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PHASE II

GROUNDWATER ASSESSMENT

EAST CHICAGO PLANT
EAST CHICAGO, INDIANA

Volume I of II

Presented to

E.I. du PONT de NEMOURS & COMPANY

CH2M HILL

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GLOSSARY

Anisotropy. An aquifer condition characterized by hydraulic properties that vary depending upon the direction of groundwater flow.

Aquifer. A water-bearing geologic formation that yields sufficient water to be economically exploited.

Average Linear Velocity. The average rate (L/T) at which groundwater flows through media pores along a macroscopically linear flow path.

Caustic. A strong base, typically having a pH higher than 10.

Confining Unit. A subsurface geologic formation, often a clay, clay till, or bedrock formation, that has such low permeability to water that the unit effectively acts as an aquifer boundary.

Discharge. (1) The flow of groundwater out of an aquifer and into another aquifer, a surface water body, or the ground surface (L^3/T). (2) The outflow of pumped water from a pipe (L^3/T). (3) To flow from one area to another, such as when groundwater flows into a river or a sewer.

Downgradient. Towards the direction of groundwater or surface water flow.

Glacial Till. A general term for unconsolidated sediment transported by glacial ice that is deposited when the ice has melted. Till is usually characterized by a dense, low-permeability, fine-grained particle matrix containing subangular gravels.

Groundwater. The water contained in interconnected pores of subsurface soils and rock under saturated conditions.

Head. A measure of the energy (per unit weight) of a water mass produced by elevation, pressure, or velocity and expressed in units of length (L).

Heterogeneity. Spatial variations in properties of geology formations (a common example of vertical heterogeneity is layering of different geologic materials).

Hydraulic Conductivity. A measure of the resistance to groundwater flow of a geologic medium. Expressed as the rate at which groundwater would flow under a unit gradient (L/T).

Hydraulic Transmission Characteristics. Properties of an aquifer that describe the flow of water through the aquifer. These properties include hydraulic conductivity (L/T), transmissivity (L^2/T), and porosity.

Hydrogeology. The combined factors describing an area of study that include interrelationships between surface water, groundwater, and the geologic media.

Kjeldahl Nitrogen. A measure of nitrogen present as both ammonia and organically-bound nitrogen.

Lacustrine Sediments. Sediments deposited as a result of lake processes, including deep water settling of fine-grained sediments and fine to coarse-grained sediments deposited along shorelines.

Leakage. The flow of water into or out of an aquifer through a low-permeability unit such as a clay liner, till, or perforations, or at joints in pipelines.

Linear Velocity. See Average Linear Velocity.

Porosity. The ratio of the volume of void spaces in a geologic material to the total volume of the geologic material (L^3/L^3).

Potentiometric Surface. A map of groundwater elevation contours defined by the elevation at which water is measured in a set of wells and interpolated between wells. In an unconfined aquifer, this surface is defined by the water table. In a confined aquifer, where water is at a pressure greater than atmospheric, the potentiometric surface is an imaginary surface defined as the elevation water would be at if it were in equilibrium with atmospheric pressure.

Pyrite. An iron sulfide mineral (FeS) typically deposited in a reducing environment.

Recharge. The addition of water or the amount of water added to an aquifer. Examples include precipitation inflow, inflow from another aquifer, or inflow from a surface water body.

Saturated. The case existing when all interconnected voids in porous materials are filled with water.

Silurian. A geologic age defined as the time interval from approximately 420 to 440 million years ago.

Staff Gauge. An instrument used to measure the water elevation in a surface water body.

Stratigraphy. The layer of rock or sediments in a certain area and their vertical and areal distribution, age, and mechanisms of deposition.

Till. See Glacial Till.

Topography. Ground surface elevations.

Transmissivity. The rate at which water is transmitted through a unit width of an aquifer under a unit hydraulic gradient (L^2/T). It can be estimated by multiplying the hydraulic conductivity (L/T) of a formation by its saturated thickness (L).

Upgradient. In the opposite direction of groundwater or surface water flow.

Water Table. The surface of a groundwater body in equilibrium with atmospheric pressure, defined as the level to which water will rise in a well penetrating an unconfined aquifer.

DU PONT EAST CHICAGO PLANT
PHASE II REPORT

EXECUTIVE SUMMARY

INTRODUCTION

E.I. du Pont de Nemours and Company, Inc. (Du Pont) owns and operates a 28-acre manufacturing facility on a 440-acre site in East Chicago, Indiana. The East Chicago plant is located in a northwest Indiana industrial area. The property overlies the Calumet Sand formation and borders the Grand Calumet River on the south. The East Chicago plant has produced a variety of chemical products for over 100 years of operation.

Du Pont has made a commitment to protect groundwater at all of its operating facilities worldwide, and to take steps to indemnify and remediate situations where groundwater use has either become or threatens to become impaired by Du Pont operations. As part of this program, Du Pont voluntarily decided to investigate the potential effect of its historic site activities on groundwater at its plant in East Chicago, Indiana.

The first phase of study (Phase I) included reviewing existing information to identify areas that may have been affected by plant operations, obtaining information about manufacturing processes and materials, and identifying and ranking areas potentially affected by past chemical and waste handling practices. Results of the Phase I activities are summarized in the Phase I Groundwater Assessment Report (CH2M HILL, 1990). Upon completion of Phase I, recommendations for collecting site-specific hydrogeologic and water quality information were made.

In the spring of 1990, Du Pont began Phase II of the Groundwater Assessment at the East Chicago plant. Although it was believed that some specific onsite areas could warrant investigation in the future, Phase II focused primarily on the plant as a whole. The primary objectives of the Phase II effort were to define hydrogeologic characteristics at the plant and to determine groundwater quality at the plant boundaries. These objectives were met by:

- Installing a groundwater and surface water monitoring network;
- Conducting aquifer property tests;
- Monitoring groundwater and surface water elevations;
- Collecting and analyzing water samples during two sampling events; and
- Performing supplemental studies in an adjacent neighborhood (Riley Park) in response to initial findings at the north site boundary.

INVESTIGATION FINDINGS

The following findings were compiled from the data collected and evaluated during the Phase II Groundwater Assessment:

- Lacustrine (primarily beach) sands with occasional layers of peat underlie the site. Glacial clay was consistently encountered beneath the sand at a depth of approximately 30 feet below ground surface.

- Groundwater was encountered at depths ranging from approximately zero to 8 feet below ground surface.

- Where saturated, the Calumet Sand has an average hydraulic conductivity of 4.5×10^{-3} cm/sec (1.5×10^{-4} ft/sec).

- A groundwater divide is present through the center of the site. The divide trends east-west, resulting in groundwater flow both to the north and south of the divide.

- South of the divide, groundwater discharges to the Grand Calumet River at an estimated rate of 70 to 80 gallons per minute (gpm). This discharge is distributed across the entire southern boundary of the Du Pont property, and accounts for approximately 0.04 percent of the total flow in the Grand Calumet River during dry weather conditions.

- North of the divide, groundwater flows northwest toward Riley Park, a residential neighborhood of East Chicago, Indiana, and northeast towards a bulk petroleum storage facility. The rate of flow to the northwest was estimated at approximately 30 gpm. The flow rate toward the northeast is not known.

- Household basement dewatering and sewer infiltration have created a groundwater depression in the Riley Park neighborhood, resulting in the groundwater divide mentioned above; as a result, some of the groundwater beneath the Du Pont East Chicago plant that would normally flow toward the Grand Calumet River under natural conditions now flows towards the Riley Park neighborhood. In Riley Park, this flow is intercepted by neighborhood sumps and sewers.

- Arsenic, barium, cadmium, fluoride, lead, and 1,2-dichloroethane were detected at the concentrations above the current federal maximum contaminant levels (MCLs) in some locations in groundwater at the site. Because of the generally degraded groundwater quality in the East Chicago-Gary-Hammond region and since no known residents are using groundwater for any purpose, MCLs are not levels above which immediate action on the Du Pont site is required. Rather, MCLs are

being used as a comparative standard to identify areas of potential concern that may warrant future attention.

- Groundwater from the all of the properties bordering the river contributes a certain amount of chemical constituents per day (some of which occur naturally) to the Grand Calumet River. The chemical constituents discharging from the Du Pont property have a negligible impact on water quality of the Grand Calumet River. (This loading typically accounts for less than one percent of the total chemical mass in the Grand Calumet River.)

- The average concentrations of inorganic constituents observed in river water samples were compared to hypothetical concentrations in river water assuming the plant groundwater contribution was removed. The comparison between the observed and hypothetical concentrations revealed no significant differences.

- In the Riley Park neighborhood, which is served by the City of East Chicago Water Department, there are no known residents using groundwater for any purpose.

CONCLUSIONS

Based on the results of the Phase II investigation, the following conclusions were made:

- Groundwater quality at the Du Pont East Chicago plant has been affected by industrial practices over the past 100 years of the plant operations.

- Groundwater is migrating from the Du Pont property both to the north and south. Flow to the south discharges to the Grand Calumet River. A substantial portion of flow to the north discharges to the sewers in the Riley Park area. This process limits the northward migration of groundwater to the southern half of the 4800 and the 4900 blocks of each street in Riley Park.

- Groundwater discharge to the Grand Calumet River has a negligible effect on the overall river water quality.

- Currently, Riley Park residents do not drink groundwater migrating from the Du Pont plant. Groundwater is not used on the Du Pont property. There is no direct evidence of human contact with groundwater discharging at the river bank along the southern boundary. Based on these facts, it can be concluded that there is no imminent threat to human health associated with groundwater discharging from the site.

PLANS FOR FUTURE WORK

Although there is no imminent threat to human health associated with site groundwater, Du Pont believes groundwater remediation may be warranted and plans to proceed with further site characterization and remediation, as appropriate. This approach is consistent with Du Pont's Groundwater Protection Policy. The goals of the planned characterization and remediation program are to:

- Refine Du Pont's understanding of current site conditions needed for effective remediation;
- Study the feasibility of and select an alternative(s) for site remediation; and
- Design and implement the alternative(s) selected.

Du Pont will proceed with the future work effort in two stages. The first stage will address the offsite migration of chemical constituents in the groundwater. A focused feasibility study will be conducted to identify and evaluate alternatives for controlling offsite migration and to select a remedy for implementation.

The second stage will be aimed at better characterizing site conditions. This work will include:

- Identification and characterization of areas that have contributed to current groundwater quality conditions;
- Identification and evaluation of alternative control measures relative to the areas identified above;
- Selection of appropriate control measure for implementation; and
- Design and implementation of the selected control measure(s).

Du Pont believes that the comprehensive approach described above will address the groundwater quality conditions identified during Phase II.

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Section 1
INTRODUCTION

BACKGROUND INFORMATION

E.I. du Pont de Nemours and Co., Inc. (Du Pont) has made a commitment to protect groundwater at all of its operating facilities worldwide, and to take steps to identify and remediate situations in which groundwater use has either become or threatens to become impaired by Du Pont industrial activities.

As part of this program, Du Pont decided to voluntarily investigate the potential effect of its historic chemical handling practices on groundwater at its plant in East Chicago, Indiana. This report presents background information for the East Chicago plant and summarizes the activities completed to date in response to Du Pont's commitment to its groundwater protection program.

Plant Location

Du Pont owns and operates a 28-acre manufacturing facility on a 440-acre site in East Chicago. The East Chicago plant site is in northwest Indiana, an industrial region on the north bank of the Grand Calumet River (Figure 1-1). The site is bounded on the west by Kennedy Avenue, on the north and northeast by the Indiana Harbor Belt Railroad, on the east by the Norfolk and Western Railroad, and on the south by the Grand Calumet River. The plant is in the center of the Grand Calumet River/Indiana Harbor Canal surface water drainage basin.

The Du Pont East Chicago plant is located within the U.S. Geological Survey (USGS) Highland Quadrangle Map (1980). Surrounding current land use and topographic information is illustrated on the USGS Whiting, Indiana, Quadrangle Map (1980) to the north; the USGS Calumet City, Illinois, Quadrangle Map (1980) to the west; and the USGS Lake Calumet, Indiana, Quadrangle Map (1977) to the northwest. The region north of the Grand Calumet River is developed primarily as industrial and commercial lands with interspersed residential areas. This area has been a primary location for steel mills and manufacturing plants, heavy manufacturing associated with the steel industry, the petroleum industry, chemical processing plants, and the meat packing industry. Numerous railroad tracks that serve plants and storage areas are shown on the USGS quadrangle maps. Many of the industrial facilities, including steel and chemical manufacturing, have been operating for over 100 years at facilities originally constructed on undeveloped, sandy shorelines, wetlands, and woodlands.

Other sites in the region are under investigation by either the U.S. Environmental Protection Agency (U.S. EPA), the Indiana Department of Environmental Management (IDEM), or the property owner. Several of these are Superfund sites. Examples include MIDCO I, MIDCO II, 9th Avenue Dump, and Lake Sandy Jo. One of these sites, the USS Lead site, is located directly across Kennedy Avenue to the west of the Du Pont East Chicago plant. The USS Lead site is currently being

CHI28770.AO.RP FIG. 1-2 SITE LOCAT. 1-15-91 LML

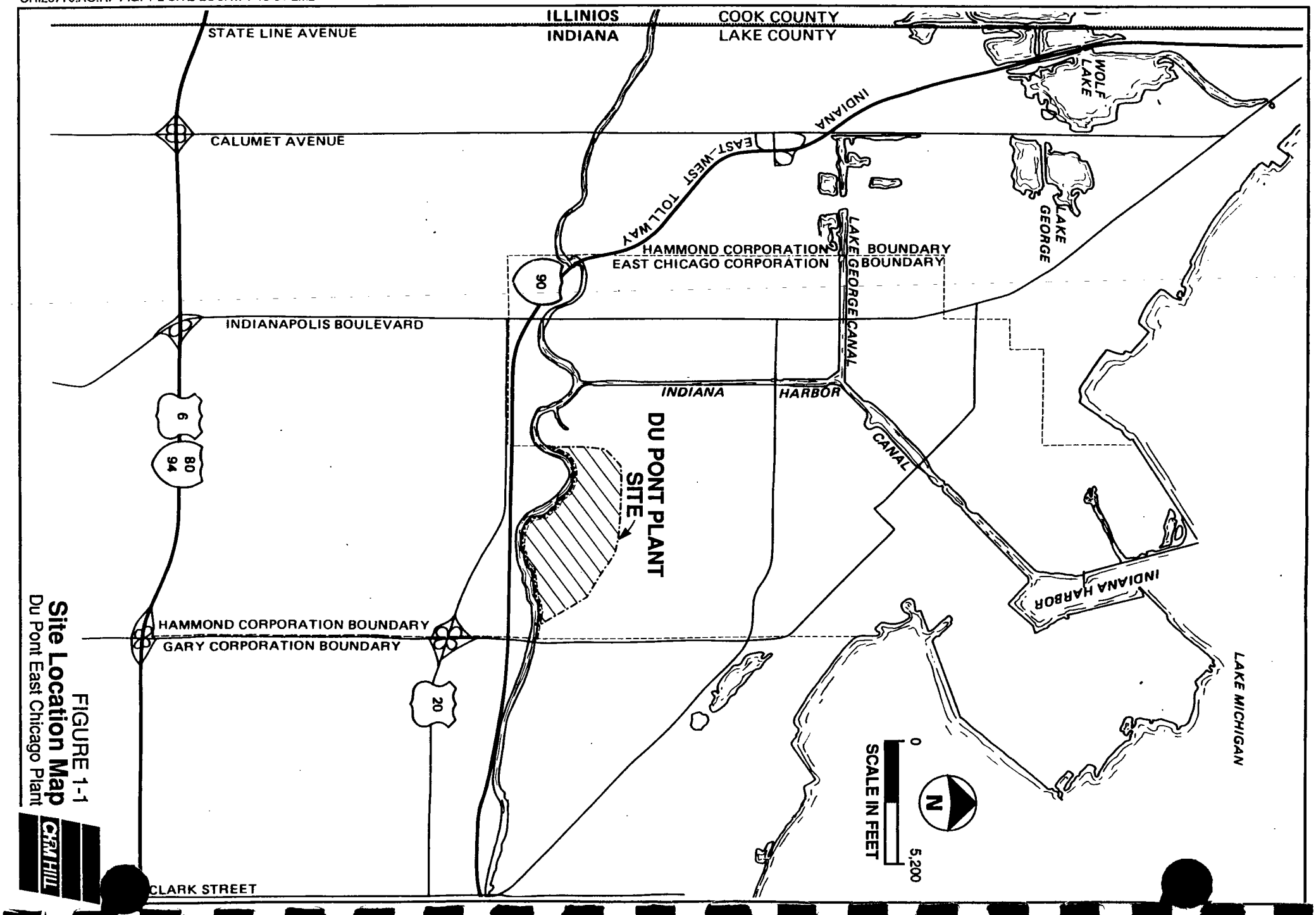

FIGURE 1-1
Site Location Map
Du Pont East Chicago Plant

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scored for listing on the National Priorities List (NPL) developed by the U.S. EPA for Superfund investigation.

Plant History

A chemical manufacturing facility was constructed at the site of the current Du Pont East Chicago plant by the Grasselli Corporation in 1892 and began operation in 1893. At that time, the facility was used to produce sulfuric acid products. Du Pont purchased the plant from the Grasselli Corporation in 1928. Over its lifetime, the facility has produced more than 100 products, including reagent-grade chemicals (hydrochloric acid, sulfuric acid, sulfamic acid, nitric acid, and ammonium hydroxide), trichlorofluoromethane products, and agricultural chemicals. Figure 1-2 summarizes products produced for periods of 25 years or longer.

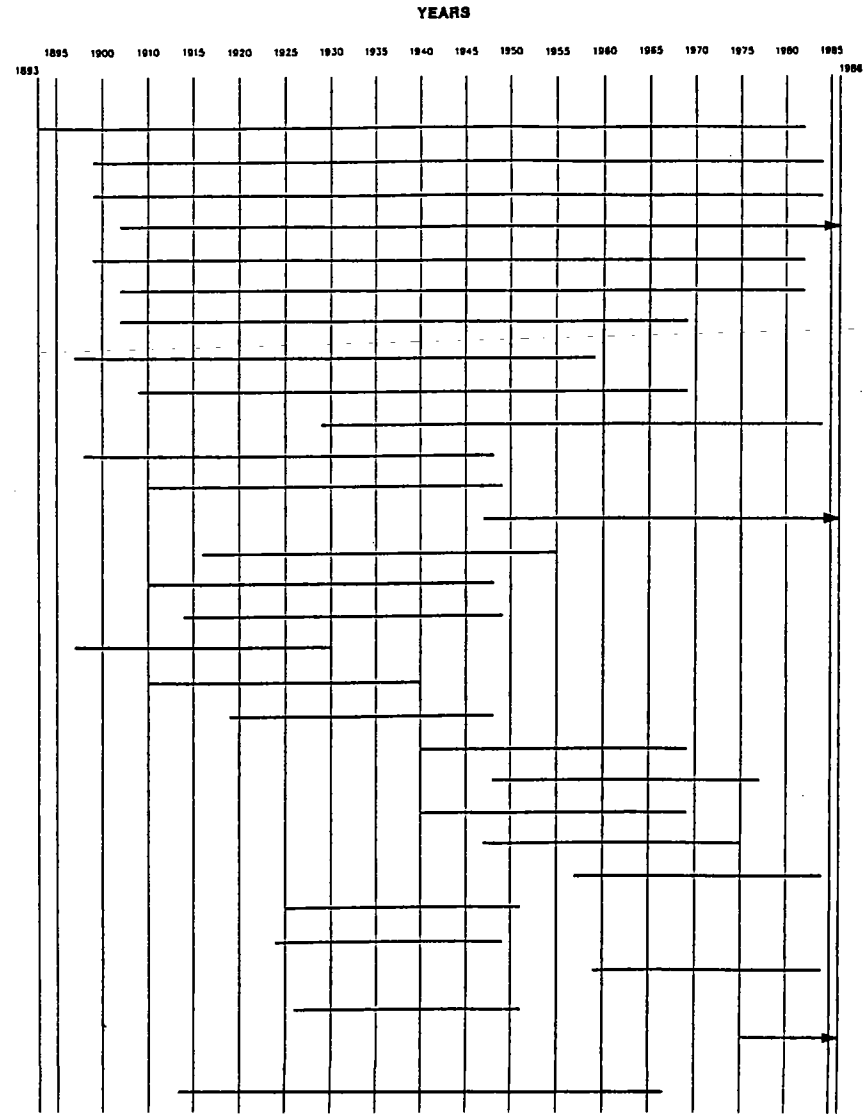
The facility grew in size between 1893 and 1945. By the late 1930s, the East Chicago plant was one of the largest of Du Pont's plants, covering approximately 160 acres of the 440-acre site. During World War II, it employed approximately 2,000 workers in the manufacturing of 21 product lines. Production declined immediately after the war. Between 1950 and 1970, the plant employed approximately 700 people until the late 1970s and early 1980s, when production and the number of employees decreased. In 1990, the plant employed 52 workers in the manufacturing of two product lines—sodium silicate products and colloidal silica products (O. J. Meyer, Du Pont, Verbal Communication, 1990). The manufacturing area for these product lines is limited to 28 acres in the southwest corner of the site.

SITE TOPOGRAPHY

The topography of the western three-fifths of the Du Pont plant site (in the vicinity of the historical primary manufacturing area) has been altered by current and previous landowners. In the late 1800s and early 1900s, the southwestern quarter of the property (adjacent to the Grand Calumet River on the south and Kennedy Avenue on the west) was developed as a manufacturing area. Soil, iron mill slag, and other fill materials were used to create a secure foundation for site development. Over the years of plant operation, solid materials no longer needed for manufacturing have been deposited on the land surface north and east of the historical primary manufacturing area. Runoff north of the historical primary manufacturing area drains to the north and collects in ponds along the northern property fence line; surface drainage south within the historical primary manufacturing area enters the Grand Calumet River.

The eastern two-fifths of the Du Pont plant property does not appear to have been affected by plant activities. This undisturbed portion of the property is referred to by Du Pont and local environmental groups as the "pristine area." The distinctive ridge and swale topography common to the Great Lakes region still exists in this area. Natural peat deposits at the surface have been observed. Surface drainage is poorly developed, and portions of this area have marshy vegetation indicative of shallow water table conditions.

PRODUCTS	BEGAN OPERATION	DISCONTINUED OPERATION	DURATION, YEARS
Sulfuric Acid Products	1893	1984	91
Nitric Acid Reagent	1899	1984	85
Sulfuric Acid Reagent	1899	1984	85
• Sodium Silicate Products	1902	1989	87
Hydrochloric Acid Reagent	1899	1982	83
Acetic Acid Reagent	1902	1982	80
Zinc Chloride Products	1902	1969	67
Hydrochloric Acid and Salt Cake Products	1897	1959	62
Ammonium Chloride Products	1909	1969	60
Dactean Inhibited Acid Products	1929	1984	55
Glauber's Salt	1898	1948	50
Lead Arsenate Products	1910	1949	39
• Colloidal Silica Products	1947	1989	42
Sodium Thiosulfate	1916	1955	39
Lime Sulfur Solution	1910	1948	38
Arsenic Acid	1914	1949	35
Mixed Acid	1897	1930	33
Bordeaux Mixture® Insecticide	1910	1940	30
Calcium Arsenate	1919	1948	29
Chromated Zinc Chloride Products	1940	1969	29
Trichlorofluoromethane-Kinetics Operation	1948	1977	29
Zinc Ammonium Chloride Products	1940	1969	29
Aluminum Chloride Products	1947	1975	28
Ammonium Hydroxide Reagent – New Facilities	1958	1984	26
Phosphoric Acid	1925	1951	26
Litharge®	1924	1949	25
Sulfamic Acid	1959	1984	25
Trisodium Phosphate Products	1926	1951	25
Fluorosulfonic Acid	1975	1988	13
Zinc Ore Roasters	1913	1967	54



• Indicates product being produced in early 1989

FIGURE 1-2
Du Pont General Production History for Products in Production Longer Than 25 Years
Du Pont East Chicago Plant

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CHI28770.AO.RP FIG. 1-2 PROD. HISTORY 2-21-91 LML

REGIONAL GEOLOGY AND HYDROGEOLOGY

Shallow Geologic Deposits

The Du Pont East Chicago site lies within the Calumet Lacustrine Plain (Indiana Geological Survey, 1975). The surficial geologic deposits in this area are primarily dune and beach complex deposits formed during and after the last glacial age when Lake Michigan water levels were significantly higher than present levels. Beach ridges and dunes are formed by fine to medium sands that are locally coarse, pebbly, and rich in natural organic matter (Rosenshein and Hunn, 1968). This sand unit, referred to as the Calumet Sand, is up to 65 feet thick.

The original regional topography and drainage have been altered as a result of many decades of industrial development. The original topography consisted of a series of beach ridges separated by swales, which were formed as Lake Michigan's shoreline receded to the north following the last stage of glaciation. During development, wet, low-lying areas between ridges have been filled, ridges have been leveled, and surface drainage patterns altered. The direction of flow within the Grand Calumet River was reversed with the blockage of its original outlet to the east, and the construction of the Indiana Harbor Canal (1901-1906) to the west.

The Calumet Sand was deposited on glacial till and/or lacustrine clay. The till, which directly overlies Silurian-age dolomite bedrock, consists of a stiff, gray, silty, clay matrix with pebbles and rock fragments. There are discontinuous sand and gravel layers within the till. The thickness of the till and lacustrine clays is approximately 100 to 150 feet.

Soils

Three soil series have been identified on and around the Du Pont East Chicago plant site (Soil Conservation Service, 1972):

- Carlisle Muck—deep, poorly-drained organic soils with 4 to 6 feet of peat over sand, marl, or silt, and a high water table
- Tawas Muck—deep, poorly-drained soils with 1 to 3.5 feet of peat over sand and a high water table
- Oakville-Tawas Complex—long, narrow ridges and sloughs in alternating strips 60 to 100 feet wide, and ridges of Oakville fine sand and sloughs of Tawas muck (peat)

The Carlisle muck soils are at low-lying lands adjacent to the river. Tawas muck soils are found in the southwest corner and northern third of the Du Pont property. Oakville-Tawas complex soils are in the undeveloped area of the site that covers approximately the eastern two-fifths of the Du Pont property. Soils in the primary manufacturing area of the site have been largely re-graded and covered with fill;

however, it is likely that Oakville-Tawas soils were present at the land surface before the site was developed (Shilts, Graves and Associates, Inc., 1978).

Regional Hydrogeologic Characteristics

Where saturated, the Calumet Sand is known as the Calumet Sand aquifer (a water table aquifer). The saturated thickness ranges from 20 feet (U.S. EPA, 1989) to 45 feet (USGS, 1989). The porosity ranges from 0.3 to 0.4. Transmissivity and hydraulic conductivity of the aquifer are reported to range from 670 to 4,000 ft^2/day, and 8 to 135 ft/day, respectively (Rosenshein and Hunn, 1968). The USGS used an average hydraulic conductivity of 50 ft/day (1.8×10^{-2} cm/sec) in its numerical model simulations of groundwater flow within the Calumet Sand aquifer (USGS, 1989). Near the Du Pont East Chicago plant, this formation is capable of providing 40 to 150 gallons per minute (CH2M HILL, 1990).

Rosenshein (1962) estimated the hydraulic conductivity of the till underlying the Calumet Sand at 1×10^{-7} to 3×10^{-7} cm/sec (0.02 to 0.06 ft/day). Minor leakage can occur through this till under strong vertical gradients. Under the gradients observed in the region, the till acts as a confining unit, separating the Calumet Sand from the bedrock aquifer below.

The primary inflow to the Calumet Sand water table system is recharged via precipitation infiltration. Regional annual recharge to the Calumet Sand has been estimated at 5 to 13 inches/year (USGS, 1989).

According to a USGS report (1989), a water table high exists within the Calumet Sand between Lake Michigan and the Grand Calumet River/Indiana Harbor Canal system (Figure 1-3). The general direction of shallow groundwater flow described in the report is from the water table high to the river/canal or to Lake Michigan. Local variations in flow were observed near submerged sewers where seepage into these lines has lowered the water table. Based on this information, the Calumet Sand discharges to Lake Michigan, the Grand Calumet River, and manmade drains such as sewers.

The Grand Calumet River acts as a local groundwater divide and discharge area. Groundwater in the Calumet Sand north of the river flows south and discharges to the river. Groundwater south of the river flows north and discharges to the river.

The stretch of the Grand Calumet River east of the Indiana Harbor Canal is referred to as the "East Branch," and the stretch of the Grand Calumet River west of the Indiana Harbor Canal is referred to as the "West Branch." The southern boundary of the Du Pont East Chicago plant abuts the East Branch. The USGS (1987) found that water in the West Branch of the Grand Calumet River would sometimes reverse flow direction, dependant primarily on the volumes of industrial discharges into both branches of the Grand Calumet River and into the Indiana Harbor Canal. Water in the East Branch, however, always flowed to the west, toward the canal. A later USGS study (1989) found that groundwater elevations in the Calumet Sand adjacent

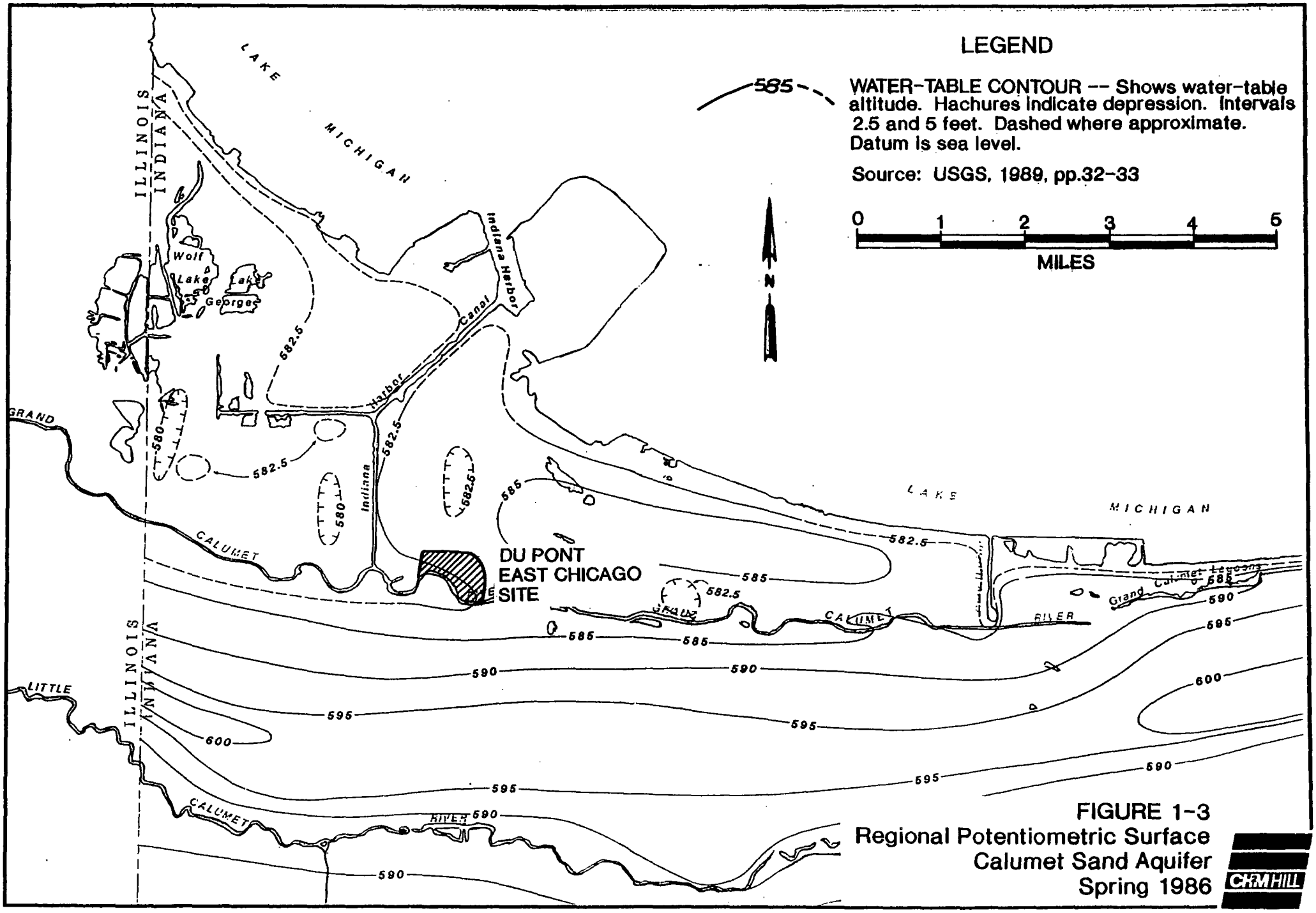

FIGURE 1-3
Regional Potentiometric Surface
Calumet Sand Aquifer
Spring 1986

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to the river were always higher than those in the Grand Calumet River, indicating that groundwater always discharges to the Grand Calumet River and that river water does not discharge to the Calumet Sand.

SUMMARY OF OTHER GEOTECHNICAL OR ENVIRONMENTAL INVESTIGATIONS

Several geotechnical or environmental investigations have been conducted at the Du Pont East Chicago site:

- Soil borings conducted over the plant life for the purposes of obtaining geotechnical information for building construction
- A U.S. EPA investigation in 1983 for the purpose of evaluating the Du Pont East Chicago plant as a potential National Priorities List (NPL) site
- A USGS investigation in 1985-1986 as part of a regional study of the Calumet Sand (results published in their 1989 report)
- A subsequent USGS investigation in 1987 focusing on the regional groundwater quality within the Calumet Sand
- A study of groundwater quality at the Conoco property (S&T Environmental, 1990) directly adjacent to the northwest corner of the Du Pont property
- The Phase I Groundwater Assessment performed by CH2M HILL between 1986 and 1990 that reviewed Du Pont records, and evaluated the potential for groundwater deterioration due to past manufacturing practices

The onsite geotechnical soil borings provided lithologic information only. Boring locations and results are discussed in the Phase I Groundwater Assessment Report (CH2M HILL, 1990).

Three monitoring wells, MW-1, MW-2, and MW-3, were installed as part of the 1983 U.S. EPA investigation. The U.S. EPA collected one round of water levels and one round of groundwater samples in March 1983. Based on their evaluation of the data, the U.S. EPA concluded that the Du Pont site did not pose an imminent threat to human health and the environment, and it was not listed as an NPL site. The locations of the U.S. EPA monitoring wells are shown on Figure 1-4.

Between 1985 and 1987, the USGS installed five monitoring wells (C-5, C-10, C-12, C-15, and D-66) on Du Pont property along the banks of the Grand Calumet River as part of its regional Calumet Sand studies. The locations of these wells are also shown on Figure 1-4. The C-series wells were used by the USGS to collect groundwater

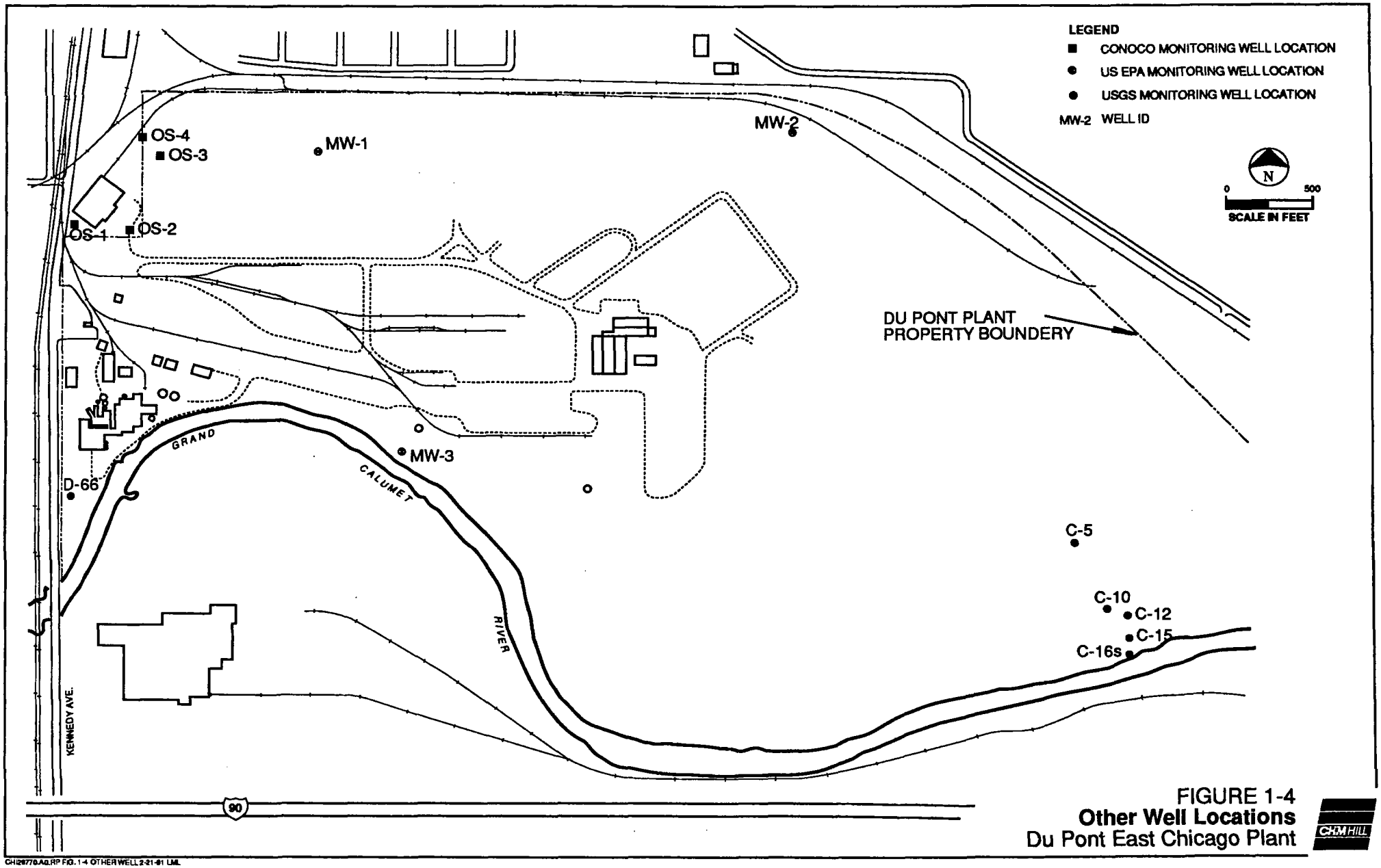


FIGURE 1-4
Other Well Locations
Du Pont East Chicago Plant

CH2M HILL

CHI26770.A0.RP FIG. 1-4 OTHER WELL 2-21-91 LML

elevations as input for a computer simulation of the Calumet Sand hydraulic system. In the later study, the USGS collected groundwater samples from wells C-10, C-12, and D-66 for chemical analyses. The results will be reported in a USGS publication that is yet to be released.

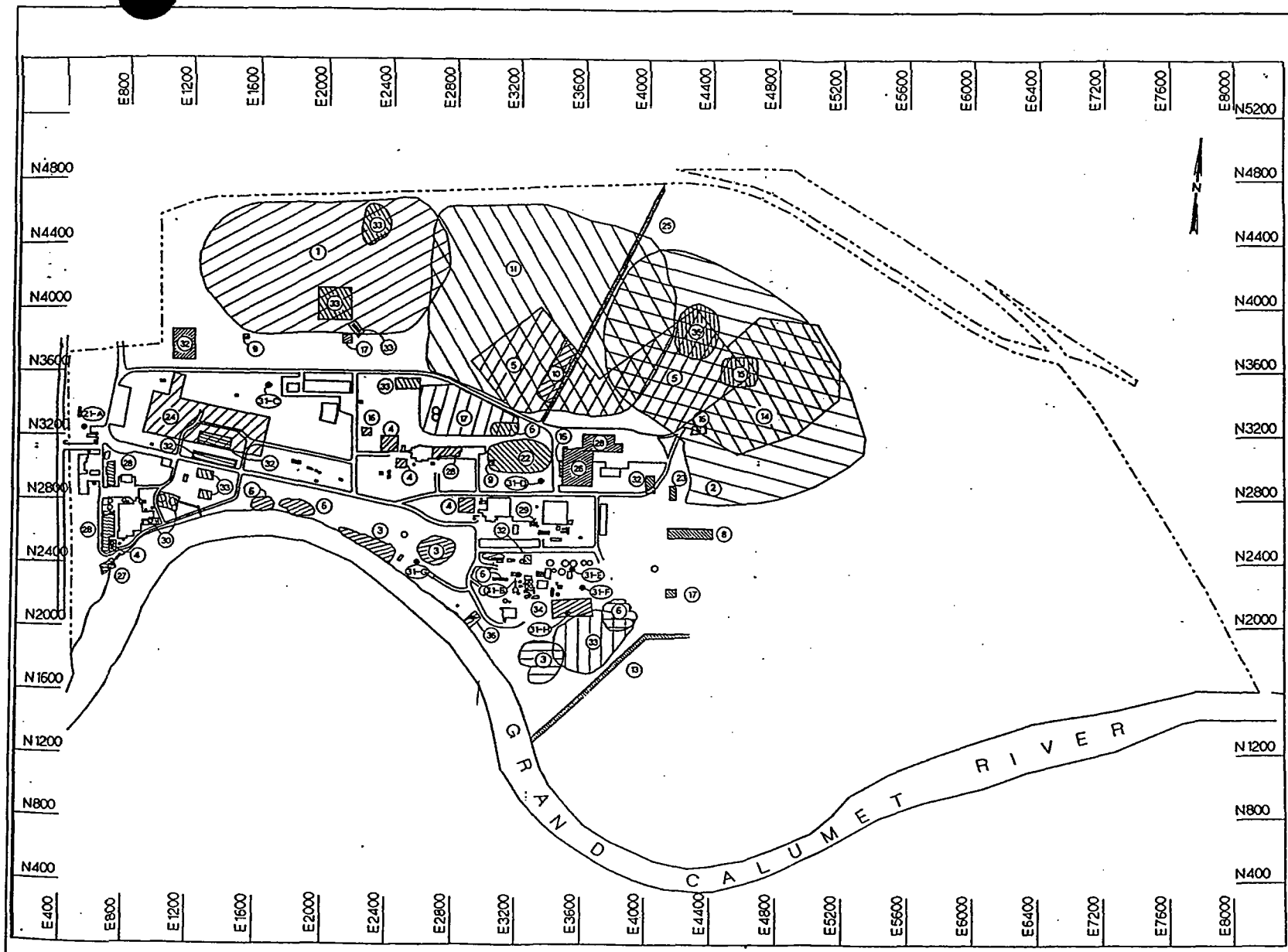
In 1990, S&T Environmental conducted an Assessment Report for the Conoco East Chicago Distribution Facility, adjacent to the Du Pont property. This study consisted of soil sampling from 18 soil borings, and groundwater sampling from 4 monitoring wells (OS-1, OS-2, OS-3, and OS-4) on the Conoco property. Conoco monitoring well locations are also shown on Figure 1-4.

Between 1986 and 1990, CH2M HILL conducted a Phase I Groundwater Assessment at the Du Pont East Chicago plant. During this study, existing plant records and published literature were reviewed and personnel interviews were conducted to identify past and present manufacturing operations and waste management practices that may have affected groundwater quality. The flow of chemicals into and out of the plant between 1893, when the facility began operation, and 1986 was evaluated. Descriptions of chemical flow associated with historic and current manufacturing activities at the site are presented in the Phase I Report (CH2M HILL, 1990).

As part of the Phase I activities, 36 areas on the plant property were identified where wastes may have been buried or stored, or where raw materials, support materials, or products may have been used or stored (Figure 1-5). To conform with similar studies conducted at other Du Pont plants, these areas were referred to as "waste management units" (WMUs). They are not, and should not be confused with, RCRA Solid Waste Management Units (SWMUs).

Each WMU was ranked as having either high, moderate, or low potential for causing groundwater degradation, based on:

- Location
- Unit design and operation
- Whether use of the unit was/is regulated
- Whether the unit was above or below grade
- Waste content
- Waste characteristics (i.e., mobility and toxicity)
- Hydrogeologic setting sensitivity
- Adequacy of the existing monitoring network



WASTE MANAGEMENT UNITS

1 ASH LANDFILL/STOKER GRATE ASH
2 RUBBLE FILL AREA
3 COAL/FLY ASH PILES
4 HAZARDOUS WASTE STORAGE AREAS-INTERIM STATUS
5 SILICA/CALCIUM SULFATE AREA
6 SULFUR AREAS
7 GENERAL PLANT
8 HCL NEUTRALIZATION PIT
9 INCINERATORS
10 CALCIUM FLUORIDE AREA
11 CALCIUM SULFATE/TSP AREA
12 NON-RAILROAD LOADING/UNLOADING AREAS
13 CHROME OUTFALL (COOLING TOWER BLOWDOWN)
14 NEW LANDFILL
15 MISC./GENERAL REFUSE AREA
16 PCB STORAGE AREAS
17 SPILLS (NOT ASSOCIATED WITH OTHER WMUS)
18 RAILROAD LOADING/UNLOADING AREAS
19 PROCESS SEWERS
20 ABOVE GROUND TANKS
21 UNDERGROUND STORAGE TANKS-EXISTING
22 INSECTICIDE AREA
23 ANTIMONY PENTACHLORIDE SETTLING BASIN
24 ZINC CRUDE MILLING AREA
25 ACID TRANSFER LINE
26 SANITARY SEWERS
27 COLLOIDAL SETTLING PITS
28 CHEMICAL STORAGE BUILDINGS-EXISTING
29 SULFAMIC ACID PITS
30 ENVIRONMENTAL CONTROL SYSTEM
31 UNDERGROUND TANKS-ABANDONED
32 CHEMICAL STORAGE BUILDINGS-ABANDONED
33 MISC. PITS/PILES
34 ZINC ROASTERS (TRAIL ORE ROASTERS)
35 ZINC MUD AREA
36 OUTFALL 002

NOTE: WMUS NO. 7, 12, 18, 19, 20 & 26 NOT SHOWN ON THIS FIGURE

LEGEND

- PLANT BOUNDARY
- BUILDINGS & ROADS
- RAILROADS
- SURFACE WATER FEATURES
- WASTE MANAGEMENT UNITS

0 300 600 900
SCALE

FIGURE 1-5
WMU Location Map
Du Pont East Chicago Plant

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CH28770.AO.RP FIG. 1-5 WMU LOCATION 2-21-91 LML

- Availability of monitoring data or other evidence of impact to groundwater
- Existence of potential receptors (if migration of constituents has occurred)
- Whether there are migrating factors that would reduce the potential for release and migration of waste constituents within the groundwater system

The ranking system used was designed to be conservative, resulting in a ranking of moderate or high whenever insufficient information existed for the individual unit. This conservative approach, the sensitivity of the hydrogeologic setting, and the lack of monitoring data to indicate otherwise resulted in either a moderate or high risk assignment (Figure 1-6) for most units (26 out of 36).

The Phase I Report ranked sites and identified the need for additional site investigations to determine whether groundwater use was impaired as a result of historic activities at these WMUs. Because many of the WMUs overlap and cover a large percent of the land adjacent to or within the historic primary manufacturing area, plantwide water quality monitoring, supplemented with limited WMU-specific monitoring, was recommended. To more fully understand the potential for movement of dissolved constituents within the groundwater system, refinement of the understanding of the local hydrogeology at the site was also recommended.

CHI185/003.51

WMU Number	Description	Activity Status	RISK CATEGORY		
			High	Moderate	Low
1	Ash Landfill / Stoker Grate Ash	Closed			●
2	Rubble Fill Area	Closed	●		
3	Coal / Fly Ash Piles	Closed			●
4	Haz. Waste Storage Areas - Interim Status	Closed		●	
5	Silica / Calcium Sulfate Area	Active		●	
6	Sulfur Areas	Closed			●
7	General Plant	Active			●
7	General Plant	Closed	●		
8	HCl Neutralization Pit	Closed	●		
9	Incinerators	Closed		●	
10	Calcium Fluoride Area	Closed			●
11	Calcium Sulfate / TSP Area	Closed	●		
12	Non-Railroad Loading / Unloading Areas	Active		●	
13	Chrome Outfall (Cooling Tower Blowdown)	Closed	●		
14	New Landfill	Active		●	
15	Misc. / General Refuse Area	Closed	●		
16	PCB Storage Areas	Closed	●		
17	Spills (Not Associated with other WMUs)	Closed	●		
18	Railroad Loading / Unloading Areas	Active		●	
19	Process Sewers	Active	●		
20	Above Ground Tanks	Active		●	
21	Underground Storage Tank - Existing	Active	●		
22	Insecticide Area	Closed	●		
23	Antimony Pentachloride Settling Basin	Closed	●		
24	Zinc Crude Milling Area	Closed	●		
25	Cities Service Acid Transfer Line	Closed			●
26	Sanitary Sewers	Active		●	
27	Colloidal Silica Settling Pits	Active			●
28	Chemical Storage Buildings - Existing	Active			●
29	Sulfamic Acid Pits	Active		●	
30	Environmental Control System	Active			●
31	Underground Tanks - Abandoned	Closed	●		
32	Chemical Storage Building - Abandoned	Closed		●	
33	Misc. Pits / Piles	Closed	●		
34	Zinc Roasters (Trail Ore Roasters)	Closed			●
35	Zinc Mud Area	Closed	●		
36	Outfall 002	Active			●

CHI28770.AC/MP FIG. 1-6 RELATIVE RISK 2-21-91 LML

FIGURE 1-6
Relative Risk Categories of WMUs
Du Pont East Chicago Plant

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Section 2
PHASE II GROUNDWATER ASSESSMENT OBJECTIVES

In the spring of 1990, Du Pont began Phase II of the Groundwater Assessment at the East Chicago plant. Phase II activities included the implementation of most of the Priority One recommendations made in the Phase I Report (see Phase I Report). The primary objectives of the Phase II effort were to define hydrogeologic characteristics at the plant and to determine groundwater quality at the plant boundaries.

The specific objectives of those investigations were to:

- Refine the understanding of site-specific hydrogeology;
- Determine whether past waste management practices at the facility, in general, have affected the groundwater quality;
- Determine whether potentially affected groundwater beneath the site was migrating offsite;
- Determine the contribution to the Grand Calumet River from onsite groundwater discharge;
- Determine qualitatively whether groundwater quality presents a threat to human health and the environment; and
- Evaluate the need for future additional investigations.

These objectives were met by:

- Installing monitoring wells along what was assumed to be upgradient (the northern edge) and downgradient (the southern edge) of the property;
- Monitoring groundwater and surface water levels;
- Conducting aquifer property testing; and
- Collecting and analyzing water samples from wells and from the Grand Calumet River.

The specific approach for conducting the Phase II Groundwater Assessment was developed based on existing site-specific and regional information. Water quality analytical parameters were selected based on historic information regarding chemical use at the facility.

Before plans for Phase II were finalized, the approach was presented and discussed with representatives from the IDEM at a meeting at their office on March 5, 1990. IDEM suggested minor changes in program approach. Modifications requested by IDEM were made and the investigations were initiated. IDEM and U.S. EPA have received monthly status reports detailing project activities throughout the duration of Phase II project activities.

CHI185/004.51

Section 3
PHASE II INVESTIGATION SUMMARY

This section of the report summarizes the data collection activities conducted to evaluate current site conditions and to achieve the objectives of the Phase II Groundwater Assessment.

PROJECT PLANNING

Project plans for the Phase II Groundwater Assessment were finalized in the spring of 1990. In March, aerial photographs of the plant were taken and used to develop an aerial base map of the plant property (Figure 3-1). Stereo photographic pairs were used to better identify locations of the WMUs characterized in Phase I. Monitoring well locations were selected based on this information and field condition observations during two site visits. Using this information, the Quality Assurance Project Plan (QAPP) for field sampling and monitoring well construction was prepared. The subcontractor documents and work scopes for drilling, elevation surveying, and analytical testing were also written.

MONITORING NETWORK INSTALLATION

The monitoring network was installed at the facility between May and early June of 1990. Fox Drilling, Inc., of Itasca, Illinois, was contracted to install the monitoring network using the hollow-stem auger drilling method. Installation and testing activities, procedures, and monitoring well construction details are documented in a Technical Memorandum, dated August 21, 1990, and included as Appendix A of this document. Objectives of the well installation and testing effort were to:

- Provide monitoring wells from which Calumet Sand groundwater quality and potentiometric information could be obtained;
- Obtain site information on subsurface stratigraphy, specifically in regard to the vertical and horizontal extent of the Calumet Sand; and
- Determine the hydraulic transmission characteristics of the Calumet Sand.

The monitoring network used during Phase II is shown on Figure 3-2. Phase II work consisted of the following components:

- Drilling and collecting soil samples from 17 monitoring well boreholes and 1 additional soil boring;
- Installing 12 onsite monitoring wells located along the Du Pont property perimeter (MW-4 through MW-15) and 5 interior monitoring wells (MW-16, MW-17, MW-18, MW-19, and MW-20);

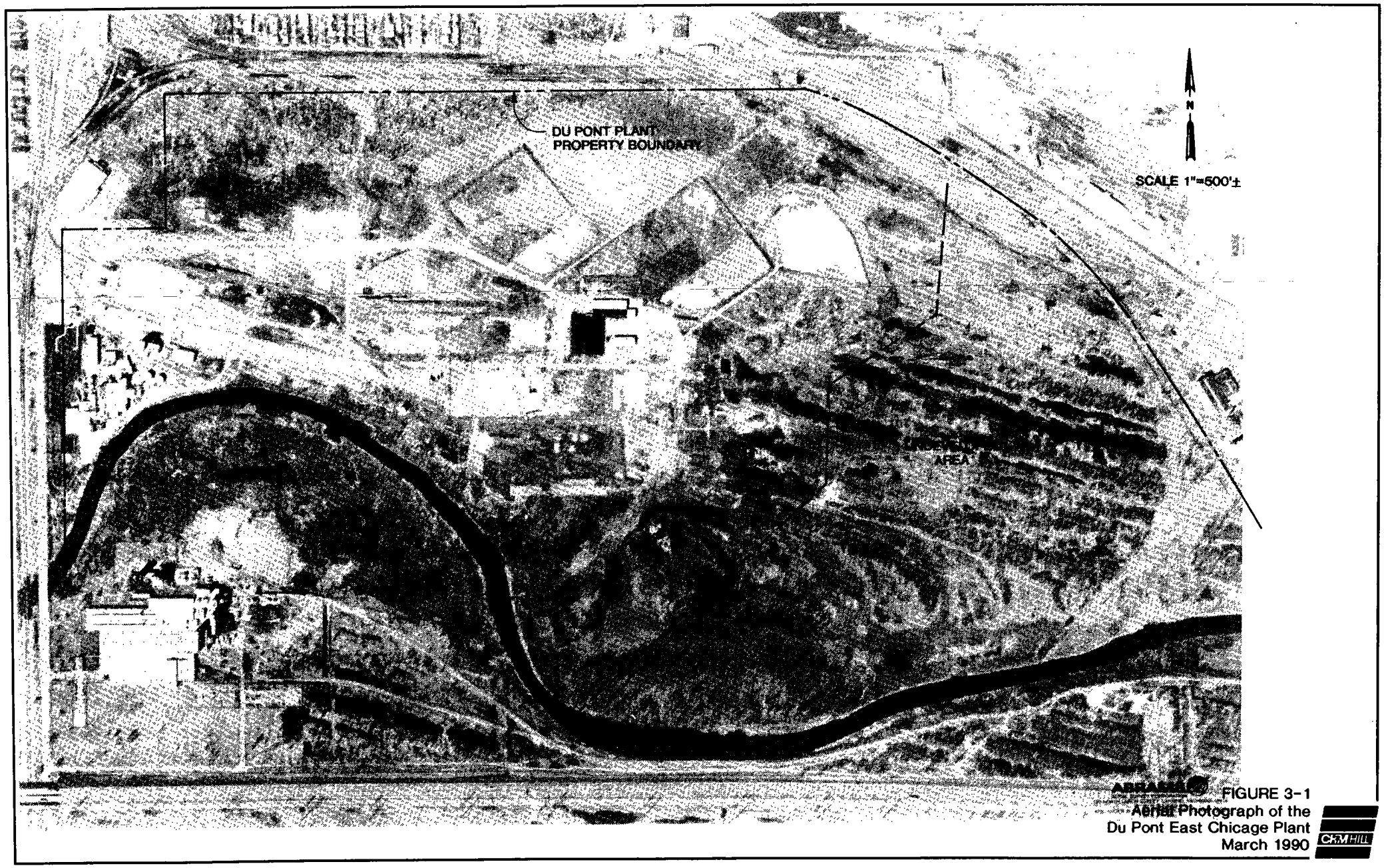


FIGURE 3-1
Aerial Photograph of the
Du Pont East Chicago Plant
March 1990

CH2M HILL

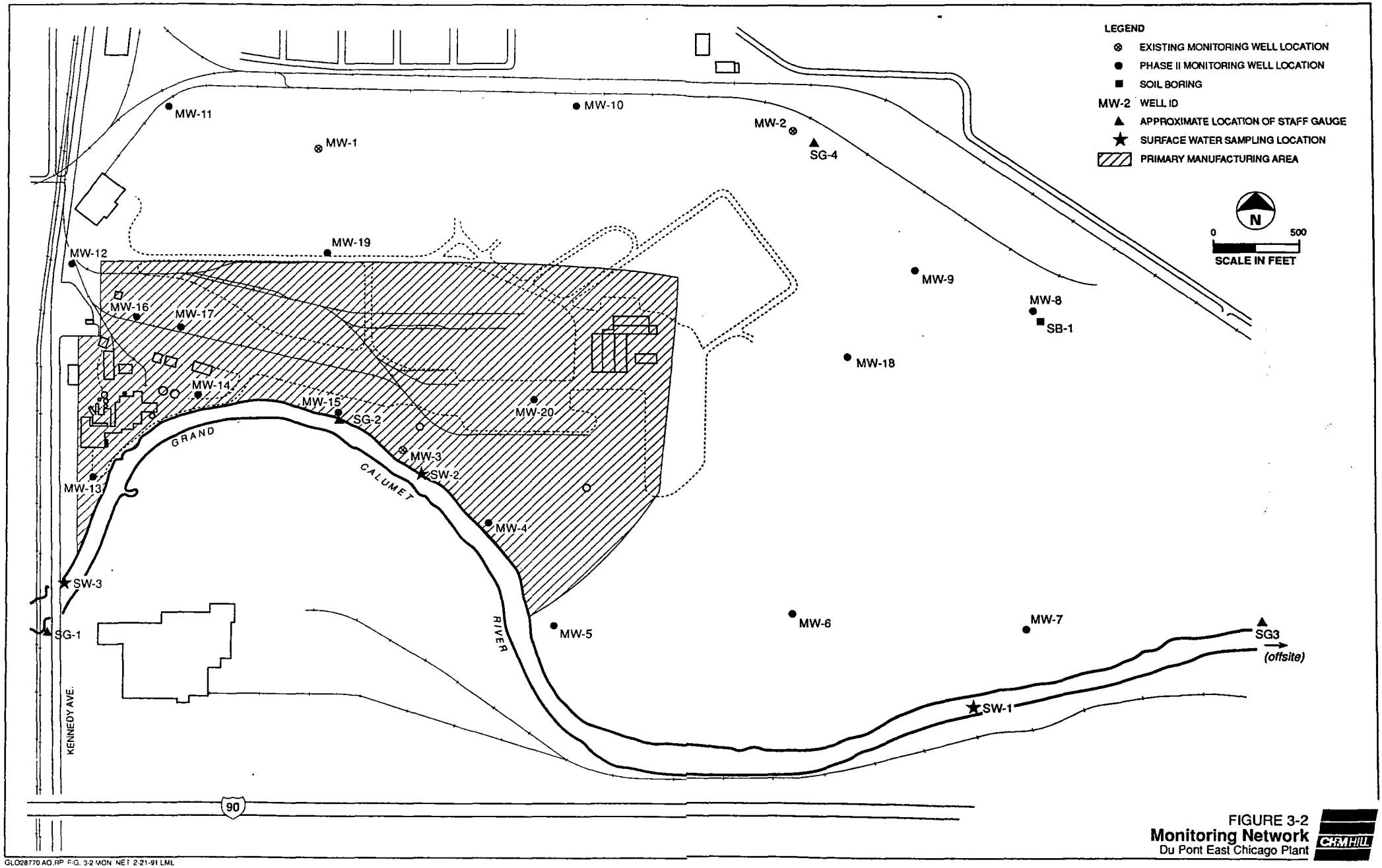


FIGURE 3-2
Monitoring Network
Du Pont East Chicago Plant

CH2M HILL

GLO28770 AO.RP FIG. 3-2 MON NET 2-21-91 LML

- Installing 4 staff gauges—3 along the Grand Calumet River (SG-1 through SG-3) and 1 (SG-4) in a marshy area near the northern edge of the plant property; and

- Surveying elevations and locations of the 3 U.S. EPA monitoring wells, 17 new monitoring wells, and 4 staff gauges.

The new monitoring wells were installed as 4-inch-diameter PVC wells. Well construction details are provided in Appendix A and summarized in Table 3-1.

RISING HEAD TESTING

Rising head tests were conducted on June 20, 1990, at eight monitoring wells (MW-4, MW-5, MW-11, MW-13, MW-15, MW-16, and MW-18) scattered across the site to determine horizontal hydraulic conductivity characteristics of the uppermost aquifer. Rising head tests (slug tests) are single-well tests used to estimate horizontal hydraulic conductivity near a well screen by adding or removing a known volume of water. The rate at which the water level in the well recovers is measured and used to estimate hydraulic conductivity.

For the rising head tests conducted at the East Chicago plant, a pressure head was applied to each well using nitrogen gas under pressure to depress the water level in the well. When the gas pressure was removed instantaneously, water level recovery data were collected in the well using pressure transducers attached to a data logger. Data were analyzed and hydraulic conductivities were estimated using the Bouwer and Rice (1976) method. The rising head test methodology and raw data are presented in detail in Appendix A as part of the Technical Memorandum dated August 21, 1990.

MONITORING

Potentiometric and water quality data were obtained on several occasions to:

- Better define site groundwater gradients and the relationship between the saturated Calumet Sand aquifer and the Grand Calumet River;

- Determine if seasonal fluctuations in groundwater gradients exist;

- Evaluate groundwater quality conditions; and

- Compare onsite groundwater quality to that within the Grand Calumet River at river locations along the southern boundary of the plant site.

Well and staff gauge water levels were measured monthly between June and December 1990 and bimonthly thereafter. Measurements were made at each of the U.S. EPA and Du Pont monitoring wells during each round. Water levels were also

Table 3-1
SUMMARY OF MONITORING WELL CONSTRUCTION

Well ID	Approximate Bottom of Screen Depth Below Ground Surface (ft)	Bottom of Screen Elevation (ft amsl)	Screen Length (ft)	Top of Screen Elevation (ft amsl)
MW-1	(19.5)	(570.6)	*	*
MW-2	(29.0)	(558.2)	*	*
MW-3	(29.2)	(561.9)	*	*
MW-4	29.0	558.5	15	573.5
MW-5	31.0	556.8	15	571.8
MW-6	30.0	556.8	15	571.8
MW-7	29.3	553.5	15	568.5
MW-8	29.0	560.3	15	575.3
MW-9	29.5	557.7	15	572.7
MW-10	33.5	554.3	15	569.3
MW-11	31.4	556.2	15	571.2
MW-12	32.0	555.7	15	570.7
MW-13	29.0	557.5	10	567.5
MW-14	28.0	560.4	10	570.4
MW-15	30.0	560.5	15	575.5
MW-16	32.0	556.6	15	571.6
MW-17	33.0	556.0	15	571
MW-18	33.5	556.5	15	571.5
MW-19	33.0	556.3	15	571.3
MW-20	32.0	558.2	15	573.2

NOTES: * CH2M HILL did not construct well; data unavailable.
( ) Estimated depth based on field measurement. Estimate may underestimate total depth of well.

measured periodically in selected USGS wells. Water levels were converted to elevations using the elevation survey data collected after network installation.

Two sets of water samples were collected for chemical analyses from 20 onsite monitoring wells (the 3 existing U.S. EPA wells and 17 newly installed wells) and from 3 locations along the Grand Calumet River. The first sampling event (Round 1) was conducted during the third week of June 1990, and the second event (Round 2) was conducted during the second week of September 1990. Samples were analyzed by National Environmental Testing, Inc., of Bartlett, Illinois, for:

- Selected water quality parameters (general indicators of the water quality and the presence of organic nitrogen that was used in the manufacturing of insecticides);

- Major and trace inorganic ions;

- Inorganic chemicals typically found in Du Pont raw materials, byproducts, manufactured products, and process wastes (see Phase I Report);

- U.S. EPA Target Compound List (TCL) volatile organic compounds (indicators of the presence of organics used in the trichlorofluoromethane manufacturing process, and solvents and fuels used for operation and maintenance of plant equipment); and

- TCL semivolatile organic compounds (acid and base/neutral extractables—indicators of fuels used for operation and maintenance of plant equipment).

A site-specific list of analytes was developed for the two wells installed downgradient of the zinc crude milling area (MW-16 and MW-17), and the one well installed downgradient of the rubble area (MW-18). This list was developed based on the knowledge of chemicals used or produced at these areas. The constituents that might be encountered in the groundwater near the zinc crude milling area were ammonia, aluminum, barium, chloride, iron, and zinc. The constituents that might be encountered in the groundwater near the rubble area were arsenic, iron, phosphates, zinc, solvents, and polychlorinated biphenyls (PCBs). The PCBs were allegedly disposed of near the edge of the rubble area. Analysis of PCBs at MW-3, MW-4, and MW-18 was added during Round 1 in response to IDEM's comments.

The TCL analyses were selected to provide comprehensive coverage of a range of organic compounds. This approach was designed to answer general questions regarding groundwater quality conditions at the site. A full listing of the constituents analyzed is provided in Table 3-2.

Table 3-2
ANALYTES TESTED AT FACILITYWIDE MONITORING SITES *
AND THEIR DETECTION LIMITS
DU PONT EAST CHICAGO PLANT

	Detection Limit (mg/l)		Detection Limit (ug/l)
Groundwater Quality Parameters		Volatile Organic Compounds	
COD	3	Acetone	10
Nitrogen, Ammonia	0.05	Benzene	1.0
Nitrogen, Kjeldahl	0.005	Bromodichloromethane	1.0
Phosphate (Total)	0.01	Bromoform	1.0
Total Dissolved Solids	0.01	Bromomethane	10
pH	NA	2-Butanone	10
		Carbon disulfide	1.0
Major Inorganic Ions		Carbon tetrachloride	1.0
Bicarbonate (HCO3)	1	Chlorobenzene	1.0
Calcium	0.001	Chloroethane	10
Carbonate (CO3)	1	2-Chloroethylvinyl ether	1.0
Carbonate (Total)	1	Chloroform	1.0
Chloride	1	Chloromethane	10
Magnesium	0.001	Dibromochloromethane	1.0
Potassium	0.001	1,2-Dichlorobenzene	1.0
Sodium	0.001	1,3-Dichlorobenzene	1.0
Sulfate	1	1,4-Dichlorobenzene	1.0
		1,1-Dichloroethane	1.0
Selected Trace Inorganic Compounds		1,2-Dichloroethane	1.0
Aluminum	0.01	1,1-Dichloroethene	1.0
Antimony	0.04	cis-1,2-Dichloroethene	1.0
Arsenic	0.001	trans-1,2-Dichloroethene	1.0
Barium	0.005	1,2-Dichloropropane	1.0
Boron	0.01	cis-1,3-Dichloropropene	1.0
Cadmium	0.005	trans-1,3-Dichloropropene	1.0
Chromium, Hexavalent	0.01	Ethyl benzene	1.0
Chromium, Total	0.005	2-Hexanone	10
Copper	0.01	4-Methly-2-pentanone	10
Cyanide, Total	0.001	Methylene chloride	5
Fluoride	0.1	Styrene	1.0
Iron	0.02	1,1,2,2-Tetrachloroethane	1.0
Lead	0.04	Tetrachloroethene	1.0
Manganese	0.01	Toluene	1.0
Mercury	0.0001	1,1,1-Trichloroethane	1.0
Nickel	0.01	1,1,2-Trichloroethane	1.0
Zinc	0.005	Trichloroethene	1.0

NOTE: * Analytes tested at specific interior wells (MW-16,MW-17, & MW-18) were a subset of this list.
NA Not applicable.

Table 3-2
ANALYTES TESTED AT FACILITYWIDE MONITORING SITES *
AND THEIR DETECTION LIMITS
DU PONT EAST CHICAGO PLANT

	Detection Limit (ug/l)		Detection Limit (ug/L)
Volatile Organic Compounds		Base/Neutral Compounds	
Vinyl Acetate	10	Di-n-octylphthalate	10
Vinyl Chloride	10	Fluoranthene	10
Xylenes, Total	1.0	Fluorene	10
Xylenes, ortho	1.0	Hexachlorobenzene	10
		Hexachlorobutadiene	10
Base/Neutral Compounds		Hexachlorocyclopentadiene	10
Acenaphthene	10	Hexachloroethane	10
Acenaphthylene	10	Indeno(1,2,3-cd)pyrene	10
Aniline	10	Isophorone	10
Anthracene	10	2-Methylnaphthalene	10
Benzidine	50	Naphthalene	10
Benzo(a)anthracene	10	2-Nitroaniline	50
Benzo(b)fluoranthene	10	3-Nitroaniline	50
Benzo(k)fluoranthene	10	4-Nitroaniline	50
Benzo(a)pyrene	10	Nitrobenzene	10
Benzo(ghi)perylene	10	N-Nitrosodimethylamine	10
Benzyl alcohol	10	N-Nitrosodiphenylamine	10
Benzyl butyl phthalate	10	N-Nitrosodi-n-propylamine	10
Acenaphthene	10	Phenanthrene	10
Bis(2-chloroethoxy)methane	10	Pyrene	10
Bis(2-ethylhexyl)phthalate	10	1,2,4-Trichlorobenzene	10
Bis(2-chloroisopropyl)ether	10		
4-Bromophenyl phenyl ether	10	Acid Compounds	
4-Chloroaniline	10	Benzoic acid	50
2-Chloronaphthalene	10	4-Chloro-3-methylphenol	10
4-Chlorophenylphenyl ether	10	2-Chlorophenol	10
Chrysene	10	2,4-Dichlorophenol	10
Dibenzo(a,h)anthracene	10	2,4-Dimethylphenol	10
Dibenzofuran	10	2,4-Dinitrophenol	50
Di-n-butylphthalate	10	2-Methylphenol	10
1,2-Dichlorobenzene	10	4-Methylphenol	10
1,3-Dichlorobenzene	10	2-Methyl-4,6-dinitrophenol	50
1,4-Dichlorobenzene	10	2-Nitrophenol	10
3,3-Dichlorobenzidine	20	4-Nitrophenol	50
Diethyl phthalate	10	Pentachlorophenol	50
Dimethyl phthalate	10	Phenol	10
2,4-Dinitrotoluene	10	2,4,5-Trichlorophenol	50
2,6-Dinitrotoluene	10	2,4,6-Trichlorophenol	10

Table 3-2
ANALYTES TESTED AT FACILITYWIDE MONITORING SITES *
AND THEIR DETECTION LIMITS
DU PONT EAST CHICAGO PLANT

	Detection Limit (ug/L)
PCBs **	
PCB-1016	1.0
PCB-1221	1.0
PCB-1232	1.0
PCB-1242	1.0
PCB-1248	1.0
PCB-1254	1.0
PCB-1260	1.0

** PCB analysis only performed at locations downgradient of actual or possible PCB storage areas (MW-3, MW-4, MW-18).

Sampling methodologies, chain-of-custody procedures for the samples, and the analytical testing program used are discussed in the QAPP dated May 1990, written for this investigation (see Volume II, Appendix I).

CHI185/005.51

Section 4
INVESTIGATION FINDINGS

SITE-SPECIFIC GEOLOGY AND HYDROGEOLOGY

Geologic and Hydrogeologic Units

Site geology characterized during the Phase II investigation coincides with the regional geology described in Section 1 of this report. Marshy areas containing peat and muck soils similar to those described by the Soil Conservation Service (1977) were observed onsite, particularly in the undeveloped area. The soil boring data from the newly installed monitoring wells were used to develop several geologic cross sections showing site stratigraphy. Cross section locations are shown on Figure 4-1. Individual geologic cross sections are presented as Figures 4-2 through 4-6. General findings were:

- The water table was encountered at zero to 8 feet below grade.
- Approximately 27 to 34 feet of fine-grained sand (Calumet Sand) having a saturated thickness of 24 to 31 feet was consistently encountered above a laterally-continuous basal clay unit. The unit forms the base of the groundwater system within the Calumet Sand.

Details of the geologic findings are presented in the soil boring logs (Appendix B) and grain size analyses (Appendix C). The grain size analyses performed in the laboratory compare well with the lithologic classification performed in the field.

To confirm the base of the Calumet Sand, several boreholes were advanced a few feet into the clay unit. Because the top of the clay unit defines the lower boundary of the Calumet Sand, it was important to determine its depth beneath the site to provide a more complete characterization of the hydrogeologic system. Approximate elevations of the base of the Calumet Sand are shown on Figure 4-7.

Potentiometric Conditions

Water level elevations were collected monthly, beginning in June 1990 (Table 4-1), and potentiometric surface maps were prepared from each set of water level measurements. The June 18, August 28, and November 30, 1990, potentiometric surface maps (Figures 4-8, 4-9, and 4-10) illustrate the range in variations observed. Although the depth to water varied with the amount of recharge occurring immediately prior to measurement, the shape of the potentiometric surface varied only slightly over the monitoring period (from June 1990 to April 1991).

Water level data were collected on November 30, 1990, to determine whether the unseasonably high rainfall (over 3 inches in a 24-hour period) and expected resulting high river stage conditions in the Grand Calumet River would have an effect on

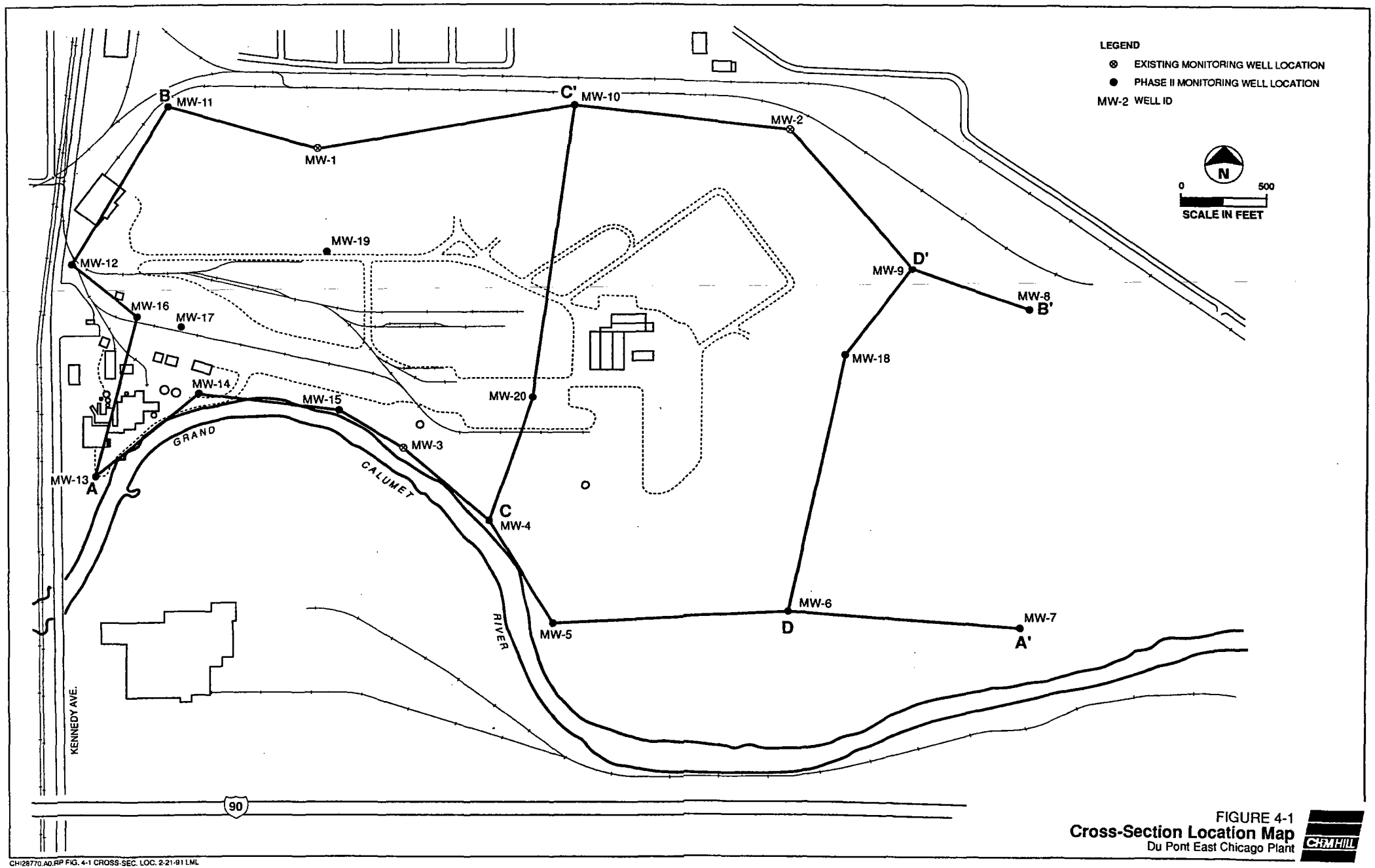
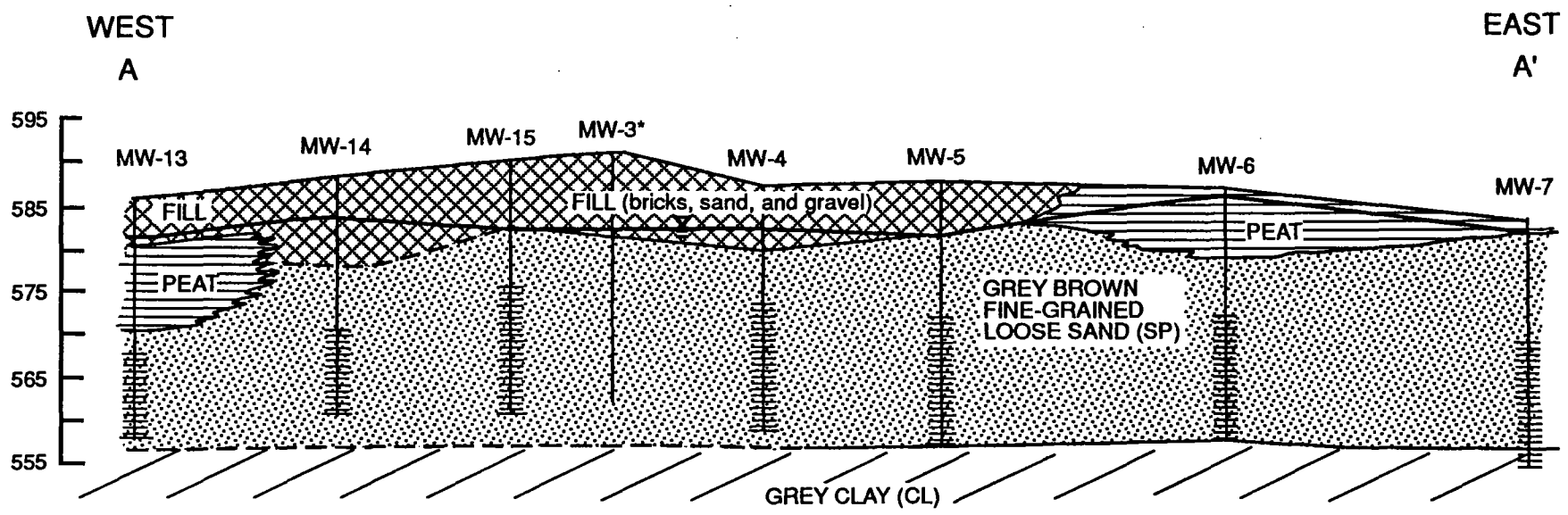


FIGURE 4-1
Cross-Section Location Map
Du Pont East Chicago Plant

CH2M HILL

CHI28770.A0.RP FIG. 4-1 CROSS-SEC. LOC. 2-21-91 LML



LEGEND

* Well construction and lithologic data are not available, these are approximate depths of U.S. EPA wells (indicated by ?)

Water elevations are from the June 18, 1990 data

Groundwater elevation

Well screened interval

MW-4 Monitoring well ID

— — — Interpolated lithologic boundary

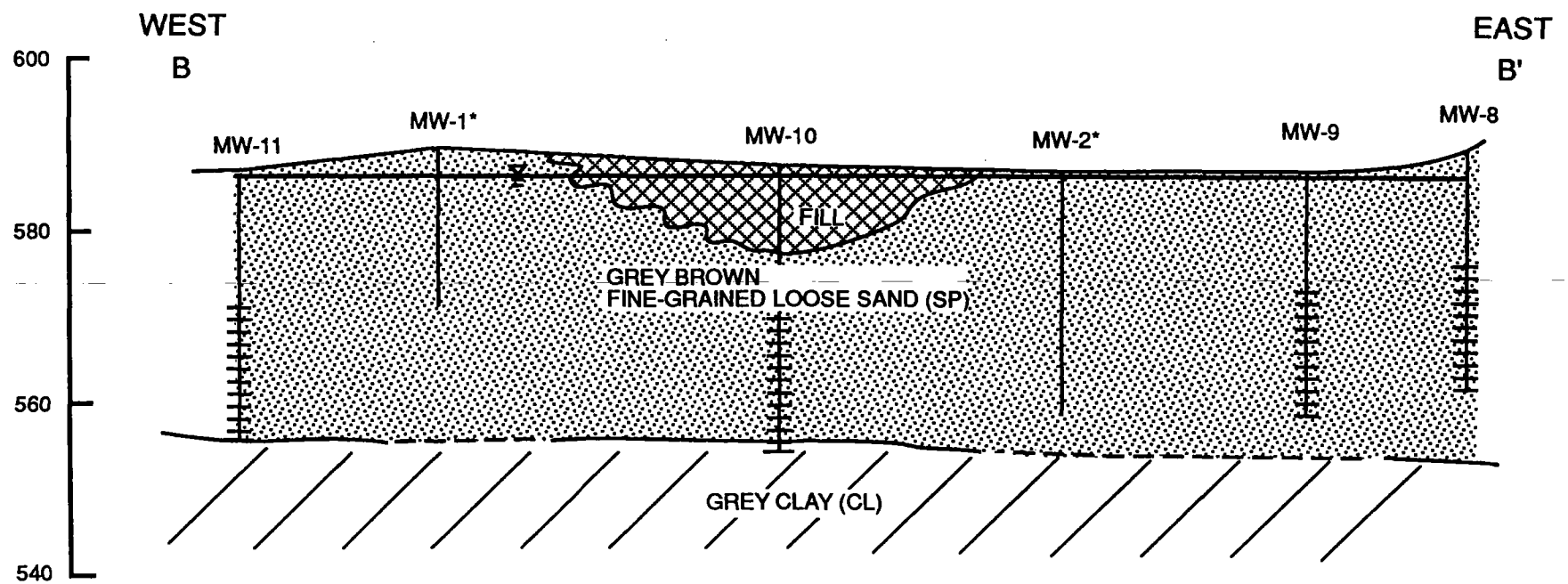
The depth and thickness of the subsurface strata indicated on the cross-section were generalized from and interpolated between borings. Information on actual subsurface conditions exists only at the specific locations and dates indicated. Soil conditions and water levels at other locations may differ from conditions occurring at the boring locations. Also, the passage of time may result in a change in the conditions at these boring locations.

HORIZONTAL SCALE IN FEET

0 400 800

FIGURE 4-2
Schematic Geological Cross-Section A-A'
DuPont East Chicago Plant

CH2M HILL



LEGEND

* Well construction and lithologic data are not available, these are approximate depths of U.S. EPA wells (indicated by ?)

Water elevations are from the June 18, 1990 data

Groundwater elevation

Well screened interval

MW-4 Monitoring well ID

— — — Interpolated lithologic boundary

The depth and thickness of the subsurface strata indicated on the cross-section were generalized from and interpolated between borings. Information on actual subsurface conditions exists only at the specific locations and dates indicated. Soil conditions and water levels at other locations may differ from conditions occurring at the boring locations. Also, the passage of time may result in a change in the conditions at these boring locations.

HORIZONTAL SCALE IN FEET

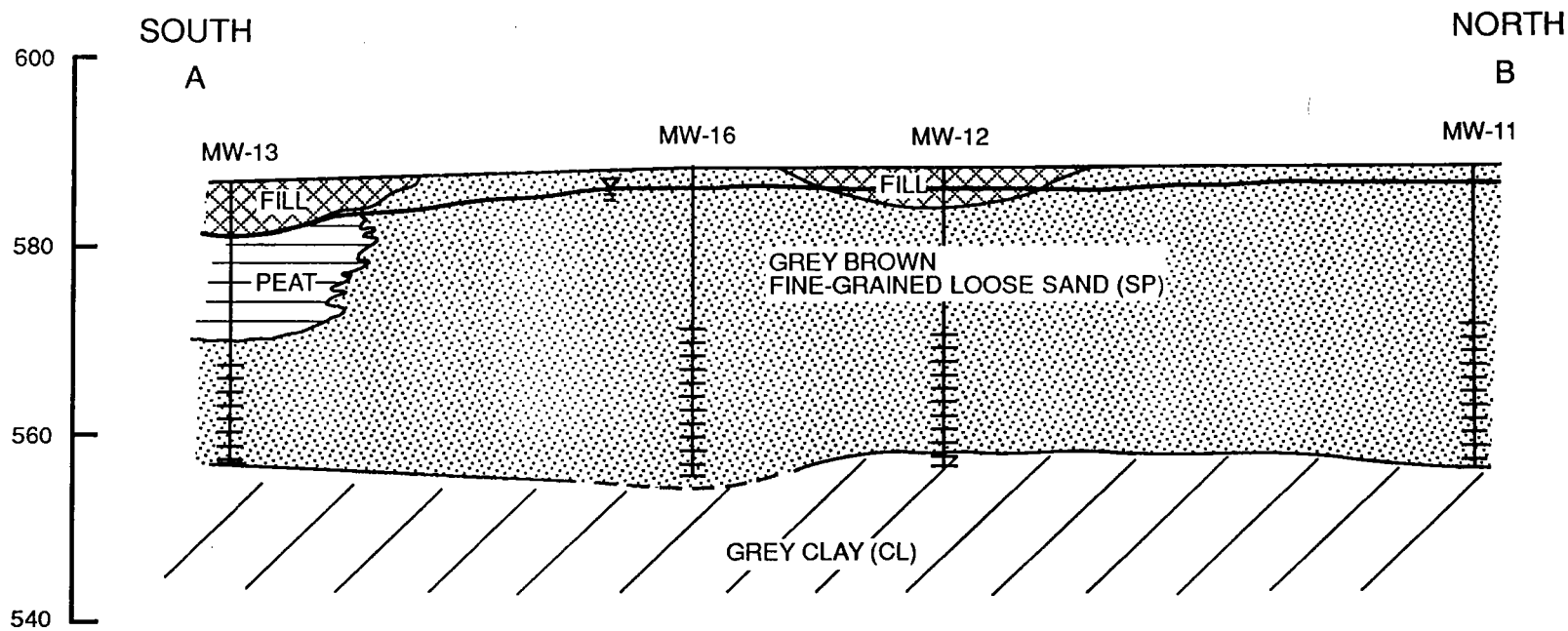
0 400 800

FIGURE 4-3

Schematic Geological Cross-Section B

DuPont East Chicago

CH2M HILL



LEGEND

* Well construction and lithologic data are not available, these are approximate depths of U.S. EPA wells (indicated by ?)

Water elevations are from the June 18, 1990 data

Groundwater elevation

Well screened interval

MW-4 Monitoring well ID

— — — Interpolated lithologic boundary

The depth and thickness of the subsurface strata indicated on the cross-section were generalized from and interpolated between borings. Information on actual subsurface conditions exists only at the specific locations and dates indicated. Soil conditions and water levels at other locations may differ from conditions occurring at the boring locations. Also, the passage of time may result in a change in the conditions at these boring locations.

HORIZONTAL SCALE IN FEET

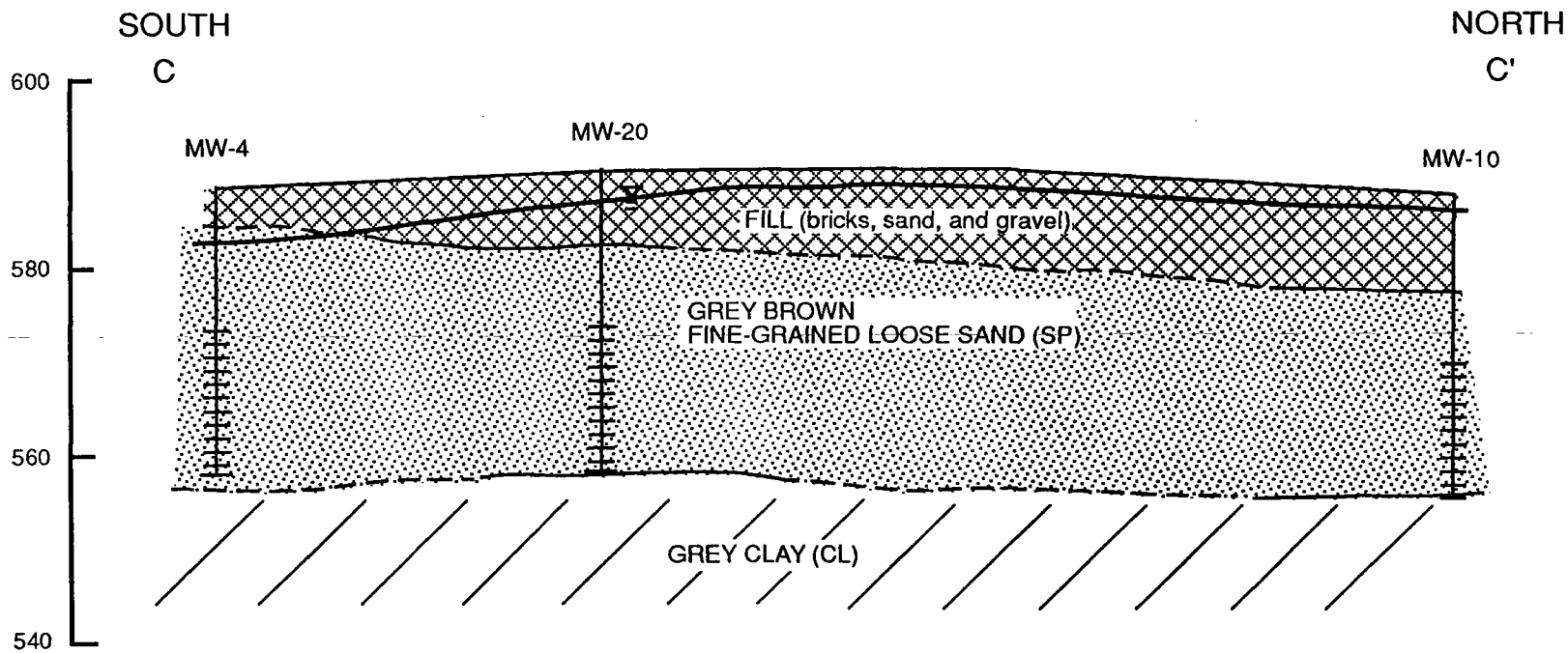
0 200 400

FIGURE 4-4

Schematic Geological Cross-Section A-B

DuPont East Chicago Plant

CH2M HILL



LEGEND

Water elevations are from the June 18, 1990 data

Groundwater elevation

Well screened interval

MW-4 Monitoring well ID

Interpolated lithologic boundary

The depth and thickness of the subsurface strata indicated on the cross-section were generalized from and interpolated between borings. Information on actual subsurface conditions exists only at the specific locations and dates indicated. Soil conditions and water levels at other locations may differ from conditions occurring at the boring locations. Also, the passage of time may result in a change in the conditions at these boring locations.

HORIZONTAL SCALE IN FEET

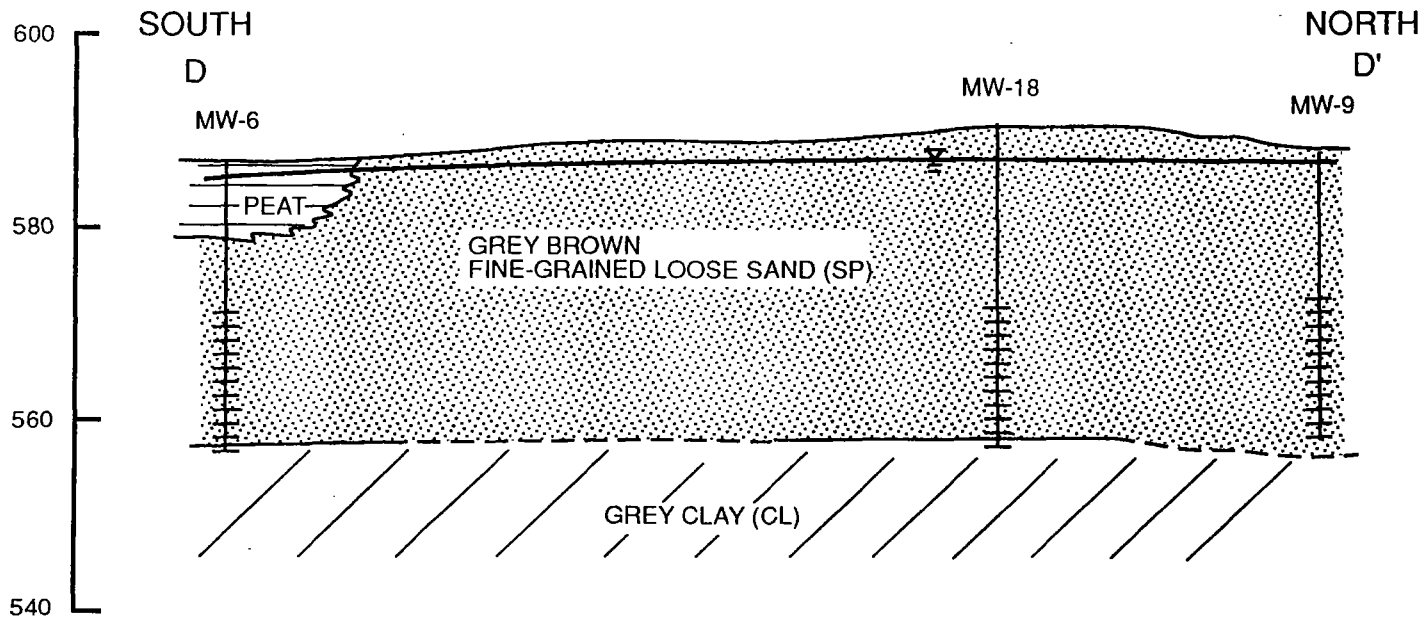
0 200 400

FIGURE 4-5

Schematic Geological Cross-Section C

DuPont East Chicago

CH2M HILL



LEGEND

Water elevations are from the June 18, 1990 data

Groundwater elevation

Well screened interval

MW-4 Monitoring well ID

— — — Interpolated lithologic boundary

The depth and thickness of the subsurface strata indicated on the cross-section were generalized from and interpolated between borings. Information on actual subsurface conditions exists only at the specific locations and dates indicated. Soil conditions and water levels at other locations may differ from conditions occurring at the boring locations. Also, the passage of time may result in a change in the conditions at these boring locations.

HORIZONTAL SCALE IN FEET

0 200 400

FIGURE 4-6

Schematic Geological Cross-Section D-D'

DuPont East Chicago Plant

CH2M HILL

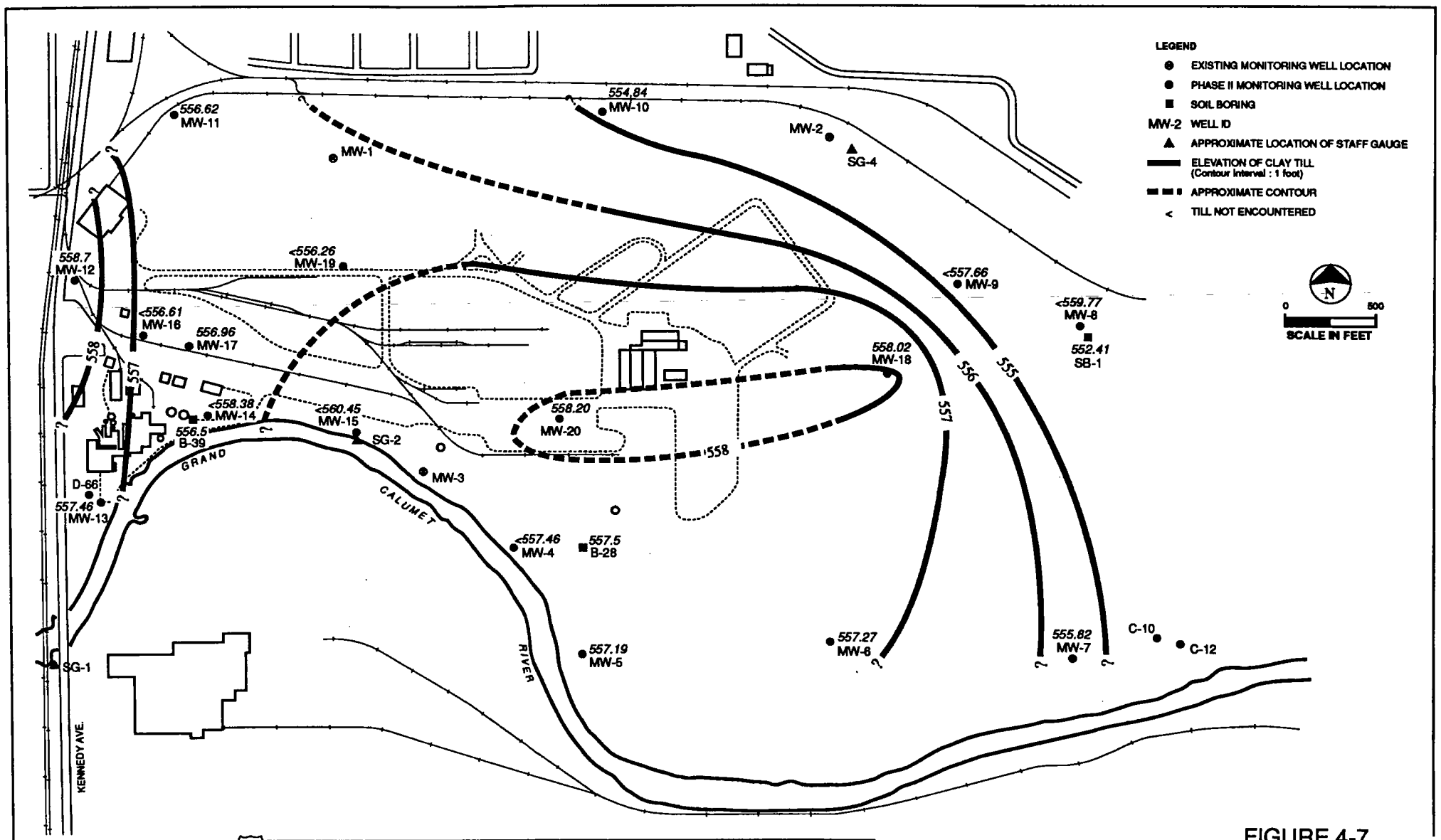


FIGURE 4-7
Approximate Elevation of Aquifer Base
Du Pont East Chicago Plant

CH2M HILL

CH29776.AO.RP FIG. 4-7 ELEV. OF AQU. 4-3-91 LML

Table 4-1
PHASE II WATER LEVEL MONITORING DATA
DU PONT EAST CHICAGO PLANT

	Elevation (Feet Above Mean Sea Level)									
	6/18/90	7/17/90	8/28/90	8/29/90	9/10/90	10/16/90	11/16/90	11/30/90	2/19/91	4/11/91
Du Pont Monitoring Wells										
MW-1	586.39	586.08	587.24	587.14	586.56	586.81	586.85	588.05	586.71	587.03
MW-2	585.90	585.87	586.73	586.68	586.31	586.65	586.59	587.12	587.03	587.16
MW-3	582.34	582.39	582.93	582.74	582.53	582.74	582.48	583.25	581.96	582.41
MW-4	582.23	582.28	582.79	582.78	582.46	582.51	582.48	582.96	582.00	582.36
MW-5	581.63	581.67	581.98	581.97	581.71	582.05	582.03	582.57	582.01	582.12
MW-6	585.65	585.91	NA	586.19	585.64	586.28	586.33	NA	586.50	586.33
MW-7	581.67	581.90	582.48	582.21	581.86	582.30	582.34	582.50	582.46	582.40
MW-8	586.00	585.83	586.62	586.62	586.33	586.40	586.54	587.22	587.17	587.23
MW-9	585.94	585.81	586.61	586.58	586.31	586.34	586.47	587.11	586.96	587.11
MW-10	585.80	585.74	586.39	586.37	585.93	586.27	586.20	586.92	586.30	586.55
MW-11	586.02	585.79	586.86	586.85	586.35	586.54	586.55	NA	586.50	586.77
MW-12	585.40	585.92	586.62	586.59	585.86	586.83	585.82	587.14	585.69	585.94
MW-13	581.18	581.28	581.59	581.49	581.32	581.50	581.49	581.78	581.29	581.36
MW-14	583.49	583.92	584.35	584.29	584.54	584.56	583.55	584.87	582.89	583.36
MW-15	582.01	585.02	582.79	582.74	582.23	582.45	585.08	583.18	581.48	582.04
MW-16	585.99	586.68	587.14	587.14	586.93	587.19	586.21	587.36	585.97	586.21
MW-17	586.14	586.78	587.34	587.32	587.00	587.45	586.48	588.05	585.99	586.42
MW-18	586.43	583.25	586.93	586.88	586.60	586.63	586.64	587.32	587.08	587.27
MW-19	586.61	586.42	587.46	587.40	586.79	587.06	586.96	588.22	586.88	587.21
MW-20	586.62	586.50	587.48	587.44	586.76	586.99	586.74	587.99	586.46	586.96
Staff Gauges										
	(6/21/90)									
SG-1	580.65	580.51	580.87	580.76	580.74	580.46	580.60	580.19	579.92	580.67
SG-2	580.27	580.56	NA	580.82	580.57	580.55	580.55	<579.98	<579.98	<579.98
SG-3	581.11	581.18	581.67	581.60	581.37	581.37	581.26	581.19	580.12	580.71
SG-4	<587.26	NA	588.04	588.02	587.77	587.71	587.84	588.50	588.56	588.70
Other Monitoring Sites										
U.S.G.S. Monitoring Wells										
C-5	583.74	NA	NA	NA	NA	584.31	584.43	NA	NA	584.95
C-10	582.44	NA	583.04	NA	NA	583.11	583.17	583.56	583.36	583.34
C-12	582.32	NA	583.03	NA	NA	583.11	583.12	583.64	583.39	583.41
C-15	581.83	NA	NA	NA	NA	NA	NA	NA	NA	NA
D-66	581.54	NA	NA	NA	NA	581.99	581.83	582.15	581.64	581.64

NOTE: NA = Not Analyzed.
"<" = Water level below bottom of gauge.

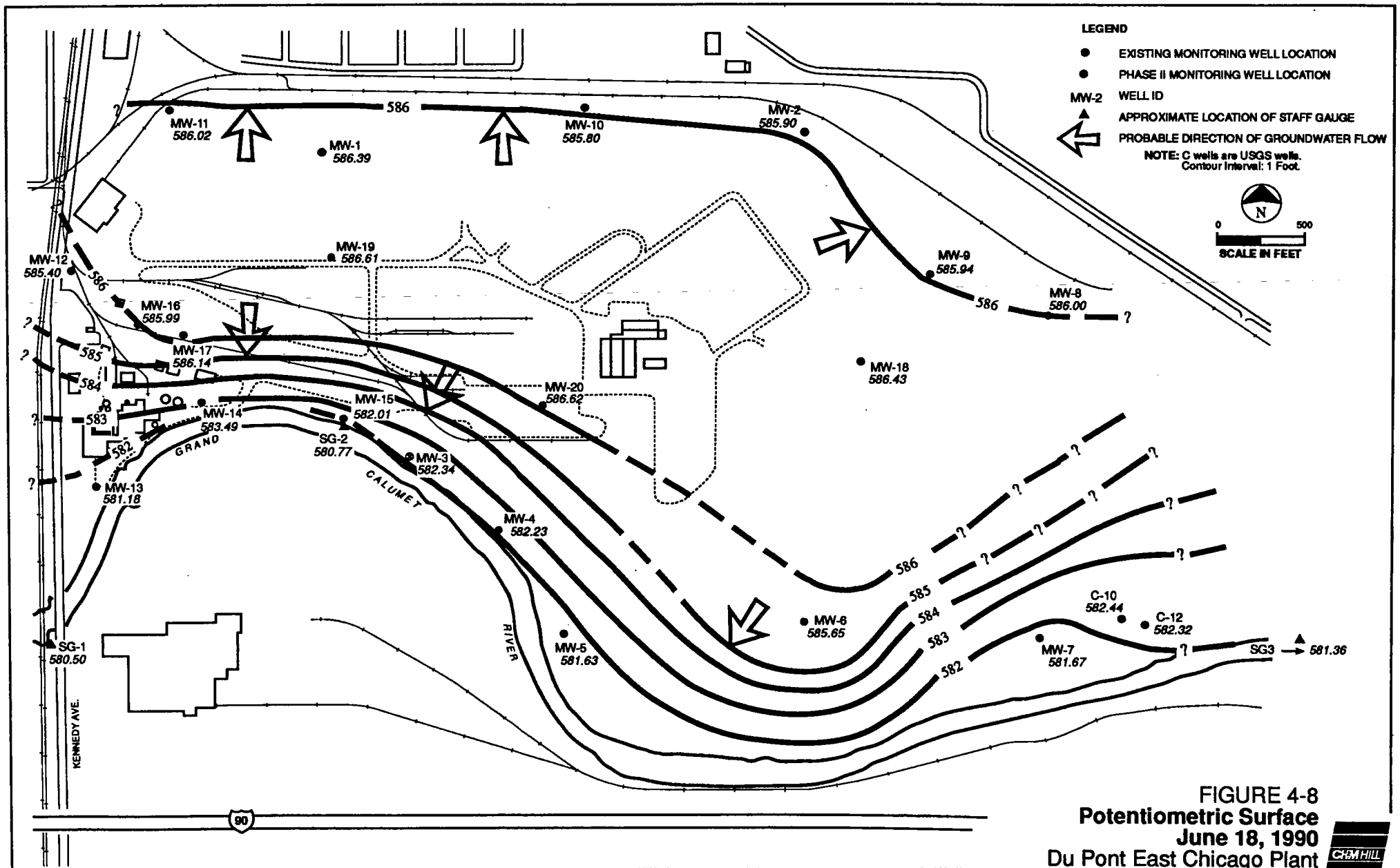


FIGURE 4-8
Potentiometric Surface
June 18, 1990
Du Pont East Chicago Plant

CH2M HILL

CHI29770.AO.XX FIG. 4-8 JUNE 18, 1990 4-3-91 LML

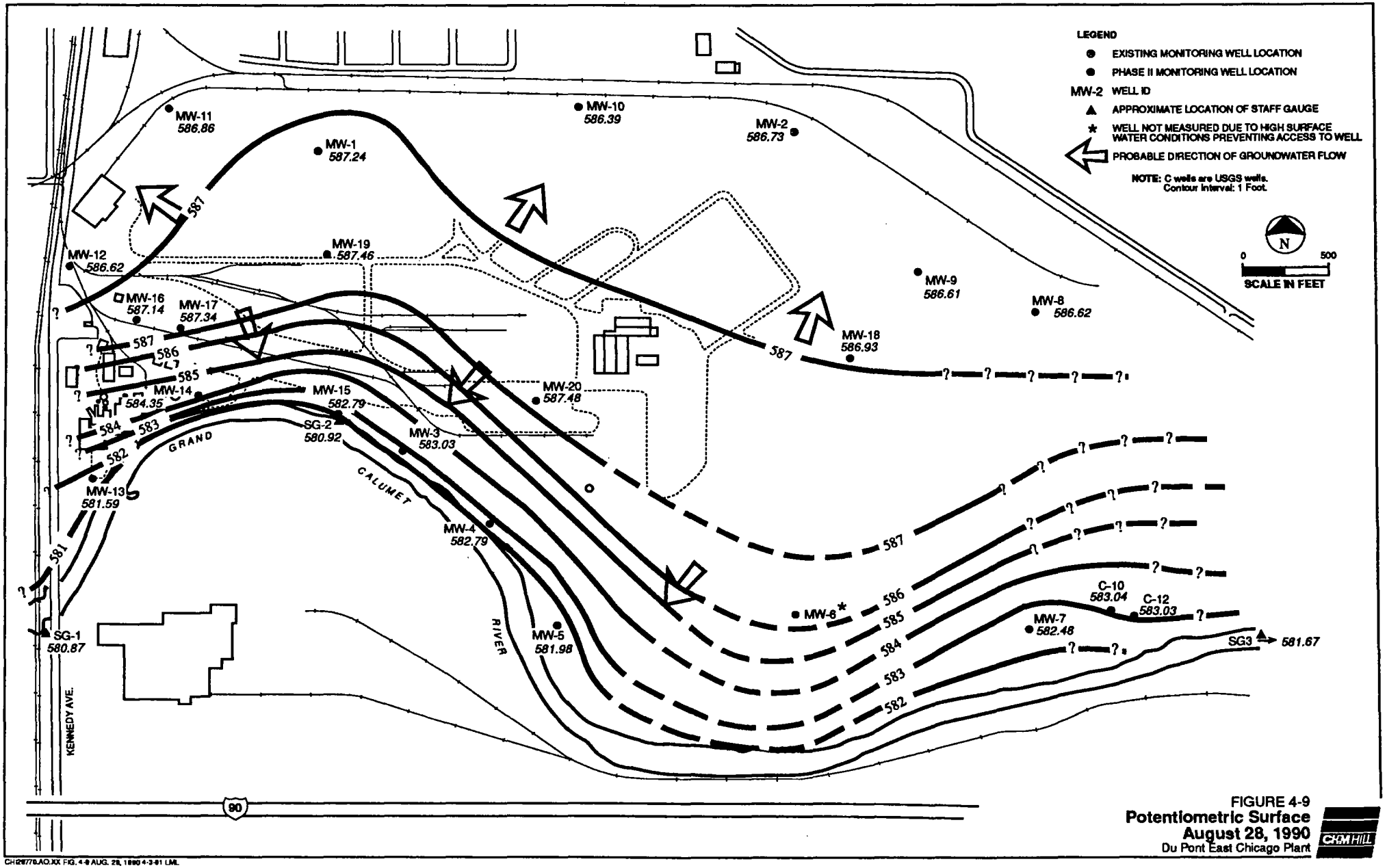


FIGURE 4-9
Potentiometric Surface
August 28, 1990
Du Pont East Chicago Plant

CH2M HILL

CH2M770.AO.XX FIG. 4-9 AUG. 28, 1990 4-3-91 LML

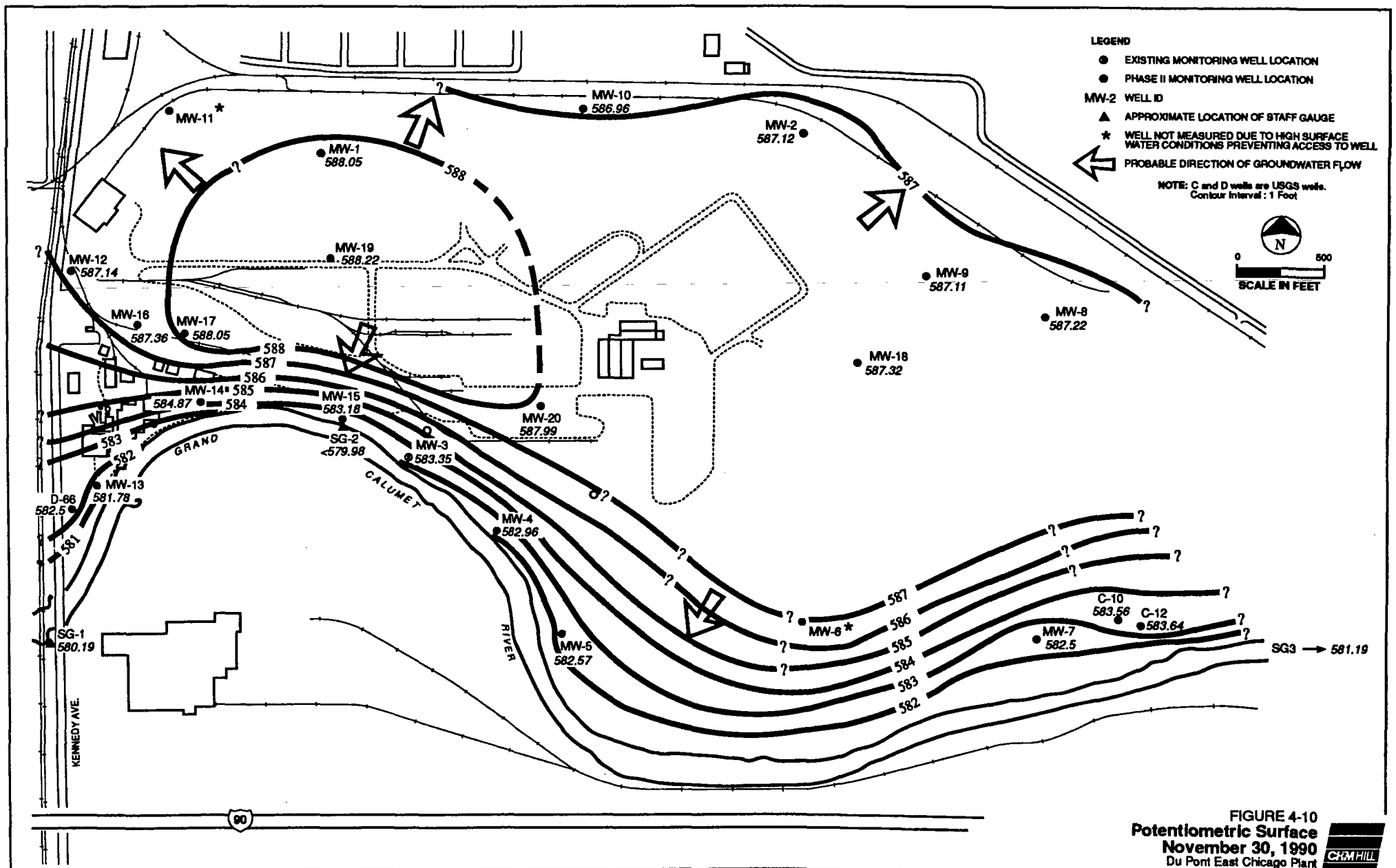


FIGURE 4-10
Potentiometric Surface
November 30, 1990
Du Pont East Chicago Plant

CH2M HILL

CH2H778.AO.XX FIG. 4-10 NOV. 30, 1990 4-3-91 LML

groundwater flow directions or gradients near the river. The potentiometric surface observed, though higher in elevation, did not vary substantially from that observed in August 1990. No evidence of groundwater flow reversal or river recharge to the Calumet Sand was observed.

Prior to collecting this information, available data indicated that the probable direction of groundwater flow at the site was toward the Grand Calumet River. Examination of the data indicate an east-west groundwater divide, running through the center of the Du Pont property. Because of the divide, the potential exists for groundwater to flow both south toward the Grand Calumet River and north toward an offsite residential community known locally as Riley Park (Figure 4-11). This contradicts the previous theory that the general direction of groundwater flow at the site was toward the Grand Calumet River.

Hydraulic Conductivity. Estimates of horizontal hydraulic conductivity in the saturated Calumet Sand were obtained from rising head testing performed in eight of the new monitoring wells installed onsite. Little variation in hydraulic response was observed when testing. An average horizontal hydraulic conductivity of 4.6×10^3 cm/sec (13 ft/day) was computed from the data collected (Table 4-2). Supporting computations are provided in Appendix A.

Groundwater Velocity and Flow. Groundwater velocities and flow rates were estimated from the Phase II geologic data, potentiometric surface data (Table 4-1), hydraulic conductivity test results (Table 4-2), and estimates of effective porosity (Appendix D). These estimates assumed that groundwater flow directions at the site were controlled entirely by hydraulic gradients and not variations in hydraulic conductivity resulting from anisotropy or heterogeneity.

Estimated average groundwater velocities within the Calumet Sand south of the divide for June and August 1990 were 0.22 to 0.24 ft/day. This velocity represents the velocity of the pore water movement, assuming a straight pathway and an average effective porosity of 0.35. Flow south of the groundwater divide discharges to the Grand Calumet River. The estimated groundwater discharge rate into the Grand Calumet River from the entire length of the Du Pont plant site ranged from 71 gallons per minute (gpm) in June 1990, to 78 gpm in August 1990 (Table 4-3). The USGS (1987) measured an average low flow of approximately 215,000 gpm for the Grand Calumet River during "dry weather" conditions (between October 3 and 4, 1984) at the Cline Avenue bridge (on the eastern edge of the Du Pont East Chicago property). For the purposes of this report, this flow measurement was considered a reasonable estimate for low flow. The groundwater discharge rate of 78 gpm from the Du Pont East Chicago plant to the Grand Calumet River represents approximately 0.04 percent of the low flow value for the Grand Calumet River.

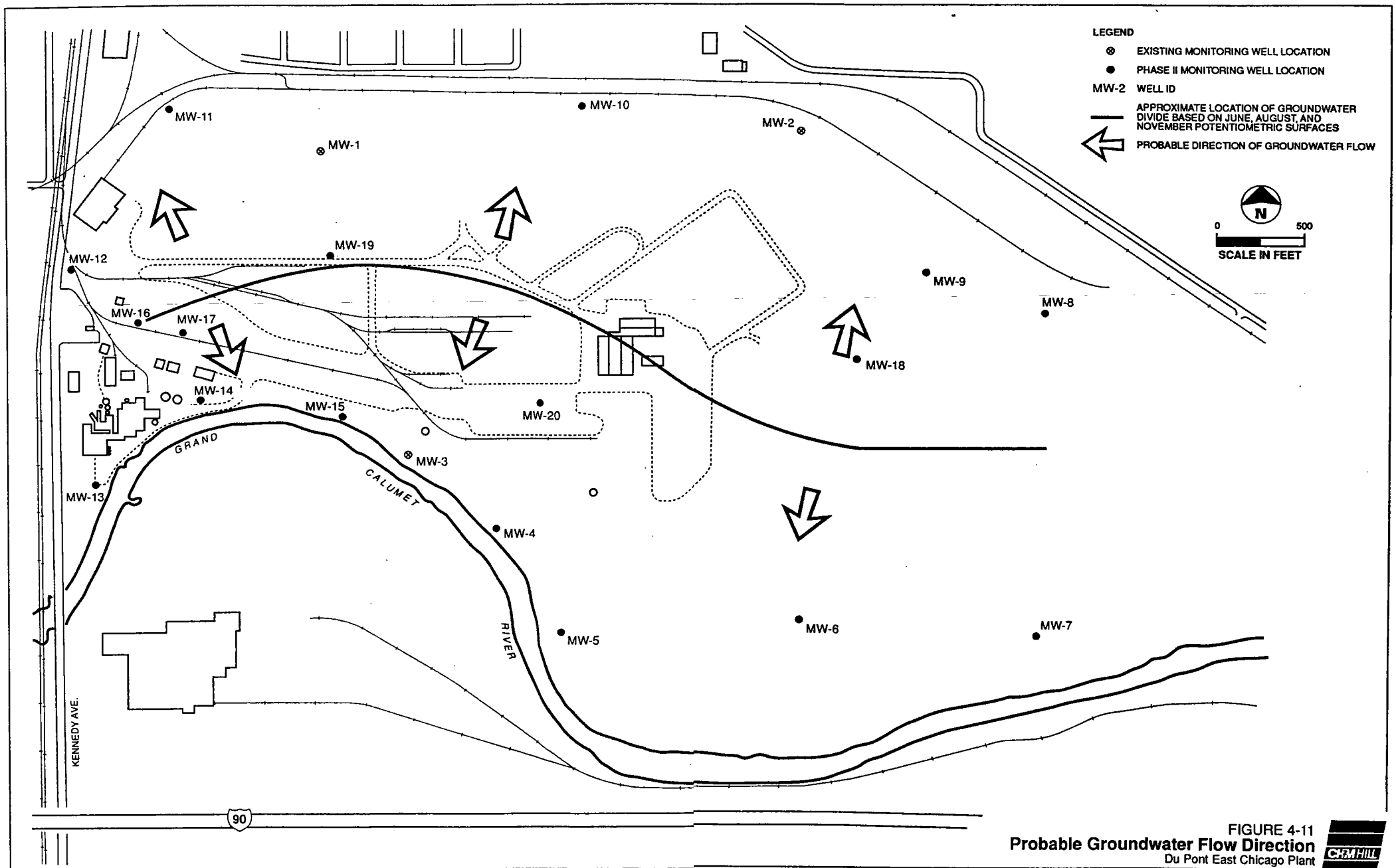


FIGURE 4-11
Probable Groundwater Flow Direction
Du Pont East Chicago Plant

CH2M HILL

CH128770.A0.RP FIG. 4-11 GRWD. FLOW 2-21-91 LML

Table 4-2
RESULTS OF VARIABLE HEAD TESTING
DU PONT EAST CHICAGO PLANT

Well I.D.	Hydraulic Conductivity (cm/s)		
	Test 1	Test 2	Log Average
MW-4	6.4E-03	---	6.4E-03
MW-5	3.8E-03	4.0E-03	3.9E-03
MW-10	4.6E-03	4.6E-03	4.6E-03
MW-11	3.6E-03	3.8E-03	3.7E-03
MW-13	3.7E-03	---	3.7E-03
MW-15	5.5E-03	5.7E-03	5.6E-03
MW-16	4.3E-03	4.3E-03	4.3E-03
MW-18	4.8E-03	5.1E-03	4.9E-03

Table 4-3
SUMMARY OF GROUNDWATER FLOW CHARACTERISTICS
DU PONT EAST CHICAGO PLANT

Flow Parameter	Flow Toward Grand Calumet River	
	June 1990	August 1990
Gradient	0.004 to 0.009 ft/ft	0.004 to 0.01 ft/ft
Average Linear Velocity	0.12 to 0.47 ft/day (44 to 170 ft/yr)	0.12 to 0.52 ft/day (44 to 190 ft/yr)
	Average = 0.22 ft/day (Average = 80 ft/yr)	Average = 0.24 ft/day (Average = 88 ft/yr)
Total Discharge	Average = 71.0 gpm	Average = 78.4 gpm

NOTES:

Average linear velocity estimated assuming a porosity of 0.35.

Ranges in linear velocities were extimated using minimum and maximum gradients and hydraulic conductivities. Average linear velocities were estimated from the total flux (discharge) and the area through which discharge occurs, using a length of 7,200 linear feet along the Grand Calumet River boundary and and average saturated thickness of 25 feet.

Saturated thicknesses were determined at individual well locations.

Average discharges were estimated using a flow tube analysis discussed in Appendix D.

Discharge rates calculated using water table gradients, hydraulic conductivity, and aquifer dimensions were compared to predicted discharge rates calculated from a steady-state water balance perspective through the following relationship:

$$Q_{in} = Q_{out}$$

Where:

Q_{in} = the sum of all groundwater inflows to the aquifer (L^3/T). Includes lateral groundwater inflow, upward vertical leakage, natural downward vertical recharge (from precipitation), and other artificial recharge from injection wells or other sources.

Q_{out} = the sum of all groundwater discharges from the aquifer (L^3/T). Includes lateral groundwater discharge, downward vertical leakage, and groundwater removal from pumping wells.

Assuming upward vertical leakage into the Calumet Sand is negligible, and leaking sewers or water mains do not act as onsite sources of artificial recharge, all groundwater inflow (Q_{in}) was attributable to natural recharge infiltration. No water supply wells exist onsite, and both downward vertical leakage out of the Calumet Sand and groundwater interception by leaking sewers onsite were assumed to be negligible. Therefore, all lateral groundwater discharge from the site should be within a range predicted from precipitation recharge alone. The range of 5 to 13 inches per year of natural recharge estimated by the USGS (1989) was used in the water balance. Distributing annual recharge over the site area of approximately 238 acres south of the groundwater divide resulted in a discharge rate to the Grand Calumet River of approximately 60 to 160 gpm. Discharge rates estimated from observed gradients and hydraulic parameters were within this range. Similarly, the predicted discharge rate for the remaining site area north of the divide ranged from 28 to 71 gpm. The discharge rate estimated from observed gradients and hydraulic parameters north of the divide was near this range.

Phase II staff gauge data indicate that the groundwater and surface water at and adjacent to the site are connected hydraulically. The wet areas onsite appear to be the surface expression of the groundwater table. In some areas, surface water enters runoff ponds before infiltrating, resulting in staff gauge water levels that are slightly higher than the water table elevation (Table 4-1). Ponding was generally attributed to the local presence of fine-grained soils and peat or muck soils accumulated in depressions.

GROUNDWATER QUALITY CHARACTERIZATION

Data Validation

Before implementing the data evaluation task, a review of the laboratory analytical data was performed to determine whether appropriate laboratory Quality

Assurance/Quality Control (QA/QC) had been conducted and to generally determine the validity of the data for the purposes of this investigation. Data validation reports are included with the laboratory data sheets in Volume II, Appendix J. Analytical data collected during this project are summarized in Appendix E.

Upon review, inorganic water quality data collected during both sampling rounds of Phase II generally met the data validation review criteria. A few inorganic constituents were not analyzed during both rounds, because of a sampling team oversight.

Portions of the organic water quality data collected during Round I did not meet the data validation review criteria. Multiple VOC constituents reported to be present in one sample (MW-11) were not detected in the sample duplicate, or upon repeat sampling. These discrepancies and the false reporting by the laboratory of VOCs in other project samples analyzed during the same time period shed doubt on the validity of the VOC data. For this reason, only the VOCs detected on a consistent basis (during both rounds) are discussed in the text of this report. Table 4-4 summarizes constituent concentrations found at levels greater than the analytical method detection limits. VOCs suspected of being the result of false positive reporting are listed at the bottom of Table 4-4.

Background Data

Because of the presence of the groundwater divide running east-west across the center of the plant, none of the monitoring wells are positioned upgradient from the plant. Under these conditions, site-specific background water quality data cannot be characterized. This constraint limits the extent to which conclusions can be drawn regarding the effect of current and historic waste management practices on local groundwater quality. Additionally, the lack of background data limits the ability to discriminate the effects of Du Pont industrial processes from the widespread effects of regional industry on the local groundwater quality. Groundwater quality in the area has been influenced by industrialization (USGS report, in press). In lieu of background data, the three lowest concentrations of each compound at different onsite locations were averaged and used as a basis for comparing the degree of water quality degradation between locations (Table 4-5).

Constituents Detected

Organic Compounds. Some organic compounds (e.g., bis(ethylhexyl)phthalate and the VOCs noted on the bottom of Table 4-4) were not detected upon repeat sampling and analysis. Those constituents that were detected in both sampling rounds are presented in Table 4-6. Of the organic compounds detected (phenol; 1,1-dichloroethane; 1,2-dichloroethane; 1,1,1-trichloroethane; carbon disulfide; and chloroform), only carbon disulfide was detected at multiple monitoring locations across the site.

Table 4-4

PHASE II GROUNDWATER QUALITY DATA

DU PONT EAST CHICAGO PLANT

Constituents	Concentration						
	MW-1		MW-2		MW-3		
	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	
Water Quality Parameters (mg/l)							
COD	NA	20	NA	957	NA	30	27
Nitrogen, Ammonia	1.3	0.32	9.46	3.31	2.55	2.36	2.31
Nitrogen, Kjeldahl	NA		NA	3.71	NA	1.77	1.90
Phosphate (Total)	0.04	1.64	0.69	1.50	1.35	2.45	2.52 J
Solids, Dissolved	2360	2280	2500	2400	1250	1690	1670
pH (units)	6.63	7.96	6.32	6.83	6.86	6.8	NA
Major Inorganic Ions (mg/l)							
Calcium	NA	519	NA	358	NA	299	287
Carbonates	100	140	168	260	260	268 J	300
Chloride	18	30	18	20	35	40	40
Magnesium	NA	17.8	NA	129	NA	71.5	67.0
Potassium	NA	5.95	NA	3.75	NA	6.26	5.98
Sodium	NA	15.7	NA	93.1	NA	61.0	57.2
Sulfate	1570	1100	1660	1900	610	1500	1400
Trace Inorganic Compounds							
Aluminum (mg/l)						0.03	0.03
Antimony	0.07						
Arsenic	0.15	0.3	0.05	0.09	0.4	1.7	2.1
Barium	0.023	0.04	0.015	0.07	0.093	0.15	0.14
Boron	0.17	0.23	0.24	0.26	0.29	0.23	0.28
Cadmium	0.013					0.064	0.068
Chromium, Total		0.026		0.008		0.007	0.007
Copper							
Cyanide, Total				0.002 UJ			
Fluoride	NA	8	NA	10	NA	2	0.8
Iron	NA	11.7	NA	60.5	NA	13.6	13.5
Lead				0.04 UJ			
Manganese	NA	0.43	NA	0.35	NA	1.33	1.24
Mercury							
Nickel						0.01	
Zinc	1.59	3.59	0.031	0.040	0.087	0.100	0.020
Organic Compounds (ug/l) (a)							
Carbon disulfide	12.0 J	4.3	34.9 J	10.8	16.6	20.9	14.4
Chloroform							
1,1-Dichloroethane							
1,2-Dichloroethane							
1,1,1-Trichloroethane							
Phenol							
Bis(2-ethylhexyl)phthalate							

NOTES: = Undetected at specified detection limit.

J = Indicates estimated value.

R = Indicates unusable data.

UJ = Undetected at specified detection limit. Unknown direction of bias in analytical data.

NA = Not analyzed.

Duplicate analysis to right in rounds with two listings.

(a) Only those volatile organic compounds detected during both rounds are reported. VOCs detected on an inconsistent basis are: bromodichloromethane, dibromochloromethane, ethyl benzene, tetrachloroethene, trichloroethene, toluene, xylenes, and 2-butanone.

Round 1 sampling was performed June 18, 1990. Round 2 sampling was performed September 10, 1990.

Table 4-4

PHASE II GROUNDWATER QUALITY DATA

DU PONT EAST CHICAGO PLANT

	Concentration					
	MW-4		MW-5		MW-6	
Constituents	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2
Water Quality Parameters (mg/l)						
COD	NA	37	NA	105	NA	509
Nitrogen, Ammonia	6.40	19.5	28.3	21.2	10	5.51
Nitrogen, Kjeldahl	NA	21.6	NA	25.0	NA	6.16
Phosphate (Total)	0.03	0.76 J	0.10	0.80		0.05
Solids, Dissolved	1710	2980	8350	9310	30600	28700
pH (units)	6.93	6.7	6.31	6.4	5.39	5.85
Major Inorganic Ions (mg/l)						
Calcium	NA	570	NA	678	NA	7560
Carbonates	152	230	472	760	774	1170 J
Chloride	46	50	397	470	17000	18000
Magnesium	NA	99.5	NA	1080	NA	498
Potassium	NA	16.5	NA	22.5	NA	45.4
Sodium	NA	75.2	NA	244	NA	730
Sulfate	1300	2500	4400	7030	90	180
Trace Inorganic Compounds						
Aluminum (mg/l)	0.06		0.22	0.10	0.20	0.39
Antimony						0.08
Arsenic	0.005	0.012	0.16	0.32	0.008	0.030
Barium	0.025		0.039	0.04	1.39	2.15
Boron	0.34	0.42	0.27	1.24	8.04	10.9
Cadmium						
Chromium, Total		0.013			0.005	
Copper						
Cyanide, Total						
Fluoride	NA	1.8	NA	12	NA	2
Iron	NA	51.0	NA	132	NA	619
Lead						
Manganese	NA	1.00	NA	2.35	NA	6.14
Mercury						
Nickel		0.02	0.02	0.02		
Zinc	0.309	1.14	9.75	11.4	0.074	0.070
Organic Compounds (ug/l) (a)						
Carbon disulfide	50.4	75.4	11.3	21.4		39.7
Chloroform	6.3	1.0				
1,1-Dichloroethane			1.6	2.4		
1,2-Dichloroethane			30.7	44.7 J		
1,1,1-Trichloroethane						
Phenol						
Bis(2-ethylhexyl)phthalate						

NOTES: = Undetected at specified detection limit.

J = Indicates estimated value.

R = Indicates unusable data.

UJ = Undetected at specified detection limit. Unknown direction of bias in analytical data.

NA = Not analyzed.

Duplicate analysis to right in rounds with two listings.

(a) Only those volatile organic compounds detected during both rounds are reported. VOCs detected on an inconsistent basis are: bromodichloromethane, dibromochloromethane, ethyl benzene, tetrachloroethene, trichloroethene, toluene, xylenes, and 2-butanone.

Round 1 sampling was performed June 18, 1990. Round 2 sampling was performed September 10, 1990.

Table 4-4

PHASE II GROUNDWATER QUALITY DATA

DU PONT EAST CHICAGO PLANT

	Concentration					
	MW-7		MW-8		MW-9	
Constituents	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2
Water Quality Parameters (mg/l)						
COD	NA	98	NA	41	NA	95
Nitrogen, Ammonia	0.91	0.89	1.25	0.99	19	55.4
Nitrogen, Kjeldahl	NA	0.95	NA	1.11	NA	62.7
Phosphate (Total)		1.92	0.81	5.13	1.5	5.45 J
Solids, Dissolved	1050	987	2290	2190	4450	6410
pH (units)	6.82	7.99	6.46	7.77	6.20	7.52
Major Inorganic Ions (mg/l)						
Calcium	NA	218	NA	486	NA	619
Carbonates	170	230	258	300	160	370
Chloride	106	150	131	210	750	1030
Magnesium	NA	32.1	NA	42.8	NA	324
Potassium	NA	3.49	NA	6.05	NA	36.5
Sodium	NA	51.2	NA	88.6	NA	640
Sulfate	360	400	1200	1300	2140	4200
Trace Inorganic Compounds						
Aluminum (mg/l)				0.11		0.05
Antimony			0.07			
Arsenic	0.002	0.002	0.018	0.009		0.03
Barium	0.055	0.04	0.043	0.08	0.029	
Boron	0.29	0.37	0.64	0.58	1.42	3.22
Cadmium						
Chromium, Total		0.013			0.006	0.012
Copper		0.01				
Cyanide, Total			0.006			
Fluoride	NA	4	NA	9	NA	9
Iron	NA	15.9	NA	54.9	NA	158
Lead		0.05		0.08		0.06
Manganese	NA	0.51	NA	1.42	NA	6.55
Mercury						
Nickel		0.07			0.02	0.07
Zinc		0.034		0.018	10.5	27.8
Organic Compounds (ug/l) (a)						
Carbon disulfide	14.2 J	28.8	27.5 J	95.8		18.1
Chloroform					1.7	
1,1-Dichloroethane						
1,2-Dichloroethane						
1,1,1-Trichloroethane					2.1	
Phenol						
Bis(2-ethylhexyl)phthalate						

NOTES: = Undetected at specified detection limit.
J = Indicates estimated value.
R = Indicates unusable data.
UJ = Undetected at specified detection limit. Unknown direction of bias in analytical data.
NA = Not analyzed.
Duplicate analysis to right in rounds with two listings.
(a) Only those volatile organic compounds detected during both rounds are reported. VOCs detected on an inconsistent basis are: bromodichloromethane, dibromochloromethane, ethyl benzene, tetrachloroethene, trichloroethene, toluene, xylenes, and 2-butanone.
Round 1 sampling was performed June 18, 1990. Round 2 sampling was performed September 10, 1990.

Table 4-4

PHASE II GROUNDWATER QUALITY DATA

DU PONT EAST CHICAGO PLANT

	Concentration						
	MW-10		MW-11			MW-12	
Constituents	Round 1	Round 2	Round 1		Round 2	Round 1	Round 2
Water Quality Parameters (mg/l)							
COD	NA	78	NA	NA	41	NA	85
Nitrogen, Ammonia	5.9	10.8	1.3	0.5	1.34	3.06	2.47
Nitrogen, Kjeldahl	NA	10.9	NA	NA	1.40	NA	2.84 J
Phosphate (Total)	2.9	23			9.9	0.15	10.3 J
Solids, Dissolved	3010	2730	2070	2040	2360	880	783
pH (units)	6.33	6.7	6.68	6.69	6.7	6.85	6.0
Major Inorganic Ions (mg/l)							
Calcium	NA	351	NA	NA	540	NA	176
Carbonates	196	240	104	144	120	212	228
Chloride	108	90	56	53	100	109	68
Magnesium	NA	19.9	NA	NA	24.3	NA	13.9
Potassium	NA	19.8	NA	NA	5.19	NA	5.32
Sodium	NA	188	NA	NA	51.8	NA	24.9
Sulfate	1810	1800	1270	1010	1700	270	420
Trace Inorganic Compounds							
Aluminum (mg/l)		0.03			0.06		
Antimony	0.05	0.04		0.06			
Arsenic	0.4	0.4	0.010	0.010	0.011	0.011	0.063
Barium	0.127	0.21	0.028	0.028	0.04	0.071	0.08
Boron	0.25	0.47	0.33	0.35	0.59	0.25	0.46
Cadmium	0.011						
Chromium, Total		0.005					
Copper							
Cyanide, Total				0.006			
Fluoride	NA	5	NA	NA	3	NA	0.9
Iron	NA	61.4 J	NA	NA	17.1	NA	10.6
Lead		0.04 UJ			0.07	0.04	0.06
Manganese	NA	0.93 J	NA	NA	0.62	NA	0.51
Mercury							
Nickel			0.01	0.01	0.02	0.02	
Zinc	0.049	0.050	5.67	5.02	7.46	0.246	0.019
Organic Compounds (ug/l) (a)							
Carbon disulfide		45.7			5.8		193
Chloroform			2.3 J	2.0 J		4.5	
1,1-Dichloroethane							
1,2-Dichloroethane							
1,1,1-Trichloroethane				5.3 J			
Phenol							
Bis(2-ethylhexyl)phthalate							

NOTES: = Undetected at specified detection limit.
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NA = Not analyzed.
Duplicate analysis to right in rounds with two listings.
(a) Only those volatile organic compounds detected during both rounds are reported. VOCs detected on an inconsistent basis are: bromodichloromethane, dibromochloromethane, ethyl benzene, tetrachloroethene, trichloroethene, toluene, xylenes, and 2-butanone.
Round 1 sampling was performed June 18, 1990. Round 2 sampling was performed September 10, 1990.

Table 4–4

PHASE II GROUNDWATER QUALITY DATA

DU PONT EAST CHICAGO PLANT

	Concentration					
	MW–13			MW–14		
Constituents	Round 1	Round 2		Round 1		Round 2
Water Quality Parameters (mg/l)						
COD	NA	760	760	NA	NA	14
Nitrogen, Ammonia	39.3	14.1	14.3	23.6	23.4	17.2
Nitrogen, Kjeldahl	NA	16.4	18.9	NA	NA	19.0
Phosphate (Total)	6.1	23.5	23.0	0.09	0.09	1.55
Solids, Dissolved	9940	11500	11700	3590	3610	3490
pH (units)	11.33	11.61	NA	6.30	6.12	6.0
Major Inorganic Ions (mg/l)						
Calcium	NA	0.188	0.190	NA	NA	731
Carbonates	6600	7000	7600	160	160	158
Chloride	40	30	30	700	730	670
Magnesium	NA	0.040	0.045	NA	NA	87.5
Potassium	NA	3.1	2.8	NA	NA	3.95
Sodium	NA	3600	3080	NA	NA	41.5
Sulfate	80	180	160	1400	1500	1000
Trace Inorganic Compounds						
Aluminum (mg/l)	18.0	0.90	0.86	0.15	0.07	0.13
Antimony						
Arsenic	0.14	0.09	0.08	0.010	0.009	0.014
Barium	0.159	0.51	0.39	0.020	0.017	0.11
Boron	0.67	0.74	3.10	0.20	0.19	0.26
Cadmium						0.005 UJ
Chromium, Total	0.022	0.010	0.012			
Copper	0.10	0.06	0.08			
Cyanide, Total						
Fluoride	NA	3	4	NA	NA	4
Iron	NA	1.63	1.38	NA	NA	23.3 J
Lead	0.28	0.08	0.15 J			0.04 UJ
Manganese	NA			NA	NA	1.00 J
Mercury	0.0004					
Nickel	0.03	0.02	0.03	0.01	0.01	0.02
Zinc	0.230	0.160	0.150	3.345	2.92	2.11
Organic Compounds (ug/l) (a)						
Carbon disulfide						
Chloroform			2.1			
1,1–Dichloroethane						
1,2–Dichloroethane						
1,1,1–Trichloroethane						
Phenol	55	208	198			
Bis(2–ethylhexyl)phthalate						15

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Round 1 sampling was performed June 18, 1990. Round 2 sampling was performed September 10, 1990.

Table 4-4

PHASE II GROUNDWATER QUALITY DATA

DU PONT EAST CHICAGO PLANT

	Concentration					
	MW-15		MW-16		MW-17	
Constituents	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2
Water Quality Parameters (mg/l)						
COD	NA	68	NA	122	NA	119
Nitrogen, Ammonia	0.55	0.70	27.9	77.4	13.7	32.9
Nitrogen, Kjeldahl	NA	2.46	NA	98.5 J	NA	41.5 J
Phosphate (Total)	0.74	2.77	NA	NA	NA	NA
Solids, Dissolved	2320	2630	3150	4720	2060	4150
pH (units)	6.64	6.5	NA	NA	6.11	5.50
Major Inorganic Ions (mg/l)						
Calcium	NA	519	NA	768	NA	705
Carbonates	336	440	128	204	96	208
Chloride	43	40	1320	2300	875	2200
Magnesium	NA	94.0	NA	316	NA	279
Potassium	NA	8.3	NA	36.2	NA	13.0
Sodium	NA	83.7	NA	43.8	NA	33.8
Sulfate	1400	1900	180	540	84	300
Trace Inorganic Compounds						
Aluminum (mg/l)	0.18	0.12		0.04	0.08	0.07
Antimony			NA	NA	NA	NA
Arsenic	0.23	0.26	0.005	0.002	0.002	0.001
Barium	0.027		0.139	0.33	1.03	1.05
Boron	1.19	0.40	NA	NA	NA	NA
Cadmium	0.014	0.006	NA	NA	NA	NA
Chromium, Total			NA	NA	NA	NA
Copper			NA	NA	NA	NA
Cyanide, Total	0.033		NA	NA	NA	NA
Fluoride	NA	11	NA	4	NA	4
Iron	NA	15.0	NA	10.5	NA	137
Lead	0.09		NA	NA	NA	NA
Manganese	NA	0.72	NA	3.09	NA	2.62
Mercury			NA	NA	NA	NA
Nickel	0.02		NA	NA	NA	NA
Zinc	2.42	2.49	10.64	35.8	65.4	227
Organic Compounds (ug/l) (a)						
Carbon disulfide	6.6		NA	NA	NA	NA
Chloroform	3.8		NA	NA	NA	NA
1,1-Dichloroethane			NA	NA	NA	NA
1,2-Dichloroethane			NA	NA	NA	NA
1,1,1-Trichloroethane			NA	NA	NA	NA
Phenol			NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate			NA	NA	NA	NA

NOTES: = Undetected at specified detection limit.

J = Indicates estimated value.

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NA = Not analyzed.

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Round 1 sampling was performed June 18, 1990. Round 2 sampling was performed September 10, 1990.

Table 4-4

PHASE II GROUNDWATER QUALITY DATA

DU PONT EAST CHICAGO PLANT

	Concentration						
	MW-18		MW-19		MW-20		
Constituents	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2	
Water Quality Parameters (mg/l)							
COD	NA	61	NA	51	NA	126	142
Nitrogen, Ammonia	NA	NA	NA	7.15	NA	5.54	5.32
Nitrogen, Kjeldahl	NA	NA	NA	7.55	NA	4.90	5.62
Phosphate (Total)		1.67	0.09	1.08		4.45	4.45
Solids, Dissolved	4500	5440	1530	4380	5190	5200	5250
pH (units)	6.64	6.83	6.84	6.6	8.70	9.0	NA
Major Inorganic Ions (mg/l)							
Calcium	NA	430	NA	626	NA	320	324
Carbonates	314	392	208	420	468	570	610
Chloride	84	150	127	400	277	310	370
Magnesium	NA	77.0	NA	150	NA	108	110
Potassium	NA	11.8	NA	16.0	NA	30.5	30.8
Sodium	NA	1010	NA	372	NA	986	1190
Sulfate	3200	3900	790	3500	3000	3500	3900
Trace Inorganic Compounds							
Aluminum (mg/l)	NA	NA	0.20	0.06		0.09	0.04
Antimony	NA	NA					
Arsenic	0.006	0.05	0.005	0.04	0.10	0.005	0.005
Barium	NA	NA	0.045	0.03	0.03	0.03	
Boron	NA	NA	0.15	0.81	0.94	1.22	1.27
Cadmium	NA	NA					
Chromium, Total	NA	NA	0.007	0.005			
Copper	NA	NA					
Cyanide, Total	NA	NA			0.003		
Fluoride	NA	17	NA	6	NA	7	8
Iron	NA	42.7	NA	41.9	NA	0.20	0.12
Lead	NA	NA				0.05	
Manganese	NA	1.96	NA	0.48	NA	0.62	0.56
Mercury	NA	NA					0.0008
Nickel	NA	NA					
Zinc	4.18	4.52	0.612	2.88		0.071	0.029
Organic Compounds (ug/l) (a)							
Carbon disulfide	51.8 J	6.0	6.9	1.2	5.8 R	44.0	53.7
Chloroform	5.9 J		7.0				
1,1-Dichloroethane					10.4 R	6.7	6.4
1,2-Dichloroethane							
1,1,1-Trichloroethane					5.5 R	1.3	1.3
Phenol	NA	NA					
Bis(2-ethylhexyl)phthalate	NA	NA					20

NOTES: = Undetected at specified detection limit.

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R = Indicates unusable data.

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NA = Not analyzed.

Duplicate analysis to right in rounds with two listings.

(a) Only those volatile organic compounds detected during both rounds are reported. VOCs detected on an inconsistent basis are: bromodichloromethane, dibromochloromethane, ethyl benzene, tetrachloroethene, trichloroethene, toluene, xylenes, and 2-butanone.

Round 1 sampling was performed June 18, 1990. Round 2 sampling was performed September 10, 1990.

Table 4-5
SURROGATE "BACKGROUND" CONCENTRATIONS IN GROUNDWATER
USED FOR COMPARATIVE PURPOSES
DU PONT EAST CHICAGO PLANT

Constituents	Concentration
Water Quality Parameters (mg/l)	
COD	20
Nitrogen, Ammonia	0.46
Nitrogen, Kjeldahl	0.70 *
Phosphate (Total)	
Solids, Dissolved	1010
Major Inorganic Ions (mg/l)	
Calcium	131
Carbonates	100
Chloride	22
Magnesium	10.6
Potassium	3.35
Sodium	24.8
Sulfate	8.5
Trace Inorganic Compounds (mg/l)	
Aluminum	
Antimony	
Arsenic	0.002
Barium	
Boron	0.17
Cadmium	
Chromium, Hexavalent	
Chromium, Total	
Copper	
Cyanide, Total	
Fluoride	1.2
Iron	4.0
Lead	
Manganese	0.26 *
Mercury	
Nickel	
Zinc	
Trace Organic Compounds ** **(ug/l)**	
Carbon disulfide	
Chloroform	
1,1-Dichloroethane	
1,2-Dichloroethane	
1,1,1-Trichloroethane	
Phenol	
Bis(2-ethylhexyl)phthalate	

Notes:

* One to two of the three averaged values below method detection limit.

** All organic compounds at the method detection limit. (See Table 3-2 for these limits)

Blank Space = All values less than or equal to the method detection limit.

VALUES ARE THE AVERAGE OF THE THREE LOWEST CONCENTRATIONS BY MONITORING WELL. IF LOW CONCENTRATION WAS AT THE METHOD DETECTION LIMIT, THE METHOD DETECTION LIMIT VALUE WAS USED.

Table 4-6
CONSTITUENTS DETECTED IN THE GROUNDWATER DURING BOTH ROUNDS 1 AND 2 DU PONT EAST CHICAGO PLANT

Constituents	Frequency *	Minimum Concentration Value & Location	Maximum Concentration Value & Location
Water Quality Parameters (mg/l)			
COD*	20/20	14 (MW-14)	957 (MW-2)
Nitrogen, Ammonia	19/19	0.32 (MW-1)	77.4 (MW-16)
Nitrogen, Kjeldahl*	18/19	BMDL - <0.05	98.5 (MW-16)
Phosphates	13/18	BMDL - <0.03	23.5 (MW-13)
Total Dissolved Solids	20/20	783 (MW-12)	30600 (MW-6)
pH	20/20	5.39 (MW-6)	11.61 (MW-13)
Major Inorganic Ions (mg/l)			
Calcium*	20/20	0.188 (MW-13)	7560 (MW-6)
Carbonate	20/20	96 (MW-17)	7000 (MW-13)
Chloride	20/20	18 (MW-1)	18000 (MW-6)
Magnesium*	20/20	0.04 (MW-13)	1080 (MW-5)
Potassium*	20/20	3.1 (MW-13)	45.4 (MW-6)
Sodium*	20/20	15.7 (MW-1)	3600 (MW-13)
Sulfate	20/20	80 (MW-13)	7030 (MW-5)
Trace Inorganic Compounds (mg/l)			
Aluminum	7/19	BMDL - <0.01	18.0 (MW-13)
Antimony	1/17	BMDL - <0.04	0.05 (MW-10)
Arsenic	19/20	0.001 (MW-17)	1.7 (MW-3)
Barium	15/19	BMDL - <0.01	2.15 (MW-6)
Boron	17/17	0.15 (MW-19)	10.9 (MW-6)
Cadmium	1/17	BMDL - <0.005	0.014 (MW-15)
Chromium, Hexavalent	0/17	BMDL - <0.01	-
Chromium, Total	3/17	BMDL - <0.005	0.022 (MW-13)
Copper	1/17	BMDL - <0.01	0.10 (MW-13)
Cyanide	0/17	BMDL - <0.001	-
Fluoride **	20/20	0.9 (MW-12)	17 (MW-18)
Iron **	20/20	0.20 (MW-20)	619 (MW-6)
Lead	2/17	BMDL - <0.04	0.28 (MW-13)
Manganese	19/20	BMDL - <0.01	6.55 (MW-9)
Mercury	0/17	BMDL - <0.0001	-
Nickel	5/17	BMDL - <0.01	0.07 (MW-9)
Zinc	17/20	BMDL - <0.005	227 (MW-17)
Trace Organic Compounds (ug/l)			
Carbon disulfide	10/18	BMDL - <1.0	193 (MW-12)
Phenol	1/18	BMDL - <10.0	208 (MW-13)
1,1-Dichloroethane	2/18	BMDL - <1.0	10.4 (MW-20)
1,2-Dichloroethane	1/18	BMDL - <1.0	44.7 (MW-5)
1,1,1-Trichloroethane	1/18	BMDL - <1.0	5.5 (MW-20)
Chloroform	1/18	BMDL - <1.0	6.3 (MW-4)

Note: * = 5/17 Detected in 5 of 17 wells sampled for that constituent.
** = Analyzed for in Round 2 only.
BMDL = Below Method Detection Limit.

The compound 1,1-dichloroethane (1,1-DCA) was detected in both rounds at MW-5 and at MW-20; 1,2-dichloroethane (1,2-DCA) was detected during both rounds of sampling at MW-5: and 1,1,1-trichloroethane (1,1,1-TCA) was consistently observed at MW-20. Chloroform was detected during both rounds at MW-4, and phenol was detected at MW-13. The sporadic spatial distribution of these organic compounds suggests that their presence cannot be attributed to a known WMU or other specific onsite source area given the information currently available for the site.

Carbon disulfide cannot be related directly to current or past plant operations. Although carbon disulfide was detected in several wells, no discernable spatial trend in the data distribution was evident. Carbon disulfide is known to be a common, naturally-occurring organic compound associated with natural organic soils such as peat or lacustrine soils that are swampy or under reducing conditions (Taylor et al., 1982). Chemical and geologic data collected during this study and by others (USGS, 1989; Soil Conservation Service, 1972) indicate that these conditions exist within the Calumet Sand in areas outside the Du Pont property. The highest concentration of carbon disulfide (193 micrograms per liter, or μg/l) was discovered in a swampy area at MW-8. This information supports the conclusion that carbon disulfide is probably naturally occurring and not related to Du Pont chemical management practices.

Kjeldahl nitrogen, a measure of both ammonia (inorganic) nitrogen and organic nitrogen, was also found at multiple monitoring locations across the site. (Although kjeldahl nitrogen is not considered an organic compound in the same sense as a VOC, its discussion is included here for the sake of convenience.) The presence of kjeldahl nitrogen at concentrations greater than ammonia nitrogen concentrations may in part be attributed to the manufacturing of agricultural area-based chemicals in the past, to other sources such as sanitary wasterwaters or natural organic nitrogen, or to analytical variability.

Inorganic Constituents. Of the dissolved inorganic constituents tested, 23 were detected in the shallow groundwater at the plant. These inorganic constituents were aluminum, antimony, arsenic, barium, boron, cadmium, calcium, carbonates, chloride, chromium, copper, fluoride, iron, lead, magnesium, manganese, nickel, phosphates, potassium, ammonia nitrogen, sodium, sulfate, and zinc. Six of the 23 were detected in only a few wells or at levels only slightly above the analytical detection limits (see Table 4-4 and Appendix E). All of these six compounds (antimony, cadmium, chromium, copper, lead, and nickel) were used at the facility in the past.

The highest concentration of lead (0.28 mg/l) was detected in the southwestern corner of the facility at MW-13. Potentiometric data (Figures 4-9 and 4-10) suggest that MW-13 may be downgradient of the USS Lead site on Kennedy Avenue across from the Du Pont plant. High levels of lead as well as other trace metals, including arsenic, have been found in the soils at the USS Lead site (Resource Consultants, Inc., 1990). Surface soil samples collected adjacent to Du Pont's office building on Kennedy Avenue as part of another study contained lead in the 10,000 mg/kg range (O. J. Meyer, Du Pont, Verbal Communication, 1990; and Resource Consultants, Inc., 1990). This finding suggests that fugitive dust emissions from the USS Lead facility

containing inorganic constituents may have settled onto Du Pont property. It is possible that the constituents from these deposits may have been leached into the groundwater in the vicinity of the site near USS Lead.

Constituent Distribution

Many constituents were detected in groundwater at what appeared to be elevated levels at multiple monitoring sites. Elevated levels were considered to be those in excess of three times the average low concentrations presented in Table 4-5. Of the 17 constituents detected at more than a few locations, 11 were present at elevated concentrations over large areas of the plant (arsenic, chloride, fluoride, iron, magnesium, manganese, nitrogen, phosphate, sodium, sulfate, and zinc). Of these 11 constituents, 5 (arsenic, chloride, fluoride, sulfate, and zinc) are of potential interest. Arsenic and fluoride concentrations exceeded the federal standards used for comparative analysis. In addition, the distribution and concentrations of chloride, sulfate, and zinc help illustrate the effect of industrial practices at the plant on groundwater quality. Observed spatial trends for each of the five constituents and their locations relative to groundwater flow directions and WMUs identified during Phase I are discussed in the subsequent paragraphs.

Arsenic. The highest concentrations of arsenic were observed near the northern property boundary in MW-1 and MW-10; at the southwestern corner in MW-13; and at the southern boundary in MW-3, MW-5, and MW-15 (Figure 4-12).

The locations of these wells with respect to groundwater flow paths and WMUs identified during Phase I suggest four potential source areas of arsenic either onsite or near the site. These areas may not necessarily be contributing arsenic to the groundwater, but represent the most likely source areas given the information collected to date.

The potential source areas identified were:

- One of the miscellaneous pits/piles north of MW-19 and south of MW-1 (WMU 33);
- The insecticide area (WMU 22), the former agricultural chemicals area (near WMU 28), and a lead arsenate sludge disposal site near the southern edge of WMU 5 originally identified as an unspecified disposal area as part of WMU 17 (the latter area was reported to the project team in early October 1990 by a former plant manager, Mr. J. Muller);
- The zinc roasters (WMU 34); and
- The USS Lead site adjacent to the plant west of MW-13 or an unidentified source onsite in the southwest corner of the property.

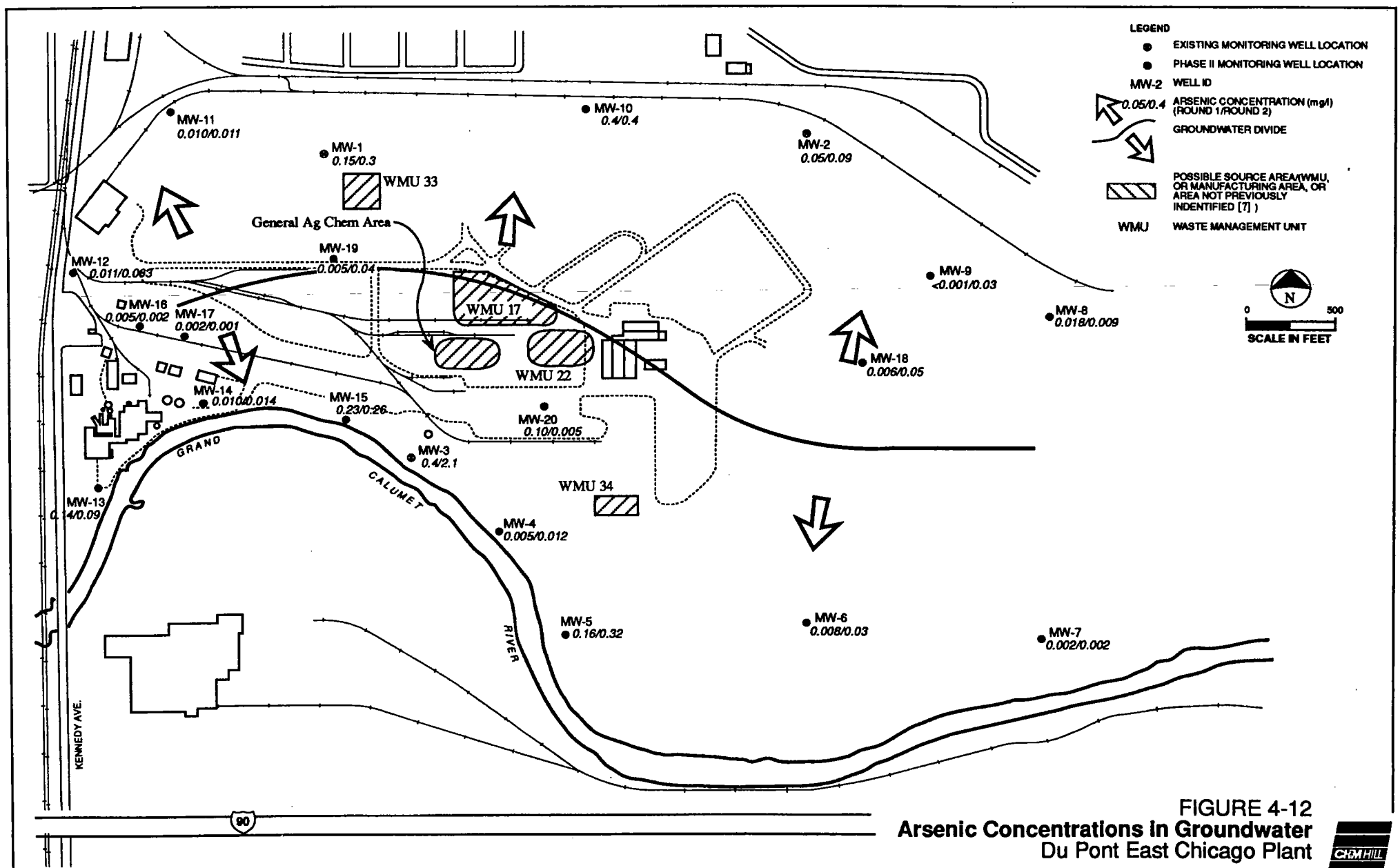

FIGURE 4-12
Arsenic Concentrations in Groundwater
Du Pont East Chicago Plant

CH2M HILL

CH2677D.A0.RP FIG. 4-12WO ARSENIC 4-3-91 LML

Some of these areas are situated near the groundwater divide. Chemicals entering the groundwater at the divide could be migrating to the north and south away from the source areas. Whether these areas are the sources of the observed water quality degradation cannot be determined without further investigation.

Chloride. The highest concentrations of chloride were observed near the westcentral part of the plant in MW-14, MW-16, and MW-17; near the northeastern edge of the plant in MW-9; and along the southeastern edge of the primary manufacturing area in MW-6 (Figure 4-13). The concentrates observed at MW-6 are several orders of magnitude higher than concentrate levels observed at other locations.

Interpretation of groundwater flow paths, water quality data, and possible chloride source areas identified during Phase I suggest that there are five areas onsite that can be identified as potential chloride sources from the information currently available:

- The zinc crude milling area (WMU 24) where zinc chloride was manufactured;
- The zinc chloride mud area (WMU 35);
- The hydrochloric acid neutralization pit (WMU 8);
- The antimony pentachloride settling basin (WMU 23); and
- An area near the eastcentral edge of the historical primary manufacturing area, upgradient of MW-20 (chlorine was used in the trichlorofluoromethane manufacturing area, upgradient of MW-20).

Whether these areas have, in fact, contributed chloride to the groundwater system has yet to be determined.

Fluoride. The highest concentrations of fluoride were observed near the southern property boundary in MW-5 and MW-15; near the northeastern portion of the plant in MW-2, MW-8, MW-9, and MW-18; and north of the primary manufacturing area in MW-1 (Figure 4-14).

Evaluation of WMUs, available water quality data, and groundwater flow paths suggest that there may be five potential source areas that can be identified as potential fluoride sources from the information currently available:

- A hydrofluoric acid spill that occurred in 1978 near the chrome outfall (WMU 13) upgradient of MW-5;
- A documented release of anhydrous hydrogen fluoride (AHF) from an above ground storage tank (WMU 20) in the AHF area (see CH2M HILL 1990 Phase I Report, Table 3-5 and Figure 3-7);

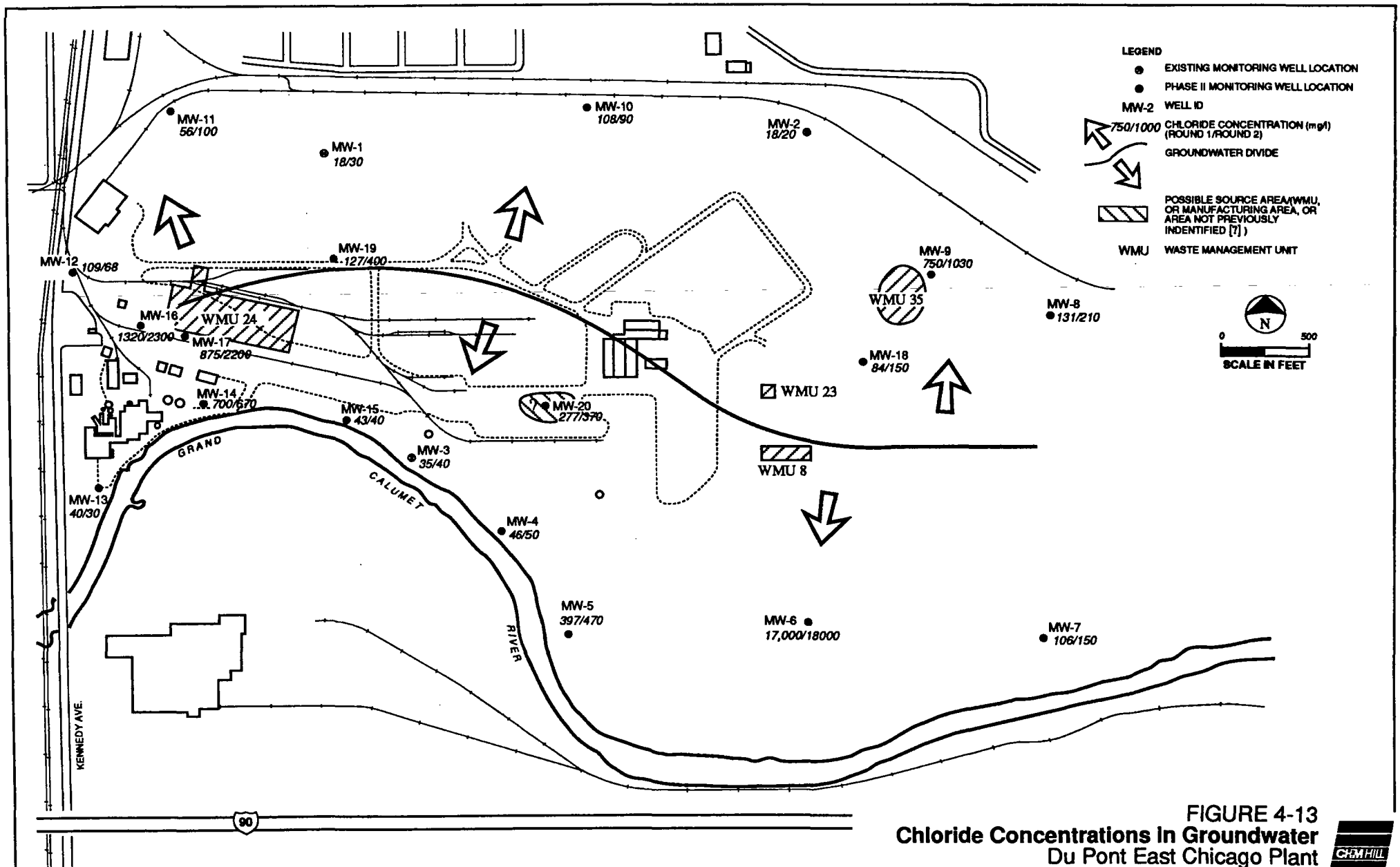

FIGURE 4-13
Chloride Concentrations in Groundwater
Du Pont East Chicago Plant

CH2M HILL

CH2M778.A0.RP FIG. 4-13WO CHLORIDE 4-3-91 LML

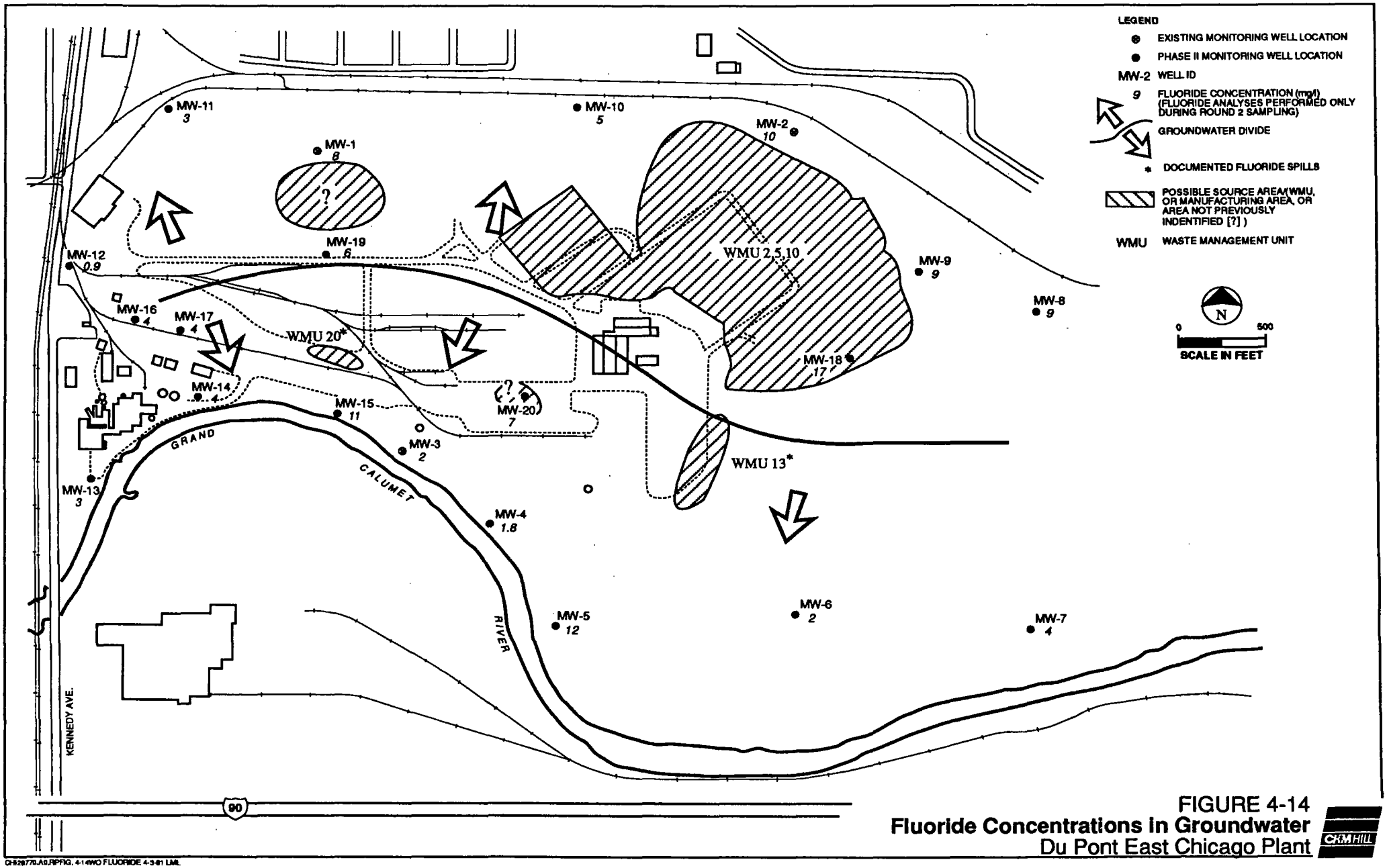

FIGURE 4-14
Fluoride Concentrations in Groundwater
Du Pont East Chicago Plant

CH2M HILL

CH528770.A0.RPFIG. 4-14WO FLUORIDE 4-3-91 LML

- A previously unidentified area upgradient of MW-1 and downgradient of MW-19;

- The northeast region either in WMU 2, WMU 5, or WMU 10, where wastes associated with the trichlorofluoromethane process were disposed; and

- An unidentified area upgradient of MW-20.

Whether these areas have, in fact, contributed fluoride to the groundwater system has yet to be determined.

Sulfate. The highest concentrations of sulfate were observed near the southwestern property boundary in MW-14 and MW-15; near the southern boundary in MW-4 and MW-5; along the northern edge of the facility in MW-1, MW-2, MW-8, MW-9, MW-10, MW-11, and MW-18; and near the eastcentral part of the facility in MW-20 (Figure 4-15).

The location of these wells with respect to groundwater flow paths and WMUs identified in Phase I suggests there may be as many as four sulfate source areas that can be identified as potential sulfate source areas from the information currently available:

- The former sulfur storage areas (WMU-6) upgradient of MW-14 and MW-15;

- Documented sulfuric acid spills that occurred in the Contact No. 3 area in the TCFM area, upgradient of MW-4 and MW-5;

- The landfills in the eastcentral part of the facility (WMU 2, WMU 5, WMU 11, and WMU 15) where sulfate was known to be disposed; and

- An unidentified area upgradient of MW-11 and MW-1, downgradient of or near MW-19.

Whether these areas have, in fact, contributed sulfate to the groundwater system has yet to be determined.

Zinc. The highest concentrations of zinc were observed near the westcentral part of the plant in MW-16 and MW-17; near the northwestern edge of the plant in MW-11; near the northeastern property boundary in MW-9; and near the southern site boundary, near the southeastern edge of the primary manufacturing area in MW-5 (Figure 4-16).

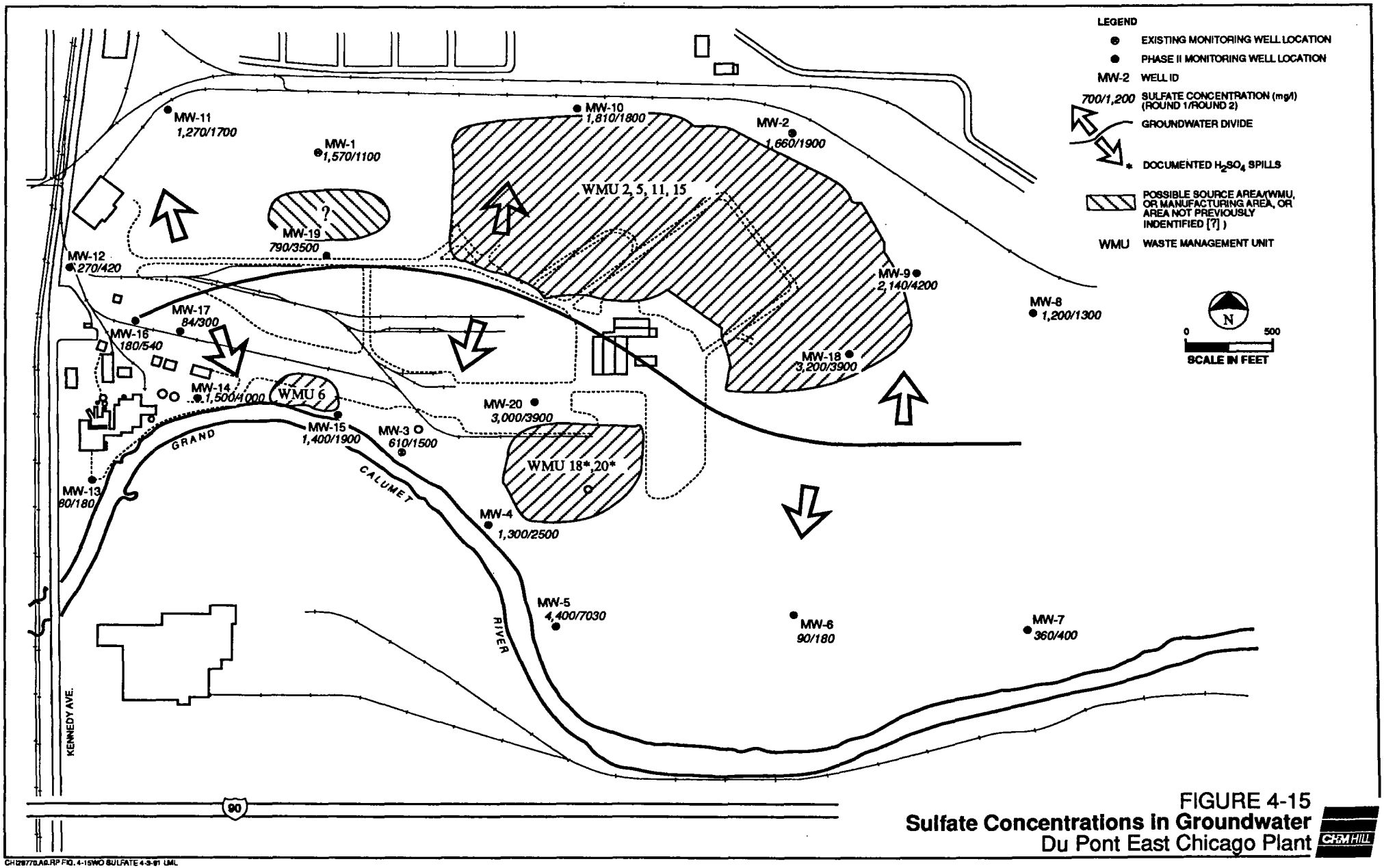

FIGURE 4-15
Sulfate Concentrations in Groundwater
Du Pont East Chicago Plant

CH2M HILL

CH12977G.AB.RP FIG. 4-15WO SULFATE 4-3-91 LML

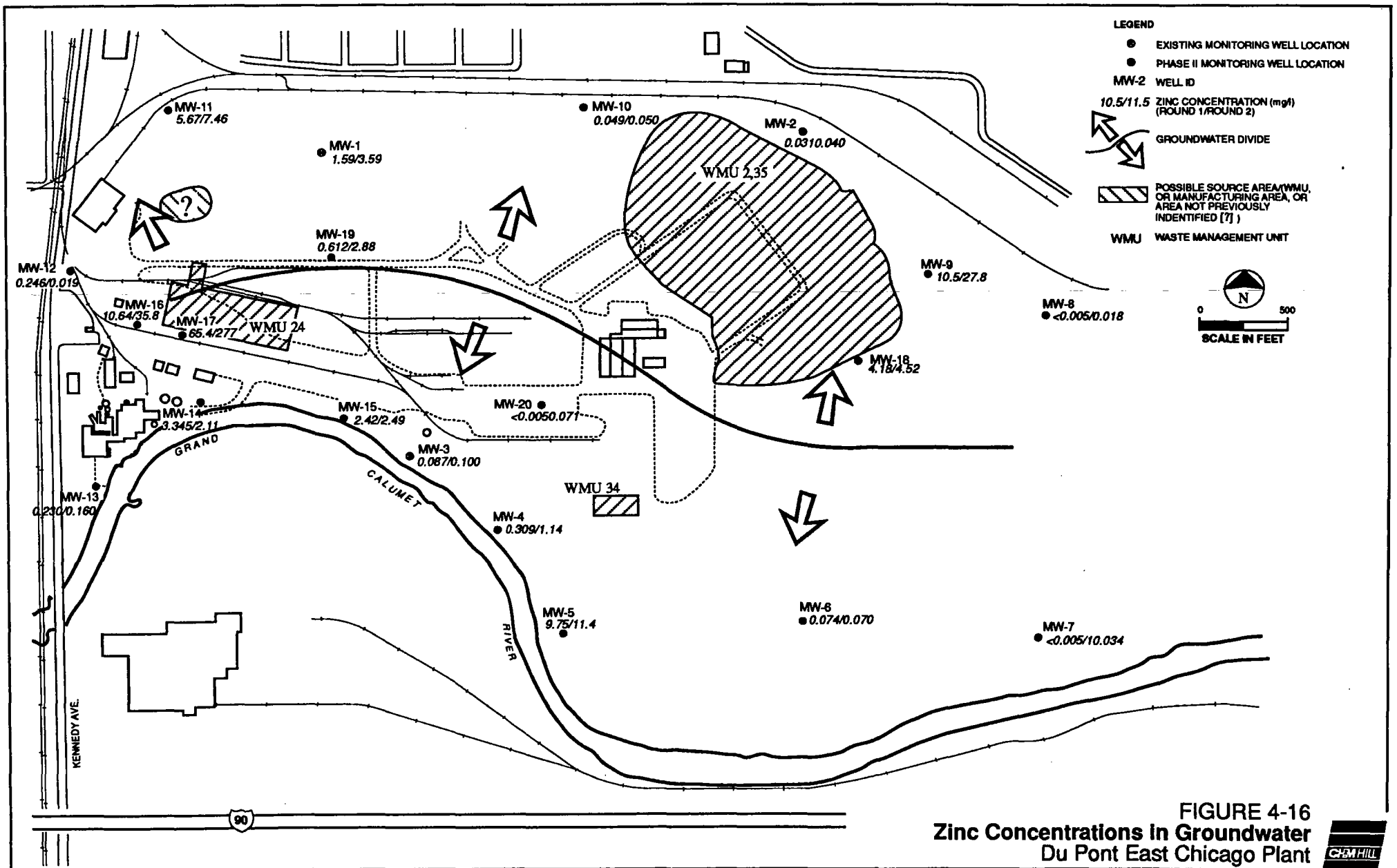

FIGURE 4-16
Zinc Concentrations in Groundwater
Du Pont East Chicago Plant

CH2M HILL

CH2977D.A0:RP FIG. 4-16 WO ZINC 7-5-91 JMG

Interpretation of zinc concentrations with regard to probable groundwater flow paths and WMU locations identified in Phase I suggests that there may be five potential zinc source areas:

- The zinc crude milling area (WMU 24);
- An unidentified area north of the groundwater divide and the zinc crude milling area;
- The zinc mud area (WMU 35);
- The rubble area (WMU 2); and
- The zinc roasters area (WMU 34).

Whether these areas have, in fact, contributed zinc to the groundwater system has yet to be determined.

Variations Observed Between Sampling Rounds

Although some groundwater constituent concentrations increased between Round 1 (June 1990) and Round 2 (September 1990), the relative constituent distributions remained fairly consistent.

An unusual amount of precipitation occurred during the late summer months of 1990. The general increase in concentrations in samples from Round 2 were attributed to the flushing of observed constituents out of the unsaturated zone and into the groundwater system due to increased infiltration. Chloride and zinc concentrations each increased by a factor of two to four in MW-16 and MW-17 (near the zinc crude milling) and by a factor of about two in MW-9. The chloride concentration at MW-6, downgradient of the hydrochloric acid neutralization pit, increased only slightly from 17,000 mg/l in Round 1 to 18,000 mg/l in Round 2. Minor increases in chloride and zinc concentrations (on the order of approximately 15 to 20 percent) were observed at MW-5.

Comparison to Drinking Water Standards

In the absence of onsite background data or federal or state[1] numerical water quality standards for in situ groundwater, observed constituent concentrations were compared to federal Safe Drinking Water Act (SDWA) primary drinking water standards.

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[1]Indiana non-numerical standards (327 Indiana Administrative Code 2-1-7) apply to groundwaters that are "a present or probable future source for public or industrial water supply." Supply waters are to be free of substances in concentrations "sufficient to injure, be chronically toxic to, or be carcinogenic, metagenic, or tetragenic to humans, animals, aquatic life, or plants."

Primary standards, called the maximum contaminant levels (MCLs), were established by the SDWA for the protection of human health.

For the purposes of this study, groundwater sampling results were compared to MCLs only because MCLs are a widely-used standard employed by state and federal regulatory agencies. Because of the widespread poor groundwater quality in the East Chicago/Gary/Hammond region, MCLs are not viewed as levels above which immediate action on the Du Pont site is required. Rather, MCLs are being used as a comparative standard and for identifying areas that may warrant future attention. Since the shallow groundwater onsite is currently not, and will not be, a source of drinking water as long as the property is under Du Pont's control, exceedances of these standards are not viewed as an inherent problem. Thus, groundwater conditions onsite do not threaten human health.

Of the inorganics detected, arsenic, barium, fluoride, and lead were detected at concentrations exceeding the federal MCLs during both sampling rounds (Table 4-7). Although cadmium concentrations exceeding the federal primary drinking water standards were observed during Round 1, these results were not reproduced during Round 2. Barium exceedances were limited to the region near MW-6 (concentrations of 1.39 and 2.15 mg/l for Rounds 1 and 2, respectively), and MW-17 (concentrations of 1.03 and 1.05 mg/l for Rounds 1 and 2, respectively). The highest concentration over the MCL for lead occurred at MW-13 (0.28 mg/l for Round 1). The quality of water at MW-13 may be a result of offsite migration from the USS Lead site. The MCLs for arsenic and fluoride were exceeded in groundwater from several onsite wells (Figures 4-12 and 4-14, and Table 4-7).

Of the organics detected during both Rounds 1 and 2, only 1,2-DCA was found at concentrations exceeding the federal MCLs. This occurred only at MW-5, where a maximum concentration of 44.7 μg/l was observed.

Potential for Offsite Migration and Exposure

The potential exists for groundwater containing the constituents detected onsite to migrate beyond the Du Pont property boundaries. Data collected during Phase II suggest that constituents of concern may be migrating to the north and the south, away from the Du Pont East Chicago plant. Site information was used to qualitatively assess the potential for exposure and threat to human health and the environment.

Groundwater Migration to the South. A comparative analysis was performed to determine whether groundwater discharging from the Du Pont property is having an adverse effect on the Grand Calumet River. The first analysis involved estimating mass loadings to the river (the mass of chemical constituents contributed per day). The second analysis compared existing water quality in the river to water quality without the effects of groundwater discharge from the Du Pont property.

Table 4-7
1NORGANIC CONCENTRATIONS EXCEEDING MAXIMUM
CONTAMINANT LEVELS (MCLs)
DU PONT EAST CHICAGO PLANT

	Concentrations Exceeding MCLs				
Constituent:	Arsenic	Barium	Cadmium	Fluoride	Lead*
Standard:	MCL: 0.05 (mg/l)	MCL: 1.0 (mg/l)	MCL: 0.01 (mg/l)	MCL: 4.0 (mg/l)	MCL: 0.05 (mg/l)
Monitoring Well	Round 1/Round 2	Round 1/Round 2	Round 1/Round 2	Round 1/Round 2	Round 1/Round 2
MW-1	0.15/0.3	--/--	0.013/--	NA/8	--/--
MW-2	0.05/0.09	--/--	--/--	NA/10	--/--
MW-3	0.4/1.7	--/--	--/0.064	NA/--	--/--
MW-4	--/--	--/--	--/--	NA/--	--/--
MW-5	0.16/0.32	--/--	--/--	NA/12	--/--
MW-6	--/--	1.39/2.15	--/--	NA/--	--/--
MW-7	--/--	--/--	--/--	NA/4	--/0.05
MW-8	--/--	--/--	--/--	NA/9	--/0.08
MW-9	--/--	--/--	--/--	NA/9	--/0.06
MW-10	0.4/0.4	--/--	0.011/--	NA/5	--/--
MW-11	--/--	--/--	--/--	NA/--	--/0.07
MW-12	--/0.063	--/--	--/--	NA/--	--/0.06
MW-13	0.14/0.09	--/--	--/--	NA/--	0.28/0.08
MW-14	--/--	--/--	--/--	NA/4	--/--
MW-15	0.23/0.26	--/--	0.014/--	NA/11	0.09/--
MW-16	--/--	--/--	NA/NA	NA/4	NA/NA
MW-17	--/--	1.03/1.05	NA/NA	NA/4	NA/NA
MW-18	--/0.05	NA/NA	NA/NA	NA/17	NA/NA
MW-19	--/--	--/--	--/--	NA/6	--/--
MW-20	0.10/--	--/--	--/--	NA/7	--/0.05
Total Detections Above MCL	8/9 of 20	2/2 of 19	3/1 of 17	NA/14 of 20	2/7 of 17

NOTES:

MCLs used in comparison are those in effect as of June 1991.
The MCLs for arsenic and fluoride are under review by U.S. EPA.
New MCLs have been approved for barium and cadmium.
The MCL for cadmium is being reduced to 0.005 mg/l (effective 7/30/92).
The MCL for barium is being increased to 2.0 mg/l (effective 1/1/93).

"--" = Below method detection limit or below MCL.

* = Detection limit is close to MCL (MCL = 0.05, detection limit = 0.04).

NA = Not analyzed.

Values listed only if equal to or above MCLs.

Mass Loadings to the Grand Calumet River. Mass loading calculations were performed for selected inorganic and organic constituents. Mass loading calculations involve estimating the mass (M) of chemical constituents in groundwater discharging to the river (over the area of concern) per unit time (T). (This number is referred to as a "loading" and is expressed in terms of mass per unit time [M/T]. Loading is commonly reported as pounds of chemical entering the receiving water per day.) The results of these calculations are then compared to the chemical load being carried by the receiving stream (in this case the Grand Calumet River) as it passes the area of concern (i.e., the area over which groundwater is discharging to the Grand Calumet River from the Du Pont property). Results are given as a percent contribution to the chemical load in the Grand Calumet River.

To provide a conservative estimate of the potential contributions of groundwater loadings to the load carried by the Grand Calumet River, the high-end estimates of groundwater loadings were divided by low-end estimates of river load. Therefore, it is likely that typical groundwater contribution from the facility is considerably lower than the results reported herein.

Groundwater loadings were determined for selected constituents by using concentrations observed from both rounds of sampling in monitoring wells at the Grand Calumet River. The data used in this evaluation were for monitoring wells MW-3, MW-4, MW-5, MW-6, MW-7, MW-14, MW-15, and MW-20. In general, the highest groundwater concentration was used when estimating loading effects. The groundwater concentration was then multiplied by the groundwater discharge estimate as determined by flow tube analysis (discussed earlier). The results for each individual constituent were summed across the total area of groundwater discharge to derive a groundwater loading rate to the river.

The load being carried by the Grand Calumet River was derived in a similar fashion. Results from both rounds of river sampling were reviewed. Of the two data sets for each constituent of interest, the lowest concentration was selected and multiplied by the "dry weather" flow estimate of 215,000 gpm obtained from 1987 USGS data. The resulting value constitutes a low-end estimate of the load carried by the Grand Calumet River.

Actual methodology followed and calculations performed are presented in Appendix F. Results of the calculations are presented in Table 4-8. Close examination of Table 4-8 and Figure 4-17 shows that even under this conservative approach groundwater discharging from the Du Pont property contributes only a fraction to the total mass of compounds of concern being carried in the Grand Calumet River. In most cases, loadings from groundwater represent considerably less than 1 percent of the total mass within the river. Those constituents present in the groundwater that contribute greater than 1 percent of the total loadings under these conservative assumptions are:

- Arsenic (3.3 percent)
- Barium (4.2 percent)

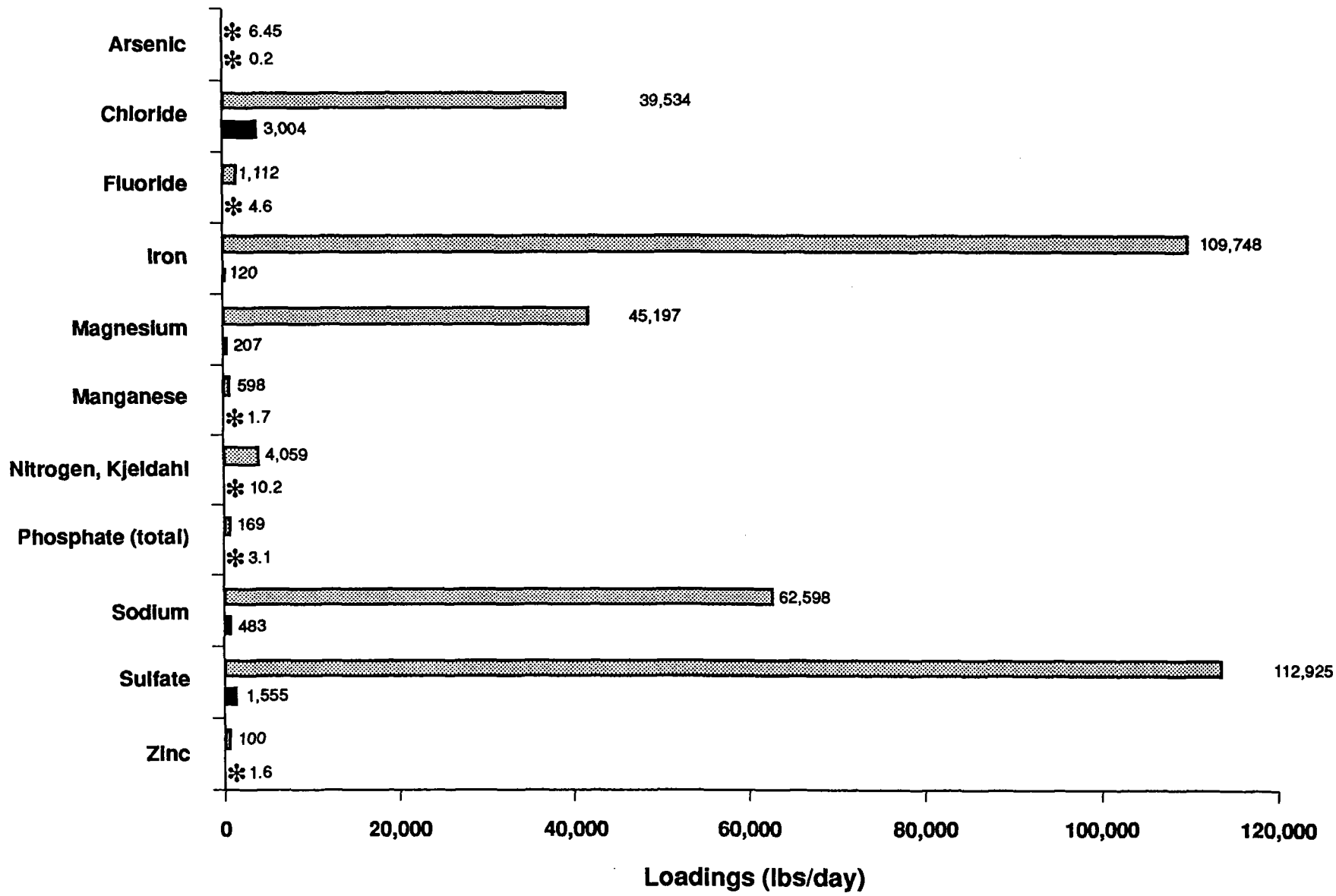
Table 4-8

ESTIMATED GROUNDWATER CONSTITUENT LOADINGS TO GRAND CALUMET RIVER

	Total Groundwater Loading to Grand Calumet River (lbs/day)			Total Surface Water Loading Present in Grand Calumet River (lbs/day)			Percent of Surface Water Loading Contributed by Groundwater
Constituents	Round 1	Round 2	High	Round 1	Round 2	Low	
Water Quality Parameters							
COD		176.99	176.99		215110.85	215110.85	0.1
Nitrogen, Ammonia	7.87	8.95	8.95	1654.81	1474.47	1474.47	0.6
Nitrogen, Kjeldahl		10.16	10.16		4058.86	4058.86	0.3
Phosphate (Total)	0.48	3.09	3.09	168.99	4066.34	168.99	1.8
Solids, Dissolved	5943	7729	7729	648410	702126	648410	1.2
Major Inorganic Ions							
Calcium		1538	1538		135525	135525	1.1
Carbonates	572	927	927	365099	406841	365099	0.3
Chloride	2148	3004	3004	39534	114093	39534	7.6
Magnesium		207	207		45197	45197	0.5
Potassium		15	15		13253	13253	0.1
Sodium		483	483		62598	62598	0.8
Sulfate	992	1555	1555	112925	180551	112925	1.4
Trace Inorganic Compounds							
Aluminum	0.91	0.18	0.91	106.30	8587.79	106.30	0.9
Antimony		0.01	0.01	103.20	103.20	103.20	0.0
Arsenic	0.08	0.21	0.21	6.45	19.61	6.45	3.3
Barium	0.20	0.41	0.41	55.21	9.80	9.80	4.2
Boron	1.36	2.11	2.11	124.36	632.10	124.36	1.7
Cadmium	0.00	0.01	0.01	12.90	13.67	12.90	0.0
Chromium, Total	0.00	0.00	0.00	12.90	291.02	12.90	0.0
Copper	0.00	0.06	0.06	25.80	238.65	25.80	0.2
Cyanide, Total	0.01		0.01	6.45	23.22	6.45	0.1
Fluoride		4.57	4.57		1111.72	1111.72	0.4
Iron		119.96	119.96		109747.52	109747.52	0.1
Lead	0.03	0.02	0.03	10.32	379.00	10.32	0.3
Manganese		1.67	1.67		598.04	598.04	0.3
Mercury				0.26	0.77	0.26	
Nickel	0.01	0.02	0.02	25.80	25.80	25.80	0.1
Zinc	1.33	1.64	1.64	100.10	2739.19	100.10	1.6
Organic Compounds							
Carbon disulfide	0.009	0.022	0.022	2.580	13.862	2.580	0.9
Chloroform	0.001	0.000	0.001	3.396	2.913	2.913	0.0
1,1-Dichloroethane	0.001	0.001	0.001	2.580	2.580	2.580	0.0
1,2-Dichloroethane	0.002	0.003	0.003	2.580	2.580	2.580	0.1
1,1,1-Trichloroethane	0.000	0.000	0.000	2.580	2.580	2.580	0.0
Phenol	0.003	0.015	0.015	25.800	25.800	25.800	0.1

Note: Blank Space = Not analyzed or values less than or equal to detection limit.

CHI28770.A0.RP Fig 4-17 GRAPH 7-1-91 JMG



LEGEND

- Minimum Calumet River (Surface Water) Loading
- Estimated Maximum Loading from Site Groundwater
- * L[illegible]g not visible at this scale

FIGURE 4-17

Contribution of Groundwater Constituent Loadings Relative to Observed Surface Water Loadin[illegible]

Du Pont East Chicago [illegible]

CH2M HILL

- Boron (1.7 percent)
- Calcium (1.1 percent)
- Chloride (7.6 percent)
- Phosphate (1.8 percent)
- Sulfate (1.4 percent)
- Zinc (1.6 percent)

Actual percent contributions under normal river flow conditions are likely to be less than those listed above.

Water Quality Concentration Comparisons. A second approach taken to the comparative analysis was to determine whether water quality in the Grand Calumet River including the contribution of groundwater discharging from the Du Pont property could be distinguished from water quality in the river without the contribution of Du Pont groundwater. This approach compares concentrations (M/L^3) rather than loading (M/T).

The results of this comparison are presented in Table 4-9. Methodology is presented in Appendix F. The first two columns of Table 4-9 present the plantwide flow-weighted concentration of selected constituents in groundwater for both rounds of sampling. The second two columns present the contribution of constituents in groundwater to surface water quality after mixing. The fifth column shows the highest groundwater contribution to surface water quality after mixing. Columns six and seven present the average surface water concentrations from sampling Rounds 1 and 2 expressed as the geometric mean of three sampling points. The eighth column shows the lowest of the two observed concentrations in surface water. Column nine shows the results when the highest observed groundwater contribution to surface water quality after mixing is subtracted from the lowest observed surface water concentration.

As can be seen by closely examining columns eight and nine of Table 4-9, river water quality without the contribution of groundwater discharging form the Du Pont property is indistinguishable from river water quality when the contribution from Du Pont is considered. Therefore, for all practical purposes, it can be concluded that groundwater discharging from the Du Pont property has a negligible effect on the water quality in the Grand Calumet River.

Groundwater Migration to the North. When the potential for northern offsite groundwater migration was discovered, Du Pont initiated several additional studies to address concerns regarding the potential for exposure to the population living in the neighborhood north of the groundwater divide. These additional studies and their results are presented in Section 5.

Table 4-9
CONTRIBUTION OF GROUNDWATER DISCHARGE TO SURFACE WATER CONSTITUENT CONCENTRATIONS

Constituents	Plantwide Flow Weighted Concentration in Groundwater		Contribution of Ground-water discharge to Surface Water Conc.**		Highest Groundwater Contribution	Average # Surface Water Concentrations		Lowest Average Surface Water Concentration	Low Surf. Wtr - High Grndwtr Concentration
Water Quality Parameters (mg/l)	Round 1	Round 2	Round 1	Round 2		Round 1	Round 2		
COD		188		0.1	0.1		83	83	83
Nitrogen, Ammonia	9.2	9.5	0.00	0.00	0.00	0.6	0.6	0.6	0.6
Nitrogen, Kjeldahl		10.80		0.004	0.004		1.57	1.57	1.57
Phosphate (Total)	0.57	3.29	0.000	0.001	0.001	0.07	1.58	0.07	0.06
Solids, Dissolved	6975	8215	2.3	3.0	3.0	251	272	251	248
Major Inorganic Ions (mg/l)									
Calcium		1636		0.6	0.6		53	53	52
Carbonates	671	983	0.2	0.4	0.40	142	158	142	142
Chloride	2521	3193	0.8	1.2	1.2	15	44	15	14
Magnesium		220.1		0.08	0.08		17.5	17.5	17.4
Potassium		15.9		0.01	0.01		5.1	5.1	5.1
Sodium		513.1		0.19	0.19		24.3	24.3	24.1
Sulfate	1165	1660	0.4	0.6	0.6	44	70	44	43
Trace Inorganic Compounds (mg/l)									
Aluminum	1.07	0.19	0.000	0.000	0.000	0.04 *	3.33	0.04	0.04
Antimony		0.01				0.04 U	0.04 U	0.04	0.04
Arsenic	0.09	0.20		0.000	0.000	0.00	0.01	0.00	0.00
Barium	0.23	0.44	0.000	0.000	0.000	0.02	0.00	0.00	0.00
Boron	1.60	2.24	0.001	0.001	0.001	0.05	0.25	0.05	0.05
Cadmium	0.003	0.006				0.005 U	0.005 *	0.005	0.005
Chromium, Total	0.002	0.004				0.005 U	0.113	0.005	0.005
Copper	0.01	0.01				0.01 U	0.09	0.01	0.01
Cyanide, Total	0.007					0.002 *	0.009	0.002	0.002
Fluoride		5		0.0	0.0		0	0	0
Iron		127.51		0.046	0.046		42.54	42.54	42.49
Lead	0.03	0.00				0.04 U	0.15	0.04	0.04
Manganese		1.78		0.001	0.001		0.23	0.23	0.23
Mercury						0.00 *	0.00	0.00	0.00
Nickel	0.01	0.02				0.01 U	0.01	0.01	0.01
Zinc	1.56	1.75	0.001	0.001	0.001	0.04	1.06	0.04	0.04
Organic Compounds (ug/l)									
Carbon disulfide	10.4	24.1	0.00	0.01	0.01	1.00 U	5.37 *	1.00	0.99
Chloroform	1.3	0.1	0.00		0.00	1.32 *	1.13	1.13	1.13
1,1-Dichloroethane	0.8	0.6	0.00	0.00	0.00	1.00 U	1.00 U	1.00	1.00
1,2-Dichloroethane	1.8	3.4	0.00	0.00	0.00	1.00 U	1.00 U	1.00	1.00
1,1,1-Trichloroethane	0.4	0.1	0.00		0.00	1.00 U	1.00 U	1.00	1.00
Phenol	3	16	0.0	0.0	0.0	10 U	10 U	10	10

Table 4-9

NOTES:

Blank Space = Not analyzed or value less than or equal to detection limit.
U = Not detected above detection limit.
# = Average surface water concentration = Geometric mean of three surface water samples.
* = At least one value below detection limit, value of detection limit used to calculate average concentration.
**= Groundwater flow weighted concentration (Groundwater discharge/Surface water discharge).

See Appendix F for individual flow tube calculations.

Section 5
SUPPLEMENTAL INVESTIGATIONS BASED ON INITIAL FINDINGS

INTRODUCTION

During the summer of 1990, analyses of the initial groundwater elevation data indicated that not all of the shallow groundwater at the Du Pont East Chicago plant flowed toward the south. Due to the presence of a groundwater divide onsite, the potential existed for groundwater to flow offsite both to the north and south. Arsenic and cadmium were detected in groundwater during Round 1 sampling near the northern edge of the property at concentrations exceeding federal MCLs. This raised the concern that these constituents could migrate toward the Riley Park community, a group of businesses and residences located north of the Du Pont facility (Figure 5-1)

Upon recognizing this situation, Du Pont immediately initiated several additional studies in the area north of the plant. Although information available at the time indicated that Riley Park was served by the City of East Chicago Water Department, Du Pont was concerned that use of unidentified private wells and contact with groundwater might be occurring. These additional studies consisted of a groundwater use survey of community residences and businesses and a sewer survey to assess the distribution and condition of sewers in the neighborhood.

RILEY PARK INVESTIGATION SUMMARY

Groundwater Use Survey

The groundwater use survey was conducted to determine whether residents of the area used groundwater or came in contact with groundwater and whether wells and basement sumps were influencing the shallow groundwater flow system.

Door-to-door interviews with local residents were conducted in late September 1990. Eighty percent of the 450 residents responded. Some information on the remaining 20 percent was provided by the City of East Chicago. Appendix G, a Technical Memorandum entitled "Riley Park Well and Basement Sump Survey," reports the survey procedures followed and results.

Sewer Survey

A second survey, focusing on the combined sanitary and storm sewers and their potential effect on the groundwater flow system, also was conducted in late September 1990. During the survey, information regarding the sewer system was obtained from the City of East Chicago. Sewer inspections were conducted to determine whether groundwater could be leaking into the sewers and consequently draining away from the neighborhood within the sewers. Structural integrity of sewer system components and evidence of groundwater infiltration were observed and

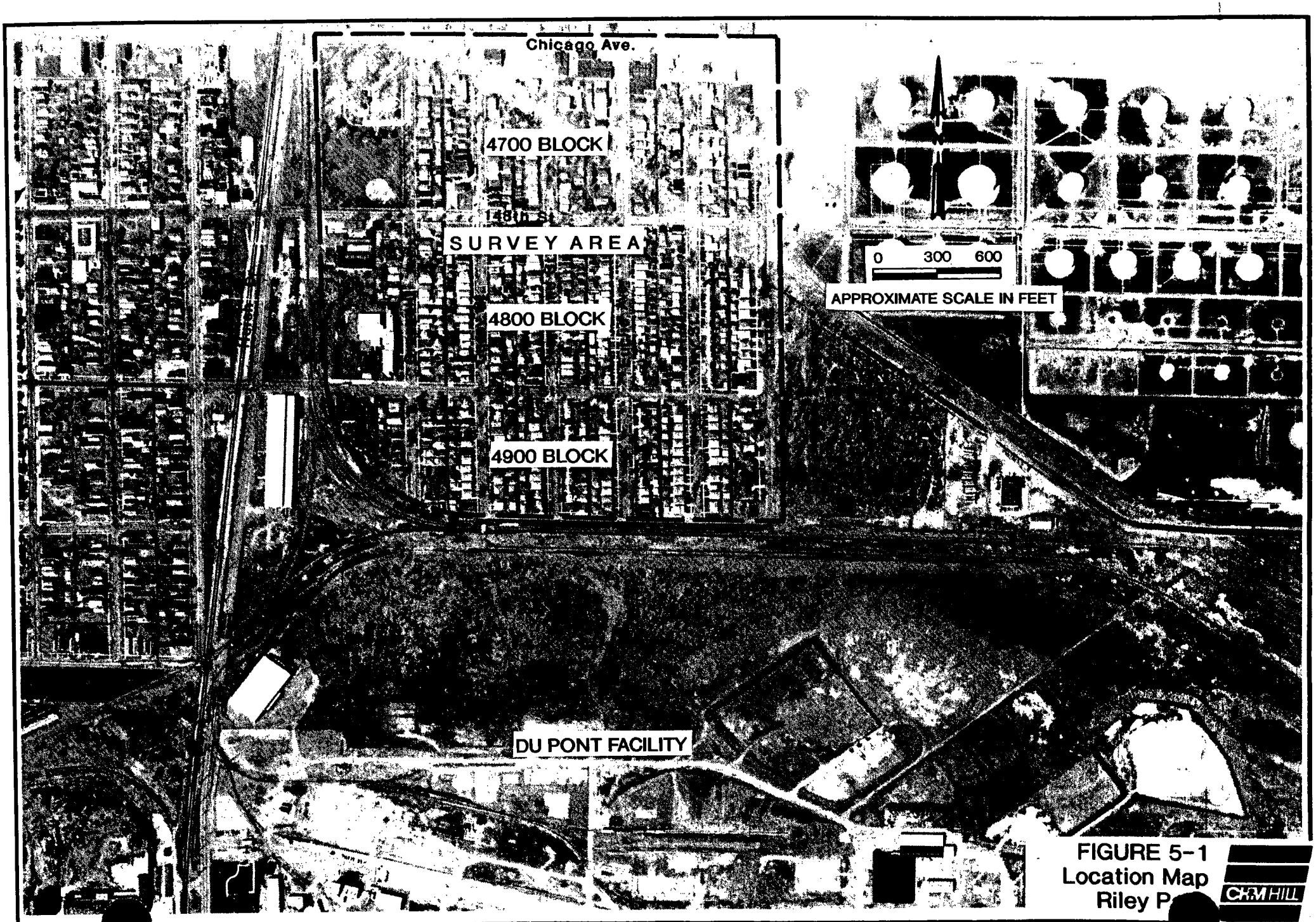


FIGURE 5-1
Location Map
Riley P

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noted. Rim elevations of the sewer surface were surveyed and the approximate elevation of the groundwater was computed. This effort is documented in a Technical Memorandum entitled "Du Pont--Riley Park Sewer Survey" and is included as Appendix H of this document.

RILEY PARK INVESTIGATION FINDINGS

Potentiometric Conditions

As part of the Riley Park studies, an approximate potentiometric surface map for Riley Park and the Du Pont East Chicago plant was prepared (Figure 5-2) using approximate groundwater elevations measured in sewers and water levels observed in monitoring wells onsite (Table 5-1). Based on these data, the gradient to the north from the plant toward Riley Park was estimated at 0.008 to 0.009 ft/ft.

Results of the Riley Park basement sump survey (Appendix G) indicated that many of the household basement sump systems in the 4900 blocks of Riley Park pump continuously. Water pumped from basements is discharged to the ground surface or to the sewer system. Sump water discharged to the ground surface evaporates, infiltrates, or flows into the sewer.

The Riley Park sewer survey (Appendix H) showed that the sewer system is submerged below the natural water table surface and receives water infiltrating from the aquifer. The sewer system acts as a drain, removing groundwater from the Calumet Sand aquifer system. The combined effects of the sump pumpage and leaking sewers have created a depression in the water table that runs east-west within the center of the 4800 blocks in Riley Park (Figure 5-2). As a result of this depression, groundwater flows north from the Du Pont East Chicago plant toward Riley Park (Figure 5-3). Apparently, this water is then captured by the sewers and conveyed to the wastewater treatment plant where it is treated prior to discharge to the Grand Calumet River. As a result of the hydraulic conditions in Riley Park, the potential for groundwater migration out of Riley Park is limited. A small outward gradient (estimated at 0.001 ft/ft) exists in the center of the 4800 block of Riley Park.

Review of information provided by the USGS (Figure 1-3) suggests that in the absence of manmade features such as sump pumps, sewers, or ditches, natural groundwater flow through Riley Park and the Du Pont East Chicago plant would be predominantly to the south toward the Grand Calumet River. The pronounced influence of these manmade features on the current regional groundwater flow system has been well documented (USGS, 1989). In the vicinity of the Du Pont East Chicago plant, the sewers and sumps in Riley Park appear to be at least partially responsible for the northward gradient, diverting water that otherwise would have flowed south toward the Grand Calumet River.

Table 5-1
SEPTEMBER GROUNDWATER ELEVATION DATA
RILEY PARK AND DU PONT EAST CHICAGO PLANT

Riley Park Estimated Groundwater Elevations
(Feet Above Mean Sea Level)

Location	Groundwater Elevation*
Grasselli Avenue	
4711 Grasselli	582.9
Grasselli and 148th	579.7
4917 Grasselli	581.8
4931 Grasselli	582.1
148th near Grasselli	579.6
Carey Steet	
4716 Carey	582.4
4729 Carey	581.4
Carey and 148th	580.0
Carey and 149th	581.3
4921 Carey	581.2
Carey and NYC RR R.O.W.	583.4
Drummond Street	
4714 Drummond	582.8
4732 Drummond	581.2
Drummond and 148th	581.3
Drummond and 149th	579.8
Drummond and 149th	577.4
4910 Drummond	580.5
4913 Drummond	581.6
Drummond & NYC RR R.O.W.	583.6
Euclid Avenue	
4714 Euclid	582.1
4732 Euclid	581.7
Euclid and 148th	581.1
4846 Euclid	580.7
Euclid and 149th	581.1
4911 Euclid	581.6
4923 Euclid	581.9
Euclid and NYC RR R.O.W.	582.2
Ivy Street	
4713 Ivy	581.8
4732 Ivy	581.8
Ivy and 148th	582.3
Ivy and 149th	581.0
Ivy and 149th	574.8
4912 Ivy	581.5
4928 Ivy	581.4
Ivy and NYC RR R.O.W.	583.3
Parrish Avenue	
4716 Parrish	584.1
4744 Parrish	582.5
Parrish and 148th	581.9
Parrish and 148th	583.7
4822 Parrish	580.7
4854 Parrish	581.3
4832 Parrish	582.1
Parrish and 149th	582.1
Parrish and 149th	581.4
4916 Parrish	582.2
4936 Parrish	582.9
148th Street	
148th near Parrish	583.1
Parrish and 148th	581.4
Miscellaneous	
Valve box near Parrish	584.3

NOTES:
* Groundwater elevations estimated from observed infiltration into sewer casings and manhole elevations.

Table 5-1
SEPTEMBER GROUNDWATER ELEVATION DATA
RILEY PARK AND DU PONT EAST CHICAGO PLANT

Du Pont Water Level Elevations
(Feet Above Mean Sea Level)

Location	Groundwater Elevation
MW-1	586.56
MW-2	586.31
MW-10	585.93
MW-11	586.35
MW-12	585.86
MW-16	586.93
MW-17	587.00
MW-18	586.60
MW-19	586.79

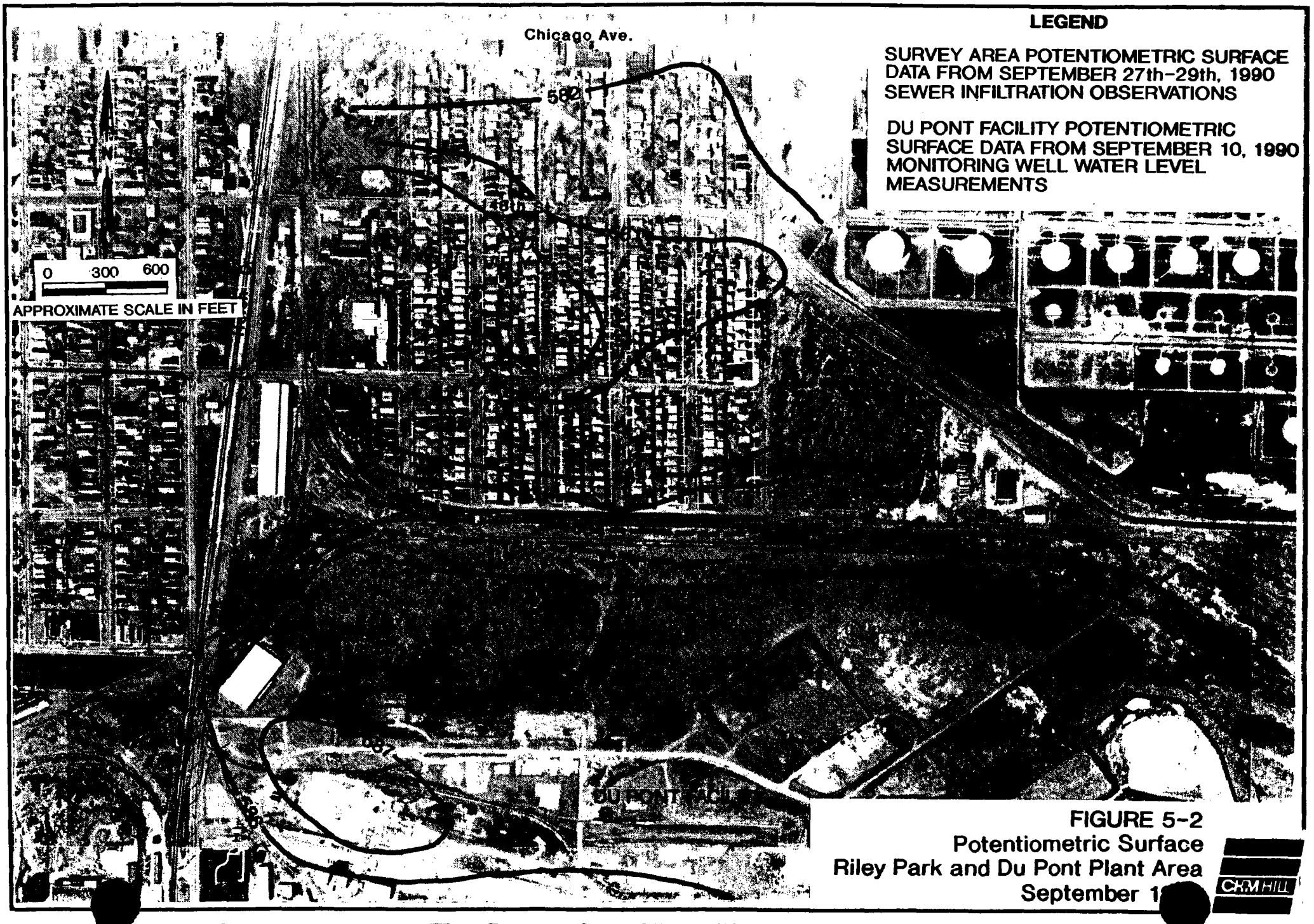

FIGURE 5-2
Potentiometric Surface
Riley Park and Du Pont Plant Area
September 1

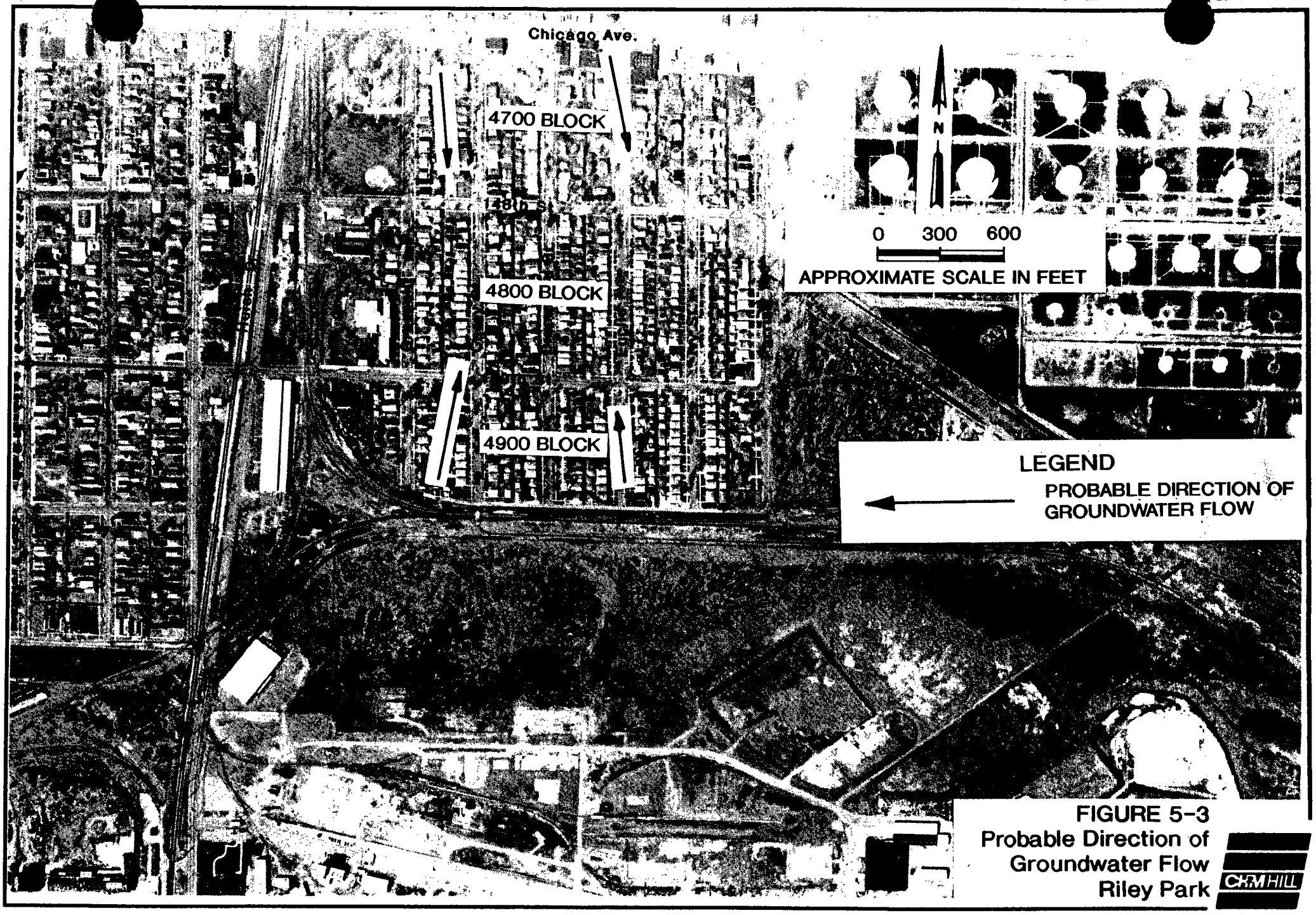

FIGURE 5-3
Probable Direction of Groundwater Flow
Riley Park

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Groundwater Velocity and Flow

Groundwater velocities and flow rates were estimated for groundwater flowing into and out of Riley Park from the Du Pont facility (Table 5-2). The velocity and rate of groundwater flowing toward Riley Park was estimated at 0.28 ft/day and 28 gpm, respectively. These estimates were computed from the hydrogeologic information obtained for the Du Pont plant area immediately south of Riley Park (Appendix D).

The gradients observed in Riley Park indicate that there is a potential for groundwater to flow out of Riley Park to the west. Groundwater flow to the west (south of the 4800-block divide) was estimated using the same technique used to estimate groundwater flow into Riley Park. Flow to the west was estimated at approximately 0.5 gpm, less than 2 percent of the 28 gpm of groundwater flow estimated to be entering Riley Park from the Du Pont East Chicago plant. The difference (approximately 27.5 gpm) leaves Riley Park as sewer water.

The estimate of the groundwater discharge to Riley Park sewers is relatively consistent with the sewer flow measurements made on November 1, 1990 (Appendix H). The total flow measured in the sewers that service the 4900 blocks of Riley Park immediately north of the Du Pont plant was approximately 24 gpm. The total flow measured in the sewers that service the 4800 blocks of Riley Park was also approximately 24 gpm. Based on available potentiometric information, some groundwater flow in the 4900 block of Riley Park bypasses the 4900-block sewers and is removed by the 4800-block sewers. The total sewer flow entering the sewer from the south is slightly greater than 24 gpm, a value close to the 27.5-gpm estimate listed above.

GROUNDWATER QUALITY STUDIES AT RILEY PARK

Approach

The results of the groundwater use and sewer surveys were used to identify sites for groundwater sampling in the Riley Park neighborhood. The basement sumps pumping on a continuous basis were selected as potentially representative groundwater sampling sites. Sewers were selected during periods when most of the flow could be attributed to groundwater infiltration. These periods occur at night when little if any sewage is being discharged from area residences, and during periods not associated with storm events.

Eight basement sumps in the southern half of the 4900 blocks of Riley Park and 11 of the 12 sewers draining the 4900 and 4800 blocks of Riley Park were sampled in late October and early November 1990 (Figure 5-4). Samples were analyzed for selected constituents found in the groundwater on Du Pont property south of Riley Park (arsenic, cadmium, chloride, iron, sulfate, and zinc), and those typically found in iron slag that was reportedly used as fill in the area (arsenic, copper, iron, magnesium, sulfate, and zinc).

Table 5-2
SUMMARY OF GROUNDWATER FLOW CHARACTERISTICS
RILEY PARK

Flow Parameter	Flow Toward Riley Park
	September 1990
Gradient	0.007 to 0.008 ft/ft
Average Linear Velocity	0.21 to 0.30 ft/day (77 to 110 ft/yr) Average = 0.28 ft/day (Average = 102 ft/yr)
Total Discharge	Average = 28 gpm

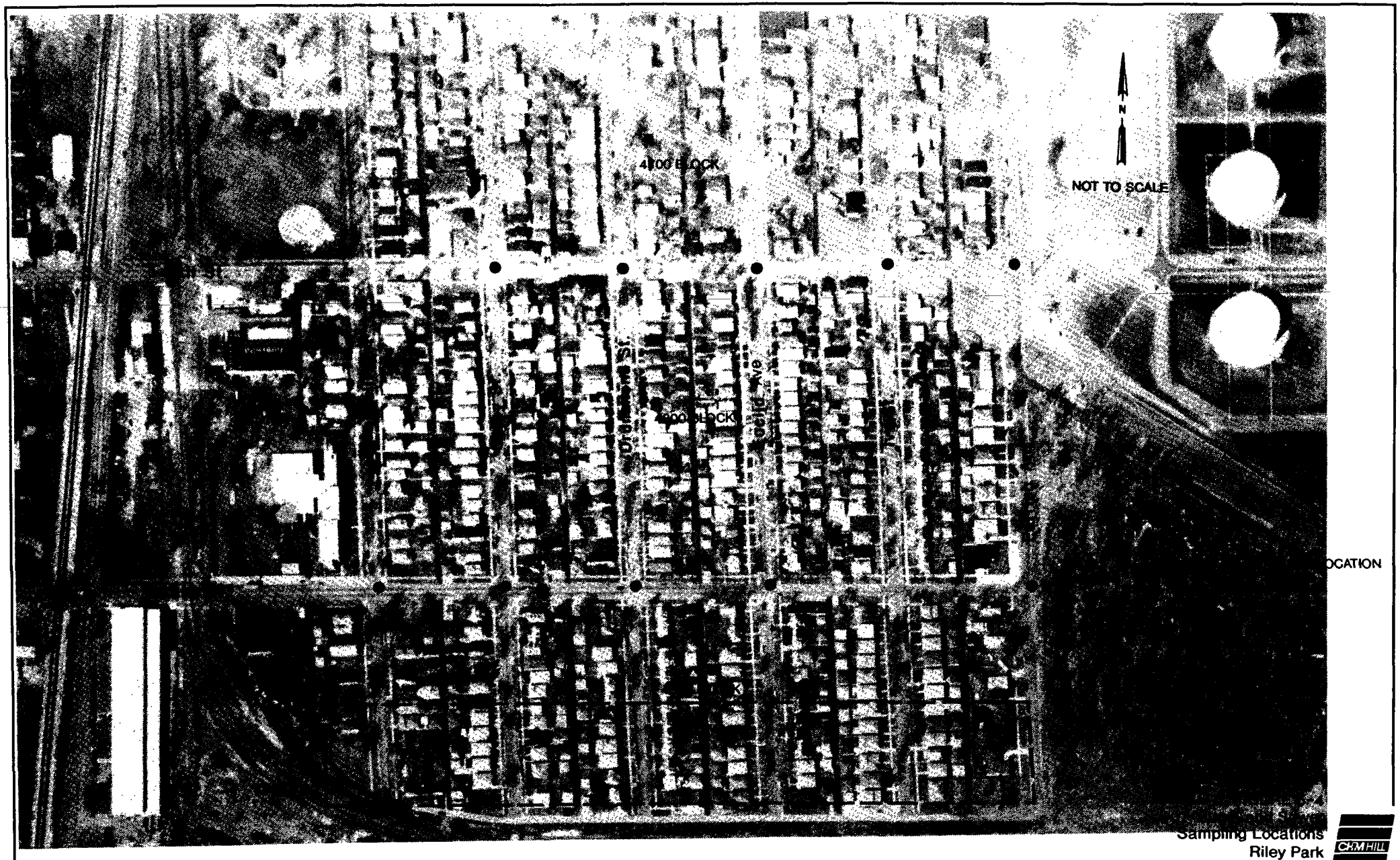
NOTES:

Average linear velocity estimated assuming a porosity of 0.35.

Ranges in linear velocities were estimated using minimum and maximum gradients and hydraulic conductivities. Average linear velocities were estimated from the total flux (discharge) and the area through which discharge occurs, using a length of 1,800 linear feet along the Riley Park boundary and an average saturated thickness of 31 feet.

Saturated thicknesses were determined at individual well locations.

Average discharges were estimated using a flow tube analysis discussed in Appendix D.



Sampling Locations
Riley Park

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Findings

Constituents Detected. Of the nine constituents tested (arsenic, cadmium, chloride, copper, fluoride, iron, magnesium, sulfate, and zinc), all but cadmium and copper were detected in both the 4900-block sewers and sump groundwater samples collected in Riley Park (Appendix E).

Constituent Distribution. A comparison between the Riley Park sewer and sump water quality results and those obtained from monitoring wells on the northern portion of the Du Pont facility (MW-1, MW-10, and MW-11) was performed to assess the northern extent and magnitude of inorganic constituent migration in groundwater associated with the Du Pont plant (see Table 5-3).

Based on the water quality and potentiometric surface results, groundwater migrating from the Du Pont facility appears to migrate no further than the southern half of Riley Park. In general, concentrations of arsenic, fluoride, iron, sulfate, and zinc decreased with increasing distance from the Du Pont East Chicago plant. Concentrations were highest in wells on the Du Pont property along the northern perimeter, slightly lower in water samples taken from the 4900 block, and even lower in water samples taken from the 4800 block (see Figure 5-1 for relative distances). Average concentrations of these five constituents in the monitoring wells samples were two to seven times greater than those observed in the 4900-block sewer samples. Average concentrations in the 4800-block sewers were approximately one-half to one-tenth those observed in the 4900-block sewer samples. Constituents detected at high concentrations in the wells on the northern edge of Du Pont property were not present in high levels in groundwater samples from the 4800 block (central portion) of Riley Park.

Sump water collected from the southern half of the 4900 block of Riley Park contained lower concentrations of arsenic, cadmium, fluoride, iron, sulfate, and zinc than the facility monitoring well samples. Sump water, on average, contained lower concentrations of arsenic, cadmium, fluoride, and iron, but higher levels of sulfate and zinc than the 4900-block sewer samples. The reasons for these differences are not known.

In general, constituent concentrations in Riley Park appeared to decrease by a factor of approximately 2 to 10 for each 800 feet of distance from the site.

Comparison to Drinking Water Standards. Water collected from the sewers draining groundwater from Riley Park were compared to MCLs only because MCLs are a widely-used standard of comparison employed by state and federal regulatory agencies. This comparison suggests that groundwater quality exceeding MCLs north of Du Pont property is limited in areal extent. Groundwater from the 4800 block of Riley Park contained no chemicals detected at concentrations greater than the federal MCLs (Table 5-4). Water collected from the sewers draining groundwater from the 4900 block of Riley Park contained arsenic and cadmium in concentrations greater than the MCLs (Table 5-4). Water collected from the sumps in the southern portion

Table 5-3
WATER QUALITY RESULTS BY LOCATION
RILEY PARK / DU PONT EAST CHICAGO PLANT

Location:	Chemical Concentrations (mg/l)											
	4800 Block Sewer of Riley Park			4900 Block Sewer of Riley Park			Sumps, Southern Half 4900 Block of Riley Park			Northern Portion of Du Pont Facility *		
Constituent	Minimum	Maximum	Average **	Minimum	Maximum	Average **	Minimum	Maximum	Average **	Minimum	Maximum	Average **
Arsenic	0.003	0.022	0.008	0.03	0.20	0.09		0.028	<0.006	0.01	0.4	0.21
Cadmium					0.011	<0.007					0.013	<0.006
Chloride	66	94	83	28	64	42	8	100	30	18	108	67
Copper	--	--	--	--	0.02	<0.01	--	0.02	<0.01	--	--	--
Fluoride	1.1	1.5	1.3	1.7	3.8	2.8	1.4	3.5	2.2	3	8	5
Iron	0.25	1.11	0.56	2.35	7.09	5.09	0.10	17.4	4.04	11.7	61.4	30.1
Magnesium	17	28	21	22	48	28	13	48	23	17.8	24.3	20.7
Sulfate	110	200	142	400	1100	900	480	1510	900	1100	1810	1540
Zinc		0.006	<0.006	0.014	1.5	0.41	0.042	9.52	1.3	0.049	7.46	3.07

NOTES:

* Based on water quality results for MW-1, MW-10, and MW-11.

** Sample and replicate averaged in calculation of constituent average.

<x.xxx = Average less than stated value. Average calculated using method detection level (MDL) for analyses below the MDL.

ND means not detected above the laboratory method detection limit.

Standards:

Primary drinking water standards: (Health-based standards)

Arsenic at 0.05 mg/l
Cadmium at 0.01 mg/l
Fluoride at 4 mg/l

Table 5–4
CHEMICAL CONCENTRATIONS EXCEEDING MCLs BY LOCATION
RILEY PARK / DU PONT EAST CHICAGO PLANT

	Location			
Federal Drinking Water Standards	4800 Block of Riley Park	4900 Block of Riley Park	Sumps, Southern Half of 4900 Block of Riley Park	Northern Portion of Du Pont Facility
Primary Standard (MCL)	-	Arsenic (0.20 mg/l) Cadmium (0.011 mg/l)	-	Arsenic (0.40 mg/l) Cadmium* (0.013 mg/l) Fluoride (8 mg/l) Lead* (0.07 mg/l)

NOTES:

MCL = Maximum Contaminant Level in effect as of June 1991 (arsenic at 0.05 mg/l, cadmium at 0.01 mg/l, fluoride at 4 mg/l, and lead at 0.01 mg/l).
The MCLs for arsenic and fluoride are under review by U.S. EPA.
The MCL for cadmium is being reduced to 0.005 mg/l (effective 7/30/92).

* = Detected only during one of two sampling rounds.

( ) = Maximum concentration observed.

MCLs for cadmium and lead at or below maximum detection limits.

of the 4900 block of Riley Park contained no chemicals tested at levels greater than the MCLs.

Potential for Exposure and Associated Threat to Human Health

Assuming that the data collected are representative of normal conditions, Riley Park residents are not typically exposed to high levels of chemicals that could have entered the groundwater system at the Du Pont East Chicago plant. No one is drinking groundwater or using groundwater for any other purpose. Sump water discharged to the ground surface and potential basement flood water did not contain the constituents tested in concentrations exceeding the federal MCLs. Few residents, if any, come in contact with the water flowing in the 4900-block sewers. In summary, there appears to be no imminent threat to human health associated with the groundwater migrating away from the Du Pont facility.

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Section 6
CONCLUSIONS AND PLANS FOR FUTURE WORK

CONCLUSIONS

Based upon the results of the Phase II investigation, the following conclusions were made:

- Groundwater quality at the Du Pont East Chicago plant has been affected by industrial practices over the past 100 years of plant operation.

- Groundwater is migrating from the Du Pont property both to the north and south. Flow to the south discharges to the Grand Calumet River. A substantial portion of flow to the north discharges to the sewers of Riley Park. This process limits the northward migration of groundwater to the southern half of the 4800 and the 4900 blocks of each street in Riley Park.

- Groundwater discharge to the Grand Calumet River has a negligible effect on the overall river water quality.

- Currently, Riley Park residents do not drink groundwater migrating from the Du Pont plant. Groundwater is not used on the Du Pont property. There is no direct evidence of human contact with groundwater discharging at the river bank along the southern boundary. Based on these facts, it can be concluded that there is no imminent threat to human health associated with groundwater discharging from the site.

PLANS FOR FUTURE WORK

Although there is no imminent threat to human health associated with site groundwater, Du Pont believes groundwater remediation may be warranted and plans to proceed with further site characterization and remediation, as appropriate. This approach is consistent with Du Pont's Groundwater Protection Policy. The goals of the planned characterization and remediation program are to:

- Refine Du Pont's understanding of current site conditions needed for effective remediation;

- Study the feasibility of and select an alternative(s) for site remediation; and

- Design and implement the alternative(s) selected.

Du Pont will proceed with the future work effort in two stages. The first stage will address the offsite migration of chemical constituents in the groundwater. A focused feasibility study will be conducted to identify and evaluate alternatives for controlling offsite migration and to select a remedy for implementation.

The second stage will be aimed at better characterizing site conditions. This work will include:

- Identification and characterization of areas that have contributed to current groundwater quality conditions;
- Identification and evaluation of alternative control measures relative to the areas identified above;
- Selection of appropriate control measure for implementation; and
- Design and implementation of the selected control measure(s).

Du Pont believes that the comprehensive approach described above will address the groundwater quality conditions identified during Phase II.

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MAPS

Calumet City 7.5-Minute Quadrangle Map, Illinois-Indiana (Scale 1:24,000). Reston, Virginia: U. S. Geological Survey. 1980.

REFERENCES (continued)

Highland 7.5-Minute Quadrangle Map, Lake County, Indiana (Scale 1:24,000). Reston, Virginia: U. S. Geological Survey. 1986.

Lake Calumet 7.5-Minute Quadrangle Map, Illinois-Indiana (Scale 1:24,000). Reston, Virginia: U. S. Geological Survey. 1977.

Whiting 7.5-Minute Quadrangle Map, Lake County, Indiana (Scale 1:24,000). Reston, Virginia: U. S. Geological Survey. 1980.

Appendix A

TECHNICAL MEMORANDUM: PHASE II GROUNDWATER ASSESSMENT FIELD WORK IMPLEMENTATION, DU PONT - EAST CHICAGO

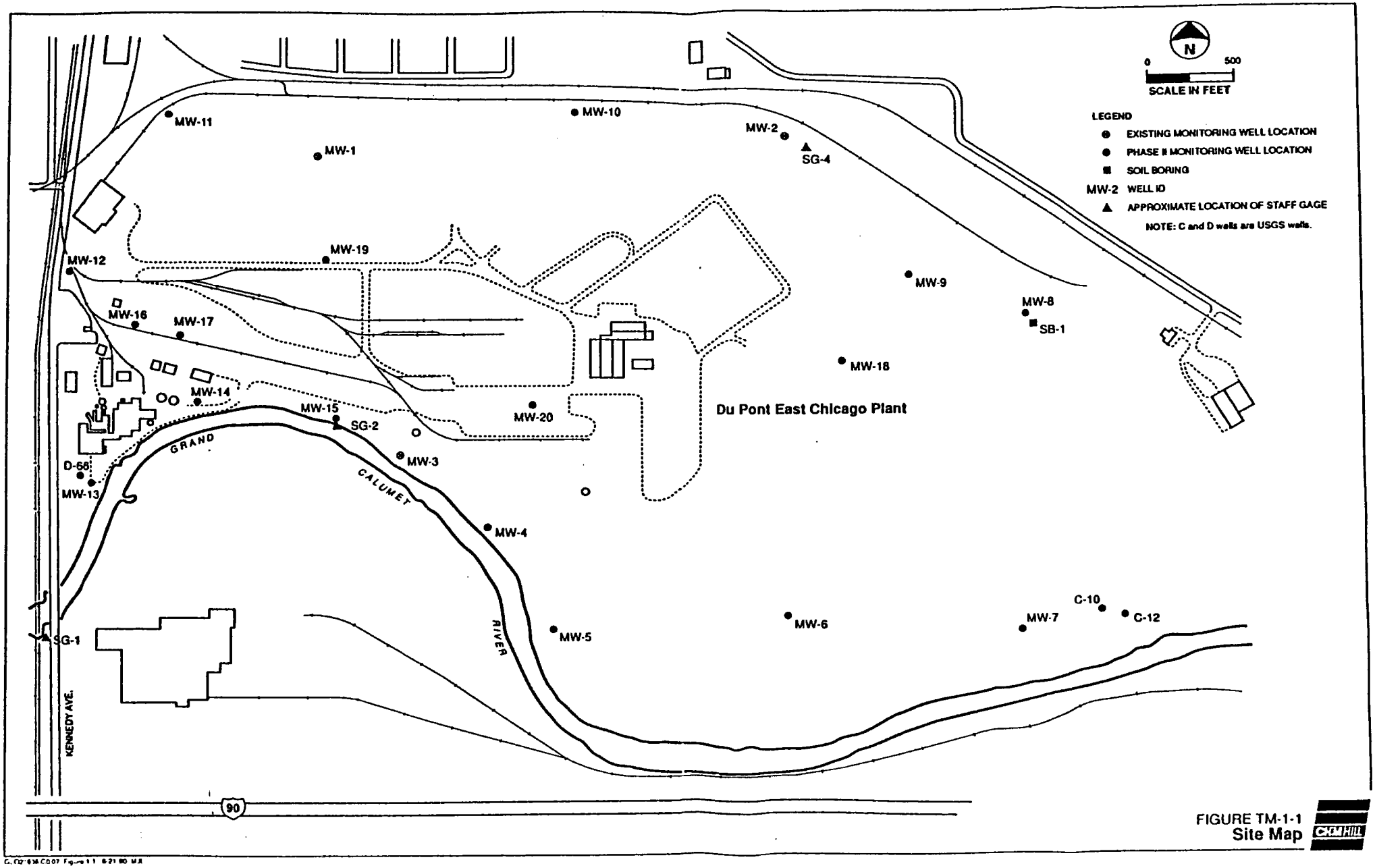

FIGURE TM-1-1
Site Map

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The alternative plan for collecting soil samples was implemented as outlined in the QAPP, thereby achieving the goal of installing the perimeter monitoring well network. The lead 6¼-inch auger was fitted with a PVC plug to inhibit the flow of saturated sand into the auger flight during drilling. The flight was advanced to within or just above the clay layer underlying the Calumet Sand. Cuttings were characterized and drilling progress was noted to determine if a change of lithology was encountered. When the auger flight was removed from the hole, the depth to the clay unit was confirmed by observing where clay was present on the outside of the lead auger. Observations were noted on soil boring log sheets that will be included in the final report. Some samples were retained for evaluation of grain size. Table TM-1-1 presents the location and depth of these samples.

One additional soil boring was advanced near MW-8 (see Figure TM-1-1) to confirm the depth to the clay as the monitoring well borehole for MW-8 did not encounter clay. Solid-stem augers of 3⅝-inch outer diameter were advanced to depth and then removed from the borehole so the clay depth could be observed from the lead auger.

MONITORING WELL CONSTRUCTION

Monitoring wells were constructed inside the hollow-stem auger flight after the flight had been advanced to depth. In most instances, heaving sands entered the augers between the auger joints. Depths of 2 to 10 feet of sand within the augers prevented the installation of wells without the use of clean water to flush out the sand. The amount of water used was recorded in field logbooks so that extra volumes of well water could be removed during development to compensate for the use of flushing water. Next, the PVC plug was knocked loose using the well screen and riser. The auger flight was then removed from around the well, leaving the well in place.

Well construction details are shown in Figure TM-1-2. Wells were usually constructed of 15-foot, 4-inch-diameter Schedule 40 PVC slotted screen with 4-inch-diameter Schedule 40 PVC riser. A 10-foot screen was used at MW-13 so that the silty layer near the ground surface was not screened for groundwater sampling purposes. The screen slot size was 0.010 inch. A coarse sand pack was placed around the screen to approximately 2 feet above the upper edge of the well screen. In addition to the coarse sand pack, most well screens were surrounded by some natural sand as that sand had a tendency to cave in and heave toward the screen when the auger was withdrawn. A 2-foot layer of fine grained silica sand was placed above the filter pack sand, and the remaining annulus of the borehole was filled with a cement-bentonite grout that was tremied in place from the surface. A 7½-inch-diameter locking steel protector pipe was placed over the well with approximately

Table TM-1-1 SOIL SAMPLES TO BE ANALYZED FOR GRAIN SIZE AND HYDROMETER PROPERTIES		
Location	**Depth (ft)**	**Type**
MW-5	14 to 16	Sand
MW-5	34 to 36	Clay
MW-9	15 to 20	Sand
MW-13	28 to 29	Sand
MW-13	29 to 30	Clay
MW-19	18 to 20	Sand
SB-1	35 to 37	Clay

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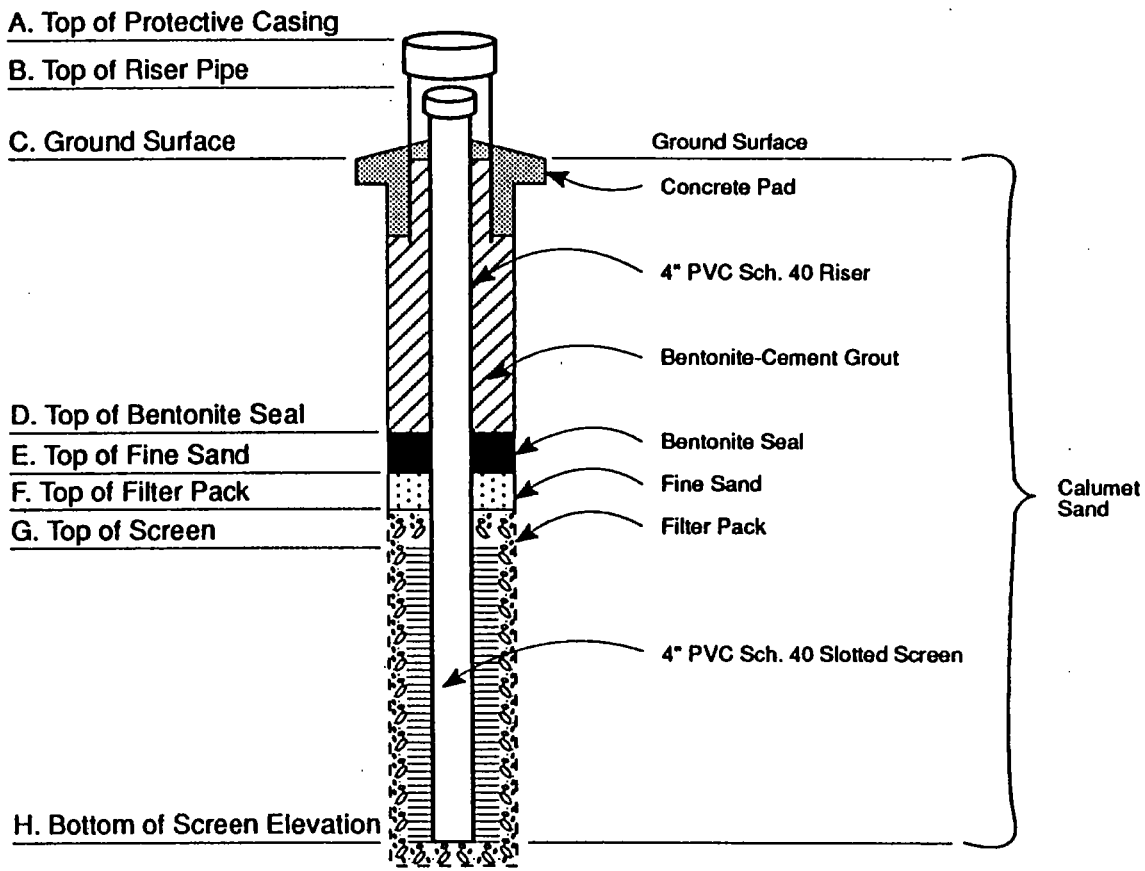
GLO21838 C0.07 Well Dia. 7-6-90 MJL



	MW1	MW2	MW3	MW4	MW5	MW6	MW7	MW8	MW9	MW10	MW11	MW12	MW13	MW14	MW15	MW16	MW17	MW18	MW19	MW20
A.	592.92	590.54	594.30	590.17	590.28	589.25	585.58	592.22	589.62	590.67	590.38	590.45	589.12	591.23	592.11	591.53	591.67	593.43	591.96	592.88
B.	592.78	590.48	594.19	589.89	590.13	589.08	585.34	591.82	589.31	590.47	590.10	590.12	588.99	590.87	591.86	591.17	591.24	593.15	591.58	592.46
C.	590.10	587.21	591.07	587.46	587.79	586.77	582.82	589.27	587.16	587.84	587.62	587.70	586.46	588.38	590.45	588.61	588.96	590.02	589.26	590.20
D.	*	*	*	579.46	579.79	578.77	575.82	582.27	580.66	577.84	578.62	576.70	574.46	576.38	581.45	577.61	576.96	579.02	577.26	581.20
E.	*	*	*	577.46	576.19	574.77	572.82	579.27	577.16	574.84	574.12	574.70	572.46	574.38	579.45	575.61	574.96	575.52	575.26	578.20
F.	*	*	*	575.46	573.79	572.77	570.02	577.27	575.16	571.34	571.62	572.70	569.46	572.38	577.45	573.61	572.96	573.52	573.26	575.70
G.	*	*	*	573.46	571.79	571.77	568.52	575.27	572.66	569.34	571.22	570.70	567.46	570.38	575.45	571.61	570.96	571.52	571.26	573.20
H.	570.60	558.21	561.87	558.46	556.79	556.77	553.52	560.27	557.66	554.34	556.22	555.70	557.46	560.38	560.45	556.61	555.96	556.52	556.26	558.20

* CH2M HILL did not construct well; data unavailable.

3 feet of the protective cover that sticks up from the ground surface. A concrete surface seal was installed between the borehole wall and the protective casing.

MONITORING WELL DEVELOPMENT

Wells were developed until the amount of water used during the drilling process and an additional 25 to 30 gallons was removed from each well. A double-line airflight method was used for development.

STAFF GAUGE INSTALLATION

Staff gauges were installed at the locations shown in Figure TM-1-3. (SG-3 was placed to the east of the site boundary and is not visible on Figure TM-1-3.) Staff gauges SG-1 and SG-3 were attached to the sides of the Kennedy Avenue and Cline Avenue bridges, respectively. Staff gauges SG-2 and SG-4 were bolted to 1-inch black pipe and driven into place.

SURVEYING

Elevations of the top of the protective casing, the top of the riser pipe, and the ground surface were determined for each well location, as were the elevations of the tops of the staff gauges (Table TM-1-2). Horizontal coordinates for the wells and gauges were also determined and tied to site data points. Surveying was performed by ACA Calumet under subcontract to CH2M HILL. Initial surveying was completed during the week of June 18. Selected points were re-surveyed during the week of July 2.

VARIABLE HEAD HYDRAULIC CONDUCTIVITY TESTING

Testing Methodology

Hydraulic conductivity tests were conducted on monitoring wells MW-4, 5, 10, 11, 13, 15, 16, and 18 at the East Chicago plant on June 20. Locations of these wells are shown in Figure TM-1-4. Hydraulic conductivity values of the unconfined, surficial sand aquifer were measured using variable head (slug) tests.

Variable head tests are single well tests used to estimate hydraulic conductivity near a well screen by adding or removing a known volume of water. The rate at which the water level in the well recovers is measured and used to estimate hydraulic conductivity.

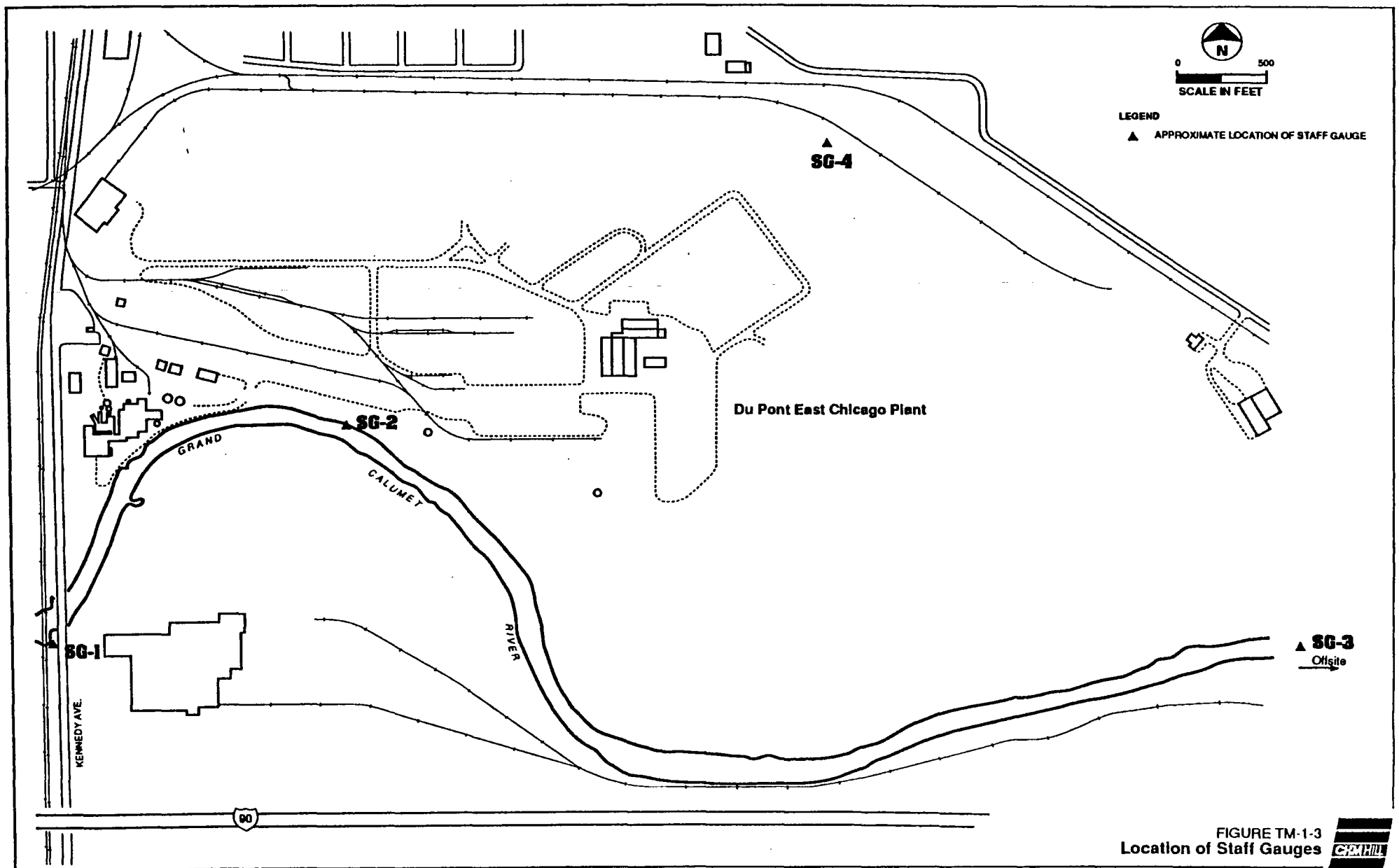


FIGURE TM-1-3
Location of Staff Gauges

CH2M HILL

Table TM-1-2
SURVEYING ELEVATION RESULTS

Monitoring Location	ELEVATION (feet asml) Outer Casing With Cover	Inner Casing	Ground Surface
WELLS			
MW-1	592.94	592.78	590.10
MW-2	590.56	590.48	587.21
MW-3	594.32	594.19	591.07
MW-4	590.19	589.89	587.46
MW-5	590.30	590.13	587.79
MW-6	589.27	589.08	586.77
MW-7	585.60	585.34	582.82
MW-8	592.24	591.82	589.27
MW-9	589.64	589.31	587.13
MW-10	590.69	590.47	587.84
MW-11	590.40	590.10	587.62
MW-12	590.57	590.12	587.70
MW-13	589.14	588.99	586.46
MW-14	591.25	590.87	588.38
MW-15	592.13	591.86	590.45
MW-16	591.55	591.17	588.61
MW-17	591.69	591.24	588.96
MW-18	593.45	593.15	590.02
MW-19	591.98	591.58	589.26
MW-20	592.90	592.46	590.20

STAFF GAUGES	ZERO POINT
SG-1	579.72
SG-2	578.57
SG-3	579.43
SG-4	587.26

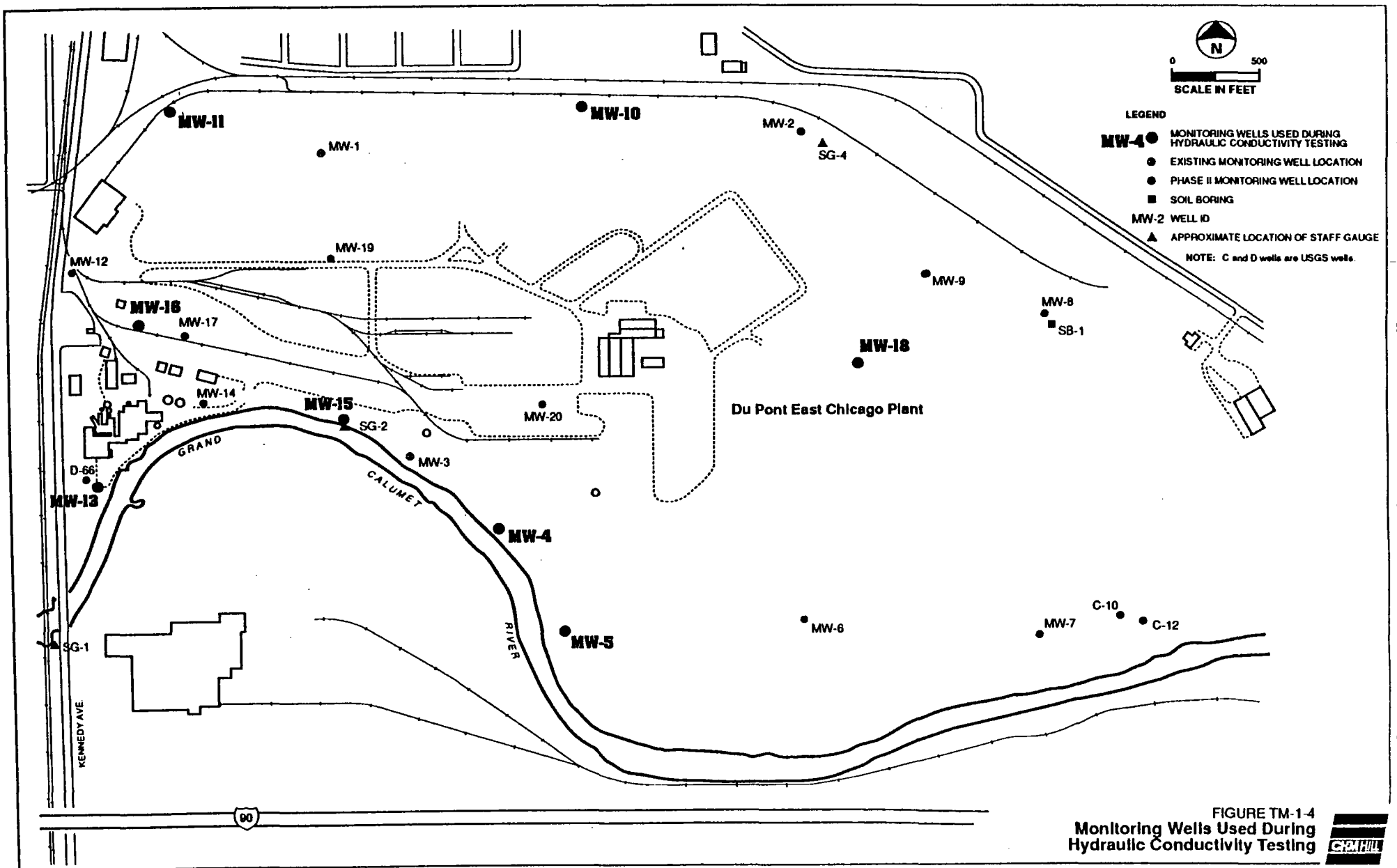


FIGURE TM-1-4
Monitoring Wells Used During Hydraulic Conductivity Testing

The tests conducted at the Du Pont plant were "rising" head tests. An artificial pressure head was applied to each well by displacing water from the well using nitrogen gas under pressure. When the water level in the well fully stabilized from the stress, the gas pressure was removed instantaneously. Data were then collected while water levels recovered within the well. All tests were run in duplicate to improve the confidence in the test results.

The test assembly used to displace well water is shown in Figure TM-1-5. The wellhead assembly was attached to the top of the riser pipe. A gas-tight seal between the assembly and riser pipe was obtained by mechanically expanding a rubber packer at the base of the assembly. The wellhead assembly contained gas-tight ports for connecting two pressure transducers, a fitting for attaching a pressure regulator, and a vent valve. The pressure transducers were connected to an electronic data logger (Campbell Scientific Model 21X). Transducer No. 1 measured total head, which is the sum of the elevation head and pressure head above the transducer. Transducer No. 2 measured the pressure head resulting from the nitrogen gas.

Besides recording head values at discrete time intervals for later analysis, the data logger was programmed to calculate hydraulic conductivity directly in the field using simplifying assumptions regarding aquifer geometry. Therefore, a quick field check on the validity of the data was possible before disassembling the equipment.

Analysis Methodology

Tests were evaluated using the Bouwer and Rice method.[1] This method was corrected to adjust the well radius to account for a porosity change associated with the sand pack when the water level changes within the screened portion of the well. The equation for estimating hydraulic conductivity is:

$$K = \frac{rc^2 \times \ln(R_e/r_w) \times \ln(y_o/y_t)}{2 \times L \times t}$$

Where:

K = hydraulic conductivity [L/T]
L = length of test zone [L]
t = time measured from start of test [T]

[1] Bouwer, Herman, and R. C. Rice. 1976. A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells. *Water Resources Research*. Vol. 12, No. 3.

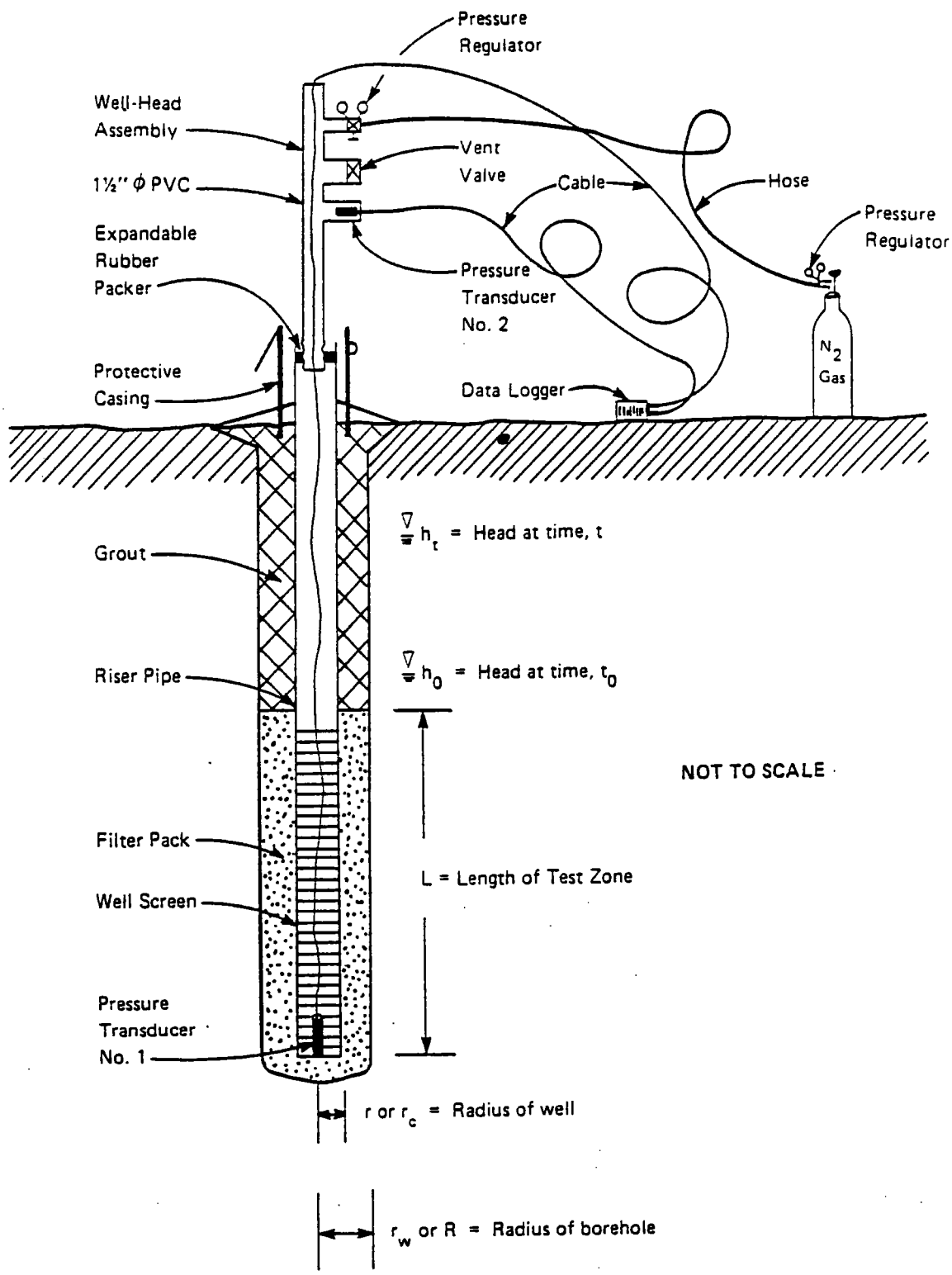


FIGURE TM-1-5
Schematic Diagram of Nitrogen Slug Test Assembly

1. The well was unlocked and the inner cap was removed. Organic vapor concentrations of the air at the riser were measured with an HNu to monitor well conditions and determine if it was necessary to monitor breathing space conditions of sampling personnel.

2. The water level was measured with an electronic water level indicator, which has an accuracy of 0.01 foot.

3. The total depth of the monitoring well was measured. Both the water level and the depth of the well were recorded.

4. The water column volume was calculated using the formula

   $$\text{Volume (gallons)} = H \times (D/2)^2 \times \pi \times 7.48 \text{ gal/ft}^3$$

   Where:

   H = Height of water column, in feet
   (depth of well minus depth to water surface)

   D = Inside diameter of casing, in feet

5. The monitoring well was purged using a Masterflex peristaltic pump, a Brainard-Kilman pump, or a bailer. Wells were purged of three well volumes or until parameters had stabilized. Purge water was stored in 55-gallon drums and labeled with the well number.

6. VOC vials were filled immediately after purging using a stainless steel bailer. Water was poured directly into the vials from the bailer to minimize the formation of air bubbles.

7. Sample bottles for the other parameters were filled using a stainless steel bailer.

8. Samples were delivered to the CH2M HILL site field office to be preserved, filtered, documented, and held in custody until transported to the laboratory.

9. The bailer and pump were decontaminated following established decontamination procedures. Nylon cord used to lower the bailer into the well was discarded after use and replaced with new cord for the next well.

10. Samples were kept in an insulated cooler with ice until shipment. Samples were directly delivered or shipped on a daily basis to NET laboratories by overnight mail.

Quality Control Measures

The analytical parameters for each well's sample are specified in Table TM-1-4, along with location of duplicate samples. Two duplicate water samples were collected for the 20 wells sampled. A water trip blank was shipped with each cooler containing VOC sample vials.

Field blanks were collected on two separate days. HPLC water was run through the sampling equipment after it had been decontaminated as a check on in-field decontamination procedures.

SURFACE WATER SAMPLING

Surface water samples were taken at three locations (Figure TM-1-6). Table TM-1-4 shows the parameters each sample was analyzed for and where sample duplicates were taken. On the day of sampling, the observed flow direction of the river was westerly. SW-01-01 was located to the east of the site (upgradient), adjacent to where the powerline along the eastern edge of the site crosses the river. The water sampled at SW-01 may have been somewhat stagnant because it was difficult to get a midstream sample because of the marshy terrain along the river in that location.

Surface water sample SW-02-01 was taken standing on the river bank adjacent to MW-03 (Figure TM-1-6). An oil sheen was observed floating on the water surface near the river's edge at a distance of about 2 feet from the bank. Care was taken to prevent oil from entering the sample bottles, but some oil may have been introduced into the sample.

Surface water sample SW-03-01 was taken to the west (downgradient) of the site to the east of the Kennedy Avenue bridge (Figure TM-1-6). An oil sheen was also observed near the edge of the river similar to that noted while sampling SW-02-01. Some oil may have been introduced into the sample bottles.

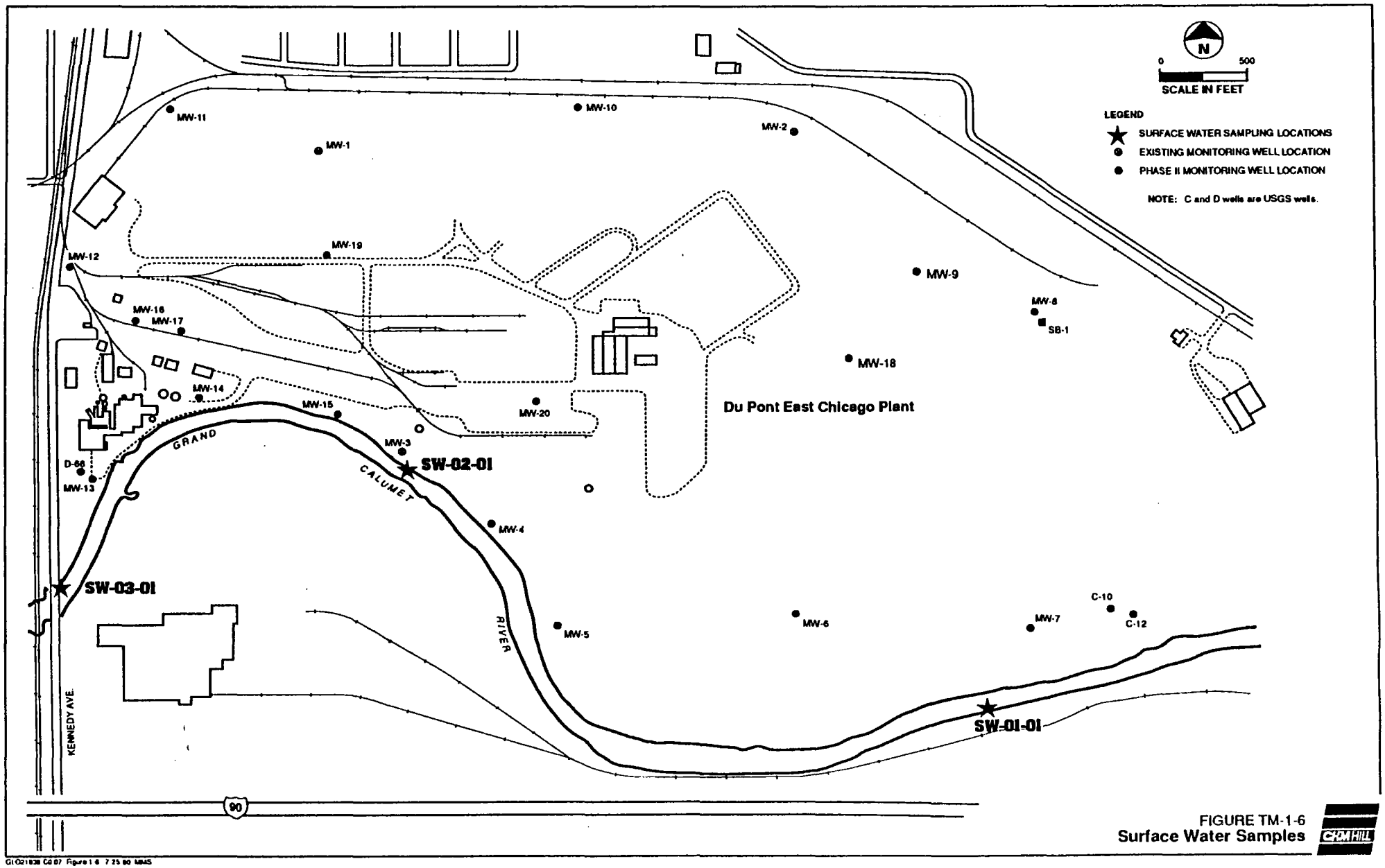


FIGURE TM-1-6
Surface Water Samples

CH2M HILL

GI 021838 C0 07 Figure 1-6 7 25 90 MMS

Table TM-1-4
WATER ANALYSES

Sample Parameters	Monitoring Wells																				Staff Gauges		
	1	2	3	4	5	6	7	8	9	10	11*	12	13	14*	15	16	17	18	19	20	01	02	03*
VOCs	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x	x	x	x
BNAs	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x	x	x	x
PCBs																		x					
Selected Organics: Bo, Cd, Cr^{+6}, Cr, Cu, Hg, Pb, Ni, Sb	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x	x	x	x
Al, Ba	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x
As, Zn	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Water Quality Paramters: Ca, Mg, K, Na, SO_4, Cl, Carbonate, Iron, TDS, Mn, Alkalinity	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cyanide	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x	x	x	x
Phosphate	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x	x	x	x
Total Kieldahl and Ammonia N	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				x	x	x

*Duplicate sample taken at WM-11, MW-14, and SW-03 locations.

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MONTHLY WATER LEVEL PROGRAM

At the request of IDEM, water levels from the monitoring wells and the staff gauges are being measured monthly. The first set of water level data from the monitoring wells was collected on June 18. A water level indicator was lowered into the well casing until water was encountered. The depth to water and the reference point used were both recorded. Water levels for the staff gauges were recorded on June 21. Because the June water level for SG-2 was suspect, the gauge was re-surveyed on July 17. Water level information for June and July is listed in Table TM-1-5.

Table TM-1-5
WATER ELEVATIONS

Monitoring Location	ELEVATION (feet amsl) 6/18/90	6/21/90	7/17/90
WELLS			
MW-1	586.39		586.08
MW-2	585.90		585.87
MW-3	582.34	582.32	582.49
MW-4	582.23		582.28
MW-5	581.63		581.67
MW-6	585.65		585.91
MW-7	581.67		581.90
MW-8	583.00		585.83
MW-9	585.94		585.81
MW-10	585.80		585.74
MW-11	586.02		585.79
MW-12	585.40		585.92
MW-13	581.18	581.07	581.28
MW-14	583.49	583.42	583.92
MW-15	582.01	581.98	585.02
MW-16	585.99		586.68
MW-17	586.14		586.78
MW-18	586.43		583.25
MW-19	586.61		586.42
MW-20	586.62		586.50
STAFF GAUGES			
SG-1		580.65	580.51
SG-2		580.27	580.56
SG-3		581.11	581.18
SG-4		587.46	587.46

y_o = initial head difference [L]
y_t = head difference at time t [L]
r_c = well radius [L] (corrected for porosity in the sand pack)
R_e = effective radial distance over which the head (y) is dissipated [L]
r_w = radius of the borehole [L]

The value of $\ln(R_e/R_w)$ is determined graphically using several curves for empirical constants given in Bouwer and Rice (1976, p. 426).

Results

Input data for each well are presented as Attachment A to this appendix. Test results of hydraulic conductivities calculated using the Bouwer and Rice method are summarized in Table TM-1-3. Average values of hydraulic conductivity indicate a range from 6.4×10^{-3} to 3.7×10^{-3} cm/s.

Data Limitations

The following assumptions are inherent in the theoretical development of the Bouwer and Rice equation for analyzing slug test data:

1. Drawdown of the water table around the well is negligible.
2. Flow in the unsaturated zone can be ignored.
3. Well losses are negligible.
4. The aquifer is homogeneous and isotropic.

Assumptions 1, 2, and 3 are probably satisfied at the East Chicago site. The effect of deviation from Assumption 4 on computed results is unknown. Therefore, each test is assumed to be an average of the formation material in the immediate vicinity of each test location.

GROUNDWATER SAMPLING

Groundwater sampling was conducted from June 18 to 21, 1990, and from September 10 to 12, 1990. Finalized analytical results will provide the basis for characterizing water quality across the site.

The monitoring well network at the East Chicago site consists of the 17 newly installed wells and 3 existing wells. After the new wells were installed and developed, conditions were allowed to stabilize at least 1 week before sampling. The samples were collected as follows:

Table TM-1-3 RESULTS OF VARIABLE HEAD TESTING			
Well I.D.	Hydraulic Conductivity (cm/s)		
	Test 1	Test 2	Log Average
MW-4	6.4×10^{-3}	---	6.4×10^{-3}
MW-5	3.8×10^{-3}	4.0×10^{-3}	3.9×10^{-3}
MW-10	4.6×10^{-3}	4.6×10^{-3}	4.6×10^{-3}
MW-11	3.6×10^{-3}	3.8×10^{-3}	3.7×10^{-3}
MW-13	3.7×10^{-3}	---	3.7×10^{-3}
MW-15	5.5×10^{-3}	5.7×10^{-3}	5.6×10^{-3}
MW-16	4.3×10^{-3}	4.3×10^{-3}	4.3×10^{-3}
MW-18	4.8×10^{-3}	5.1×10^{-3}	4.9×10^{-3}

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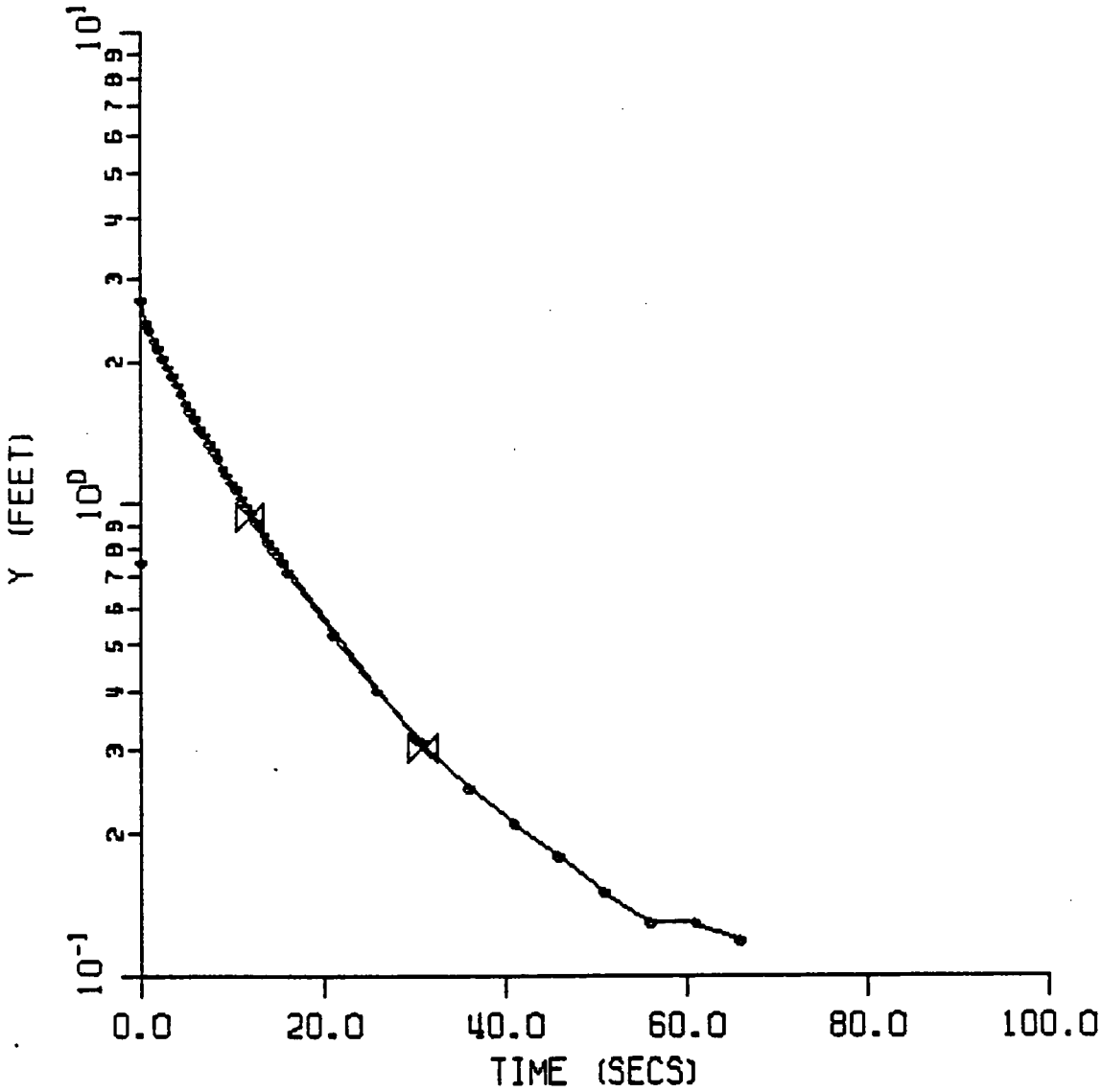
Attachment A

GRAPHICAL REPRESENTATIONS OF HYDRAULIC CONDUCTIVITY DATA

DUPONT - EAST CHICAGO
MW-4
TEST 1



K (CM/S) = 0.006360

WELL SPECS. (FEET)

SCREEN LENGTH = 15.0

WELL SCREEN/BORE RADIUS = 0.17

WELL CASING RADIUS = 0.17

AQUIFER THICKNESS = 23.5

H (FEET) = 23.50

COEFFICIENTS

A = 0.00

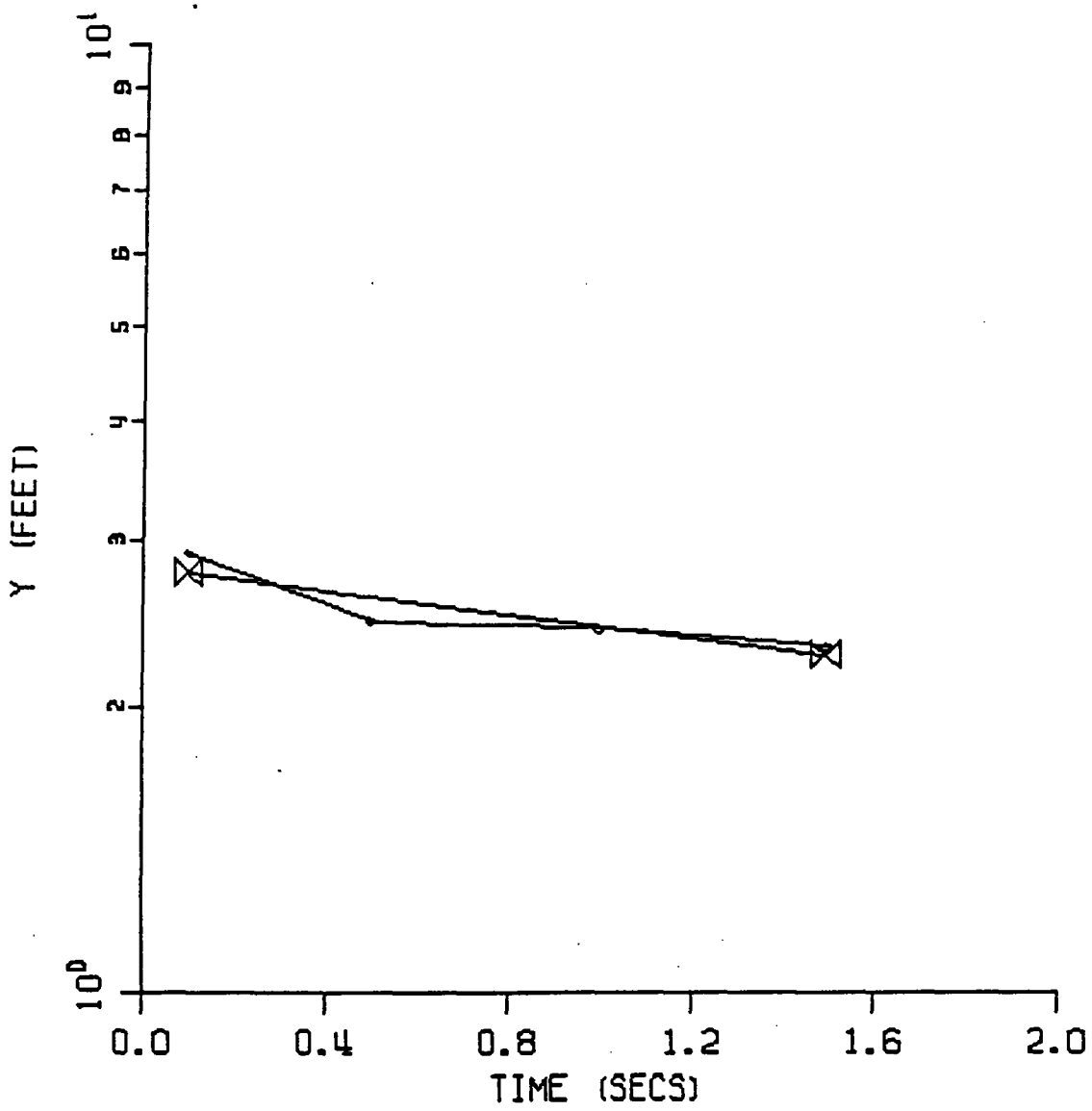
B = 0.00

C = 3.85

Y-INTERCEPT = 1.92

SLOPE = -0.0259

DUPØNT - EAST CHICAGØ
MW-4
TEST 2



K (CM/S) = 0.015360

WELL SPECS. (FEET)

SCREEN LENGTH = 15.0

WELL SCREEN/BØRE RADIUS = 0.17

WELL CASING RADIUS = 0.17

AQUIFER THICKNESS = 23.5

H (FEET) = 23.50

CØEFFICIENTS

A = 0.00

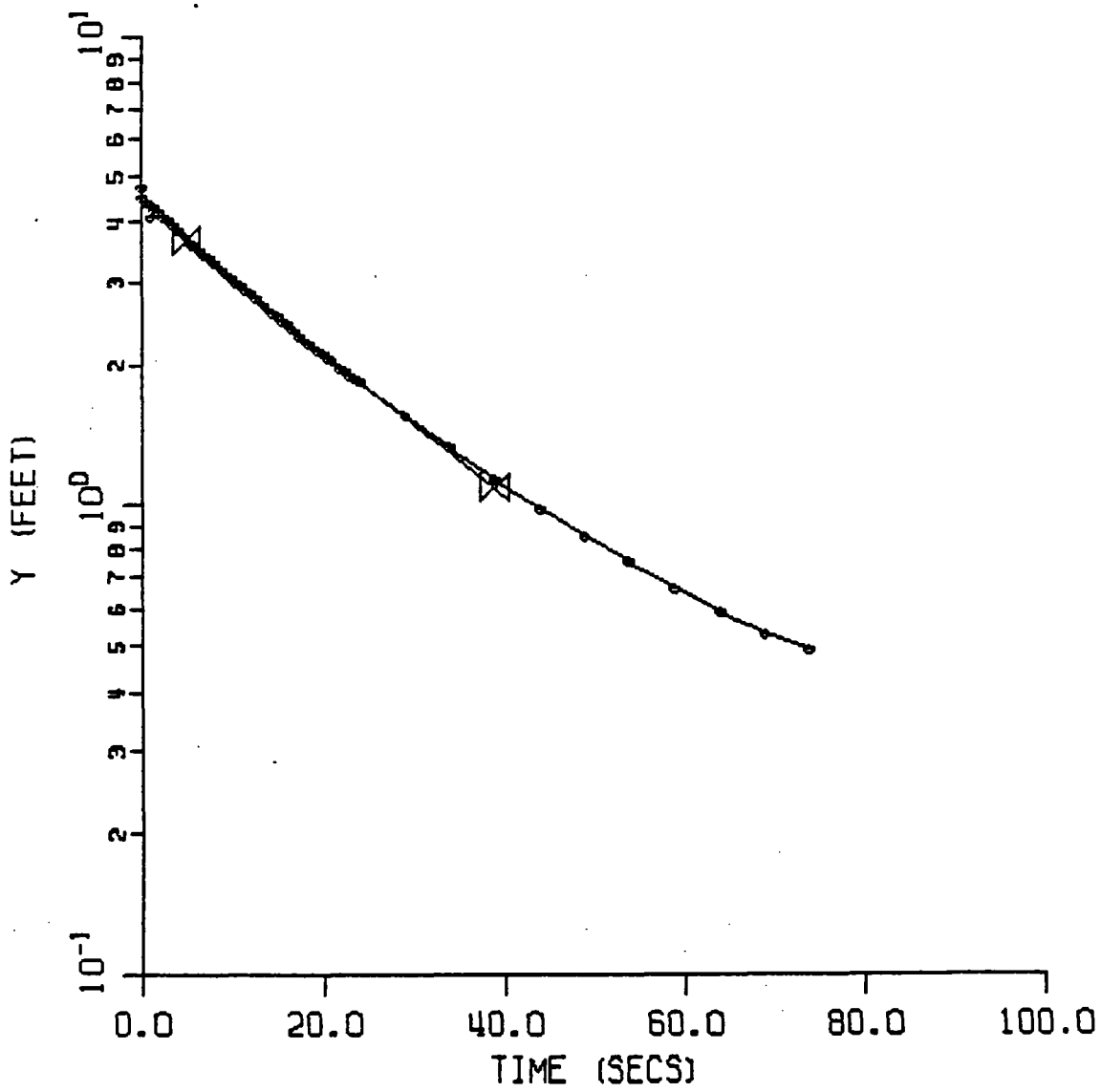
B = 0.00

C = 3.85

Y-INTERCEPT = 2.82

SLØPE = -0.0626

DUPØNT - EAST CHICAGØ
MW-5
TEST 1



K (CM/S) = 0.003845

WELL SPECS. (FEET)

SCREEN LENGTH = 15.0

WELL SCREEN/BØRE RADIUS = 0.17

WELL CASING RADIUS = 0.17

AQUIFER THICKNESS = 25.0

H (FEET) = 25.00

CØEFFICIENTS

A = 0.00

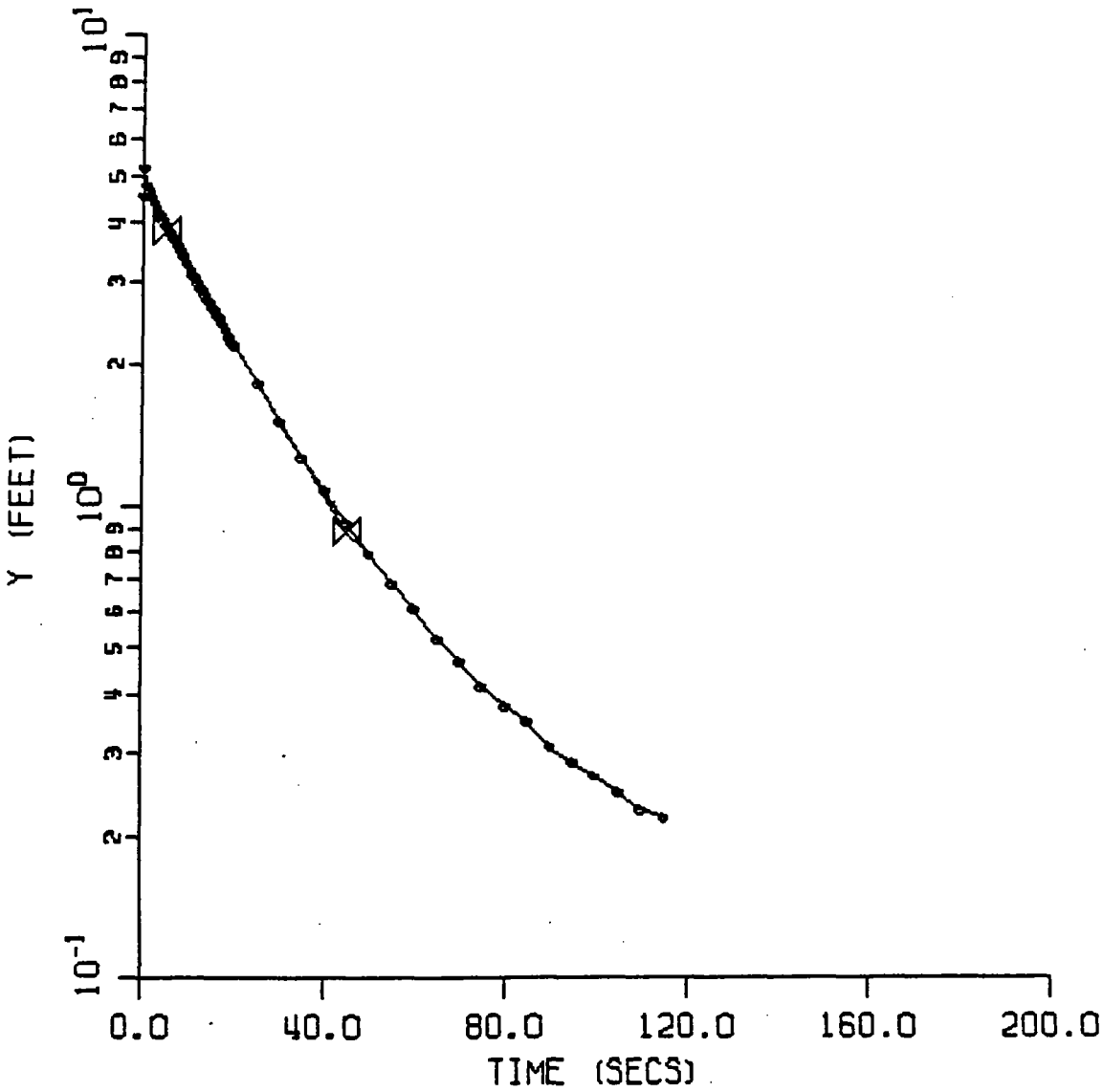
B = 0.00

C = 3.85

Y-INTERCEPT = 4.35

SLØPE = -0.0155

DUPONT - EAST CHICAGO
MW-5
TEST 2



K (CM/S) = 0.003961

WELL SPECS. (FEET)

SCREEN LENGTH = 15.0

WELL SCREEN/BORE RADIUS = 0.17

WELL CASING RADIUS = 0.17

AQUIFER THICKNESS = 25.0

H (FEET) = 25.00

COEFFICIENTS

A = 0.00

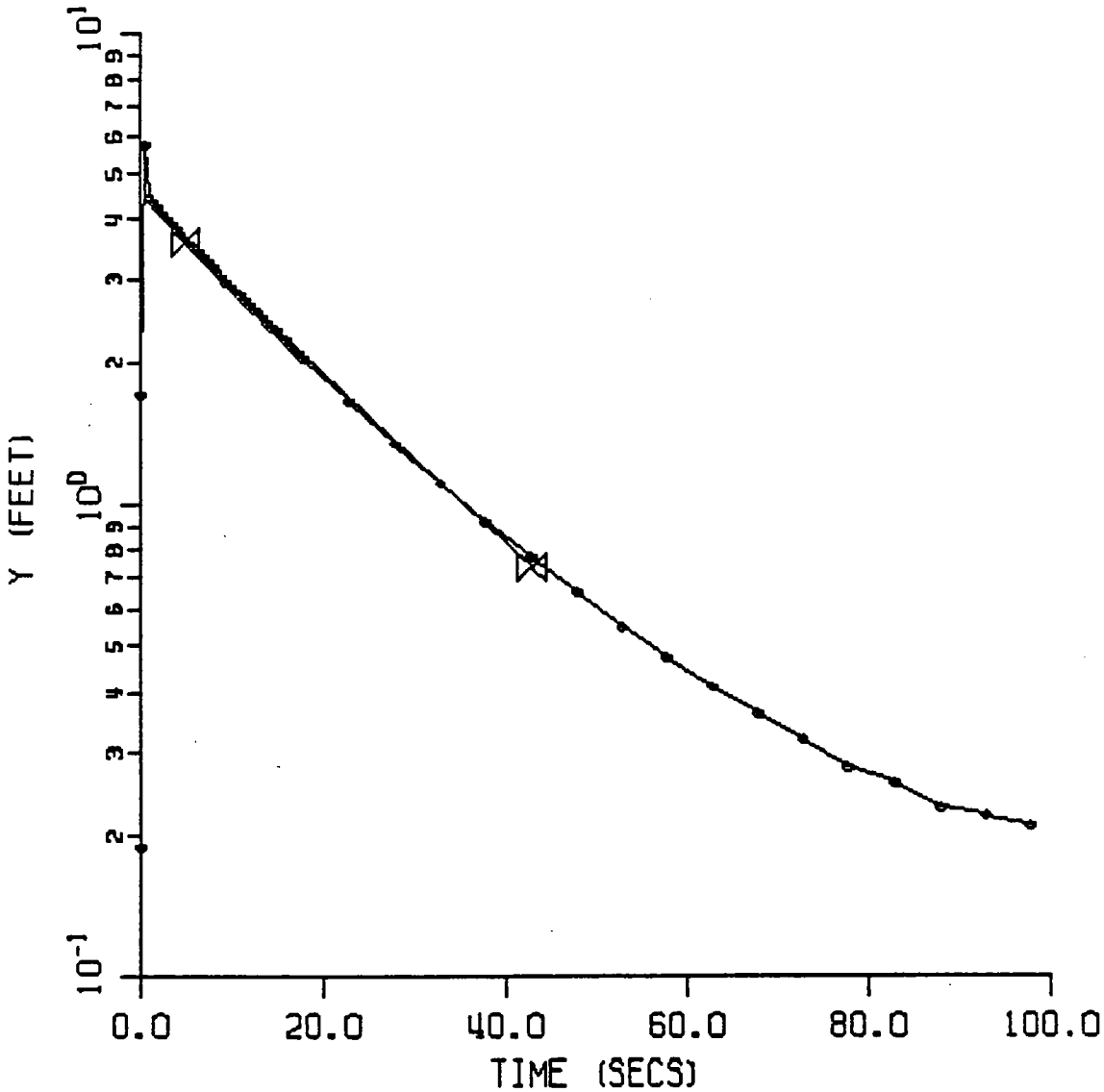
B = 0.00

C = 3.85

Y-INTERCEPT = 4.65

SLOPE = -0.0160

DUPØNT - EAST CHICAGØ
MW-10
TEST 1



K (CM/S) = 0.004630

WELL SPECS. (FEET)

SCREEN LENGTH = 15.0

WELL SCREEN/BØRE RADIUS = 0.17

WELL CASING RADIUS = 0.17

AQUIFER THICKNESS = 31.5

H (FEET) = 31.50

COEFFICIENTS

A = 0.00

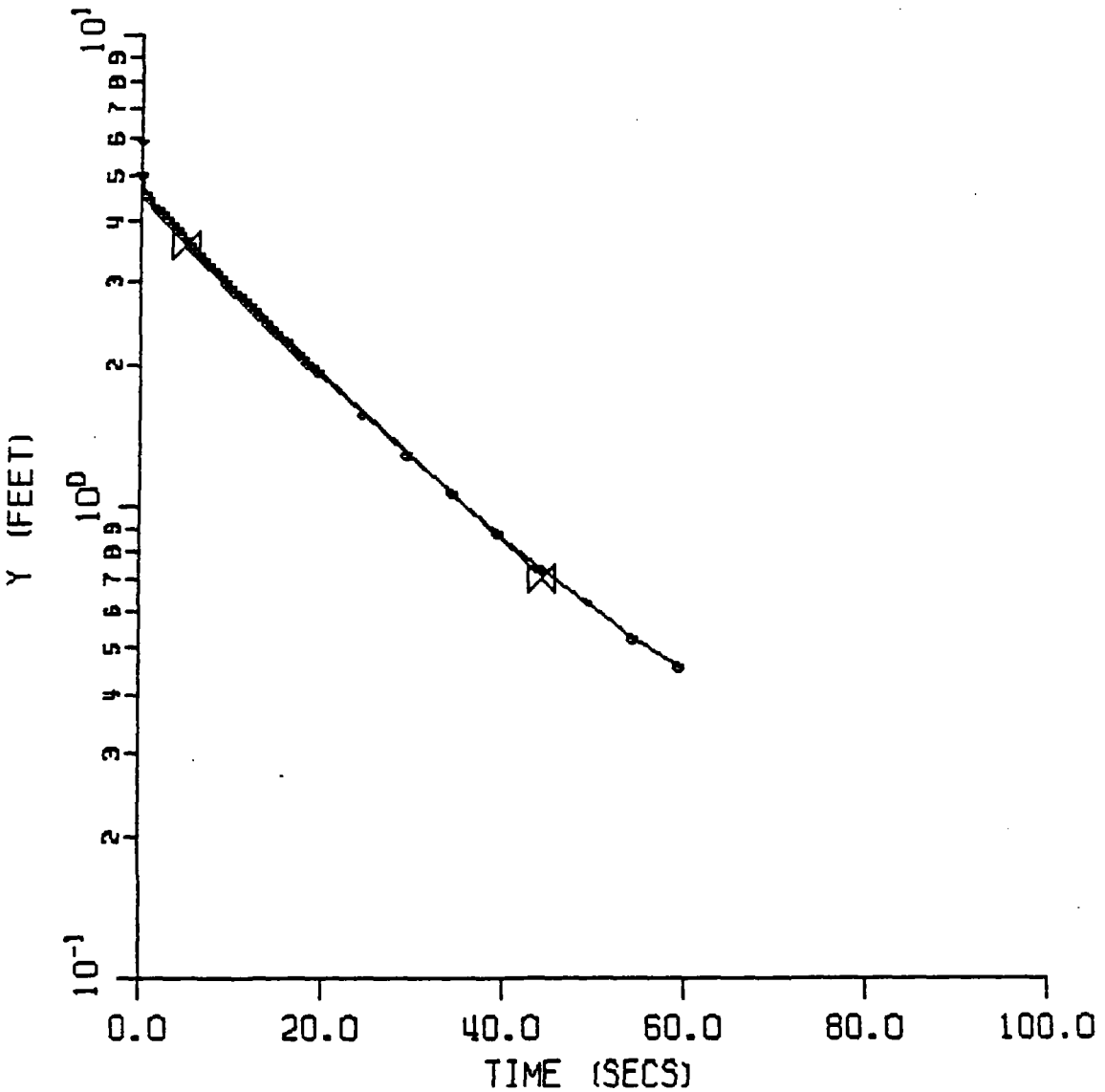
B = 0.00

C = 3.85

Y-INTERCEPT = 4.37

SLØPE = -0.0180

DUPØNT - EAST CHICAGØ
MW-10
TEST 2



K (CM/S) = 0.004582

WELL SPECS. (FEET)

SCREEN LENGTH = 15.0

WELL SCREEN/BØRE RADIUS = 0.17

WELL CASING RADIUS = 0.17

AQUIFER THICKNESS = 31.5

H (FEET) = 31.50

CØEFFICIENTS

A = 0.00

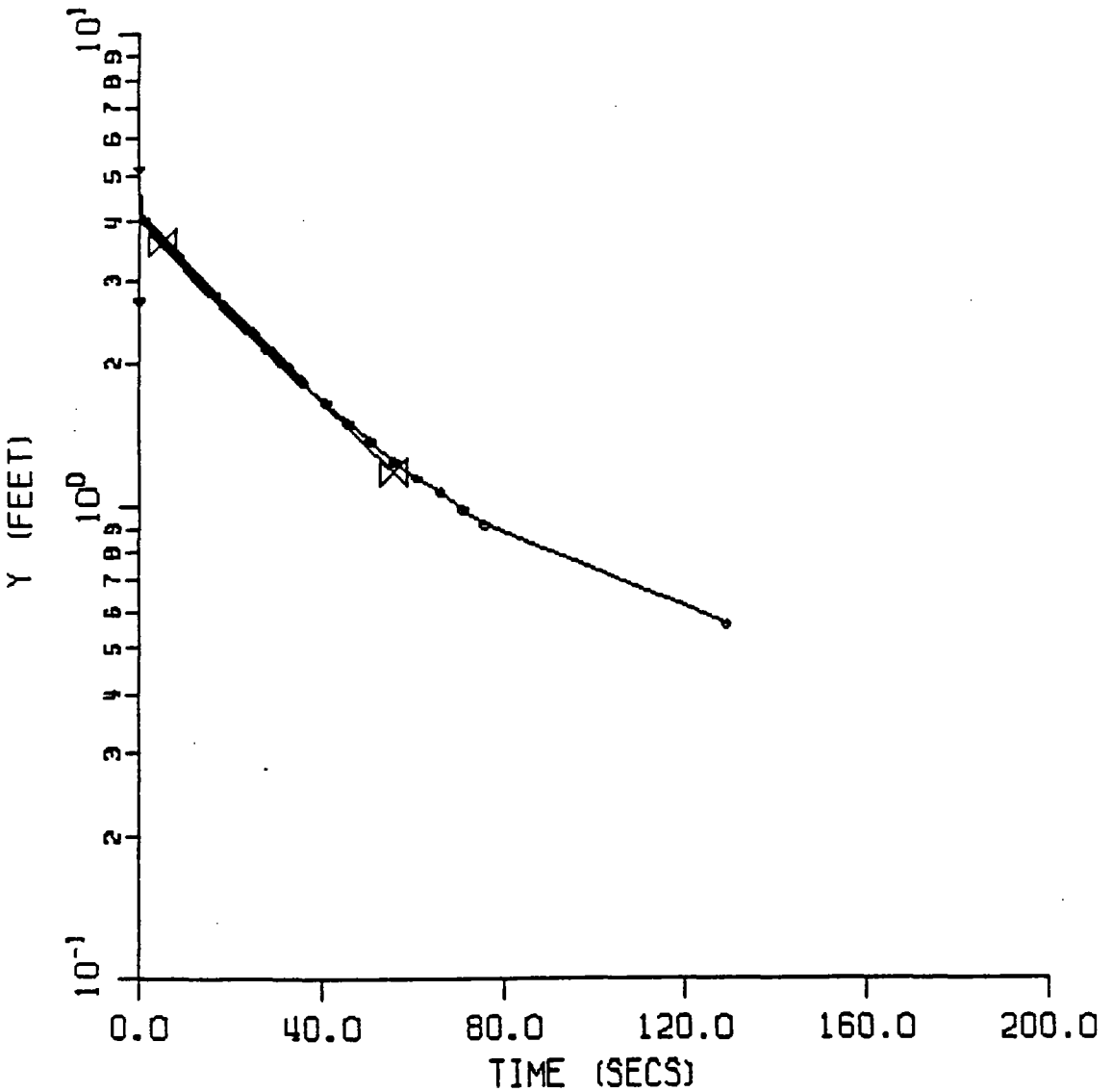
B = 0.00

C = 3.85

Y-INTERCEPT = 4.38

SLØPE = -0.0178

DUPØNT - EAST CHICAGØ
MW-11
TEST 1



K (CM/S) = 0.003564

WELL SPECS. (FEET)

SCREEN LENGTH = 10.0

WELL SCREEN/BORE RADIUS = 0.17

WELL CASING RADIUS = 0.17

AQUIFER THICKNESS = 30.5

H (FEET) = 30.50

COEFFICIENTS

A = 0.00

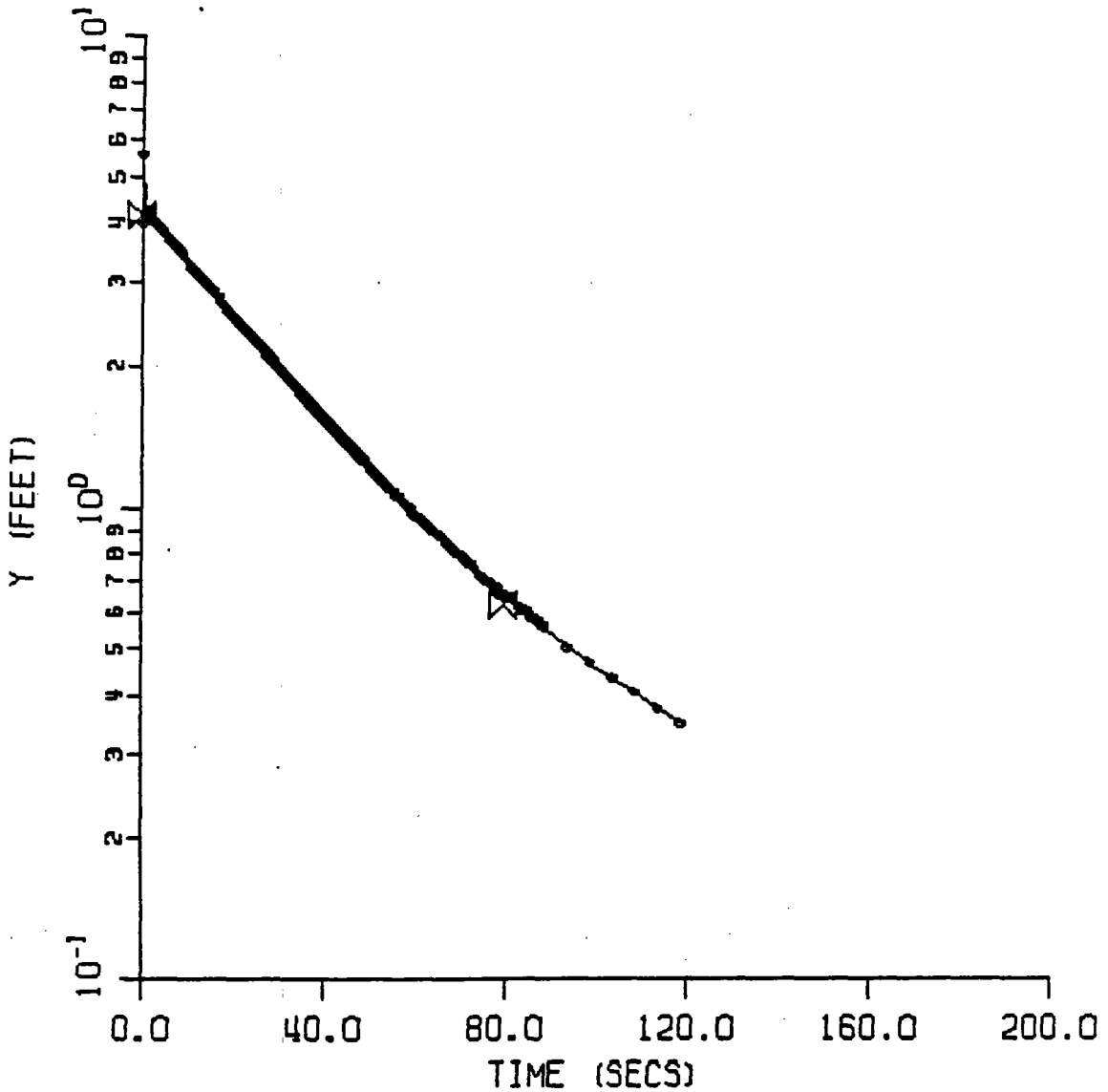
B = 0.00

C = 2.94

Y-INTERCEPT = 4.02

SLØPE = -0.0095

DUPØNT - EAST CHICAGØ
MW-11
TEST 2



K (CM/S) = 0.003851

WELL SPECS. (FEET)

SCREEN LENGTH = 10.0

WELL SCREEN/BØRE RADIUS = 0.17

WELL CASING RADIUS = 0.17

AQUIFER THICKNESS = 30.5

H (FEET) = 30.50

COEFFICIENTS

A = 0.00

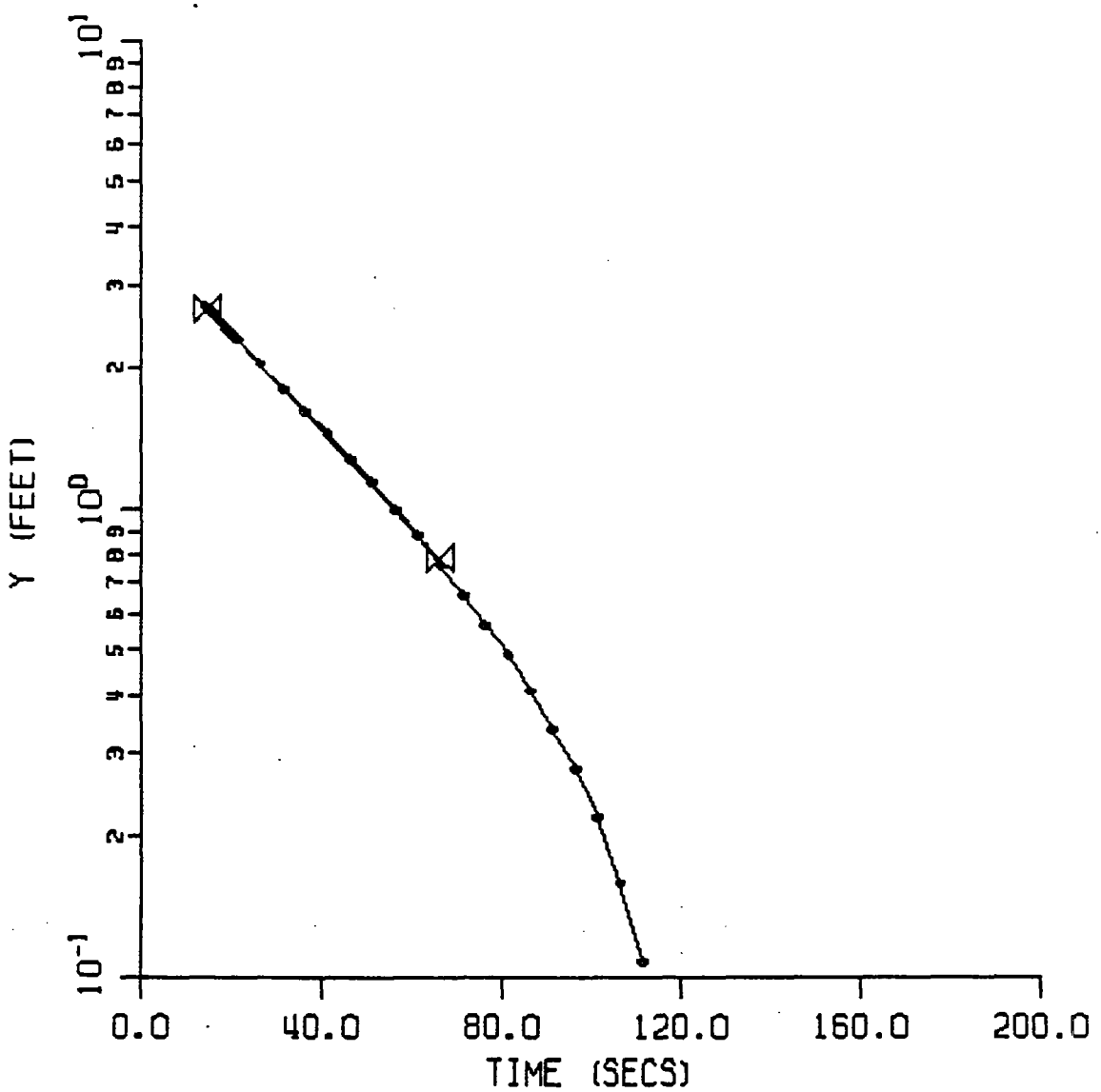
B = 0.00

C = 2.94

Y-INTERCEPT = 4.14

SLØPE = -0.0103

DUPØNT - EAST CHICAGØ
MW-13
TEST 1



K (CM/S) = 0.003724

WELL SPECS. (FEET)

SCREEN LENGTH = 10.0

WELL SCREEN/BORE RADIUS = 0.17

WELL CASING RADIUS = 0.17

AQUIFER THICKNESS = 24.0

H (FEET) = 24.00

COEFFICIENTS

A = 0.00

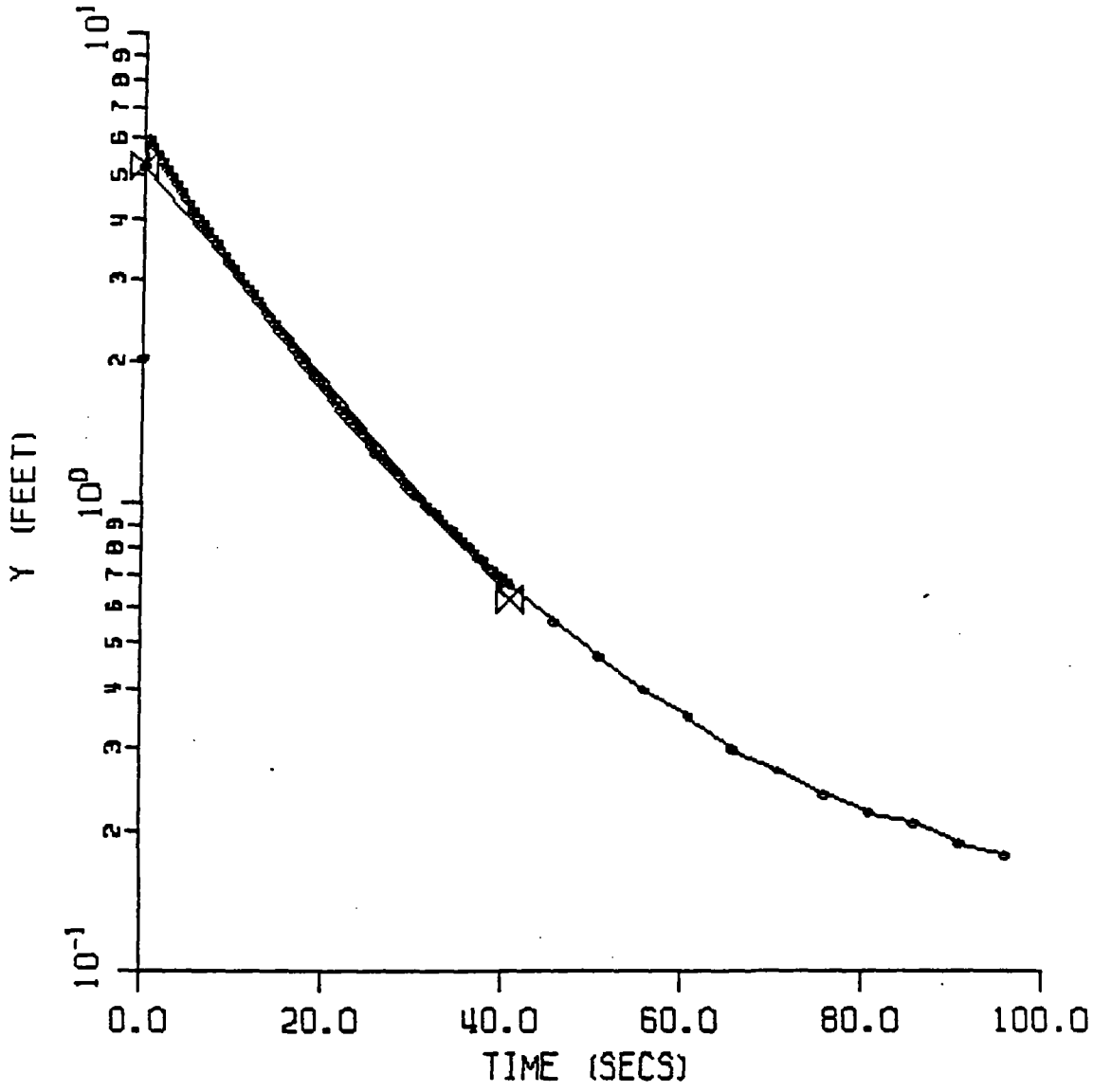
B = 0.00

C = 2.94

Y-INTERCEPT = 3.81

SLOPE = -0.0103

DUPONT - EAST CHICAGO
MW-15
TEST 1



K (CM/S) = 0.005483

WELL SPECS. (FEET)

SCREEN LENGTH = 15.0

WELL SCREEN/BORE RADIUS = 0.17

WELL CASING RADIUS = 0.17

AQUIFER THICKNESS = 22.5

H (FEET) = 22.50

COEFFICIENTS

A = 0.00

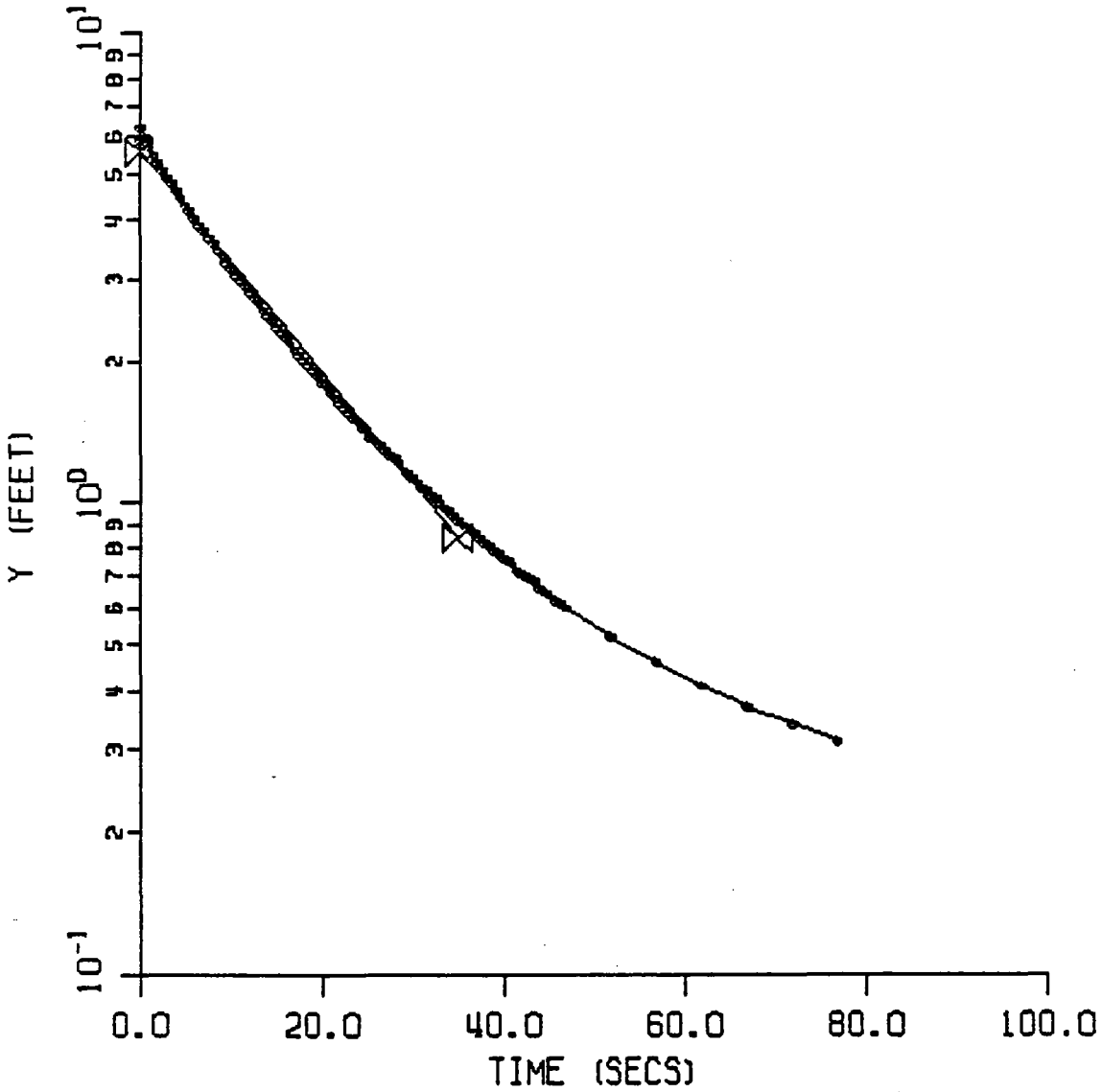
B = 0.00

C = 3.85

Y-INTERCEPT = 5.22

SLOPE = -0.0225

DUPONT - EAST CHICAGO
MW-15
TEST 2



K (CM/S) = 0.005716

WELL SPECS. (FEET)

SCREEN LENGTH = 15.0

WELL SCREEN/BORE RADIUS = 0.17

WELL CASING RADIUS = 0.17

AQUIFER THICKNESS = 22.5

H (FEET) = 22.50

COEFFICIENTS

A = 0.00

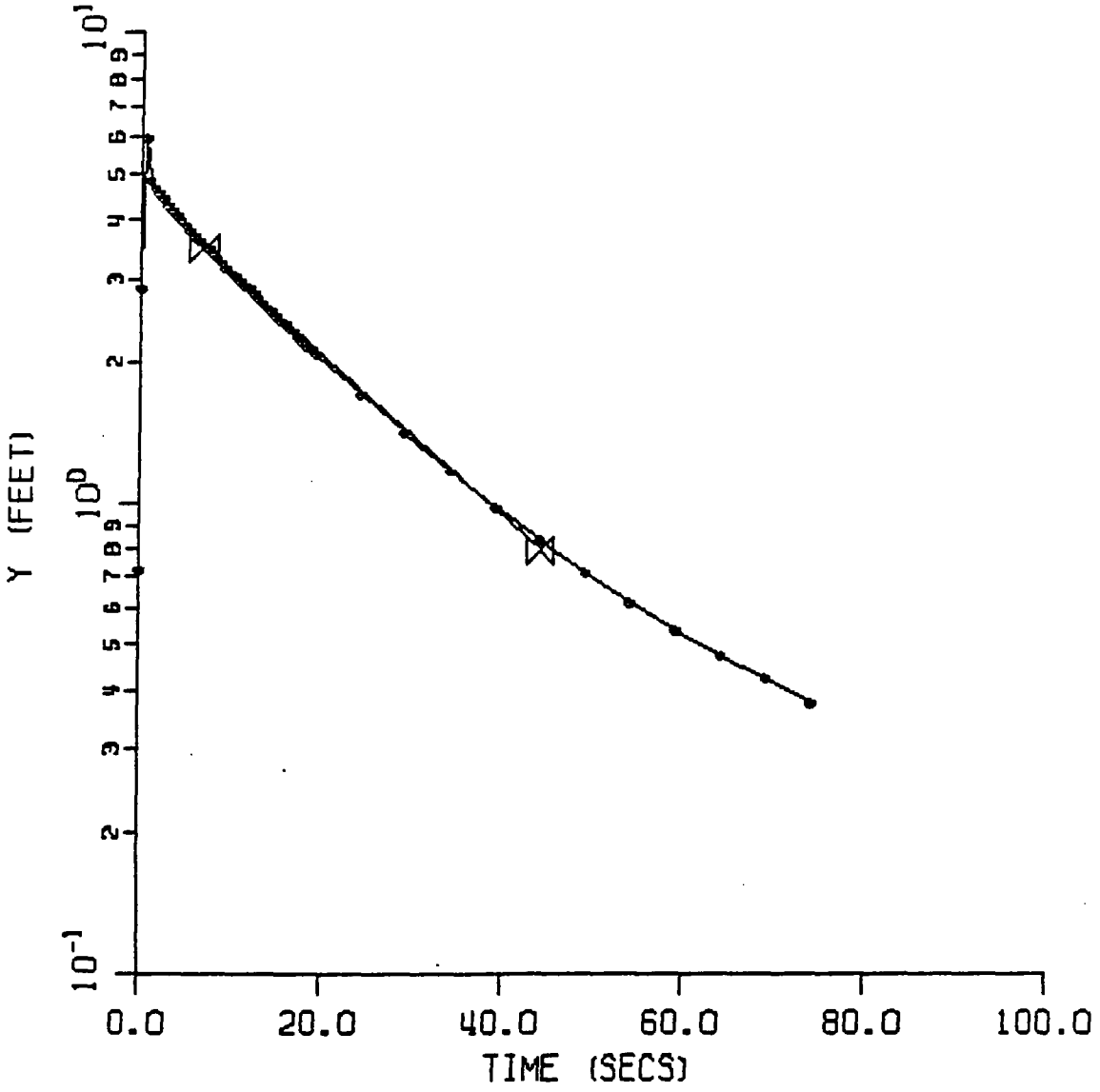
B = 0.00

C = 3.85

Y-INTERCEPT = 5.59

SLOPE = -0.0235

DUPØNT - EAST CHICAGØ
MW-16
TEST 1



K (CM/S) = 0.004315

WELL SPECS. (FEET)

SCREEN LENGTH = 15.0

WELL SCREEN/BØRE RADIUS = 0.17

WELL CASING RADIUS = 0.17

AQUIFER THICKNESS = 29.5

H (FEET) = 29.50

COEFFICIENTS

A = 0.00

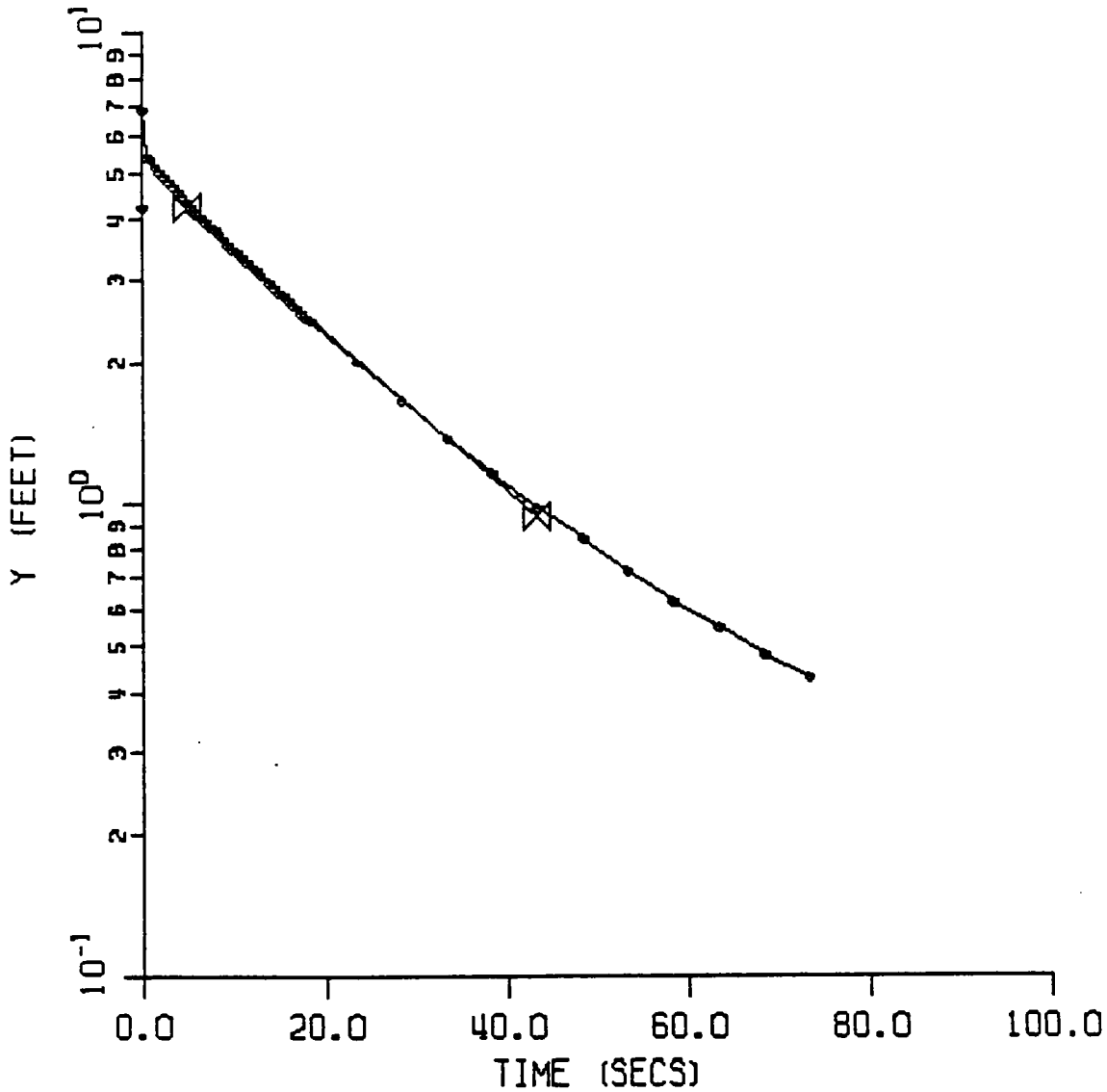
B = 0.00

C = 3.85

Y-INTERCEPT = 4.56

SLØPE = -0.0170

DUPØNT - EAST CHICAGØ
MW-16
TEST 2



K (CM/S) = 0.004332

WELL SPECS. (FEET)

SCREEN LENGTH = 15.0

WELL SCREEN/BØRE RADIUS = 0.17

WELL CASING RADIUS = 0.17

AQUIFER THICKNESS = 29.5

H (FEET) = 29.50

CØEFFICIENTS

A = 0.00

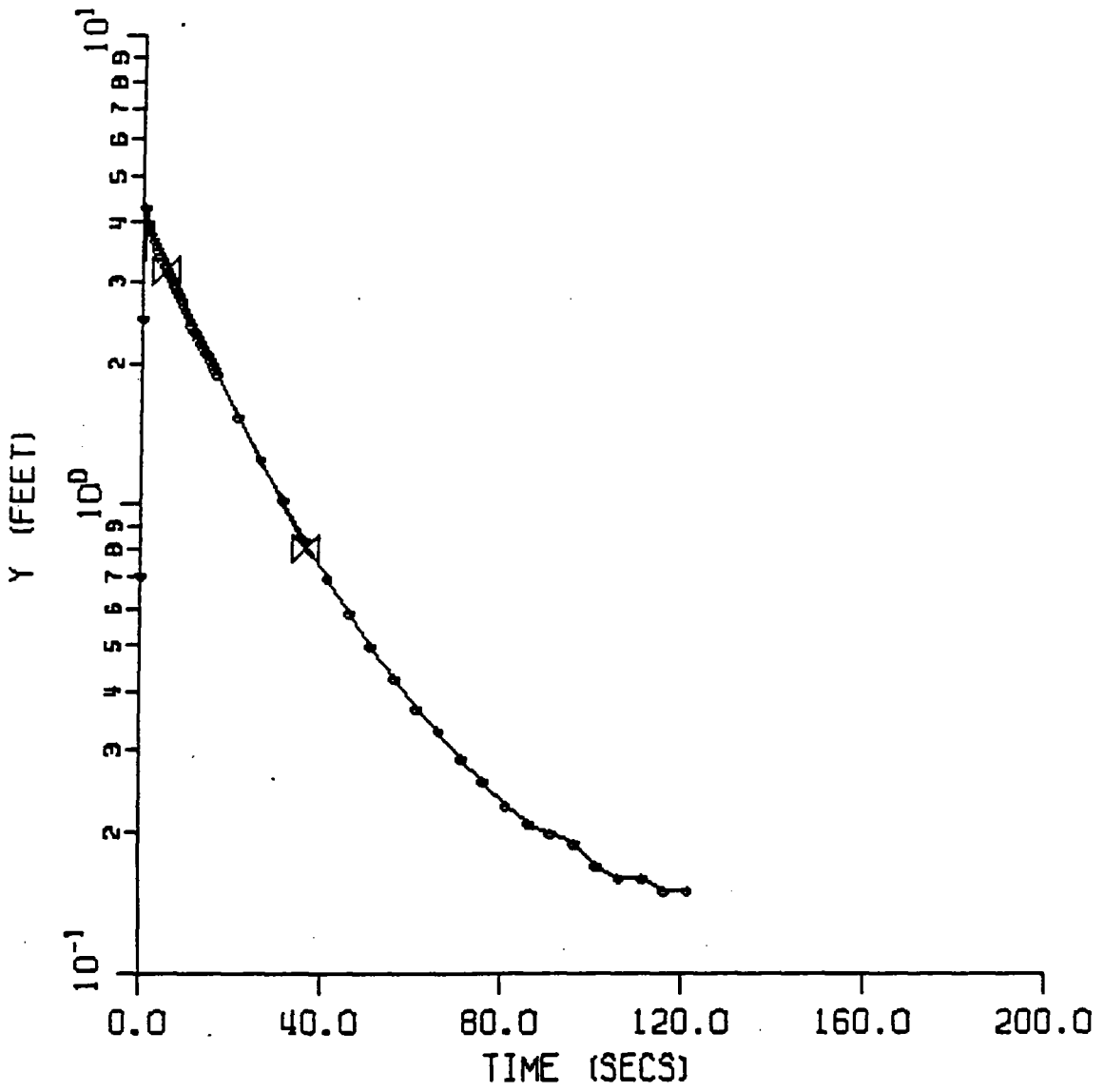
B = 0.00

C = 3.85

Y-INTERCEPT = 5.14

SLØPE = -0.0170

DUPONT - EAST CHICAGO
MW-18
TEST 1



K (CM/S) = 0.004781

WELL SPECS. (FEET)

SCREEN LENGTH = 15.0

WELL SCREEN/BORE RADIUS = 0.17

WELL CASING RADIUS = 0.17

AQUIFER THICKNESS = 29.5

H (FEET) = 29.50

COEFFICIENTS

A = 0.00

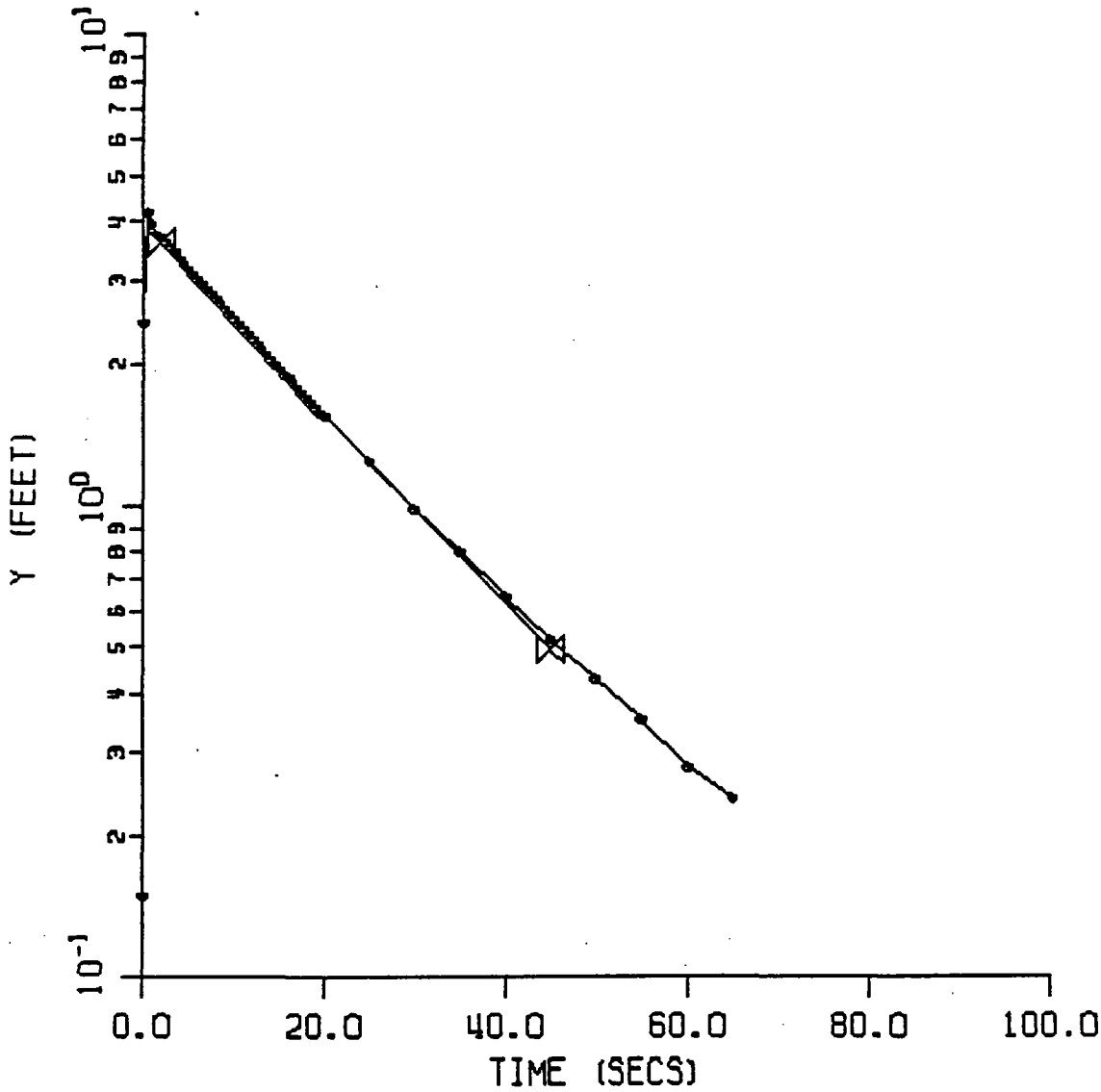
B = 0.00

C = 3.85

Y-INTERCEPT = 3.93

SLOPE = -0.0188

DUPØNT - EAST CHICAGØ
MW-18
TEST 2



K (CM/S) = 0.005092

WELL SPECS. (FEET)

SCREEN LENGTH = 15.0

WELL SCREEN/BØRE RADIUS = 0.17

WELL CASING RADIUS = 0.17

AQUIFER THICKNESS = 29.5

H (FEET) = 29.50

COEFFICIENTS

A = 0.00

B = 0.00

C = 3.85

Y-INTERCEPT = 3.94

SLØPE = -0.0200

Appendix B

SOIL BORING LOGS

Appendix B Contents.

o Soil Boring Logs: MW-4 through MW-20

CH2M HILL

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-4 SHEET 1 OF 1

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION South Boundary of Site
ELEVATION ~ 587.46' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT Mobile B-61 Truck Mount Rig, 6 1/4" ID HSA with Knock-out Plugs
WATER LEVEL AND DATE START 5/25/90 FINISH LOGGER C. Cruciani

DEPTH BELOW SURFACE (FT)	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0						Blind drilled: log completed using cuttings and drilling progress observations HNu BG = .2 ppm TOX = 0 LEL 0% 0_2 20.8% BH = "Borehole"
		GRB			Red Bricks, Misc. Fill	Fill, red bricks, etc. 0800 HNu BH = BG TOX BE = BG
5						0810 HNu BH = BG LEL = BG
		GRB			V. FINE GRAINED SILTY SAND, grey, wet, med. dense, SM	0831 HNu BH = BG HNu cuttings = BG TOX BH = BG TOX cuttings = BG
10						
		GRB			V. FINE GRAINED, POORLY GRADED SAND, wet, grey, tr. silt, dense, SP	
15						
		GRB			FINE GRAINED, POORLY GRADED SAND, tr. silt, saturated, grey, dense (like a slurry when it comes out of a hole), SP	Slight rotten egg odor from cuttings TOX BH, breathing = BG
20						0846 HNu BH = BG TOX BH = BG TOX breathing = BG
25						0900 Augers to 30 feet, HNu stopped working
30		GRB			AS ABOVE	End of boring @ 30' Clay not intercepted

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-5 SHEET 1 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Southern Boundary of Site
ELEVATION ~587.79' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT ATV Rig CME-55, 6 1/4" ID hollow stem augers, 140 lb. hammer
WATER LEVEL AND DATE START 5/21/90 FINISH 5/22/90 LOGGER M.K.Dwyer

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0						
5	4-6	S1	1.4	1-1-1-1 (2)	4.6-5 SANDY GRAVEL, GP, red brown, wet, very loose, soft; 5-6 SILTY CLAY, CL, greyish-black, wet, very loose, soft (unders)	HNu = 0 ppm (hole) Explo = 0% LEL 20.8% O_2 H_2S = 0 ppm HNu = 0 ppm (sample)
10	9-11	S2	1.3	1-1-1-1 (2)	CLAYEY SILT & F.G. SAND, ML, medium grey, moist, very loose, soft, Alt. layers of silt and sand (6" spacing)	HNu = 0 ppm (sample) HNu = 0 ppm (hole) Explo = 0% LEL 20.8% O_2 H_2S = 0 ppm
15	14-16	S3	1.8	3-2-2-2 (4)	FINE GRAINED SAND, SP, grey-brown, well-sorted, wet, very loose, soft, no structure, homogeneous, angular, red cinder fragments	HNu = 0 ppm (sample) End for day 5/21/90
20	19-21	S4	1.8	2-2-2-4 (4)	FINE GRAINED SAND, SP, grey-brown, well sorted, wet, very loose, soft, homogeneous	Begin 5/22/90 HNu = 0 ppm (sample) HNu = 0 ppm (hole) Explo = 20.8% O_2 0% LEL H_2S = 0 ppm
25	24-26	S5	1.9	6-6-6-7 (12)	FINE GRAINED SAND, some medium sand, trace coarse sand, SW, grey-brown, poorly sorted, wet, medium, stiff, trace org. fragments	HNu = 0 ppm (sample)
30	29-31	S6	2.0	4-4-4-6	29-30.6 AS ABOVE, SW	

CH2M HILL

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-5 SHEET 2 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Southern Boundary of Site

ELEVATION ~587.79' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL

DRILLING METHOD AND EQUIPMENT ATV Rig CME-55, 6¼" ID hollow stem augers, 140 lb. hammer

WATER LEVEL AND DATE _____ START 5/21/90 FINISH 5/22/90 LOGGER M.K.Dwyer

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30	31	S6	2.0	(8)	AS ABOVE	HNu = 0 ppm (sample)
					30.6-31 CL, grey, moist, loose, medium	HNu = 0 ppm (hole) Explo = 0 LEL 20.8% O_2 H_2S = 0 ppm
35	34-36	S7	1.6	6-6-7-10 (13)	AS ABOVE, CL	HNu = 0 ppm 12:20 pm
					End of boring at 36'	

CH2M HILL

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-6 SHEET 1 OF 1

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION South Portion of Site, N. of Woods
ELEVATION ~586.77' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT ATV Rig CME-55, 6 1/4" ID hollow stem augers
WATER LEVEL AND DATE Surface START 5/24/90 FINISH 5/24/90 LOGGER M.K.Dwyer

DEPTH BELOW SURFACE (FT)	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0		GRB			0-8' ORGANIC PEAT	Blind drilled: log completed using cuttings & drilling progress observations HNu = 0 ppm LEL HNu = 0 ppm (soil) Explo = 20.8% O_2 0% LEL H_2S = 0 ppm
5						
		GRB			LIGHT BROWN FINE SAND, SP, wet, very loose, soft	
10						
15						
20		GRB			AS ABOVE, SP	HNu = 0 ppm (hole) HNu = 0 ppm (soil) Explo = 20.8% O_2 > 0% LEL H_2S = 0 ppm
		GRB			FINE SAND, becoming siltier towards bottom of hole @ 26', SW-SM	
25						
		GRB			SILTY CLAY, grey-black, CL-ML	Clay observed on augers at depth 28' HNu = 0 ppm (soil)
30					End of boring at 29'5"	

CH2M HILL

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-7 SHEET 1 OF 1

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Southeast Corner of Site

ELEVATION ~ 582.82' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL

DRILLING METHOD AND EQUIPMENT ATV Rig CME-55, 6 1/4" ID hollow stem augers

WATER LEVEL AND DATE _____ START 5/29/90 FINISH 5/29/90 LOGGER M.K.Dwyer

DEPTH BELOW SURFACE (FT)	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0		GRB			0-2' ORGANIC PEAT	Blind drilled: log completed using cuttings and drilling progress observations HNu = 0.2 ppm (background) Explo = 20.8% 0_2 0% LEL H_2S = 0 ppm HNu = 0 ppm (soil)
		GRB			SP, wet, very loose, soft, well-sorted, homogeneous	
5						
10						
15						
20		GRB			FINE GRAINED SAND, SP, medium-brown, trace silt	
25						
		GRB			SILTY CLAY, grey, CL-ML	Clay observed on augers at 27' HNu = 2-3 ppm (in hole) HNu > 1 ppm (breathing zone) Explo = 20.8% 0_2 0% LEL H_2S = 0 ppm
30					End boring at 29.5'	

CH2M HILL

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-8 SHEET 1 OF 1

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Northeast Portion of Site
ELEVATION ~587.79' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT ATV Rig CME-55, 6 1/4" ID hollow stem augers, 10 1/2" bit
WATER LEVEL AND DATE START 5/30/90 FINISH 5/30/90 LOGGER M.K.Dwyer

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0		GRB			FINE GRAINED SAND, SP, medium, brown, wet, very loose, soft, well-sorted, homogeneous	Blind drilled: log completed using cuttings and drilling progress observations HNu = 0.5 ppm (hole) HNu = 0 ppm (soil) Explo = 20.8% 0_2 0% LEL H_2S = 0 ppm
5						
10						
15						
20						HNu = 0.8 ppm (hole) HNu = 0 ppm (soil) Explo - 20.8% 0_2 0% LEL H_2S = 0 ppm
		GRB			FINE SAND, becoming siltier, SP (trace silt) @ 26-27'	
25						
		GRB			SILTY SAND, grey, SM	
30					End of boring at 29.5'	No clay intercepted

CH2M HILL

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-9 SHEET 1 OF 1

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Northeast Portion of Site
ELEVATION ~ 587.16' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT ATV Rig CME-55, 6 1/4" ID hollow stem augers, 10 1/2" bit
WATER LEVEL AND DATE _____ START 5/30/90 FINISH 5/30/90 LOGGER M.K.Dwyer

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0	0-1	GRB			ORGANIC PEAT, grey-black	Blind drilled: log completed using cuttings and drilling progress observations
		GRB			FINE GRAINED SAND, SP, medium brown, wet, very loose, soft, well-sorted, homogeneous	HNu = 0 ppm (hole, soil) Explo = 20.8% 0_2 0% LEL H_2S = 0 ppm
5						
10						
15		GRB			AS ABOVE, SP	HNu = 0 ppm (hole, soil) Explo = 20.8% 0_2, 0% LEL H_2S = 0 ppm Collect soil sample @ 15-20'
20						
25						
		GRB			28' SILTY SAND, grey, SM	No clay intercepted
30					End of boring at 29.5'	

CH2M HILL

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-10 SHEET 1 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Northern Boundary of Site
ELEVATION ~587.84' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT ATV Rig CME-55, 6 1/4" ID hollow stem augers, 10 1/2" bit
WATER LEVEL AND DATE START 5/31/90 FINISH 5/31/90 LOGGER M.K.Dwyer

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0	0-1	GRB GRB			0-10' FILL Dark brown cinders and gravel in sand/silt matrix	Blind drilled: log completed using cuttings and drilling progress observations HNu = 0 ppm (hole, fill) Explo = 20.8% 0_2 0% LEL H_2S = 0 ppm
5						
10		GRB			FINE GRAINED SAND, SP, medium brown, well-sorted, wet, very loose, soft, homogeneous (comprised of well-rounded quartz), trace coarse sand	HNu = 0.6 ppm (at 15')
15						
20		GRB			AS ABOVE, SP	
25						No silt HNu = 0.8 ppm (at 28') Explo = 20.8% 0% LEL
30						

CH2M HILL

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-10 SHEET 2 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Northern Boundary of Site
ELEVATION ~ 587.84' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT ATV Rig CME-55, 6 1/4" ID hollow stem augers, 10 1/2" bit
WATER LEVEL AND DATE START 5/31/90 FINISH 5/31/90 LOGGER M.K.Dwyer

DEPTH BELOW SURFACE (FT)	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30		GRB			FINE GRAINED SAND, SP, medium brown, well-sorted, trace of sand	
		GRB			SILTY CLAY, grey-black, CL-ML	HNu = 0.2 ppm (hole)
35					End of boring at 34'	

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-11 SHEET 1 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Northwest Corner of Site
ELEVATION ~587.62' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT ATV 6 1/4" ID Hollow Stem Augers
WATER LEVEL AND DATE ~5' START 6/12/90 FINISH 6/13/90 LOGGER L. Weyer

DEPTH BELOW SURFACE (FT)	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0		GRB			TOPSOIL, dark grey-brown, fine sand, wet below 5'	Blind drilled: log completed using cuttings and drilling progress observations
						∇ approximate
5						
10		GRB			Poorly graded fine to med. SAND, SP	
15						
20						
		GRB			AS ABOVE, SP	
25						
30						

CH2M HILL

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-11 SHEET 2 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Northwest Corner of Site
ELEVATION ~ 587.62' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT ATV 6 1/4" ID Hollow Stem Augers
WATER LEVEL AND DATE ~5' START 6/12/90 FINISH 6/13/90 LOGGER L. Weyer

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30		GRB			AS ABOVE, SP	Clay observed on augers at depth of 31'
		GRB			Silty CLAY, grey, CL-ML	
35					End boring @ 34'	

CHMHILL

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-12 SHEET 1 OF 1

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION North of Guard Shacks Along Kennedy Ave.
ELEVATION ~587.70' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT Mobile B-61 Truck Mount Rig, 6 1/4" ID HSA
WATER LEVEL AND DATE _____ START 5/29/90 FINISH 5/29/90 LOGGER C. Cruciani

DEPTH BELOW SURFACE (FT)	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0						HNu BG = 1 ppm LEL = 0 TOX = 0 = H_2S 0_2 = 20.8
		GRB			FILL, coarse, angular, gravel & pebbles, black, saturated	No split spoon samples. Cuttings logged knock-out plugs used due to sand blow-in 0905 HNu Borehole = BG TOX = BG LEL = BG 0_2 = BG
		GRB			V. FINE-GRAINED, POORLY GRADED SAND, trace silt, dk. brown to black, wet, loose to med. dense, SP	
5						0910 HNu breathing = BG TOX = BG LEL = BG 0_2 = BG
		GRB			Lighter in color with depth (grey to dk. grey)	
10						
						0920 HNu breathing = BG TOX = BG LEL = BG 0_2 = BG
15						
		GRB			SAND, trace SILT, SP, grey, wet, med. dense	0930 HNu breathing = BG LEL = BG 0_2 = BG 0935 HNu borehole = BG HNu breathing = BG
20						
25						
						Driller thinks he may have hit clay at 29'. We will drill to 32', knock out plug to set well, pull back if possible.
30		GRB			CLAY, grey, wet, soft, v. plastic, tr. sand, CL	Confirmed when augers pulled up Clay at 29'

CH2M HILL

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-13 SHEET 1 OF 1

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Southwest Corner of Site Near Settling Pit
ELEVATION ~586.46' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT Mobile Drill B61, 6 1/4" HSA with Center Plug
WATER LEVEL AND DATE _____ START 5/22/90 FINISH 5/22/90 LOGGER C. Cruciani

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0						HNu BG = 0.5 ppm LEL = 22% TOX = 0
	3-5	1	1.2	5-4-3-2	FILL, cobbles, silty sand, silt, red brick?	HNu sample = BG 0820 HNu borehole = BG
5						0832 HNU BH = BG LEL = <1 0_2 = 22% TOX = 0
	8-10	2	1.0	1/24"	PEAT, dk. brown to black, moist to wet, OL	HNu sample = BG TOX = 0
10						
	13-15	3	1.8	0-3/24"	AS ABOVE, 1 sand seam 10" from bottom of sample, v. poorly graded, v. fine sand, tr. silt, SP, lt. grey, wet, OL	Sample rod sank 6" without being pushed HNu sample = BG
15						
	18-20	4	1.4	1-5-8-9	V. FINE SILTY SAND, poorly graded, wet, dense, dk. brown, SM	0900 HNu BH = BG 0925 HNu sample = BG
20						
	23-25	5	0.5	3-1-5-6	NO RECOVERY — pushed spoon with hydraulics to get sample 2nd attempt. AS ABOVE, SM	HNu sample = BG Using hydraulics to push spoon down
25						
	28-30	6	2.0	2-2-4-6	1' AS ABOVE, SM, grain size of sand 28-29' 1' CLAY, v. plastic, tr. sand, wet, soft, grain size of clay 29-30', CL	1040 HNu sample = BG No evidence of product above clay
30						

End of boring @ 30'

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-14 SHEET 1 OF 1

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Sourthern Boundary of Site
ELEVATION ~588.38' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT 6 1/4" HSA and Mobile Drill B-61 Truck Mount
WATER LEVEL AND DATE _____ START 5/23/90 FINISH 5/23/90 LOGGER M.K.Dwyer C. Cruciani

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0						HNu = 0 ppm Explo = 20.8% 0_2 0% LEL H_2S = 0 ppm
	3-5	S1	0.9	1-1-2-1 (3)	FINE GRAINED SAND, SP, light brown, well-sorted, wet (added water to hole), very loose, soft, homogeneous	
5						
	8-10	S2	1.2	1-/12-6-10 (7)	FINE GRAINED SAND, trace medium sand, SP; light brown, well-sorted, wet, loose, medium, homogeneous, trace organics	HNu = 0 ppm (hole) Explo = 20.8% 0% LEL H_2S = 0 ppm HNu = 0 ppm (sample)
10						
	13-15	S3	1.4	3-17-20-29 (37)	V. FINE GRAINED, poorly graded SILTY SAND, SM, lt. brown to buff with layers of black, organic ? material	
15						
20						HNu borehole = BG TOX borehole = BG LEL borehole = BG HNu borehole = BG TOX borehole = 0 LEL borehole = 0
25						Blind drilled
30		S4		2-8-12-20	V. FINE GRAINED SAND AND SILT, poorly graded, SM, lt. brown to buff or tan	End boring @ 30'

CH2M HILL

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-15 SHEET 1 OF 1

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Southern Boundary of Site North of River
ELEVATION ~590.45' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT 6 1/4" HSA with Knock-out Plugs
WATER LEVEL AND DATE START 5/24/90 FINISH 5/24/90 LOGGER C. Cruciani

DEPTH BELOW SURFACE (FT)	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0		GRB			SANDY SILT, dk. brown to black, dry, slightly dense, ML	0925 HNu BG = 1 ppm with rig running Blind drilled: log completed using cuttings and drilling progress observations
		GRB			AS ABOVE, tr. black clay, ML	
5		GRB			SAND WITH SILT, sand v. fine, buff, dry, loose to med. dense, SW	
		GRB		Color change	8' SILTY, V. FINE SAND, wet, SM, tan to orange, med. dense 10' SILTY SAND, dk. brown, wet, med. dense, sand v. fine, SM, tr. clay	HNu BH = BG LEL = 0% Some "balls" as cuttings
10						
						13' HNu BH = BG
15						
		GRB			V. FINE, POORLY GRADED SAND, SP dk. brown, tr. silt, wet	HNu BH = BG TOX BH = 0 Saturated, sloppy cuttings
20					More light brown to tan with depth	
25						
		GRB			AS ABOVE, SP	
30						Had drillers stop at 30'. No clay encountered.

CH2M HILL

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-16 SHEET 1 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Southwest Boundary of Zinc Area
ELEVATION ~588.61' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT Mobile B-61 Truck Mount Rig, 6 1/4" ID HSA
WATER LEVEL AND DATE _____ START 5/31/90 FINISH 5/31/90 LOGGER P. Newman

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0		GRB			SAND WITH SOME SILT, SM, fine, dark brown to black, dry, loose SAND WITH SILT,SM, fine beds of light brown & brown/black, dry	Blind drilled: log completed using cuttings and drilling progress observations No HNu deflections
		GRB			SAND WITH SILT, SP, fine, light brown to yellow	Saturation @ 6' no HNu deflections
5						
10						
		GRB			SAND WITH SILT, SP, fine, light grey	
15						
20		GRB			AS ABOVE, SP	No HNU deflections
25		GRB			AS ABOVE, SP	
30		GRB			AS ABOVE, SP	

CH2M HILL

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-16 SHEET 2 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Southwest Boundary of Zinc Area
ELEVATION ~ 588.61' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT Mobile B-61 Truck Mount Rig, 6 1/4" ID HSA
WATER LEVEL AND DATE START 5/31/90 FINISH 5/31/90 LOGGER P. Newman

DEPTH BELOW SURFACE (FT)	SAMPLE			STANDARD PENETRATION TEST RESULTS	SOIL DESCRIPTION	COMMENTS
	INTERVAL	TYPE AND NUMBER	RECOVERY (FT)	6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30					AS ABOVE, SP	Clay not encountered
					End soil boring @ 32'	

CH2M HILL

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-17 SHEET 1 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Southeast Boundary of Zinc Area
ELEVATION ~ 588.96' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT 6 1/4" HSA with Mobile Drill B-61 Truck Mount Rig
WATER LEVEL AND DATE START 5/30/90 FINISH 5/30/90 LOGGER C. Cruciani

DEPTH BELOW SURFACE (FT)	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0						0730 HNu BG = 0.7 ppm TOX BG = 0 ppm = H_2S
		GRB			FILL, silty sand, pebbles (angular)	LEL = 0% 0_2 = 20.8% Breathing Borehole 0735 TOX = BG HNu = BG LEL = BG 0_2 = 20.8
5		GRB			5' SAND, moist, buff, med. gr., poorly graded, trace black discoloration, SP	Blind drilled: log completed using cuttings and drilling progress observations
		GRB			SAND, AS ABOVE, except orange to tan, wet, v. fine gr. to fine gr., tr. to little silt, SP	BH, Breathing 0740 TOX = BG HNu = BG LEL = BG 0_2 = 20.8%
10						0745, borehole, breathing TOX = BG HNu = BG LEL = BG 0_2 = 20.8%
15		GRB			AS ABOVE, SP (cuttings)	0750, borehole, breathing TOX = BG HNu = BG LEL = BG O_2 = 20.8%
20						
25						0755 borehole, breathing TOX = BG HNu = BG LEL = BG 0_2 = 20.8%
		GRB			AS ABOVE, SP	Possibly "different" drilling here. Not su 0810 BG reading from borehole all parameters
30						

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-17 SHEET 2 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Southeast Boundary of Zinc Area

ELEVATION ~588.96' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL

DRILLING METHOD AND EQUIPMENT 6 1/4" HSA with Mobile Drill B-61 Truck Mount Rig

WATER LEVEL AND DATE START 5/30/90 FINISH 5/30/90 LOGGER C. Cruciani

DEPTH BELOW SURFACE (FT)	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30					AS ABOVE, SP	Clay? Harder drilling
					CLAY, grey, CL	Clay visible on augers from approximately 32' depth
					End boring @ 33'	
35						

CH2M HILL

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-18 SHEET 1 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION South of Landfill
ELEVATION ~590.02' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT ATV Rig CME 55, 6 1/4" HSA
WATER LEVEL AND DATE START 6/13/90 FINISH 6/13/90 LOGGER L. Weyer

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0		GRB			SAND with some silt, fine-med. grained, SP, grey-brown	Blind drilled: log completed using cuttings and drilling progress observations
5						
10						
15		GRB			AS ABOVE, SP	
20						
25						
30		GRB			AS ABOVE, SP	

CH2M HILL

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-18 SHEET 2 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION South of Landfill

ELEVATION ~ 590.02' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL

DRILLING METHOD AND EQUIPMENT ATV Rig CME 55, 6 1/4" HSA

WATER LEVEL AND DATE _____ START 6/13/90 FINISH 6/13/90 LOGGER L. Weyer

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30		GRB			AS ABOVE, SP	Clay visible on augers at 32'
		GRB			CLAY, grey, wet, soft	
					End boring @ 33'	
35						

CH2M HILL

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-19 SHEET 1 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION South of Insecticide Area
ELEVATION ~ 589.26' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT Mobile B-61 Truck Mount Rig, 6 1/4" ID HSA, 10 1/2" bit
WATER LEVEL AND DATE ~ 5' START 5/31/90 FINISH 5/31/90 LOGGER P. Newman

DEPTH BELOW SURFACE (FT)	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0						Start drilling @ 13:30 Blind drilled: log completed using cuttings and drillings progress observations
		GRB			SILT WITH SAND, ML, dark brown to black, soft, dry	No HNu deflection
		GRB			SAND WITH SILT, SM, fine, dark brown with seams of light brown	
5						
		GRB			AS ABOVE, SP, yellow to light brown, wet	Saturation @ 5' No HNu deflection
10		GRB			AS ABOVE, SP, dark brown, flowing, increased silt content	
15		GRB			AS ABOVE, SP	
20		GRB			AS ABOVE, SP	
25		GRB			AS ABOVE, SP	No HNu deflection
30		GRB			AS ABOVE, SP	

CH2M HILL

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-19 SHEET 2 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION South of Insecticide Area
ELEVATION ~ 589.26' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT Mobile B-61 Truck Mount Rig, 6 1/4" ID HSA, 10 1/2" bit
WATER LEVEL AND DATE START 5/31/90 FINISH 5/31/90 LOGGER P. Newman

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30					AS ABOVE, SP	HNu = 0 ppm (hole) Explo = 20.8% 0_2 0% LEL H_2S = 0 ppm No clay intercepted
					End of boring @ 33'	

CH2M HILL

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-20 SHEET 1 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Process Area
ELEVATION ~590.20' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL
DRILLING METHOD AND EQUIPMENT Mobile Rig CME55
WATER LEVEL AND DATE ~5' START 6/11/90 FINISH 6/12/90 LOGGER L. Weyer

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0		GRB			Coarse dark grey gravel, fill	HNu BG (~0.2 ppm) Blind drilled: log completed using cuttings and drilling progress observations
5		GRB			FILL, black, wet	
10		GRB			Fine to medium wet SAND, dark grey-brown, SP	HNu = BG
15						
20						
25		GRB			AS ABOVE, SP	
30						

CH2M HILL

PROJECT NUMBER	BORING NUMBER
CHI 28770.A0.DR	MW-20 SHEET 2 OF 2

SOIL BORING LOG

PROJECT DuPont-East Chicago LOCATION Process Area

ELEVATION ~590.20' DRILLING CONTRACTOR Fox Drilling Inc., Itasca, IL

DRILLING METHOD AND EQUIPMENT Mobile Rig CME55

WATER LEVEL AND DATE ~5' START 6/11/90 FINISH 6/12/90 LOGGER L. Weyer

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY,	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30						
		GRB			AS ABOVE, SP	HNu = BG
		GRB			CLAY, grey, wet, CL	Trace clay on drill bit at 32'
					End boring @ 33'	
35						

Appendix C

GRAIN SIZE ANALYSES

Appendix C Contents

- o Discussion

  - Table C-1, Lab and Field Classification of Grain Size

- o Letter from Schleede Hampton Associates, August 30, 1990, listing sample classification

- o Letter from Schleede Hampton Associates, June 29, 1990, including sieve grain size analyses

Appendix C

DISCUSSION

Seven soil samples from four monitoring well borings and one soil boring were sent to Schleede Hampton Associates, Inc. for grain size analysis. Each sample was analyzed according to the Standard Methods for Particle Size Analysis of Soils ASTM D-442, including hydrometer for silts and clays. The data from the grain size testing were classified with the ASTM D-2487 (laboratory) and ASTM D-2488 (visual/field) methods.

Laboratory classifications correspond well with those made in the field (Table C-1). The sampling sites are distributed around the Du Pont facility, and show that the top 25 or more feet of unconsolidated sediment is poorly graded sand with a trace of silt. Beneath the sand is a silty clay with a trace of sand.

CHI184/019.51

Table C-1 LAB AND FIELD CLASSIFICATION OF GRAIN SIZE			
Location	Depth (ft)	Lab Analysis	Field Classification
SB-1	36	Silty CLAY, little Sand, trace Gravel, CL*	NA
MW-5	15	SAND, trace Silt, SP-SM	Fine grained Sand, SP
	35	Silty CLAY, trace Sand, CL*	Clay, CL
MW-9	17.5	SAND, trace Silt, SP-SM	Find grained Sand, SP
MW-13	27	SAND, trace Silt, SP-SM	V.Fine Sand, SM
	29.5	Sandy Silty CLAY, little Sand, trace Gravel, CL-ML*	Clay, CL
MW-19	19	SAND, trace Silt, SP-SM	Sand with Silt, SP

Notes:

* Plasticity Index was estimated from visual manual procedures conducted on sample. Atterberg Limit determination was not requested.

File: TAB C-1

SCHLEEDE HAMPTON ASSOCIATES INC
CONSULTING ENGINEERS

August 30, 1990
Ms. CindyCiuciani
CH2M Hill
310 W. Wisconsin Avenue, Suite 700
Milwaukee, Wisconsin 53201

Re: Laboratory Analsis
Fox Lab Testing
SHA File No. 40265

Dear Cindy:

As requested, we have conducted additional analysis on the samples submitted to our laboratory by Fox Drilling Company

The following is a summary of the requested analyses:

Boring No.	Sample No.	Depth	Classification
SB-I	Bulk	36'	Silty CLAY, little Sand, trace Gravel, CL*
MW-9	Bulk	17.5'	SAND, trace Silt, SP-SM
MW-5	S-7	35'	Silty CLAY, trace Sand, CL*
MW-5	S-3	15'	SAND, trace Silt, SP-SM
MW-19	Bulk	19'	SAND, trace Silt, SP-SM
MW-13	S-6A	29.5'	SandySilty CLAY, little Sand, trace Gravel,
		CL - ML*	
MW-13	S-6	27'	SAND, trace Silt, SP-SM

* Plasticity Index was estimated from visual manual procedures conducted on sample. Atterberg Limit determination was not requested.

The classification was done in general accordance with ASTM D-2487 and D-2488 and modified as in the attached General Notes.

Thank you for the opportunity to be of service. If you have any questions, please do not hesitate to contact us.

Very truly yours,
SCHLEEDE-HAMPTON ASSOCIATES, INC.

William D. Prigge /dr

William D. Prigge, P.E.
Project Engineer

cc: Mr. Ben Fox, Fox Drilling Company

1601 NORTH BOND STREET SUITE 106
NAPERVILLE, ILLINOIS 60563 708-369-0710
FAX 708-369-1723

GENERAL NOTES

PARTICLE SIZE DESCRIPTION & TERMINOLOGY:

Coarse Grained or Granular Soils have more than 50% of their dry weight retained on a #200 sieve; they are described as: boulders, cobbles, gravel or sand. Fine Grained soils have less than 50% of their dry weight retained on a #200 sieve; they are described as: clays or clayey silts if they are cohesive and silts if they are non-cohesive. In addition to gradation, granular soils are defined on the basis of their relative in-place density and fine grained soils on the basis of their strength or consistency and their plasticity.

Major Component Of Sample	Size Range
Boulders	Over 8 in. (200mm)
Cobbles	8 inches to 3 inches (200mm to 75mm)
Gravel	3 inches to #4 sieve (75mm to 4.76mm)
Sand	#4 to #200 sieve (4.76mm to 0.074mm)
Silt	Passing #200 sieve (0.074mm to 0.005mm)
Clay	Smaller than 0.005mm

Descriptive Term Of Components Also Present in Sample	Percent Of Dry Weight
Trace	1 - 9
Little	10 - 19
Some	20 - 34
And	35 - 50

RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION

GRANULAR SOILS

DENSITY CLASSIFICATION	APPROXIMATE RANGE OF "N"*
Very Loose	0 - 3
Slightly Dense	4 - 9
Medium Dense	10 - 29
Dense	30 - 49
Very Dense	50 - 80
Extremely Dense	80+

COHESIVE SOILS

CONSISTENCY	UNCONFINED COMPRESSIVE STRENGTH. Qu-TSF	APPROPRIATE RANGE "N"
Very Soft	0.25	0 - 2
Soft	0.25 - 0.49	3 - 4
Medium (Firm)	0.30 - 0.99	5 - 8
Stiff	1.00 - 1.99	9 - 15
Very Stiff	2.00 - 3.99	16 - 30
Hard	4.00 - 8.00	31 - 50
Very Hard	8.00	Over 50

*STANDARD PENETRATION TEST (ASTM D1586) - A 2.0" outside-diameter, split barrel sampler is driven into undisturbed soil by means of a 140-pound weight falling freely through a vertical distance of 30 inches. The sampler is normally driven three successive 6-inch increments. The total number of blows required for the final 12 inches of penetration is the Standard Penetration Resistance (N).

SCHLEEDE HAMPTON ASSOCIATES INC

CONSULTING ENGINEERS

June 29, 1990

Mr. Ben Fox
Fox Drilling Company
500 Park Boulevard
Suite 1212
Itasca, Illinois 60143

Re: Laboratory Testing
CH2M Hill Project #CH128770.DR
for Fox Drilling Company
SHA File No. 40265

Dear Ben:

Schleede-Hampton Associates, Inc. has completed the laboratory testing requested for the above referenced project.

The samples submitted to our laboratory were subjected to testing in accordance with the Standard Methods for Particle Size Analysis of Soils, ASTM D-422 (Grain Size Analysis including Hydrometer). Test results presented in graphical form are attached.

Thank you for the opportunity to be of continuing service. If you have any questions, please do not hesitate to contact us.

Very truly yours,

SCHLEEDE-HAMPTON ASSOCIATES, INC.

William D. Prigge/dla

William D. Prigge, P. E.
Project Engineer

WDP/dla
Attachments

1601 NORTH BOND STREET SUITE 106
NAPERVILLE, ILLINOIS 60563 708-369-0710
FAX 708-369-1723

40265MW-5UNKWN35

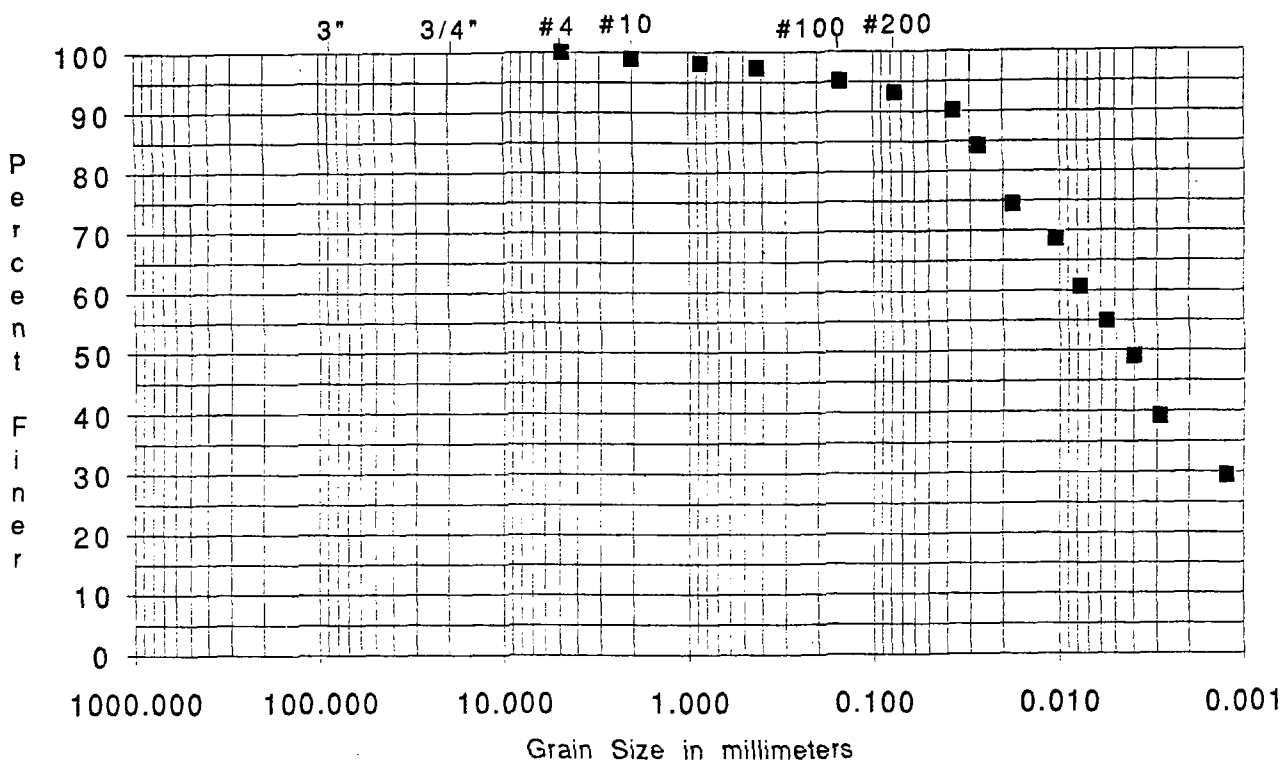
JOB NAME:	FOX LAB TESTING-CH2MHILL
PROJECT NO.	40265
BORING NO.	MW-5
SAMPLE NO.	S-7
DEPTH	35

ASTM D-422

	TOTAL SAMPLE WT.=	87.5 (gms.)			TOTAL	DIAMETER
+10 SIEVE PORTION	SIEVE SIZE	CUM WT. RET	PART % RET	PART % PASS	PASSING	(mm)
	1	0.0	0.0%	100.0%	**100.0%**	**25.000**
	3/4 IN	0.0	0.0%	100.0%	**100.0%**	**19.000**
	1/2 IN	0.0	0.0%	100.0%	**100.0%**	**12.500**
	3/8 IN	0.0	0.0%	100.0%	**100.0%**	**9.500**
	#4	0.0	0.0%	100.0%	**100.0%**	**4.750**
	#10	1.0	1.1%	98.9%	**98.9%**	**2.000**
	WT. OF SAMPLE AT START OF HYDRO=	50.0 (gms.)				
-#10 SIEVE PORTION	#20	0.4	0.8%	99.2%	**98.1%**	**0.850**
	#40	0.8	1.5%	98.5%	**97.4%**	**0.420**
	#100	1.9	3.8%	96.2%	**95.1%**	**0.150**
	#200	2.9	5.8%	94.2%	**93.2%**	**0.075**
HYDROMETER PORTION	TEMPERATURE(°C)=	24.0				
	TEMP BATH BULB READING	4.0				
	SPECIFIC GRAVITY Gs=	2.70 (assumed)				
	ELAPSED TIME (MIN)	UNCORR	CORRECTED	PERCENTPASS		
	1	50.0	46.0	91.1%	**90.1%**	**0.0365**
	2	47.0	43.0	85.1%	**84.2%**	**0.0266**
	5	42.0	38.0	75.2%	**74.4%**	**0.0176**
	15	39.0	35.0	69.3%	**68.5%**	**0.0104**
	30	35.0	31.0	61.4%	**60.7%**	**0.0076**
	60	32.0	28.0	55.4%	**54.8%**	**0.0055**
	120	29.0	25.0	49.5%	**49.0%**	**0.0040**
	250	24.0	20.0	39.6%	**39.2%**	**0.0029**
	1440	19.0	15.0	29.7%	**29.4%**	**0.0012**

SCHLEEDE HAMPTON ASSOCIATES, INC.
CONSULTING ENGINEERS

GRAIN SIZE DISTRIBUTION CURVE



SCHLEEDE-HAMPTON ASSOC., INC.

SAMPLE ID 40265MW-5UNKWN35plot

40265MW-5UNKWN15

JOB NAME:	FOX LAB TESTING-CH2MHILL
PROJECT NO.	40265
BORING NO.	MW-5
SAMPLE NO.	S-3
DEPTH	15

ASTM D-422

					TOTAL PASSING	DIAMETER (mm)
	TOTAL SAMPLE WT.=	96.6	(gms.)			
+10 SIEVE PORTION	SIEVE SIZE	CUM WT. RET	PART % RET	PART % PASS		
	1	0.0	0.0%	100.0%	100.0%	25.000
	3/4 IN	0.0	0.0%	100.0%	100.0%	19.000
	1/2 IN	0.0	0.0%	100.0%	100.0%	12.500
	3/8 IN	0.0	0.0%	100.0%	100.0%	9.500
	#4	0.0	0.0%	100.0%	100.0%	4.750
	#10	0.5	0.6%	99.4%	99.4%	2.000
	WT. OF SAMPLE AT START OF HYDRO=	50.0	(gms.)			
-#10 SIEVE PORTION	#20	0.4	0.8%	99.2%	98.7%	0.850
	#40	0.6	1.1%	98.9%	98.3%	0.420
	#100	32.6	65.3%	34.7%	34.5%	0.150
	#200	46.6	93.3%	6.7%	6.7%	0.075
HYDROMETER PORTION	TEMPERATURE(°C)=	24.0				
	TEMP BATH BULB READING	4.0				
	SPECIFIC GRAVITY Gs=	2.68	(assumed)			
	ELAPSED TIME (MIN)	UNCORR	CORRECTED	PERCENTPASS		
	1	5.0	1.0	2.0%	2.0%	0.0505
	2	4.0	0.0	0.0%	0.0%	0.0358
	5	4.0	0.0	0.0%	0.0%	0.0226
	15	4.0	0.0	0.0%	0.0%	0.0131
	30	4.0	0.0	0.0%	0.0%	0.0092
	60	4.0	0.0	0.0%	0.0%	0.0065
	120	4.0	0.0	0.0%	0.0%	0.0046
	250	4.0	0.0	0.0%	0.0%	0.0032
	1440	4.0	0.0	0.0%	0.0%	0.0013

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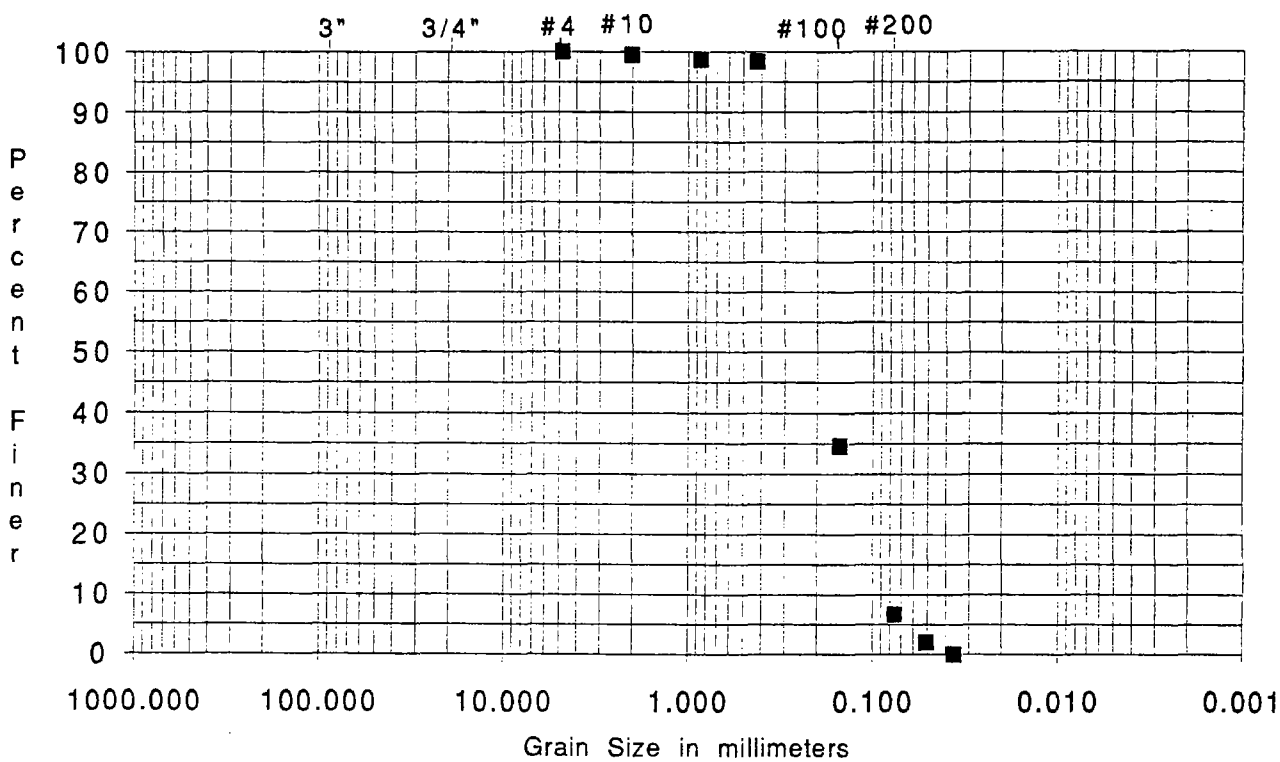

SCHLEEDE-HAMPTON ASSOC., INC.

SAMPLE ID 40265MW-5UNKWN15plot

40265MW-9UNKWN17.5

JOB NAME:	FOX LAB TESTING-CH2MHILL
PROJECT NO.	40265
BORING NO.	MW-9
SAMPLE NO.	BULK
DEPTH	17.5

ASTM D-422

					TOTAL PASSING	DIAMETER (mm)
	TOTAL SAMPLE WT.=	167.5 (gms.)				
+10 SIEVE PORTION	SIEVE SIZE	CUM WT. RET	PART % RET	PART % PASS		
	1	0.0	0.0%	100.0%	100.0%	25.000
	3/4 IN	0.0	0.0%	100.0%	100.0%	19.000
	1/2 IN	0.0	0.0%	100.0%	100.0%	12.500
	3/8 IN	0.0	0.0%	100.0%	100.0%	9.500
	#4	0.0	0.0%	100.0%	100.0%	4.750
	#10	0.0	0.0%	100.0%	100.0%	2.000
	WT. OF SAMPLE AT START OF HYDRO=	50.0 (gms.)				
-#10 SIEVE PORTION	#20	0.0	0.1%	99.9%	99.9%	0.850
	#40	0.2	0.3%	99.7%	99.7%	0.420
	#100	24.0	48.0%	52.0%	52.0%	0.150
	#200	46.7	93.4%	6.6%	6.6%	0.075
HYDROMETER PORTION	TEMPERATURE(°C)=	24.0				
	TEMP BATH BULB READING	4.0				
	SPECIFIC GRAVITY Gs=	2.68 (assumed)				
	ELAPSED TIME (MIN)	UNCORR	CORRECTED	PERCENTPASS		
	1	5.0	1.0	2.0%	2.0%	0.0505
	2	4.0	0.0	0.0%	0.0%	0.0358
	5	4.0	0.0	0.0%	0.0%	0.0226
	15	4.0	0.0	0.0%	0.0%	0.0131
	30	4.0	0.0	0.0%	0.0%	0.0092
	60	4.0	0.0	0.0%	0.0%	0.0065
	120	4.0	0.0	0.0%	0.0%	0.0046
	250	4.0	0.0	0.0%	0.0%	0.0032
	1440	4.0	0.0	0.0%	0.0%	0.0013

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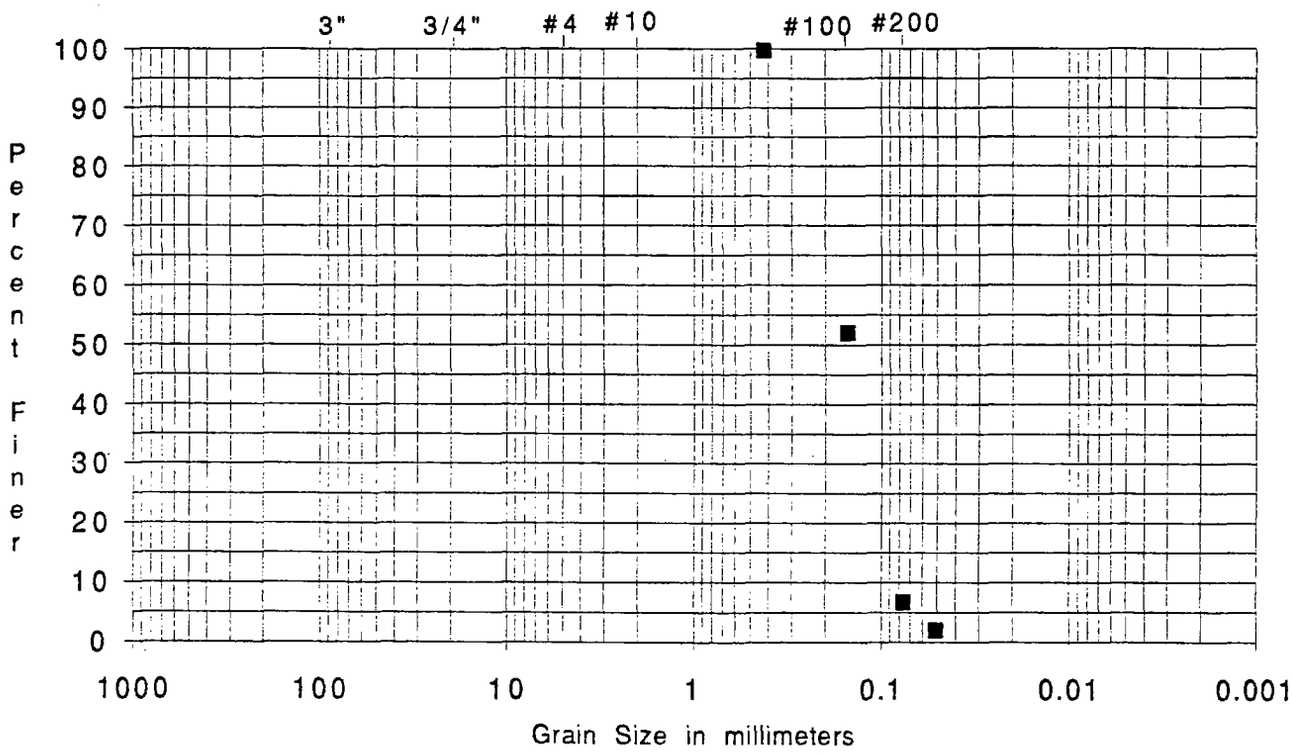

SCHLEEDE-HAMPTON ASSOC., INC.

SAMPLE ID 40265MW-9UNKWN17.5plot

40265MW-19UNKWN19

JOB NAME:	FOX LAB TESTING-CH2MHILL					
PROJECT NO.	40265					
BORING NO.	MW-19					
SAMPLE NO.	BULK					
DEPTH	19					
		ASTM D-422				
	TOTAL SAMPLE WT.=	151.9	(gms.)		TOTAL	DIAMETER
+10 SIEVE PORTION	SIEVE SIZE	CUM WT. RET	PART % RET	PART % PASS	PASSING	(mm)
	1	0.0	0.0%	100.0%	100.0%	25.000
	3/4 IN	0.0	0.0%	100.0%	100.0%	19.000
	1/2 IN	0.0	0.0%	100.0%	100.0%	12.500
	3/8 IN	0.4	0.3%	99.7%	99.7%	9.500
	#4	0.7	0.5%	99.5%	99.5%	4.750
	#10	1.7	1.1%	98.9%	98.9%	2.000
WT. OF SAMPLE AT START OF HYDRO=		50.0	(gms.)			
-#10 SIEVE PORTION	#20	0.2	0.3%	99.7%	98.6%	0.850
	#40	0.4	0.9%	99.1%	98.0%	0.420
	#100	27.5	55.0%	45.0%	44.5%	0.150
	#200	47.5	95.1%	4.9%	4.9%	0.075
HYDROMETER PORTION	TEMPERATURE(°C)=	24.0				
	TEMP BATH BULB READING	4.0				
	SPECIFIC GRAVITY Gs=	2.68	(assumed)			
	ELAPSED TIME (MIN)	UNCORR	CORRECTED	PERCENTPASS		
	1	5.0	1.0	2.0%	2.0%	0.0505
	2	4.0	0.0	0.0%	0.0%	0.0358
	5	4.0	0.0	0.0%	0.0%	0.0226
	15	4.0	0.0	0.0%	0.0%	0.0131
	30	4.0	0.0	0.0%	0.0%	0.0092
	60	4.0	0.0	0.0%	0.0%	0.0065
	120	4.0	0.0	0.0%	0.0%	0.0046
	250	4.0	0.0	0.0%	0.0%	0.0032
	1440	4.0	0.0	0.0%	0.0%	0.0013

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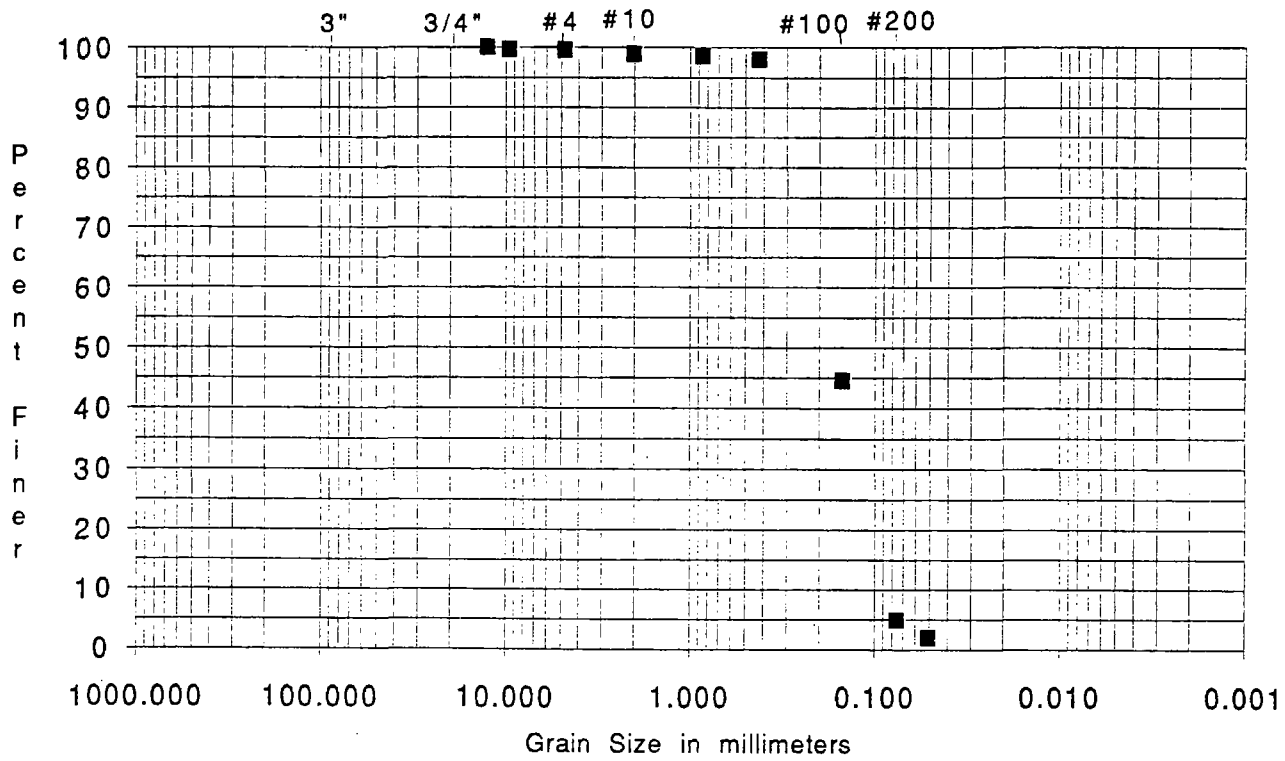

SCHLEEDE-HAMPTON ASSOC., INC.

SAMPLE ID 40265MW-19UNKWN19plot

40265MW-13UNKWN27

JOB NAME:	FOX LAB TESTING-CH2MHILL
PROJECT NO.	40265
BORING NO.	MW-13
SAMPLE NO.	S-6
DEPTH	27

ASTM D-422

					TOTAL PASSING	DIAMETER (mm)
	TOTAL SAMPLE WT.=	146.4 (gms.)				
+10 SIEVE PORTION	SIEVE SIZE	CUM WT. RET	PART % RET	PART % PASS		
	1	0.0	0.0%	100.0%	100.0%	25.000
	3/4 IN	0.0	0.0%	100.0%	100.0%	19.000
	1/2 IN	0.0	0.0%	100.0%	100.0%	12.500
	3/8 IN	0.0	0.0%	100.0%	100.0%	9.500
	#4	0.0	0.0%	100.0%	100.0%	4.750
	#10	0.3	0.2%	99.8%	99.8%	2.000
	WT. OF SAMPLE AT START OF HYDRO=	50.0 (gms.)				
-#10 SIEVE PORTION	#20	0.0	0.0%	100.0%	99.7%	0.850
	#40	0.1	0.2%	99.8%	99.6%	0.420
	#100	29.1	58.3%	41.7%	41.6%	0.150
	#200	49.4	98.8%	1.2%	1.2%	0.075
HYDROMETER PORTION	TEMPERATURE(°C)=	24.0				
	TEMP BATH BULB READING	4.0				
	SPECIFIC GRAVITY Gs=	2.68 (assumed)				
	ELAPSED TIME (MIN)	UNCORR	CORRECTED	PERCENTPASS		
	1	4.0	0.0	0.0%	0.0%	0.0506
	2	4.0	0.0	0.0%	0.0%	0.0358
	5	4.0	0.0	0.0%	0.0%	0.0226
	15	4.0	0.0	0.0%	0.0%	0.0131
	30	4.0	0.0	0.0%	0.0%	0.0092
	60	4.0	0.0	0.0%	0.0%	0.0065
	120	4.0	0.0	0.0%	0.0%	0.0046
	250	4.0	0.0	0.0%	0.0%	0.0032
	1440	4.0	0.0	0.0%	0.0%	0.0013

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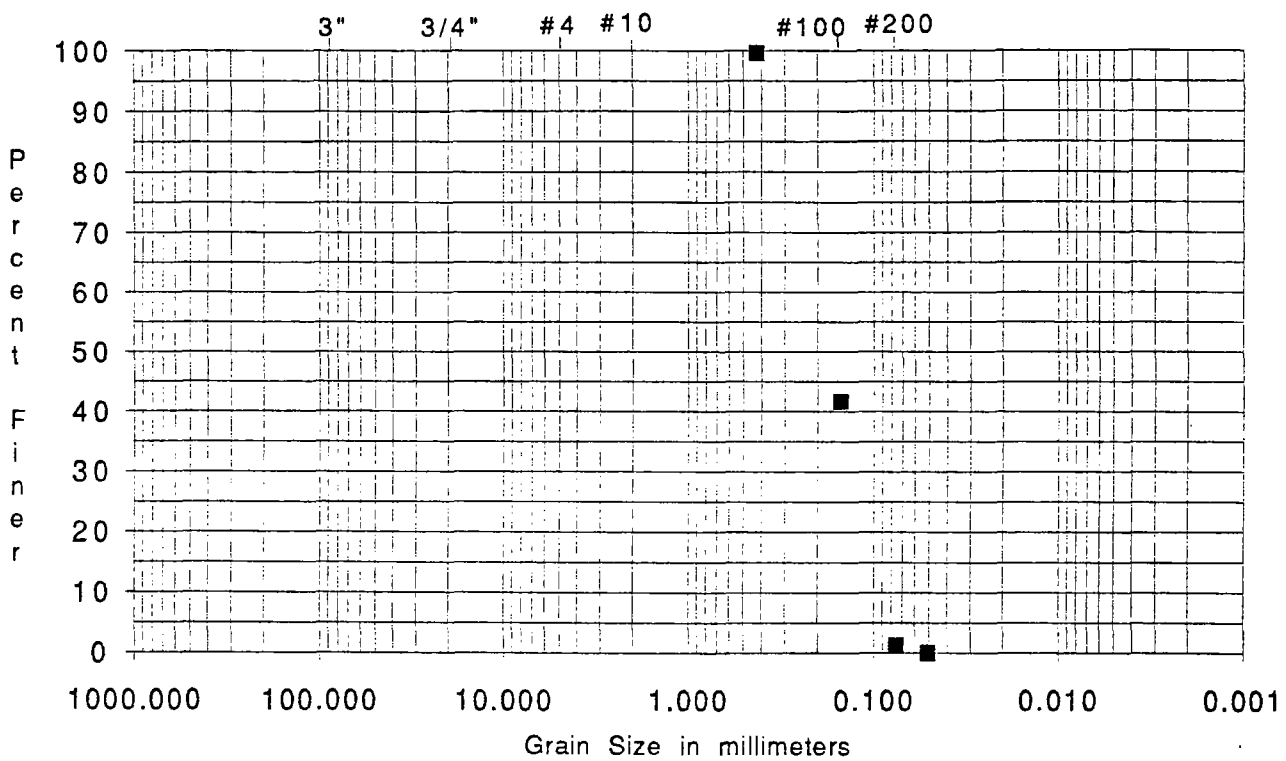

SCHLEEDE-HAMPTON ASSOC., INC.7R7BSAMPLE ID 40265MW-13UNKWN27plot

40265MW-13UNKWN29.5

JOB NAME:	FOX LAB TESTING-CH2MHILL
PROJECT NO.	40265
BORING NO.	MW-13
SAMPLE NO.	S-6A
DEPTH	29.5

ASTM D-422

					TOTAL	DIAMETER
	TOTAL SAMPLE WT.=	125.8 (gms.)				
+10 SIEVE PORTION	SIEVE SIZE	CUM WT. RET	PART % RET	PART % PASS	PASSING	(mm)
	1	0.0	0.0%	100.0%	100.0%	25.000
	3/4 IN	0.0	0.0%	100.0%	100.0%	19.000
	1/2 IN	0.0	0.0%	100.0%	100.0%	12.500
	3/8 IN	4.7	3.8%	96.2%	96.2%	9.500
	#4	8.0	6.4%	93.6%	93.6%	4.750
	#10	28.8	22.9%	77.1%	77.1%	2.000
	WT. OF SAMPLE AT START OF HYDRO=	50.0 (gms.)				
-#10 SIEVE PORTION	#20	1.8	3.6%	96.4%	74.3%	0.850
	#40	3.8	7.7%	92.3%	71.2%	0.420
	#100	6.9	13.8%	86.2%	66.4%	0.150
	#200	8.7	17.5%	82.5%	63.6%	0.075
HYDROMETER PORTION	TEMPERATURE(°C)=	24.0				
	TEMP BATH BULB READING	4.0				
	SPECIFIC GRAVITY Gs=	2.70 (assumed)				
	ELAPSED TIME (MIN)	UNCORR	CORRECTED	PERCENTPASS		
	1	42.0	38.0	75.2%	58.0%	0.0393
	2	38.0	34.0	67.3%	51.9%	0.0288
	5	36.0	32.0	63.4%	48.8%	0.0185
	15	32.0	28.0	55.4%	42.7%	0.0110
	30	28.0	24.0	47.5%	36.6%	0.0080
	60	25.0	21.0	41.6%	32.1%	0.0058
	120	22.0	18.0	35.6%	27.5%	0.0042
	250	19.0	15.0	29.7%	22.9%	0.0029
	1440	14.0	10.0	19.8%	15.3%	0.0013

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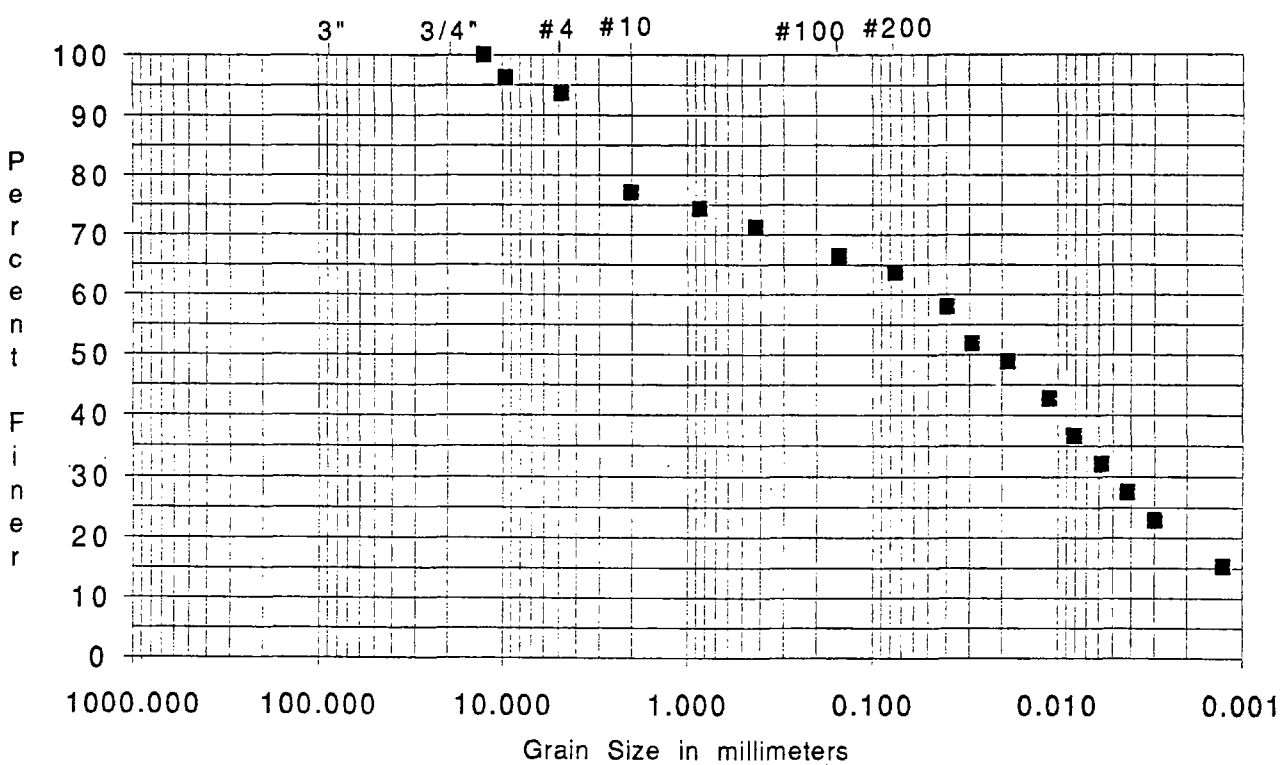

SCHLEEDE-HAMPTON ASSOC., INC.

SAMPLE ID 40265MW-13UNKWN29.5plot

40265SB-1UNKWN36

JOB NAME:	FOX LAB TESTING-CH2MHILL
PROJECT NO.	40265
BORING NO.	SB-1
SAMPLE NO.	BULK
DEPTH	36

ASTM D-422

					TOTAL PASSING	DIAMETER (mm)
	TOTAL SAMPLE WT.=	208.4 (gms.)				
+10 SIEVE PORTION	SIEVE SIZE	CUM WT. RET	PART % RET	PART % PASS		
	1	0.0	0.0%	100.0%	**100.0%**	**25.000**
	3/4 IN	0.0	0.0%	100.0%	**100.0%**	**19.000**
	1/2 IN	0.0	0.0%	100.0%	**100.0%**	**12.500**
	3/8 IN	4.6	2.2%	97.8%	**97.8%**	**9.500**
	#4	8.5	4.1%	95.9%	**95.9%**	**4.750**
	#10	12.4	5.9%	94.1%	**94.1%**	**2.000**
	WT. OF SAMPLE AT START OF HYDRO=	50.0 (gms.)				
-#10 SIEVE PORTION	#20	0.9	1.8%	98.2%	**92.4%**	**0.850**
	#40	2.0	4.1%	95.9%	**90.2%**	**0.420**
	#100	4.5	9.0%	91.0%	**85.6%**	**0.150**
	#200	7.0	13.9%	86.1%	**81.0%**	**0.075**
HYDROMETER PORTION	TEMPERATURE(°C)=	24.0				
	TEMP BATH BULB READING	4.0				
	SPECIFIC GRAVITY Gs=	2.70 (assumed)				
	ELAPSED TIME (MIN)	UNCORR	CORRECTED	PERCENTPASS		
	1	46.0	42.0	83.2%	**78.2%**	**0.0380**
	2	44.0	40.0	79.2%	**74.5%**	**0.0273**
	5	41.0	37.0	73.3%	**68.9%**	**0.0178**
	15	37.0	33.0	65.3%	**61.5%**	**0.0106**
	30	34.0	30.0	59.4%	**55.9%**	**0.0077**
	60	31.0	27.0	53.5%	**50.3%**	**0.0055**
	120	27.0	23.0	45.5%	**42.8%**	**0.0040**
	250	23.0	19.0	37.6%	**35.4%**	**0.0029**
	1440	18.0	14.0	27.7%	**26.1%**	**0.0012**

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CONSULTING ENGINEERS

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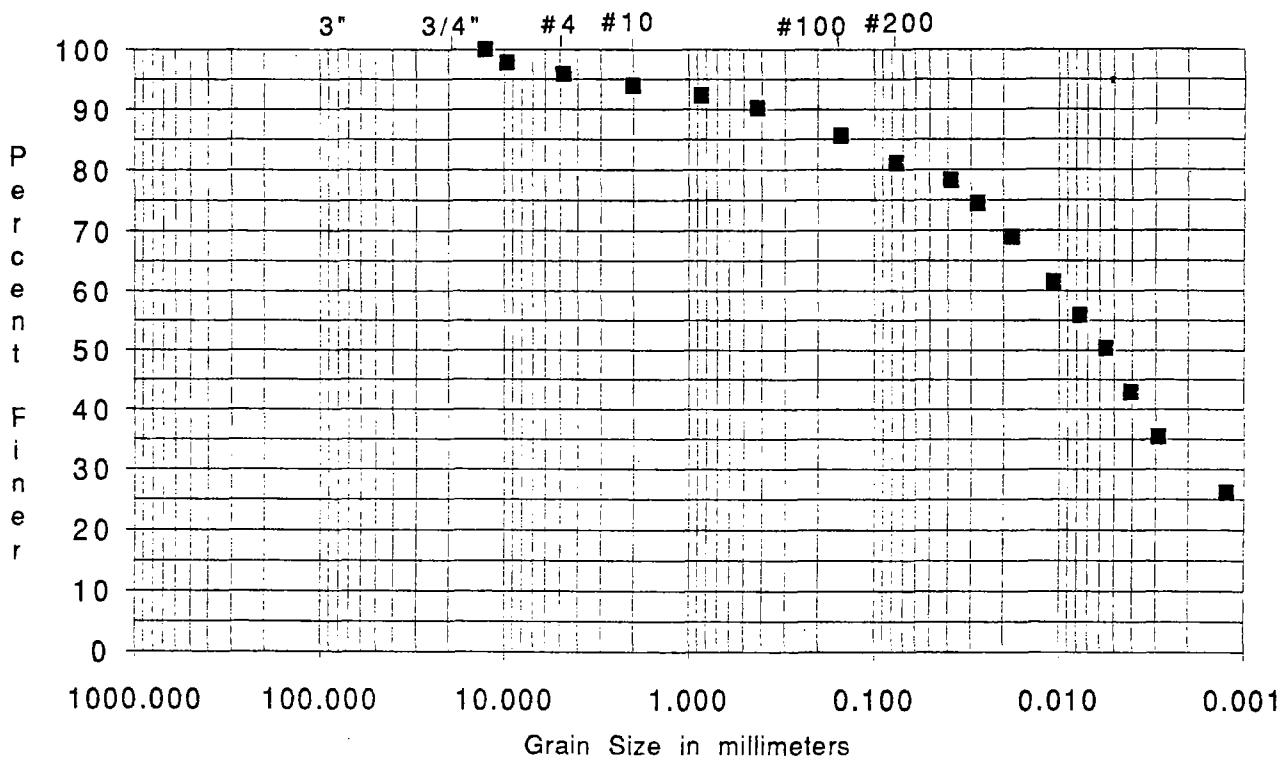

SCHLEEDE-HAMPTON ASSOC., INC.

SAMPLE ID 40265SB-1UNKWN36plot

Appendix D

GROUNDWATER FLOW CALCULATIONS

Appendix D Contents

o Discussion

- Figure D-1, Flow Tube Locations, Du Pont East Chicago Plant, June 1990

- Figure D-2, Flow Tube Locations, Du Pont East Chicago Plant, August 1990

- Figure D-3, Flow Tube Locations, Du Pont East Chicago Plant, September 1990

Appendix D

GROUNDWATER FLOW CALCULATIONS

GROUNDWATER DISCHARGE RATES

This appendix summarizes the assumptions and equations used to compute groundwater discharge rates and velocities at the Du Pont East Chicago plant. A flow tube approach was used to estimate groundwater discharge rates. Data from the June and August, 1990 water level monitoring periods were used to generate flow tubes for groundwater discharge south of the groundwater divide to the Grand Calumet River. Data from the September Riley Park investigations were used for the flow tube analysis toward Riley Park. Steps used in these estimates were:

1) Groundwater flow lines were drawn perpendicular to the potentiometric surface lines for each date. Flow lines were drawn to encompass perimeter monitoring wells. The area between each pair of flow lines was given a flow tube number. Figures D-1, D-2, and D-3 show flow lines, flow tube locations and flow tube numbers for each estimate prepared.

2) The average gradient (water level change over distance) was determined from the figures for each flow tube.

3) The average width of each flow tube was determined from the figures.

4) A representative hydraulic conductivity for each flow tube was selected. For each flow tube with a well in which hydraulic conductivity was measured, the measured value of hydraulic conductivity was selected. When the hydraulic conductivity was not measured in the well for a given flow tube, the plantwide log-average hydraulic conductivity was assumed to be representative of the aquifer within that flow tube.

5) A representative saturated thickness for each flow tube was selected. The saturated thickness was calculated based upon the water elevation in the monitoring well within the specific flow tube and the elevation of the aquifer base measured in that well (as indicated by the elevation of the top of the clay till). If clay till was not encountered in a boring within a flow tube, the clay till elevation was interpolated from data presented on Figure 4-7.

6) Groundwater discharge rates were estimated using the Darcian law of flow:

$$Q = KIA$$

where:

- Q = Darcian flux (L^3/T)
- K = Hydraulic conductivity of the geologic unit through which flow occurs (L/T)
- I = The water table surface hydraulic gradient (L/L)
- A = The area (flow tube width times saturated thickness) of the flow face through which the flux is measured (L^2)

7) The total groundwater discharge from the site was determined as the sum of the flow tubes for each date. Each of the input parameters and resulting discharge values are presented in Tables D-1, D-2, and D-3, for each date.

The flow tube type analysis is not universally valid, and is subject to a number of simplifying assumptions. The assumptions that apply to this analysis are:

- The aquifer is homogeneous and isotropic;
- The slope of the water table has a negligible effect on the aquifer saturated thickness;
- Groundwater flow is essentially horizontal (no vertical component of flow);
- A hydraulic conductivity and aquifer saturated thickness measured at a single well are representative of the overall flow tube;
- The average width and gradient of each flow tube is an adequate indicator of overall flow tube properties for those tubes that converge or diverge; and
- Darcy's law applies

GROUNDWATER VELOCITIES

Groundwater velocities were estimated using a process similar to that used to estimate groundwater discharge rates. The average linear groundwater velocity was estimated. Average linear velocity is the rate at which groundwater moves through soil pores, assuming a macroscopically straight groundwater flow path.
Average, maximum, and minimum groundwater velocities were estimated using data from the June and August 1990, water level monitoring periods to calculate flow to the Grand Calumet River. Data from the September Riley Park investigations were used to calculate groundwater flow to the north. These results are presented in the text in Tables 4-3 and 5-2. The equation used to estimate groundwater velocities was:

$$v = KI/n$$

where:

v = Average linear groundwater velocity (L/T)
K = Representative hydraulic conductivity (L^2/T), determined as above
I = Hydraulic gradient (L/L)
n = Aquifer porosity (L^3/L^3), assumed at 0.35

The hydraulic gradient was considered to be the only variable in this equation. Thus the average groundwater velocity was estimated using an average value for the hydraulic gradient, while the maximum and minimum groundwater velocities were estimated using the highest and lowest gradients, respectively, for each date as determined from the potentiometric maps. The highest and lowest gradients for a

given date do not necessarily correspond to the highest and lowest average gradient for each flow tube, as shown in Tables D-1 through D-3.

CHI184/016.51

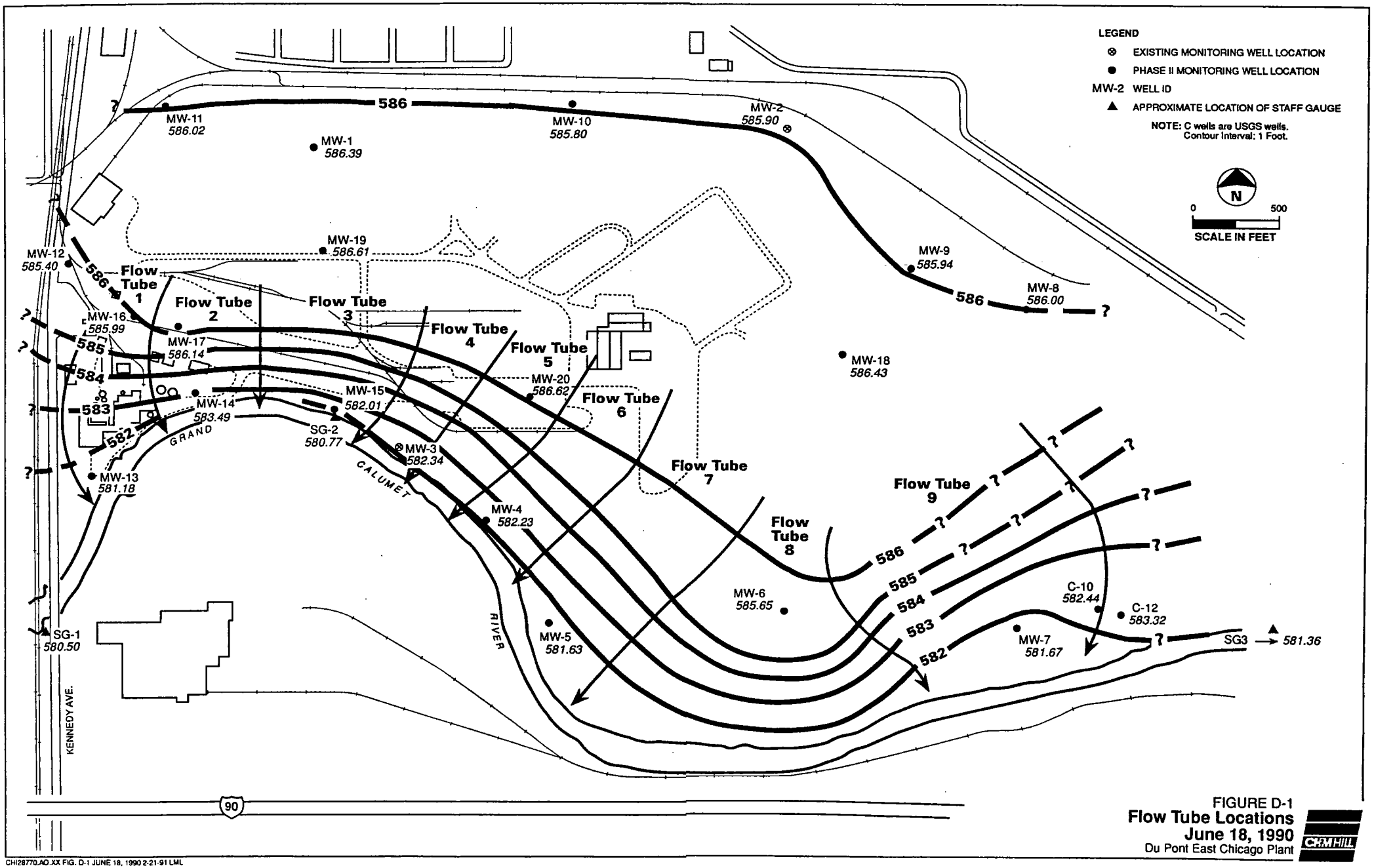

FIGURE D-1
Flow Tube Locations
June 18, 1990
Du Pont East Chicago Plant

CH2M HILL

CHI28770.AO.XX FIG. D-1 JUNE 18, 1990 2-21-91 LML

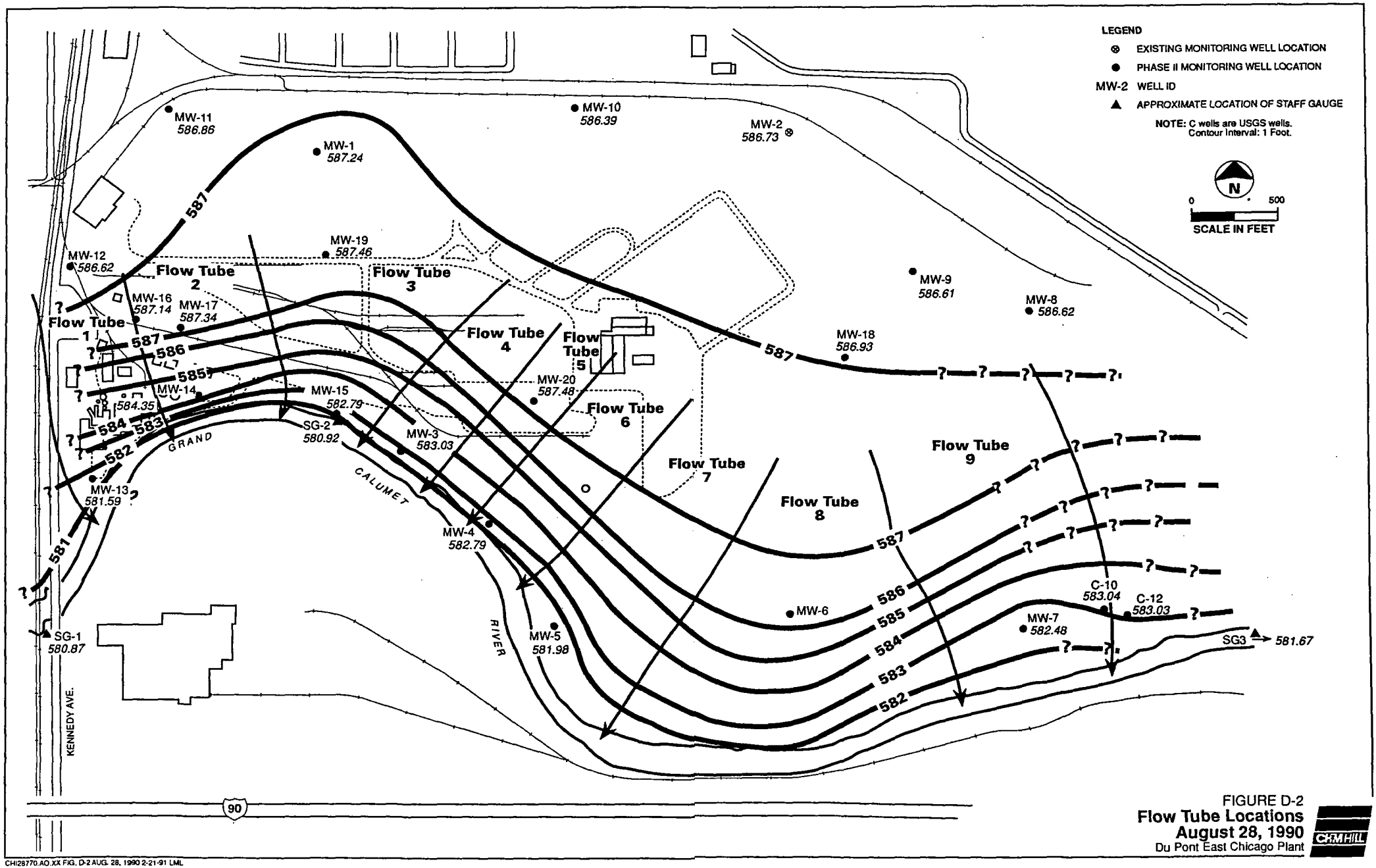

FIGURE D-2
Flow Tube Locations
August 28, 1990
Du Pont East Chicago Plant

CH2M HILL

CHI28770.AO.XX FIG. D-2 AUG. 28, 1990 2-21-91 LML

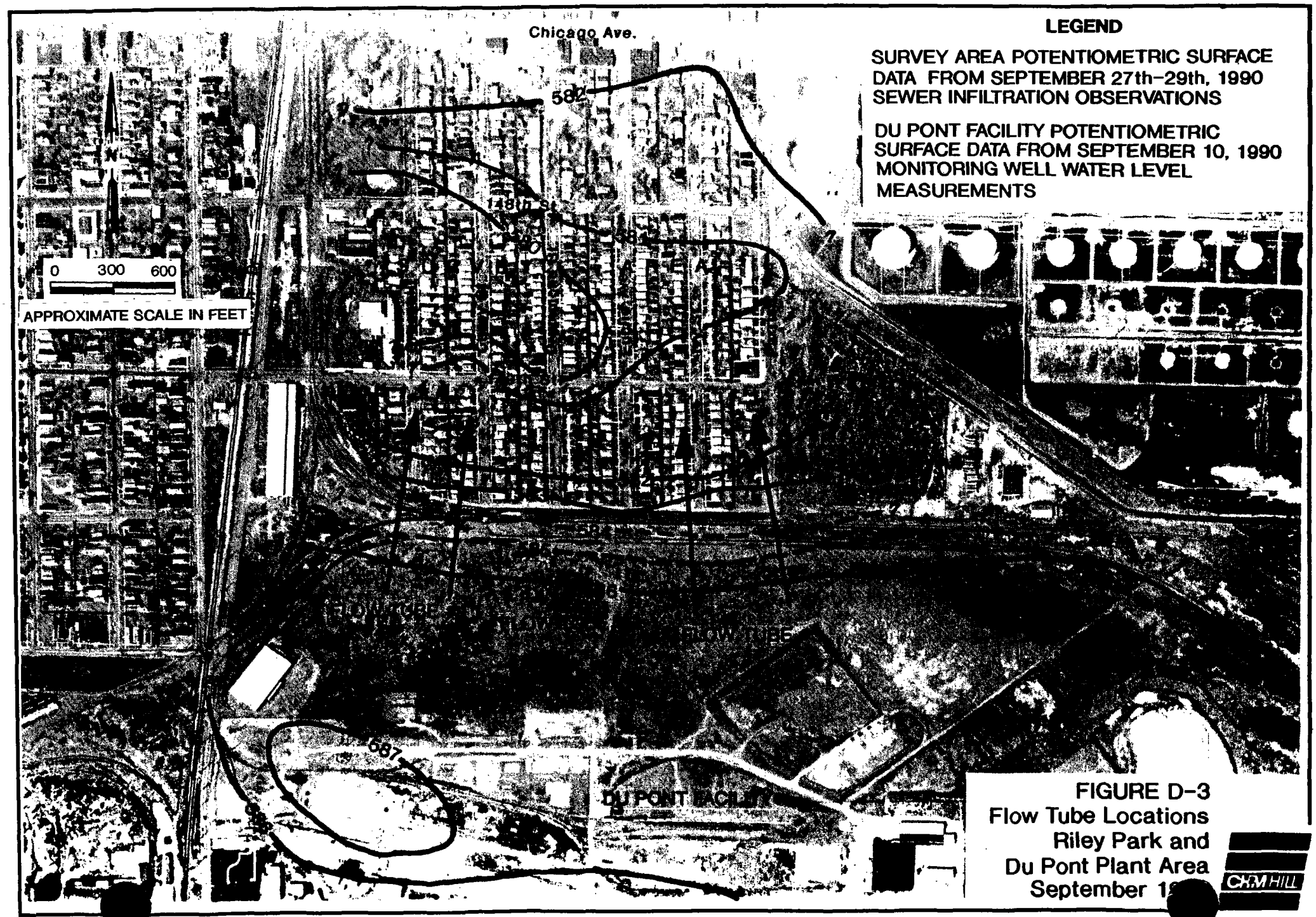

FIGURE D-3
Flow Tube Locations
Riley Park and
Du Pont Plant Area
September 1

Table D-1
FLOW TUBE PARAMETERS FOR GROUNDWATER DISCHARGE ESTIMATES
June 18, 1990, Data

Parameter	Flow Tube Number 1	2	3	4	5	6	7	8	9
Representative Monitoring Well	MW-13	MW-14	MW-15	MW-3	MW-20	MW-4	MW-5	MW-6	MW-7
Average Gradient	6.00E-03	8.33E-03	8.89E-03	6.15E-03	5.71E-03	4.93E-03	4.10E-03	4.10E-03	5.80E-03
Hydraulic Conductivity (ft/s)	1.2E-04	1.5E-04	1.8E-04	1.5E-04	1.5E-04	2.1E-04	1.3E-04	1.5E-04	1.5E-04
Average Flow Tube Width (ft)	500	625	815	360	450	500	700	1250	1475
Saturated Thickness (ft)	23.7	27.0	24.8	24.8	28.4	25.0	24.4	28.4	25.9
Flow Tube Discharge (gpm)	3.8	9.5	14.5	3.7	4.9	5.8	4.1	9.8	14.9
Total Discharge (gpm)		71.0							

Table D-2
FLOW TUBE PARAMETERS FOR GROUNDWATER DISCHARGE ESTIMATES
August 28, 1990, Data

Parameter	Flow Tube Number 1	2	3	4	5	6	7	8	9
Representative Monitoring Well	MW-13	MW-14	MW-15	MW-3	MW-20	MW-4	MW-5	MW-6	MW-7
Average Gradient	7.41E-03	1.00E-02	6.90E-03	6.90E-03	7.14E-03	6.76E-03	5.21E-03	4.65E-03	5.13E-03
Hydraulic Conductivity (ft/s)	1.2E-04	1.5E-04	1.8E-04	1.5E-04	1.5E-04	2.1E-04	1.3E-04	1.5E-04	1.5E-04
Average Flow Tube Width (ft)	660	750	750	475	340	525	790	1440	1030
Saturated Thickness (ft)	24.1	27.8	25.5	25.5	29.3	25.5	24.8	28.9	26.7
Flow Tube Discharge (gpm)	6.3	14.0	10.7	5.6	4.8	8.5	6.0	13.0	9.5
Total Discharge (gpm)		78.4							

Table D-3 FLOW TUBE PARAMETERS FOR GROUNDWATER DISCHARGE ESTIMATES Riley Park September, 1990, Data			
	Flow Tube Number		
Parameter	1	2	3
Representative Monitoring Well	MW-11	MW-1	MW-10
Average Gradient	7.84E-03	8.00E-03	7.02E-03
Hydraulic Conductivity (ft/s)	1.2E-04	1.5E-04	1.5E-04
Average Flow Tube Width (ft)	300	1110	400
Saturated Thickness (ft)	30.2	30.9	31.6
Flow Tube Discharge (gpm)	3.8	18.5	6.0
Total Discharge (gpm)		28.3	

Appendix E

ANALYTICAL DATA SUMMARY TABLES

Appendix E Contents

- Table E-1, Constituents Detected and Their Concentrations, Du Pont East Chicago Plant
- Table E-2, Riley Park Sewer and Sump Analytical Data

Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	MW-01-01	MW-01-02	MW-02-01	MW-02-02	MW-03-01	MW-03-02	MW-03FR-02	MW-04-01	MW-04-02	MW-05-01	MW-05-02
Lab ID:	112164	117448	112072	117692	112002	117665	117666	112014	117395	112013	117444
Date:	6/20/90	9/11/90	6/20/90	9/12/90	6/19/90	9/12/90	9/12/90	6/19/90	9/11/90	6/19/90	9/11/90
GROUNDWATER QUALITY PARAMETERS (mg/l)											
Alkalinity, (CaCO3) Bicarb.	100	140	168	260	260	268 J	300	152	230	472	760
Alkalinity, (CaCO3) Carb.	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Alkalinity, Total (CaCO3)	100	140	168	260	260	268 J	300	152	230	472	760
COD	NA	20	NA	957	NA	30	27	NA	37	NA	105
Phosphate (Total)	0.04	1.64	0.69	1.50	1.35	2.45	2.52 J	0.03	0.76 J	0.10	0.80
Solids, Dissolved	2360	2280	2500	2400	1250	1690	1670	1710	2980	8350	9310
pH	6.63	7.96	6.32	6.83	6.86	6.8	NA	6.93	6.7	6.31	6.4
INORGANICS (mg/l)											
Aluminum	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.03	0.03	0.06	0.01 U	0.22	0.10
Antimony	0.07	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
Arsenic	0.15	0.3	0.05	0.09	0.4	1.7	2.1	0.005	0.012	0.16	0.32
Barium	0.023	0.04	0.015	0.07	0.093	0.15	0.14	0.025	0.01 U	0.039	0.04
Boron	0.17	0.23	0.24	0.26	0.29	0.23	0.28	0.34	0.42	0.27	1.24
Cadmium	0.013	0.005 U	0.005 U	0.005 U	0.005 U	0.064	0.068	0.005 U	0.005 U	0.005 U	0.005 U
Calcium	NA	519	NA	358	NA	299	287	NA	570	NA	678
Chloride	18	30	18	20	35	40	40	46	50	397	470
Chromium, Hexavalent	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Chromium, Total	0.005 U	0.026	0.005 U	0.008	0.005 U	0.007	0.007	0.005 U	0.013	0.005 U	0.005 U
Copper	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Cyanide, Total	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Fluoride	NA	8	NA	10	NA	2	0.8	NA	1.8	NA	12
Iron	NA	11.7	NA	60.5	NA	13.6	13.5	NA	51.0	NA	132
Lead	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
Magnesium	NA	17.8	NA	129	NA	71.5	67.0	NA	99.5	NA	1080
Manganese	NA	0.43	NA	0.35	NA	1.33	1.24	NA	1.00	NA	2.35
Mercury	0.0001 U	0.0002 U	0.0001 U	0.0002 U	0.0001 U	0.0002 U	0.0002 U	0.0001 U	0.0002 U	0.0002 U	0.0002 U
Nickel	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01	0.01 U	0.01 U	0.02	0.02	0.02
Nitrogen, Ammonia	1.3	0.32	9.46	3.31	2.55	2.36	2.31	6.40	19.5	28.3	21.2
Nitrogen, Kjeldahl	NA	0.05 U	NA	3.71	NA	1.77	1.90	NA	21.6	NA	25.0
Potassium	NA	5.95	NA	3.75	NA	6.26	5.98	NA	16.5	NA	22.5
Sodium	NA	15.7	NA	93.1	NA	61.0	57.2	NA	75.2	NA	244
Sulfate	1570	1100	1660	1900	610	1500	1400	1300	2500	4400	7030
Zinc	1.59	3.59	0.031	0.040	0.087	0.100	0.020	0.309	1.14	9.75	11.4

Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	MW-01-01	MW-01-02	MW-02-01	MW-02-02	MW-03-01	MW-03-02	MW-03FR-02	MW-04-01	MW-04-02	MW-05-01	MW-05-02
Lab ID:	112164	117448	112072	117692	112002	117665	117666	112014	117395	112013	117444
Date:	6/20/90	9/11/90	6/20/90	9/12/90	6/19/90	9/12/90	9/12/90	6/19/90	9/11/90	6/19/90	9/11/90
VOLATILE COMPOUNDS (ug/l)											
Acetone	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzene	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	4.0	1.0 U	1.0 U	1.0 U
Bromoform	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Butanone	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Carbon disulfide	12.0 J	4.3	34.9 J	10.8	16.6	20.9	14.4	50.4	75.4	11.3	21.4
Carbon tetrachloride	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Chloroethylvinyl ether	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	6.3	1.0	1.0 U	1.0 U
Chloromethane	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibromochloromethane	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.5	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.6	2.4
1,2-Dichloroethane	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	30.7	44.7 J
1,1-Dichloroethene	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Ethyl benzene	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Hexanone	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Methyl-2-pentanone	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Methylene chloride	5 UJ	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Styrene	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	7.2	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.3 B	1.0 U	2.8	1.0 U
1,1,1-Trichloroethane	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	MW-01-01	MW-01-02	MW-02-01	MW-02-02	MW-03-01	MW-03-02	MW-03FR-02	MW-04-01	MW-04-02	MW-05-01	MW-05-02
Lab ID:	112164	117448	112072	117692	112002	117665	117666	112014	117395	112013	117444
Date:	6/20/90	9/11/90	6/20/90	9/12/90	6/19/90	9/12/90	9/12/90	6/19/90	9/11/90	6/19/90	9/11/90
Vinyl Acetate	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Vinyl Chloride	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Xylenes, Total	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylenes, ortho	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
BASE/NEUTRAL COMPOUNDS (ug/l)											
Acenaphthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Aniline	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzidine	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Benzo(a)anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(a)pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(ghi)perylene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzyl alcohol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzyl butyl phthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bis(2-chloroethyl)ether	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bis(2-chloroethoxy)methane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bis(2-ethylhexyl)phthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bis(2-chloroisopropyl)ether	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Bromophenyl phenyl ether	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Chloroaniline	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Chloronaphthalene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Chlorophenylphenyl ether	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chrysene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibenzo(a,h)anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibenzofuran	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Di-n-butylphthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Diethyl phthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dimethyl phthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U

Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	MW-01-01	MW-01-02	MW-02-01	MW-02-02	MW-03-01	MW-03-02	MW-03FR-02	MW-04-01	MW-04-02	MW-05-01	MW-05-02
Lab ID:	112164	117448	112072	117692	112002	117665	117666	112014	117395	112013	117444
Date:	6/20/90	9/11/90	6/20/90	9/12/90	6/19/90	9/12/90	9/12/90	6/19/90	9/11/90	6/19/90	9/11/90
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Di-n-octylphthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluorene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorobutadiene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Isophorone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Methylnaphthalene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Naphthalene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Nitroaniline	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
3-Nitroaniline	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
4-Nitroaniline	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Nitrobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
N-Nitrosodimethylamine	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
N-Nitrosodiphenylamine	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
N-Nitrosodi-n-propylamine	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Phenanthrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2,4-Trichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
ACID COMPOUNDS (ug/l)											
Benzoic acid	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
4-Chloro-3-methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Chlorophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
2-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Methyl-4,6-dinitrophenol	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
2-Nitrophenol	50 U	10 U	50 U	10 U	50 U	10 U	10 U	50 U	10 U	50 U	10 U
4-Nitrophenol	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Pentachlorophenol	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Phenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U

Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	MW-01-01	MW-01-02	MW-02-01	MW-02-02	MW-03-01	MW-03-02	MW-03FR-02	MW-04-01	MW-04-02	MW-05-01	MW-05-02
Lab ID:	112164	117448	112072	117692	112002	117665	117666	112014	117395	112013	117444
Date:	6/20/90	9/11/90	6/20/90	9/12/90	6/19/90	9/12/90	9/12/90	6/19/90	9/11/90	6/19/90	9/11/90
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
PCBs (ug/l)											
PCB-1016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCB-1221	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCB-1232	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCB-1242	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCB-1248	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCB-1254	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCB-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

LEGEND:

U = Indicates the component was analyzed for but not detected at a level equal to or greater than the reporting limit.
J = Indicates an estimated value. This flag was used when the data indicates the presence of a component below the stated reporting limit or when the direction of analytical bias is unknown.
B = Indicates unusable data. This flag was used when the component was found in the associated QA/QC blank sample(s) as well as the sample. This notation indicates probable contamination and suggests the data not be used to make project decisions.
R = Indicates unusable data. This flag was used when the associated QA/QC data indicates significant deficiencies in the analytical data and suggests the data not be used to make project decisions.
UJ = Indicates the component was analyzed for but not detected at a level equal to or greater than the reporting limit. This flag was used when the QA/QC data indicate a bias in the analytical data but the direction of bias is unknown.
NA = Not Analyzed.

Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	MW-06-01	MW-06-02	MW-07-01	MW-07-02	MW-08-01	MW-08-02	MW-09-01	MW-09-02	MW-10-01	MW-10-02
Lab ID:	112161	117667	112191	117445	112192	117449	112160	117398	112167	117648
Date:	6/21/90	9/12/90	6/21/90	9/11/90	6/21/90	9/11/90	6/20/90	9/11/90	6/20/90	9/12/90
GROUNDWATER QUALITY PARAMETERS (mg/l)										
Alkalinity, (CaCO3) Bicarb.	774	1170 J	170	230	258	300	160	370	196	240
Alkalinity, (CaCO3) Carb.	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Alkalinity, Total (CaCO3)	774	1170 J	170	230	258	300	160	370	196	240
COD	NA	509	NA	98	NA	41	NA	95	NA	78
Phosphate (Total)	0.03 U	0.05	0.03 U	1.92	0.81	5.13	1.5	5.45 J	2.9	23
Solids, Dissolved	30600	28700	1050	987	2290	2190	4450	6410	3010	2730
pH	5.39	5.85	6.82	7.99	6.46	7.77	6.20	7.52	6.33	6.7
INORGANICS (mg/l)										
Aluminum	0.20	0.39	0.01 U	0.01 U	0.01 U	0.11	0.01 U	0.05	0.01 U	0.03
Antimony	0.04 U	0.08	0.04 U	0.04 U	0.07	0.04 U	0.04 U	0.04 U	0.05	0.04
Arsenic	0.008	0.030	0.002	0.002	0.018	0.009	0.01 U	0.03	0.4	0.4
Barium	1.39	2.15	0.055	0.04	0.043	0.08	0.029	0.01 U	0.127	0.21
Boron	8.04	10.9	0.29	0.37	0.64	0.58	1.42	3.22	0.25	0.47
Cadmium	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.011	0.005 U
Calcium	NA	7560	NA	218	NA	486	NA	619	NA	351
Chloride	17000	18000	106	150	131	210	750	1030	108	90
Chromium, Hexavalent	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Chromium, Total	0.005	0.005 U	0.005 U	0.013	0.005 U	0.005 U	0.006	0.012	0.005 U	0.005
Copper	0.01 U	0.01 U	0.01 U	0.01	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Cyanide, Total	0.002 U	0.002 U	0.001 U	0.002 U	0.006	0.002 U	0.002 U	0.002 U	0.001 U	0.002 U
Fluoride	NA	2	NA	4	NA	9	NA	9	NA	5
Iron	NA	619	NA	15.9	NA	54.9	NA	158	NA	61.4 J
Lead	0.04 U	0.04 U	0.04 U	0.05	0.04 U	0.08	0.04 U	0.06	0.04 U	0.04 U
Magnesium	NA	498	NA	32.1	NA	42.8	NA	324	NA	19.9
Manganese	NA	6.14	NA	0.51	NA	1.42	NA	6.55	NA	0.93 J
Mercury	0.0001 U	0.0002 U	0.0001 U	0.0002 U	0.0001 U	0.0002 U	0.0001 U	0.0002 U	0.0001 U	0.0002 U
Nickel	0.01 U	0.01 U	0.01 U	0.07	0.01 U	0.01 U	0.02	0.07	0.01 U	0.01 U
Nitrogen, Ammonia	10	5.51	0.91	0.89	1.25	0.99	19	55.4	5.9	10.8
Nitrogen, Kjeldahl	NA	6.16	NA	0.95	NA	1.11	NA	62.7	NA	10.9
Potassium	NA	45.4	NA	3.49	NA	6.05	NA	36.5	NA	19.8
Sodium	NA	730	NA	51.2	NA	88.6	NA	640	NA	188
Sulfate	90	180	360	400	1200	1300	2140	4200	1810	1800
Zinc	0.074	0.070	0.005 U	0.034	0.005 U	0.018	10.5	27.8	0.049	0.050

Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	MW-06-01	MW-06-02	MW-07-01	MW-07-02	MW-08-01	MW-08-02	MW-09-01	MW-09-02	MW-10-01	MW-10-02
Lab ID:	112161	117667	112191	117445	112192	117449	112160	117398	112167	117648
Date:	6/21/90	9/12/90	6/21/90	9/11/90	6/21/90	9/11/90	6/20/90	9/11/90	6/20/90	9/12/90
VOLATILE COMPOUNDS (ug/l)										
Acetone	10 UJ	10 U	10 U	10 U	10 U	10 U	10 UJ	10 U	10 UJ	10 U
Benzene	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 UJ	1.0 U
Bromodichloromethane	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 UJ	1.0 U
Bromoform	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 UJ	1.0 U
Bromomethane	10 UJ	10 U	10 U	10 U	10 U	10 U	10 UJ	10 U	10 UJ	10 U
2-Butanone	10 UJ	10 U	10 U	10 U	10 U	10 U	10 UJ	10 U	10 UJ	10 U
Carbon disulfide	1.0 UJ	39.7	14.2 J	28.8	27.5 J	95.8	1.0 UJ	18.1	1.0 UJ	45.7
Carbon tetrachloride	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 UJ	1.0 U
Chlorobenzene	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 UJ	1.0 U
Chloroethane	10 UJ	10 U	10 U	10 U	10 U	10 U	10 UJ	10 U	10 UJ	10 U
2-Chloroethylvinyl ether	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 UJ	1.0 U
Chloroform	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.7 J	1.0 U	1.0 UJ	1.0 U
Chloromethane	10 UJ	10 U	10 U	10 U	10 U	10 U	10 UJ	10 U	10 UJ	10 U
Dibromochloromethane	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 UJ	1.0 U
1,2-Dichlorobenzene	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 UJ	1.0 U
1,3-Dichlorobenzene	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 UJ	1.0 U
1,4-Dichlorobenzene	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 UJ	1.0 U
1,1-Dichloroethane	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 UJ	1.0 U
1,2-Dichloroethane	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 UJ	1.0 U
1,1-Dichloroethene	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 UJ	1.0 U
cis-1,2-Dichloroethene	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 UJ	1.0 U
trans-1,2-Dichloroethene	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 UJ	1.0 U
1,2-Dichloropropane	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 UJ	1.0 U
cis-1,3-Dichloropropene	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 UJ	1.0 U
trans-1,3-Dichloropropene	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 UJ	1.0 U
Ethyl benzene	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 UJ	1.0 U
2-Hexanone	10 UJ	10 U	10 U	10 U	10 U	10 U	10 UJ	10 U	10 UJ	10 U
4-Methyl-2-pentanone	10 UJ	10 U	10 U	10 U	10 U	10 U	10 UJ	10 U	10 UJ	10 U
Methylene chloride	5 UJ	5 U	5 U	5 U	5 U	5 U	5 UJ	5 U	5 UJ	5 U
Styrene	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 UJ	1.0 U
1,1,2,2-Tetrachloroethane	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 UJ	1.0 U
Tetrachloroethene	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 UJ	1.0 U
Toluene	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	8.6 J	1.0 U	1.0 UJ	1.0 U
1,1,1-Trichloroethane	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	2.1 J	1.0 U	1.0 UJ	1.0 U
1,1,2-Trichloroethane	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 UJ	1.0 U
Trichloroethene	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 UJ	1.0 U

Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	MW-06-01	MW-06-02	MW-07-01	MW-07-02	MW-08-01	MW-08-02	MW-09-01	MW-09-02	MW-10-01	MW-10-02
Lab ID:	112161	117667	112191	117445	112192	117449	112160	117398	112167	117648
Date:	6/21/90	9/12/90	6/21/90	9/11/90	6/21/90	9/11/90	6/20/90	9/11/90	6/20/90	9/12/90
Vinyl Acetate	10 UJ	10 U	10 U	10 U	10 U	10 U	10 UJ	10 U	10 UJ	10 U
Vinyl Chloride	10 UJ	10 U	10 U	10 U	10 U	10 U	10 UJ	10 U	10 UJ	10 U
Xylenes, Total	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.7 B	1.0 U	1.0 UJ	1.0 U
Xylenes, ortho	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UB	1.0 U	1.0 UJ	1.0 U
BASE/NEUTRAL COMPOUNDS (ug/l)										
Acenaphthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Aniline	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzidine	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Benzo(a)anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(a)pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(ghi)perylene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzyl alcohol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzyl butyl phthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bis(2-chloroethyl)ether	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bis(2-chloroethoxy)methane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bis(2-ethylhexyl)phthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bis(2-chloroisopropyl)ether	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Bromophenyl phenyl ether	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Chloroaniline	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Chloronaphthalene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Chlorophenylphenyl ether	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chrysene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibenzo(a,h)anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibenzofuran	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Di-n-butylphthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Diethyl phthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dimethyl phthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U

Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	MW-06-01	MW-06-02	MW-07-01	MW-07-02	MW-08-01	MW-08-02	MW-09-01	MW-09-02	MW-10-01	MW-10-02
Lab ID:	112161	117667	112191	117445	112192	117449	112160	117398	112167	117648
Date:	6/21/90	9/12/90	6/21/90	9/11/90	6/21/90	9/11/90	6/20/90	9/11/90	6/20/90	9/12/90
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Di-n-octylphthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluorene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorobutadiene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Isophorone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Methylnaphthalene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Naphthalene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Nitroaniline	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
3-Nitroaniline	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
4-Nitroaniline	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Nitrobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
N-Nitrosodimethylamine	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
N-Nitrosodiphenylamine	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
N-Nitrosodi-n-propylamine	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Phenanthrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2,4-Trichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
ACID COMPOUNDS (ug/l)										
Benzoic acid	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
4-Chloro-3-methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Chlorophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
2-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Methyl-4,6-dinitrophenol	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
2-Nitrophenol	50 U	10 U	50 U	10 U	50 U	10 U	50 U	10 U	50 U	10 U
4-Nitrophenol	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Pentachlorophenol	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Phenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U

Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	MW-06-01	MW-06-02	MW-07-01	MW-07-02	MW-08-01	MW-08-02	MW-09-01	MW-09-02	MW-10-01	MW-10-02
Lab ID:	112161	117667	112191	117445	112192	117449	112160	117398	112167	117648
Date:	6/21/90	9/12/90	6/21/90	9/11/90	6/21/90	9/11/90	6/20/90	9/11/90	6/20/90	9/12/90
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
PCBs (ug/l)										
PCB-1016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCB-1221	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCB-1232	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCB-1242	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCB-1248	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCB-1254	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCB-1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

LEGEND:

U = Indicates the component was analyzed for but not detected at a level equal to or greater than the reporting limit.
J = Indicates an estimated value. This flag was used when the data indicates the presence of a component below the stated reporting limit or when the direction of analytical bias is unknown.
B = Indicates unusable data. This flag was used when the component was found in the associated QA/QC blank sample(s) as well as the sample. This notation indicates probable contamination and suggests the data not be used to make project decisions.
R = Indicates unusable data. This flag was used when the associated QA/QC data indicates significant deficiencies in the analytical data and suggests the data not be used to make project decisions.
UJ = Indicates the component was analyzed for but not detected at a level equal to or greater than the reporting limit. This flag was used when the QA/QC data indicate a bias in the analytical data but the direction of bias is unknown.
NA = Not Analyzed.

Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	MW-11-01	FRMW-11-01	MW-11-02	MW-12-01	MW-12-02	MW-13-01	MW-13-02	MW-13FR-02
Lab ID:	112165	112166	117446	112001	117317	111852	117683	117684
Date:	6/20/90	6/20/90	9/11/90	6/19/90	9/10/90	6/18/90	9/12/90	9/12/90
GROUNDWATER QUALITY PARAMETERS (mg/l)								
Alkalinity, (CaCO3) Bicarb.	104	144	120	212	228	1 U	1 U	1 U
Alkalinity, (CaCO3) Carb.	1 U	1 U	1 U	1 U	1 U	4800	4800	5600
Alkalinity, Total (CaCO3)	104	144	120	212	228	6600	7000	7600
COD	NA	NA	41	NA	85	NA	760	760
Phosphate (Total)	0.03 U	0.03 U	9.9	0.15	10.3 J	6.1	23.5	23.0
Solids, Dissolved	2070	2040	2360	880	783	9940	11500	11700
pH	6.68	6.69	6.7	6.85	6.0	11.33	11.61	NA
INORGANICS (mg/l)								
Aluminum	0.01 U	0.01 U	0.06	0.01 U	0.01 U	18.0	0.90	0.86
Antimony	0.04 U	0.06	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
Arsenic	0.010	0.010	0.011	0.011	0.063	0.14	0.09	0.08
Barium	0.028	0.028	0.04	0.071	0.08	0.159	0.51	0.39
Boron	0.33	0.35	0.59	0.25	0.46	0.67	0.74	3.10
Cadmium	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Calcium	NA	NA	540	NA	176	NA	0.188	0.190
Chloride	56	53	100	109	68	40	30	30
Chromium, Hexavalent	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.3 U	0.2 U	0.2 U
Chromium, Total	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.022	0.010	0.012
Copper	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.10	0.06	0.08
Cyanide, Total	0.001 U	0.006	0.002 U	0.002 U	0.001 U	0.001 U	0.002 U	0.002 U
Fluoride	NA	NA	3	NA	0.9	NA	3	4
Iron	NA	NA	17.1	NA	10.6	NA	1.63	1.38
Lead	0.04 U	0.04 U	0.07	0.04	0.06	0.28	0.08	0.15 J
Magnesium	NA	NA	24.3	NA	13.9	NA	0.040	0.045
Manganese	NA	NA	0.62	NA	0.51	NA	0.01 U	0.01 U
Mercury	0.0001 U	0.0001 U	0.0002 U	0.0001 U	0.0002 U	0.0004	0.0004 U	0.0004 U
Nickel	0.01	0.01	0.02	0.02	0.01 U	0.03	0.02	0.03
Nitrogen, Ammonia	1.3	0.5	1.34	3.06	2.47	39.3	14.1	14.3
Nitrogen, Kjeldahl	NA	NA	1.40	NA	2.84 J	NA	16.4	18.9
Potassium	NA	NA	5.19	NA	5.32	NA	3.1	2.8
Sodium	NA	NA	51.8	NA	24.9	NA	3600	3080
Sulfate	1270	1010	1700	270	420	80	180	160
Zinc	5.67	5.02	7.46	0.246	0.019	0.230	0.160	0.150

Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	MW-11-01	FRMW-11-01	MW-11-02	MW-12-01	MW-12-02	MW-13-01	MW-13-02	MW-13FR-02
Lab ID:	112165	112166	117446	112001	117317	111852	117683	117684
Date:	6/20/90	6/20/90	9/11/90	6/19/90	9/10/90	6/18/90	9/12/90	9/12/90
VOLATILE COMPOUNDS (ug/l)								
Acetone	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U
Benzene	1.0 UJ	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	1.1 J	1.0 J	1.0 U	2.5	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	1.0 UJ	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U
2-Butanone	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U	10.9
Carbon disulfide	1.0 UJ	1.0 UJ	5.8	1.0 U	193	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	1.0 UJ	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	1.0 UJ	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U
2-Chloroethylvinyl ether	1.0 UJ	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	2.3 J	2.0 J	1.0 U	4.5	1.0 U	1.0 U	1.0 U	2.1
Chloromethane	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U
Dibromochloromethane	1.0 UJ	1.0 UJ	1.0 U	1.1	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	1.0 UJ	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 UJ	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 UJ	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	1.0 UJ	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	1.0 UJ	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	1.0 UJ	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 UJ	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	1.0 UJ	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	1.0 UJ	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	1.0 UJ	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	1.0 UJ	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Ethyl benzene	1.0 UJ	2.9 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Hexanone	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U
4-Methyl-2-pentanone	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U
Methylene chloride	5 UJ	5 UJ	5 U	5 U	5 U	5 U	5 U	5 U
Styrene	1.0 UJ	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 UJ	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	1.0 UJ	112 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	1.0 UJ	22.7 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1-Trichloroethane	1.0 UJ	5.3 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 UJ	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	1.0 UJ	16.8 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	MW-11-01	FRMW-11-01	MW-11-02	MW-12-01	MW-12-02	MW-13-01	MW-13-02	MW-13FR-02
Lab ID:	112165	112166	117446	112001	117317	111852	117683	117684
Date:	6/20/90	6/20/90	9/11/90	6/19/90	9/10/90	6/18/90	9/12/90	9/12/90
Vinyl Acetate	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U
Vinyl Chloride	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U
Xylenes, Total	1.0 UJ	11.7 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylenes, ortho	1.0 UJ	2.6 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
BASE/NEUTRAL COMPOUNDS (ug/l)								
Acenaphthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Aniline	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzidine	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Benzo(a)anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(a)pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(ghi)perylene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzyl alcohol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzyl butyl phthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bis(2-chloroethyl)ether	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bis(2-chloroethoxy)methane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bis(2-ethylhexyl)phthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bis(2-chloroisopropyl)ether	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Bromophenyl phenyl ether	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Chloroaniline	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Chloronaphthalene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Chlorophenylphenyl ether	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chrysene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibenzo(a,h)anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibenzofuran	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Di-n-butylphthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Diethyl phthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dimethyl phthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U

Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	MW-11-01	FRMW-11-01	MW-11-02	MW-12-01	MW-12-02	MW-13-01	MW-13-02	MW-13FR-02
Lab ID:	112165	112166	117446	112001	117317	111852	117683	117684
Date:	6/20/90	6/20/90	9/11/90	6/19/90	9/10/90	6/18/90	9/12/90	9/12/90
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Di-n-octylphthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluorene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorobutadiene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Isophorone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Methylnaphthalene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Naphthalene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Nitroaniline	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
3-Nitroaniline	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
4-Nitroaniline	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Nitrobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
N-Nitrosodimethylamine	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
N-Nitrosodiphenylamine	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
N-Nitrosodi-n-propylamine	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Phenanthrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2,4-Trichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
ACID COMPOUNDS (ug/l)								
Benzoic acid	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
4-Chloro-3-methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Chlorophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
2-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Methyl-4,6-dinitrophenol	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
2-Nitrophenol	50 U	50 U	10 U	50 U	10 U	50 U	10 U	10 U
4-Nitrophenol	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Pentachlorophenol	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Phenol	10 U	10 U	10 U	10 U	10 U	55	208	198
2,4,5-Trichlorophenol	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U

Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	MW-11-01	FRMW-11-01	MW-11-02	MW-12-01	MW-12-02	MW-13-01	MW-13-02	MW-13FR-02
Lab ID:	112165	112166	117446	112001	117317	111852	117683	117684
Date:	6/20/90	6/20/90	9/11/90	6/19/90	9/10/90	6/18/90	9/12/90	9/12/90
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
PCBs (ug/l)								
PCB-1016	NA	NA	NA	NA	NA	1.0 U	NA	NA
PCB-1221	NA	NA	NA	NA	NA	1.0 U	NA	NA
PCB-1232	NA	NA	NA	NA	NA	1.0 U	NA	NA
PCB-1242	NA	NA	NA	NA	NA	1.0 U	NA	NA
PCB-1248	NA	NA	NA	NA	NA	1.0 U	NA	NA
PCB-1254	NA	NA	NA	NA	NA	1.0 U	NA	NA
PCB-1260	NA	NA	NA	NA	NA	1.0 U	NA	NA

LEGEND:

U = Indicates the component was analyzed for but not detected at a level equal to or greater than the reporting lim
J = Indicates an estimated value. This flag was used when the data indicates the presence of a component belo the stated reporting limit or when the direction of analytical bias is unknown.
B = Indicates unusable data. This flag was used when the component was found in the associated QA/QC blank as well as the sample. This notation indicates probable contamination and suggests the data not be used to
R = Indicates unusable data. This flag was used when the associated QA/QC data indicates significant deficiencie analytical data and suggests the data not be used to make project decisions.
UJ = Indicates the component was analyzed for but not detected at a level equal to or greater than the reporting lim This flag was used when the QA/QC data indicate a bias in the analytical data but the direction of bias is unk
NA = Not Analyzed.

Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	MW-14-01	FRMW-14-01	MW-14-02	MW-15-01	MW-15-02	MW-16-01	MW-16-02	MW-17-01	MW-17-02
Lab ID:	111853	111854	117646	112015	117399	112016	117318	112000	117319
Date:	6/18/90	6/18/90	9/12/90	6/19/90	9/11/90	6/19/90	9/10/90	6/19/90	9/10/90
GROUNDWATER QUALITY PARAMETERS (mg/l)									
Alkalinity, (CaCO3) Bicarb.	160	160	156	336	440	128	204	96	208
Alkalinity, (CaCO3) Carb.	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Alkalinity, Total (CaCO3)	160	160	156	336	440	128	204	96	208
COD	NA	NA	14	NA	68	NA	122	NA	119
Phosphate (Total)	0.09	0.09	1.55	0.74	2.77	NA	NA	NA	NA
Solids, Dissolved	3590	3610	3490	2320	2630	3150	4720	2060	4150
pH	6.30	6.12	6.0	6.64	6.5	NA	NA	6.11	5.50
INORGANICS (mg/l)									
Aluminum	0.15	0.07	0.13	0.18	0.12	0.01 U	0.04	0.08	0.07
Antimony	0.04 U	0.04 U	0.06	0.04 U	0.04 U	NA	NA	NA	NA
Arsenic	0.010	0.009	0.014	0.23	0.26	0.005	0.002	0.002	0.001
Barium	0.020	0.017	0.11	0.027	0.01 U	0.139	0.33	1.03	1.05
Boron	0.20	0.19	0.26	1.19	0.40	NA	NA	NA	NA
Cadmium	0.005 U	0.005 U	0.005 U	0.014	0.006	NA	NA	NA	NA
Calcium	NA	NA	731	NA	519	NA	768	NA	705
Chloride	700	730	670	43	40	1320	2300	875	2200
Chromium, Hexavalent	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	NA	NA	NA	NA
Chromium, Total	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	NA	NA	NA	NA
Copper	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	NA	NA	NA	NA
Cyanide, Total	0.001 U	0.001 U	0.002 U	0.033	0.002 U	NA	NA	NA	NA
Fluoride	NA	NA	4	NA	11	NA	4	NA	4
Iron	NA	NA	23.3 J	NA	15.0	NA	10.5	NA	137
Lead	0.04 U	0.04 U	0.04 U	0.09	0.04 U	NA	NA	NA	NA
Magnesium	NA	NA	87.5	NA	94.0	NA	316	NA	279
Manganese	NA	NA	1.00 J	NA	0.72	NA	3.09	NA	2.62
Mercury	0.0001 U	0.0001 U	0.0002 U	0.0001 U	0.0002 U	NA	NA	NA	NA
Nickel	0.01	0.01	0.02	0.02	0.01 U	NA	NA	NA	NA
Nitrogen, Ammonia	23.6	23.4	17.2	0.55	0.70	27.9	77.4	13.7	32.9
Nitrogen, Kjeldahl	NA	NA	19.0	NA	2.46	NA	98.5 J	NA	41.5 J
Potassium	NA	NA	3.95	NA	8.3	NA	36.2	NA	13.0
Sodium	NA	NA	41.5	NA	83.7	NA	43.8	NA	33.8
Sulfate	1400	1500	1000	1400	1900	180	540	84	300
Zinc	3.345	2.92	2.11	2.42	2.49	10.64	35.8	65.4	227

Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	MW-14-01	FRMW-14-01	MW-14-02	MW-15-01	MW-15-02	MW-16-01	MW-16-02	MW-17-01	MW-17-02
Lab ID:	111853	111854	117646	112015	117399	112016	117318	112000	117319
Date:	6/18/90	6/18/90	9/12/90	6/19/90	9/11/90	6/19/90	9/10/90	6/19/90	9/10/90
VOLATILE COMPOUNDS (ug/l)									
Acetone	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Benzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	NA
Bromodichloromethane	1.0 U	1.0 U	1.0 U	1.9	1.0 U	NA	NA	NA	NA
Bromoform	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	NA
Bromomethane	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
2-Butanone	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Carbon disulfide	1.0 U	1.0 U	1.0 U	6.6	1.0 U	NA	NA	NA	NA
Carbon tetrachloride	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	NA
Chlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	NA
Chloroethane	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
2-Chloroethylvinyl ether	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	NA
Chloroform	1.0 U	1.0 U	1.0 U	3.8	1.0 U	NA	NA	NA	NA
Chloromethane	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Dibromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	NA
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	NA
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	NA
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	NA
1,1-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	NA
1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	NA
1,1-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	NA
cis-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	NA
trans-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	NA
1,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	NA
cis-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	NA
trans-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	NA
Ethyl benzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	NA
2-Hexanone	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
4-Methyl-2-pentanone	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Methylene chloride	5 U	5 U	5 U	5 U	5 U	NA	NA	NA	NA
Styrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	NA
Tetrachloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	NA
Toluene	1.0 U	1.0 U	1.0 U	1.4 B	1.0 U	NA	NA	NA	NA
1,1,1-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	NA
1,1,2-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	NA
Trichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	NA

Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	MW-14-01	FRMW-14-01	MW-14-02	MW-15-01	MW-15-02	MW-16-01	MW-16-02	MW-17-01	MW-17-02
Lab ID:	111853	111854	117646	112015	117399	112016	117318	112000	117319
Date:	6/18/90	6/18/90	9/12/90	6/19/90	9/11/90	6/19/90	9/10/90	6/19/90	9/10/90
Vinyl Acetate	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Vinyl Chloride	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Xylenes, Total	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	NA
Xylenes, ortho	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	NA	NA	NA	NA
BASE/NEUTRAL COMPOUNDS (ug/l)									
Acenaphthene	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Acenaphthylene	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Aniline	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Anthracene	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Benzidine	50 U	50 U	50 U	50 U	50 U	NA	NA	NA	NA
Benzo(a)anthracene	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Benzo(b)fluoranthene	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Benzo(k)fluoranthene	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Benzo(a)pyrene	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Benzo(ghi)perylene	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Benzyl alcohol	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Benzyl butyl phthalate	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Bis(2-chloroethyl)ether	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Bis(2-chloroethoxy)methane	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	10 U	10 U	15	10 U	10 U	NA	NA	NA	NA
Bis(2-chloroisopropyl)ether	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
4-Bromophenyl phenyl ether	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
4-Chloroaniline	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
2-Chloronaphthalene	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
4-Chlorophenylphenyl ether	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Chrysene	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Dibenzo(a,h)anthracene	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Dibenzofuran	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Di-n-butylphthalate	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
3,3'-Dichlorobenzidine	20 U	20 U	20 U	20 U	20 U	NA	NA	NA	NA
Diethyl phthalate	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Dimethyl phthalate	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
2,4-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA

Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	MW-14-01	FRMW-14-01	MW-14-02	MW-15-01	MW-15-02	MW-16-01	MW-16-02	MW-17-01	MW-17-02
Lab ID:	111853	111854	117646	112015	117399	112016	117318	112000	117319
Date:	6/18/90	6/18/90	9/12/90	6/19/90	9/11/90	6/19/90	9/10/90	6/19/90	9/10/90
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Di-n-octylphthalate	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Fluoranthene	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Fluorene	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Hexachlorobenzene	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Hexachlorobutadiene	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Hexachlorocyclopentadiene	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Hexachloroethane	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Isophorone	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
2-Methylnaphthalene	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Naphthalene	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
2-Nitroaniline	50 U	50 U	50 U	50 U	50 U	NA	NA	NA	NA
3-Nitroaniline	50 U	50 U	50 U	50 U	50 U	NA	NA	NA	NA
4-Nitroaniline	50 U	50 U	50 U	50 U	50 U	NA	NA	NA	NA
Nitrobenzene	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
N-Nitrosodimethylamine	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
N-Nitrosodiphenylamine	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
N-Nitrosodi-n-propylamine	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Phenanthrene	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
Pyrene	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
1,2,4-Trichlorobenzene	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
ACID COMPOUNDS (ug/l)									
Benzoic acid	50 U	50 U	50 U	50 U	50 U	NA	NA	NA	NA
4-Chloro-3-methylphenol	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
2-Chlorophenol	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
2,4-Dichlorophenol	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
2,4-Dimethylphenol	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
2,4-Dinitrophenol	50 U	50 U	50 U	50 U	50 U	NA	NA	NA	NA
2-Methylphenol	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
4-Methylphenol	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
2-Methyl-4,6-dinitrophenol	50 U	50 U	50 U	50 U	50 U	NA	NA	NA	NA
2-Nitrophenol	50 U	50 U	10 U	50 U	10 U	NA	NA	NA	NA
4-Nitrophenol	50 U	50 U	50 U	50 U	50 U	NA	NA	NA	NA
Pentachlorophenol	50 U	50 U	50 U	50 U	50 U	NA	NA	NA	NA
Phenol	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
2,4,5-Trichlorophenol	50 U	50 U	50 U	50 U	50 U	NA	NA	NA	NA

Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	MW-14-01	FRMW-14-01	MW-14-02	MW-15-01	MW-15-02	MW-16-01	MW-16-02	MW-17-01	MW-17-02
Lab ID:	111853	111854	117646	112015	117399	112016	117318	112000	117319
Date:	6/18/90	6/18/90	9/12/90	6/19/90	9/11/90	6/19/90	9/10/90	6/19/90	9/10/90
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA
PCBs (ug/l)									
PCB-1016	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA	NA
PCB-1221	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA	NA
PCB-1232	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA	NA
PCB-1242	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA	NA
PCB-1248	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA	NA
PCB-1254	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA	NA
PCB-1260	1.0 U	1.0 U	NA	NA	NA	NA	NA	NA	NA

LEGEND:

U = Indicates the component was analyzed for but not detected at a level equal to or greater than the reporting limit.
J = Indicates an estimated value. This flag was used when the data indicates the presence of a component below the stated reporting limit or when the direction of analytical bias is unknown.
B = Indicates unusable data. This flag was used when the component was found in the associated QA/QC blank samp as well as the sample. This notation indicates probable contamination and suggests the data not be used to make
R = Indicates unusable data. This flag was used when the associated QA/QC data indicates significant deficiencies in t analytical data and suggests the data not be used to make project decisions.
UJ = Indicates the component was analyzed for but not detected at a level equal to or greater than the reporting limit. This flag was used when the QA/QC data indicate a bias in the analytical data but the direction of bias is unknown
NA = Not Analyzed.

Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	MW-18-01	FRMW-18-01	MW-18-02	FRMW-18-02	MW-19-01	MW-19-02	MW-20-01	MW-20-02	MW-20FR-02
Lab ID:	112169	112168	117732	117695	112003	117447	112070	117442	117443
Date:	6/20/90	6/20/90	9/12/90	9/12/90	6/19/90	9/11/90	6/20/90	9/11/90	9/11/90
GROUNDWATER QUALITY PARAMETERS (mg/l)									
Alkalinity, (CaCO3) Bicarb.	314	NA	392	NA	208	420	468	570	550
Alkalinity, (CaCO3) Carb.	1 U	NA	1 U	NA	1 U	1 U	1 U	1 U	60
Alkalinity, Total (CaCO3)	314	NA	392	NA	208	420	468	570	610
COD	NA	NA	61	NA	NA	51	NA	126	142
Phosphate (Total)	0.03 U	NA	1.67	NA	0.09	1.08	0.03 U	4.45	4.45
Solids, Dissolved	4500	NA	5440	NA	1530	4380	5190	5200	5250
pH	6.64	6.89	6.83	NA	6.84	6.6	8.70	9.0	NA
INORGANICS (mg/l)									
Aluminum	NA	NA	NA	NA	0.20	0.06	0.01 U	0.09	0.04
Antimony	NA	NA	NA	NA	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
Arsenic	0.006	NA	0.05	NA	0.005	0.04	0.10	0.005	0.005
Barium	NA	NA	NA	NA	0.045	0.03	0.03	0.03	0.01 U
Boron	NA	NA	NA	NA	0.15	0.81	0.94	1.22	1.27
Cadmium	NA	NA	NA	NA	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Calcium	NA	NA	430	NA	NA	626	NA	320	324
Chloride	84	NA	150	NA	127	400	277	310	370
Chromium, Hexavalent	NA	NA	NA	NA	0.01 U	0.01 U	0.01 U	0.01 U	0.1 U
Chromium, Total	NA	NA	NA	NA	0.007	0.005	0.005 U	0.005 U	0.005 U
Copper	NA	NA	NA	NA	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Cyanide, Total	NA	NA	NA	NA	0.002 U	0.002 U	0.003	0.02 U	0.002 U
Fluoride	NA	NA	17	NA	NA	6	NA	7	8
Iron	NA	NA	42.7	NA	NA	41.9	NA	0.20	0.12
Lead	NA	NA	NA	NA	0.04 U	0.04 U	0.04 U	0.05	0.04 U
Magnesium	NA	NA	77.0	NA	NA	150	NA	108	110
Manganese	NA	NA	1.96	NA	NA	0.48	NA	0.62	0.56
Mercury	NA	NA	NA	NA	0.0001 U	0.0002 U	0.0001 U	0.0002 U	0.0008
Nickel	NA	NA	NA	NA	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Nitrogen, Ammonia	NA	NA	NA	NA	NA	7.15	NA	5.54	5.32
Nitrogen, Kjeldahl	NA	NA	NA	NA	NA	7.55	NA	4.90	5.62
Potassium	NA	NA	11.8	NA	NA	16.0	NA	30.5	30.8
Sodium	NA	NA	1010	NA	NA	372	NA	986	1190
Sulfate	3200	NA	3900	NA	790	3500	3000	3500	3900
Zinc	4.18	NA	4.52	NA	0.612	2.88	0.005 U	0.071	0.029

Table E-1
ONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	MW-18-01	FRMW-18-01	MW-18-02	FRMW-18-02	MW-19-01	MW-19-02	MW-20-01	MW-20-02	MW-20FR-02
Lab ID:	112169	112168	117732	117695	112003	117447	112070	117442	117443
Date:	6/20/90	6/20/90	9/12/90	9/12/90	6/19/90	9/11/90	6/20/90	9/11/90	9/11/90
VOLATILE COMPOUNDS (ug/l)									
Acetone	10 UJ	NA	10 U	NA	10 U	10 U	10 UR	10 U	10 U
Benzene	1.0 UJ	NA	1.0 U	NA	1.0 U	1.0 U	1.0 UR	1.0 U	1.0 U
Bromodichloromethane	2.6 J	NA	1.0 U	NA	4.4	1.0 U	1.0 UR	1.0 U	1.0 U
Bromoform	1.0 UJ	NA	1.0 U	NA	1.0 U	1.0 U	1.0 UR	1.0 U	1.0 U
Bromomethane	10 UJ	NA	10 U	NA	10 U	10 U	10 UR	10 U	10 U
2-Butanone	10 UJ	NA	10 U	NA	10 U	10 U	10 UR	10 U	10 U
Carbon disulfide	51.8 J	NA	6.0	NA	6.9	1.2	5.8 R	44.0	53.7
Carbon tetrachloride	1.0 UJ	NA	1.0 U	NA	1.0 U	1.0 U	1.0 UR	1.0 U	1.0 U
Chlorobenzene	1.0 UJ	NA	1.0 U	NA	1.0 U	1.0 U	1.0 UR	1.0 U	1.0 U
Chloroethane	10 UJ	NA	10 U	NA	10 U	10 U	10 UR	10 U	10 U
2-Chloroethylvinyl ether	1.0 UJ	NA	1.0 U	NA	1.0 U	1.0 U	1.0 UR	1.0 U	1.0 U
Chloroform	5.9 J	NA	1.0 U	NA	7.0	1.0 U	1.0 UR	1.0 U	1.0 U
Chloromethane	10 UJ	NA	10 U	NA	10 U	10 U	10 UR	10 U	10 U
Dibromochloromethane	1.0 J	NA	1.0 U	NA	1.8	1.0 U	1.0 UR	1.0 U	1.0 U
1,2-Dichlorobenzene	1.0 UJ	NA	1.0 U	NA	1.0 U	1.0 U	1.0 UR	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 UJ	NA	1.0 U	NA	1.0 U	1.0 U	1.0 UR	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 UJ	NA	1.0 U	NA	1.0 U	1.0 U	1.0 UR	1.0 U	1.0 U
1,1-Dichloroethane	1.0 UJ	NA	1.0 U	NA	1.0 U	1.0 U	10.4 R	6.7	6.4
1,2-Dichloroethane	1.0 UJ	NA	1.0 U	NA	1.0 U	1.0 U	1.0 UR	1.0 U	1.0 U
1,1-Dichloroethene	1.0 UJ	NA	1.0 U	NA	1.0 U	1.0 U	1.0 UR	1.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 UJ	NA	1.0 U	NA	1.0 U	1.0 U	1.0 UR	1.0 U	1.0 U
trans-1,2-Dichloroethene	1.0 UJ	NA	1.0 U	NA	1.0 U	1.0 U	1.0 UR	1.0 U	1.0 U
1,2-Dichloropropane	1.0 UJ	NA	1.0 U	NA	1.0 U	1.0 U	1.0 UR	1.0 U	1.0 U
cis-1,3-Dichloropropene	1.0 UJ	NA	1.0 U	NA	1.0 U	1.0 U	1.0 UR	1.0 U	1.0 U
trans-1,3-Dichloropropene	1.0 UJ	NA	1.0 U	NA	1.0 U	1.0 U	1.0 UR	1.0 U	1.0 U
Ethyl benzene	1.0 UJ	NA	1.0 U	NA	1.0 U	1.0 U	1.0 UR	1.0 U	1.0 U
2-Hexanone	10 UJ	NA	10 U	NA	10 U	10 U	10 UR	10 U	10 U
4-Methyl-2-pentanone	10 UJ	NA	10 U	NA	10 U	10 U	10 UR	10 U	10 U
Methylene chloride	5 UJ	NA	5 U	NA	5 U	5 U	5 UR	5 U	5 U
Styrene	1.0 UJ	NA	1.0 U	NA	1.0 U	1.0 U	1.0 UR	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 UJ	NA	1.0 U	NA	1.0 U	1.0 U	1.0 UR	1.0 U	1.0 U
Tetrachloroethene	1.0 UJ	NA	1.0 U	NA	1.0 U	1.0 U	1.0 UR	1.0 U	1.0 U
Toluene	1.0 UJ	NA	1.0 U	NA	1.0 U	1.0 U	2.1 R	1.0 U	1.0 U
1,1,1-Trichloroethane	1.0 UJ	NA	1.0 U	NA	1.0 U	1.0 U	5.5 R	1.3	1.3
1,1,2-Trichloroethane	1.0 UJ	NA	1.0 U	NA	1.0 U	1.0 U	1.0 UR	1.0 U	1.0 U
Trichloroethene	1.0 UJ	NA	1.0 U	NA	1.0 U	1.0 U	1.0 UR	1.0 U	1.0 U

Table E-1
ONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	MW-18-01	FRMW-18-01	MW-18-02	FRMW-18-02	MW-19-01	MW-19-02	MW-20-01	MW-20-02	MW-20FR-02
Lab ID:	112169	112168	117732	117695	112003	117447	112070	117442	117443
Date:	6/20/90	6/20/90	9/12/90	9/12/90	6/19/90	9/11/90	6/20/90	9/11/90	9/11/90
Vinyl Acetate	10 UJ	NA	10 U	NA	10 U	10 U	10 UR	10 U	10 U
Vinyl Chloride	10 UJ	NA	10 U	NA	10 U	10 U	10 UR	10 U	10 U
Xylenes, Total	1.0 UJ	NA	1.0 U	NA	1.0 U	1.0 U	1.0 UR	1.0 U	1.0 U
Xylenes, ortho	1.0 UJ	NA	1.0 U	NA	1.0 U	1.0 U	1.0 UR	1.0 U	1.0 U
BASE/NEUTRAL COMPOUNDS (ug/l)									
Acenaphthene	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
Acenaphthylene	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
Aniline	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
Anthracene	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
Benzidine	NA	NA	NA	NA	50 U	50 U	50 U	50 U	50 U
Benzo(a)anthracene	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
Benzo(a)pyrene	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
Benzo(ghi)perylene	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
Benzyl alcohol	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
Benzyl butyl phthalate	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
Bis(2-chloroethyl)ether	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
Bis(2-chloroethoxy)methane	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
Bis(2-ethylhexyl)phthalate	NA	NA	NA	NA	10 U	10 U	10 U	10 U	20
Bis(2-chloroisopropyl)ether	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
4-Bromophenyl phenyl ether	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
4-Chloroaniline	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
2-Chloronaphthalene	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
4-Chlorophenylphenyl ether	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
Chrysene	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
Dibenzo(a,h)anthracene	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
Dibenzofuran	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
Di-n-butylphthalate	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
1,2-Dichlorobenzene	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine	NA	NA	NA	NA	20 U	20 U	20 U	20 U	20 U
Diethyl phthalate	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
Dimethyl phthalate	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrotoluene	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U

Table E-1
ONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	MW-18-01	FRMW-18-01	MW-18-02	FRMW-18-02	MW-19-01	MW-19-02	MW-20-01	MW-20-02	MW-20FR-02
Lab ID:	112169	112168	117732	117695	112003	117447	112070	117442	117443
Date:	6/20/90	6/20/90	9/12/90	9/12/90	6/19/90	9/11/90	6/20/90	9/11/90	9/11/90
2,6-Dinitrotoluene	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
Di-n-octylphthalate	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
Fluoranthene	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
Fluorene	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
Hexachlorobenzene	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
Hexachlorobutadiene	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
Hexachloroethane	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
Isophorone	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
2-Methylnaphthalene	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
Naphthalene	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
2-Nitroaniline	NA	NA	NA	NA	50 U	50 U	50 U	50 U	50 U
3-Nitroaniline	NA	NA	NA	NA	50 U	50 U	50 U	50 U	50 U
4-Nitroaniline	NA	NA	NA	NA	50 U	50 U	50 U	50 U	50 U
Nitrobenzene	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
N-Nitrosodimethylamine	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
N-Nitrosodiphenylamine	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
N-Nitrosodi-n-propylamine	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
Phenanthrene	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
Pyrene	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
1,2,4-Trichlorobenzene	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
ACID COMPOUNDS (ug/l)									
Benzoic acid	NA	NA	NA	NA	50 U	50 U	50 U	50 U	50 U
4-Chloro-3-methylphenol	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
2-Chlorophenol	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	NA	NA	NA	NA	50 U	50 U	50 U	50 U	50 U
2-Methylphenol	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
4-Methylphenol	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
2-Methyl-4,6-dinitrophenol	NA	NA	NA	NA	50 U	50 U	50 U	50 U	50 U
2-Nitrophenol	NA	NA	NA	NA	50 U	10 U	50 U	10 U	10 U
4-Nitrophenol	NA	NA	NA	NA	50 U	50 U	50 U	50 U	50 U
Pentachlorophenol	NA	NA	NA	NA	50 U	50 U	50 U	50 U	50 U
Phenol	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	NA	NA	NA	NA	50 U	50 U	50 U	50 U	50 U

Table E-1
ONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	MW-18-01	FRMW-18-01	MW-18-02	FRMW-18-02	MW-19-01	MW-19-02	MW-20-01	MW-20-02	MW-20FR-02
Lab ID:	112169	112168	117732	117695	112003	117447	112070	117442	117443
Date:	6/20/90	6/20/90	9/12/90	9/12/90	6/19/90	9/11/90	6/20/90	9/11/90	9/11/90
2,4,6-Trichlorophenol	NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U
PCBs (ug/l)									
PCB-1016	1.0 U	1.0 U	NA	1.0 U	NA	NA	NA	NA	NA
PCB-1221	1.0 U	1.0 U	NA	1.0 U	NA	NA	NA	NA	NA
PCB-1232	1.0 U	1.0 U	NA	1.0 U	NA	NA	NA	NA	NA
PCB-1242	1.0 U	1.0 U	NA	1.0 U	NA	NA	NA	NA	NA
PCB-1248	1.0 U	1.0 U	NA	1.0 U	NA	NA	NA	NA	NA
PCB-1254	1.0 U	1.0 U	NA	1.0 U	NA	NA	NA	NA	NA
PCB-1260	1.0 U	1.0 U	NA	1.0 U	NA	NA	NA	NA	NA

LEGEND:

U = Indicates the component was analyzed for but not detected at a level equal to or greater than the reporting limit.

J = Indicates an estimated value. This flag was used when the data indicates the presence of a component below the stated reporting limit or when the direction of analytical bias is unknown.

B = Indicates unusable data. This flag was used when the component was found in the associated QA/QC blank sample(s as well as the sample. This notation indicates probable contamination and suggests the data not be used to make proj

R = Indicates unusable data. This flag was used when the associated QA/QC data indicates significant deficiencies in the analytical data and suggests the data not be used to make project decisions.

UJ = Indicates the component was analyzed for but not detected at a level equal to or greater than the reporting limit. This flag was used when the QA/QC data indicate a bias in the analytical data but the direction of bias is unknown.

NA = Not Analyzed.

Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	SW-01-01	SW-01-02	SW-02-01	SW-02-02	SW-03-01	FRSW-03-01	SW-03-02	FB-01-01	FB-01-02	FB-02-01	FB-02-02
Lab ID:	111855	117693	111856	117647	111857	111858	117694	112071	117668	112162	117645
Date:	6/18/90	9/12/90	6/18/90	9/12/90	6/18/90	6/18/90	9/12/90	6/20/90	9/12/90	6/21/90	9/11/90
GROUNDWATER QUALITY PARAMETERS (mg/l)											
Alkalinity, (CaCO3) Bicarb.	140	136	136	212	156	142	136	7	6	6	6
Alkalinity, (CaCO3) Carb.	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Alkalinity, Total (CaCO3)	140	136	136	212	156	142	136	7	6	6	6
COD	NA	105	NA	115	NA	NA	48	NA	3	NA	3 U
Phosphate (Total)	0.09	0.83	0.03	6.29	0.06	0.18	0.75	0.03 U	0.01 U	0.03 U	0.31
Solids, Dissolved	243	293	270	217	247	237	317	40	13	7	1 U
pH	7.66	7.1	7.62	7.8	7.54	7.74	7.1	8.78	NA	10.23	NA
INORGANICS (mg/l)											
Aluminum	0.14	1.55	0.01 U	3.30	0.25	0.01 U	7.21	0.01 U	0.03	0.01 U	0.03
Antimony	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U	0.04	0.04 U
Arsenic	0.002	0.001	0.004	0.017	0.002	0.002	0.026	0.002	0.01 U	0.001 U	0.001 U
Barium	0.024	0.09	0.019	0.25	0.016	0.029	0.17	0.005 U	0.02	0.005 U	0.01
Boron	0.05	0.15	0.05	0.35	0.04	0.05	0.28	0.01 U	0.11	0.01 U	0.04
Cadmium	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.006	0.005 U	0.005 U	0.005 U	0.005 U
Calcium	NA	45.2	NA	50.9	NA	NA	63.0	NA	0.179	NA	0.051
Chloride	4	47	30	40	31	29	46	4	1 U	1 U	1 U
Chromium, Hexavalent	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Chromium, Total	0.005 U	0.048	0.005 U	0.098	0.005 U	0.005 U	0.305	0.005	0.006	0.005 U	0.005 U
Copper	0.01 U	0.06	0.01 U	0.06	0.01 U	0.01 U	0.22	0.01 U	0.07	0.01 U	0.08
Cyanide, Total	0.004	0.008 J	0.001 U	0.010	0.002	0.007	0.009 J	0.002 U	0.002 U	0.002 U	0.002 U
Fluoride	NA	0.5	NA	0.4	NA	NA	0.4	NA	0.1 U	NA	0.1 U
Iron	NA	17.1	NA	36.3	NA	NA	124	NA	0.10	NA	0.02 U
Lead	0.04 U	0.04 U	0.04 U	0.11	0.04 U	0.04 U	0.72 J	0.04 U	0.04 U	0.04 U	0.04 U
Magnesium	NA	15.1	NA	17.2	NA	NA	20.7	NA	0.052	NA	0.017
Manganese	NA	0.30	NA	0.46	NA	NA	1.68	NA	0.01 U	NA	0.01 U
Mercury	0.0001 U	0.0002 U	0.0001 U	0.0002 U	0.0001 U	0.0002	0.0009	0.0001 U	0.0002 U	0.0001 U	0.0002 U
Nickel	0.01 U	0.01	0.01 U	0.01	0.01 U	0.01 U	0.01	0.01 U	0.01 U	0.01 U	0.01 U
Nitrogen, Ammonia	0.56	0.48	0.68	0.81	0.64	0.75	0.48	0.09	0.03	0.03	0.05 U
Nitrogen, Kjeldahl	NA	1.77	NA	4.49	NA	NA	0.49	NA	0.05 U	NA	0.02 U
Potassium	NA	4.59	NA	5.53	NA	NA	5.34	NA	0.029	NA	0.022
Sodium	NA	21.8	NA	24.0	NA	NA	27.3	NA	0.131	NA	0.045
Sulfate	39	68	41	70	50	55	72	1 U	1 U	1 U	1 U
Zinc	0.051	0.470	0.051	0.760	0.042	0.012	3.35	0.005 U	0.060	0.005 U	0.010

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Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	SW-01-01	SW-01-02	SW-02-01	SW-02-02	SW-03-01	FRSW-03-01	SW-03-02	FB-01-01	FB-01-02	FB-02-01	FB-02-02
Lab ID:	111855	117693	111856	117647	111857	111858	117694	112071	117668	112162	117645
Date:	6/18/90	9/12/90	6/18/90	9/12/90	6/18/90	6/18/90	9/12/90	6/20/90	9/12/90	6/21/90	9/11/90
VOLATILE COMPOUNDS (ug/l)											
Acetone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	10 U
Benzene	3.4	1.0 U	4.9	1.0 U	4.8	4.8	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Bromodichloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Bromoform	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Bromomethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	10 U
2-Butanone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	10 U
Carbon disulfide	1.0 U	4.7	1.0 U	33.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Carbon tetrachloride	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Chlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Chloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	10 U
2-Chloroethylvinyl ether	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Chloroform	1.0 U	1.2	1.7	1.0	1.0 U	1.8	1.2	1.0 U	1.0 U	1.0 UJ	1.0 U
Chloromethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	10 U
Dibromochloromethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
1,2-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
1,3-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
1,4-Dichlorobenzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
1,1-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
1,2-Dichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
1,1-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
cis-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
trans-1,2-Dichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
1,2-Dichloropropane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
cis-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
trans-1,3-Dichloropropene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Ethyl benzene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
2-Hexanone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	10 U
4-Methyl-2-pentanone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	10 U
Methylene chloride	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 UJ	5 U
Styrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
1,1,2,2-Tetrachloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Tetrachloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Toluene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
1,1,1-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
1,1,2-Trichloroethane	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Trichloroethene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U

Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	SW-01-01	SW-01-02	SW-02-01	SW-02-02	SW-03-01	FRSW-03-01	SW-03-02	FB-01-01	FB-01-02	FB-02-01	FB-02-02
Lab ID:	111855	117693	111856	117647	111857	111858	117694	112071	117668	112162	117645
Date:	6/18/90	9/12/90	6/18/90	9/12/90	6/18/90	6/18/90	9/12/90	6/20/90	9/12/90	6/21/90	9/11/90
Vinyl Acetate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	10 U
Vinyl Chloride	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	10 U
Xylenes, Total	1.0 U	1.0 U	1.2	1.0 U	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
Xylenes, ortho	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U
BASE/NEUTRAL COMPOUNDS (ug/l)											
Acenaphthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Aniline	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzidine	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Benzo(a)anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(a)pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(ghi)perylene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzyl alcohol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzyl butyl phthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bis(2-chloroethyl)ether	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bis(2-chloroethoxy)methane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bis(2-ethylhexyl)phthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bis(2-chloroisopropyl)ether	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Bromophenyl phenyl ether	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Chloroaniline	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Chloronaphthalene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Chlorophenylphenyl ether	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chrysene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibenzo(a,h)anthracene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibenzofuran	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Di-n-butylphthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Diethyl phthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dimethyl phthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U

Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	SW-01-01	SW-01-02	SW-02-01	SW-02-02	SW-03-01	FRSW-03-01	SW-03-02	FB-01-01	FB-01-02	FB-02-01	FB-02-02
Lab ID:	111855	117693	111856	117647	111857	111858	117694	112071	117668	112162	117645
Date:	6/18/90	9/12/90	6/18/90	9/12/90	6/18/90	6/18/90	9/12/90	6/20/90	9/12/90	6/21/90	9/11/90
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Di-n-octylphthalate	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluorene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorobutadiene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachloroethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Isophorone	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Methylnaphthalene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Naphthalene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Nitroaniline	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
3-Nitroaniline	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
4-Nitroaniline	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Nitrobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
N-Nitrosodimethylamine	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
N-Nitrosodiphenylamine	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
N-Nitrosodi-n-propylamine	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Phenanthrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Pyrene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2,4-Trichlorobenzene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
ACID COMPOUNDS (ug/l)											
Benzoic acid	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
4-Chloro-3-methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Chlorophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
2-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Methyl-4,6-dinitrophenol	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
2-Nitrophenol	50 U	10 U	50 U	10 U	50 U	50 U	10 U	50 U	10 U	50 U	10 U
4-Nitrophenol	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Pentachlorophenol	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Phenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U

Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	SW-01-01	SW-01-02	SW-02-01	SW-02-02	SW-03-01	FRSW-03-01	SW-03-02	FB-01-01	FB-01-02	FB-02-01	FB-02-02
Lab ID:	111855	117693	111856	117647	111857	111858	117694	112071	117668	112162	117645
Date:	6/18/90	9/12/90	6/18/90	9/12/90	6/18/90	6/18/90	9/12/90	6/20/90	9/12/90	6/21/90	9/11/90
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
PCBs (ug/l)											
PCB-1016	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	NA	1.0 U	NA	NA	NA
PCB-1221	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	NA	1.0 U	NA	NA	NA
PCB-1232	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	NA	1.0 U	NA	NA	NA
PCB-1242	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	NA	1.0 U	NA	NA	NA
PCB-1248	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	NA	1.0 U	NA	NA	NA
PCB-1254	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	NA	1.0 U	NA	NA	NA
PCB-1260	1.0 U	NA	1.0 U	NA	1.0 U	1.0 U	NA	1.0 U	NA	NA	NA

LEGEND:

U = Indicates the component was analyzed for but not detected at a level equal to or greater than the reporting limit.
J = Indicates an estimated value. This flag was used when the data indicates the presence of a component below the stated reporting limit or when the direction of analytical bias is unknown.
B = Indicates unusable data. This flag was used when the component was found in the associated QA/QC blank sample(s) as well as the sample. This notation indicates probable contamination and suggests the data not be used to make project decisions.
R = Indicates unusable data. This flag was used when the associated QA/QC data indicates significant deficiencies in the analytical data and suggests the data not be used to make project decisions.
UJ = Indicates the component was analyzed for but not detected at a level equal to or greater than the reporting limit. This flag was used when the QA/QC data indicate a bias in the analytical data but the direction of bias is unknown.
NA = Not Analyzed.

Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	TB-01-01	TB-01-02	TB-02-01	TB-02-02
Lab ID:	112004	117644	112163	117649
Date:	6/20/90	9/11/90	6/21/90	9/12/90
GROUNDWATER QUALITY PARAMETERS (mg/l)				
Alkalinity, (CaCO3) Bicarb.	NA	NA	NA	NA
Alkalinity, (CaCO3) Carb.	NA	NA	NA	NA
Alkalinity, Total (CaCO3)	NA	NA	NA	NA
COD	NA	NA	NA	NA
Phosphate (Total)	NA	NA	NA	NA
Solids, Dissolved	NA	NA	NA	NA
pH	NA	NA	NA	NA
INORGANICS (mg/l)				
Aluminum	NA	NA	NA	NA
Antimony	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA
Barium	NA	NA	NA	NA
Boron	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA
Calcium	NA	NA	NA	NA
Chloride	NA	NA	NA	NA
Chromium, Hexavalent	NA	NA	NA	NA
Chromium, Total	NA	NA	NA	NA
Copper	NA	NA	NA	NA
Cyanide, Total	NA	NA	NA	NA
Fluoride	NA	NA	NA	NA
Iron	NA	NA	NA	NA
Lead	NA	NA	NA	NA
Magnesium	NA	NA	NA	NA
Manganese	NA	NA	NA	NA
Mercury	NA	NA	NA	NA
Nickel	NA	NA	NA	NA
Nitrogen, Ammonia	NA	NA	NA	NA
Nitrogen, Kjeldahl	NA	NA	NA	NA
Potassium	NA	NA	NA	NA
Sodium	NA	NA	NA	NA
Sulfate	NA	NA	NA	NA
Zinc	NA	NA	NA	NA

Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	TB-01-01	TB-01-02	TB-02-01	TB-02-02
Lab ID:	112004	117644	112163	117649
Date:	6/20/90	9/11/90	6/21/90	9/12/90
VOLATILE COMPOUNDS (ug/l)				
Acetone	NA	10 U	10 U	10 U
Benzene	1.0 UJ	1.0 U	1.0 U	1.0 U
Bromodichloromethane	1.0 UJ	1.0 U	1.0 U	1.0 U
Bromoform	1.0 UJ	1.0 U	1.0 U	1.0 U
Bromomethane	10 UJ	10 U	10 U	10 U
2-Butanone	NA	10 U	10 U	10 U
Carbon disulfide	NA	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	1.0 UJ	1.0 U	1.0 U	1.0 U
Chlorobenzene	1.0 UJ	1.0 U	1.0 U	1.0 U
Chloroethane	10 UJ	10 U	10 U	10 U
2-Chloroethylvinyl ether	1.0 UJ	1.0 U	1.0 U	1.0 U
Chloroform	1.0 UJ	1.0 U	1.0 U	1.0 U
Chloromethane	10 UJ	10 U	10 U	10 U
Dibromochloromethane	1.0 UJ	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	1.0 UJ	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	1.0 UJ	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	1.0 UJ	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	1.0 UJ	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	1.0 UJ	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	1.0 UJ	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	1.0 UJ	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	1.0 UJ	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	1.0 UJ	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	1.0 UJ	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	1.0 UJ	1.0 U	1.0 U	1.0 U
Ethyl benzene	1.0 UJ	1.0 U	1.0 U	1.0 U
2-Hexanone	NA	10 U	10 U	10 U
4-Methyl-2-pentanone	NA	10 U	10 U	10 U
Methylene chloride	5 UJ	5 U	5 U	5 U
Styrene	NA	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	1.0 UJ	1.0 U	1.0 U	1.0 U
Tetrachloroethene	1.0 UJ	1.0 U	1.0 U	1.0 U
Toluene	1.0 UJ	1.0 U	1.0 U	1.0 U
1,1,1-Trichloroethane	1.0 UJ	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	1.0 UJ	1.0 U	1.0 U	1.0 U
Trichloroethene	1.0 UJ	1.0 U	1.0 U	1.0 U

Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	TB-01-01	TB-01-02	TB-02-01	TB-02-02
Lab ID:	112004	117644	112163	117649
Date:	6/20/90	9/11/90	6/21/90	9/12/90
Vinyl Acetate	NA	10 U	10 U	10 U
Vinyl Chloride	10 UJ	10 U	10 U	10 U
Xylenes, Total	1.0 UJ	1.0 U	1.0 U	1.0 U
Xylenes, ortho	NA	1.0 U	1.0 U	1.0 U
BASE/NEUTRAL COMPOUNDS (ug/l)				
Acenaphthene	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA
Aniline	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA
Benzidine	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA
Benzo(ghi)perylene	NA	NA	NA	NA
Benzyl alcohol	NA	NA	NA	NA
Benzyl butyl phthalate	NA	NA	NA	NA
Bis(2-chloroethyl)ether	NA	NA	NA	NA
Bis(2-chloroethoxy)methane	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	NA	NA	NA	NA
Bis(2-chloroisopropyl)ether	NA	NA	NA	NA
4-Bromophenyl phenyl ether	NA	NA	NA	NA
4-Chloroaniline	NA	NA	NA	NA
2-Chloronaphthalene	NA	NA	NA	NA
4-Chlorophenylphenyl ether	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA
Dibenzo(a,h)anthracene	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA
Di-n-butylphthalate	NA	NA	NA	NA
1,2-Dichlorobenzene	NA	NA	NA	NA
1,3-Dichlorobenzene	NA	NA	NA	NA
1,4-Dichlorobenzene	NA	NA	NA	NA
3,3'-Dichlorobenzidine	NA	NA	NA	NA
Diethyl phthalate	NA	NA	NA	NA
Dimethyl phthalate	NA	NA	NA	NA
2,4-Dinitrotoluene	NA	NA	NA	NA

Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	TB-01-01	TB-01-02	TB-02-01	TB-02-02
Lab ID:	112004	117644	112163	117649
Date:	6/20/90	9/11/90	6/21/90	9/12/90
2,6-Dinitrotoluene	NA	NA	NA	NA
Di-n-octylphthalate	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA
Hexachlorobenzene	NA	NA	NA	NA
Hexachlorobutadiene	NA	NA	NA	NA
Hexachlorocyclopentadiene	NA	NA	NA	NA
Hexachloroethane	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA
Isophorone	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA
2-Nitroaniline	NA	NA	NA	NA
3-Nitroaniline	NA	NA	NA	NA
4-Nitroaniline	NA	NA	NA	NA
Nitrobenzene	NA	NA	NA	NA
N-Nitrosodimethylamine	NA	NA	NA	NA
N-Nitrosodiphenylamine	NA	NA	NA	NA
N-Nitrosodi-n-propylamine	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA
1,2,4-Trichlorobenzene	NA	NA	NA	NA
ACID COMPOUNDS (ug/l)				
Benzoic acid	NA	NA	NA	NA
4-Chloro-3-methylphenol	NA	NA	NA	NA
2-Chlorophenol	NA	NA	NA	NA
2,4-Dichlorophenol	NA	NA	NA	NA
2,4-Dimethylphenol	NA	NA	NA	NA
2,4-Dinitrophenol	NA	NA	NA	NA
2-Methylphenol	NA	NA	NA	NA
4-Methylphenol	NA	NA	NA	NA
2-Methyl-4,6-dinitrophenol	NA	NA	NA	NA
2-Nitrophenol	NA	NA	NA	NA
4-Nitrophenol	NA	NA	NA	NA
Pentachlorophenol	NA	NA	NA	NA
Phenol	NA	NA	NA	NA
2,4,5-Trichlorophenol	NA	NA	NA	NA

Table E-1
CONSTITUENTS DETECTED AND THEIR CONCENTRATIONS
DU PONT EAST CHICAGO PLANT

Location:	TB-01-01	TB-01-02	TB-02-01	TB-02-02
Lab ID:	112004	117644	112163	117649
Date:	6/20/90	9/11/90	6/21/90	9/12/90
2,4,6-Trichlorophenol	NA	NA	NA	NA
PCBs (ug/l)				
PCB-1016	NA	NA	NA	NA
PCB-1221	NA	NA	NA	NA
PCB-1232	NA	NA	NA	NA
PCB-1242	NA	NA	NA	NA
PCB-1248	NA	NA	NA	NA
PCB-1254	NA	NA	NA	NA
PCB-1260	NA	NA	NA	NA

LEGEND:

U = Indicates the component was analyzed for but not detected at a level equal to or greater than the reporting limit.
J = Indicates an estimated value. This flag was used when the data indicates the presence of a component below the stated reporting limit or when the direction of analytical bias is unknown.
B = Indicates unusable data. This flag was used when the component was found in the associated QA/QC blank sample(s) as well as the sample. This notation indicates probable contamination and suggests the data not be used to make project decisions.
R = Indicates unusable data. This flag was used when the associated QA/QC data indicates significant deficiencies in the analytical data and suggests the data not be used to make project decisions.
UJ = Indicates the component was analyzed for but not detected at a level equal to or greater than the reporting limit. This flag was used when the QA/QC data indicate a bias in the analytical data but the direction of bias is unknown.
NA = Not Analyzed.

Table E-2

RESIDENCE AND SEWER SAMPLING RESULTS
RILEY PARK

Manhole Number	Location	Concentration (mg/l)									
		Chloride	Fluoride	Sulfate	Arsenic	Cadmium	Copper	Iron	Magnesium	Zinc	Manganese
Sewers											
4-51	Parish & 148th	88	1.3	140	0.005	<0.005	<0.01	1.11	28	0.006	NA
4-71	Ivy & 148th	66	1.3	130	0.004	<0.005	<0.01	0.26	17	0.005	NA
	Split	70.8	1.2	104	0.01	<0.002	NA	0.280	19.400	0.057	0.120
4-89	Euclid & 148th	94	1.5	200	0.007	<0.005	<0.01	0.25	24	<0.005	NA
4-107	Drummond & 148th	88	1.3	110	0.022	<0.005	<0.01	0.78	19	0.006	NA
	Split	88.8	1.3	69.6	0.024	<0.002	NA	0.690	17.400	<0.020	0.110
4-125	Carey & 148th	80	1.1	130	0.003	<0.005	<0.01	0.39	18	0.006	NA
4-62	Parish & 149th	28	3.7	1100	0.03	0.011	<0.01	7.09	48	0.018	NA
4-75	Near 4912 Ivy	28	3.8	900	0.05	0.008	<0.01	7.02	23	0.128	NA
4-93	Euclid & 149th	40	1.7	400	0.08	<0.005	<0.01	2.35	23	1.50	NA
	Duplicate	40	2.3	800	0.07	<0.005	<0.01	2.78	24	1.53	NA
	Split	44.3	1.7	786	0.069	<0.002	NA	2.900	23.300	1.700	0.554
4-111	Drummond & 149th	52	2.1	800	0.20	<0.005	<0.01	2.96	23	0.042	NA
4-129	Carey & 149th	42	2.6	1100	0.18	0.008	0.02	6.22	22	0.764	NA
	Duplicate	42	2.4	1100	0.15	<0.005	<0.01	5.41	21	0.684	NA
	Split	51.7	0.9	956	0.200	<0.002	NA	5.400	20.500	0.630	0.539
4-147	Grasselli & 149th	64	2.5	800	0.011	<0.005	<0.01	5.08	29	0.014	NA
RESIDENCES*											
	Residence 1	30	2.9	1510	0.002	<0.005	<0.01	0.10	48	0.042	
	Residence 2	8	3.5	1110	0.010	<0.005	<0.01	7.18	17	0.267	
	Residence 3	26	2.0	480	0.001	<0.005	<0.01	0.16	13	0.119	
	Duplicate	28	2.1	430	0.001	<0.005	<0.01	0.11	12	0.039	
	Residence 4	12	2.8	910	0.001	<0.005	<0.01	0.77	21	9.52	
	Residence 5	36	1.8	608	<0.001	<0.005	<0.01	1.21	18	0.088	
	Residence 6	8	1.4	720	<0.001	<0.005	<0.01	1.51	13	0.094	
	Duplicate	10	1.5	710	<0.001	<0.005	<0.01	1.80	14	0.067	
	Residence 7	100	1.8	1120	0.028	<0.005	0.02	17.4	32	0.060	
	Residence 8	20	1.6	1080	0.006	<0.005	<0.01	3.88	19	0.077	

Notes:
* Residential sampling locations confidential.
Split samples analyses from the testing laboratory ETC.
Duplicate and sample analyses from the testing laboratory NET.

Appendix F

LOADING COMPUTATIONS

Appendix F

LOADINGS COMPUTATIONS

The purpose of calculating loadings was to assess the potential effect of groundwater chemical discharge on Grand Calumet River quality. In this report, a loading is defined as the total chemical mass flow rate in either groundwater or surface water discharge. The loadings assessment characterized:

- The relative contribution of plant groundwater constituent loadings to the total loadings present in the Grand Calumet River; and

- River constituent concentrations with and (hypothetically) without the effect of plant groundwater discharge.

Any assessment of chemical mass flow rates requires a prior assessment of the groundwater flow system. Therefore, calculations and results presented in this Appendix rely on the assumptions and results of Appendix D, Groundwater Flow Computations.

GROUNDWATER LOADINGS

Chemical loadings from groundwater to the Grand Calumet River were estimated from both Round 1 and Round 2 analytical data. The procedure used to estimate loadings was:

1) Groundwater and chemical discharge was discretized into the flow tubes generated and presented in Appendix D. The constituent concentrations measured in each perimeter monitoring well within the flow tube were

assumed to be representative of the overall groundwater quality within the flow tube.

2) The chemical mass flow rate (loading) was estimated for each constituent in each flow tube using the equation:

$$L_{ft} = Q_{ft} * C_{ft}$$

where:

L_{ft} = Chemical loading for the given flow tube (M/T)

Q_{ft} = Flow tube groundwater discharge rate (L^3/T), see Appendix D

C_{ft} = Representative chemical concentration for the given flow tube (M/L^3), as measured at the perimeter monitoring well within the flow tube

3) The total chemical loadings from the plant to the Grand Calumet River were estimated as the sum of the chemical loadings from each flow tube. The total chemical loadings and loadings for each flow tube from Round 1 and Round 2 analytical data are shown in Tables F-1 and F-2, respectively.

4) Chemical mass (or loads) currently in the Grand Calumet River were calculated using the equation:

$$L_r = Q_r * C_r$$

where:

L_r = Chemical load in the Grand Calumet River (M/T)

Q_r = Grand Calumet River discharge (L^3/T). Because there are no stage data for the Grand Calumet River, the USGS (1987) "dry weather" discharge rate of 215,000 gpm measured at the Cline Avenue bridge was assumed to be a representative low flow rate of the Grand Calumet River.

C_r = Average Grand Calumet River constituent concentration (M/L^3). Because three surface water samples were collected in the Grand Calumet River adjacent to the Du Pont East Chicago plant during each sampling round (see Figure 3-2 for sampling locations), the geometric mean constituent concentration was calculated and assumed to represent average river constituent concentrations for this analysis.

These surface water average (geometric mean) chemical concentrations and loads for each sampling round are presented in Table 4-9 and 4-8, respectively.

5) The highest groundwater constituent loadings were compared to the lowest surface water loads to estimate a worst-case impact scenario by the Du Pont East Chicago plant groundwater. These results are presented in the text in Table 4-8.

GROUNDWATER CONTRIBUTION TO RIVER CONSTITUENT CONCENTRATIONS

A second analysis of groundwater impact on surface water in the Grand Calumet River involved a comparison of observed Grand Calumet River constituent concentrations from Round 1 and Round 2 data to hypothetical Grand Calumet River

constituent concentrations if the effect of plant groundwater discharge were removed. The procedure used to develop this comparison was:

1) The average representative surface water concentrations were considered to be the geometric mean concentrations as calculated in step 4), above.

2) Average representative plantwide groundwater constituent concentrations were estimated. These were estimated using a flow-weighting approach derived from the flow tube analysis explained in Appendix D. Flow weighted constituent concentrations were determined for each flow tube using the following formula:

$$C_{fw} = C_{ft} * Q_{ft}/Q_T$$

where:

C_{fw} = Flow-weighted constituent concentration (M/L^3)

C_{ft} = Representative flow tube constituent concentration, taken as the concentration from the perimeter well within the given flow tube (M/L^3).

Q_{ft} = Flow tube groundwater discharge, from Appendix D (L^3/T)

Q_T = Total plantwide groundwater discharge, determined as the sum of all flow tube groundwater discharges, from Appendix D (L^3/T).

These flow-weighted concentrations for each flow tube are presented in Tables F-1 and F-2, for Round 1 and Round 2 samples, respectively. A total plantwide average

groundwater constituent concentration was considered to be the sum of the flow-weighted concentrations for all the flow tubes.

3) The average (flow-weighted) plantwide groundwater concentration was diluted by the volume of water in the Grand Calumet River, assuming full mixing of groundwater discharge with surface water, using the equation:

$$C_{cg} = C_{fwp} * Q_T/Q_R$$

where:

C_{cg} = Constituent concentration in surface water from groundwater discharge contribution (M/L^3)

Cfwp = Plantwide flow-weighted groundwater concentration, calculated above (M/L^3)

Q_T = Total plantwide groundwater discharge, determined as the sum of all flow tube groundwater discharges, from Appendix D (L^3/T).

Q_R = Total Grand Calumet River discharge. The value of 215,000 gpm measured by the USGS (1987) as a "dry weather" flow was assumed to be representative of an average low flow discharge (L^3/T).

The plantwide flow weighted concentrations (C_{fwp}) are presented in Tables F-1 and F-2 for Round 1 and Round 2 chemical data, respectively. Constituent concentrations in surface water from the groundwater discharge contribution (C_{cg}) are presented in Table 4-9.

4) The highest values of C_{cg} from either Round 1 or Round 2 analytical data were subtracted from the lowest average surface water concentrations from either Round 1 or Round 2, to show the maximum contrast in chemical concentrations. These results are presented in Table 4-9. Results showed no differences could be distinguished in observed surface water concentrations and hypothetical surface water concentrations if the groundwater contribution were removed.

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Table F-1
Flow Weighted Groundwater Concentrations and Loadings--Round 1

Representative Monitoring Well	Flow Tube 1 MW-13			Flow Tube 2 MW-14		
Total Q Round 1 (gpm) = 71.0						
Flow Tube Discharge (gpm) =		3.8			9.5	
Fraction of Total Q =		0.0535			0.1338	
Constituents	Round 1 Conc.	Flow Weighted Conc.	Flow Tube Loading (lbs/day)	Round 1 Conc.	Flow Weighted Conc.	Flow Tube Loading (lbs/day)
Water Quality Parameters (mg/l)						
COD	NA	NA	NA	NA	NA	NA
Nitrogen, Ammonia	39.3	2.1	1.8	23.6	3.2	2.7
Nitrogen, Kjeldahl	NA	NA	NA	NA	NA	NA
Phosphate (Total)	6.1	0.3	0.3	0.09	0.01	0.01
Solids, Dissolved	9940	532	453	3590	480	409
Major Inorganic Ions (mg/l)						
Calcium	NA	NA	NA	NA	NA	NA
Carbonates	6600	353	301	160	21	18
Chloride	40	2	2	700	94	80
Magnesium	NA	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA	NA
Sulfate	80	4	4	1400	187	160
Trace Inorganic Compounds						
Aluminum	18.0	1.0	0.8	0.15	0.02	0.02
Antimony						
Arsenic	0.14	0.01	0.01	0.010	0.001	0.001
Barium	0.159	0.009	0.007	0.020	0.003	0.002
Boron	0.67	0.04	0.03	0.20	0.03	0.02
Cadmium						
Chromium, Total	0.022	0.001	0.001			
Copper	0.10	0.01	0.00			
Cyanide, Total						
Fluoride	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	NA
Lead	0.28	0.01	0.01			
Manganese	NA	NA	NA	NA	NA	NA
Mercury	0.0004	0.0000	0.0000			
Nickel	0.03	0.00	0.00	0.01	0.00	0.00
Zinc	0.230	0.012	0.010	3.345	0.448	0.381
Organic Compounds (ug/l)						
Carbon disulfide						
Chloroform						
1,1-Dichloroethane						
1,2-Dichloroethane						
1,1,1-Trichloroethane						
Phenol	55	3	0			

Notes: NA = Not Analyzed.
Blank Space = Values less than or equal to detection limit.

Table F-1
Flow Weighted Groundwater Concentrations and Loadings--Round 1

Representative Monitoring Well	Flow Tube 2 MW-14			Flow Tube 3 MW-15		
Total Q Round 1 (gpm) = 71.0						
Flow Tube Discharge (gpm) =		9.5			14.5	
Fraction of Total Q =		0.1338			0.2042	
Constituents	Round 1 Conc. (Dup.)	Flow Weighted Conc.	Flow Tube Loading (lbs/day)	Round 1 Conc.	Flow Weighted Conc.	Flow Tube Loading (lbs/day)
Water Quality Parameters (mg/l)						
COD	NA	NA	NA	NA	NA	NA
Nitrogen, Ammonia	23.4	3.1	2.7	0.55	0.11	0.10
Nitrogen, Kjeldahl	NA	NA	NA	NA	NA	NA
Phosphate (Total)	0.09	0.01	0.01	0.74	0.15	0.13
Solids, Dissolved	3610	483	412	2320	474	404
Major Inorganic Ions (mg/l)						
Calcium	NA	NA	NA	NA	NA	NA
Carbonates	160	21	18	336	69	58
Chloride	730	98	83	43	9	7
Magnesium	NA	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA	NA
Sulfate	1500	201	171	1400	286	244
Trace Inorganic Compounds						
Aluminum	0.07	0.01	0.01	0.18	0.04	0.03
Antimony						
Arsenic	0.009	0.001	0.001	0.23	0.05	0.04
Barium	0.017	0.002	0.002	0.027	0.006	0.005
Boron	0.19	0.03	0.02	1.19	0.24	0.21
Cadmium				0.014	0.0029	0.0024
Chromium, Total						
Copper						
Cyanide, Total				0.033	0.007	0.006
Fluoride	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	NA
Lead				0.09	0.02	0.02
Manganese	NA	NA	NA	NA	NA	NA
Mercury						
Nickel	0.01	0.00	0.00	0.02	0.00	0.00
Zinc	2.92	0.39	0.33	2.42	0.49	0.42
Organic Compounds (ug/l)						
Carbon disulfide				6.6	1.3	0.0
Chloroform				3.8	0.8	0.0
1,1-Dichloroethane						
1,2-Dichloroethane						
1,1,1-Trichloroethane						
Phenol						

Notes: NA = Not Analyzed.
Blank Space = Values less than or equal to detection limit.

Table F-1
Flow Weighted Groundwater Concentrations and Loadings--Round 1

Representative Monitoring Well	Flow Tube 4 MW-3			Flow Tube 5 MW-20		
Total Q Round 1 (gpm) = 71.0						
Flow Tube Discharge (gpm) =		3.7			4.9	
Fraction of Total Q =		0.0521			0.0690	
Constituents	Round 1 Conc.	Flow Weighted Conc.	Flow Tube Loading (lbs/day)	Round 1 Conc.	Flow Weighted Conc.	Flow Tube Loading (lbs/day)
Water Quality Parameters (mg/l)						
COD	NA	NA	NA	NA	NA	NA
Nitrogen, Ammonia	2.55	0.13	0.11	NA	NA	NA
Nitrogen, Kjeldahl	NA	NA	NA	NA	NA	NA
Phosphate (Total)	1.35	0.07	0.06			
Solids, Dissolved	1250	65	56	5190	358	305
Major Inorganic Ions (mg/l)						
Calcium	NA	NA	NA	NA	NA	NA
Carbonates	260	14	12	468	32	28
Chloride	35	2	2	277	19	16
Magnesium	NA	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA	NA
Sulfate	610	32	27	3000	207	176
Trace Inorganic Compounds						
Aluminum						
Antimony						
Arsenic	0.4	0.0	0.0	0.10	0.01	0.01
Barium	0.093	0.005	0.004	0.03	0.00	0.00
Boron	0.29	0.02	0.01	0.94	0.06	0.06
Cadmium						
Chromium, Total						
Copper						
Cyanide, Total				0.003	0.000	0.000
Fluoride	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	NA
Lead						
Manganese	NA	NA	NA	NA	NA	NA
Mercury						
Nickel						
Zinc	0.087	0.005	0.004			
Organic Compounds (ug/l)						
Carbon disulfide	16.6	0.9	0.0	5.8	0.4	0.0
Chloroform						
1,1-Dichloroethane				10.4	0.7	0.0
1,2-Dichloroethane						
1,1,1-Trichloroethane				5.5	0.4	0.0
Phenol						

Notes: NA = Not Analyzed.
Blank Space = Values less than or equal to detection limit.

Table F-1
Flow Weighted Groundwater Concentrations and Loadings--Round 1

Representative Monitoring Well	Flow Tube 6 MW-4			Flow Tube 7 MW-5		
Total Q Round 1 (gpm) = 71.0						
Flow Tube Discharge (gpm) =		5.8			4.1	
Fraction of Total Q =		0.0817			0.0577	
Constituents	Round 1 Conc.	Flow Weighted Conc.	Flow Tube Loading (lbs/day)	Round 1 Conc.	Flow Weighted Conc.	Flow Tube Loading (lbs/day)
Water Quality Parameters (mg/l)						
COD	NA	NA	NA	NA	NA	NA
Nitrogen, Ammonia	6.40	0.52	0.45	28.3	1.6	1.4
Nitrogen, Kjeldahl	NA	NA	NA	NA	NA	NA
Phosphate (Total)	0.03	0.00	0.00	0.10	0.0	0.00
Solids, Dissolved	1710	140	119	8350	482	411
Major Inorganic Ions (mg/l)						
Calcium	NA	NA	NA	NA	NA	NA
Carbonates	152	12	11	472	27	23
Chloride	46	4	3	397	23	20
Magnesium	NA	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA	NA
Sulfate	1300	106	90	4400	254	216
Trace Inorganic Compounds						
Aluminum	0.06	0.00	0.00	0.22	0.01	0.01
Antimony						
Arsenic	0.005	0.000	0.000	0.16	0.01	0.01
Barium	0.025	0.002	0.002	0.039	0.002	0.002
Boron	0.34	0.03	0.02	0.27	0.02	0.01
Cadmium						
Chromium, Total						
Copper						
Cyanide, Total						
Fluoride	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	NA
Lead						
Manganese	NA	NA	NA	NA	NA	NA
Mercury						
Nickel				0.02	0.00	0.00
Zinc	0.309	0.025	0.022	9.75	0.56	0.48
Organic Compounds (ug/l)						
Carbon disulfide	50.4	4.1	0.0	11.3	0.7	0.0
Chloroform	6.3	0.5	0.0			
1,1-Dichloroethane				1.6	0.1	0.0
1,2-Dichloroethane				30.7	1.8	0.0
1,1,1-Trichloroethane						
Phenol						

Notes: NA = Not Analyzed.
Blank Space = Values less than or equal to detection limit.

Table F-1
Flow Weighted Groundwater Concentrations and Loadings--Round 1

Representative Monitoring Well	Flow Tube 8 MW-6			Flow Tube 9 MW-7		
Total Q Round 1 (gpm) = 71.0						
Flow Tube Discharge (gpm) =	9.8			14.9		
Fraction of Total Q =	0.1380			0.2099		
Constituents	Round 1 Conc.	Flow Weighted Conc.	Flow Tube Loading (lbs/day)	Round 1 Conc.	Flow Weighted Conc.	Flow Tube Loading (lbs/day)
Water Quality Parameters (mg/l)						
COD	NA	NA	NA	NA	NA	NA
Nitrogen, Ammonia	10	1	1	0.91	0.19	0.16
Nitrogen, Kjeldahl	NA	NA	NA	NA	NA	NA
Phosphate (Total)						
Solids, Dissolved	30600	4224	3599	1050	220	188
Major Inorganic Ions (mg/l)						
Calcium	NA	NA	NA	NA	NA	NA
Carbonates	774	107	91	170	36	30
Chloride	17000	2346	1999	106	22	19
Magnesium	NA	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA	NA
Sulfate	90	12	11	360	76	64
Trace Inorganic Compounds						
Aluminum	0.20	0.03	0.02			
Antimony						
Arsenic	0.008	0.001	0.001	0.002	0.000	0.000
Barium	1.39	0.19	0.16	0.055	0.012	0.010
Boron	8.04	1.11	0.95	0.29	0.06	0.05
Cadmium						
Chromium, Total	0.005	0.001	0.001			
Copper						
Cyanide, Total						
Fluoride	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	NA
Lead						
Manganese	NA	NA	NA	NA	NA	NA
Mercury						
Nickel						
Zinc	0.074	0.010	0.009			
Organic Compounds (ug/l)						
Carbon disulfide				14.2	3.0	0.0
Chloroform						
1,1-Dichloroethane						
1,2-Dichloroethane						
1,1,1-Trichloroethane						
Phenol						

Notes: NA = Not Analyzed.
Blank Space = Values less than or equal to detection limit.

Table F-1
Flow Weighted Groundwater Concentrations and Loadings--Round 1

Representative Monitoring Well Total Q Round 1 (gpm) = 71.0 Flow Tube Discharge (gpm) = Fraction of Total Q =	Plantwide Flow Weighted Concentration in Groundwater	Plantwide Groundwater Loading (lbs/day)
Constituents		
Water Quality Parameters (mg/l)		
COD	NA	NA
Nitrogen, Ammonia	9.2	7.9
Nitrogen, Kjeldahl	NA	NA
Phosphate (Total)	0.6	0.5
Solids, Dissolved	6975	5943
Major Inorganic Ions (mg/l)		
Calcium	NA	NA
Carbonates	671	572
Chloride	2521	2148
Magnesium	NA	NA
Potassium	NA	NA
Sodium	NA	NA
Sulfate	1165	992
Trace Inorganic Compounds		
Aluminum	1.07	0.91
Antimony		
Arsenic	0.09	0.08
Barium	0.231	0.197
Boron	1.60	1.36
Cadmium	0.003	0.002
Chromium, Total	0.002	0.002
Copper	0.01	0.00
Cyanide, Total	0.007	0.006
Fluoride	NA	NA
Iron	NA	NA
Lead	0.03	0.03
Manganese	NA	NA
Mercury		
Nickel	0.01	0.01
Zinc	1.56	1.33
Organic Compounds (ug/l)		
Carbon disulfide	10.4	0.0
Chloroform	1.3	0.0
1,1-Dichloroethane	0.8	0.0
1,2-Dichloroethane	1.8	0.0
1,1,1-Trichloroethane	0.4	0.0
Phenol	3	0

Notes: NA = Not Analyzed.
Blank Space = Values less than or equal to detection limit.

Table F-2
Flow Weighted Groundwater Concentrations and Loadings--Round 2

Representative Monitoring Well	Flow Tube 1 MW-13					
Total Q Round 2 (gpm) = 78.4						
Flow Tube Discharge (gpm) =			6.0			
Fraction of Total Q =			0.0765			
Constituents	Round 2 Conc.	Flow Weighted Conc.	Flow Tube Loading (lbs/day)	Round 2 Conc. (Dup.)	Flow Weighted Conc.	Flow Tube Loading (lbs/day)
Water Quality Parameters (mg/l)						
COD	760	58	55	760	58	55
Nitrogen, Ammonia	14.1	1.1	1.0	14.3	1.1	1.0
Nitrogen, Kjeldahl	16.4	1.3	1.2	18.9	1.4	1.4
Phosphate (Total)	23.5	1.8	1.7	23.0	1.8	1.7
Solids, Dissolved	11500	880	828	11700	895	842
Major Inorganic Ions (mg/l)						
Calcium	0.188	0.014	0.014	0.190	0.015	0.014
Carbonates	7000	536	504	7600	582	547
Chloride	30	2	2	30	2	2
Magnesium	0.040	0.003	0.003	0.045	0.003	0.003
Potassium	3.1	0.2	0.2	2.8	0.2	0.2
Sodium	3600	276	259	3080	236	222
Sulfate	180	14	13	160	12	12
Trace Inorganic Compounds						
Aluminum	0.90	0.07	0.06	0.86	0.07	0.06
Antimony						
Arsenic	0.09	0.01	0.01	0.08	0.01	0.01
Barium	0.51	0.04	0.04	0.39	0.03	0.03
Boron	0.74	0.06	0.05	3.10	0.24	0.22
Cadmium						
Chromium, Total	0.010	0.001	0.001	0.012	0.001	0.001
Copper	0.06	0.00	0.00	0.08	0.01	0.01
Cyanide, Total						
Fluoride	3	0	0	4	0	0
Iron	1.63	0.12	0.12	1.38	0.11	0.10
Lead	0.08	0.01	0.01	0.15 J	0.01	0.01
Manganese						
Mercury						
Nickel	0.02	0.00	0.00	0.03	0.00	0.00
Zinc	0.160	0.012	0.012	0.150	0.011	0.011
Organic Compounds (ug/l) (a)						
Carbon disulfide						
Chloroform				2.1	0.1607	0.0002
1,1-Dichloroethane						
1,2-Dichloroethane						
1,1,1-Trichloroethane						
Phenol	208	16	0	198	15	0

Notes: NA = Not Analyzed.
Blank Space = Values less than or equal to detection limit.

Table F-2
Flow Weighted Groundwater Concentrations and Loadings--Round 2

Representative Monitoring Well	Flow Tube 2 MW-14			Flow Tube 3 MW-15		
Total Q Round 2 (gpm) = 78.4						
Flow Tube Discharge (gpm) =		14.0			10.7	
Fraction of Total Q =		0.1786			0.1365	
Constituents	Round 2 Conc.	Flow Weighted Conc.	Flow Tube Loading (lbs/day)	Round 2 Conc.	Flow Weighted Conc.	Flow Tube Loading (lbs/day)
Water Quality Parameters (mg/l)						
COD	14	2	2	68	9	9
Nitrogen, Ammonia	17.2	3.1	2.9	0.70	0.10	0.09
Nitrogen, Kjeldahl	19.0	3.4	3.2	2.46	0.34	0.32
Phosphate (Total)	1.55	0.28	0.26	2.77	0.38	0.36
Solids, Dissolved	3490	623	586	2630	359	338
Major Inorganic Ions (mg/l)						
Calcium	731	131	123	519	71	67
Carbonates	156	28	26	440	60	56
Chloride	670	120	113	40	5	5
Magnesium	87.5	15.6	14.7	94.0	12.8	12.1
Potassium	3.95	0.71	0.66	8.3	1.1	1.1
Sodium	41.5	7.4	7.0	83.7	11.4	10.7
Sulfate	1000	179	168	1900	259	244
Trace Inorganic Compounds						
Aluminum	0.13	0.02	0.02	0.12	0.02	0.02
Antimony						
Arsenic	0.014	0.002	0.002	0.26	0.04	0.03
Barium	0.11	0.02	0.02			
Boron	0.26	0.05	0.04	0.40	0.05	0.05
Cadmium				0.006	0.001	0.001
Chromium, Total						
Copper						
Cyanide, Total						
Fluoride	4	1	1	11	2	1
Iron	23.3 J	4.2	3.9	15.0	2.0	1.9
Lead						
Manganese	1.00 J	0.18	0.17	0.72	0.10	0.09
Mercury						
Nickel	0.02	0.00	0.00			
Zinc	2.11	0.38	0.35	2.49	0.34	0.32
Organic Compounds (ug/l) (a)						
Carbon disulfide						
Chloroform						
1,1-Dichloroethane						
1,2-Dichloroethane						
1,1,1-Trichloroethane						
Phenol						

Notes: NA = Not Analyzed.
Blank Space = Values less than or equal to detection limit.

Table F-2
Flow Weighted Groundwater Concentrations and Loadings--Round 2

	Flow Tube 4					
Representative Monitoring Well	MW-3			MW-3		
Total Q Round 2 (gpm) = 78.4						
Flow Tube Discharge (gpm) =	5.6			5.6		
Fraction of Total Q =	0.0714			0.0714		
Constituents	Round 2 Conc.	Flow Weighted Conc.	Flow Tube Loading (lbs/day)	Round 2 Conc. (Dup.)	Flow Weighted Conc.	Flow Tube Loading (lbs/day)
Water Quality Parameters (mg/l)						
COD	30	2	2	27	2	2
Nitrogen, Ammonia	2.36	0.17	0.16	2.31	0.17	0.16
Nitrogen, Kjeldahl	1.77	0.13	0.12	1.90	0.14	0.13
Phosphate (Total)	2.45	0.18	0.16	2.52 J	0.18	0.17
Solids, Dissolved	1690	121	114	1670	119	112
Major Inorganic Ions (mg/l)						
Calcium	299	21	20	287	21	19
Carbonates	268 J	19	18	300	21	20
Chloride	40	3	3	40	3	3
Magnesium	71.5	5.1	4.8	67.0	4.8	4.5
Potassium	6.26	0.45	0.42	5.98	0.43	0.40
Sodium	61.0	4.4	4.1	57.2	4.1	3.8
Sulfate	1500	107	101	1400	100	94
Trace Inorganic Compounds						
Aluminum	0.03	0.00	0.00	0.03	0.00	0.00
Antimony						
Arsenic	1.7	0.1	0.1	2.1	0.2	0.1
Barium	0.15	0.01	0.01	0.14	0.01	0.01
Boron	0.23	0.02	0.02	0.28	0.02	0.02
Cadmium	0.064	0.005	0.004	0.068	0.005	0.005
Chromium, Total	0.007	0.001	0.000	0.007	0.001	0.000
Copper						
Cyanide, Total						
Fluoride	2	0	0	0.8	0.1	0.1
Iron	13.6	1.0	0.9	13.5	1.0	0.9
Lead						
Manganese	1.33	0.10	0.09	1.24	0.09	0.08
Mercury						
Nickel	0.01	0.00	0.00			
Zinc	0.1	0.0	0.0	0.020	0.0	0.0
Organic Compounds (ug/l) (a)						
Carbon disulfide	20.9	1.5	0.0	14.4	1.0	0.0
Chloroform						
1,1-Dichloroethane						
1,2-Dichloroethane						
1,1,1-Trichloroethane						
Phenol						

Notes: NA = Not Analyzed.
Blank Space = Values less than or equal to detection limit.

Table F-2
Flow Weighted Groundwater Concentrations and Loadings--Round 2

	Flow Tube 5					
Representative Monitoring Well	MW-20			MW-20		
Total Q Round 2 (gpm) = 78.4						
Flow Tube Discharge (gpm) =	4.8					
Fraction of Total Q =	0.0612					
Constituents	Round 2 Conc.	Flow Weighted Conc.	Flow Tube Loading (lbs/day)	Round 2 Conc. (Dup.)	Flow Weighted Conc.	Flow Tube Loading (lbs/day)
Water Quality Parameters (mg/l)						
COD	126	8	7	142	9	8
Nitrogen, Ammonia	5.54	0.34	0.32	5.32	0.33	0.31
Nitrogen, Kjeldahl	4.90	0.30	0.28	5.62	0.34	0.32
Phosphate (Total)	4.45	0.27	0.26	4.45	0.27	0.26
Solids, Dissolved	5200	318	300	5250	321	302
Major Inorganic Ions (mg/l)						
Calcium	320	20	18	324	20	19
Carbonates	570	35	33	610	37	35
Chloride	310	19	18	370	23	21
Magnesium	108	7	6	110	7	6
Potassium	30.5	1.9	1.8	30.8	1.9	1.8
Sodium	986	60	57	1190	73	69
Sulfate	3500	214	202	3900	239	225
Trace Inorganic Compounds						
Aluminum	0.09	0.01	0.01	0.04	0.00	0.00
Antimony						
Arsenic	0.005	0.000	0.000	0.005	0.000	0.000
Barium	0.03	0.00	0.00			
Boron	1.22	0.07	0.07	1.27	0.08	0.07
Cadmium						
Chromium, Total						
Copper						
Cyanide, Total						
Fluoride	7	0	0	8	0	0
Iron	0.20	0.01	0.01	0.12	0.01	0.01
Lead	0.05	0.00	0.00			
Manganese	0.62	0.04	0.04	0.56	0.03	0.03
Mercury				0.0008	0.0000	0.0000
Nickel						
Zinc	0.071	0.00	0.00	0.029	0.002	0.002
Organic Compounds (ug/l) (a)						
Carbon disulfide	44.0	2.7	0.0	53.7	3.3	0.0
Chloroform						
1,1-Dichloroethane	6.7	0.4	0.0	6.4	0.4	0.0
1,2-Dichloroethane						
1,1,1-Trichloroethane	1.3	0.1	0.0	1.3	0.1	0.0
Phenol						

Notes: NA = Not Analyzed.
Blank Space = Values less than or equal to detection limit.

Table F-2
Flow Weighted Groundwater Concentrations and Loadings--Round 2

Representative Monitoring Well	Flow Tube 6 MW-4			Flow Tube 7 MW-5		
Total Q Round 2 (gpm) = 78.4						
Flow Tube Discharge (gpm) =	8.5			6.0		
Fraction of Total Q =	0.1084			0.0765		
Constituents	Round 2 Conc.	Flow Weighted Conc.	Flow Tube Loading (lbs/day)	Round 2 Conc.	Flow Weighted Conc.	Flow Tube Loading (lbs/day)
Water Quality Parameters (mg/l)						
COD	37	4	4	105	8	8
Nitrogen, Ammonia	19.5	2.1	2.0	21.2	1.6	1.5
Nitrogen, Kjeldahl	21.6	2.3	2.2	25.0	1.9	1.8
Phosphate (Total)	0.76 J	0.08	0.08	0.80	0.06	0.06
Solids, Dissolved	2980	323	304	9310	712	670
Major Inorganic Ions (mg/l)						
Calcium	570	62	58	678	52	49
Carbonates	230	25	23	760	58	55
Chloride	50	5	5	470	36	34
Magnesium	99.5	10.8	10.1	1080	83	78
Potassium	16.5	1.8	1.7	22.5	1.7	1.6
Sodium	75.2	8.2	7.7	244	19	18
Sulfate	2500	271	255	7030	538	506
Trace Inorganic Compounds						
Aluminum				0.10	0.01	0.01
Antimony						
Arsenic	0.012	0.001	0.001	0.32	0.02	0.02
Barium				0.04	0.00	0.00
Boron	0.42	0.05	0.04	1.24	0.09	0.09
Cadmium						
Chromium, Total	0.013	0.001	0.001			
Copper						
Cyanide, Total						
Fluoride	1.8	0.2	0.2	12	1	1
Iron	51.0	6	5	132	10	10
Lead						
Manganese	1.00	0.11	0.10	2.35	0.18	0.17
Mercury						
Nickel	0.02	0.00	0.00	0.02	0.00	0.00
Zinc	1.14	0.12	0.12	11.4	0.9	0.8
Organic Compounds (ug/l) (a)						
Carbon disulfide	75.4	8.2	0.0	21.4	1.6	0.0
Chloroform	1.0	0.1	0.0			
1,1-Dichloroethane				2.4	0.2	0.0
1,2-Dichloroethane				44.7 J	3.4	0.0
1,1,1-Trichloroethane						
Phenol						

Notes: NA = Not Analyzed.
Blank Space = Values less than or equal to detection limit.

Table F-2
Flow Weighted Groundwater Concentrations and Loadings--Round 2

Representative Monitoring Well	Flow Tube 8 MW-6			Flow Tube 9 MW-7		
Total Q Round 2 (gpm) = 78.4						
Flow Tube Discharge (gpm) =		13.0			9.5	
Fraction of Total Q =		0.1658			0.1212	
Constituents	Round 2 Conc.	Flow Weighted Conc.	Flow Tube Loading (lbs/day)	Round 2 Conc.	Flow Weighted Conc.	Flow Tube Loading (lbs/day)
Water Quality Parameters (mg/l)						
COD	509	84	79	98	12	11
Nitrogen, Ammonia	5.51	0.91	0.86	0.89	0.11	0.10
Nitrogen, Kjeldahl	6.16	1.02	0.96	0.95	0.12	0.11
Phosphate (Total)	0.05	0.01	0.01	1.92	0.23	0.22
Solids, Dissolved	28700	4759	4477	987	120	113
Major Inorganic Ions (mg/l)						
Calcium	7560	1254	1179	218	26	25
Carbonates	1170 J	194	183	230	28	26
Chloride	18000	2985	2808	150	18	17
Magnesium	498	83	78	32	4	4
Potassium	45.4	7.5	7.1	3.5	0.4	0.4
Sodium	730	121	114	51.2	6.2	5.8
Sulfate	180	30	28	400	48	46
Trace Inorganic Compounds						
Aluminum	0.39	0.06	0.06			
Antimony	0.08	0.01	0.01			
Arsenic	0.030	0.00	0.00	0.002	0.000	0.000
Barium	2.15	0.36	0.34	0.04	0.00	0.00
Boron	10.9	1.8	1.7	0.37	0.04	0.04
Cadmium						
Chromium, Total				0.013	0.002	0.001
Copper				0.01	0.00	0.00
Cyanide, Total						
Fluoride	2	0	0	4	0	0
Iron	619	103	97	15.9	1.9	1.8
Lead				0.05 J	0.01	0.01
Manganese	6.14	1.02	0.96	0.51	0.06	0.06
Mercury						
Nickel				0.07	0.01	0.01
Zinc	0.070	0.012	0.011	0.034	0.004	0.004
Organic Compounds (ug/l) (a)						
Carbon disulfide	39.7	6.6	0.0	28.8	3.5	0.0
Chloroform						
1,1-Dichloroethane						
1,2-Dichloroethane						
1,1,1-Trichloroethane						
Phenol						

Notes: NA = Not Analyzed.
Blank Space = Values less than or equal to detection limit.

Table F-2
Flow Weighted Groundwater Concentrations and Loadings--Round 2

Representative Monitoring Well Total Q Round 2 (gpm) = 78.4 Flow Tube Discharge (gpm) = Fraction of Total Q =	Plantwide Flow Weighted Groundwater Concentration (mg/l) *	Plantwide Groundwater Loading (lbs/day) *
Constituents		
Water Quality Parameters (mg/l)		
COD	188	177
Nitrogen, Ammonia	9.51	8.95
Nitrogen, Kjeldahl	10.80	10.16
Phosphate (Total)	3.29	3.09
Solids, Dissolved	8215	7729
Major Inorganic Ions (mg/l)		
Calcium	1636	1538
Carbonates	983	927
Chloride	3193	3004
Magnesium	220	207
Potassium	15.9	14.9
Sodium	513	483
Sulfate	1660	1555
Trace Inorganic Compounds		
Aluminum	0.19	0.18
Antimony	0.01	0.01
Arsenic	0.20	0.21
Barium	0.44	0.41
Boron	2.2	2.1
Cadmium	0.005	0.005
Chromium, Total	0.004	0.004
Copper	0.01	0.01
Cyanide, Total	0.000	0.000
Fluoride	5	5
Iron	127.5	120.0
Lead	0.02	0.01
Manganese	1.78	1.67
Mercury	0.0000	0.0000
Nickel	0.02	0.02
Zinc	1.752	1.643
Organic Compounds (ug/l) (a)		
Carbon disulfide	24.1	0.0
Chloroform	0.1	0.0
1,1-Dichloroethane	0.6	0.0
1,2-Dichloroethane	3.4	0.0
1,1,1-Trichloroethane	0.1	0.0
Phenol	16	0

Notes: NA = Not Analyzed.
Blank Space = Values less than or equal to detection limit.

Appendix F Contents

o Loading Computations Discussion

Appendix G

MEMORANDUM: RILEY PARK WELL AND BASEMENT SUMP SURVEY

CH-1046 REV. 11/80

DU PONT

ESTABLISHED 1802

E. I. DU PONT DE NEMOURS & COMPANY

INCORPORATED

EAST CHICAGO, INDIANA 46312

CHEMICALS AND PIGMENTS DEPARTMENT

Dear Resident,

Under contract to Du Pont, CH2M HILL is performing a survey of groundwater use in your neighborhood. The attached press release briefly describes the survey.

We stopped by today with a brief questionnaire, but no one was at home. We would like to schedule a convenient time for an interview, please call 391-4600 today until 7:30 p.m. and ask for Dave Cox. We hope you will cooperate with this survey.

We appreciate your assistance.

CHI120\006

CH-1046 REV. 11/80

ESTABLISHED 1802

E. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED

EAST CHICAGO, INDIANA 46312

CHEMICALS AND PIGMENTS DEPARTMENT

Muy Estimado Residente,

Bajo contracto con Du Pont, CH2M HILL está conduciendo un investigación de uso de agua subterránea an su vecinidad. La noticia acompañando esta carta describe la investigación.

Visitamos su casa hoy, pero nadie estuvo a casa. Quisiéramos arreglar un tiempo conveniente por una entrevista. Por favor llamar a 391-4600 hoy antes de 7:30 por la tarde y pedir por Dave Cox.

Apreciéramos toda la assistencia que pueden darnos con este investigación.

CHI120\006

Appendix G Contents

Memorandum: Riley Park Well & Basement Sump Survey

- Attachment A: Questionnaire
- Attachment B: First Contact Letter and Press Release
- Attachment C: Second and Third Contact Letters

MEMORANDUM

TO: Gene Hartstein/Du Pont
O. J. Meyer/Du Pont
Steve Cline/Du Pont

FROM: Pixie Newman/CH2M HILL
Don Johnson/CH2M HILL
Bernice Aument/CH2M HILL

DATE: October 15, 1990

PROJECT NO: CHI28770.A0.SU

SUBJECT: Riley Park
Well & Basement Sump Survey

Note: Specific addresses are not presented in this Appendix to protect the confidentiality of individual residents.

INTRODUCTION

This memorandum presents the results of a door-to-door well and basement sump survey in the Riley Park neighborhood of East Chicago, Indiana. Interviews were conducted between September 26 and 28, 1990. Land use in the study area is primarily residential, with a few businesses on the northern and western margins of the area. It is bordered by Chicago Avenue to the north, Huish Street to the west, Parrish Avenue to the east, and an unnamed road just north of the E.J. and E. Railroad right-of-way to the south (Figure 1).

The preliminary results of the Phase II East Chicago Plant Groundwater Assessment showed groundwater concentrations of arsenic and cadmium in excess of the federal primary drinking water standards at sites located near the northern edge of the plant. Water levels in wells open to the shallow Calumet Sand aquifer indicate that the potential exists for groundwater to flow both north and south away from the center of the plant.

When the potential for offsite migration of contaminated groundwater was discovered, Du Pont asked CH2M HILL to conduct a survey of groundwater use in the Riley Park area. The purpose of this survey was to locate wells and basement sumps that may be affecting the direction and rate of groundwater flow north of the plant. This information was also used to determine the need for and scope of future investigations in this area.

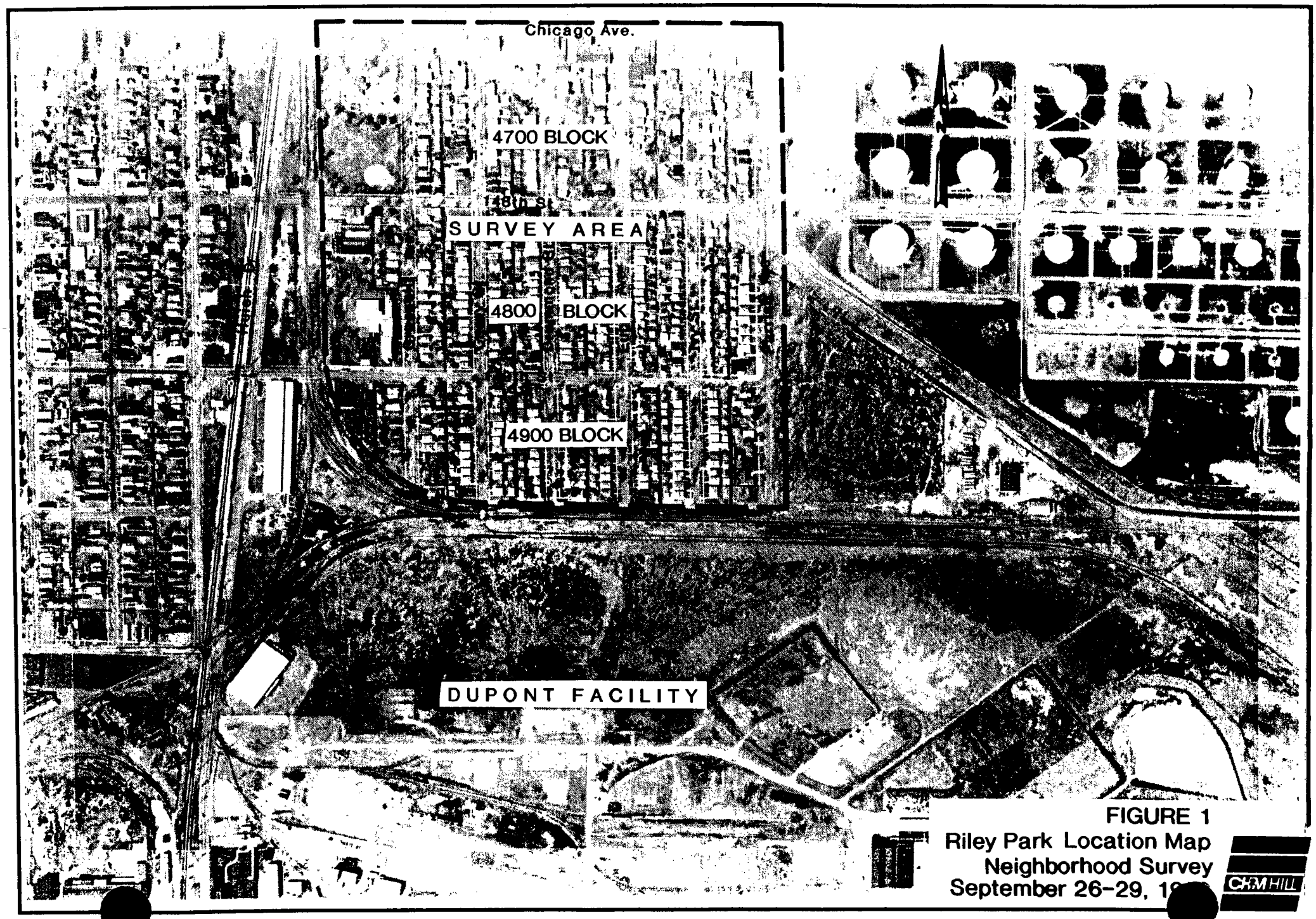

FIGURE 1
Riley Park Location Map
Neighborhood Survey
September 26-29, 19

APPROACH AND RESPONSE RATE

The task team consisted of five 2-person, door-to-door survey crews and one person dedicated to tracking survey progress and processing information collected. The crews attempted to interview an occupant of each residence or business in the survey area.

A maximum of three attempts to interview were made at each address. If an individual was available to answer the survey questions, the questionnaire (Attachment A) was completed and a copy of the press release was provided to the respondent. If no resident was available to answer the survey questions during the first attempt, the survey team left copies of the first contact letter and the press release (Attachment B). Second and third attempts were made by contact letter mailings (see Attachment C). The options of making an appointment to complete the survey or completing the survey by phone were presented.

Of the 454 residences and businesses surveyed, 369 (81 percent) responded. Responses are summarized in Table 1. A listing of those who did not respond was submitted to the City of East Chicago Water Department to verify that these residences are supplied with City water.

RESULTS

PRIVATE WELLS

No drinking water wells were reported to exist in the study area. Four private wells used for other purposes were located during the survey. Of these wells, one on Ivy Street is currently in use. This well is used exclusively for the purpose of removing basement seepage. The other three wells are inactive and were never used to produce water for purposes of consumption.

A well on Euclid Street was removed approximately 25 years ago. The current resident reported the well to be about 12 feet deep. It was used for watering fruits, vegetables, lawns, and flower gardens. The well is no longer used.

A well point about 4 feet deep was installed in a residential basement on Ivy Street in August of 1990. The pump is activated during rainstorm events to remove excess water from the basement. The well discharges directly to the sewer.

A steel well point was installed in another residential basement on Ivy Street approximately 12 years ago. It is 5 feet deep and was formerly used to water gardens and lawns. The owner reported the water to be oily-smelling and "caustic," and attributed the poor water quality to a former junk/scrap yard east of Parrish Street. The well is no longer used.

The presence of a well on Carey Street was reported by a neighboring Carey Street resident. The current resident at this address may not know that the well exists. Allegedly, it was located outside the garage and was used to water gardens.

BASEMENT SUMPS AND FLOODING

All recorded basement flooding problems were evaluated to determine if the primary cause for flooding was shallow depth to groundwater. Locations where basement flooding occurred only during heavy rain events were not considered to be groundwater-related problems.

Thirty-two residences with basement flooding problems attributable to high water table conditions were identified. Thirty of these residences use sump pumps to remove the excess water. Two residents relied solely on the basement floor drain, or manual efforts (mop, shop vacuum) to remove excess water.

Sixteen of the thirty residences using sumps reported that their pumps operate continuously and adequately remove the excess water; three did not know the frequency of operation of their sump pump, but felt the excess water was removed adequately; and eleven continued to experience basement flooding despite the use of the sump pump.

Sump water is discharged directly to the sewer (14 of the 30, or 47 percent), the ground surface (8 of the 30, or 27 percent), and both the sewer and the ground surface (2 of the 30, or 7 percent). Six of the residents who actively remove excess water from their basements did not know where this water was discharged.

Table 1
RILEY PARK SUMP AND BASEMENT INFORMATION
SEPT 26-SEPT 29, 1990

STREET ADDRESS INDIVIDUAL ADDRESSES CONFIDENTIAL	NAME/CONTACT NAMES CONFIDENTIAL	CONTACT MADE X=YES	EAST CHICAGO WATER X=YES	PRIVATE WELL X=YES	SUMP PUMPS PUMP X=YES	SUMP PUMPS RUN CONT. X=YES	SUMP PUMPS DISCHARGE	BASEMENT FLOODING FLOOD X=YES	BASEMENT FLOODING WHEN H=HEAVY	BASEMENT FLOODING HOW OFTEN H=HEAVY	BASEMENT FLOODING DEPTH	ACCESS X=YES	BASEMENT WATER DISPOSAL METHOD(S) AND OTHER COMMENTS
4700 BLOCK CAREY STREET		X	X					X	H.RAINS				DOWN SEWER
		X	X										
		X	X										
		X	X										
		X	X										
		X	X					X	H.RAINS	3/25 YRS			
		X	X										
		X	X					?					CITY PUMP STATION OFF
		X	X										
		X	X						H.RAINS	1/YR		X	DOWN SEWER
		X	X						H.RAINS	1/YR		X	DOWN SEWER
		X	X						H.RAINS	2/YR	3-4"	X	DOWN SEWER
		X	X		X								
		X	X					X	H.RAIN		1'	X	DOWN SEWER
		X	X		X								
		X	X	?									
		X	X					X					CITY PUMP STATION OFF
		X	X										DOWN SEWER
		X	X	?					RARELY				
		X	X		X		SEWER						DOWN SEWER
		X	X		?			X	H.RAIN	RARELY	2"		
		X	X										
		X	X										DOWN SEWER
		X	X										
		X	X										
		X	X										NO BASEMENT
		X	X										
		X	X										DOWN SEWER
		X	X										
		X											
4800 BLOCK CAREY STREET		X	X										
		X	X					X	RAINS	RAIN	1'	X	DOWN SEWER
		X											UNFINISHED ADDITION
		X	X					X	H.RAIN	1/YR	1'	X	DOWN SEWER
		X											
		X	X										
		X	X		X		SEWER					X	PUMP HASN'T RUN FOR A YEAR
		X	X									X	
		X	X										
		X	X										
		X	X										
		X	X										DAMP, SPANISH
		X	X										
		X	X										
		X	X										
		X											NO BASEMENT
		X	X										
		X	X					X	H.RAINS			X	DOWN DRAIN
		X	X										
		X	X		X		SEWER						
		X	X					X	H.RAINS		1/4"	X	WET/DRY VACUUM
		X	X										
		X											
		X	X					X	H.RAINS		1/2"	X	FLOOR DRAIN
		X	X										
		X	X		X		SEWER						SEEPAGE

Table 1
RILEY PARK SUMP AND BASEMENT INFORMATION
SEPT 26-SEPT 29, 1990

STREET ADDRESS INDIVIDUAL ADDRESSES CONFIDENTIAL	NAME/CONTACT NAMES CONFIDENTIAL	CONTACT MADE X=YES	EAST CHICAGO WATER X=YES	PRIVATE WELL X=YES	SUMP PUMPS PUMP X=YES	SUMP PUMPS RUN CONT. X=YES	SUMP PUMPS DISCHARGE	BASEMENT FLOODING FLOOD X=YES	BASEMENT FLOODING WHEN H=HEAVY	BASEMENT FLOODING HOW OFTEN H=HEAVY	BASEMENT FLOODING DEPTH	ACCESS X=YES	BASEMENT WATER DISPOSAL METHOD(S) AND OTHER COMMENTS
4800 BLOCK CAREY STREET		X	X					X	H.RAINS		SEEPAGE	X	
		X											
		X	X					X	RAINS		2"	X	SEEPAGE
		X	X										
		X											
		X	X										DAMP
		X	X										
		X	X										
		X	X										
		X	X		X			X					
		X	X										
4900 BLOCK CAREY STREET		X	X										
		X											
		X	X		X		SIDE OF HOUSE	X	RAINS		1"	X	
		X	X							ONCE		X	SEEPAGE
		X	X								SEEPAGE	X	DOWN DRAIN
		X	X										SEEPAGE
		X											
		X	X		X		CITY SEWER	X	H.RAINS	TWICE		X	
		X	X										NO BASEMENT
		X	X								SEEPAGE	X	SEWER
		X	X					X		OFTEN	3'		SEEPAGE/SOAK UP W/NEWSPAP
		X	X		X		CITY SEWER						DAMP
		X	X					X	TWICE	RARELY			LARGE TREE ROOTS
		X	X		2	X	ALLEY/YARD	X	CITY NO P	H.RAIN	5-6"	X	DOWN DRAIN
		X	X		X		SEWER	X	RAINS		1"	X	BAIL WATER OUT
		X	X		X	X	CITY SEWER	X				X	SUMP PUMP KEEPS UP
		X	X										
		X	X					X	RAINS	RAIN	6" MAX	X	DOWN DRAIN
		X	X		X	X	SEWER					X	DAMP
		X	X					X	RAINS	RAIN	<1"	?	FIX BASEMENT NEXT WEEK
		X	X					X	H.RAINS	RAINS	1"	X	WET/DRY VAC
		X	X					X	*RAINS*		*TRICKLES*		*SEEPAGE*
		X	X		X	X	SEWER	X	DAILY	TWICE/DA	4"	X	
		X	X		X	X	YARD					X	
4700 BLOCK DRUMMOND STREET		X	X		X		SEWER	X	H.RAIN	H.RAIN	6-8"	X	
		X											
		X											
		X	X										
		X	X						ONCE				
		X											
		X	X						*H.RAIN*				*SEEPAGE*
		X	X										
		X	X										
		X	X										
		X	X	?								NO	
		X	X									*NO*	
		X											
		X	X					X					
		X											
		X	X					X					BAD DRAINAGE
		X	X					X	H.RAINS	H.RAINS	3"	X	DOWN SEWER
		X	X										
		X											
		X	X										

Table 1
RILEY PARK SUMP AND BASEMENT INFORMATION
SEPT 26-SEPT 29, 1990

STREET ADDRESS INDIVIDUAL ADDRESSES CONFIDENTIAL	NAME/CONTACT NAMES CONFIDENTIAL	CONTACT MADE X=YES	EAST CHICAGO WATER X=YES	PRIVATE WELL X=YES	SUMP PUMPS PUMP X=YES	SUMP PUMPS RUN CONT. X=YES	SUMP PUMPS DISCHARGE	BASEMENT FLOODING FLOOD X=YES	BASEMENT FLOODING WHEN H=HEAVY	BASEMENT FLOODING HOW OFTEN H=HEAVY	BASEMENT FLOODING DEPTH	ACCESS X=YES	BASEMENT WATER DISPOSAL METHOD(S) AND OTHER COMMENTS
4700 BLOCK DRUMMOND STREET		X	X										
		X	X										
		X											
		X	X									NO	
		X											
		X											
		X	X										
		X	X										
		X	X										NO BASEMENT
4800 BLOCK DRUMMOND STREET		X											
		X	X										
		X											
		X											
		X	X										
		X	X										
		X											
		X	X					X	H.RAIN	H.RAIN	<1/2"	X	
		X	X					X	RAINS	2/YR	<1"	N0	DOWN DRAIN
		X	X					X	H.H.RAIN			X	WAIT TILL DRIES UP
		X	X					X	H.RAIN	H.RAIN	<1/2"	X	MOP UP WATER
		X	X										
		X	X		X		BACK YARD	X	RAINS	RAINS		X	REPLACE SHOPVAC
		X											GAVE PAPER, UNCOOPERATIVE
		X	X		?								
		X											GAVE PAPER, UNCOOPERATIVE
		X	X					X	H.RAIN	H.RAIN	SEEPAGE		
		X	X										
		X	X					X	H.RAINS	H.RAINS			FLOOR DRAIN
		X	X										
		X	X										
		X	X										
		X	X										
		X	X					X	RAINS	RAINS	SHALLOW		WAIT TILL DRIES UP
		X											
		X	X										
		X											
		X	X					X	FLOOD		SHALLOW	X	
		X	X							H.RAIN	TRICKLE		
		X											
		X	X					X	RAINS	RAINS	EV INCHE	X	VACUUM/DOWN SEWER
		X	X					X	RAIN/SNOW MELT		SEEPAGE	X	DOWN DRAIN
		X											
		X	X										
		X	X					X	RAINS	RAINS	PUDDLES	X	MOP TO FLOOR DRAIN
		X	X										NO BASEMENT
		X	X										
		X											
		X	X										SEEPAGE
		X	X										
		X	X					X	RAINS	RAIN	PUDDLES		DOWN DRAIN
BLOCK DRUMMOND STREET		X											
		X	X										
		X	X										
		X	X					X	H.RAINS	H.RAIN	1"	?	MOP/FLOOR DRAIN
		X	X	?									
		X	X					X	OCCASS	H.RAINS	SEV. FEET		FLOOR DRAIN

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4900 BLOCK DRUMMOND STREET		X											
		X	X										
		X	X					X	H.RAINS	H.RAINS	1/2"		FLOOR DRAIN
		X											
		X	X										
		X	X		X		BACK YARD						
		X											
		X	X										SEEPAGE
		X	X					X			1/2"	X	PUDDLES
		X	X					X			1"		
		X	X		X	X	SEWER						
		X	X					X	RAINS	RAINS	2"		WAIT TILL DRIES UP
		X	X										
		X	X		X		CITY SEWER					X	
		X	X					X	RAIN	RAIN	1"		MOP UP
		X	X					X	H.RAINS	HRAINS	SEPPAGE	X	WAIT TILL DRIES UP
		X	X		X	X	YARD	X				X	
		X	X		?			X					
		X	X		X	?	?						
4700 BLOCK EUCLID AVENUE		X	X					X	INFREQ	H.RAIN			
		X	X										
		X	X										
		X	X										
		X	X										
		X	X										
		X	X					X	H.RAIN	SEEPAGE	FILM		
		X	X					X	RAIN	INFREQ	INCHES	X	
		X	X										
		X	X										
		X	X										
		X	X					?	H.RAIN	H.RAIN		?	
		X	X										
		X	X										
		X											
		X	X										
		X	X										
		X											
		X	X										
4800 BLOCK EUCLID AVENUE		X	X					X	RAIN	RAIN	4-6"	X	
		X	X										
		X	X										
		X											
		X	X										
		X											
		X	X										
		X	X										
		X	X		X		SEWER	X	H.RAIN			X	
		X											
		X	X										
		X	X										
		X	X										SEEPAGE
		X	X										
		X	X					X	H.RAINS	H.RAINS	SEEPAGE		
		X	X					X	RAIN	RAIN	1-6"	X	PORTABLE PUMP TO STREET
		X	X										

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4800 BLOCK EUCLID AVENUE		X											
		X	X					X	1980	1/10 YR			
		X	X										
		X	X										
		X	X										
		X	X					X		2/20 YR			
		X	X					X	RAIN		WET FLOORS		DOWN DRAIN
		X	X										
		X	X										
		X	X										
		X	X					X		1/11YR	ANKLE		
		X											
		X	X									?	
		X	X					X	H.RAINS	RAIN	1-2"	X	DOWN DRAIN
		X	X										
		X											
		X	X					X	H.RAINS	1/8 YRS			
		X	X										SEEPAGE
		X	X										
		X	X					X			NOT MUCH		SEEPAGE
		X	X	X	G			X	1957	INFREQ		X	WELL REM. 2-5 YRS/AGO
4900 BLOCK EUCLID AVENUE		X	X		?			?				?	SEEPAGE
		X											
		X	X		X		BACK YARD	X	RAIN		MESSY"	X	SQUEEGY
		X	X										
		X	X					X	RAIN	RAIN	2"	X	FLOOR DRAIN
		X	X										
		X	X					X	RAIN	RAIN		X	
		X	X					X	SEWER B	INFREQ	1"	X	WET/DRY VACUUM
		X	X		X		CITY SEWER					X	
		X											
		X	X					X	H.RAINS	RAINS	1"	X	SEWER
		X	X					X	RAIN	RAIN	1/8"		SQUEEGE WATER TO DRAIN
		X	X										
		X											
		X	X										
		X	X		X		CITY SEWER	X	RAINS		TRICKLES	X	SUMP PUMP WATER OUT
		X	X		?			X	H.RAINS	RAINS	SEEPAGE	X	WAIT TILL DRIES UP
		X	X		X	X	OUTSIDE	X	H.RAINS	RAINS	12"	X	DOWN DRAIN
		X											
		X											
		X	X					X	RAINS	RAINS	?		WAIT TILL DRIES UP
		X											
		X	X		X	X	?	X	H.RAINS	H.RAINS	INCHES	?	
		X	X									X	
		X	X		X	X	SEWER	X	RAINS	RAINS		X	ALL SUMMER DURING RAINS
4700 BLOCK GRASSELLI AVENUE		X	X										
		X	X		?								
		X	X		X			X	H.RAIN	H.RAIN	SHALLOW	X	DOWN DRAIN
		X	X					?					
		X											
		X	X										
		X	X										DRAIN BACKS-UP
		X	X										
		X											

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4700 BLOCK GRASSELLI AVENUE		X											
		X	X		?			X	RAINS		PUDDLE	?	DRAIN BACKS UP
		X	X										
		X											
		X											
		X	X					X	H.RAINS	OCC.	PUDDLES	X	
		X	X					X	H.RAINS	H.RAINS	6"	X	FLOOR DRAIN
		X											
		X	X					X	H.RAINS	H.RAINS	1/2"	X	DRAIN BACKS UP
		X											
		X	X					X	H.RAINS	H.RAINS	TRICKLE	X	FLOOR DRAIN
		X	X										
		X	X										
		X	X										
4800 BLOCK GRASSELLI AVENUE		X	X										
		X											
		X	X					X	H.RAINS	RAINS	?	X	FLOOR DRAIN
		X	X					X					
		X	X										
		X	X		X		BACK YARD					?	
		X	X					X	RAINS	NOT OFT	TRICKLE	?	FLOOR DRAIN/VACUUM UP
		X	X					X	RAINS	RARELY		X	
		X	X										
		X	X		X			X	H.RAINS	H.RAINS	1"	X	DOWN DRAIN
		X	X										
		X											
		X	X					X	H.RAINS		SEEPAGE	X	FLOOR DRAIN
		X											
		X	X		X		SEWER	X	H.RAINS	H.RAINS	SEEPAGE	X	FLOOR DRAIN/BACKUP
		X	X										
		X	X		X		SEWER					X	
		X											
		X	X					X	RAINS	H.RAINS	SEEPAGE	X	FLOOR DRAIN
		X	X		X		SEWER	X	H.RAINS	H.RAINS	SEEPAGE	X	SUMP PUMP OUT
		X	X					X	1975	ONCE	3"		
		X	X					X	H.RAINS		1"	N	FLOOR DRAIN
		X	X										
		X	X					X	ALWAYS	MORE WH	1"	?	FLOOR DRAIN
		X											
		X	X					X	H.RAINS	H.RAINS	1" FL	X	DRAIN TO SEWER
		X											
		X	X										
		X	X										
4900 BLOCK GRASSELLI AVENUE		X	X										SEEPAGE
		X	X										
		X	X										
		X	X										
		X	X										
		X	X					X	H.RAINS	H.RAINS	1" MAX	X	FLOOR DRAIN
		X	X					X	RAINS	RAINS	SEEPAGE	?	
		X	X					X	H.RAIN	H.RAIN	TRICKLE	X	WET/DRY VACUUM UP
		X											
		X	X										SEEPAGE
		X	X					X	H.RAIN/SNOW MELT		3-4"	X	FLOOR DRAIN
		X											
		X	X		X		FRONT LAWN					?	

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4900 BLOCK GRASSELLI AVENUE		X	X					X	H.RAIN	RAIN			DOWN DRAIN
		X	X		X	X	SEWER	X				X	
		X	X					X	H.RAIN	H.RAIN	NOT DEE	X	FLOOR DRAIN
		X											
		X	X					X	ALL THE T	ME	<1"	X	
		X	X		X	X	GRASSELLI ST	X	SP OUT	POWER O	<1"	X	FLOOR DRAIN
MISCELLANEOUS ADDRESSES		X	X										
		X	X										
		X	X										
4700 BLOCK IVY STREET		X	X										NO BASEMENT
		X	X					X	H.RAIN			Y	FLOOR DRAIN/BACKUP
		X											NEIGHBOR BASEMENT FLOODIN
		X	X	X	X		SEWER	X	H.RAIN	H.RAIN		X	WELL ACTS AS SUMP(BSMT)
		X	X					X	H.RAIN	H.RAIN	3"	X	FLOOR DRAIN
		X	X										
		X											
		X	X					X	H.RAIN			?	MOP UP
		X	X										
		X	X										
		X	X										
		X	X										
		X	X										
		X											
		X											
		X	X					X	H.RAIN	H.RAIN	SEEPAGE	X	FLOOR DRAIN
		X											
		X	X										
		X	X										
		X	X										
		X											
		X	X										
		X											
		X	X										
		X	X										
		X											
		X	X										
4800 BLOCK IVY STREET		X	X					X				X	
		X	X		X		LAWN	X	H.RAIN	H.RAIN	1"	X	SUMP/DRAIN
		X	X										
		X	X					X	RAIN	NOT MUC	TRICKLE		
		X	X										
		X	X					X	RAIN	RAIN	SM STREAM		MOP UP
		X	X					X	H.RAIN	INFREQ		X	FLOOR DRAIN
		X	X										
		X											
		X	X										
		X	X										
		X	X										
		X	X										
		X	X										
		X	X										
		X	X										
		X											
		X											

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4800 BLOCK IVY STREET		X	X		X		YARD	X				?	
		X	X										
		X	X		X		LAWN	X	H.RAIN	H.RAIN	<1"	X	
		X	X										
		X	X					X			3"	X	WET/DRY VACUUM UP
		X											
		X	X					X	H.RAIN	H.RAIN		?	DOWN DRAIN
		X											
		X	X					X	H.RAIN		LITTLE		
		X	X					X	H.RAIN		?	X	BUCKET TO YARD
		X	X					X	H.RAIN				FLOOR DRAIN
		X	X										
		X	X										
		X	X										
		X	X		X		?	X	?	?	?	X	JUST MOVED, DON'T KNOW HIS
		X	X		X		?	X	H.RAIN	H.RAIN	DEEP	X	SUMP
		X	X										DAMP WHEN RAINS
		X	X										
4900 BLOCK IVY STREET		X											
		X											
		X	X										
		X	X										
		X											
		X											
		X											
		X	X										DAMP
		X	X										
		X	X		X	X	ALLEY	X	RAIN	RAIN	1"	X	DOWN DRAIN
		X	X										
		X	X					X	RAIN	RAIN		X	
		X	X										
		X	X		2	X	LAWN/SEWER	X	H.RAIN	H.RAIN		X	
		X	X										
		X	X		X			X	RAIN	RAIN		X	
		X	X					X	RAIN	RAIN		X	DOWN DRAIN
		X	X		X		SEWER	X	H.RAIN	H.RAIN	SEEPAGE	X	DOWN SEWER
		X	X		2		YARD, SEWER	X	RAIN	RAIN		X	
		X	X										
		X	X		X		?	X	RAIN	RAIN	3/4"	X	SUMP PUMP OUT
		X	X										
		X	X		2	X	SEWER	X	H.RAIN	H.RAIN		X	SUMP PUMP OUT
		X	X	X	X		SEWER	X	RAIN	1/YR	1/2"-2"	X	S.PUMP OUT/WELL IN BSMT
		X	X		X	?	LAWN	X	RAIN			X	
4700 BLOCK PARRISH AVENUE		X	X										
		X	X										
		X	X					X	H.RAINS	H.RAINS	4"	X	DOWN DRAIN
		X	X					X	H.RAINS	H.RAINS	1/2-1"	X	DOWN DRAIN
		X											
		X	X		X		SEWER						
		X	X										
		X	X										
4800 BLOCK PARRISH AVENUE		X	X		X	X	SIDE OF HOUSE	X	S/P OFF			X	PUMP OUT SIDE OF HOUSE
		X	X					X		2/18YRS		?	DOWN DRAIN
		X	X										
		X	X					X	H.RAINS	H.RAINS	SEEPAGE	?	DOWN DRAIN

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					PUMP X=YES	RUN CONT. X=YES	DISCHARGE	FLOOD X=YES	WHEN H=HEAVY	HOW OFTEN H=HEAVY	DEPTH		
4800 BLOCK PARRISH AVENUE		X	X		X								
		X	X					X	H.RAINS	H.RAINS	SEEPAGE	?	DOWN DRAIN
		X	X					X	ONCE	H.RAINS	1"	?	PUMP OUTSIDE
		X											
		X	X		?			X	H.RAINS		1-2.5"	X	MOP/VACUUM UP
		X	X					X	H.RAINS		TRICKLE	X	DOWN DRAIN
		X	X		X		SEWER	X	H.RAINS	H.RAINS	1"	X	DOWN DRAIN
4900 BLOCK PARRISH AVENUE		X	X		?			X	H.RAINS	H.RAINS	1"	X	MOP UP
		X											
		X	X		X		SIDE OF HOUSE	X	H.RAINS	H.RAINS		X	
		X	X		?								
		X	X					X	H.RAINS	H.RAIN	3-4"	X	

ID Code:

First Attempt:	Second Attempt:	Third Attempt:
Date Time	Date Time	Date Time
_____ _____	_____ _____	_____ _____
Team Leader:____	Team Leader:_____	Team Leader:___

INTRODUCTORY COMMENTS (See separate sheet).

QUESTIONNAIRE

INTRODUCTORY QUESTIONS:

1. What is your name? _____

2. What is your address? _____

3. What is your phone no?_____

WATER USE QUESTIONS:

1. Do you use City of East Chicago water? Y N ?

2. Do you or did you ever have a private groundwater well at this address? Y N ?

   If Yes:

   2a. Can you show me where it is? Y N ?

   Notes:_____

   _____

   2b. What do you know about this well?

   Notes:Depth, Construction, Date installed

   _____

   _____

ID Code:

2c. Is it still in use? Y N ?

If Yes:

2c1. What is the water used for?

2c1a. Watering fruits & Vegetables? Y N ?

If Yes:

What fruits & vegetables

do you grow?

Notes: _____

_____

2c1b. Watering lawns & flower gardens? Y N ?

2c1c. Washing cars? Y N ?

2c1d. Swimming pools? Y N ?

2c1e. Showering? Y N ?

2c1f. Drinking? Y N ?

2c1g. Washing dishes? Y N ?

2c1h. Laundering clothes? Y N ?

3. Does your basement have a sump pump? Y N ?

If Yes:

3a. Does it run continuously? Y N ?

3b. Where does it discharge?

Notes: _____

_____

ID Code: _____

What happens to that water?

Notes: _____

_____

3c. Does your basement flood? Y N ?

3c1. When?

Notes: _____

_____

3c2. How often?

Notes: _____

_____

3c3. How deep does it get?

Notes: _____

3c4. What do you do about it?

Notes: _____

_____

4. In the future (as part of this study), we may need to sample basements and wells.

Could we sample yours, if needed? Y N ?

Thank you for your time.

Once this information has been compiled, the results will be made available for review at the Main and the Pastrick Branch Libraries.

GLCOM7/029.51

ID Code:

__ Flooded Basement

__ Access

__ Lawn Discharge

__ Well

__ Acess

__ Inactive

__ Active

__ Shallow

__ Fruits & Vegs

__ Lawns & Flower Gardens

__ Washing Cars

__ Swimming Pools

__ Showering

__ Drinking

__ Washing Dishes

__ Laundering Clothes

Attachment B

FIRST CONTACT LETTER AND PRESS RELEASE

FOR IMMEDIATE RELEASE

September 26, 1990

Contact: Gene Hartstein
Du Pont
(219) 391-4601

COMMUNITY SURVEY IS NEWEST PART OF DUPONT'S
VOLUNTARY GROUNDWATER ASSESSMENT PROGRAM

Du Pont environmental consultants today began a door-to-door survey of the Riley Park area of East Chicago to help determine the direction of flow, quality and use of groundwater in the area. The survey is the latest part of a voluntary groundwater assessment program undertaken by the company's East Chicago Plant.

"Although we believe all the homes in the area are using public water supplies, our survey teams are specifically interested in locating groundwater wells," said Gene Hartstein, Plant Manager.

Analyses of samples taken from monitoring wells in the northern areas of the Du Pont plant site in the second phase of the groundwater assessment revealed the presence of two contaminants at levels exceeding federal primary drinking water standards. Cadmium was found at a level slightly in excess of the federal standard. Arsenic was found at a significantly higher level than the federal drinking water standard. Arsenic was used in a manufacturing process at the site, but has not been in use for the last 45 years. Cadmium was never used at the Du Pont plant, so the source of that contaminant is unknown.

"We have no proof that these contaminants have moved north beyond our property," said Hartstein. "But to get a complete picture of groundwater movement in the area, we need to identify factors, such as wells, that could affect its flow. At some future time, we will probably ask to drill test wells in the neighborhood to gather additional information."

Until this phase of the groundwater assessment is completed, including a determination of whether the two contaminants have moved off Du Pont property, company officials want to make certain that Riley Park residents are not using well water for drinking purposes, according to Hartstein.

"The appropriate federal, state and local officials receive regular reports on the progress of this program," he said. "We are committed to working with them. We are also committed to protecting the health of our neighbors and keeping them fully informed about this program."

#####

NOTICIA DE PRENSA

CONTACTAR: Gene Hartstein
Du Pont
391-4601

RECONOCIMIENTO DE COMUNIDAD ES LA PARTE MAS NUEVA DEL PROGRAMA VOLUNTARIO DE AVALUACION DE AGUAS SUBTERRANEOS

Consultos ambientales de Du Pont hoy comenzaron un reconocimiento del area de Riley Park de East Chicago para ayudar en la determinación de la dirección de flujo, calidad y uso de aguas subterraneos en el area. El reconocimiento es la parte más nuevo de un programa voluntario de avaluación de aguas subterraneos hecho por el East Chicago Plant.

"Aunque creímos que todas las casas en el area usan aqua publico, nuestros grupos de reconocimiento esperan colocar cualquieros pozos de aguas subterraneos" dijo Gene Hartstein, el mayordomo de la planta.

Analisis de aguas obtenidos de pozos colocados en el norte limite del sitio de la plant de DuPont contienen la presencia de dos contaminantes con niveles que exceden normas federales primarias por aguas potables. Cadmium estuvo encontrado en niveles un poco más elevado que normas federales. Arsenic estuvo encontrado en niveles significante más elevado que normas federales. Se usaban arsenic en la manufactura en el sitio, pero hace 45 años que no se ha usado. Nunca se habia usado Cadmium en la planta DuPont, y por eso el origen de esta contaminación no se sabe.

"No hay prueba que esta contaminación ha viajado al norte del limite de nuestra propiedad," dijo Hartstein. "Pero para obtener un idea completa del movimiento de los aguas subterraneos, necesitamos identificar factores, como pozos, que puedan afectar su flujo. En el futuro, a lo mejor, queríamos pedir permiso a colocar pozos de prueba en la vecinidad para obtener mas información."

Hasta se completa este fase del reconocimiento, incluyendo una determinación si estas dos contaminantes han viajado al norte de la propiedad de DuPont, oficiales de la compania quieren estar seguro que los residentes de Riley Park no estan usando agua de pozo para beber, segun Hartstein.

"Oficiales federales, estatales, y locales apropiados recibiran noticias regulares del progreso de este programa", el dijo. "Nos comprometimos a trabajar con ellos. Además, nos comprometimos a proteger la salúd de nuestros vecinos y en dandoles toda información sobre este programa."

Attachment C

SECOND AND THIRD CONTACT LETTERS

CH-1046 REV. 11/80

ESTABLISHED 1802

E. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED
EAST CHICAGO, INDIANA 46312

CHEMICALS AND PIGMENTS DEPARTMENT

Dear Resident,

We stopped by today with a brief questionnaire, but no one was at home. We would like to schedule a convenient time for an interview, please call 391-4600 today until 7:30 p.m. and ask for Dave Cox. We hope you will cooperate with this survey.

We appreciate your assistance.

CHI120\006

CH-1046 REV. 11/80

DU PONT

ESTABLISHED 1802

E. I. DU PONT DE NEMOURS & COMPANY

INCORPORATED

EAST CHICAGO, INDIANA 46312

CHEMICALS AND PIGMENTS DEPARTMENT

Muy Estimado Residente,

Visitamos su casa hoy, pero nadie estuvo a casa. Quisiéramos arreglar un tiempo conveniente por una entrevista. Por favor llamar a 391-4600 hoy antes de 7:30 por la tarde y pedir por Dave Cox.

Apreciéramos toda la assistencia que pueden darnos con este investigación.

CHI120\006

Appendix H

MEMORANDUM: DU PONT -- RILEY PARK SEWER SURVEY

Appendix H Contents

o Memorandum: Du Pont -- Riley Park Sewer Survey

CH2M HILL

MEMORANDUM

TO: Gene Hartstein/Du Pont
O.J. Meyer/Du Pont
Steve Cline/Du Pont
Diane Heck/Du Pont

FROM: Willie Gonwa/CH2M HILL
Don Johnson/CH2M HILL
Pixie Newman/CH2M HILL

DATE: October 15, 1990

SUBJECT: Du Pont--Riley Park Sewer Survey

PROJECT: CHI28770.A0.SU

INTRODUCTION

This memorandum describes the sewer survey conducted from September 27 to September 29, 1990, in the Riley Park area and followup field work conducted on October 26, 1990. The purpose of the survey was to assess the general effect of the sewer system on groundwater flow in the area. Sewer manholes and catch basins were inspected to:

(1) Determine the layout of the sewer system

(2) Assess the integrity of the sewer lines and the potential for exfiltration or infiltration of groundwater from water table aquifer

(3) Look for evidence of exfiltration of or infiltration by groundwater

(4) Use the information collected to help characterize hydraulic conditions controlling groundwater flow north of the Du Pont East Chicago plant

To support this effort, two maps were obtained from the East Chicago City Engineer's Office:

- A 1954 plan showing the original sewer system
- An undated "current" atlas showing the relief sewer system as well as the sewers illustrated in the 1954 plan (the atlas assigns numbers to the manholes throughout the system)

No as-built plans or elevations are available for the sewer system.

During the inspection, depth measurements were made of sewer inverts and evidence of groundwater infiltration, if present (Table 1). Measurements were made relative to the edge of the sewer surface structure (rim). Rim elevations were surveyed in October (Table 1). Water table elevations, inferred from the field data, are listed in Table 1 and inert elevations are listed in Table 2.

The purpose of the followup field effort conducted on October 26, 1990, was to measure flow rates in selected sewers that might be acting as line "sinks" (draining groundwater out of the aquifer). The flow rates in 10 of the 12 north/south sewer pipes serving the 4900 and 4800 blocks of Riley Park were measured (Table 3).

SEWER SYSTEM CHARACTERISTICS

LAYOUT

The original sewer system in Riley Park consists of 12- to 15-inch combined sewers flowing north from the paved, unnamed road that runs along the southern edge of Riley Park (shown as the NYC Railroad right-of-way on the City's plans) and south from the B & O Railroad right-of-way to a 36- to 48-inch brick collector on 148th Street (see Figure 1). This service area is called Sub-System 4 by the City of East Chicago and the East Chicago Sanitary District (the owner of the system). The sewers in this area also serve Sub-System 4A, which is bounded by Huish to the east, the B & O Railroad right-of-way to the north, the Indiana Harbor Canal to the west, and 151st Street to the south. A portion of the Sub-System 4A sewer system (southwest of Riley Park) is serviced by separate storm and sanitary sewers.

To provide relief from flooding for the over-taxed brick collector on 148th Street, a relief sewer was constructed. The relief sewer starts with a 15-inch-diameter sewer at Chicago Avenue and McCook Avenue in Sub-System 4A. The relief sewer initially flows south for 2 blocks to 149th Street and then east to Parrish Avenue. At Parrish Avenue, the relief sewer jogs to the north and then flows southeast down Gary Avenue. As it flows through Riley Park, the relief sewer increases to 54 inches in diameter.

Within the Riley Park area, the relief sewer intercepts all water flowing north from the 4900 blocks and all water from 149th Street. The remainder of Sub-System 4 continues to flow to the original brick collector. Within Sub-System 4A, the brick collector serves the area north of 149th Street and east of Melville Avenue, with the remaining flow accommodated by the relief sewer.

Table 1
SUMMARY OF SEWER SURVEY DATA

		Measured					Estimated		
Manhole Number	Location	Pipe Diameter (in)	Rim Elevations (AMSL-ft)	Depth To Invert (in) *	Groundwater Infiltration Depth (in)*	Evidence of High Water Depth (in) *	Flow Depth (in) **	Flow Velocity (fps)	Flow Rate (gpm)
4-45	Parrish & Gary	60	587.85	246	—	—	9	—	—
4-49	4716 Parrish	18	587.73	130	44	24	4	1	131
4-50	4744 Parrish	18	587.63	132	62	34	9	2	—
4-51	Parrish & 148th	48	588.12	201	75	—	13	—	—
4-51A	Parrish & 148th	—	586.88	—	38	—		—	—
4-53	4822 Parrish	18	587.57	141	83	—	4	0.4	52
4-55	4854 Parrish	18	586.25	119	59	—	5	0.1	—
4-55B	4832 Parrish	18	586.89	132	57	—	5	0.1	—
4-56	Parrish & 149th	18	585.42	107	40	—	6	—	—
4-57	Parrish & 149th	—	585.40	106	48	85	6	0.5	—
4-58	4916 Parrish	12	585.59	102	41	—	5	0.1	14
4-59	4936 Parrish	12	585.70	98	34	21	7	0.3	52
4-60	Parrish & NYC RR ROW	12	—	—	—	—	—	—	—
Valve Box	Near 4-60 Parrish & NYC RR ROW	—	586.33	—	24	—	—	0	—
4-61	148th near Parrish	42	588.05	201	60		13	0.6	680
4-62	Parrish & 149th	54	585.42	220	48	—	—	—	—
Valve Box	Near 4-62 Parrish & 149th	—	585.51	—	—	—	—	—	—
4-68	4713 Ivy	15	587.54	133	69	—	3	0.4	31
4-69	4732 Ivy	15	587.52	141	69	32	3	0.5	39
4-69B	4723 Ivy	15	587.74	—	—	—	—	—	—
4-71	Ivy & 148th	42	588.10	200	70	—	13	—	—
4-75	Ivy & 149th	12	585.61	107	55	—	1	0	0
4-75A	Ivy & 149th	—	585.52	—	—	—	—	—	—
4-76	Ivy & 149th	54	585.57	211	129	—	7	1	—
4-77	4912 Ivy	12	585.50	99	48	30	3	1	69
4-78	4928 Ivy	12	585.10	89	45	32	2	0.4	15
4-78A	4925 Ivy	—	585.23	—	—	—	—	—	—
4-79	Ivy & NYC RR ROW	12	585.75	85	30	19	2	0	0
4-86	4714 Euclid	15	587.91	136	70	—	2	2	87
4-87	4732 Euclid	15	587.86	143	74	21	2	4	175
4-87A	4737 Euclid	—	587.80	—	—	—	—	—	—
4-89	Euclid & 148th	42	586.86	179	69	—	13	—	—
4-92	4846 Euclid	15	585.71	115	60	35	3	0.5	39
4-93	Euclid & 149th	12	585.09	102	48	31	2	0.25	—

Notes: * Measured from manhole rim.
** Measured from bottom of sewer pipe.

Table 1
SUMMARY OF SEWER SURVEY DATA

Manhole Number	Location	Measured					Estimated		
		Pipe Diameter (in)	Rim Elevations (AMSL-ft)	Depth To Invert (in) *	Groundwater Infiltration Depth (in)*	Evidence of High Water Depth (in) *	Flow Depth (in) **	Flow Velocity (fps)	Flow Rate (gpm)
4-93A	Euclid & 149th	—	584.98	54	—	36	8	0	—
4-94	Euclid & 149th	54	585.08	212	—	69	7	1	540
4-95	4911 Euclid	12	585.84	106	51	35	3	—	—
4-96	4923 Euclid	12	586.10	105	51	34	6	—	—
4-96A	4928 Euclid	—	585.84	57	—	35	6	—	—
4-97	Euclid & NYC RR ROW	12	586.85	96	56	42	0.5	0	0
4-104	4714 Drummond	15	587.51	131	57	—	4	0.2	—
4-105	4732 Drummond	15	586.90	140	68	—	4	0.25	29
4-105B	4732 Drummond	—	586.93	—	—	—	—	—	—
4-107	Drummond & 148th	42	586.54	176	63	—	13	—	—
4-109	4834 Drummond	15	585.87	114	—	40	3	1	78
4-110	4848 Drummond	15	586.08						—
4-111	Drummond & 149th	12	585.83	107	72	58	1.5	0	0
4-112	Drummond & 149th	54	585.61	215	99	73	21	2	5100
4-113	4910 Drummond	12	585.95	102	66	39	2	2	77
4-114	4913 Drummond	12	586.11	100	54	43	4	1	103
4-114A	4920 Drummond	—	NA	77	—	—	34	0	—
4-115	Drummond & NYC RR ROW	12	586.89	97	40	25	6	0	—
4-122	4716 Carey	15	588.10	136	68	—	3	0.2	—
4-123	4729 Carey	15	586.40	122	60	—	3	0.3	—
4-125	Carey & 148th	42	585.02	154	60	—	13	—	—
4-128	4849 Carey	15	585.76	117	—	50	3.5	0.3	—
4-129	Carey & 149th	12	585.48	106	50	—	5	—	—
4-130	Carey & 149th	54	585.50	193	—	—	—	—	—
4-131	4909 Carey	12	586.07	108	—	52	2.5	1.5	80
4-132	4921 Carey	12	585.63	97	53	31	3	—	—
4-133	Carey & NYC RR ROW	12	586.03	89	32	28	6	—	—
4-139	4711 Grasselli	15	586.96	121	49	—	5	0.5	80
4-140	4727 Grasselli	15	586.32	—	—	—	—	—	—
4-142	Grasselli & 148th	36	584.86	150	62		13	—	—
4-145	4853 Grasselli	15	586.05	117	—	55	1.5	1.5	43
4-146	Grasselli & 149th	12	585.77						—
4-147	Grasselli & 149th	54	585.65	192	—	—	32	—	—
4-148	4909 Grasselli	12	586.02	110	—	54	2.5	0.3	16
4-149	4917 Grasselli	12	585.94	107	50	—	1	2	28
4-150	4931 Grasselli	12	585.64	99.5	43	—	2.5	0.2	11
4-151	Grasselli & NYC RR ROW	12	585.74	—	—	—	—	—	—
4-155	148th near Grasselli	36	585.02	163	65	—	13	2	2100

Notes: * Measured from manhole rim.
** Measured from bottom of sewer pipe.

Table 1
SUMMARY OF SEWER SURVEY DATA

Manhole Number	Location	Measured Flow Area (sq in)	Estimated Flow (gpm)	Comments
4-45	Parrish & Gary	—	—	No infiltration
4-49	4716 Parrish	42	131	Oily sheen
4-50	4744 Parrish	—	—	Laterals collapsed on both sides, causing street to fall; 2 abandoned laterals coming in; flow partially obstructed; much infiltration
4-51	Parrish & 148th	—	—	Much infiltration
4-51A	Parrish & 148th	—	—	Catch basin; depth to standing water = 67"
4-53	4822 Parrish	42	52	Medium infiltration; no connection to relief sewer
4-55	4854 Parrish	—	—	Flow partially obstructed
4-55B	4832 Parrish	—	—	Little infiltration; abandoned lateral enters manhole
4-56	Parrish & 149th	—	—	No flow; oily sheen; much infiltration; clear water flow
4-57	Parrish & 149th	—	—	Oily sheen; new manhole; 3" debris; little infiltration, flow depth to estimated invert, irregular cross-section
4-58	4916 Parrish	45	14	Oily sheen; some sanitary flow; some visible infiltration
4-59	4936 Parrish	56	52	Much infiltration; clear water flow, about 2" of debris in invert, flow depth to estimated invert
4-60	Parrish & NYC RR ROW	—	—	Could not locate
Valve Box	Near 4-60 Parrish & NYC RR ROW	—	—	31" depth to standing water; no flow; much debris, some infiltration, oily sheen
4-61	148th near Parrish	365	680	Medium infiltration
4-62	Parrish & 149th	—	—	New manhole; little infiltration
Valve Box	Near 4-62 Parrish & 149th	—	—	
4-68	4713 Ivy	25	31	Some visible infiltration; 8" pipe from catch basin
4-69	4732 Ivy	25	39	Clear water flow
4-69B	4723 Ivy	—	—	Could not open
4-71	Ivy & 148th	—	—	Much flow from both directions
4-75	Ivy & 149th	4	0	Some visible infiltration; some staining
4-75A	Ivy & 149th	—	—	Catch basin; could not open
4-76	Ivy & 149th	—	—	Partially obstructed flow; some visible infiltration
4-77	4912 Ivy	22	69	No visible infiltration
4-78	4928 Ivy	12	15	Much visible iron-stained infiltration
4-78A	4925 Ivy	—	—	Catch basin
4-79	Ivy & NYC RR ROW	12	0	Much visible iron-stained infiltration
4-86	4714 Euclid	14	87	Clear water flow
4-87	4732 Euclid	14	175	
4-87A	4737 Euclid	—	—	Did not measure; catch basin
4-89	Euclid & 148th	—	—	Much flow from both directions
4-92	4846 Euclid	25	39	
4-93	Euclid & 149th	—	—	Flow partially obstructed

Notes: * Measured from manhole rim.
** Measured from bottom of sewer pipe.

File: SWMEMTB1.WK1

Table 1
SUMMARY OF SEWER SURVEY DATA

Manhole Number	Location	Measured Flow Area (sq in)	Estimated Flow (gpm)	Comments
4-93A	Euclid & 149th	—	—	Catch basin
4-94	Euclid & 149th	174	540	
4-95	4911 Euclid	—	—	Flow obstructed
4-96	4923 Euclid	—	—	Flow obstructed
4-96A	4928 Euclid	—	—	Catch basin; no flow
4-97	Euclid & NYC RR ROW	2	0	No flow
4-104	4714 Drummond	—	—	Oily sheen; flow partially obstructed; medium infiltration
4-105	4732 Drummond	38	29	
4-105B	4732 Drummond	—	—	Did not measure; catch basin
4-107	Drummond & 148th	—	—	Much flow from both directions
4-109	4834 Drummond	25	78	
4-110	4848 Drummond	—	—	Unable to remove cover
4-111	Drummond & 149th	8	0	Virtually no flow
4-112	Drummond & 149th	824	5100	
4-113	4910 Drummond	12	77	
4-114	4913 Drummond	33	103	No flow in line from adjacent 4-114A
4-114A	4920 Drummond	—	—	Catch basin; dark oily appearance in standing water
4-115	Drummond & NYC RR ROW	—	—	Flow obstructed, wet but no flow
4-122	4716 Carey	—	—	Flow partially obstructed
4-123	4729 Carey	—	—	Flow partially obstructed; much infiltration
4-125	Carey & 148th	—	—	Much flow from both directions; much infiltration
4-128	4849 Carey	—	—	Flow partially obstructed
4-129	Carey & 149th	—	—	Obstructed, little flow
4-130	Carey & 149th	—	—	
4-131	4909 Carey	17	80	
4-132	4921 Carey	—	—	Much visable infiltration, partially obstructed
4-133	Carey & NYC RR ROW	—	—	Obstructed
4-139	4711 Grasselli	52	80	Little infiltration; some sanitary flow
4-140	4727 Grasselli	—	—	Could not open
4-142	Grasselli & 148th	—	—	Lateral from storm inlet collapsed, causing street to fail; much infiltration
4-145	4853 Grasselli	9	43	
4-146	Grasselli & 149th	—	—	Could not open
4-147	Grasselli & 149th	1414	—	
4-148	4909 Grasselli	17	16	
4-149	4917 Grasselli	5	28	Much visable infiltration
4-150	4931 Grasselli	17	11	Much visable infiltration
4-151	Grasselli & NYC RR ROW	—	—	Under asphalt – not located
4-155	148th near Grasselli	331	2100	4" – 5" of muck in invert

Notes: * Measured from manhole rim.
** Measured from bottom of sewer pipe.

Table 2
SEWER AND INFERRED GROUNDWATER ELEVATIONS
SEPTEMBER 27-29, 1990

Manhole Number	Location	Elevation (ft) *		Head Difference (ft)
		Invert	Groundwater Infiltration**	
4-139	4711 Grasselli	576.88	582.88	6.00
4-142	Grasselli and 148th	572.36	579.69	7.33
4-149	4917 Grasselli	577.02	581.77	4.75
4-150	4931 Grasselli	577.35	582.06	4.71
4-155	148th near Grasselli	571.44	579.60	8.17
4-122	4716 Carey	576.77	582.43	5.67
4-123	4729 Carey	576.23	581.40	5.17
4-125	Carey and 148th	572.19	580.02	7.83
4-129	Carey and 149th	576.65	581.31	4.67
4-132	4921 Carey	577.55	581.21	3.67
4-133	Carey and NYC RR ROW	578.61	583.36	4.75
4-104	4714 Drummond	576.59	582.76	6.17
4-105	4732 Drummond	575.23	581.23	6.00
4-107	Drummond and 148th	571.87	581.29	9.42
4-111	Drummond and 149th	576.91	579.83	2.92
4-112	Drummond and 149th	567.69	577.36	9.67
4-113	4910 Drummond	577.45	580.45	3.00
4-114	4913 Drummond	577.78	581.61	3.83
4-115	Drummond & NYC RR ROW	578.81	583.56	4.75
4-86	4714 Euclid	576.58	582.08	5.50
4-87	4732 Euclid	575.94	581.69	5.75
4-89	Euclid and 148th	571.94	581.11	9.17
4-92	4846 Euclid	576.13	580.71	4.58
4-93	Euclid and 149th	576.59	581.09	4.50
4-95	4911 Euclid	577.01	581.59	4.58
4-96	4923 Euclid	577.35	581.85	4.50
4-97	Euclid and NYC RR ROW	578.85	582.18	3.33
4-68	4713 Ivy	576.46	581.79	5.33
4-69	4732 Ivy	575.77	581.77	6.00
4-71	Ivy and 148th	571.43	582.27	10.83
4-75	Ivy and 149th	576.69	581.03	4.33

Table 2
SEWER AND INFERRED GROUNDWATER ELEVATIONS
SEPTEMBER 27-29, 1990

Manhole Number	Location	Elevation (ft) *		Head Difference (ft)
		Invert	Groundwater Infiltration**	
4-76	Ivy and 149th	567.99	574.82	6.83
4-77	4912 Ivy	577.25	581.50	4.25
4-78	4928 Ivy	577.68	581.35	3.67
4-79	Ivy and NYC RR ROW	578.67	583.25	4.58
4-49	4716 Parrish	576.90	584.06	7.17
4-50	4744 Parrish	576.63	582.46	5.83
4-51	Parrish and 148th	571.37	581.87	10.50
4-53	4822 Parrish	575.82	580.65	4.83
4-55	4854 Parrish	576.33	581.33	5.00
4-55B	4832 Parrish	575.89	582.14	6.25
4-56	Parrish and 149th	576.50	582.09	5.58
4-57	Parrish and 149th	576.57	581.40	4.83
4-58	4916 Parrish	577.09	582.17	5.08
4-59	4936 Parrish	577.53	582.87	5.33
4-61	148th near Parrish	571.30	583.05	11.75
4-62	Parrish and 149th	567.09	581.42	14.33

Notes:
* Above mean sea level.
** Observed groundwater infiltration elevation.

File SWMEMTB2.WK1

Table 3 MEASURED SEWER FLOW OCTOBER 26, 1990			
Manhole Number	Address	Time	Flow (gpm)
4-51	Parrish and 148th	0400	2.7
4-62	Parrish and 149th	0344	5.8
4-71	Ivy and 148th	0415	5.4
4-76	Ivy and 149th	NA	NA
4-89	Euclid and 148th	0432	3.9
4-94	Euclid and 149th	0309	2.1
4-107	Drummond and 148th	0449	4.7
4-112	Drummond and 149th	0256	2.1
4-125	Carey and 148th	0504	2.8
4-130	Carey and 149th	0226	2.0
4-142	Grasselli and 148th	NA	NA
4-147	Grasselli and 149th	0205	7.9
		Maximum	7.9
		Minimum	2.0
		Average	3.9
	Total measured flow to the 148th Street Main		19.5
	Total estimated flow to 148th Street Main		23.4
	Total measured flow to the 149th Street Main		19.9
	Total estimated flow to 149th Street Main		23.9

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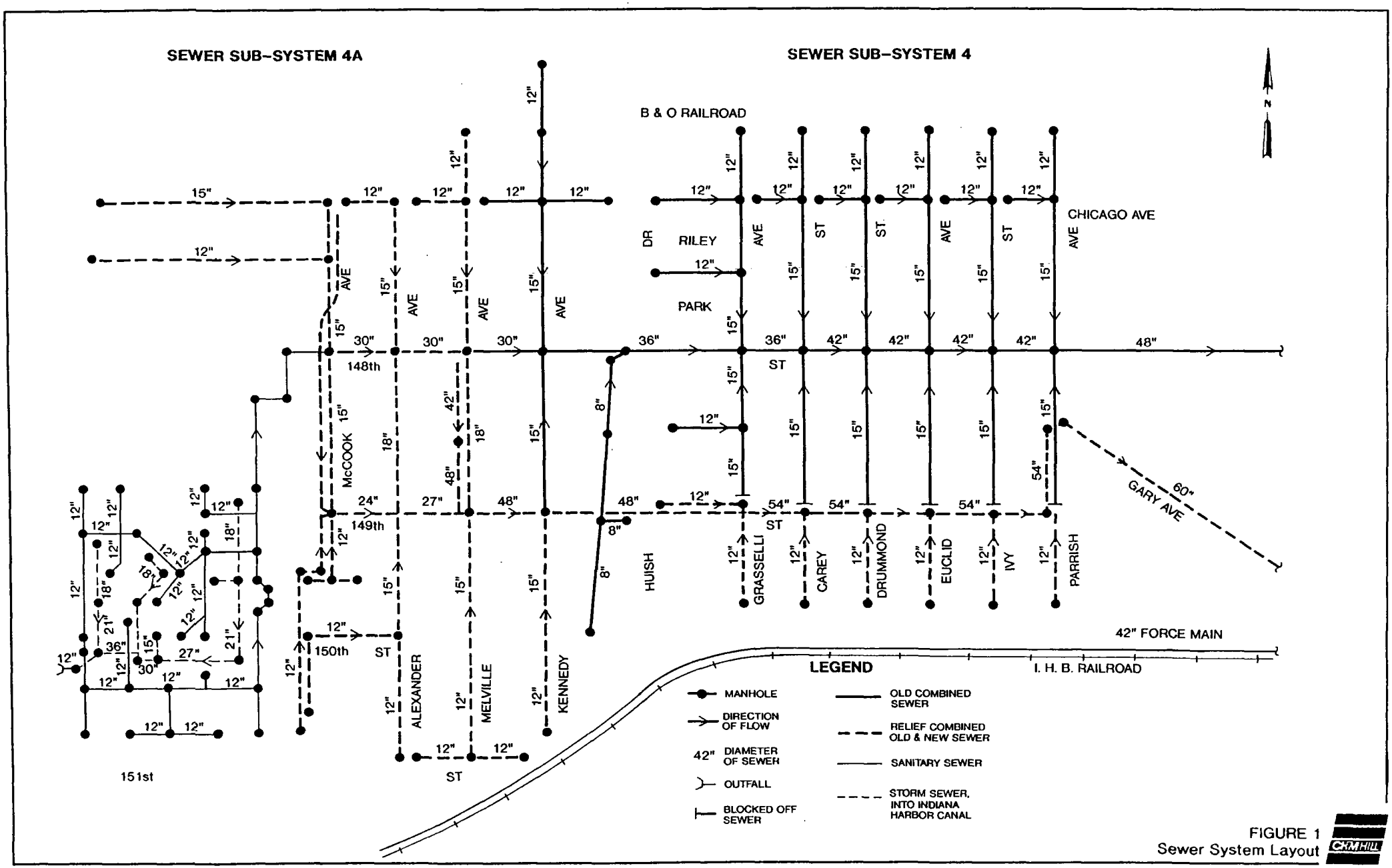

FIGURE 1
Sewer System Layout

Upon leaving the Riley Park area, both the brick collector and the relief sewer flow east to the Alder Street Pumping Station. There, water is combined with an 84-inch sewer serving Inland Steel and residential areas to the north of Riley Park, and is pumped through a 42-inch force main to the East Chicago Wastewater Treatment Plant. Overflow passes through a concrete flume into the Grand Calumet River.

In Riley Park, the 12- to 15-inch combined sewers are typically 8 to 12 feet below grade. The 54-inch relief sewer varies from 16 to 20 feet below grade and the 36- to 42-inch brick collector is 12 to 17 feet below grade. Storm inlets consist of a grate with an 8- to 12-inch discharge pipe that projects from the bottom. An elbow at approximately 3 feet deep directs the flow to a manhole or catch basin at the crown of the street. Where a catch basin exists, it is usually 10 to 15 feet away from the manhole into which it discharges. Both catch basin and manhole are located near the centerline of the street (Figure 2).

PHYSICAL CONDITION

The original sewer system consists of 12- to 15-inch vitreous clay pipe (VCP) local sewers on the north-south streets which convey flow to a 48-inch brick collector. Individual houses are served by 4-inch VCP laterals, which is typical for the era in which these houses were constructed. Manholes are of brick construction. The structural condition of all elements of the original system is generally poor. The cone of most manholes contain missing or crumbling bricks, and many of the barrels are failing similarly. Many frames are cracked and misaligned. Typically, the shelf and invert of most manholes are constructed of concrete and are in good shape (Figure 3). These observations were made from visual inspection of the manholes and catch basins from the surface. Although no direct inspection of the sewers was done, there was ample surficial evidence of localized street subsidence caused by failure of the VCP storm inlet laterals. Also, a local resident reported a recent cave-in of the brick collector which necessitated major emergency repairs.

The relief sewer (new sewer) is of reinforced concrete construction with precast manholes. The structural condition of the manholes appears to be good.

GROUNDWATER INFILTRATION

VISUAL EVIDENCE

Substantial infiltration was visible in many of the manholes inspected. This was especially true within the 4900 blocks where the water table appeared to be only 1-1/2 to 2 feet below grade. Observed flow in many of the manholes throughout the area consisted mainly of clear water. There was no rain during the manhole inspections, so none of the flow could be attributed to the inflow of stormwater runoff.

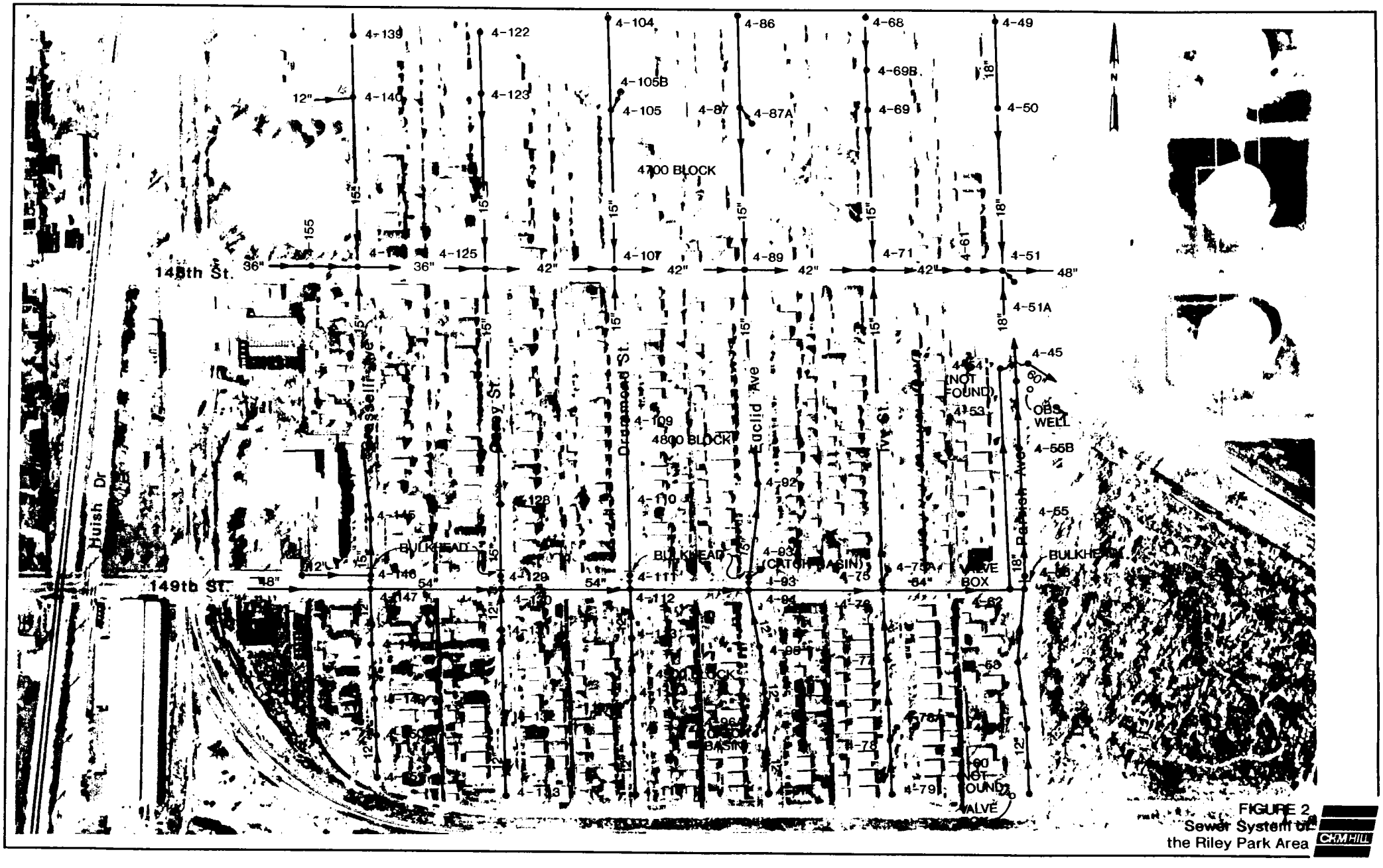

FIGURE 2
Sewer System of the Riley Park Area

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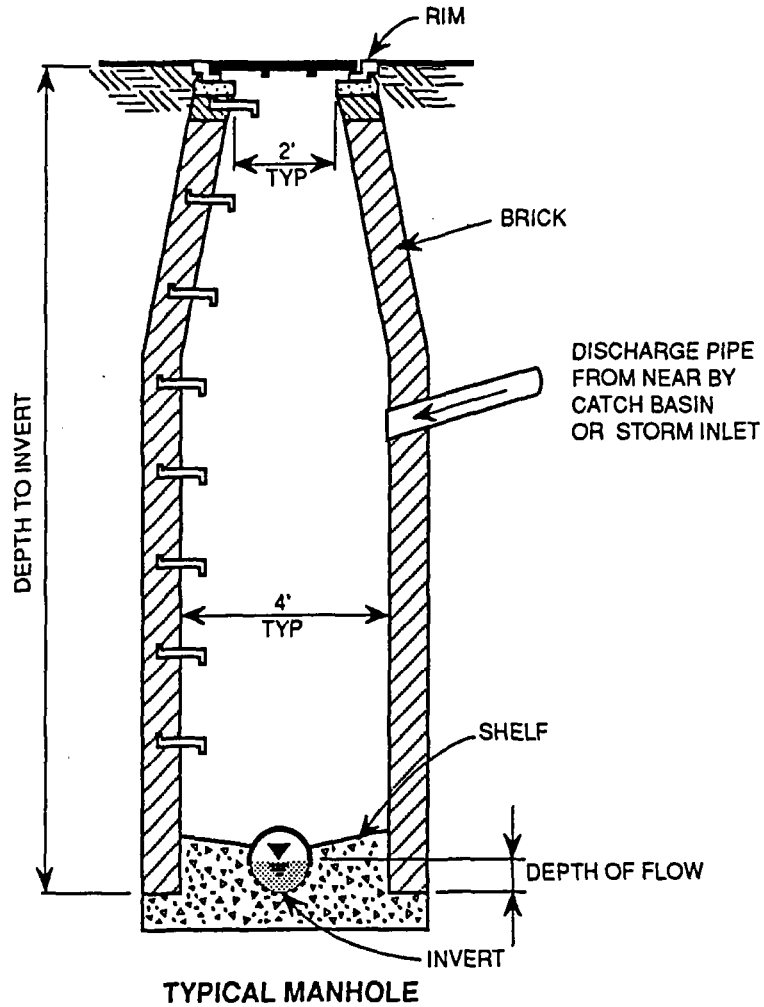
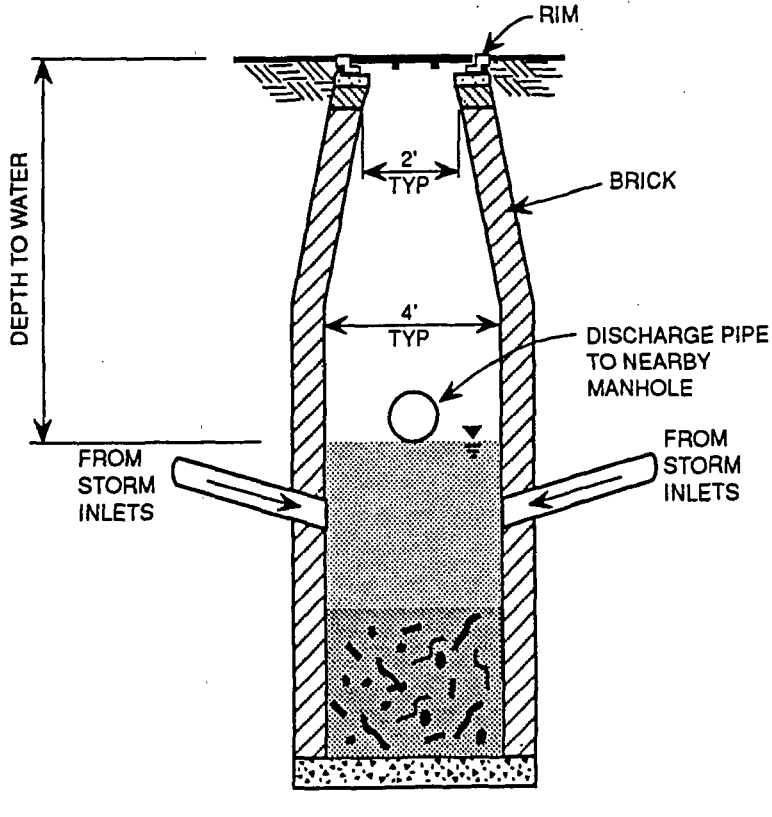


TYPICAL MANHOLE

NOT TO SCALE



TYPICAL CATCH BASIN

NOT TO SCALE

FIGURE 3
Manhole and Catch Basin Construction

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MISC. MANHOLE 10-29-90MMS

In many cases, there was evidence such as staining or mottling which indicated higher groundwater levels than visible on the day of inspection.

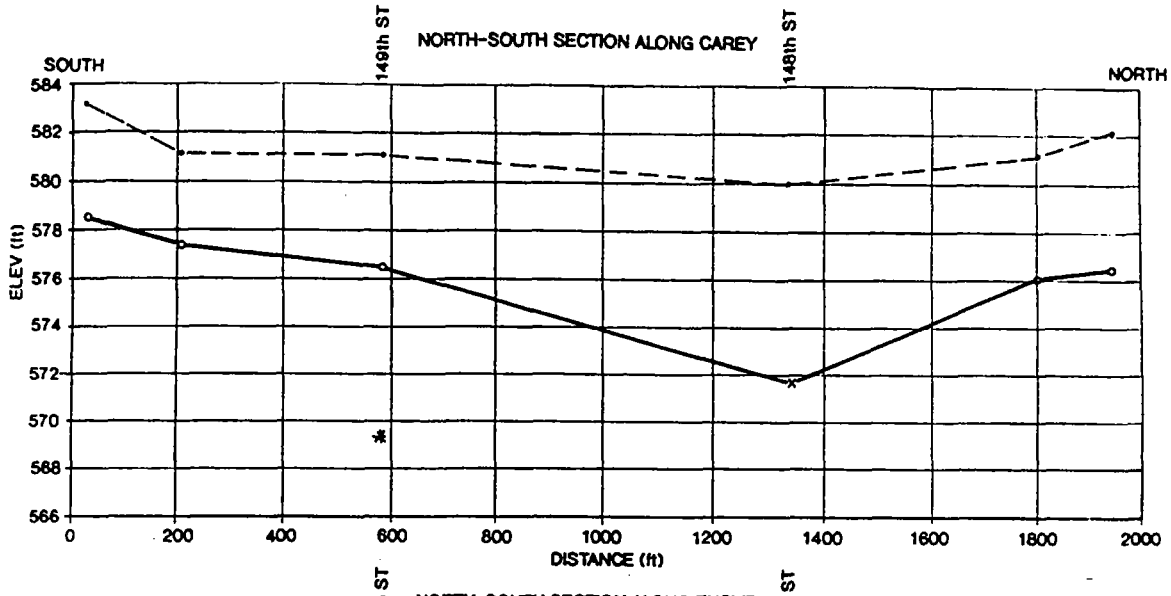
HYDRAULICS

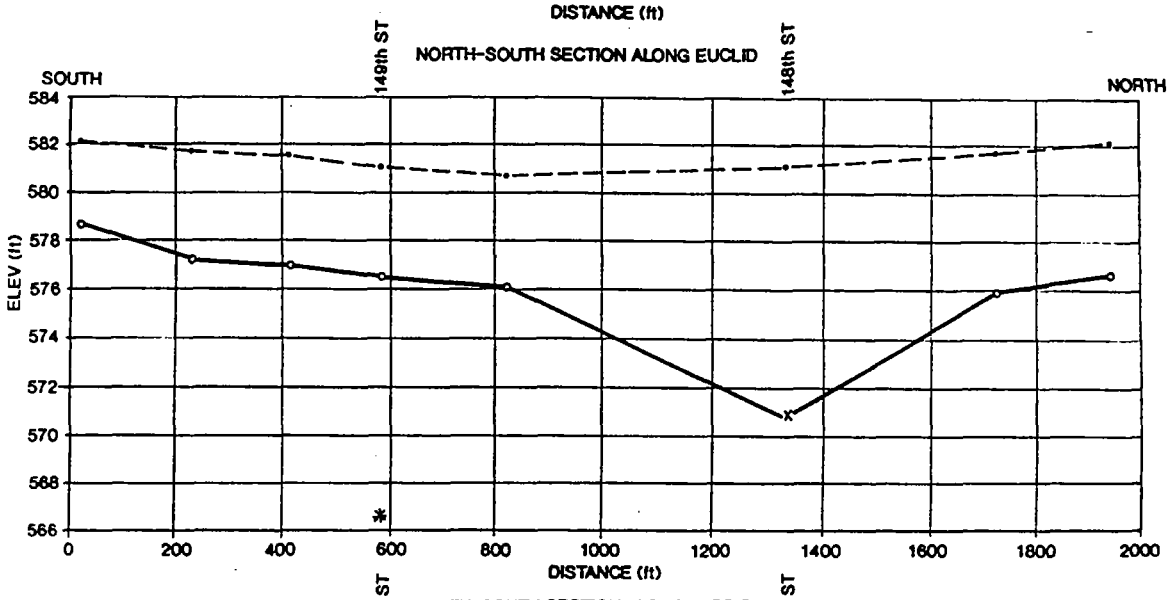
In general, the sewer system in the Riley Park area is approximately 3 to 11 feet below the groundwater surface (Table 2 and Figure 4). As a result of this head difference and the poor integrity of the old sewer system, groundwater appears to be infiltrating the sewers on a continuous basis. Data collected indicate that the sewers are acting as a series of line sinks or drains, influencing the groundwater flow and the potentiometric surface of the shallow Calumet Sand aquifer system.

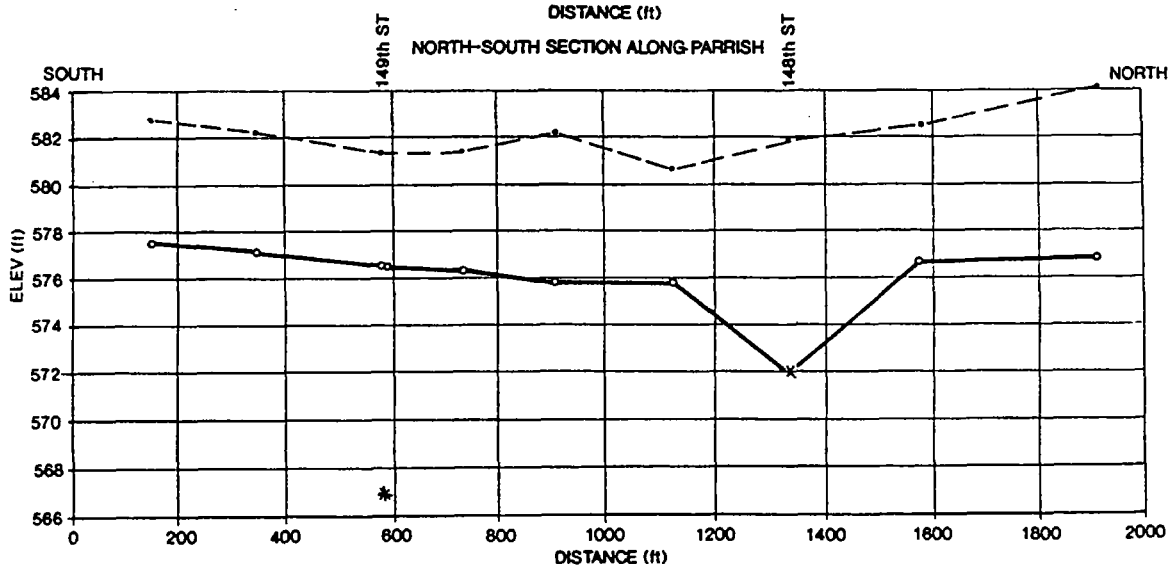
Groundwater infiltration was observed in late September and measured on October 26, 1990. Flow measurements were made during the 2:00 to 5:30 am time period to minimize the relative contribution of sanitary inflow to sewer flow. No precipitation had occurred for several days prior to measuring flows. For these reasons, the observed flows were primarily attributed to groundwater infiltration and basement sump pump discharge directly conveyed to these sewers. (See the Well and Basement Sumps Memorandum for further information on sump pump and discharge).

Individual flow rates for the 4900-block and 4800-block sewers varied from approximately 2 to 8 gpm and averaged 4 gpm (Table 3). On October 26, 1990, the total discharge to the new relief sewer on 149th Street from the 4900-block sewers was estimated at approximately 24 gpm; the discharge to the old combined sewer main on 148th Street from the 4800-block sewers was estimated at approximately 24 gpm. (Up to 10 percent of the flow from the 4800-block sewers may be sanitary flow because some of the individual pipeflow measurements were as late as 5:30 in the morning).

The potentiometric surface in Riley Park and along the northern edge of the Du Pont facility (Figure 5) was approximated using the September infiltration elevation data (Table 2) and groundwater levels measured in the Du Pont monitoring wells on September 10, 1990. An east-west groundwater divide was identified within the center of the 4800 blocks of Grasselli Avenue, Drummond Street, Carey Street, Euclid Avenue, Ivy Street, and Parrish Avenue. A 3-foot head difference existed between this divide and the southern boundary of the Riley Park neighborhood. A head drop of 3 feet (northern gradient of 0.0078 ft/ft) was also observed between the northern portion of the Du Pont site and the southern boundary of the Riley Park neighborhood. These head differences were attributed to the combined effect of sewer infiltration and aquifer dewatering due to sump pump use and discharge to the sewer.







KEY

- • POTENTIOMETRIC SURFACE ELEVATION, BASED ON INFILTRATION OBSERVATIONS
- o ELEVATION OF INVERT
- ✱ ELEVATION OF RELIEF MAIN
- × ELEVATION OF OLD COMBINED SEWER MAIN

FIGURE 4
Potentiometric Surface and Invert Elevation Cross Sections

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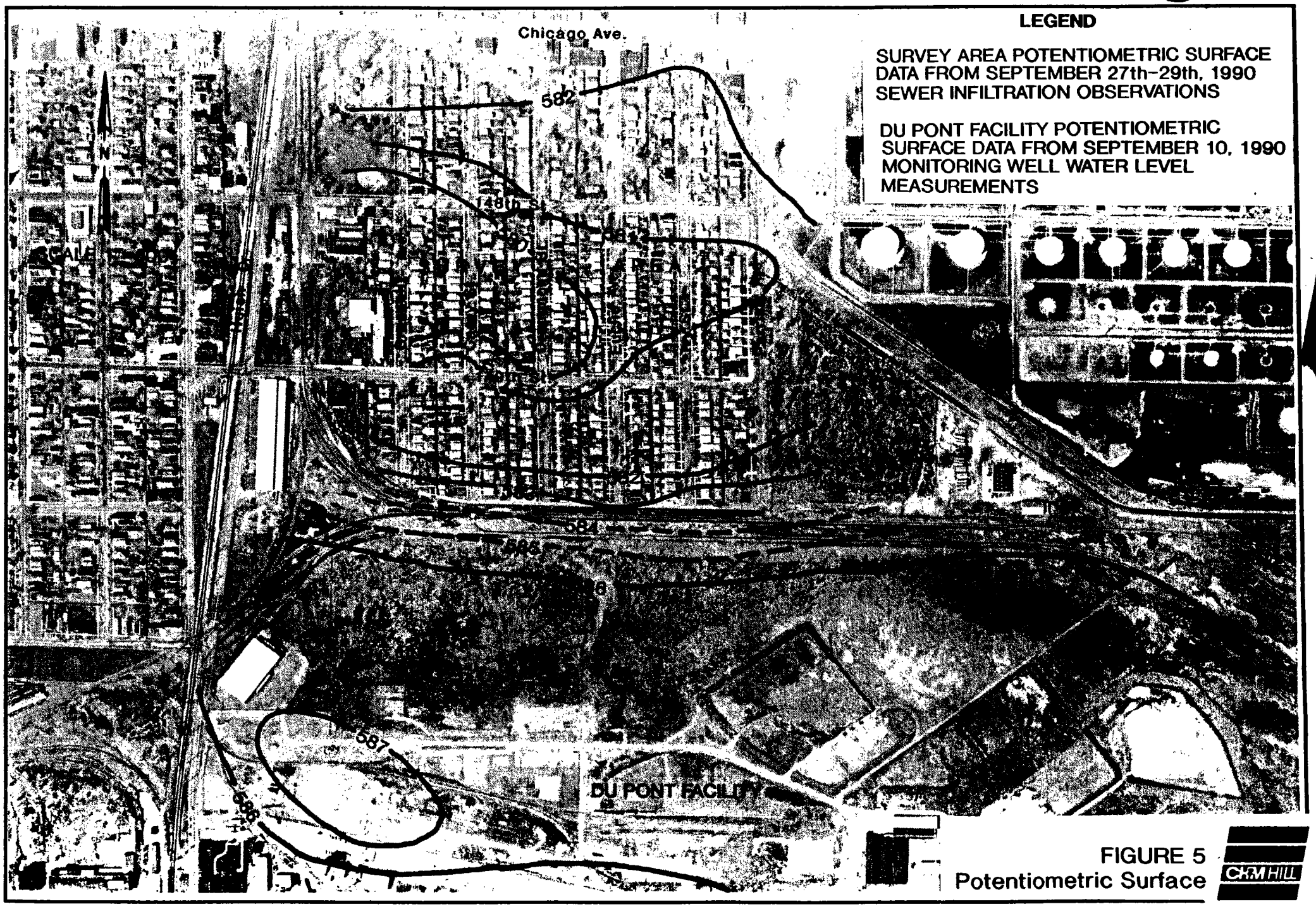

FIGURE 5
Potentiometric Surface

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Based on these findings, groundwater in the shallow aquifer, migrating north from the Du Pont facility into Riley Park, is captured by the 4900- and 4800-block sewers. The east-west divide in the 4800 block limits northward flow of groundwater from the Du Pont facility.

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Appendix I. Quality Assurance Project Plan for Limited Investigation of Groundwater and Surface Water Quality

Appendix J. Technical Memoranda for Round 1 and Round 2 Data Validation for Du Pont-East Chicago Facility and Analytical Data Sheets

Appendix I

QUALITY ASSURANCE PROJECT PLAN FOR LIMITED INVESTIGATION OF GROUNDWATER AND SURFACE WATER QUALITY

Appendix A

STANDARD OPERATING PROCEDURES FOR FIELD MEASUREMENTS

FIELD MEASUREMENT OF pH

METHOD

Electrometric

REFERENCES

Methods for Chemical Analysis of Water and Wastes, U.S. EPA, Method 150.1, 1983.

Orion SA250 pH Meter Instruction Manual, 1987, Part No. 205376-001, Orion Research Incorporated, Boston, MA.

Orion Ross pH Electrode Instruction Manual, 1988, Part No. 502700-098, Orion Research Incorporated, Boston, MA.

SENSITIVITY

0.01 pH unit

RANGE

1 to 12 pH units

SAMPLE HOLDING TIME

Less than 6 hours

REAGENTS

- pH buffer solutions for pH 4, 7, and 10
- Deionized water in squirt bottle
- 3 M KCL internal filling solution
- Storage solutions

APPARATUS

- pH meter
- Combination pH and reference electrode
- Beakers, plastic or glass
- Spare battery

CALIBRATION (most pH Meters)

1. Select either pH 4 and 7, or pH 7 and 10 buffers, whichever will bracket the expected sample concentration. Note: Mix all buffer solutions before use.

2. Place electrode in pH 7 buffer solution. Wait for the pH to stabilize and adjust CAL until pH display reads 7.0.

3. Rinse electrodes and replace pH 7 buffer with either pH 4 or 10 buffer.

4. Wait for the pH value to stabilize. Adjust SLOPE until pH display reads 4.0 for the pH 4 buffer or 10.0 for the pH 10 buffer. Note: Slope values in the 92 to 102 percent range are acceptable.

5. Rinse electrodes and replace pH 4/10 buffer with pH 7 buffer.

6. If display reading is not 7.0, repeat steps 2 through 4.

AUTOCALIBRATION (ORION SA 250)

1. Select either pH 4 and 7, or pH 7 and 10 buffers, whichever will bracket the expected sample concentration. Note: Shake all buffer solutions before use.

2. Select pH mode and resolution (pH 0.1).

3. Press ISO and verify that the isopotential point is 7.0.

4. Place electrode and Automatic Temperature Compensation (ATC) probe in pH 7 buffer.

5. Press CAL. The display will alternate between 0.1 and the pH value of the buffer. Wait for the pH value to stabilize. Press ENTER. After a short pause the display will advance to 0.2.

6. Rinse electrodes and ATC probe and replace pH 7 buffer with either pH 4 or 10 buffer.

7. Wait for pH value to stabilize. Press ENTER. The letters pH will be displayed. The pH meter is calibrated and ready for use. Note: Slope values in the 92 to 102 percent range are acceptable.

8. Rinse electrode and ATC probe and place into sample. Read the pH directly.

CALIBRATION FREQUENCY

Daily, at the beginning and end of the day, recheck calibration with pH 7 buffer once every ten samples and after maintenance.

OPERATING PROCEDURE

1. Check all connections for tight fit.
2. Inspect electrodes (and ATC probe).
3. Check battery charge.
4. Perform calibration, at the beginning and end of the day.
5. Rinse the electrode with distilled water and then with the sample to be measured.
6. Place electrode (and ATC probe) in previously mixed sample. Immerse electrode such that junction is covered by sample.
7. When the display is stable, record sample pH.
8. Recheck calibration with pH 7 buffer solution once every ten samples.
9. After use store electrode. For short-term storage (up to 1 week) soak electrode in manufacturer's recommended storage solution. For long-term storage, the reference chamber should be filled and the filling hole securely covered.
10. Cover the sensing element and/or reference junction with its protective cap and a few drops of the manufacturer's recommended storage solution.

CALIBRATION PROCEDURE

1. Switch mode to OFF and unplug the probe, correct meter zero (if necessary) by turning the adjustment screw so that the meter needle coincides with the zero on the conductivity scale.

2. Switch mode to REDLINE, correct meter redline (if necessary) by turning the adjustment screw so that the meter needle coincides with the redline on the meter face. If this cannot be accomplished, replace the batteries.

3. Plug the probe into the probe jack.

4. Place the probe in the 0.01 N standard potassium chloride solution. Record temperature (°C) and conductance (micromho/cm).

5. Correct conductivity reading for temperature. This value must correspond ($\pm$10 percent) to the expected value in Table 1. If the calibration fails, then appropriate corrective action must be performed and the instrument recalibrated.

Note: The temperature probe should be calibrated against a NBS, an ATSM standard or equivalent thermometer before each sampling event.

OPERATION PROCEDURE

1. Perform calibration at end and beginning of the day.

2. Switch mode to TEMPERATURE. Allow time for the probe temperature to come to equilibrium with that of the water before reading. Read the temperature on the bottom scale of the meter in degrees Celsius.

3. Switch mode to X100. If the reading is below 50 on the 0-500 range (5.0 on the 0-50 mS/m range), switch to X10. If the reading is still below 50 (5.0 mS/m), switch to the X1 scale. Read the meter scale and multiply the reading by the mode factor. The answer is expressed in microohms/cm. Measurements are not temperature compensated.

4. When measuring on the X100 and X10 scales, depress the CELL TEST button. The meter reading should fall less than 2 percent; if greater, the probe is fouled and the measurement is in error. Clean the probe and remeasure.

OPERATING SUGGESTIONS

- Obstructions near the probe can disturb readings.

- When the calibration test indicates low readings the probable cause is dirty electrodes. Hard water deposits, oil, and organic matter are the most likely contaminants.

- Caution: Do not touch the electrodes inside the probe. The plating material is soft and can be scraped off.

- If cleaning does not restore the probe performance, replatinizing may be required. Always rinse the probe thoroughly in tap water, then in distilled or deionized water after cleaning and before storage. It is best (not required) to store conductivity cells in deionized water.

- Most problems in obtaining good records with monitoring equipment are related to electrode fouling and to inadequate sample circulation.

CALIBRATION FREQUENCY

At the beginning and end of the day or after maintenance, recharge battery after each use. Factory checkout and calibration shall be yearly or when malfunctioning.

CALCULATIONS

Calculate conductivity using the formula:

$$G_{25} = \frac{G_T}{[1 + 0.02\ (T-25)]}$$

where:

G_{25} = conductivity at 25°C, umho/cm
T = temperature of sample, °C
G_T = conductivity of sample at temperature T, umho/cm

Table 1
CONDUCTIVITY METER CALIBRATION TABLE

Temperature (°C)	Conductivity (umho/cm)
15	1,141.5
16	1,167.5
17	1,193.6
18	1,219.9
19	1,246.4
20	1,273.0
21	1,299.7
22	1,326.6
23	1,353.6
24	1,380.8
25	1,408.1
26	1,436.5
27	1,463.2
28	1,490.9
29	1,518.7
30	1,546.7

QUALITY CONTROL REQUIREMENTS

The accuracy of conductivity measurements will be assessed by measurement with a 0.01 N standard KCl solution before sample analysis and at the end of the day. Accuracy of measurements will be ± 5 percent of the standard. Precision will be assessed by analysis of duplicate measurements which will have a relative percent difference of ≤ 15 percent. Duplicates will be run at the rate of one every ten samples. The thermometer on the conductivity meter will be checked before each sampling event for accuracy against an ASTM, NBS standard or equivalent thermometer. Accuracy of the measurement shall be ± 1°C.

PREVENTATIVE MAINTENANCE

- The only maintenance required in battery replacement (every 200 hours or as needed).
- Recalibration (if necessary) should be done at the factory.

HNu MONITORING

REFERENCES

HNu Model PI101 Portable Photoioniozation Analyzer Instruction Manual, December 1985, HNu Systems, Inc., Newton, MA.

HNu Model ISP1 101 Intrinsically Safe Portable Photoionization Analyzer Instruction Manual, January 1986, HNu Systems, Inc., Newton, MA.

SENSITIVITY

0 to 20 ppm at full-scale detection at span = 9.8 ppm; 10.2 ev Probe.

RANGE

0.1 to 2,000 ppm.

CALIBRATION GAS

Isobutylene at 100 ppm

CALIBRATION

By analyzing a gas of known concentration, the HNu is easily calibrated. Isobutylene is typically used as the calibration gas with the instrument calibrated to benzene equivalents. When calibrating the HNu, always remember to deliver the calibration gas at ambient temperature and pressure, handle gas cylinders with care, and calibrate every day. Also, the calibration gas must be stable during the period of use, all gas cylinders must have proper regulators.

CALIBRATION PROCEDURE

1. Identify the probe by lamp label.

2. Attach the probe to the readout unit. Twist connector clockwise until locked.

3. Affirm the relative photoionization sensitivity (PS) calibration gas. [The required reading for isobutylene to read in benzene equivalents is equal to isobutylene ppm x PS (Isob)/PS (benzene)]

4. Turn the function switch to battery check position. The indicator should read within the green arc. If indicator is below the green arc or if red L&D comes on, battery must be charged.

5. Zero the instrument by turning function switch to standby and rotate potentiometer until the meter reads zero.

6. Connect sampling hose to regulator outlet and the other end to sampling probe of HNu.

7. Crack regulator valve.

8. Adjust span potentiometer to obtain proper reading.

9. If calibration can not be achieved, clean the UV light source window using lens paper and HNu cleaning compound.

10. If still unable to calibrate, perform preventative maintenance. Return to factory if those procedures do not work.

CALIBRATION FREQUENCY

Daily or after maintenance. Recharge battery after each use. Factory check out and calibration shall be yearly or when malfunctioning.

PREVENTATIVE MAINTENANCE (frequency)

BATTERY (daily)

Check the battery charge during each period of operation. When the meter needle falls below the green zone or the low-battery indicator light illuminates recharge battery. Do not use the instrument when light is on. When not operating, leave the analyzer assembled and connected to the battery charger. In case of emergency, the analyzer may be used with a low-battery charge.

GAS CYLINDERS AND VALVES (after installation)

All gas supply lines must be leak tested. Leakage can be determined by testing line connections and valve stems with a commercially available leak test solution. Leaks are generally stopped by tightening the fitted surfaces but may require new hardware.

AIR SAMPLING STREAM (initially, then as needed)

Leaks that develop in this system may result in dilution or loss of sample, causing erroneous vapor concentrations and slow response. A fan draws gas in through the probe and ion chamber. Small fluctuations in the flow rate will not affect the measurement. A major obstruction to the flow rate will prevent proper operation and lengthen response time. Refer to the manufacturer's instrument manual for specific procedures.

QUALITY CONTROL REQUIREMENTS

Precision of ± 30 percent. Daily calibration.

OVA MONITORING

REFERENCE

Model OVA 128 Century Organic Vapor Analyzer, Instruction, December 1985, Foxboro, New Haven, CT.

SENSITIVITY

0.1 ppm (methane).

RANGE

0 to 1,000 ppm.

CALIBRATION GAS

Methane gas at 100 ppm.

CALIBRATION

By analyzing a gas of known concentration, the OVA is easily calibrated. Methane in air at a concentration of 100 ppm is typically used as the calibration mixture, although the OVA can be calibrated to many other compounds. Primary calibration of an OVA is performed at the factory. When calibrating the OVA, always remember to deliver the calibration gas at ambient temperature and pressure, handle the gas cylinders with care, and calibrate every day. Also, the calibration gas must be stable during the period of use, and all gas cylinders must have proper regulators.

CALIBRATION PROCEDURE

1. Connect probe readout assembly to sidepack unit.

2. Check battery condition by moving INSTR Switch to BATT.

3. Turn INSTR to ON and allow 5 minutes to warm up.

4. Use calibration adjust knob to set needle to level desired for activating alarm. If alarm level is not zero, the calibration switch must be set to appropriate level.

5. Turn volume knob fully clockwise.
6. Turn the alarm level adjust knob until the audible alarm is activated.

7. Move calibration switch to 1X and adjust meter reading to zero using zero calibration adjustment.

8. Turn pump switch on.

9. Open hydrogen tank valve and hydrogen supply valve. Wait 1 minute.

10. Depress ignitor button until burner lights (not more than 6 seconds).

11. Set calibration switch to 10X.

12. Connect sampling hose to regulator outlet and the other end to sampling probe of OVA.

13. Crack the regulator valve.

14. Check to see if proper reading is achieved.

15. If reading is ± 10 percent from expected value, return to factory for recalibration.

CALIBRATION FREQUENCY

Daily or after maintenance, recharge battery after each use. Factory check out and calibration shall be yearly or when malfunctioning.

PREVENTATIVE MAINTENANCE

BATTERY (daily)

Check battery condition by moving the INSTR switch to the BATT position. Recharge the battery if a low charge is indicated. Do not use the instrument with a low battery charge. When not operating, leave the analyzer connected to a battery charger. Never recharge battery in a hazardous environment.

PARTICLE FILTER (as needed)

Particle filters (primary and secondary) remove foreign matter (>10 microns) from the sample stream. These filters must be in the sample line whenever the instrument is operating. A decrease in flow rate may indicate a plugged filter.

SAMPLING FIXTURES (as needed)

Sampling fixtures should be periodically cleaned with an air hose and/or detergent water to eliminate foreign particulate matter.

HYDROGEN FUEL, CALIBRATION GAS, AND VALVES (initially, after changes)

Use prepurified or zero-grade hydrogen (certified total hydrocarbons as methane <0.5 ppm recommended). All fuel and calibration gas supply lines should be

leak tested. Leakage can be determined by testing line connections and valve stems with a commercially available leak test solution. Leaks are usually stopped by tightening the fitted surfaces but may require new washers or hardware.

AIR SAMPLING PUMP SYSTEM (initially, as needed)

Leaks that develop in this system may result in dilution or loss of sample, causing erroneous vapor concentrations and slow response. The OVA is equipped with a flow gauge that provides a method to check for air leaks. Refer to the manufacturer's instrument manual for specific procedures.

CONTAMINATED CONTROL (as needed)

Background readings may be relatively high under normal ambient conditions. The sources of high background are normal methane background, contaminated hydrogen supply gas, and contamination in the air sample line. Background readings less than 1 ppm are generally accepted since sample measurement is additive to that background. However, the low background values are more desirable. High background is commonly corrected by running the OVA for an extended time in a clean area. Refer to the manufacturer's instrument manual for specific analysis and correction procedures.

QUALITY CONTROL REQUIREMENTS

Precision of ±30 percent. Daily calibration.

GLT925/057.50

MSA

Combustible Gas and Oxygen Alarm

part no. 449900

model 260

instruction manual

IMPORTANT WARNING

Like any piece of complex equipment, the MSA® Combustible Gas and Oxygen Alarm will perform as designed only if it is used and serviced in accordance with the manufacturer's instructions. This manual must be carefully read by all individuals who have or will have the responsibility for using or servicing the product. The warranties made by Mine Safety Appliances Company with respect to the product are voided if the product is not used and serviced in accordance with the instructions in this manual. Please protect yourself and your employees by following them. NOTE: See other cautions and limitations inside.

Factory Mutual System Approved

Factory Mutual approved as intrinsically safe for Class 1, Division 1, Groups C and D and non-incendive for use in Class 1, Division 2, Groups A, B, C and D hazardous locations when used with MSA Battery Pt. No. 457839.

Manufactured by
MINE SAFETY APPLIANCES COMPANY
PITTSBURGH, PENNSYLVANIA, U.S.A. 15208

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FIGURES

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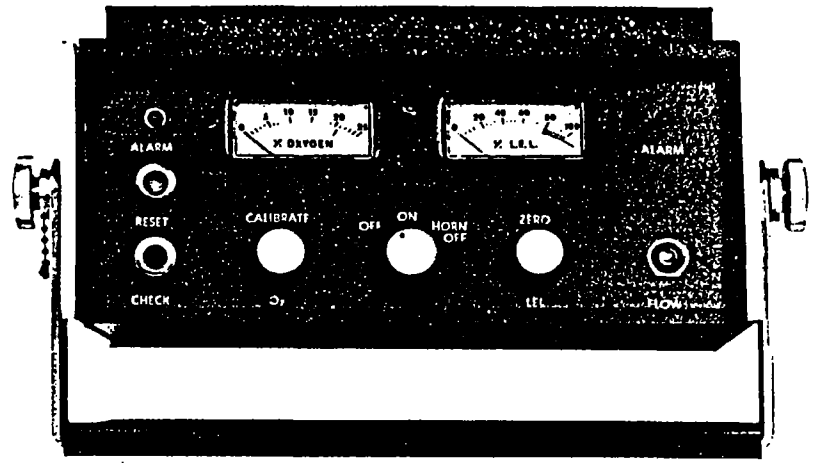

FIGURE 1 — MSA MODEL 260 CONTROL PANEL

I. CAUTIONS AND LIMITATIONS

Prior to testing potentially dangerous atmospheres with the MSA® Model 260 Combustible Gas and Oxygen Alarm the user should be familiar with the first five sections of this instruction manual.

Cautions and limitations associated with the use of the Model 260 are as follows:

1. **The Model 260 is designed to measure combustible gas or vapor content in air. It will not indicate the combustible gas content in an inert gas background, furnace stack or in a reducing atmosphere. Further, this instrument should not be used where the oxygen concentration exceeds that of fresh air (oxygen enriched atmospheres).**
2. **Proper readings are obtained only when the battery has a sufficient level of charge.**
   a. **The battery charge level should be checked occasionally throughout a testing period.**
   b. **Upon receiving a new Model 260, it is recommended that the battery be charged for at least 16 hours.**
   c. **As a regular monthly maintenance item for optimum battery service, the Model 260 should be run for 8 to 10 hours and then fully charged for 24 to 36 hours.**
   d. **After each day of use or if the indicator has not been used for more than 7 days, the battery should be charged for a minimum of 16 hours.**
   e. **Do not operate Model 260 while it is charging.**
   f. **Recharging must be done in a non-hazardous location, known to be free of combustible gases or vapors.**

3. Certain materials such as silicone, silicates and organic lead compounds tend to poison the pelement catalyst thereby giving erroneously low readings. Calibration checks should be made frequently if such materials are suspected to be present in the tested atmosphere. (See Section III for more detail.)
4. The combustible gas indicator detects only combustible gases and vapors in air. It will not indicate the presence of combustible airborne mists or dusts such as lubricating oils, coal dust, or grain dust.
5. Pressurized or low pressure samples will give erroneous oxygen percent readings. For atmospheric sampling at higher or lower altitudes the instrument oxygen meter should be calibrated at the elevation where sampling is to take place.
6. Acid gases, such as carbon dioxide will shorten the service life of the oxygen sensor.
7. The oxygen sensor is packaged separately in an inert atmosphere. It must be installed before the Model 260 can be used.
8. When sampling with accessory sampling lines, a 50 foot sample line will increase the initial response time of the Model 260 to approximately 30 seconds and the final response to approximately 3 minutes. Two 50 foot lines connected in series will increase the response times to 60 seconds and 6 minutes respectively. Lines over 100 feet in length are not recommended.

INITIAL INSTALLATION INSTRUCTIONS FOR OXYGEN SENSOR

The oxygen sensor used in the Model 260 to measure the oxygen concentration is now packaged separately. The oxygen sensor must be installed in the Model 260 prior to placing the instrument into service. Once installed, it should be left in place until end of its useful life, normally one year.

To install the sensor:

1. Remove the carrying handle by loosening both knurled screws and spreading the handle beyond the collars. Lift it from the shafts of the screws.
2. Remove the left side of the case by removing the four mounting screws. Slowly draw the side away from the case as far as the connecting wires will permit. (Hold the case lid to prevent its falling from the case).
3. Slide the top panel approximately three inches from the remainder of the case.
4. Open the protective bag containing the oxygen sensor and install the "O" ring provided onto the threaded end of the sensor.
5. Screw the sensor into the manifold by hand, firmly, so as to compress the "O" ring and prevent sample flow leakage.
6. Push the connectors onto the two terminals at the top of the sensor — the gray wire to the positive terminal and the yellow wire to the negative.

7. Reassemble the case by sliding the top panel back into position.
8. Place the case side in position and install the lid hinge pins into each side.
9. Install the mounting screws. Note: insert all four screws loosely before tightening any one of them.
10. Reattach the handle.
11. See the instruction manual pages for leak testing the sample flow system and adjusting the oxygen calibration.

II. INSTRUMENT DESCRIPTION

The MSA Model 260 Combustible Gas and Oxygen Alarm is a hand-carried, battery-operated instrument (See Figures 1 and 2). It has been designed to sample atmospheres for combustible gases or vapors and oxygen content and warn the user when pre-determined concentrations of either are reached.

Major features of the Model 260 are ease of operation and reliability. Integrated circuit electronics and rugged components have been used to provide a tough, compact instrument.

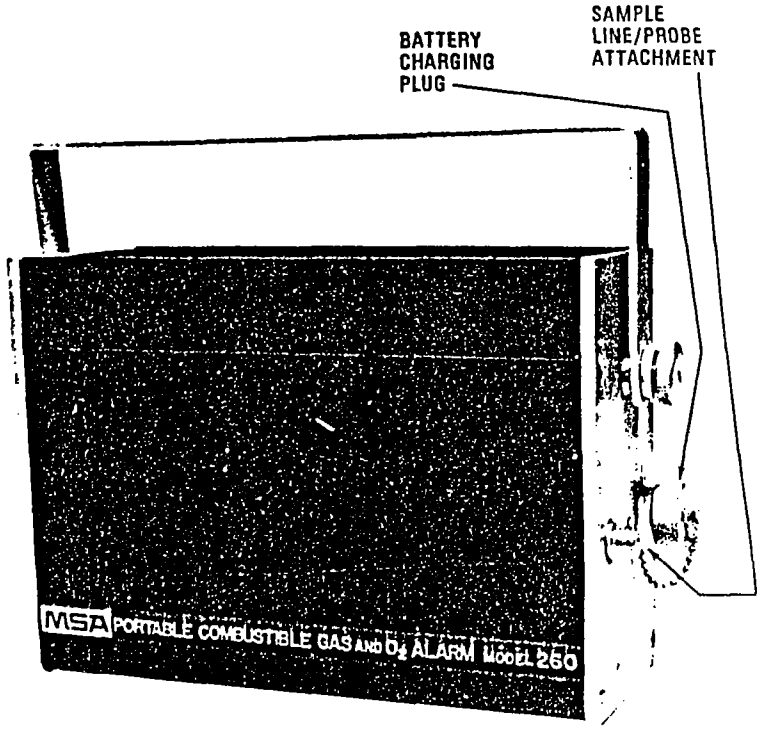

FIGURE 2 —
SAMPLE LINE/PROBE AND BATTERY CHARGING CABLE ATTACHMENTS

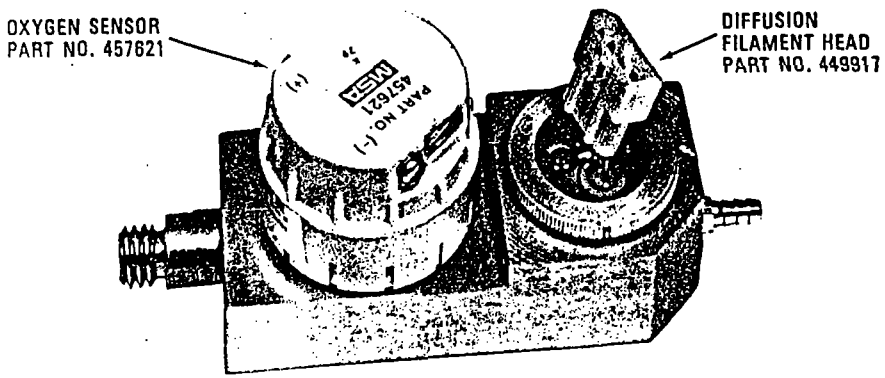

FIGURE 3 — MANIFOLD BLOCK

The Model 260 is two completely separate indicators in a single housing and uses a common flow system. Oxygen and combustible gas concentrations shown on separate meters are automatically indicated by red alarm lights and an audible alarm. Other controls provide quick on-site operational checks. The zero and calibrate controls may have "lift-to-adjust" knobs to prevent accidental changing of adjustments.

A small pump pulls the atmospheric sample through a manifold block in which the oxygen sensor and combustible gas diffusion head are mounted (Figure 3). The flow then passes through the pump and to a flow indicator on the control panel prior to being exhausted (Figure 4). The approximate flow rate is 1 liter per minute.

The Model 260 is powered by a rechargeable 2.4 volt Ni-Cd battery pack (Figure 5) sealed in a plastic case. Recharging circuitry is contained within the instrument. Recharging requires only connecting the instrument into a 115V ac outlet using the cord supplied with the instrument.

The battery also can be recharged from a 12V dc source (such as an automobile battery) by the use of an accessory charge cord. The connectors of the charging cords are keyed to the receptacle on the instrument to prevent accidental use of an incorrect power supply. A fully-charged battery provides over 8 hours of continuous non-alarm operation.

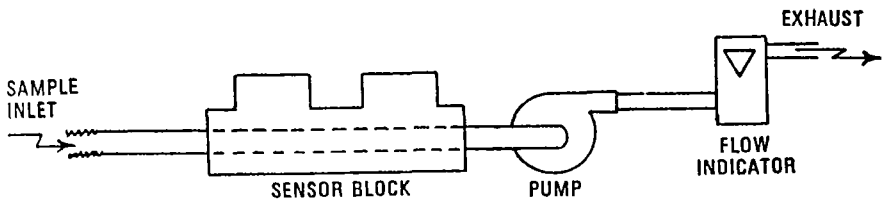

FIGURE 4 — FLOW DIAGRAM

III. USE AND LIMITATIONS

The MSA Model 260 Oxygen and Combustible Gas Alarm provides an efficient and reliable method of testing atmospheres for sufficient oxygen content for life support and/or the presence of combustible gases or vapors which may pose a potential flammability hazard. Common examples of such locations are man-holes, storage tanks, tank cars, confined spaces, pumping stations, etc.

It is important that the instrument response be appraised by someone skilled or experienced in properly interpreting the instrument readings with respect to particular conditions, on-going operations and safe practices. For example, an atmosphere that shows no flammability hazard can still be toxic to workmen. Also a tank or vessel which is safe before work is initiated may be rendered unsafe by work activities which cause a temperature increase, or by stirring or handling bottom sludge in petroleum tanks.

Combustible gases will burn or explode only when the fuel/air mixtures are within certain proportions. For most common hydrocarbon gases this range of proportions runs from approximately 1% to as high as 15% by volume in air. The minimum concentration of a particular combustible gas in air which can be ignited is defined as the LOWER EXPLOSIVE LIMIT; abbreviated L.E.L. The maximum concentration that can be ignited is defined as the UPPER EXPLOSIVE LIMIT; abbreviated U.E.L. In some references the terms are called LOWER and UPPER LIMITS of FLAMMABILITY (LFL or UFL).

The combustible measurement is dependent upon catalytic combustion of the flammable gas in combination with the oxygen in the air. Conditions can exist in a closed space where not enough oxygen remains to provide a correct combustible gas reading. (NOTE: This low oxygen level is far below what is required for human life.) In these instances, the % oxygen reading is most important. A low oxygen concentration in an enclosed atmosphere indicates that: (1) some other gas has displaced much of the air, or (2) some process has consumed much of the available oxygen.

Upon initially opening and probing an enclosed area, move the probe into the area slowly while watching the meters to provide the earliest possible indication of a potentially dangerous condition.

Be prepared to vacate the area if the Model 260 combustible or oxygen meter indicates the possibility of a hazardous condition.

The oxygen sensor responds to the partial pressures of oxygen in the atmosphere being tested. For this reason, changes in atmospheric or sample pressure will change the oxygen reading. Calibration should be checked and adjusted at the elevation where the instrument is to be used.

The oxygen sensor is temperature compensated in the range of 32 to 104°F (0 to 40°C), use down to 0°F is possible when calibrated at the temperature and if more sampling time is allowed for slow sensor response — approximately 3 minutes without sample line.

The life [illegible] oxygen sensor is reduced by exposure to carbon dioxide. Th[illegible]nsor life will be reduced to 2 days in 100% carbon [illegible] tive therefore all tests of atmospheres containing excess concentrations of carbon dioxide should be stopped as soon as a constant reading is obtained. Abnormally slow recoveries to the air calibration point after exposure to high carbon dioxide is to be expected.

Certain materials in the sampled atmosphere affect the catalytic material on the pelement and may cause the indicator to respond incorrectly. Included are organic lead compounds such as are used in leaded gasoline and silicon compounds in the form of silanes, silicones and silicates (often found in hydraulic fluids).

When an atmosphere contaminated with leaded gasoline is tested, the lead produces a solid product of combustion which, upon repeated exposure, may develop a coating upon the detector pelement resulting in a loss of sensitivity. To reduce this possibility, an inhibitor-filter is available for insertion in an external cartridge holder. This device chemically reacts with the tetra-ethyl lead vapors to produce a more volatile lead compound.

The inhibitor-filters are available in packages of six each and identified by part number 47740. Each consists of a glass ampoule wrapped with cotton and filled with chemical. To prepare the item for use, the ampoule should be crushed between the fingers then inserted in the external cartridge holder. One inhibitor-filter will provide instrument protection for eight hours of continuous testing.

Silanes, silicones, silicates and other volatile compounds containing silicon in the tested atmosphere may seriously impair the response of the instrument. Some of these materials rapidly "poison" the detector filament so that it will not function properly. When such materials are even suspected to be in the atmosphere being tested, the instrument calibration must be checked after each series of tests.

As mentioned previously, the battery must have a sufficient charge level for the Alarm to function properly. For this reason, a convenient battery check push-button has been included on the Alarm control panel. The battery should also be performance-checked monthly. See Section VI, MAINTENANCE AND CALIBRATION.

The Model 260 Combustible Gas Indicator is normally calibrated on pentane as being representative of the flammability characteristics of most commonly encountered combustible gases. The meter scale is calibrated from zero to 100% L.E.L. which corresponds to actual volume concentrations of 0 to approximately 1.4% pentane in air. A booklet of response curves is supplied with the Model 260. These curves may be used to interpret meter readings when sampling combustible gases other than pentane. Calibration for combustibles other than pentane may be made on special order.

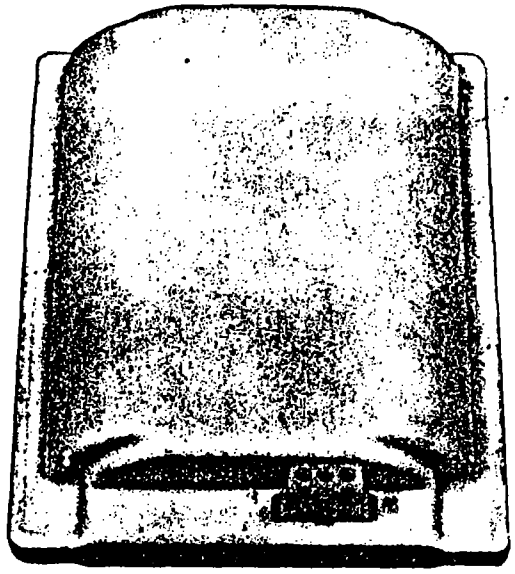

FIGURE 5 — BATTERY PACK

Accessory Items

A number of accessories are available for use with the Model 260 Combustible Gas and Oxygen Alarm. Part numbers are listed in the last section.

Sample lines	special synthetic rubber lines which have minimal gas adsorption characteristics are available in 5, 10, 25 and 50 foot lengths.
Sample probes	3-foot hollow brass probe, a 3-foot plastic probe for possible electrical hazards and a 4-foot solid end probe to prevent liquid pickup from wet tank bottoms, etc.
Dust filter	a cotton filter fitting an external holder provides sensor protection from dirt accumulation in dusty or dirty atmospheres.
Inhibitor filter	protects catalytic filaments from being "poisoned" by leaded fuels. Fits external filter holder.
External filter holder	accommodates either a dust filter or an inhibitor filter.
Line trap assembly	prevents liquids from being drawn into the instrument.

Calibration check equipment ....consists of a supply of calibration gas, a flow regulator and an adapter hose.

Harness, carrying .....neck and waist straps to hold the Model 260 while climbing etc.

IV. PRINCIPLES OF OPERATION

A block diagram of the MSA Model 260 is shown in Figure 6. The oxygen and combustible gas indicators are operated simultaneously. Each indicator has an alarm warning light which provides a visual alarm signal. An alarm signal on either unit will energize an audible alarm as well. A switch allows the audible alarm to be turned off if so desired. The alarm lights will stay on until the reset button is pushed after the concentration returns to the predetermined level.

Oxygen Analyzer

The oxygen analyzer is a galvanic type cell containing dissimilar metal electrodes in a special electrolyte. The cell is sealed with a membrane which allows oxygen to diffuse into the active area. The current generated by the cell is proportional to the oxygen partial pressure in the atmospheric sample passing over the face of the membrane. The generated current passes through a resistance to provide a voltage input signal for an amplifier. The output of the amplifier drives the oxygen indicating meter and also serves as an input to the alarm comparator circuitry.

Combustible Gas Indicator

The flammable properties of combustible gases are used as a basis of detection for the combustible gas indicator. The sensor consists of a pair of pelletized filaments called "pelements" arranged in an electrically balanced bridge circuit. The detector pelement is treated with a special catalyst. The catalyst causes the combustible gases to combine with oxygen at much lower temperatures than would be required for normal burning. The inactive compensator pelement is also exposed to the sample flow and acts to offset any electrical changes caused by flow conditions, sample temperature, pressure and/or humidity.

Combustible gases in the sample combine with oxygen at the surface of the catalyzed detector pelement. Heat is liberated by this chemical reaction increasing the temperature of this pelement causing an associated increase in the pelement electrical resistance.

Increased resistance of the detector pelement unbalances the bridge causing a voltage change in the mid-point connection between the detector pelement and compensating pelement. This voltage signal is applied to an amplifier which drives the combustible gas indicating meter and provides an input for an alarm comparator circuit.

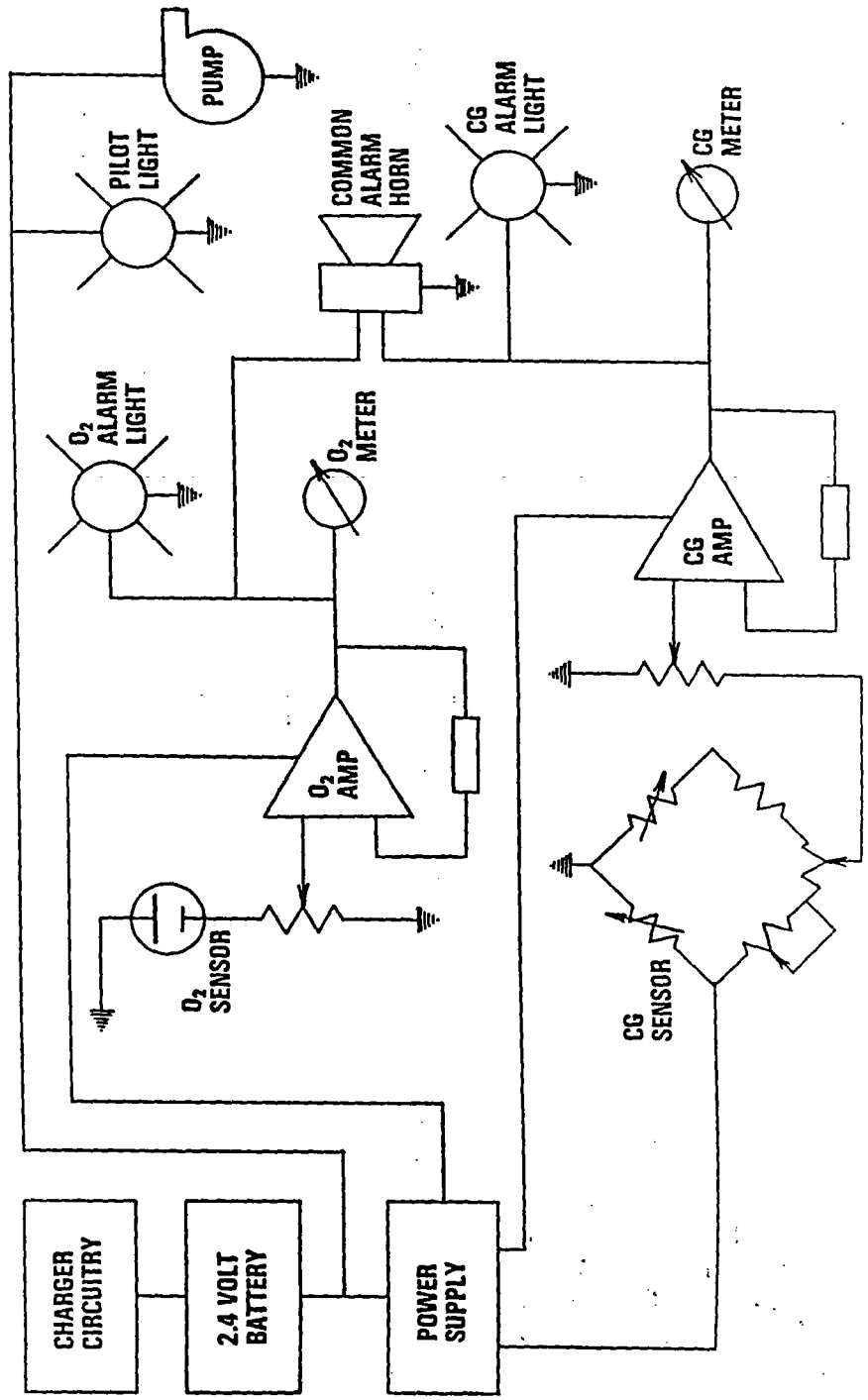

FIGURE 6 — BLOCK DIAGRAM

OPERATING PROCEDURE

The Model 260 should be checked and "zeroed" in an uncontaminated atmosphere. Refer to Figure 1 and use the following procedure.

1. Open the instrument lid. Turn the center ON-OFF control to the far right HORN-OFF position. Both meter pointers will move and one or both alarm lights may light.
2. If the % oxygen meter pointer stabilizes at a value other than 20.8%, the pointer should be set to 20.8% by using the CALIBRATE O_2 control.
3. The % LEL meter pointer should be set to zero by adjusting the ZERO LEL control.
4. If either the alarm lights are lighted press the Alarm Reset button.
5. Momentarily place a finger over the sample inlet fitting or the end of the sample line probe. Observe that the flow indicator float drops out of sight indicating no flow. If the float does not drop, check out the flow system for leaks as described under Section VII.
6. Press the CHECK button and observe the % LEL meter. The pointer must read at 80% LEL or higher as marked by the BATTERY zone on the meter. If the pointer reading is less, the batteries must be recharged. No tests should be attempted as the instrument will not perform properly. See Section VI for battery charging instructions.
7. If it is desired that the audible alarm sound for combustible gas or low oxygen concentrations, turn the center ON-OFF control back one position to the ON setting.
8. Accessory equipment such as sampling lines, probes, carrying harness, filters or line traps should be attached as required. See Figure 2.
9. The instrument is ready for atmospheric sampling.

VI. MAINTENANCE AND CALIBRATION

Battery Service

The primary maintenance item of the Model 260 is the rechargeable 2.4 volt nickel cadmium (Ni-Cd) battery (Figure 7). The battery is recharged by simply removing the screw cap covering receptacle and connecting one end of the charging cable to the instrument and the other end to a 115V ac outlet.

If desired, the battery can be recharged from a 12V dc source. An accessory battery charging cable is available, one end of which plugs into the Model 260 while the other end is fitted with an automobile cigarette lighter plug.

Recommended charging time is 16 hours. It may be left on charge for longer periods without damaging the battery.
CAUTION: RECHARGING MUST BE DONE IN A NON-HAZARDOUS LOCATION.

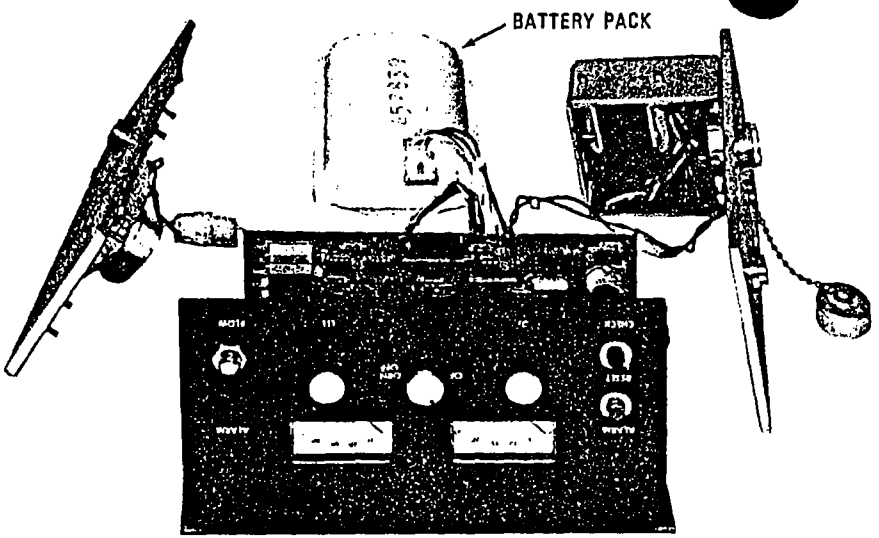

FIGURE 7 — DISASSEMBLY SHOWING BATTERY PACK

The batteries sometimes will not supply full power capacity after repeated partial use between chargings. For this reason, it is recommended that the batteries be "exercised" at least once monthly. Run the Model 260 for 8 to 10 hours and then recharge.

If the instrument has not been used for 30 days, the batteries should be charged prior to use.

Should the battery not respond to recharging or not "hold" a charge, the battery should be replaced. Replacement procedure is as follows:

1. Loosen the knurled screws holding the handle and remove the handle.
2. Looking at the front panel of the instrument, remove the right side (audible alarm side panel) by unscrewing the four side panel screws.
3. Gently pull the side panel loose and tilt the instrument to help the battery case slide out. Disconnect the molded nylon plug.
4. Install new battery in the reverse procedure outlined above.

Calibration

Before the calibration of the combustible gas indicator can be checked, the Model 260 must be in operating condition as described in the OPERATING PROCEDURE, Section V. Optional calibration equipment is shown in Figure 8. Calibration check-adjustment is made as follows:

1. Attach the flow control to the recommended calibration gas tank.
2. Connect the adapter-hose to the flow control.
3. Open flow control valve.
4. Connect the adapter-hose fitting to the inlet of the instrument; after about 15 seconds the L.E.L. meter pointer should be stable and within the range specified on the calibration sheet accompanying the calibration equipment. If the meter pointer is not in the correct range, stop the flow, remove the right hand side cover. Turn on the flow and adjust the "S" control with a small screwdriver to obtain a reading as specified on the calibration sheet.
5. Disconnect the adapter-hose fitting from the instrument.
6. Close the flow control valve.
7. Remove the adapter-hose from the flow control.
8. Remove the flow control from the calibration gas tank.
9. Replace the side cover on the Model 260.

CAUTION: Calibration gas tank contents are under pressure. Use no oil, grease or flammable solvents on the flow control or the calibration gas tank. Do not store calibration gas tank near heat or fire or in rooms used for habitation. Do not throw in fire, incinerate or puncture. Keep out of reach of children. It is illegal and hazardous to refill this tank. Do not attach the calibration gas tank to any other apparatus than described above. Do not attach any gas tank other than MSA calibration tanks to the regulator.

Printed Circuit Board Adjustments

The printed circuit board contains six adjustment pots as shown in Figure 9. These are identified as:

Combustible Gas Indicator

CZ — coarse zero is adjusted by setting the ZERO L.E.L. control at mid-range; sampling fresh air and adjusting the % L.E.L. meter to read zero.

S — span is adjusted after proper zeroing by sampling calibration gas and adjusting the read-out accordingly.

CHK — this controls the battery charge indication and should read at "B" in the word BATTERY on the meter face when the battery voltage measured with a voltmeter is 2.40V.

CGA — the combustible gas alarm point is factory set at 50% L.E.L.

Oxygen Indicator

OA — the oxygen alarm point adjustment. It is factory set at 19.5% oxygen.

OT — oxygen trim is factory adjusted with the instrument turned on to obtain a zero reading on the oxygen meter when sampling a pure inert gas (100% nitrogen).

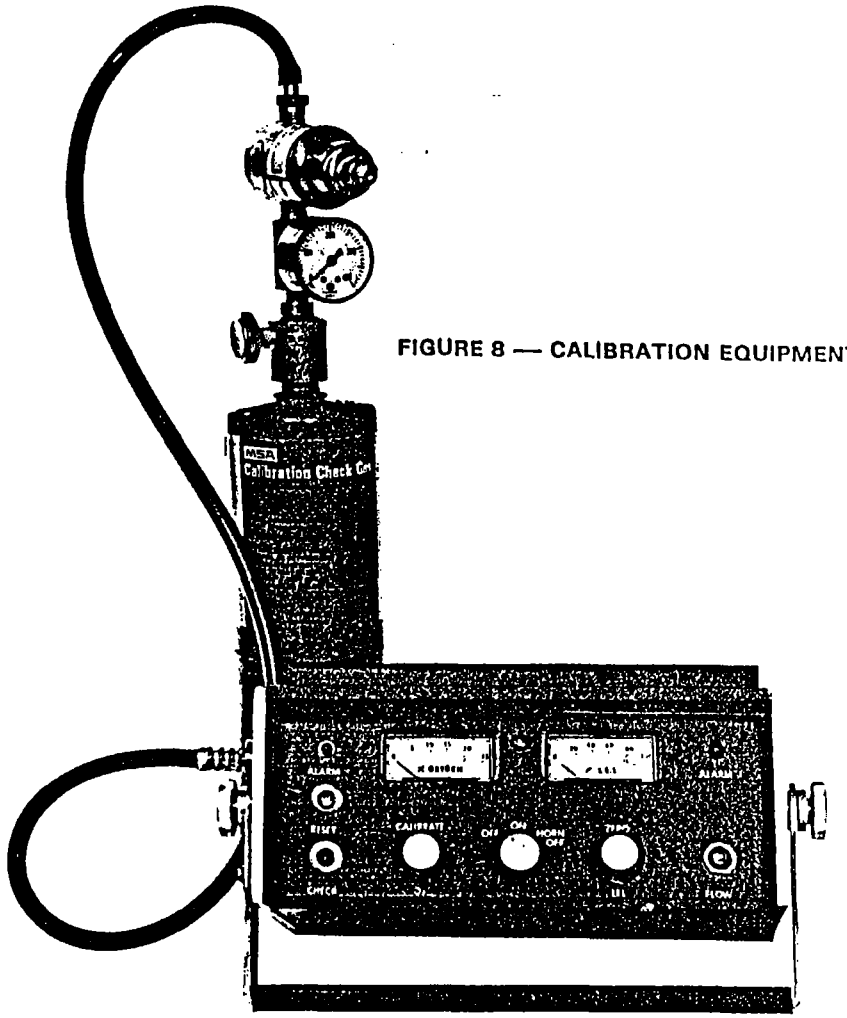

FIGURE 8 — CALIBRATION EQUIPMENT

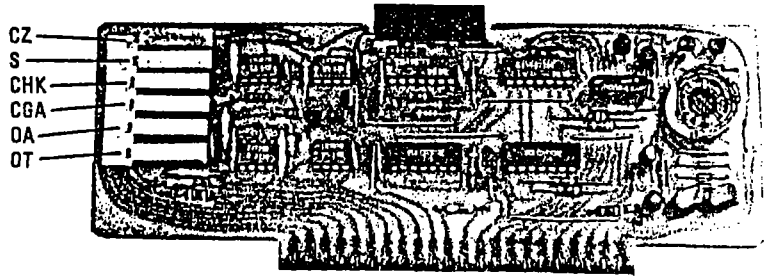

FIGURE 9 — PRINTED CIRCUIT BOARD ADJUSTMENTS

MSA Instrument Division
Instruction Manual:

MODEL 360 CARBON MONOXIDE, COMBUSTIBLE GAS & OXYGEN ALARM OR MODEL 361 HYDROGEN SULFIDE, COMBUSTIBLE GAS & OXYGEN ALARM

MINE SAFETY APPLIANCES COMPANY - INSTRUMENT DIVISION
P.O. BOX 427, PITTSBURGH, PENNSYLVANIA 15230

6870 (L) REV 8

476473

IMPORTANT WARNING

THIS MANUAL MUST BE CAREFULLY READ BY ALL INDIVIDUALS WHO HAVE OR WILL HAVE THE RESPONSIBILITY FOR INSTALLING, USING, OR SERVICING THE PRODUCT. Like any piece of complex equipment, the MODEL 360 CARBON MONOXIDE, COMBUSTIBLE GAS & OXYGEN ALARM OR MODEL 361 HYDROGREN SULFIDE, COMBUSTIBLE GAS & OXYGEN ALARM will perform as designed only if it is installed, used and serviced in accordance with the manufacturer's instructions. OTHERWISE IT COULD FAIL TO PERFORM AS DESIGNED AND PERSONS WHO RELY ON THIS PRODUCT FOR THEIR SAFETY COULD SUSTAIN SEVERE BODILY INJURY OR DEATH.

The warranties made by Mine Safety Appliances Company with respect to the product are voided if the product is not installed, used and serviced in accordance with the instructions in this manual. Please protect yourself and your employees by following them. We encourage our customers to write or call for a demonstration of this equipment prior to use or for any additional information relative to use or repairs.

VI TROUBLE-SHOOTING AND REPAIR

Difficulties with the Model 260 can be localized by disassembling the instrument and performing a few tests described below. Refer to Figure 10. Disassembly procedure is:

1. If an accessory is attached to the side of the instrument case, disconnect it.
2. Remove the carrying handle.
   a. Loosen both knurled screws.
   b. The arms of the handle ride on a collar. Spread the arms beyond the collar and lift the handle from the shaft of the knurled screw.

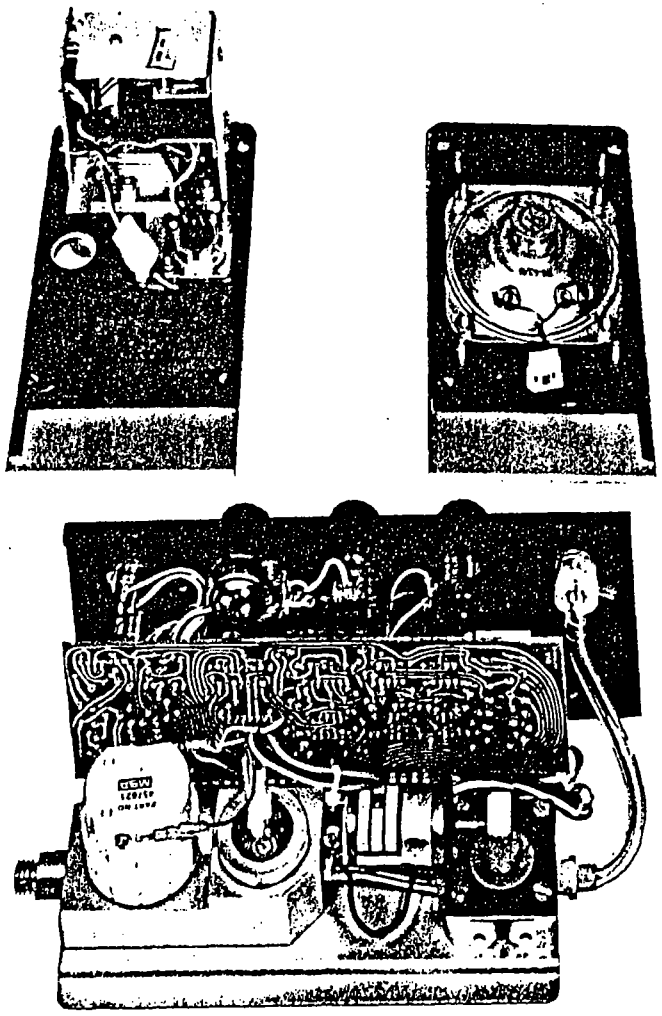

FIGURE 10 — DISASSEMBLY PHOTO

3. Remove both sides of the case by removing the two of four screws. Slowly draw the sides away from the case as far as the connecting wires will permit.
4. Disconnect molded nylon plugs from battery and the speaker.
5. Slide the battery out of the case.
6. All of the remaining components and wiring are bolted to the top panel of the case. This panel assembly can be removed as a unit by simply sliding the assembly from the extruded sides of the case.
7. For trouble-shooting, the battery can be re-connected after the instrument is out of the case.

Flow System

Flow problems — should flow continue when the inlet is shut, a leak in the flow system is indicated. Stop off the flow at the pump inlet ascertaining that the pump stalls. Work back the flow path towards the sample inlet until the leak is identified.

Pump — the pump and motor are capable of 750 to 1000 hours of sampling. After this period of time the motor may fail to start or may run erratically. The pump assembly should be replaced if the panel mounted flow indicator indicates no flow when the instrument is turned on and the battery check reading indicates a charged battery. The pump assembly is replaced as follows:

1. Remove the printed circuit board.
2. Unsolder the pump leads.
3. Remove the two screws from the base of the Pump Assembly.
4. Withdraw the Pump Assembly and remove the plastic tubing.
5. Attach the new Pump Assembly (pump and motor) to the mounting plate with the two screws.
6. Connect the plastic tubing to the pump.
7. Solder the pump power leads to the motor terminals.
   a. Solder the red wire to the positive terminal of the motor.
   b. Solder the black wire to the negative terminal of the motor.
8. Insert the printed circuit board, check operation and reassemble the instrument.

Oxygen Cell

The Oxygen Cell should perform for approximately one year without attention or maintenance. Eventually, however, it will lose sensitivity. When it does, the meter needle can no longer be set to 20.8% with the CALIBRATE knob when sampling uncontaminated fresh air. At this time, the cell should be replaced. Use the following procedure. Refer to Figure 11.

To remove the Oxygen Cell, disassemble the instrument and remove the printed circuit board.

1. Disconnect the positive (gray) and negative (yellow) slip-on leads from the Oxygen Cell.
2. Turn the Oxygen Cell counterclockwise to remove it and its O-ring from the manifold.

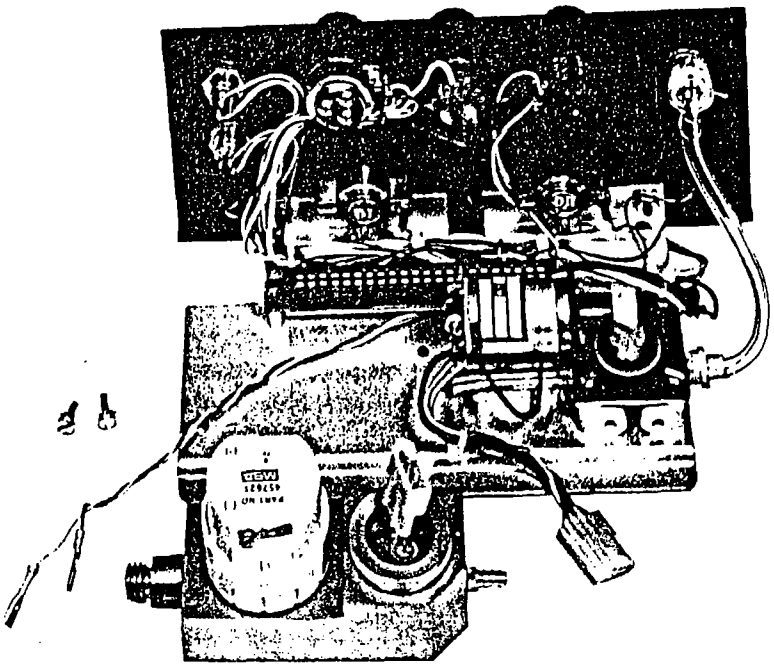

FIGURE 11 — SENSOR REPLACEMENT

3. Install the O-ring and the new Oxygen Cell.
4. Connect the gray lead to the positive terminal and the yellow lead to the negative terminal.
5. Check for leaks in flow system; see step 5 of Operation Procedure.
6. Reassemble the instrument; turn ON and check the O_2 calibration — adjust if necessary.

Combustible Gas Indicator

It is recommended that at least once each week the combustible gas indicating portion of the instrument be checked for operating accuracy with a known gas-air mixture and be adjusted as necessary. (MSA supplies such calibration equipment as accessory items.) If proper calibration cannot be attained and/or the combustible gas meter cannot be zeroed, then the sensor diffusion head should be replaced and the instrument calibrated. Use the following procedure:

1. Unplug the nylon connector from the sensing head. Refer to Figure 11.
2. The diffusion head is held to the manifold with a retaining ring. Unscrew the retaining ring by turning it counterclockwise, remove the diffusion head and remove the O-ring.
3. Insert the O-ring and the new diffusion head into the manifold.
4. Lock the diffusion head to the manifold with the retaining ring. Use enough finger pressure on the retaining ring to compress the O-ring.
5. Connect the nylon sensing head plug.
6. Reassemble the instrument.
7. Check for leaks in flow system, see step 5 of Operation Procedure.
8. Check calibration: see Maintenance and Calibration.

If additional servicing is required, send the complete instrument to: Mine Safety Appliances Company
Repair Department
7522 Meade Street
Pittsburgh, Pennsylvania 15208

VIII. PARTS AND ACCESSORIES LIST

When ordering MSA Combustible Gas and Oxygen Alarm, or any of the replacement parts or accessories, please use part numbers.

Description	Part No.
Combustible Gas and Oxygen Alarm Model 260	449900
5-foot synthetic rubber sampling line complete with couplings	11354
10-foot synthetic rubber sampling line complete with couplings	11955
15-foot synthetic rubber sampling line complete with couplings	11912
25-foot synthetic rubber sampling line complete with couplings	11913
50-foot synthetic rubber sampling line complete with couplings	11958
Tube, 3-foot hollow brass probe	11961
Tube, 3-foot plastic probe	73743
Rod, 4-foot solid brass probe	11960
Filter, Cotton Dust, package of 6	16499
Filter, inhibitor, package of 6	47740
External cartridge holder	14273
Line trap	74809
Line trap adaptor	459641
Oxygen Sensor	457621
Pump Assembly	449965
Harness, carrying	457754
Cable, charging, 115V 60Hz ac	449918
Cable, charging, 12V dc	449919
Diffusion Head	449917
Battery Pack	457839
Calibration:	
Flow control, 1.5 1/m	459948
Cylinder, gas 0.6% Propane in air	459943
Adapter, Hose	449401

CAUTIONS AND WARNINGS

1. The toxic sensors used in the Model 360 or 361 are designed to detect carbon monoxide or hydrogen sulfide, respectively. These two toxic gases may be present in work areas. Other toxic gases and vapors may also be present in work areas which cannot be detected by the Model 360 or 361. Every work area should be appraised by someone trained in hazard control to make sure that the correct instrument is chosen and to determine whether other instruments or methods should be used in addition to the Model 360 or 361 to prevent possible exposures to other toxic gases.

2. The toxic gas sensors will exhibit cross-sensitivities to several other gases (NOTE: See Section 6 for cross-sensitivity tables).

3. Handle the toxic sensor carefully; it is a sealed unit which contains an acid electrolyte. If electrolyte is leaking from the sensor, exercise caution so that the electrolyte does not contact skin, eyes or clothing, thus avoiding acid burns. If contact occurs, rinse the area immediately with a large quantity of water. In case of contact with eyes, immediately flush eyes with plenty of clean water for at least 15 minutes and contact a physician.

4. The combustible gas sensor of the Model 360 or 361 is designed to measure combustible gas or vapor content in air. It will not indicate the combustible gas content in an inert gas background, furnace stack or in other atmospheres with less than 10% oxygen. Further, these instruments should not be used where the oxygen concentration exceeds that of fresh air (oxygen enriched atmospheres) because the extra oxygen makes any combustible mix easier to ignite and, thus, more dangerous.

5. Certain materials such as silicone, silicates and organic lead compounds tend to poison the combustible gas sensor, thereby causing erroneously low readings. Calibration checks should be made frequently if such materials are suspected to be present in the tested atmosphere. (NOTE: See Uses and Limitations, Section 1 - OPERATION for more detailed information.)

6. The combustible gas sensor detects only combustible gases and vapors in air. It will not indicate the presence of combustible airborne mists or dusts such as lubricating oils, coal dust or grain dust.

7. Combustible gases will burn or explode only when the fuel/air mixtures are within certain proportions. The minimum concentration of a particular combustible gas in air which will burn and continue to burn when ignited is defined as the lower explosive limit (LEL). The maximum concentration that can be ignited is defined as the upper explosive limit (UEL). In some references, the terms used are lower and upper flammable limits (LFL and UFL). See Uses and Limitations, Section 1 - OPERATION.

8. Before each day's usage, sensitivity must be tested on a known concentration of the combustible gas for which the instrument is calibrated (equivalent to 25% to 50% of full-scale concentration). The indication must be equal to or higher than the actual concentration.

9. The oxygen sensor of the Model 360 or 361 detects the partial pressure of the oxygen in the sample. High or low pressure samples will give erroneous oxygen percent (%) readings. For atmospheric sampling at higher or lower altitudes, the instrument oxygen meter should be calibrated at the elevation where sampling is to take place.

10. Acid gases, such as carbon dioxide will shorten the service life of the oxygen sensor.

11. The oxygen and toxic gas sensors are packaged separately in sealed containers. They must be installed before the Model 360 or 361 can be used.

12. Sampling lines will increase the response time of the instrument. For example: a 50-foot sample line will increase the initial response time of the Model 360 or 361 to approximately 30 seconds and the final response to approximately 3 minutes.

13. Use only genuine MSA replacement parts when performing any maintenance procedures provided in this manual. Failure to do so may seriously impair instrument performance and may void all warranties and approvals. Repair or alteration of the Model 360 or 361 beyond the scope of these maintenance instructions, by anyone other than a certified MSA serviceman, may void all warranties and approvals.

14. Proper readings are obtained only when the battery has a sufficient level of charge.
    a. Upon receiving a new Model 360 or 361, it is recommended that the battery be charged for at least 14 hours.

    b. After each day of use the battery should be charged for a minimum of 14 hours.

    c. Recharging must be done in a non-hazardous location to prevent the potential ignition of combustible atmospheres.

    d. Do not operate the Model 360 or 361 while the battery is being charged.

e. As a regular monthly maintenance item for optimum battery service, the Model 360 or 361 battery should be charged for 14 hours. Then run the instrument for 8 hours and fully charge the battery for 24 to 36 hours.

15. The sample inlet filter should be examined each time the Model 360 or 361 is recharged. If the filter element appears to be coated with dust or dirt, it should be washed, dried and reinserted or a new element substituted. Make sure that the inlet seal O-ring in the inlet filter cap is properly seated. If O-ring is damaged or missing, the O-ring must be replaced before using the Model 360 or 361 with any sampling accessories.

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SECTION 1

OPERATION

GENERAL SPECIFICATIONS

Performance Characteristics

- ACCURACY: Combustible Gas: ±3% LEL up to 50% of full-scale; ±5% LEL, 50% to 100% of full-scale

  Oxygen: ±0.8% O_2, 0% to 10% oxygen
  ±0.3% O_2, 10% to 25% oxygen

  Toxic Gas: When calibrated with 300 ppm CO or 40 ppm H_2S calibration gas at temperature of use:

  Model 360: ±10 ppm CO or ±10% of reading (whichever is greater)

  Model 361: ±2 ppm H_2S or ±10% of reading (whichever is greater)

- RANGES: Toxic Gas: o Model 360: 0 to 500 ppm CO;
  o Model 361: 0 to 50 ppm H_2S

  Combustible Gas: 0 to 100% LEL measurement; 60% LEL maximum alarm set point

  Oxygen: 0 to 25% O_2

- RESPONSE TIME TO 90% OF FINAL READING:

  Combustible Gas: 15 seconds

  Oxygen: 20 seconds

- OPERATING HUMIDITY RANGE:

  10 to 90% RH; (NOTE: Long-term exposures to extreme limits of humidity will reduce the life of the toxic gas sensor.)

- OPERATING TEMPERATURE RANGE:

  32° to 104°F (0° to 40°C)

  Model 360: Temperature compensated for a maximum error of ±25 ppm CO from 0° to 40°C

  Model 361: Temperature compensated for a maximum error of ±5 ppm H_2S from 0° to 40°C

- STORAGE TEMPERATURE RANGE: 32° to 104°F

- ALARMS: High Oxygen, Low Oxygen, High Combustible Gas and High Toxic Gas Alarms (all adjustable); Off-scale, LEL Latching and Low Battery Alarms (not adjustable)

Operating Characteristics

- POWER SUPPLY: Rechargeable, sealed, 4.0-volt lead-acid battery pack

- OPERATING TIME: A minimum of 8 hours with fully charged battery

- READOUT: LCD with individual descriptors for range identification & alarms:
  - SCAN Mode: The LCD digital display automatically and sequentially switches to each of the three sensors for approximately 7 seconds per sensor (NOTE: All three alarm circuits are continuously monitored, regardless of display readout)
  - MANUAL Mode: The LCD digital display is connected to one of the three sensors manually selected by a push button control (NOTE: All three alarm circuits are continuously monitored, regardless of display readout)

- SAMPLE FLOW RATE: Approximately 1.5 liters per minute

Physical Characteristics

- CASE CONSTRUCTION: Aluminum
- DIMENSIONS: 10 x 7 x 3-3/4 in.
- WEIGHT: 7-1/2 lbs.
- ACCESSORIES: Sample lines up to 50 feet long, sample line liquid trap, probe tubes, 120 and 240 VAC battery chargers, carrying harness, and calibration kits are available
- SERIAL NUMBER: Located on nameplate inside of lid

INTRODUCTION

Prior to testing potentially dangerous atmospheres with the MSA® Model 360 or 361 Toxic Gas, Combustible Gas and Oxygen Alarm, the user must be familiar with all sections of this Instruction Manual.

The Model 360 or 361 is a hand-carried, battery-operated instrument (Figures 1A, 1B and 2). It is designed to sample atmospheres for carbon monoxide concentration (Model 360), hydrogen sulfide concentration (Model 361), combustible gases or vapors, oxygen content, and to warn the user when predeterminded concentrations are reached.

Major features of the Model 360 or 361 are ease of operation and reliability; the integrated circuit electronics and rugged components provide a tough, compact instrument.

The Model 360 or 361 houses three separate sensors and uses a common flow system. The zero and calibration controls have "lift-to-adjust" knobs to prevent any accidental change in adjustments.

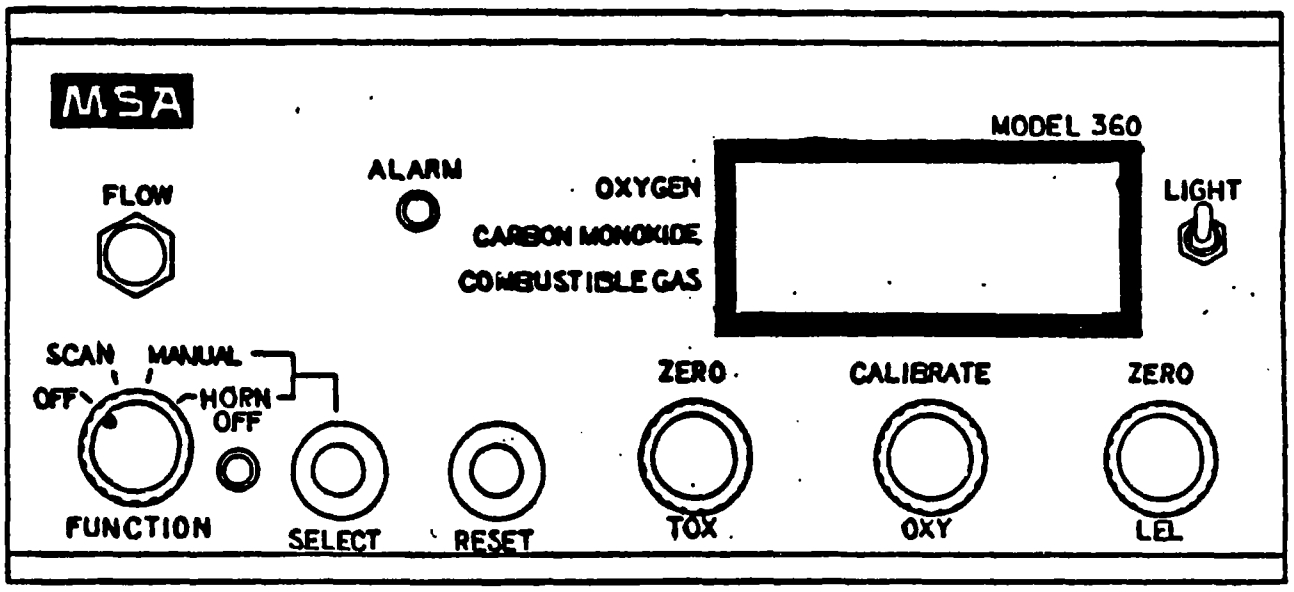

Figure 1A. MSA Mode 360 Control Panel

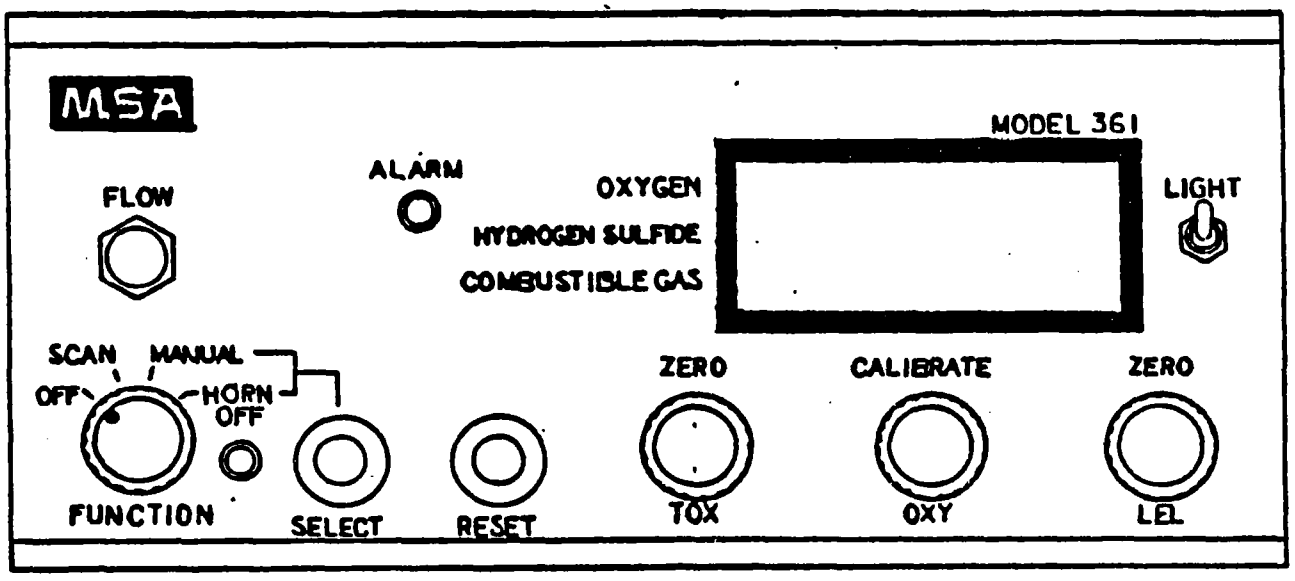

Figure 1B. MSA Mode 361 Control Panel

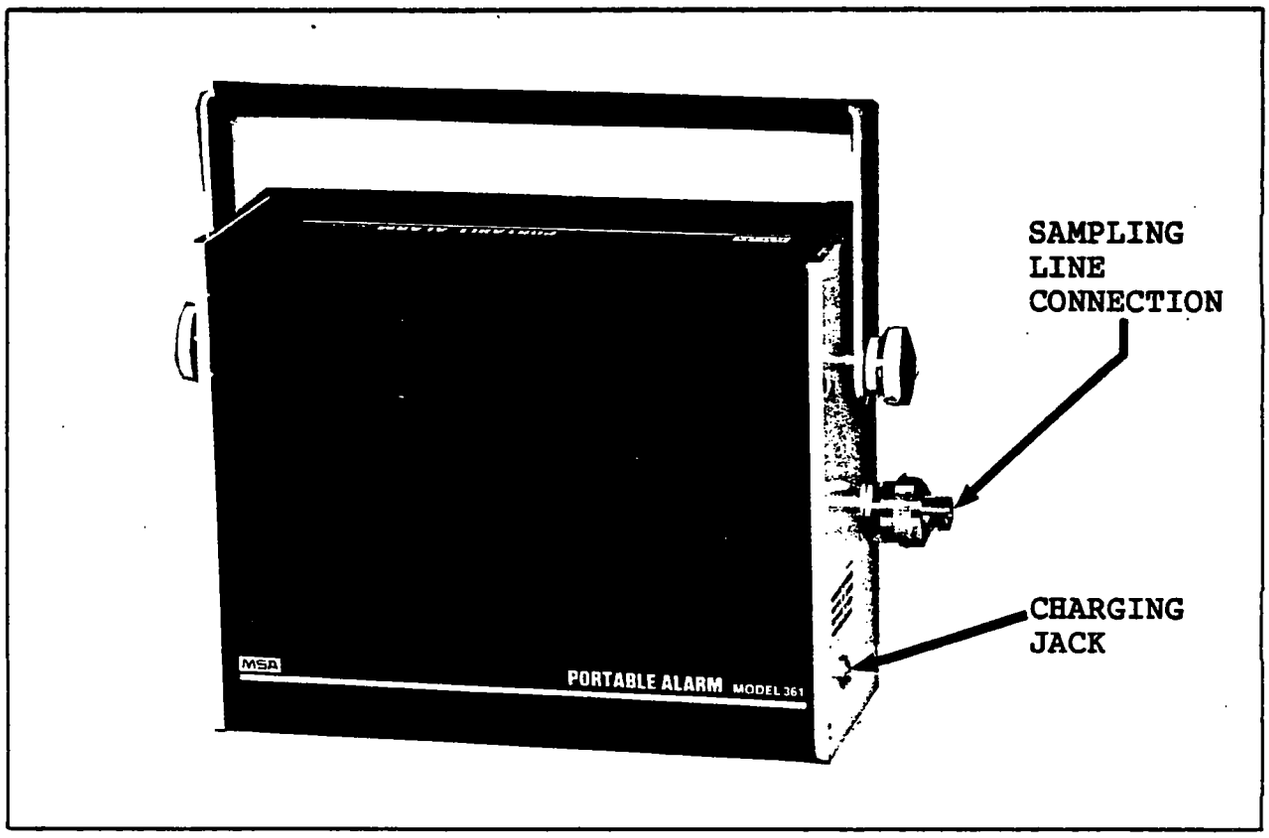

Figure 2. Sample Line/Probe Connection and Battery Charging Jack

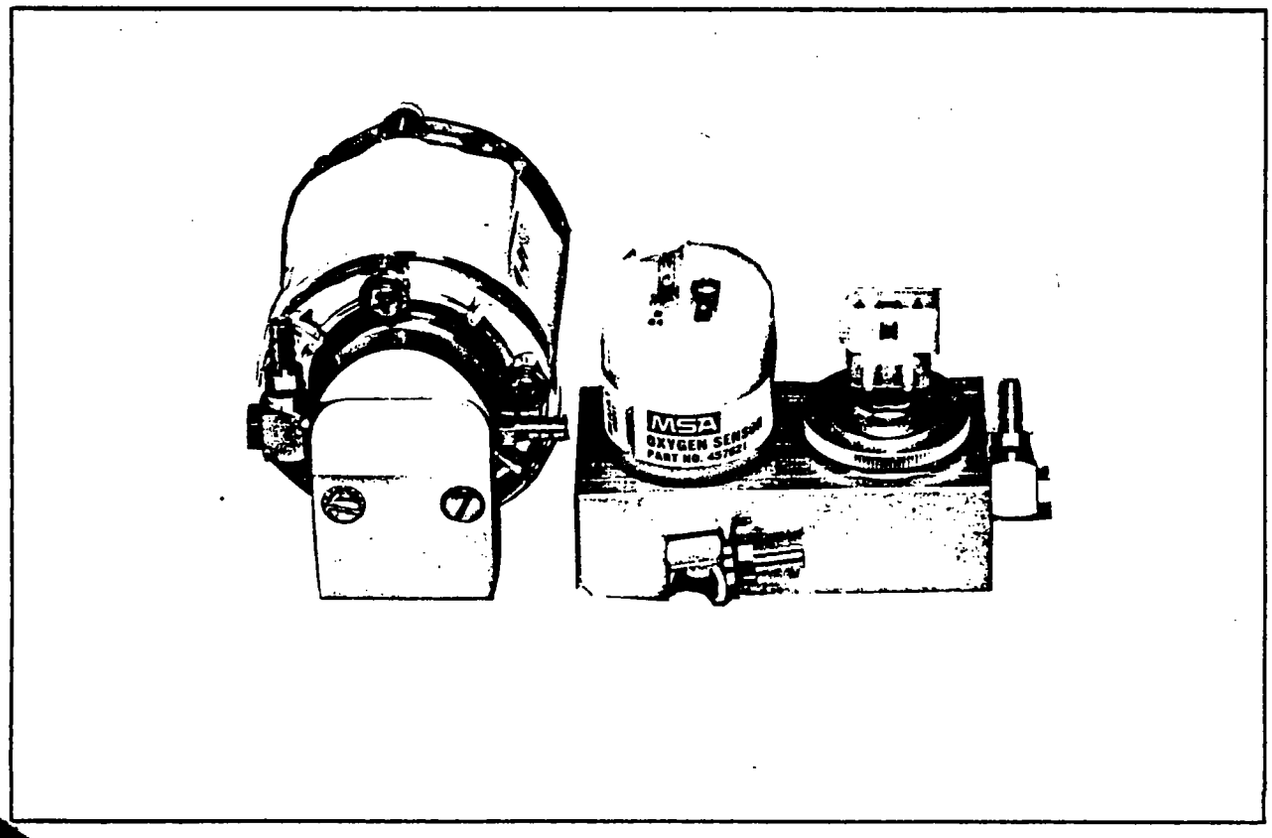

Figure 3. Manifold Blocks

A small pump pulls the atmospheric sample through a filter and pushes it through the manifold blocks in which the toxic gas, combustible gas and oxygen sensors are mounted (Figure 3). The flow then passes through a flow indicator on the control panel (Figure 4) and is finally exhausted to the side of the case. The approximate flow rate is 1.5 liters per minute.

The Model 360 or 361 is powered by a rechargeable, 4.0-volt lead-acid battery pack (Figure 5) sealed in a plastic case. Recharging requires only connecting the instrument to the charger. (NOTE: 120-volt and 240-volt versions are available.) A fully charged battery provides a minimum of 8 hours continuous non-alarm operation at normal temperatures.

USES AND LIMITATIONS

The MSA Model 360 or 361 Alarm provides an efficient and reliable method of testing atmospheres for: the presence of carbon monoxide (Model 360) or hydrogen sulfide (Model 361); combustible gases or vapors which may pose a potential flammability hazard; and sufficient oxygen content for life support. Common examples of such locations are manholes, storage tanks, tank cars, confined spaces, pumping stations, etc.

It is important that the instrument response be appraised by someone trained or experienced in properly interpreting the instrument readings with respect to particular conditions, on-going operations and safe practices. For example, an atmosphere that shows no flammability hazard can still be toxic to workmen. Also, if there is less than 10% oxygen, the instrument may not give an accurate combustible gas reading. Further, a tank or vessel which is safe before work is initiated may be rendered unsafe by changing conditions or work activities, such as by causing a temperature increase, or by stirring or handling bottom sludge in petroleum tanks.

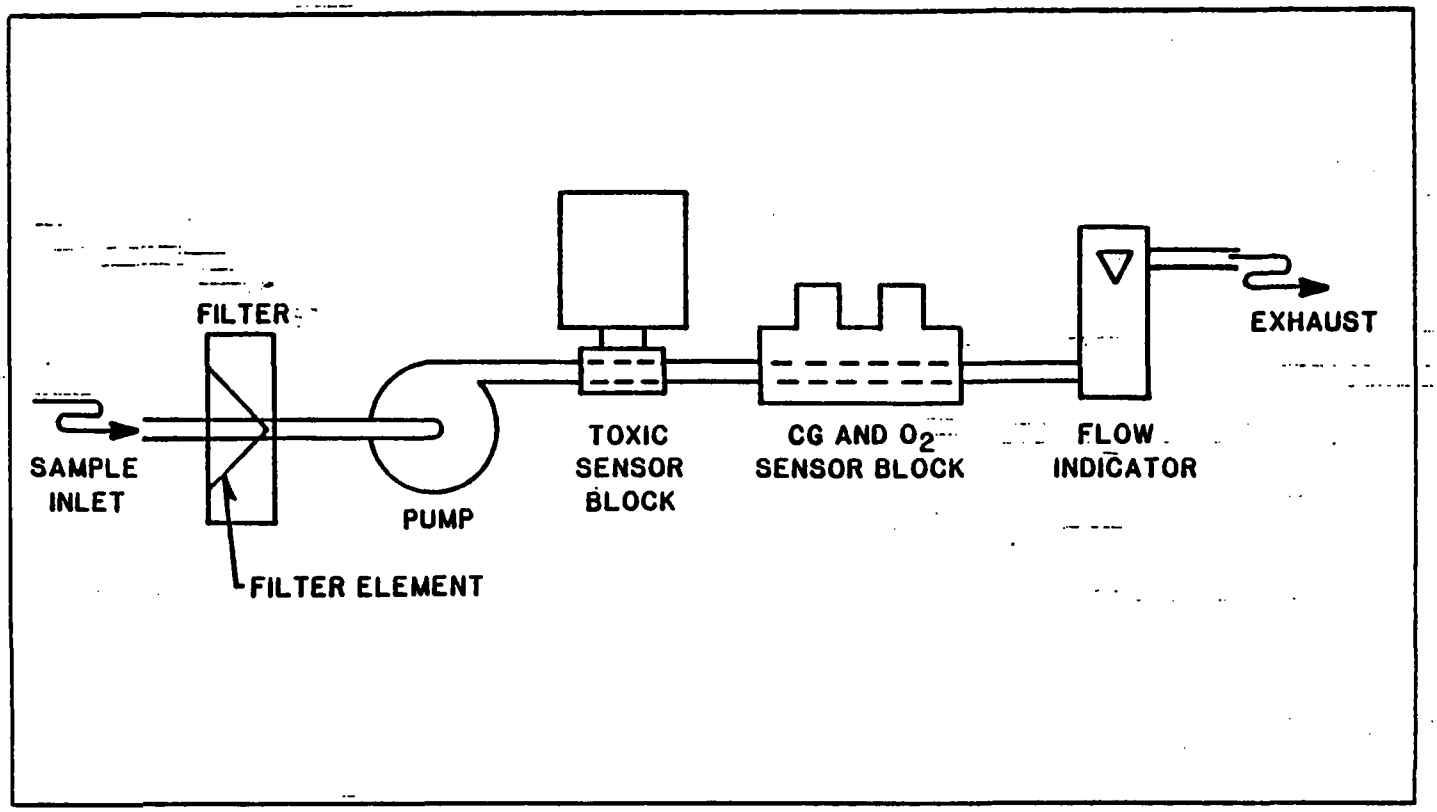

Figure 4. Flow Diagram

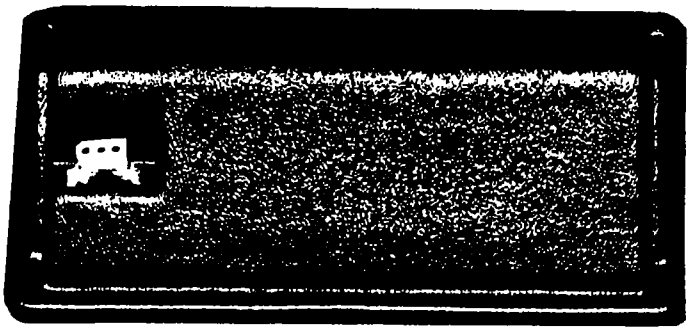

Figure 5. Battery Pack

The toxic sensors used in the Model 360 or 361 are designed to detect carbon monoxide and hydrogen sulfide, respectively. These two toxic gases may be present in work areas. Other toxic gases and vapors which cannot be detected by the Model 360 or 361 may also be present in work areas. It is important that every work area be appraised by someone trained in hazard control to make sure that the correct instrument is chosen and to determine whether other instruments or methods should be used in addition to the Model 360 or 361 to prevent possible exposures to other toxic gases.

Combustible gases will burn or explode only when the fuel/air mixtures are within certain proportions. The minimum concentration of a particular combustible gas in air which will burn when ignited is defined as the lower explosive limit (LEL). The maximum concentration that can be ignited is defined as the upper explosive limit (UEL). In some references, the terms used are lower and upper flammable limits (LFL and UFL).

Certain materials in the sampled atmosphere affect the catalytic material on the combustible gas sensor and may cause the indicator to respond incorrectly. Included are organic lead compounds used in leaded gasoline and silicon compounds in the form of silanes, silicones and silicates (often found in hydraulic fluids). Some of these materials rapidly "poison" the detector pelement so that it will malfunction. When such materials are even suspected to be in the atmosphere being tested, the instrument calibration must be checked before and after each series of tests.

The combustible gas sensor of these instruments is normally calibrated on pentane as being representative of the flammability characteristics of most commonly encountered combustible gases. The meter scale is calibrated from 0% to 100% LEL which corresponds to actual volume concentrations of 0% to approximately 1.5% pentane. Even though the instrument responds

to any combustible gas/air mixture below the flammable range, it provides accurate measurement only of the specific gas for which it has been calibrated. For response to other combustibles, see Section 6. The responses to these combustibles may be more or less sensitive than pentane. Calibration for combustibles other than pentane may be obtained through special order. The conversion factors in Section 6 may only be used with a Model 360 or 361 calibrated on pentane.

The combustible measurement is dependent upon catalytic combustion of the flammable gas in combination with the oxygen in the air. Conditions can exist in a closed space where not enough oxygen remains to provide a correct combustible gas reading (approximately 10% oxygen or less).

(NOTE: This low oxygen level is far below what is required for human life.)

In these instances, the % oxygen reading is most important. A low oxygen concentration in an enclosed atmosphere indicates that: (1) some other gas has displaced much of the air, or (2) some process has consumed much of the available oxygen. Upon initially opening and probing an enclosed area, move the probe into the area slowly while watching the readout to provide the earliest possible indication of a potentially dangerous condition.

The oxygen sensor responds to the partial pressures of oxygen in the atmosphere being tested. For this reason, changes in the atmospheric or sample pressure will change the oxygen reading. Calibration should be checked and adjusted in fresh air at the elevation where the instrument is to be used.

The oxygen sensor is temperature compensated in the range of 32° to 104°F (0° to 40°C). Use down to 0°F is possible when

calibrated at the temperature of use and if more sampling time is allowed for slower sensor response (approximately 3 minutes without sample line). The life of the oxygen sensor is reduced by exposure to carbon dioxide. The sensor life will be reduced to 2 days in 100% carbon dioxide, 50 days in 5%, and 100 days in 1%. The effect is cumulative; therefore, all tests of atmospheres containing excess concentrations of carbon dioxide should be stopped as soon as a constant reading is obtained. Flush the flow system with fresh air (20.8% oxygen) as soon as possible. Slow recovery to the air calibration point after exposure to high carbon dioxide is to be expected.
Evacuate all personnel from the area if the Model 360 or 361 toxic gas, combustible gas or oxygen alarm indicates the possibility of a hazardous condition.

The battery must have a sufficient charge level for the indicator to function properly. The descriptor BATT will appear in the readout when the battery voltage is too low. In addition, when operating in the ON position, the audible alarm activates when the battery voltage drops to a low level, thus indicating that recharging is necessary. The battery should be performance-checked on a monthly basis. (NOTE: See Section 3, MAINTENANCE.)

Accessory Items

The following accessory items are available for use with the Model 360 or 361 Combustible Gas, Oxygen and Toxic Alarm. See Section 5, PARTS LIST for their respective part numbers.

SAMPLE LINES: Special synthetic rubber lines which have minimal gas absorption characteristics are available in 5, 10, 15, 25, 35, and 50-foot lengths

SAMPLE PROBES: 3-foot, hollow brass probe; 3-foot hollow plastic probe for use in areas where contact with hazardous voltages is possible; and a 4-foot, solid end probe to prevent liquid pickup from wet tank bottoms

LINE TRAP ASSEMBLY:	Helps prevent liquids from being drawn into the instrument
CALIBRATION EQUIPMENT:	Consists of calibration gases, a flow regulator, and an adapter hose
CARRYING HARNESS:	Neck and waist straps to hold the Model 360/361 in place while climbing, etc.

INITIAL OXYGEN AND TOXIC SENSOR INSTALLATION

The oxygen and toxic sensors are packaged separately and must be installed in the Model 360 or 361 prior to placing the instrument into service. Once installed, the sensors should be left in place until the end of their useful lives.

Sensor Installation

1. Remove the carrying handle by loosening both knurled screws and spreading the handle beyond the collars. Lift handle from screw shafts.

2. Remove the left side of the case (the end with the threaded inlet fitting) by removing the four mounting screws. Allowing left side to remain attached to the top panel (via tubing and charge jack wires) slowly slide the top panel from the case until the plastic connectors for the battery and speaker are accessible. Disconnect these connectors. (NOTE: Hold the case lid to prevent it from falling off case; set lid aside.)

3. Slide the top panel completely off the remainder of the case.

4. Open the protective bag containing the oxygen sensor and install the O-ring onto the threaded end of the sensor.

5. Firmly screw the sensor into the manifold by hand so as to compress the O-ring and thereby prevent sample flow leakage.

6. Push the connectors onto the two terminals at the top of the sensor [NOTE: Connect the gray wire to the positive (+) terminal and the yellow wire to the negative (-) terminal.]

7. Open the protective bag containing the toxic sensor and install the O-ring into the threaded end of the sensor.

8. Remove toxic sensor manifold from chassis by removing the 2 screws from the back of the chassis.

9. Remove plastic cap and packaging material and discard. Make sure the sintered metal disc is in place in the manifold.

10. Firmly screw the sensor onto the manifold by hand so as to compress the O-ring and thereby prevent sample flow leakage.

11. Reinstall the flowblock onto the chassis and connect the mating electrical connectors.

12. Reassemble the case by sliding the top panel back into position and reconnect the speaker and battery pack. (NOTE: The top and case fit together by two dove-tail type tongue and grooves. Be sure to align both carefully before sliding the panel onto the instrument. The panel should slide on easily; if resistance occurs, the tongue and grooves are positioned incorrectly.) While sliding the panel, make sure that the tubing is not pinched.

13. Place the case side in position and install the lid hinge pins into each side. Make sure the tubing is not pinched.

14. Install the mounting screws. (NOTE: Insert all four screws loosely before tightening any one of them.)

15. Reattach the handle.

16. See Troubleshooting Guidelines and Oxygen and Toxic Calibration in Section 3, MAINTENANCE for instructions on leak testing the sample flow system and adjusting the oxygen calibration.

OPERATING INSTRUCTIONS

The Model 360 or 361 oxygen calibration and toxic and combustible zero checks must be made in fresh air or with the inlet end of the sampling line in fresh air.

1. Turn the FUNCTION control to the HORN OFF position; the HORN OFF indicator will light and the descriptor % LEL will show in the readout.

2. Set the readout to zero (00) by adjusting the LEL ZERO control (NOTE: this must be done within 30 seconds of turning ON to prevent the possibility of activating the off-scale, LEL latching alarm).

3. Press the SELECT button firmly to obtain % OXY on the readout; then set the readout to 20.8% by adjusting the OXY CALIBRATE control.

4. Press the SELECT button firmly to obtain PPM TOX on the readout; then set the readout to zero (00) by adjusting the TOX ZERO control.

5. Press the RESET button.

6. Turn the FUNCTION control to MANUAL for continuous readout of any one gas or to SCAN for automatic scanning of the three gas

readings. (NOTE: All alarm functions operate in either position.)

7. Momentarily place a finger over the sample inlet fitting or the end of the sample line. Observe that the FLOW indicator float drops out of sight, indicating no flow. If it does not, check the flow system for leaks.

8. The instrument is ready for sampling. Move it to the area for sampling or place the end of the sampling line at the point where the sample is to be taken.

WARNING

If an alarm condition is indicated by an ALARM or OVER sign in the readout or a pulsing horn, evacuate personnel from the area and notify the safety officer or fire department.

A low battery condition is indicated by a BATT sign in the readout or by a steady horn; remove the Model 360 or 361 and recharge in a nonhazardous area to prevent potential ignition of combustible atmospheres.

SECTION 2

THEORY OF OPERATION

INTRODUCTION

A block diagram of the MSA Model 360 or 361 is provided in Figure 6. The Model 360 or 361 toxic gas, combustible gas and oxygen sensors operate simultaneously. Each sensing circuit is equipped with an individual, visual alarm descriptor. There is a common, pulsating audible alarm; one position of the FUNCTION switch enables the audible alarm to be turned off, if so desired. The alarm descriptors will remain on until the concentration returns to within the alarm setpoints, and the reset button is depressed.

A low-battery alarm will activate the BATT descriptor in the display and a continuous, steady-sounding audible alarm. This steady sound indicates that the Model 360 or 361 must be removed from service and charged in a nonhazardous area.

WARNING

Exposure of the combustible gas sensor to a concentration high enough to cause the readout to indicate a reading greater than 100% LEL will cause the readout to latch. When latched, the LEL readout will be blank and the descriptors for OVER and LEL ALARM will appear. This latching circuit is a warning that the gas concentration has exceeded the LEL and that all personnel must be evacuated from the area.

This latching circuit can be reset by removing the Model 360 or 361 to an area known to be free of combustible gas (fresh air) and turning off the instrument. The Model 360 or 361 can then be turned on and rezeroed in fresh air. This latch circuit does not operate during the first 30 seconds after turning on the instrument, thus providing sufficient time for sensor warm-up and rezeroing.

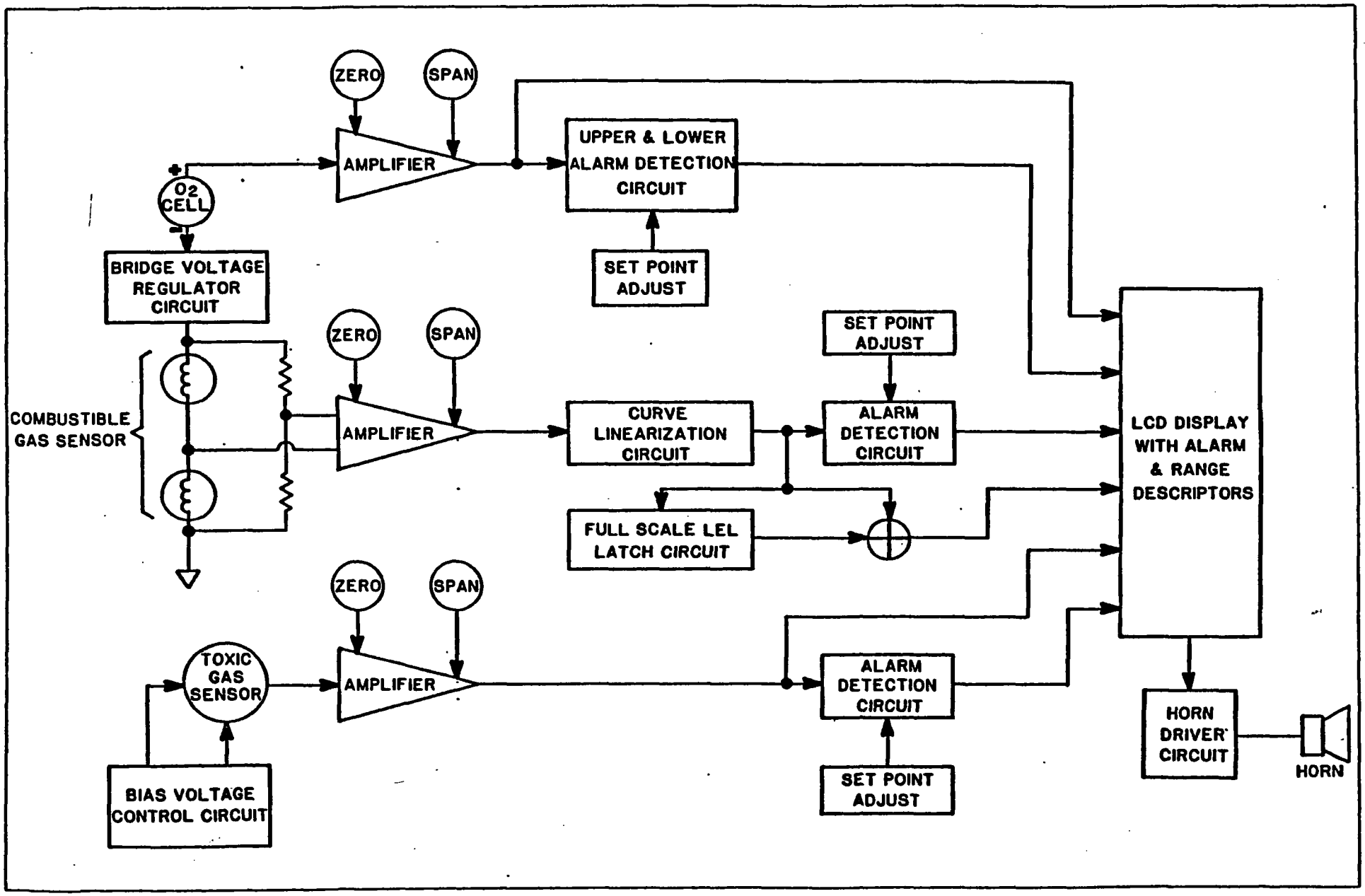

Figure 6. Block Diagram

TOXIC GAS SENSOR

The toxic gas sensor used in both the Model 360 and 361 is a membrane-sealed electrochemical cell. The cell requires an external voltage source to function and produces a current output that is proportional to the amount of CO or H_2S present. The CO or H_2S diffuses through the front membrane of the cell and is oxidized at the working electrode. Current flows through the liquid electrolyte (acid solution) to the counter/reference electrode where oxygen reduction occurs. The amount of current produced for a concentration of CO or H_2S is dependent on the voltage across the working and reference electrodes as well as the electrode materials and the electrolyte. The choice of the particular noble metal electrodes and the setting of the cell voltage optimizes the sensor for the detection of CO or H_2S.

The current from the cell is fed to a current to voltage converter. This voltage signal is applied to an amplifier which drives the toxic gas readout and provides an input for an alarm comparator circuit.

COMBUSTIBLE GAS SENSOR

The flammable properties of combustible gases are used as the basis of detection. The sensor consists of a pair of pelletized filaments called "Pelements™" arranged in an electrically balanced bridge circuit. The detector pelement is treated with a palladium catalyst that causes the combustible gases to combine with oxygen at much lower temperatures than would be required for normal burning. The inactive compensator pelement is also exposed to the sample flow and acts to offset any electrical changes caused by flow conditions, sample temperature, pressure and/or humidity.

Combustible gases in the sample combine with oxygen in the air at the surface of the catalyzed detector pelement. Heat is liberated by this chemical reaction, thus increasing the temperature of the pelement and causing an associated increase in

the pelement electrical resistance.

Increased resistance of the detector pelement unbalances the bridge circuit, causing a voltage change at the mid-point connection between the detector pelement and the compensating pelement. This voltage signal is applied to an amplifier which drives the combustible gas readout and provides an input for an alarm comparator circuit.

OXYGEN SENSOR

The oxygen sensor is a galvanic type cell containing gold and lead electrodes in a potassium hydroxide solution. The cell is sealed with a membrane which allows oxygen to diffuse into the active area. The current generated by the cell is proportional to the oxygen partial pressure in the atmospheric sample passing over the face of the membrane. The generated current passes through a resistance to provide a voltage input signal for an amplifier. The output of the amplifier drives the oxygen readout and also serves as an input to the alarm comparator circuit.

SECTION 3
MAINTENANCE

BATTERY PACK CHARGING

The primary maintenance item of the Model 360 or 361 is the rechargeable, 4.0-volt lead-acid battery (Figure 7). Upon receiving a new Model 360 or 361, the battery pack must be fully charged, per the following procedure. Using the appropriate battery charger [120 VAC (Part No. 631664) or 240 VAC (Part No. 631712)] insert charger plug into charge jack (Figure 2).

CAUTION

Use only the chargers specified above to charge the instrument; otherwise, damage to the battery pack and/or the instrument circuitry may result.

The POWER ON lamp indicates that the charger is receiving power from the 120 or 240 VAC line. The FAST CHARGE lamp indicates that the battery voltage is low and that the charger has automatically switched to the higher charge rate. When the battery is approximately 95% charged, the charger will change to the trickle charge rate and the FAST CHARGE lamp will be extinguished. Recommended charging time is 14 hours. The battery pack may be left on charge for longer periods without damage.

WARNING

Do not charge the battery pack in areas that may contain a flammable mixture of combustible gases, vapors, mists or dust and air; otherwise, an explosion may occur since a source of ignition exists during charging. The battery pack may not supply full power capacity after repeated partial use between chargings; therefore, it is recommended that

the battery pack be "exercised" at least once per month by operating the fully charged Model 360 or 361 for 8 hours and then recharging. The battery pack should be charged after each day of use (or prior to use if the instrument has not been operated for 30 days).

Extended Operation

External Charging Adapter (Part No. 477153) can be used to charge a depleted battery while it is removed from the instrument. Use of this adapter permits extended operation by enabling the user to install a second, back-up battery into the instrument while externally charging the depleted battery.

BATTERY PACK REPLACEMENT

When the rechargeable, 4.0-volt lead-acid battery pack no longer responds to recharging or no longer "holds" a charge, the pack should be replaced according to the following procedure (Figure 7):

1. Loosen the knurled screws holding the handle and remove handle.

2. Looking at the front panel of the instrument, remove the right (audible alarm side) panel by unscrewing the 4 side panel screws.

3. Gently pull the side panel loose and tilt the instrument to help slide out the battery case. Disconnect the molded nylon plug from the battery case. (NOTE: Do not disconnect the alarm speaker.)

4. Install the new battery by reversing steps 1 through 3 above.

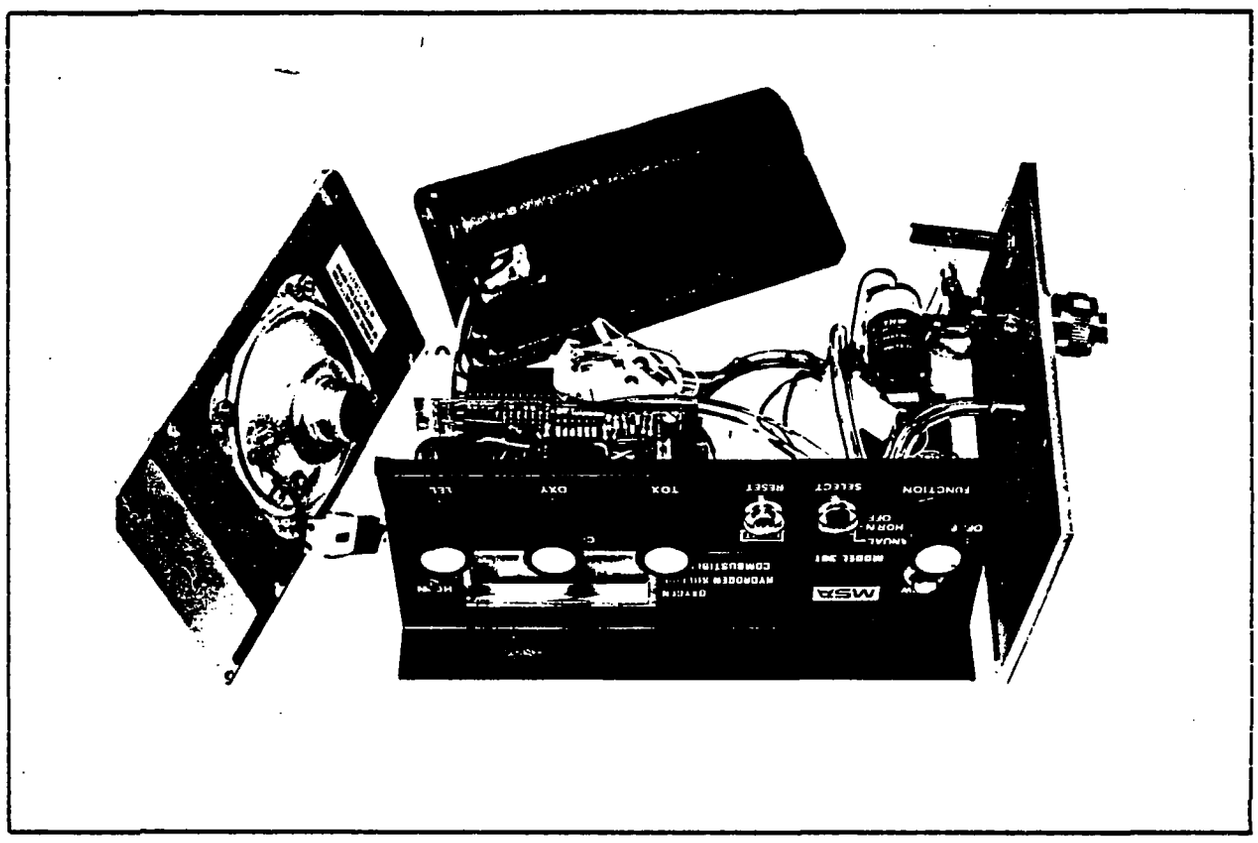

Figure 7. Disassembly Showing Battery Pack

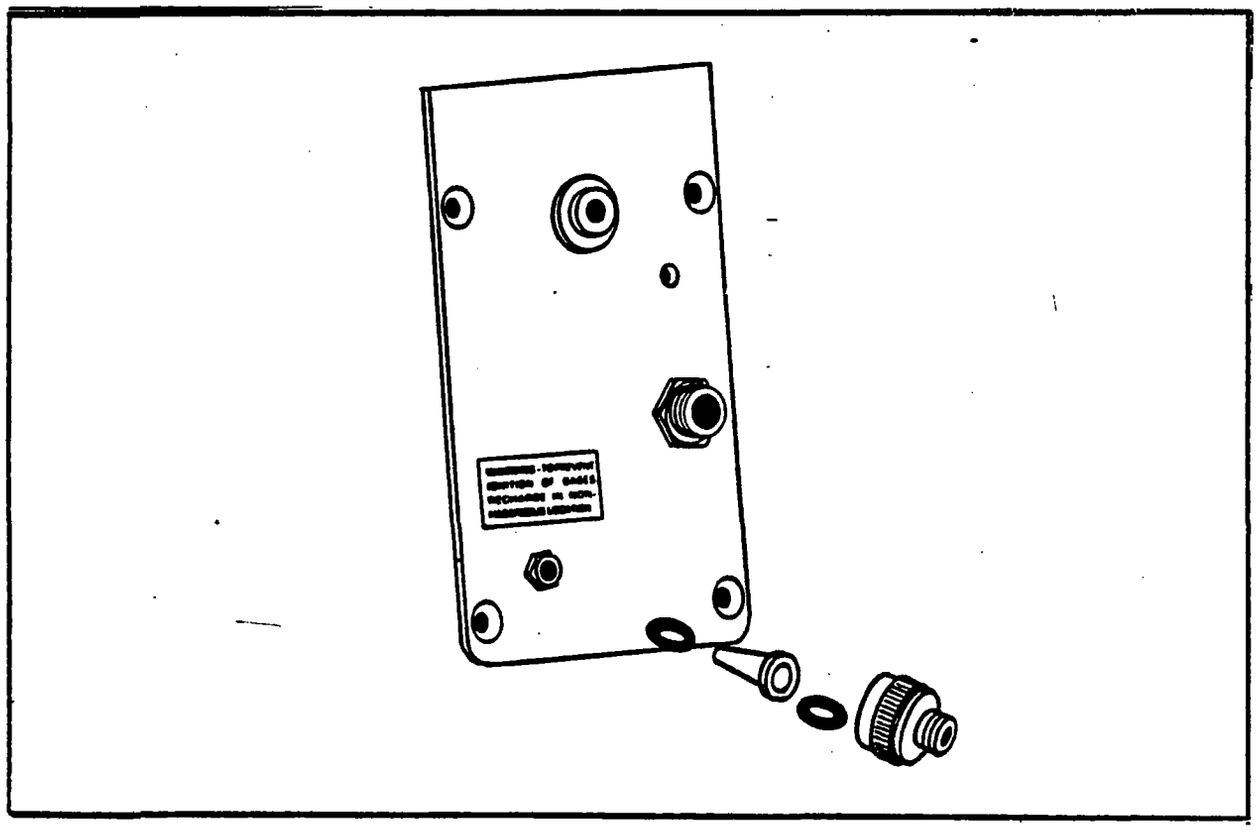

Figure 8. Disassembly Showing Sample Inlet Filter

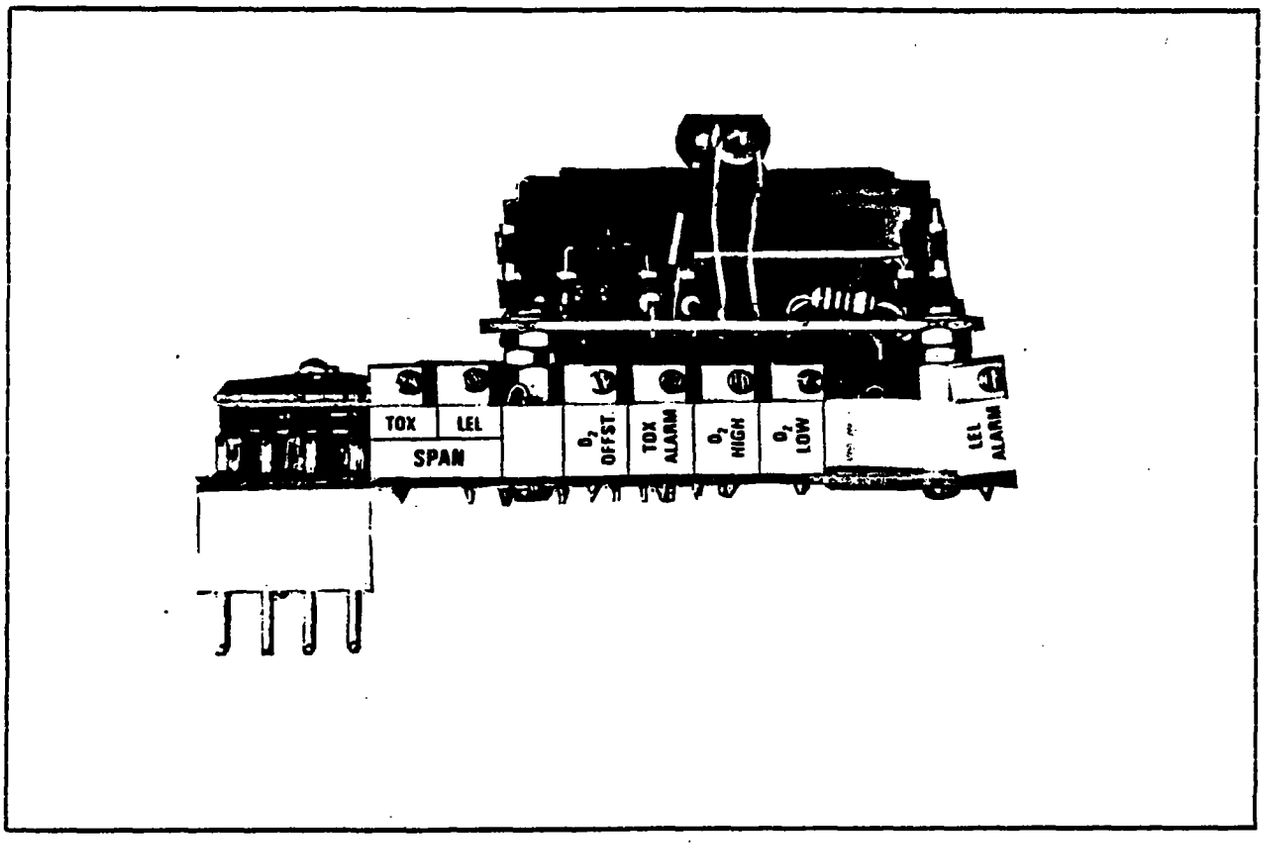

Figure 9. Printed Circuit Board Adjustments

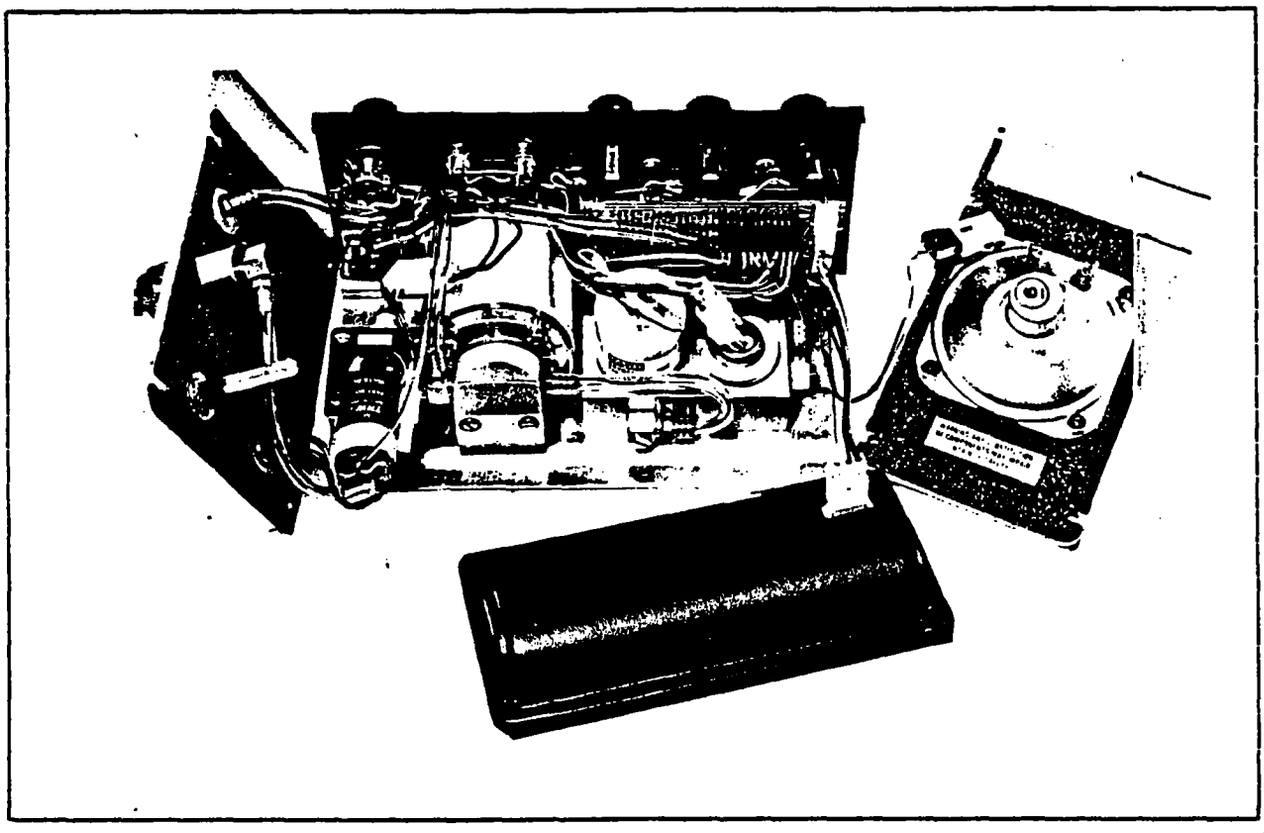

Figure 10. Disassembly Photo

SAMPLE INLET FILTER/FILTER ELEMENT

The sample inlet filter should be examined each time the Model 360 or 361 is recharged (Figure 8). If the filter element appears to be coated with dust or dirt, it should be washed, dried and re-inserted or a new element substituted. If a new element is installed, also install a new filter o-ring. Make sure the inlet seal O-ring in the inlet filter cap is properly seated. If the O-ring is damaged or missing, replace it before using the Model 360 or 361 with any sampling accessories.

PRINTED CIRCUIT BOARD ADJUSTMENT

The printed circuit board contains seven adjustment pots (Figure 9), identified as follows:

Toxic Gas Adjustments

TOX

ALARM: Model 360 -- The Carbon Monoxide Gas Alarm Point Adjustment (factory-set at 50 ppm)

Model 361 -- The Hydrogen Sulfide Gas Alarm Point Adjustment (factory-set at 10 ppm)

TOX

SPAN: After zeroing, the TOX SPAN is adjusted by sampling calibration gas and adjusting the readout accordingly

Combustible Gas Adjustments

LEL

ALARM: The Combustible Gas Alarm Point Adjustment (factory-set at 25% LEL; maximum setting is 60% LEL)

LEL

SPAN: After zeroing, the Span is adjusted by sampling calibration check gas and adjusting the readout accordingly

Oxygen Adjustments

O_2
HIGH: The Oxygen High Alarm Point adjustment (factory-set at 23%)

O_2
LOW: The Oxygen Low Alarm Point Adjustment (factory-set at 19.5% oxygen)

O_2
OFFSET: The Oxygen Offset controls the zero reading of the oxygen meter. The leads to the oxygen cell must be disconnected and shorted together, and the front panel OXY CALIBRATE knob turned fully clockwise. The % oxygen meter should indicate zero; adjust the O_2 OFFSET, if necessary.

TROUBLESHOOTING GUIDELINES

Difficulties with the Model 360 or 361 can be localized by disassembling the instrument and performing the following tests (Figure 10):

1. Disconnect any accessories attached to the side of the instrument case.

2. Loosen knurled screws holding the handle and remove handle.

3. Remove both sides of case by removing the two sets of four screws. Remove instrument lid and set aside. Slowly draw the sides away from the case as far as the connecting wires allow.

4. Disconnect molded nylon plugs from the battery and speaker.

5. Slide the battery out of the case.

6. All of the remaining components and wiring are bolted to the top panel of the case; this panel can be removed as a unit by simply sliding the assembly from the extruded sides of case.

7. For troubleshooting purposes, the battery (and speaker, if desired) can be reconnected after the instrument is removed from the case.

FLOW SYSTEM

A leak in the flow system is indicated when flow continues after the inlet is blocked. Block off the flow at the pump inlet by pinching the tubing with pliers to ensure that the pump stalls. If the pump stalls, remove the inlet filter cap and filter element and place a finger over the opening. If the pump then stalls, the O-ring in the inlet cap should be replaced. If the pump does not stall when the inlet opening is blocked, inspect the condition of the pump assembly, tubing, barbed hose fitting and its O-ring, and the O-ring behind the filter adapter. Replace any worn or damaged parts.

A blockage in the flow system is indicated when the float does not rise in the panel indicator. Remove any sampling line and, if this does not allow the flow to resume, examine the sample inlet filter for blockage or dirt. Clean or replace the filter element if necessary. If the flow is not restored by either of these procedures, the pump assembly should be inspected and/or replaced.

PUMP ASSEMBLY REPLACEMENT

The pump and motor are capable of 750 to 1000 hours of sampling. After this time period has lapsed, the motor may fail to start or may run erratically. The pump assembly should be replaced if the panel-mounted flow indicator indicates no flow when the instrument is turned on and the BATT check does not show in the display. Replace pump assembly by performing the following procedure:

1. Unsolder the leads from the motor.

2. Remove the four screws from the base of the pump assembly.

3. Withdraw the pump assembly and remove the plastic tubing.

4. Connect the plastic tubing to the pump.

5. Attach the new pump assembly to the mounting plate with the four screws.

6. Solder the pump power leads to the motor terminals.

   a. Solder the yellow wire to the positive (+) terminal of the motor.

   b. Solder the green wire to the negative (-) terminal of the motor.

7. Check for leaks in the flow system (NOTE: See Step 7 of Operating Instructions, Section 1 - OPERATION).

8. Reassemble the instrument.

TOXIC CELL REPLACEMENT

The toxic cell should perform for approximately 1 year without maintenance. Eventually however, it will lose sensitivity and will not span correctly.

At this time, the cell should be replaced by performing the following procedure:

1. Remove the toxic cell and manifold from chassis by removing the two screws from the back of the chassis.

2. Disconnect the mating electrical connector.

3. Unscrew the toxic cell from the manifold. Make sure that the sintered metal disc remains in place in the manifold.

WARNING

Handle the sensor carefully; it is a sealed unit which contains an acid electrolyte. If electrolyte is leaking from the sensor, exercise caution so that the electrolyte does not contact skin, eyes or clothing, thus avoiding acid burns. If contact occurs, rinse the area immediately with a large quantity of water. In case of contact with eyes, immediately flush eyes with plenty of clean water for at least 15 minutes and call a physician.

4. Open the protective bag containing the toxic sensor and install the O-ring into the threaded end of the sensor.

5. Firmly screw the sensor into the manifold by hand so as to compress the O-ring and thereby prevent sample flow leakage.

6. Reinstall the flow block onto the chassis and connect the mating electrical connector.

7. Check for leaks in the flow system. (NOTE: See Step 7 of Operating Instructions, Section 1 - OPERATION.)

8. Reassemble the instrument.

9. Check calibration (NOTE: See Section 4, CALIBRATION).

COMBUSTIBLE GAS SENSOR REPLACEMENT

Before each day's use, check the combustible gas indicating portion of the Model 360 or 361 for operating accuracy with a known gas-air mixture and adjust as necessary. (NOTE: See Section 5, PARTS LIST for available MSA calibration equipment.) If proper calibration cannot be obtained and/or the combustible

gas readout cannot be zeroed, the sensor diffusion head should be replaced and the instrument recalibrated by performing the following procedure:

1. Unplug the nylon connector from the sensing head.

2. Unscrew the retaining ring holding the diffusion head to the manifold by turning the retaining ring counterclockwise. Remove the diffusion head and O-ring.

3. Inspect and reinstall the O-ring and replacement diffusion head into the manifold.

4. Install the diffusion head in the manifold with the retaining ring. Use enough finger pressure on the retaining ring to compress the O-ring.

5. Connect the nylon sensing head plug.

6. Check for leaks in the flow system (NOTE: See step 7 of Operating Instructions in Section 1, OPERATION).

7. Reassemble the instrument.

8. Check calibration (See Section 4, CALIBRATION).

OXYGEN CELL REPLACEMENT

The oxygen cell should perform for approximately 1 year without maintenance. Eventually, however, it will lose sensitivity. When it does, the readout can no longer be set to 20.8% with the OXY CALIBRATE knob when sampling fresh air. At this time, the cell should be replaced by performing the following procedure:

1. Disconnect the gray [positive (+)] and the yellow [negative (-)] leads from the oxygen cell.

Appendix I Contents

- Quality Assurance Project Plan for Limited Investigation of Groundwater and Surface Water Quality

Engineers
Planners
Economists
Scientists

June 4, 1990

CHI28770.A0

Mr. O. J. Meyer
E.I. DuPont de Nemours & Company
Chemicals and Pigments
5215 Kennedy Avenue
East Chicago, Indiana 46312

Dear Mr. Meyer:

Subject: Final QAPP for Groundwater and Surface Water Quality Limited Investigation
DuPont, East Chicago Facility

Enclosed please find two copies of the Groundwater and Surface Water Limited Investigation QAPP. Additional copies will be available to you upon request. We have incorporated your review comments into this final document. Feel free to call us with any questions you may have.

Sincerely,

CH2M HILL

Cynthia L. W. Cruciani
Assistant Project Manager

ph/GLT976/055.51
Enclosures
cc: E. F. Hartstein/DuPont
Pixie Newman/CHI

QUALITY ASSURANCE PROJECT PLAN

for

LIMITED INVESTIGATION OF GROUNDWATER AND SURFACE WATER QUALITY

at the DuPont East Chicago Plant
East Chicago, Indiana

Prepared for
E.I. DuPont de Nemours and Co., Inc.

Prepared by
CH2M HILL, Inc.

May 1990

GLT976/057.51

APPROVAL SIGNATURES

The undersigned have read and agree with the guidelines and procedures set forth in this document. This Quality Assurance Project Plan (QAPP) will be implemented by the CH2M HILL Project Team as part of the limited investigation and engineering evaluation at the DuPont East Chicago Plant.

PREPARED BY: _____ _____

Cynthia Cruciani — Date
Hydrogeologist, CH2M HILL

APPROVED BY: _____ _____

Pixie A.B. Newman — Date
Project Manager, CH2M HILL

APPROVED BY: _____ _____

O. J. Meyer — Date
Chemicals and Pigments, DuPont

GLT925/036.51

Section 1
INTRODUCTION

E.I. DuPont de Nemours and Co., Inc. (DuPont), has made a corporate commitment to assess the quality of groundwater at all of its operating facilities worldwide and to take steps to correct situations where groundwater has either become or threatens to become contaminated as a result of past or present manufacturing and/or waste management practices.

DuPont is taking a phased approach to this endeavor. The first phase of the groundwater assessment involved reviewing plant records to identify past and present manufacturing operations and/or waste management practices which may have caused groundwater contamination. Available data of local and regional geology, groundwater quality, and use were also reviewed. From this review, a list of waste management units (WMUs) was developed. WMUs were evaluated against nine criteria and subsequently assigned a relative risk category. WMUs were prioritized and recommendations were then made for further evaluation.

The Phase I groundwater assessment for the East Chicago Plant was conducted by searching existing plant records and published literature, and interviewing plant personnel. CH2M HILL identified 36 known or suspected WMUs on the plant property. The results are presented in a report dated February 1990.

Because of the high or uncertain mobility of several of the waste constituents, uncertainty regarding WMU locations, sensitivity of the hydraulic setting, and the lack of groundwater monitoring at the site, the majority of the WMUs were assigned to the high or moderate risk category. Because of the risk of contamination from the site, DuPont has decided that a plant-scale groundwater/surface water monitoring program will be implemented. In addition, site-specific monitoring at some of the WMUs will be conducted. This Quality Assurance Project Plan (QAPP) addresses environmental sampling and analytical protocols that will be followed during the course of the work.

PROJECT OBJECTIVES

The objectives of the investigation are:

- Determine whether past waste management practices at the facility have resulted in groundwater contamination that is migrating offsite
- Qualitatively determine whether these chemicals threaten human health and the environment
- Refine understanding of local hydrology and hydrogeology
- Assess potential contribution of groundwater discharge to water quality of the Grand Calumet River

- Determine extent of contamination in close proximity to WMU 2 (Rubble Area) and WMU 24 (Zinc Chloride Milling Area).

BACKGROUND

SITE DESCRIPTION

The East Chicago plant, located in the northwestern corner of Indiana (Figure 1-1) began production in 1893. Over its lifetime, the facility has produced sulfuric acid, zinc chloride, insecticide, chlorofluorocarbon compounds, trisodium phosphate, sodium silicate, colloidal silica, hydrochloric acid, nitric acid, and many other products. Coal, PCBs, and petroleum products have also been used and/or stored at the East Chicago plant. A more detailed description of each of the plant production processes is provided in the Phase I Groundwater Assessment (CH2M HILL, 1990).

Wastes, raw materials, support materials, and products are known or thought to have been buried or stored in approximately 36 WMUs (Figure 1-2). A detailed description of the materials stored or disposed of in the WMUs can be found in the Phase I Groundwater Assessment. Although the raw materials, support materials, and products are not wastes, their presence constitutes a potential for groundwater contamination. Therefore, they are called "wastes" for consistency.

The site is located on the north bank of the Grand Calumet River in the center of the Grand Calumet River/Indiana Harbor Canal drainage basin. Low areas adjacent to the river are frequently flooded (Hartke, et al., 1975). Water quality of the river is poor because of shallow depth and heavy contaminant loadings due to industry.

From ground surface the geology at the site consists of:

- Calumet Sand, approximately 40 feet thick
- Clay, approximately 80 feet thick
- Silurian, Ordovician, and Cambrian sedimentary rocks, >1,000 feet thick

The groundwater table occurs from 0 to 8 feet below ground surface at the site. Much of the surface area, particularly the eastern two-fifths of the site, is mature beach dune and swale topography with groundwater near the land surface in the swale areas. The Calumet Sand is the uppermost aquifer at the site and is considered to be important for water supply in the area. From the limited data for the site, the potential groundwater flow direction is from north to south. The discharge area is believed to be the Grand Calumet River. No water supply wells are located between the WMUs and the Grand Calumet River.

PROJECT DESCRIPTION

CH2M HILL will gather additional data necessary to determine whether past waste management practices have resulted in groundwater contamination that has migrated offsite and, if so, whether these chemicals threaten human health and the

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Appendix A. Standard Operating Procedures for Field Measurements
Appendix B. NET Midwest Laboratory QAPP

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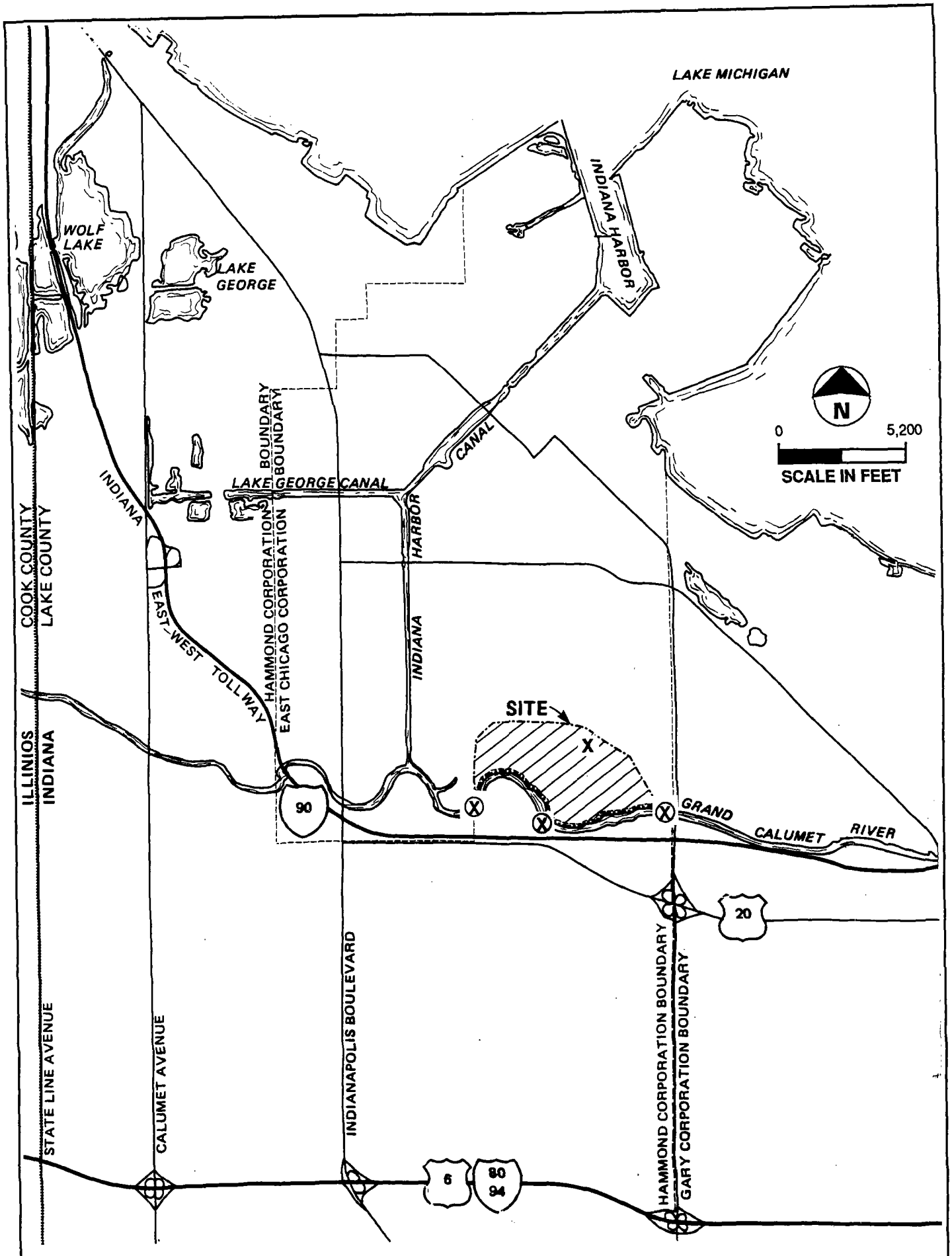

X = PROPOSED STAFF GAGE LOCATION

⊗ = PROPOSED STAFF GAGE LOCATIONS AND SURFACE WATER SAMPLING LOCATIONS

FIGURE 1-1
Site Location Map
Du Pont East Chicago QAPP

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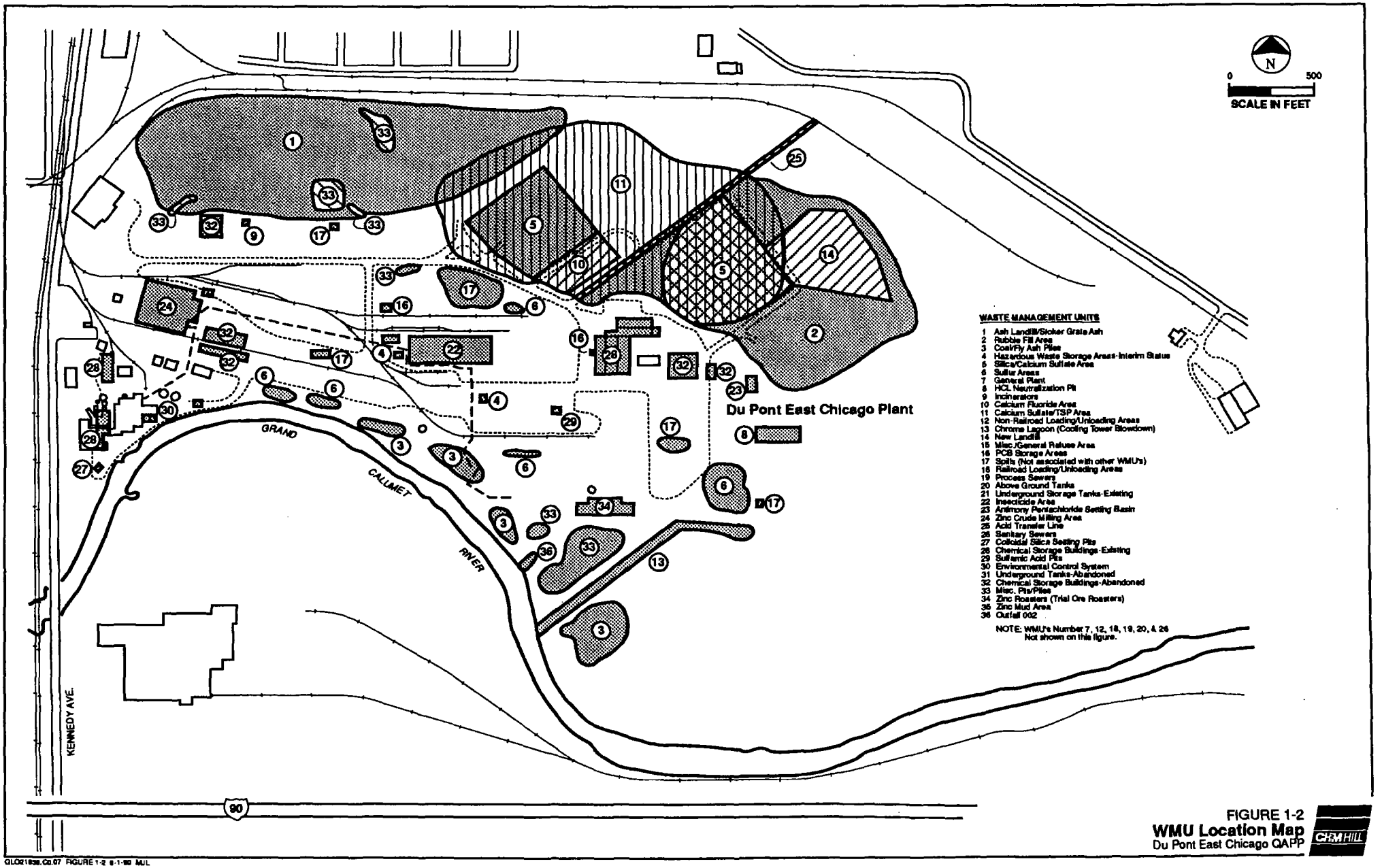

FIGURE 1-2
WMU Location Map
Du Pont East Chicago QAPP

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GLO21838.C0.07 FIGURE 1-2 8-1-90 MJL

environment. In addition, this study will be used to guide future facility-wide and WMU-specific investigation and possible remediation.

PURPOSE

This Quality Assurance Project Plan (QAPP) details the procedures to be followed over the course of the field investigation and serves as the quality assurance and quality control (QA/QC) outline for the project data. The QAPP is prepared to address analytical work performed by DuPont's designated laboratory and the field work performed by CH2M HILL. The following elements included in this plan are consistent with U.S. EPA guidance.

- Project Description
- Project Organization and Responsibility
- Quality Assurance Objectives for Data Measurement
- Sampling Procedures
- Sample Handling, Documentation, Custody, Shipping
- Calibration Procedures and Maintenance Frequency
- Analytical Procedures
- Data Management and Reporting
- Quality Control Checks
- Performance and System Audits
- Preventative Maintenance
- Data Measurement Assessment Procedures
- Corrective Action
- Quality Assurance Reporting

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Section 2
PROJECT ORGANIZATION AND RESPONSIBILITY

Pixie Newman is the Project Manager for this project. Ms. Newman is a Senior Hydrogeologist and Project Manager in CH2M HILL's Chicago office. She has more than 7 years experience in designing, implementing, and managing hydrogeologic investigations and groundwater sampling projects. Ms. Newman will serve as the principal point of contact with DuPont and will be responsible for maintaining project quality and controlling the budget and schedule.

The Assistant Project Manager for this project is Cynthia Cruciani. Ms. Cruciani is the Principal Hydrogeologist who will be responsible for preparing the project operations plans and for conducting and coordinating the field effort. Ms. Cruciani has extensive field experience and has written many investigative reports.

The Field Team Leader for the project is Mary Dwyer. As Field Team Leader, Ms. Dwyer will be responsible for coordinating activities with subcontractors and assuring the availability and maintenance of all sampling equipment and materials. She will also supervise the completion of field notebooks.

The Project Consultants will provide technical review of the work performed by the project team to ensure the work's technical quality. The Project Consultant/Senior Review Team were selected based on their experience in projects of this nature and technical expertise in the response technologies likely to be considered. Fox Drilling will provide drilling and related field services. NET Midwest Inc., will provide analytical services.

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Section 3
QUALITY ASSURANCE OBJECTIVES FOR DATA MEASUREMENT

Quality assurance objectives for data measurement are usually expressed in terms of precision, accuracy, completeness, representativeness, and comparability. Definitions and application of these characteristics are presented below. QC measurements to quantify precision, accuracy, and completeness and ensure representativeness and completeness are described in the field sampling and laboratory analysis sections.

PRECISION

Precision is the measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions. Precision is best expressed in terms of the standard deviation (measure of the variability of a group of measurements compared to an average value). Various measures of precision exist depending upon the "prescribed similar conditions." The specific criteria of precision for each major measurement parameter are detailed within their individual analytical test methodology. Duplicates will be collected and analyzed for both the onsite and offsite laboratories as a means to assess sampling and analytical reproducibility and as a measure of precision of the data collection activity.

ACCURACY

Accuracy is a measure of the bias in a system. It is the degree of agreement of a measurement (or an average of measurements of the same thing), X, with an accepted reference or true value, T, usually expressed as the difference between the two values, (X-T), or the difference as a percentage of the reference or true value, 100 (X-T)/T, and sometimes expressed as a ratio, (X/T). The specific criteria of accuracy for each measurement parameter are detailed within specific laboratory analytical test methods.

Blank samples will provide checks for procedural contamination and ambient conditions at the site, and will be used to assess the accuracy of sample collection and laboratory analyses. One per 10 blanks or 1 blank per daily batch, whichever is more frequent, will be collected for samples being analyzed at both the onsite and offsite laboratories.

COMPLETENESS

Completeness is the measure of the amount of valid data obtained from the collection and measurement system compared with the amount of data expected under normal circumstances. Thus, completeness is defined as the percentage of measurements made that are judged to be valid measurements.

REPRESENTATIVENESS

Representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variation at a sampling point, or an environmental condition. As part of the routine sampling program, blind replicate samples will be collected and used as a means to assess field representativeness. One replicate sample per 10 will be collected for samples being analyzed at both the onsite and offsite laboratories. By definition, replicate samples should be representative of a given point in space and time.

The objective of representativeness is to assess whether the information obtained during the investigation accurately represents the actual site conditions. The sampling network was designed to provide data representative of site conditions. All field sampling activities will be performed following the standards outlined in Section 4.

COMPARABILITY

Comparability expresses the confidence with which one data set can be compared to another. The samples will be comparable, if the same unit is sampled and analyzed, and if the units of measurement are the same. The use of the standard sampling procedures and recognized field techniques for sampling should make the resulting data comparable to other measurements on similar samples under similar sampling conditions.

FIELD MEASUREMENT QUALITY ASSURANCE

Procedures or operator's manuals used in field measurement, calibration, and maintenance are given in Appendix A. Air monitoring for health and safety will be done using an organic vapor photoionization detector and an explosimeter. In addition, field monitoring to define the magnitude and extent of contamination and provide parameters necessary for remedial design will also be collected. All calibrations, measurements, and maintenance performed on field instruments should be recorded in field notebooks.

The HNu photoionization detector will be calibrated with a standard calibration gas a minimum of once each day. The pH meters will also be calibrated daily with standard solutions as outlined in Appendix A. With calibration, accuracy of the field measurements is checked. Precision is measured by taking replicate measurements of the calibration standards. To achieve completeness, field measurements will be repeated after recalibration or by using another instrument if invalid measurements are obtained. Representativeness and comparability of field measurements is achieved by the use of standard techniques to analyze samples.

LABORATORY ANALYSIS QUALITY ASSURANCE

The general quality assurance objective is to provide data of acceptable and documented quality. Table 3-1 presents the target quantitation limits (MDLs) for VOC analyses per the U.S. EPA's Contract Laboratory Program. These target

Table 3-1
TARGET QUANTITATION LIMITS

Volatiles	CAS Number	Quantitation Limits[a] Low Soil/Sediment[b] (µg/l)	Water (µg/kg)
1. Chloromethane	74-87-3	10	10
2. Bromomethane	74-83-9	10	10
3. Vinyl Chloride	75-01-4	10	10
4. Chloroethane	75-00-2	10	10
5. Methylene Chloride	75-09-2	5	5
6. Acetone	67-64-1	10	10
7. Carbon Disulfide	75-15-0	5	5
8. 1,1-Dichloroethene	75-35-4	5	5
9. 1,1-Dichloroethane	75-34-3	5	5
10. 1,2-Dichloroethene (total)	540-59-0	5	5
11. Chloroform	67-66-3	5	5
12. 1,2-Dichloroethane	107-06-2	5	5
13. 2-Butanone	78-93-3	10	10
14. 1,1,1-Trichloroethane	71-55-6	5	5
15. Carbon Tetrachloride	56-23-5	5	5
16. Vinyl Acetate	108-05-4	10	10
17. Bromodichloromethane	75-27-4	5	5
18. 1,2-Dichloropropane	78-87-5	5	5
19. cis-1,3-Dichloropropene	10061-01-5	5	5
20. Trichloroethene	79-01-6	5	5
21. Dibromochloromethane	124-48-1	5	5
22. 1,1,2-Trichloroethane	79-00-5	5	5
23. Benzene	71-43-2	5	5
24. trans-1,3-Dichloropropene	10061-02-6	5	5
25. Bromoform	75-25-2	5	5
26. 4-Methyl-2-pentanone	108-10-1	10	10
27. 2-Hexanone	591-78-6	10	10
28. Tetrachloroethene	127-18-4	5	5
29. Toluene	108-88-3	5	5
30. 1,1,2,2-Tetrachloroethane	79-34-5	5	5
31. Chlorobenzene	108-90-7	5	5
32. Ethylbenzene	100-41-4	5	5
33. Styrene	100-42-5	5	5
34. Xylenes (total)	1330-20-7	5	5
35. Tetrahydrofuran	———	10	10

Note: Specific quantitation limits are highly matrix and sample dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable in all samples.

[a] Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher.

[b] Medium Soil/Sediment target quantitation limits for Volatile TCL Compounds are 125 times the individual Low Soil/Sediment quantitation limits.

quantitation limits will be used for the DuPont field investigation and engineering evaluation.

Because of the large number of organic parameters and potential matrixes, it is difficult to develop precision and accuracy objectives and control limits for every organic parameter in every matrix. Therefore, it is necessary to extrapolate this information from a more limited set of compounds. This is typically done with 1) surrogate spike compounds that are added to every sample before extraction and analysis, and 2) matrix spike and matrix spike duplicate compounds that are added to selected samples before extraction and analysis. Although the surrogate and matrix spike analyses do not provide statistically valid statements about precision and accuracy for every compound in a sample, they do give the data reviewer enough information to make qualitative judgments about precision and accuracy on a sample-by-sample basis. The recoveries of the surrogate and matrix spike compounds can also be used to accept or reject data. The recoveries of the surrogate are also used as a criterion to reanalyze the sample or series of samples.

The matrix spiked sample analysis is designated to provide information about the effect of the sample matrix on the digestion and measurement methodology. The spike is added before any extraction or sample preparation steps. At least one spiked sample and one duplicate spiked sample analysis will be performed for each batch of samples or for each 20 samples received, whichever is more frequent. The individual component percent recoveries (%R) will be calculated and reported.

Data completeness can be quantified during data assessment. The laboratories are expected to provide data meeting QC acceptance criteria for 90 percent or more of the requested determinations. For completeness, it is expected that the procedures proposed for chemical characterization of the samples collected will provide data meeting QC acceptance criteria for all samples tested.

Representativeness is to assess the degree to which the data represent actual site conditions. Standard sampling techniques and the design of a sampling network were used to provide data representativeness of site conditions. Standard techniques to analyze representative samples are used to provide comparable data. Analytical methods to be used by the laboratory are specified in the laboratory's QAPP (Appendix B).

Analytical data quality and method performance will be monitored by the use of study blanks, laboratory blanks, and matrix spike and matrix spike duplicate analyses. As data are generated, they will be reviewed for compliance with the quality assurance objectives and control charts developed. Data that fall outside of the quality control limits will be investigated and corrective actions taken.

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Section 4
SAMPLING PROCEDURES

CH2M HILL will install groundwater monitoring wells for the collection of groundwater samples and potentiometric surface data. CH2M HILL will conduct sampling of groundwater and surface water to assess the impact of the site on the local environmental quality. Surface water samples will be collected at several points upstream, downstream, and adjacent to the DuPont East Chicago facility. In addition, four staff gages will be installed for the collection of surface water elevations at and near the site to evaluate the interaction of groundwater and surface water and to verify groundwater and surface water flow direction. The approximate locations of the staff gages are shown in Figure 1-1.

HEALTH AND SAFETY REQUIREMENTS

Work at the East Chicago facility will be conducted in accordance with the Health and Safety Plan. Work will be conducted in Level D or C personal health and safety protection.

All necessary health and safety equipment will be readily available at the site at all times and be in conformance with the site Health and Safety Plan. All work will cease whenever health and safety requirements are not followed or if environmental conditions deteriorate to work cessation levels indicated in the site Health and Safety Plan.

PRE-FIELD WORK ACTIVITIES

Before field work begins, the following tasks will be performed:

- The designated lab coordinators will be notified as soon as possible (10 working days) before samples will be collected so the coordinator can secure laboratory space and ship sample containers. (All anticipated samples, including trip blanks, duplicates, replicates, and equipment blanks, will be accounted for).

- The DuPont Project Manager will be notified of the upcoming sampling event at least 2 weeks (10 working days) before field work begins.

- Required equipment and supplies will be assembled 3 working days before the event. Some of the supplies will be purchased on the day of sampling or immediately before.

- All sampling and support equipment will be checked to be sure it is in good working order before going to the field. Equipment will be selected no more than 5 working days before departure.

- Arrangements will be made for Federal Express pickup or the route to the closest Federal Express office will be determined.

- The field work team will be assembled and briefed on the upcoming event. The sampling check list, equipment check list, team responsibilities, and sampling sequence will be reviewed.

UPON ARRIVING AT THE SITE

The following tasks will be performed upon arriving at the site:

- Check in with the designated East Chicago Plant project coordinator.
- Post the route to the hospital and emergency phone numbers.
- Purchase all necessary supplies not acquired at the home office.
- Unpack vehicle of all necessary equipment.
- Check for sample bottle damage.
- Meet with the subcontractor personnel and discuss project coordination.
- Assemble necessary sampling/monitoring equipment for the day's sampling.
- Fill out field sheets with as much information as possible (e.g., boring or well location).
- Label sample bottles with as much information as possible (if not provided by the laboratory).

FIELD WORK ACTIVITIES

MONITORING WELL DRILLING, INSTALLATION, COMPLETION, AND DEVELOPMENT

Fifteen to seventeen groundwater monitoring wells will be installed and sampled. In addition, three existing monitoring wells at the East Chicago facility will be sampled. Approximate well locations are included in Figure 4-1 and the rationale for well placement is included in Table 4-1.

Well borings will be advanced using 6-1/4 inch I. D. hollow stem augers through the Calumet Sand to the top of the confining clay till layer approximately 30 to 40 feet below ground surface. Standard split-spoon samples will be collected every 5 feet for geologic logging if conditions permit. The primary objective of the field effort is to install monitoring wells so that groundwater flow direction and groundwater quality can be assessed. If the Calumet Sand formation produces blow-in such that split-spoon sampling is impractical, end plugs may be used to prevent blow-in of sand into augers so that wells may be installed. Cuttings will be characterized and drilling rates noted to determine the lower boundary of the Calumet Sand. Samples will be retained in glass Mason-type jars for possible future geotechnical testing.

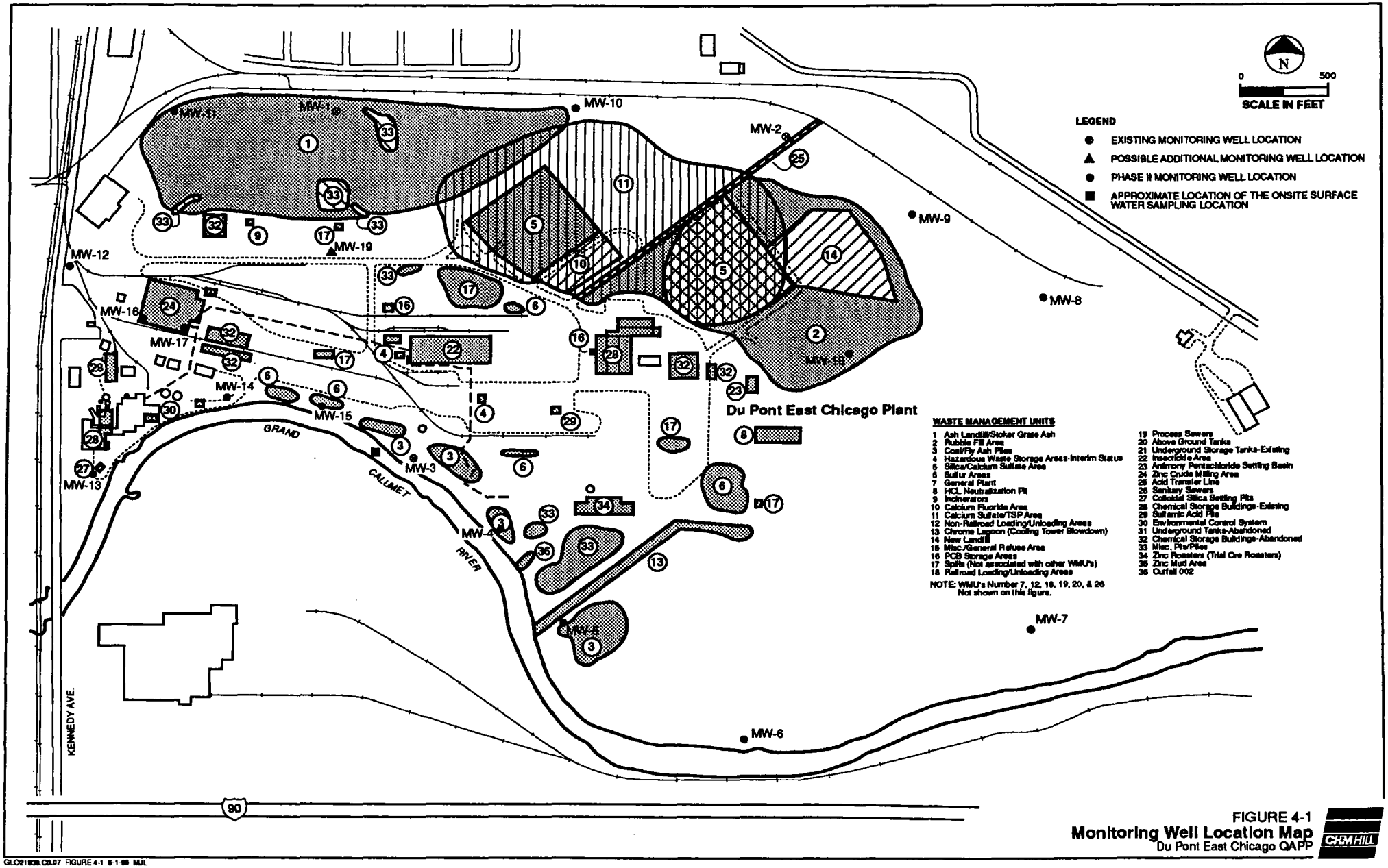

FIGURE 4-1
Monitoring Well Location Map
Du Pont East Chicago QAPP

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GLO21839.C0.07 FIGURE 4-1 6-1-96 MUL

Table 4-1
RATIONALE FOR MONITORING WELL PLACEMENT

Well No.	Rationale
MW-4 through MW-15	Site Perimeter Wells: In addition to providing groundwater quality information for sections of the site's perimeter, these wells will provide potentiometric information across the site—groundwater flow direction, and whether groundwater flow is discharging to the Calumet River.
MW-16, MW-17	These monitoring wells should provide downgradient water quality for the zinc crude milling area (WMU-24).
MW-18	The location of a monitoring well in this location should allow for an additional downgradient water quality monitoring point for the New Landfill (WMU-14) and the rubble fill area (WMU-2).
MW-19	Location provides an additional groundwater quality monitoring point in the interior of the former manufacturing area.
MW-20	Location provides a groundwater quality monitoring point in the interior of the former manufacturing area.

GLT103/003.51

Wells will be constructed of 15-foot, 4-inch-diameter Schedule 40 PVC slotted screen with 4-inch-diameter Schedule 40 PVC riser. The slot size will be selected based on the grain size of the formation encountered. A 0.010-inch slot size is anticipated. A coarse sand to medium gravel pack will extend from the bottom of the boring to 2 feet above the top of the well screen. Wherever practical, the screen will be placed immediately above the confining clay till layer. A 2-foot layer of fine-grained transition sand (Ottawa type or equivalent) will be placed above the sand pack. A 2-foot bentonite seal will be placed above the fine sand. The remaining annulus of the borehole will be filled with a cement-bentonite grout which will be tremied in place. The grout will extend to a minimum of 1 foot below ground surface between a protective casing and the well riser. A 4-foot length concrete seal will be installed between the borehole wall and a protective casing. (The concrete seal will be a minimum of 5 total feet to prevent frost heave of the well). A 7-foot, 6-inch-diameter locking steel protector pipe will be placed over the well and, in traffic areas, bumper posts will also be installed around the well. Wells will have a minimum 3-foot stickup. Typical well construction is shown in Figure 4-2.

Following installation, each monitoring well will be developed until substantially free of sediment. Purge water from wells adjacent to former plant activity areas will be placed in 55-gallon drums adjacent to the well until laboratory results are received. Based on the analytical results, development water will be disposed of on the ground adjacent to the well or treated at the onsite water treatment facility. Wells will be developed using surge and purge methods. Elevation of the top of the inner casing of the new and existing monitoring wells will be surveyed to the nearest 0.01 foot as referenced to the U.S.G.S.

GROUNDWATER SAMPLING PROCEDURES

Groundwater samples will be collected during two sampling rounds from the new and existing monitoring wells. Sampling will proceed in the following sequence.

1. The well cap will be removed and the organic vapor concentrations of the air at the riser will be measured with an HNu to monitor the health and safety of the sampling personnel.

2. The water level will be measured with an electronic water level indicator, which has an accuracy of ±0.01 foot.

3. The depth of monitoring wells will be measured and recorded.

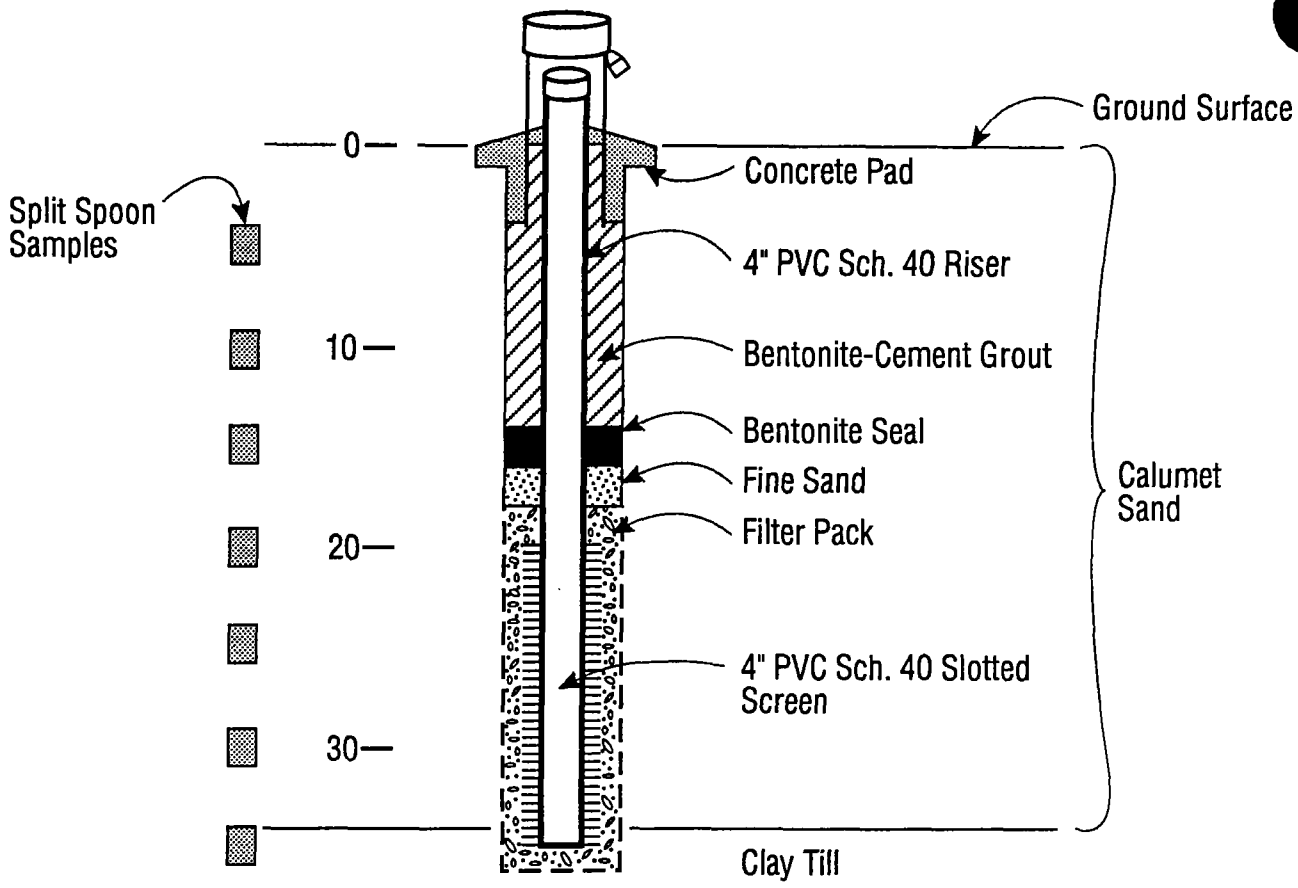
4. The casing volume will be calculated using the formula

   $$\text{Volume (gallons)} = H \times (D/2)^2 \times 7.48 \times \pi$$

   where:

   H = Height of water column in feet
   (depth of well minus depth to water surface)
   D = Inside diameter of casing in feet

GL021838.C0.07 Figure 2 5-14-90



Note:
Protective System includes 3 Protective Posts as needed to protect wells.

FIGURE 4-2
Monitoring Well Diagram
Du Pont East Chicago QAPP

CH2M HILL

5. The monitoring wells will be purged using a peristaltic, submersible, or Brainard-Kilman (BK) pump or a bailer. Purge water will be stored in 55-gallon drums next to the wells until the analytical results are received. Based on the results, purge water will be disposed of on the ground adjacent to the well or treated in the onsite water treatment facility.

6. Where applicable, the samples for VOCs will be collected immediately after purging using either a stainless steel or Teflon bailer by pouring from the bailer directly into the vials so that the formation of air bubbles is minimized. Only one VOC vial will be taken from each full bailer to minimize the loss of VOCs through subsequent pouring and exposure to air.

7. Samples for other parameters will be collected after VOCs using a stainless steel or Teflon bailer.

8. Samples will be preserved as listed in Table 4-2.

9. The bailer will be decontaminated according to the procedures described below under Decontamination. Nylon cord used to lower bailers into the wells will be discarded after use at each well and new cord will be used for the following well.

SURFACE WATER SAMPLING

Three surface water samples will be collected during two sampling rounds downgradient, adjacent to, and upgradient of the East Chicago facility. At each location, the elevation of the water surface at the sampling point will be measured to the nearest 0.01 foot. The sample bottles will be inverted and immersed into the water and then righted below the water surface. Care will be taken to make sure the bottles fill slowly. Also, no air bubbles will be allowed in the VOA vials. The onsite surface water sampling location is shown in Figure 4-1; offsite locations are shown in Figure 1-1. The samples will be preserved as described in Table 4-2.

STAFF GAGE INSTALLATION AND MEASUREMENT

Four staff gages calibrated to 0.10 foot will be installed at the East Chicago facility. Three gages will be placed in the Grand Calumet River and the fourth in an onsite area with standing water (most likely in the eastern two-fifths of the site). The staff gages will be attached to metal stakes that will be driven into the ground or attached to bridge pilings. The top of each gage will be surveyed. A reading to the nearest one-tenth of a foot with an estimate to the nearest one-hundredth of a foot, will be obtained from each gage when the groundwater elevations are measured. Staff gage locations are shown in Figure 1-1.

HYDROGEOLOGIC EVALUATION

Following well installation and development, static groundwater levels will be measured in each well to determine the local configuration of the groundwater

Table 4-2
SAMPLE TYPES AND PRESERVATIVES - GROUNDWATER SAMPLING
DUPONT EAST CHICAGO PLANT

Analysis	Bottles	Preservation	Holding Time	Quantity
ORGANICS				
- Acid Extractables	Two 1/2-gallon amber bottles (Teflon-lined caps)	Iced to 4°C	5 days for extraction 40 days for analysis	Fill to shoulder
- Volatiles	Two 40-ml volatile organic analysis vials	Iced to 4°C	7 days	Fill to top, no air space
- PCBs	One 1-liter polyethylene bottle	Iced to 4°C	7 days for extraction 40 days after extraction for analysis	Fill to shoulder
INORGANICS				
- Dissolved Metals	One 1-liter polyethylene bottle	HNO3 to pH <2, Iced to 4°C	6 months	Fill to shoulder
CONVENTIONAL				
- COD	One 1-liter polyethylene bottle	H2SO4 to pH <2, Iced to 4°C	28 days	Fill to shoulder
- Ammonia	One 1-liter polyethylene bottle	H2SO4 to pH <2, Iced to 4°C	28 days	Fill to shoulder
- Total Kjeldahl N	One 1-liter polyethylene bottle	H2SO4 to pH <2, Iced to 4°C	28 days	Fill to shoulder
- Major Ions (1)	One 1-liter polyethylene bottle	Iced to 4°C	28 days	Fill to shoulder
- Alkalinity	One 1-liter polyethylene bottle	Iced to 4°C	14 days	Fill to shoulder
- Phosphorous (Total)	One 1-liter polyethylene bottle	Iced to 4°C	28 days	Fill to shoulder
- Total Dissolved Solids	One 1-liter polyethylene bottle	Iced to 4°C	7 days; 48 hours	Fill to shoulder
CYANIDE	One 1-liter polyethylene bottle	NaOH to pH >12 Iced to 4°C	14 days	Fill to shoulder

NOTES:
(1) Major Ions include: Fe, Mn, F, Ca, Mg, K, Na, Cl, SO4, HCO3.

surface and the potential direction of groundwater movement. After groundwater sample collection, rising head hydraulic conductivity tests will be performed on three to six wells. This information will be used to calculate expected average groundwater velocities at the site.

RISING HEAD CONDUCTIVITY TESTS

Variable head (slug) tests are single well tests used to estimate hydraulic conductivity in the vicinity of the well screen by adding or removing a known volume of water. The rate at which the water level in the well recovers is measured in a rising head conductivity test and results are used to estimate hydraulic conductivity.

An artificial head pressure will be applied to the inside of the well casing using a volume of inert gas under pressure. A known volume of water will be displaced through the well screen and back into the aquifer. When the water level has fully stabilized, the pressure will be released and the water level will be lowered. Data will then be collected using the pressure transducers while the water level recovers in the well. Collected data will be evaluated using Bouwer and Rice's (1976) method.

EQUIPMENT DECONTAMINATION PROCEDURES

All drilling equipment (soil boring augers, rods) will be steam cleaned before use and between drilling locations. All sampling and well purging equipment will be decontaminated between each boring and well in the following manner:

- Visible debris or dirt will be brushed off and then scrub washed with clean water. Tap water may be used for this initial washing.
- Nylon rope will be removed from bailers and discarded after use.
- Equipment will be washed and scrubbed with a 2.5 percent (w/w) trisodium phosphate solution. The exterior surface of the article will be scrubbed thoroughly and rinsed with clear water.
- Equipment will be rinsed with a 10 percent (v/v) methanol solution.
- Equipment will be final rinsed with deionized or distilled water.
- Equipment will be placed on a clean plastic sheet to allow for air drying.

REFERENCES

Bouwer, Herman, and R.C. Rice. A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Well. Water Resources Research. Vol. 12, No. 3. 1976.

GLT976/061.51

Section 5
SAMPLE HANDLING, DOCUMENTATION, CUSTODY, AND SHIPPING

The sample custody procedures outlined below will ensure that sample handling from the time of collection through time of shipment is properly documented. Proper custody procedures are necessary to ensure that analytical results are representative of site conditions. A sample is under your custody if it is:

- In your possession
- In your view, after being in your possession
- In your possession and you placed it in a secured location
- In a designated secure area

FIELD SAMPLE HANDLING AND CUSTODY PROCEDURES

The sampling team will always consist of at least two people. The person designated the field team leader (FTL) will assume ultimate responsibility for sample custody. The FTL "accepts" the samples from the sampler. The FTL in turn prepares the samples and relinquishes them to the laboratory or the sampling team member delivering the samples to the laboratory who relinquishes them to the laboratory.

The sampler is responsible for documentation of preservatives used, supplies used, exact sampling locations, etc. The sampler will also be responsible for decontamination of the sample containers and labeling the containers before relinquishing them to the FTL.

The following sample packaging and shipment procedure should allow samples to arrive at the laboratory with the chain-of-custody intact:

- The field sampler is personally responsible for the care and custody of the samples until they are transferred or properly dispatched. As few people as possible will handle the samples.

- All bottles will be labeled with sample numbers and locations.

- Monitoring well groundwater grab samples will be given the following designation:

  MW-xx-yy

  where:

  xx = the well number
  yy = the sequential number of samples collected at that location

  MW-04-01 would therefore indicate the first sample collected from monitoring well designated as 04.

- Surface water grab samples will be given the following designation:

  SW-xx-yy

  where:

  xx = the number of the surface water sampling location

  yy = the sequential number of samples collected at that location

  SW-03-01 would therefore indicate the first sample collected at surface water sampling location 03.

- Sample labels will be completed for each sample using waterproof ink unless prohibited by weather conditions, and will include sample number, location, date, and time collected, preservative used, requested analysis, and sampler's initials.

- The outside of the sample containers will be decontaminated using clean water and mild detergent if needed and toweled dry. The lids will be sealed with electrical tape. Labels will be secured onto the containers with clear plastic tape. Sample jars will be placed into individual ziploc bags.

- All chain-of-custody forms will be completed by the FTL. The laboratory may provide its own chain-of-custody forms with the sample containers.

- Samples will be placed in coolers or sample shuttles with ice and inert packing material and shipped to NET Midwest, Inc. for analysis, with a separate signed custody record enclosed in each sample shuttle or cooler. Shipping containers will be locked and secured with strapping tape and custody seals for shipment to the laboratory. The custody seal will be attached to the front right and back left of the sample shuttle and covered with clear plastic tape. The shuttle will be strapped shut with strapping tape in at least two locations. Samples taken to the onsite laboratory will be placed on ice immediately after collection and will be taken to the lab as soon as possible.

SAMPLE SHIPPING

All shipments will be accompanied by the chain-of-custody record identifying the contents. The original record will accompany the shipment, and a copy will be retained by the sampler for return to the sampling office. All shipments will be shipped to NET Midwest via Federal Express.

FINAL EVIDENCE FILES AND CUSTODY PROCEDURES

The final evidence files will be maintained by CH2M HILL until the project is concluded. Files will be maintained along with all relevant records, logs, field notebooks, pictures, subcontractor reports and data reviews under custody of the CH2M HILL Project Manager or Assistant Project Manager.

GLT976/063.51

Section 6
CALIBRATION PROCEDURES AND MAINTENANCE FREQUENCY

FIELD EQUIPMENT

The calibration procedures and frequency of calibration for field equipment are provided in Appendix A. Each piece of field equipment will be tested in the CH2M HILL warehouse before each use to ensure it is in proper working order before it is sent to the site. The instrument operator's manual will dictate the frequency of calibration and maintenance.

LABORATORY EQUIPMENT

The calibration and maintenance procedures and frequency of calibration for laboratory equipment should be in accordance with the laboratory's QAPP (Appendix B).

GLT976/064.51

Section 7
ANALYTICAL PROCEDURES

The procedures for measurements taken in the field are described in Appendix A. They include air monitoring with an organic vapor photoionization detector and an explosimeter and groundwater measurements for pH, conductivity, temperature, dissolved oxygen, and oxidation-reduction potential.

LABORATORY ANALYTICAL METHODS

Groundwater and surface water samples collected during the field investigation will be analyzed for chemical constituents by NET Midwest, Inc. These analyses are to evaluate the magnitude and extent, if any, of the impact of the site and selected WMUs on the surface water and groundwater in the area. Selected soil samples collected during monitoring well drilling may be submitted for grain size analysis. Table 7-1 presents the predicted number of surface water and groundwater samples to be analyzed.

GLT976/065.51

Table 7-1
GROUNDWATER AND SURFACE WATER
SAMPLING ANALYTICAL PROGRAM

	GROUNDWATER INVESTIGATION				SURFACE WATER INVESTIGATION				
	No. of Samples	No. of Replicates	No. of Blanks	Total	No. of Samples	No. of Replicates	No. of Blanks	Total	PROJECT TOTAL
TCL VOCs	34	4	4	42	6	1	1	8	50
TCL BNAs	30	3	3	36	6	1	1	8	44
PCBs	1	1	1	3	0	0	0	0	3
SELECTED TRACE INORGANICS									
Bo, Cd, Cr+6, Cr, Cu, Hg, Pb, Ni, Sb	30	3	3	36	6	1	1	8	44
Al	32	4	4	40	6	1	1	8	48
As	34	4	4	42	6	1	1	8	50
Ba	32	4	4	40	6	1	1	8	48
Zn	36	4	4	44	6	1	1	8	52
MAJOR IONS AND WATER QUALITY PARAMETERS									
Calcium	30	3	3	36	6	1	1	8	44
Magnesium	30	3	3	36	6	1	1	8	44
Potassium	30	3	3	36	6	1	1	8	44
Sodium	30	3	3	36	6	1	1	8	44
Sulfate	34	4	4	42	6	1	1	8	50
Chloride	36	4	4	44	6	1	1	8	52
HCO3, CO3	36	4	4	44	6	1	1	8	52
Iron	36	4	4	44	6	1	1	8	52
Manganese	30	3	3	36	6	1	1	8	44
Phosphate	34	4	4	42	6	1	1	8	50
Total Kjeldahl	32	4	4	40	6	1	1	8	48
Ammonia Nitrogen	32	4	4	40	6	1	1	8	48
TDS	30	3	3	36	6	1	1	8	44
Alkalinity	30	3	3	36	6	1	1	8	44
Cyanide	30	3	3	36	6	1	1	8	44
FIELD MEASUREMENTS - Dissolved O2 - pH - Specific Conductance - Oxidation Reduction Potential - Temperature	36	4	4	44	6	1	1	8	52

Section 8
DATA MANAGEMENT AND REPORTING

FIELD DATA

All field recording sheets, instrument outputs, and worksheets for calculating results will be retained. Field measurements should be recorded in the site log book. Data used in project reports will be reduced and summarized as appropriate. Field data quality review shall be the responsibility of the field team leader.

LABORATORY DATA

The data will be reported directly from the laboratory to CH2M HILL. Quality control review of the NET Midwest data package will be conducted by a CH2M HILL project team member experienced in QC review of analytical data from CLP laboratories. The data will be reviewed to evaluate their validity and to assure that required protocols were followed so that data are scientifically defensible. CH2M HILL will manage the data by transcribing it into spreadsheet format or other database management system for use during project interpretation.

GLT976/066.51

Section 9
QUALITY CONTROL CHECKS

FIELD QUALITY CONTROL

Field analyses will be performed onsite and will not involve samples that are collected and retained. The primary QA/QC objective is to obtain reproducible measurements to a degree of accuracy consistent with limits imposed by analytical methodologies used and with the intended use of the data. A precision limit of 10 percent will be used for all measurements taken in the field. Quality control procedures will be limited to checking the reproducibility of measurements by taking multiple readings and by calibration of instruments.

LABORATORY QUALITY CONTROL

The internal quality control procedures for the analytical samples will be in control of NET Midwest, Inc.

GLT961/067.51

Section 10
PERFORMANCE AND SYSTEMS AUDITS

The capability and performance of the total laboratory measurement systems will be monitored with system and performance audits as outlined in the NET Midwest QAPP (Appendix B).

GLT976/068.51

Section 11
PREVENTIVE MAINTENANCE

FIELD MEASUREMENTS

Appropriate preventive maintenance procedures will be followed before and during fieldwork to minimize downtime. The FTL will be responsible for notifying CH2M HILL's equipment manager at least 1 week before the sampling event so that proper field equipment and supplies can be obtained and serviced, if needed.

The FTL will ensure that the measurement an monitoring equipment are calibrated before sampling and that calibration is documented. Strict adherence to presampling activity in accordance with the sampling procedures (Section 4) will allow for preventive maintenance.

LABORATORY PROCEDURES

Laboratory preventive maintenance procedures and schedules shall be specified by NET Midwest, Inc.

GLT961/069.51

Section 12
DATA MEASUREMENT ASSESSMENT PROCEDURES

Equations for calculating precision, accuracy, and completeness as described in Section 4 are detailed below. Precision is a measure of the reproducibility of field sampling and laboratory analyses. Both field duplicates (replicates) and laboratory duplicates will be analyzed to determine data precision. The results will be reported as relative percent difference (RPD), calculated by:

$$RPD = \frac{D1 - D2}{(D1 + D2)/2} \times 100$$

where:

D1 = concentration of first duplicate
D2 = concentration of second duplicate

The accuracy of analytical results is a measure of the agreement between an experimental determination of the true value of the parameter being measured. Sample spike analyses are used to determine the accuracy of analyses. A known quantity of the constituent of interest is added to a sample and analyzed. The amount of spiked compound recovered by analysis is compared to the amount added. Percent recovery is calculated by:

$$\%R = \frac{SSR-SR}{SA} \times 100$$

SSR = quantity measured in spike sample
SR = quantity measured in unspiked sample
SA = quantity of spike added

The completeness of data from a sampling program is interpreted as the percentage of valid data obtained compared to the amount that was expected to be obtained.

$$\text{Completeness} = \frac{\text{Data values usable}}{\text{Total data values obtained}} \times 100$$

Analytical data from the laboratory will be assessed for accuracy, precision, and completeness by laboratory personnel.

The laboratory will document that both initial and ongoing instrument calibration and tuning and analytical QC criteria have been met. The laboratory will demonstrate that interferences from the analytical system are under control and that surrogate spike, matrix spike, and matrix duplicate recoveries outside the specified acceptance windows are attributable to sample matrix interferences and not to laboratory analytical errors.

Data from field measurements will be assessed for precision and accuracy through review of calibrations and by taking duplicate readings. Any standards, blanks, or

duplicates will be examined and precision and accuracy calculated from the formulas given. All data will be reviewed for completeness by the FTL.

GLT971/074.51

Section 13
CORRECTIVE ACTION

FIELD MEASUREMENTS

The FTL will be responsible for correcting any deviations from the sampling procedures identified in Section 4. Deviations and subsequent corrective measures will be documented by the FTL. As the possible deviations are dependent upon unknown field conditions, corrective measures cannot be specified. For field measurements, the corrective action must be suited to the situation and may include:

- Repeating measurements
- Checking batteries
- Recalibrating an instrument
- Replacing an instrument

LABORATORY CORRECTIONS

The laboratory's Corrective Actions Program will be specified by NET Midwest, Inc.

GLT961/070.51

Section 14
QUALITY ASSURANCE REPORTING

No separate QA report for this project is anticipated.

GLT961/071.51

SECTION 4
CALIBRATION

Before calibration of the Model 360 or Model 361 can be checked, the instrument must be in operating condition (NOTE: See Operating Instructions in Section 1, OPERATION). Optional calibration equipment is shown in Figure 11. Calibration check adjustment is made as follows:

MODEL 360 CALIBRATION (USING THE MODEL R CALIBRATION CHECK KIT)

1. Attach the flow control to the 0.75% pentane/15% oxygen calibration gas tank.

2. Connect the adapter-hose to the flow control.

3. Open the flow control valve.

4. Connect the adapter-hose fitting to the inlet of the instrument; within 30 seconds, the LEL readout should stabilize and indicate between 47 and 55%. If the indication is not in the correct range, remove the right end of the indicator and adjust the LEL SPAN control to obtain 50%.

5. Verify the oxygen reading; it should be between 13 and 17%.

6. Disconnect the adapter-hose fitting from the instrument.

7. Close the flow control valve.

8. Remove the flow control from the calibration gas tank.

9. Attach the flow control to the 300 ppm carbon monoxide calibration gas tank.

10. Open the flow control valve.

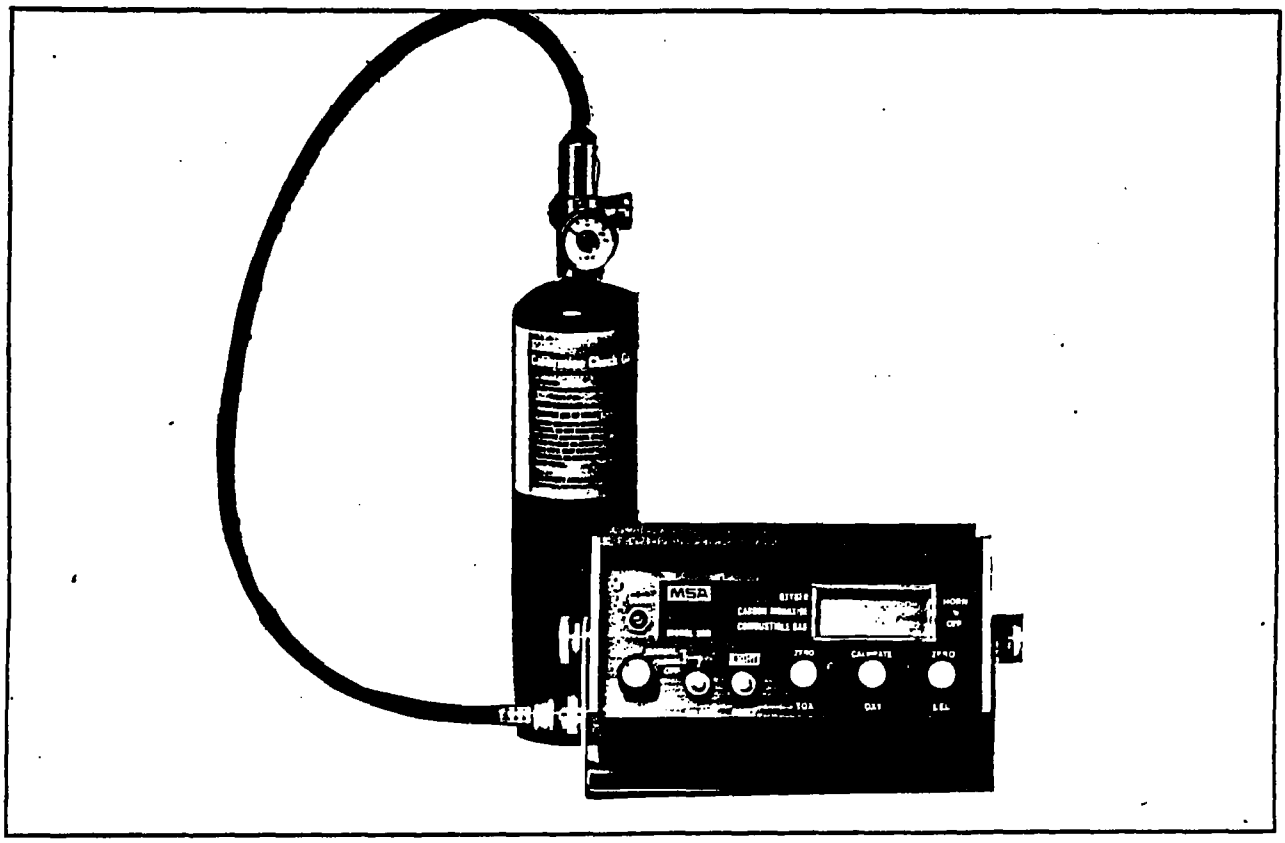


Figure 11. Model 360 or 361 with Calibration Equipment

11. Connect the adapter-hose fitting to the inlet of the instrument; after approximately 2 minutes, the TOX readout should stabilize and indicate between 275 and 325 ppm. If the indication is not in the correct range, remove the right end of the indicator and adjust the TOX SPAN control to obtain 300ppm.

12. Disconnect the adapter-hose fitting from the instrument.

13. Close the flow control valve.

14. Remove the adapter-hose from the flow control.

15. Remove the flow control from the calibration gas tank.

MODEL 361 CALIBRATION (USING MODEL RP CALIBRATION CHECK KIT) (FIGURE 11)

1. Attach the flow control to the .75% pentane/15% oxygen calibration gas tank.

2. Connect the adapter-hose to the flow control.

3. Open the flow control valve.

4. Connect the adapter-hose fitting to the inlet of the instrument; within 30 seconds, the LEL meter should stabilize and indicate between 47 and 55%. If the indication is not in the correct range, remove the right end of the indicator and adjust the LEL SPAN control to obtain 50%

5. Verify the oxygen reading; it should be between 13 and 17%.

6. Disconnect the adapter-hose fitting from the instrument.

7. Close the flow control valve.

8. Remove the flow control from the calibration gas tank.

9. Attach the flow control to the 40 ppm hydrogen sulfide calibration gas tank.

10. Open the flow control valve.

11. Connect the adapter-hose fitting to the inlet of the instrument; after approximately 1 minute, the TOX readout should stabilize and indicate between 35 to 45 ppm. If the indication is not in the correct range, remove the right end of the indicator and adjust the TOX SPAN control to obtain 40 ppm.

12. Disconnect the adapter-hose fitting from the instrument.

13. Close the flow control valve.

14. Remove the adapter-hose from the flow control.

15. Remove the flow control from the calibration gas tank.

CAUTION

Calibration gas tank contents are under pressure. Do not use oil, grease or flammable solvents on the flow control or the calibration gas tank. Do not store calibration gas tank near heat or fire, nor in rooms used for habitation. Do not throw in fire, incinerate or puncture. Keep out of the reach of children. It is illegal and hazardous to refill this tank. Do not attach any gas tank other than MSA calibration tanks to the flow control.

SECTION 5
PARTS LIST

Component/Assembly	MSA Part NO.
Model 360 Carbon Monoxide, Combustible Gas and Oxygen Alarm	476151
Model 361 Hydrogen Sulfide, Combustible Gas and Oxygen Alarm	476152
5-Foot Synthetic Rubber Sampling Line w/Couplings	11354
10-Foot Synthetic Rubber Sampling Line w/Couplings	11955
15-Foot Synthetic Rubber Sampling Line w/Couplings	11912
25-Foot Synthetic Rubber Sampling Line w/Couplings	11913
50-Foot Synthetic Rubber Sampling Line w/Couplings	11958
3-Foot Hollow Brass Probe Tube	11961
3-Foot Plastic Probe Tube	73743
4-Foot Solid Brass Probe Rod	11960
Line Trap Assembly	74814
Oxygen Sensor	457621
Carbon Monoxide Sensor	472077
Hydrogen Sulfide Sensor	467376
Pump Assembly	476086
Carrying Harness	457754
Diffusion Head	449917
O-Ring (for Diffusion Head)	67283
Carbon Monoxide Sensor for Model 360, with O-Ring	472077
Hydrogen Sulfide Sensor for Model 361, with O-Ring	478840
O-Ring (for Toxic Sensors)	62740
Disc (Porous)	472301
Battery Pack	476144
Battery Charger, 120 Volt	631664
Battery Charger, 240 Volt	631712
Sample Inlet Filter Element Replacement Kit	469995
Inlet Seal (O-ring)	632152
Printed Circuit Board	476750

PARTS LIST (CONT.)

Component/Assembly	MSA Part No.
MODEL 360 Calibration	
(Using Model R Calibration Check Kit)	
Flow Control, 1.5 L/m	459948
Gas Cylinder, 0.75% Pentane/15% oxygen	476304
Gas Cylinder, 300 ppm Carbon Monoxide	461769
Adapter-Hose	449401
MODEL 361 Calibration	
(Using Model RP Calibration Check Kit)	
Flow Control, 1.5 L/m	467896
Gas Cylinder, 0.75% Pentane/15% Oxygen	478192
Gas Cylinder, 40 ppm Hydrogen Sulfide	467897
Adapter-Hose	449401
Instruction Manual, Model 360/361	476473

SECTION 6

RESPONSE INFORMATION

Table 6-1. Model 360 CO Response to Interferants

INTERFERANT	INTERFERANT CONCENTRATION (PPM)	SENSOR RESPONSE (PPM)
Ammonia	100	-4
Benzene	17.7	0
Carbon Dioxide	5000	-4
Carbon Disulfide	14.5	2
Carbon Monoxide	100	100
Chlorine	5	0
Dimethyl Sulfide	4.5	2
Ethylene	50	100
Freon 12	1000	-2
Hexane	500	-2
Hydrogen	500	70
Hydrogen Cyanide	42	30
Hydrogen Sulfide	40	170
Isopropanol	50	40
Mercaptan		
Ethyl	4.4	6
Methyl	5	7
Methane	50,000	-3
Methanol	50	130
Nitric Oxide	100	260
Nitrogen Dioxide	100	80
Sulfur Dioxide	150	30

Table 6-2. Model 361 H_2S Response to Interferants

INTERFERANT	INTERFERANT CONCENTRATION (PPM)	SENSOR RESPONSE (PPM)
Ammonia	100	0
Benzene	17.7	0
Carbon Dioxide	5000	0
Carbon Disulfide	14.5	0
Carbon Monoxide	100	0
Chlorine	5	0
Dimethyl Sulfide	4.5	0
Ethylene	50	0
Freon 12	1000	0
Hexane	500	0
Hydrogen	500	1
Hydrogen Cyanide	42	0
Hydrogen Sulfide	40	40
Isopropanol	50	0
Mercaptan		
Ethyl	44	3
Methyl	5	5
Methane	50,000	0
Methanol	50	0
Nitric Oxide	100	2
Nitrogen Dioxide	100	-8
Sulfur Dioxide	150	5

SECTION 7

CONVERSION FACTORS

CHEMICAL	CONVERSION FACTOR
Acetone	1.0
Acetylene	0.8
Benzene	1.1
Iso-Butane	1.0
n-Butane	1.0
Butadiene	0.8
Butene-1	1.0
Carbon Monoxide	0.6
Ethane	0.7
Ethyl Acetate	1.1
Ethyl Alcohol	1.0
Ethylene	0.8
Ethylene Oxide	0.9
Ethyl Ether	1.1
Gasoline	1.0
Heptane	1.1
Hexane	1.3
Hydrogen	0.6
Methane	0.6
Methyl Alcohol	0.7
Methyl Ethyl Kentone	1.6
Pentane	1.0
Propane	0.9
Propylene	1.0
Propylene Oxide	1.0
Iso Propyl Alcohol	1.1
Tetrahydrofuran	0.8
Toluene	1.2

E:
Model 360 or Model 361, calibrated on Pentane, is used to for propane, the conversion factor is 0.9. If the meter 50% LEL, the true propane concentration is:

(50% x 0.9) OR 45% LEL

curves presented in this manual are typical of a Model 360 or l 361 calibrated on Pentane. The response of a particular l 360 or Model 361 may be higher or lower than the stated response. For this reason an accuracy tolerance of ±25% should be applied in the interpretation of any meter response.

CALIBRATION TEST SYSTEM MODEL RP CHECK KIT USING FLOW CONTROL PART NO. 467896

instruction manual

IMPORTANT WARNING

THIS MANUAL MUST BE CAREFULLY READ BY ALL INDIVIDUALS WHO HAVE OR WILL HAVE THE RESPONSIBILITY FOR INSTALLING, USING, OR SERVICING THE PRODUCT. Like any piece of complex equipment, the MODEL RP CHECK KIT USING FLOW CONTROL PART NO. 467896 will perform as designed only if it is installed, used and serviced in accordance with the manufacturer's instructions. OTHERWISE IT COULD FAIL TO PERFORM AS DESIGNED AND PERSONS WHO RELY ON THIS PRODUCT FOR THEIR SAFETY COULD SUSTAIN SEVERE BODILY INJURY OR DEATH.

The warranties made by Mine Safety Appliances Company with respect to the product are voided if the product is not installed, used and serviced in accordance with the instructions in this manual. Please protect yourself and your employees by following them. We encourage our customers to write or call for a demonstration of this equipment prior to use or for any additional information relative to use or repairs.

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Manufactured by

MINE SAFETY APPLIANCES COMPANY

PITTSBURGH, PENNSYLVANIA, U.S.A. 15230

588 (L) REV. 0

478303

MSA CALIBRATION TEST SYSTEM
for use with
MSA HYDROGEN SULFIDE, COMBUSTIBLE GAS
AND OXYGEN ALARM MODEL 361

Parts Required: Flow Control, part no. 467896
Adapter-Hose, part no. 449401
Calibration Gas, part no. 478192
50% LEL Pentane (.75% Pentane and
15% Oxygen in nitrogen)
Calibration Gas, part no. 467898
Hydrogen Sulfide 10 ppm in Nitrogen

INSTRUCTIONS

Test the operation of the pump and sample flow indicator by momentarily placing a finger over the sample inlet of the instrument. The flow indicator should be at the top of the window before falling from view while the inlet is blocked. If not, see the instrument Instructi.. Manual for required maintenance.

1. Attach the flow control to the .75% pentane and 15% oxygen calibration gas tank.

2. Connect the adapter-hose to the flow control.

3. Open the flow control valve.

4. Connect the adapter-hose fitting to the inlet of the instrument; after approximately 15 seconds, the LEL meter should stabilize and indicate between 47 and 55%. If the indication is not in the correct range, remove the right end of the indicator and adjust the LEL SPAN control to obtain 50%.

5. Verify the oxygen reading; it should be between 13 and 17%. (This is a response check only. The oxygen sensor should be calibrated to 20.8% oxygen in fresh air before each use.)

6. Disconnect the adapter-hose fitting from the instrument.

7. Close the flow control valve.

8. Remove the flow control from the calibration gas tank.

9. Attach the flow control to the hydrogen sulfide calibration gas tank.

10. Open the flow control valve.

11. Connect the adapter-hose fitting to the inlet of the instrument; after approximately 1 minute, the TOX readout should stabilize and indicate 7 to 13 ppm. If the indication is not in the correct range, remove the right end of the indicator and adjust the TOX SPAN control to obtain 10 ppm.

12. Disconnect the adapter-hose fitting from the instrument.

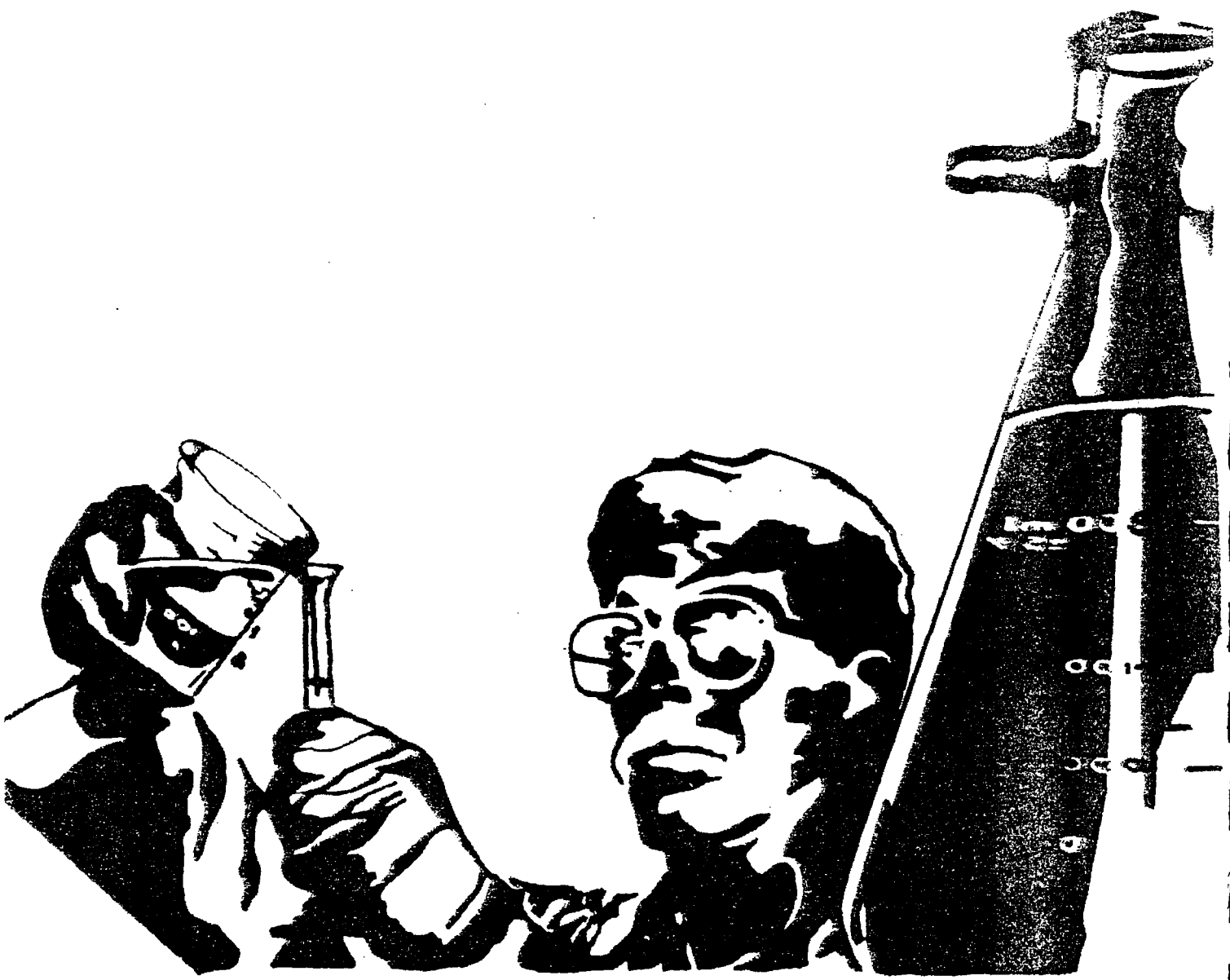
13. Close the flow control valve.

14. Remove the adapter-hose from the flow control.

15. Remove the flow control from the calibration gas tank.

Appendix B
NET MIDWEST LABORATORY QAPP

NET



NET

NATIONAL
ENVIRONMENTAL
TESTING, INC.

NET Midwest, Inc.

Stan S.Zaworski
President

Irene R. Plagge
Vice-President
Finance

Robert N. Bucaro
Vice-President and
Corporate Director of Quality Assurance

Scott C. Gerrick
Vice-President
Business Development

William H. Mottashed III
Manager Bartlett Division
850 W. Bartlett Road
Bartlett IL 60103
312/289-3100

Michael K. McGee
Manager Cedar Falls Division
704 Enterprise Drive
Cedar Falls IA 50613
319/277-2401

Jaime M. Maceda
Manager Chicago Division
222 South Morgan Street
Chicago IL 60607
312/666-4469

Joseph D. Shafer
Manager Indianapolis Division
6964 Hillsdale Court
Indianapolis IN 46250
317/842-4261

Toni Gartner
Manager Rockford Division
3548 35th Street
Rockford IL 61109
815/874-2171

QUALIFICATIONS PROFILE

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OVERVIEW

NET Midwest, Inc.'s regional headquarters are in Bartlett, Illinois. NET Midwest, Inc. currently has five operating divisional laboratories: Bartlett, Illinois; Cedar Falls, Iowa, Chicago, Illinois; Indianapolis, Indiana; and Rockford, Illinois. It is the intent of the management of the corporation and its parent company, National Environmental Testing, Inc., to establish additional divisional laboratories at other strategic locations.

NATIONAL ENVIRONMENTAL TESTING, INC., is a network of high quality regional laboratories in California, Illinois, Indiana, Iowa, New Jersey, and Texas, that offers a comprehensive range of environmental testing services. NET Midwest, Inc. can offer the best of both worlds - the customized, personal service you would expect from your regional lab, but also the advantages made possible by a large, national corporation.

Division Managers are each responsible for profitability and analytical quality assurance within their operating units. They are accountable for their performance to the President who is assisted by the Vice-President of Finance, the Vice-President and Director of Quality Assurance, and the Vice President of Business Development.

While the division manager's autonomy allows flexibility to meet the needs of our clients on a local basis, NET Midwest, Inc.'s corporate staff monitors and coordinates the activities of all laboratories to assure consistent quality of results and services. Each lab must operate within guidelines established at the corporate level for business practices, personnel management, laboratory methods, facilities management, and record keeping. Most importantly, each must participate in our inter-laboratory quality assurance program.

In summary, NET's management approach has allowed us to develop a network of responsive, self-sufficient laboratories which are competitively superior.

FACILITIES

NET Midwest's regional headquarters are located at 850 West Bartlett Road, Bartlett, Illinois. The Bartlett Division laboratory is in the same facility. This location has a total of 7500 square feet of which 2100 square feet is corporate offices; 5300 square feet is laboratory. As is the case at each of the NET Midwest facilities, there are actually four separate laboratories: inorganic chemistry, organic chemistry, wastewater, and microbiology. In addition, each divisional laboratory has a specialty -- at Bartlett this special section is gas chromatography/mass spectrometry. Each laboratory in the NET Midwest group maintains several separate and complete sets of analytical glassware, thus eliminating cross-contamination between high-level and trace-level analyses.

NET Midwest's second laboratory is located at 704 Enterprise Drive in Cedar Falls, Iowa. This laboratory is 9800 square feet, of which 3000 square feet is office and 6800 square feet is laboratory space. The Iowa laboratory specializes in a wide variety of environmental and industrial hygiene analyses. The Cedar Falls laboratory is currently the only AIHA accredited laboratory in the NET group of laboratories. This laboratory is also accredited by the National Institute of Standards and Technology (formerly the National Bureau of Standards) under the NVLAP program for the analysis of bulk materials for asbestos content.

NET Midwest's third laboratory is located at 222 South Morgan Street in Chicago, Illinois. This facility is 5100 square feet of lab space and 1200 square feet of office. This lab specializes in the analysis of foods, grains, pharmaceuticals, cosmetics and feed additives. With a wide range of clients throughout the United States, nutrition labeling and vitamin analyses are the primary services of this laboratory.

NET Midwest's fourth facility is at 6964 Hillsdale Court in Indianapolis, Indiana. This laboratory is 6380 square feet of which 1900 square feet is office and 4480 square feet is laboratory. The Indianapolis laboratory specializes in the analysis of a wide variety of matrices in support of the auto industry.

NET Midwest's fifth facility is located at 3548 35th Street, Rockford, Illinois. This laboratory is 5000 square feet of which 900 square feet is devoted to office, 2600 square feet to laboratory, and 1500 square feet of warehouse. The Rockford lab specializes in environmental testing of drinking water wells for VOC contamination with complete GC/MS capabilities. It also provides the other NET Midwest divisions with the capability for the Waste Incineration Profile which includes BTU, Chlorine and Sulfur.

GENERAL SERVICES

With its extensive laboratory capabilities and creative application of professional experience, NET Midwest serves a variety of client needs in the fields of chemical and microbiological testing. The list below describes general categories of services offered by NET Midwest, while the Special Projects Section presents examples of how we have integrated certain elements of our services for specific projects.

SOIL	MINERALS
FOOD	BACTERIA
SLUDGE	RESIDUES
GRAINS	PROXIMATES
COSMETICS	NUTRITION LABELING
HAZARDOUS WASTE	PRIORITY POLLUTANTS
HEALTH PRODUCTS	TRACE METALS
GROUNDWATER	AMINO ACIDS
FEED ADDITIVES	PESTICIDES
WASTEWATER	VITAMINS
PHARMACEUTICALS	SOLVENTS
SEDIMENT	PCB'S
INDUSTRIAL HYGIENE	ASBESTOS ANALYSIS

* EPA Contract Laboratory Program *
* Air Sample Analysis *
* RCRA groundwater programs *
* AHERA Asbestos Testing *
* U.S. Army Nutrition Study *
* NPDES permit monitoring *
* Landfill leachate analyses *
* OTC drug quality control *
* Incineration profile *
* Bacteriological monitoring *
* Contaminated grain study *
* Vitamin assaying *
* Industrial Hygiene Surveys *
* Underground Storage Tanks *

SPECIAL PROJECTS

Client. . . . . **Illinois EPA**
Springfield IL
217-785-5168
Karl Reed

Project Name: Contract Lab Program

NET Midwest was selected to be an Illinois Environmental Protection Agency contract laboratory. Under that program, we provided analytical services for three activities: emergency response, the Comprehensive Environmental Response Compensation and Liability Act (CERCLA). and the Clean Illinois Program relating to hazardous wastes sites. As part of these programs, samples were analyzed to determine the presence and concentration of specific chemicals including: heavy metals, cyanide, PCB's and complete organic priority pollutants. Extensive GC/MS analyses were performed to identify unknown organic compounds. Sample matrices included: soils, wastewater, groundwater, sludge, and unidentified material from drums. NET Midwest prepared an extensive QA plan in accordance with the federal Contract Laboratory Program (CLP). This was utilized to provide consistent results of known and documented quality that are legally defensible in court.

Client. . . . . **General Foods**
Chicago IL
312-471-7719
Tom O'Brian

Project Name: "Tang" Quality Control

General Foods routinely sends samples of "Tang" to NET Midwest to be analyzed for vitamins. This is done to primarily check their batch processor.

Client. . . . . **Sheller Globe Corp.**
Iowa City IA
319-524-4560
Bill Murray

Project Name: Industrial Hygiene Survey

NET Midwest completed a comprehensive industrial hygiene survey at the Iowa City facility to evaluate worker exposure to a wide variety of chemicals.Contaminants evaluated included solvents, metals, dusts, acids, stripping compounds as well as other contaminants.

Client. . . . . **U.S. Army - Natick Research Center**
617-651-4489
Bonnie Atwood

Project Name: Rations for Nutrient Content

The U.S. Army awarded a contract to the Chicago division of NET Midwest, Inc. to analyze rations for Fatty Acids, Cholesterol, Vitamins, Minerals, etc. This 3-year project was to determine the stability of these nutrients in both the components and the complete meals.

Client. . . . . **Petroleum Marketers of Iowa**
Des Moines IA
515-244-6273
Ed Kistenmacher

Project Name: Benzene Monitoring

Working with the Petroleum Marketers of Iowa, NET Midwest completed the analysis of several hundred benzene air samples for oil jobbers in Iowa. The air samples were analyzed to determine compliance with the OSHA Benzene Standard. Soil testing has also been completed in conjunction with the removal of several hundred underground storage tanks in Iowa.

Client. . . . . **Soft Sheen Inc.**
Chicago IL
312-978-0700
Kevin Gross

Project Name: Preservative Challenge Test

This sizable manufacturer of beauty and hair-care products submits samples for preservative testing. A Preservative Challenge Test is performed with specific microoganisms incubated at optimum conditions and then tested at one, two, three and four hour intervals.

Client. . . . . Dames and Moore
Park Ridge IL
312-297-6120
Mike Ander

Project Name: Indiana Army Ammunition Plant Contamination Survey

As a subcontractor to Dames & Moore, NET Midwest was responsible for the chemical analysis of surface water, sediment and soil samples. Analytical parameters included explosives and priority pollutants. The performance of the contract was monitored by the US Army Toxic and Hazardous Materials Agency and included an extensive Quality Assurance Program. Months of testing and methods development were required to achieve certification before actual samples could be analyzed.

Client. . . . . Illinois Power Co.
Decatur IL
217-424-6832
Harry Walton

Project Name: Groundwater Monitoring

Illinois Power Company contracted with NET Midwest to perform a two year groundwater monitoring study at several Illinois Power facilities. Much of this work fell under the RCRA monitoring requirements. Analyses included groundwater contamination parameters, Safe Drinking Water Act metals, organics and radiological parameters.

Client. . . . . Rockwell International
Cedar Rapids IA
319-395-5716
Darrell Kula

Project Name: Wastewater Monitoring

NET Midwest is involved in ongoing analysis of the plant effluent into the Cedar Rapids Water Pollution Control Facility. The work involves analysis of various organic and metals parameters to ensure that they are in compliance with their pretreatment permits. NET Midwest was able to meet the stringent 24 hour turn around required for this project.

Client. . . . . . **Fannie May**
Chicago IL
312-243-2700
Ken Day

Project Name: Raw Ingredient QC

Fannie May Candy Company daily sends many of its raw ingredients to NET Midwest for Quality Control analyses. This includes such tests as aflatoxin in nuts. As part of a quarterly inspection of their Chicago manufacturing facility, we also do a thorough audit of their of their facility for proper sanitation.

Client. . . . . . **Testing Service Co.**
Wheaton IL
312-653-3920
Charles Luther

Project Name: TCE Monitoring

As subcontractor to Testing Services Corporation, NET Midwest was responsible for groundwater monitoring of trichloroethylene. This project, located in Michigan, was to determine the extent and movement of the TCE contamination plume. Water and soil samples were analyzed in addition to drinking water monitoring from a nearby city.

Client. . . . . . **Mardel**
Glendale Heights IL
312-351-0606
Ron Reid

Project Name: Product Labeling Verification

NET Midwest routinely analyzes finished products for this manufacturer of aquarium pet food, to assure that the various lots contain the labeled specifications.

Client. . . . . Iowa Environmental Services
515-279-8042
Glenn Soyer

Project Name: VA Medical Center
Iowa City

Iowa Environmental Services is involved with an asbestos abatement project that is being done in conjunction with the renovation of a VA hospital. NET Midwest has been responsible for analytical testing of asbestos bulk and air samples. IES has also contracted with NET Midwest to periodically inspect the site to assure that proper abatement practices are followed.

Client. . . . . **E.A. Hickok & Assoc.**
Des Moines IA
515-277-6678
Rod Vlieger

Project Name: Marshalltown Instruments

Working for E.A. Hickok and Associates, NET Midwest was responsible for the analysis of soil and water samples at the Marshalltown Instruments site. This analysis was required to comply with RCRA site closure regulations. Analyses included volatile organics and Safe Drinking Water Act metals.

Client. . . . . **Sundstrand Aviation**
Rockford IL
815-226-6000
Olven Briles

Project Name: Space Shuttle
Water Quality

NET Midwest supplied Standard Plate Count analyses to Sundstrand Aviation during their development of the water supply system to be used on the space shuttles. NET Midwest's bacteriology lab has been certified by the Illinois Department of Public Health to perform specific bacteriological tests on drinking water.

Client. . . . . **Dames & Moore**
Park Ridge IL
312-297-6120
Mike Ander

Project Name: Buffalo Rock
Reclamation Project

As a subcontractor to Dames & Moore, NET Midwest was responsible for all analytical work on the Buffalo Rock Reclamation Project. This abandoned coal mine study included analysis of mine spoil samples, water samples, and soil samples. Procedures applicable to overburden and mine soils were used. Analyses included minerals, heavy metals, general water quality parameters, neutralization potential, and available and exchangeable soil constituents.

Client. . . . . **Fred C. Hart & Assoc.**
Denver, CO
816-459-6719
John M. Wise

Project Name: Farmland Industries

Under contract from Fred C. Hart & Assoc., NET Midwest conducted a priority pollutant screening of soil samples for one of Farmland Industries' plants. The samples were analyzed for all 128 priority pollutants as listed in Section 3 of the Clean Water Act. At the time, no reference methods existed for soil samples; NET Midwest adapted existing methods to meet the needs of our client.

Client. . . . . **Owens-Illinois**
Toledo, Ohio
419-247-9506
Gary Griffith

Project Name: Priority Pollutant
Monitoring

Owens-Illinois contracted with NET Midwest for priority pollutant analysis of wastewater effluents at four of their paper mills located across the United States. These analytical results were used for NPDES permit application requirements. Analysis included the complete priority pollutant list of 128 parameters.

Client. . . . . **Dames & Moore**
Park Ridge IL
312-297-6120
Mike Ander

Project Name: Exxon Mine Site

As a subcontractor to Dames & Moore, NET Midwest was responsible for surface water, ground water, air, sediment, and macrophyte analysis on a monthly and/or quarterly basis. This included data generation for minerals, trace metals, pesticides, and other organics. Sediment loading and sulfur dioxide air monitoring were added to the study. The purpose of the project was to provide a complete baseline study of an area in Wisconsin relative to a new ore mine.

Client. . . . . **Harza Engineering**
Chicago IL
312-855-7000
Krishna Myankar

Project Name: Oil Removal Study

Harza Engineering was the prime contractor to design and construct a drinking water treatment plant on a pilot scale to remove oil contamination. NET Midwest analyzed samples obtained from 6 treatment points throughout the system. The purpose of the project was to determine the most efficient method of removing oil contamination from a water supply and to see if the final effluent would meet drinking water requirements. A portion of the project included 7 samples for complete priority pollutant analysis and Safe Drinking Water Act organic parameters at the part per trillion level.

Client. . . . . **Conagra Poultry Company**
El Dorado AR
501-863-1624
Dr. R. L. Hood

Project Name: Vitamins in Premix

Conagra Poultry Company contracts with NET Midwest to analyze their premix feed ingredients for vitamins. This is done to ensure that the premix, which is eventually fed to livestock and poultry, is mixed correctly and satisfies label claims.

Client. . . . . **Amoco Oil**
Whiting IN
219-473-3075
Jim Miller

Project Name: Specialized Testing

Samples of waxes and oils are analyzed per the Code of Federal Regulations in order to establish their compliance with the appropriate regulation. This establishes their suitability to be used as coatings in the food industry.

Client. . . . . **Metcalf & Eddy**
Wakefield MA
617-246-5200
Bruce Goodwin

Project Name: Pembroke/Cross Brothers Superfund Site

As a subcontractor to Metcalf & Eddy, NET Midwest was responsible for the chemical analysis of soil, groundwater and drinking water samples to determine the presence and extent of contamination at a superfund site. Analysis included heavy metals, cyanide, phenol, and the complete organic target compound list (TCL). An extensive Quality Assurance Project Plan was prepared in accordance with guidelines and specifications presented in the federal Contract Laboratory Program (CLP). USEPA approval of the QAPP was required prior to performing this contract.

CREDENTIALS AND CERTIFICATIONS

NET Midwest's laboratories are staffed with professionally qualified and experienced chemists, biologists, microbiologists, and managers utilizing the latest equipment.

As a member of the American Council of Independent Laboratories, NET Midwest has pledged to maintain absolute impartiality and confidentiality whether the client be government, industry, or an individual. The ACIL's strict Qualification Program outlines standards for personnel, equipment and reference sample programs. In addition to its professional recognition, ACIL divisional and national conferences provide NET Midwest with information on governmental regulations, legislative analysis and management assistance.

Through either corporate or individual memberships, NET Midwest is represented in many other industrial and professional associations, a few of which are:

American Chemical Society
American Water Works Association
Institute of Food Technologists
American Electroplaters Society
Association of Official Analytical Chemists
National Feed Ingredient Association
Water Quality Association
Society for Applied Spectroscopy
American Society-Mass Spectrometry
Association of Vitamin Chemists
American Society for Testing and Materials
American Industrial Hygiene Association
American Industrial Hygiene Association-IA/IL Section
Iowa Safety Council
American Society of Safety Engineers
Black Hawk County(Iowa)Environmental Task Force
Iowa Association of Business and Industry
Iowa Society of Solid Waste Operation
National Asbestos Council

The Department of Public Health, State of Illinois, has inspected and approved our personnel and facilities to conduct microbiological analyses of public and private drinking water supplies. This certification is listed in the U.S. Department of Health, Education and Welfare registry of laboratories. Periodic inspections by the State ensures compliance in quality assurance, record keeping and facility maintenance. Most states have certification reciprocity.

NET Midwest is also certified by the Illinois Environmental Protection Agency for the analyses required under the Safe Drinking Water Act.

In addition to IEPA's certification, NET Midwest was also "approved" to provide analytical services to the Agency under its Contract Lab Program. Under this program, NET Midwest provided services for three activities: emergency response, the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), and the Clean Illinois Program relating to hazardous waste sites. An extensive Quality Assurance Plan was prepared modeled after the Federal Contract Lab Program. This is utilized to provide results consistent with the federal program which requires results of a known and documented quality that are legally defensible in a court of law.

The Cedar Falls Division of NET Midwest is accredited by the American Industrial Hygiene Association (#285), and is certified by the EPA for bulk asbestos analyses. The laboratory is also enrolled in the NVLAP bulk asbestos certification program administered by the National Bureau of Standards.

NET Midwest is certified by the Wisconsin Department of Natural Resources. Minimum requirements and criteria for laboratories submitting monitoring data to the Department have been established. These rules are applicable to commercial, municipal, and industrial laboratories that analyze wastewater, groundwater, surface water, hazardous substances, hazardous waste, and sediments. These rules specify methodology, laboratory quality control procedures, and laboratory records.

NET Midwest is also certified by the US Army Toxic and Hazardous Materials Agency (USATHAMA) to perform analysis on water, soil, and sediments for a wide variety of tests, including explosives and priority pollutants.

NET Midwest is certified by the State of Iowa for the analysis of Safe Drinking Water Act parameters and participates in the EPA Water Pollution and Water Supply Performance Evaluation Studies.

PARTIAL LIST OF CLIENTS

JOHN DEERE	WRIGLEY'S
FANNIE MAY	NABISCO BRANDS
CHRYSLER CORP	WEHRAN ENGINEERS
ARMY CORPS OF ENG	ILLINOIS POWER COMPANY
BAXTER-TRAVENOL	DONOHUE & ASSOCIATES
BAXTER & WOODMAN	ESPEY, HUSTON & ASSOC
BROWNING-FERRIS CO	U. S. ARMY - NATICK
ROCKWELL INT'L	METCALF & EDDY
U.S. VETERAN'S ADMIN	HARZA ENGINEERING
CATERPILLAR	INGERSOLL
KEEBLER COMPANY	MOBIL CHEMICAL
MINNESOTA MINING	F.P.D. DUPAGE COUNTY
COMMONWEALTH EDISON	ROLLINS INVIRONMENTAL
GENERAL ELECTRIC	HICKOK AND ASSOCIATES
DAMES & MOORE	S.E.T. ENVIRONMENTAL
MCDONALD'S	MOTOROLA
DEL MONTE	QUAKER OATS
ILLINOIS EPA	FERMILAB
AMOCO OIL	UNION OIL CO
VON DUPRIN	U. S. STEEL
SAFETY KLEEN	WOODWARD-CLYDE
ARVIN INDUSTRIES	CPC DIV. OF GMC
B. F. GOODRICH	WESTERN ELECTRIC
DELCO REMY DIV. OF GMC	IN'T MINERALS & CHEMICALS
A.E. STALEY MANUFACTURING	INDIANA DEPT. ENVIRON. MGT.

REGULATORY AGENCIES

Compliance with rules issued by various government regulatory agencies is often the prime reason for a client to seek the services of NET Midwest. Therefore, we maintain contact with such agencies and stay attuned to their ever-changing requirements. This program of positive communication proves invaluable to many of our clients by providing them with assistance in regulation monitoring, permitting, compliance, data gathering, etc. NET Midwest regularly communicates with agencies such as:

FEDERAL

Environmental Protection Agency
Department of Agriculture
Department of the Army, Corps of Engineers
Department of Wildlife and Conservation
Bureau of Standards
Geological Survey
Department of Commerce
Nuclear Regulatory Commission
Food and Drug Administration
Department of Public Health
US Army Toxic and Hazardous Materials Agency
Occupational Safety and Health Administration(OSHA)
National Institute of Occupational Safety and Health(NIOSH)

STATE

Environmental Protection Agency
Department of Public Health
Department of Natural Resources
Department of Environmental Monitoring
Department of Transportation
Department of Conservation
Department of Water Resources
State Water Survey

MISCELLANEOUS

Metropolitan Sanitary District of Greater Chicago
Rockford Sanitary District
Northeastern Illinois Planning Commission
Various Municipal Utility Districts

EQUIPMENT AND PROCEDURES

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LABORATORY EQUIPMENT

A substantial investment in laboratory equipment is necessary to properly perform high quality analytical work. NET Midwest is committed to a continuous expansion and upgrading of equipment and capabilities as required to maintain its total service commitment to clients. NET Midwest's present laboratory equipment includes:

5 - H-P 5970b MSD Gas Chromatograph/Mass Spectrometers

2 - H-P 5993b Gas Chromatograph/Mass Spectrometer

P E 8500 Gas Chromatograph with NPD & FID

P E 3920 Gas Chromatograph with FID & TCD

2 - H-P 5890 Gas Chromatograph with ECD & FID

H-P 5880 Gas Chromatograph with dual ECD, FID, & NPD

H-P 5880 Gas Chromatograph with dual ECD & FID

H-P 5890 Gas Chromatograph with FID

Tracor 560 Gas Chromatograph with ECD

Varian 1475 Atomic Absorption Spectrophotometer

PE 5100 Atomic Absorption Spectrophotometer

PE 703 Atomic Absorption Spectrophotometer

PE 560 Atomic Absorption Spectrophotometer

2-PE 460 Atomic Absorption Spectrophotometers

PE Plasma 40 ICP Emission Spectrometer

Beckman DU-20 UV/VIS Spectrophotometer

Waters 440/441 HPLC with 420 Fluorescence

Dohrmann DC-80 Low Level TOC Analyzer

Dohrman DX-20 TOX Analyzer

Olympus BH-2 Phase Contrast Microscope

Olympus BH-2 Polarized Light Microscope

Sequoia-Turner Model 450 Fluorometer

Parr Oxygen Bomb Calorimeter System

Pye Unicam UV-VIS Spectrophotometer

LABORATORY PROCEDURES

NET Midwest analyzes a wide range of sample matrices for a long list of parameters. The types of samples would include: water, foods, cosmetics, sludges, bottom sediments, grains, alloys, tissues, feed additives, hazardous waste, soils, fertilizers, and many more.

As is the case with all submitted analytical work, NET Midwest utilizes the current approved procedure or the most appropriate methodology. For example, any samples submitted in conjunction with requirements to satisfy U.S. Environmental Protection Agency permits or applications would necessitate use of USEPA methods. Many food products submitted for quality control would use procedures from the Association of Official Analytical Chemists.

Analytical protocols can be specified by the client or the appropriate method will be selected by the laboratory.

The following is a list of the principal agencies and associations that provide analytical method reference sources for laboratories like NET Midwest.

National Bureau of Standards
U.S. Environmental Protection Agency
Association of Official Analytical Chemists
American Society of Testing Materials
Institute of Food Technology
AWWA/WPCF Standard Methods Committee
Department of Public Health
U.S. Department of Agriculture
U.S. Pharmacopeia
National Institute of Occupational Safety and Health(NIOSH)
Occupational Safety and Health Administration(OSHA)

A complete list of reference manuals, books, methods, etc. is available for review in NET Midwest's copyrighted Quality Assurance Manual.

In addition to all of the available reference methods, NET Midwest has written a complete set of Procedure Manuals. These Manuals not only give the complete analytical protocol, but also compile the background information from all of the references and from experiences of the staff, and incorporate them into the procedure. This would include such information as interferences, pretreatment, holding times, etc.

SAMPLE MANAGEMENT

The following is a table from 40CFR 136 to be utilized as a guideline for sample containers, preservation of samples, and holding times. This table is extremely important in assuring data reliability. NET Midwest provides all required sample containers at no extra charge to control contamination and preservation.

PARAMETER	CONTAINER	PRESERVATIVE	MAXIMUM HOLDING TIME
Acidity/Alkalinity	P,G	None	14 days
Ammonia	P,G	H2SO4 to pH<2	28 days
BOD	P,G	None	48 hours
Chloride	P,G	None	28 days
Chlorine	P,G	None	immediately
Chromium, hex	P,G	None	24 hours
COD	P,G	H2SO4 to pH<2	28 days
Color	P,G	None	48 hours
Conductivity	P,G	None	28 days
Cyanide	P,G	NaOH to pH>12	14 days
Fluoride	P,G	None	28 days
Hardness	P,G	None	6 months
MBAS	P,G	None	48 hours
Mercury	P,G	HN03 to pH<2	28 days
Metals	P,G	HN03 to pH<2	6 months
Nitrate	P,G	None	48 hours
Nitrite	P,G	None	48 hours
Nitrogen,total	P,G	H2S04 to pH<2	28 days
Oil & grease	G	H2S04 to pH<2	28 days
Organic compounds			
Volatiles	G	None	14 days
Extractables			
pre-extraction	G	None	7 days
post-extraction	G	None	40 days
pH	P,G	None	immediately
Phenol	G	H2S04 to pH<2	28 days
Phosphorus	P,G	H2S04 to pH<2	28 days
Radiologicals	P,G	HNO3 to pH<2	6 months
Silica	P	None	28 days
Solids: tot, susp, vol	P,G	None	7 days
Solids: diss, sett.	P,G	None	48 hours
Sulfate	P,G	None	28 days
Sulfide	P,G	ZnAc+NaOH to pH>9	7 days
Sulfite	P,G	None	immediately
TOC	P,G	H2S04 to pH<2	28 days
TOX	G	HN03 pH<2	14 days
Turbidity	P,G	None	48 hours

P = Plastic G = Glass

With the exception of fluoride, metals, and radiologicals, all samples must be kept at 4C in addition to listed preservatives.

COMPUTER MANAGEMENT SYSTEM

NET Midwest utilizes a computerized laboratory management system to assist the entire operations of the laboratory from the logging in of samples to the generation of customized reports. This custom written system is one of the most advanced systems in the country, and allows us at NET Midwest to give you the service you need with the speed, accuracy, and unlimited flexibility of the computer. We've virtually eliminated the mistakes and excuses that go hand in hand with a manual system; i.e. transcription errors; paperwork being lost or buried on someones desk; due dates or holding times being missed because it wasn't written down; etc. The computer system allows us to maximize the quality and responsiveness of our analytical service and at the same time minimizes a lot of the burdensome manual tasks required in our business. This nets out to better quality service and data at lower costs.

The following is the menu from which most of the day to day operations of LABSYS are accomplished:

LABSYS LABORATORY MANAGEMENT SYSTEM MAIN MENU

1...ENTER NEW SAMPLES (LOGIN)
2...CORRECT SAMPLE AND TEST SELECTION
3...PRINT LABELS
4...PRINT CLIENT FILE
5...PRINT DAILY LOG

6...PRINT TEST QUEUE / PRINT DATA SHEETS
7...ENTER TEST RESULTS
8...CORRECT TEST RESULTS
9...LOAD & CORRECT TEST RESULTS

10..PRINT/DISPLAY - INDIVIDUAL SAMPLE STATUS
11..PRINT ALL SAMPLE COMPLETION STATUS
12..PRINT AND APPROVE DATA
13..PRINT REPORT
14..PRINT INVOICE

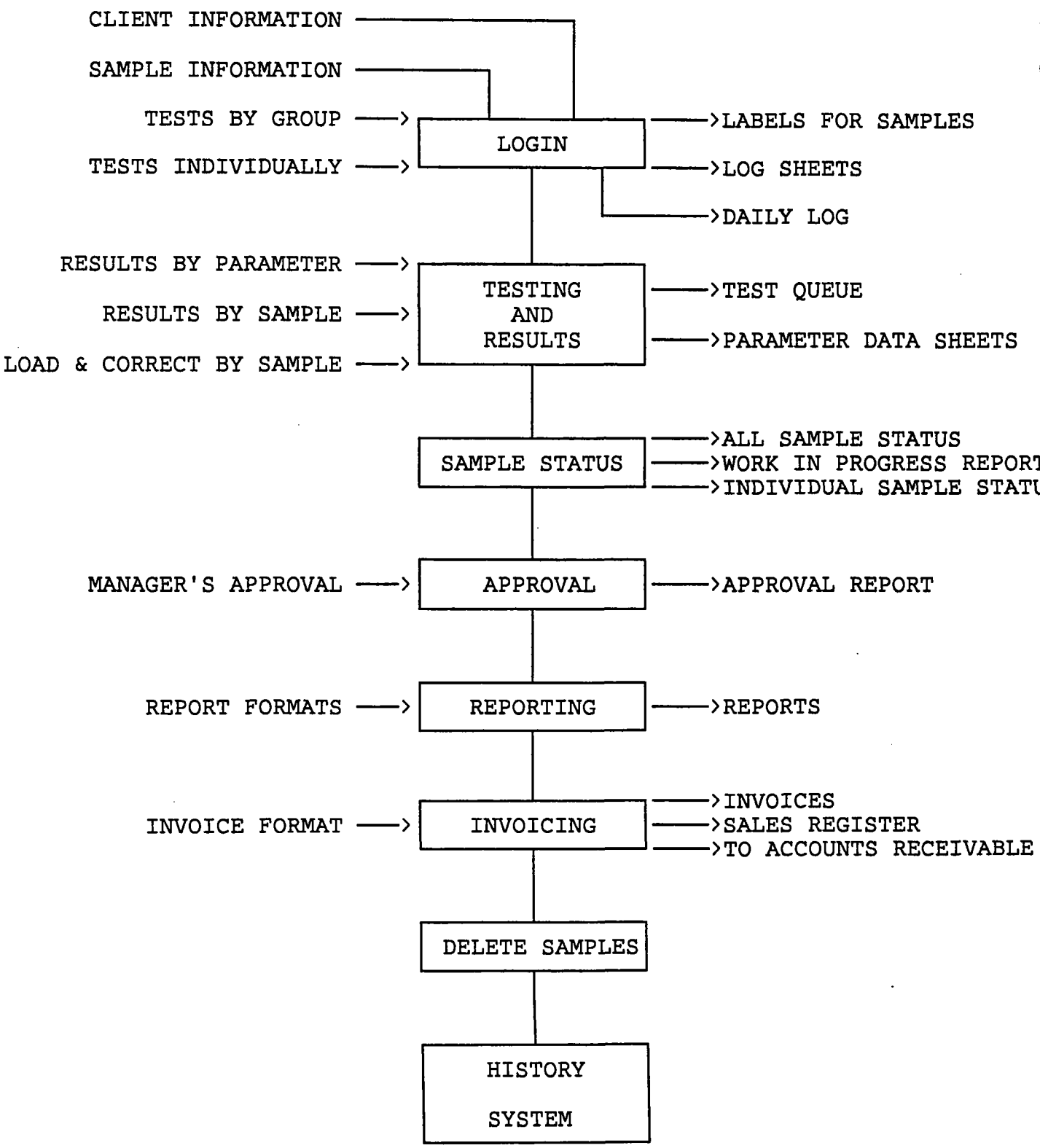
15..PRINT TEST LIST AND GROUP LISTS
16..HISTORY MENU

In addition, LABSYS also has a maintenance menu. Each of the modules on this menu perform some sort of maintenance function.

1...CLIENT FILE MAINTENANCE
2...DELETE SAMPLES
3...TEST FILE MAINTENANCE & REPORTS
4...INITIAL SYSTEM, FORMAT REPORT/INVOICE/SET SAMPLE NO.
5...END OF MONTH REORGANIZATION OF DATA
6...CREATE DATA FILES
7...CONFIGURE TERMINAL
8...BALANCE
9...SET CUSTOMER ACCESS INFORMATION
10..INITIALIZE QA COUNTER SYSTEM
11..PRINT/DISPLAY WORK IN PROGRESS

Again, the system maximizes the quality and responsiveness of data tracking and reporting of NET Midwest analytical services. We're proud of our computer management system at NET Midwest and would welcome the opportunity to discuss it further. The following page shows a brief diagram of the flow of data using the system.

LABSYS DATA FLOW



QUALITY ASSURANCE

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GENERAL DISCUSSION

The purpose of the independent analytical laboratory is to provide information that is accurate, reliable, and adequate for its intended use with absolute impartiality. To meet this purpose, NET Midwest has developed a complete Quality Assurance Program to guide the total operations of our laboratories from shipping of bottles to filing of reports. This program is described in full in our Quality Assurance Manual. This manual is the basis for instruction and direction in the establishment and maintenance of NET Midwest's Quality Assurance Program. It describes the criteria, guidelines and recommendations for the physical resources, the human resources, the data validation and the mode of operation of the laboratory. Management, statistical, preventative, corrective, administrative, and investigative techniques are employed to maximize this achievement.

NET Midwest's copyrighted Quality Assurance Manual is representative of our great investment in total quality assurance. Therefore, we consider much of its content proprietary. While a manual is available for inspection and review at each of NET Midwest's offices, copies will only be allowed to leave the office when the party makes a request in writing and agrees to sign our release form.

The following table of contents from our Quality Assurance Manual gives a listing of all sections that are covered. As can be seen, NET Midwest has invested in an extensive program which covers every aspect of laboratory operations.

1. INTRODUCTION
2. QUALITY ASSURANCE OVERVIEW
3. ORGANIZATION FOR QUALITY
4. COSTS AND BENEFITS
5. TRAINING AND CERTIFICATION
6. PROCEDURE MANUALS
7. FACILITIES
8. PROCUREMENT CONTROL, REAGENTS AND REFERENCE STANDARDS
9. MAINTENANCE AND CALIBRATION
10. PACKING AND SHIPPING
11. DOCUMENT CONTROL
12. DATA HANDLING, REPORTING AND RECORDKEEPING
13. CUSTOMER RELATIONS
14. CALIBRATION CURVES
15. PRECISION AND ACCURACY
16. INTERLABORATORY TESTING
17. DATA VALIDATION AND REVIEW
18. CLOSED LOOP CORRECTIVE ACTION AND FEEDBACK
19. AUDITS
20. REFERENCES

Q.A. MANUAL SUMMARY

In order to obtain a clearer picture of NET Midwest's commitment to quality, the following is a summary of each section of our Q.A. Manual. For a more detailed review of our program, we invite you to meet with one of our Division Managers at your nearest NET Midwest office.

SECTION 2. QUALITY ASSURANCE OVERVIEW

This section was written to provide a general overview of our Quality Assurance Program. This summary allows the reader to obtain a total picture of our program without reading the entire Q.A. Manual.

SECTION 3. ORGANIZATION FOR QUALITY

The establishment of a quality assurance program, as described in our Quality Assurance Manual, requires the assistance of all the people within NET Midwest to carry out the monitoring, recordkeeping, statistical techniques and other functions required by our system. This total commitment of all personnel to the production of reliable data is dependent upon the conscientious effort of everyone involved. Therefore it is important that each member of the organization have a clear understanding of his or her duties, responsibilities and their relationship to the company-wide effort. This section assists in that understanding by giving a structure and organization to this commitment to quality. Organization charts for the corporation and the divisions, along with job descriptions for all personnel are provided.

SECTION 4. COSTS AND BENEFITS

Quality assurance costs are segregated and recorded to identify elements of our quality assurance program whose costs may be disproportionate to the benefits derived. This assists in carrying out policies in the most efficient and economical manner commensurate with continued accuracy and precision of the data produced. Simply stated - what are the real costs associated with our Q.A. program in relationship to the benefits?

SECTION 5. TRAINING & CERTIFICATION

The most important element in providing quality data is our people. Therefore, it is vital to make sure every employee is thoroughly knowledgeable in their area of responsibility and can demonstrate competence on a regular basis in documented form. To attain this, we have a formal training program which not only ensures that every employee knows what they're doing, but generates confidence that our analytical results are correct. This mandatory training program covers all aspects of our operation, including extensive training in quality assurance and safety.

SECTION 6. PROCEDURE MANUALS

A quality assurance program should assure that all work, from the ordering of materials to the reporting of results, be prescribed in clear and complete written instructions of a type appropriate to the circumstances. Manuals are not only written for our analytical testing programs but also for such aspects of our operation as maintenance, calibration, reporting, quoting, and invoicing. Bench sheets, when appropriate, have been developed for immediate reference.

SECTION 7. FACILITIES

Because of the extent to which the laboratory environment can affect the results of the analysis, the laboratory facility must be carefully planned and that plan periodically evaluated. In general, the physical conditions shall comply with applicable local building codes, OSHA requirements, EPA requirements, and/or other legal requirements. Emphasis will be placed on professionalism, efficiency, and safety.

SECTION 8. PROCUREMENT CONTROL, REAGENTS, AND REFERENCE STANDARDS

The quality of our reagents and chemicals can directly affect the quality of our analytical results. Described in this section are the procedures for ordering, receiving, marking, and storing materials, reagents, and chemicals. Minimum standards are specified to insure that these supplies do not jeopardize the quality of our analytical results. Also established are the shelf lives for reagents, standards, and chemicals.

SECTION 9. MAINTENANCE AND CALIBRATION

Because we rely so heavily on our instruments, it is the purpose of this section to assure that only properly maintained and calibrated instruments and equipment are used in the measurement process. Preventive maintenance is an orderly program of positive actions (equipment cleaning, lubricating, adjusting, reconditioning, and/or testing) to prevent instruments from failing during use. Calibration is the process by which a standard or piece of equipment of a given accuracy is compared against a standard or piece of equipment of a higher accuracy. Adjustments are made as necessary to assure that the standards or equipment are within the prescribed accuracy.

SECTION 10. PACKING AND SHIPPING

Because of the fragile and sometimes sensitive nature of samples and their containers, special precautions must be taken for handling, storage, packing and shipping to protect the integrity of the samples and to minimize damage, loss, deterioration, degradation, and/or modification. This section addresses acceptable sample containers, sample volumes, preservatives, holding times, chain of custody procedures, DOT shipping regulations, and the disposal of samples.

SECTION 11. DOCUMENT CONTROL

Sound procedural documentation of laboratory operations - from dishwashing and balance calibration to maintenance and analytical testing - are essential to overall quality control. Inaccurate or outdated procedures within a facility can cause severe quality problems. It is the purpose of this section therefore, to describe the system we use to ensure that current specifications, methods, and standards are in the hands of users and that they do not use obsolete documents. A system of distribution, review, approval, recall, and update is established and rigidly utilized.

SECTION 12. DATA HANDLING, REPORTING AND RECORDKEEPING

Essential to our business and clients is a systematic approach to our handling of the large amount of data we generate. This system should allow for rapid information recovery and access. It should also allow for the maintenance and the storage of this data for future reference. It is the purpose of this section,

therefore, to describe the system and the forms that are used to request, record, transcribe, report, and store the results of our analytical testing.

SECTION 13. CUSTOMER RELATIONS

Vital to our business is the establishment of a good working relationship with our clients. To assist in maintaining that relationship on a professional level, guidelines are established concerning turn-around time, emergency requests, customer complaints, and our rerun policy.

SECTION 14. CALIBRATION CURVES

Calibration curves are plots of the instrument response versus the concentration. 90% of the analyses we perform are based on a calibration curve and the validity of our data is dependent to a great degree on how well these are established. Since it would be impractical to develop a new standard curve every time an analysis is performed, we have established a method for verifying it with each set of samples. It is the purpose of this section to describe how calibration curves are developed and to establish the methods for their verification on a daily basis.

SECTION 15. PRECISION AND ACCURACY

Our precision and accuracy program is a continuing, systematic, in-house regimen intended to ensure the production of analytical data of continuing high validity. This is accomplished primarily by running precision and accuracy control checks with every sample set. Control charts have been developed at the 99% confidence limit to plot this data as it is generated.

SECTION 16. INTERLABORATORY TESTING

The interlaboratory control program involves analysis of check samples (EPA, USGS, ERA, etc.) by each division laboratory in order to assess the continuing capability and relative performance of each. This program shall not be limited to check samples from the corporate office. Check samples from clients, EPA surveys, USGS surveys, certification programs, etc. are also analyzed.

SECTION 17. DATA VALIDATION AND REVIEW

This section describes the process whereby data is screened, and accepted or rejected based on a set of criteria. This involves a critical review of a body of data in order to locate dubious values. It may involve only cursory scan to detect extreme values or a detailed evaluation requiring the use of a computer. Included in this section are anion-cation balances, chemical relationships, etc.

SECTION 18. CLOSED LOOP CORRECTIVE ACTION AND FEEDBACK

Experience has shown that most problems will not disappear until positive action has been taken by management. The significant characteristic of any good management system is the step that closes the loop - the determination to make a change if the system demands it. This section establishes a mode for correcting a deviation, fixing responsibility for the action required, documenting the steps taken, and securing a report on the resolution of the problem.

SECTION 19. SYSTEM AUDITS

Our Q.A. Program dictates a number of steps, procedures, and documentations that must be followed in order to ensure the accuracy and reliability of our results. All that is needed then, is a follow-up system to ensure that all items dictated in this manual are being carried out. This section describes the three different auditing systems that we use: 1) Divisional - Each division manager is required to do an internal audit at least every quarter. 2) Corporate - Auditing is performed by the Vice-President and Director of Quality Assurance at least annually. 3) Other - These audits are performed by our clients or regulatory agencies as needed to satisfy their own Q.A. programs or as a prerequisite to obtaining a specific job or certification.

KEY PERSONNEL

NET Midwest, as a member of the American Council of Independent Laboratories, subscribes to its Manual of Practice, which contains a general description of the basic personnel requirements. The ACIL also provides "A Guide for Preparing a Personnel Policy Manual". This guide was used extensively in the preparation of NET Midwest's Personnel Policy Manual.

A file is maintained on each employee as required by various Federal and State Agencies. This file contains miscellaneous information, vacations, background, education, etc. Its primary function is to maintain the following records:

> Safety meeting attendance is required for all employees. To protect the health and welfare of our lab people, regular safety meetings are held and attendance is recorded.
>
> Health and accident records are kept for both the protection of the personnel and the Company. When an employee is sick at work or is absent due to illness, the reason is recorded. NET Midwest's insurance company and OSHA require posting of accidents and rates.
>
> NET Midwest trains its people so that their capabilities constantly expand. Thus, as the company grows, people have grown to fill management needs. Laboratory training is both on an individual basis and informal classes are held by the Division Manager.

Among NET Midwest's total staff of professional and administrative personnel, the following people hold positions of key responsibility in management, technical direction, and client service.

STAN S. ZAWORSKI

PRESIDENT

St. Mary's College, Winona, Minnesota, B.S. 1970;
Biology Major, Chemistry Minor

SPECIAL INTERESTS

Air, Water & Sediment Chemistry
Atomic Absorption Procedural Development
Gas Chromatography for Pesticides & Halogenated Hydrocarbons
TOC Analysis of Surface Waters and Sediments

EXPERIENCE

NET Midwest, Inc. (formerly Aqualab, Inc.)
President, 1988 - present

AQUALAB, INC.
President, 1987 - 1988

Responsible for complete technical and business operation of the corporation. This includes all aspects in the areas of finance, marketing, informational systems, and lab operations.

AQUALAB, Inc.
Vice-President, Lab Operations, 1980 - 1987
Vice-President, 1978 - 1980

Responsible for all multi-divisional technical operations. This included the preparation of all analytical procedure manuals, a review of regulations for the entire corporation, and QA/QC.

AQUALAB, Inc.
General Manager, 1977 - 1980

Accountable for the total performance of the division. This included profitability, business development, customer service, analytical reporting, project and facilities management, and quality assurance. Also included is personnel training, guidance, and evaluation.

AQUALAB, Inc.
Chief Chemist, 1976

Suburban Labs
Analytical Chemist, 1972-76

PROFESSIONAL AFFILIATIONS

AWWA Committee for Standard Methods
Illinois Potable Water Supply Association
Chicago Area Association of Laboratories
American Council of Independent Laboratories

PAPERS AND SPECIAL WORK

"Halogenated Hydrocarbons in a Public Water Supply," prepared for City of Elgin, 1977

"PCB Contamination of Airport Environs following Airplane Accident," prepared for Liquid Waste, Inc., 1977

Pesticide Analysis of Rock River Fish Tissue," prepared for Espey, Huston & Assoc., 1977

"Benthic and Macrophyte Analysis of Various Wisconsin Flora and Fauna," prepared for Dames & Moore, 1977

"Elutriate Analysis of Louisiana River Sediments," prepared for SAI, Inc., 1977

"Analysis of Priority Pollutants by GC/MS using capillary column," for AQUALAB, Inc., 1981

"Quality Assurance Manual" revised for AQUALAB, 1983

"Quality Assurance Manual prepared for AQUALAB, 1977

"Dredging Baseline Analysis," prepared for Corps of Engineers, 1977

"TOC in Rock River Sediments," prepared for Espey Huston & Assoc., 1976

"Acanthocephelon Infestattion of Fresh Water Game Fish from the Mississippi River," 1970

"Analysis of Trace Bismuth and Lead in Nickel Alloy," prepared for Charles Kawin Co., 1976

"Quality Assurance Manual updated for AQUALAB, 1980

"Analytical Procedure Manual" prepared for AQUALAB, Inc., 1982

IRENE R. PLAGGE

VICE-PRESIDENT, FINANCE

Collegiate studies in accounting, budget and finance, interpreting financial statements and personnel.

SPECIAL INTERESTS

Computer Data Management
Budget Preparation
Cash Management
Administrative Management
Credit Policies and Procedures

EXPERIENCE

NET Midwest, Inc. (formerly Aqualab, Inc.)
Vice-President, Finanace; Corporate Secretary, Treasurer
1988 - present

AQUALAB, Inc.
Vice-President, Finance; Corporate Secretary, Treasurer
1987 - 1988

Vice-President, Business Operations, 1985 - 1987

Manages the general accounting and data processing staff. Responsible for the preparation of the organizations financial data including budgets and cash management.

AQUALAB, Inc.
Administrative Manager, 1984-1985

Prepared the company's payrolls for four divisions and the Corporate staff using a computerized system. Recommended improvements in record keeping and systems operations. Maintained personnel records.

AQUALAB, Inc. Bartlett Division
Office Manager, 1978-1984

Responsible for Accounts Receivable, Accounts Payable, Customer Service and reporting of analytical data.

AQUALAB, Inc. Bartlett Division
Secretary 1977-78

DUKANE CORPORATION
Secretary to the Chief Engineer, 1954-1961

PROFESSIONAL AFFILIATIONS

American Council of Independent Laboratories
Associated Management Institute
Bartlett Area Chamber of Commerce
Illinois State Chamber of Commerce

ROBERT N. BUCARO

VICE PRESIDENT AND DIRECTOR OF QUALITY ASSURANCE

B.S., Northern Illinois University, 1974,
Biology Major, Chemistry Minor

SPECIAL INTERESTS

Water Chemistry
Aquatic Ecology
Quality Assurance in Analytical Methods
Laboratory Management

EXPERIENCE

NET Midwest, Inc. (formerly Aqualab, Inc.)
Vice-President, 1988 - present
Director of Quality Assurance, 1985 - present

AQUALAB, Inc.
Vice-President, 1987 - 1988
Director of Quality Assurance, 1985 - 1988

Responsible for the multi-divisional development and implementation of all aspects of AQUALAB's QA/QC efforts. This includes the preparation of all analytical procedure manuals and a review of regulations for the entire corporation.

AQUALAB, Inc. - Bartlett Division
Division Manager, 1980 - 1985

Accountable for the total performance of the division. This included profitability, business development, customer service, analytical reporting, project and facilities management, and quality assurance. Also included was personnel training, guidance, and evaluation.

Hazleton Environmental Sciences
Chemistry Group Leader, 1977 - 1980

Responsible for the technical operations of the chemistry laboratories.

Hazleton Environmental Sciences
Associate Chemist, 1977

Performed analyses in the water chemistry laboratory, including the operation and maintenance of the auto-analyzers.

Suburban Labs
Supervisor, Wet Chemistry Laboratory 1975 - 1977

Responsible for the technical operations of the wet chemistry laboratory.

Analytical Chemist, 1974 - 1975

PROFESSIONAL AFFILIATIONS

Association of Official Analytical Chemists
American Council of Independent Laboratories
American Water Works Association

PAPERS AND SPECIAL WORK

"Lead Content in Orconectes Virilis from the Kishwaukee River," prepared for Northern Illinois University, 1974

"Chemistry Procedures Manual" prepared for Suburban Labs, 1977

"Water Quality of Lake Michigan at the Zion Nuclear Power Station," prepared for Commonwealth Edison, 1977

"Analysis of Hazardous Wastes Using USEPA and ASTM Methods," prepared for Residuals Management Technology, 1980

"Heavy Metal Uptake in Trout," prepared for the Colorado UTE Electric Association, 1980

"Water Quality of the Missouri River at the Cooper Nuclear Power Station," prepared for the Nebraska Public Power District, 1978

"Water Qquality of the Rock River(Michigan),"prepared for Harza Engineering, 1979

"Study of Bacterial Contamination and Dissolved Oxygen Citation Lake," prepared the Citation Lake Homeowners Association, 1979

"Quality Assurance Audit for the City of Lincoln, Nebraska, Wastewater System Laboratory," prepared for the City of Lincoln, Nebraska, 1980

"Quality Assurance Audit of Sanitation Laboratory at the Park District of Chicago," 1982

"Oil Removal from a Drinking Water Source to Part-Per-Trillion Level," prepared for Harza Engineering, 1982

"Method Development for the Analysis of Near-surface Hydrocarbon Soil Gases," prepared for Illinois Crude Oil Productions, 1983

"Quality Control Plan for INAAP Contamination Survey," prepared for Dames & Moore, 1983

"Quality Assurance Project Plan - IEPA Contract Lab Program", prepared for AQUALAB, Inc., 1986

"Explosives Analysis by GC-FID of water & soil at INAAP,"prepared for USATHAMA, 1982

"The Importance of Quality Assurance,"presented to the Illinois Chapter, Government Refuse Collection and Disposal Association, 1982

"Fatty Acids in Industrial Wastewater," prepared for Owens-Illinois, 1983

SCOTT C. GERRICK

VICE PRESIDENT, BUSINESS DEVELOPMENT

College of DuPage, Glen Ellyn, IL
Associate in Science, 1982
University of Wisconsin, College of Engineering
The Department of Engineering Professional Development

SPECIAL INTERESTS

Investigation and Remediation of Sanitary Landfill Sites
Marketing Techniques in Analytical Laboratories
Interaction between the regulated Community and the Political System

EXPERIENCE

NET Midwest, Inc. (formerly Aqualab, Inc.)
Vice President, Business Development, 1988 - Present

Responsible for all marketing and business development within the Midwest Region. This includes guidance, literature, personnel training, trade shows and market research.

AQUALAB, Inc - Bartlett Division
Manager Client Services 1987-1988

Established and maintained marketing and sales program for the Bartlett and Rockford Divisions.

Forest Preserve District of DuPage County
Environmental Control Manager 1984-1987

Responsible for integrating and coordinating a number of dissimilar environmental functions at the Forest Preserve's eight landfills to ensure adherence to county, state and federal environmental laws on FPD land, and oversaw all inspections. Responsible for approving EPA permits for waste disposal, conducting the sampling program on all pre-groundwater monitoring wells(250) and interpreting all data.

Forest Preserve District of DuPage County
Environmental Testing Coordinator, 1978-1984

Suburban Laboratories
Supervisor, 1975-1978

Environmental testing laboratory. Responsible for the scheduling of all sampling and receipt of all samples. This included water, wastewater, waste, air pollution and Industrial Hygiene Testing.

Suburban Laboratories
Lab Technician, 1973-1975

Performed analyses in the water chemistry laboratory.

Richardson Research
Technician, 1972-1973

Performed air, stack, noise, waste and water analysis.

PROFESSIONAL AFFILIATIONS

American Public Works Association-Institute of Solid Wastes
Illinois Department of Agriculture-Certified Public Operator
National Environmental Health Association-Certified Environmental Health Technician
Goverment Refuse Collection Disposal Association
American Public Health Association

MICHAEL K. MCGEE

DIVISION MANAGER - CEDAR FALLS

University of Massachusetts, Amherst, Massachusetts, M.S. 1980;
Public Health and Environmental Health

University of Iowa, Iowa City, Iowa, B.A. 1976;
Biology Major, Phi Beta Kappa

SPECIAL INTERESTS

Industrial Hygiene Audits
Employee Exposure Monitoring
Noise Level Monitoring
Hearing Conservation Programs
Right-to-Know Programs
Evaluation and Control of Workplace Health Risks

EXPERIENCE

NET Midwest, Inc. - (formerly Serco Labs)-Cedar Falls Division
Division Manager, 1988 - present

Serco Labs
Division Manager, 1984 - 1988

Accountable for the total performance of the division. This includes profitability, business development, customer service, analytical reporting, project and facilities management, quality assurance, and maintenance of AIHA Laboratory Accreditation. Also included is personnel training, guidance, and evaluation.

In addition to management responsibilities, provides a broad range of industrial hygiene and safety consulting services.

John Deere Dubuque Works
Industrial Hygienist, 1979 - 1984

Responsible for the development and administration of health and safety programs for a workforce of 5000 employees of a heavy machinery manufacturer.

CERTIFICATION

Certified Industrial Hygienist, Comprehensive Practice

PROFESSIONAL AFFILIATIONS

American Industrial Hygiene Association (AIHA)
American Industrial Hygiene Association, Iowa/Illinois Section
President, 1984
Sectretary-Treasurer, 1982
American Academy of Industrial Hygiene
American Society of Safety Engineers
Iowa Safety Council, President-Elect, 1988
Iowa Safety Council, Vice-President, 1987
Iowa Safety Council, Treasurer, 1986
Board of Directors, 1985 - present
University of Iowa Institute of Agricultural and Preventive Medicine Advisory Council, 1984

PUBLICATIONS

McGee, M. K. and R. K. Oestenstad: "The Effect of the Growth of Facial Hair on Protective Factors for One Model of Closed Circuit Pressure Demand Self-Contained Breathing Apparatus," American Industrial Hygiene Association Journal, 44(7):480-484, 1983.

Moore, G. S., E. J. Calabrese and M.K. McGee: "Health Effects of Monochloramine in Drinking Water," Journal of Environmental Science Health, A15(3):239-258, 1980.

CONTINUING EDUCATION

"Analytical Business Techniques for the Industrial Hygienist" - AIHA Conference/ San Francisco, 1988

"Current Techniques for Asbestos Sampling and Analysis" - AIHA Conference/Montreal, 1987

"Right-to-Know" - University of Minnesota, 1986

"Effective Professional Presentation" - AIHA Conference/ Detroit, 1984

"Heat and Health Performance"- AIHA Conference, 1982

"Advanced Occupational Health" - University of Iowa, 1981

"Advanced Industrial Noise Exposure Monitoring" - AIHA Conference/Montreal, 1987

"Health Hazard Recognition" - Iowa Safety Council, 1986

"Industrial Hygiene Applications of Microcomputers" - AIHA Conference/Las Vegas, 1985

"Local Exhaust Systems Troubleshooting" - AIHA Conference/

"Problems in Preventive Medicine" - Univ. of Iowa, 1982

"Audiometric Technician Training". - Univ. of Michigan 1981

"Occupational Respirator Protection" - NIOSH, 1979

JAIME M. MACEDA

MANAGER - CHICAGO DIVISION

B.S., Mapua Institute of Technology; Manila, Philippines
Bachelor of Science in Chemistry

SPECIAL INTERESTS

Vitamin Chemistry
High Performance Liquid Chromatography

EXPERIENCE

NET Midwest, Inc. (formerly Aqualab, Inc.) - Chicago Division
Division Manager, 1988 - present

AQUALAB, Inc. - Chicago Division
Division Manager, 1986 - 1988

Accountable for the total performance of the division. This includes profitability, business development, customer service, analytical reporting, project and facilities management, and quality assurance. Also included is personnel training, guidance, and evaluation.

AQUALAB, Inc. - Chicago Division
Chief Chemist, 1984 - 1986

ROSNER/RUNYON LABORATORIES, Inc. (purchased by Aqualab, Inc. -1984)
Lab Supervisor, 1978 - 1984

BAY LABORATORIES
Analytical Chemist, April 1978 - Sept. 1978
Pharmaceutical Products

ROSNER-HIXON LABORATORIES
Chemist, April 1970 - March 1978
Commercial Analytical Lab. Food, Feeds, Drugs, etc.

CONSOLIDATED DISTILLED PRODUCTS INC.
Chemist, July 1968 - March 1970
Wine, Cordials and Liquors

MERCURY DRUG COMPANY, INC.
Quality Control Supervisor, January 1965 - May 1968
Drugs and Pharmaceutical Products

PROFESSIONAL AFFILIATIONS

Registered Chemist, Philippines Board of Examiners for Chemists
American Chemical Society
Association of Vitamin Chemists
Gas Chromatography Discussion Group, Chicago Chapter
Association of Official Analytical Chemists
National Feed Ingredients Association

JOSEPH D. SHAFER

MANAGER - INDIANAPOLIS DIVISION

B.A. University of Indianapolis(formerly Indiana Central Univ.)
Indianapolis, Indiana 1972
Chemistry Major, Mathematics Minor

Graduate Studies, Indiana University/Purdue University of Indianapolis

SPECIAL INTERESTS

Investigation and remediation of uncontrolled waste sites
Quality Assurance techniques in analytical laboratories
Certification of analytical laboratories
Interaction between the regulated community and the political system

EXPERIENCE

NET Midwest, Inc. (formerly Aqualab, Inc.)-Indianapolis Division
Division Manager, 1988 - present

AQUALAB, Inc. - Indianapolis Division
Division Manager, 1987 - 1988

Accountable for the total performance of the division. This includes profitability, business development, customer service, analytical reporting, project and facilities management, and quality assurance. Also included is personnel training, guidance, and evaluation. Additionally functioned as sales manager for the division.

Anatech Environmental Services
Vice President, 1985-1987

Responsible for managing the Environmental Services Division of Anatech Inc. This included overseeing the operation of the laboratory, Quality Assurance officer, Government Liason, and Sales Director.

Indiana State Board of Health
Superfund On-Scene Coordinator, Working Group Leader 1984-1985

Oversaw the work of other On-Scene Coordinators while actively functioning in the same capacity. Position included investigating uncontrolled waste sites and

representing the State through the negotiation, plan approvals and eventual site clean-ups.

Indiana State Board of Health
Senior Technical Support Chemist 1981-1984

Supported the Solid and Hazardous Waste groups by inspecting analytical laboratories, reviewing plans and permits, training employees, overseeing sampling and analysis, reviewing pending legislation, interpreting analytical data and investigating complaints.

Indiana State Board of Health
Analytical Chemist 1976-1981

Worked as an analytical bench chemist in the water and sewage laboratory performing analysis on water, wastewater and solid waste.

Best Foods Division of CPC International
Associate Quality Assurance Chemist 1972-1976

Investigated consumer complaints, audited production and tested alternate ingredients. Oversaw production start ups.

PROFESSIONAL AFFILIATIONS

Water Pollution Control Federation
Environmental Quality Control Inc.

PAPERS AND SPECIAL WORK

"Quality Assurance Manual" prepared for Anatech Inc., 1981.

"Laboratory Procedural and Quality Assurance Program Plans" prepared for the Ind. Department of Environmental Management, 1986.

"Longterm Effectiveness of Nitrification Inhibitors on Oxygen Demands in Selective Wastewaters" Prepared for the Indiana State Board of Health, 1978.

WILLIAM H. MOTTASHED III

MANAGER - BARTLETT DIVISION

Harper College, 1976-78

SPECIAL INTERESTS

Water Chemistry
Atomic Absorption Spectrophotometry
Methods Development
Laboratory Management

EXPERIENCE

NET Midwest, Inc. (formerly Aqualab, Inc.) - Bartlett
Division Manager, 1988 - present

AQUALAB, Inc. - Bartlett Division
Division Manager, 1985 - 1988

Accountable for the total performance of the division. This includes profitability, business development, customer service, analytical reporting, project and facilities management, and quality assurance. Also included is personnel training, guidance, and evaluation.

AQUALAB, Inc. - Rockford Division
Division Manager, 1984-1985

Accountable for the total performance of the division. This included profitability, business development, customer service, analytical reporting, project and facilities management, and quality assurance. Also included is personnel training, guidance, and evaluation.

AQUALAB, Inc. - Bartlett Division
Laboratory Supervisor, 1983-1984

Worked directly with the division manager, assisting with various aspects of client services, personnel management, and lab operations. Also served as an analytical back-up in the inorganics laboratories.

AQUALAB, Inc. - Bartlett Division
Atomic Absorption Analyst, 1980-1983

Performed metals analyses using Atomic Absorption Spectroscopy, including all digestions and sample preps.

AQUALAB, Inc. - Bartlett Division
Wastewater Technician, 1978-1980

Responsible for all wastewater analyses and field sampling.

PROFESSIONAL AFFILIATIONS

American Water Works Association
American Chemical Society
American Council of Independent laboratories
American Electroplaters Society

PAPERS AND SPECIAL WORK

"Nephelometric Turbidity and Chlorine Removal by a Prototype Granular Carbon Cartridge", prepared for Brunswick Corp., 1979

"Low Level TOC in Surface Water Samples", prepared for Gulf Coast Laboratory, 1983

"Selective Metals by AA in Groundwater Contaminated with Explosives", prepared for the Indiana Army Ammunition Plant Project, 1983

"Polymeric Removal of Oil & Heavy Metals in Industrial Wastewater," prepared for Fehr, Graham & Associates, 1985

"Effectiveness of a Renewable Cartridge Filter", prepared for Autotrol Corporation, 1979

"Quality Assurance Analyses of Arsenic and Selenium in Groundwater", prepared for AQUALAB, 1982

"Utilization of the Perkin Elmer MHS-10 in the Analyis of Water Samples for Arsenic Mercury and Selenium", prepared for Aqualab Procedure Manual, 1983

"Analysis of Volatile Priority Pollutants by GC/FID", for AQUALAB, Inc., 1984

TONI GARTNER

MANAGER - ROCKFORD DIVISION

M.S.Ed. Northern Illinois University, 1981; B.S. Biological Sciences, Northern Illinois University, 1962, Medical Technologist (ASCP), Swedish-American Hospital, 1963.

PROFESSIONAL CERTIFICATIONS

American Society for Clinical Pathologists-Medical Technologist,045655.
Illinois Department of Public Health and Illinois Environmental Protection Agency Certified Analyst

EXPERIENCE

NET Midwest, Inc. (formerly Aqualab, Inc.) - Rockford Division
Division Manager, 1988 - present

AQUALAB, Inc. - Rockford Division
Division Manager, 1985 - 1988

Accountable for the total performance of the division. This includes profitability, business development, customer service, analytical reporting, project and facilities management, and quality assurance. Also included is personnel training, guidance, and evaluation.

Illinois College of Medicine at Rockford
Biomedical Service Laboratories, 1982 - 1985

Winnebago County Health Dept. 1976-present
Clinical Research Coordinator
Laboratory Consultant/Technologist

Rockford School of Medicine
Laboratory Supervisor,
Division of Infectious Diseases, 1975 - 1982

AQUALAB, Inc.
Microbiology Supervisor, 1974 - 1975

PROFESSIONAL AFFILIATIONS

Illinois Society for Microbiology
American Society for Medical Technology
American Water Works Association

Clinical Laboratory Management Association
American Society for Microbiology
American Council of Independent Laboratories

PAPERS AND SPECIAL WORK

" A Cost Effective Method for Triple Site Culturing for N. Gonorrhea." Journal of Clinical Microbiology, Vol.19 No. 6, June 1984

"In Vitro Activity of Moxalactam Alone and in Combination with Ten Other Selected Antibiotics." International Conference on Antimicrobial Agents and Chemotherapy, 1981

"Synergy of Cefazolin-Tobramycin Against Gram Positive Bacteria" Presented at American Society of Microbiology 78th Annual Meeting, May 1978

"A Comparison of Bacampicillin with Amoxicillin in Treating Genital and Extragenital Gonnorrhea." First STD World Conference, San Juan PR, 1981

Appendix J

TECHNICAL MEMORANDA FOR ROUND 1 AND ROUND 2 DATA VALIDATION FOR DU PONT-EAST CHICAGO FACILITY AND ANALYTICAL DATA SHEETS

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112014

Sample Description: MW-04-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 0950

Date Received: 06-21-90 1120

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112014

Sample Description: MW-04-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 0950

Date Received: 06-21-90 1120

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-25-90

Sample No.: 112013

Sample Description: MW-05-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 1055

Date Received: 06-21-90 1120

Alkalinity, Bicarb.(CaC03)	472.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	472.	mg/L
Chloride	397.	mg/L
Cyanide, Total	<0.002	mg/L
Nitrogen, Ammonia	28.3	mg/L
pH	6.31	units
Phosphate, Total	0.10	mg/L
Solids, Dissolved	8350.	mg/L
Sulfate	4400.	mg/L
Aluminum	0.22	mg/L
Antimony	<0.04	mg/L
Arsenic	0.16	mg/L
Barium	0.039	mg/L
Boron	0.27	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0002	mg/L
Nickel	0.02	mg/L
Zinc	9.75	mg/L

Neal E. Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112013

Sample Description: MW-05-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 1055

Date Received: 06-21-90 1120

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	11.3	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	1.6	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	30.7	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	2.8	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

Appendix J Contents

- Technical Memorandum: Phase II Groundwater Assessment, Du Pont East Chicago Plant, Round No. 1 Data Review
- Technical Memorandum: Data Validation for Du Pont-East Chicago Round 2 Sample Data
- Round 1 Laboratory Analytical Reports
- Round 2 Laboratory Analytical Reports

TECHNICAL MEMORANDUM

CH2M HILL

TO: Project File

FROM: Chris Ohland/GLO

DATE: September 24, 1990

SUBJECT: Phase II Groundwater Assessment
Du Pont East Chicago Plant
Round No. 1 Data Review

PROJECT: CHI28770.A0.MN

INTRODUCTION

This technical memorandum describes the review of Round No. 1 laboratory data generated during the investigation of groundwater and surface water quality at the Du Pont East Chicago Plant. This data review is an assessment of the laboratory data for its compliance to stated quality assurance (QA) and quality control (QC) goals.

The Quality Assurance Project Plan (QAPP) identifies the specific QA/QC measures needed to provide data of known and documentable quality. In summary, these measures include: holding time limitations, blanks, instrument performance (tuning and calibration), matrix variables (surrogate recovery, spike recovery, and duplicates), overall system performance, and reporting format.

All Round No. 1 analytical data were produced at National Environmental Laboratories Midwest (NET) of Bartlett, Illinois using procedures consistent with the Contract Laboratory Program and U.S. EPA SW-846 methodologies. Data QA/QC packages received from NET contained summaries of QA/QC measures by test method. Some of these packages contained detailed information, others contained only summary information.

The level of information provided affected the type of review provided by CH2M HILL and described herein. Where sufficient documentation was provided by NET the data were reviewed and validated in accordance to the Functional Guidelines for Evaluation Organic Analyses, U.S. EPA (February 1988). Validation is an assessment of the laboratory data in terms of the data quality objectives described in the QAPP.

Data evaluation, which assesses the data in terms of the project objectives was not included in this task.

Test methods can be generally categorized into four analytical groups used to measure the requested water quality parameters: Volatile organic analyses (VOAs), semi-volatile organic analyses (SVOAs), PCBs analyses, inorganic analyses and non-metallic inorganic analyses or conventionals.

SEMI-VOLATILE ORGANICS

The laboratory provided results from their laboratory spike blank for assessment of recovery. No matrix spike analyses were performed on samples collected at the East Chicago site. Bias caused by sample matrix cannot be addressed from these data.

NET's instrument tuning and calibration summaries, surrogate recoveries, method blanks, and blank spikes were reviewed by CH2M HILL. Except for the following deficiencies, the results appear to be acceptable:

- No method blank or laboratory spike samples were analyzed with field samples MW-3, MW-6, MW-5, MW-4, MW-12, MW-13, MW-14D, MW-15, MW-16, and MW-19. Except for sample MW-13, no sample contained any of the target compound list (TCL) parameters and therefore no qualification of the data was applied to the results.

- Sample MW-13 showed unacceptable surrogate recoveries after two attempts to re-analyze. No attempt to re-extract and re-analyze was demonstrated and the uncertainty of the analytical results is unusually high. The results for this analysis should not be used without qualification. Because phenol was reported in the sample MW-13 will be reassessed during Round 2.

VOLATILE ORGANIC ANALYSES

The laboratory's reported detection limits are lower than those typically reported by laboratories using the same methods. A more typical and realistic approach is to report quantification limits above the method detection limits.

Other concerns identified are:

- Samples MW-2, MW-7, MW-8, MW-20, and FB-1 were analyzed within an analytical QC batch associated with a method blank that contained unacceptable levels of carbon disulfide and chloroform. The level in the blank does not however account for all that is present in the sample. Because the uncertainty of the source of the blank contamination, the results for these samples are suspect and will be checked during Round 2.

- The analysis of sample MW-20 appeared to have been preceded by analysis of a sample containing high levels of VOCs. The levels reported for MW-20 may be affected by carryover in the chromatography. These results for MW-20 are suspect and will be checked during Round 2.

- Samples MW-2, MW-7, MW-8, MW-20, and FB-1 were analyzed within a few days of the acceptable limit for holding times. This delay may

have resulted in a loss of sample VOCs. The detection limits in these samples may have a low bias.

- Samples MW-9, MW-6, FB-2, TB-1, MW-1, MW-11, MW-11D, MW-10, and MW-18 (analyzed within a QC batch) were analyzed just before or after exceeding the holding time requirement. Non-detected parameters may have been present in higher levels of concentration at time of collection. The detection limit in these sample were estimated and may have a low bias.

- The presence of xylene in sample MW-9 can be attributed to blank contamination. The other parameters which were found in samples analyzed in this QC batch are bromodicholoromethane, carbon disulfide, chloroform, toluene, and 1,1,1-trichloroethane. Because of the inconsistencies presented in the VOA data the presence of these parameters should be supported with subsequent analytical results.

- Samples MW-4 and MW-15 were analyzed within a QC batch with a method blank that contained toluene and methylene chloride at concentration levels sufficient to affect the levels reported in the samples. The only other parameters which were found in these samples were bromodichloromethane, dibromochloromethane, carbon disulfide, chloroform, and toluene. The concentration of carbon disulfide is significantly higher than would we expected from contamination within this QC set.

POLYCHLORINATED BIPHENYLS

No raw data or QC summaries for the polychlorinated biphenyls parameters were available for review.

METALS AND CONVENTIONALS

No raw data or raw data summaries for the metals and conventional parameters except for recovery information for laboratory control samples, were available for review. The metals and conventional test methods were assessed through personal communication with the Laboratory QA supervisor (Ray Kalicki, August 30, 1990) at NET—Bartlett.

As part of the NET's laboratory QA/QC program specific QC measures are taken and evaluated against control criteria. These measures include instrument calibration and calibration checks, blanks, duplicates, laboratory control samples, and blank spikes (if applicable).

CH2M HILL's samples were not analyzed unless certain instrument conditions were met. In other circumstances, the samples may have been reanalyzed depending upon the QC measure that had been exceeded.

Unlike the QC measures taken for organic analyses where a subset of indicator parameters are extrapolated to the range of parameters tested, metal and conventional test generally have parameter specific QC measures. Based on the information provided, it is reasonable to assume that the laboratory performed all the necessary QC measures and followed all corrective action when necessary and has provided data that meets the data quality objectives of this project.

CHI184/027.51

TECHNICAL MEMORANDUM

CH2M HILL

TO: Pixie Newman/CHI

FROM: Dan MacGregor/GLO

DATE: October 22, 1990

SUBJECT: Data Validation for Du Pont-East Chicago Round 2 Sample Data

PROJECT: CHI28770.A0.MN

INTRODUCTION: This technical memorandum summarizes data validation for Round 2 laboratory data for the Du Pont-East Chicago Phase II Groundwater Assessment. This data validation was a technical review of the three data packages (Volatiles, Base/Neutral/Acids, and Inorganics) submitted by NET laboratories. The purpose of the review was to assess the quality of the analytical data. The data was found acceptable with the qualifiers noted below.

VOLATILE DATA VALIDATION: Field samples MW-01-02 through MW-15-02, MW-18-02 through MW-20-02, and SW-01-02 through SW-03-02 were analyzed for volatile parameters.

Holding times: All samples were analyzed within 14 days of sampling, thus all holding time requirements were met.

Instrument tune requirements: Samples were analyzed on 9/19, 21, 22, 23, 25, and 26/90. On each of these days, the Gas Chromatograph/Mass Spectrometer (GC/MS) was successfully evaluated with bromofluoromethane against tune requirements.

Initial and continuing calibration: Due to an imperfection in the GC/MS software every time an initial calibration was updated, it's date of calibration also got updated. This caused come confusion as to which continuing calibration data went with what initial calibration data. With this clarification from NET laboratories, the calibration data were inspected and all calibration data were found to be acceptable.

Blanks: Both field blanks and both trip blanks contained no contaminating compounds above reporting limits. All lab blanks showed concentrations of methylene chloride. Instrument F, 9/26/90 data, had the high methylene chloride concentration at 43.67 μg/l. The majority of lab blanks also showed residues of acetone, typically in the 5 μg/l range. Other lab blank contaminates were 2-butanone, tetrahydrofuran, chloromethane, and tetrachloroethene. No samples contained any of these blank contaminating compounds.

Surrogate recoveries: Surrogate recoveries were inspected and were found to be acceptable.

Internal standards: No data were provided for internal standard review.

Matrix spike/matrix spike duplicate (MS/MSD): The MS/MSD data were generated from deionized water (DI water), not from field subsamples, thus these data do not provide an accurate measure of accuracy and precision for the analytical method in regards to the field samples. The DI water MS/MSD data were acceptable except for a 1,1-diclhoroethene fortification that only had a 60% percent recovery (the lower control limit for 1,1-dichloroethane is 61%). No qualifiers were added as a result of the MS/MSD data.

Field duplicates: Field duplicates were taken and analyzed for samples MW-03, MW-13, and MW-20. All three samples showed similar results. A full assessment of these samples could be made if spectra and quantitation sheets were obtained.

Sample completeness: Six of the 21 samples contained positive results. Samples MW-04-02, SW-01, SW-02, and SW-03-02 all had chloroform residues at 1.0, 1.2, 1.0, and 1.2 μg/l respectively. Sample MW-05-02 had 1,1-dichloroethane at 2.4 μg/l and 1,2-dichloroethane at 44.7 μg/l. The 1,2-dichloroethane result was flagged as estimated due to poor calibration of this compound. Sample MW-20-02 had 1,1-dichloroethane at 6.7 μg/l and 1,1,1-trichloroethane at 1.3 μg/l. All samples were checked for the number of positive hits and the magnitude of these hits. Sample calculations, dilutions, preparation, retention times, and spectra could be reviewed in the future if this information were obtained.

BASE/NEUTRAL/ACID DATA VALIDATION (BNAs): Field samples MW-01-02 through MW-15-02, MW-19-02, MW-20-02, and SW-01-02 through SW-03-02 were analyzed for BNAs. These samples were reviewed as outlined below.

Holding times: Due to insufficient sample data, it was not possible to determine if the 7-day extraction hold time was meet or not. Hold data were evaluated for the analysis holding time, all samples were analyzed within 40 days of sampling, thus meeting this requirement.

Instrument tune requirements: Samples were analyzed on 9/19, 20, 22, 24, 25, 26, and 27/90. On each of these days the GC/MS was successfully evaluated with decafluorotriphenylphosphine against tune requirements.

Initial and continuing calibration: Initial and continuing calibration data were validated and all were found to be acceptable.

Blanks: Neither field blanks contained any contaminating compounds above the reporting limit. Both lab blanks contained one or two low level compounds. Phenol was found in one lab blank at 3.8 μg/l, and bis(2-ethylhexyl)phthalate (1.43 μg/l), and di-n-butylphthalate (5.29 μg/l), were found in the other lab blank. MW-13-02 samples contained concentrations of phenol, and the MW-14-02 sample and one of two of the MW-20-02 samples contained concentrations of bis(2-ethylhexyl)phthalate, but they were in excess of 10 times the blank contamination concentrations, thus, no qualifiers were added.

Surrogate recoveries: Surrogate recoveries were inspected and all were found to be acceptable.

Internal standards: No data were provided for internal standard review.

Matrix spike/matrix spike duplicate (MS/MSD): The MS/MSD data were generated from deionized water (DI water), not from field subsamples, thus these data do not provide an accurate measure of accuracy and precision for the analytical method in regards to the field samples. The DI water MS/MSD data were acceptable. No qualifiers were added as a result of the MS/MSD data.

Field duplicates: Field duplicates were taken and analyzed for samples MW-03, MW-13, and MW-20. All three samples showed similar results. A full assessment of these samples could be made if spectra and quantitation sheets are obtained.

Sample completeness: Only two samples had any compounds detected above the detection limit. Sample MW-13-02, and its duplicate FRMW-13-02, both contained phenol at approximately 200 μg/l. The corresponding lab blank was phenol contamination but only at a concentration of 3.8 μg/l which was 10 times less than the sample value, thus no qualifier was added to the sample data. Sample MW-14-02 contained bis(2-ethylhexyl)phthalate at 15 μg/l again the corresponding lab blank was contamination with this compound, but again its concentration value of 1.43 μg/l was 10 times less than the sample value thus, no qualifier was added.

INORGANIC DATA VALIDATION: Field samples MW-01-02 through MW-20-02, and SW-01-02 through SW-03-02 were analyzed for inorganics. These samples were reviewed as outlined below.

Holding times: The 14-day holding time for cyanide was exceeded by 1 day for samples MW-02-02, SW-01-02, and SW-03-02. The cyanide results for these samples were flagged as estimated (UJ or J). All other samples met holding time requirements.

Instrument calibration: All calibrations were acceptable for all samples. There were some calculation errors but the difference was typically only a few percentage points, never moving a sample outside the acceptable criteria range.

Blanks: There were many low level contaminating compounds in the field blank samples, but all levels were significantly lower (at least an order of magnitude) than sample concentrations. No data were provided for laboratory blanks. No qualifiers were added as a result of blank contamination.

Lab control spikes/external standards: Several recoveries were outside accepted control limits, these are listed below:

- Alkalinity recoveries for samples MW-03-02 and MW-6-02 were greater than the acceptable limit.
- Cadmium recoveries for samples MW-10-02 and MW-14-02 were greater than the acceptable limit.
- Iron recoveries for samples MW-10-02 and MW-14-02 were greater than the acceptable limit.
- Manganese recoveries for samples MW-10-02 and MW-14-02 were greater than the acceptable limit.
- Lead recoveries were less than the acceptable limit for samples MW-2-02, MW-10-02, MW-13-02, MW-14-02, SW-01-02, and ME-03-02.

Any positive sample results for these compounds in these samples were flagged as estimated (J), and negative results for these compounds were also flagged as estimated (UJ).

Field duplicates: Field duplicates were taken and analyzed for samples MW-03-02, MW-13-02, and MW-20-02. All three samples showed similar results. The original sample MW-3-02 had a potassium value of 6.26 mg/l and the duplicate had a value of 59.8 mg/l. This possible dilution error was brought to the laboratory's attention. After verifying that the error had occurred, the duplicate sample report was corrected. The original carbonate alkalinity value for MW-20-02 was less than 1 mg/l, and the duplicate had a value of 60 mg/l.

Matrix spike/matrix spike duplicate (MS/MSD): The MS/MSD recovery and replication data were generally very good. Total kjeldahl nitrogen was greater than acceptable limits for samples MW-12-02, MW-16-02, and MW-17-02. Total phosphate was greater than the acceptable limits for MW-04-02, MW-09-02, and MW-12-02. Positive results for these compounds in these samples were flagged as estimated (J).

ROUND 1

LABORATORY ANALYTICAL REPORTS

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112164

Sample Description: MW-01-01
GL021838.C0.07

Date Taken: 06-20-90 1610

Date Received: 06-22-90 1030

Alkalinity, Bicarb.(CaC03)	100.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	100.	mg/L
Chloride	18.	mg/L
Cyanide, Total	<0.002	mg/L
Nitrogen, Ammonia	1.3	mg/L
pH	6.63	units
Phosphate, Total	0.04	mg/L
Solids, Dissolved	2360.	mg/L
Sulfate	1570.	mg/L
Aluminum	<0.01	mg/L
Antimony	0.07	mg/L
Arsenic	0.15	mg/L
Barium	0.023	mg/L
Boron	0.17	mg/L
Cadmium	0.013	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	<0.01	mg/L
Zinc	1.59	mg/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112164

Sample Description: MW-01-01
GL021838.C0.07

Date Taken: 06-20-90 1610

Date Received: 06-22-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	12.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112164

Sample Description: MW-01-01
GL021838.C0.07

Date Taken: 06-20-90 1610

Date Received: 06-22-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

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310 West Wisconsin Ave
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07-20-90

Sample No.: 112164

Sample Description: MW-01-01
GL021838.C0.07

Date Taken: 06-20-90 1610

Date Received: 06-22-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112072

Sample Description: MW-02-01
GL021838.C0.07

Date Taken: 06-20-90 1050

Date Received: 06-22-90 1330

Alkalinity, Bicarb.(CaC03)	168.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	168.	mg/L
Chloride	18.	mg/L
Cyanide, Total	<0.002	mg/L
Nitrogen, Ammonia	9.46	mg/L
pH	6.32	units
Phosphate, Total	0.69	mg/L
Solids, Dissolved	2500.	mg/L
Sulfate	1660.	mg/L
Aluminum	<0.01	mg/L
Antimony	<0.04	mg/L
Arsenic	0.05	mg/L
Barium	0.015	mg/L
Boron	0.24	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	<0.01	mg/L
Zinc	0.031	mg/L

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310 West Wisconsin Ave
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07-20-90

Sample No.: 112072

Sample Description: MW-02-01
GL021838.C0.07

Date Taken: 06-20-90 1050

Date Received: 06-22-90 1330

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	34.9	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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07-20-90

Sample No.: 112072

Sample Description: MW-02-01
GL021838.C0.07

Date Taken: 06-20-90 1050

Date Received: 06-22-90 1330

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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07-20-90

Sample No.: 112072

Sample Description: MW-02-01
GL021838.C0.07

Date Taken: 06-20-90 1050

Date Received: 06-22-90 1330

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112164

Sample Description: MW-01-01
GL021838.C0.07

Date Taken: 06-20-90 1610

Date Received: 06-22-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

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Project Manager

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07-20-90

Sample No.: 112164

Sample Description: MW-01-01
GL021838.C0.07

Date Taken: 06-20-90 1610

Date Received: 06-22-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112072

Sample Description: MW-02-01
GL021838.C0.07

Date Taken: 06-20-90 1050

Date Received: 06-22-90 1330

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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Milwaukee WI 53201

07-20-90

Sample No.: 112072

Sample Description: MW-02-01
GL021838.C0.07

Date Taken: 06-20-90 1050

Date Received: 06-22-90 1330

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112002

Sample Description: MW-03-01
GL021838.C0.07

Date Taken: 06-19-90 1629

Date Received: 06-21-90 1030

Alkalinity, Bicarb.(CaC03)	260.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	260.	mg/L
Chloride	35.	mg/L
Cyanide, Total	<0.002	mg/L
Nitrogen, Ammonia	2.55	mg/L
pH	6.86	units
Phosphate, Total	1.35	mg/L
Solids, Dissolved	1250.	mg/L
Sulfate	610.	mg/L
Aluminum	<0.01	mg/L
Antimony	<0.04	mg/L
Arsenic	0.4	mg/L
Barium	0.093	mg/L
Boron	0.29	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	<0.01	mg/L
Zinc	0.087	mg/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112002

Sample Description: MW-03-01
GL021838.C0.07

Date Taken: 06-19-90 1629

Date Received: 06-21-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	16.6	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

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CH2M HILL
310 West Wisconsin Ave
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Milwaukee WI 53201

07-20-90

Sample No.: 112002

Sample Description: MW-03-01
GL021838.C0.07

Date Taken: 06-19-90 1629

Date Received: 06-21-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

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07-20-90

Sample No.: 112002

Sample Description: MW-03-01
GL021838.C0.07

Date Taken: 06-19-90 1629

Date Received: 06-21-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112002

Sample Description: MW-03-01
GL021838.C0.07

Date Taken: 06-19-90 1629

Date Received: 06-21-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112002

Sample Description: MW-03-01
GL021838.C0.07

Date Taken: 06-19-90 1629

Date Received: 06-21-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E Cleghorn

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Bartlett Division
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Bartlett, IL 60103

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112014

Sample Description: MW-04-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 0950

Date Received: 06-21-90 1120

Alkalinity, Bicarb.(CaC03)	152.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	152.	mg/L
Chloride	46.	mg/L
Cyanide, Total	<0.002	mg/L
Nitrogen, Ammonia	6.40	mg/L
pH	6.93	units
Phosphate, Total	0.03	mg/L
Solids, Dissolved	1710.	mg/L
Sulfate	1300.	mg/L
Aluminum	0.06	mg/L
Antimony	<0.04	mg/L
Arsenic	0.005	mg/L
Barium	0.025	mg/L
Boron	0.34	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	<0.01	mg/L
Zinc	0.309	mg/L

Neal E Cleghorn

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Project Manager

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Bartlett Division
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112014

Sample Description: MW-04-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 0950

Date Received: 06-21-90 1120

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	50.4	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	6.3	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	4.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	5.3	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	1.5	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

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07-20-90

Sample No.: 112014

Sample Description: MW-04-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 0950

Date Received: 06-21-90 1120

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

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07-20-90

Sample No.: 112014

Sample Description: MW-04-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 0950

Date Received: 06-21-90 1120

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112013

Sample Description: MW-05-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 1055

Date Received: 06-21-90 1120

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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07-20-90

Sample No.: 112013

Sample Description: MW-05-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 1055

Date Received: 06-21-90 1120

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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ANALYTICAL REPORT

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CH2M HILL
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Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112013

Sample Description: MW-05-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 1055

Date Received: 06-21-90 1120

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

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Milwaukee WI 53201

07-20-90

Sample No.: 112013

Sample Description: MW-05-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 1055

Date Received: 06-21-90 1120

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112161

Sample Description: MW-06-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 0845

Date Received: 06-22-90 1030

Alkalinity, Bicarb.(CaC03)	774.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	774.	mg/L
Chloride	17,000.	mg/L
Cyanide, Total	<0.002	mg/L
Nitrogen, Ammonia	10.	mg/L
pH	5.39	units
Phosphate, Total	<0.03	mg/L
Solids, Dissolved	30,600.	mg/L
Sulfate	90.	mg/L
Aluminum	0.20	mg/L
Antimony	<0.04	mg/L
Arsenic	0.008	mg/L
Barium	1.39	mg/L
Boron	8.04	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	<0.01	mg/L
Zinc	0.074	mg/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112161

Sample Description: MW-06-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 0845

Date Received: 06-22-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
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07-20-90

Sample No.: 112161

Sample Description: MW-06-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 0845

Date Received: 06-22-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E Cleghorn

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07-20-90

Sample No.: 112161

Sample Description: MW-06-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 0845

Date Received: 06-22-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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07-20-90

Sample No.: 112161

Sample Description: MW-06-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 0845

Date Received: 06-22-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112161

Sample Description: MW-06-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 0845

Date Received: 06-22-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112191

Sample Description: MW-07-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 1030

Date Received: 06-22-90 1030

Alkalinity, Bicarb.(CaC03)	170.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	170.	mg/L
Chloride	106.	mg/L
Cyanide, Total	<0.001	mg/L
Nitrogen, Ammonia	0.91	mg/L
pH	6.82	units
Phosphate, Total	<0.03	mg/L
Solids, Dissolved	1050.	mg/L
Sulfate	360.	mg/L
Aluminum	<0.01	mg/L
Antimony	<0.04	mg/L
Arsenic	0.002	mg/L
Barium	0.055	mg/L
Boron	0.29	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	<0.01	mg/L
Zinc	<0.005	mg/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112191

Sample Description: MW-07-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 1030

Date Received: 06-22-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	14.2	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

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Project Manager

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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
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Milwaukee WI 53201

07-20-90

Sample No.: 112191

Sample Description: MW-07-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 1030

Date Received: 06-22-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112191

Sample Description: MW-07-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 1030

Date Received: 06-22-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112191

Sample Description: MW-07-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 1030

Date Received: 06-22-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112191

Sample Description: MW-07-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 1030

Date Received: 06-22-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112192

Sample Description: MW-08-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 1130

Date Received: 06-22-90 1030

Alkalinity, Bicarb.(CaC03)	258.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	258.	mg/L
Chloride	131.	mg/L
Cyanide, Total	0.006	mg/L
Nitrogen, Ammonia	1.25	mg/L
pH	6.46	units
Phosphate, Total	0.81	mg/L
Solids, Dissolved	2290.	mg/L
Sulfate	1200.	mg/L
Aluminum	<0.01	mg/L
Antimony	0.07	mg/L
Arsenic	0.018	mg/L
Barium	0.043	mg/L
Boron	0.64	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	<0.01	mg/L
Zinc	<0.005	mg/L

Neal E. Clegghorn
Project Manager

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112192

Sample Description: MW-08-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 1130

Date Received: 06-22-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	27.5	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112192

Sample Description: MW-08-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 1130

Date Received: 06-22-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112192

Sample Description: MW-08-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 1130

Date Received: 06-22-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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NET Midwest, Inc.
Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112192

Sample Description: MW-08-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 1130

Date Received: 06-22-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112192

Sample Description: MW-08-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 1130

Date Received: 06-22-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Clegg
Project Manager

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112160

Sample Description: MW-09-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-20-90 1630

Date Received: 06-22-90 1030

Alkalinity, Bicarb.(CaC03)	160.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	160.	mg/L
Chloride	750.	mg/L
Cyanide, Total	<0.002	mg/L
Nitrogen, Ammonia	19.	mg/L
pH	6.20	units
Phosphate, Total	1.5	mg/L
Solids, Dissolved	4450.	mg/L
Sulfate	2140.	mg/L
Aluminum	<0.01	mg/L
Antimony	<0.04	mg/L
Arsenic	<0.01	mg/L
Barium	0.029	mg/L
Boron	1.42	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.006	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	0.02	mg/L
Zinc	10.5	mg/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112160

Sample Description: MW-09-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-20-90 1630

Date Received: 06-22-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	1.7	ug/L
1,1,1-Trichloroethane	2.1	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	8.6	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
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07-20-90

Sample No.: 112160

Sample Description: MW-09-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-20-90 1630

Date Received: 06-22-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	1.7	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

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07-20-90

Sample No.: 112160

Sample Description: MW-09-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-20-90 1630

Date Received: 06-22-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112167

Sample Description: MW-10-01
GL021838.C0.07

Date Taken: 06-20-90

Date Received: 06-22-90 1030

Alkalinity, Bicarb.(CaC03)	196.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	196.	mg/L
Chloride	108.	mg/L
Cyanide, Total	<0.001	mg/L
Nitrogen, Ammonia	5.9	mg/L
pH	6.33	units
Phosphate, Total	2.9	mg/L
Solids, Dissolved	3010.	mg/L
Sulfate	1810.	mg/L
Aluminum	<0.01	mg/L
Antimony	0.05	mg/L
Arsenic	0.4	mg/L
Barium	0.127	mg/L
Boron	0.25	mg/L
Cadmium	0.011	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	<0.01	mg/L
Zinc	0.049	mg/L

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07-20-90

Sample No.: 112167

Sample Description: MW-10-01
GL021838.C0.07

Date Taken: 06-20-90

Date Received: 06-22-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

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07-20-90

Sample No.: 112167

Sample Description: MW-10-01
GL021838.C0.07

Date Taken: 06-20-90

Date Received: 06-22-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

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07-20-90

Sample No.: 112167

Sample Description: MW-10-01
GL021838.C0.07

Date Taken: 06-20-90

Date Received: 06-22-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112160

Sample Description: MW-09-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-20-90 1630

Date Received: 06-22-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112160

Sample Description: MW-09-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-20-90 1630

Date Received: 06-22-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E Cleghorn

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112167

Sample Description: MW-10-01
GL021838.C0.07

Date Taken: 06-20-90

Date Received: 06-22-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

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07-20-90

Sample No.: 112167

Sample Description: MW-10-01
GL021838.C0.07

Date Taken: 06-20-90

Date Received: 06-22-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112165

Sample Description: MW-11-01
GL021838.C0.07

Date Taken: 06-20-90 1540

Date Received: 06-22-90 1030

Alkalinity, Bicarb.(CaC03)	104.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	104.	mg/L
Chloride	56.	mg/L
Cyanide, Total	<0.001	mg/L
Nitrogen, Ammonia	1.3	mg/L
pH	6.68	units
Phosphate, Total	<0.03	mg/L
Solids, Dissolved	2070.	mg/L
Sulfate	1270.	mg/L
Aluminum	<0.01	mg/L
Antimony	<0.04	mg/L
Arsenic	0.010	mg/L
Barium	0.028	mg/L
Boron	0.33	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	0.01	mg/L
Zinc	5.67	mg/L

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Project Manager

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ANALYTICAL REPORT

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Milwaukee WI 53201

07-20-90

Sample No.: 112165

Sample Description: MW-11-01
GL021838.C0.07

Date Taken: 06-20-90 1540

Date Received: 06-22-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	2.3	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	1.1	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

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07-20-90

Sample No.: 112165

Sample Description: MW-11-01
GL021838.C0.07

Date Taken: 06-20-90 1540

Date Received: 06-22-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
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Milwaukee WI 53201

07-20-90

Sample No.: 112165

Sample Description: MW-11-01
GL021838.C0.07

Date Taken: 06-20-90 1540

Date Received: 06-22-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112165

Sample Description: MW-11-01
GL021838.C0.07

Date Taken: 06-20-90 1540

Date Received: 06-22-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112165

Sample Description: MW-11-01
GL021838.C0.07

Date Taken: 06-20-90 1540

Date Received: 06-22-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112166

Sample Description: MW-11-02
GL021838.C0.07

Date Taken: 06-20-90 1540

Date Received: 06-22-90 1030

Alkalinity, Bicarb.(CaC03)	144.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	144.	mg/L
Chloride	53.	mg/L
Cyanide, Total	0.006	mg/L
Nitrogen, Ammonia	0.5	mg/L
pH	6.69	units
Phosphate, Total	<0.03	mg/L
Solids, Dissolved	2040.	mg/L
Sulfate	1010.	mg/L
Aluminum	<0.01	mg/L
Antimony	0.06	mg/L
Arsenic	0.010	mg/L
Barium	0.028	mg/L
Boron	0.35	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	0.01	mg/L
Zinc	5.02	mg/L

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07-20-90

Sample No.: 112166

Sample Description: MW-11-02
GL021838.C0.07

Date Taken: 06-20-90 1540

Date Received: 06-22-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	2.0	ug/L
1,1,1-Trichloroethane	5.3	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	16.8	ug/L
Bromodichloromethane	1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	22.7	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

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07-20-90

Sample No.: 112166

Sample Description: MW-11-02
GL021838.C0.07

Date Taken: 06-20-90 1540

Date Received: 06-22-90 1030

Tetrachloroethene	112.	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	2.9	ug/L
meta & para-Xylene	11.7	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	2.6	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

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07-20-90

Sample No.: 112166

Sample Description: MW-11-02
GL021838.C0.07

Date Taken: 06-20-90 1540

Date Received: 06-22-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

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Milwaukee WI 53201

07-20-90

Sample No.: 112166

Sample Description: MW-11-02
GL021838.C0.07

Date Taken: 06-20-90 1540

Date Received: 06-22-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

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07-20-90

Sample No.: 112166

Sample Description: MW-11-02
GL021838.C0.07

Date Taken: 06-20-90 1540

Date Received: 06-22-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
Project Manager

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NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112001

Sample Description: MW-12-01
GL021838.C0.07

Date Taken: 06-19-90 1540

Date Received: 06-21-90 1030

Alkalinity, Bicarb.(CaC03)	212.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	212.	mg/L
Chloride	109.	mg/L
Cyanide, Total	<0.002	mg/L
Nitrogen, Ammonia	3.06	mg/L
pH	6.85	units
Phosphate, Total	0.15	mg/L
Solids, Dissolved	880.	mg/L
Sulfate	270.	mg/L
Aluminum	<0.01	mg/L
Antimony	<0.04	mg/L
Arsenic	0.011	mg/L
Barium	0.071	mg/L
Boron	0.25	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	0.02	mg/L
Zinc	0.246	mg/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112001

Sample Description: MW-12-01
GL021838.C0.07

Date Taken: 06-19-90 1540

Date Received: 06-21-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	4.5	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	2.5	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	1.1	ug/L
2-Hexanone	<10.	ug/L

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07-20-90

Sample No.: 112001

Sample Description: MW-12-01
GL021838.C0.07

Date Taken: 06-19-90 1540

Date Received: 06-21-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

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07-20-90

Sample No.: 112001

Sample Description: MW-12-01
GL021838.C0.07

Date Taken: 06-19-90 1540

Date Received: 06-21-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

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07-20-90

Sample No.: 112001

Sample Description: MW-12-01
GL021838.C0.07

Date Taken: 06-19-90 1540

Date Received: 06-21-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

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07-20-90

Sample No.: 112001

Sample Description: MW-12-01
GL021838.C0.07

Date Taken: 06-19-90 1540

Date Received: 06-21-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
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850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

CORRECTED REPORT

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

09-17-90

Sample No.: 111852

Sample Description: MW-13-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 @420

Date Received: 06-19-90 1220

Alkalinity, Bicarb.(CaC03)	<1.	mg/L
Alkalinity, Carb. (CaC03)	4800.	mg/L
Alkalinity, Total (CaC03)	6600.	mg/L
Chloride	40.	mg/L
Cyanide, Total	<0.001	mg/L
Nitrogen, Ammonia	39.3	mg/L
pH	11.33	units
Phosphate, Total	6.1	mg/L
Solids, Dissolved	9940.	mg/L
Sulfate	80.	mg/L
Aluminum	18.0	mg/L
Antimony	<0.04	mg/L
Arsenic	0.14	mg/L
Barium	0.159	mg/L
Boron	0.67	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.3	mg/L
Chromium, Total	0.022	mg/L
Copper	0.10	mg/L
Lead	0.28	mg/L
Mercury	0.0004	mg/L
Nickel	0.03	mg/L
Zinc	0.230	mg/L

T. Gartner

Toni Gartner
Division Manager

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09-17-90

Sample No.: 111852

Sample Description: MW-13-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 @420

Date Received: 06-19-90 1220

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

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09-17-90

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Date Taken: 06-18-90 @420

Date Received: 06-19-90 1220

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

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09-17-90

Sample No.: 111852

Sample Description: MW-13-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 @420

Date Received: 06-19-90 1220

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

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09-17-90

Sample No.: 111852

Sample Description: MW-13-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 @420

Date Received: 06-19-90 1220

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

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09-17-90

Sample No.: 111852

Sample Description: MW-13-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 @420

Date Received: 06-19-90 1220

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	55.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L
PCB's		
PCB-1016	<1.0	ug/L
PCB-1221	<1.0	ug/L
PCB-1232	<1.0	ug/L
PCB-1242	<1.0	ug/L
PCB-1248	<1.0	ug/L
PCB-1254	<1.0	ug/L
PCB-1260	<1.0	ug/L

T. Gartner

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111853

Sample Description: MW-14-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1400

Date Received: 06-19-90 1220

Alkalinity, Bicarb.(CaC03)	160.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	160.	mg/L
Chloride	700.	mg/L
Cyanide, Total	<0.001	mg/L
Nitrogen, Ammonia	23.6	mg/L
pH	6.30	units
Phosphate, Total	0.09	mg/L
Solids, Dissolved	3590.	mg/L
Sulfate	1400.	mg/L
Aluminum	0.15	mg/L
Antimony	<0.04	mg/L
Arsenic	0.010	mg/L
Barium	0.020	mg/L
Boron	0.20	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	0.01	mg/L
Zinc	3.345	mg/L

Neal E. Cleghorn
Project Manager

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07-20-90

Sample No.: 111853

Sample Description: MW-14-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1400

Date Received: 06-19-90 1220

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
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07-20-90

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GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1400

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Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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Sample No.: 111853

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GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1400

Date Received: 06-19-90 1220

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
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Date Taken: 06-18-90 1400

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N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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07-20-90

Sample No.: 111853

Sample Description: MW-14-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1400

Date Received: 06-19-90 1220

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L
PCB's		
PCB-1016	<1.0	ug/L
PCB-1221	<1.0	ug/L
PCB-1232	<1.0	ug/L
PCB-1242	<1.0	ug/L
PCB-1248	<1.0	ug/L
PCB-1254	<1.0	ug/L
PCB-1260	<1.0	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111854

Sample Description: MW-14-02
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1400

Date Received: 06-19-90 1220

Alkalinity, Bicarb.(CaC03)	160.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	160.	mg/L
Chloride	730.	mg/L
Cyanide, Total	<0.001	mg/L
Nitrogen, Ammonia	23.4	mg/L
pH	6.12	units
Phosphate, Total	0.09	mg/L
Solids, Dissolved	3610.	mg/L
Sulfate	1500.	mg/L
Aluminum	0.07	mg/L
Antimony	<0.04	mg/L
Arsenic	0.009	mg/L
Barium	0.017	mg/L
Boron	0.19	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	0.01	mg/L
Zinc	2.92	mg/L

Neal E. Cleghorn
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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
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Milwaukee WI 53201

07-20-90

Sample No.: 111854

Sample Description: MW-14-02
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1400

Date Received: 06-19-90 1220

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111854

Sample Description: MW-14-02
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1400

Date Received: 06-19-90 1220

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E Cleghorn

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111854

Sample Description: MW-14-02
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1400

Date Received: 06-19-90 1220

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111854

Sample Description: MW-14-02
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1400

Date Received: 06-19-90 1220

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

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Bartlett, IL 60103

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111854

Sample Description: MW-14-02
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1400

Date Received: 06-19-90 1220

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L
PCB's		
PCB-1016	<1.0	ug/L
PCB-1221	<1.0	ug/L
PCB-1232	<1.0	ug/L
PCB-1242	<1.0	ug/L
PCB-1248	<1.0	ug/L
PCB-1254	<1.0	ug/L
PCB-1260	<1.0	ug/L

Neal E Cleghorn

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Project Manager

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Bartlett Division
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112015

Sample Description: MW-15-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 0840

Date Received: 06-21-90 1120

Alkalinity, Bicarb.(CaC03)	336.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	336.	mg/L
Chloride	43.	mg/L
Cyanide, Total	0.033	mg/L
Nitrogen, Ammonia	0.55	mg/L
pH	6.64	units
Phosphate, Total	0.74	mg/L
Solids, Dissolved	2320.	mg/L
Sulfate	1400.	mg/L
Aluminum	0.18	mg/L
Antimony	<0.04	mg/L
Arsenic	0.23	mg/L
Barium	0.027	mg/L
Boron	1.19	mg/L
Cadmium	0.014	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	0.09	mg/L
Mercury	<0.0001	mg/L
Nickel	0.02	mg/L
Zinc	2.42	mg/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
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Milwaukee WI 53201

07-20-90

Sample No.: 112015

Sample Description: MW-15-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 0840

Date Received: 06-21-90 1120

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	6.6	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	3.8	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	1.9	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	1.4	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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07-20-90

Sample No.: 112015

Sample Description: MW-15-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 0840

Date Received: 06-21-90 1120

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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07-20-90

Sample No.: 112015

Sample Description: MW-15-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 0840

Date Received: 06-21-90 1120

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112015

Sample Description: MW-15-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 0840

Date Received: 06-21-90 1120

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112015

Sample Description: MW-15-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 0840

Date Received: 06-21-90 1120

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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NET Midwest, Inc.
Bartlett Division
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Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112016

Sample Description: MW-16-01
GL021838.C0.07; DuPont - East Chicago

Date Taken: 06-19-90 1230

Date Received: 06-21-90 1120

Alkalinity, Bicarb.(CaC03)	128.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	128.	mg/L
Chloride	1320.	mg/L
Nitrogen, Ammonia	27.9	mg/L
Solids, Dissolved	3150.	mg/L
Sulfate	180.	mg/L
Aluminum	<0.01	mg/L
Arsenic	0.005	mg/L
Barium	0.139	mg/L
Zinc	10.64	mg/L

Toni Gartner
Division Manager

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NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112000

Sample Description: MW-17-01
GLO21838.CO.07; DuPont

Date Taken: 06-19-90 1435

Date Received: 06-21-90 1030

Alkalinity, Bicarb.(CaC03)	96.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	96.	mg/L
Chloride	875.	mg/L
pH	6.11	units
Solids, Dissolved	2060.	mg/L
Sulfate	84.	mg/L
Aluminum	0.08	mg/L
Arsenic	0.002	mg/L
Barium	1.03	mg/L
Zinc	65.4	mg/L

Toni Gartner
Division Manager

NET
NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

08-01-90

Sample No.: 114182

Sample Description: MW-17-01
GLO21838.CO.07; DuPont

Date Taken: 06-19-90 1435

Date Received: 06-21-90 1030

Nitrogen, Ammonia	13.7	mg/L

Tona Gartner
Division Manager

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NET Midwest, Inc.
Bartlett Division
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Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112169

Sample Description: MW-18-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-20-90 1050

Date Received: 06-22-90 1030

Alkalinity, Bicarb.(CaC03)	314.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	314.	mg/L
Chloride	84.	mg/L
pH	6.64	units
Phosphate, Total	<0.03	mg/L
Solids, Dissolved	4500.	mg/L
Sulfate	3200.	mg/L
Arsenic	0.006	mg/L
Zinc	4.18	mg/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
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Milwaukee WI 53201

07-20-90

Sample No.: 112169

Sample Description: MW-18-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-20-90 1050

Date Received: 06-22-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	51.8	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	5.9	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	2.6	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112169

Sample Description: MW-18-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-20-90 1050

Date Received: 06-22-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L
PCB's		
PCB-1016	<1.0	ug/L
PCB-1221	<1.0	ug/L
PCB-1232	<1.0	ug/L
PCB-1242	<1.0	ug/L
PCB-1248	<1.0	ug/L
PCB-1254	<1.0	ug/L
PCB-1260	<1.0	ug/L

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

06-29-90

Sample No.: 112168

Sample Description: MW-18-02
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-20-90 1050

Date Received: 06-22-90 1030

pH	6.89	units
PCB's		
PCB-1016	<1.0	ug/L
PCB-1221	<1.0	ug/L
PCB-1232	<1.0	ug/L
PCB-1242	<1.0	ug/L
PCB-1248	<1.0	ug/L
PCB-1254	<1.0	ug/L
PCB-1260	<1.0	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112003

Sample Description: MW-19-01
GL021838.C0.07; DuPont

Date Taken: 06-19-90 1435

Date Received: 06-21-90 1030

Alkalinity, Bicarb.(CaC03)	208.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	208.	mg/L
Chloride	127.	mg/L
Cyanide, Total	<0.002	mg/L
pH	6.84	units
Phosphate, Total	0.09	mg/L
Solids, Dissolved	1530.	mg/L
Sulfate	790.	mg/L
Aluminum	0.20	mg/L
Antimony	<0.04	mg/L
Arsenic	0.005	mg/L
Barium	0.045	mg/L
Boron	0.15	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.007	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	<0.01	mg/L
Zinc	0.612	mg/L

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112003

Sample Description: MW-19-01
GL021838.C0.07; DuPont

Date Taken: 06-19-90 1435

Date Received: 06-21-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	6.9	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	7.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	4.4	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	1.8	ug/L
2-Hexanone	<10.	ug/L

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Bartlett Division
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112003

Sample Description: MW-19-01
GL021838.C0.07; DuPont

Date Taken: 06-19-90 1435

Date Received: 06-21-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112003

Sample Description: MW-19-01
GL021838.C0.07; DuPont

Date Taken: 06-19-90 1435

Date Received: 06-21-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

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Project Manager

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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112003

Sample Description: MW-19-01
GL021838.C0.07; DuPont

Date Taken: 06-19-90 1435

Date Received: 06-21-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

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Project Manager

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Bartlett Division
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Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112003

Sample Description: MW-19-01
GL021838.C0.07; DuPont

Date Taken: 06-19-90 1435

Date Received: 06-21-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112070

Sample Description: MW-20-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-20-90 0910

Date Received: 06-22-90 1030

Alkalinity, Bicarb.(CaC03)	468.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	468.	mg/L
Chloride	277.	mg/L
Cyanide, Total	0.003	mg/L
pH	8.70	units
Phosphate, Total	<0.03	mg/L
Solids, Dissolved	5190.	mg/L
Sulfate	3000.	mg/L
Aluminum	<0.01	mg/L
Antimony	<0.04	mg/L
Arsenic	0.10	mg/L
Barium	0.03	mg/L
Boron	0.94	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	<0.01	mg/L
Zinc	<0.005	mg/L

Neal E. Cleghorn
Project Manager

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NET Midwest, Inc.
Bartlett Division
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Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112070

Sample Description: MW-20-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-20-90 0910

Date Received: 06-22-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	5.8	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	10.4	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	5.5	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	2.1	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112070

Sample Description: MW-20-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-20-90 0910

Date Received: 06-22-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112070

Sample Description: MW-20-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-20-90 0910

Date Received: 06-22-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112070

Sample Description: MW-20-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-20-90 0910

Date Received: 06-22-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112070

Sample Description: MW-20-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-20-90 0910

Date Received: 06-22-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
Project Manager

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NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111855

Sample Description: SW-01-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1745

Date Received: 06-19-90 1220

Alkalinity, Bicarb.(CaC03)	140.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	140.	mg/L
Chloride	4.	mg/L
Cyanide, Total	0.004	mg/L
Nitrogen, Ammonia	0.56	mg/L
pH	7.66	units
Phosphate, Total	0.09	mg/L
Solids, Dissolved	243.	mg/L
Sulfate	39.	mg/L
Aluminum	0.14	mg/L
Antimony	<0.04	mg/L
Arsenic	0.002	mg/L
Barium	0.024	mg/L
Boron	0.05	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	<0.01	mg/L
Zinc	0.051	mg/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111855

Sample Description: SW-01-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1745

Date Received: 06-19-90 1220

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	3.4	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111855

Sample Description: SW-01-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1745

Date Received: 06-19-90 1220

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111855

Sample Description: SW-01-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1745

Date Received: 06-19-90 1220

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111855

Sample Description: SW-01-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1745

Date Received: 06-19-90 1220

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

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Milwaukee WI 53201

07-20-90

Sample No.: 111855

Sample Description: SW-01-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1745

Date Received: 06-19-90 1220

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L
PCB's		
PCB-1016	<1.0	ug/L
PCB-1221	<1.0	ug/L
PCB-1232	<1.0	ug/L
PCB-1242	<1.0	ug/L
PCB-1248	<1.0	ug/L
PCB-1254	<1.0	ug/L
PCB-1260	<1.0	ug/L

Neal E Cleghorn

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111856

Sample Description: SW-02-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1815

Date Received: 06-19-90 1220

Alkalinity, Bicarb.(CaC03)	136	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	136.	mg/L
Chloride	30.	mg/L
Cyanide, Total	<0.001	mg/L
Nitrogen, Ammonia	0.68	mg/L
pH	7.62	units
Phosphate, Total	0.03	mg/L
Solids, Dissolved	270.	mg/L
Sulfate	41.	mg/L
Aluminum	<0.01	mg/L
Antimony	<0.04	mg/L
Arsenic	0.004	mg/L
Barium	0.019	mg/L
Boron	0.05	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	<0.01	mg/L
Zinc	0.051	mg/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111856

Sample Description: SW-02-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1815

Date Received: 06-19-90 1220

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	1.7	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	4.9	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111856

Sample Description: SW-02-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1815

Date Received: 06-19-90 1220

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	1.2	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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Milwaukee WI 53201

07-20-90

Sample No.: 111856

Sample Description: SW-02-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1815

Date Received: 06-19-90 1220

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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NET Midwest, Inc.
Bartlett Division
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Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111856

Sample Description: SW-02-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1815

Date Received: 06-19-90 1220

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Clegborn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112162

Sample Description: FB-02-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 0950

Date Received: 06-22-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112162

Sample Description: FB-02-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 0950

Date Received: 06-22-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
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Milwaukee WI 53201

07-20-90

Sample No.: 112162

Sample Description: FB-02-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 0950

Date Received: 06-22-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
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07-20-90

Sample No.: 112162

Sample Description: FB-02-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 0950

Date Received: 06-22-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111856

Sample Description: SW-02-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1815

Date Received: 06-19-90 1220

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L
PCB's		
PCB-1016	<1.0	ug/L
PCB-1221	<1.0	ug/L
PCB-1232	<1.0	ug/L
PCB-1242	<1.0	ug/L
PCB-1248	<1.0	ug/L
PCB-1254	<1.0	ug/L
PCB-1260	<1.0	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

CORRECTED REPORT

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

09-17-90

Sample No.: 111857

Sample Description: SW-03-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1845

Date Received: 06-19-90 1220

Alkalinity, Bicarb.(CaC03)	156.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	156.	mg/L
Chloride	31.	mg/L
Cyanide, Total	0.002	mg/L
Nitrogen, Ammonia	0.64	mg/L
pH	7.54	units
Phosphate, Total	0.06	mg/L
Solids, Dissolved	247.	mg/L
Sulfate	50.	mg/L
Aluminum	0.25	mg/L
Antimony	<0.04	mg/L
Arsenic	0.002	mg/L
Barium	0.016	mg/L
Boron	0.04	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	<0.01	mg/L
Zinc	0.042	mg/L

T. Gartner

Toni Gartner
Division Manager

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CORRECTED REPORT

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

09-17-90

Sample No.: 111857

Sample Description: SW-03-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1845

Date Received: 06-19-90 1220

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	4.8	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

T. Gartner

Toni Gartner
Division Manager

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Milwaukee WI 53201

09-17-90

Sample No.: 111857

Sample Description: SW-03-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1845

Date Received: 06-19-90 1220

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

T. Gartner

Toni Gartner
Division Manager

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Suite 700 P.O. Box 2090
Milwaukee WI 53201

09-17-90

Sample No.: 111857

Sample Description: SW-03-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1845

Date Received: 06-19-90 1220

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Toni Gartner
Division Manager

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Milwaukee WI 53201

09-17-90

Sample No.: 111857

Sample Description: SW-03-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1845

Date Received: 06-19-90 1220

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

T. Gartner

Toni Gartner
Division Manager

RE PAGING ON

NATIONAL ENVIRONMENTAL TESTING, INC.

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CORRECTED REPORT

ANALYTICAL REPORT

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Milwaukee WI 53201

09-17-90

Sample No.: 111857

Sample Description: SW-03-01
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1845

Date Received: 06-19-90 1220

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L
PCB's		
PCB-1016	<1.0	ug/L
PCB-1221	<1.0	ug/L
PCB-1232	<1.0	ug/L
PCB-1242	<1.0	ug/L
PCB-1248	<1.0	ug/L
PCB-1254	<1.0	ug/L
PCB-1260	<1.0	ug/L

T. Gartner

Toni Gartner
Division Manager

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Bartlett, IL 60103

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111858

Sample Description: SW-03-02
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1845

Date Received: 06-19-90 1220

Alkalinity, Bicarb.(CaC03)	142.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	142.	mg/L
Chloride	29.	mg/L
Cyanide, Total	0.007	mg/L
Nitrogen, Ammonia	0.75	mg/L
pH	7.74	units
Phosphate, Total	0.18	mg/L
Solids, Dissolved	237.	mg/L
Sulfate	55.	mg/L
Aluminum	<0.01	mg/L
Antimony	<0.04	mg/L
Arsenic	0.002	mg/L
Barium	0.029	mg/L
Boron	0.05	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	0.0002	mg/L
Nickel	<0.01	mg/L
Zinc	0.012	mg/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111858

Sample Description: SW-03-02
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1845

Date Received: 06-19-90 1220

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	1.8	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	4.8	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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Milwaukee WI 53201

07-20-90

Sample No.: 111858

Sample Description: SW-03-02
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1845

Date Received: 06-19-90 1220

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
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07-20-90

Sample No.: 111858

Sample Description: SW-03-02
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1845

Date Received: 06-19-90 1220

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 111858

Sample Description: SW-03-02
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1845

Date Received: 06-19-90 1220

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
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07-20-90

Sample No.: 111858

Sample Description: SW-03-02
GL021838.C0.07; DuPont East Chicago

Date Taken: 06-18-90 1845

Date Received: 06-19-90 1220

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L
PCB's		
PCB-1016	<1.0	ug/L
PCB-1221	<1.0	ug/L
PCB-1232	<1.0	ug/L
PCB-1242	<1.0	ug/L
PCB-1248	<1.0	ug/L
PCB-1254	<1.0	ug/L
PCB-1260	<1.0	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112071

Sample Description: FB-01
GL021838.CO.07; DuPont East Chicago

Date Taken: 06-20-90 1226

Date Received: 06-22-90 1030

Alkalinity, Bicarb.(CaC03)	7.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	7.	mg/L
Chloride	4.	mg/L
Cyanide, Total	<0.002	mg/L
Nitrogen, Ammonia	0.09	mg/L
pH	8.78	units
Phosphate, Total	<0.03	mg/L
Solids, Dissolved	40.	mg/L
Sulfate	<1.0	mg/L
Aluminum	<0.01	mg/L
Antimony	<0.04	mg/L
Arsenic	0.002	mg/L
Barium	<0.005	mg/L
Boron	<0.01	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	<0.01	mg/L
Zinc	<0.005	mg/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112071

Sample Description: FB-01
GL021838.CO.07; DuPont East Chicago

Date Taken: 06-20-90 1226

Date Received: 06-22-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112071

Sample Description: FB-01
GL021838.CO.07; DuPont East Chicago

Date Taken: 06-20-90 1226

Date Received: 06-22-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112071

Sample Description: FB-01
GL021838.CO.07; DuPont East Chicago

Date Taken: 06-20-90 1226

Date Received: 06-22-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112071

Sample Description: FB-01
GL021838.CO.07; DuPont East Chicago

Date Taken: 06-20-90 1226

Date Received: 06-22-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112071

Sample Description: FB-01
GL021838.CO.07; DuPont East Chicago

Date Taken: 06-20-90 1226

Date Received: 06-22-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L
PCB's		
PCB-1016	<1.0	ug/L
PCB-1221	<1.0	ug/L
PCB-1232	<1.0	ug/L
PCB-1242	<1.0	ug/L
PCB-1248	<1.0	ug/L
PCB-1254	<1.0	ug/L
PCB-1260	<1.0	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112162

Sample Description: FB-02-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 0950

Date Received: 06-22-90 1030

Alkalinity, Bicarb.(CaC03)	6.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	6.	mg/L
Chloride	<1.	mg/L
Cyanide, Total	<0.002	mg/L
Nitrogen, Ammonia	0.03	mg/L
pH	10.23	units
Phosphate, Total	<0.03	mg/L
Solids, Dissolved	7.	mg/L
Sulfate	<1.	mg/L
Aluminum	<0.01	mg/L
Antimony	0.04	mg/L
Arsenic	<0.001	mg/L
Barium	<0.005	mg/L
Boron	<0.01	mg/L
Cadmium	<0.005	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Mercury	<0.0001	mg/L
Nickel	<0.01	mg/L
Zinc	<0.005	mg/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-20-90

Sample No.: 112162

Sample Description: FB-02-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 0950

Date Received: 06-22-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-06-90

Sample No.: 112004

Sample Description: TB-01-01
GL021838.CO.07; DuPont

Date Taken: 06-20-90 0954

Date Received: 06-21-90 1030

VOLATILE COMPOUNDS

Acrolein	<10.	ug/L
Acrylonitrile	<10.	ug/L
Benzene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
Bromoform	<1.0	ug/L
Bromomethane	<10.	ug/L
Carbon tetrachloride	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Chloroethane	<10.	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
Chloroform	<1.0	ug/L
Chloromethane	<10.	ug/L
Dibromochloromethane	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
1,1-Dichloroethene	<1.0	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
Ethyl benzene	<1.0	ug/L
Methylene chloride	<5.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
Tetrachloroethene	<1.0	ug/L
Toluene	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L

Toni Gartner
Division Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

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Bartlett Division
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Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-06-90

Sample No.: 112004

Sample Description: TB-01-01
GL021838.CO.07; DuPont

Date Taken: 06-20-90 0954

Date Received: 06-21-90 1030

VOLATILE COMPOUNDS

1,1,2-Trichloroethane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Trichlorofluoromethane	<1.0	ug/L
Vinyl chloride	<10.	ug/L
Xylenes, Total	<1.0	ug/L

Toni Gartner
Division Manager

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Bartlett Division
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Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-10-90

Sample No.: 112163

Sample Description: TB-02-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 1030

Date Received: 06-22-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

07-10-90

Sample No.: 112163

Sample Description: TB-02-01
CHI28770.A0.MN; DuPont East Chicago

Date Taken: 06-21-90 1030

Date Received: 06-22-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

ROUND 2

LABORATORY ANALYTICAL REPORTS

NET NATIONAL ENVIRONMENTAL TESTING, INC.®

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

09-26-90

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Avenue
Suite 700 P.O.Box 2090
Milwaukee WI 53201

REF: Sample No(s).
117644, 117649, 117695

Dear Ms. Newman,

Attached please find Analytical Reports for the above referenced Sample No(s).

The QA/QC package you requested will follow in a few days. If, however, you receive an invoice in the meantime, please be assured that we have not overlooked the QA/QC data.

If you have any concerns, please feel free to give us a call.

Sincerely,
NET Midwest, Inc.

Neal E Cleghorn

Neal Cleghorn
Project Manager

Encls.

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

10/02/90

Mr. Chris Ohland
CH2M HILL
310 W. Wisconsin Ave.
Suite 700 PO Box 2090
Milwaukee, WI 53201

REF: Sample #s
117317-8
117442-9

Dear Mr. Ohland,

Enclosed please find Analytical Reports for the above referenced Sample No(s).

The QA/QC package you requested will follow in a few days accompanied with a Case Narrative. As you will notice on samples 117442 and 117448, we found N, Ammonia results higher than Total Nitrogen results. The samples were re-run, on another day, and the same result was found. This information will be detailed on the Case Narrative.

If you have any concerns, please feel free to give us a call.

Sincerely,
NET Midwest, Inc.

Ray Kalicki
QA Coordinator

Encls. Reports

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117448

Sample Description: MW-01-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: 09-11-90 1220

Date Received: 09-12-90 1030

Alkalinity, Bicarb.(CaC03)	140.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	140.	mg/L
Chloride	30.	mg/L
COD	20.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	8.	mg/L
Nitrogen, Ammonia	0.32	mg/L
Nitrogen, Kjeldahl	<0.05	mg/L
Phosphate, Total	1.64	mg/L
Solids, Dissolved	2280.	mg/L
Sulfate	1100.	mg/L
Aluminum	<0.01	mg/L
Antimony	<0.04	mg/L
Arsenic	0.3	mg/L
Barium	0.04	mg/L
Boron	0.23	mg/L
Cadmium	<0.005	mg/L
Calcium	519.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.026	mg/L
Copper	<0.01	mg/L
Iron	11.7	mg/L
Lead	<0.04	mg/L
Magnesium	17.8	mg/L
Manganese	0.43	mg/L
Mercury	<0.0002	mg/L
Nickel	<0.01	mg/L
Potassium	5.95	mg/L
Sodium	15.7	mg/L

Kelly Jones

Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117448

Sample Description: MW-01-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: 09-11-90 1220

Date Received: 09-12-90 1030

Zinc	3.59	mg/L

Kelly Jones

Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117448

Sample Description: MW01-02
DuPont

Date Taken: 09-11-90 1220

Date Received: 09-12-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	4.3	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117448

Sample Description: MW01-02
DuPont

Date Taken: 09-11-90 1220

Date Received: 09-12-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117448

Sample Description: MW01-02
DuPont

Date Taken: 09-11-90 1220

Date Received: 09-12-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117448

Sample Description: MW01-02
DuPont

Date Taken: 09-11-90 1220

Date Received: 09-12-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117448

Sample Description: MW01-02
DuPont

Date Taken: 09-11-90 1220

Date Received: 09-12-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117692

Page 1

Sample Description: MW02-02; Grab
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 1230

Date Received: 09-13-90 1000

Alkalinity, Bicarb.(CaC03)	260.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	260.	mg/L
Chloride	20.	mg/L
COD	957.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	10.	mg/L
Nitrogen, Ammonia	3.31	mg/L
Nitrogen, Kjeldahl	3.71	mg/L
Phosphate, Total	1.50	mg/L
Solids, Dissolved	2400.	mg/L
Sulfate	1900.	mg/L
Aluminum	<0.01	mg/L
Antimony	<0.04	mg/L
Arsenic	0.09	mg/L
Barium	0.07	mg/L
Boron	0.26	mg/L
Cadmium	<0.005	mg/L
Calcium	358.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.008	mg/L
Copper	<0.01	mg/L
Iron	60.5	mg/L
Lead	<0.04	mg/L
Magnesium	129.	mg/L
Manganese	0.35	mg/L
Mercury	<0.0002	mg/L
Nickel	<0.01	mg/L
Potassium	3.75	mg/L
Sodium	93.1	mg/L

Kelly Jones
Kelly Jones
Project Manager

NET
NATIONAL ENVIRONMENTAL TESTING, INC.

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Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117692

Page 2

Sample Description: MW02-02; Grab
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 1230

Date Received: 09-13-90 1000

Zinc	0.040	mg/L

Kelly Jones

Kelly Jones
Project Manager

J-181

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-01-90

Sample No.: 117692

Sample Description: MW02-02
DuPont

Date Taken: 09-12-90 1230

Date Received: 09-13-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	10.8	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-01-90

Sample No.: 117692

Sample Description: MW02-02
DuPont

Date Taken: 09-12-90 1230

Date Received: 09-13-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
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Bartlett Division
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Bartlett, IL 60103

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-01-90

Sample No.: 117692

Sample Description: MW02-02
DuPont

Date Taken: 09-12-90 1230

Date Received: 09-13-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-01-90

Sample No.: 117692

Sample Description: MW02-02
DuPont

Date Taken: 09-12-90 1230

Date Received: 09-13-90 1000

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-01-90

Sample No.: 117692

Sample Description: MW02-02
DuPont

Date Taken: 09-12-90 1230

Date Received: 09-13-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117665

Page 1

Sample Description: MW03-02;Grab
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 0837

Date Received: 09-13-90 1000

Alkalinity, Bicarb.(CaC03)	268.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	268.	mg/L
Chloride	40.	mg/L
COD	30.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	2.	mg/L
Nitrogen, Ammonia	2.36	mg/L
Nitrogen, Kjeldahl	1.77	mg/L
Phosphate, Total	2.45	mg/L
Solids, Dissolved	1690.	mg/L
Sulfate	1500.	mg/L
Aluminum	0.03	mg/L
Antimony	<0.04	mg/L
Arsenic	1.7	mg/L
Barium	0.15	mg/L
Boron	0.23	mg/L
Cadmium	0.064	mg/L
Calcium	299.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.007	mg/L
Copper	<0.01	mg/L
Iron	13.6	mg/L
Lead	<0.04	mg/L
Magnesium	71.5	mg/L
Manganese	1.33	mg/L
Mercury	<0.0002	mg/L
Nickel	0.01	mg/L
Potassium	6.26	mg/L
Sodium	61.0	mg/L

Kelly Jones
Kelly Jones
Project Manager

NET
NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117665

Page 2

Sample Description: MW03-02;Grab
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 0837

Date Received: 09-13-90 1000

Zinc	0.100	mg/L

Kelly Jones

Kelly Jones
Project Manager

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NET Midwest, Inc.
Bartlett Division
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Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117665

Sample Description: MW03-02
DuPont

Date Taken: 09-12-90 0837

Date Received: 09-13-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	20.9	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

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Bartlett Division
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117665

Sample Description: MW03-02
DuPont

Date Taken: 09-12-90 0837

Date Received: 09-13-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117665

Sample Description: MW03-02
DuPont

Date Taken: 09-12-90 0837

Date Received: 09-13-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117665

Sample Description: MW03-02
DuPont

Date Taken: 09-12-90 0837

Date Received: 09-13-90 1000

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

NET
NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117665

Sample Description: MW03-02
DuPont

Date Taken: 09-12-90 0837

Date Received: 09-13-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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CORRECTED REPORT

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

11-07-90

Sample No.: 117666

Sample Description: FRMW03-02;Grab
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 0837

Date Received: 09-13-90 1000

Alkalinity, Bicarb.(CaC03)	300.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	300.	mg/L
Chloride	40.	mg/L
COD	27.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	0.8	mg/L
Nitrogen, Ammonia	2.31	mg/L
Nitrogen, Kjeldahl	1.90	mg/L
Phosphate, Total	2.52	mg/L
Solids, Dissolved	1670.	mg/L
Sulfate	1400.	mg/L
Aluminum	0.03	mg/L
Antimony	<0.04	mg/L
Arsenic	2.1	mg/L
Barium	0.14	mg/L
Boron	0.28	mg/L
Cadmium	0.068	mg/L
Calcium	287.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.007	mg/L
Copper	<0.01	mg/L
Iron	13.5	mg/L
Lead	<0.04	mg/L
Magnesium	67.0	mg/L
Manganese	1.24	mg/L
Mercury	<0.0002	mg/L
Nickel	<0.01	mg/L
Potassium	5.98	mg/L
Sodium	57.2	mg/L

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
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Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117666

Page 9

Sample Description: FRMW03-02;Grab
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 0837

Date Received: 09-13-90 1000

Zinc	0.020	mg/L

Kelly Jones

Kelly Jones
Project Manager

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117666

Sample Description: FRMW03-02
DuPont

Date Taken: 09-12-90 0837

Date Received: 09-13-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	14.4	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117666

Sample Description: FRMW03-02
DuPont

Date Taken: 09-12-90 0837

Date Received: 09-13-90 1000

Tetrachloroethene	7.2	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117666

Sample Description: FRMW03-02
DuPont

Date Taken: 09-12-90 0837

Date Received: 09-13-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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NET Midwest, Inc.
Bartlett Division
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Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117666

Sample Description: FRMW03-02
DuPont

Date Taken: 09-12-90 0837

Date Received: 09-13-90 1000

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Milwaukee WI 53201

01-03-91

Sample No.: 117666

Sample Description: FRMW03-02
DuPont

Date Taken: 09-12-90 0837

Date Received: 09-13-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117395

Page 1

Sample Description: MW04-02
CHI28770.PO.MN; DuPont East Chicago

Date Taken: 09-11-90 1655

Date Received: 09-12-90 1030

Alkalinity, Bicarb.(CaC03)	230.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	230.	mg/L
Chloride	50.	mg/L
COD	37.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	1.8	mg/L
Nitrogen, Ammonia	19.5	mg/L
Nitrogen, Kjeldahl	21.6	mg/L
Phosphate, Total	0.76	mg/L
Solids, Dissolved	2980.	mg/L
Sulfate	2500.	mg/L
Aluminum	<0.01	mg/L
Antimony	<0.04	mg/L
Arsenic	0.012	mg/L
Barium	<0.01	mg/L
Boron	0.42	mg/L
Cadmium	<0.005	mg/L
Calcium	570.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.013	mg/L
Copper	<0.01	mg/L
Iron	51.0	mg/L
Lead	<0.04	mg/L
Magnesium	99.5	mg/L
Manganese	1.00	mg/L
Mercury	<0.0002	mg/L
Nickel	0.02	mg/L
Potassium	16.5	mg/L
Sodium	75.2	mg/L

Kelly Jones

Kelly Jones
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117395

Page 2

Sample Description: MW04-02
CHI28770.PO.MN; DuPont East Chicago

Date Taken: 09-11-90 1655

Date Received: 09-12-90 1030

Zinc	1.14	mg/L

Kelly Jones
Kelly Jones
Project Manager

J-202

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117395

Sample Description: MW04-02
DuPont

Date Taken: 09-11-90 1655

Date Received: 09-12-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	75.4	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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Bartlett, IL 60103

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117395

Sample Description: MW04-02
DuPont

Date Taken: 09-11-90 1655

Date Received: 09-12-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117395

Sample Description: MW04-02
DuPont

Date Taken: 09-11-90 1655

Date Received: 09-12-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117395

Sample Description: MW04-02
DuPont

Date Taken: 09-11-90 1655

Date Received: 09-12-90 1000

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117395

Sample Description: MW04-02
DuPont

Date Taken: 09-11-90 1655

Date Received: 09-12-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E Cleghorn
Neal E. Cleghorn
Project Manager

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117396

Sample Description: MW04-02MS
DuPont

Date Taken: 09-11-90 1655

Date Received: 09-12-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	72.2	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	1.1	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117396

Sample Description: MW04-02MS
DuPont

Date Taken: 09-11-90 1655

Date Received: 09-12-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117397

Sample Description: MW04-02MSD
DuPont

Date Taken: 09-11-90 1655

Date Received: 09-12-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	89.6	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117397

Sample Description: MW04-02MSD
DuPont

Date Taken: 09-11-90 1655

Date Received: 09-12-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117444

Sample Description: MW05-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: 09-11-90 1547

Date Received: 09-12-90 1030

Alkalinity, Bicarb.(CaC03)	760.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	760.	mg/L
Chloride	470.	mg/L
COD	105.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	12.	mg/L
Nitrogen, Ammonia	21.2	mg/L
Nitrogen, Kjeldahl	25.0	mg/L
Phosphate, Total	0.80	mg/L
Solids, Dissolved	9310.	mg/L
Sulfate	7030.	mg/L
Aluminum	0.10	mg/L
Antimony	<0.04	mg/L
Arsenic	0.32	mg/L
Barium	0.04	mg/L
Boron	1.24	mg/L
Cadmium	<0.005	mg/L
Calcium	678.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Iron	132.	mg/L
Lead	<0.04	mg/L
Magnesium	1080.	mg/L
Manganese	2.35	mg/L
Mercury	<0.0002	mg/L
Nickel	0.02	mg/L
Potassium	22.5	mg/L
Sodium	244.	mg/L

Kelly Jones

Kelly Jones
Project Manager

NET
NATIONAL ENVIRONMENTAL TESTING, INC.

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Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117444

Sample Description: MW05-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: 09-11-90 1547

Date Received: 09-12-90 1030

Zinc	11.4	mg/L

Kelly Jones

Kelly Jones
Project Manager

J-213

NATIONAL ENVIRONMENTAL TESTING, INC.

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Bartlett Division
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117444

Sample Description: MW05-02
DuPont

Date Taken: 09-11-90 1547

Date Received: 09-12-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	21.4	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	2.4	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	44.7	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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CH2M HILL
310 West Wisconsin Ave
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10-02-90

Sample No.: 117444

Sample Description: MW05-02
DuPont

Date Taken: 09-11-90 1547

Date Received: 09-12-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
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Milwaukee WI 53201

10-02-90

Sample No.: 117444

Sample Description: MW05-02
DuPont

Date Taken: 09-11-90 1547

Date Received: 09-12-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
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310 West Wisconsin Ave
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Milwaukee WI 53201

10-02-90

Sample No.: 117444

Sample Description: MW05-02
DuPont

Date Taken: 09-11-90 1547

Date Received: 09-12-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
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10-02-90

Sample No.: 117444

Sample Description: MW05-02
DuPont

Date Taken: 09-11-90 1547

Date Received: 09-12-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett, IL 60103

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117667

Page 15

Sample Description: MW06-02;Grab
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 0830

Date Received: 09-13-90 1000

Alkalinity, Bicarb.(CaC03)	1170.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	1170.	mg/L
Chloride	18,000.	mg/L
COD	509.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	2.	mg/L
Nitrogen, Ammonia	5.51	mg/L
Nitrogen, Kjeldahl	6.16	mg/L
Phosphate, Total	0.05	mg/L
Solids, Dissolved	28,700.	mg/L
Sulfate	180.	mg/L
Aluminum	0.39	mg/L
Antimony	0.08	mg/L
Arsenic	0.030	mg/L
Barium	2.15	mg/L
Boron	10.9	mg/L
Cadmium	<0.005	mg/L
Calcium	7560.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Iron	619.	mg/L
Lead	<0.04	mg/L
Magnesium	498.	mg/L
Manganese	6.14	mg/L
Mercury	<0.0002	mg/L
Nickel	<0.01	mg/L
Potassium	45.4	mg/L
Sodium	730.	mg/L

Kelly Jones

Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117667

Page 16

Sample Description: MW06-02;Grab
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 0830

Date Received: 09-13-90 1000

Zinc	0.070	mg/L

Kelly Jones
Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117667

Sample Description: MW06-02
DuPont

Date Taken: 09-12-90 0830

Date Received: 09-13-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	39.7	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117667

Sample Description: MW06-02
DuPont

Date Taken: 09-12-90 0830

Date Received: 09-13-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117667

Sample Description: MW06-02
DuPont

Date Taken: 09-12-90 0830

Date Received: 09-13-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117667

Sample Description: MW06-02
DuPont

Date Taken: 09-12-90 0830

Date Received: 09-13-90 1000

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117667

Sample Description: MW06-02
DuPont

Date Taken: 09-12-90 0830

Date Received: 09-13-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117445

Sample Description: MW07-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: 09-11-90 1607

Date Received: 09-12-90 1030

Alkalinity, Bicarb.(CaC03)	230.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	230.	mg/L
Chloride	150.	mg/L
COD	98.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	4.	mg/L
Nitrogen, Ammonia	0.89	mg/L
Nitrogen, Kjeldahl	0.95	mg/L
Phosphate, Total	1.92	mg/L
Solids, Dissolved	987.	mg/L
Sulfate	400.	mg/L
Aluminum	<0.01	mg/L
Antimony	<0.04	mg/L
Arsenic	0.002	mg/L
Barium	0.04	mg/L
Boron	0.37	mg/L
Cadmium	<0.005	mg/L
Calcium	218.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.013	mg/L
Copper	0.01	mg/L
Iron	15.9	mg/L
Lead	0.05	mg/L
Magnesium	32.1	mg/L
Manganese	0.51	mg/L
Mercury	<0.0002	mg/L
Nickel	0.07	mg/L
Potassium	3.49	mg/L
Sodium	51.2	mg/L

Kelly Jones

Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117445

Sample Description: MW07-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: 09-11-90 1607

Date Received: 09-12-90 1030

Zinc	0.034	mg/L

Kelly Jones
Kelly Jones
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117445

Sample Description: MW07-02
DuPont

Date Taken: 09-11-90 1607

Date Received: 09-12-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	28.8	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117445

Sample Description: MW07-02
DuPont

Date Taken: 09-11-90 1607

Date Received: 09-12-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117445

Sample Description: MW07-02
DuPont

Date Taken: 09-11-90 1607

Date Received: 09-12-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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CH2M HILL
310 West Wisconsin Ave
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Milwaukee WI 53201

10-02-90

Sample No.: 117445

Sample Description: MW07-02
DuPont

Date Taken: 09-11-90 1607

Date Received: 09-12-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett Division
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117445

Sample Description: MW07-02
DuPont

Date Taken: 09-11-90 1607

Date Received: 09-12-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn

Neal E. Cleghorn
Project Manager

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NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117449

Sample Description: MW-08-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: y9-11-90 1443

Date Received: 09-12-90 1030

Alkalinity, Bicarb.(CaC03)	300.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	300.	mg/L
Chloride	210.	mg/L
COD	41.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	9.	mg/L
Nitrogen, Ammonia	0.99	mg/L
Nitrogen, Kjeldahl	1.11	mg/L
Phosphate, Total	5.13	mg/L
Solids, Dissolved	2190.	mg/L
Sulfate	1300.	mg/L
Aluminum	0.11	mg/L
Antimony	<0.04	mg/L
Arsenic	0.009	mg/L
Barium	0.08	mg/L
Boron	0.58	mg/L
Cadmium	<0.005	mg/L
Calcium	486.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Iron	54.9	mg/L
Lead	0.08	mg/L
Magnesium	42.8	mg/L
Manganese	1.42	mg/L
Mercury	<0.0002	mg/L
Nickel	<0.01	mg/L
Potassium	6.05	mg/L
Sodium	88.6	mg/L

Kelly Jones

Kelly Jones
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117449

Sample Description: MW-08-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: y9-11-90 1443

Date Received: 09-12-90 1030

Zinc	0.018	mg/L

Kelly Jones
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117449

Sample Description: MW08-02
DuPont

Date Taken: 09-11-90 1443

Date Received: 09-12-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	95.8	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117449

Sample Description: MW08-02
DuPont

Date Taken: 09-11-90 1443

Date Received: 09-12-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117449

Sample Description: MW08-02
DuPont

Date Taken: 09-11-90 1443

Date Received: 09-12-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117449

Sample Description: MW08-02
DuPont

Date Taken: 09-11-90 1443

Date Received: 09-12-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117449

Sample Description: MW08-02
DuPont

Date Taken: 09-11-90 1443

Date Received: 09-12-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117398

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Sample Description: MW09-02
CHI28770.PO.MN; DuPont East Chicago

Date Taken: 09-11-90 1728

Date Received: 09-12-90 1030

Alkalinity, Bicarb.(CaC03)	370.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	370.	mg/L
Chloride	1030.	mg/L
COD	95.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	9.	mg/L
Nitrogen, Ammonia	55.4	mg/L
Nitrogen, Kjeldahl	62.7	mg/L
Phosphate, Total	5.45	mg/L
Solids, Dissolved	6410.	mg/L
Sulfate	4200.	mg/L
Aluminum	0.05	mg/L
Antimony	<0.04	mg/L
Arsenic	0.03	mg/L
Barium	<0.01	mg/L
Boron	3.22	mg/L
Cadmium	<0.005	mg/L
Calcium	619.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.012	mg/L
Copper	<0.01	mg/L
Iron	158.	mg/L
Lead	0.06	mg/L
Magnesium	324.	mg/L
Manganese	6.55	mg/L
Mercury	<0.0002	mg/L
Nickel	0.07	mg/L
Potassium	36.5	mg/L
Sodium	640.	mg/L

Kelly Jones

Kelly Jones
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

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Milwaukee WI 53201

10-10-90

Sample No.: 117398

Page 9

Sample Description: MW09-02
CHI28770.PO.MN; DuPont East Chicago

Date Taken: 09-11-90 1728

Date Received: 09-12-90 1030

Zinc	27.8	mg/L

Kelly Jones
Kelly Jones
Project Manager

J-241

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117398

Sample Description: MW09-02
DuPont

Date Taken: 09-11-90 1728

Date Received: 09-12-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	18.1	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117398

Sample Description: MW09-02
DuPont

Date Taken: 09-11-90 1728

Date Received: 09-12-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

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310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117398

Sample Description: MW09-02
DuPont

Date Taken: 09-11-90 1728

Date Received: 09-12-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Fax: (708) 289-5445

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117398

Sample Description: MW09-02
DuPont

Date Taken: 09-11-90 1728

Date Received: 09-12-90 1000

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

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310 West Wisconsin Ave
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Milwaukee WI 53201

10-22-90

Sample No.: 117398

Sample Description: MW09-02
DuPont

Date Taken: 09-11-90 1728

Date Received: 09-12-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117648

Page 22

Sample Description: MW10-02
DuPont-East Chicago; CHI28770.AO.MN

Date Taken: 09-12-90 1215

Date Received: 09-13-90 1000

Alkalinity, Bicarb.(CaC03)	240.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	240.	mg/L
Chloride	90.	mg/L
COD	78.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	5.	mg/L
Nitrogen, Ammonia	10.8	mg/L
Nitrogen, Kjeldahl	10.9	mg/L
Phosphate, Total	23.	mg/L
Solids, Dissolved	2730.	mg/L
Sulfate	1800.	mg/L
Aluminum	0.03	mg/L
Antimony	0.04	mg/L
Arsenic	0.4	mg/L
Barium	0.21	mg/L
Boron	0.47	mg/L
Cadmium	<0.005	mg/L
Calcium	351.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.005	mg/L
Copper	<0.01	mg/L
Iron	61.4	mg/L
Lead	<0.04	mg/L
Magnesium	19.9	mg/L
Manganese	0.93	mg/L
Mercury	<0.0002	mg/L
Nickel	<0.01	mg/L
Potassium	19.8	mg/L
Sodium	188.	mg/L

Kelly Jones

Kelly Jones
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117648

Page 23

Sample Description: MW10-02
DuPont-East Chicago; CHI28770.AO.MN

Date Taken: 09-12-90 1215

Date Received: 09-13-90 1000

Zinc	0.050	mg/L

Kelly Jones

Kelly Jones
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117648

Sample Description: MW10-02
DuPont

Date Taken: 09-12-90 1215

Date Received: 09-13-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	45.7	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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Fax: (708) 289-5445

ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117648

Sample Description: MW10-02
DuPont

Date Taken: 09-12-90 1215

Date Received: 09-13-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Fax: (708) 289-5445

ANALYTICAL REPORT

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Milwaukee WI 53201

10-10-90

Sample No.: 117648

Sample Description: MW10-02
DuPont

Date Taken: 09-12-90 1215

Date Received: 09-13-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117648

Sample Description: MW10-02
DuPont

Date Taken: 09-12-90 1215

Date Received: 09-13-90 1000

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

Tel: (708) 289-3100
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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117648

Sample Description: MW10-02
DuPont

Date Taken: 09-12-90 1215

Date Received: 09-13-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
Project Manager

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NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117446

Sample Description: MW11-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: 09-11-90 0958

Date Received: 09-12-90 1030

Alkalinity, Bicarb.(CaC03)	120.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	120.	mg/L
Chloride	100.	mg/L
COD	41.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	3.	mg/L
Nitrogen, Ammonia	1.34	mg/L
Nitrogen, Kjeldahl	1.40	mg/L
Phosphate, Total	9.9	mg/L
Solids, Dissolved	2360.	mg/L
Sulfate	1700.	mg/L
Aluminum	0.06	mg/L
Antimony	<0.04	mg/L
Arsenic	0.011	mg/L
Barium	0.04	mg/L
Boron	0.59	mg/L
Cadmium	<0.005	mg/L
Calcium	540.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Iron	17.1	mg/L
Lead	0.07	mg/L
Magnesium	24.3	mg/L
Manganese	0.62	mg/L
Mercury	<0.0002	mg/L
Nickel	0.02	mg/L
Potassium	5.19	mg/L
Sodium	51.8	mg/L

Kelly Jones

Kelly Jones
Project Manager

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NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117446

Sample Description: MW11-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: 09-11-90 0958

Date Received: 09-12-90 1030

Zinc	7.46	mg/L

Kelly Jones
Kelly Jones
Project Manager

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117446

Sample Description: MW11-02
DuPont

Date Taken: 09-11-90 0958

Date Received: 09-12-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	5.8	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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10-02-90

Sample No.: 117446

Sample Description: MW11-02
DuPont

Date Taken: 09-11-90 0958

Date Received: 09-12-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

J-257

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117446

Sample Description: MW11-02
DuPont

Date Taken: 09-11-90 0958

Date Received: 09-12-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
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Milwaukee WI 53201

10-02-90

Sample No.: 117446

Sample Description: MW11-02
DuPont

Date Taken: 09-11-90 0958

Date Received: 09-12-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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10-02-90

Sample No.: 117446

Sample Description: MW11-02
DuPont

Date Taken: 09-11-90 0958

Date Received: 09-12-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117317

Sample Description: MW12-02
CHI28770.AOMN; DuPont East Chicago

Date Taken: 09-10-90 1510

Date Received: 09-11-90 1030

Alkalinity, Bicarb.(CaC03)	228.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	228.	mg/L
Chloride	68.	mg/L
COD	85.	mg/L
Cyanide, Total	<0.001	mg/L
Fluoride	0.9	mg/L
Nitrogen, Ammonia	2.47	mg/L
Nitrogen, Kjeldahl	2.84	mg/L
Phosphate, Total	10.3	mg/L
Solids, Dissolved	783.	mg/L
Sulfate	420.	mg/L
Aluminum	<0.01	mg/L
Antimony	<0.04	mg/L
Arsenic	0.063	mg/L
Barium	0.08	mg/L
Boron	0.46	mg/L
Cadmium	<0.005	mg/L
Calcium	176.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Iron	10.6	mg/L
Lead	0.06	mg/L
Magnesium	13.9	mg/L
Manganese	0.51	mg/L
Mercury	<0.0002	mg/L
Nickel	<0.01	mg/L
Potassium	5.32	mg/L
Sodium	24.9	mg/L

Kelly Jones

Kelly Jones
Project Manager

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ANALYTICAL REPORT

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310 West Wisconsin Ave
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10-02-90

Sample No.: 117317

Sample Description: MW12-02
CHI28770.AOMN; DuPont East Chicago

Date Taken: 09-10-90 1510

Date Received: 09-11-90 1030

Zinc	0.019	mg/L

Kelly Jones

Kelly Jones
Project Manager

J-262

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
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Milwaukee WI 53201

10-02-90

Sample No.: 117317

Sample Description: MW12-02
DuPont

Date Taken: 09-10-90 1510

Date Received: 09-11-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	193.	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117317

Sample Description: MW12-02
DuPont

Date Taken: 09-10-90 1510

Date Received: 09-11-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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CH2M HILL
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10-02-90

Sample No.: 117317

Sample Description: MW12-02
DuPont

Date Taken: 09-10-90 1510

Date Received: 09-11-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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CH2M HILL
310 West Wisconsin Ave
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Milwaukee WI 53201

10-02-90

Sample No.: 117317

Sample Description: MW12-02
DuPont

Date Taken: 09-10-90 1510

Date Received: 09-11-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117317

Sample Description: MW12-02
DuPont

Date Taken: 09-10-90 1510

Date Received: 09-11-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
Project Manager

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NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117683

Page 1

Sample Description: MW13-02; Grab
DuPont-East Chicago; C1181500.KO.MN

Date Taken: 09-12-90 1620

Date Received: 09-13-90 1000

Alkalinity, Bicarb.(CaC03)	<1.	mg/L
Alkalinity, Carb. (CaC03)	4800.	mg/L
Alkalinity, Total (CaC03)	7000.	mg/L
Chloride	30.	mg/L
COD	760.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	3.	mg/L
Nitrogen, Ammonia	14.1	mg/L
Nitrogen, Kjeldahl	16.4	mg/L
Phosphate, Total	23.5	mg/L
Solids, Dissolved	11,500.	mg/L
Sulfate	180.	mg/L
Aluminum	0.90	mg/L
Antimony	<0.04	mg/L
Arsenic	0.09	mg/L
Barium	0.51	mg/L
Boron	0.74	mg/L
Cadmium	<0.005	mg/L
Calcium	0.188	mg/L
Chromium, Hexavalent	<0.2	mg/L
Chromium, Total	0.010	mg/L
Copper	0.06	mg/L
Iron	1.63	mg/L
Lead	0.08	mg/L
Magnesium	0.040	mg/L
Manganese	<0.01	mg/L
Mercury	<0.0004	mg/L
Nickel	0.02	mg/L
Potassium	3.1	mg/L
Sodium	3600.	mg/L

Kelly Jones
Project Manager

NET
NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117683

Page 2

Sample Description: MW13-02; Grab
DuPont-East Chicago; C1181500.KO.MN

Date Taken: 09-12-90 1620

Date Received: 09-13-90 1000

Zinc	0.160	mg/L

Kelly Jones

Kelly Jones
Project Manager

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NET Midwest, Inc.
Bartlett Division
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Bartlett, IL 60103

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117683

Sample Description: MW13-02
DuPont

Date Taken: 09-12-90 1620

Date Received: 09-13-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117683

Sample Description: MW13-02
DuPont

Date Taken: 09-12-90 1620

Date Received: 09-13-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117683

Sample Description: MW13-02
DuPont

Date Taken: 09-12-90 1620

Date Received: 09-13-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
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Milwaukee WI 53201

01-03-91

Sample No.: 117683

Sample Description: MW13-02
DuPont

Date Taken: 09-12-90 1620

Date Received: 09-13-90 1000

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
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Milwaukee WI 53201

01-03-91

Sample No.: 117683

Sample Description: MW13-02
DuPont

Date Taken: 09-12-90 1620

Date Received: 09-13-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	208.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
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Bartlett Division
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117684

Page 8

Sample Description: FRMW13-02; Grab
DuPont-East Chicago

Date Taken: 09-12-90 1620

Date Received: 09-13-90 1000

Alkalinity, Bicarb.(CaC03)	<1.	mg/L
Alkalinity, Carb. (CaC03)	5600.	mg/L
Alkalinity, Total (CaC03)	7600.	mg/L
Chloride	30.	mg/L
COD	760.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	4.	mg/L
Nitrogen, Ammonia	14.3	mg/L
Nitrogen, Kjeldahl	18.9	mg/L
Phosphate, Total	23.0	mg/L
Solids, Dissolved	11,700.	mg/L
Sulfate	160.	mg/L
Aluminum	0.86	mg/L
Antimony	<0.04	mg/L
Arsenic	0.08	mg/L
Barium	0.39	mg/L
Boron	3.10	mg/L
Cadmium	<0.005	mg/L
Calcium	0.190	mg/L
Chromium, Hexavalent	<0.2	mg/L
Chromium, Total	0.012	mg/L
Copper	0.08	mg/L
Iron	1.38	mg/L
Lead	0.15	mg/L
Magnesium	0.045	mg/L
Manganese	<0.01	mg/L
Mercury	<0.0004	mg/L
Nickel	0.03	mg/L
Potassium	2.8	mg/L
Sodium	3080.	mg/L

Kelly Jones
Kelly Jones
Project Manager

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Milwaukee WI 53201

10-10-90

Sample No.: 117684

Page 9

Sample Description: FRMW13-02; Grab
DuPont-East Chicago

Date Taken: 09-12-90 1620

Date Received: 09-13-90 1000

Zinc	0.150	mg/L

Kelly Jones
Project Manager

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01-03-91

Sample No.: 117684

Sample Description: FRMW13-02
DuPont

Date Taken: 09-12-90 1620

Date Received: 09-13-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	10.9	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	2.1	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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Milwaukee WI 53201

01-03-91

Sample No.: 117684

Sample Description: FRMW13-02
DuPont

Date Taken: 09-12-90 1620

Date Received: 09-13-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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01-03-91

Sample No.: 117684

Sample Description: FRMW13-02
DuPont

Date Taken: 09-12-90 1620

Date Received: 09-13-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
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CH2M HILL
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Milwaukee WI 53201

01-03-91

Sample No.: 117684

Sample Description: FRMW13-02
DuPont

Date Taken: 09-12-90 1620

Date Received: 09-13-90 1000

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Milwaukee WI 53201

01-03-91

Sample No.: 117684

Sample Description: FRMW13-02
DuPont

Date Taken: 09-12-90 1620

Date Received: 09-13-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	198.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117646

Page 8

Sample Description: MW14-02
DuPont-East Chicago; CHI28770.AO.MN

Date Taken: 09-12-90 1055

Date Received: 09-13-90 1000

Alkalinity, Bicarb.(CaC03)	156.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	156.	mg/L
Chloride	670.	mg/L
COD	14.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	4.	mg/L
Nitrogen, Ammonia	17.2	mg/L
Nitrogen, Kjeldahl	19.0	mg/L
Phosphate, Total	1.55	mg/L
Solids, Dissolved	3490.	mg/L
Sulfate	1000.	mg/L
Aluminum	0.13	mg/L
Antimony	0.06	mg/L
Arsenic	0.014	mg/L
Barium	0.11	mg/L
Boron	0.26	mg/L
Cadmium	<0.005	mg/L
Calcium	731.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Iron	23.3	mg/L
Lead	<0.04	mg/L
Magnesium	87.5	mg/L
Manganese	1.00	mg/L
Mercury	<0.0002	mg/L
Nickel	0.02	mg/L
Potassium	3.95	mg/L
Sodium	41.5	mg/L

Kelly Jones

Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117646

Page 9

Sample Description: MW14-02
DuPont-East Chicago; CHI28770.AO.MN

Date Taken: 09-12-90 1055

Date Received: 09-13-90 1000

Zinc	2.11	mg/L

Kelly Jones

Kelly Jones
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
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Milwaukee WI 53201

10-10-90

Sample No.: 117646

Sample Description: MW14-02
DuPont

Date Taken: 09-12-90 1055

Date Received: 09-13-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117646

Sample Description: MW14-02
DuPont

Date Taken: 09-12-90 1055

Date Received: 09-13-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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ANALYTICAL REPORT

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CH2M HILL
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Milwaukee WI 53201

10-10-90

Sample No.: 117646

Sample Description: MW14-02
DuPont

Date Taken: 09-12-90 1055

Date Received: 09-13-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117646

Sample Description: MW14-02
DuPont

Date Taken: 09-12-90 1055

Date Received: 09-13-90 1000

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	15.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

NET NATIONAL ENVIRONMENTAL TESTING, INC.

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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117646

Sample Description: MW14-02
DuPont

Date Taken: 09-12-90 1055

Date Received: 09-13-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn

Neal E. Cleghorn
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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

CORRECTED REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117399

Sample Description: MW15-02
CHI28770.PO.MN; DuPont East Chicago

Date Taken: 09-11-90 1803

Date Received: 09-12-90 1030

Alkalinity, Bicarb.(CaC03)	440.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	440.	mg/L
Chloride	40.	mg/L
COD	68.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	11.	mg/L
Nitrogen, Ammonia	0.70	mg/L
Nitrogen, Kjeldahl	2.46	mg/L
Phosphate, Total	2.77	mg/L
Solids, Dissolved	2630.	mg/L
Sulfate	1900.	mg/L
Aluminum	0.12	mg/L
Antimony	<0.04	mg/L
Arsenic	0.26	mg/L
Barium	<0.01	mg/L
Boron	0.40	mg/L
Cadmium	0.006	mg/L
Calcium	519.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Iron	15.0	mg/L
Lead	<0.04	mg/L
Magnesium	94.0	mg/L
Manganese	0.72	mg/L
Mercury	<0.0002	mg/L
Nickel	<0.01	mg/L
Potassium	8.3	mg/L
Sodium	83.7	mg/L

Kelly Jones
Project Manager

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ANALYTICAL REPORT

CORRECTED REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117399

Sample Description: MW15-02
CHI28770.PO.MN; DuPont East Chicago

Date Taken: 09-11-90 1803

Date Received: 09-12-90 1030

Zinc	2.49	mg/L

Kelly Jones
Project Manager

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Bartlett Division
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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117399

Sample Description: MW15-02
DuPont

Date Taken: 09-11-90 1803

Date Received: 09-12-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117399

Sample Description: MW15-02
DuPont

Date Taken: 09-11-90 1803

Date Received: 09-12-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117399

Sample Description: MW15-02
DuPont

Date Taken: 09-11-90 1803

Date Received: 09-12-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117399

Sample Description: MW15-02
DuPont

Date Taken: 09-11-90 1803

Date Received: 09-12-90 1000

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
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Bartlett Division
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Bartlett, IL 60103

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-22-90

Sample No.: 117399

Sample Description: MW15-02
DuPont

Date Taken: 09-11-90 1803

Date Received: 09-12-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117318

Sample Description: MW16-02
CHI28770.AOMN; DuPont East Chicago

Date Taken: 09-10-90 1711

Date Received: 09-11-90 1030

Alkalinity, Bicarb.(CaC03)	204.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	204.	mg/L
Chloride	2,300.	mg/L
COD	122.	mg/L
Fluoride	4.	mg/L
Nitrogen, Ammonia	77.4	mg/L
Nitrogen, Kjeldahl	98.5	mg/L
Solids, Dissolved	4720.	mg/L
Sulfate	540.	mg/L
Aluminum	0.04	mg/L
Arsenic	0.002	mg/L
Barium	0.33	mg/L
Calcium	768.	mg/L
Iron	10.5	mg/L
Magnesium	316.	mg/L
Manganese	3.09	mg/L
Potassium	36.2	mg/L
Sodium	43.8	mg/L
Zinc	35.8	mg/L

Kelly Jones

Kelly Jones
Project Manager

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NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117319

Sample Description: MW17-02
CHI28770.AOMN; DuPont East Chicago

Date Taken: 09-10-90 1840

Date Received: 09-11-90 1030

Alkalinity, Bicarb.(CaC03)	208.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	208.	mg/L
Chloride	2,200.	mg/L
COD	119.	mg/L
Fluoride	4.	mg/L
Nitrogen, Ammonia	32.9	mg/L
Nitrogen, Kjeldahl	41.5	mg/L
Solids, Dissolved	4150.	mg/L
Sulfate	300.	mg/L
Aluminum	0.07	mg/L
Arsenic	0.001	mg/L
Barium	1.05	mg/L
Calcium	705.	mg/L
Iron	137.	mg/L
Magnesium	279.	mg/L
Manganese	2.62	mg/L
Potassium	13.0	mg/L
Sodium	33.8	mg/L
Zinc	227.	mg/L

Kelly Jones

Kelly Jones
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117732

Page 1

Sample Description: MW18-02; Grab
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 1445

Date Received: 09-13-90 1000

Alkalinity, Bicarb.(CaC03)	392.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	392.	mg/L
Chloride	150.	mg/L
COD	61.	mg/L
Fluoride	17.	mg/L
Phosphate, Total	1.67	mg/L
Solids, Dissolved	5440.	mg/L
Sulfate	3900.	mg/L
Arsenic	0.05	mg/L
Calcium	430.	mg/L
Iron	42.7	mg/L
Magnesium	77.0	mg/L
Manganese	1.96	mg/L
Potassium	11.8	mg/L
Sodium	1010.	mg/L
Zinc	4.52	mg/L

Kelly Jones

Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117332

Sample Description: MW18-02
DuPont

Date Taken: 09-12-90 1445

Date Received: 09-13-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	6.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117332

Sample Description: MW18-02
DuPont

Date Taken: 09-12-90 1445

Date Received: 09-13-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

09-26-90

Sample No.: 117695

Sample Description: FRMW18-02; Grab
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 1445

Date Received: 09-12-90 1830

PCB's

PCB-1016	<1.0	ug/L
PCB-1221	<1.0	ug/L
PCB-1232	<1.0	ug/L
PCB-1242	<1.0	ug/L
PCB-1248	<1.0	ug/L
PCB-1254	<1.0	ug/L
PCB-1260	<1.0	ug/L

Neal E. Cleghorn
Project Manager

NET
NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117447

Sample Description: MW19-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: 09-11-90 1210

Date Received: 09-12-90 1030

Alkalinity, Bicarb.(CaC03)	420.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	420.	mg/L
Chloride	400.	mg/L
COD	51.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	6.	mg/L
Nitrogen, Ammonia	7.15	mg/L
Nitrogen, Kjeldahl	7.55	mg/L
Phosphate, Total	1.08	mg/L
Solids, Dissolved	4380.	mg/L
Sulfate	3500.	mg/L
Aluminum	0.06	mg/L
Antimony	<0.04	mg/L
Arsenic	0.04	mg/L
Barium	0.03	mg/L
Boron	0.81	mg/L
Cadmium	<0.005	mg/L
Calcium	626.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.005	mg/L
Copper	<0.01	mg/L
Iron	41.9	mg/L
Lead	<0.04	mg/L
Magnesium	150.	mg/L
Manganese	0.48	mg/L
Mercury	<0.0002	mg/L
Nickel	<0.01	mg/L
Potassium	16.0	mg/L
Sodium	372.	mg/L

Kelly Jones

Kelly Jones
Project Manager

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117447

Sample Description: MW19-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: 09-11-90 1210

Date Received: 09-12-90 1030

Zinc	2.88	mg/L

Kelly Jones

Kelly Jones
Project Manager

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117447

Sample Description: MW19-02
DuPont

Date Taken: 09-11-90 1210

Date Received: 09-12-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	1.2	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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10-02-90

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DuPont

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Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

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10-02-90

Sample No.: 117447

Sample Description: MW19-02
DuPont

Date Taken: 09-11-90 1210

Date Received: 09-12-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E Cleghorn

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10-02-90

Sample No.: 117447

Sample Description: MW19-02
DuPont

Date Taken: 09-11-90 1210

Date Received: 09-12-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

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10-02-90

Sample No.: 117447

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DuPont

Date Taken: 09-11-90 1210

Date Received: 09-12-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117442

Sample Description: MW20-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: 09-11-90 1335

Date Received: 09-12-90 1030

Alkalinity, Bicarb.(CaC03)	570.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	570.	mg/L
Chloride	310.	mg/L
COD	126.	mg/L
Cyanide, Total	<0.02	mg/L
Fluoride	7.	mg/L
Nitrogen, Ammonia	5.54	mg/L
Nitrogen, Kjeldahl	4.90	mg/L
Phosphate, Total	4.45	mg/L
Solids, Dissolved	5200.	mg/L
Sulfate	3500.	mg/L
Aluminum	0.09	mg/L
Antimony	<0.04	mg/L
Arsenic	0.005	mg/L
Barium	0.03	mg/L
Boron	1.22	mg/L
Cadmium	<0.005	mg/L
Calcium	320.	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Iron	0.20	mg/L
Lead	0.05	mg/L
Magnesium	108.	mg/L
Manganese	0.62	mg/L
Mercury	<0.0002	mg/L
Nickel	<0.01	mg/L
Potassium	30.5	mg/L
Sodium	986.	mg/L

Kelly Jones

Kelly Jones
Project Manager

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10-02-90

Sample No.: 117442

Sample Description: MW20-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: 09-11-90 1335

Date Received: 09-12-90 1030

Zinc	0.071	mg/L

Kelly Jones

Kelly Jones
Project Manager

J-310

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10-02-90

Sample No.: 117442

Sample Description: MW20-02
DuPont

Date Taken: 09-11-90 1335

Date Received: 09-12-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	44.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	6.7	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	1.3	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
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Sample No.: 117442

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DuPont

Date Taken: 09-11-90 1335

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Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E Cleghorn

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B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
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N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

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10-02-90

Sample No.: 117442

Sample Description: MW20-02
DuPont

Date Taken: 09-11-90 1335

Date Received: 09-12-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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Milwaukee WI 53201

10-02-90

Sample No.: 117443

Sample Description: FRMW20-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: 09-11-90 1335

Date Received: 09-12-90 1030

Alkalinity, Bicarb.(CaC03)	550.	mg/L
Alkalinity, Carb. (CaC03)	60.	mg/L
Alkalinity, Total (CaC03)	610.	mg/L
Chloride	370.	mg/L
COD	142.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	8.	mg/L
Nitrogen, Ammonia	5.32	mg/L
Nitrogen, Kjeldahl	5.62	mg/L
Phosphate, Total	4.45	mg/L
Solids, Dissolved	5250.	mg/L
Sulfate	3900.	mg/L
Aluminum	0.04	mg/L
Antimony	<0.04	mg/L
Arsenic	0.005	mg/L
Barium	<0.01	mg/L
Boron	1.27	mg/L
Cadmium	<0.005	mg/L
Calcium	324.	mg/L
Chromium, Hexavalent	<0.1	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Iron	0.12	mg/L
Lead	<0.04	mg/L
Magnesium	110.	mg/L
Manganese	0.56	mg/L
Mercury	0.0008	mg/L
Nickel	<0.01	mg/L
Potassium	30.8	mg/L
Sodium	1190.	mg/L

Kelly Jones

Kelly Jones
Project Manager

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10-02-90

Sample No.: 117443

Sample Description: FRMW20-02
CHI28770.AO.MN; DuPont East Chicago

Date Taken: 09-11-90 1335

Date Received: 09-12-90 1030

Zinc	0.029	mg/L

Kelly Jones

Kelly Jones
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10-02-90

Sample No.: 117443

Sample Description: FRMW20-02
DuPont

Date Taken: 09-11-90 1335

Date Received: 09-12-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	53.7	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	6.4	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	1.3	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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310 West Wisconsin Ave
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Milwaukee WI 53201

10-02-90

Sample No.: 117443

Sample Description: FRMW20-02
DuPont

Date Taken: 09-11-90 1335

Date Received: 09-12-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117443

Sample Description: FRMW20-02
DuPont

Date Taken: 09-11-90 1335

Date Received: 09-12-90 1030

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
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CH2M HILL
310 West Wisconsin Ave
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Milwaukee WI 53201

10-02-90

Sample No.: 117443

Sample Description: FRMW20-02
DuPont

Date Taken: 09-11-90 1335

Date Received: 09-12-90 1030

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	20.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

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Bartlett Division
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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-02-90

Sample No.: 117443

Sample Description: FRMW20-02
DuPont

Date Taken: 09-11-90 1335

Date Received: 09-12-90 1030

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117693

Page 8

Sample Description: SW01-02; Grab
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 1435

Date Received: 09-13-90 1000

Alkalinity, Bicarb.(CaC03)	136.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	136.	mg/L
Chloride	47.	mg/L
COD	105.	mg/L
Cyanide, Total	0.008	mg/L
Fluoride	0.5	mg/L
Nitrogen, Ammonia	0.48	mg/L
Nitrogen, Kjeldahl	1.77	mg/L
Phosphate, Total	0.83	mg/L
Solids, Dissolved	293.	mg/L
Sulfate	68.	mg/L
Aluminum	1.55	mg/L
Antimony	<0.04	mg/L
Arsenic	0.001	mg/L
Barium	0.09	mg/L
Boron	0.15	mg/L
Cadmium	<0.005	mg/L
Calcium	45.2	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.048	mg/L
Copper	0.06	mg/L
Iron	17.1	mg/L
Lead	<0.04	mg/L
Magnesium	15.1	mg/L
Manganese	0.30	mg/L
Mercury	<0.0002	mg/L
Nickel	0.01	mg/L
Potassium	4.59	mg/L
Sodium	21.8	mg/L

Kelly Jones
Kelly Jones
Project Manager

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Milwaukee WI 53201

10-10-90

Sample No.: 117693

Page 9

Sample Description: SW01-02; Grab
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 1435

Date Received: 09-13-90 1000

Zinc	0.470	mg/L

Kelly Jones
Kelly Jones
Project Manager

NET
NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-01-90

Sample No.: 117693

Sample Description: SW01-02
DuPont

Date Taken: 09-12-90 1435

Date Received: 09-13-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	4.7	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	1.2	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-01-90

Sample No.: 117693

Sample Description: SW01-02
DuPont

Date Taken: 09-12-90 1435

Date Received: 09-13-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Milwaukee WI 53201

10-01-90

Sample No.: 117693

Sample Description: SW01-02
DuPont

Date Taken: 09-12-90 1435

Date Received: 09-13-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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NET Midwest, Inc.
Bartlett Division
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Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-01-90

Sample No.: 117693

Sample Description: SW01-02
DuPont

Date Taken: 09-12-90 1435

Date Received: 09-13-90 1000

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-01-90

Sample No.: 117693

Sample Description: SW01-02
DuPont

Date Taken: 09-12-90 1435

Date Received: 09-13-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117647

Page 15

Sample Description: SW02-02
DuPont-East Chicago; CHI28770.AO.MN

Date Taken: 09-12-90 1103

Date Received: 09-13-90 1000

Alkalinity, Bicarb.(CaC03)	212.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	212.	mg/L
Chloride	40.	mg/L
COD	115.	mg/L
Cyanide, Total	0.010	mg/L
Fluoride	0.4	mg/L
Nitrogen, Ammonia	0.81	mg/L
Nitrogen, Kjeldahl	4.49	mg/L
Phosphate, Total	6.29	mg/L
Solids, Dissolved	217.	mg/L
Sulfate	70.	mg/L
Aluminum	3.30	mg/L
Antimony	<0.04	mg/L
Arsenic	0.017	mg/L
Barium	0.25	mg/L
Boron	0.35	mg/L
Cadmium	<0.005	mg/L
Calcium	50.9	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.098	mg/L
Copper	0.06	mg/L
Iron	36.3	mg/L
Lead	0.11	mg/L
Magnesium	17.2	mg/L
Manganese	0.46	mg/L
Mercury	<0.0002	mg/L
Nickel	0.01	mg/L
Potassium	5.53	mg/L
Sodium	24.0	mg/L

Kelly Jones

Kelly Jones
Project Manager

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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117647

Page 16

Sample Description: SW02-02
DuPont-East Chicago; CHI28770.AO.MN

Date Taken: 09-12-90 1103

Date Received: 09-13-90 1000

Zinc	0.760	mg/L

Kelly Jones

Kelly Jones
Project Manager

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Bartlett Division
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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117647

Sample Description: SW02-02
DuPont

Date Taken: 09-12-90 1103

Date Received: 09-13-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	33.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117647

Sample Description: SW02-02
DuPont

Date Taken: 09-12-90 1103

Date Received: 09-13-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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NET Midwest, Inc.
Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117647

Sample Description: SW02-02
DuPont

Date Taken: 09-12-90 1103

Date Received: 09-13-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117647

Sample Description: SW02-02
DuPont

Date Taken: 09-12-90 1103

Date Received: 09-13-90 1000

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117647

Sample Description: SW02-02
DuPont

Date Taken: 09-12-90 1103

Date Received: 09-13-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117694

Page 15

Sample Description: SW03-02; Grab
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 1525

Date Received: 09-13-90 1000

Alkalinity, Bicarb.(CaC03)	136.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	136.	mg/L
Chloride	46.	mg/L
COD	48.	mg/L
Cyanide, Total	0.009	mg/L
Fluoride	0.4	mg/L
Nitrogen, Ammonia	0.48	mg/L
Nitrogen, Kjeldahl	0.49	mg/L
Phosphate, Total	0.75	mg/L
Solids, Dissolved	317.	mg/L
Sulfate	72.	mg/L
Aluminum	7.21	mg/L
Antimony	<0.04	mg/L
Arsenic	0.026	mg/L
Barium	0.17	mg/L
Boron	0.28	mg/L
Cadmium	0.006	mg/L
Calcium	63.0	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.305	mg/L
Copper	0.22	mg/L
Iron	124.	mg/L
Lead	0.72	mg/L
Magnesium	20.7	mg/L
Manganese	1.68	mg/L
Mercury	0.0009	mg/L
Nickel	0.01	mg/L
Potassium	5.34	mg/L
Sodium	27.3	mg/L

Kelly Jones

Kelly Jones
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117694

Page 16

Sample Description: SW03-02; Grab
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 1525

Date Received: 09-13-90 1000

Zinc	3.35	mg/L

Kelly Jones

Kelly Jones
Project Manager

J-338

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
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Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-01-90

Sample No.: 117694

Sample Description: SW03-02
DuPont

Date Taken: 09-12-90 1525

Date Received: 09-13-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	1.2	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-01-90

Sample No.: 117694

Sample Description: SW03-02
DuPont

Date Taken: 09-12-90 1525

Date Received: 09-13-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-01-90

Sample No.: 117694

Sample Description: SW03-02
DuPont

Date Taken: 09-12-90 1525

Date Received: 09-13-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-01-90

Sample No.: 117694

Sample Description: SW03-02
DuPont

Date Taken: 09-12-90 1525

Date Received: 09-13-90 1000

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett Division
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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
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Milwaukee WI 53201

10-01-90

Sample No.: 117694

Sample Description: SW03-02
DuPont

Date Taken: 09-12-90 1525

Date Received: 09-13-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117668

Page 22

Sample Description: FB01-02;Grab; Equipment Blank
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 0730

Date Received: 09-13-90 1000

Alkalinity, Bicarb.(CaC03)	6.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	6.	mg/L
Chloride	<1.	mg/L
COD	3.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	<0.1	mg/L
Nitrogen, Ammonia	0.03	mg/L
Nitrogen, Kjeldahl	<0.05	mg/L
Phosphate, Total	<0.01	mg/L
Solids, Dissolved	13.	mg/L
Sulfate	<1.	mg/L
Aluminum	0.03	mg/L
Antimony	<0.04	mg/L
Arsenic	<0.01	mg/L
Barium	0.02	mg/L
Boron	0.11	mg/L
Cadmium	<0.005	mg/L
Calcium	0.179	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	0.006	mg/L
Copper	0.07	mg/L
Iron	0.10	mg/L
Lead	<0.04	mg/L
Magnesium	0.052	mg/L
Manganese	<0.01	mg/L
Mercury	<0.0002	mg/L
Nickel	<0.01	mg/L
Potassium	0.029	mg/L
Sodium	0.131	mg/L

Kelly Jones

Kelly Jones
Project Manager

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Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117668

Page 23

Sample Description: FB01-02;Grab; Equipment Blank
CH128770.AO.MN; DuPont-East Chicago

Date Taken: 09-12-90 0730

Date Received: 09-13-90 1000

Zinc	0.060	mg/L

Kelly Jones

Kelly Jones
Project Manager

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ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117668

Sample Description: FB01-02
DuPont

Date Taken: 09-12-90 0730

Date Received: 09-13-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117668

Sample Description: FB01-02
DuPont

Date Taken: 09-12-90 0730

Date Received: 09-13-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

J-347

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NET Midwest, Inc.
Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117668

Sample Description: FB01-02
DuPont

Date Taken: 09-12-90 0730

Date Received: 09-13-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L
Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

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Bartlett Division
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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117668

Sample Description: FB01-02
DuPont

Date Taken: 09-12-90 0730

Date Received: 09-13-90 1000

N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Bartlett, IL 60103

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ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

01-03-91

Sample No.: 117668

Sample Description: FB01-02
DuPont

Date Taken: 09-12-90 0730

Date Received: 09-13-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E. Cleghorn
Project Manager

J-350

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117645

Page 1

Sample Description: FB02-02
DuPont-East Chicago; CHI28770.AO.MN

Date Taken: 09-11-90 1500

Date Received: 09-13-90 1000

Alkalinity, Bicarb.(CaC03)	6.	mg/L
Alkalinity, Carb. (CaC03)	<1.	mg/L
Alkalinity, Total (CaC03)	6.	mg/L
Chloride	<1.	mg/L
COD	<3.	mg/L
Cyanide, Total	<0.002	mg/L
Fluoride	<0.1	mg/L
Nitrogen, Ammonia	<0.05	mg/L
Nitrogen, Kjeldahl	<0.02	mg/L
Phosphate, Total	0.31	mg/L
Solids, Dissolved	<1.	mg/L
Sulfate	<1.	mg/L
Aluminum	0.03	mg/L
Antimony	<0.04	mg/L
Arsenic	<0.001	mg/L
Barium	0.01	mg/L
Boron	0.04	mg/L
Cadmium	<0.005	mg/L
Calcium	0.051	mg/L
Chromium, Hexavalent	<0.01	mg/L
Chromium, Total	<0.005	mg/L
Copper	0.08	mg/L
Iron	<0.02	mg/L
Lead	<0.04	mg/L
Magnesium	0.017	mg/L
Manganese	<0.01	mg/L
Mercury	<0.0002	mg/L
Nickel	<0.01	mg/L
Potassium	0.022	mg/L
Sodium	0.045	mg/L

Kelly Jones
Kelly Jones
Project Manager

NET
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ANALYTICAL REPORT

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10-10-90

Sample No.: 117645

Page 2

Sample Description: FB02-02
DuPont-East Chicago; CHI28770.AO.MN

Date Taken: 09-11-90 1500

Date Received: 09-13-90 1000

Zinc	0.010	mg/L

Kelly Jones
Kelly Jones
Project Manager

J-352

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Bartlett Division
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ANALYTICAL REPORT

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CH2M HILL
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Milwaukee WI 53201

10-10-90

Sample No.: 117645

Sample Description: FB02-02
DuPont

Date Taken: 09-11-90 1500

Date Received: 09-13-90 1000

ACID TARGET COMPOUNDS

2-Chlorophenol	<10.	ug/L
Phenol	<10.	ug/L
2-Methylphenol	<10.	ug/L
4-Methylphenol	<10.	ug/L
Benzoic acid	<50.	ug/L
2-Nitrophenol	<50.	ug/L
2,4-Dimethylphenol	<10.	ug/L
2,4-Dichlorophenol	<10.	ug/L
4-Chloro-3-methylphenol	<10.	ug/L
2,4,6-Trichlorophenol	<10.	ug/L
2,4,5-Trichlorophenol	<50.	ug/L
2,4-Dinitrophenol	<50.	ug/L
4-Nitrophenol	<50.	ug/L
2-Methyl-4,6-dinitrophenol	<50.	ug/L
Pentachlorophenol	<50.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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Milwaukee WI 53201

10-10-90

Sample No.: 117645

Sample Description: FB02-02
DuPont

Date Taken: 09-11-90 1500

Date Received: 09-13-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L

Neal E. Cleghorn

Neal E. Cleghorn
Project Manager

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10-10-90

Sample No.: 117645

Sample Description: FB02-02
DuPont

Date Taken: 09-11-90 1500

Date Received: 09-13-90 1000

cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L
Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E. Cleghorn

Neal E. Cleghorn
Project Manager

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10-10-90

Sample No.: 117645

Sample Description: FB02-02
DuPont

Date Taken: 09-11-90 1500

Date Received: 09-13-90 1000

B/N TARGET COMPOUNDS

Aniline	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
Benzyl alcohol	<10.	ug/L
Hexachloroethane	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
Isophorone	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L
Naphthalene	<10.	ug/L
4-Chloroaniline	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
2-Methylnaphthalene	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
3-Nitroaniline	<50.	ug/L
2-Nitroaniline	<50.	ug/L
4-Nitroaniline	<50.	ug/L
Acenaphthylene	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
Acenaphthene	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Bartlett Division
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Fax: (708) 289-5445

ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
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Milwaukee WI 53201

10-10-90

Sample No.: 117645

Sample Description: FB02-02
DuPont

Date Taken: 09-11-90 1500

Date Received: 09-13-90 1000

Fluorene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Dibenzofuran	<10.	ug/L
Diethyl phthalate	<10.	ug/L
N-Nitrosodiphenylamine	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Phenanthrene	<10.	ug/L
Anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
Fluoranthene	<10.	ug/L
Pyrene	<10.	ug/L
Benz(a)anthracene	<10.	ug/L
Chrysene	<10.	ug/L
Benzidine	<50.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Butyl benzyl phthalate	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

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CH2M HILL
310 West Wisconsin Ave
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Milwaukee WI 53201

10-10-90

Sample No.: 117645

Sample Description: FB02-02
DuPont

Date Taken: 09-11-90 1500

Date Received: 09-13-90 1000

Benzo(ghi)perylene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

Neal E. Cleghorn
Project Manager

J-358

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117644

Sample Description: TB01-02
DuPont

Date Taken: 09-11-90 1150

Date Received: 09-12-90 1030

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117644

Sample Description: TB01-02
DuPont

Date Taken: 09-11-90 1150

Date Received: 09-12-90 1030

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

J-360

NET NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Ms. Pixie Newman
CH2M HILL
310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117649

Sample Description: TB02-02
DuPont

Date Taken: 09-12-90 1240

Date Received: 09-13-90 1000

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/L
Vinyl chloride	<10.	ug/L
Bromomethane	<10.	ug/L
Chloroethane	<10.	ug/L
1,1-Dichloroethene	<1.0	ug/L
Carbon disulfide	<1.0	ug/L
Acetone	<10.	ug/L
Methylene chloride	<5.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
Vinyl acetate	<10.	ug/L
2-Butanone	<10.	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
Chloroform	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
Benzene	<1.0	ug/L
Carbon tetrachloride	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
4-Methyl-2-pentanone	<10.	ug/L
Toluene	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
1,1,2-Trichloroethane	<1.0	ug/L
Dibromochloromethane	<1.0	ug/L
2-Hexanone	<10.	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager

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ANALYTICAL REPORT

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310 West Wisconsin Ave
Suite 700 P.O. Box 2090
Milwaukee WI 53201

10-10-90

Sample No.: 117649

Sample Description: TB02-02
DuPont

Date Taken: 09-12-90 1240

Date Received: 09-13-90 1000

Tetrachloroethene	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Ethylbenzene	<1.0	ug/L
meta & para-Xylene	<1.0	ug/L
Bromoform	<1.0	ug/L
Styrene	<1.0	ug/L
ortho-Xylene	<1.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L

Neal E Cleghorn

Neal E. Cleghorn
Project Manager