	--	--	--	--	--	--	137	ND	19	ND
arsenic	--	--	--	--	--	--	31	ND	3.5	ND
barium	--	--	--	--	--	--	622	NA	40	NA
beryllium	--	--	--	--	--	--	<2.2	0.6	<0.49	0.3J
cadmium	--	--	--	--	--	--	14	ND	1.2	ND
chromium	--	--	--	--	--	--	407	97	14	15
copper	--	--	--	--	--	--	NA	126	NA	35
iron	--	--	--	--	--	--	64500	NA	10400	ND
lead	--	--	--	--	--	--	5.2	34J	<0.4	45J
magnesium	--	--	--	--	--	--	5760	NA	1490	NA
manganese	--	--	--	--	--	--	971	NA	173	NA
mercury	--	--	--	--	--	--	38	0.83	2.7	ND
nickel	--	--	--	--	--	--	<30	ND	8.3	ND
selenium	--	--	--	--	--	--	1.5	ND	0.25	ND
silver	--	--	--	--	--	--	<8.0	ND	<1.8	ND
vanadium	--	--	--	--	--	--	101	NA	32	NA
zinc	--	--	--	--	--	--	11000	2830J	200	217J
Volatile Organics (ppm)										
toluene	ND	ND	ND	ND	ND	0.008	ND	0.007	ND	0.009
methylene chloride	0.1B	0.051B	0.005JB	0.003JB	0.05	0.008B	ND	0.003JB	ND	0.007B
acetone	0.003J	0.005J	0.045JB	ND	0.01J	0.12J	ND	0.085J	ND	0.130J

TABLE 6-2 (continued)

RFA: SUMMARY OF CONSTITUENTS DETECTED IN SOIL SAMPLES
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

	SS-1 (EPA)	SS-1A (EPA)	SS-4 (CG)	SS-4D (CG)	SS-2 (EPA)	SS-2 (CG)	SS-3 (EPA)	SS-1 (CG)	BG1 (EPA)	SS-3 (CG)
Semi-Volatile Organics (ppm)					ND		ND			
fluoranthene	1.5	0.31J	0.53	0.6	--	ND	--	1.5	6.1	4.0
pyrene	1.3	0.29J	0.3JB	0.41B	--	0.039JB	--	0.68JB	ND	2.4J
chrysene	0.68J	0.2J	0.27J	0.3J	--	ND	--	0.64	3.7	1.8
benzo(b)fluoranthene	0.75	0.23J	ND	ND	--	ND	--	1.9	3.4J	4.7
benzo(a)pyrene	0.51J	0.14J	0.34J	0.41	--	ND	--	0.8	2.1J	1.9
benzo(g,h,i)perylene	0.3J	ND	ND	ND	--	ND	--	0.64	ND	1.0
benzo(a)anthracene	ND	0.37	0.19J	0.26J	--	ND	--	ND	ND	1.6
phenanthrene	1.1	0.17J	0.19J	0.26J	--	ND	--	0.42	4.2	1.8
anthracene	0.3J	ND	0.076J	0.11J	--	ND	--	0.15J	1.2J	0.47
acenaphthylene	ND	ND	0.038J	ND	--	ND	--	0.23J	ND	0.43
naphthalene	ND	ND	ND	ND	--	ND	--	0.15J	ND	0.072J
acenaphthene	ND	ND	ND	ND	--	ND	--	ND	ND	0.11J
benzo(k)fluoranthene	ND	ND	0.53J	0.67	--	ND	--	ND	ND	ND
indeno(1,2,3-cd)pyrene	ND	ND	ND	ND	--	ND	--	0.8	ND	1.2
dimethylphthalate	1.4	ND	ND	ND	--	ND	--	ND	ND	ND
di-n-octylphthalate	ND	ND	ND	ND	--	ND	--	0.45	ND	ND
butylbenzylphthalate	ND	ND	ND	ND	--	ND	--	0.15J	22.0	5.8J
di-n-butylphthalate	ND	ND	0.15J	0.45	--	0.039J	--	ND	ND	ND
bis(2-ethyl hexyl) phthalate	ND	0.14J	0.49B	ND	--	ND	--	1.7B	ND	1.8B
1,2 dichlorobenzene	ND	ND	ND	ND	--	0.039J	--	ND	ND	ND
hexachlorocyclopentadiene	ND	ND	ND	ND	--	ND	--	ND	ND	0.036J
2-nitroaniline	ND	ND	ND	ND	--	ND	--	0.45	ND	ND
dibenzofuran	ND	ND	ND	ND	--	ND	--	ND	ND	0.072J

TABLE 6-2 (continued)

RFA: SUMMARY OF CONSTITUENTS DETECTED IN SOIL SAMPLES
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

	SS-1 (EPA)	SS-1A (EPA)	SS-4 (CG)	SS-4D (CG)	SS-2 (EPA)	SS-2 (CG)	SS-3 (EPA)	SS-1 (CG)	BG1 (EPA)	SS-3 (CG)
PCBs (ppm)			ND	ND		ND			ND	ND
arochlor-1254	0.031	0.005	--	--	0.009	--	3.2	ND	--	--
arochlor-1260	ND		--	--	ND	--	ND	59	--	--
Pesticides (ppm)	ND	ND	ND	ND	ND	ND	ND		ND	
heptachlorepoxide	--	--	--	--	--	--	--	1.3	--	ND
delta-BHC	--	--	--	--	--	--	--	ND	--	0.12

NOTES:

ppm = Part Per Million
ND = Not Detected.
< = Less than. Number indicates detection limit.
(CG) = CIBA-GEIGY sample
(EPA) = United States Environmental Protection Agency sample collected by Versar Inc.
B = Analyte was found in the blank.
Table based on data reported by Versar (1988) and CIBA-GEIGY file data.
J = Presence of compound detected, value estimated (Versar, 1988).
J = Estimated value based on QA/QC review or the compound is present below the specified detection limit (CIBA-GEIGY)
Split samples were obtained during soil sampling. The samples and splits are as follows: SS-1 (EPA) and SS-4 (CG), SS-1A (EPA) and SS-4D (CG), SS-2 (EPA) and SS-2 (CG), SS-3 (EPA) and SS-1 (CG). Samples BG1 (EPA) and SS-3 (CG) were obtained from background locations.
Sample SS-1A (EPA) is a field duplicate of sample SS-1 (EPA). Sample SS-4D (CG) is a field duplicate of sample SS-4 (CG).
Samples collected on 11 June 1987.
NA = Not Analyzed

TABLE 6-3

PRFI: SAMPLING AND ANALYSIS PROGRAM SUMMARY
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

Sample Location	Area	Media	Analytical Parameters
MW-1S	Production Area	Soil (subsurface)	Sample not analyzed*
MW-1D	Production Area	Soil (subsurface)	Appendix IX
MW-2	Production Area	Soil (subsurface)	TCL + 30
MW-3	Production Area	Soil (subsurface)	TCL + 30
MW-4	Production Area	Soil (subsurface)	TCL + 30
MW-5	Production Area	Soil (subsurface)	TCL + 30
MW-6	Warwick Area	Soil (subsurface)	Appendix IX
MW-7	Waste Water Treatment Area	Soil (subsurface)	Appendix IX
MW-8	Waste Water Treatment Area	Soil (subsurface)	TCL + 30
MW-9	Waste Water Treatment Area	Soil (subsurface)	TCL + 30
RS-1	Warwick Area	Soil (surficial)	TCL + 30
RS-2	Warwick Area	Soil (surficial)	TCL + 30
RS-3	Warwick Area	Soil (surficial)	TCL + 30
RS-4	Warwick Area	Soil (surficial)	TCL + 30
RS-5	Warwick Area	Soil (surficial)	Appendix IX
MW-1S	Production Area	Ground Water	TCL + 30
MW-1D	Production Area	Ground Water	Appendix IX
MW-2	Production Area	Ground Water	TCL + 30
MW-3	Production Area	Ground Water	TCL + 30
MW-4	Production Area	Ground Water	TCL + 30
MW-5	Production Area	Ground Water	TCL + 30
MW-6	Warwick Area	Ground Water	Appendix IX
MW-7	Waste Water Treatment Area	Ground Water	Appendix IX
MW-8	Waste Water Treatment Area	Ground Water	TCL + 30
MW-9	Waste Water Treatment Area	Ground Water	TCL + 30

Notes:
TCL = Targeted Compound List parameters plus a 30 compound library search
* = Adjacent boring MW-1D provided the sample required to investigate soil quality at that location.

TABLE 6-4
PRFI: SUMMARY OF ORGANIC COMPOUNDS DETECTED IN FIELD BLANK SAMPLES
CIBA-GEIGY FACILITY, CRANSTON, RHODE ISLAND

		(1,2,4)	(1,2,4)
	Sampling Location:	Field Blank	Field Blank
	Representative Matrix:	Soil	Water
	Sampling Date:	5/18/88	6/8/88
	Laboratory I.D. Number:	447-006	488-005
Volatile Organic Compounds	Chemical[3] Compound Group		
acetone			4 JB
2-butanone	ketone	ND	16
1,2-dichloropropane	aliphatic halide	4 J	ND
methylene chloride	aliphatic halide	--	10 B
toluene	alkyl aromatic	ND	4 J
tetrachloroethylene	aliphatic halide	ND	ND
VOC - TOTAL		4	34
Semi-Volatile Organics			
aldrin	pesticide	0.01 J	ND
alpha-BHC	pesticide	0.01 J	ND
delta-BHC	pesticide	0.01 J	ND
gamma-BHC	pesticide	0.01 J	ND
4,4'-DDE	pesticide	0.01 J	ND
4,4'-DDT	pesticide	0.01 J	ND
dieldrin	pesticide	0.01 J	ND
bis(2-ethylhexyl)phthalate	DAE	--	2 JB
diethyl phthalate	DAE	0.7 J	ND
di-n-octyl phthalate	DAE	3J	ND
endosulfan II	pesticide	0.01 J	ND
endrin	pesticide	0.01 J	ND
heptachlor	pesticide	0.01 J	ND
heptachlor epoxide	pesticide	0.01 J	ND
kepone	pesticide	0.06 J	ND
SVO - TOTAL		3.87	2 ND

NOTES

(1) COMPOUND CONCENTRATIONS REPORTED IN ug/L (ppb)
(2) ND = NOT DETECTED OR BELOW METHOD DETECTION LIMIT
J = CONCENTRATION IS AN ESTIMATED VALUE LESS THAN THE METHOD DETECTION LIMIT
B = CONTAMINANT PRESENT IN LABORATORY METHOD BLANK
(3) DAE = DICARBOXYLIC ACID ESTER
(4) APPENDIX IX ANALYSIS

TABLE 6-5

PRFI: SUMMARY OF ORGANIC COMPOUNDS DETECTED IN TRIP BLANK SAMPLES
CIBA-GEIGY FACILITY, CRANSTON, RHODE ISLAND

	(1,2)	(1,2)	(1,2)	(1,2)	(1,2)	(1,2)	(1,2)	
	Sampling Location:	Trip Blank	TB-2	TB-3	TB-4	TB-1	TB-2	TB-3
	Representative Matrix:	Soil	Soil	Soil	Soil	Water	Water	Water
	Sampling Date:	5/17/88	5/18/88	5/19/88	5/23/88	6/7/88	6/8/88	6/9/88
	Laboratory I.D. Number	442-004	447-009	450-003	454-001	482-005	454-008	492-002
Volatile Organic Compounds	Chemical Compound Group							
acetone	ketone	ND	ND	ND	56	ND	--	ND
benzene	aromatic	--	ND	4 JB	--	--	--	--
methylene chloride	aliphatic halide	--	ND	29 B	--	--	--	--
toluene	alkyl aromatic	--	ND	1 JB	--	--	--	--
unknown		ND	ND	5 T	ND	ND	--	ND
VOC - SUBTOTAL		0	0	34	56	0	0	0
TIC - SUBTOTAL		0	0	5	0	0	0	0
VOC + TIC - TOTAL		0	0	39	56	0	0	0

NOTES
(1) COMPOUND CONCENTRATIONS REPORTED IN ug/L (ppb)
(2) -- = NO DATA OR NOT ANALYZED
ND = NOT DETECTED OR BELOW METHOD DETECTION LIMIT
J = CONCENTRATION IS AN ESTIAMTED VALUE LESS THAN THE METHOD DETECTION LIMIT
B = CONTAMINANT PRESENT IN LABORATORY METHOD BLANK
T = TENTATIVELY IDENTIFIED COMPOUND (TIC)

TABLE 6-6

PRF1: SUMMARY OF INORGANIC CONSTITUENTS DETECTED IN SOIL SAMPLES
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

	(1,2)	(1)	(1)	(1)	(1)	(1,3)	(1,2)	(1,2)	(1)	(1)	(1)	(1)	(1)	(1)	(1,2)	(2,4)
Sample Number	MW-1D	MW-2	MW-3	MW-4	MW-5	DUP-1	MW-6	MW-7	MW-8	MW-9	RS-1	RS-2	RS-3	RS-4	RS-5	FB
Lab I.D. Number	447-008	442-001	442-002	442-003	454-004	454-003	447-007	450-001	447-001	454-002	447-002	447-003	447-004	447-005	450-002	447-006
Depth	4-6 ft	3.5-7.5 ft	4-10 ft	5-9 ft	4-8 ft	4-8 ft	3-5 ft	5-7 ft	5-7 ft	2-6 ft	1 ft	1 ft	1 ft	1 ft	1 ft	--
Date	5/17/88	5/17/88	5/17/88	5/17/88	5/23/88	5/23/88	5/18/88	5/19/88	5/19/88	5/23/88	5/18/88	5/18/88	5/18/88	5/18/88	5/19/88	5/18/88
Analyte																
aluminum	7650	5210	6310	5840	5840	6780	10900	6390	2970	6790	6630	6030	6480	5880	2960	64.3
antimony	<15.0	<16.9	<19.4	<17.2	<13.0	<12.6	<20.8	<15.2	<12.6	<12.9	<12.9	<13.8	<13.4	<14.4	44.3	<60.0
arsenic	4.70	3.6	8.2	4.10	2.90	2.90	4.80	7.70	<0.64	<0.66	4.70	5.40	4.90	3.90	1.30	26.0
barium	63.9	606	99.5	40.8	28.3	38.4	74.1	127	25.6	49.9	74.4	142	65.5	81.0	30.2	65.9
beryllium	<0.15	<0.17	<0.19	<0.17	<0.13	<0.13	1.00	<0.15	<0.13	<0.13	<0.13	<0.14	<0.13	<0.14	<0.15	<0.60
cadmium	<1.20	<1.40	2.6	<1.40	<1.10	<1.10	<1.70	<1.30	<1.10	<1.1	<1.10	<1.20	<1.10	<1.20	11.0	<5.00
calcium	2270	3380	6480	1370	617	610	1780	5230	897	1750	2130	1960	1550	2240	598	256
chromium	17.1	14.6	456	10.4	7.97	9.48	15.4	135	4.40	9.91	24.4	24.4	10.6	38.6	20.2	5.10
cobalt	3.49	3.41	9.22	4.81	4.45	5.14	4.05	4.12	1.64	5.40	4.70	4.36	4.19	3.93	3.41	<5.00
copper	186	25.2	221	12.1	7.17	8.32	18.6	115	42.2	10.7	48.2	574	31.4	34.5	26.1	19.1
iron	13300	11200	76600	12200	11100	11700	17900	9520	3910	14400	14300	12500	13000	12100	14200	176
lead	49.3	67.2	197	5.30	16	14.7	29.3	265	7.97	11.9	43.7	383	80.0	84.1	6.60	<21.0
magnesium	1410	1970	1480	1960	1670	1600	1520	1440	944	1560	1520	1910	1530	1480	1020	<200
manganese	175	118	3850	140	216	243	169	185	41.3	164	357	196	225	255	146	<6.10
mercury	<0.08	0.18	<0.10	<0.10	<0.05	<0.06	<0.12	0.30	<0.06	<0.05	0.34	0.21	0.07	0.22	0.17	<0.20
nickel	11.4	11	12.4	10.1	8.17	6.25	7.54	10.6	2.71	7.07	8.80	29.8	8.17	10.2	11.0	<11.0
potassium	538	913	564	446	534	526	365	569	426	1090	461	436	476	632	414	<290.0
selenium	1.03	<0.33	<0.39	<0.37	<0.26	<0.26	0.81	0.40	<0.29	<0.26	0.38	0.86	0.35	0.48	<0.30	<2.40
silver	<0.50	0.68	2.46	0.57	0.72	0.42	<0.69	1.95	<0.42	<0.04	<0.43	1.60	<0.44	<0.48	<0.50	<2.00
sodium	359	356	418	337	252	251	387	338	161	411	211	249	206	274	254	1260

TABLE 6-6 (continued)

PRFI: SUMMARY OF INORGANIC CONSTITUENTS DETECTED IN SOIL SAMPLES
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

Sample Number	(1,2) MW-1D	(1) MW-2	(1) MW-3	(1) MW-4	(1) MW-5	(1,3) DUP-1	(1,2) MW-6	(1,2) MW-7	(1) MW-8	(1) MW-9	(1) RS-1	(1) RS-2	(1) RS-3	(1) RS-4	(1,2) RS-5	(2,4) FB
Lab I.D. Number	447-008	442-001	442-002	442-003	454-004	454-003	447-007	450-001	447-001	454-002	447-002	447-003	447-004	447-005	450-002	447-006
Depth	4-6 ft	3.5-7.5 ft	4-10 ft	5-9 ft	4-8 ft	4-8 ft	3-5 ft	5-7 ft	5-7 ft	2-6 ft	1 ft	1 ft	1 ft	1 ft	1 ft	--
Date	5/17/88	5/17/88	5/17/88	5/17/88	5/23/88	5/23/88	5/18/88	5/19/88	5/19/88	5/23/88	5/18/88	5/18/88	5/18/88	5/18/88	5/19/88	5/18/88
thallium	<0.67	<0.66	<0.78	<0.75	<0.52	<0.52	<0.92	<0.60	<0.57	<0.53	<0.57	<0.62	<0.60	<0.64	<0.67	<4.80
vanadium	27.4	26.6	25.4	16.8	11.5	12.2	15.9	13.0	4.46	13.0	13.8	18.6	15.1	18.5	15.0	<4.00
zinc	48.9	138	444	34.4	42.5	55.0	159	320	38.7	111	94.2	2320	112	217	24600	63.1
tin	<125	NA	NA	NA	NA	NA	<173	<126	NA	NA	NA	NA	NA	NA	<126	<500
cyanide	<0.63	23.9	5.07	<0.73	<0.56	<0.54	<0.87	0.69	<0.54	<0.55	0.55	0.62	<0.56	1.38	1.37	<10.0
fluoride	122.7	NA	NA	NA	NA	NA	165.7	159	NA	NA	NA	NA	NA	NA	121	1300
sulfide	456.0	NA	NA	NA	NA	NA	<1.0	<1.0	NA	NA	NA	NA	NA	NA	<1.0	<5.0

NOTES

(1) CONCENTRATIONS IN mg/kg (ppm)

(2) MOST SOIL SAMPLES ANALYZED FOR TCL METALS; SELECTED SAMPLES (MW-1D, MW-6, MW-7, RS-5 and FB) WERE ANALYZED FOR APPENDIX IX METALS

(3) DUPLICATE SAMPLE (DUP-1) COLLECTED AT MW-5

(4) FIELD BLANK (FB) PERFORMED ON SPLIT-SPOON SAMPLER FOR MW-6 (VALUES REPORTED IN ug/l).

(5) < = LESS THAN (NUMBER INDICATES DETECTION LIMIT).

NA = NOT ANALYZED

TABLE 6-7

PRFI: SUMMARY OF INORGANIC CONSTITUENTS DETECTED IN GROUND WATER SAMPLES
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

	(1)	(1,2)	(1)	(1)	(1)	(1)	(1,2)	(1,2)	(1)	(1)	(1,3)	(1,2,4)
Sample Number	MW-1S	MW-1D	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	DUP	FB-1
Lab I.D. Number	482-002	488-007	482-004	482-001	482-003	492-001	488-004	488-006	488-002	488-001	488-003	488-005
Date	6/7/88	6/8/88	6/7/88	6/7/88	6/7/88	6/9/88	6/8/88	6/8/88	6/8/88	6/8/88	6/8/88	6/8/88
Analyte												
aluminum	2910	3240	2240	2580	29700	5240	2210	1340	3990	1860	958	<50.0
antimony	<25.0	<25.0	44.6	<25.0	30.5	<25.0	<25.0	<25.0	25.5	<25.0	<25.0	<25.0
arsenic	13.7	6.00	20.9	22.3	17.5	7.30	<3.00	5.10	4.70	<3.00	<3.00	<3.00
barium	165	101	1050	88.2	246	123	107	110	152	88.9	99.8	<41.0
beryllium	0.67	<0.60	0.91	<0.60	0.92	<0.60	2.10	<0.60	<0.60	0.72	<0.60	<0.60
cadmium	<2.00	<2.00	<2.00	<2.0	<2.00	<2.00	<2.00	<2.00	<2.00	<2.0	<2.00	<2.00
calcium	61000	25800	130000	24800	76300	19500	29100	19000	56900	16300	16000	<200
chromium	17.9	11.7	34.5	8.20	46.7	13.8	8.00	11.9	62.4	11.6	7.90	<3.00
cobalt	<5.00	20.2	6.80	<5.00	30.7	<5.00	<5.00	8.30	11.7	<5.00	<5.00	<5.00
copper	<13.0	<13.0	148	<13.0	73.0	<13.0	<13.0	<13.0	28.8	<13.0	<13.0	<13.0
iron	4260	27900	6360	14800	71500	10100	15000	20100	35800	3680	2260	<84.0
lead	9.80	5.60	192	16.2	59.1	16.5	6.50	4.50	24.6	2.60	1.8	<0.70
magnesium	5400	6880	4410	4650	16900	3140	3070	5620	10500	3250	3000	<200
manganese	622	5050	445	1270	4620	1810	963	1160	4100	2170	2110	<6.10
mercury	<0.20	<0.20	1.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
nickel	12.4	21.9	23.8	<11.0	47.3	13.0	<11.0	<11.0	25.2	<11.0	<11.0	<11.0
potassium	13900	4800	21200	3800	10900	2070	3320	2090	10000	5730	5810	<290
selenium	<1.30	<1.20	<1.20	<1.30	<1.20	2.1	<1.20	<1.20	<1.20	<1.20	3.2	<1.20
silver	<2.00	<2.00	23.5	<2.00	<2.00	<2.00	<2.00	5.20	33.0	<2.00	<2.00	<2.00
sodium	217000	28400	77800	23500	92400	15000	16300	13200	25500	34900	35700	<861
thallium	<2.70	<2.40	<2.40	<2.70	<2.40	<2.40	<2.40	<2.40	<2.40	<2.40	<2.40	<2.40

TABLE 6-7 (continued)

PRFI: SUMMARY OF INORGANIC CONSTITUENTS DETECTED IN GROUND WATER SAMPLES
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

	(1)	(1,2)	(1)	(1)	(1)	(1,2)	(1,2)	(1)	(1)	(1,3)	(1,2,4)	
Sample Number	MW-1S	MW-1D	MW-2	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	DUP	FB-1	
Lab I.D. Number	482-002	488-007	482-004	482-003	492-001	488-004	488-006	488-002	488-001	488-003	488-005	
Date	6/7/88	6/8/88	6/7/88	6/7/88	6/9/88	6/8/88	6/8/88	6/8/88	6/8/88	6/8/88	6/8/88	
vanadium	10.1	<4.00	13.3	<4.00	75.7	4.50	4.20	<4.00	<4.00	<4.00	<4.00	<4.00
zinc	25.4	49.0	111	30.1	150	49.9	249	34.4	195	33.0	15.4	<5.00
tin	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500
cyanide	<10.0	<10.0	<10.0	<10.0	<10.0	15.5	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
fluoride	NA	760	NA	NA	NA	NA	480	540	NA	NA	NA	<450
sulfide	NA	<1000	NA	NA	NA	NA	<1000	<1000	NA	NA	NA	<1000

NOTES

(1) CONCENTRATIONS IN ug/l (ppb)

(2) MOST GROUND WATER SAMPLES ANALYZED FOR TCL METALS; SELECTED SAMPLES (MW-1D, MW-6, MW-7 and FB-1) WERE ANALYZED FOR APPENDIX IX METALS

(3) DUPLICATE SAMPLE (DUP) COLLECTED AT MW-9

(4) FIELD BLANK (FB-1) PERFORMED ON BAILER FOR MW-6

(5) < = LESS THAN (NUMBER INDICATES DETECTION LIMIT)

NA = NOT ANALYZED

TABLE 6-8

PRFI: SUMMARY OF ORGANIC COMPOUNDS DETECTED IN SOIL SAMPLES FROM THE PRODUCTION AREA
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

		(1,2,4)	(1,2)	(1,2)	(1,2)	(1,2)	(1,2,5)
Sampling Location:		MW-1D	MW-2	MW-3	MW-4	MW-5	DUP-1
Sampling Depth:		4-6 ft	3.5-7.5 ft	4-10 ft	5-9 ft	4-8 ft	4-8 ft
Sampling Date:		5/18/88	5/17/88	5/17/88	5/17/88	5/23/88	5/23/88
Laboratory I.D. Number:		447-008	442-001	442-002	442-003	454-004	454-003
Volatile Organic Compounds	Chemical[3] Compound Group						
acetone	ketone	2.9	ND	ND	0.064	0.028 B	0.017 B
2-butanone	ketone	0.3 J	ND	ND	ND	ND	ND
chlorobenzene	aromatic halide	33.0	3.5	ND	ND	ND	ND
ethyl benzene	alkyl aromatic	3.6	0.16 J	ND	ND	ND	ND
methylene chloride	aliphatic halide	ND	0.29 J	0.004 J	0.007 J	ND	ND
toluene	alkyl aromatic	ND	1.04	ND	0.063	0.026 B	0.023 B
xylenes (total)	alkyl aromatic	19.0	4.5	ND	ND	ND	ND
2,3-dimethyl-pentane	alkane	--	0.82 T	ND	ND	ND	ND
unknown	alkane	--	12.43 T	ND	ND	0.100 T	0.093 T
unknown		--	2.08 T	ND	0.049 T	ND	ND
VOC - SUBTOTAL:		58.8	9.5	0.004	0.13	0.05	0.04
TIC - SUBTOTAL:		--	15.3	ND	0.05	0.10	0.09
VOC AND TIC TOTAL:		58.8	24.8	0.004	0.18	0.15	0.13

TABLE 6-8 (continued)

PRFI: SUMMARY OF ORGANIC COMPOUNDS DETECTED IN SOIL SAMPLES FROM THE PRODUCTION AREA
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

		(1,2,4)	(1,2)	(1,2)	(1,2)	(1,2)	(1,2,5)
Sampling Location:		MW-1D	MW-2	MW-3	MW-4	MW-5	DUP-1
Sampling Depth:		4-6 ft	3.5-7.5 ft	4-10 ft	5-9 ft	4-8 ft	4-8 ft
Sampling Date:		5/18/88	5/17/88	5/17/88	5/17/88	5/23/88	5/23/88
Laboratory I.D. Number:		447-008	442-001	442-002	442-003	454-004	454-003
Semi-Volatile Organics	Chemical[3] Compound Group						
acenaphthene	PAH	ND	ND	0.05 J	ND	ND	ND
anthracene	PAH	4.8 J	0.06 J	0.14 J	ND	ND	ND
AROCLOR-1248	PCB	ND	3.30	ND	ND	ND	ND
benzo(a)anthracene	PAH	6.4 J	0.32 J	0.33 J	ND	ND	ND
benzo(b)fluoranthene	PAH	2.4 J	0.57	0.50	ND	ND	0.08 J
benzo(g,h,i)perylene	PAH	2.1 J	ND	ND	ND	ND	ND
benzo(a)pyrene	PAH	4.0 J	0.33 J	0.29 J	ND	ND	ND
bis(2-ethylhexyl)phthalate	DAE	ND	0.78 B	1.1 B	0.53 B	0.10 JB	0.16 JB
butyl benzyl phthalate	DAE	ND	ND	ND	ND	ND	0.10 J
chrysene	PAH	6.3 J	0.35 J	0.34 J	ND	ND	ND
1,2-dichlorobenzene	aromatic halide	ND	0.25 J	ND	ND	ND	ND
diethyl phthalate	DAE	ND	ND	0.18 J	0.70	0.03 J	0.07 J
di-n-octyl phthalate	DAE	ND	ND	ND	ND	ND	0.24 J
disulfoton	pesticide	0.17*	--	--	--	--	--
fluoranthene	PAH	19.0 J	0.67	0.69	ND	ND	0.08 J
fluorene	PAH	3.6 J	ND	0.11 J	ND	ND	ND
methoxychlor	pesticide	2.4	ND	ND	ND	ND	ND
2-methylnaphthalene	PAH	1.6 J	ND	ND	ND	ND	ND
2-methyl phenol	alkyl phenolic	ND	ND	ND	0.11 J	ND	ND
4-methyl phenol	alkyl phenolic	ND	0.04 J	ND	0.11 J	ND	ND
naphthalene	PAH	3.7 J	0.21 J	ND	0.06 J	ND	ND
phenanthrene	PAH	19.0 J	0.29 J	0.46	ND	ND	0.05 J

TABLE 6-8 (continued)

PRFI: SUMMARY OF ORGANIC COMPOUNDS DETECTED IN SOIL SAMPLES FROM THE PRODUCTION AREA
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

		(1,2,4)	(1,2)	(1,2)	(1,2)	(1,2)	(1,2,5)
Sampling Location:		MW-1D	MW-2	MW-3	MW-4	MW-5	DUP-1
Sampling Depth:		4-6 ft	3.5-7.5 ft	4-10 ft	5-9 ft	4-8 ft	4-8 ft
Sampling Date:		5/18/88	5/17/88	5/17/88	5/17/88	5/23/88	5/23/88
Laboratory I.D. Number:		447-008	442-001	442-002	442-003	454-004	454-003
pyrene	PAH	10.0 J	0.80	0.70	ND	ND	0.07 J
benzene, 1,1-oxybis-	aryl ether	--	0.30 T	ND	ND	ND	ND
benzene, 1-chloro-4-(trifluoromethyl)-	aromatic halide	--	0.61 T	ND	ND	ND	ND
1-chloromethyl benzene isomer	alkyl aromatic halide	--	ND	ND	0.55 T	ND	ND
dimethyl pyridine isomer	heterocyclic aromatic	--	ND	0.80 T	10.2 T	ND	ND
nonyl phenol isomer	alkyl phenolic	--	2.19 T	ND	ND	ND	ND
phenol, 2-(2h-benzotriazol-2-yl)-4-methyl	amino phenolic	--	3.4 T	ND	ND	ND	ND
pyridine, 2-ethyl-6-methyl	heterocyclic aromatic	--	ND	ND	0.53 T	ND	ND
4-tetramethylbutyl phenol isomer	alkyl phenolic	--	29.0 T	ND	ND	ND	ND
unknown phthalate ester	DAE	--	ND	2.50 T	ND	ND	1.66 T
unknown	alkane	--	1.49 T	ND	ND	ND	0.29 T
unknown	--	--	6.74 T	0.96 T	ND	ND	ND
SVO - SUBTOTAL:		85.5	8.0	4.9	1.5	0.1	0.8
TIC - SUBTOTAL:		--	43.7	4.3	11.3	ND	2.0
SVO AND TIC TOTAL:		85.5	51.7	9.1	12.8	0.1	2.8

TABLE 6-8 (continued)

PRFI: SUMMARY OF ORGANIC COMPOUNDS DETECTED IN SOIL SAMPLES FROM THE PRODUCTION AREA
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

NOTES:

(1) COMPOUND CONCENTRATIONS REPORTED IN mg/kg (ppm)
(2) -- = NO DATA OR NOT ANALYZED
* = AVERAGE CONCENTRATION OF TWO LABORATORY DUPLICATE SAMPLES
ND = NOT DETECTED OR BELOW METHOD DETECTION LIMIT
J = CONCENTRATION IS AN ESTIMATED VALUE LESS THAN THE METHOD DETECTION LIMIT
B = CONTAMINANT PRESENT IN LABORATORY METHOD BLANK
T = TENTATIVELY IDENTIFIED COMPOUNT (TIC)
(3) DAE = DICARBOXYLIC ACID ESTER
PAH = POLYNUCLEAR AROMATIC HYDROCARBONS
PCB = POLYCHLORINATED BIPHENYL
(4) APPENDIX IX ANALYSIS
(5) DUPLICATE OF SAMPLE MW-5

TABLE 6-9
PRFI: SUMMARY OF ORGANIC COMPOUNDS DETECTED IN GROUND WATER SAMPLES FROM THE PRODUCTION AREA
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

		(1,2)	(1,2,4)	(1,2)	(1,2)	(1,2)	(1,2)	(1,2,5)
Sampling Location:		MW-1S	MW-1D	MW-2	MW-3	MW-4	MW-5	FH1
Sampling Date:		6/7/88	6/8/88	6/7/88	6/7/88	6/7/88	6/9/88	5/18/88
Laboratory I.D. Number:		482-002	488-007	482-004	482-001	482-003	492-001	447-010
Volatile Organic Compounds	**Chemical[3] Compound Group**							
benzene	aromatic	64 J	ND	ND	ND	ND	ND	ND
chlorobenzene	aromatic halide	33000	ND	21000	ND	300	ND	ND
chloroform	alkyl halide	ND	ND	ND	ND	ND	ND	11
1,2-dichloroethenes (total)	aliphatic halide	ND	ND	35000	ND	ND	ND	ND
ethyl benzene	alkyl aromatic	2600	ND	ND	ND	180 J	ND	ND
methylene chloride	aliphatic halide	ND	3 JB	ND	ND	ND	ND	ND
toluene	alkyl aromatic	130 J	2 J	4300	ND	39000	ND	ND
xylenes (total)	alkyl aromatic	7200	ND	ND	ND	ND	ND	ND
---								
chloromethyl benzene isomer	alkyl aromatic halide	ND	--	ND	ND	2400 T	ND	ND
unknown		ND	--	ND	7 T	ND	ND	ND
VOC - SUBTOTAL:		42994	5	60300	ND	39480	ND	11
TIC - SUBTOTAL:		ND	--	ND	7	2400	ND	ND
VOC AND TIC TOTAL:		42994	5	60300	7	41880	ND	11

TABLE 6-9 (continued)

PRFI: SUMMARY OF ORGANIC COMPOUNDS DETECTED IN GROUND WATER SAMPLES FROM THE PRODUCTION AREA
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

		(1,2)	(1,2,4)	(1,2)	(1,2)	(1,2)	(1,2)	(1,2,5)
Sampling Location:		MW-1S	MW-1D	MW-2	MW-3	MW-4	MW-5	FH1
Sampling Date:		6/7/88	6/8/88	6/7/88	6/7/88	6/7/88	6/9/88	5/18/88
Laboratory I.D. Number:		482-002	488-007	482-004	482-001	482-003	492-001	447-010
Semi-Volatile Organics								
acenaphthene	PAH	ND	ND	ND	ND	12 J	ND	--
anthracene	PAH	ND	ND	ND	2 J	ND	ND	--
benzoic acid	carboxylic acid	ND	ND	ND	ND	38 J	ND	--
benzyl alcohol	aryl alcohol	ND	ND	ND	ND	22 J	ND	--
bis(2-chloroethyl)ether	aliphatic ether halide	ND	ND	ND	ND	3 J	ND	--
bis(2-ethylhexyl) phthalate	DAE	110 B	2 JB	ND	240 B	ND	170 B	--
4-chloroaniline	aromatic amine	10 J	ND	ND	ND	ND	ND	--
chlordane	pesticide	ND	ND	ND	ND	ND	5.54	--
2-chlorophenol	phenolic halide	84	ND	98	ND	13 J	ND	--
1,2-dichlorobenzene	aromatic halide	3 J	ND	280	ND	51	ND	--
1,3-dichlorobenzene	aromatic halide	1 J	ND	ND	ND	ND	ND	--
1,4-dichlorobenzene	aromatic halide	ND	ND	6 J	ND	ND	ND	--
2,4-dichlorophenol	phenolic halide	ND	ND	ND	ND	69	ND	--
diethyl phthalate	DAE	ND	ND	2 J	ND	1 J	ND	--
2,4-dimethylphenol	alkyl phenolic	53	ND	ND	ND	13 J	ND	--
di-n-butyl phthalate	DAE	ND	1 J	16 J	ND	ND	ND	--
di-n-octyl phthalate	DAE	5 J	ND	ND	7 J	ND	ND	--
fluoranthene	PAH	ND	ND	ND	7 J	ND	ND	--
2-methylnaphthalene	PAH	ND	ND	9 J	ND	ND	ND	--
2-methylphenol	alkyl phenolic	ND	ND	34	ND	380	ND	--
4-methylphenol	alkyl phenolic	23	ND	210	ND	100	ND	--
naphthalene	PAH	ND	ND	200	ND	11 J	ND	--
pentachlorophenol	phenolic halide	ND	ND	32 J	ND	ND	ND	--
phenanthrene	PAH	ND	ND	2 J	ND	ND	ND	--

TABLE 6-9 (continued)

PRFI: SUMMARY OF ORGANIC COMPOUNDS DETECTED IN GROUND WATER SAMPLES FROM THE PRODUCTION AREA
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

		(1,2)	(1,2,4)	(1,2)	(1,2)	(1,2)	(1,2)	(1,2,5)
Sampling Location:		MW-1S	MW-1D	MW-2	MW-3	MW-4	MW-5	FH1
Sampling Date:		6/7/88	6/8/88	6/7/88	6/7/88	6/7/88	6/9/88	5/18/88
Laboratory I.D. Number:		482-002	488-007	482-004	482-001	482-003	492-001	447-010
phenol	phenolic	12 J	ND	41	ND	13 J	ND	--
pyrene	PAH	ND	ND	ND	5 J	ND	ND	--
benzene methanol, 2-chloro	alkyl aromatic halide	ND	--	ND	ND	24 T	ND	--
benzene,1,1'-oxybis	aryl ether	ND	--	41 T	ND	93 T	ND	--
benzenepropanoic acid	aryl carboxylic acid	ND	--	200 T	ND	ND	ND	--
benzoic acid, 2-methyl	carboxylic acid	ND	--	ND	ND	16 T	ND	--
1h-benzotriazole	cyclic amine	15 T	--	ND	ND	ND	ND	--
butane,1,1'-oxybis	alkyl ether	200 T	--	ND	ND	ND	ND	--
chlorobenzoic acid isomer	carboxylic acid halide	ND	--	ND	ND	90 T	ND	--
chloromethyl benzene isomer	alkyl aromatic halide	ND	--	ND	ND	910 T	ND	--
chlorotrifluoromethyl benzenamine isomer	aromatic amino halide	69 T	--	ND	ND	ND	ND	--
2,5-cyclohexadiene-1,4-dione	ketone diene	ND	--	33 T	ND	ND	ND	--
2,6-bis(1,1-dimethylethyl) decanoic acid	carboxylic acid	ND	--	57 T	ND	ND	ND	--
2,3-dihydro methyl 1h-indene isomer	PAH	ND	--	370 T	ND	ND	ND	--
dimethyl benzene isomer	alkyl aromatic	2080 T	--	220 T	ND	1670 T	ND	--
dimethyl phenol isomer	alkyl phenolic	ND	--	ND	ND	140 T	ND	--
dimethyl pyridine isomer	heterocyclic aromatic	148 T	--	ND	ND	182 T	ND	--
ethanone,2,2-dimethoxy-1,2-diphenyl	aryl ketone	170 T	--	ND	ND	ND	ND	--
ethyl benzene	alkyl aromatic	790 T	--	ND	ND	120 T	ND	--
ethylmethyl benzene isomer	alkyl aromatic	ND	--	67 T	ND	ND	ND	--
furan,2-butyltetrahydro	cyclic ether	66 T	--	ND	ND	14 T	ND	--
1(3H)-isobenzofuranone	cyclic ether	16 T	--	ND	ND	ND	ND	--

TABLE 6-9 (continued)

PRFI: SUMMARY OF ORGANIC COMPOUNDS DETECTED IN GROUND WATER SAMPLES FROM THE PRODUCTION AREA
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

Sampling Location:		(1,2) MW-1S	(1,2,4) MW-1D	(1,2) MW-2	(1,2) MW-3	(1,2) MW-4	(1,2) MW-5	(1,2,5) FH1
Sampling Date:		6/7/88	6/8/88	6/7/88	6/7/88	6/7/88	6/9/88	5/18/88
Laboratory I.D. Number:		482-002	488-007	482-004	482-001	482-003	492-001	447-010
2,4-pentanediol,2-methyl	alkyl diol	ND	--	160 T	ND	ND	ND	--
phenol,3-(1,1-dimethylethyl)	alkyl phenolic	85 T	--	52 T	ND	ND	ND	--
4-tetramethylbutyl phenol isomer	alkyl phenolic	ND	--	78 T	ND	ND	ND	--
unknown aromatic	aromatic	23 T	--	ND	ND	ND	ND	--
unknown acid	carboxylic acid	ND	--	520 T	ND	ND	ND	--
unknown hydrocarbon		ND	--	80 T	ND	ND	ND	--
unknown		849 T	--	523 T	ND	139 T	17 T	--
SVO - SUBTOTAL:		301	3	930	261	726	176	--
TIC - SUBTOTAL:		4511	--	2401	ND	3398	17	--
SVO AND TIC TOTAL:		4812	3	3331	261	4124	193	--

NOTES:
(1) COMPOUND CONCENTRATIONS REPORTED IN ug/l (ppb)
(2) -- = NO DATA OR NOT ANALYZED
ND = NOT DETECTED OR BELOW METHOD OF DETECTION LIMIT
J = CONCENTRATION IS AN ESTIMATED VALUE LESS THAN THE METHOD DETECTION LIMIT
B = CONTAMINANT PRESENT IN LABORATORY METHOD BLANK
T = TENTATIVELY IDENTIFIED COMPOUNT (TIC)
(3) DAE = DICARBOXYLIC ACID ESTER
PAH = POLYNUCLEAR AROMATIC HYDROCARBONS
(4) APPENDIX IX ANALYSIS
(5) FIRE HYDRANT WATER SAMPLE

TABLE 6-10
PRFI: SUMMARY OF ORGANIC COMPOUNDS DETECTED IN SOIL SAMPLES
FROM THE WASTE WATER TREATMENT AREA
CIBA-GEIGY FACILITY, CRANSTON, RHODE ISLAND

		(1,2,4)	(1,2)	(1,2)
Sampling Location:		MW-7	MW-8	MW-9
Sampling Depth:		5-7 ft	5-7 ft	2-6 ft
Sampling Date:		5/19/88	5/18/88	5/23/88
Laboratory I.D. Number:		450-001	447-001	454-002
Volatile Organic Compounds	**Chemical[3] Compound Group**	F	I	L
acetone	ketone	0.015	ND	0.033 B
2-butanone	ketone	0.003 JB	ND	ND
1,2-dichloroethane	aliphatic halide	0.002 J	ND	ND
1,1,2,2-tetrachloroethane	aliphatic halide	0.013	ND	ND
toluene	alkyl aromatic	0.003 J	ND	0.023 B
1,1,1-trichloroethane	aliphatic halide	ND	0.009	ND
trichloroethylene	aliphatic halide	0.012	ND	ND
unknown alkane	alkane	--	ND	0.116 T
VOC - SUBTOTAL		0.05	0.01	0.06
TIC - SUBTOTAL		--	ND	0.12
VOC + TIC - TOTAL		0.05	0.01	0.17
Semi-Volatile Compounds				
alpha-chlordane	pesticide	0.26	--	--
gamma-chlordane	pesticide	0.18	--	--
bis(2-ethyl hexyl)phthalate	DAE	ND	0.13 JB	0.87 B
butyl benzyl phthalate	DAE	ND	0.41	ND
dieldrin	pesticide	0.017	ND	ND
diethyl phthlate	DAE	ND	ND	1.3
dimethyl phthalate	DAE	ND	0.26 J	ND
4,4'-DDE	pesticide	0.085	ND	ND
4,4'-DDD	pesticide	0.13	ND	ND
fluoranthene	PAH	0.83 J	0.031 J	ND
OCDD	dioxin	0.00022	--	--
phenanthrene	PAH	ND	0.017 J	ND
pyrene	PAH	0.67 J	ND	ND
bicyclo(4.2.0) octa-1,3,5-triene	triene	--	0.37 T	ND

TABLE 6-10
PRFI: SUMMARY OF ORGANIC COMPOUNDS DETECTED IN SOIL SAMPLES
FROM THE WASTE WATER TREATMENT AREA
CIBA-GEIGY FACILITY, CRANSTON, RHODE ISLAND

	(1,2,4)	(1,2)	(1,2)
Sampling Location:	MW-7	MW-8	MW-9
Sampling Depth:	5-7 ft	5-7 ft	2-6 ft
Sampling Date:	5/19/88	5/18/88	5/23/88
Laboratory I.D. Number:	450-001	447-001	454-002
unknown	--	0.46 T	3.9 T
SVO - SUBTOTAL	2.17	0.85	2.17
TIC - SUBTOTAL	--	0.83	3.90
SVO + TIC - TOTAL	2.17	2.51	9.97

NOTES

(1) COMPOUND CONCENTRATIONS REPORTED IN mg/kg (ppm)
(2) -- = NO DATA OR NOT ANALYZED
ND = NOT DETECTED OR BELOW METHOD DETECTION LIMIT
J = CONCENTRATION IS AN ESTIMATED VALUE LESS THAN THE METHOD DETECTION LIMIT
B = CONTAMINANT PRESENT IN LABORATORY METHOD BLANK
T = TENTATIVELY IDENTIFIED COMPOUND (TIC)
(3) DAE = DICARBOXYLIC ACID ESTER
PAH = POLYNUCLEAR AROMATIC HYDROCARBONS
(4) APPENDIX IX ANALYSIS

TABLE 6-11

PRFI: SUMMARY OF ORGANIC COMPOUNDS DETECTED IN GROUND WATER SAMPLES
FROM THE WASTE WATER TREATMENT AREA
CIBA-GEIGY FACILITY, CRANSTON, RHODE ISLAND

		(1,2,4)	(1,2)	(1,2)	(1,2,5)
Sampling Location:		MW-7	MW-8	MW-9	DUP
Sampling Date:		6/8/88	6/8/88	6/8/88	6/8/88
Laboratory I.D. Number:		488-006	488-002	488-001	488-003
	Chemical (3)				
Volatile Organic Compounds	Compound Group				
acetone	ketone	ND	ND	12 B	8 JB
1,2-dichloropropane	aliphatic halide	ND	83 JB	ND	ND
methylene chloride	aliphatic halide	ND	10000	4 JB	50 B
toluene	alkyl aromatic	ND	ND	ND	3 J
1,1,1-trichloroethane	aliphatic halide	ND	470	ND	4 J
xylenes (total)	alkyl aromatic	ND	ND	ND	6
VOC - SUBTOTAL		ND	10553	16	71
TIC - SUBTOTAL		ND	ND	ND	ND
VOC + TIC - TOTAL		ND	10553	16	71
Semi-Volatile Organics					
acenaphthene	PAH	ND	2 J	ND	ND
anthracene	PAH	ND	1 J	ND	ND
bis(2-ethyl hexyl)phthalate	DAE	4 JB	43	3 J	2 J
fluoranthene	PAH	ND	5 J	ND	ND
fluorene	PAH	ND	1 J	ND	ND
phenanthrene	PAH	ND	5 J	ND	ND
pyrene	PAH	ND	4 J	ND	ND
9-octadecen-1-ol(z)	alcohol	--	55 T	140 T	140 T
unknown	carboxylic acid	--	9 T	ND	ND
unknown	alkane	--	19 T	ND	ND
unknown	aromatic	--	52 T	50 T	20 T
unknown	aromatic	--	49 T	35 T	21 T
SVO - SUBTOTAL		4	61	3	2
TIC - SUBTOTAL		--	184	225	181
SVO + TIC - TOTAL		4	245	228	183

NOTES

(1) COMPOUND CONCENTRATIONS REPORTED IN ug/L (ppb)

(2) -- = NO DATA OR NOT ANALYZED
ND = NOT DETECTED OR BELOW METHOD DETECTION LIMIT
J = CONCENTRATION IS AN ESTIMATED VALUE LESS THAN THE METHOD DETECTION LIMIT
B = CONTAMINANT PRESENT IN LABORATORY METHOD BLANK
T = TENTATIVELY IDENTIFIED COMPOUNG (TIC)

(3) DAE = DICARBOXYLIC ACID ESTER
PAH = POLYNUCLEAR AROMATIC HYDROCARBONS

(4) APPENDIX IX ANALYSIS

(5) DUPLICATE OF SAMPLE MW-9

TABLE 6-12

PRFI: SUMMARY OF ORGANIC COMPOUNDS DETECTED IN SOIL SAMPLES FROM THE WARWICK AREA
CIBA-GEIGY FACILITY, CRANSTON, RHODE ISLAND

		(1,2,4)	(1,2)	(1,2)	(1,2)	(1,2)	(1,2,4)
Sampling Location:		MW-6	RS-1	RS-2	RS-3	RS-4	RS-5
Sampling Depth:		3-5 ft	1 ft	1 ft	1 ft	1 ft	1 ft
Sampling Date:		5/18/88	5/18/88	5/18/88	5/18/88	5/18/88	5/19/88
Laboratory I.D. Number:		447-007	447-002	447-003	447-004	447-005	450-002
Volatile Organic Compounds	Chemical[3] Compound Group						
acetone	ketone	ND	ND	0.009	ND	ND	ND
2-butanone	ketone	0.003 JB	ND	ND	ND	ND	0.002 JB
chlorobenzene	aromatic halide	ND	ND	ND	ND	ND	0.0006 J
ethyl benzene	alkyl aromatic	ND	ND	0.001 J	ND	ND	ND
methylene chloride	aliphatic halide	ND	ND	0.005 J	0.005 J	0.004 J	ND
tetrachloroethylene	aliphatic halide	ND	0.002 J	0.013	ND	ND	ND
toluene	alkyl aromatic	ND	0.001 J	0.007	ND	ND	0.005 JB
1,1,1-trichloroethane	aliphatic halide	ND	0.004 J	0.002 JB	ND	ND	ND
trichloroethylene	aliphatic halide	ND	ND	ND	ND	ND	0.005 J
benzene, 1-chloro-4-trifluoromethyl	alkyl aromatic halide	--	ND	0.019 T	ND	ND	ND
unknown		--	ND	0.006 T	ND	ND	ND
VOC - SUBTOTAL		0.003	0.007	0.037	0.005	0.004	0.013
TIC - SUBTOTAL		--	ND	0.025	ND	ND	ND
VOC + TIC - TOTAL		0.003	0.007	0.062	0.005	0.004	0.013

TABLE 6-12 (continued)

PRFI: SUMMARY OF ORGANIC COMPOUNDS DETECTED IN SOIL SAMPLES FROM THE WARWICK AREA
CIBA-GEIGY FACILITY, CRANSTON, RHODE ISLAND

		(1,2,4)	(1,2)	(1,2)	(1,2)	(1,2)	(1,2,4)
Sampling Location:		MW-6	RS-1	RS-2	RS-3	RS-4	RS-5
Sampling Depth:		3-5 ft	1 ft	1 ft	1 ft	1 ft	1 ft
Sampling Date:		5/18/88	5/18/88	5/18/88	5/18/88	5/18/88	5/19/88
Laboratory I.D. Number:		447-007	447-002	447-003	447-004	447-005	450-002
Semi-Volatile Organics							
AROCLOR-1254	PCB	ND	ND	ND	ND	0.98	2.5
acenaphthene	PAH	ND	0.02 J	0.57	0.15 J	ND	ND
acenaphthylene	PAH	ND	0.009 J	0.074 J	0.046 J	0.018 J	ND
anthracene	PAH	ND	0.059 J	0.77	0.5	0.11 J	ND
benzo(a)anthracene	PAH	ND	0.36 J	3.5	1.5	0.59	ND
benzo(b)fluoranthene	PAH	ND	0.4	3.3	1.2	0.44	ND
benzo(k)fluoranthene	PAH	ND	ND	ND	1.2	ND	ND
benzo(g,h,i)perylene	PAH	ND	0.2 J	1.6	0.5	0.27 J	ND
benzo(a)pyrene	PAH	ND	0.37 J	3.2	1.2	0.61	ND
bis(2-chloroethyl)ether	alkoxy ether	ND	ND	0.084 J	ND	ND	ND
bis(2-ethyl hexyl)phthalate	DAE	ND	0.11 JB	0.41 JB	0.12 JB	0.24 JB	0.69 J
butyl benzyl phthalate	DAE	ND	ND	ND	0.2 J	ND	ND
chlordane	pesticide	ND	ND	ND	0.29	0.59	ND
chrysene	PAH	ND	0.41	3.7	1.4	0.65	ND
4-chloroaniline	aryl amine halide	ND	ND	0.26 J	ND	0.17 J	ND
2-chlorophenol	phenolic halide	ND	ND	ND	ND	ND	3.7 J
dibenzofuran	ACE	ND	ND	0.15 J	0.1 J	0.014 J	ND
diethyl phthalate	DAE	ND	ND	0.036 J	ND	ND	ND
di-n-butyl phthalate	DAE	ND	ND	ND	ND	0.098 J	ND
disulfoton	pesticide	ND	--	--	--	--	0.06
fluoranthene	PAH	0.1 J	0.71	6.5	3.1	1	ND
fluorene	PAH	ND	0.02 J	0.4 J	0.21 J	ND	ND
indeno(1,2,3,c,d)pyrene	PAH	ND	0.19 J	1.5	0.52	0.24 J	ND

TABLE 6-12 (continued)

PRFI: SUMMARY OF ORGANIC COMPOUNDS DETECTED IN SOIL SAMPLES FROM THE WARWICK AREA
CIBA-GEIGY FACILITY, CRANSTON, RHODE ISLAND

		(1,2,4)	(1,2)	(1,2)	(1,2)	(1,2)	(1,2,4)
Sampling Location:		MW-6	RS-1	RS-2	RS-3	RS-4	RS-5
Sampling Depth:		3-5 ft	1 ft	1 ft	1 ft	1 ft	1 ft
Sampling Date:		5/18/88	5/18/88	5/18/88	5/18/88	5/18/88	5/19/88
Laboratory I.D. Number:		447-007	447-002	447-003	447-004	447-005	450-002
isophorone	cyclic ketone	0.099 J	ND	ND	ND	ND	ND
2-methylnaphthalene	PAH	ND	ND	0.049 J	0.029 J	ND	ND
naphthalene	PAH	ND	ND	0.078 J	0.051 J	0.028 J	ND
OCDD	dioxin	ND	--	--	--	--	0.00024
phenanthrene	PAH	0.062 J	0.31 J	3.8	2.2	0.57	ND
pyrene	PAH	0.062 J	0.69	6.5	2.9	1.5	2 J

11H-benzo(a)fluorene	PAH	--	0.17 T	ND	ND	ND	--
11H-benzo(b)fluorene	PAH	--	ND	ND	ND	ND	--
benzenamine, 2-chloro-5-(trifluoromethyl)	aromatic amino halide	--	ND	4.5 T	ND	ND	--
benzenamine, 4-chloro-3-(trifluoromethyl)	aromatic amino halide	--	ND	1.4 T	ND	ND	--
benzene, 1-chloro-4-(trifluoromethyl)	alkyl aromatic halide	--	ND	0.4 T	ND	ND	--
2,5-cyclohexadiene-1,4-dione, 2,6-bis(1,1-dimethylethyl)	cyclic diene	--	ND	ND	ND	1.1 T	--
methyl pyrene isomer	PAH	--	ND	ND	0.37 T	ND	--
phenol, 2,4-bis-(1,1-dimethylethyl)	alkoxy aromatic	--	ND	0.7 T	ND	ND	--
phenol, dimethyl-phosphate (3:1)	alkyl phenolic	--	ND	ND	ND	1.6 T	--
trimethyl benzene isomer	alkyl aromatic	--	ND	0.52 T	ND	ND	--
unknown PAH	PAH	--	0.16 T	ND	1.91 T	ND	--
unknown phthalate ester	DAE	--	2.1 T	ND	ND	ND	--
unknown phenol		--	ND	ND	ND	0.65 T	--
unknown	alkane	--	0.42 T	1.87 T	1.55 T	0.81 T	--
unknown		--	1.16 T	4.1 T	1.09 T	4.07 T	--

TABLE 6-12 (continued)

PRFI: SUMMARY OF ORGANIC COMPOUNDS DETECTED IN SOIL SAMPLES FROM THE WARWICK AREA
CIBA-GEIGY FACILITY, CRANSTON, RHODE ISLAND

	(1,2,4)	(1,2)	(1,2)	(1,2)	(1,2)	(1,2,4)
Sampling Location:	MW-6	RS-1	RS-2	RS-3	RS-4	RS-5
Sampling Depth:	3-5 ft	1 ft	1 ft	1 ft	1 ft	1 ft
Sampling Date:	5/18/88	5/18/88	5/18/88	5/18/88	5/18/88	5/19/88
Laboratory I.D. Number:	447-007	447-002	447-003	447-004	447-005	450-002
SVO - SUBTOTAL	0.32	3.86	36.48	17.42	8.12	8.95
TIC - SUBTOTAL	--	4.01	13.49	4.92	8.23	--
SVO + TIC - TOTAL	0.32	7.87	49.97	22.34	16.35	8.95

NOTES

(1) COMPOUND CONCENTRATIONS REPORTED IN mg/kg (ppm)
(2) -- = NO DATA OR NOT ANALYZED
ND = NOT DETECTED OR BELOW METHOD DETECTION LIMIT
J = CONCENTRATION IS AN ESTIAMTED VALUE LESS THAN THE METHOD DETECTION LIMIT
B = CONTAMINANT PRESENT IN LABORATORY METHOD BLANK
T = TENTATIVELY IDENTIFIED COMPOUND (TIC)
(3) DAE = DICARBOXYLIC ACID ESTER
ACE = AROMATIC CYCLIC ETHER
PAH = POLYNUCLEAR AROMATIC HYDROCARBON
PCB = POLYCHLORINATED BIPHENYL
(4) APPENDIX IX ANALYSIS

TABLE 6-13

PRFI: SUMMARY OF ORGANIC COMPOUNDS DETECTED IN GROUND WATER SAMPLES
FROM THE WARWICK AREA
CIBA-GEIGY FACILITY, CRANSTON, RHODE ISLAND

		(1,2,3)
Sampling Location:		MW-6
Sampling Date:		6/8/88
Laboratory I.D. Number:		488-004
Volatile Organic Compounds	Chemical[3] Compound Group	
methylene chloride	aliphatic halide	5 B
toluene	alkyl aromatic	4 J
VOC - TOTAL		5
Semi-Volatile Organcis		
bis(2-ethylhexyl)phthalate	DAE	2 JB
methoxychlor	pesticide	1.4
SVO - TOTAL		3.4

NOTES

(1) COMPOUND CONCENTRATIONS REPORTED IN ug/L (ppb)

(2) ND = NOT DETECTED OR BELOW METHOD DETECTION LIMIT

J = CONCENTRATION IS AN ESTIMATED VALUE LESS THAN THE METHOD DETECTION LIMIT

B = CONTAMINANT PRESENT IN LABORATORY METHOD BLANK

(3) APPENDIX IX ANALYSIS

TABLE 6-14
RFA: SUMMARY OF CONSTITUENTS DETECTED IN OFF-SITE
SOIL SAMPLES COLLECTED ON 23 JULY 1986
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

	Sample Number						
	1	2	3	4	5	6	7
Metals (ppm)							
Zinc	25.1	105.2	19.9	33.3	32.6	40.2	65.5
Volatile Organic Compounds (ppm)							
Chloroform	8	0.5	2	6	6	40	6
Bromodichloromethane	ND	ND	ND	ND	ND	1	ND
1,1,1-trichloroethane	ND	ND	ND	ND	ND	0.8	ND
Carbon Tetrachloride	ND	ND	ND	ND	ND	0.5	ND
Dichloromethane	20	2	1	10	8	70	10
1,2-dichloroethene	ND	ND	ND	ND	ND	0.8	ND
Benzene	ND	ND	ND	ND	ND	0.7	ND
Toluene	0.6	ND	ND	0.6	0.7	2	0.9
Ethylbenzene	ND	ND	ND	ND	ND	0.5	ND
Xylene	ND	ND	ND	0.9	1	3	2
Polynuclear Aromatic Hydrocarbons (ppm)							
Naphthalene	ND	ND	0.018	0.091	ND	ND	0.034
Acenaphthylene	ND	0.092	0.057	0.68	0.043	0.023	0.25
Acenaphthene	ND	0.18	0.051	ND	ND	ND	ND
Fluorene	ND	0.33	0.11	0.69	ND	ND	0.033
Phenanthrene	0.066	4.5	2.0	5.8	0.24	0.25	0.35
Anthracene	ND	0.55	0.13	4.9	ND	ND	0.056
Fluoranthene	0.19	6.7	2.3	14.0	0.49	0.46	0.69
Pyrene	0.14	4.7	1.4	12.0	0.37	0.36	0.55
Benzo(a)anthracene	0.074	1.8	0.52	3.1	0.22	0.18	0.4
Chrysene	0.053	2.3	3.7	6.3	0.14	0.12	0.33
Benzo(b)fluoranthene	ND	1.8	0.56	4.2	0.18	ND	0.58
Benzo(k)fluoranthene	ND	3.2	0.47	2.7	0.18	0.25	0.35
Benzo(a)pyrene	ND	3.6	0.55	4.0	0.23	ND	0.68
Ideno(1,2,3)pyrene	ND	ND	0.6	1.5	ND	ND	ND
Benzo(g,h,i)perylene	ND	ND	0.44	1.3	ND	ND	ND

TABLE 6-14 (continued)
RFA: SUMMARY OF CONSTITUENTS DETECTED IN OFF-SITE
SOIL SAMPLES COLLECTED ON 23 JULY 1986
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

	Sample Number						
	1	2	3	4	5	6	7
Others (ppm)							
Dacthal	0.91	ND	ND	ND	ND	ND	ND
p-cresol	ND	ND	ND	ND	ND	ND	ND
phenyl ether	ND	ND	ND	ND	ND	ND	ND
biphenyl	ND	ND	0.048	0.95	ND	0.034	ND
Tinuvin 327	ND	11.0	ND	ND	ND	2.1	0.11
Tinuvin 328	0.11	1.5	ND	ND	ND	0.42	0.036
Prometon	ND	ND	ND	ND	ND	ND	ND

Notes:
ND = Not Detected
ppm = Parts Per Million
Analyses performed by Rhode Island Department of Health, Division of Laboratories.
Table based on data reported by Versar (1988).

TABLE 6-15
RFA: SUMMARY OF CONSTITUENTS DETECTED IN OFF-SITE
SOIL SAMPLES COLLECTED ON 12 NOVEMBER 1986
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

	Sample Number						
	2A	A	B	C	D	RT	OT
Metals (ppm)							
Zinc	34.1	NA	151.0	232.0	88.7	NA	NA
Volatile Organics (ppm)	ND	NA	ND	ND	ND	NA	NA
Polynuclear Aromatic Hydrocarbons (ppm)							
Naphthalene	ND	ND	ND	ND	ND	ND	ND
Acenaphthylene	ND	ND	0.18	ND	ND	ND	ND
Acenaphthene	ND	ND	ND	ND	ND	ND	ND
Fluorene	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	3.4	ND	2.3	0.52	ND	ND	ND
Anthracene	0.4	ND	0.3	ND	ND	ND	ND
Fluoranthene	5.8	0.013	4.1	0.82	ND	ND	ND
Pyrene	5.8	0.01	3.5	0.82	ND	ND	ND
Benzo(a)anthracene	6.8	ND	2.4	0.72	ND	ND	ND
Chrysene	4.7	ND	2.0	0.48	ND	ND	ND
Benzo(b)fluoranthene	ND	ND	3.2	ND	ND	ND	ND
Benzo(k)fluoranthene	1.5	ND	1.3	ND	ND	ND	ND
Benzo(a)pyrene	14.0	ND	5.3	1.3	ND	ND	ND
Ideno(1,2,3)pyrene	6.6	ND	2.4	ND	ND	ND	ND
Dibenzo(a,h)anthracene	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	5.7	ND	2.5	ND	ND	ND	ND

TABLE 6-15 (continued)
RFA: SUMMARY OF CONSTITUENTS DETECTED IN OFF-SITE
SOIL SAMPLES COLLECTED ON 12 NOVEMBER 1986
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

	Sample Number						
	2A	A	B	C	D	RT	OT
Others (ppm)							
Dacthal	ND	6800	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate	1.0	ND	7.3	0.88	39.0	1.9	ND
Hexanedioic Acid Dioctyl Ester		ND	ND	**	ND	**	NDND
p-cresol	ND	ND	ND	ND	ND	ND	ND
phenyl ether	ND	ND	ND	ND	ND	ND	ND
biphenyl	ND	0.039	ND	ND	ND	ND	ND
Tinuvin 327	ND	ND	ND	ND	ND	ND	ND
Tinuvin 328	ND	ND	ND	ND	ND	ND	ND
Prometon	ND	ND	ND	ND	ND	ND	ND

Notes
ND = Not Detected.
MDL = Minimum Detection Limit.
ppm = Parts Per Million.
Analyses performed by Rhode Island Department of Health, Division of Laboratories.
** = Appears to be present but its presence cannot be confirmed or quantified.
NA = Not Analyzed.
Table based on data reported by Versar (1988).

TABLE 6-16
RFA: SUMMARY OF CONSTITUENTS DETECTED IN OFF-SITE SOIL SAMPLES COLLECTED ON 15 APRIL 1987
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

	MDL	8	9	10	11	12	13	14	15	16	17
Volatile Organics (ppm)											
1,1,2,2-tetrachloroethane	0.5	0.7	ND	ND	ND	ND	ND	ND	ND	ND	ND
Polynuclear Aromatic Hydrocarbons (ppm)											
Naphthalene	0.1	ND	ND	ND	ND	0.19	ND	ND	ND	ND	ND
Acenaphthylene	0.1	ND	0.2	ND	ND	0.38	0.26	ND	ND	ND	ND
Acenaphthene	0.1	ND	ND	ND	ND	0.3	ND	ND	ND	ND	ND
Fluorene	0.1	ND	0.14	ND	0.1	0.62	ND	ND	ND	ND	ND
Phenanthrene	0.1	ND	1.5	0.36	0.84	6.6	0.78	0.36	0.1	ND	ND
Anthracene	0.1	ND	0.14	ND	ND	0.7	0.14	ND	ND	ND	ND
Fluoranthene	0.1	0.12	3.5	0.44	1.2	8.6	3.1	0.54	0.28	0.14	ND
Pyrene	0.1	0.14	2.7	0.38	1.1	8.9	2.0	0.36	0.24	0.14	ND
Benzo(a)anthracene	0.1	ND	1.6	0.26	0.4	4.2	1.7	0.26	0.16	ND	ND
Chrysene	0.1	ND	0.72	0.14	0.34	3.5	1.1	ND	ND	ND	ND
Benzo(b)fluoranthene	0.1	ND	2.7	ND	0.6	3.0	1.9	0.32	ND	ND	ND
Benzo(k)fluoranthene	0.1	ND	2.1	ND	0.58	4.0	2.1	ND	ND	ND	ND
Benzo(a)pyrene	0.1	ND	0.64	ND	0.62	11.0	5.3	ND	ND	ND	ND
Ideno(1,2,3)pyrene	0.1	ND	1.7	ND	ND	5.7	ND	ND	ND	ND	ND
Dibenzo(a,h)anthracene	0.1	ND	0.34	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	0.1	ND	1.2	ND	ND	ND	ND	ND	ND	ND	ND
Others (ppm)											
p-cresol	0.075	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
phenyl ether	0.075	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

TABLE 6-16 (continued)
RFA: SUMMARY OF CONSTITUENTS DETECTED IN OFF-SITE SOIL SAMPLES COLLECTED ON 15 APRIL 1987
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

	MDL	8	9	10	11	12	13	14	15	16	17
Others (ppm) (continued)											
biphenyl	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tinuvin 327	0.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tinuvin 328	0.5	ND	ND	ND	ND	ND	ND	0.84	ND	ND	ND
Prometon	0.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dacthal	0.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-tetramylphenol	0.025	ND	ND	0.04	ND	ND	ND	ND	ND	ND	ND
2,4-di-tertbutylphenol	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-phenyl-1-naphthylamine	0.075	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tinuvin P	0.01	ND	ND	0.02	ND	ND	0.01	ND	ND	ND	ND
Diethyl phthalate	0.2	ND	ND	1.3	2.3	5.2	2.4	5.2	1.5	1.3	1.1
Dibutyl phthalate	0.2	ND	0.4	ND	0.24	0.74	1.3	0.9	1.3	0.82	0.38
Butylbenzyl phthalate	0.5	0.19	ND	ND	ND	8.4	2.6	ND	ND	ND	ND
bis(2-ethylhexyl)phthalate	0.5	19.0	11.0	57.0	1.8	4.5	45.0	5.8	200	2.90	0.84
DDT	0.5	ND	ND	ND	ND	ND	1.8	ND	ND	ND	ND
DDE	0.5	ND	ND	2.2	ND	ND	ND	ND	ND	ND	ND

Notes:
ND = Not Detected
MDL = Minimum Detection Limit
ppm = Parts Per Million
Analyses performed by the Rhode Island Department of Health, Division of Laboratories.
Table based on data reported by Versar (1988).

TABLE 6-17

RFA: SUMMARY OF CONSTITUENTS DETECTED IN SEDIMENT SAMPLES FROM THE PAWTUXET RIVER
CIBA-GEIGY FACILITY, CRANSTON, RHODE ISLAND

	SD-1 (EPA)	SED-1 (CG)	SD-2 (EPA)	SED-2 (CG)	SD-3 (EPA)	SED-3 (CG)	SD-4 (EPA)	SED-4 (CG)
Metals (ppm)								
antimony	44		32		26		<45	
arsenic	6.5		6.6		2.8		9.3	
barium	182	NA	133	NA	18	NA	222	NA
beryllium	1.5	2.0	1.2	1.3	<0.58	<0.23	1.7	<2.5
cadmium	16	3.9	3	ND	<1.3	ND	5.9	ND
copper	NA	211	NA	203	NA	15	NA	516
chromium	79	61	310	226	14	210	1080	827
iron	18600	NA	19200	NA	9380	NA	21100	NA
lead	237	<35	188	<26	17	<3.8	369	<47
magnesium	1880	NA	2820	NA	1100	NA	3610	NA
manganese	560	NA	302	NA	100	NA	266	NA
mercury	10	ND	6.3	0.62	<11	ND	23	0.32
nickel	33	3.6	<15	ND	<7.8	ND	<22	ND
selenium	NA		NA		NA		NA	
silver	<5.1	5.2	<4.0	<1.0	<2.1	ND	<5.9	<2.2
thallium	NA		NA		NA		NA	
vanadium	29	NA	33	NA	7.8	NA	43	NA
zinc	389	<274	528	<373	52	<18	2280	<1770
Volatile Organics (ppm)								
toluene	0.03	0.033	ND	0.13	0.001J	ND	ND	0.23
2-butanone	ND	ND	2.4B	ND	ND	ND	4.0B	0.74J
tetrachloroethylene	ND		ND		ND		1.7	
chlorobenzene	ND	ND	ND	0.13	ND	ND	ND	ND
methylene chloride	0.067B	0.009JB	0.56JB	ND	0.004JB	ND	1.2B	0.065JB
acetone	0.208	0.180J	0.83JB	1.8J	0.005J	0.089J	2.0JB	4.7J
Semi-Volatile Organics (ppm)								
fluoranthene	1.4	1.9	ND	2.2	ND	0.76	6.5	17.0
pyrene	1.1	1.0B	ND	1.4B	ND	0.46B	6.5	5.9JB
chrysene	0.79J	0.78	ND	ND	ND	0.38J	3.7J	5.1
benzo(b)fluoranthene	1.0	1.7	ND	2.2	ND	ND	3.4J	11.0
benzo(k)fluoranthene	ND	ND	ND	ND	ND	ND	3.1	ND
benzo(a)pyrene	0.52J	1.0	ND	1.5	ND	0.42	2.7J	4.6
benzo(g,h,i)perylene	0.31J	0.54J	ND	ND	ND	ND	1.8J	ND
phenanthrene	0.7J	0.78	ND	1.0	ND	0.42	4.3	7.7
indeno(1,2,3-cd)pyrene	ND	0.7	ND	0.76J	ND	ND	1.5J	2.9
benzo(a)anthracene	0.52J	ND	ND	0.76	ND	0.3J	ND	ND
2-methylnaphthalene	ND	ND	ND	0.14J	ND	ND	ND	0.32J

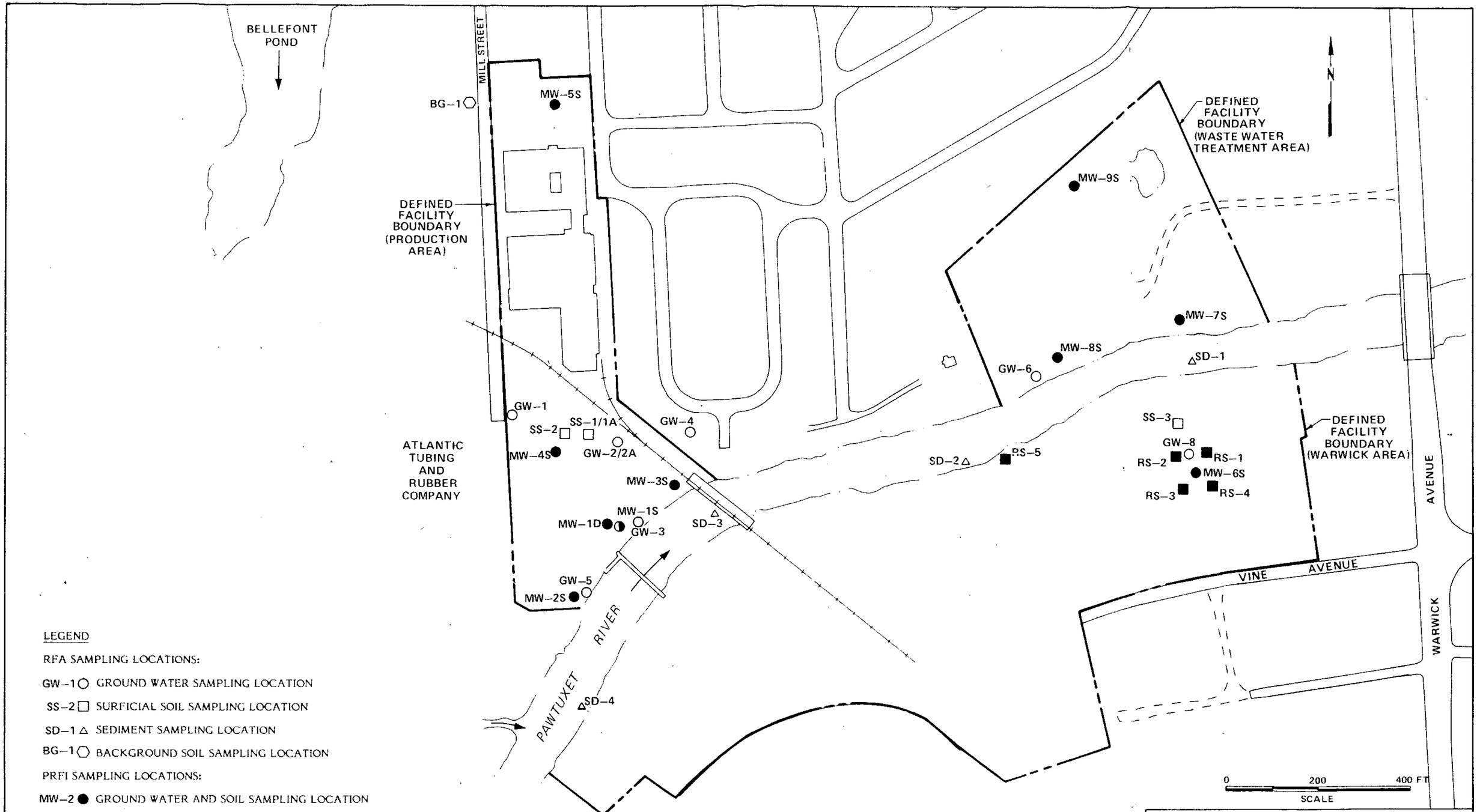
TABLE 6-17 (continued)

RFA: SUMMARY OF CONSTITUENTS DETECTED IN SEDIMENT SAMPLES FROM THE PAWTUXET RIVER
CIBA-GEIGY FACILITY, CRANSTON, RHODE ISLAND

	SD-1 (EPA)	SED-1 (CG)	SD-2 (EPA)	SED-2 (CG)	SD-3 (EPA)	SED-3 (CG)	SD-4 (EPA)	SED-4 (CG)
acenaphthylene	ND	0.16J	ND	ND	ND	0.84J	ND	2.2
fluorene	ND	ND	ND	0.21J	ND	ND	ND	ND
anthracene	ND	0.16J	ND	0.21J	ND	0.084J	ND	ND
naphthalene	ND	ND	ND	ND	ND	ND	ND	0.43J
butylbenzylphthalate	0.13J	ND	ND	ND	ND	ND	ND	ND
bis-2-ethylhexylphthalate	10.0	8.7B	ND	5.8B	19.0	3.4B	2.0J	2.8B
di-n-octylphthalate	0.49J	ND	ND	ND	6.4	1.4J	ND	ND
di-n-butylphthalate	ND	ND	ND	ND	ND	0.042J	ND	ND
Pesticides/PCBs (ppm)								
dieldren	ND	ND	ND	0.89	ND	ND	ND	ND
Dioxin (TCDD)/Furan (TCDF) (ppm)								
	ND	ND	NA	NA	NA	NA	ND	ND

NOTES

J = CONCENTRATION IS AN ESTIMATED VALUE LESS THAN THE METHOD DETECTION LIMIT
ND = NOT DETECTED
NA = NOT ANALYZED
< = LESS THAN (NUMBER INDICATES DETECTION LIMIT)
BLANK SPACE INDICATES UNCERTAINTY AS TO WHETHER THE PARAMETER WAS TESTED FOR AND NOT DETECTED OR NOT TESTED FOR
TABLE BASED ON DATA PRESENTED IN THE RFA (VERSAR, 1988)
ppm = PARTS PER MILLION
CG = CIBA-GEIGY SAMPLE
EPA = UNITED STATES ENVIRONMENTAL PROTECTION AGENCY SAMPLE COLLECTED BY VERSAR, INC.
SPLIT SAMPLES WERE OBTAINED DURING THE SEDIMENT SAMPLING. THE SAMPLES AND SPLITS ARE AS FOLLOWS: SD-1 AND SED-1, SD-2 AND SED-2, SD-3 AND SED-3, SD-4 AND SED-4.
SAMPLES COLLECTED ON 12 JUNE 1987



LEGEND

RFA SAMPLING LOCATIONS:

GW-1 ○ GROUND WATER SAMPLING LOCATION

SS-2 □ SURFICIAL SOIL SAMPLING LOCATION

SD-1 △ SEDIMENT SAMPLING LOCATION

BG-1 ⬡ BACKGROUND SOIL SAMPLING LOCATION

PRFI SAMPLING LOCATIONS:

MW-2 ● GROUND WATER AND SOIL SAMPLING LOCATION

RS-1 ■ SURFICIAL SOIL SAMPLING LOCATION

MW-1S ◑ GROUND WATER SAMPLING LOCATION ONLY

NOTE: RFA SAMPLING LOCATIONS BASED ON ATTACHMENT 1B OF THE DRAFT ADMINISTRATIVE ORDER ON CONSENT. LOCATIONS SHOWN ARE APPROXIMATE. PRFI LOCATIONS BASED ON SURVEY BY WATERMAN ENGINEERING COMPANY OF EAST PROVIDENCE, RHODE ISLAND.

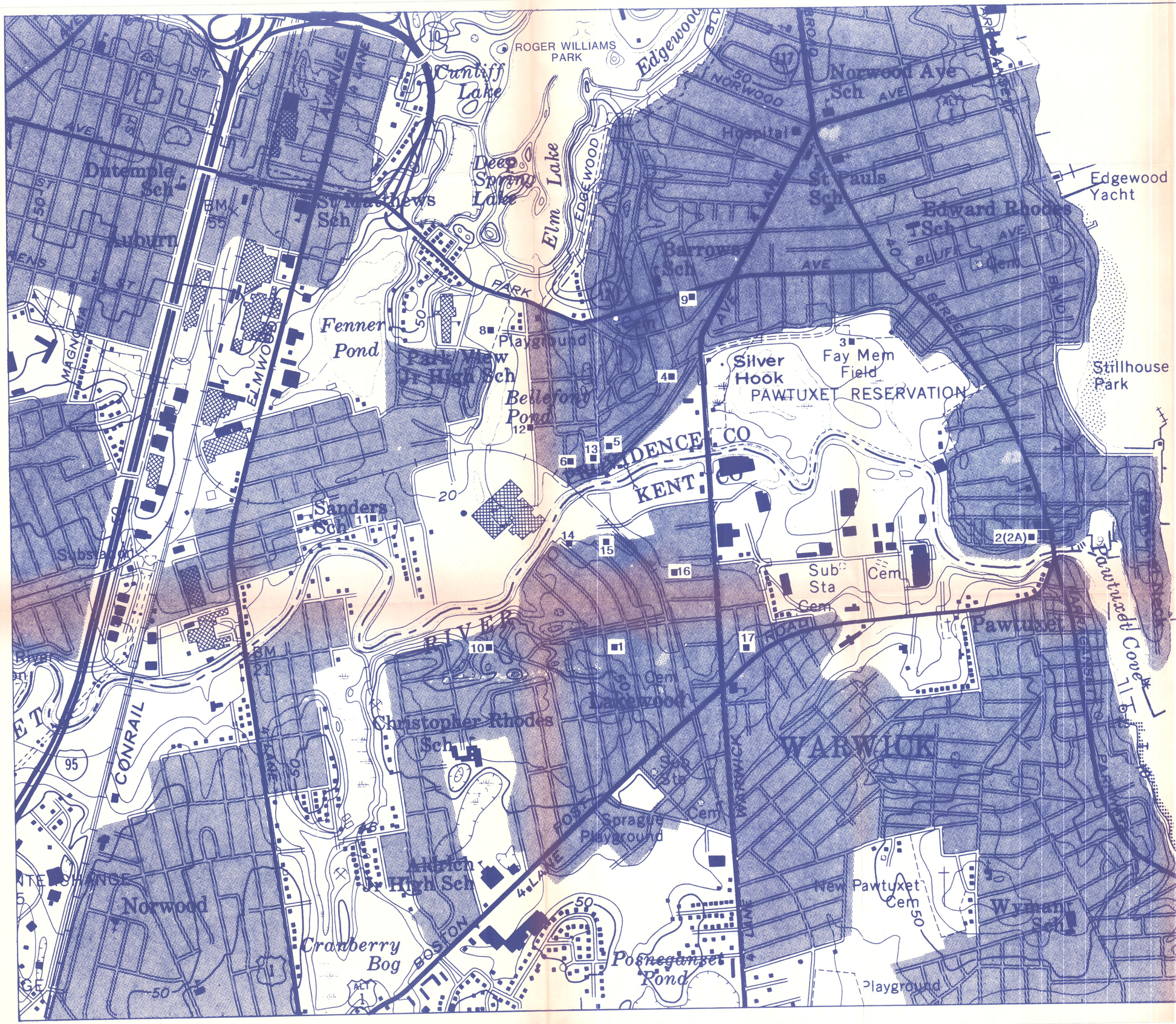
BASE MAP SOURCE: GEOD CORPORATION OF NEWFOUNDLAND, NEW JERSEY. MAPPED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHS. DATE FLOWN: 2 APRIL 1989

RFA AND PRFI SAMPLING LOCATIONS
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

WOODWARD - CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS
WAYNE, NEW JERSEY

DR. BY	KF	SCALE:	AS SHOWN	PROJ NO:	87X4660
CK'D. BY	MH	DATE:	22 JUN 1989	FIG. NO	6-1



LEGEND:

3 ■ OFF SITE SURFICIAL SOIL SAMPLING LOCATION

NOTES:

1. SAMPLING LOCATIONS BASED ON VERSAR (1988) AND RIDEM (1986, 1987)
2. SAMPLES COLLECTED BY RIDEM (DIVISION OF AIR AND HAZARDOUS MATERIALS)
3. SAMPLING LOCATION 2 WAS RESAMPLED AND DESIGNATED 2A
4. SAMPLE 7 WAS COLLECTED IN ROGER WILLIAMS PARK
5. SAMPLING LOCATIONS A, B, C, D, RT AND OT WERE NOT INDICATED ON ANY OF THE MAPS PRESENTED BY VERSAR (1988) OR RIDEM (1986, 1987). THE LOCATIONS WERE DESCRIBED AS FOLLOWS:

A RURAL LOCATION – NORTH KINGSTON
B EAST SIDE – PROVIDENCE
C MOUNT PLEASANT – PROVIDENCE
D BUTTONWOODS – WARWICK
RT RED TOMATO (GROWN NEAR FACILITY), AND
OT ORANGE TOMATO (GROWN NEAR FACILITY)

BASE MAP SOURCE:

USGS PROVIDENCE QUADRANGLE (1975)

0 500 1000 FT
SCALE

RFA OFF-SITE SOIL SAMPLING LOCATIONS
CIBA-GEIGY FACILITY
CRANSTON, RHODE ISLAND

WOODWARD-CLYDE CONSULTANTS
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS
WAYNE, NEW JERSEY

DR. BY:	KF	SCALE:	AS SHOWN	PROJ. NO.:	87X4660
CK'D. BY:	CJM	DATE:	7 JUN 1989	FIG. NO.:	6–2

Section Seven

SECTION 7
DATA EVALUATION

The objectives of the Current Assessment Summary Report are to summarize and interpret data pertinent to the facility so that the need for interim measures can be evaluated, the identification of additional conditions of concern (other than those specified in the Order) can be made, the preliminary investigation of corrective measures can be conducted, and the investigation work plan can be developed. Based on those objectives, CIBA-GEIGY believes that the Current Assessment Summary Report requirements of the Order have been satisfactory addressed. Therefore, within the context of the Facility Assessment and the Preliminary Investigation, CIBA-GEIGY does not propose to investigate further conditions associated with the facility. Rather, CIBA-GEIGY proposes to initiate Phase I of the Facility Investigation upon approval of this Facility Investigation Proposal by the USEPA.

The Facility Assessment analytical data from on-site locations, off-site locations, and the Pawtuxet River, reviewed and presented herein, are presumed to be valid. Those data are included in the Facility Assessment Report and summarized in the "Findings of Fact" section in the Order. Therefore, CIBA-GEIGY has assumed that the USEPA believes the data to be representative of site conditions.

CIBA-GEIGY has not considered validating any of the Facility Assessment data or evaluating quality assurance/quality control associated with the Facility Assessment because such work is beyond the scope of the Facility Investigation Proposal. Instead, CIBA-GEIGY offers the following comments regarding the Facility Assessment.

Because the Facility Assessment did not document sampling methodologies, CIBA-GEIGY could not evaluate this critical step in the sampling and analysis

Section Eight

SECTION 8
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Appendix A

APPENDIX A
BORING LOGS AND
PIEZOMETER AND MONITORING WELL CONSTRUCTION DETAILS

BORING LOGS

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING MW-2S

SHEET 1 OF 1

PROJECT AND LOCATION	CIBA - FE164, Cranston, R.I
ELEVATION AND DATUM	12.54' MSL
PROJECT NO	87X4660
DRILLING AGENCY	Soil Exploration
FOREMAN	Mark Zook
DATE STARTED	5/17/88
DATE FINISHED	5/17/88
DRILLING EQUIPMENT	TRUCK-MOUNTED DRILLING RIG Acker Soil Mat
COMPLETION DEPTH	20 FT
ROCK DEPTH	NOT ENCOUNTERED
SIZE AND TYPE OF BIT	8¼" ID HSA
SIZE AND TYPE CORE BARREL	
NO SAMPLES	DIST 2
UNDIST	CORE
WATER LEVEL	FIRST ≈ 5'
COMPL	24 HR
CASING	
CASING HAMMER	WEIGHT / DROP
SAMPLER	2 IN. O.D. SPLIT SPOON
SAMPLER HAMMER	WEIGHT 140 LBS. DROP 30 IN.
BORING ANGLE AND DIRECTION	VERTICAL
INSPECTOR	R. J. Herring

DESCRIPTION	PIEZOMETER	DEPTH, FT	SAMPLES NO.	RECOV. FT.	PENETR. RESIST. BL/6 IN.	TIME	HNU READINGS (PPM) SAMPLE	AMBIENT AIR	TIME	REMARKS
FILL, f. sand, bricks, f. gravel tr. c. gravel,	RISER	1 2 3								Classification of soil from 0-3.5' and from 17.5-20' was based on the return of soil cuttings.
FILL, c. sand, bricks, clay tile, some v.f. gravel, black matrix, few c. gravel		4 5	S-1	0.5'	4 4 3 5	1030	10	0.8		Black ooze above and below water table, some sheen
Same as above		6 7	S-2	0.3'	4 5 4 3	1035	10	0.8		Combined samples S-1 and S-2 into one sample.
Same as above		8 9 10 11 12 13 14								
finer SAND, Medium SILT with some coarse sand	SCREEN	15 16 17 18								
	TAIL	19								

WOODWARD-CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING MW-35 SHEET 1 OF 1

PROJECT AND LOCATION: CIBA-GEIGY, Cranston, RI		ELEVATION AND DATUM: 14.42' MSL	PROJECT NO: 87X4660
DRILLING AGENCY: Soil Exploration	FOREMAN: MARK ZORK	DATE STARTED: 5/17/88	DATE FINISHED: 5/17/88
DRILLING EQUIPMENT: TRUCK-MOUNTED DRILLING RIG		COMPLETION DEPTH: 20' FT	ROCK DEPTH: NOT ENCOUNTERED
SIZE AND TYPE OF BIT: 4¼" ID HSA	SIZE AND TYPE CORE BARREL	NO. SAMPLES: DIST 5	UNDIST / CORE
CASING: NA		WATER LEVEL: FIRST ≈ 5'	COMPL / 24 HR
CASING HAMMER: WEIGHT	DROP	BORING ANGLE AND DIRECTION: VERTICAL	
SAMPLER: 2 IN. O.D. SPLIT SPOON			
SAMPLER HAMMER: WEIGHT 140 LBS.	DROP 30 IN.	INSPECTOR: HENNING / HOULDAY	

DESCRIPTION	PIEZOMETER	DEPTH, FT	SAMPLES NO.	RECOV. FT.	PENETR. RESIST. BL/6IN	TIME	HNU READINGS (PPM) SAMPLE	AMBIENT AIR	TIME	REMARKS
FILL, orange-brown f-m SAND with some silt, gravel, wood, and brick fragments, moist	SCREEN	1	S-1	0.4		1001	3.2	0.4		Sampling began ≈ 1022.
FILL, brown f-m SAND with gravel silt, wood, and brick fragments		2, 3	S-2	0.9		1006	4.2	0.4		
FILL, brown-orange f-m SAND with silt, gravel, and wood, wet		4, 5	S-3	0.7		15	2.1	0.4	1420	Poor recovery during sampling, as a result, samples S3-S5 were composited.
FILL, brown-orange f SAND with silt, and gravel, wet		6, 7	S-4	0.7		1422	3.1	0.4	1422	
FILL, black clayey SILT; brown silty SAND with gravel, wet.		8, 9	S-5	0.5		1424	2.0	0.4	1422	
Grey f-m silty SAND, wet		10, 11, 12, 13, 14, 15, 16, 17, 18, 19								Split spoons not taken after sample was taken for analysis. Classification of soil below 10' was based on soil cuttings.
	TAIL									

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LOG OF BORING MW-4S SHEET 1 OF 1

PROJECT AND LOCATION	CIBA GEIGY, Cranston, RI
ELEVATION AND DATUM	18.24' MSL
PROJECT NO	87X4660
DRILLING AGENCY	Soil Exploration
FOREMAN	JIM
DATE STARTED	5/17/88
DATE FINISHED	5/17/88
DRILLING EQUIPMENT	TRUCK-MOUNTED DRILLING RIG Acker Soil Map
COMPLETION DEPTH	19 FT
ROCK DEPTH	NOT ENCOUNTERED
SIZE AND TYPE OF B.IT	4¼" ID HSA
SIZE AND TYPE CORE BARREL	
CASING	NA
NO. SAMPLES	DIST 10
UNDIST	CORE
WATER LEVEL	FIRST 7.5'
COMPL	24 HR
CASING HAMMER	WEIGHT
DROP	
BORING ANGLE AND DIRECTION	VERTICAL
SAMPLER 2-3 IN. O.D. SPLIT SPOONS	
SAMPLER HAMMER	WEIGHT 140 LBS.
DROP 30 IN.	
INSPECTOR	MARK HOULDAY

DESCRIPTION	PIEZOMETER	DEPTH, FT	SAMPLES NO.	RECOV. FT.	PENETR. RESIST. BL/6 IN	TIME	HNU READINGS (PPM) SAMPLE	AMBIENT AIR	TIME	REMARKS
FILL, Brown to grey silty f SAND with gravel, moist	RISER	1	S-1	1.1'	22 46 115 55	9 30				Sampling began at ≈ 9 30 HNU - not working, shut in probe.
FILL, Brown to orange silty f SAND with gravel, moist		3	S-2	1.2'	23 26 27 35	9 50				
FILL, Brown silty f SAND with gravel, moist		4	S-3	0.7'	70 120/6	10 10				Refusal - building foundation? Moved borehole ≈ 3'.
FILL, Brown to orange to grey f sandy SILT with clay and gravel, moist		6	S-4	0.8'	5 7 7 12	10 30				
Grey to black to brown clayey SILT, moist to wet	SCREEN	8	S-5	0.5'	10 7 7 6	11 00				Hit water table at ≈ 7.5'. Composited samples S4/S5* and submitted for analysis.
Black to grey f sandy SILT (≈ 12"), Black to grey clayey SILT (≈ 6"), wet		10	S-6	1.5'	7 8 10 7	11 10				
Black to grey silty CLAY, thin lenses of grey f. sand, wet		12	S-7	1.3'	6 5 6 9	11 20				
Brown to grey f-m SAND (≈ 14"), Grey silty clay (4"), wet		14	S-8	1.5'	6 7 8 11	11 30				
Black to grey f-m SAND, grey silty clay lenses, wet	TAIL	16	S-9	1.7'	8 11 12 12	11 40				
Same as above		18	S-10	1.7'	13 17 19 14	11 50				

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LOG OF BORING MW-5S

SHEET 1 OF 2

PROJECT AND LOCATION: CIBA-GEIGY, Cranston, RI		ELEVATION AND DATUM: 24.87' MSL	PROJECT NO: 87X4660
DRILLING AGENCY: Soil Exploration	FOREMAN: MARK ZORK	DATE STARTED: 5/23/88	DATE FINISHED: 5/23/88
DRILLING EQUIPMENT: TRUCK-MOUNTED DRILLING RIG Acker Soil Mat		COMPLETION DEPTH: 18' FT	ROCK DEPTH: NOT ENCOUNTERED
SIZE AND TYPE OF BIT: 8¼" ID HSA	SIZE AND TYPE CORE BARREL	NO SAMPLES: DIST 4	UNDIST / CORE
CASING: NA		WATER LEVEL: FIRST ≈7.5'	COMPL / 24 HR
CASING HAMMER / WEIGHT	DROP	BORING ANGLE AND DIRECTION: VERTICAL	
SAMPLER: 3 IN. O.D. SPLIT SPOON			
SAMPLER HAMMER / WEIGHT: 140 LBS.	DROP: 30 IN.	INSPECTOR: MARK HOULDAY	

DESCRIPTION	PIEZOMETER	DEPTH, FT	SAMPLES NO.	RECOV. FT.	PENETR. RESIST. BL/6 IN	TIME	HNU READINGS (PPM) SAMPLE	AMBIENT AIR	TIME	REMARKS
Brown to dark brown SILT with clay, f sand, and organic matter, moist.	RISER	1	S-1	1.5	5 5 7 7	855	0.4	0.4	930	Began sampling at ≈850
Brown clayey SILT with tan f sand and gravel, moist.		2–4	S-2	1.4	11 13 14 19	905	0.5	0.4	930	Split spoon sample taken only down to water table.
Tan - orange f SAND with gravel, tr. silt, moist.		5–6	S-3	1.6	18 23 25 21	910	0.4	0.4	932	Took a replicate sample (DUP1) Composited S3 and S4 for analysis.
Same as above	SCREEN	7–8	S-4	1.2	19 23 24 23	920	0.4	0.4	930	Hit Water Table at 7.5'
	BLANK	9–19								

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LOG OF BORING MW-6S SHEET 1 OF 2

PROJECT AND LOCATION: CIBA-GEIGY Cranston, RI		ELEVATION AND DATUM: 11.45' MSL	PROJECT NO: 87X4660
DRILLING AGENCY: Soil Exploration	FOREMAN: MARK ZORK	DATE STARTED: 5/18/88	DATE FINISHED: 5/18/88
DRILLING EQUIPMENT: TRUCK-MOUNTED DRILLING RIG Acker Soil Mat		COMPLETION DEPTH: 30 FT	ROCK DEPTH: NOT ENCOUNTERED
SIZE AND TYPE OF BIT: 4¼" ID HSA	SIZE AND TYPE CORE BARREL	NO. SAMPLES: DIST 15	UNDIST / CORE
CASING: NA		WATER LEVEL: FIRST 5'	COMPL / 24 HR
CASING HAMMER / WEIGHT	DROP	BORING ANGLE AND DIRECTION: VERTICAL	
SAMPLER 2-3 IN. O.D. SPLIT SPOONS			
SAMPLER HAMMER / WEIGHT 140 LBS.	DROP 30 IN.	INSPECTOR: MARK HOULDAY	

DESCRIPTION	PIEZOMETER	DEPTH, FT	SAMPLES NO.	RECOV. FT.	PENETR. RESIST. BL/6IN	TIME	HNU READINGS (PPM) SAMPLE	AMBIENT AIR	TIME	REMARKS
Brown to grey SILT with f. sand, clay, and gravel, moist	RISER	1	S-1	1.5'	38 22 33 14	8 25	1.4	0.8	9 15	Sampling began at ≈ 8 25.
Dark brown to black SILT with clay and organic matter, moist		2								
		3	S-2	1.3'	13 8 6 4	8 30	1.5	0.6	9 15	Sample submitted for analysis taken from 3-5'.
Dark brown to black SILT with clay and organics, tr. f sand, wet		4								
		5	S-3	1.6'	1 1 1 2	8 40	0.8	0.8	9 15	Hit water table at 5'.
Brown to grey SILT with clay, f sand, and organics (roots, peat), wet	SCREEN	6								
		7	S-4	1.3'	8 3 1 32	8 45	0.8	0.8	9 16	
Orange m SAND with tr. silt and clay, wet		8								
		9	S-5	1.3'	3 4 3 8	8 50	1.1	0.8	9 16	Obvious change in stratigraphy.
Grey to orange f-c SAND with tr. silt and clay, wet		10								
		11	S-6	1.2'	3 4 3 5	9 00	0.8	0.8	10 05	
Same as above		12								
		13	S-7	1.2'	2 3 3 4	9 05	0.8	0.8	10 05	
Same as above	BLANK	14								
		15	S-8	1.1'	3 7 8 9	9 10	0.8	0.8	10 05	
Same as above		16								
		17	S-9	1.4'	6 8 8 9	9 15	0.8	0.8	10 05	
Grey to orange f-c SAND with tr. silt and clay, wet (14")		18								
Grey clayey SILT, wet (2")		19	S-10	1.3'	25 13 11 38	9 30	0.8	0.8	10 05	

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MW-6S

DESCRIPTION	PIEZOMETER	DEPTH, FT	SAMPLES NO.	SAMPLES RECOV, FT	SAMPLES PENETR RESIST BL/6IN.	SAMPLES TIME	HNU READINGS (PPM) SAMPLE	HNU READINGS (PPM) AMBIENT AIR	HNU READINGS (PPM) TIME	REMARKS
Grey - dark grey clayey SILT, wet		21	S-11	1.3'	7 5 7 7	9 35	0.8	0.8	10 30	
Grey - dark grey silty f SAND (8") Grey - dark grey clayey SILT (8")		22 23	S-12	1.3'	7 8 20 21	9 45	0.8	0.8	10 30	
Grey f SAND with gravel, tr. silt, clay, wet		24 25	S-13	0.6'	5 8 10 12	9 50	0.8	0.8	10 30	
Grey clayey SILT, wet		26 27	S-14	1.6'	7 8 8 8	9 57	0.8	0.8	10 20	Completed sampling at ≈ 10 05 AM. 5/18/88.
Same as above		28 29 30	S-15	1.8'	5 6 8 10	10 05	0.8	0.8	10 20	Terminated boring at 30'.

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LOG OF BORING MW-8S

SHEET 1 OF 2

PROJECT AND LOCATION	CIBA-GEIGY, Cranston, RI
ELEVATION AND DATUM	15.00' MSL
PROJECT NO	87X4660
DRILLING AGENCY	Soil Exploration
FOREMAN	MALK
DATE STARTED	5/18/88
DATE FINISHED	5/19/88
DRILLING EQUIPMENT	TRUCK-MOUNTED DRILLING RIG Acker - Soil Mat
COMPLETION DEPTH	30 FT
ROCK DEPTH	NOT ENCOUNTERED
SIZE AND TYPE OF BIT	4¼" ID HSA
SIZE AND TYPE CORE BARREL	
CASING	NA
NO SAMPLES	DIST 15 / UNDIST / CORE
WATER LEVEL	FIRST ≈ 7.5' / COMPL / 24 HR
CASING HAMMER	WEIGHT / DROP
SAMPLER	2/3 IN. O.D. SPLIT SPOON
BORING ANGLE AND DIRECTION	VERTICAL
SAMPLER HAMMER	WEIGHT 140 LBS. / DROP 30 IN.
INSPECTOR	MARK HOULDAY

DESCRIPTION	PIEZOMETER	DEPTH, FT	SAMPLES NO.	RECOV. FT.	PENETR. RESIST. BL/6IN	TIME	HNU READINGS (PPM) SAMPLE	AMBIENT AIR	TIME	REMARKS
FILL, tan-orange-brown SAND with gravel, asphalt, and silt, moist		1	S-1	1.5'	7 8 13 14	3:05				Sampling began at 3:00 Raining - HNU not working!
FILL, brown silt with gravel, tr. clay and f. sand, moist.		2 3	S-2	0.5'	5 7 8 10	3:25			-	Refusal at 2', moved bore-hole 5 times.
FILL, tan-brown m SAND with gravel and fiberglass, moist		4 5	S-3	0.8'	7 8 11 9	3:35				Sample interval 5-7' submitted for analysis
FILL?, light brown m SAND with gravel, tr. silt, and wood, wet		6 7	S-4	0.8'	9 9 8 8	3:40				Hit water table at 7.5' End drilling 5/18/88
FILL?, tan-light brown m SAND with gravel, tr. silt, wet		8 9	S-5	1.3'	5 7 9 11	8:05				Began sampling 5/19/88 8:00 AM
Dark brown SILT with organic matter (twigs), some f sand, tr. clay, wet		10 11	S-6	1.3'	4 4 4 7	8:15				
Orange-tan m-c SAND, some gravel, tr. silt, wet		12 13	S-7	0.3'	3 4 5 5	8:18				
Orange m-c SAND, some gravel, wet		14 15	S-8	1.3'	5 4 3 3	8:25				
Orange m-c SAND, some gravel (12") Grey clayey SILT, wet (12")		16 17	S-9	2.0'	5 4 33 30	8:40				
Grey clayey SILT, wet		18 19	S-10	1.0'	5 7 13 14	8:50				

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MW-8S

DESCRIPTION	PIEZOMETER	DEPTH, FT	SAMPLES NO.	RECOV. FT	PENETR RESIST BL/6IN.	TIME	HNU READINGS (PPM) SAMPLE	AMBIENT AIR	TIME	REMARKS
Grey clayey SILT, wet		21	S-11	1.5'	9 10 10 13	9:15				
		22								
Same as above		23	S-12	1.6'	5 4 6 5	9:20				
		24								
Same as above		25	S-13	1.9'	5 6 4 6	9:28				
		26								
Same as above		27	S-14	0.9'	5 4 5 5	9:35				Hit a running sand at 28'.
		28								Washed borehole out!
Grey f SAND with silt (≈10")		29	S-15	1.6'	7 10 12 11	9:45				
Grey clayey SILT, wet (≈10")		30								Boring terminated at 30'.

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LOG OF BORING MW-9S

SHEET 1 OF 2

PROJECT AND LOCATION	CIBA-GEIGY, Cranston, RI
ELEVATION AND DATUM	15.44' MSL
PROJECT NO	87X4660
DRILLING AGENCY	Soil Exploration
FOREMAN	MARK
DATE STARTED	5/20/88
DATE FINISHED	5/20/88
DRILLING EQUIPMENT	TRUCK-MOUNTED DRILLING RIG
COMPLETION DEPTH	34 FT
ROCK DEPTH	NOT ENCOUNTERED
SIZE AND TYPE OF BIT	4¼" ID HSA
SIZE AND TYPE CORE BARREL	
CASING	
NO. SAMPLES	DIST 17 / UNDIST / CORE
WATER LEVEL	FIRST 5' / COMPL / 24 HR
CASING HAMMER	WEIGHT / DROP
BORING ANGLE AND DIRECTION	VERTICAL
SAMPLER 2-3 IN. O.D. SPLIT SPOONS	
SAMPLER HAMMER	WEIGHT 140 LBS. / DROP 30 IN.
INSPECTOR	MARK HOULDAY

DESCRIPTION	PIEZOMETER	DEPTH, FT	SAMPLES NO.	RECOV. FT.	PENETR. RESIST. BL/6 IN	TIME	HNU READINGS (PPM) SAMPLE	AMBIENT AIR	TIME	REMARKS
FILL - black asphalt, tan to light brown f sand with gravel, tr. silt, moist.		1	S-1	1.5'	10 25 20 15	740	0.4	0.4	900	Sampling began at ≈ 735 5/20/88
FILL - brown to tan f sandy SILT with asphalt, gravel, moist		3	S-2	1.5'	19 20 53 27	750	0.8	0.4	900	* Samples S2-S3 composited for analysis.
FILL - brown to tan f sandy SILT with gravel and tr. clay, wet		5	S-3	1.2'	16 33 22 53	840	0.8	0.4	900	Hit water table at ≈ 5'
FILL - light brown to grey silty f sand with gravel, tr. clay, wet		7	S-4	0.8'	16 31 11 19	845	1.2	0.4	905	
Brown SILT with clay and gravel (6") Tan - light brown silty f SAND with gravel, wet (4")		9	S-5	0.8'	11 12 14 12	835	0.8	0.4	905	
Tan f-m SAND with gravel (4") Rust - orange clayey SILT (6") Grey clayey SILT (4"), wet		11	S-6	1.2'	6 7 6 6	845	0.8	0.4	1000	
Grey clayey SILT, moist-wet		13	S-7	0.3'	7 8 8 9	850	0.7	0.4	1000	
Same as above		15	S-8	1.3'	5 7 8 8	900	0.4	0.4	1000	
Same as above		17	S-9	1.25'	7 8 8 8	905	0.5	0.4	1005	
Same as above		19	S-10	1.4'	3 4 3 4	915	0.7	0.4	1005	

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MW-9S

DESCRIPTION	PIEZOMETER	DEPTH, FT	SAMPLES NO.	RECOV, FT	PENETR RESIST BL/6IN.	TIME	HNU READINGS (PPM) SAMPLE	AMBIENT AIR	TIME	REMARKS
Grey clayey SILT, wet		21–22	S-11	1.3'	12 1 1 1	9 20	0.4	0.4	10 15	
Grey silty CLAY, wet		23–24	S-12	1.3'	2 1 2 2	9 25	0.4	0.4	10 15	
Grey clayey SILT, wet		25–26	S-13	1.5'	10 9 10 9	9 35	0.4	0.4	10 15	
Same as above.		27–28	S-14	1.7'	8 8 10 10	9 40	0.4	0.4	10 55	
Grey clayey SILT, wet (9") Grey of sandy SILT, wet (6")		29–30	S-15	1.3'	8 8 10 10	9 50	0.4	0.4	10 55	
Grey clayey SILT, wet		31–32	S-16	1.5'	3 3 3 3	9 58	0.4	0.4	10 55	
Grey clayey SILT, wet (9") Grey silty of SAND, wet (8")		33–34	S-17	1.4'	3 2 1 1	10 10	0.4	0.4	10 55	Completed sampling at ≈ 10 10 AM 5/20/88. Terminate boring at 34'.

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LOG OF BORING P-10 SHEET 1 OF 3

PROJECT AND LOCATION: CIBA - GEIGY, RI		ELEVATION AND DATUM: 13.61' MSL	PROJECT NO: 87X4660
DRILLING AGENCY: Able Drilling	FOREMAN: John Perry	DATE STARTED: 4/11/88	DATE FINISHED: 4/11/88
DRILLING EQUIPMENT: TRUCK-MOUNTED DRILLING RIG Mobil Drill (B40L)		COMPLETION DEPTH: 49.5' FT	ROCK DEPTH: NOT ENCOUNTERED
SIZE AND TYPE OF BIT: ≈4" Hollow Stem Auger	SIZE AND TYPE CORE BARREL	NO. SAMPLES: DIST 23	UNDIST / CORE
CASING		WATER LEVEL: FIRST ≈5.5'	COMPL / 24 HR
CASING HAMMER: WEIGHT	DROP	BORING ANGLE AND DIRECTION: VERTICAL	
SAMPLER: 2 IN. O.D. SPLIT SPOON			
SAMPLER HAMMER: WEIGHT 140/300 LBS.	DROP 30 IN.	INSPECTOR: Mark Houlday	

DESCRIPTION	PIEZOMETER	DEPTH, FT	SAMPLES NO.	RECOV. FT.	PENETR. RESIST. BL/6 IN	TIME	HNU READINGS (PPM) SAMPLE	AMBIENT AIR	TIME	REMARKS
No Sample Taken										Sampling began ≈ 9:30 AM. Raining - HNU down
FILL - brown to dark brown SILT with some clay, f sand, + gravel, moist		1–2	S-1	0.5	16 16 9	9:30				Short apron - 18"
Same as above		3–4	S-2	0.3	6 5 5 5	9:35				
No Sample Taken										
FILL - Black clayey SILT with some f sand, wet		5–6	S-3	0.5	2 5 4 3	9:40				Hit water table ≈ 5.5' Greasy appearance, no odor.
FILL - Black greasy fiberglass, wood, some silt, wet		7–8	S-4	0.3	5 9 6 2	9:50				No obvious odor.
FILL - Black greasy fiberglass, wood, some silt, wet		9–10	S-5	0.3	4 2 1 1	10:05				
FILL - Black greasy fiberglass, wood, and silt (≈20") Black - brown silty f sand with clay (≈2")		11–12	S-6	1.8	4 3 3 3	10:15				FILL - Bina Sediment interface?
No Sample Taken		13–14								
Brown - grey silty f SAND with some clay and peat lenses, wet		15–16	S-7	0.9	2 6 2 4	10:25				Change in color of Samples
No Sample Taken		17								
Grey silty f SAND with clay lenses, wet		18	S-8	0.6	11 10 8 11	10:32				
Grey - lt. black - brown silty f SAND with clay, wet		19	S-9	0.8	2 1	10:40				

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LOG OF BORING R1D

CASING PENETR. RESIST. BL/FT	DESCRIPTION	PIEZ.	DEPTH, FT	SAMPLES TYPE NUMBER	RECOV. FT	PENETR RESIST BL/6IN.	time	~~OVA~~ HNU READINGS (PPM) SAMPLE	AMB. AIR	time	REMARKS
	See previous page		20	S-9	0.8	2 2	10^{40}				
	Grey f SAND with silt, tr. clay, wet		21 22	S-10	1.8	5 7 6 7	10^{53}				
	Same as above		23 24	S-11	1.1	2 3 4 6	10^{59}				
	Same as above		25 26	S-12	0.9	6 4 3 3	11^{20}				
	Same as above		27 28	S-13	0.6	3 5 6 6	11^{30}				
	Same as above		29 30	S-14	0.7	2 1 3 2	12^{00}				approximate depth of bulkhead
	Same as above		31 32	S-15	1.9	3 5 4 7	12^{05}				
	Same as above		33 34	S-16	0.8	4 3 6 7	12^{25}				
	Same as above		35 36	S-17	0.7	4 3 6 7	1^{25}				Stratigraphy very consistent
	Same as above		37 38	S-18	1.9	4 4 6 4	1^{30}				
	Grey - brown - tan f SAND with silt and tr. clay, wet		39 40	S-19	2.0	11 8 7 6	1^{45}				Change in color of sediments
	Same as above		41 42	S-20	2.0	6 4 3 3	2^{30}				
	Grey silty f SAND with tr. clay, wet		43 44	S-21	2.0	3 3 6 9	2^{45}				
	Same as above		45	S-22	1.1	11 12	2^{50}				

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LOG OF BORING P-1D

CASING PENETR. RESIST. BL/FT	DESCRIPTION	PIEZ.	DEPTH, FT	SAMPLES TYPE NUMBER	SAMPLES RECOV. FT	SAMPLES PENETR. RESIST BL/6IN.	SAMPLES time	~~OVA~~ HNU (PPM) READINGS SAMPLE	AMB. AIR	time	REMARKS
	See previous page		46	S-22	1.1	20 20	250				
	No Sample Taken		47								
	Dense grey CLAY with trace silt		48	S-23	0.3	50 50 34 67	255				Refusal - used 300 lb. hammer.
			49								
			50								Terminated Sampling.
			51								

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LOG OF BORING R14D

SHEET 1 OF 3

PROJECT AND LOCATION: CIBA-GEIGY, RI		ELEVATION AND DATUM: 24.76' MSL	PROJECT NO.: 87X4660
DRILLING AGENCY: Able Drilling	FOREMAN: John Perry	DATE STARTED: 4/14/88	DATE FINISHED: 4/15/88
DRILLING EQUIPMENT: TRUCK-MOUNTED DRILLING RIG Mobil Drill (B40L)		COMPLETION DEPTH: 58.5 FT	ROCK DEPTH:
SIZE AND TYPE OF BIT: 4" Hollow Stem Auger	SIZE AND TYPE CORE BARREL:	NO. SAMPLES: DIST 28	UNDIST / CORE
CASING		WATER LEVEL: FIRST ≈ 8'	COMPL / 24 HR
CASING HAMMER: WEIGHT	DROP	BORING ANGLE AND DIRECTION: VERTICAL	
SAMPLER 2 IN. O.D. SPLIT SPOON			
SAMPLER HAMMER: WEIGHT 140 LBS.	DROP 30 IN.	INSPECTOR: Mark Houlday	

DESCRIPTION	PIEZOMETER	DEPTH, FT	SAMPLES NO.	RECOV. FT.	PENETR. RESIST. BL/6 IN.	TIME	HNU READINGS (PPM) SAMPLE	AMBIENT AIR	TIME	REMARKS
Brown - dark brown clayey SILT with tr. of sand, gravel and organics debris, moist		1	S-1	1.2	3 4 17 19	1240				
Brown - wet clayey SILT with f-m sand and gravel, moist		3	S-2	1.4	12 16 16 20	1244				
Light brown - tan silty f SAND with gravel, moist		5	S-3	1.5	11 11 21 20	107				HNU - background 0.4 - down borehole 0.4
Light brown - tan silty f SAND with gravel, moist		7	S-4	1.3	20 18 16 13	112				
Tan - Light brown f-m SAND, tr. gravel, wet		9	S-5	1.1	4 5 5 5	130				Hit water table at ≈ 8'.
Same as above		11	S-6	1.4	3 6 7 7	135				
Same as above		13	S-7	1.3	3 6 7 9	145				
Same as above		15	S-8	1.3	10 10 10 12	150				
Same as above		17	S-9	1.4	6 9 8 10	215				
No recovery		19	S-10	N R	5 5 7 10	220				Wedged sampler in borehole

WOODWARD–CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING R14D

CASING PENETR RESIST BL/FT	DESCRIPTION	PIEZ.	DEPTH, FT	SAMPLES TYPE NUMBER	RECOV. FT	PENETR RESIST BL/6IN.	time	OVA READINGS HNU (PPM) SAMPLE	AMB. AIR	time	REMARKS
	Tan - light brown f SAND, tr. silt, wet (18") Rust m SAND, wet (6")		20 21 22	S-11	2.0	9 12 15 18	4 45				Blew hydraulic hose on rig ≈ 3 00. Rig fixed ≈ 4 35
	Rust f-m SAND, tr. silt, wet		23 24	S-12	1.0	7 10 14 19	4 55				
	Same as above		25 26	S-13	2.0	4 5 8 20	5 10				Scanned samples and borehole with HNU - background only
	Rust f-m SAND, tr silt and gravel, wet		27 28	S-14	2.0	17 24 25 37	5 30				
	No Sample Taken		29 30								
	Rust - brown f-m SAND, tr silt, wet (≈ 22") Brown clayey SILT, moist (≈ 2").		31 32	S-15	2.0	24 26 30 39	5 55				Switched to 300 lb. hammer
	Rust - brown f-m SAND, tr. silt, wet		33 34	S-16	1.5	19 19 21 18	6 05				put down casing - pulled up augers. Stopped sampling 7 30 4/14/88
	No Sample Taken		35								
	Grey clayey SILT with f sand, moist		36 37	S-17	1.0	6 8 10 15	10 15				Began sampling 4/15/88 10 15
	Grey clayey SILT with f SAND, moist		38 39	S-18	2.0	8 9 17 20	10 30				
	Grey - brown m SAND with gravel, tr. silt, clay, - wet		40 41	S-19	1.3	13 19 22 19	10 45				
	Brown - dark brown - rust - grey - f SAND with silt, clay, tr. gravel, wet		42 43	S-20	2.0	8 9 11 13	10 50				
	Grey clayey SILT, moist		44 45	S-21	1.3	4 5 6 11	11 15				
	No recovery			S-22	N R	5 7	11 30				

WOODWARD–CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

LOG OF BORING P14D

CASING PENETR. RESIST. BL/FT	DESCRIPTION	PIEZ.	DEPTH, FT	SAMPLES TYPE NUMBER	RECOV. FT	PENETR RESIST BL/6IN.	time	OVA READINGS (PPM) SAMPLE	AMB. AIR	time	REMARKS
	No recovery		46	S-22	N R	7 16	11 30				
	TILL - grey med sand, silt, clay and gravel, wet, poorly consolidated		47 48	S-23	1.1	6 8 12 12	12 00				
	TILL - grey m-c sand with gravel, tr. silt and clay, wet, Poorly consolidated		49 50	S-24	1.0	9 11 19 20	12 10				
	Dark grey dense TILL (silty clay with rock fragments), moist		51 52	S-25	1.1	7 9 17 12	12 45				
	Dark grey dense TILL (silty clay with rock fragments), moist		53 54	S-26	0.8	21 27 35 39	1 00				
	Dark grey dense TILL (silty clay with tr. gravel, moist		55 56	S-27	0.6	38 32 37 35	1 05				
	Dark grey dense TILL (silty clay with tr. gravel, rock fragment in nose of spoon		57 58	S-28	0.3	32 39 46 63	1 10				Rock in spoon - grey, planar, with bedding or foliation.
			59 60								

PIEZOMETER AND MONITORING WELL CONSTRUCTION DETAILS

AM89-149A

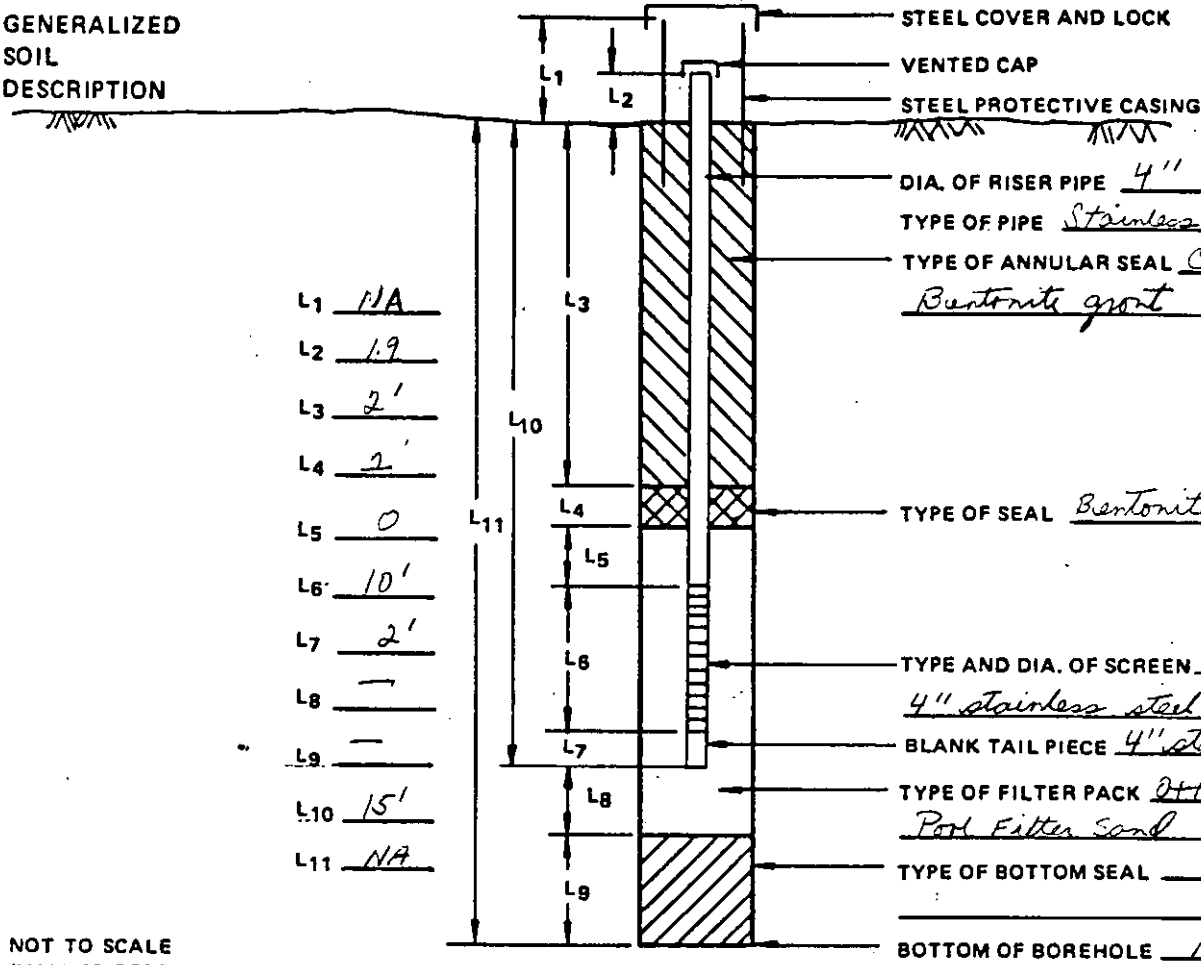
WOODWARD–CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

CONSTRUCTION OF MONITORING WELL NO. MW-1 S

PROJECT AND LOCATION: CIBA-GEIGY, Cranston, RI	GROUND ELEV. AND DATUM: 13.74' MSL	PROJECT NO.: 87 x 4660
DRILLING AGENCY: Soil Exploration	TOP OF RISER ELEV.: 15.67'	DATE FINISHED: 5/18/88
METHOD OF DRILLING: 8¼" ID HSA	TOP OF PROTECTIVE CASING ELEV.: NA	INSPECTOR: M. Hourlday
DIA. OF BOREHOLE: 14"	GROUND WATER ELEV.: 10.46' (6/7/88)	CHECKED BY:
DEPTH OF BOREHOLE: 15'		

GENERALIZED SOIL DESCRIPTION



L1 NA
L2 1.9
L3 2'
L4 2'
L5 0
L6 10'
L7 2'
L8 —
L9 —
L10 15'
L11 NA

STEEL COVER AND LOCK

VENTED CAP

STEEL PROTECTIVE CASING

DIA. OF RISER PIPE 4"

TYPE OF PIPE Stainless Steel

TYPE OF ANNULAR SEAL Cement-Bentonite grout

TYPE OF SEAL Bentonite pellet

TYPE AND DIA. OF SCREEN 10 slot 4" stainless steel

BLANK TAIL PIECE 4" stainless steel

TYPE OF FILTER PACK Ottawa Pool Filter Sand

TYPE OF BOTTOM SEAL N/A

BOTTOM OF BOREHOLE N/A

NOT TO SCALE
(VALUES REPORTED IN FT)

REMARKS Augered down to 15' using an 8¼" ID hollow stem auger. Installed blank tail piece (15'-13'), 10 slot screen (13'-3'), and riser pipe (3' ≈ 3' above ground surface). All well materials were constructed of 4" - sch. 5, 316 stainless steel. Well installation included a filter pack of Ottawa pool sand (15-4'), secondary filter pack (4'-3'), bentonite pellet seal (3-2'), and a cement-bentonite annular seal (2'-surface).

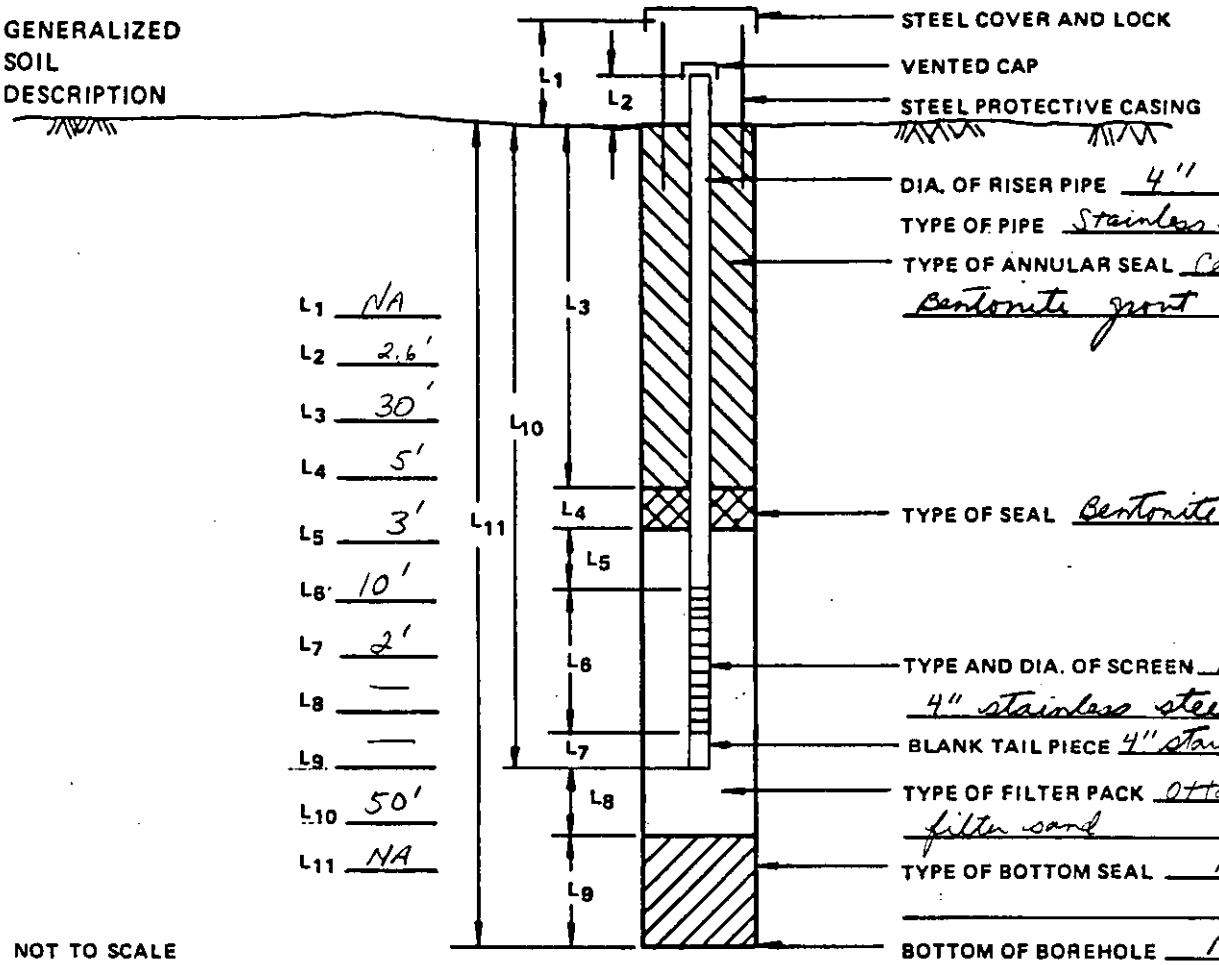
WOODWARD–CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

CONSTRUCTION OF MONITORING WELL NO. MW-1D

PROJECT AND LOCATION	GROUND ELEV. AND DATUM	PROJECT NO.
CIBA-GEIGY, Cranston, RI	13.74' MSL	87x4660
DRILLING AGENCY	TOP OF RISER ELEV.	DATE FINISHED
Soil Exploration	16.34'	5/21/88
METHOD OF DRILLING 8¼" ID HSA	TOP OF PROTECTIVE CASING ELEV.	INSPECTOR:
DIA. OF BOREHOLE 14"	NA	M. HOULDAY
DEPTH OF BOREHOLE 50'	GROUND WATER ELEV.	CHECKED BY:
	9.87' (6/7/88)	

GENERALIZED SOIL DESCRIPTION



STEEL COVER AND LOCK

VENTED CAP

STEEL PROTECTIVE CASING

DIA. OF RISER PIPE 4"

TYPE OF PIPE Stainless Steel

TYPE OF ANNULAR SEAL Cement-Bentonite grout

TYPE OF SEAL Bentonite pellet

TYPE AND DIA. OF SCREEN 10 slot, 4" stainless steel

BLANK TAIL PIECE 4" stainless steel

TYPE OF FILTER PACK Ottawa filter sand

TYPE OF BOTTOM SEAL NA

BOTTOM OF BOREHOLE NA

L1 NA
L2 2.6'
L3 30'
L4 5'
L5 3'
L6 10'
L7 2'
L8 —
L9 —
L10 50'
L11 NA

NOT TO SCALE
(VALUES REPORTED IN FT)

REMARKS Augered down to 50' using 8¼" ID hollow stem augers. Installed blank tail piece (50-48'), 10 slot screen (48-38'), and riser pipe (38-≈3' above ground surface). All well materials were constructed of 4", sch 5, 316 stainless steel. Well installation included a filter pack of Ottawa filter sand (50-36'); secondary filter pack (36-35'), bentonite pellet seal (35-30'), and a cement-bentonite annular seal (30'-surface).

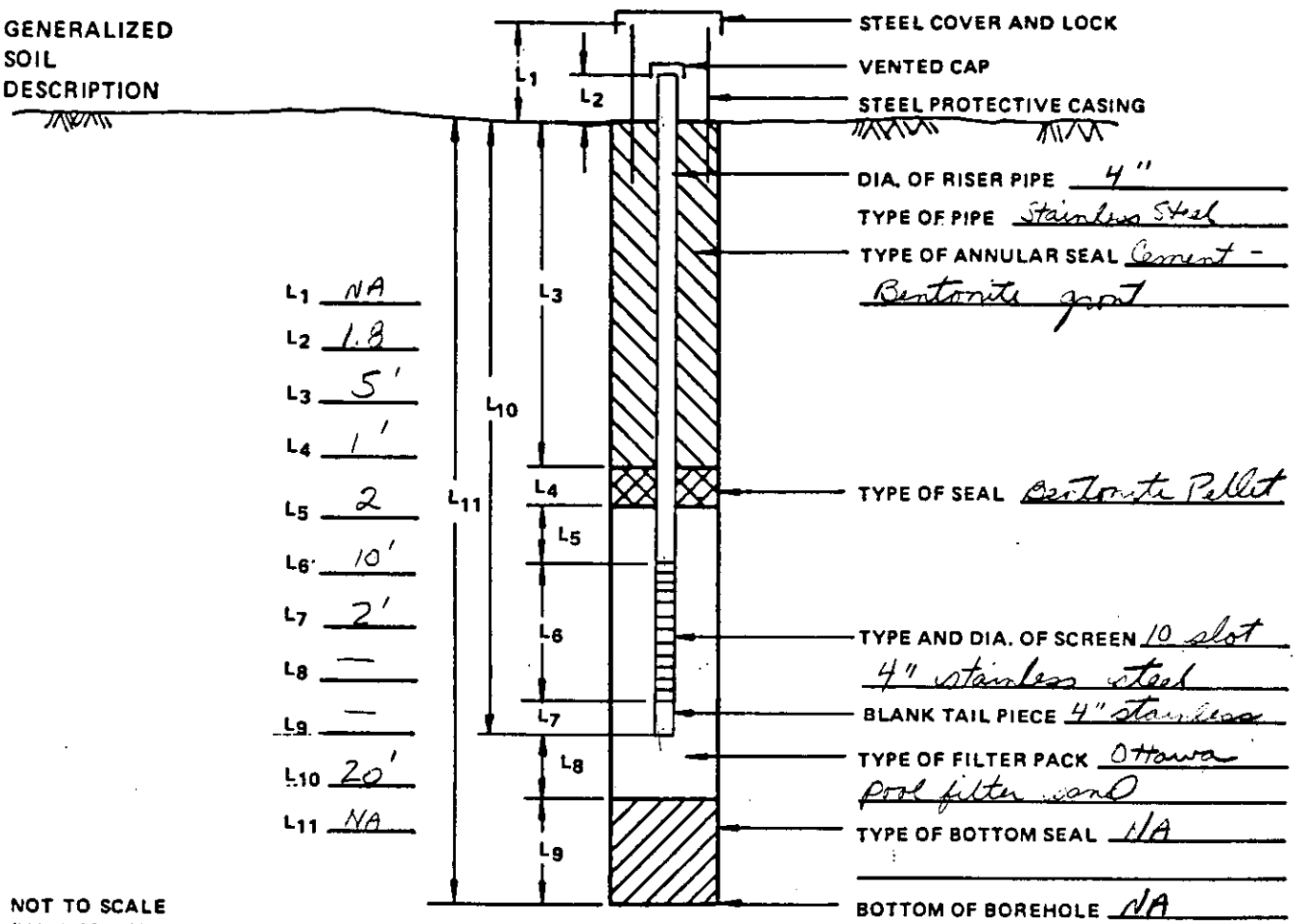
WOODWARD–CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

CONSTRUCTION OF MONITORING WELL NO. MW-2S

PROJECT AND LOCATION	GROUND ELEV. AND DATUM	PROJECT NO.
CIBA-GEIGY, Cranston, RI	12.68' MSL	87x4660
DRILLING AGENCY: Soil Exploration	TOP OF RISER ELEV. 14.50'	DATE FINISHED 5/17/88
METHOD OF DRILLING 8¼" ID HSA	TOP OF PROTECTIVE CASING ELEV. NA	INSPECTOR: R. Henning
DIA. OF BOREHOLE 14"	GROUND WATER ELEV. 9.54' (6/7/88)	CHECKED BY:
DEPTH OF BOREHOLE 20'		

GENERALIZED SOIL DESCRIPTION



L1 NA
L2 1.8
L3 5'
L4 1'
L5 2
L6 10'
L7 2'
L8 —
L9 —
L10 20'
L11 NA

NOT TO SCALE
(VALUES REPORTED IN FT)

REMARKS Augered down to 20' using an 8¼" ID hollow stem auger. Installed blank tail piece (20-18'); 10 slot screen (18-8') and riser (8-≈3' above grade). All well materials were constructed of 4", sch. 5, 316 stainless steel. Well installation included a filter pack of Ottawa filter sand (20-7'), secondary filter pack (7-6'); bentonite pellet seal (6-5'), and a cement-bentonite annular seal (5-surface).

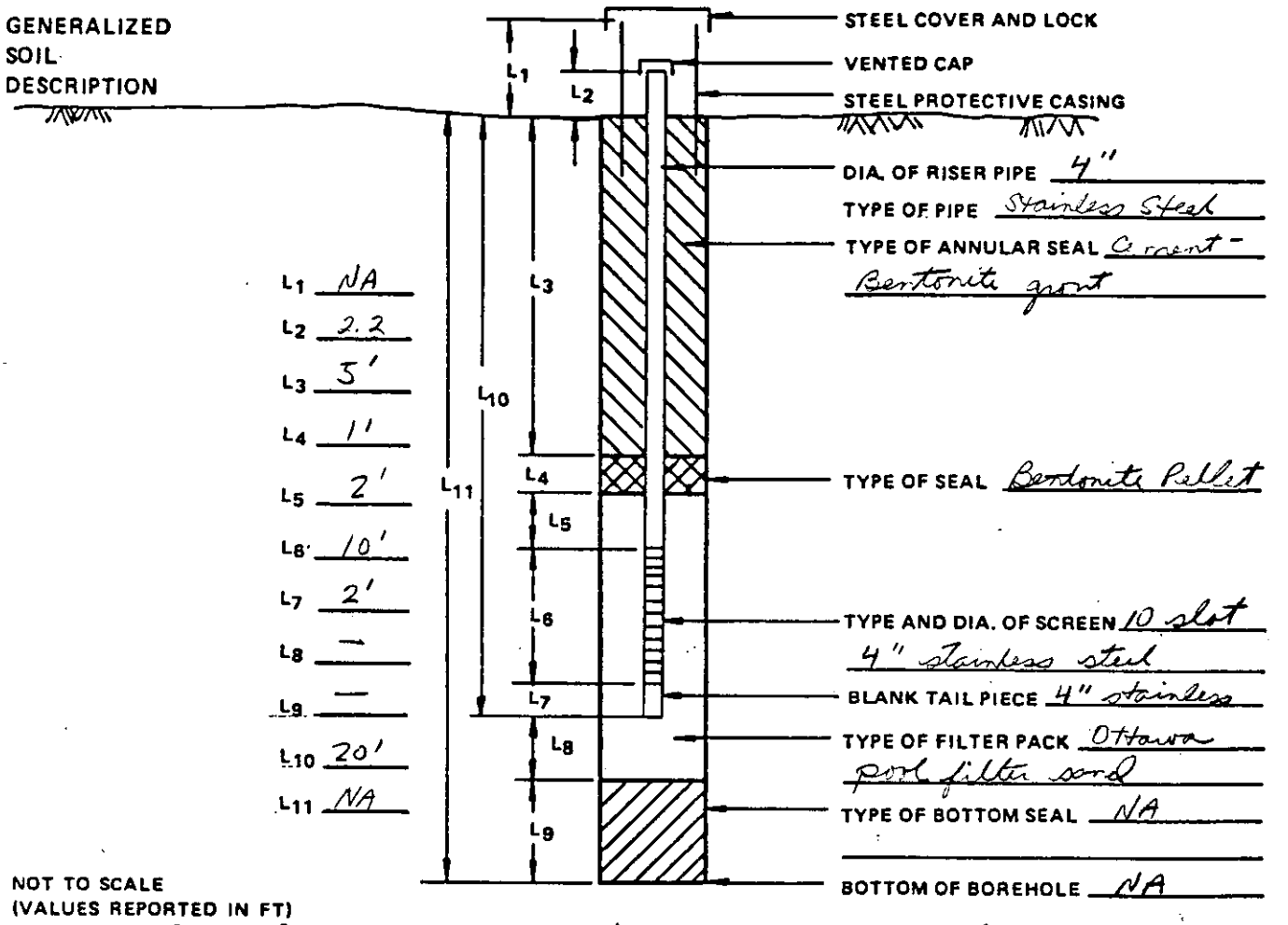
WOODWARD–CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

CONSTRUCTION OF MONITORING WELL NO. MW-3S

PROJECT AND LOCATION	GROUND ELEV. AND DATUM	PROJECT NO.
CIBA-GEIGY, Cranston, RI	14.52' MSL	87X4660
DRILLING AGENCY	TOP OF RISER ELEV.	DATE FINISHED
Soil Exploration Corp.	16.67'	5/17/88
METHOD OF DRILLING 8¼" ID HSA	TOP OF PROTECTIVE CASING ELEV. NA	INSPECTOR: R.J. Hennings
DIA. OF BOREHOLE 14"	GROUND WATER ELEV. 8.33 (6/7/88)	CHECKED BY:
DEPTH OF BOREHOLE 20'		

GENERALIZED SOIL DESCRIPTION



L1 NA
L2 2.2
L3 5'
L4 1'
L5 2'
L6 10'
L7 2'
L8 —
L9 —
L10 20'
L11 NA

NOT TO SCALE
(VALUES REPORTED IN FT)

REMARKS Augered down to 20' using an 8¼" ID hollow stem auger. Installed blank tail piece (20-18'); 10 slot screen (18-8') and riser (8-≈2.5' above grade). All well materials were constructed of 4", sch. 5, 316 stainless steel. Well installation included a filter pack of Ottawa filter sand (20-7'), secondary filter pack (7-6'); bentonite pellet seal (6-5'), and a cement-bentonite annular seal.

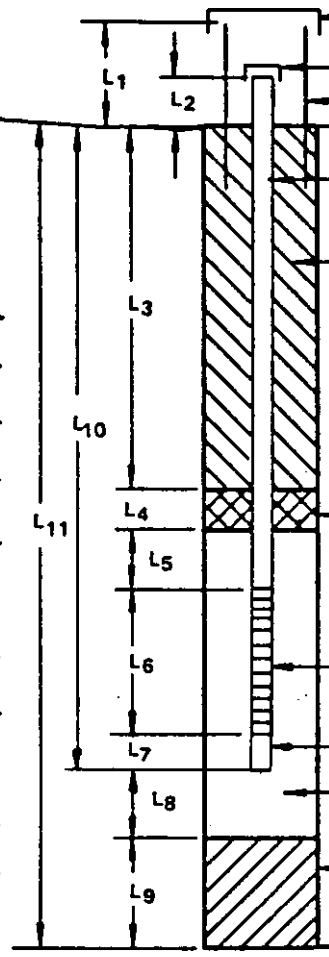
WOODWARD–CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

CONSTRUCTION OF MONITORING WELL NO. MW-4S

PROJECT AND LOCATION	GROUND ELEV. AND DATUM	PROJECT NO.
CIBA-GEIGY, Cranston, RI	18.36' MSL	87X4660
DRILLING AGENCY: Soil Exploration	TOP OF RISER ELEV.: 21.34'	DATE FINISHED: 5/17/88
METHOD OF DRILLING: 8¼" ID HSA	TOP OF PROTECTIVE CASING ELEV.: NA	INSPECTOR: MARK HOULDAY
DIA. OF BOREHOLE: 14"	GROUND WATER ELEV.: 12.11 (6/7/88)	CHECKED BY:
DEPTH OF BOREHOLE: 18'		

GENERALIZED SOIL DESCRIPTION



L1 NA
L2 3.0
L3 2'
L4 2'
L5 2'
L6 10'
L7 2'
L8 —
L9 —
L10 18'
L11 NA

STEEL COVER AND LOCK

VENTED CAP

STEEL PROTECTIVE CASING

DIA. OF RISER PIPE 4"

TYPE OF PIPE Stainless Steel

TYPE OF ANNULAR SEAL Cement - bentonite grout

TYPE OF SEAL Bentonite pellet

TYPE AND DIA. OF SCREEN 10 slot 4" stainless steel

BLANK TAIL PIECE 4" stainless steel

TYPE OF FILTER PACK Ottawa filter sand

TYPE OF BOTTOM SEAL NA

BOTTOM OF BOREHOLE NA

NOT TO SCALE
(VALUES REPORTED IN FT)

REMARKS Augered down to 18' using 8¼" ID hollow stem augers. Installed blank tail piece (18'-16'), 10 slot screen (16-6'), and riser pipe (6'-≈3' above surface). All well materials were constructed of 4", sch. 5, 316 stainless steel. Well installation included a filter pack of Ottawa filter sand (18-5'), secondary filter pack (5-4'), bentonite pellet seal (4-2'), and a cement-bentonite annular seal (2'-surface).

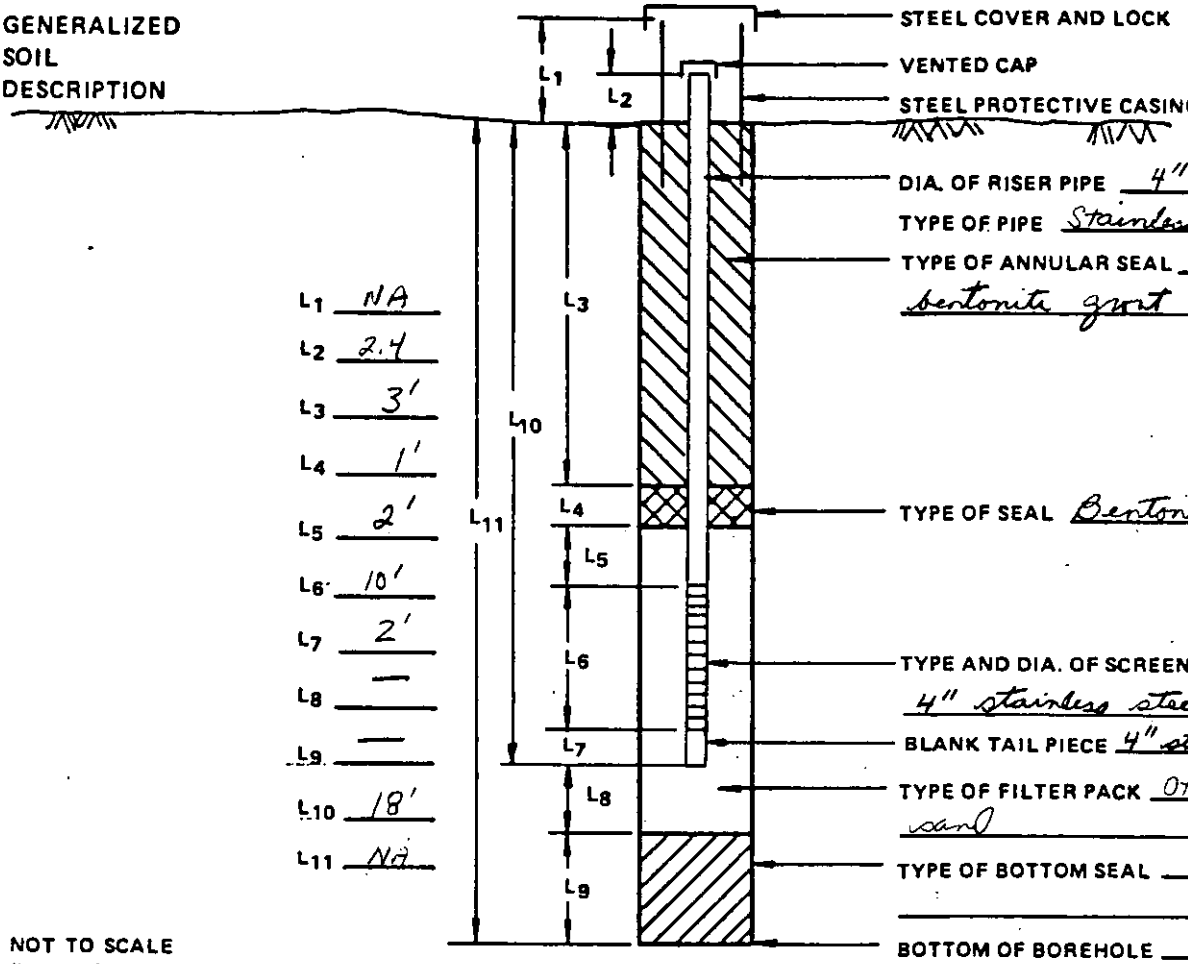
WOODWARD–CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

CONSTRUCTION OF MONITORING WELL NO. MW-5S

PROJECT AND LOCATION	GROUND ELEV. AND DATUM	PROJECT NO.
CIBA-GEIGY, Cranston, RI	23.82' MSL	87x4660
DRILLING AGENCY: Soil Exploration	TOP OF RISER ELEV. 26.23'	DATE FINISHED 5/23/88
METHOD OF DRILLING 8¼" ID HSA	TOP OF PROTECTIVE CASING ELEV. NA	INSPECTOR: M. HOULDAY
DIA. OF BOREHOLE 14"	GROUND WATER ELEV. 12.11 (6/7/88)	CHECKED BY:
DEPTH OF BOREHOLE 18'		

GENERALIZED SOIL DESCRIPTION



STEEL COVER AND LOCK

VENTED CAP

STEEL PROTECTIVE CASING

DIA. OF RISER PIPE 4"

TYPE OF PIPE Stainless Steel

TYPE OF ANNULAR SEAL Cement-bentonite grout

TYPE OF SEAL Bentonite pellet

TYPE AND DIA. OF SCREEN 10 slot 4" stainless steel

BLANK TAIL PIECE 4" stainless steel

TYPE OF FILTER PACK Ottawa filter sand

TYPE OF BOTTOM SEAL NA

BOTTOM OF BOREHOLE NA

L1 NA
L2 2.4
L3 3'
L4 1'
L5 2'
L6 10'
L7 2'
L8 —
L9 —
L10 18'
L11 NA

NOT TO SCALE
(VALUES REPORTED IN FT)

REMARKS Augered down to 18' using 8¼" hollow stem augers. Installed blank tail piece (18-16'), 10 slot screen (16-6'), and riser pipe (6'-≈3' above ground surface). All well materials were constructed of 4", sch. 5, 316 stainless steel. Well installation included a filter pack of Ottawa filter sand (18-5'), secondary filter pack (5-4'), bentonite pellet seal (4-3'), and a cement-bentonite annular seal (3'-surface).

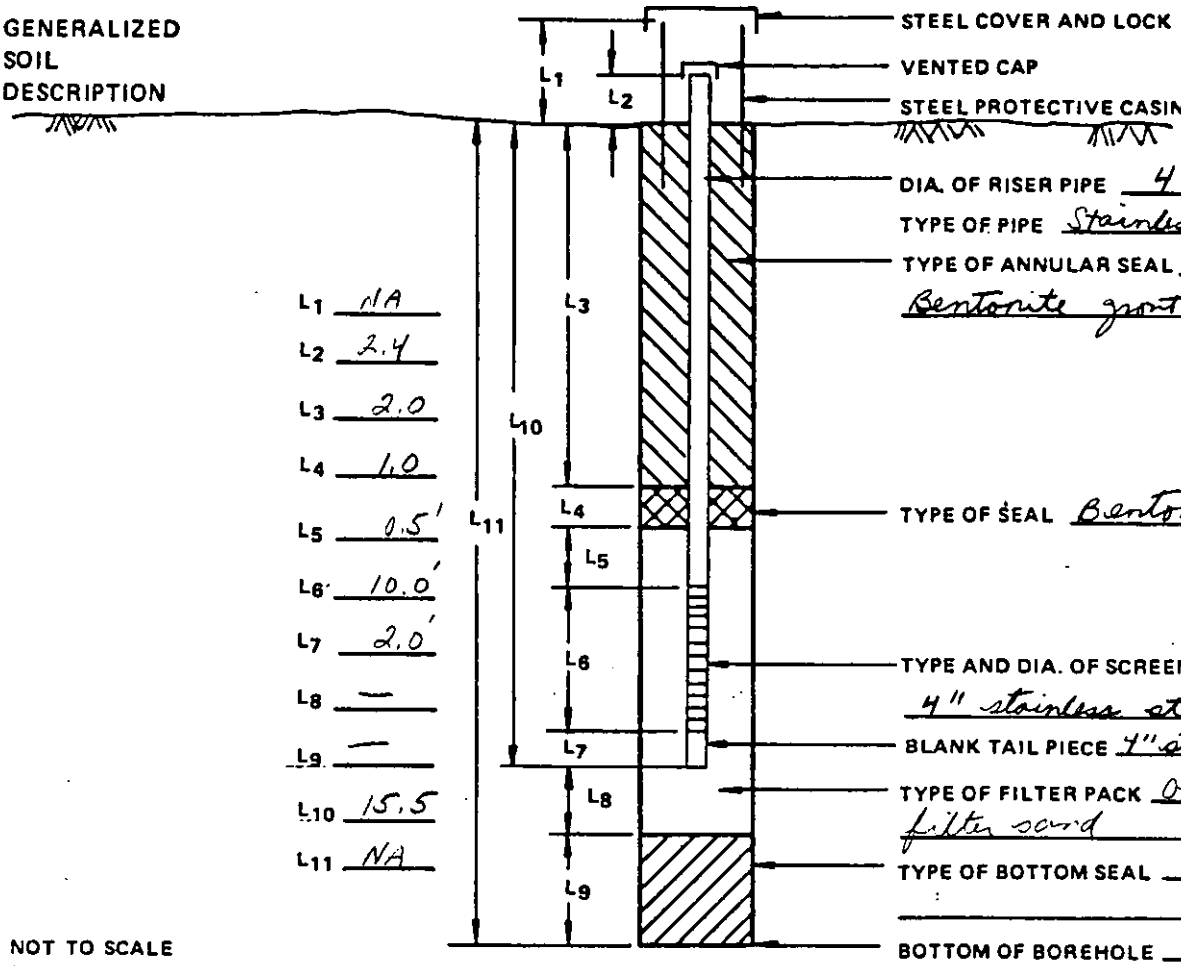
WOODWARD–CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

CONSTRUCTION OF MONITORING WELL NO. MW-6S

PROJECT AND LOCATION	GROUND ELEV. AND DATUM	PROJECT NO.
CIBA-GEIGY, Cranston, RI	11.62' MSL	87X4660
DRILLING AGENCY: Soil Exploration	TOP OF RISER ELEV. 14.04'	DATE FINISHED 5/19/88
METHOD OF DRILLING 8¼" ID HSA	TOP OF PROTECTIVE CASING ELEV. NA	INSPECTOR: M. HOULDAY
DIA. OF BOREHOLE 14"	GROUND WATER ELEV. 7.17 (6/7/88)	CHECKED BY:
DEPTH OF BOREHOLE 15.5'		

GENERALIZED SOIL DESCRIPTION



STEEL COVER AND LOCK

VENTED CAP

STEEL PROTECTIVE CASING

DIA. OF RISER PIPE 4"

TYPE OF PIPE Stainless Steel

TYPE OF ANNULAR SEAL Cement-Bentonite grout

TYPE OF SEAL Bentonite pellet

TYPE AND DIA. OF SCREEN 10 slot 4" stainless steel

BLANK TAIL PIECE 4" stainless steel

TYPE OF FILTER PACK Ottawa filter sand

TYPE OF BOTTOM SEAL NA

BOTTOM OF BOREHOLE NA

L1 NA
L2 2.4
L3 2.0
L4 1.0
L5 0.5'
L6 10.0'
L7 2.0'
L8 —
L9 —
L10 15.5
L11 NA

NOT TO SCALE
(VALUES REPORTED IN FT)

REMARKS Augered down to 15.5' using using 8¼" ID hollow stem augers. Installed blank tail piece (15.5–13.5'), 10 slot screen (13.5–3.5'), and riser pipe (3.5–≈3' above ground surface). All well materials were constructed of 4", sch.5, 316 stainless steel. Well installation included a filter pack of Ottawa filter sand (15.5–3'), bentonite pellet seal (3'–2'), and a cement-bentonite annular seal (2'–surface).

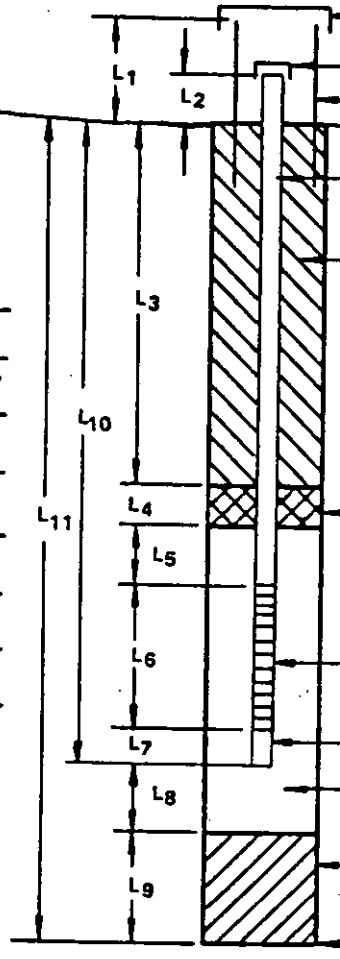
WOODWARD–CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

CONSTRUCTION OF MONITORING WELL NO. MW-7S

PROJECT AND LOCATION: CIBA-GEIGY, Cranston, RI	GROUND ELEV. AND DATUM: 13.04' MSL	PROJECT NO.: 87X4660
DRILLING AGENCY: Soil Exploration	TOP OF RISER ELEV.: 15.18'	DATE FINISHED: 5/18/88
METHOD OF DRILLING: 8¼" ID HSA	TOP OF PROTECTIVE CASING ELEV.: NA	INSPECTOR: M. HOULDAY
DIA. OF BOREHOLE: 14"	GROUND WATER ELEV.: 8.13' (6/7/88)	CHECKED BY:
DEPTH OF BOREHOLE: 20'		

GENERALIZED SOIL DESCRIPTION



L1 NA
L2 2.1'
L3 5'
L4 1'
L5 2'
L6 10'
L7 2'
L8 —
L9 —
L10 20'
L11 NA

STEEL COVER AND LOCK

VENTED CAP

STEEL PROTECTIVE CASING

DIA. OF RISER PIPE 4"

TYPE OF PIPE stainless steel

TYPE OF ANNULAR SEAL Cement - bentonite grout

TYPE OF SEAL bentonite pellet

TYPE AND DIA. OF SCREEN 10 slot, 4" stainless steel

BLANK TAIL PIECE 4" Stainless steel

TYPE OF FILTER PACK Ottawa filter sand

TYPE OF BOTTOM SEAL NA

BOTTOM OF BOREHOLE NA

NOT TO SCALE
(VALUES REPORTED IN FT)

REMARKS Augered down to 20' using 8¼" ID hollow stem augers. Installed blank tail piece (20-18'), 10 slot screen (18-8'), and riser pipe (8-≈2' above ground surface). All well materials were constructed of 4", sch. 5, 316 stainless steel. Well installation included a filter pack of Ottawa filter sand (20-7'), secondary filter pack (7-6'), bentonite pellet seal (6-5'), and a cement-bentonite annular seal (5-surface).

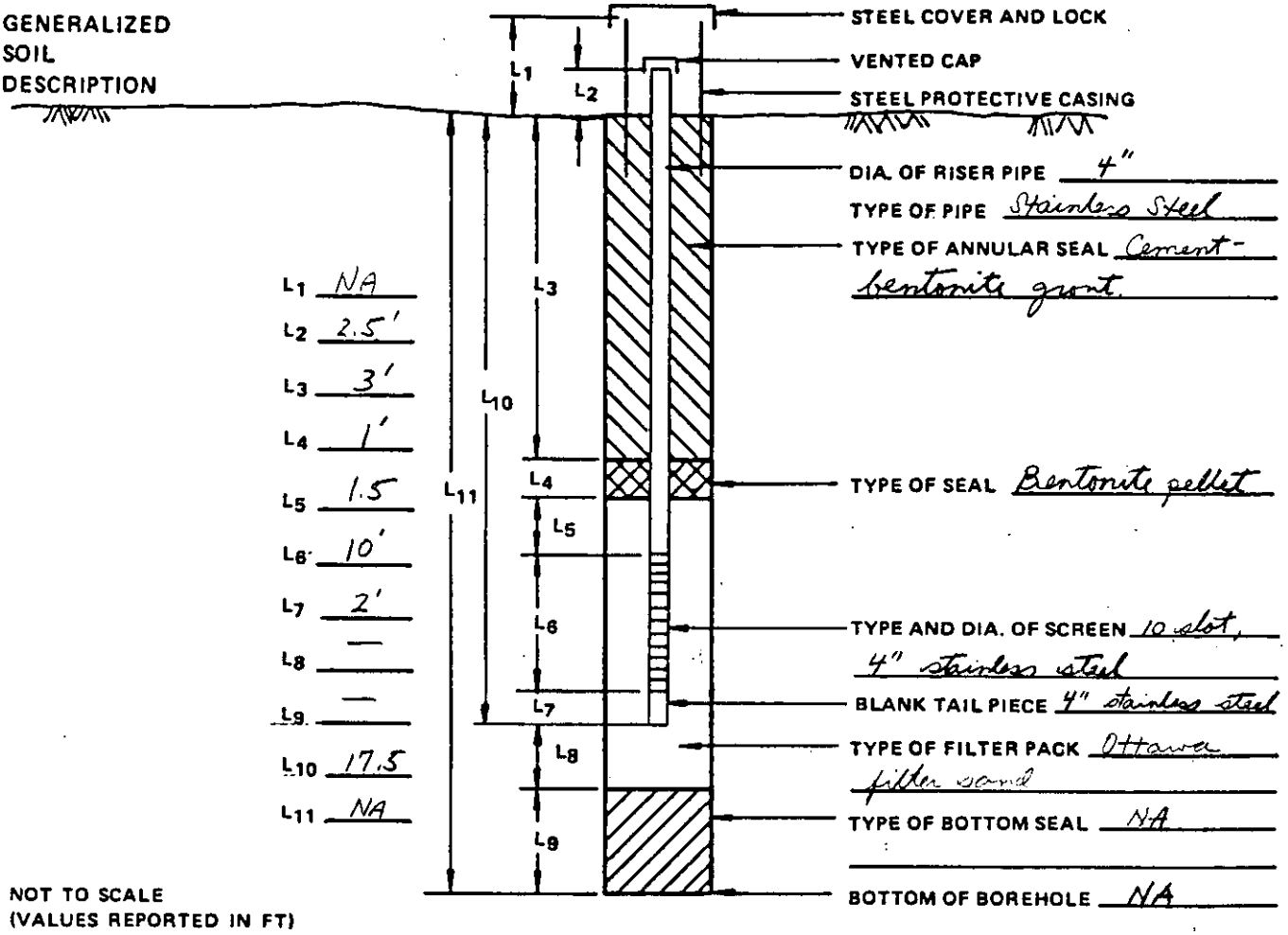
WOODWARD–CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

CONSTRUCTION OF MONITORING WELL NO. MW-8S

PROJECT AND LOCATION	GROUND ELEV. AND DATUM	PROJECT NO.
CIBA-GEIGY, Cranston, RI	15.00' MSL	87X4660
DRILLING AGENCY	TOP OF RISER ELEV.	DATE FINISHED
Soil Exploration	17.53'	5/19/88
METHOD OF DRILLING 8¼" ID HSA	TOP OF PROTECTIVE CASING ELEV.	INSPECTOR:
DIA. OF BOREHOLE 14"	NA	M. HOULDAY
DEPTH OF BOREHOLE 17.5'	GROUND WATER ELEV.	CHECKED BY:
	6.29' (6/7/88)	

GENERALIZED SOIL DESCRIPTION



L1 NA
L2 2.5'
L3 3'
L4 1'
L5 1.5
L6 10'
L7 2'
L8 —
L9 —
L10 17.5
L11 NA

NOT TO SCALE
(VALUES REPORTED IN FT)

REMARKS Augered down to 17.5' using 8¼" ID hollow stem augers. Installed blank tail piece (17.5 – 15.5'); 10 slot screen (15.5 – 5.5'), and riser pipe (5.5 – ≈ 3' above ground surface). All well materials were constructed of 4", sch 5, 316 stainless steel. Well installation included a filter pack of Ottawa filter sand (17.5' – 5'); secondary filter pack (5 – 4'), bentonite pellet seal (4 – 3'), and a cement-bentonite annular seal (3' – surface).

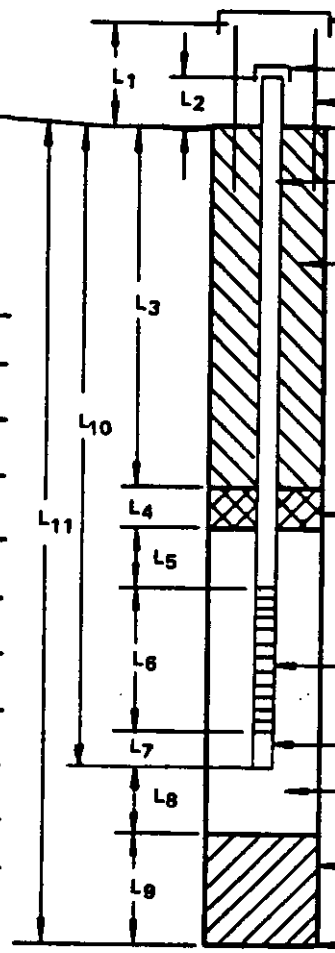
WOODWARD–CLYDE CONSULTANTS

CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS

CONSTRUCTION OF MONITORING WELL NO. MW-9S

PROJECT AND LOCATION: CIBA-GEIGY, Cranston, RI	GROUND ELEV. AND DATUM: 15.41' MSL	PROJECT NO.: 87X4660
DRILLING AGENCY: Soil Exploration	TOP OF RISER ELEV.: 17.84'	DATE FINISHED: 5/20/88
METHOD OF DRILLING: 8¼" ID HSA	TOP OF PROTECTIVE CASING ELEV.: NA	INSPECTOR: M. HOULDAY
DIA. OF BOREHOLE: 14"	GROUND WATER ELEV.: 11.60' (6/7/88)	CHECKED BY:
DEPTH OF BOREHOLE: 15'		

GENERALIZED SOIL DESCRIPTION



L1 NA
L2 2.4
L3 2'
L4 1'
L5 0
L6 10'
L7 2'
L8 —
L9 —
L10 15'
L11 NA

STEEL COVER AND LOCK

VENTED CAP

STEEL PROTECTIVE CASING

DIA. OF RISER PIPE 4"

TYPE OF PIPE Stainless Steel

TYPE OF ANNULAR SEAL Cement-bentonite grout

TYPE OF SEAL Bentonite grout

TYPE AND DIA. OF SCREEN 10 slot 4" stainless steel

BLANK TAIL PIECE 4" stainless steel

TYPE OF FILTER PACK Ottawa filter sand

TYPE OF BOTTOM SEAL NA

BOTTOM OF BOREHOLE NA

NOT TO SCALE
(VALUES REPORTED IN FT)

REMARKS Augered down to 15' using 8¼" ID hollow stem augers. Installed blank tail piece (15-13'), 10 slot screen (13'-3'), and riser pipe (3' - ≈3' above ground surface). All well materials were constructed of 4", sch. 5, 316 stainless steel. Well installation included a filter pack of Ottawa filter sand (15-4'), secondary filter pack (4-3'), bentonite pellet seal (3-2'), and a cement-bentonite annular seal (2'-surface).

PIEZOMETER INSTALLATION REPORT

Project CIBA - GEIGY

Project No. 87X4660 Installed By Able Drilling

Piezometer No. P-1S

Location Production Area (Southern End)

Date 4/11/88 Time 3:30

Method of Installation Augered through ≈ 2' of fill materials. Inserted well point and drove well point down to a depth of 10'.

LOG OF BORING AND PIEZOMETER

BORING

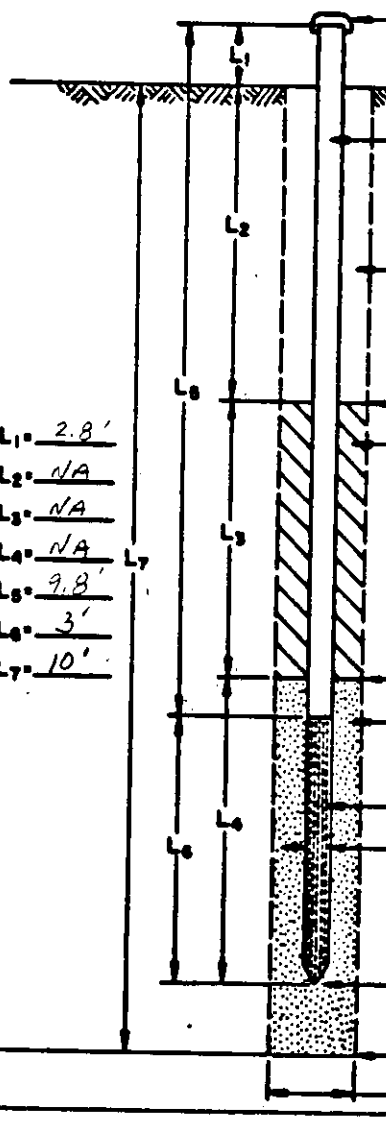
Depth in ft.	Description	Symbol
0	FILL, brown - dark brown silt with some clay, of sand, and gravel, moist. (Observations based on return of soil cuttings during drilling)	
5		

PIEZOMETER

Type of Piezometer 3' galvanized steel well point

Ground Elev. 13.73'

Top of Riser Elev. 16.48'



L_1 = 2.8'
L_2 = NA
L_3 = NA
L_4 = NA
L_5 = 9.8'
L_6 = 3'
L_7 = 10'

Vented Cap

I.D. of Riser Pipe 1¼"

Type of Pipe steel

Type of Backfill Around Riser soil cuttings

Top of Seal Elev. N/A

Type of Seal Material NA

Top of Filter Elev. N/A

Type of Filter Material IN SITU SOIL

Size of Openings 80 guage

Diameter of Piezometer Tip 1¼"

Bottom of Piez. Elev. 3.73'

Bottom of Boring Elev. 3.73'

Diameter of Boring NA

Remarks

Inspected By M. Holliday

WOODWARD-CLYDE CONSULTANTS

PIEZOMETER INSTALLATION REPORT

Project: CIBA-GEIGY

Project No.: 87X4660 Installed By: Able Drilling

Piezometer No.: P-1D

Location: Production Area (Southern End)

Date: 4/11/88 Time: 3:[illegible]

Method of Installation: Using a 4" ID hollow stem auger, drilled down to ≈ 47.5' installed well point to 43'. Backfilled using soil cuttings.

LOG OF BORING AND PIEZOMETER

BORING

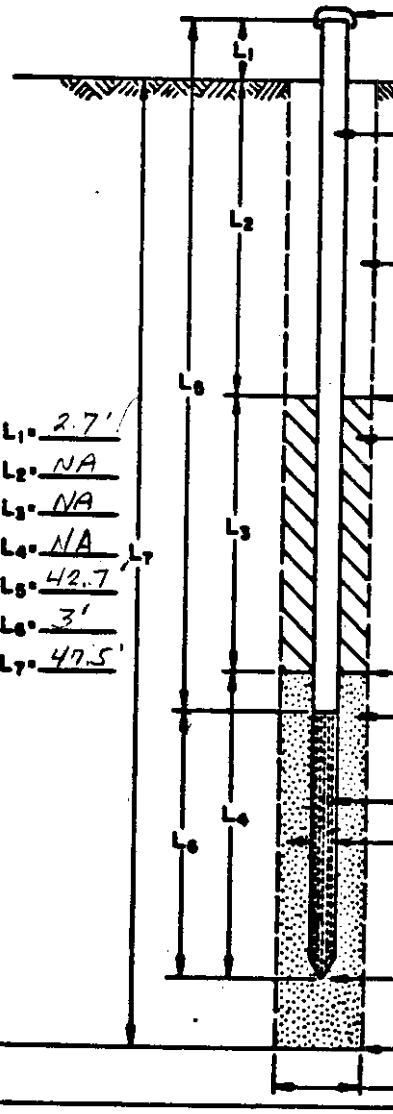
Depth in ft.	Description	Symbol
	See Boring Logs for P1D	

PIEZOMETER

Type of Piezometer: 3' galvanized steel well point

Ground Elev.: 13.73

Top of Riser Elev.: 16.38'



Vented Cap

I.D. of Riser Pipe: 1¼"

Type of Pipe: Steel

Type of Backfill Around Riser: Soil Cuttings

Top of Seal Elev.: NA

Type of Seal Material: NA

Top of Filter Elev.: NA

Type of Filter Material: Soil Cuttings

Size of Openings: 80 gauge

Diameter of Piezometer Tip: 1¼"

Bottom of Piez. Elev.: -29.27

Bottom of Boring Elev.: -35.77

Diameter of Boring: ≈ 8"

L_1 = 2.7'
L_2 = NA
L_3 = NA
L_4 = NA
L_5 = 42.7'
L_6 = 3'
L_7 = 47.5'

Remarks: Took continuous split spoon samples down to ≈ 49.5'. Hit clay layer at about 47.5'. Sediments washed up into augers. As a result, we could only get piezometer down to a depth of 43'.

Inspected By: Mark Holiday

WOODWARD – CLYDE CONSULTANTS

PIEZOMETER INSTALLATION REPORT

Project: CIBA - GEIGY
Project No.: 87X4660 Installed By: Able Drilling
Piezometer No.: P-2S
Location: Production Area (Southern End)
Date: 4/12/88 Time: 8:32 AM

Method of Installation: Augured down through fill material (≈4.5'). Pushed well point down to a depth of 8-11'.

LOG OF BORING AND PIEZOMETER

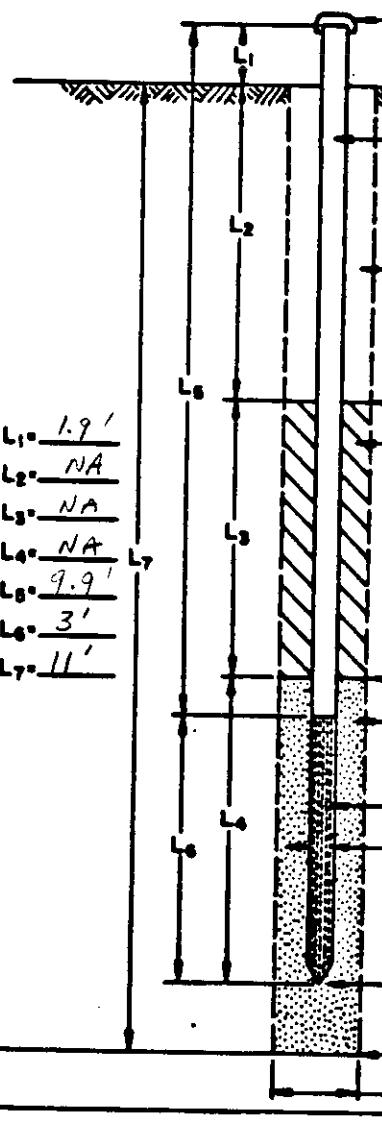
BORING

Depth in ft.	Description	Symbol
0	FILL - brown - dark brown silt with ∫ sand, clay and gravel, moist. (Observations based on return of soil cuttings during drilling)	
5		

PIEZOMETER

Type of Piezometer: 3' galvanized steel well point

Ground Elev.: 12.78'
Top of Riser Elev.: 14.71'



L_1 = 1.9'
L_2 = NA
L_3 = NA
L_4 = NA
L_5 = 9.9'
L_6 = 3'
L_7 = 11'

Vented Cap
I.D. of Riser Pipe: 1¼"
Type of Pipe: galvanized steel
Type of Backfill Around Riser: Soil Cuttings
Top of Seal Elev.: NA
Type of Seal Material: NA
Top of Filter Elev.: NA
Type of Filter Material: Native Soil
Size of Openings: 20 gauge
Diameter of Piezometer Tip: 1¼"
Bottom of Piez. Elev.: 1.78'
Bottom of Boring Elev.: 1.78'
Diameter of Boring: NA

Remarks: Encountered alot of fill material during installation. Location of piezometer was moved 3 times before installation could be completed.

Inspected By: Mark Houlday

WOODWARD - CLYDE CONSULTANTS

PIEZOMETER INSTALLATION REPORT

Project: CIBA-GEIGY
Project No.: 87X4660 Installed By: Able Drilling
Piezometer No.: P-3S
Location: Production Area (Southern End)
Date: 4/12/88 Time: ~930

Method of Installation: Augered through fill material down to a depth of 3'. Pushed and hammered well point down to 8.5-11.5'.

LOG OF BORING AND PIEZOMETER

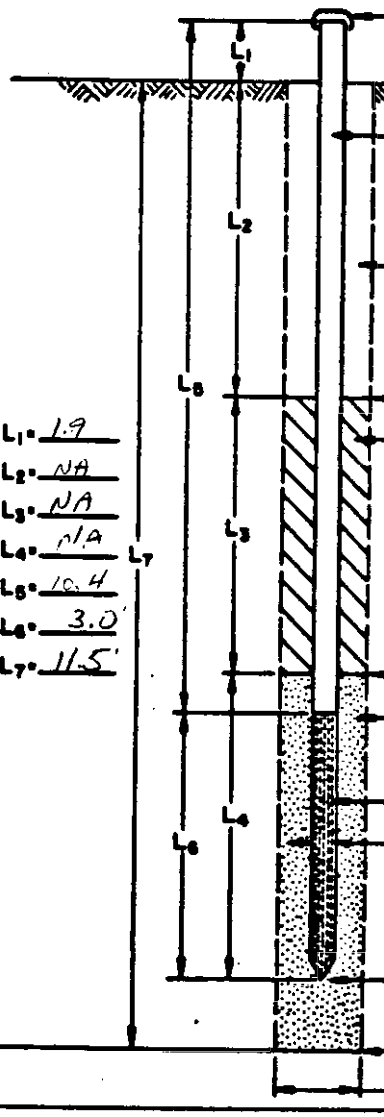
BORING

Depth in ft.	Description	Symbol
0	FILL - brown - dark brown silt with f sand, clay and gravel, moist. (Observation based on return of soil cuttings during drilling).	
5		

PIEZOMETER

Type of Piezometer: 3' galvanized steel well point

Ground Elev.: 14.45' Top of Riser Elev.: 16.33'



Vented Cap

I.D. of Riser Pipe: 1¼"

Type of Pipe: galvanized steel

Type of Backfill Around Riser: Soil cuttings

Top of Seal Elev.: NA

Type of Seal Material: NA

Top of Filter Elev.: NA

Type of Filter Material: Insitu Soil

Size of Openings: 20 gauge

Diameter of Piezometer Tip: 1¼"

Bottom of Piez. Elev.: 2.95'

Bottom of Boring Elev.: 2.95'

Diameter of Boring: NA

L1 = 1.9
L2 = NA
L3 = NA
L4 = NA
L5 = 10.4
L6 = 3.0'
L7 = 11.5'

Remarks:

Inspected By: K. Houlsby

WOODWARD-CLYDE CONSULTANTS

PIEZOMETER INSTALLATION REPORT

Project CIBA - GEIGY
Project No. 87X4660 Installed By Able Drilling

Piezometer No. P-4S
Location Production Area (along Mill St.)
Date 4/12/88 Time 10:00 AM

Method of Installation Augered down through 2' of fill material. Pushed down piezometer to 15-18'.

LOG OF BORING AND PIEZOMETER

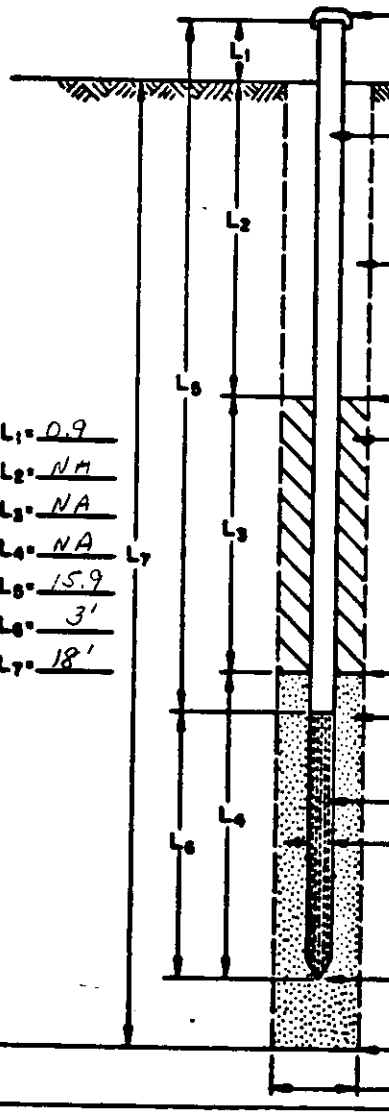
BORING

Depth in ft.	Description	Symbol
0	FILL - brown sandy silt with some clay and gravel, moist. (Observations based on return of soil cuttings during drilling).	
5		

PIEZOMETER

Type of Piezometer 3' galvanized steel well point

Ground Elev. 19.08'
Top of Riser Elev. 19.99'



Vented Cap

I.D. of Riser Pipe 1¼"

Type of Pipe galvanized steel

Type of Backfill Around Riser Soil Cuttings

Top of Seal Elev. NA

Type of Seal Material NA

L_1 = 0.9
L_2 = NA
L_3 = NA
L_4 = NA
L_5 = 15.9
L_6 = 3'
L_7 = 18'

Top of Filter Elev. NA

Type of Filter Material Sweetwater sand

Size of Openings 80 gauge

Diameter of Piezometer Tip 1¼"

Bottom of Piez. Elev. 1.08

Bottom of Boring Elev. 1.08

Diameter of Boring NA

Remarks Used elevation of existing piezometer (GW4) to target installation depth of P4. Depth of water in GW4 = 12.9'. Well point was therefore installed at 15-18'.

Inspected By R. Hoadley

WOODWARD - CLYDE CONSULTANTS

PIEZOMETER INSTALLATION REPORT

Project: CIBA - GEIGY
Project No.: 87X4660 Installed By: Able Drilling
Piezometer No.: P55
Location: Production Area (South-Central Area)
Date: 4/12/88 Time: 10 38

Method of Installation: Augured down to 2'. Inserted well point, pushed and drove piezometer down to 13 - 16'.

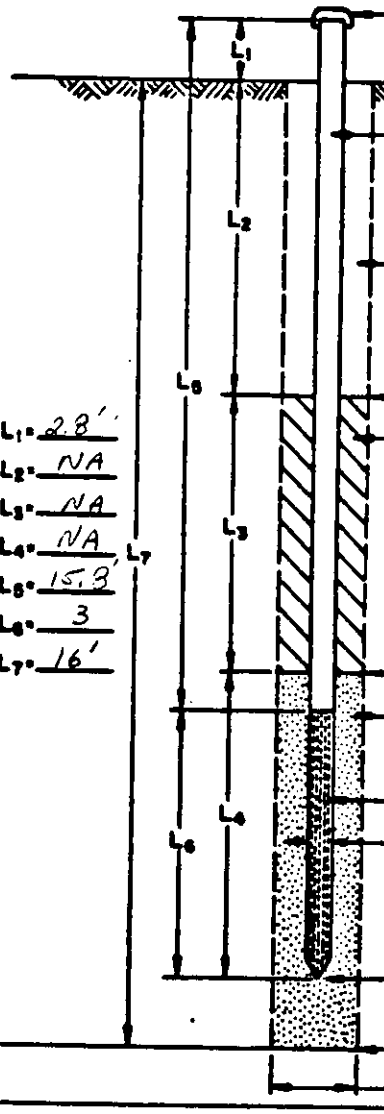
LOG OF BORING AND PIEZOMETER

BORING		
Depth in ft.	Description	Symbol

PIEZOMETER

Type of Piezometer: 3' galvanized steel well point

Ground Elev.: 18.48' Top of Riser Elev.: 21.27'



Vented Cap

I.D. of Riser Pipe: 1¼"

Type of Pipe: galvanized steel

Type of Backfill Around Riser: Soil cuttings

Top of Seal Elev.: NA

Type of Seal Material: NA

Top of Filter Elev.: NA

Type of Filter Material: Native soil

Size of Openings: 80 gauge

Diameter of Piezometer Tip: 1¼"

Bottom of Piez. Elev.: 2.48'

Bottom of Boring Elev.: 2.48'

Diameter of Boring: NA

L_1 = 2.8'
L_2 = NA
L_3 = NA
L_4 = NA
L_5 = 15.3'
L_6 = 3
L_7 = 16'

Remarks: Assumed depth of water table to be ≈ 11' (based on depth of water in GW4)

Inspected By: R. Hordley

WOODWARD - CLYDE CONSULTANTS

PIEZOMETER INSTALLATION REPORT

Project: CIBA - GEIGY
Project No.: 87X4660 Installed By: Able Drilling
Piezometer No.: P6S
Location: Production Area (Near RR Tracks)
Date: 4/12/88 Time: 12^00

Method of Installation: Augered down to 2'; inserted well point, pushed and hammered piezometer down to 15-18'.

LOG OF BORING AND PIEZOMETER

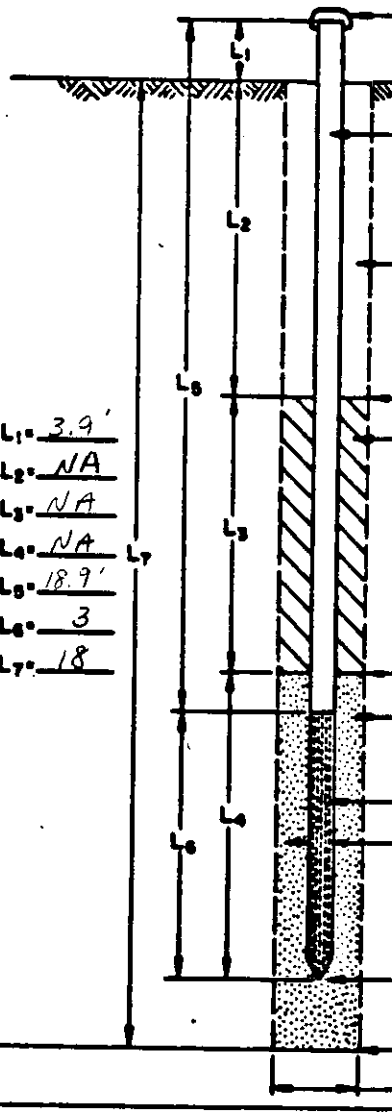
BORING

Depth in ft.	Description	Symbol
0	FILL - Brown - dark brown silty f sand with some clay, moist. (Observations based on return of soil cuttings during drilling)	
5		

PIEZOMETER

Type of Piezometer: 3' galvanized steel piezometer

Ground Elev.: 21.61'
Top of Riser Elev.: 23.71'



Vented Cap

I.D. of Riser Pipe: 1¼"
Type of Pipe: galvanized

Type of Backfill Around Riser: Soil Cuttings

Top of Seal Elev.: NA
Type of Seal Material: NA

Top of Filter Elev.: NA
Type of Filter Material: Native Soil

Size of Openings: 80 gauge
Diameter of Piezometer Tip: 1¼"

Bottom of Piez. Elev.: 3.61

Bottom of Boring Elev.: 3.61
Diameter of Boring: NA

L1 = 3.9'
L2 = NA
L3 = NA
L4 = NA
L5 = 18.9'
L6 = 3
L7 = 18

Remarks: P6S installed in former tank area. Initially, hit refusal at 13'. Offset location of P6S by ≈ 3'.

Inspected By: Mark Houlday

WOODWARD - CLYDE CONSULTANTS

PIEZOMETER INSTALLATION REPORT

Piezometer No. P6M

Project CIBA-GEIGY

Location Production Area (Near RR. Tracks)

Project No. 87X4660 Installed By ABLE DRILLING Co. Date 13 APR. 88 Time 7:30-1:30 pm

Method of Installation Augered to 23 FT → Hammered to 40 FT.
(2' Samples taken every 5 FT between 15 and 22 FT)
15' Samples " " every 5 FT between 25 and 40 FT)
No samples beyond 40 FT — hammered to 42.5 (POSSIBLY BEDROCK)

LOG OF BORING AND PIEZOMETER

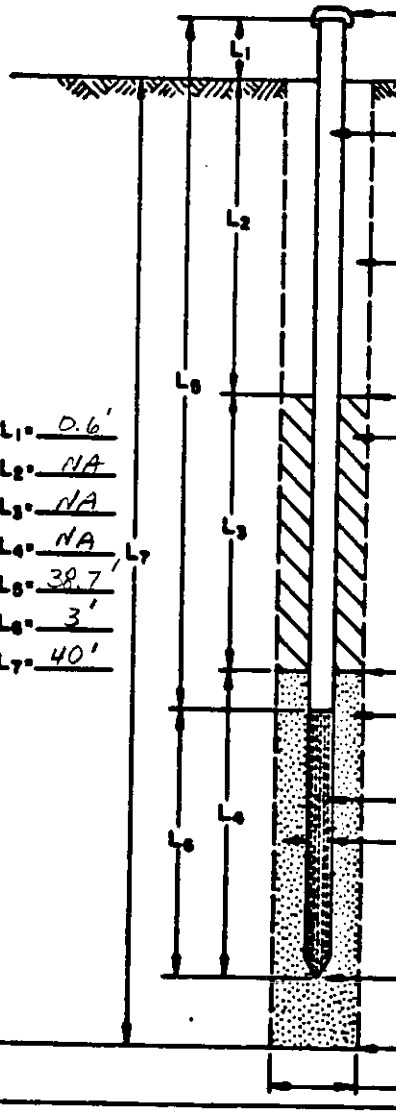
BORING

Depth in ft.	Description	Symbol
	For Details: See Boring Log for P6I.	
	WATER TABLE: ~ 14 FT	
	No samples available beyond 40 FT — hole collapse. Hammer to "possibly bedrock" (≈ 42.5')	

PIEZOMETER

Type of Piezometer 3' galvanized steel piezometer

Ground Elev. 21.39' Top of Riser Elev. 22.01'



Vented Cap

I.D. of Riser Pipe 1 1/4"

Type of Pipe galvanized steel

Type of Backfill Around Riser Soil Cuttings

Top of Seal Elev. N/A

Type of Seal Material N/A

Top of Filter Elev. N/A

Type of Filter Material Imported Soil

Size of Openings 80 gauge

Diameter of Piezometer Tip 1 1/4"

Bottom of Piez. Elev. -18.61'

Bottom of Boring Elev. -18.61'

Diameter of Boring NA

L1 = 0.6'
L2 = NA
L3 = NA
L4 = NA
L5 = 38.7'
L6 = 3'
L7 = 40'

Remarks

Inspected By L. Morisi

WOODWARD-CLYDE CONSULTANTS

PIEZOMETER INSTALLATION REPORT

Project CIBA - GEIGY
Project No. 87X4660 Installed By Able Drilling

Piezometer No. P-7S-A
Location Wastewater treatment area, SE corner
Date 4/12/88 Time 1:00 PM

Method of Installation Augured down to 3', water table is ≈ 4' based on data from existing piezometer. Well point pushed piezometer down to 6-9'.

LOG OF BORING AND PIEZOMETER

BORING

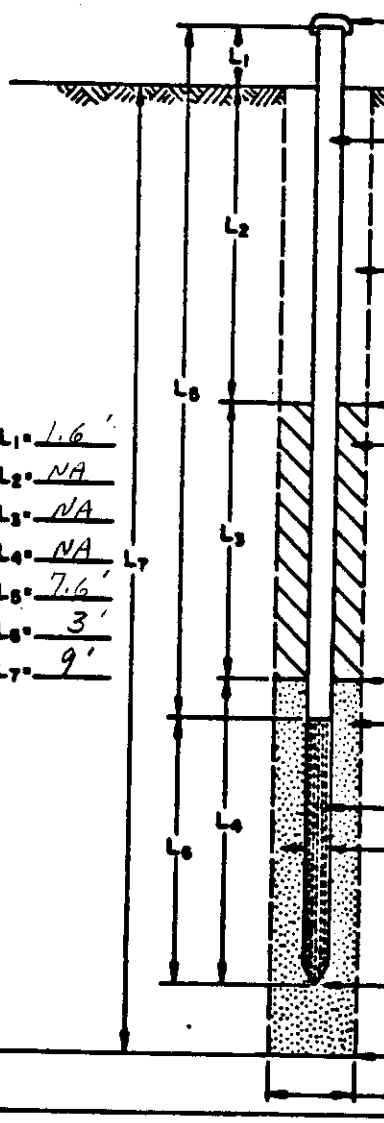
Depth in ft.	Description	Symbol
0	Brown - dark brown sandy SILT with clay, moist. (Observations based on return of soil cuttings during drilling).	
5		

PIEZOMETER

Type of Piezometer 3' galvanized steel piezometer

Ground Elev. 10.98'

Top of Riser Elev. 12.55'



L1 = 1.6'
L2 = NA
L3 = NA
L4 = NA
L5 = 7.6'
L6 = 3'
L7 = 9'

Vented Cap

I.D. of Riser Pipe 1¼"

Type of Pipe galvanized

Type of Backfill Around Riser Soil cuttings

Top of Seal Elev. NA

Type of Seal Material NA

Top of Filter Elev. NA

Type of Filter Material Native soil

Size of Openings ~~20 gauge~~

Diameter of Piezometer Tip 1¼"

Bottom of Piez. Elev. 1.98'

Bottom of Boring Elev. 1.98'

Diameter of Boring NA

Remarks Water table approximated from existing piezometer and elevation of river.

Inspected By M. Houlday

WOODWARD - CLYDE CONSULTANTS

PIEZOMETER INSTALLATION REPORT

Project CIBA - GEIGY
Project No. 87x4660 Installed By Able Drilling

Piezometer No. P-75-B
Location WesteWater Treatment Area, SE Corner
Date 4/15/88 Time ≈ 2:30 PM

Method of Installation Augered (solid stem) down to 15'. Took a split spoon sample from 15-17'. Hit clay layers at ≈ 16'.

LOG OF BORING AND PIEZOMETER

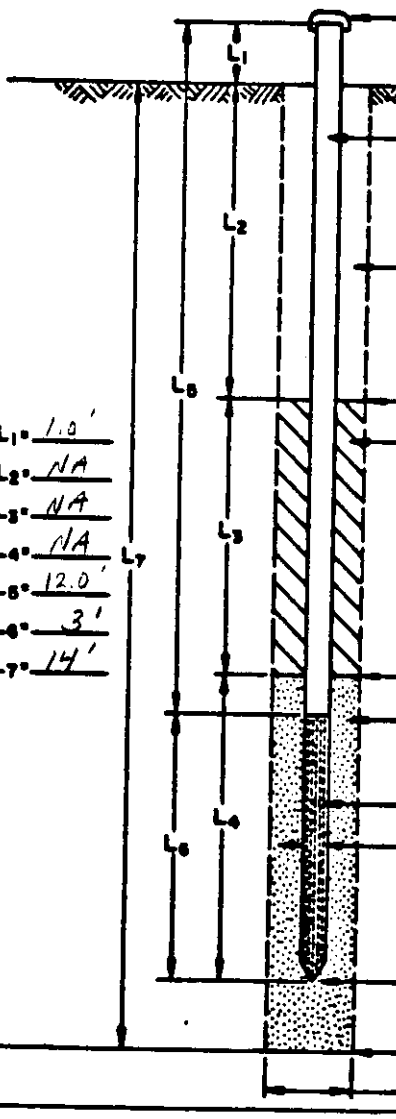
BORING

Depth in ft.	Description	Symbol
0	Brown - dark brown sandy SILT with clay, moist.	
5	Same as above, wet.	
10	(Observations based on return of soil cuttings during drilling).	

PIEZOMETER

Type of Piezometer 3' galvanized steel piezometer

Ground Elev. 10.98'
Top of Riser Elev. 11.99'



L_1 = 1.0'
L_2 = NA
L_3 = NA
L_4 = NA
L_5 = 12.0'
L_6 = 3'
L_7 = 14'

Vented Cap
I.D. of Riser Pipe 1¼"
Type of Pipe galvanized
Type of Backfill Around Riser Soil Cuttings
Top of Seal Elev. N/A
Type of Seal Material NA
Top of Filter Elev. N/A
Type of Filter Material Soil Cuttings
Size of Openings 80 gauge
Diameter of Piezometer Tip 1¼"
Bottom of Piez. Elev. -3.02
Bottom of Boring Elev. -3.02
Diameter of Boring NA

Remarks

Inspected By M. Holiday

WOODWARD-CLYDE CONSULTANTS

PIEZOMETER INSTALLATION REPORT

Project CIBA - GEIGY
Project No. 87X4660 Installed By Able Drilling

Piezometer No. P-8S
Location Wastewater Treatment Area, SW Corner
Date 4/12/88 Time 1:30 PM

Method of Installation Augered down to water table (≈6.5'). Inserted well point, pushed piezometer down to 11.5'

LOG OF BORING AND PIEZOMETER

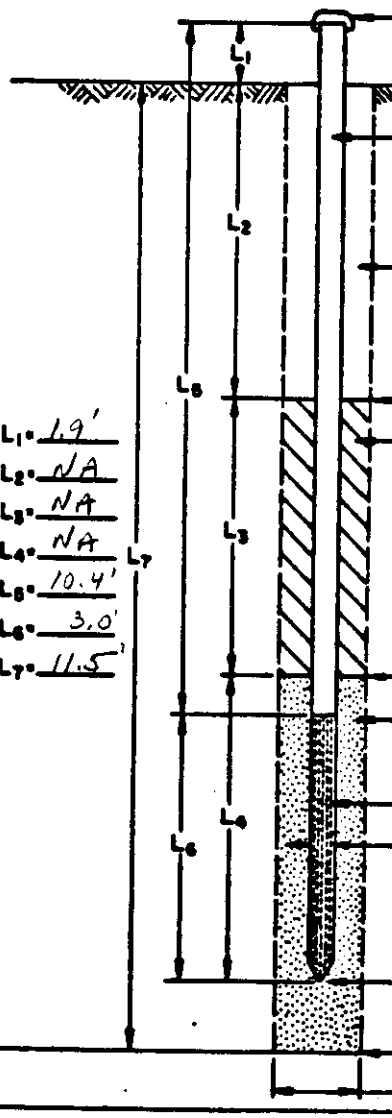
BORING

Depth in ft.	Description	Symbol
0	FILL - brown - dark brown sandy silt with clay, moist. (Observations based on return of soil cuttings during drilling).	
5		

PIEZOMETER

Type of Piezometer 3' galvanized steel piezometer

Ground Elev. 14.99' Top of Riser Elev. 16.93'



L1 = 1.9'
L2 = NA
L3 = NA
L4 = NA
L5 = 10.4'
L6 = 3.0'
L7 = 11.5'

Vented Cap

I.D. of Riser Pipe 1¼"

Type of Pipe galvanized steel

Type of Backfill Around Riser Soil cuttings

Top of Seal Elev. NA

Type of Seal Material NA

Top of Filter Elev. NA

Type of Filter Material Insitu Soil

Size of Openings 80 gauge

Diameter of Piezometer Tip 1¼"

Bottom of Piez. Elev. 3.49'

Bottom of Boring Elev. 3.49'

Diameter of Boring NA

Remarks Area has been filled in. Hit water table at 6.5', ≈ the same elevation of the river.

Inspected By M. Houlday

WOODWARD - CLYDE CONSULTANTS

PIEZOMETER INSTALLATION REPORT

Project: CIBA - GEIGY
Project No.: 87X4660 Installed By: ABLE
Piezometer No.: P-9S
Location: Center of Waste-Water Treatment area
Date: 7/12/88 Time: 4:00 pm

Method of Installation: Augered down to 7' = inserted well tip and pushed down to 12'.

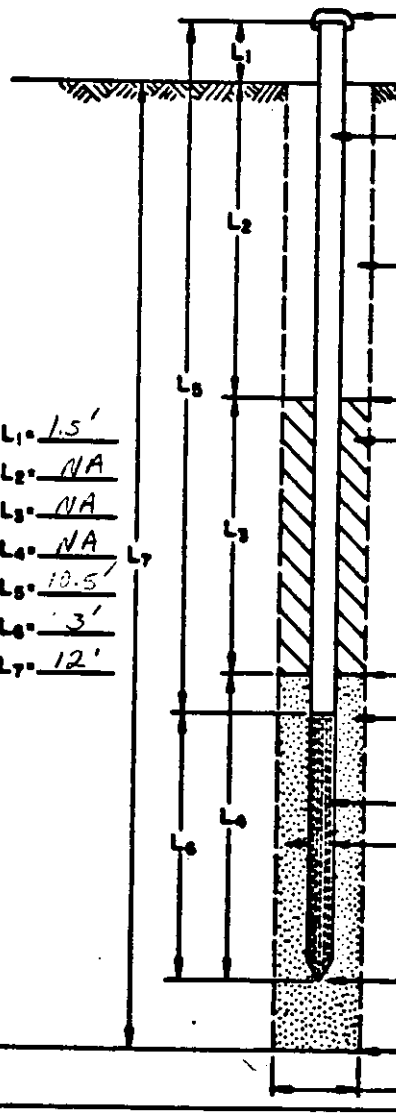
LOG OF BORING AND PIEZOMETER

BORING		
Depth in ft.	Description	Symbol

PIEZOMETER

Type of Piezometer: 3' galvanized steel piezometer

Ground Elev.: 14.65'
Top of Riser Elev.: 16.16'



Vented Cap

I.D. of Riser Pipe: 1 1/4"
Type of Pipe: galvanized steel
Type of Backfill Around Riser: Soil Cuttings
Top of Seal Elev.: N/A
Type of Seal Material: N/A
Top of Filter Elev.: N/A
Type of Filter Material: Native soil
Size of Openings: 80 mesh
Diameter of Piezometer Tip: 1 1/4"
Bottom of Piez. Elev.: 2.65'
Bottom of Boring Elev.: 2.65'
Diameter of Boring: NA

L1 = 1.5'
L2 = NA
L3 = NA
L4 = NA
L5 = 10.5'
L6 = 3'
L7 = 12'

Remarks:

Inspected By: M. H / L. M.

WOODWARD-CLYDE CONSULTANTS

PIEZOMETER INSTALLATION REPORT

Project: CIBA - GEIGY
Project No.: 87K4660 Installed By: ABLE

Piezometer No.: P-10S
Location: Warwick Area - along river
Date: 7/12/88 Time: 4:00 pm

Method of Installation:
Hugered down to a depth of 7 FT. Inserted well tip and pushed down to 12 FT.

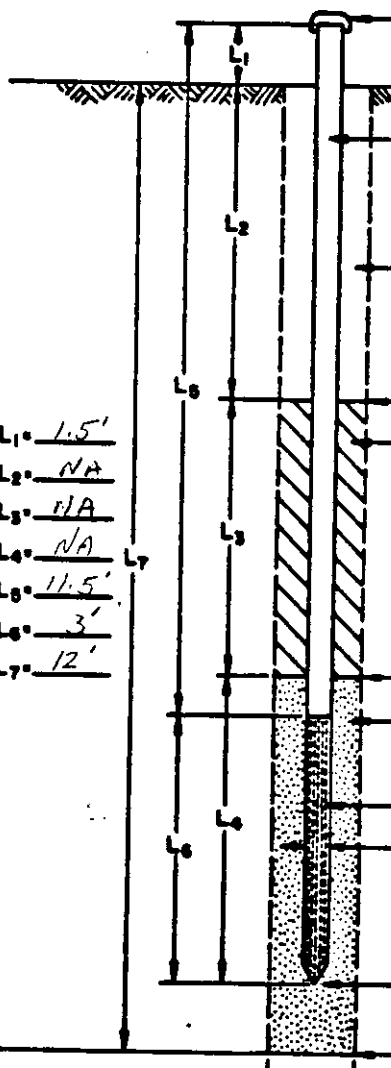
LOG OF BORING AND PIEZOMETER

BORING		
Depth in ft.	Description	Symbol

PIEZOMETER

Type of Piezometer: 3' galvanized steel piezometer

Ground Elev.: 12.69 Top of Riser Elev.: 14.20'



Vented Cap

I.D. of Riser Pipe: 1 1/4"

Type of Pipe: galvanized steel

Type of Backfill Around Riser: Soil Cuttings

Top of Seal Elev.: N/A

Type of Seal Material: N/A

Top of Filter Elev.: N/A

Type of Filter Material: Native soil

Size of Openings: 80 gauge

Diameter of Piezometer Tip: 1 1/4"

Bottom of Piez. Elev.: 0.69'

Bottom of Boring Elev.: 0.69'

Diameter of Boring: NA

L1 = 1.5'
L2 = NA
L3 = NA
L4 = NA
L5 = 11.5'
L6 = 3'
L7 = 12'

Remarks:

Inspected By: M.H / L.M.

PIEZOMETER INSTALLATION REPORT

Project: CIBA - GEIGY
Project No.: 87X4660 Installed By: ABLE DRILL Co.
Piezometer No.: P-11 S
Location: Northeastern part of Wastewater Treatment Facility
Date: 13 APR 88 Time: 3:00 - 4:00

Method of Installation: Augered to a depth of 4.5 FT. - hammered piezometer (wellpoint) to 10 FT.

LOG OF BORING AND PIEZOMETER

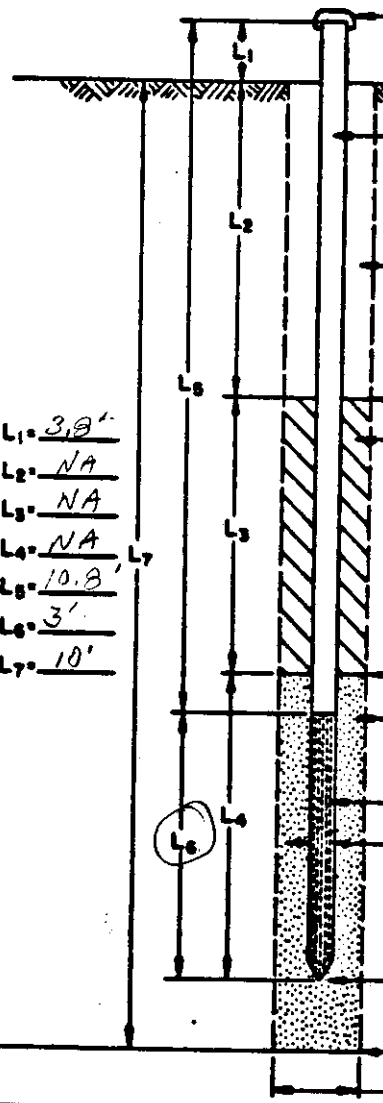
BORING

Depth in ft.	Description	Symbol
0	Dark brown to black coarse sand + med. sand + pebbles (organics)	
~4'	↓ Same as above - but pebbles become more abundant (0.25" to 1" diam.). Color becomes dark grey. (First sign of moisture)	
4.5	← Sign. Locally moist - water table.	
	(Observations based on return of soil cuttings during drilling)	

PIEZOMETER

Type of Piezometer: 3' galvanized steel piezometer

Ground Elev.: 14.45'
Top of Riser Elev.: 18.29'



L1 = 3.8'
L2 = NA
L3 = NA
L4 = NA
L5 = 10.8'
L6 = 3'
L7 = 10'

Vented Cap
I.D. of Riser Pipe: 1 1/4"
Type of Pipe: galvanized steel
Type of Backfill Around Riser: Soil Cuttings
Top of Seal Elev.: N/A
Type of Seal Material: N/A
Top of Filter Elev.: N/A
Type of Filter Material: Imported Soil
Size of Openings: 20 gauge
Diameter of Piezometer Tip: 1 1/4"
Bottom of Piez. Elev.: 4.45'
Bottom of Boring Elev.: 4.45'
Diameter of Boring: NA

Remarks: Moved hole ~1 FT. north of orange stake marker.

Inspected By: L. MORISI

PIEZOMETER INSTALLATION REPORT

Project: CIBA - GEIGY
Project No.: 87Y 4660 Installed By: ABLE DRILL Co.
Piezometer No.: P12 S-A
Location: NW corner of Waste Water Treatment Area
Date: 13 APR. 88 Time: 9:00 - 4:30 pm

Method of Installation: Augered to 7 FT; hammered well tip to 12 FT. (Screen located between 9-12 FT).

LOG OF BORING AND PIEZOMETER

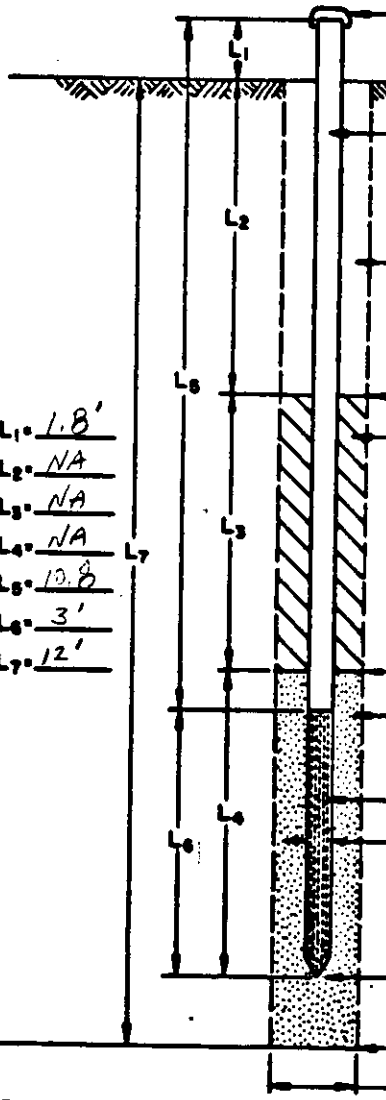
BORING

Depth in ft.	Description	Symbol
0	Dark brown to black medium sand, silt, minor amount of pebbles (organics)	
4'	Lt. to med. brown coarse to medium sand, silt + pebbles.	
5'	Dark brown to black medium sand, + silt, few pebbles. (Very first sign of moisture).	
6'	Dark brown to black fine sand + silt	
7'	SAME - Moist (muddy) (Observations based on return of soil cuttings during drilling)	

PIEZOMETER

Type of Piezometer: 3' galvanized steel piezometer

Ground Elev.: 14.17 Top of Riser Elev.: 16.00'



L_1 = 1.8'
L_2 = NA
L_3 = NA
L_4 = NA
L_5 = 10.8
L_6 = 3'
L_7 = 12'

Vented Cap

I.D. of Riser Pipe: 1 1/4"

Type of Pipe: galvanized steel

Type of Backfill Around Riser: Soil Cuttings

Top of Seal Elev.: N/A

Type of Seal Material: N/A

Top of Filter Elev.: N/A

Type of Filter Material: INSITU SOIL

Size of Openings: 80 gauge

Diameter of Piezometer Tip: 1 1/4"

Bottom of Piez. Elev.: 2.17

Bottom of Boring Elev.: 2.17

Diameter of Boring: NA

Remarks:

Inspected By: L. Morrison

WOODWARD-CLYDE CONSULTANTS

PIEZOMETER INSTALLATION REPORT

Project CIBA - GEIGY
Project No. 87x4660 Installed By Able Drilling

Piezometer No. P-12S-B
Location Former Tank Area, NW corner
Date 4/14/88 Time 1:30 PM

Method of Installation Augered down to 19'. Took split spoon samples down to 26.5'. Encountered a soft wet clay from 15-26.5. Clay layer is atleast 11.5' thick. Backfilled to 15'. Installed well point from 12-15'.

LOG OF BORING AND PIEZOMETER

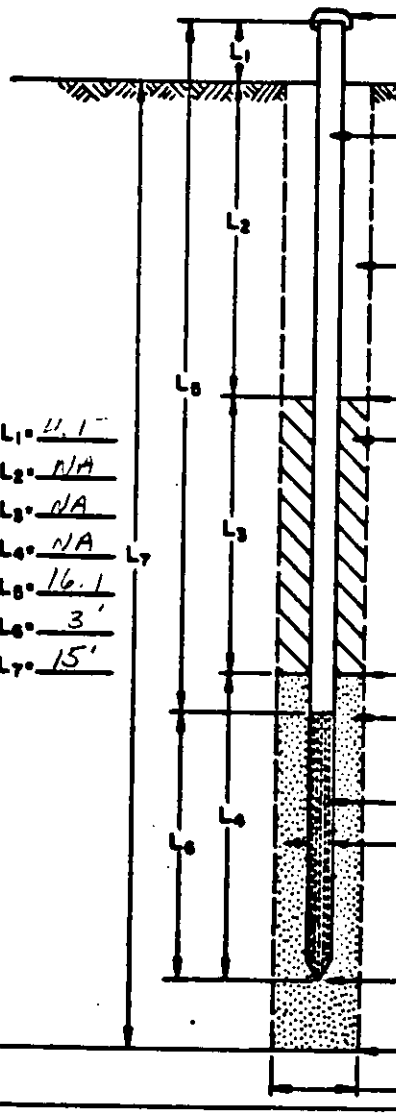
BORING

Depth in ft.	Description	Symbol
0	Dark brown f sandy SILT with some clay, tr. gravel moist.	
5	(Observations are based on return of soil cuttings during drilling).	

PIEZOMETER

Type of Piezometer 3' galvanized steel piezometer

Ground Elev. 14.17 Top of Riser Elev. 18.24



L_1 = 11.1'
L_2 = NA
L_3 = NA
L_4 = NA
L_5 = 16.1
L_6 = 3'
L_7 = 15'

Vented Cap

I.D. of Riser Pipe 1¼"
Type of Pipe galvanized steel
Type of Backfill Around Riser Soil Cuttings
Top of Seal Elev. NA
Type of Seal Material NA
Top of Filter Elev. NA
Type of Filter Material Soil Cuttings
Size of Openings 80 gauge
Diameter of Piezometer Tip 1¼"
Bottom of Piez. Elev. -0.83'
Bottom of Boring Elev. -12.33'
Diameter of Boring NA

Remarks

Inspected By [signature]

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PIEZOMETER INSTALLATION REPORT

Project: CIBA-GEIGY
Project No.: 87X4660 Installed By: Able Drilling
Piezometer No.: P-13S
Location: Production Area - Between buildings 25 + 26.
Date: 4/15/88 Time: 9:00 AM

Method of Installation: Augered down to 15' (using solid stem augers). Water table not obvious from cuttings. Removed drill rods from hole, measured water at 9'. Backfilled boring; installed well point from 11-14'.

LOG OF BORING AND PIEZOMETER

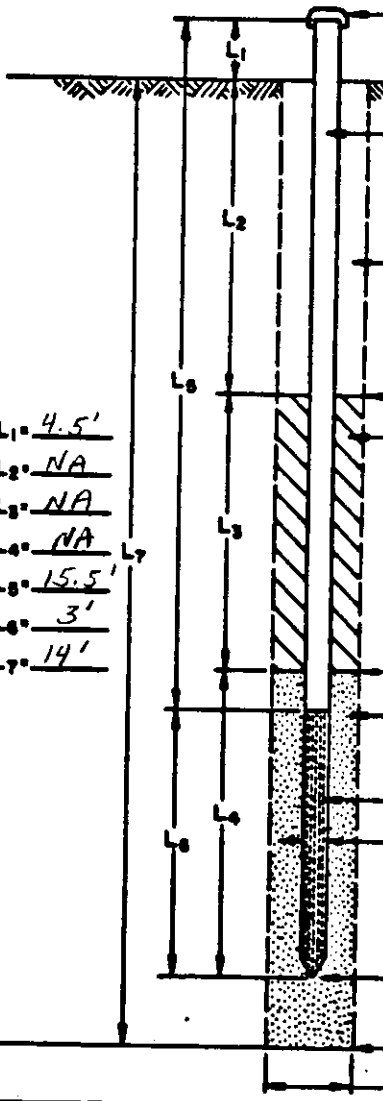
BORING

Depth in ft.	Description	Symbol
0	FILL - brown clayey silt with some f sand and gravel, moist	
5	FILL - light brown - tan f sand, some silt, moist	
10	(Observations based on return of soil cuttings during drilling).	

PIEZOMETER

Type of Piezometer: 3' galvanized steel piezometer

Ground Elev.: 23.89'
Top of Riser Elev.: 23.43'



L_1 = 4.5'
L_2 = NA
L_3 = NA
L_4 = NA
L_5 = 15.5'
L_6 = 3'
L_7 = 14'

Vented Cap
I.D. of Riser Pipe: 1¼"
Type of Pipe: galvanized steel
Type of Backfill Around Riser: Soil Cuttings
Top of Seal Elev.: NA
Type of Seal Material: Soil Cuttings
Top of Filter Elev.: NA
Type of Filter Material: Soil Cuttings
Size of Openings: 80 gauge
Diameter of Piezometer Tip: 1¼"
Bottom of Piez. Elev.: 9.89'
Bottom of Boring Elev.: 8.89'
Diameter of Boring: Nat.

Remarks: Measured water in boring at 9'.

Inspected By: [signature]

WOODWARD - CLYDE CONSULTANTS

PIEZOMETER INSTALLATION REPORT

Project: CIBA - GEIGY
Project No.: 87X4660 Installed By: Able Drilling
Piezometer No.: P14S
Location: NW corner of Production Area
Date: 4/15/88 Time: 8:00 AM

Method of Installation: Augered down to 1'; inserted well point, pushed and hammered piezometer down to 13'. Water table was 8' as observed in split spoon samples for P14D.

LOG OF BORING AND PIEZOMETER

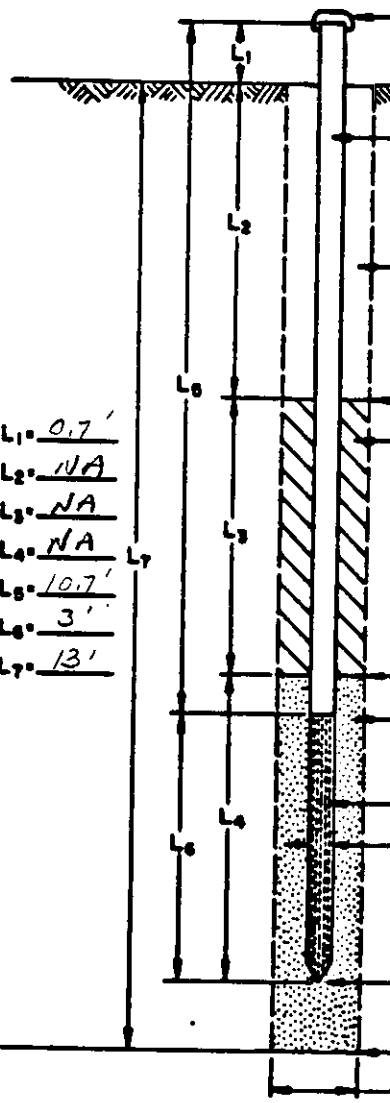
BORING

Depth in ft.	Description	Symbol
0	Brown - dark brown clayey SILT with tr. of sand and gravel, moist. (Observations based on return of soil cuttings during drilling)	
1		

PIEZOMETER

Type of Piezometer: 3' galvanized steel piezometer

Ground Elev.: 23.51'
Top of Riser Elev.: 24.16'



Vented Cap

I.D. of Riser Pipe: 1¼"
Type of Pipe: galvanized steel
Type of Backfill Around Riser: Soil Cuttings
Top of Seal Elev.: NA
Type of Seal Material: Native Soil.
Top of Filter Elev.: NA
Type of Filter Material: native soil
Size of Openings: 80 gauge
Diameter of Piezometer Tip: 1¼"
Bottom of Piez. Elev.: 10.51'
Bottom of Boring Elev.: 10.51'
Diameter of Boring: NA

L_1 = 0.7'
L_2 = NA
L_3 = NA
L_4 = NA
L_5 = 10.7'
L_6 = 3'
L_7 = 13'

Remarks:

Inspected By: M. Houlday

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PIEZOMETER INSTALLATION REPORT

Project: CIBA - GEIGY
Project No.: 87X4660 Installed By: Able Drilling

Piezometer No.: P14D
Location: NW Corner of Production Area
Date: 4/15/88 Time: 1:00 PM

Method of Installation: Augered and washed and drove casing to 58.5'. Backfilled borehole to 47'. Installed well point from 47 - 50' in loosely consolidated material.

LOG OF BORING AND PIEZOMETER

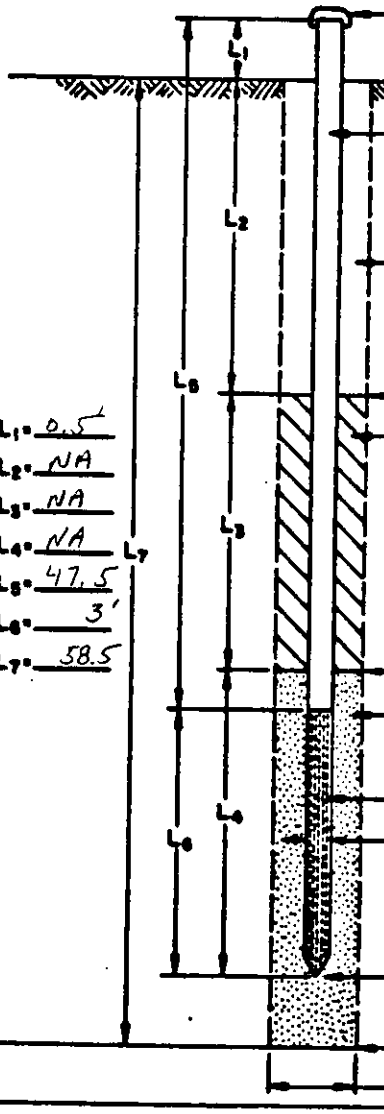
BORING

Depth in ft.	Description	Symbol
	See boring log P14D	

PIEZOMETER

Type of Piezometer: 3' galvanized steel piezometer

Ground Elev.: 23.51'
Top of Riser Elev.: 24.00'



Vented Cap

I.D. of Riser Pipe: 1¼"
Type of Pipe: galvanized steel
Type of Backfill Around Riser: Soil Cuttings
Top of Seal Elev.: NA
Type of Seal Material: Soil Cuttings
Top of Filter Elev.: NA
Type of Filter Material: Soil Cuttings
Size of Openings: 80 gauge
Diameter of Piezometer Tip: 1¼"
Bottom of Piez. Elev.: -24.49
Bottom of Boring Elev.: -34.99
Diameter of Boring: NA

L_1 = 0.5'
L_2 = NA
L_3 = NA
L_4 = NA
L_5 = 47.5
L_6 = 3'
L_7 = 58.5

Remarks: Installed piezometer just above dense till in an unconsolidated till like material

Inspected By: R. Hartley

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