# EXPANDED SITE INVESTIGATION
# DEAD CREEK PROJECT SITES
# AT CAHOKIA/SAUGET, ILLINOIS
# FINAL REPORT
# VOLUME 2 OF 2

May 1988

Prepared for:

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
Division of Land Pollution Control
2200 Churchill Road
P.O. Box 19276
Springfield, Illinois 62794-9276

**ecology and environment, inc.**
111 WEST JACKSON BLVD., CHICAGO, ILLINOIS 60604, TEL. 312-663-9415
International Specialists in the Environment
recycled paper

TABLE OF CONTENTS

VOLUME 2


| Appendix | | Page |
|---|---|---|
| A | CURRENT SITUATION REPORT. . . . . | A-1 |
| B | BORING LOGS AND MONITORING WELL DATA. . . . . | B-1 |
| C | AIR SAMPLING FLOW VOLUME CALCULATIONS AND CALIBRATION DATA. . . . . | C-1 |
| D | SAMPLE RESULTS. . . . . | D-1 |
| E | SUMMARY TABLES FOR SITE-SPECIFIC CONTAMINANT LOADING TO THE MISSISSIPPI RIVER. . . . . | E-1 |
| F | TOXICOLOGICAL PROFILES. . . . . | F-1 |

# APPENDIX A

## DESCRIPTION OF CURRENT SITUATION
## AT THE
## DEAD CREEK PROJECT SITES

## TABLE OF CONTENTS


| Section | Page |
|---|---|
| I. INTRODUCTION | 1 |
| II. GENERAL DESCRIPTION OF PROJECT AREA | 1 |
| Location | 1 |
| Areal Description and Topography | 1 |
| Climate | 6 |
| Geology | 6 |
| Hydrology | 13 |
| Surface Drainage | 13 |
| Groundwater | 14 |
| III. SITE SPECIFIC DESCRIPTIONS | 19 |
| Site G | G-1 |
| Site H | H-1 |
| Site I and Creek Sector A | IA-1 |
| Site J | J-1 |
| Site K | K-1 |
| Site L | L-1 |
| Site M | M-1 |
| Site N | N-1 |
| Site O | O-1 |
| Site P | P-1 |
| Site Q | Q-1 |
| Site R | R-1 |
| Creek Sector B | B-1 |
| Creek Sectors C-F | C-1 |

## LIST OF FIGURES


| Figure | | Page |
|---|---|---|
| 1 | Dead Creek Project Site Location Map | 2 |
| 2 | Site Reporting Designations for the Dead Creek Project | 3 |
| 3 | Boundaries of Engineering Plates for the Dead Creek Sites | 5 |
| 4 | Generalized Geologic Column for South-Central Illinois | 8 |
| 5 | Thickness of the Unconsolidated Valley Fill in the Dead Creek Study Area | 9 |
| 6 | Cross Section of the Valley Fill in the Vicnity of the Dead Creek Sites | 10 |
| G-1 | Dead Creek Site Area G With Sample Locations | G-3 |
| H-1 | Dead Creek Site Area H with Magnetic Anomalies | H-3 |
| IA-1 | Dead Creek Site Area I and Creek Sector A with Sampling Locations | IA-5 |
| J-1 | Dead Creek Site Area J | J-2 |
| K-1 | Dead Creek Site Area K | K-2 |
| L-1 | Dead Creek Site Area L with Sampling Locations | L-2 |
| M-1 | Dead Creek Site Area M with Sampling Locations | M-2 |
| N-1 | Dead Creek Site Area N with Sampling Locations in Creek Sector C | N-2 |
| O-1 | Former Sludge Lagoons and Contaminated Soil Areas at Site O | O-3 |
| P-1 | Dead Creek Site Area P | P-2 |
| Q-1 | Dead Creek Site Area Q with Sampling Locations | Q-2 |
| Q-2 | USEPA - FIT Subsurface Soil Sampling Locations at Site Q | Q-10 |
| R-1 | State and USEPA Sampling Locations at Site R | R-4 |
| B-1 | IEPA Sampling Locations at Creek Sector B and Site M | B-3 |
| B-2 | Locations of IEPA Monitoring Wells and Residential Wells Sampled in the Vicinity of Dead Creek | B-12 |
| C-1 | IEPA Sampling Locations Creek Sectors C through F | C-2 |

## LIST OF FIGURES (continued)


| Figure | |
|---|---|
| Plate 1 | Topographic Map of Site P |
| Plate 2 | Topographic Map of Site O |
| Plate 3 | Topographic Map of Site R and Northern Portion of Site Q |
| Plate 4 | Topographic Map of the Southern Portion of Site Q |
| Plate 5 | Topographic Map of Site J |
| Plate 6 | Topographic Map of Sites K and H |
| Plate 7 | Topographic Map of Site S |
| Plate 8 | Topographic Map of Sites I, H, G, Creek Sector A, and Northern Portion of Creek Sector B |
| Plate 9 | Topographic Map of Sites G, L, M, N, Southern Portion of H, Creek Sector B, and Northern Portion of Creek Sector C |
| Plate 10 | Topographic Map of Dead Creek, Includes Creek Sector D, Southern Portion of C, and Northern Portion of E |
| Plate 11 | Topographic Map of Dead Creek, Including Southern Portion of Creek Sector E, and Northern Portion of Creek Sector F |


NOTE: Plates 1 through 11 are attached herein under separate cover.

## LIST OF TABLES


| Table | | Page |
|---|---|---|
| G-1 | Analysis of Subsurface Soil Samples from Site G (Collected by IEPA in 1980 | G-4 |
| G-2 | Analysis of Waste Samples from Oily Pit at Site G (Collected by IEPA 10-1-84) | G-6 |
| IA-1 | Analysis of Water Samples from Creek Sector A (Collected by IEPA) | IA-3 |
| IA-2 | Analysis of Sediment Samples from Creek Sector A (Collected by IEPA) | IA-4 |
| M-1 | Analysis of Surface Water and Sediment Samples from Site M (Collected by IEPA 9-15-80) | M-4 |
| O-1 | Identified Organic Compounds in Samples from Trench Excavation at Site O (Collected July 20, 1984 by Russell and Axon, Inc.) | O-5 |
| O-2 | Analytical Results for Soil Samples at Site O (Split Samples Collected February 19, 1983 by IEPA and EEI) | O-6 |
| O-3 | Analytical Results for Soil Samples at Site O (Split Samples Collected March 12, 1983 by IEPA and EEI) | O-7 |
| Q-1 | Analysis of Surface and Ground Water Samples Collected by IEPA At Site Q | Q-4 |
| Q-2 | Analysis of Leachate Samples from Site Q (Collected October 28, 1981 and September 29, 1983 by IEPA) | Q-6 |
| Q-3 | Analysis of Flyash Used as Cover from Stockpiles at Site Q (Samples by IEPA in 1972) | Q-8 |
| Q-4 | Identified Organic Compounds in Subsurface Soil Samples from Site Q (Samples Collected July 13 Through July 20, 1983 by Ecology and Environment, Inc.) | Q-11 thru Q-15 |
| R-1 | A Listing of Waste Types and Approximate Quantities Deposited at Site R as Reported by Monsanto | R-2 |
| R-2 | Analysis of Ground Water Samples from Site R (Collected August 22, 1968 by the Illinois Department of Public Health) | R-5 |
| R-3 | Analysis of Ground Water Samples from Site R (Collected December 5, 1972 by IEPA) | R-6 |

| Table | | Page |
|---|---|---|


R-4 Analysis of Surface Water Samples From Waste Ponds at Site R (Collected January 19, 1973 by IEPA) ..... R-7

R-5 Analysis of Ground Water Samples From Site R (Collected February 22, 1973 by IEPA) ..... R-9

R-6 Analysis of Ground Water Samples from Site R (Collected May 6, 1974 by IEPA) ..... R-10

R-7 Analysis of Ground Water Samples from Site R (Collected October 28, 1975 by IEPA) ..... R-11

R-8 Analysis of Ground Water Samples from Site R (Collected February 17, 1976 by IEPA) ..... R-12

R-9 Analysis of Ground Water Samples from Site R (Collected by IEPA on October 12, 1979) ..... R-14

R-10 Organic Analysis of Ground Water Samples from Site R (Collected by IEPA on March 25, 1981) ..... R-16

R-11 Analysis of Leachate and Sediment Samples from Site R (Collected October 2, 1981 by IEPA) ..... R-17

R-12 Compilation of Leachate and Sediment Samples Collected at Site R in November, 1981 ..... R-18

R-13 Analysis of Tetra Through Octachlorinated Dibenzo-P-Dioxins and Dibenzofurans in Leachate Samples from Site R (Collected November 12, 1981 by Ecology and Environment, Inc.) ..... R-20

R-14 Inorganic Analysis of Leachate Samples from Site R (Collected November 12, 1981 by Ecology and Environment, Inc.) ..... R-21

R-15 Inorganic Analysis of Sediment Samples from Site R (Collected November 12, 1981 by Ecology and Environment, Inc.) ..... R-22

R-16 Identified Organic Compounds in Leachate and Sediment Samples from Site R (Collected November 12, 1981 by Ecology and Environment, Inc.) ..... R-23

R-17 Comparative Analysis of Chemicals Detected in Samples at Site R and Those Reported to have been Disposed of or Manufactured by Monsanto ..... R-26

B-1 Analysis of Soil Samples in the Northern Portion of Creek Sector B (Collected by IEPA 9/8/80 through 10/25/80) ..... B-4

| Table | | Page |
|---|---|---|


B-2 Analysis of Subsurface Soil Samples at Boring Location P-1 in Creek Sector B (Collected by IEPA 9-8-80) ..... B-6

B-3 Analysis of Soil Samples in the Southern Portion of Creek Sector B (Collectd by IEPA 9/8/80 through 10/25/80) ..... B-7

B-4 Organic Analysis of Sediment Samples from Dead Creek, Sector B (Split Samples-IEPA and Monsanto Collected 10/2/80) ..... B-9

B-5 Inorganic Analysis of Sediment Samples from Dead Creek, Sector B (Split Samples - IEPA and Monsanto Collected 10/2/80) ..... B-10

B-6 Analysis of Ground Water Samples from the IEPA Monitoring Wells (Collected 10/23/80) ..... B-13

B-7 Analysis of Ground Water Samples from the IEPA Monitoring Wells (Collected 1/28/81) ..... B-14

B-8 Analysis of Ground Water Samples from the IEPA Monitoring Wells (Collected 3/11/81) ..... B-15

B-9 Analysis of Residential Well and Seepage Samples Collected By IEPA ..... B-17

B-10 Analysis of Identified Organics in Ground Water and Soil Samples in the Vicinity of Creek Sector B (Collected by USEPA 3/3/82) ..... B-18

B-11 Inorganic Analysis of Ground Water and Soil Samples in the Vicinity of Creek Sector B (Collected by USEPA 3/3/82) ..... B-19

C-1 Analysis of Surface Water and Sediment Samples from Creek Sectors C through F (Collected by IEPA 9/25/80) ..... C-3

# I. INTRODUCTION

The RI portion of the Dead Creek Project Remedial Investigation/Feasibility Study, as described in the Project Work Plan, includes eleven tasks to be completed. Task 5, Description of Current Situation, calls for Ecology and Environment, Inc. to prepare a description of the background information pertinent to the area and its problems and outline the purpose and need for remedial investigation in the area.

This report was prepared to provide the information on and a description of the current situation of the sites in the Dead Creek Project area. The report is organized to provide an area wide description followed by a detailed site by site description. The site by site description provides a detailed presentation of all available information concerning each site, which was acquired and evaluated during Tasks 3 and 4 of the RI.

# II. GENERAL DESCRIPTION OF PROJECT AREA

## Location

The Dead Creek Project area is located in and around the cities of Sauget (formerly Monsanto) and Cahokia in St. Clair County, Illinois (Figure 1). Under the scope of the RFP issued by the IEPA, the study area consists of 18 suspected uncontrolled hazardous waste sites located throughout the study area (Figure 2). The project area consists of 12 individual sites and 6 additional sectors in Dead Creek.

## Areal Description and Topography

The sites to be investigated as part of the Dead Creek Project are in an area which contains a mixture of industrial, residential, commercial, farm, and undeveloped land. The sites consist of closed and active landfills, industrial property, undeveloped or currently unutilized land, residential land, and an areal drainage flowpath (Dead Creek).

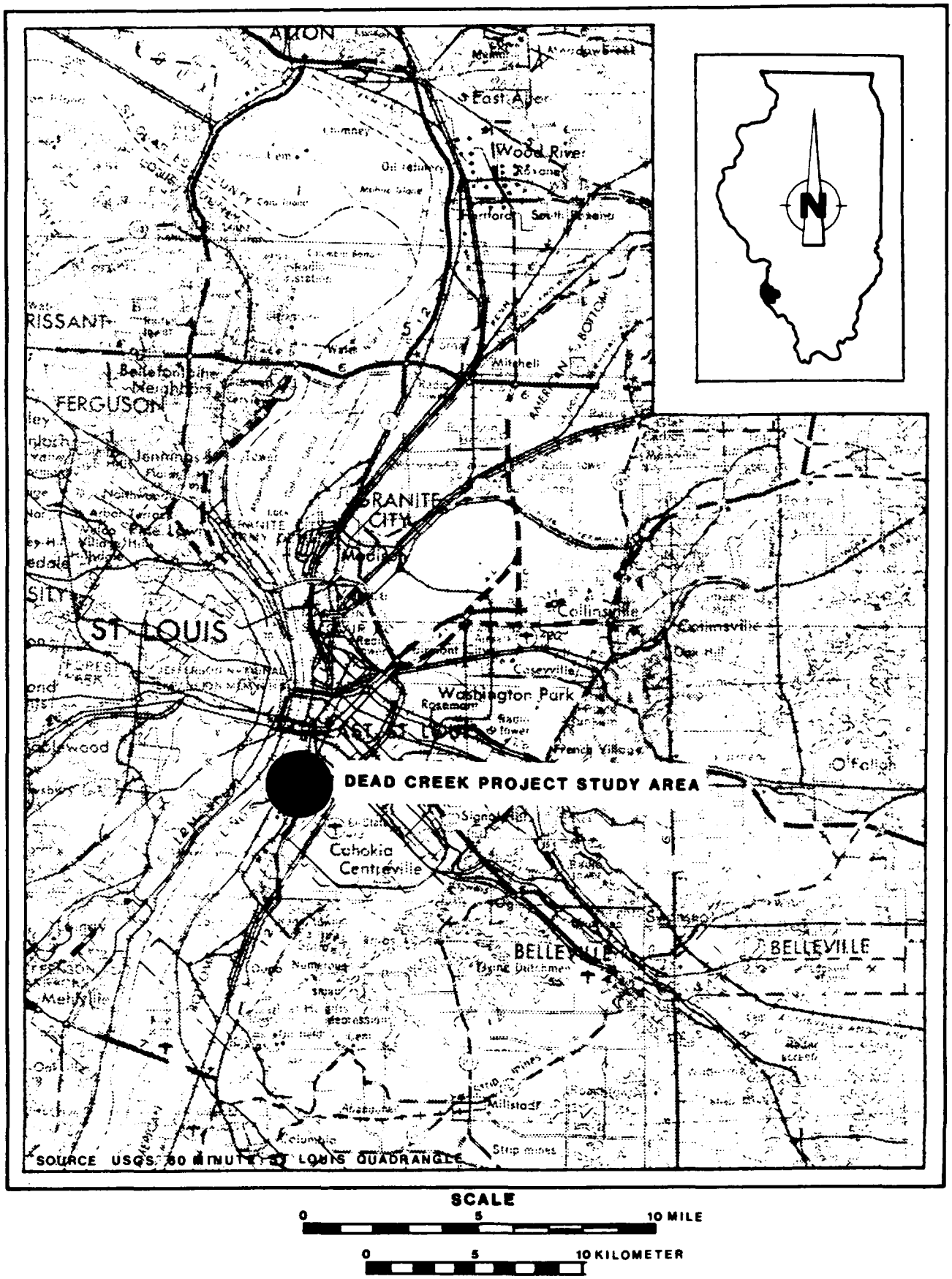



FIGURE 1
DEAD CREEK PROJECT SITE LOCATION MAP

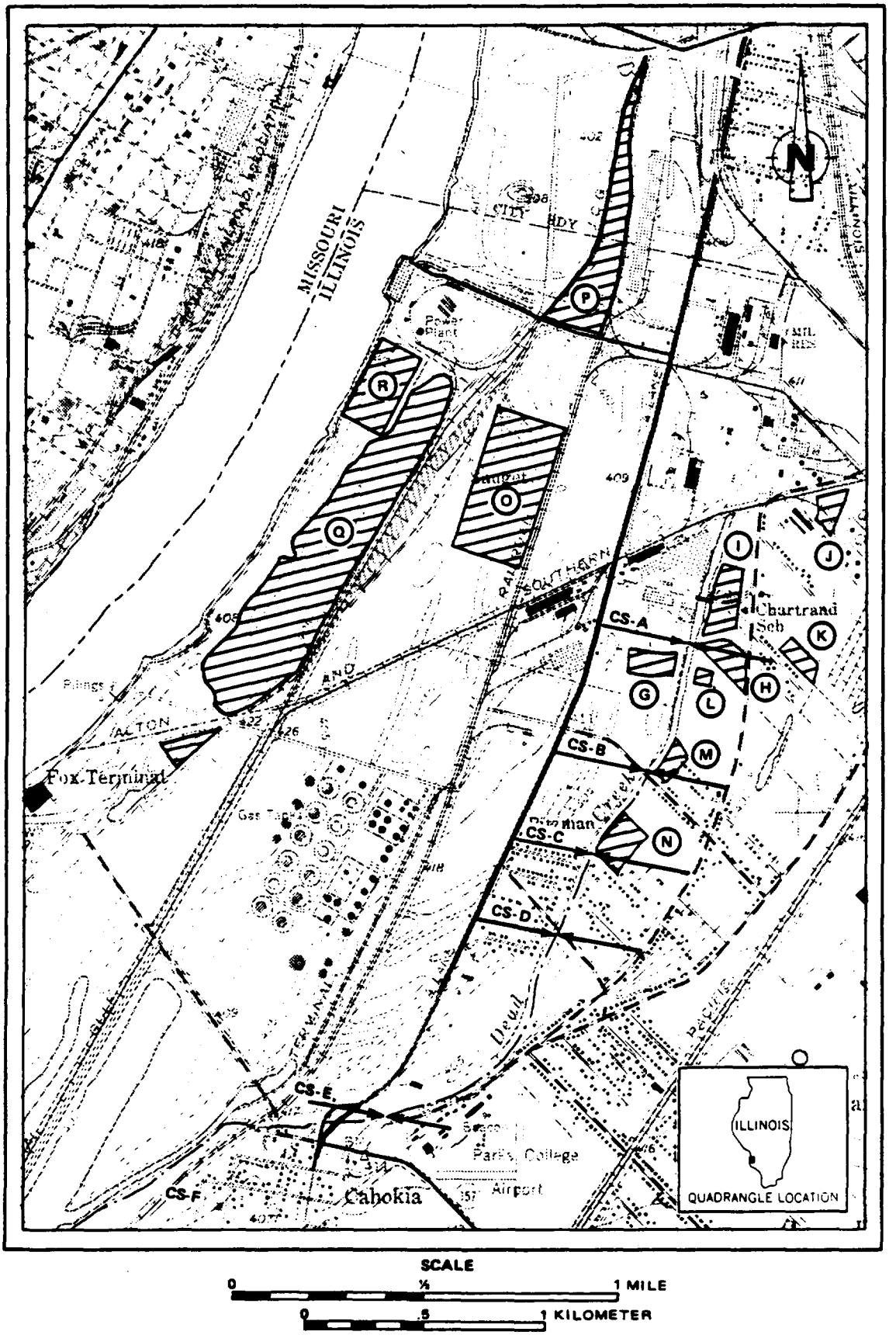



FIGURE 2
SITE REPORTING DESIGNATIONS FOR THE DEAD CREEK PROJECT

The project area is situated within the floodplain of the Mississippi River in an area known locally as the American Bottoms. Topography in the site area is controlled by structural features of the bedrock which resulted from glacial and fluvial occurrences. The Mississippi River meandered over the American Bottoms floodplain between the upland bluffs, which form the floodplain boundaries, prior to the establishment of the present channel. The meadering of the river has given rise to typical floodplain characteristics throughout the study area. These features include low, broad, flat, swampy areas; terraces (generally found north of the study are); curved ridges and swales (typified as meander scars) formed as slack water bars or channels; alluvial fans; wetlands vegetation (although all vegetation is generally sparse due to industrialization and urbanization); mounds; and crescent shaped ox-bow lakes. The shifting of the Mississippi River channel has resulted in heterogeneous interbedding of fine and coarser material in the surficial flood plain deposits. Material has also been transported to the flood plain from the uplands and from the bluffs by overland flow which has resulted from rainstorms.

As in the case of most flood plains, the American Bottoms area is not perfectly flat. Many slight, naturally occurring and manmade, irregularities exist. However, in general the land surface at the site area is 400 feet above mean sea level. The land generally slopes from north to south and from the east toward the river. The wide floodplain area (approximately 6.5 miles across in the site area) exhibits little topographic relief except in the adjacent bluffs and upland areas which tend to be high (up to 150 feet above floodplain levels), steep, and moderately well drained. The local average land scope in the site area is 0.06% to the west. Regional floodplain slope is 0.0059% to 0.009% to the south (Fenneman, 1909; Jacobs, 1971).

Topographic maps for the study area were developed as part of Task 3 of the Remedial Investigation. The topographic maps are included as an attachment to this report, and an Index Map, Figure 3, depicts the

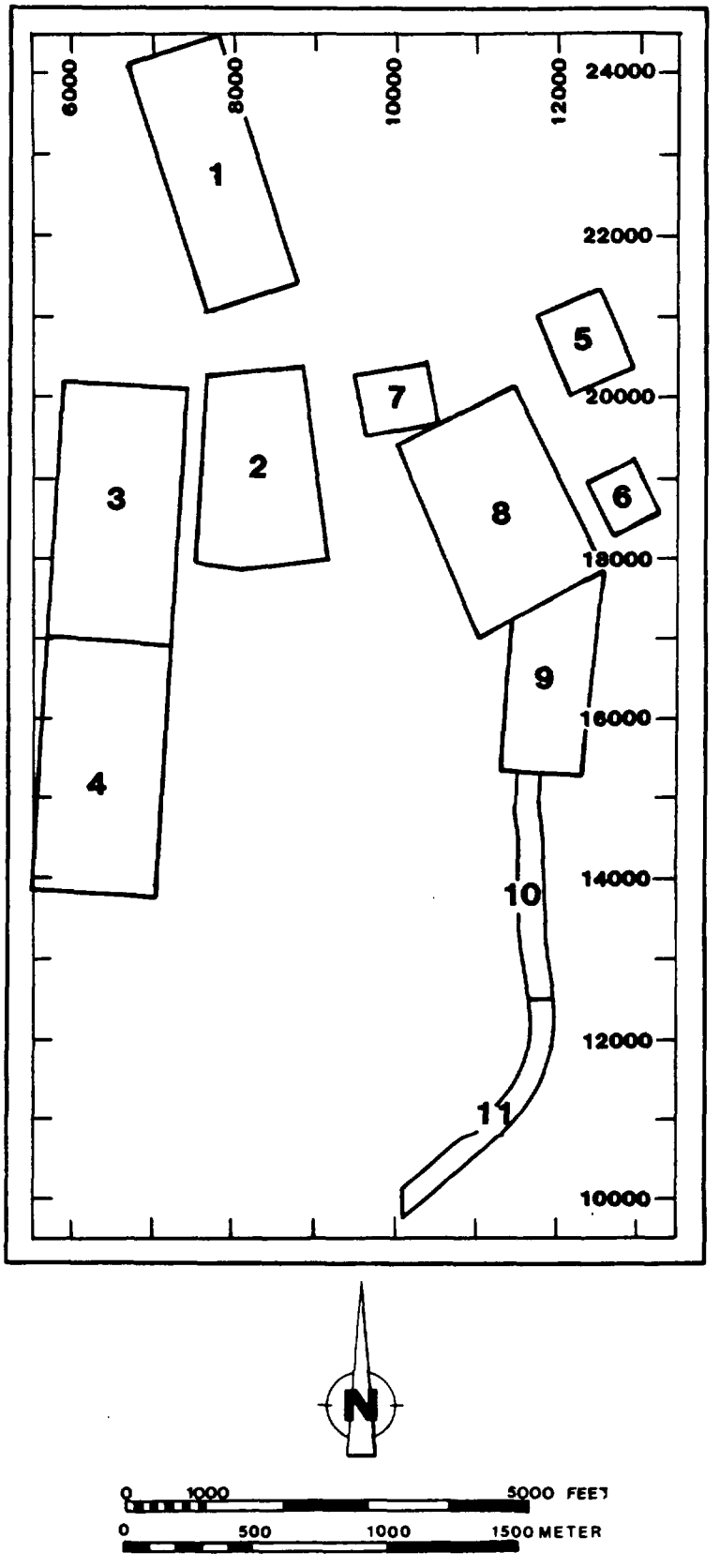



FIGURE 3
BOUNDARIES OF ENGINEERING PLATES FOR THE DEAD CREEK SITES

areal relationships of the topographic maps.

## Climate

The climate in the site area is generally described as continental with hot, humid summers and mild winters punctuated by extremely cold periods of short duration. The site area is located in a major frontal convergence zone where warm, moist air from the Gulf of Mexico meets cold, dry air from Canada. This convergence zone produces a variety of rapid changes in weather conditions.

The 80-year average precipitation reported by Keefe (1983) was 35.4 inches per year, although the yearly average over the last 25 years (same data base) was up slightly to 39.5 inches per year. June is normally the wettest month, with an average of 4.3 inches of rain. Much of the summer rainfall is produced by thunderstorms, which are also responsible for the unusually heavy rains which periodically cause isolated flooding. Rainstorms which produce 1 to 2 inches of precipitation are common. Relative humidity typically ranges between 50 and 60 percent during the summer. Snow can occur in any and all months from November through April. Annual snowfall averages 17 inches.

The regional average annual temperature is 56° F. (Fahrenheit) with a January mean of 32° F. and a July mean of 79° F.. Periodic polar air fronts move through the area during the winter producing lows of -10 to-15 degrees Fahrenheit. July and August are typically hot and humid, producing temperatures above 90° F. on an average of 22 days/year. Highs in excess of 100° F. generally occur for short periods of 3 to 5 days.

## Geology

The geologic formations present in the site study area consist of unconsolidated alluvium and glacial outwash, which are underlain by Mississippian and other bedrock layers. These bedrock layers are

underlain by basement granitic crystalline rock. The geologic formation sequence for South-Central Illinois is represented in Figure 4. The study area, the American Bottoms, and the Mississippi River channels are all located in a broad deep cut bedrock valley. The bedrock valley is delineated by bluff lines on both sides. Based upon available data, the bedrock valley has steep walls along the bluff lines while the valley bottom slopes gently toward the middle.

Within the bedrock valley, the Mississippi River has provided the primary mechanisms controlling the recent formation of geology and hydrogeology. Bergstrom, et al (1956) suggests that the bedrock valley is pre-glacial in nature; however, Willman et al (1970) concludes that insufficient data exists to suggest a pre-glacial valley structure for the Mississippi River. Nevertheless, glaciation did significantly modify and redesign the Mississippi River and its valley through both glacial and interglacial periods. These changes occurred as glacial wasting caused massive amounts of meltwater to be directed generally southward through and around bedrock and ice contacts, ultimately discharging into the Gulf of Mexico. Through geologic history, a wide and deep valley (2 to 8 miles across and up to 170 feet deep) has been carved into the predominantly soft sedimentary bedrock underlying the river (Bergstrom, 1956). Changes in stream flow, direction, and sediment load have caused this valley to fill with secondary alluvial sediments. These constantly changing parameters have resulted in the river continuously picking up and depositing (and cutting and filling) its sediment base, thereby directing and redirecting the river and its channels throughout time.

The unconsolidated valley fill, present in the bedrock valley, ranges in thickness from approximately 70 to 120 feet in the study area. The thickness of the valley fill in the region of the study area is depicted in Figure 5. A cross section of the valley fill in the vicinity of the study area is presented in Figure 6.

The valley fill deposits are typically comprised of two main formations which may reach as deep as 120 feet in the site area. The Cahokia, the uppermost formation, is comprised of predominantly silt,

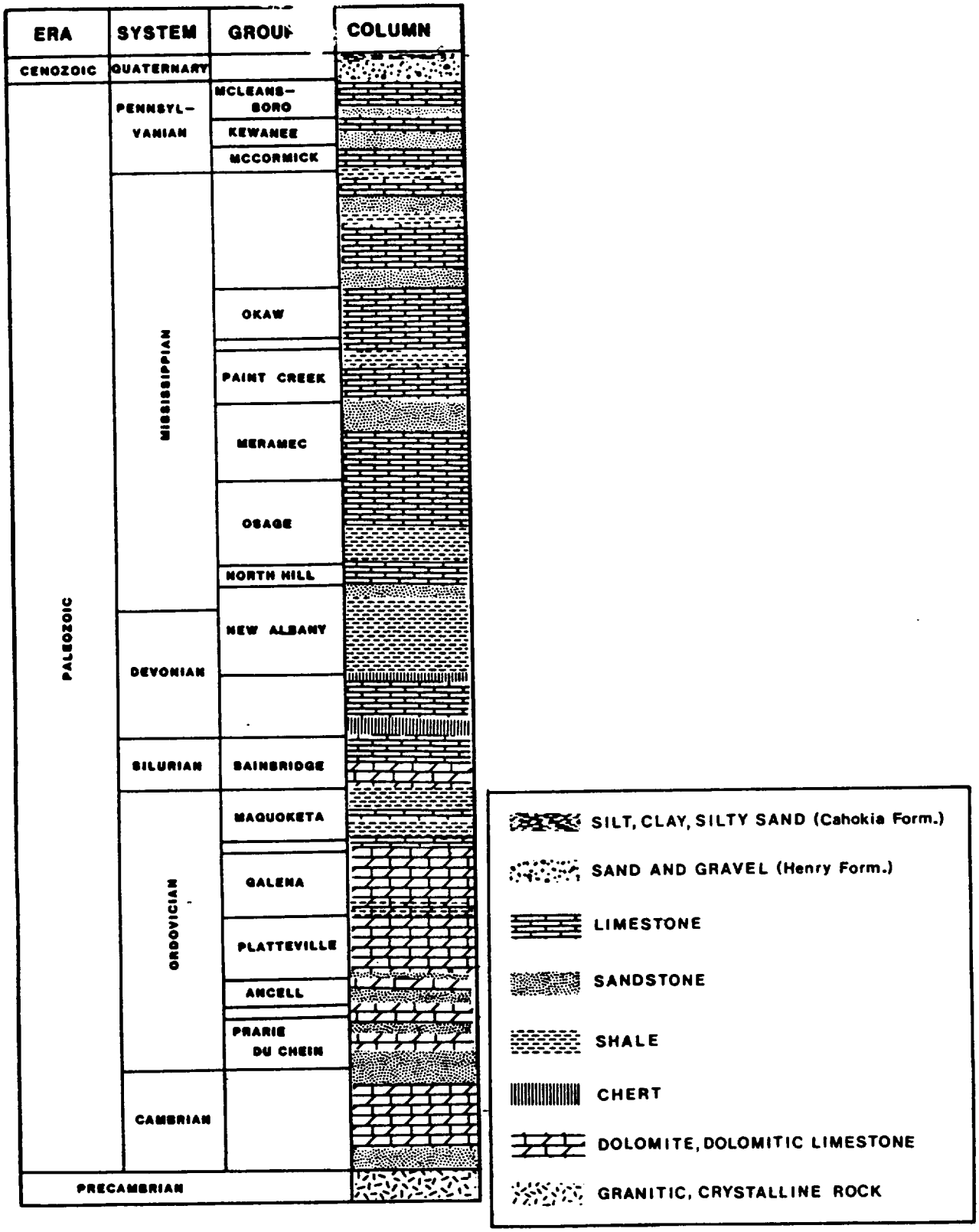
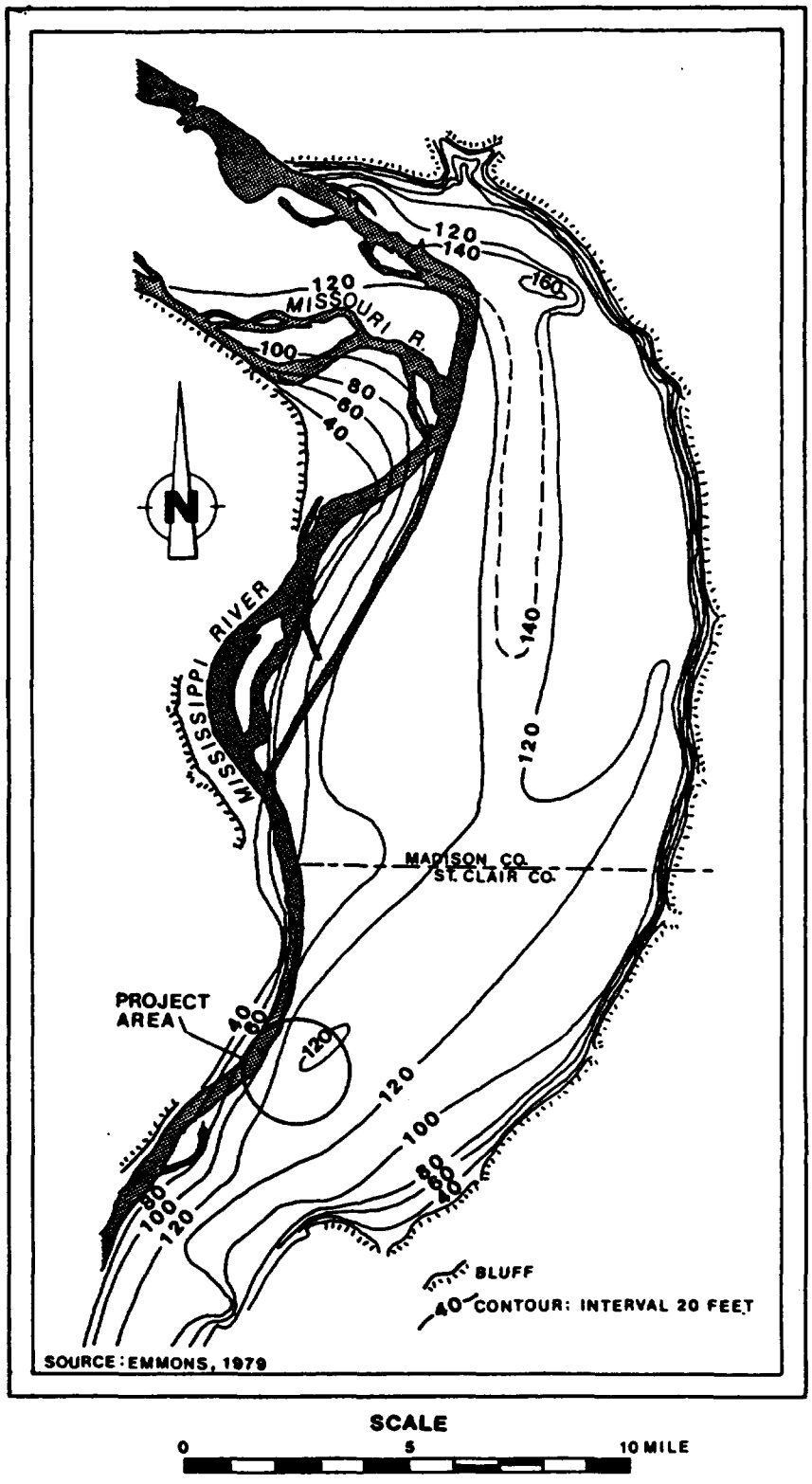


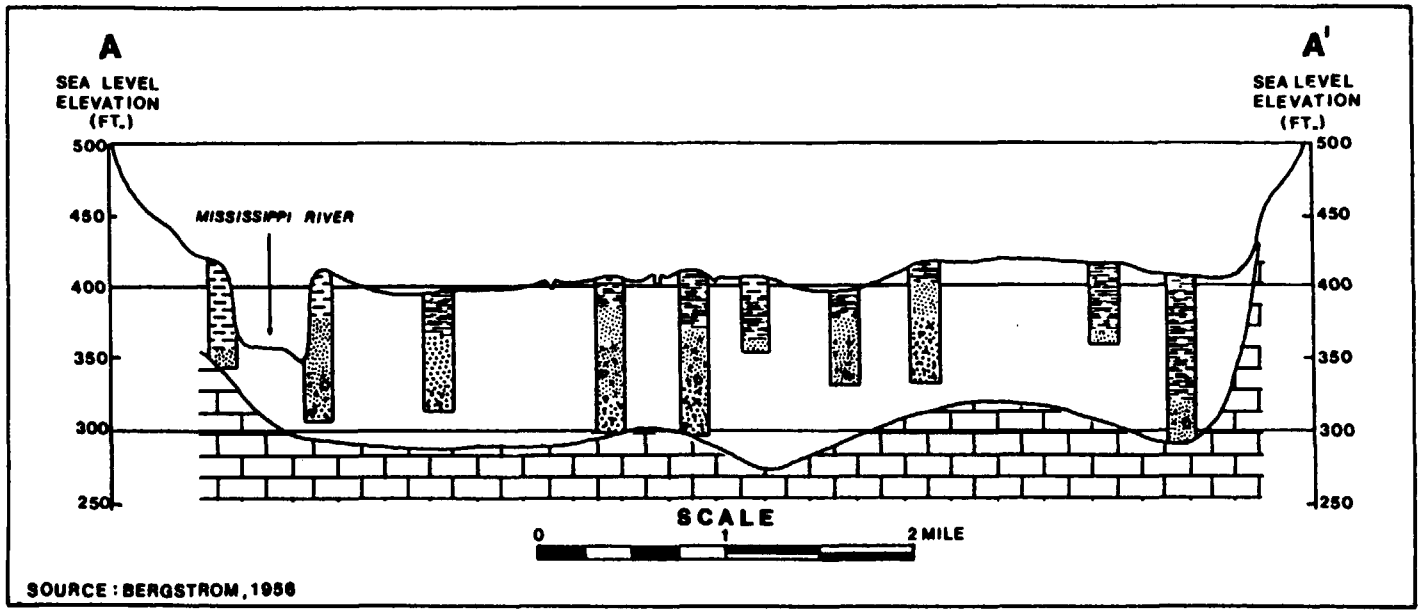

FIGURE 4
GENERALIZED GEOLOGIC COLUMN FOR SOUTH-CENTRAL ILLINOIS

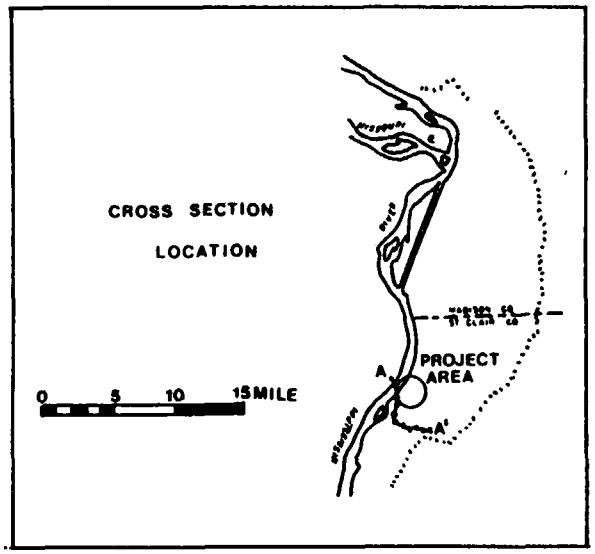



SCALE

0 5 10 MILE

FIGURE 5
THICKNESS OF THE UNCONSOLIDATED VALLEY FILL IN THE DEAD CREEK STUDY AREA



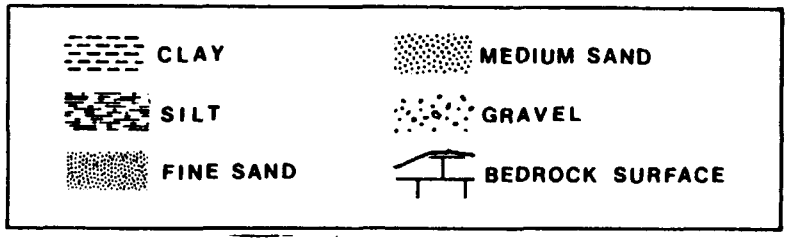




FIGURE 6
CROSS SECTION OF THE VALLEY FILL IN THE VICINITY OF THE DEAD CREEK SITES

clay, and fine sand deposits generally indicative of an aggrading environment. These deposits were laid down as flood events of the Mississippi River, eolian activity, bank slumping, erosion, and/or slugs of material deposited directly by tributary streams. This formation has been frequently reworked by the Mississippi River and typically consists of coarser material intertongued with finer grained deposits. As such, these deposits can be variable in thickness (ranging from 15 to 30 feet). Larger expressions of tributary deposits may form thicker alluvial fans where high energy streams dissipated and dropped their sediment load.

The second major formation of the floodplain setting is the Mackinaw Member of the Henry Formation. This formation underlies the Cahokia Alluvium, and is comprised of sand and gravel from glacial outwash. Within the study area, this material rests directly on the bedrock surface and can be highly variable in thickness (70 to 100 feet) due to the fluvial processes which formed it. This formation typically contains portions which are complexly interbedded due to meandering of the river throughout history.

A third minor formation noted locally within the floodplain, but not discovered within the site investigation area, is the Peyton Colluvium. This material is comprised of fine grained silt (loess) and clay (till) which has slumped from upland areas and accumulated at the base of steep bluffs.

Immediately adjacent to the floodplain (and 3.5 to 5 miles east-south east of the sites) is an upland area marked by a steep (50 to 150 feet above surrounding terrain) bluff. Structurally, these upland areas are based unconformably on bedrock (which has not been eroded as deeply as the adjacent valley), and consists of 10 to 100 feet of uncolsolidated sediments of predominantly glacial origin. No upland formations exist in the study area; however, erosion and slumping of the upland has provided the parent material for the Cahokia Formation and Peyton Colluvium, which are found in the floodplain.

The entire study area is underlain by relatively soft sedimentary rock layers. Typically, these rocks consist of shale, limestone, sandstone, and dolomite, which were formed through geologic time by lithification of sediment and sediment-like materials. In general, parent materials were disintegrated into sand, silt, clay, and mud, which were then deposited sequentially by sedimentary processes, such as precipitation and erosion. These sequential deposits (formations) were ultimately lithified by compression, compaction, reclystallization, and cementation. General depositional environments included shallow and deep seas, rivers, and swamps. These environments provided varying thicknesses of similar materials. Missing sequences apparently represent unconformities caused by terrestrial or near terrestrial erosional processes. These sedimentary rock sequences represent millions of years of geologic time.

The earliest sedimentary rock overlying the granite basement rock is Cambrian age sandstone limestone, dolomite, and shale. The Ordovician system overlies the Cambrian. Its formations consist of sandstone, dolomite, limestone and shale. Overlying the Ordovician is the Silurian System consisting of numerous limestone layers. Next youngest is the Devonian System, with limestone, sandstone, and shale formations. At the top of the sequence is the Mississippian System containing numerous limestone, shale, siltstone, dolomite, and sandstone layers. In the adjacent highlands and at one bedrock high located within the valley south of the site area, the Pennsylvanian System may be found to contain various sandstones, siltstones, and shale formations.

Bedrock structure in the area appears to be controlled by a significant fold (the Waterloo anticline) and fluvial erosion (primarily by the Mississippi River). The fold is centered approximately 6 miles south of the site area, and the structure trends north-northwest. This fold has bent the overlying rock in the area, producing a gentle northeast-east dip of up to 3 percent on the bedrock strata. This allows the deep strata to be exposed by bedrock

valley erosional processes to the southwest of the study area, while maintaining these same formations at a deeper elevation to the northeast of the study area.

## Hydrology

The description of the hydrology of the study area is divided into the surface drainage and groundwater discussions presented below.

### Surface Drainage

The Mississippi River extends far to the north and south of the site area and drains the American Bottoms and the tributary upland area. Although the Mississippi River floodplain is subject to periodic inundation by excess water runoff, most of the area is protected from massive regional flooding by a complex series of levees and other flood control structures. This condition partially adds to local small scale flooding problems since precipitation is trapped behind the flood control structures where drainage is typically poor. Dead Creek itself provides drainage for a portion of the American Bottoms, and ultimately discharges to the Mississippi River via the Prairie DuPont Floodway and Cahokia Chute. Fenneman (1909) has suggested that Dead Creek may at one time have been a southward extension of Cahokia Creek. Excessive siltation, realignment of surface drainage, or stream piracy may have redirected Cahokia Creek to its present channel, thus cutting off Dead Creek from the original source water.

Major surface drainage in the area is also provided by Cahokia Creek (to the north) and the Old Prairie DuPont Creek (to the south). Both of these creeks channel surface water directly into the Mississippi River. Significant additional secondary drainage within the site area and floodplain is provided by an extensive system of storm drains, pumping stations, and ditches, which were constructed or modified from existing natural drainage features for this purpose.

## Groundwater

Groundwater exists in both the unconsolidated valley fill and the underlying bedrock formations. The Mississippian bedrock limestone and sandstone are water-bearing formations. Where these formations are located immediately below the unconsolidated material, there is sufficient groundwater for small or medium users. However, because of the abundance of groundwater present in the valley fill sand and gravel, the bedrock aquifer is of little significance to the study area. The majority of available groundwater in the study area is present in, and taken from, the valley fill materials. The Illinois State Water Survey has identified the study area as one in which the chances of obtaining a well yielding 500 gpm or more are good. The coarsest deposits, which are most favorable for water development, are commonly encountered near bedrock and generally average 30 to 40 feet in thickness. However, because of the alluvial nature of deposits in the study area, sand and gravel deposits which yield significant quantities of groundwater are commonly found in the study area nearer the ground surface.

Prior to development of the area, groundwater levels within the study area were very near the surface elevation of 400 ft MSL. As a result, ponds, swamps, and poorly drained areas were prevalent. The development of the area led to the construction of levees, drainage ditches, and wells, all of which caused the lowering of the groundwater levels. In the early 1960's, the extensive industrial pumpage in the study area (over 30 million gallons per day) resulted in a lowering of the water table by as much as 50 feet. However, due in part to the decrease in industrial groundwater use, groundwater levels within the study area have sustained a significant rise since the Mississippi River floods of 1973. Groundwater withdrawal within all of St. Clair County, in 1980, only amounted to 16 million gallons per day. As a result, measurements of monitoring wells near Dead Creek identified the water table at approximately 393 feet MSL (about 15 ft. below ground surface) in January 1981. Groundwater levels near other portions of the study area are expected to be similarly

depressed below ground surface except where affected by surface structure or well pumpage. Groundwater levels are affected by flood stages of the Mississippi River, and undergo water-level fluctuations as a result of seasonal weather patterns. In areas remote from major pumping centers, water levels generally recede in late spring, summer and early fall, when discharge from the groundwater reservoir by evapotranspiration, groundwater run-off to streams, and pumping from wells is greater than recharge. Recovery of water levels generally occurs in the early winter when conditions are favorable for infiltration of rainfall to the water table. Water level recovery is especially pronounced during the spring when the groundwater reservoir receives most of its annual recharge. Water levels are generally highest in May and lowest in December. Water levels remote from major pumping centers have a seasonal fluctuation ranging from 1 to 13 feet, with an average fluctuation of about 4 feet.

Based upon the surface drainage system for the region in 1900, R.J. Schicht (Illinois State Water Survey, 1965) estimated the piezometric surface prior to heavy development in the area. Groundwater elevation was estimated to be about 420 feet near the bluffs to about 400 feet near the Mississippi River. The piezometric surface had an average slope of about 3 feet per mile and ranged from 6 feet per mile in the Alton area to the north, to one foot per mile in the Dupo area to the south. The slope of the piezometric surface was greatest near the bluffs and flatest near the Mississippi River. Groundwater movement was generally directed to the west and south toward the Mississippi River and other streams and lakes.

Groundwater movement in the shallow deposits throughout the study area generally follow the land surface topography, with lateral movement toward local discharge zones (wells and small streams), and some movement into the deeper unconsolidated aquifers. Groundwater in the deeper unconsolidated deposits generally follows the bedrock surface. Accordingly, groundwater generally flows downstream through the sand and gravel aquifers in much the same direction as the original streamflow, but at a much slower rate.

In 1962, the general pattern of groundwater flow was slow movement from all directions toward the cones of depression, which had formed due to heavy pumpage, or toward the Mississippi River and other streams. In the study area, the lowering of the water table that accompanied groundwater withdrawal in the area established hydraulic gradients from the Mississippi River towards the pumping centers. In portions of the study area, groundwater levels were below the surface of the river and appreciable quantities of water were diverted from the river into the aquifer by the process of induced infiltration. Within the study area, the slope of the piezometric surface near the cone of depression, produced by pumping at the Monsanto facilities, exceeded 30 feet per mile.

The principal hydraulic properties of the valley fill and alluvium present in the study area indicate that the materials readily transmit groundwater and have a large amount of groundwater storage capacity. In 1952, tests were conducted for the Monsanto Chemical Corporation to evaluate the hydraulic properties of the deposits. The upper 40 feet of unconsolidated materials in the area consisted of sandy clay, and the lower 80 feet of unconsolidated material in the area consisted of various layers of sand and sand and gravel. A pump test was conducted on a well located 515 feet east of the Mississippi River and drilled to a depth of 99 feet. Six observation wells were used to assess the pump test. Using the time-drawdown method of analysis, the coefficient of transmissivity was determined to be 210,000 gpd/ft. The coefficient of storage was determined to be 0.082 ($ft^3/ft^3$), which is in the range typical of water table conditions. The coefficient of permeability was determined to be 2800 $gpd/ft^2$.

Recharge of groundwater in the study area is received from direct infiltration of precipitation and run-off, subsurface flow of infiltrated precipitation from the bluff area to the east, and induced infiltration from adjacent river beds, where pumpage has lowered the water table below the level of the river. Direct

recharge of the water table only captures a portion of the annual precipitation. A major portion of the precipitation runs-off to streams or is lost by the evapotransporation process before it reaches the aquifer. Nevertheless, precipitation is probably the most important recharge source for the study area as a whole. The amount of surface recharge that reaches the saturation zone depends upon many factors, including the character of the soil and other materials above the water table, the topography, vegetal cover, land use, soil moisture, depth to the water table, the intensity and seasonal distribution of precipitation, and temperature. Because of the low relief and limited runoff in the study area, and because the upper silt and clay fill is not so impermeable as to prevent appreciable recharge, most of the precipitation either evaporates or seeps into the soil. Because of the extensive flood-control network in the area, recharge from floodwaters provides a limited input to the area. Based upon a modified form of the Darcy equation, R.J. Schicht (1965) calculated the average rate of surface recharge to be about 371,000 gpd/sq. mi. for the study area.

Regional groundwater flow components to the west and south provide subsurface recharge to the study area. Schicht similarly estimated that the average recharge from subsurface flow of water from the eastern bluff boundary is 329,000 gpd/mi.

The lowering of the water table as a result of groundwater withdrawals in the study area has, in the past, established a hydraulic gradient from the Mississippi River toward the pumping centers. This resulted in water percolation through the river bed and into the aquifer, producing induced infiltration recharge. Schicht estimated the 1961 induced infiltration recharge volume for the study area to be approximately 18.5 million gpd, or roughly 58%, of the 31.9 million gpd total being withdrawn. Water withdrawal data from 1980 for the study area and areas to the north indicate that total withdrawals amount to only 3.9 million gpd as compared to more than 42 million gpd in 1961. Accordingly, for the study area, the amount of current induced infiltration from the Mississippi is

believed to be small due to dramatically reduced groundwater usage. Although current, detailed data for public and industrial water supply wells in the study area is presently unavailable, 1980 Illinois State Water Survey data indicated the presence of ten wells in or generally near the study area.

The chemical character of groundwater found in the study area varies geographically and with depth. Pumping rates and surface activities may also influence local quality. Generally, shallow wells (less than 50 feet deep) are quite highly mineralized and may have a high chloride content. Groundwater in heavily pumped areas often has high sulfate and iron contents and elevated hardness values.

Groundwater quality data developed by Schicht (1965) for Township 2N, Range 10W, Section 26, which includes a major portion of the study area, provides historical chemical data for wells with depths of approximately 100 feet. In general, the water quality was consistent. Hardness values ranged from 377 to 777 ppm, chloride values ranged from 9 to 61 ppm, and sulfate values ranged from 137 to 487 ppm. Recent Illinois State Water Survey data developed by Keefe (1983) identified a general increase in chloride and sulfate concentrations for groundwater in the study area. The general increase in chlorides was associated with the use of road salts since increased concentrations correlated with major highway locations. Increases in sulfate concentrations were speculated to be caused by an upward movement of high sulfate water from the bedrock as a result of pumping activities. Decreases in chloride and sulfate contents of groundwater were identified in a section along the Mississippi River where extensive nearby pumping had resulted in induced infiltration from the river.

# III. SITE SPECIFIC DESCRIPTIONS

## SITE G. ABANDONED LANDFILL

### Site Description

Site G is a former subsurface/surface disposal area which occupies approximately 4.5 acres in Sauget, Illinois. The site is bordered on the north by Queeny Avenue; on the east by Dead Creek; on the south by a cultivated field; and on the west by Wiese Engineering Company property.

The surface of Site G is littered with demolition debris and metal wastes. Several small pits have been observed in the northeast and east-central portions of the site. Oily and tar-like wastes, along with scattered corroded drums, are found in these areas. Additionally, 20-30 deteriorated drums are scattered along a ridge running east-west, near the southern perimeter of the site. The western portion of Site G is marked by a mounded area with several corroded drums protruding at the surface. A large depression is found immediately south of the mounded area. This depression receives surface runoff from a sizable area within the site. Also, exposed debris is present over most of the site. In areas where wastes are not exposed, flyash and cinder material has been used as cover.

### Site History and Previous Investigations

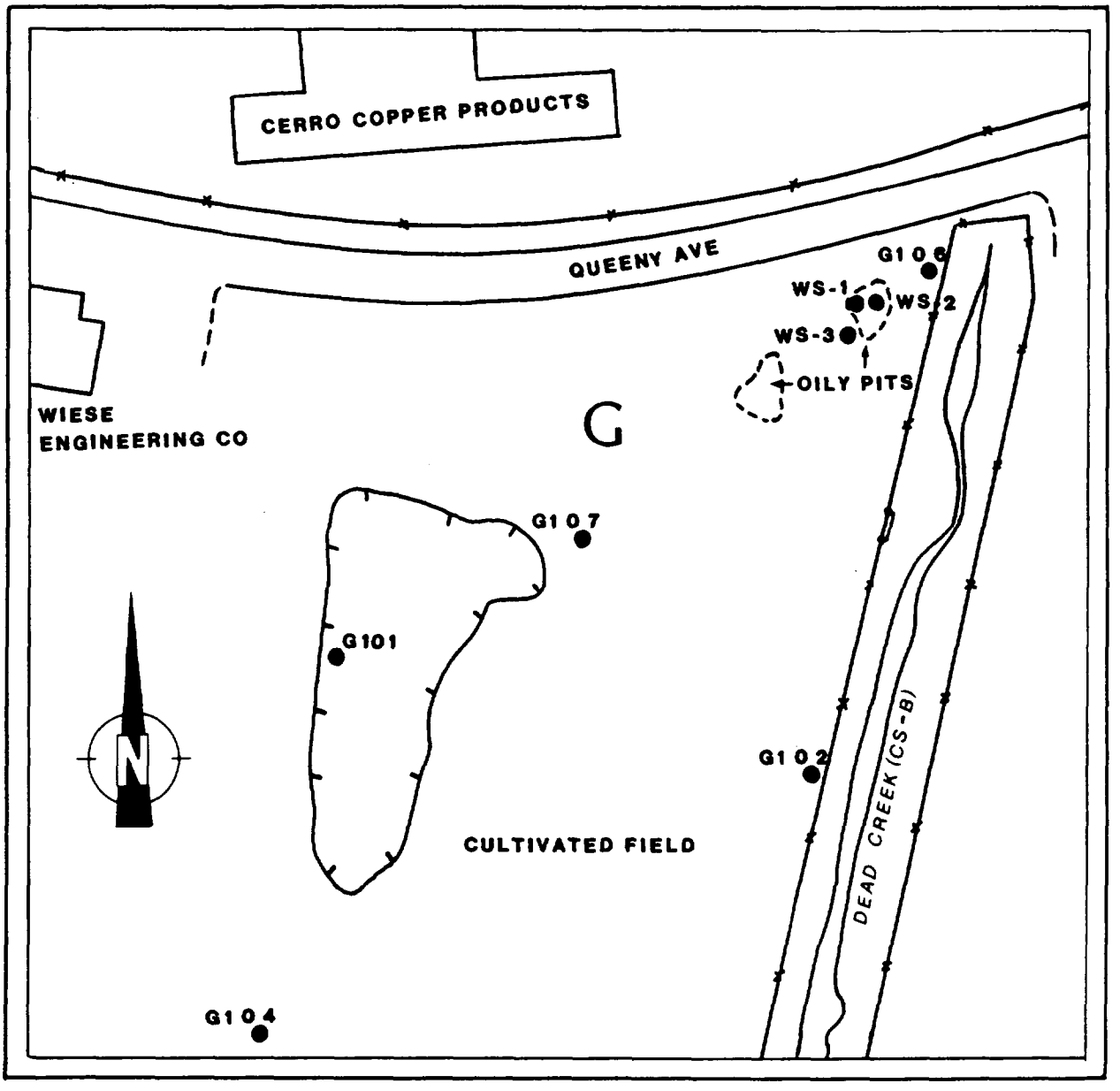
Examination of historical aerial photographs indicates excavation at Site G began sometime prior to 1950 and disposal operations were initiated shortly thereafter. No information is available concerning owners or operators for Site G at the time disposal was occurring. The photographs suggest disposal activities at the site continued until the early 1970s. Presently, Site G is inactive, although recent observations suggest that random dumping of various non-chemical wastes continues.

Site G was previously studied by the Illinois EPA in 1980 and 1981 as

part of an area-wide study to determine the source of contamination found in Dead Creek.

The results of this study were reported in the Preliminary Hydrogeological Investigation in the Northern Portion of Dead Creek and Vicinity in 1980-1981 (St. John Report). Locations of samples collected to date in the vicinity of Site G are shown on Figure G-1. The IEPA study completed in 1981 included collecting samples from subsurface soils and groundwater at Site G, and collecting surface water and sediment samples from Dead Creek immediately east of the site. Monitoring well G106 was installed in the northeast corner of the site, and well G107 is located approximately 50 feet south of Site G in a surface depression. In addition, wells G101 and G104 were installed southwest of the site as part of the general area investigation. Analytical data for these wells are presented in Tables B-6, B-7, and B-8, located in the Creek Sector B portion of this report. Several organic contaminants were detected at elevated levels in well G107. These include chlorophenol, chlorobenzene, dichlorophenol, dichlorobenzene, and PCBs. PCBs were also detected in samples collected from well G106. Both of these wells showed concentrations of heavy metals; specifically arsenic, barium, copper, lead, and manganese, which exceeded IEPA water quality standards. Phosphorus also exceeded the standards in both wells. Wells G101 and G104 showed little evidence of contamination although trace levels of PCBs were found in G101. Preliminary surveillance in November, 1985 at Site G showed wells G101, G104, and G107 to be intact. Well G106 was not located, and is suspected to have been destroyed.

In order to determine the vertical distribution of contaminants in the area, the IEPA collected subsurface soil samples at the locations of wells G106 and G107. Analytical data from these samples is shown in Table G-1. High levels of metals and phosphorus were detected in all samples. Trace levels of PCBs were found to a depth of 13 feet at G106. A quantified level (0.62 ppm) of PCBs was found at a depth of two feet in the location of G107, but PCBs were not detected in deeper samples. In October, 1984, IEPA collected three soil samples




LEGEND

G106 IEPA MONITORING WELL

WS-1 IEPA WASTE SAMPLING LOCATION

FIGURE G-1
DEAD CREEK SITE AREA G WITH SAMPLE LOCATIONS

TABLE G-1: ANALYSIS OF SUBSURFACE SOIL SAMPLES
FROM SITE G (COLLECTED BY IEPA IN 1980)

SAMPLE LOCATION AND DEPTH

| PARAMETER | G106 | | | | | | | G107 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 7.5'-9.0' | 10'-11.5' | 12'5'-13' | 15.5'-17' | 18'-19.5' | 20'-21.5' | 30'-31.5' | 0.5'-2' | 5'-6.5' | 10.5'-12' | 15.5'-17' | 18'-19.5' | 20.5'-22' | 25.5'-27' |
| Copper | 140 | 90 | 59 | 54 | 56 | 28 | 14 | 91 | 53 | | | | | |
| Iron | 12,600 | 12,300 | 10,400 | 9,700 | 13,600 | 5,700 | 4,700 | 21,200 | 21,900 | | | | | |
| Lead | 15 | 11 | 8 | 9 | 12 | 3 | 6 | 170 | 49 | | | | | |
| Nickel | 36 | 21 | 11 | 43 | 21 | 8 | 19 | 37 | 39 | | | | | |
| Phosphorus | 592 | 475 | 383 | 391 | 540 | 249 | 183 | 1340 | 681 | | | | | |
| Zinc | 183 | 53 | 36 | 43 | 49 | 29 | - | 370 | 313 | | | | | |
| PCBs | * | * | * | - | - | - | - | 0.62 | - | | | | | |

NOTE: All results in ppm
Blanks indicate parameter not analyzed
- below detection limits
* detected but not quantified (trace)

at Site G from a pit in the northeast corner. Analyses of these samples are presented in Table G-2. Elevated levels of heavy metals were found in all samples, as were various organic contaminants. PCBs were detected in sample WS-3, but not in the other two samples. Sample WS-1 showed the highest degree of organic contamination. Organics detected in this sample include dimethyl phenanthrene, phenyl indene, pyrene, trimethyl phenanthrene, and aliphatic hydrocarbons.

Data from additional samples taken adjacent to Site G in Dead Creek are addressed in the narrative for Creek Sector B. Site G may be a source of contamination in Dead Creek; however, since the hydrology in the area is not well-defined, this cannot presently be determined.

A geophysical investigation, including flux-gate magnetometry and electromagnetics (EM), was completed at Site G in December, 1985 as part of the Dead Creek RI/FS project. A survey grid with dimensions of 440 by 600 feet was laid out using a compass and tape measure. Because of the large amount of scrap metal scattered about the surface of Site G, instruments were calibrated in off-site areas. The magnetometer survey was subcontracted to Technos, Inc. of Miami, Florida.

The magnetometer survey at Site G showed that a major magnetic anomaly covers most of the northern portion of the site. Several smaller anomalies were found to the north of the large depression in the southwest corner of Site G. Survey lines run south of the fill area in a cultivated field showed no magnetic anomalies above background conditions. The mounds in the northwest corner of the site showed smaller anomalies at the surface and larger anomalies for deeper readings, indicating significant quantities of buried metals.

An EM survey was done using the same grid as for the magnetometer investigation. Shallow soundings indicated three areas showing relatively high intensity anomalies. These include a 50 feet by 20

TABLE G-2: ANALYSIS OF WASTE SAMPLES FROM OILY PIT AT SITE G
(COLLECTED BY IEPA 10-1-84)

| PARAMETER ANALYZED | SAMPLE NUMBER WS-1 | WS-2 | WS-3 |
|---|---|---|---|
| Arsenic | 0.3 | 0.6 | 97 |
| Cadmium | 0.1 | 0.8 | 16.8 |
| Copper | 101.4 | 509 | 712 |
| Chromium | 24.4 | 27.2 | 30 |
| Iron | 106 | 151 | 6025 |
| Lead | 26.6 | 52.1 | 337 |
| Manganese | - | - | 9.9 |
| Mercury | 0.36 | 0.46 | 1.99 |
| Zinc | 101.4 | 339 | 104,100 |
| Aliphatic Hydrocarbons | 19,200 | 5.23 | - |
| Chlorobenzene | - | 0.58 | - |
| Dimethyl phenanthrene | 3100 | - | - |
| Phenyl indene | 320 | - | - |
| Pyrene | 610 | - | - |
| Trimethyl Phenanthrene | 1400 | - | - |
| PCBs | - | - | 18 |
| Other Organics (not specified) | 1200 | 0.4 | 4070 |

NOTE: All results in ppm
- indicates below detection limits

feet area in the northeast corner, a 150 feet by 100 feet area in the east-central portion, and the entire mounded area along the west perimeter of the site. Deep soundings (approximately 10 to 15 meters in depth) indicated a significant anomaly covers most of the northern portion of the site. Three negative anomalies were recorded in the center of the fill area, possibly indicating higher, off-scale instrument readings or the presence of significant quantities non-conductive material such as concrete. The EM survey also showed anomalies trending off-site in the northwest corner, indicating the possibility that the actual filled area extends north under Queeny Avenue.

## Data Assessment and Recommendations

Activities proposed at Site G for the Dead Creek Project include collecting 10 subsurface and 40 surface soil samples, and water samples from IEPA wells located on or near the site. A soil gas monitoring survey is also scheduled for Site G, and will be conducted in conjunction with ambient air monitoring at the site. Additional investigation is necessary to adequately characterize the site and to provide an adequate data base for conducting the feasibility study. Existing monitoring wells in the vicinity of the site need to be refurbished prior to sampling. Additional wells need to be installed around the site to determine if Site G is contributing to groundwater pollution in the area. Additional borings and subsurface sampling (alternatively excavation of test pits and sampling) in anomalous areas encountered during the geophysical study would be needed to provide additional information concerning depth of fill, waste characteristics, and past operation. This additional information will allow more specific evaluation of remedial alternatives. The hydrology of Site G in relation to Dead Creek also needs to be assessed to determine if the site is a source of pollution observed in the creek. This assessment would include collecting the following data: (1) Ground water elevations from a minimum of three locations on each side of the creek, (2) Surface water and creek bed elevations from three locations in the creek, and (3) Infiltration rates for the

alluvium and the Henry formation at Site G. The above data, in conjunction with the stratigraphic columns from borings in the creek bed (St. John Report), would provide sufficient information to determine the relationship, if any, between ground water and the surface hydrology of the creek.

It was previously noted that IEPA well G106 was not located during a preliminary survey. Further attempts should be made to locate this well and to repair it if it is feasible to do so. The condition of all IEPA wells should be assessed, and reconstruction or redevelopment should be performed in accordance with the assessment.

## SITE H. ROGER'S CARTAGE PROPERTY

### Site Description

Site H is a former disposal area covering approximately five acres in Sauget, Illinois. The site is located immediately southwest of the intersection of Queeny Avenue and Falling Springs Road. Presently, Site H is an open field which has been covered, vegetated, and graded. Several depression areas, capable of retaining rain water, are also evident. Surface drainage is generally to the west; although certain localized drainage is toward the aforementioned depressions.

### Site History and Previous Investigations

A review of historical aerial photographs indicates that Site H was initially used as a disposal area sometime around 1940. Monsanto Company submitted a "Notification of Hazardous Waste Site Form" to the U.S. EPA in 1981, indicating below-ground drum disposal of organics, inorganics, and solvents. The notification listed the site name as Sauget Monsanto Illinois Landfill, and indicated that waste disposal continued until 1957. Site H is presently owned by James Tolbird of Roger's Cartage Company. Photographs suggest the site initially operated as a sand and gravel borrow pit prior to disposal activities. The southern half of Site I operated contiguously with Site H, and the properties were subsequently separated by the construction of Queeny Avenue.

Previous investigation of Site H is limited to review of historical photographs and the installation of one monitoring well downgradient from the site. This well, G110, was sampled in 1980 and 1981 as part of IEPAs hydrogeological investigation. Analytical data for well G110 is shown in Tables B-6, B-7, and B-8, presented in the Creek Sector B portion of this report. Contaminants detected in G110 include PCBs, chlorophenol, cyclohexanone, arsenic, copper, and nickel.

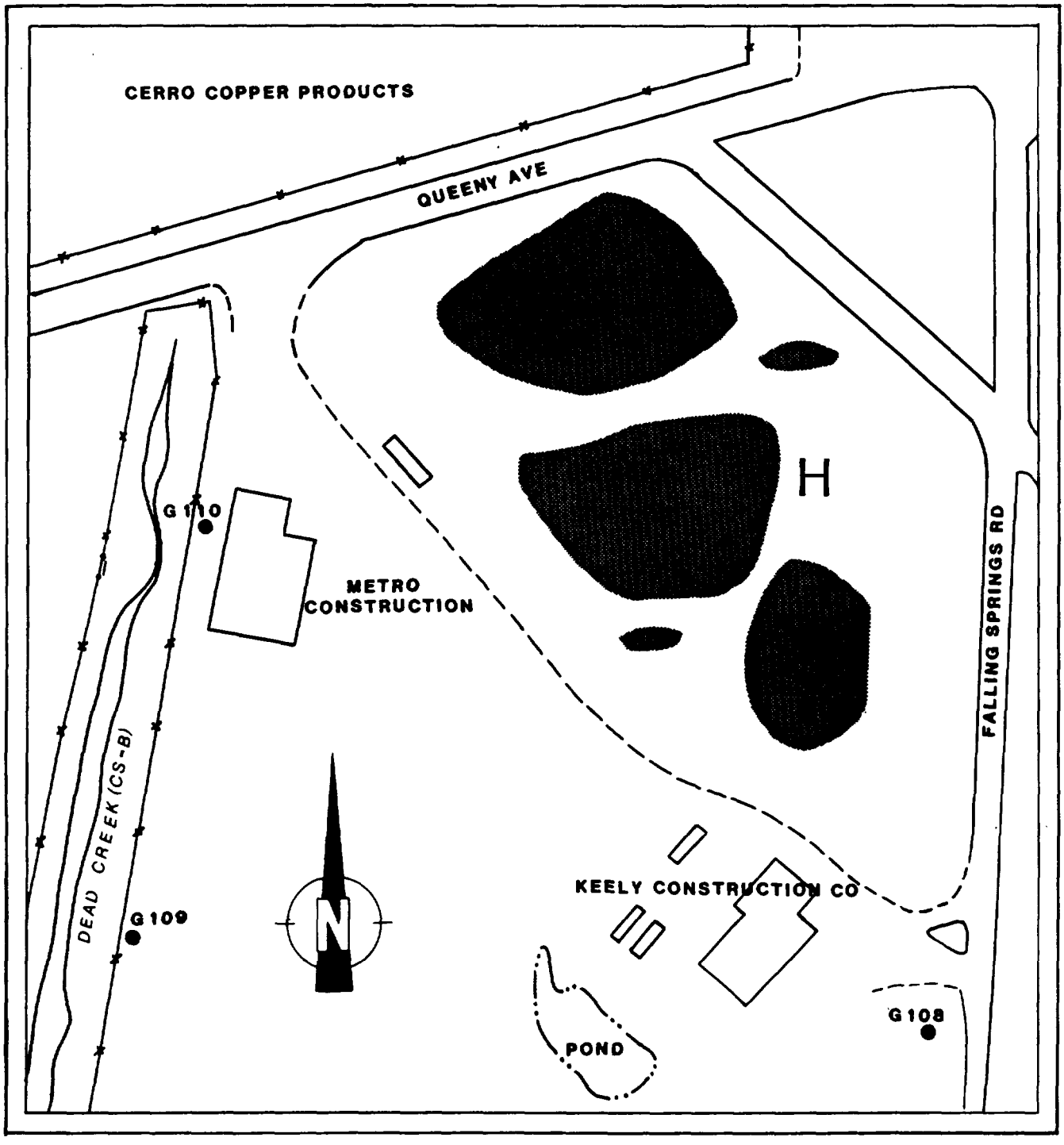
As part of the Dead Creek Project, a geophysical survey, including flux-gate magnetometry and EM, was conducted at Site H in December 1985. A survey grid with dimensions of 520 feet by 550 feet was laid out over the site using a compass and tape measure. Technos, Inc. was contracted to conduct the magnetometer survey.

The results of the magnetometer survey indicate three large areas with major magnetic anomalies and two smaller localized areas with lower intensity anomalies (Figure H-1). All anomalies are of sufficient magnitude to indicate buried drums or a large amount of other buried ferrous metal. The southernmost, large anomalous area correlated well with one of the surface depressions observed recently at the site, while the other two large areas partially correlated with depressions. This information, in conjunction with historical photographs, indicates that all anomalous areas are part of one large fill or disposal pit.

Further evaluation of Site H was done using EM with various coil spacings, allowing for different depths of penetration. Results from shallow soundings (0 to 7.5 meter effective depth range) indicate three high intensity anomalies which correlate well with the magnetic anomalies seen in the magnetometer survey. These anomalous areas were also seen in the results from intermediate soundings (5 to 15 meters). In addition, three negative anomalies were noted near the north and central portions of the site. These negative readings indicate areas of lower conductivity, and may be attributable to relatively non-conductive contaminants (organics), or to other materials such as concrete rubble or clay. Deep soundings (12 to 30 meters) showed much lower conductivity readings over the entire site, which may indicate that disposal was generally limited to a depth of less than 15 meters.

## Data Assessment and Recommendations

The absence of any detailed historical information concerning waste disposal or analytical data concerning Site H creates a major data




SCALE

0 100 500 FEET

LEGEND

LOCATION OF MAGNETIC ANOMALY

G110 IEPA MONITORING WELL

FIGURE H-1
DEAD CREEK SITE AREA H WITH MAGNETIC ANOMALIES

gap. The scope of work for this site during the Dead Creek Project includes collecting five surface and five subsurface soil samples for analysis. A soil gas survey and ambient air monitoring will also be completed at Site H. If specific contaminants are found, this data base would not be sufficient to conduct feasibility study evaluations.

Depending on the results of the initial sampling, additional sampling will be required to further define the extent of any contamination found at the site. This would include installation of monitoring wells and evaluation of ground water conditions. Further geophysical investigations to the north to Cerro Copper Products Company property would allow for more accurate definition of site boundaries and potential drum disposal areas. Additional borings and subsurface sampling or pit excavation would be necessary to accurately determine locations and types of buried wastes.

## SITE I AND CREEK SECTOR A - CERRO COPPER PRODUCTS

### Site Description

Site I is an operating copper refining and tube manufacturing facility covering approximately 55 acres in Sauget, Illinois. The areas of interest for the Dead Creek Project at this facility include a former sand and gravel pit which was subsequently filled with unknown wastes, and a holding pond (Creek Sector A) which formerly served as head waters for Dead Creek. The Cerro Copper Products property is bordered on the north by the Alton and Southern Railroad; on the west by Illinois Route 3; on the south by Queeny Avenue; and on the east by Falling Springs Road. The areas to be investigated encompass roughly the eastern one-third of the property. Presently, the former gravel pit/fill area is covered and graded, and is used for equipment storage.

### Site History and Previous Investigations

Cerro DePasco Corporation of New York purchased the existing plant and property west of Dead Creek in 1957 from the Lewin-Mathes Corporation. Cerro Copper subsequently added property east of the creek to their holdings in 1967. Examination of historical aerial photographs indicate subsurface disposal at Site I was discontinued sometime between the years 1955-1962. These photographs also show that Site I and Site H, which is located across Queeny Avenue to the south, constitute one large subsurface disposal area. Monsanto company submitted a "Notification of Hazardous Waste Site" form for this landfill (Sauget Monsanto Illinois Landfill), indicating disposal of organics, inorganics, and solvents in drums. The years of operation listed on the notification are "unknown to 1957." Historical photographs suggest activity at the site began prior to 1937.

Creek Sector A reportedly received discharges from Monsanto and other companies prior to 1970. In the early 1970's, the culvert

under Queeny Avenue was sealed off to restrict flow from these ponds to the remainder of Dead Creek. The ponds were subsequently regraded to the north for the purpose of directing drainage into a concrete vault with a bar screen located at the north end of the Cerro Copper Products property. When the water level in the ponds rises, the water discharges through the vault to an interceptor, which ultimately drains to the Sauget Wastewater Treatment Plant. According to Cerro Copper officials, the only direct discharges to the holding ponds at this time are area run-off and roof drainage. No process wastewater, cooling water, or other wastes are directly discharged. Five runoff drain pipes project from the west bank of the ponds.

The holding ponds, Creek Sector A, on the Cerro Copper Products property were identified as a major source of groundwater pollution in the area as a result of the IEPA Preliminary Hydrogeologic Investigation completed in 1981. Analyses of water and sediment samples from the holding ponds are included in Tables IA-1 and IA-2, and sample locations are shown in Figure IA-1. Contaminants detected at significant concentrations in these samples include PCBs, dichlorobenzene, aliphatic hydrocarbons, arsenic, cadmium, chromium, lead, and mercury.

The IEPA Preliminary Hydrogeologic Investigation also included installation of one monitoring well on the Cerro Copper Products property downgradient from Site I and the holding ponds. Analyses of samples collected from this well (well number G112) are included in Tables B-6, B-7, and B-8, located in the Creek Sector B portion of this report. Contaminants detected at elevated levels in this well include chlorobenzene, dichlorobenzene, chloroaniline, phenol, copper, phosphorus, and zinc. The contaminants in the ground water may be attributable to Site I or the holding ponds (Creek Sector A); however, a more detailed investigation is necessary to accurately determine the source.

A geophysical investigation was scheduled to be conducted at Site I as part of the initial investigations for the Dead Creek Project.

TABLE IA-1: ANALYSIS OF WATER SAMPLES FROM CREEK SECTOR A
(COLLECTED BY IEPA)

| PARAMETERS | SAMPLE DATE AND LOCATION | | | |
|---|---|---|---|---|
| | 11/26/80 | | 1/26/81 | |
| | 5503 | 5504 | 5501 | 5502 |
| Alkalinity | 127 | 110 | | |
| Ammonia | 0.2 | 1.0 | | |
| Arsenic | 0.058 | 0.025 | | |
| Barium | 1.2 | 0.7 | | |
| BOD-5 | 630 | 158 | | |
| Boron | 0.2 | 0.3 | | |
| Cadmium | 0.36 | 0.19 | | |
| COD | | 1190 | | |
| Chloride | 33 | 36 | | |
| Chromium (Total) | 0.61 | 0.21 | | |
| Copper | 4.5 | 3.6 | | |
| Cyanide | .01 | .01 | | |
| Fluoride | 0.4 | 0.7 | | |
| Hardness | 227 | 260 | | |
| Iron | 58 | 28 | | |
| Lead | 6.6 | 2.8 | | |
| Magnesium | 35.8 | 28.7 | | |
| Manganese | 1.0 | 0.67 | | |
| Mercury | 0.0016 | 0.0016 | | |
| Nickel | 4.2 | 3.3 | | |
| Nitrate-Nitrite | 1.4 | 1.7 | | |
| pH | 6.9 | 7.0 | | |
| Phenols | 0.02 | 0.035 | | |
| Phosphorus | 1.9 | 3.4 | | |
| Potassium | 4.3 | 6.2 | | |
| R.O.E. | 361 | 407 | | |
| Selenium | 0.002 | | | |
| Silver | 0.24 | 0.14 | | |
| Sodium | 19.7 | 22.4 | | |
| Sulfate | 90 | 130 | | |
| Zinc | 30 | 17 | | |
| PCB (ppb) | 22 | 28 | 2.0 | - |
| Aliphatic hydrocarbons (ppb) | 23,000 | | | |

NOTES: All results in ppm unless otherwise noted
Blanks indicate that parameter was not analyzed
- Indicates below detection limits

TABLE IA-2: ANALYSIS OF SEDIMENT SAMPLES FROM CREEK SECTOR A
(COLLECTED BY IEPA)

| | SAMPLE DATE AND LOCATION | | | |
|---|---|---|---|---|
| | 11-26-80 | | 1-28-81 | |
| PARAMETERS | x128 | x129 | x128 | x129 |
| Ammonia | | | 30 | 96 |
| Barium | | | 1200 | 2500 |
| Cadmium | | | 51 | 22 |
| Calcium | | | 5300 | 13,100 |
| Chromium | | | 140 | 490 |
| Copper | | | 5500 | 24,000 |
| Iron | | | 29,500 | 51,900 |
| Lead | | | 840 | 2600 |
| Magnesium | | | 2300 | 2100 |
| Manganese | | | 140 | 250 |
| Mercury | | | 101 | 6.9 |
| Nickel | | | 570 | 1500 |
| Potassium | | | 670 | 520 |
| Silver | | | 29 | 98 |
| Zinc | | | 2300 | 5800 |
| Aliphatic Hydrocarbons | 13 | 26 | | |
| Dichlorobenzene | - | 1.7 | | |
| PCBs | 2.2 | 13 | | |

NOTES: All results in ppm
Blanks indicate parameter not analyzed for
- below detection limits

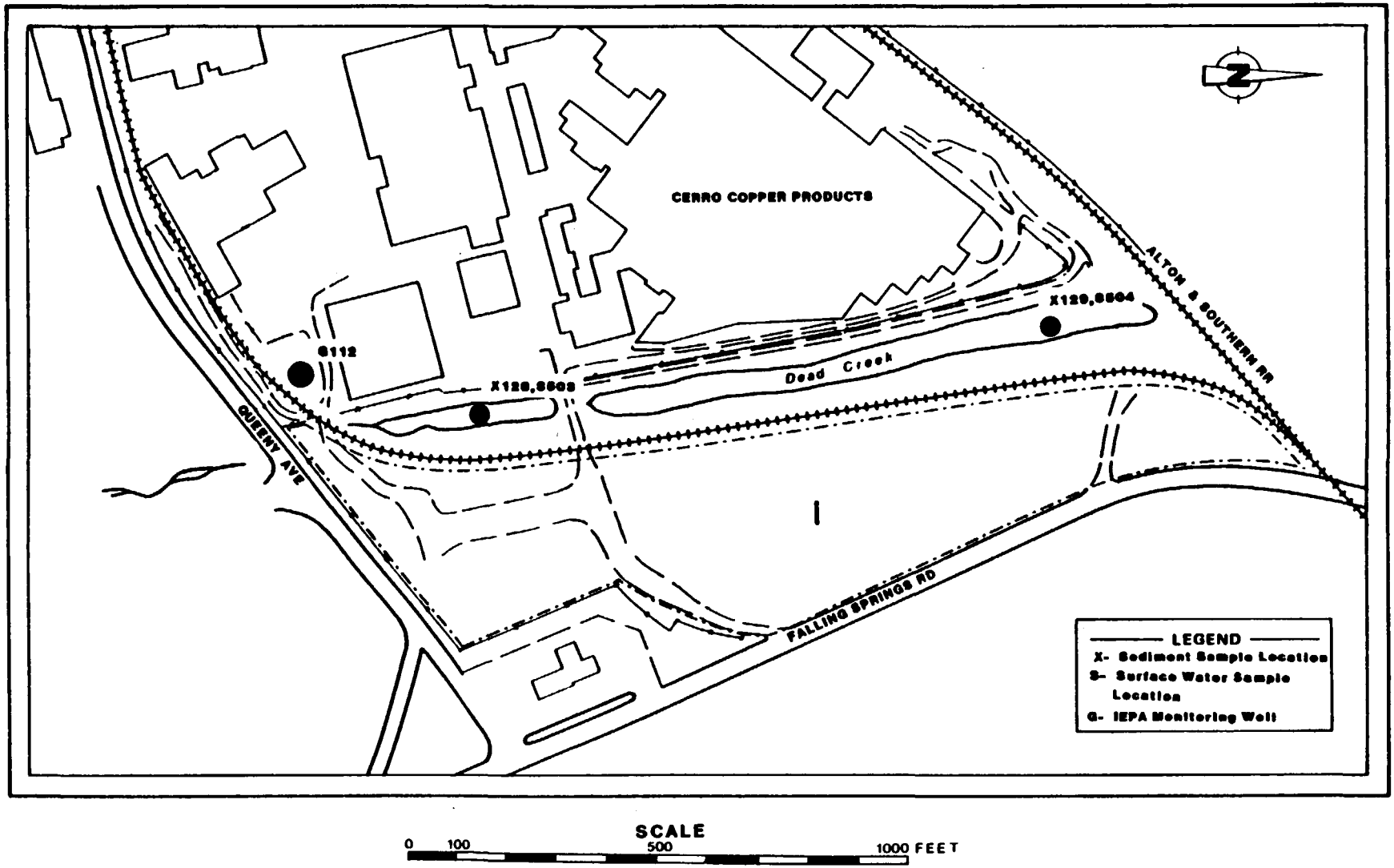



FIGURE IA-1
DEAD CREEK SITE AREA I AND CREEK SECTOR A WITH SAMPLING LOCATIONS

This investigation was cancelled on the scheduled day due to the denial of access to the site by Cerro Copper officials.

## Data Assessment and Recommendations

Field activities to be completed for these sites during the project include collecting 32 surface soil and 15 subsurface soil samples at Site I, and collecting three surface water samples from Creek Sector A. A soil gas survey and ambient air monitoring are also scheduled to be conducted at Site I. In order to have an adequate data base to complete the feasibliity study for these sites, additional information is necessary. Additional field activities should include a more detailed characterization of Creek Sector A, which would be accomplished with sediment sampling and assessment of subsurface soil and ground water conditions.

For Site I, the proposed geophysical investigation should be completed prior to any additional field activities. Subsequent to the geophysical investigation, 5-6 monitoring wells should be stratigically located to ensure efficient collection of data necessary to identify the presence of and to determine the sources of any ground water contamination. Additional subsurface soil sampling would be conducted, as necessary, in conjunction with monitoring well installation. Excavation of test pits, in conjunction with sampling, is an alternative method of data collection for Site I.

## SITE J. STERLING STEEL FOUNDRY

### Site Description

Site J consists of two pits and a surface disposal area utilized by an active steel foundry in the Village of Sauget, Illinois. The site is bordered on the north by the Alton and Southern Railroad; on the west by Monsanto Road; on the south by Little Avenue, and on the east by a Mobil Oil Tank Farm. The surface disposal area is defined by a triangular portion of the property to the northeast of the plant buildings. Generally, surface drainage in this area is directed toward a ditch along the northern perimeter. However, several scattered depression areas are also evident. Two unlined pits and one concrete-lined surface impoundment were observed at Site J, along with an incinerator which is no longer in use (Figure J-1).

### Site History and Previous Investigations

The pit located southeast of the plant building was excavated approximately 30 years ago, based on a review of historical aerial photographs. According to the site operator, it was a borrow pit for road construction fill. The pit was subsequently filled with scrap metal, demolition debris, and casting sand. No evidence has been found suggesting disposal of hazardous materials in the borrow pit. The other unlined pit, located north of the plant building, was excavated in approximately 1950 for the purpose of collecting and settling baghouse dust from furnaces in the foundry. The dust is blown into this pit through underground piping, thus reducing the chance for off-site migration of airborne particulates. The adjacent concrete impoundment has two aerators, used to cool water from the furnaces and compressors.

A small incinerator is situated immediately west of the former borrow pit at Site J (Figure J-1). It has a stack approximately 15-18 feet in height, and was used solely to burn trash and empty bentonite sacks, according to the plant operator. The incinerator was operated

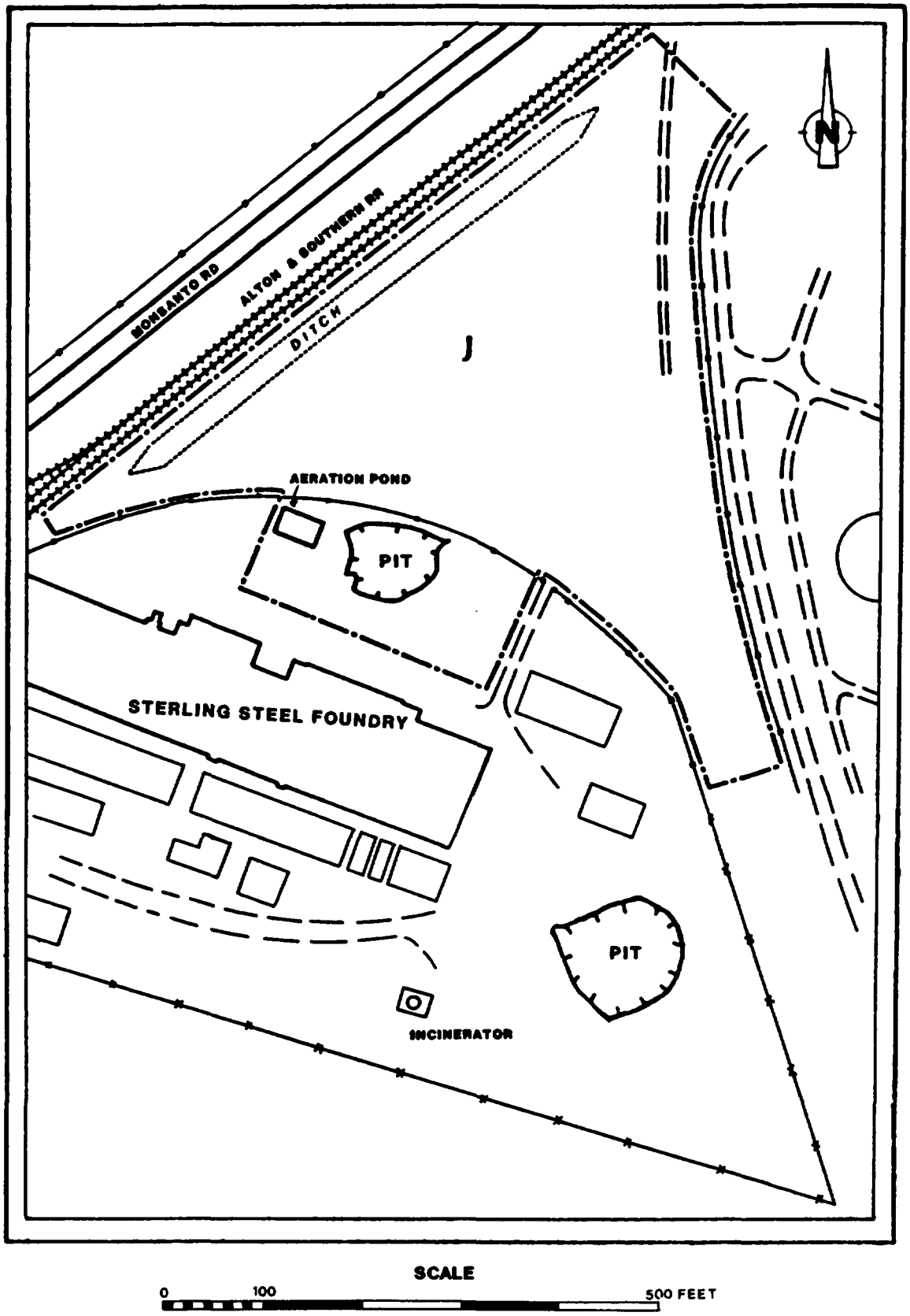



FIGURE J-1
DEAD CREEK SITE AREA J

for 10-12 years following its installation in 1970.

The surface disposal area covers approximately six acres to the northeast of the plant buildings. Sometime in the mid-1970's, Sterling Steel began to use this area for disposal of spent casting sand, slag, scrap steel, and construction debris. No initial excavation was done in this area prior to disposal activities, other than installing a drainage ditch along the northern perimeter. The area is periodically graded, although several depressional areas are evident. Several corroded drums, apparently containing only casting sand and slag, were also observed during a recent visit to the site.

R. O. Shive and Claude Harrell began operations at Sterling Steel Castings Company at its present location in 1922. In 1982, St. Louis Steel Company purchased the facility, and the name was changed to Sterling Steel Foundry, Inc. Raw materials used in Sterling's casting operations included manganese, chromium, nickel, the molybdenum, silicon, bentonite, and water. Water is circulated from furnaces and compressors to the aerated holding pond, and wastewater is directed to the Sauget Treatment Plant.

Site J has not been previously investigated by IEPA. The site was identified by inspection of historical photographs, which indicate possible disposal in the sand pits.

The original scope of work for the Dead Creek Project, as stipulated in the RFP, called for geophysical investigations at Site J to determine potential areas of drum disposal. Based on background review and visual observation, it was determined that geophysical surveys could not adequately define such locations in the originally proposed surface disposal area. This is due to the high metal content of the wastes in the area (casting sand, slag, scrap steel, steel shot), which would result in the entire site appearing as one large anomaly, thereby making it impossible to differentiate drums from other wastes.

A scaled down geophysical survey, including flux-gate magnetometry and EM, was conducted in an area adjacent to the unlined pit northeast of the plant buildings (Figure J-1). The purpose of this survey was to determine if drum disposal may have occurred in this area. A 100 feet by 100 feet grid was set up in a grassy area immediately east of the pit, and survey lines were run on 20 foot intervals. The magnetometer survey results indicated no sigifnicant anomalies within the survey area. Several small anomalies did appear, but were not large enough to infer drums. On-site observations suggest that these smaller anomalies are a result of buried slag or interference from steel castings and scrap metals which are stored adjacent to the survey area.

An EM survey was conducted using the same basic grid system as above. However, several survey points were offset due to physical limitations (coil spacings for the EM are changed depending on desired penetration, thus necessitating offsets). Analysis of the EM data for both horizontal and vertical dipoles (10 meter spacing) indicates an elongate, elliptical-shaped anomaly southeast of the unlined pit. This anomaly dissipates to the north, and is likely attributable to the stockpiled castings and scrap.

## Data Assessment and Recommendations

No analytical data is presently available concerning Site J. The scope of work for this project includes collecting five surface and five subsurface soil samples for waste characterization. In addition to this sampling, a soil gas survey and ambient air monitoring will be conducted at Site J. If contamination is detected, additional attempts should be made to locate information concerning past operations at the site. Additional subsurface soil sampling and installation and sampling of ground water monitoring wells should then be carried out. If contamination is detected, this added investigation would be essential in order to complete feasibility study activities.

## SITE K. FORMER SAND PIT

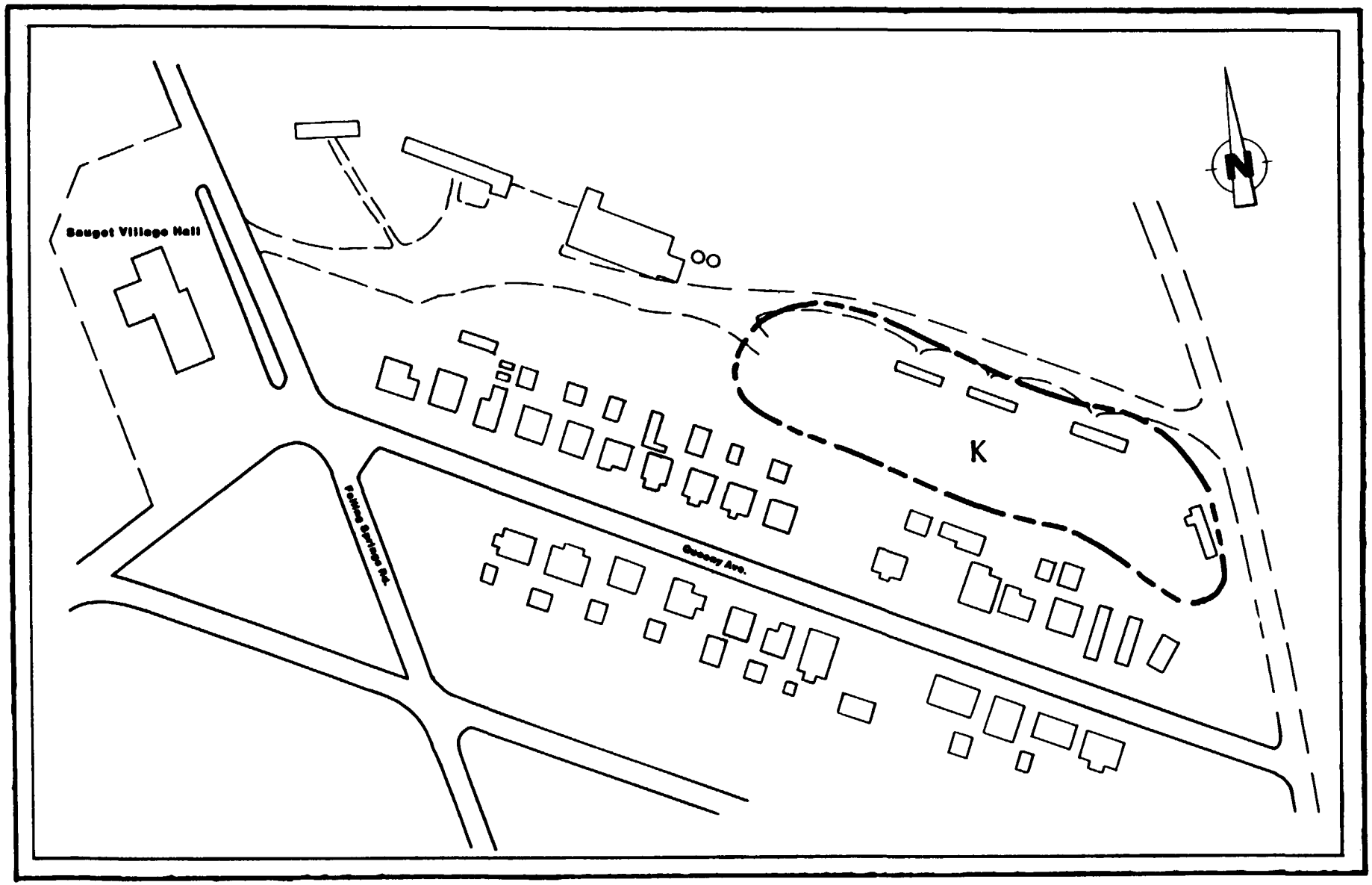
### Site Description

Site K is the location of a former sand pit for which no file information could be located. The site is located north of a residential area on Queeny Avenue, and east of Falling Springs Road in Sauget, Illinois (Figure K-1). Site K covers approximately six acres, and presently the property is unoccupied. Several trucks with the name M-T-S, Inc. (Sauget) on the doors were observed at the site during preliminary reconnaissance, but there was no activity at the property. Subsequent attempts to contact M-T-S, Inc. by telephone did not succeed. Several trailer homes and houses are located within 100 feet of the site. The pit, which constitutes Site K, has been filled and covered with soil and gravel, and the area has been graded to the surrounding topography.

### Site History and Previous Investigation

Historical aerial photographs suggest possible waste disposal operations at Site K. Excavation at the site began sometime in the late 1940s. By 1955, the site was filled with unknown materials, and a vegetation cover had started to develop. No buildings were apparent at the site at the time of the initial excavation. After the excavation was filled, the site remained unchanged until at least 1968. Photographs from 1973 again show an excavation, somewhat larger than the first one, in the same location at Site K. This pit contained water, as seen in photographs from 1973 and 1974, and a building had been erected at the site sometime prior to 1973. No information has been located concerning operations at the site during this time period. The second excavation was filled with unknown materials by 1979, and the site has apparently remained generally unchanged since that time.

Previous investigation of Site K has been limited to a review of the historical photographs. No field investigations have been conducted at the site.




SCALE

0 100 500 FEET

FIGURE K-1
DEAD CREEK SITE AREA K

## Data Assessment and Recommendations

No sampling and/or analytical data has been developed to date for Site K. Since other sand pits/disposal operations in the area have shown significant contamination, it is entirely possible that the disposal of hazardous materials did occur at this site. Field activities scheduled for Site K consists of collecting three subsurface soil samples and conducting soil gas and ambient air surveys. This sampling should be adequate to determine the presence of wastes and also indicate if further investigation is necessary. If contamination is detected, additional attempts should be made to locate information concerning past operations at the site. Additional subsurface soil sampling and installation and sampling of groundwater monitoring wells should then be carried out. If contamination is detected, this added investigation would be essential in order to complete feasibility study activities. In addition, depending upon subsurface conditions identified, a geophysical investigation may be of value to delineate pit boundaries as well as determine the presence of subsurface drum disposal.

## SITE L - OLD WAGGONER COMPANY IMPOUNDMENT

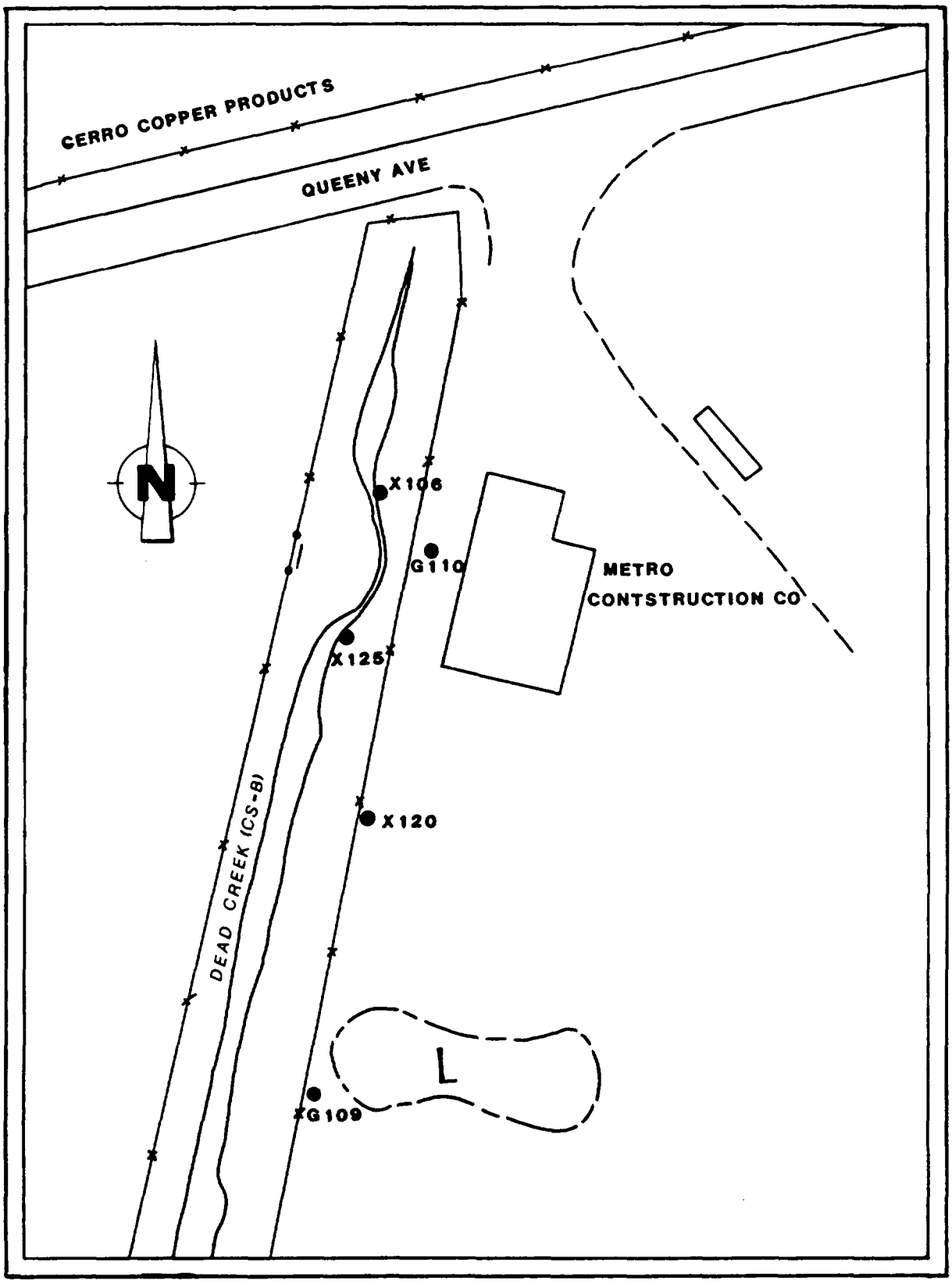
### Site Description

Site L is the location of a former surface impoundment used by the Harold Waggoner Company to dispose of wash water from a truck cleaning operation. The impoundment was situated approximately 250 feet south of the present Metro Construction Company building, and approximately 125 feet east of Dead Creek (Figure L-1). The site is now covered with black cinders, and is used by Metro Construction Company for equipment storage. Several rows of heavy equipment are presently stored in the immediate area of the former impoundment. This equipment should be moved prior to any field activities.

### Site History and Previous Investigations

Waggoner Company, owned and operated by Harold Waggoner, specialized in hauling industrial wastes for companies in the St. Louis/Metro East area. Harold Waggoner operated the company from 1964 to 1974, when he sold the operation to Ruan Trucking Company. Prior to 1971, Wagonner reportedly discharged wash water from truck cleaning operations directly to Dead Creek. In August 1971, the IEPA ordered Waggoner to cease discharging wastes to the creek. Subsequently, a pit was excavated for the purpose of storing wash waters, and the pit was used by Waggoner until 1974. Based on a review of historical photographs, the dimensions of this pit were determined to be roughly 70 feet by 150 feet. Ruan Trucking reportedly continued this practice of wash water storage until 1978. The property was then leased, and later purchased, by Tony Lechner of Metro Construction Company.

The IEPA calculated a rough estimate of the quantity of wash water disposed of in the impoundment between 1971 and 1978. This estimated volume, 164,000 gallons, is based on the assumption that Ruan Trucking operated at the same volume as Waggoner. The estimate is useful as a starting point for further calculations concerning




SCALE

0 100 400 FEET

LEGEND

G110 IEPA MONITORING WELL

X120 IEPA SOIL SAMPLING LOCATION

FIGURE L-1

DEAD CREEK SITE AREA L WITH SAMPLING LOCATIONS

expected leachate migration rates and plume characteristics in the ground water aquifer. It should be noted that the impoundment was not lined, and the base consisted of medium to coarse grained sands.

Site L was identified in the IEPA St. John Report as a source of both ground water and surface water contamination in the area. The IEPA study included collecting several soil/sediment samples and one groundwater sample from areas downgradient of Site L. Results from analyses of sediment samples are presented in Table B-1, located in the Creek Sector B portion of this report. Results from the analyses of groundwater samples from the monitoring well downgradient of Site L (well G109) are included in Tables B-6, B-7, and B-8 (Creek Sector B).

Monitoring well G109, located approximately 100 feet west of the former impoundment, was found to be the most polluted well during IEPA's preliminary investigation. Also, during the installation of G109, drillers became nauseous from fumes at the well location. Initial sampling conducted by IEPA on October 23, 1980 indicated the presence of chlorophenol, phenol, and cyclohexanone, along with relatively high levels of heavy metals (Table B-6). Analyses from subsequent sampling events did not show organic contaminants, other than phenol. Arsenic, cadmium, copper, nickel, and phosphorus were detected at quantities significantly above IEPA's water quality standards. Other IEPA monitoring wells adjacent to the creek showed concentrations of these contaminants at least an order of magnitude (10 times) less than those found in G109. No other likely sources of contamination are known to exist in the immediate area. In view of these points, it is likely that contaminants found in well G109 are attributable to the former disposal impoundment (Site L).

Surface soil samples collected in the vicinity of Site L during the IEPA study include X106, X120, and X125 (Figure L-1). Samples X106 and X125 were taken from the creek bed, and X120 was taken from surface soil east of the creek in the general vicinity of the

impoundment. Analyses of these samples are presented in Table B-1, which is located in the Creek Sector B portion of this report. High levels of several organic contaminants were detected in X125. These include alkyl benzenes, dichlorobenzene, dichlorophenol, hydrocarbons, naphthalenes, and trichlorobenzene at concentrations ranging from 78 to 21,000 parts per million (ppm). PCBs, including 10,000 ppm at X125, were detected in all three samples. Sample X106 was not analyzed for inorganic parameters, and concentrations of inorganics in X120 and X125 were only slightly higher than those found in the background soil sample X121 (see Tables B-1 and B-3).

Geophysical surveys were completed at Site L as part of the Dead Creek Project in December, 1985. These surveys included the use of EM and flux-gate magnetometry over a 200 feet by 200 feet grid in the area of the former disposal impoundment. Two rows of heavy equipment and trailers were present in the middle of the site at the time of the survey.

Magnetometer readings indicated a significant magnetic anomaly in the southwest corner of the site. Another large anomaly was observed between the rows of equipment; but an accurate assessment of the size and actual magnitude of the anomaly was not possible due to surface interference. An EM survey was conducted using different coil alignments to obtain readings from various depths. Shallow soundings indicated a single anomaly with the approximate dimensions of 150 feet by 100 feet in the southeast corner of Site L. Readings in this area were significantly higher than those obtained from a random check point in the cultivated field to the south. Deeper instrument penetration showed an anomaly that was similarly located in the southeast corner; however, the size and the magnitude of the readings were smaller than observed in the shallow investigation. Readings from the remainder of Site L showed no significant anomalies, although these readings were generally higher than those seen at the check point in the cultivated field. This is probably due to cinders covering the site, which are not present in the cultivated field.

## Data Assessment and Recommendations

Investigations planned for Site L during the RI include subsurface soil sampling and soil gas monitoring. Ambient air monitoring will also be conducted as for all sites in the project.

Further activities necessary to provide adequate data for the feasibility study should include installation and sampling of 3 to 4 monitoring wells, and collecting additional subsurface soil samples. Subsurface soil sampling would be done in conjunction with well installation, and would provide additional data concerning migration of contaminants. The hydrology of the area also needs to be assessed to determine the interaction, if any, between the ground water and the creek.

Preliminary geophysical investigations and subsequent acquisition of historical aerial photographs indicate the likely presence of waste residues extending to the farmland to the south of Site L. Accordingly, additional surveys should be conducted south of the area initially surveyed. Additional geophysical investigations would allow better definition of the impoundment boundaries and also aid in delineating off-site migration of contaminants.

## SITE M. HALL CONSTRUCTION PIT

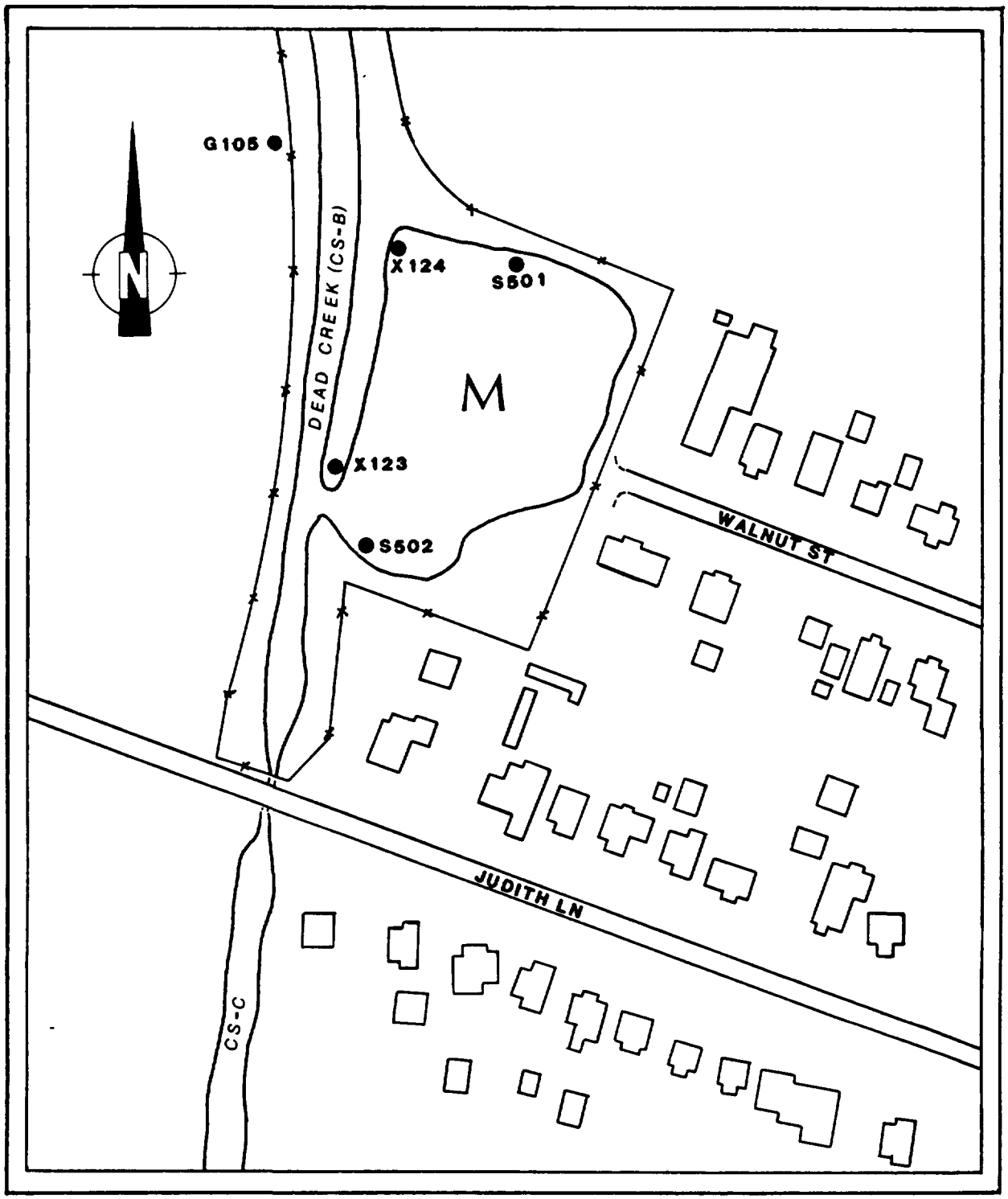
### Site Description

Site M is a sand pit excavated by the H.H. Hall Construction Company in the mid to late 1940's. The pit is located immediately east of Dead Creek, and approximately 300 feet north of Judith Lane in Cahokia, Illinois (Figure M-1). The dimensions of the pit are approximately 275 by 350 feet. Presently, Site M is enclosed by a chain link fence, which also surrounds Creek Sector B. A small residential area is located just east of the pit on Walnut Street, which earlier served as an access road to Site M. The pit was excavated prior to any residential development on this street. Observations suggest that the pit is apparently isolated from Dead Creek by an embankment; however, this embankment may not be continuous. Aerial photographs indicate that a small break in the southern part of the embankment may allow flow between the creek and Site M. This possibility is supported by past IEPA inspections indicating discoloration in the pit similar to that observed in Dead Creek.

### Site History and Previous Investigations

No information is available on file concerning waste disposal activities at Site M. It is possible that disposal did occur, since access to the pit remained unrestricted until a snow fence was erected in 1980. From review of historical aerial photographs, it is evident that minor changes in the dimensions of the pit have occurred. This could be an indication of filling around the perimeter of the pit. IEPA and the Cahokia Health Department have received numerous complaints about Site M and the creek from residents in the area. These complaints address, for the most part, seepage of odoriferous water into basements and problems associated with well water used to water gardens and lawns.

IEPA sampled several private wells in the area during the preliminary




SCALE

0 150 600 FEET

LEGEND

G105 IEPA MONITORING WELL

X124 IEPA SEDIMENT SAMPLING LOCATION

S502 IEPA SURFACE WATER SAMPLING LOCATION

FIGURE M-1

DEAD CREEK SITE AREA M WITH SAMPLING LOCATIONS

hydrogeological study conducted in 1980. In addition, one sample of basement seepage from a home on Walnut Street near Site M was collected. Analytical results of these samples are presented in Table B-9, located in the Creek Sector B portion of the report. The results show concentrations of copper, manganese, and phosphorus above the state's water quality standards in one or more wells as well as in the basement seepage sample.

In conjunction with the creek sampling done in 1980, IEPA collected sediment and water samples from Site M. Analytical data for these samples are presented in Table M-1. In general, the water samples showed no significant contamination, although water quality standards for copper, phosphorous, and zinc were exceeded. Trace levels of PCBs (0.9 to 4.4 ppb) were found in both samples. The sediment samples, however, did show fairly high levels of several contaminants, including cadmium, chromium, copper, lead, nickel, zinc, and PCBs. In general, the samples closer to the break in the embankment separating Site M from Dead Creek showed higher levels of contaminants than the other samples.

Because water levels in the pit were approximately two feet higher than those found in the closest monitoring wells, the IEPA study concluded that there is no hydrological connection between water in the pit and the ground water aquifer. This assessment may or may not be accurate.

## Data Assessments and Recommendations

The IEPA study conducted in 1980 showed significant contamination at Site M and identified specific waste types present. Investigation of Site M for the Dead Creek Project includes collecting two surface water and three sediment samples. A soil gas survey and ambient air monitoring will also be conducted at Site M. This sampling program will not provide sufficient data to adequately evaluate remedial alternatives. Core samples should be collected from the bottom of the pit in order to determine the types of wastes present and the

TABLE M-1:

ANALYSIS OF SURFACE WATER AND SEDIMENT SAMPLES FROM SITE M
(COLLECTED BY IEPA 9-15-80)

| | SAMPLE LOCATIONS | | | |
|---|---|---|---|---|
| | Water | | Sediment | |
| PARAMETERS | S 501 | S 502 | X 123 | X 124 |
| Alkalinity | 80 | 85 | | |
| Arsenic | 0.006 | 0.01 | | |
| Barium | 0.2 | 0.5 | 4,400 | 350 |
| Berylium | | | 3 | 1 |
| BOD-5 | 4 | 33 | | |
| Boron | 0.2 | 0.2 | - | 25 |
| Cadmium | - | - | 40 | 4 |
| Calcium | | | 12,500 | 4,500 |
| COD | 58 | 85 | | |
| Chloride | 27 | 28 | | |
| Chromium | - | - | 150 | 50 |
| Copper | 0.035 | 0.33 | 18,700 | 4,500 |
| Cyanide | 0.02 | - | | |
| Flouride | 0.4 | 0.4 | | |
| Iron | 0.8 | 1.8 | 49,000 | 13,500 |
| Lead | - | 0.01 | 1,400 | 130 |
| Magnesium | 6 | 6 | 3,400 | 3,500 |
| Manganese | 0.06 | 0.82 | 200 | 80 |
| Mercury | - | - | | |
| Nickel | 0.02 | 0.05 | 1,600 | 590 |
| Phenol | 0.01 | 0.01 | | |
| Phosphorus | 0.17 | 0.31 | | |
| Potassium | 5.9 | 6.2 | 950 | 1,000 |
| Silver | - | - | 30 | 6 |
| Sodium | 24 | 25 | 650 | 100 |
| Strontium | | | 175 | 27 |
| Vanadium | | | 42 | 19 |
| Zinc | 0.1 | 0.7 | 17,700 | 2,600 |
| PCBs | 0.0009 | 0.0044 | 1,100 | 24 |
| Dichlorobenzene | | | | |

NOTE: All results in ppm.
Blanks indicate parameter not analyzed.
- Indicates below detection limits.

extent of vertical migration of contaminants that has occurred. In addition, several borings should be completed around the perimeter of the pit, including the embankment between the pit and the creek. It would also be necessary to verify that there is no hydrological connection between the water in the pit and the ground water aquifer. This would be best accomplished using continuous recording gauging stations at wells in the vicinity of the creek and at the pit. These activities would provide the information necessary to proceed with a viable remedial program.

## SITE N - H.H. HALL CONSTRUCTION CO.

### Site Description

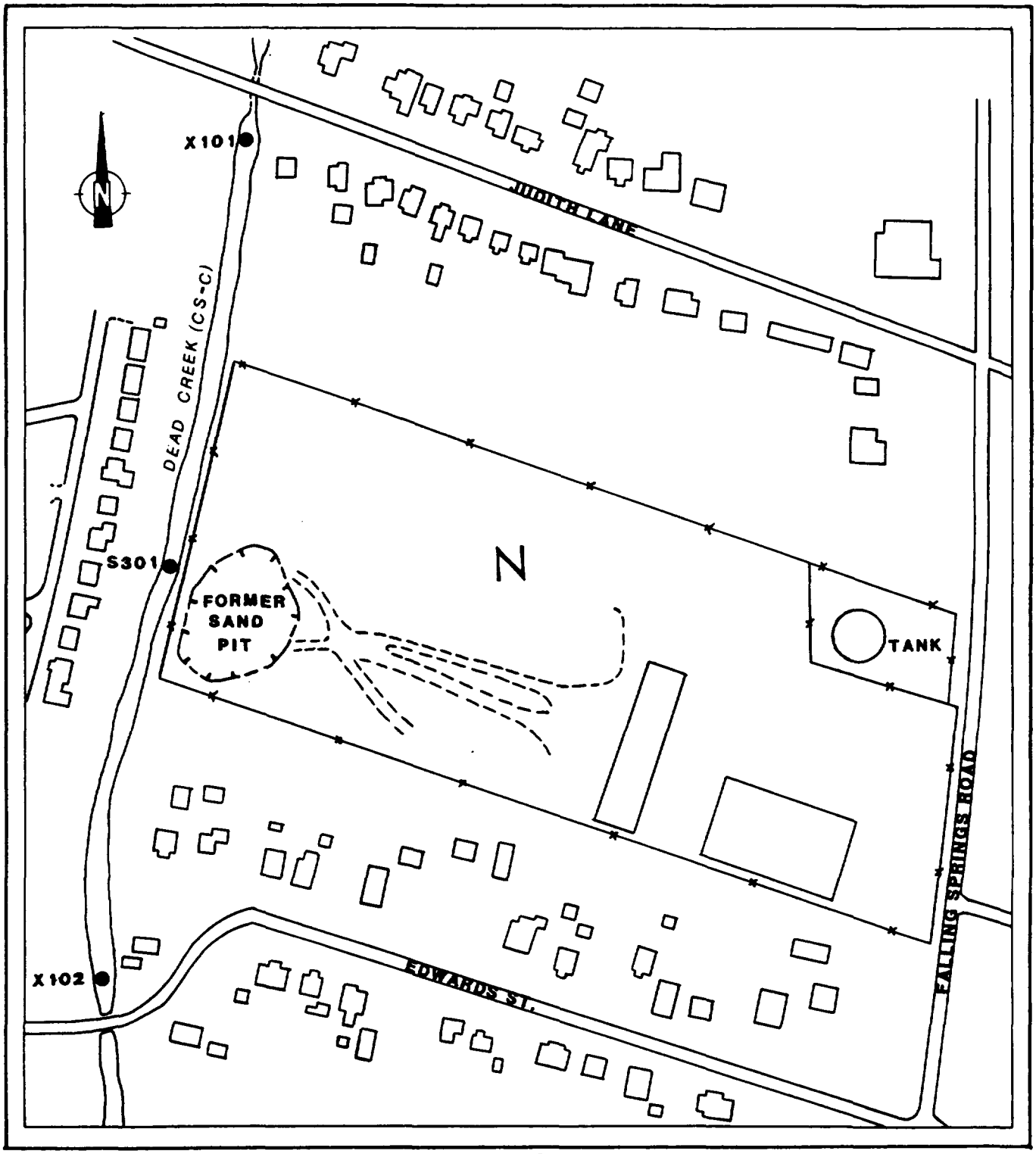
Site N is an operations and equipment storage facility for the H. H. Hall Construction Company of East St. Louis. The site is located in a residential/commercial neighborhood in the town of Cahokia, Illinois. Site N is bordered on the north by residential property along Judith Lane; on the west by Dead Creek; on the south by residential property along Edwards Street, and on the east by Falling Springs Road. The entire facility covers approximately 23 acres. Access to the site is restricted by a chain link fence.

### Site History and Previous Investigation

Historical photographs indicate that a borrow pit existed at the facility which may have been used for waste disposal. The borrow pit, located in the southwest corner adjacent to Dead Creek, is roughly 4-5 acres in size (Figure N-1). No file information has been located concerning waste disposal at Site N. The pit has been filled and covered.

Historical photographs indicate that excavation at Site N began sometime prior to 1950. The presence of water in the pit was displayed in photographs from 1950, suggesting excavation into the Henry Formation aquifer. Hall Construction Company officials were recently contacted in an attempt to gather further information about the site. Apparently the pit was excavated in the late 1940's as a borrow pit for road construction materials. According to the officials contacted, concrete rubble and other demolition debris are the only wastes disposed of in the pit by Hall Construction. The area is presently covered with rubble and debris and is used only for equipment storage.

Although no analytical data has been developed for Site N, it should not be overlooked as a possible source of contamination in the area.




SCALE

0 100 200 800 FEET

LEGEND

X101 IEPA SEDIMENT SAMPLING LOCATION

S301 IEPA SURFACE WATER SAMPLING LOCATION

FIGURE N-1

DEAD CREEK SITE AREA N WITH SAMPLING LOCATIONS IN CREEK SECTOR C

The site is located adjacent to Creek Sector C of Dead Creek, which has shown elevated levels of several contaminants, including PCBs. At this time, it cannot be determined if the contamination in Creek Sector C is the result of flow from the heavily-contaminated Creek Sector B, or the result of other unknown sources. It is also not known if access to Site N has always been restricted. Accordingly, the possibility exists that other parties may have used the pit for disposal.

## Data Assessment and Recommendations

No sampling or field investigation data is presently available for Site N. Field activities scheduled at Site N during the Dead Creek Project include collecting three surface and two subsurface soil samples. In addition, a soil gas survey and ambient air monitoring will be conducted at the site. These investigations should be adequate to characterize the types of wastes present. The results of this sampling should also indicate if further investigation of the site is warranted.

If contamination is identified at the site, additional subsurface soil sampling and installation and sampling of groundwater monitoring wells should be carried out. This added investigation would be essential to complete feasibility study activities. In addition, depending upon subsurface conditions identified, a geophysical investigation may be of value to delineate pit boundaries and determine the presence of subsurface drum disposal. The hydrology of the creek in relation to the site should also be assessed to determine the potential for discharge from the pit to the creek.

## SITE O - SAUGET WASTE WATER TREATMENT PLANT

### Site Description

Site O is the Sauget Waste Water Treatment Plant and related property, located on Mobile Avenue in Sauget, Illinois. The property covers approximately 45 acres in a heavily industrialized area. The site consists of a series of four inactive sludge dewatering lagoons and a separate area of contamination. The former sludge lagoons cover approximately 20 acres to the south of the treatment plant buildings, and the identified contaminated area (3 acres) is located immediately west of the Sauget Waste Water Treatment Plant on the northwest corner of the property.

### Site History and Previous Investigations

The Sauget Treatment Plant has been in operation in some form since approximately 1952. The plant primarily treats effluent from area industries, but also provides treatment for the entire Village of Sauget. Approximately ten million gallons per day (MGD) of waste water is treated at this facility, of which over 95 percent is from industrial sources. Area industries served by the Sauget Treatment Plant include Monsanto Chemical, Cerro Copper, Sterling Steel Foundry, Amax Zinc, Rogers Cartage, Edwin Cooper, and Midwest Rubber. Effluent from the treatment plant is directed to a National Pollutant Discharge Elimination System (NPDES) permitted discharge point in the Mississippi River.

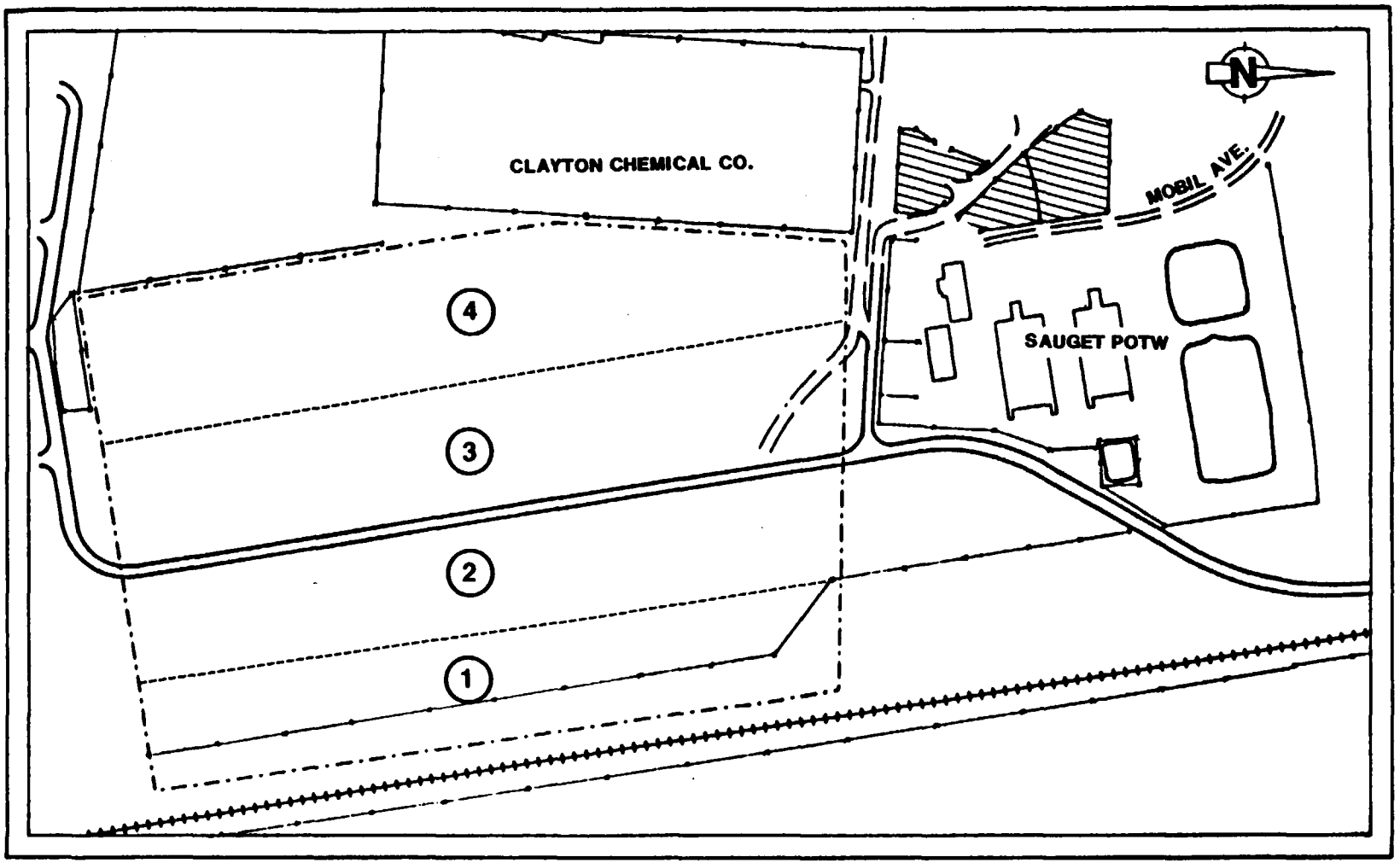
The treatment plant has a long history of NPDES permit violations, for the most part due to the chemical quality of the plant effluent. Mercury, PCBs, and organic solvents have been detected at concentrations exceeding permit limits on several occasions. A USEPA study conducted in 1982 concluded that the treatment plant waste water contributed a substantial volume of priority, toxic pollutants annually to the Mississippi River. Since operations began, the plant has undergone several modifications and upgrades, increasing both

capacity and effluent quality.

According to a Notification of Hazardous Waste Site Form submitted to USEPA in 1981, the former lagoons were used for disposal of clarifier sludges from 1965 to approximately 1978. The lagoons were designed to drain liquid from the sludge. The lagoons were not artificially lined, and were apparently excavated into the Henry Formation Sand. Initially, the sludge was not treated in any way after being placed in the lagoons. After an unknown period of time, lime was used for neutralization.

In 1982, IEPA personnel collected a sample of filter cake sludge from the treatment plant, which provides an indication of the chemical quality of sludges placed in the lagoons. Analysis of this sample showed several organic contaminants, including chlorinated benzenes, xylene, and aliphatic hydrocarbons, at concentrations ranging from 120 to 820 ppm. The lagoons are presently covered with two feet of clay and have been vegetated. Sludges from the Sauget Treatment Plant, which is still in operation, are presently taken to two IEPA-permitted landfills in the St. Louis Metro-East area.

Extensive construction/excavation has been done since 1981 in the area surrounding the Sauget Treatment Plant. The new American Bottoms Regional Treatment Plant, completed in 1985 but not on line as yet, is located immediately south of the former sludge lagoons. Several problems involving chemical wastes were encountered during excavation work for the construction of this facility. In 1984, workers uncovered a black, tar-like substance with a strong solvent odor while digging a trench for sewer and water lines to the new treatment plant. Although file information is sketchy concerning the exact location of this incident, it is thought to be in the southern portion of Lagoons 3 and 4 (Figure 0-1). Two samples of the waste material were collected by Envirodyne Engineers, Inc. (EEI) of St. Louis, and a limited organic analysis was run. Both samples showed the presence of PCBs (477 to 653 ppm), phenol (0.28 to 12.0 ppm), and oil and grease (29 to 35 percent). Benzene was also detected at




LEGEND

(2) FORMER SLUDGE LAGOON

APPROXIMATE LAGOON BOUNDARY

AREA OF INDENTIFIED SOIL CONTAMINATION

SCALE

0 100 500 1000 FEET

FIGURE O-1

FORMER SLUDGE LAGOONS AND CONTAMINATED SOIL AREAS AT SITE O

trace levels (1 ppb) in both samples.

Several additional locations have reportedly been sampled by EEI as a result of uncovering waste materials during excavation activities around the Sauget Treatment Plant. However, attempts to gather information concerning specific sample locations and analytical data have been of limited success. Chemical data for two soil samples collected from excavated soil piles in the area of the former sludge lagoons was acquired. These results are shown in Table O-1. Both samples show high levels of several chlorinated organics and other priority pollutants. Values were listed for total PCBs, however, the PCB results could not be verified by the laboratory. Although limited data has been acquired, available data indicates that the former sludge lagoon area likely contains widespread organic and inorganic contamination.

In 1983, IEPA identified another highly contaminated area at Site O. This area is located directly west of the existing treatment plant and approximately 200 feet north of the Clayton Chemical Company property (Figure O-1). IEPA and EEI personnel conducted a cooperative sampling effort in this area during February and March of 1983. A total of 33 surface and subsurface soil samples were collected and analyzed for PCBs and TCDD (samples collected in March were analyzed for TCDD only). Analytical results for these samples are shown in Tables O-2 and O-3. The results of initial sampling done in February show relatively high levels of PCBs in all samples, including those taken to a depth of 14 inches. Sample location 5, in the area of a proposed effluent-pump station, was the only location where TCDD was detected in the initial sampling. Based on the results from samples collected in February, it was determined that further sampling would be necessary. In March, 1983, 21 soil samples were collected from 10 locations in the area of the initial sampling. Depths of these samples ranged from 0 to 28 inches. Sample number 14 was a composite of several soil piles, and samples 10A and 10B were spiked control samples. The results of these samples indicate significant TCDD contamination throughout the area. Sample locations

TABLE O-1: IDENTIFIED ORGANIC COMPOUNDS IN SAMPLES FROM TRENCH EXCAVATION AT SITE O (COLLECTED JULY 20, 1984 BY RUSSELL AND AXON, INC.)[a]

| | SAMPLE LOCATIONS | | |
|---|---|---|---|
| PARAMETERS | SAMPLE 1 | SAMPLE 2 | BLANK |
| 2,4-Dichlorophenol | 50.1 | | |
| Pentachlorophenol | 3,600 | 159 | |
| 2,4,6-Trichlorophenol | 39.3 | | |
| Crysene | 123 | 2.2 | |
| Benzo-k-Fluoranthene | 15.9 | 0.45 | |
| Bis(2-Ethylhexyl) Phthalate | 10.9 | | 0.098 |
| 1,2-Chlorobenzene | | 12.2 | |
| 1,4-Dichlorobenzene | | 8.01 | |
| Di-Butyl Phthalate | | 5.06 | 0.1 |
| Phenanthrene | 100 | 1.6 | |
| Pyrene | 102 | 2.1 | |
| 1,2,4-Trichlorobenzene | 65.3 | 1.6 | |
| PCBs | * | * | |
| Benzo(a)Pyrene | 4.2 | 1.0 | |

NOTE: All results in ppm.
Blanks indicate compound not detected.
* Identified, but values cannot be verified.
a Analysis performed by Envirodyne Engineers, Inc. (EEI), St. Louis, MO.

TABLE 02: ANALYTICAL RESULTS FOR SOIL SAMPLES AT SITE 0 (SPLIT SAMPLES COLLECTED FEBRUARY 19, 1983 BY IEPA AND EEI)

| | PARAMETERS | | | | |
|---|---|---|---|---|---|
| SAMPLE NO. (Depth) | PCB - IEPA | PCB - EEI | TCDD - IEPA[a] | TCDD - EEI | Comment |
| 1 (0" - F") | 1,500 | 3,690 | | | |
| 2A (0"- F") | 7,600 | 5,350 | | | |
| 2B (7" - 13") | 390 | 716 | | | |
| 3A (0" - 7") | 9,100 | 137,250 | | | |
| 3B (7" - 13") | 40 | 28 | | | |
| 4A (0" - 6") | 20,000 | 21,020 | | | |
| 4A (0" - 6") | - | 15,510 | | | Duplicate-EEI |
| 4B (6" - 13") | 54,000 | 149,600 | | | |
| 5A (0" - 6") | 32,000 | 112,930 | 18 | 28 | |
| 5A (0" - 6") | - | - | 17 | - | Duplicate-IEPA |
| 5B (6" - 14") | 20,000 | 12,050 | 4.1 | 5.1 | |
| 6 (0" - 8") | 120 | 90 | | | |

NOTE: All results in ng/g (ppb).
Blanks indicate below detection limits.
- Indicates parameter not analyzed.
a Hazelton Raltech, Inc. performed TCDD analysis for IEPA.

TABLE O-3: ANALYTICAL RESULTS FOR SOIL SAMPLES AT SITE O. (SPLIT SAMPLES COLLECTED MARCH 12, 1983 BY IEPA AND EEI)

| | PARAMETERS | | |
|---|---|---|---|
| SAMPLE NO. (Depth) | TCDD - IEPA[a] | TCDD - EEI | COMMENTS |
| 7A (0"- 6") | | | |
| 7B (8" - 16") | 1.8 | 44 | |
| 8A (0" - 6") | 77 | Interferences | |
| 8B (6" - 12) | * | 19 | |
| 8C (13" - 18") | | 37 | |
| 8D (18" - 25") | | 56 | Duplicate |
| 8D (18" - 25") | | | |
| 9A (0" - 6") | 1.3 | | |
| 9B (6" - 12") | * | | |
| 9C (14" - 21") | | | |
| 9D (22" - 28") | 0.92 | | Control Sample |
| 10A | 12 | | Control Sample |
| 10B | * | 13 | |
| 11A (0" - 6") | | | |
| 11B (G" - 18") | * | | |
| 12 (10" - 19") | * | | |
| 13A (0" - 7") | | | |
| 13B (7" - 18") | 13 | 13 | |
| 14 (0" - 6") | 25 | 170 | Composite of soil samples |
| 15 (0" - 16") | | | |
| 16 (0" - 18") | | | |

NOTE: All results in ng/g (ppb).
Blanks indicate below detection limits.
* Sample not collected by IEPA.
a Hazelton Raltech, Inc. performed TCDD analysis for IEPA.

8, 15 and 16, all near the proposed pump station, showed the highest concentrations of TCDD (ranging from 13 to 170 ppb).

Based on the results of the sampling done in February and March, 1983, USEPA estimated that 2800 cubic yards of contaminated soil existed at the site. Further sampling was proposed by USEPA to determine the extent of PCB and dioxin contamination, and plans were prepared by Russell and Axon, Inc., a contractor for the Village of Sauget, for a temporary containment facility for the contaminated soil. The USEPA, IEPA, the Village of Sauget, and contractors representing the village were involved in discussions concerning possible remedial alternatives for the contaminated soil. However, no remedial actions have been implemented to date. Presently, a fence encloses the contaminated area, and the surface has been covered with gravel.

The source of the PCB and dioxin contamination on the northwest portion of the site has not been conclusively determined. A likely source is a tank owned by Bliss Waste Oil of Missouri, which was located on the Clayton Chemical Company property. Bliss Waste Oil had four above-ground storage tanks located in the northern portion of Clayton's property which were used to store waste oil and diesel fuel. In February, 1983, a former employee of Bliss informed IEPA of a leaking underground storage tank owned by Bliss in the area of the other tanks. This tank was apparently used to drain unwanted liquid from the above ground tanks.

IEPA located the underground tank and conducted preliminary sampling an excavated area around the tank. Analysis of these samples detected significant levels of PCBs and other priority pollutant organic compounds. In June, 1983, the underground tank was removed by a contractor for Russell Bliss (the former owner), and additional sampling was done to determine the extent of remaining soil contamination. Liquids and sludges in the tank were containerized, along with contaminated soil from the excavation. All containerized materials were removed to a licensed hazardous waste facility by November, 1983.

## Data Assessment and Recommendations

Based on the information outlined above, there is significant and widespread contamination in the area of the Sauget Treatment Plant. Additional information is available from Russell and Axon, Inc., and further attempts should be made to secure all data pertaining to chemical wastes in the area from this contractor. A signifcant amount of analytical data has been generated for the contaminated area west of the treatment plant. However, the horizontal and vertical extent of contamination has not been assessed. Similarly, very little data is available with respect to the former sludge lagoons which would be useful in proposing remedial alteratives.

The present scope of work for this project includes only collecting and cataloging all data pertaining to Site O. Wastes have been characterized in the area west of the treatment plant, and two major contaminants have been identified to a depth of 28 inches in this area. Data is also available from samples taken in the vicinity of the former sludge lagoons which provides an indication of possible waste types present in the lagoons. The approximate boundaries of the lagoons can be determined based on a review of historical aerial photographs. The data generated to date for Site O indicates that further field investigation is warranted. In order to define and specify remedial alternatives, the areas of surface and subsurface soil contamination need to be accurately defined. In addition, since the sludge lagoons are not lined, and may have been excavated into the Henry Formation aquifer, a strong possibility for ground water contamination exists.

For the former sludge lagoons, it is recommended that soil borings be completed into the lagoons to a depth sufficient to assess the vertical migration of contaminants from the lagoons. The borings should be located so as to provide intersecting cross sections for mapping purposes, and should cover the entire lagoon area. Samples should be composited for ten foot intervals for each boring and analyzed for all hazard substance list (HSL) compounds. These

borings and samples would provide adequate characaterization of the chemical constituents present in the lagoons and provide information concerning vertical migration of contaminants. In addition, four deeper borings should be completed around the periphery of the lagoons to determine if, or to what extent, wastes have migrated from the lagoons. Detailed field screening would be done on samples from these borings using a portable gas chromatograph (GC). A geophysical investigation using electromagnetics would be completed in conjunction with these borings to define the lateral extent of any contaminant plume that may be present. If initial borings into the lagoons indicate that ground water monitoring is necessary, the deeper borings around the periphery could be used for monitoring well emplacement.

The identified area of soil contamination west of the treatment plant should be more accurately defined. Recommendations for this area include completing several test borings in the area to determine the maximum depth of contamination, followed by grid sampling to accurately define the contaminated area. Samples collected from the test borings could be extracted and analyzed for PCBs in the field using GC. Since they were found at high concentrations in previous samples, PCBs would be a good indicator for other possible contaminants. Following the determination of the maximum depth of contamination, a detailed sampling program should be developed and conducted in order to define the extent of contamination.

## SITE P - SAUGET/MONSANTO LANDFILL

### Site Description

Site P is an inactive, IEPA-permitted landfill covering approximately 20 acres in Sauget, Illinois (Figure P-1). The site is bordered on the west by the Illinois Central Gulf Railroad; on the south by Monsanto Avenue, and on the east by the Terminal Railroad Association railroad. The two railroads converge to delineate the north boundary. Generally, the geology at the site consists of silty sand, underlain by fine grained to silty clay, followed by fine to coarse grained sands down to the bedrock. Surface drainage is to the south-central portion of the site, which was not landfilled due to the presence of a potable water line in this area. A depression area is also found along the east perimeter, adjacent to the Terminal Railroad. Surface drainage will not leave the site due to the presence of railroad embankments along the perimeter and the depression in the central portion of the site.

### Site History and Previous Investigations

Sauget and Company entered into a lease agreement with the Union Electric Company in St. Louis to operate a waste disposal facility in 1972. In January 1973, IEPA issued an operating permit to Sauget and Company to accept only non-chemical waste from Monsanto. Sauget and Company subsequently applied for, and was granted, a supplemental permit in 1974 which allowed acceptance of general waste and diatomaceous earth filter cake from Edwin Cooper, Inc. (now Ethyl Corp.). The IEPA began conducting routine inspections of the facility in 1974, at which time no violations were evident. In October 1975, an inspector observed a small amount of yellowish, tar-like liquid in an area adjacent to several crushed fiber drums which were labelled "Monsanto ACL-85, Chlorine Composition." Sauget and Company and Monsanto were subsequently notified of this permit violation, and the matter was not further addressed. The site was operated in general compliance until December 1977, when an

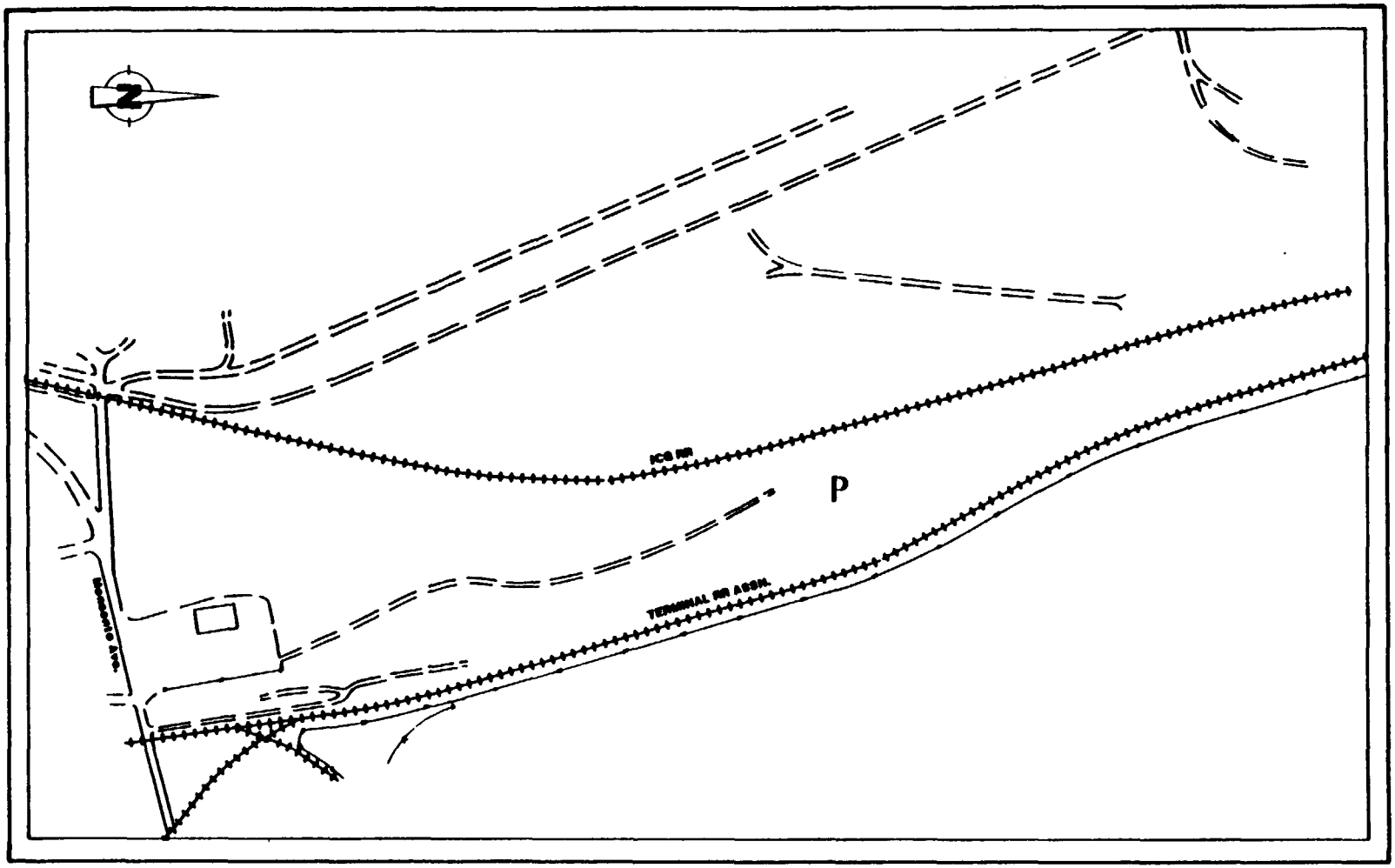



FIGURE P-1
DEAD CREEK SITE AREA P

inspection revealed the disposal of approximately 25 metal containers (12-15 gallon) full of phosphorus pentasulfide ($P_2S_5$), a flammable solid. Monsanto was required to excavate and remove all of this material from the site, and to discontinue disposal of any chemical wastes or packagings.

The IEPA became aware of another potential problem at this time, specifically the use of a Southern Railway slag pile for intermediate and final cover material. Analysis of this slag showed it to be unsuitable as cover due to its high permeability and heavy metal content. Cinders were also used as cover material at Site P, and are expected to pose the same problems as the slag; that is, increased surface water infiltration and the resulting potential for leaching heavy metals along with organic wastes into the groundwater.

State inspections in 1978 and 1979 indicated unpermitted disposal of Monsanto ACL filter residues and packagings. The composition of this material is not known. According to the site operator at that time, this material would occasionally ignite when in contact with the filter cake waste from Edwin Cooper.

An Illinois American Water Company distribution main was discovered in 1980 during preparatory excavation on the southern portion of the site. The south one-third of the property was purchased from Illinois Central Gulf in 1971 by Paul Sauget. Following discovery of the water line, Site Plans and permits were modified to include no waste disposal within 100 feet of the line.

Review of available IEPA records indicates that the Edwin Cooper filter cake is the only industrial process waste that was reported to have been disposed of at Site P. Records indicate that approximately 117,000 cubic yards of this material was accepted. The filter cake was classified as non-hazardous on special waste authorization permit number 7400017, based on EP toxicity results submitted in 1973. Additional analytical data is available for a filter cake composite sample from Edwin Cooper in 1979 which indicates elevated levels of

lead (18.4 ppm), cadmium (1.8), zinc (7,220 ppm), and a pH of 11.22. No groundwater monitoring program has been established for Site P, nor have wastes at the site been adequately characterized. No sampling or other field investigation activities have been conducted, other than routine IEPA inspections, at the site.

## Data Assessment and Recommendations

A groundwater study consisting of installation and sampling of 6 wells is the only planned field investigation for Site P during the Dead Creek Project. Additional investigation will be necessary to adequately characterize the site and to provide an adequate data base for conducting the feasibility study if groundwater contamination is detected. Further evaluation of subsurface soil conditions at the site would be necessary in order to define waste characteristics and the vertical and lateral extent of contamination so that remedial alternatives can be assessed.

## SITE Q - SAUGET/SAUGET LANDFILL

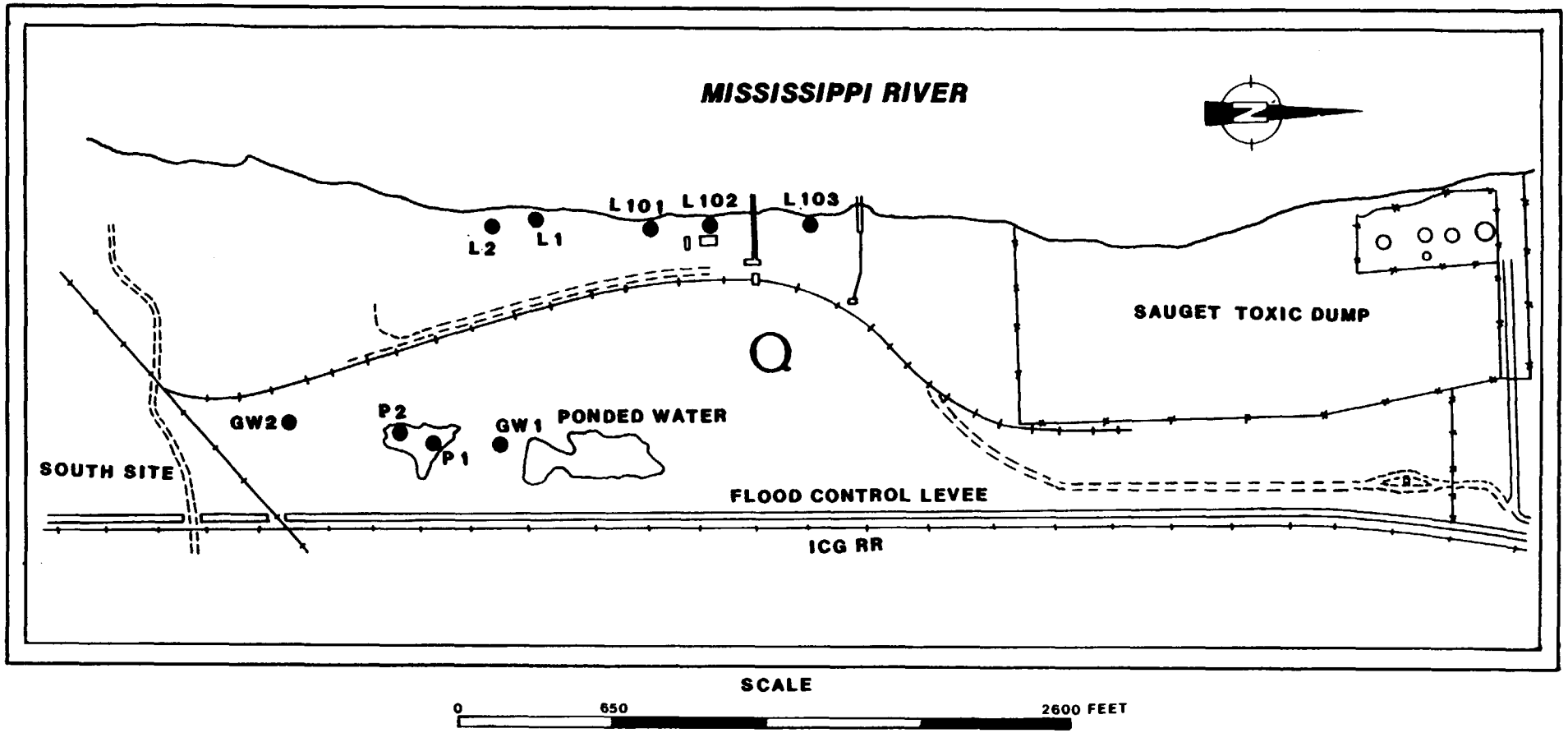
### Site Description

Site Q is the Sauget/Sauget Landfill, an inactive waste disposal facility operated by Sauget and Company between the years 1966 and 1973. The site is approximately 90 acres in size, including a southern extension, as delineated by the Alton and Southern Railroad tracks (Figure Q-1). The site is located on east bank of the Mississippi River and is also on the river side of a U.S. Army Corps of Engineers flood control levee. Site Q is also situated immediately east of Site R, commonly known at Sauget Toxic Dump, a chemical waste disposal facility owned by the Monsanto Chemical Company.

Site Q was operated without a permit from IEPA, although registration with the Illinois Department of Public Health was obtained for the north site in 1967, prior to the formation of the IEPA. The site is presently covered with black cinders, which is an unsuitable cover material due to its high permeability. Site Q is presently owned by the Riverport Terminal and Fleeting Company, and the property is leased to the Pillsbury Company. Pillsbury operates a coal unloading facility at the site.

### Site History and Previous Investgations

Disposal operations at Site Q began in approximately 1966 in the northernmost portion of the property. A Union Electric Company flyash pond existed at the site in an area immediately south of Monsanto's chemical dump. IEPA inspections in the early 1970's documented several violations of the Illinois Environmental Protection Act, including open burning, use of unsuitable cover materials (cinders and flyash), and acceptance of liquid chemical wastes. Septic tank pumpings were also accepted at the site from approximately 1968 to 1972, and were apparently co-disposed with general municipal refuse.




LEGEND

| | |
|---|---|
| GW1 | IEPA GROUNDWATER SAMPLING LOCATION |
| P1 | IEPA SURFACE WATER SAMPLING LOCATION |
| L1 | IEPA LEACHATE SAMPLING LOCATION |

FIGURE Q-1
DEAD CREEK SITE AREA Q WITH SAMPLING LOCATIONS

in April, 1971, a complaint was filed by IEPA against Sauget and Company for the violations mentioned above. The company was ordered to cease and desist open burning, accepting liquid chemical wastes, open dumping, and use of cinders and flyash as cover material. In July, 1972, a smoldering underground fire was observed by IEPA inspectors at the site. The fire continued to smolder until October, 1972 despite repeated attempts to extinguish it. Underground fires were a continuing problem, as documented by later IEPA inspection reports. In the spring of 1973, flood waters from the Mississippi River inundated Site Q. This condition persisted into the fall, and operations at the site were discontinued. Exposed refuse was observed being carried downstream in the river at that time.

Sauget and Company filed a permit application to IEPA in 1972 for a proposed extension to the existing landfill. The proposed extension was located south of the Alton and Southern railroad tracks, and will be referred to as the south site. IEPA denied issuance of a permit for this extension several times, as Sauget and Company had filed repeated applications. Although approval of the south site was never issued, disposal operations continued in this area.

In the early 1970's, IEPA collected several samples from Site Q. Approximate sample locations are shown in Figure Q-1. Analytical data for samples collected from ponded water, leachate seeps, and ground water are provided in Table Q-1. The first set of samples, collected in October, 1972, consisted of one sample from ponded water, and one leachate sample. The results for these samples show the presence of several metals, including copper, iron, lead, mercury, and zinc. Ground water samples were collected in January, 1973 from two monitoring wells at Site Q. Information regarding construction details for these wells has not been located. Sample GW-1 showed trace levels of cadmium, silver, and phenols, while GW-2 showed very little evidence of contamination. Samples were again collected by IEPA from ponded water at Site Q on two occasions in April, 1973. Analytical results showed low levels of boron, cadmium, copper, iron, lead, manganese, mercury, nickel, and zinc in sample

TABLE Q-1: ANALYSIS OF SURFACE AND GROUND WATER SAMPLES COLLECTED BY IEPA AT SITE Q

| | SAMPLE LOCATIONS AND DATES | | | | | |
|---|---|---|---|---|---|---|
| | 10/17/72 | | 1-17-73 | | 4-10-73 | 4-26-73 |
| PARAMETERS | P-1 | L-1 | GW-1 | GW-2 | P-2 | P-3 |
| Calcium | 80 | 56 | 310 | 137 | 250 | 280 |
| Magnesium | 8 | 26 | 57 | 205 | 42 | 44 |
| Sodium | 23 | 169 | 275 | 13 | 230 | 205 |
| Potassium | 6 | 30 | 10 | 4 | 85 | 70 |
| Ammonia | 0.19 | 21 | NA | NA | 32 | 36 |
| Boron | 7 | 6.5 | NA | NA | 2.6 | 2.8 |
| Cadmium | | | 0.02 | | NA | 0.02 |
| Chromium (Total) | | | | | NA | 0.03 |
| Copper | | 0.01 | | | 0.02 | |
| Iron | | 46 | | | 60 | 67 |
| Lead | | 0.02 | | | 0.07 | 0.07 |
| Manganese | | | | | 6 | 6.5 |
| Mercury (ppb) | 0.5 | 0.5 | | | 0.4 | 0.6 |
| Nickel | | | | | 0.3 | 0.2 |
| Silver | | | 0.01 | | | |
| Zinc | | 0.2 | | 0.1 | 4.2 | 5 |
| Alkalinity | 46 | 810 | 645 | 375 | 420 | |
| Chloride | 19 | 4 | 310 | 24 | 210 | 205 |
| Nitrate | NA | NA | NA | NA | NA | |
| Phosphate | NA | NA | NA | NA | 3.7 | 5 |
| Sulfate | 230 | 18 | 325 | 25 | 350 | 270 |
| Hardness | 240 | 560 | NA | NA | 970 | 930 |
| Phenols | NA | NA | 0.02 | | NA | NA |

NOTE: All results in ppm unless noted otherwise.
Blanks indicate below detection limit.
NA indicated parameter not analyzed.
P = Ponded water, L = Leachate, GW = Groundwater

P-2 and/or P-3. Although the data from samples collected in the early 1970's showed the presence of several contaminants, most notably phenol and heavy metals, no conclusive evidence of contamination at Site Q was obtained.

IEPA collected samples from leachate seeps along the Mississippi River in October, 1981 and again in September, 1983. The locations of these samples are shown in Figure Q-1, and analytical results are presented in Table Q-2. Data for the 1981 samples shows elevated concentrations of arsenic, chromium, copper, lead, managanese, and phosphorus in both samples. Additionally, low levels of phenols and PCBs were detected in the samples. The samples collected in September, 1983 show very similar results. Heavy metals and PCBs were again detected at concentrations very close to those seen in the earlier samples.

The cinders and flyash used as cover materials at Site Q have been the subject of numerous investigations and complaints by IEPA. In addition, the depth of final cover has been deemed inadequate, and enforcement action is pending on this matter. The Illinois Pollution Control Board Case Number 77-84 was filed against Sauget and Company and Paul Sauget in May, 1977. As a result of the findings in this case, a monetary penalty was invoked, and Sauget and Company was ordered to place two feet of suitable cover material on the entire site by February, 1981. Sauget's failure to comply with these orders led the Illinois Attorney General's office to file a similar case. Site Q has been a chronic enforcement problem, and recently Paul Sauget was found in contempt of court for failure to comply with court orders.

Laboratory tests run on the cinders and flyash indicate permeability values in the range of $9 \times 10^{-3}$ centimeters per second, which is considered unsuitable by IEPA. In addition, metals analysis of the cover material showed unacceptably high levels of arsenic, copper, lead, and zinc. In 1972, IEPA collected samples from stockpiled flyash at Site Q, and ran leach tests for inorganic constituents.

TABLE Q-2: ANALYSIS OF LEACHATE SAMPLES FROM SITE Q (COLLECTED OCTOBER 28, 1981 AND SEPTEMBER 29, 1983 BY IEPA)

| | SAMPLE LOCATIONS AND DATES | | | | |
|---|---|---|---|---|---|
| | 10-28-81 | | 9-29-83 | | |
| PARAMETERS | L-1 | L-2 | L101 | L012 | L103 |
| Alkalinity | 255 | 293 | 191 | 158 | 242 |
| Ammonia | 3.8 | 2.8 | 6.5 | 4 | 3.7 |
| Arsenic | 0.057 | 0.022 | 0.11 | 0.034 | 0.012 |
| Barium | 0.8 | 0.2 | 0.5 | 0.4 | 0.3 |
| Boron | 5.8 | 5.6 | 37.5 | 42 | 23 |
| Cadmium | | | | | |
| COD | 445 | 35 | 87 | 94 | 71 |
| Chloride | 15 | 17 | 23 | 22 | 31 |
| Chromium (Total) | 0.08 | | 0.03 | 0.01 | |
| Copper | 0.2 | 0.04 | 1.2 | 0.06 | |
| Cyanide | | | | 0.01 | 0.01 |
| Hardness | 1330 | 1220 | 1225 | 1360 | 1045 |
| Iron | 207 | 17.5 | 86 | 36 | 6.4 |
| Lead | 0.26 | | 0.13 | 0.08 | 0.02 |
| Magnesium | 145 | 67 | 81 | 73 | 44.5 |
| Manganese | 7.7 | 34 | 6.7 | 6.8 | 2.7 |
| Mercury | | | | | |
| Nickel | 0.3 | | 0.1 | 0.1 | |
| Nitrate | 0.24 | 0.4 | 0.21 | 6.1 | 1.8 |
| Phosphorus | 6.1 | 0.74 | 3.1 | 1.3 | 0.86 |
| Potassium | 16.5 | 9.5 | 13.4 | 13.5 | 17 |
| R.O.E. | 1980 | 1829 | 1880 | 2118 | 1563 |
| Silver | 0.02 | 0.01 | 0.01 | | |
| Sodium | 55.7 | 53.3 | 56 | 70 | 51 |
| Sulfate | 1196 | 1059 | 1200 | 1350 | 900 |
| Zinc | 1.2 | 0.2 | 0.3 | 0.2 | |
| Phenol | 0.005 | 0.005 | | | |
| PCBs (PPB) | 0.7 | 1 | 0.5 | | 0.1 |
| 2,3-D(PPB) | | | | | |

NOTE: All results in ppm unless noted otherwise.
Blanks indicate below detection limits.

Samples were taken from piles estimated to be 5 years old, 1 year old, and fresh material to determine the types and quantities of contaminants being leached from this material at the site. Analytical data for these samples are shown in Table Q-3. Analysis of the first set of samples (August, 1972) shows a distinct trend of the more soluble compounds, such as calcium, sodium and potassium, being leached from the fresh ash. However, the second set of samples, collected in October 1972, does not show a similar trend. The reasons for this discrepancy are not clear. The data in Table Q-3 also shows that significant quantities of metals are contained in the ash, particularly for the material estimated to be five years old.

IEPA's Notices of Violations concerning disposal of chemical wastes at Site Q in early inspections are supported by more recent information. Notification of Hazardous Waste Site Forms were submitted to USEPA from three companies for this site. These notifications indicate disposal of organics, inorganics, solvents, pesticides, paint sludges, and unknown wastes at the site. In May, 1980 workers uncovered buried drums and unknown wastes while excavating for construction of a railroad spur on the property. Workers observed a haze or smoke rising from the material after it was uncovered, suggesting corrosive and/or reactive properties.

In November, 1985, IEPA received a sketch from a reporter for a St. Louis newspaper indicating the location of buried drums containing PCBs. The reporter's source of this information is not known, nor has the information been verified to date.

As a result of the May, 1980 incident in which buried drums were unearthed, USEPA tasked its FIT contractor (Ecology and Environment, Inc.) to perform a detailed study to determine the extent of chemical contamination at Site Q. The study included a systematic geophysical investigation using EM, magnetometry, and ground penetrating radar (GPR), followed by a drilling and sampling program to investigate possible subsurface contamination. The investigation was limited

TABLE Q-3: ANALYSIS OF FLYASH USED AS COVER FROM STOCKPILES AT SITE Q (SAMPLED BY IEPA IN 1972)

SAMPLE NUMBERS AND DATES

| PARAMETERS | 8/3/72 | | | 10/16/72 | | |
|---|---|---|---|---|---|---|
| | 5 Years | 1 Year | Fresh | 5 Years | 1 Year | Fresh |
| Calcium | 125 | 245 | 285 | 580 | 120 | 130 |
| Magnesium | 4.6 | 6.4 | 0.5 | 9 | 2 | |
| Sodium | 10 | 7.5 | 58 | 140 | 1.3 | 36 |
| Potassium | 7 | 11 | 79 | 56 | 2 | 45 |
| Ammonia | 1.8 | 0.36 | 0.47 | 0.75 | 0.05 | 0.15 |
| Arsenic | NA | NA | NA | | | 0.02 |
| Barium | 0.1 | | 0.1 | | | |
| Boron | 0.9 | 3.6 | 1.8 | 1.3 | 0.6 | 2.4 |
| Cadmium | 0.01 | 0.01 | 0.02 | 0.02 | | |
| Chromium | | | | 0.03 | | |
| Copper | 0.09 | 0.01 | 0.01 | 0.06 | | |
| Iron | 1.3 | 0.1 | | 0.85 | 0.1 | |
| Lead | 0.03 | | | 0.02 | 0.01 | 0.02 |
| Manganese | 0.69 | 0.03 | 0.03 | 0.75 | | |
| Mercury (ppb) | 6 | | | 6.2 | | |
| Nickel | 0.1 | 0.1 | 0.2 | 0.12 | 0.05 | 0.05 |
| Silver | 0.005 | 0.005 | 0.005 | | | |
| Zinc | 0.8 | 0.1 | | 1.05 | 0.05 | 0.02 |
| Alkalinity | 140 | 65 | 120 | 120 | 80 | 135 |
| Chloride | 10 | 12 | 60 | 150 | 4 | 49 |
| Flouride | 0.2 | 0.2 | 0.1 | 0.3 | 0.3 | 0.2 |
| Phosphate | NA | NA | NA | 1.6 | 0.07 | 0.05 |
| Sulfate | 290 | 950 | 1300 | 1600 | 250 | 270 |
| Hardness | 420 | 1000 | 1400 | 1600 | 340 | 350 |
| COD | 250 | 33 | 52 | 460 | 26 | 45 |

NOTE: All results in ppm unless noted otherwise.
Blanks indicate below detection limit.
NA indicates parameter not analyzed.

to the northern portion of the site which amounts to approximately 25 percent of the site area.

Technos, Inc. of Miami, Florida was contracted to perform the geophysical investigation. This investigation was completed in June 1983. Results of the geophysical investigation identified the probable limits of landfilling and burial zones of relatively large concentrations of iron bearing materials such as drums or car bodies. These iron bearing zones were found in several distinct locations in the north-central and western portions of the study area.

Following the geophysical investigation, a drilling/sampling program was conducted to determine if subsurface soils were contaminated. The program consisted of drilling 18 test borings through the landfill, and collecting 35 soil samples for full priority pollutant analysis, as designated by USEPA. Subsurface soil samples were collected at depths ranging from 10 to 26 feet. Sample locations are shown in Figure Q-2. Analytical data for the soil samples are shown in Table Q-4, which consists of five pages. As can be seen in the table, a wide variety of organic compounds were detected at high concentrations in these samples. The sample analysis consisted of testing for 112 organic compounds, and 63 compounds were confirmed to be present in the subsurface samples.

Specifically, the data showed that thirty-four organic compounds were found at concentrations of 10 ppm or greater. Of these 34 compounds, 20 compounds were detected at concentrations 100 ppm or greater. And of these 20 compounds, 7 compounds were detected at concentrations of 1000 ppm or greater. Compounds detected at concentrations of 1000 ppm or greater include 2,4-dichlorophenol, 1,2,4-trichlorobenzene, 1,4-dichlorobenzene, bis(2-ethylhexyl) phthalate, toluene, o-xylene, and PCB-1260. In addition, 2,3,7,8-TCDD was detected in two samples (B4B and B8B). Compounds detected in samples taken from Site Q include many of the same compounds as detected in samples taken from Site R, the Sauget Toxic Dump site. Contamination was detected

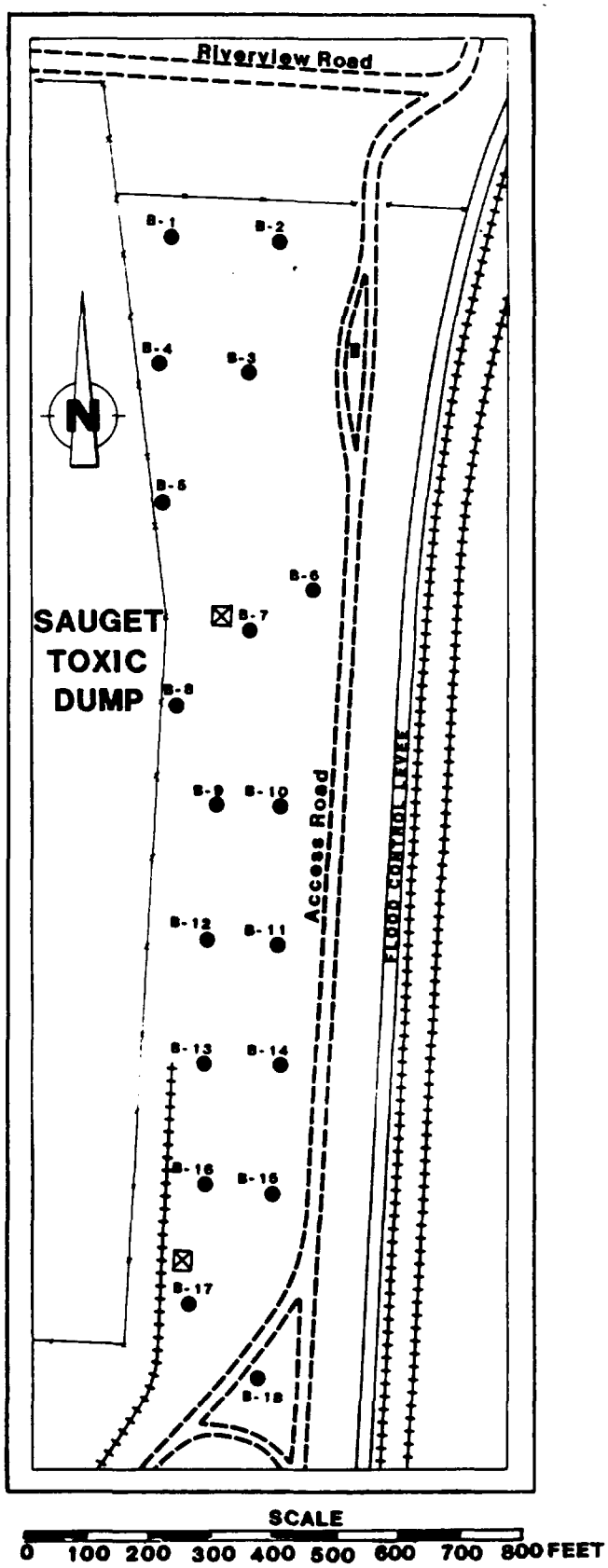



FIGURE Q-2
USEPA - FIT SUBSURFACE SOIL SAMPLING LOCATIONS AT SITE Q

TABLE Q-4: IDENTIFIED ORGANIC COMPOUNDS IN
SUBSURFACE SOIL SAMPLES FROM SITE Q
(SAMPLES COLLECTED JULY 13, THROUGH JULY 20, 1983
BY ECOLOGY AND ENVIRONMENT, INC.)

| | BORING/SAMPLE NUMBER / DEPTH (in feet) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PARAMETERS | B1A 10.0-11.5 | B1B 17.5-19.0 | B2A 13.5-15.5 | B2B 17.0-19.0 | B3A 10.0-12.0 | B3B 13.5-15.5 | B4A 10.0-12.0 | B4B 13.5-15.5 |
| 2,3,7,8-TCDD | | | | | | | | 3.31 |
| 2,4,6-trichlorophenol | 2,500 | 170,000 | 22,000 | 520 | 1,400 | 1,500 | | 94,000 |
| 2-chlorophenol | 24,000 | 65,000 | 800 | | 1,500 | LT | 57,000 | 360,000 |
| 2,4-dichlorophenol | 66,000 | 3,100,000 | 31,000 | 1700 | 760 | 4,500 | | 370,000 |
| 2,4-dimethyphenol | | | 500 | | | | | 72,000 |
| 4,6-dinitro-2-methylphenol | | | | | | | | |
| pentachlorophenol | | 86,000 | 5,400 | LT | | 11,000 | | 100,000 |
| phenol | 24,000 | 55,000 | 45,000 | 4,400 | 3,200 | 100,000 | 98,000 | 88,000 |
| 2-methylphenol- | | | | | | | | |
| 4-methylphenol | | | LT | | 560 | LT | | 330,000 |
| 2,4,5-trichlorophenol | | | | LT | | | | |
| acenaphthene | | | 1,200 | 2,800 | | | | |
| 1,2,4-trichlorobenzene | | | | 480 | | | LT | 100,000 |
| 1,2-dichlorobenzene | LT | | LT | | | LT | | 20,000 |
| 1,4-dichlorobenzene | | | 1,800 | 720 | LT | 760 | LT | 66,000 |
| fluoranthene | | | | 1,200 | | | | LT |
| isophorone | | | | | | | | |
| napthalene | | | 11,000 | 8,300 | | | | LT |
| nitorbenzene | | 8,800 | 400 | | | | | 56,000 |
| N-nitrosodiphenylamine | | | | | | | | |
| bis(2-ethylhexyl)phthalate | | | | LT | | | | 62,000 |
| butyl benzyl phthalate | | | | | | | | |
| di-n-butyl phthalate | LT | | | | | | | LT |
| di-n-octyl phthalate | | | | | | | | |
| diethyl phthalate | | | | | | | | |
| benzo(a)anthracene | | | | | | | | |
| benzo(a)pyrene | | | | | | | | |
| benzo(b)fluoranthene | | | | | | | | |
| benzo(k)fluoranthene | | | | | | | | |
| chrysene | | | | 400 | | | | |
| anthracene | | | | | | | | |
| benzo(ghi)perylene | | | | | | | | |
| fluorene | | | 600 | 3,000 | | | | LT |
| phenanthrene | | | 1,000 | 2,700 | | | | LT |
| dibenzo(a,h)anthracene | | | | | | | | |
| indeno(1,2,3-cd)phrene | | | | | | | | |
| pyrene | | | LT | LT | | | | LT |
| aniline | | | | | | | | |
| 4-chloraniline | | | LT | | | | | |
| dibenzofuran | | | 1,000 | 3,000 | | | | |
| 2-methylnapthalene | | | 2,000 | 2,300 | | | | |
| 3-nitroaniline | | | 4,600 | | | | | |
| benzene | | | | | | | | |
| Chlorobenzene | | | | | | | 10,000 | 40,000 |
| 1,2-dichloroethane | | | | | | | | |
| 1,1-dichloroethane | | | | | | | | |
| 1,1,2,2-tetrachloroethene | | | | | | | | |
| 1,2-trans-dichloroethene | | | | | | | | |
| ethylbenzene | | | | | | | | |
| methylene chloride | | | 7.4 | 3.7 | LM | 8.0 | | |
| tetrachloroethene | | | | | | | | |
| toluene | | | | | | | | |
| trichloroethene | | | | | | | | |
| acetone | | | 960 | | | 977 | | LM |
| 2-butanone | | | | | | | | |
| 4-methyl-2-pentanone | | | | | | LT | | |
| styrene | | | | | | | | |
| O-xylene | | | | 2.0 | | | | 5,100 |
| PCB-1242 | | | | | | | | |
| PCB1254 | | | | | | | | |
| PCB-1248 | 1,000 | | | | | | | |
| PCB-1260 | | | 485.2 | | 69.6 | | | |
| PCB-1016 | | | 2,120.6 | | | | | |
| Total PCB | | | | | | | 68,000 | 1,000,000 |

NOTE: All results in ppb.
LT = Present, but lower than the detection limit for low hazard analyses.
LM = Present, but lower than the detection limit for medium hazard analyses.
P= The sample could not be cleaned up sufficiently to yield TCDD results.
NA = Not analyzed, sample could not be cleaned up sufficiently.
Blank = not detected.

TABLE Q-4 (continued)

| PARAMETERS | B5A 13.5-15.5 | B5B 17.0-19.0 | B6A 10.0-12.0 | B6B 13.5-15.5 | B7A 10.0-12.0 | B7B 13.5-15.5 | B8A 13.5-15.5 | B8B 17.5-19.5 |
|---|---|---|---|---|---|---|---|---|
| | BORING/SAMPLE NUMBER Depth (in feet) | | | | | | | |
| 2,3,7,8-TCDD | | | | | | | | 0.11 |
| 2,4,6-trichlorophenol | 130,000 | 26,000 | 2,700 | 4,800 | 2,700 | | 480,000 | 10,000 |
| 2-chlorophenol | 31,000 | 8,400 | 1,600 | 1,600 | LT | | | |
| 2,4-dichlorophenol | 560,000 | 260,000 | 17,000 | 15,000 | 6,100 | | 1,500,000 | 64,000 |
| 2,4-dimethyphenol | | | 2,000 | | | | | |
| 4,6-dinitro-2-methylphenol | | | | | | | | |
| pentachlorophenol | | | | 16,000 | 25,000 | 31,000 | | |
| phenol | 140,000 | 250,000 | 45,000 | 11,000 | 1,800 | | | |
| 2-methylphenol- | | | 1,400 | 600 | | | | |
| 4-methylphenol | | 36,000 | 7,000 | 1,400 | | | | |
| 2,4,5-trichlorophenol | | | | | | | | |
| acenaphthene | | | | | | | | |
| 1,2,4-trichlorobenzene | 86,000 | 13,000 | | | | | 120,000 | |
| 1,2-dichlorobenzene | 100,000 | 28,000 | LT | | | | 180,000 | |
| 1,4-dichlorobenzene | | | 3,100 | 800 | | | | |
| fluoranthene | | | | | | | | |
| isophorone | | | | | | | | |
| napthalene | | LT | 800 | LT | | | 380,000 | LT |
| nitorbenzene | 27,000 | 11,000 | LT | | | | 52,000 | |
| N-nitrosodiphenylamine | | | | | | | | |
| bis(2-ethylhexyl)phthalate | | | | | | | | |
| butyl benzyl phthalate | | | | | | | | |
| di-n-butyl phthalate | | | 400 | LT | | | | |
| di-n-octyl phthalate | | | | | | | | |
| diethyl phthalate | | | | | | | | |
| benzo(a)anthracene | | | | | | | | |
| benzo(a)pyrene | | | | | | LT | | |
| benzo(b)fluoranthene | | | | | | LT | | |
| benzo(k)fluoranthene | | | | | | LT | | |
| chrysene | | | | | | LT | | |
| anthracene | | | | | | | | |
| benzo(ghi)perylene | | | | | | | | |
| fluorene | | | | | | | | |
| phenanthrene | | | | | | | | |
| dibenzo(a,h)anthracene | | | | | | | | |
| indeno(1,2,3-cd)phrene | | | | | | | | |
| pyrene | | | | | | | | |
| aniline | | | | | | | | |
| 4-chloraniline | | | 9,000 | | | | | |
| dibenzofuran | | | | | | | | |
| 2-methylnapthalene | | | | | | | | |
| 3-nitroaniline | | | | | | | | |
| benzene | | | | | | 3.2 | LM | |
| Chlorobenzene | 18,000 | 27,000 | 100,000 | 8.4 | | 4.2 | 7,100 | |
| 1,2-dichloroethane | | | 12,000 | 3.4 | | | | |
| 1,1-dichloroethane | | | | | | | | |
| 1,1,2,2-tetrachloroethene | | | | | | | | |
| 1,2-trans-dichloroethene | | | | | | | | |
| ethylbenzene | | | 46,000 | 3.8 | | 4.5 | | |
| methylene chloride | | | | 15.0 | 86.0 | 45.0 | LT | |
| tetrachloroethene | | | | | LT | | | |
| toluene | | | 50,000 | LT | | 6.1 | | |
| trichloroethene | | | | | | LT | | |
| acetone | | | | 330 | 200 | 2,600 | | |
| 2-butanone | | | | LT | LT | LT | | |
| 4-methyl-2-pentanone | | | | | | | | |
| styrene | | | | | | | | |
| O-xylene | | | 140,000 | 13.0 | LT | 22.0 | | |
| PCB-1242 | 70,000 | | | | | | 1,700 | 2,700 |
| PCB1254 | 60,000 | | | | | | | |
| PCB-1248 | | | | 4,700 | | | | |
| PCB-1260 | | | | | 590 | 13,000 | 880 | 1,500 |
| PCB-1016 | | | | | 2,300 | 46,000 | | |
| Total PCB | | 66,000 | | | | | | |

All results in ppb.
LT = Present, but lower than the detection limit for low hazard analyses.
LM = Present, but lower than the detection limit for medium hazard analyses.
P = The sample could not be cleaned up sufficiently to yield TCDD results.
NA = Not analyzed, sample could not be cleaned up sufficiently.
Blank = Not detected.

TABLE Q-4 (Continued)

| PARAMETERS | B9A 15.0-17.0 | B9B 17.0-19.0 | B10A 17.0-19.0 | B10B 19.0-21.0 | B11A 17.0-19.0 | B11B 19.0-21.0 | B12A 17.0-19.0 | B12B 19.0-21.0 |
|---|---|---|---|---|---|---|---|---|
| | BORING/SAMPLE NUMBER DEPTH (in feet) | | | | | | | |
| 2,3,7,8-TCDD | | | P | | P | P | | |
| 2,4,6-trichlorophenol | LT | 600 | 48,000 | 640 | | | 4,400 | 9,400 |
| 2-chlorophenol | 640 | 1,100 | 1,700 | LT | | | 1,200 | 520 |
| 2,4-dichlorophenol | 7,400 | 9,800 | 170,000 | 9,60 | 3,200 | 20,000 | 8,800 | 4,200 |
| 2,4-dimethyphenol | | LT | | | | | | |
| 4,6-dinitro-2-methylphenol | | | | | | | | |
| pentachlorophenol | | 4,800 | | 2,200 | | | 24,000 | 920 |
| phenol | 7,500 | 14,000 | 32,000 | 11,000 | 6,200 | 37,000 | 17,000 | 7,500 |
| 2-methylphenol- | | | | | | | | |
| 4-methylphenol | 1,400 | 2,300 | 2,700 | | | | 1,000 | 720 |
| 2,4,5-trichlorophenol | | | | | | | | |
| acenaphthene | | | | | | | | |
| 1,2,4-trichlorobenzene | | | 11,000 | | | | | |
| 1,2-dichlorobenzene | | | 11,000 | | LT | | | 800 |
| 1,4-dichlorobenzene | | LT | 27,000 | | LT | | | 1,000 |
| fluoranthene | | | | | | | | |
| isophorone | | | | | 17,000 | LT | | 720 |
| napthalene | | | 6,500 | | 72,000 | 35,000 | LT | 640 |
| nitrobenzene | | | | | | | | |
| N-nitrosodiphenylamine | | | | | | LT | LT | |
| bis(2-ethylhexyl)phthalate | 440 | | | | 52,000 | 34,000 | 440 | |
| butyl benzyl phthalate | | | | | LT | | | |
| di-n-butyl phthalate | | 1,500 | LT | | 23,000 | LT | | |
| di-n-octyl phthalate | | | | | | | | |
| diethyl phthalate | LT | 840 | | | | | | |
| benzo(a)anthracene | | | | | | | | |
| benzo(a)pyrene | | | | | | | | |
| benzo(b)fluoranthene | | | | | | | | 1,000 |
| benzo(k)fluoranthene | | | | | | | | 1,000 |
| chrysene | | | | | 6,400 | | | |
| anthracene | | | | | | | | |
| benzo(ghi)perylene | | | | | | | | |
| fluorene | | | | | | | | |
| phenanthrene | | | | | 5,200 | | | |
| dibenzo(a,h)anthracene | | | | | | | | |
| indeno(1,2,3-cd)phrene | | | | | | | | |
| pyrene | | | | | 5,600 | | | |
| aniline | | | | | | | | |
| 4-chloraniline | | | | | | | | LT |
| dibenzofuran | | | | | | | | |
| 2-methylnapthalene | | | | | 10,000 | | | |
| 3-nitroaniline | | | | | | | | |
| benzene | | | LM | | | | | |
| Chlorobenzene | | | 5,200 | | LM | | | |
| 1,2-dichloroethane | | | | | | | | |
| 1,1-dichloroethane | | | | | | | | |
| 1,1,2,2-tetrachloroethane | | | | | | | | |
| 1,2-trans-dichloroethene | | | | | | | | |
| ethylbenzene | | | 6,500 | | 220,000 | | | |
| methylene chloride | 3.3 | 300 | 8,700 | LT | | | | |
| tetrachloroethene | | | | | | | | |
| toluene | | | 130,000 | | 1,300,000 | 100,000 | | LM |
| trichloroethene | | | | | 42,000 | | | |
| acetone | 210 | 14,000 | | 4,400 | | | | |
| 2-butanone | | | | | | | | |
| 4-methyl-2-pentanone | | | | | | | LT | |
| styrene | | | | | | | | |
| O-xylene | | | 30,000 | | 650,000 | 70,000 | | LM |
| PCB-1242 | 600 | | NA | | | | | |
| PCB1254 | | | NA | | | | | |
| PCB-1248 | | | NA | | 38,000 | 70,000 | | |
| PCB-1260 | 1,500 | 1,300 | NA | 120 | 45,000 | 681,000 | 7,000 | 5,000 |
| PCB-1016 | | | | | | | | |

All results in ppb.
LT = Present, but lower than the detection limit for low hazard analyses.
LM = Present, but lower than the detection limit for medium hazard analyses.
P = The sample could not be cleaned up sufficiently to yield TCDD results.
NA = Not analyzed, sample could not be cleaned up sufficiently.
Blank = Not detected.

TABLE Q-4 (Continued)

| PARAMETERS | B13A 17.0-19.0 | B13B 19.0-21.0 | B14A 17.0-19.0 | B14B 19.0-21.0 | B15A 22.0-24.0 | B15B 24.0-26.0 | B16A 22.0-24.0 | B17A 22.0-24.0 |
|---|---|---|---|---|---|---|---|---|
| | BORING/SAMPLE NUMBER Depth (in feet) | | | | | | | |
| 2,3,7,8-TCDD | | | | | | | | |
| 2,4,6-trichlorephenol | 20,000 | 4,600 | | | 800 | 1,900 | 7,700 | 6,400 |
| 2-chlorophenol | 2,500 | 3,800 | | | 600 | 1,600 | 4,600 | 100,000 |
| 2,4-dichlorophenol | 9,400 | 11,000 | 460,000 | | | 11,000 | 27,000 | 120,000 |
| 2,4-dimethyphenol | | LT | | | | | 680 | |
| 4,6-dinitro-2-methylphenol | LT | | | | | | | |
| pentachlorophenol | 12,000 | 44,000 | 16,000 | 16.000 | 4,200 | 12,000 | 39,000 | 26,000 |
| phenol | 8,900 | 15,000 | | | 6,000 | 13,000 | 16,000 | 50,000 |
| 2-methylphenol- | | | | | | | | |
| 4-methylphenol | 920 | 1,400 | | 16,000 | | 1,000 | 1,900 | 9,200 |
| 2,4,5-trichlorophenol | | | | | | | LT | |
| acenaphthene | | | | | | | | |
| 1,2,4-trichlorobenzene | 2,400 | 3,000 | 13,000,000 | 2,000,000 | | | | |
| 1,2-dichlorobenzene | | | 620,000 | 55,000 | | | LT | |
| 1,4-dichlorobenzene | 1,300 | 2,000 | 1,200,000 | 100,000 | | 1,600 | 4,100 | |
| fluoranthene | | | | | | | | |
| isophorone | | | | 14,000 | | | | |
| napthalene | | LT | 210,000 | 20,000 | | 720 | 2,000 | |
| nitorbenzene | | | | | | | | |
| N-nitrosodiphenylamine | | 400 | | | | | | |
| bis(2-ethylhexyl)phthalate | | | 1,100,000 | 220,000 | | | 4,600 | |
| butyl benzyl phthalate | | | | LT | | LT | | |
| di-n-butyl phthalate | | LT | 900,000 | 49,000 | LT | 3,800 | | |
| di-n-octyl phthalate | | LT | | | | | | |
| diethyl phthalate | | | | | | LT | | |
| benzo(a)anthracene | | | | | | | | |
| benzo(a)pyrene | LT | | | | | | | |
| benzo(b)fluroranthene | 1,300* | | | | | | | |
| benzo(k)fluroranthene | 1,300* | | | | | | | |
| chrysene | | | | | | | | |
| anthracene | | | | | | | | |
| benzo(ghi)perylene | 880 | | | | | | | |
| fluorene | | | | | | | | |
| phenanthrene | | | | | | | | |
| dibenzo(a,h)anthracene | LT | | | | | | | |
| indeno(1,2,3-cd)phrene | LT | | | | | | | |
| pyrene | | | | | | | | |
| aniline | | | | | | | 680 | |
| 4-chloraniline | LT | 2,200 | | | | | 9,600 | |
| dibenzofuran | | | | | | | | |
| 2-methylnapthalene | | | | LT | | | | |
| 3-nitroaniline | | | | | | | | |
| benzene | | | 44,000 | | | | | |
| Chlorobenzene | | | 63,000 | LM | | | | |
| 1,2-dichloroethane | | | | | | | | |
| 1,1-dichloroethane | | | 19,000 | | | | | |
| 1,1,2,2-tetrachloroethane | | | 5,700 | | | | | |
| 1,2-trans-dichloroethane | | | 11,000 | | | | | |
| ethylbenzene | | | 790,000 | 330,000 | LT | | | |
| methylene chloride | 50.0 | 13.0 | 5,800 | | 2.5 | 23.0 | | LM |
| tetrachloroethane | | | 12,000 | | | | | |
| toluene | | | 2,400,000 | 540,000 | | | | |
| trichloroethene | | | 55,000 | | | | | |
| acetone | 90.0 | 430 | | | 540 | 1,400 | | |
| 2-butenone | | | LM | | | | | |
| 4-methyl-2-pentanone | | LT | 250,000 | | LT | | | |
| styrene | | | | 64,000 | 4.2 | 5.3 | | |
| O-xylene | | | 2,300,000 | 1,400,000 | | LT | | |
| PCB-1242 | | | | | | 5,000 | | |
| PCB1254 | | | | | | | | |
| PCB-1248 | | | | | | | | |
| PCB-1260 | 770 | 1,300 | 2,900,000 | 16,000,000 | 190 | 1,000 | 370 | 68.0 |
| PCB-1016 | | | | | 210 | | | |
| Total PCB | | | | | | | | |

All results in ppb.
LT = Present, but lower than the detection limit for low hazard analyses.
LM - Present, but lower than the detection limit for medium hazard analyses
P = The sample could not be cleaned up sufficiently to yield TCDD results.
NA = Not analyzed, sample could not be cleaned up sufficiently.
Blank = Not detected.

TABLE Q-4 (Continued)

| PARAMETERS | BI7B 24.0-26.0 | BI8A 22.0-24.0 | BI8B 24.0-26.0 | Blank 1 | Blank 2 | Spike @1.0 ppb | Spike @1.0 ppb |
|---|---|---|---|---|---|---|---|
| | BORING/SAMPLE NUMBER Depth (in feet) | | | | | | |
| 2,3,7,8-TCDD | | | | | | 0.37 | 0.91 |
| 2,4,6-trichlorophenol | | | | | | | |
| 2-chlorophenol | | | | | | | |
| 2,4-dichlorophenol | 3,800 | | | | | | |
| 2,4-dimethyphenol | | | | | | | |
| 4,6-dinitro-2-methylphenol | | | | | | | |
| pentachlorophenol | | | | | | | |
| phenol | | | | | | | |
| 2-methylphenol- | | | | | | | |
| 4-methylphenol | | | | | | | |
| 2,4,5-trichlorophenol | | | | | | | |
| acenaphthene | | | | | | | |
| 1,2,4-trichlorobenzene | | | | | | | |
| 1,2-dichlorobenzene | | | | | | | |
| 1,4-dichlorobenzene | 550 | | LT | | | | |
| fluoranthene | | | | | 1,000 | | |
| isophorone | | | | | | | |
| napthalene | | | | | | | |
| nitorbenzene | | | | | | | |
| N-nitrosodiphenylamine | | | | | | | |
| bis(2-ethylhexyl)phthalate | 580 | 910 | 1,400 | LT | | | |
| butyl benzyl phthalate | | | | | | | |
| di-n-butyl phthalate | | | LT | | | | |
| di-n-octyl phthalate | | LT | | | | | |
| diethyl phthalate | | | | | | | |
| benzo(a)anthracene | | 520 | | | 600 | | |
| benzo(a)pyrene | | | | | LT | | |
| benzo(b)flu | | LT | | | LT | | |
| benzo(k)fluoranthene | | LT | | | LT | | |
| chrysene | | 640 | | | 560 | | |
| anthracene | | | | | | | |
| benzo(ghi)perylene | | | | | | | |
| fluorene | | | | | | | |
| phenanthrene | | | | | 720 | | |
| dibenzo(a,h)anthracene | | | | | | | |
| indeno(1,2,3-cd)phrene | | | | | | | |
| pyrene | | LT | | | 800 | | |
| aniline | 51,000 | 1,700 | | | | | |
| 4-chloraniline | | 960 | | | | | |
| dibenzofuran | | | | | | | |
| 2-methylnapthalene | | | | | | | |
| 3-nitroaniline | | | | | | | |
| benzene | | | | | | | |
| Chlorobenzene | 4.1 | | | | | | |
| 1,2-dichloroethane | | | | | | | |
| 1,1-dichloroethane | | | | | | | |
| 1,1,2,2-tetrachloroethene | | | | | | | |
| 1,2-trans-dichloroethene | | | | | | | |
| ethylbenzene | 7.7 | | | | | | |
| methylene chloride | 6.1 | 19.0 | 47.0 | LM | 6.9 | | |
| tetrachloroethene | | | | | | | |
| toluene | | | | | | | |
| trichloroethene | | | | | | | |
| acetone | 2,000 | | 260 | | | | |
| 2-butanone | | | | | | | |
| 4-methyl-2-pentanone | | | | | | | |
| styrene | | | | | | | |
| O-xylene | 23.0 | | | | | | |
| PCB-1242 | | | | | | | |
| PCB1254 | | | | | | | |
| PCB-1248 | | | | | | | |
| PCB-1260 | 160 | | 2,400 | | 260 | | |
| PCB-1016 | | | | | | | |
| Total PCB | | 670 | | | | | |

All results in ppb.
LT = Present, but lower than the detection limit for low hazard analyses.
LM = Present, but lower than the detection limit for medium hazard analyses.
P = The sample could ot be cleaned up sufficiently to yield TCDD results.
NA = Not analyzed, sample, could not be cleaned up sufficiently.
Blank = Not detected.

across the entire area investigated, which suggests that disposal of large quantities of chemical wastes occurred specifically in the northern portion of Site Q and probably over the entire site area.

## Data Assessment and Recommendations

The data developed to date for Site Q shows significant overall contamination at the site. Leachate samples collected from the west-central portion of the site contained phenols, PCBs, and several metals. Data collected prior to 1980 show general degradation of water quality, as evidenced by the analysis of leachate and pond water samples. The cinders and flyash used as cover material over the entire site have been shown to contain elevated levels of heavy metals, and also to be highly permeable. The subsurface soil investigation conducted in 1983 indicated widespread organic contamination to a depth of 26 feet in the northern portion of Site Q. This study provides the only depth and area-specific information available for the site concerning chemical contamination. Since the 1983 study was limited to approximately 25 percent of the total site area, it is apparent that further investigation is necessary for Site Q.

Field activities presently scheduled at Site Q for the Dead Creek Project include the installation and sampling of seven monitoring wells and ambient air monitoring. This would provide limited information concerning overall site contamination, but would not be adequate to permit a detailed feasibility study of specific remedial options. Further field activities should include additional geophysical investigations and subsurface soil sampling for areas not covered in the 1983 investigation, plus infiltration tests, hydraulic conductivity tests, ground water monitoring, and an assessment of the ground water hydrology in relation to the river.

The proposed geophysical surveys should be conducted in both on- and off-site areas to delineate any off-site migration of contaminant plumes and other possible drum burial areas. Infiltration tests would be conducted at several locations to determine the adequacy of

cover material, and to provide an estimate of leachate production. The ground and surface hydrology should be assessed over a period of time sufficient to address seasonal fluctuations. This assessment would provide data to determine ground water discharge and recharge in relation to the river. Additional investigation, if necessary, would be proposed following the completion of these activities.

## SITE R - SAUGET TOXIC DUMP

### Site Description

Site R is the Sauget Toxic Dump, an inactive industrial waste landfill used by the Monsanto Chemical Company between the years 1957 and 1977. Site R occupies approximately 36 acres adjacent to the Mississippi River in Sauget, Illinois. The site is located immediately west of Site Q, commonly known as the Sauget Landfill. Site R is presently covered with a clay cap and vegetated, and drainage is directed to ditches around the perimeter of the site. A Monsanto feedstock tank farm is located adjacent to the site on the northwest side.

### Site History and Previous Investigation

Site R, also known as the Krummrich Landfill, was operated by Sauget and Company under contract with Monsanto. According to an Eckhardt Report summary sheet submitted in 1979 by Monsanto, approximately 262,500 tons of liquid and solid industrial wastes were disposed of at Site R from Monsanto plants in Sauget and St. Louis. In 1981, Monsanto submitted two Notification of Hazardous Waste Site Forms for Site R to the USEPA. The Monsanto W.G. Krummrich Plant (Sauget) listed 290,000 cubic yards (c.y.) of organics, inorganics, solvents, pesticides, and heavy metals as having been disposed at Site R. The Monsanto J. F. Queeny Plant (St. Louis) listed 6600 c.y. of the same waste types as above. Both notifications also indicated below-ground disposal of drums.

Monsanto has also submitted two reports to IEPA outling waste types and volumes disposed of at Site R for the years 1968 and 1972. Data compiled from these reports are summarized in Table R-1. This tabulation shows that the volume of wastes landfilled in 1972 was significantly lower than that in 1968 This reduction reflects the elimination of several major production operations at Monsanto's Krummrich Plant. By 1975, the majority of chemical waste disposal at

TABLE R-1: A LISTING OF WASTE TYPES AND APPROXIMATE QUANTITIES DEPOSITED AT SITE R AS REPORTED BY MONSANTO

| | Approximate Annual Volume (Cubic Yards) 1968 | 1972 |
|---|---|---|
| Still Residues | | |
| From Distillation of: | | |
| Nitroaniline and Similar Compounds | 1700 | 94 |
| Cresols, Esters of Phenol | | 1140 |
| Chlorophenol, Chlorophenol Ether | 1070 | 774 |
| Aniline Derivatives | 1300 | 208 |
| Chlorobenzol | 130 | 13 |
| Nitro Benzene Derivatives | 100 | 1190 |
| Phenol | 1020 | |
| Aromatic Caboxylic Acids | 1500 | |
| Chlorinated Hydrocarbons | | 425 |
| By Products | | |
| Mixed Isomers of Nitrochlorobenzene | 1700 | 785 |
| Mixed Isomers of Dichlorophenol | 3000 | 1240 |
| Waste Maleic Anhydride | 730 | |
| Waste Chlorobenzenes and Nitrochlorobenzene | 120 | |
| Contaminated Acids and Caustic | | |
| Waste Sulfuric Acid with Chloropenol Present | 1500 | 1395 |
| Waste Caustic Soda with Chlorophenol Present | 5300 | 1760 |
| Waste Solvents | | |
| Waste Methanol Contaminated with Mercaptans | 600 | |
| Waste Isopropanol (Water and Chlorinated Hydrocarbon) | 5500 | |
| Miscellaneous Solvents | 1019 | |
| Oily Material | 101 | |
| Filter Sludges | | |
| Spent Carbon or Other Filter Media | 600 | 12 |
| Lime Mud from Nitroaniline Production | 1000 | 1195 |
| Gypsum | | 5600 |
| Obsolete Samples and Sampling Wastes | | |
| Chlorophenols | 72 | 40 |
| Laboratory Samples | 208 | 150 |
| Total | 28,270 | 16,021 |

NOTE: Blanks indicate waste type not reported.

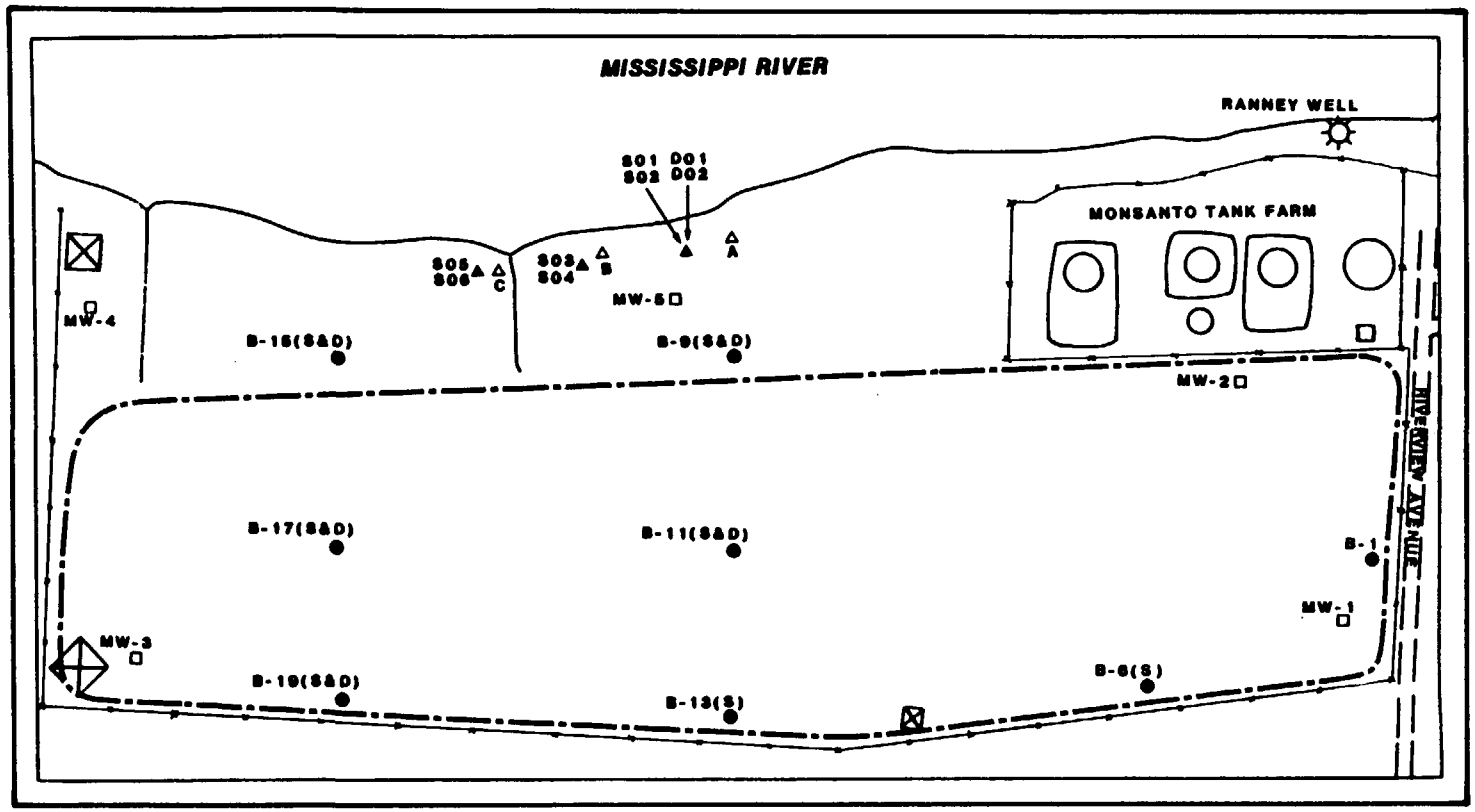
Site R had been terminated, as wastes were either hauled to other disposal facilities or incinerated on the plant site.

Very little information is available concerning disposal activities at Site R prior to 1967. In March, 1967, Sauget and Company filed an application for registration to operate a refuse disposal facility to the Illinois Department of Public Health. Health Department inspection reports from 1967 indicate disposal of liquid chemical wastes and metal containers from Monsanto. Liquids were pumped from tank trucks and drums into several pits around the site. Cinders were used as intermediate cover material.

In August, 1968, the Illinois Department of Public Health collected five ground water samples from on-site monitoring wells. The locations of these wells are shown in Figure R-1, and analytical results are presented in Table R-2. Phenols were detected in all wells at concentrations ranging from 15 to 1220 ppb. Alkalinity and total solids were also analyzed for, but no significant conclusions can be made from the data for these parameters.

IEPA began making routine inspections at Site R in 1971. Photographs of the site at this time suggest that wastes were disposed of in direct contact with the ground water. No segregation of liquid wastes was apparent in these photographs. IEPA collected another set of samples from the monitoring wells in December, 1972. Analytical data for these samples are shown in Table R-3. The results indicate concentrations of iron, zinc, and phenol above the State's water quality standards. Oil was also detected in wells MW-1 and MW-4. Samples were also collected from waste ponds at Site R by IEPA in January, 1973 and analyzed for phenol. Two samples were collected from pits identified as crystallization ponds, and one sample was taken from a spent caustic pond. Results for the waste pond samples are shown in Table R-4. High concentrations of phenols were detected in all samples.

In 1973, IEPA sent notices to Sauget and Company and Monsanto




LEGEND

| | |
|---|---|
| A | IEPA LEACHATE & SEDIMENT SAMPLING LOCATION |
| S01 | USEPA - FIT LEACHATE & SEDIMENT SAMPLING LOCATION |
| D01 | DUPLICATE SAMPLE |
| MW-1 | IEPA MONITORING WELL SAMPLING LOCATION (PRIOR TO 1979) |
| B-1 | IEPA MONITORING WELL SAMPLING LOCATION (1979-1981) |

SCALE

0 100 400 800 FEET

FIGURE R-1
STATE AND USEPA SAMPLING LOCATIONS AT SITE R.

TABLE R-2: ANALYSIS OF GROUND WATER SAMPLES FROM SITE R (COLLECTED AUGUST 22, 1968 BY THE ILLINOIS DEPARTMENT OF PUBLIC HEALTH)

| PARAMETERS | SAMPLE LOCATIONS | | | | |
|---|---|---|---|---|---|
| | MW-1 | MW-3 | MW-4 | MW-5 | MW-6 |
| Total Solids (conductivity mmhos) | 320 | 300 | 280 | 250 | 500 |
| Alkalinity (ppm) | 172 | 148 | 156 | 124 | 248 |
| Phenol (ppb) | 1220 | 25 | 20 | 15 | 1200 |

TABLE R-3: ANALYSIS OF GROUND WATER SAMPLES FROM SITE R (COLLECTED DECEMBER 5, 1972 By IEPA)

| PARAMETERS | SAMPLE LOCATIONS | | | |
|---|---|---|---|---|
| | MW-1 | MW-2 | MW-3 | MW-5 |
| Calcium | 50.2 | 147 | 36 | 49 |
| Magnesium | 15.8 | 36 | 18 | 18.5 |
| Sodium | 18.5 | 112 | 15 | 18.5 |
| Potassium | 3.6 | 6.7 | 4.2 | 3.5 |
| Ammonia | 1.5 | 2 | 0.65 | 0.92 |
| Arsenic | | | | |
| Boron | 0.1 | 0.7 | 0.1 | 0.1 |
| Cadmium | | | | |
| Chromium (Total) | | | | |
| Copper | | 0.1 | | |
| Iron | 2.4 | 28.2 | 1.4 | 8.5 |
| Lead | | | | 0. 02 |
| Manganese | 0.35 | 0.61 | 0.12 | 0.95 |
| Mercury | | | | |
| Nickel | | | | |
| Zinc | 0.40 | 1.42 | 0.21 | 2.05 |
| Alkalinity | 180 | 430 | 145 | 185 |
| Chloride | 22 | 225 | 22 | 22 |
| Fluoride | 0.2 | 0.2 | 0.2 | 2 |
| Nitrate | 0.1 | 0.3 | 0.1 | 0.1 |
| Phosphate | 0.003 | 0.21 | 0.05 | 0.34 |
| Sulfate | 16 | 12 | 29 | 32 |
| Conductivity (mmhos) | 445 | 1400 | 390 | 470 |
| Phenols | 0.088 | 0.2 | 0.007 | 0.014 |
| Oil | 1 | 0 | 1 | 0 |
| Hardness | 200 | 530 | 170 | 200 |
| COD | 46 | 135 | 3 | 8 |

NOTE: All results in ppm.
Blanks indicate below detection limits.

TABLE R-4: ANALYSIS OF SURFACE WATER SAMPLES FROM WASTE PONDS AT SITE R (COLLECTED JANUARY 18, 1973 BY IEPA)

| | SAMPLE LOCATIONS | | |
|---|---|---|---|
| PARAMETER | CRYSTALLIZATION POND 221 | CRYSTALLIZATION POND 270 | SPENT CAUSTIC POND |
| Phenol | 2800 | 50,000 | 2,000 |

NOTE: Results in mg/l (ppm).

outlining violations of the Environmental Protection Act at Site R. Violations noted included inadequate segregation of wastes, open dumping of chemical wastes, and operation of a disposal facility without the necessary permits. In addition, it was noted that the cinders being used as cover material was not in accordance with the Rules and Regulations set forth by the Illinois Pollution Control Board. These violations were reiterated several times in 1973 and 1974.

The monitoring wells at Site R were sampled annually between the years 1973 and 1976. In addition to the monitoring wells on site, a Monsanto production well (Ranney Well), located in the northwest corner, was also sampled. Results from these sampling efforts are summarized in Tables R-5 through R-8. Although specific pumping data for the Ranney Well could not be located, Illinois State Water Survey reports and file information suggests that pumpage of the well produced a significant cone of influence in the area. Sample data shows significant contamination in the Ranney Well, most notably with phenols and PCBs. COD, which is a non-specific indicator of organic contaminants, was also detected at much higher concentrations in the Ranney Well than in other wells sampled. Iron, mercury, and zinc exceeded water quality standards on one or more occasion during this time period. It should be noted that analysis of samples collected at Site R prior to 1976 was limited to inorganic parameters and phenols. Ground water samples collected in February, 1976 were analyzed for PCBs (Table R-8). The Ranney well was the only well to show a detectable concentration of PCBs (7.7 ppb).

IEPA monthly inspection reports from 1975 indicate a significant reduction in the volume of chemical waste disposal at Site R. Wastes were being shipped to other locations for disposal or were being incinerated at Monsanto's Krummrich Plant. Monsanto voluntarily ceased disposal operations at the site in 1977 and began closure proceedings. D'Appolonia Consulting Engineers, Inc. (D'Appolonia) was contracted by Monsanto to conduct a subsurface investigation of the site. Twenty soil borings were drilled and eight monitoring

TABLE R-5: ANALYSIS OF GROUNDWATER SAMPLES FROM SITE R (COLLECTED FEBRUARY 22, 1973 BY IEPA)

| PARAMETERS | SAMPLE LOCATIONS | | | | |
|---|---|---|---|---|---|
| | MW-1 | MW-2 | MW-4 | MW-5 | RANNEY WELL |
| Iron | 6.8 | 11 | 0.8 | 6.6 | 1.9 |
| Manganese | 0.35 | 0.55 | 0.05 | 1.05 | 0.92 |
| Mercury (ppb) | 0.4 | | | 0.2 | |
| Zinc | 1.9 | 0.6 | | 1.5 | |
| Ammonia | 1.6 | 2.6 | 0.7 | 1.3 | 0.98 |
| Phenol (ppb) | 150 | 80 | | | 7500 |
| BOD | 31 | 48 | 1 | 1 | 85 |
| COD | 51 | 78 | 16 | 13 | 220 |

NOTE: All results in ppm unless noted otherwise.
Blanks indicate below detection limits.

TABLE R-6: ANALYSIS OF GROUND WATER SAMPLES FROM SITE R (COLLECTED MAY 6, 1974 BY IEPA)

| | SAMPLE LOCATIONS | | | | | |
|---|---|---|---|---|---|---|
| PARAMETERS | MW-1 | MW-2 | MW-3 | MW-4 | MW-5 | Ranney Well |
| Arsenic | 0.001 | 0.001 | 0.005 | | 0.001 | 0.002 |
| Barium | 0.1 | 0.3 | 0.2 | 0.1 | 0.2 | 0.2 |
| Boron | 0.3 | 0.9 | 8.4 | 0.2 | 0.1 | |
| Cadmium | | 0.02 | | | | |
| COD | 44 | 990 | 21 | 14 | 17 | 340 |
| Chloride | 90 | 215 | 30 | 17 | 16 | 25 |
| Cyanide | | 0.008 | | | | 0.005 |
| Iron | 15 | 43.2 | 11.9 | 2.71 | 7.5 | 2.65 |
| Lead | 0.008 | 0.01 | | 0.008 | 0.014 | 0.95 |
| Manganese | 0.69 | 1.4 | 1.1 | 0.2 | 0.9 | 0.95 |
| Nitrate | | | | | | 0.4 |
| Oil | 4 | 7 | 1 | | | 5 |
| Phenols | 0.35 | 120 | 0.1 | 0.02 | 0.1 | 15 |
| R.O.E. | 720 | 1600 | 750 | 270 | 240 | 820 |
| Selenium | | | | | | |
| Sulfate | 220 | 78 | 305 | 48 | 41 | 31 |

NOTE: All results in ppm.
Blanks indicate below detection limits.

TABLE R-7: ANALYSIS OF GROUND WATER SAMPLES FROM SITE R (COLLECTED OCTOBER 28, 1975 BY IEPA).

| | SAMPLE LOCATIONS | | | |
|---|---|---|---|---|
| PARAMETERS | RANNEY WELL | MW-2 | MW-4 | MW-5 |
| Ammonia | | | | |
| Arsenic | 0.002 | | 0.002 | |
| Barium | 0.1 | 0.1 | 0.1 | 0.2 |
| Boron | 0.7 | 0.9 | 0.5 | 0.2 |
| Cadmium | | | | |
| COD | 345 | 210 | 12 | 16 |
| Chloride | 110 | 200 | 23 | 20 |
| Cyanide | | 0.02 | 0.01 | |
| Iron | 4.5 | 13.4 | 1.45 | 11 |
| Lead | 0.02 | | 0.01 | 0.04 |
| Manganese | 1.3 | 0.2 | 0.1 | 0.7 |
| Nitrate | | 0.3 | 0.2 | 0.1 |
| Oil | 3 | 6 | 2 | 3 |
| Phenol | 19 | 1.1 | 0.025 | 0.013 |
| R.O.E. | 300 | 920 | 230 | 200 |
| Selenium | 0.02 | | | |
| Sulfate | 95 | 6 | 22 | 15 |

NOTE: All results in mg/l, (ppm).
Blanks indicate not detected.

TABLE R-8: ANALYSIS OF GROUNDWATER SAMPLES FROM SITE R (COLLECTED FEBRUARY 17, 1976 BY IEPA)

| | SAMPLE LOCATIONS | | | | | |
|---|---|---|---|---|---|---|
| PARAMETERS | MW-1 | MW-2 | MW-3 | MW-4 | MW-5 | RANNEY WELL |
| Arsenic | | | | | | 0.001 |
| Barium | | | | 0.2 | 0.3 | 0.1 |
| Boron | 0.3 | 0.8 | 8 | 0.5 | 0.1 | 1.4 |
| Cadmium | | | | | | |
| COD | 28 | 130 | 8 | 16 | 15 | 390 |
| Chloride | 60 | 410 | 65 | 35 | 35 | 250 |
| Cyanide | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Iron | 5.1 | 19.5 | 4.3 | 0.7 | 7.1 | 4.6 |
| Lead | 0.01 | 0.02 | | | 0.02 | |
| Manganese | 0.27 | 0.27 | 0.1 | 0.1 | 0.85 | 1.45 |
| Nitrate | 0.8 | 0.1 | | | | 0.3 |
| Phenols | 0.03 | 0.01 | | | | |
| ROE | 370 | 890 | 260 | 220 | 260 | 900 |
| Selenium | | | | | | |
| Sulfate | 110 | 20 | 100 | 44 | 36 | 180 |
| PCBs (ppb) | | | | | | 7.7 |

NOTE: All results in mg/1 (ppm) unless noted otherwise.
Blanks indicate below detection limits.

wells were installed. The D'Appolonia study concluded that the landfill area consisted of 5 to 20 feet of flyash, cinders, silty clay, and unidentified waste. The landfill is underlain by alluvium, consisting of fine sands, silt, and clay ranging in thickness from 5 to 50 feet. Field permeability tests showed that alluvium is fairly permeable ($1 \times 10^{-3}$ cm/sec) suggesting that silty sand is the major component of the alluvium. This finding is supported by the evidence of vertical migration of contaminants to a depth of 65 feet, as suggested in the boring logs. Water levels were generally 25 to 30 feet below ground surface.

In May, 1978, Monsanto filed closure documents to IEPA detailing a closure plan for the site. In general, the plan consisted of specifications for the installation of a drainage system and clay cap, along with details for grading, seeding, and access restriction. The Helmkamp Construction Company was retained to implement the closure plan. An IEPA inspection report from October, 1979 indicated that closure operations at Site R were complete, including installation of a clay cap 3 to 6 feet in thickness. In February, 1980, Richard Sinise, an Environmental Control Engineer for Monsanto, filed an Affidavit of Closure for Site R.

IEPA personnel collected ground water samples from monitoring wells installed by D'Applonia in October, 1979 (Figure R-1). The samples were analyzed for inorganics and organic parameters reported by Monsanto to have been disposed of at the site. Analytical results for these samples are shown in Table R-9. Analysis showed the presence of several organic contaminants in the wells. Both shallow (25 to 35 feet) and deep (60 to 70 feet) wells were sampled, and chlorotoluene and phenol were found in all wells sampled. Well B-19S, located in the southeast portion of the site, also showed chlorophenol, dichlorobenzene, and diphenyl ether at concentrations ranging from 0.81 to 2.1 ppm. Iron, copper, and zinc exceeded water quality standards in several wells. Another set of samples was

TABLE R-9: ANALYSIS OF GROUNDWATER SAMPLES FROM SITE R (COLLECTED BY IEPA ON OCTOBER 12, 1979)

| PARAMETERS | SAMPLE LOCATIONS | | | | | |
|---|---|---|---|---|---|---|
| | B-9S | B-9D | B-13D | B-15S | B-17S | B-19S |
| Inorganics | | | | | | |
| Arsenic | 0.01 | 0.004 | 0.002 | 0.002 | 0.002 | 0.007 |
| Cadmium | 0.02 | | 0.01 | | | 0.01 |
| Chromium | 0.03 | | 0.04 | | | 0.03 |
| Copper | 1.2 | 0.32 | 0.87 | 0.14 | 0.42 | 1.6 |
| Iron | 290 | 100 | 130 | 56 | 110 | 230 |
| Lead | 0.2 | | 0.3 | | 0.1 | 0.2 |
| Magnesium | 31 | 10 | 27 | 83 | 11 | 28 |
| Manganese | 7.8 | 1 | 1.4 | 1.8 | 0.99 | 2.8 |
| Nickel | 0.6 | 0.2 | 1.9 | 0.1 | 0.1 | 0.2 |
| Zinc | 3.3 | 0.36 | 3 | 0.4 | 0.52 | 0.87 |
| Organics | | | | | | |
| Aliphatic hydrocarbons | | | | * | * | * |
| Chlorophenol | * | * | | | | 0.81 |
| Chlorotoluene | 70 | 40 | 10 | 0.34 | 11 | 18 |
| Dichlorbenzene | | | | | | 1.6 |
| Diphenylether | | | | | 0.32 | 2.1 |
| Phenol | 21 | 56 | 10 | 14.3 | 41.5 | 22 |

NOTE: All results in ppm
Blanks indicate below detection limits
* Contaminants present, but not quantified

collected by the IEPA from the D'Appolonia monitoring wells in March, 1981. These samples were analyzed specifically for organic compounds. Analytical data for these samples are shown in Table R-10. Concentrations of organic contaminants were detected in all wells sampled. Chlorobenzene (130 to 3000 ppb) was detected in all wells, while biphenylamine, chlorophenol, dichlorobenzene, and dichlorophenol were seen in five or more wells.

In October, 1981, IEPA collected leachate and sediment samples at Site R from an area adjacent to the Mississippi River. Leachate and sediment samples were collected from three locations where leachate seeps were observed flowing from the landfill into the river. Analytical results for these samples are presented in Table R-11, and locations of the samples are shown in Figure R-1. The three water samples showed contamination with a wide variety of organic compounds. PCBs and chloroaniline were detected in all sediment samples. Other compounds detected in sediment samples included 2,4-dichlorophenoxy-acetic acid (2,4-D), chloronitrobenzene, dichloroaniline, chlorophenol, biphenyl-2-ol, and dichlorophenol. The presence of 2,4-D and chlorinated phenols in these samples suggested that dioxin was also a potential contaminant at the site. The IEPA subsequently requested assistance from USEPA in securing a laboratory to perform dioxin analysis on leachate samples from Site R. In November, 1981 a USEPA contractor (Ecology and Environment, Inc.) collected leachate and sediment samples at three locations adjacent to the river (Figure R-1). A total of eight samples plus three blanks were collected. Dioxin analysis was performed by the Brehm Laboratory at Wright State University. Monsanto obtained split samples and analyzed for chlorinated dibenzo-p-dioxins (CDDs), select organics, and metals. The USEPA samples were analyzed for tetra through octa CDDs and dibenzofurans (CDFs), select organics, and metals. Table R-12 provides an explanation and cross-reference for samples collected by USEPA and Monsanto.

Analytical results for CDDs and CDFs in the USEPA leachate samples

TABLE R-10: ORGANIC ANALYSIS OF GROUNDWATER SAMPLES FROM SITE R
(COLLECTED BY IEPA ON MARCH 25, 1981)

| | SAMPLE LOCATIONS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| PARAMETERS | B-1 | B-6S | B-9S | B9D | B11S | B-11D | B-15D | B-17D | B-19D |
| Aliphatic hydrocarbons | | | | | 4,000 | | | | |
| Biphenylamine | 1,800 | 250 | | | 15,000 | 1,100 | 1,300 | 860 | 660 |
| Chlorobenzene | 3,000 | 130 | 720 | 810 | 1,000 | 2,800 | 2,800 | 650 | 300 |
| Chlorophenol | 6,600 | 5,300 | 11,000 | 12,000 | 13,000 | 3,200 | 3,200 | | 950 |
| Chloronitrobenzene | | | 2,500 | 1,500 | | | | | |
| Dichlorobenzene | 2,600 | | | | 1,000 | 800 | 930 | 420 | 360 |
| Dichlorophenol | 1,100 | 700 | | | | 630 | 2,900 | 670 | |
| Trichlorophenol | | | | | | | | 1,200 | |

NOTE: All results in ug/l (ppb).
Blanks indicate below detection limit.

TABLE: R-11: ANALYSIS OF LEACHATE AND SEDIMENT SAMPLES FROM SITE R
(COLLECTED OCTOBER 2, 1981 BY IEPA)

| PARAMETERS | SAMPLE LOCATIONS | | | | | |
|---|---|---|---|---|---|---|
| | SAMPLE A (WATER) D022687 | SAMPLE B (WATER) D022688 | SAMPLE C (WATER) D022689 | SOIL SAMPLE A D022690 | SOIL SAMPLE B D022692 | SOIL SAMPLE C D022692 |
| PCB | | | 2.6 | 48 | 150 | 230 |
| Toluene | 11 | 40 | 150 | | | |
| Chlorobenzene | 160 | 390 | 1,600 | | | |
| Chloroaniline | 24,000 | 22,000 | 38,000 | 1,700 | 190 | 6,900 |
| Chloronitrobenzene | 21,000 | 9,600 | 820 | | 130 | |
| 2.4-D | 16,000 | 17,000 | 7,800 | 53 | (<5) | (<5) |
| 2,4,5-T | | | | (<5) | (<5) | (<5) |
| Dichloronitrobenzene | 740 | 590 | 790 | | | |
| Dichloroaniline | 870 | 820 | 2,800 | | | 190 |
| Chloronitroaniline | 84 | 33 | | | | |
| Nitroaniline | 100 | 23 | | | | |
| Chlorophenol | 15,000 | 30,000 | 27,000 | | | 290 |
| Phenol | 22,000 | 17,000 | 12,000 | | | |
| Methylphenol | 570 | 220 | 110 | | | |
| Dichlorophenol | 32,000 | 7,200 | 2,100 | 40 | | |
| Nitrophenol | 600 | | | | | |
| Biphenyldiol | 1,700 | | | | | |
| Aniline | 550 | 120 | 35 | | | |
| Methylbenzene | 180 | 2,000 | 140 | | | |
| Sucponamide | | | | | | |
| 4-methyl-2-pentanol | 26 | | | | | |
| 2-methyl cyclopentanol | 93 | | | | | |
| Biphenyl 2-Ol | 300 | 300 | 280 | | | 310 |
| Benzenesulfonamide | 76 | 630 | | | | |
| Dichlorobenzene | | 110 | 250 | | | |
| Benzoic Acid/Derivatives | 12,000 | 6,600 | 2,000 | | | |
| Hydroxybenzoic Acid/ Derivatives | 12,000 | | | | | |
| 2,4-D Isomer | 38,000 | 48,000 | 29,000 | | | |
| 2,4,5-T Isomer | 10,000 | 12,000 | 6,500 | | | |

NOTE: All results in ppb.
Blanks indicate below detection limits.
( ) indicates values are unconfirmed.

TABLE R-12: COMPILATION OF LEACHATE AND SEDIMENT SAMPLES COLLECTED AT SITE R IN NOVEMBER, 1981

| STATION NUMBER | USEPA SAMPLE NUMBER[a] | MONSANTO SAMPLE NUMBER | DESCRIPTION |
|---|---|---|---|
| 1 | S01 | M01 | Leachate (5% Sediment) |
| 1 | D01 | | Duplicate for S01 |
| 1 | S02 | M02 | Sediment |
| 1 | D02 | | Duplicate for S02 |
| 2 | S03 | M03 | Leachate (10% Sediment) |
| 2 | S04 | M04 | Sediment |
| 3 | S05 | M05 | Leachate (10% Sediment |
| 3 | S06 | M06 | Sediment |
| Blank | S07 | | City of Chicago tap water. Blank for low level analysis. |
| Blank | R01 | | City of Chicago tap water. Blank for medium level analysis. |
| Blank | R01 | | City of Chicago tap water. Extra blank for low level analysis. |

NOTE: Monsanto did not split samples where no number is listed.
a - Samples collected by Ecology and Environment, Inc.

are shown in Table R-13. Tetra- and penta-CDDs and CDFS were not detected in any of the samples. However, higher chlorinated dioxins and furans (hexa through octa isomers) were detected in three of the five samples submitted for analysis. Concentrations of these compounds ranged from 4.5 to 2693 parts per trillion (ppt). The two remaining samples, S07 and R01, were water blanks, and showed no detectable CDDs or CDFs. Monsanto also analyzed samples M01 through M05 for CDDs, and results showed no detectable concentrations of these compounds.

Inorganic data for the leachate and sediment samples from Site R are shown in Tables R-14 and R-15. In general, the leachate samples did not show significant inorganic contamination, although concentrations of chromium, copper, boron and iron exceeded water quality standards in two or more samples. Cyanide was detected in several samples, but was also found in the blank. Therefore, the results for cyanide should be considered unreliable. Data for the sediment samples show more substantial evidence of contamination. Elevated levels of arsenic, chromium, copper, lead, and barium were found in several samples. Identified organic compounds in leachate and sediment samples are listed in Table R-16. Phenol and chlorinated phenols were found in all but one sediment sample (M02) at concentrations ranging from 0.2 to 300 ppb. Leachate samples showed elevated levels of several organic parameters, including chlorinated phenols, chlorinated benzenes, chloroanilines, and 2,4-D. As shown in Table R-16, there is a significant discrepancy in the Monsanto and USEPA data for the sediment samples. The values listed by Monsanto were consistently and substantially higher than USEPA values. This may be explained by the fact that USEPA's samples were initially analyzed as medium hazard samples. Because of the higher detection limits associated with this analysis, no contaminants were initially found. USEPA subsequently decided to rerun the samples at lower detection limits. It is possible that the increased holding time and handling of these samples were instrumental in the reduction of concentrations of contaminants found.

Site R was assessed using USEPAs Hazard Ranking System (HRS) model in

TABLE R-13: ANALYSIS OF TETRA THROUGH OCTACHLORINATED DIBENZO-P-DIOXINS AND DIBENZOFURANS IN LEACHATE SAMPLES FROM SITE R (COLLECTED NOVEMBER 12, 1981 BY ECOLOGY AND ENVIRONMENT, INC.)

| SAMPLE LOCATIONS | PARAMETERS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | TCDDs | TCDFs | PCDDs | PCDFs | HXCDDs | HXCDFs | HPCDDs | HPCDFs | OCDDs | OCDFs |
| S01 | | | | | 4.5 | 6.3 | 86 | 74 | 323 | 30 |
| S03 | | | | | 6.3 | 10 | 181 | 182 | 675 | 103 |
| S05 | | | | | 5.8 | 6.3 | 152 | 112 | 2693 | 53 |
| S07 (Blank) | | | | | | | | | | |
| R01 (Blank) | | | | | | | | | | |

NOTE: All results in parts per trillion (ppb).
Blanks indicate below detection limits.
Analysis performed by Brehm Laboratory, Wright State University.

TABLE R-14: INORGANIC ANALYSIS OF LEACHATE SAMPLES FROM SITE R (COLLECTED NOVEMBER 12, 1981 BY ECOLOGY AND ENVIRONMENT, INC.)

| | SAMPLE LOCATIONS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| PARAMETERS | S01 | M01 | D01 | S03 | M03 | S05 | M05 | R01 |
| Arsenic | 0.034 | 0.02 | 0.031 | 0.016 | 0.025 | 0.029 | 0.065 | |
| Mercury | 0.0002 | | 0.0002 | 0.0002 | 0.0014 | 0.0008 | 0.001 | |
| Selenium | 0.038 | | 0.032 | 0.026 | | 0.031 | | |
| Thallium | | | | | | | | |
| Antimony | | | | | | | | |
| Beryllium | | 0.008 | | | 0.005 | | 0.008 | |
| Cadmium | | 0.006 | | | 0.007 | | 0.008 | |
| Chromium | 0.04 | 0.086 | 0.02 | 0.015 | 0.075 | 0.02 | 0.07 | 0.01 |
| Copper | | 0.073 | | | 0.092 | | 0.08 | |
| Lead | 0.005 | | 0.008 | | | | | |
| Nickel | 0.04 | 0.155 | | | 0.124 | | 0.144 | |
| Silver | | | | | | 0.01 | | |
| Zinc | 0.048 | 0.216 | 0.024 | 0.01 | 0.216 | 0.049 | 0.062 | 0.31 |
| Aluminum | | 26.8 | | | 30.5 | | 3.22 | |
| Barium | | 0.5 | | | 0.5 | | 0.36 | |
| Boron | 19.7 | 18 | 17.1 | 15.35 | 13.6 | 21.6 | 19.1 | |
| Calcium | N/A | 368 | N/A | N/A | 257 | N/A | 257 | N/A |
| Cobalt | | 0.03 | | | 0.019 | | 0.031 | |
| Iron | 0.06 | 25.5 | 0.06 | | 30.8 | 0.63 | 27.4 | |
| Magnesium | N/A | 43.2 | N/A | N/A | 48.2 | N/A | 39.8 | N/A |
| Manganese | 0.02 | 6.27 | 0.32 | 1.99 | 2.1 | 5.4 | 8.82 | 0.03 |
| Molybdenum | N/A | 0.53 | N/A | N/A | 0.403 | N/A | 0.439 | N/A |
| Phosphorus | N/A | 0.9 | N/A | N/A | 0.907 | N/A | 2.06 | N/A |
| Sodium | N/A | 40.4 | N/A | N/A | 41.8 | N/A | 44.2 | N/A |
| Tin | | | | | | 0.02 | 1.4 | |
| Vanadium | | 0.18 | | | 0.138 | | 0.17 | |
| Cyanide | 0.071 | N/A | 0.057 | N/A | N/A | N/A | N/A | 0.13 |

NOTE: All Results in ppm.
Blanks indicate below detection limits.
N/A - Parameter not analyzed.
R01 is a water blank.

TABLE R-15: INORGANIC ANALYSIS OF SEDIMENT SAMPLES FROM SITE R (COLLECTED NOVEMBER 12, 1981 BY ECOLOGY AND ENVIRONMENT, INC.)

| | SAMPLE LOCATIONS | | | | | | |
|---|---|---|---|---|---|---|---|
| PARAMETERS | S02 | S03 | M02 | S04 | M04 | S06 | M06 |
| Arsenic | 1.1 | 2.9 | 5.3 | 1.25 | 9.6 | 1.8 | 8.2 |
| Mercury | | | | | | | |
| Selenium | 1.1 | 1.8 | | 1.5 | | 1.6 | |
| Thallium | | | | | | | |
| Antimony | | | | 4.0 | | | |
| Beryllium | | | 0.412 | | 0.489 | | 1.08 |
| Cadmium | | | 0.747 | 0.61 | 1.04 | | 2.49 |
| Chromium | | | 10.7 | | 10.4 | | 28.7 |
| Copper | | | 7.17 | | 7.89 | | 25.5 |
| Lead | 2.4 | 2.9 | | 2.45 | | 1.7 | |
| Nickel | | | 17.4 | | 18.6 | | 33.8 |
| Zinc | 9.5 | 10 | 29.5 | 6.8 | 36.3 | 9.2 | 69.4 |
| Aluminum | 150 | 190 | 3870 | 155 | 4380 | 170 | 13,900 |
| Barium | | | 75.4 | | 130 | 20 | 7.79 |
| Boron | | 25 | 53 | 17 | 28.7 | 26 | 30.3 |
| Calcium | N/A | N/A | 3660 | N/A | 4010 | N/A | 6590 |
| Cobalt | | | 4.7 | | 4.8 | | 9.45 |
| Iron | 580 | 660 | 5870 | 425 | 8660 | 580 | 12,600 |
| Magnesium | N/A | N/A | 1780 | N/A | 2090 | N/A | 4080 |
| Manganese | 76 | 46 | 79.7 | 42 | 119 | 47 | 273 |
| Molybdenum | N/A | N/A | 10.6 | N/A | 12.5 | N/A | 22.4 |
| Phosphorus | N/A | N/A | 154 | N/A | 270 | N/A | 366 |
| Sodium | N/A | N/A | 1840 | N/A | 1270 | N/A | 4720 |
| Tin | | | | | | | |
| Vanadium | | | 14.4 | | 17 | | 43.9 |
| Cyanide | 28 | 13 | N/A | 6.8 | N/A | 90 | N/A |

NOTE: All results in ppm.
Blanks indicate below detection limit.
N/A - Parameter not analyzed.

TABLE R-16: IDENTIFIED ORGANIC COMPOUNDS IN LEACHATE
AND SEDIMENT SAMPLES FROM SITE R
(COLLECTED NOVEMBER 12, 1981 BY ECOLOGY AND ENVIRONMENT, INC.)

| | SAMPLE LOCATIONS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | LEACHATE | | | SEDIMENT | | | | | |
| PARAMETERS | M01 | M03 | M05 | S02 | M02 | S04 | M04 | S06 | M06 |
| 2-Chlorophenol | 340 | 100 | | 0.26 | | 0.2 | 200 | 0.4 | |
| 2,4-Dichlorophenol | 100 | | | | | 0.42 | | 0.56 | |
| Phenol | 130 | | | | | 0.5 | 300 | 0.42 | 300 |
| 2,4,6-Trichlorophenol | | | | | | | | 0.32 | |
| 1,4-Dichlorobenzene | 30 | | | | 200 | | 400 | | 600 |
| 1,2-Dichlorobenzene | 20 | | | | | | | | |
| Bis(2 ethylhexyl) Phthalate | | | | | 400 | | 300 | | 400 |
| Chlorobenzene | 160 | 30 | | | | | | | |
| Aniline | 60 | 40 | 25 | | | | | | |
| Chloroanilines | 8000 | 4000 | 600 | | | | | | |
| Dichloroanilines | 100 | 40 | | | | | | | 200 |
| Chloronitrobenzenes | 3000 | 80 | | | | | | | |
| 2,4-D | 332 | 100 | | | | | | | |
| PCBs | | | 0.008 | | 0.014 | | 0.034 | | 0.192 |

NOTE: *All results in parts per billion (ppb).*
Blanks indicate below detection limit.

July, 1982 by Ecology & Environment, Inc. The final migration score assigned to the site was 7.23, which included observed releases for both the ground water and surface water routes. Route scores for ground water and surface water were 6.12 and 10.91 respectively. The air route was assigned a zero score because an observed release had not been documented. The reason for the relatively low final score for Site R is the lack of a target population, which is a major factor in the HRS model. The source of potable water in the area is an intake in the Mississippi River, located approximately 2.5 miles upstream from the site. The upstream location of the intake excludes it from being used in the model.

In 1982, the Illinois Attorney General's office filed suit (Complaint Number 82-CH-185) against Monsanto outlining several apparent violations of the Illinois Environmental Protection Act. For the most part, the Complaint was directed at alleged water pollution caused by the defendant. Relief requested by the Attorney General included civil penalties and issuance of an injunction directing the defendant to immediately prevent seepage of wastes into the Mississippi River, and to remove all such wastes from the property. To date, no information has been located concerning a determination in this case. The Attorney General's office is presently engaged in an ongoing suit against Monsanto in an attempt to have all wastes removed from the site.

USEPA file information suggests that fish studies have been conducted in the Mississippi River in the vicinity of Site R. The Food and Drug Administration (FDA) in Edwardsville, Illinois has found unacceptable concentrations of PCBs in fish collected downstream of Site R. A detailed study was proposed for the area in the immediate vicinity of the site, however, attempts to obtain data from this study have been unsuccessful to date. It is not known if this study was to have included an assessment of the Sauget Treatment Plant effluent, which is discharged immediately northwest of Site R.

In 1982, USEPA developed a comparative analysis of chemicals

detected in monitoring wells and leachate samples from Site R as they relate to wastes reported by Monsanto to have been disposed of at the site. Also included in the analysis were chemicals reported as being manufactured at Monsanto's Krummrich Plant, as documented in the 1977 chemical inventory developed as a result of the Toxic Substances Control Act (TSCA) and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). The analysis revealed a high degree of association or correlation between chemicals detected in the sample, and those reported to have been disposed of or manufactured by Monsanto. A summary of data from this USEPA analysis report is presented in Table R-17.

In 1984, Monsanto contracted Geraghty and Miller, Inc. to perform a detailed hydrogeologic investigation in the Sauget area. Data from this study, which included the installation of approximately 60 monitoring wells, have not been made available.

## Data Assessment and Recommendations

A great deal of data has been developed to date for Site R. Organic contaminants have been detected in both shallow and deep monitoring wells on site, as well as in leachate seeps leaving the site. Evidence of contamination has been observed to a depth of approximately 60 feet in soil borings. A substantial listing of the types and quantities of chemical wastes disposed of at the site was submitted to IEPA by Monsanto. In view of this information the only significant data gaps are: (1) specific delineation of contaminant boundaries, and (2) determination of the presence or absence of air emissions from the site. Because of the permeable nature of the subsurface soils and the characteristics of the wastes present at the site, it is likely that extensive migration of contaminants has occurred.

The present scope of work for the Dead Creek Project includes installation and sampling of monitoring wells at Site R. Ambient air monitoring will also be conducted to determine to what extent, if any, off-gassing of organic contaminants is occurring. Every effort

TABLE R-17: COMPARATIVE ANALYSIS OF CHEMICALS DETECTED IN SAMPLES AT SITE R AND THOSE REPORTED TO HAVE BEEN DISPOSED OR MANUFACTURED BY MONSANTO

| COMPOUNDS | LEACHATE/SEDIMENT ANALYSIS | | | GROUNDWATER ANALYSIS | REPORTED DISPOSAL | MANUFACTURED |
|---|---|---|---|---|---|---|
| | IEPA | MONSANTO | USEPA | IEPA | MONSANTO | MONSANTO |
| PCBs | X | X | | | | X |
| Chlorobenzene | X | X | | X | X | X |
| Dichlorobenzene | X | X | | X | | X |
| Chloroaniline | X | X | | | X | X |
| Chloronitrobenzene | X | X | | X | X | X |
| Dichloronitrobenzene | X | | | | | |
| Chlorophenol | X | X | X | X | X | X |
| Dichlorophenol | X | X | X | X | X | X |
| 2,4-D/isomers | X | X | | | | X |
| 2,4,5,-T/Isomers | X | | | | | X |
| Aniline | X | X | | | | |
| Dichloroaniline | X | | | | X | |
| Chloronitroaniline | X | | | | X | X |
| Nitroaniline | X | | | | X | X |
| Phenol | X | X | X | X | X | |
| Nitrophenol | X | | | | | |
| Methylphenol | X | | | | | |
| Diphenyldiol | X | | | | | |
| Benzoic Acid/Derivatives | X | | | | X | X |
| 4-methyl-2-pentanol | X | | | | X | |
| 2-methylcyclopentanol | X | | | | X | |
| Benzene Sulfonamide | X | | | | X | |
| Chlorotoluene | X | | | | | X |
| Dioxins/Dibenzofurans | | | X | | X (By Product) | X (By Product) |

should be made by th IEPA to obtain data on, and gain access to, the Monsanto wells installed by Geraghty and Miller. Access to these wells would likely eliminate the need for, or at least affect the location of, the monitoring wells to be installed during the field investigation of Site R. Pending the results of ground water sampling, a more specific approach to delineating the extent of contamination could be proposed. Samples should initially be collected from a minimum of 8 wells on Site R, and hydraulic conductivity tests should be run on a minimum of 2 deep and 2 shallow wells. Possibilities for identifying plume characteristics include conducting electromagenetic surveys (including off site areas), and soil gas monitoring. In any event, the lateral and vertical extent of contaminantion must be addressed prior to design of remedial options.

## CREEK SECTOR B - DEAD CREEK

### Site Description

Creek Sector B (CS-B) includes the portion of Dead Creek lying between Queeny Avenue and Judith Lane in Sauget, Illinois. Three other sites in the Dead Creek Project are located adjacent to CS-B. These include Site G to the northwest, Site L to the northeast, and Site M to the southeast. All of these sites have been identified at one time or another as possible sources of pollution in CS-B. Presently, CS-B and Site M are enclosed by a chain link fence which was installed by the USEPA in 1982. The banks of the creek are heavily vegetated, and debris is scattered throughout the northern one-half of CS-B. Culverts at Queeny Avenue and Judith Lane have been blocked in order to prevent any release of contaminants to the remainder of the creek, although the adequacy of these blocks has been questioned several times. Water levels in the creek vary substantially depending on rainfall, and during extended periods of no precipitation, the creek becomes a dry ditch.

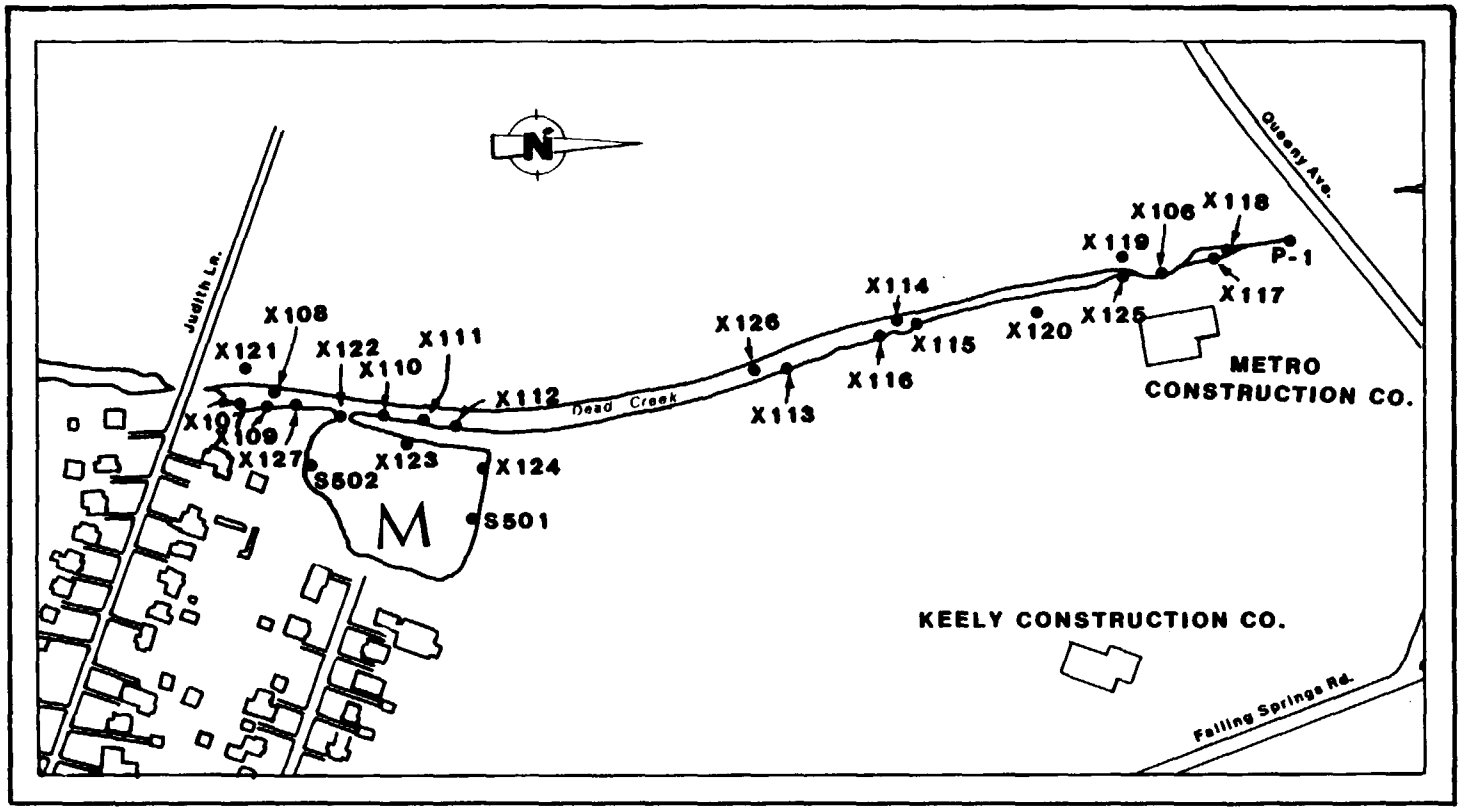
### Site History and Previous Investigations

The IEPA initially became aware of environmental problems at CS-B in May, 1980 when several complaints were received concerning smouldering and fires observed the creek bed. In August, 1980, a local resident's dog died, apparently of chemical burns resulting from contact with materials in the ditch. Following this incident, the IEPA conducted preliminary sampling to determine the cause of these problems in CS-B. Chemical analysis of these samples indicated high levels of PCBs, phosphorus, and heavy metals, and the IEPA subsequently authorized the installation of fencing in order to prevent public access to the creek. In September 1980, the Illinois Department of Transportation (IDOT) completed installation of 7000 feet of snow fence with warning signs around CS-B and Site M. The IEPA subsequently performed a preliminary hydrogeological investigation in the area in an attempt to identify the sources of pollution

in Dead Creek. The results of this investigation are documented in the St. John Report. The snow fence was later replaced with a chain link and barbed wire fence. The installation of this fence was authorized by the USEPA, and was completed in October, 1982.

Prior to the IEPA investigation in 1980, the City of Cahokia Health Department received complaints from area residents concerning discharges from Cerro Copper Product (Cerro) entering CS-B. In 1975, IEPA visited the site in order to determine if these discharges were occurring. Investigators observed discoloration in the creek and along the banks similar to what was later observed in the holding ponds at Cerro. One water sample was collected by IEPA from the creek immediately south of Queeny Avenue. Analysis of this sample indicated the presence of copper (0.3 ppm), iron (3.2 ppm), and mercury (0.1 ppb). The culvert under Queeny Avenue was sealed sometime in the early 1970's by Cerro Copper and the Monsanto Chemical Company for the purpose of restricting flow from the holding ponds at Cerro (Creek Sector A). The holding ponds were also regraded to the north to direct their flow to an interceptor discharging to the Sauget Wastewater Treatment Plant. The investigators concluded that flow through the blocked culvert had occurred, although the direction of flow could not be determined because no flow was evident at the time of the inspection.

The IEPA hydrogeological study, conducted in 1980, included collecting 20 surface sediment samples for analysis from CS-B (Figure B-1). Analyses of samples from the northern portion of CS-B are presented in Table B-1. Samples x106, x119, x120, x125, and x126 showed PCBs in concentrations ranging from 1.1 to 10,000 parts per million (ppm). Sample x125, taken adjacent to the former Waggoner Company operation, contained additional organic contaminants, including alkylbenzenes (370 ppm), dichlorobenzene (660 ppm), trichlorobenzene (78 ppm), dichlorophenol (170 ppm), and hydrocarbons (21,000 ppm). These contaminants were not detected in other surface sediment samples in the northern portion of CS-B during this




LEGEND

| | |
|---|---|
| X106 | SEDIMENT SAMPLING LOCATION |
| S502 | SURFACE WATER SAMPLING LOCATION |
| P-1 | SUBSURFACE SOIL SAMPLING LOCATION |

SCALE

0 150 600 900 FEET

FIGURE 8-1
IEPA SAMPLING LOCATIONS AT CREEK SECTOR B AND SITE M

TABLE B-1: ANALYSIS OF SOIL SAMPLES IN THE NORTHERN PORTION OF CREEK SECTOR B (COLLECTED BY IEPA 9-8-80 THROUGH 10-25-80)

| | SAMPLE LOCATIONS | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PARAMETERS | x106 | x113 | x114 | x115 | x116 | x117 | x118 | x119 | x120 | x125 | x126 |
| Aluminum | | 10,000 | 6,400 | 9,000 | 9,000 | 1,300 | 1,200 | | | | |
| Arsenic | | 300 | 23 | 18 | 9 | 16 | 15 | | | | |
| Barium | | 2,400 | 1,600 | 3,400 | 300 | 400 | 1,600 | 510 | 1,200 | 2,500 | 5,000 |
| Berylium | | - | - | - | - | - | - | 1 | 1 | - | 2 |
| Boron | | - | - | - | - | - | 6 | - | - | - | 76 |
| Cadmium | | 400 | - | 120 | - | - | - | 7 | 3 | 6 | 70 |
| Calcium | | 11,000 | 14,000 | 11,000 | 5,000 | 1,600 | 6,000 | 7,300 | 72,000 | 6,900 | 19,000 |
| Chromium | | 250 | 400 | 120 | 130 | - | - | 36 | 38 | 50 | 100 |
| Cobalt | | 100 | - | 40 | - | - | - | 9 | 10 | 9 | 50 |
| Copper | | 3,800 | 4,800 | 22,000 | 270 | 160 | 1,000 | 100 | 150 | 1,000 | 44,800 |
| Iron | | 365,000 | 55,000 | 40,000 | 12,000 | 2,400 | 4,300 | 17,500 | 16,200 | 7,000 | 107,000 |
| Lead | | 3,600 | 2,000 | 3,200 | 80 | - | 100 | 43 | 60 | 260 | 2,000 |
| Magnesium | | 4,000 | 2,800 | 5,000 | 2,600 | 1,200 | 1,000 | 4,500 | 4,300 | 380 | 3,700 |
| Manganese | | 120 | 130 | 150 | 60 | 40 | 50 | 260 | 350 | 45 | 280 |
| Mercury | | 30 | 1.7 | 4 | 0.2 | 2 | 2 | | | | |
| Nickel | | 2,500 | 1,700 | 2,400 | 140 | - | - | - | 80 | 130 | 3,000 |
| Phosphorus | | | | | | | | | | 2,000 | 8,900 |
| Potassium | | 1,400 | 1,300 | 1,500 | 2,300 | 850 | 1,200 | 1,800 | 1,200 | 770 | 860 |
| Silver | | | - | - | - | 50 | - | - | - | - | 100 |
| Sodium | | 2,800 | 700 | 1,100 | 360 | 150 | 180 | 110 | 225 | 80 | 1,400 |
| Strontium | | 180 | 140 | 200 | 40 | - | - | 42 | 140 | 50 | 300 |
| Vanadium | | - | - | 150 | - | - | - | 27 | 27 | 13 | 85 |
| Zinc | | 61,000 | 20,000 | 71,000 | 2,500 | - | 300 | 2,000 | 700 | 1,500 | 62,000 |
| PCBs | 5,200 | | | | | | | 1.1 | 80 | 10,000 | 350 |
| Alkylbenzenes | - | | | | | | | - | - | 370 | - |
| Dichlorobenzene | - | | | | | | | - | - | 660 | - |
| Dichlorophenol | - | | | | | | | - | - | 170 | - |
| Hydrocarbons | - | | | | | | | - | - | 21,000 | - |
| Naphthalenes | - | | | | | | | - | - | 650 | - |
| Trichlorobenzene | - | | | | | | | - | - | 78 | - |

NOTE: All results in ppm
Blank indicate parameter not analyzed
- Indicates below detection limits

investigation. In general, inorganic analysis of these samples indicated high levels of several metals in comparison with background conditions (Table B-3, sample x121).

Subsurface soil samples were also collected by IEPA from one location in the northern portion of CS-B during the 1980 investigation. Analyses of samples from boring P-1 are included in Table B-2. Results indicated the presence of PCBs to a depth of seven feet, and other organic contaminants to a depth of three feet. PCB concentrations ranged from 9,200 ppm near the surface to 53 ppm at depths greater than 4 feet and up to 7 feet. Other organic contaminants were detected at concentrations ranging from 12,000 ppm near the surface to 240 ppm at 2.5 feet. These results indicate non-uniform contaminant deposition in the northern portion of CS-B, which is common in riverine systems. The above data indicate that historical release(s) of contaminants to the northern portion of CS-B did occur. However, the horizontal and vertical extent of the resulting contamination has not been fully defined.

Analyses of sediment samples from the southern portion of CS-B are summarized in Table B-3. Sample x121 was taken from soil outside the creek bed to establish background conditions. Samples x107, x122, and x127 contained PCBs at concentrations ranging from 73 to 540 ppm. Sample x122 also showed diclorobenzene (0.35 ppm). This was the only organic contaminant other than PCBs detected in samples from the southern portion of CS-B. Several metals, including arsenic, cadmium, chromium, copper, lead, and zinc, were detected at levels significantly above background concentrations in all samples. However, the metal concentrations were comparable to concentrations detected in samples of sediment taken in the northern portion of CS-B. All of the samples were collected from the creek bed adjacent to, or downstream from Site M, which is an old sand pit excavated by the H.H. Hall Construction Company in approximately 1950. Hazardous materials were not reported to have been disposed of at Site M.

In October, 1980 IEPA and Monsanto Chemical Company cooperatively

TABLE B-2: ANALYSIS OF SUBSURFACE SOIL SAMPLES AT BORING LOCATION P-1 IN CREEK SECTOR B. (COLLECTED BY IEPA 9-8-80)

| PARAMETERS | SAMPLE DEPTH | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0'-1' | 1'-2' | 2'-3' | 3'-4' | 4'-5' | 5'-6 | 6'-7' |
| Biphenyl | 6,000 | 9,000 | 1,100 | | | | |
| Chloronitrobenzene | 200 | 240 | | | | | |
| Dichlorobenzene | 12,000 | 8,900 | 240 | | | | |
| PCBs | 9,200 | 2,600 | 92B-6 | 240 | 53 | 53 | 54 |
| Trichlorobenzene | 380 | 3,700 | 590 | | | | |
| Xylene | 540 | 250 | | | | | |

NOTE: All results in ppm
Blanks indicate below detection limits

TABLE B-3: ANALYSIS OF SOIL SAMPLES IN THE SOUTHERN PORTION OF CREEK SECTOR B (COLLECTED BY IEPA 9-8-80 THROUGH 10-25-80)

| PARAMETERS | SAMPLE LOCATIONS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | x107 | x108 | x109 | x110 | x111 | x112 | x121 | x122 | x127 |
| Aluminum | | 8,000 | 9,100 | 7,000 | 8,000 | 6,600 | | | |
| Arsenic | 6,000 | 44 | 25 | 67 | 80 | 50 | | | |
| Barium | 4,800 | 3,800 | 1,600 | 4,300 | 1,800 | 8,000 | 230 | 5,500 | 2,500 |
| Berylium | - | - | - | - | - | - | - | 2 | 2 |
| Boron | - | - | - | - | - | - | - | - | - |
| Cadmium | 70 | - | 200 | 40 | 100 | 100 | 1 | 35 | 50 |
| Calcium | 11,000 | 10,000 | 24,000 | 16,000 | 13,000 | 30,000 | 11,000 | 15,000 | 8,000 |
| Chromium | 360 | 300 | - | 140 | 50 | 50 | - | 50 | 340 |
| Cobalt | 30 | 30 | 20 | - | - | 30 | 9 | 15 | 30 |
| Copper | 32,000 | 31,000 | 7,700 | 22,000 | 15,000 | 41,000 | 100 | 21,900 | 28,000 |
| Iron | 70,000 | 58,000 | 75,000 | 67,000 | 68,000 | 52,000 | 16,500 | 50,000 | 63,000 |
| Lead | 24,000 | 2,000 | 1,700 | 2,000 | 2,000 | 5,100 | - | 1,700 | 1,700 |
| Magnesium | 2,900 | 3,900 | 3,600 | 4,100 | 4,000 | 4,000 | 5,900 | 3,800 | 2,700 |
| Manganese | 150 | 150 | 300 | 200 | 160 | 300 | 370 | 190 | 150 |
| Mercury | - | 1.7 | 3 | 3.3 | 3.2 | 6 | - | - | - |
| Nickel | 3,500 | 3,000 | 900 | 1,900 | 2,000 | 2,700 | 120 | 1,700 | |
| Phosphorus | 7,040 | - | - | - | - | - | - | - | 4,700 |
| Potassium | 1,200 | 1,500 | 1,700 | 1,300 | 1,600 | 1,200 | 1,500 | 960 | 1,000 |
| Silver | 40 | - | - | - | - | - | - | 30 | 40 |
| Sodium | 1,700 | 900 | 900 | 700 | 1,000 | 1,600 | 80 | 630 | 700 |
| Strontium | 180 | 200 | 130 | 160 | 160 | 430 | 32 | 190 | 130 |
| Vanadium | 60 | - | - | 70 | 100 | - | 25 | 45 | 45 |
| Zinc | 25,000 | 22,000 | 27,000 | 25,000 | 47,000 | 52,000 | 230 | 19,900 | 28,000 |
| PCBs | 120 | - | - | - | - | - | - | 540 | 73 |
| Dichlorobenzene | - | - | - | - | - | - | - | 0.35 | - |

NOTE: All results in ppm
Blanks indicate that parameter not analyzed
- Indicates parameter is below detector limit

collected three sediment samples from CS-B in order to confirm results of earlier sampling done by IEPA. SD-1 was collected from the creek bed 40 yards-south of Queeny Avenue. This location is adjacent to the former Waggoner Company building and also near an old outfall (effluent pipe) from the Midwest Rubber Company. Samples SD-2 and SD-3 were collected approximately 220 yards south of SD-1, in the central portion of CS-B. Results of these samples, including a blank soil sample collected from the Missouri Bottoms in St. Charles, Mo., are presented in Tables B-4 and B-5. PCBs (45-13,000 ppm) were found in all three samples from CS-B, as were several chlorinated benzenes. Chlorinated phenols and phosphate ester were detected in samples SD-1 and SD-3, but were not found in SD-2. The analysis of these samples for inorganic parameters detected generally higher levels of inorganic parameters in SD-2 and SD-3 than those for SD-1 and the soil blank. These results clearly indicate differential contamination in CS-B, with SD-1 showing high levels of PCBs and other organic compounds, whereas SD-2 and SD-3 contained higher levels of metals.

IEPA personnel also collected two sediment samples from CS-B in December, 1982, as part of an area-wide dioxin sampling effort managed by the USEPA which also included Site O. The first sample was collected along the east bank of the creek, approximately 80 yards south of Queeny Avenue. Previous sampling conducted by IEPA in this area had shown high concentrations of PCBs. The second sample was collected along the west bank of the creek, approximately 50 yards south of Queeny Avenue. Both samples were analyzed specifically for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) by a USEPA contract laboratory. The first sample showed a quantified level (0.54 ppb) of TCDD, and the second sample was below the detection limit.

IEPAs Preliminary Hydrogeological Investigation of Dead Creek in 1980 was conducted for the purpose of determining possible sources of pollution observed in CS-B. The study included installation and

TABLE B-4: ORGANIC ANALYSIS OF SEDIMENT SAMPLES FROM DEAD CREEK, SECTOR B (SPLIT SAMPLES-IEPA AND MONSANTO COLLECTED 10-2-80)

| PARAMETERS | SAMPLE LOCATIONS | | | |
|---|---|---|---|---|
| | SD-1 | SD-2 | SD-3 | Blank* |
| CHLOROBENZENES: | | | | |
| Monochlorobenzene | (0.9) | | (0.3) | |
| p-Dichlorobenzene | 370 | (0.3) | (0.4) | |
| o-Dichlorobenzene | 80 | (0.6) | 1 | |
| Trichlorobenzenes | 85 | 1.6 | (0.7) | |
| Tetrachlorobenzenes | 6.1 | 2.4 | (0.4) | |
| Pentacesorobenzene | | | | |
| Hexachlorobenzene | | 1.2 | | |
| Nitrochlorobenzenes | 120 | | | |
| CHLOROPHENOLS: | | | | |
| o-Chlorophenol | 3.7 | | | |
| p-Chlorophenol | 6.6 | | (0.9) | |
| 2,4-Dichlorophenol | 1.2 | | | |
| Pentachlorophenol | 130 | | 1.8 | |
| PHOSPHATE ESTERS: | | | | |
| Dibutylphenyl Phosphate | 330 | | (0.8) | |
| Butyldiphenyl Phosphate | | | (0.8) | |
| Triphenyl Phosphate | 2600 | | | |
| 2-Ethylhexyldiphenyl Phosphate | | | 2.2 | |
| Isodecyldiphenyl Phosphate | | | | |
| T-Butylphenyldiphenyl Phosphate | 28 | | | |
| Di-t-butylphenyldiphenyl Phosphate | | | | |
| Nonylphenyl Diphenyl Phosphate | | | | |
| Cumylphenyldiphenl Phosphate | 3.7 | | | |
| PCBs ($Cl_2$ to $Cl_6$ Homologs) | 13,000 | 240 | 45 | |

NOTE: All values in ppm
*Soil blank collected from Missouri Bottoms, St. Charles, Mo.
Blanks indicate below detection limits
( ) Semi-quantitative values

TABLE B-5: INORGANIC ANALYSIS OF SEDIMENT SAMPLES FROM DEAD CREEK, SECTOR B (SPLIT SAMPLES - IEPA AND MONSANTO COLLECTED 10-2-80)

| | SAMPLE LOCATIONS | | | |
|---|---|---|---|---|
| PARAMETERS | SD-1 | SD-2 | SD-3 | Blank* |
| Aluminum | 1,400 | 5,100 | 5,300 | 5,600 |
| Antimony | 13 | 240 | 160 | 29 |
| Arsenic | 210 | 40 | 55 | 5 |
| Barium | 770 | 1,200 | 1,300 | 130 |
| Beryllium | - | - | - | - |
| Boron | 28 | 160 | 100 | 27 |
| Cadmium | 5.1 | 60 | 55 | 3.9 |
| Calcium | 8,500 | 9,200 | 6,200 | 4,600 |
| Chromium | 25 | 110 | 240 | 19 |
| Cobalt | 15 | 180 | 120 | 33 |
| Copper | 460 | 28,000 | 18,000 | 19 |
| Iron | 4,700 | 53,000 | 30,000 | 9,900 |
| Lead | 180 | 2,000 | 1,600 | 50 |
| Magnesium | 460 | 2,200 | 2,000 | 2,300 |
| Manganese | 29 | 170 | 110 | 510 |
| Molybdenum | 6.1 | 92 | 68 | 11 |
| Nickel | 110 | 2,000 | 1,700 | 39 |
| Phosphorus | 2,500 | 13,000 | 9,400 | 610 |
| Silicon | 73 | 150 | 89 | 110 |
| Silver | - | 42 | 29 | - |
| Sodium | 400 | 540 | 410 | 320 |
| Strontium | 35 | 230 | 110 | 17 |
| Tin | 18 | 260 | 320 | 18 |
| Titanium | 32 | 110 | 80 | 37 |
| Vanadium | 34 | 140 | 130 | 130 |
| Zinc | 280 | 32,000 | 18,000 | 56 |

NOTE: All values in ppm
* Soil blank collected from Missouri Bottoms, St. Charles, MO.
- Indicates below detection limits.

sampling of 12 monitoring wells in addition to the 1980 soil/sediment sampling described above. Residential wells were also sampled to determine ground water quality in the area. Locations of IEPA monitoring wells and residential well samples are shown in Figure B-2. All IEPA wells were screened in the Henry Formation sands, with screened interval elevations ranging between 366 and 402 feet Mean Sea Level. The hydraulic gradient in the vicinity of CS-B is very flat, with ground water flow generally to the west toward the Mississippi River.

Analytical data for three sets of samples from the IEPA monitoring wells, corresponding to three sampling events in 1980 and 1981, are presented in Tables B-6, B-7, and B-8. Well G108 can be considered a background well due to its location upgradient from the known disposal areas around CS-B. Organic contaminants were consistently found in Wells G107 and G112. These wells are in downgradient monitoring positions for sites G and I respectively. Certain organic contaminants were detected in Wells G102, G109 and G110 during the initial sample event, but these wells did not show any of the organics in subsequent samples. Well G102 is located immediately west of the northern portion of CS-B, and near the southeast corner of Site G. Well G109 is located approximately 150 feet west of the former Waggoner surface impoundment (Site L). Well G110 is located downgradient of Site H. PCBs were detected at one time or another in Wells G101, G102, G104, G106, G107, G110, and G112. Of these, only G101 and G102 showed PCBs in all three sets of samples.

Inorganic analyses of samples from the IEPA monitoring wells indicate several parameters at concentrations above background (G108) and water quality standards. Standards for iron, manganese, and phosphorus were exceeded in samples from the background well. Barium, cadmium and lead were detected at concentrations exceeding standards in one or more well(s). In general, wells G109, G110, and G112 showed the most significant inorganic contamination. When compared with data for other wells, G109 contained very high concentrations of arsenic, copper, nickel, and zinc. The pH for G109

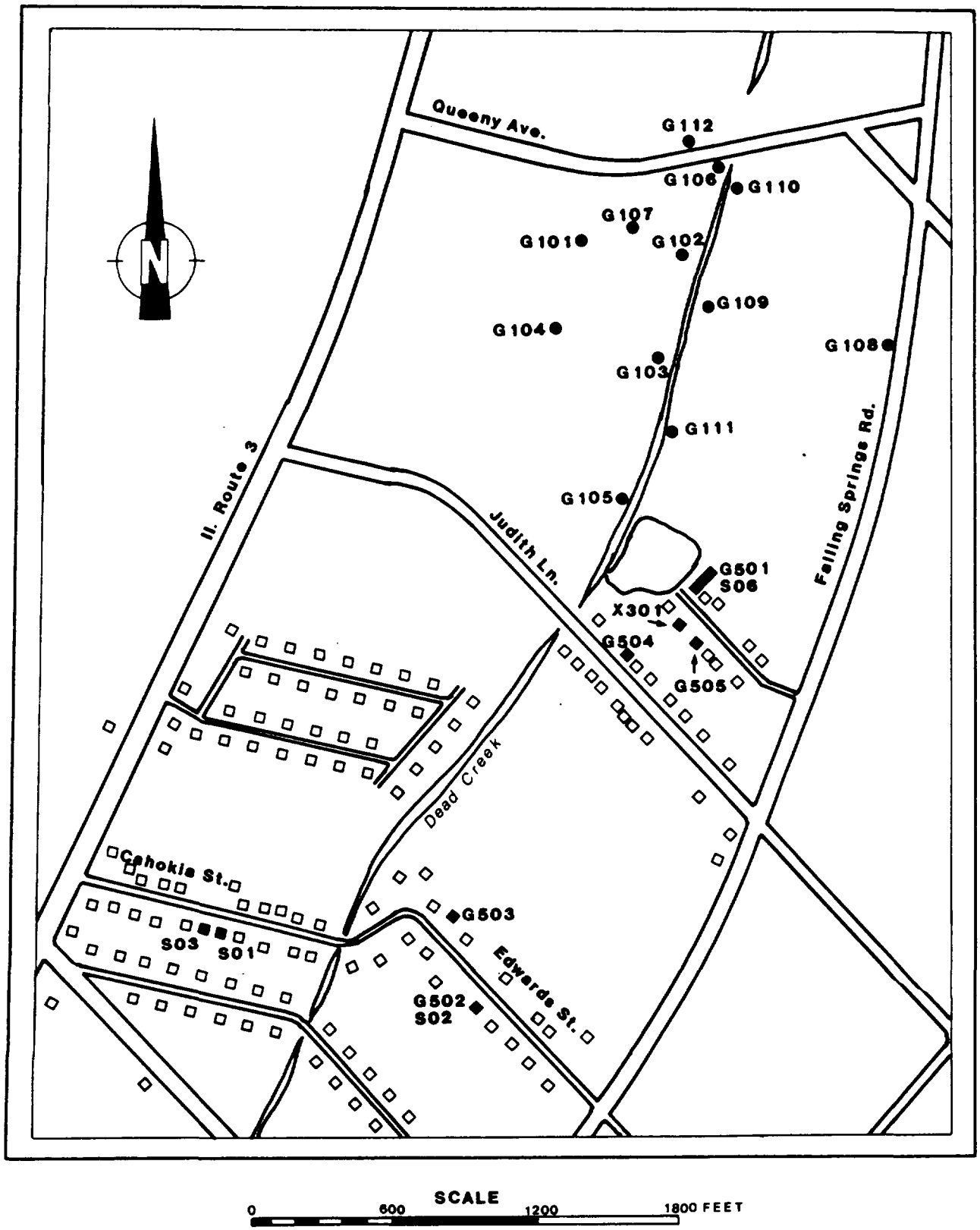



FIGURE B-2
LOCATIONS OF IEPA MONITORING WELLS AND RESIDENTIAL WELLS SAMPLED IN THE VICINITY OF DEAD CREEK

TABLE B-6: ANALYSIS OF GROUNDWATER SAMPLES FROM THE IEPA MONITORING WELLS
(COLLECTED 10-23-80)

| PARAMETERS | SAMPLE LOCATIONS | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | G101 | G102 | G103 | G104 | G105 | G106 | G107 | G108 | G109 | G110 | G111 | G112 |
| Alkalinity | 362 | 410 | 336 | 406 | 271 | 387 | 552 | 375 | 287 | 210 | 302 | 699 |
| Ammonia | 0.3 | 1.0 | 1.7 | 0.4 | 0.9 | 2.9 | 0.5 | 0.3 | 4.5 | 1.2 | 0.1 | 1.5 |
| Arsenic | 0.023 | 0.023 | 0.043 | 0.049 | 0.067 | 0.16 | 0.043 | 0.008 | 0.055 | 0.053 | 0.008 | 0.019 |
| Barium | 1.3 | 0.8 | 2.9 | 2.2 | 2.0 | 0.6 | 2.1 | 0.3 | 0.2 | 0.5 | 0.2 | 0.5 |
| Boron | 0.5 | 0.4 | 0.5 | 0.6 | 0.4 | 0.5 | 0.5 | 0.4 | 0.4 | 0.5 | 0.5 | 5.6 |
| Cadmium | 0.0 | 0.0 | 0.03 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.5 | 0.0 | 0.06 |
| Calcium | 180 | 210 | 210 | 210 | 340 | 185 | 500 | 140 | 380 | 500 | 110 | 242 |
| BOD | 237 | 160 | 244 | 206 | 473 | 115 | 1070 | 298 | 275 | 780 | 79 | 162 |
| Chloride | 48 | 103 | 58 | 52 | 65 | 109 | 132 | 79 | 69 | 61 | 32 | 363 |
| Chromium (Total) | 0.04 | 0.02 | 0.09 | 0.04 | 0.12 | 0.01 | 0.07 | 0.0 | 0.0 | 0.38 | 0.0 | 0.01 |
| Chromium (+6) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Copper | 0.46 | 0.13 | 1.1 | 0.31 | 0.73 | 0.44 | 0.68 | 0.04 | 0.13 | 2.3 | 0.04 | 1.2 |
| Cyanide | | | | | | | | | | | | 0.0 |
| Fluoride | 0.4 | 0.7 | 0.7 | 0.3 | 1.0 | 0.7 | 0.7 | 0.3 | 1.2 | 0.8 | 0.3 | 0.5 |
| Hardness | 501 | 884 | 549 | 630 | 528 | 637 | 777 | 496 | 1664 | 279 | 419 | 1080 |
| Iron | 51.0 | 30.5 | 86 | 90 | 18 | 62 | 13 | 4.1 | 39.0 | 340 | 5 | 18 |
| Lead | 0.10 | 0.15 | 0.26 | 0.2 | 0.31 | 0.0 | 0.27 | 0.0 | 0.0 | 7.3 | 0.07 | 0.44 |
| Magnesium | 0.09 | 90 | 79 | 72 | 100 | 49 | 205 | 24 | 100 | 209 | 24 | 82.5 |
| Manganese | 5.1 | 3.8 | 4.2 | 3.4 | 4.2 | 1.9 | 9.8 | 0.98 | 4.5 | 8.0 | 1.1 | 3.9 |
| Mercury | 0.0 | 0.0 | 0.0002 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0001 | 0.0 | 0.0 | 0.0 | 0.0001 |
| Nickel | 0.1 | 0.1 | 0.9 | 0.1 | 0.8 | 0.1 | 0.3 | 0.0 | 0.5 | 1.9 | 0.0 | 0.3 |
| Nitrate-Nitrite | 0.1 | 0.1 | 0.1 | 0.4 | 0.0 | 0.1 | 0.1 | 1.1 | 0.0 | 0.4 | 0.5 | 0.0 |
| pH | 6.6 | 6.6 | 6.5 | 6.6 | 6.6 | 6.5 | 6.4 | 6.6 | 6.3 | 6.7 | 7.0 | 6.4 |
| Phenolics | 0.0 | .01 | 0.0 | 0.005 | 0.0 | 0.065 | 2.5 | 0.01 | 0.45 | 0.015 | 0.0 | 0.875 |
| Phosphorus | 2.9 | 1.2 | 3.3 | 2.7 | 6.0 | 1.8 | 9.4 | .18 | .72 | 16 | .24 | .69 |
| Potassium | 10.6 | 13.1 | 13.4 | 12.3 | 22 | 7.7 | 15.2 | 13.7 | 14.9 | 29 | 4.9 | 58 |
| R.O.E. | 650 | 1230 | 765 | 790 | 824 | 1020 | 1230 | 704 | 2460 | 508 | 512 | 2130 |
| Selenium | 0.003 | 0.001 | 0.004 | 0.01 | 0.008 | 0.001 | 0.004 | 0.001 | 0.001 | 0.005 | 0.002 | 0.001 |
| Silver | 0.01 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.01 | 0.0 | 0.0 | 0.02 | 0.11 |
| Sodium | 24 | 60 | 40 | 29 | 57 | 96 | | 40 | 40 | 53 | 24 | 260 |
| S.C. | 870 | 1500 | 1050 | 1080 | 1040 | 1340 | 1430 | 960 | 2470 | 720 | 490 | |
| Sulfate | 132 | 434 | 230 | 204 | 296 | 281 | 201 | 103 | 1348 | 93 | 104 | 518 |
| Z | 0.6 | 0.4 | 6.2 | 0.3 | 3.7 | 0.1 | 0.8 | 0.0 | 0.1 | 8.0 | 0.0 | 7.8 |
| PCB (ppb) | 1.0 | 1.2 | - | - | - | - | - | - | - | 2.7 | - | - |
| Chlorophenol (ppb) | - | 1200 | - | - | - | - | 630 | - | 19 | - | - | - |
| Chlorobenzene (ppb) | - | - | - | - | - | - | 19 | - | - | - | - | 100 |
| Dichlorobenzene (ppb) | - | - | - | - | - | - | 25 | - | - | - | - | 65 |
| Dichlorophenol (ppb) | - | - | - | - | - | - | 890 | - | - | - | - | - |
| Cyclohexanone (ppb) | - | - | - | - | - | - | - | - | 120 | 5.9 | - | - |
| Chloroaniline (ppb) | - | - | - | - | - | - | - | - | - | - | - | 3500 |

NOTE: All results in ppm unless otherwise noted.
Blanks indicate parameter not analyzed.
- indicates below detection limits.

TABLE B-7: ANALYSIS OF GROUNDWATER SAMPLES FROM THE IEPA MONITORING WELLS
(COLLECTED 1-28-81)

| PARAMETERS | SAMPLE LOCATIONS | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | G101 | G102 | G103 | G104 | G105 | G106 | G107 | G108 | G109 | G110 | G111 | G112 |
| Alkalinity | 447 | 421 | 266 | 520 | 363 | 556 | 621 | 448 | 18 | 308 | 394 | 619 |
| Ammonia | 0.3 | 0.0 | 1.4 | 0.2 | 0.7 | 3.3 | 1.0 | 0.0 | 17 | 0.2 | 0.1 | 0.5 |
| Arsenic | 0.015 | 0.016 | 0.018 | 0.002 | 0.037 | 0.11 | 0.021 | 0.004 | 7.5 | 0.013 | 0.014 | 0.027 |
| Barium | 0.9 | 1.2 | 0.9 | 0.3 | 1.8 | 1.0 | 3.2 | 0.5 | 0.2 | 1.0 | 0.7 | 0.5 |
| Boron | 0.3 | 0.4 | 0.4 | 0.7 | 0.4 | 0.5 | 0.5 | 0.2 | 0.8 | 0.2 | 0.6 | 0.9 |
| Cadmium | 0.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.00 | 0.00 | 0.00 |
| Calcium | 220.0 | 328.9 | 176.3 | 218.0 | 319.2 | 225.5 | 1169.5 | 205.5 | 466.7 | 169.4 | 181.4 | 198.3 |
| C.O.D. | 45 | 93 | 56 | 9 | 143 | 212 | 635 | 8 | 1315 | 37 | 28 | 47 |
| Chloride | 20 | 128 | 64 | 29 | 59 | 156 | 201 | 76 | 32 | 36 | 18 | 210 |
| Chromium (Total) | 0.02 | 0.02 | 0.02 | 0.00 | 0.03 | 0.00 | 0.09 | 0.00 | 0.04 | 0.02 | 0.02 | 0.00 |
| Copper | 0.59 | 0.79 | 0.36 | 0.14 | 0.43 | 0.29 | 0.97 | 0.00 | 94.1 | 0.11 | 0.04 | 0.28 |
| Cyanide | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| Hardness | 554 | 1072 | 490 | 717 | 764 | 617 | 960 | 564 | 2144 | 447 | 530 | 486 |
| Iron | 30.4 | 16.5 | 20.8 | 1.4 | 60.8 | 67.5 | 172 | 0.3 | 198 | 19.1 | 10.1 | 18.9 |
| Lead | 0.17 | 0.08 | 0.00 | 0.00 | 0.07 | 0.00 | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Magnesium | 48.2 | 78.0 | 46.3 | 49.1 | 73.6 | 49.1 | 288.1 | 34.3 | 184.4 | 43.5 | 37.9 | 54.0 |
| Manganese | 3.02 | 3.15 | 3.07 | 1.41 | 4.10 | 2.13 | 9.64 | 0.34 | 8.30 | 0.77 | 1.76 | 2.78 |
| Mercury | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0004 | 0.0 | 0.0 | 0.0 |
| Nickel | 0.1 | 0.1 | 0.4 | 0.0 | 0.2 | 0.0 | 0.5 | 0.0 | 176 | 0.9 | 0.0 | 0.0 |
| Nitrate-Nitrite | 0.0 | 2.5 | 0.1 | 0.5 | 0.0 | 0.0 | 0.2 | 3.5 | 0.3 | 18 | 0.5 | 0.0 |
| pH | 7.0 | 7.0 | 7.1 | 7.2 | 7.0 | 6.9 | 6.9 | 7.1 | 4.1 | 6.9 | 7.0 | 6.9 |
| Phenolics | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.46 | 0.5 | 0.01 | 1.86 | 0.02 | 0.015 | 0.05 |
| Phosphorus | 0.91 | 0.88 | 0.41 | 0.06 | 3.6 | 2.1 | 10 | 0.03 | 3.7 | 1.0 | 0.51 | 0.53 |
| Potassium | 6.4 | 12 | 8.8 | 6.0 | 13 | 6.2 | 20 | 16 | 18 | 7.5 | 4.2 | 20 |
| Selenium | 0.002 | 0.002 | 0.002 | 0.002 | 0.003 | 0.002 | 0.011 | 0.004 | 0.006 | 0.016 | 0.002 | 0.0 |
| Silver | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Sodium | 13 | 63 | 48 | 15 | 50 | 94 | 60 | 30 | 37 | 13 | 14 | 18 |
| Sulfate | 129 | 583 | 256 | 265 | 468 | 143 | 276 | 86 | 3371 | 57 | 153 | 212 |
| Zinc | 0.3 | 1.2 | 1.8 | 0.1 | 1.5 | 0.1 | 1.5 | 0.0 | 10.1 | 2.0 | 0.1 | 2.8 |
| PCB (ppb) | 0.22 | 3.9 | - | 0.3 | - | - | 0.4 | - | - | - | - | - |
| Chlorobenzene (ppb) | | | | | | | 6.3 | - | - | | | 2.5 |
| Dichlorophenol (ppb) | | | | | | | 560 | - | - | | | - |
| Chloroaniline (ppb) | | | | | | | 90 | - | - | | | 2.1 |

NOTE: All results in ppm unless otherwise noted.
Blanks indicate parameter not analyzed.
- indicates below detection limits.

TABLE B-8: ANALYSIS OF GROUNDWATER SAMPLES FROM THE IEPA MONITORING WELLS
(COLLECTED 3-10-81 - 3-11-81)

SAMPLE LOCATIONS

| PARAMETERS | G101 | G102 | G103 | G104 | G105 | G106 | G107 | G108 | G109 | G110 | G111 | G112 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alkalinity | 463 | 464 | 319 | 568 | 393 | 594 | 657 | 464 | 58 | 331 | 387 | 400 |
| Ammonia | 0.2 | 0.0 | 1.5 | 0.0 | 0.4 | 3.0 | 0.2 | 0.0 | 15 | 0.0 | 0.1 | 0.7 |
| Arsenic | 0.001 | 0.0 | 0.003 | 0.001 | 0.013 | 0.085 | 0.004 | 0.001 | 3.9 | 0.001 | 0.001 | 0.00 |
| Barium | 0.0 | 0.7 | 0.1 | 0.2 | 0.2 | 0.3 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.0 |
| Boron | 0.2 | 0.4 | 0.3 | 0.7 | 0.3 | 0.5 | 0.5 | 0.2 | 0.5 | 0.1 | 0.4 | 3.4 |
| Cadmium | 0.0 | 0.01 | 0.01 | 0.0 | 0.0 | 0.0 | 0.01 | 0.0 | 0.07 | 1.1 | 0.0 | 0.17 |
| Calcium | 154 | 333 | 161 | 205 | 218 | 175 | 186 | 148 | 431 | 121 | 164 | 207 |
| BOD | 10 | 24 | 47 | 9 | 23 | 146 | 47 | 12 | 930 | 10 | 9 | 52 |
| Chloride | 16 | 124 | 46 | 28 | 57 | 150 | 235 | 51 | 24 | 27 | 16 | 133 |
| Chromium (Total) | 0.0 | 0.0 | 0.0 | 0.01 | 0.0 | 0.0 | 0.0 | 0.0 | 0.01 | 0.0 | 0.0 | 0.0 |
| Copper | 0.04 | 0.06 | 0.08 | 0.02 | 0.02 | 0.01 | 0.01 | 0.03 | 67 | 0.02 | 0.07 | 0.48 |
| Cyanide | 0.0 | 0.0 | 0.0 | 0.01 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Hardness | 542 | 1062 | 620 | 839 | 796 | 675 | 1096 | 479 | 1651 | 424 | 485 | 789 |
| Iron | 0.3 | 0.3 | 1.6 | 0.0 | 9.4 | 4.9 | 2.4 | 0.0 | 1.4 | 0.0 | 0.2 | 0.5 |
| Lead | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.06 | 0.0 | 0.0 | 0.0 | 0.0 | 0.07 | 0.0 |
| Magnesium | 34.2 | 77.9 | 41.9 | 56.8 | 47 | 44.8 | 44.8 | 22.3 | 138 | 28.7 | 31.8 | 72 |
| Manganese | 2.0 | 2.98 | 3.51 | 0.61 | 2.32 | 1.62 | 2.12 | 0.23 | 6.22 | 0.14 | 1.02 | 2.1 |
| Mercury | - | - | - | - | - | - | 0.0002 | - | 0.0003 | - | - | - |
| Nickel | 0.0 | 0.3 | 1.1 | 0.0 | 0.2 | 0.0 | 0.0 | 0.1 | 123 | 1.2 | 0.0 | 0.4 |
| Nitrate-Nitrite | 0.0 | 1.1 | 0.0 | 2.3 | 0.0 | 0.0 | 0.0 | 0.3 | 0.3 | 15 | 2.7 | 0.2 |
| pH | 6.9 | 6.8 | 6.8 | 6.9 | 6.8 | 6.7 | 6.7 | 7.0 | 4.6 | 6.6 | 6.8 | 6.6 |
| Phenolics | 0.0 | 0.0 | 0.005 | 0.0 | 0.0 | 0.0 | 1.7 | 0.1 | 1.4 | 0.0 | 0.0 | 0.00 |
| Phosphorus | 0.0 | 0.08 | 0.03 | 0.02 | 0.1 | 1.5 | 0.03 | 0.02 | 2.2 | 0.01 | 0.01 | 0.03 |
| Potassium | 4.0 | 10.8 | 10.4 | 5.9 | 8.9 | 5.7 | 2.8 | 18.2 | 6.4 | 6.3 | 2.9 | 40.2 |
| Selenium | 0.0 | 0.0 | 0.001 | 0.003 | 0.0 | 0.0 | 0.0 | 0.001 | 0.003 | 0.018 | 0.001 | 0.0 |
| Silver | 0.01 | 0.02 | 0.0 | 0.0 | 0.02 | 0.01 | 0.01 | 0.0 | 0.0 | 0.01 | 0.01 | 0.01 |
| Sodium | 11 | 64 | 65.6 | 17.4 | 51.2 | 92.6 | 39.2 | 25.2 | 12.1 | 14.2 | 15.5 | 96.6 |
| Sulfate | 118 | 617 | 471 | 303 | 466 | 146 | 313 | 55 | 2629 | 61 | 147 | 544 |
| Zinc | 0.1 | 0.8 | 2.8 | 0.1 | 0.3 | 0.1 | 0.1 | 0.3 | 6.3 | 1.8 | 0.1 | 11.8 |
| PCB (ppb) | 0.13 | 0.46 | - | 0.1 | - | 2.4 | 0.37 | - | - | 0.9 | - | 2.0 |

NOTE: All results in ppm unless otherwise noted.
Blanks indicate parameter not analyzed.
- indictes below detection limits.

was 6.3, 4.1, and 4.6 during the three sampling events. This indicates an unidentified source was releasing acid to the groundwater. Other wells which exhibited significant inorganic contamination include G102, G103, G105, and G106, all of which are located adjacent to CS-B along the west side. The data indicates non-uniform ground water contamination in the area, likely resulting from a variety of pollutional sources.

Private wells in the area have been periodically sampled by the IEPA and the USEPA. These wells are no longer used for potable water, but they are used for watering lawns and gardens. Locations of private well samples in the Dead Creek area are shown in Figure B-2. IEPA sampled five residential wells and collected one basement seepage sample near Creek Sectors B and C. Analytical data for these samples are presented in Table B-9. G504, located east of CS-B on Judith Lane, exceeded the standard for copper. The wells all showed water quality similar to that found in IEPA monitoring well G108, indicative of background conditions in the area. The basement seepage sample was collected from a residence on Walnut Street, just east of Site M. Analysis of this sample indicated higher levels of barium and copper, when compared with the private well samples. The seepage sample (x301) also showed a measurable level of chlordane, which was likely due to the application of commercial pesticides.

In March, 1982 the USEPA collected ground water samples from four private wells (S01, S02, S03, and S06) and two IEPA monitoring wells (S04 and S05). Ground water samples S04 and S05 correspond to IEPA monitoring wells G102 and G101 respectively. In addition, soil samples (S07 S10, S11) were collected from three gardens where well water is used for watering. Soil Samples S07, S010, and S011 were collected from gardens at the locations of ground water samples S01, S02, and S03 respectively (see Figure B-2 for approximate sample locations). Water and soil blank samples, R09 and R12 respectively, were also collected and analyzed. Analytical data for these samples are presented in Tables B-10 and B-11.

TABLE B-9: ANALYSIS OF RESIDENTIAL WELL AND SEEPAGE SAMPLES COLLECTED BY IEPA

| PARAMETERS | SAMPLE DATES AND LOCATIONS | | | | | |
|---|---|---|---|---|---|---|
| | 9/16/80 G501 | 9/16/80 G502 | 9/16/80 G503 | 9/23/80 G504 | 6/8/83 G505 | 1/5/83 x301 |
| Arsenic | 0.008 | 0.004 | 0.001 | | 0.01 | 0.017 |
| Barium | 0.2 | 0.16 | 0.39 | 0.05 | 0.4 | 1.1 |
| Boron | 0.28 | 0.27 | 0.25 | 0.58 | 0.4 | 0.3 |
| Cadmium | | | | | | |
| Chromium | | | | | | |
| Copper | 0.02 | | | 0.06 | 0.01 | 0.03 |
| Iron | 4.6 | 19 | 17.7 | 0.73 | 26 | 31 |
| Lead | | | | | | 0.03 |
| Magnesium | 33 | 39 | 36 | 30 | 35.3 | 54 |
| Manganese | 1.02 | 1.26 | 0.79 | 0.65 | 1.3 | 1.49 |
| Mercury | | | | 0.0001 | | |
| Nickel | | | | 0.02 | | 0.1 |
| Phosphorus | | | | 0.02 | 0.62 | 1.2 |
| Potassium | 6.6 | 5.7 | 4.5 | 6 | 6.2 | 6.4 |
| Silver | | | | | | |
| Sodium | 21 | 24 | 12 | 26 | 15.2 | 19 |
| Zinc | 0.85 | | 0.18 | 0.8 | | 0.7 |
| PCBs | - | - | - | | | |
| Chlordane (ppb) | - | - | - | - | | 0.13 |

NOTE: All results in ppm unless otherwise noted
Blanks indicate below detection limit
- Indicates parameter not analyzed
Sample x301 was collected from basement seepage

TABLE B-10: ANALYSIS OF IDENTIFIED ORGANICS IN GROUND WATER AND SOIL SAMPLES IN THE VICINITY OF CREEK SECTOR B (COLLECTED BY USEPA 3-3-82)

| | SAMPLE LOCATION | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ground Water | | | | | | | Soil | | | |
| PARAMETERS | S01 | S02 | S03 | S04 | S05 | S06 | R09 | S07 | S010 | S011 | R012 |
| bis(2-ethylhexyl) phthalate | 64 | 62 | | | 19 | a | | | | a | 0.44 |
| di-n-butyl phthalate | a | a | a | a | 11 | a | | | | a | a |
| diethyl phthalate | a | a | a | a | | | a | | | | |
| 3,4 benzofluoranthene | a | | | | | | | | | | |
| benzo(k) fluoranthene | a | | | | | | | | | | |
| butyl benzylphthalate | | | | a | | | a | | | | |
| methylene chloride | 16 | 16 | 2300 | 3100 | 990 | 2000 | 19 | 1 | 0.1 | | 0.75 |
| 1,2-dichlorobenzene | | | | a | | | | | | | |
| 1,4-dichlorobenzene | | | | a | | | | | | | |
| chlorobenzene | | | | a | a | | | | | | |
| heptachlor | | | | 0.11b | 0.146 | | | | | | |
| beta-BHC | | | | 0.18b | 0.3b | 4.04b | | | | | |
| gamma-BHC | | | | 0.16b | 0.25b | | | | | | |
| alpha-BHC | | | | | 0.18b | 0.25b | | | | | |
| aldrin | | | | 0.17b | | | | | | | |
| dieldrin | | | | | | | | 0.012 | | 0.0046 | |
| chlordane | | | | | | | | | 0.11b | | |
| heptachlorepoxide | | | | | | 1.46b | | | | | |
| delta-BHC | | | | | | 0.95b | | | | | |
| fluoranthene | | | | | | | a | | | a | |
| benzo(a) anthracene | | | | | | | a | | | a | |
| anthracene | | | | | | | a | | | | |
| pyrene | | | | | | | a | | | a | |
| Chrysene | | | | | | | | | | a | 0.02b |

NOTE: All results in ppb
Blanks indicate below detection limit
a - Compound detected at value below specified contract detection limit (compound identified as present, but not quantified)
b- value not confirmed by GCMS
Samples R09 and R012 are water and soil blanks, respectively

TABLE B-11: INORGANIC ANALYSIS OF GROUND WATER AND SOIL SAMPLES IN THE VICINITY OF CREEK SECTOR B (COLLECTED BY USEPA 3-3-82)

SAMPLE LOCATIONS

| PARAMETERS | GROUND WATER - in PPB | | | | | | SOIL IN PPM | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | S01 | S02 | S03 | S04 | S05 | S06 | S07 | S010 | S011 | R012 |
| Aluminum | | 400 | 390 | | 940 | 1,200 | 750 | 600 | 430 | |
| Antimony | | | | | | | | | | |
| Arsenic | 11 | | | 29 | | | 1.3 | 1.0 | | |
| Barium | | | | | | | 80 | 80 | 80 | |
| Beryllium | | | | | | | | | | |
| Boron | 10,500 | 11,000 | 8,000 | 1,800 | 140 | 110 | | | | |
| Cadmium | 4.2 | 14 | 31 | 5.3 | | 2.8 | 1.06 | 1.64 | 0.29 | |
| Chromium | 12 | | | | | | 2.2 | | | 3.2 |
| Cobalt | 62 | 70 | 82 | 95 | | | | | | |
| Copper | 65 | | | | | | 16 | 24 | 13 | |
| Iron | 65,000 | 31,000 | 38,000 | 28,000 | 530 | 250 | 340 | 360 | 240 | |
| Lead | 570 | 97 | 74 | 9 | 11 | 10 | (45) | (20) | (25) | |
| Manganese | 1,600 | 1,100 | 1,500 | 5,100 | 460 | 80 | 120 | 630 | 134 | |
| Mercury | | | | | | | | | | |
| Mercury* | 0.1 | 0.4 | 0.4 | 0.2 | 0.1 | | | | | |
| Nickel | | | | | | | 6.5 | 5.5 | 4 | |
| Selenium | | | | | | | | | | |
| Silver | | | | | | | | | | |
| Thallium | | | | | | | | | | |
| Tin | | | | | | | | | 2 | |
| Vanadium | | | | | | | | | | |
| Zinc | 107,000 | 109.000 | 40,000 | 1,900 | 260 | 350 | 96 | 77 | 130 | |

NOTE: Blanks indicate below detection limits
( ) - Results did not meet USEPA Quality Control criteria - Data unreliable
* Duplicate analysis performed by USEPA central regional laboratory
Samples R09 and R012 are water and soil blanks, respectively

Quantified levels of bis-(2-ethylhexyl) phthalate were found in wells S01, S02, and S05. In addition, seven compounds from the pesticide fraction were detected in Wells S04, S05 (IEPA wells), and S06. Diethyl phthalate, butyl benzylphthalate, and methylene chloride were detected in the water blank, indicating that values of these parameters found in other samples should be disregarded. Methylene chloride was used to decontaminate sampling equipment, and concentrations of this parameter in all samples should not be considered indicative of aquifer conditions. Water quality standards for lead and cadmium were exceeded in one or more wells.

The soil samples showed trace levels of chlordane and dieldrin. It could not be determined if levels of pesticides found in the gardens soils were attributable to the use of well water or application of commercial pesticide products to the gardens. Phthalates, methylene chloride, chrysene, and chromium were detected in the soil blank (R012), and these compounds should be disregarded in other samples.

In September and October, 1980 IEPA conducted preliminary air monitoring in CS-B. The survey included use of detector tubes (Drager) for halogenated hydrocarbons, and collection of air samples in charcoal tubes with subsequent laboratory analysis. The detector tubes showed positive readings for hydrocarbons in the northern portion of CS-B, adjacent to the former Waggoner Building. Results were not quantified, and negative readings were observed in all other areas surveyed. Air samples were collected from two locations in CS-B using charcoal tubes and sampling pumps. Two samples were collected from each location in order to monitor conditions for undisturbed and disturbed soil. Samples from the first location, 40 yards south of Queeny Avenue, showed no positive readings for volatile organic compounds (VOCs) for disturbed or undisturbed soil conditions. Xylene was detected for disturbed and undisturbed soil conditions at the second sampling location, which was 60 yards north of Judith Lane, adjacent to Site M. All samples were extracted and analyzed at IEPAs Springfield Laboratory.

A USEPA Field Investigation Team (FIT) contractor also performed an air monitoring survey in the creek bed in March, 1982. This survey involved the use of an organic vapor analyzer (OVA), an HNU photoionizer, and Drager detector tubes for phosgene gas. Results indicated that a small, but measurable, concentration of organic vapors were present in the breathing zone (5 feet above ground surface), with concentrations increasing closer to the creek bed. In the breathing zone, the OVA showed readings up to 0.5 ppm above background, and the HNU readings were as high as 9 ppm above background. The survey crew also observed a 3-inch effluent pipeline adjacent to the former Waggoner Building which was discharging a small stream of oily liquid. OVA and HNU readings were taken approximately 6 inches from the surface where this liquid had pooled. The OVA showed concentrations up to 350 ppm, and the HNU showed concentrations ranging from 400 to 900 ppm in this area. Phosgene gas was not detected in any area using the Drager tubes.

HRS scores have been calculated on two separate occasions for Dead Creek. The creek was first scored in July, 1982, by Ecology & Environment, Inc., with a final migration score of 18.48. The site was again scored in March, 1985 by IEPA in an attempt to increase the previous score. IEPAs assessment led to a final score of 29.23, however, this score has not been finalized by USEPA. Route scores for the 1982 assessment were as follows: ground water 4.24, surface water 7.55, and air 30.77. Corresponding route scores in the 1985 assessment were 5.65, 10.07, and 49.23. Observed releases were used for all route scores in both the 1982 and the 1985 scoring packages. The only difference in the assessments was in the value assigned for waste quantity in the three routes. The 1982 package listed waste quantity as unknown (assigned value - 0), while IEPA calculated an approximate volume of waste based on sample results and visual observations.

A significant amount of data has been developed showing a wide range of contaminants in and around CS-B. Review of existing file data indicates numerous possible sources of contamination in the area.

Prior to blocking the culvert at Queeny Avenue, Cerro Copper and Monsanto Chemical reportedly discharged process wastes directly into the creek. According to past IEPA inspection reports the former Waggoner Company, an industrial waste hauling operation, discharged wash waters from truck cleaning activities directly to CS-B. After IEPA order Waggoner to cease this practice, an unlined surface impoundment was apparently used for disposal of wash water. In the 1940s and 1950s sites H and I were used for disposal of various industrial wastes. These sites were actually a single, large disposal area prior to the construction of Queeny Avenue in the late 1940s. In the 1950s, the Midwest Rubber Company, located west of State Route 50 and south of Queeny Avenue, had an effluent pipeline which ran from their plant location to the northern portion of CS-B. Midwest Rubber Co. reportedly discharged process wastes, including oils and cooling water, to the creek. Site G is a surface/subsurface disposal area with corroded drums and other wastes exposed on the surface. Surface drainage for at least a portion of this site is directed to CS-B.

## Data Assessment and Recommendations

The scope of field investigation work for CS-B during the Dead Creek Project includes collecting three surface water samples from the Creek in Sector B. This sampling program should be sufficient to characterize the water currently in the creek. Soil gas and ambient air monitoring will also be done in and around CS-B.

Although a great deal of data is available for CS-B, most of the data is 4-6 years old. Because of the dynamic nature of the creek and disposal activities in the area, existing conditions may not be accurately characterized by historical sampling data. Feasibility study activities for CS-B could be accomplished using existing data and applying assumptions concerning chemical profiles (contaminant distribution). However, to properly accomplish the feasibility study activities, a current chemical depth profile of the creek bed should be developed. This would consist of collecting

sediment and subsurface soil samples from several locations in the creek bed and along the banks. The hydrology of the area has not been well-defined and should be addressed further. It has not been established whether the ground water discharges to Dead Creek or the creek acts as a recharge conduit for the Henry Formation aquifer. If discharge to the creek is occurring, the subsurface disposal areas (Sites H and I in particular) may be major contributors to the contamination of the creek.

Accordingly, existing IEPA monitoring wells on both sides of the creek should be redeveloped to allow for accurate water level measurements. This, in conjunction with detailed surveying of the creek bed and water levels in the creek, would allow adequate assessment of the hydrology in the area. This would be best accomplished using continuous-recording water level instrumentation, and should be continued over a period of time sufficient to address seasonal fluctuations. In addition, records of industries in the area should be thoroughly reviewed to establish a profile of possible releases from each source.

## SECTORS C THROUGH F - DEAD CREEK

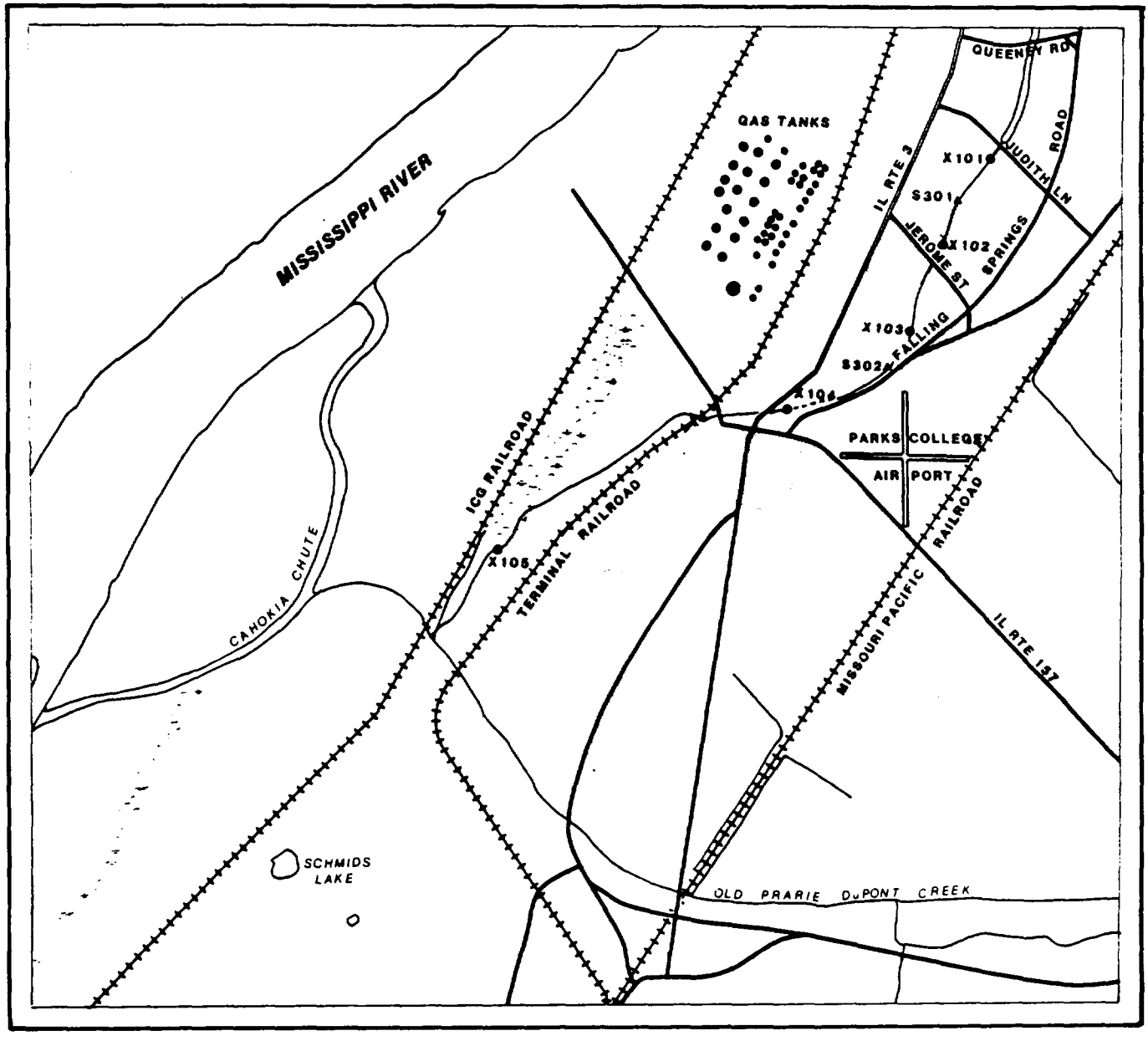
### Site Description

Creek Sectors C through F include the entire length of Dead Creek south of Judith Lane. This portion of the creek flows south-southwest through the Village of Cahokia prior to discharge into the Prairie DuPont floodway. The floodway subsequently discharges into the Cahokia Chute of the Mississippi River. The creek is somewhat wider through these sectors than in sectors A and B, and is not as heavily vegetated as Sector B. Creek Sectors C through F are delineated as follows: CS-C- Judith Lane to Cahokia Street, CS-D - Cahokia Street to Jerome Street, CS-E - Jerome Street to the intersection of State Route 3 and State Route 157, CS-F - intersection (as above) to the discharge point in the old Prairie DuPont Creek.

### Site History and Previous Investigations

There are no known discharges to Dead Creek south of Judith Lane, although several apparent discharge pipes have been observed during preliminary reconnaissance. Site N of the Dead Creek Project is located immediately east of the creek in the southern portion of CS-C. Land use in the vicinity of Sectors C through F is residential/commercial for the most part. The creek flows underground through a culvert in the southern part of CS-E near Parks College. Although the Culvert under Judith Lane has reportedly been blocked, flow emanating from the culvert has been observed on several occasions.

IEPA collected five sediment and two surface water samples from creek Sectors C through F as part of their Preliminary Hydrogeological Study conducted in 1980. Locations of these samples are shown in Figure C-1, and analytical data is presented in Table C-1. The water samples showed very little evidence of contamination, although concentrations of copper exceeded the IEPA's water quality




SCALE

0 0.5 1 MILE

LEGEND

X101 SEDIMENT SAMPLING LOCATION

S301 SURFACE WATER SAMPLING LOCATION

RESIDENTIAL AREA

FIGURE C-1

IEPA SAMPLING LOCATIONS CREEK SECTORS C THROUGH F

TABLE C-1: ANALYSIS OF SURFACE WATER AND SEDIMENT SAMPLES FROM CREEK SECTORS C THROUGH F (COLLECTED BY IEPA 9-25-80)

| | SAMPLE LOCATIONS | | | | | | |
|---|---|---|---|---|---|---|---|
| | Water | | Sediment | | | | |
| PARAMETERS | S301 | S302 | x101 | x102 | x103 | x104 | x105 |
| Aluminum | | | 12,000 | | | | |
| Arsenic | 0.008 | 0.006 | 26 | | | | |
| Barium | 0.12 | 0.08 | 1,300 | 4,700 | 210 | 390 | 475 |
| Berylium | - | - | - | 3 | - | 2 | - |
| Boron | 0.06 | 0.04 | - | 76 | - | - | - |
| Cadmium | - | - | - | 50 | 8 | 31 | 2 |
| Calcium | | | 24,000 | 5,300 | 210,000 | 16,000 | 13,000 |
| Chromium | - | 0.01 | 400 | 50 | 60 | 50 | - |
| Cobalt | | | 40 | 32 | 6 | 8 | 9 |
| Copper | 0.26 | 0.04 | 15,000 | 17,200 | 320 | 1,800 | 360 |
| Iron | 0.66 | 0.87 | 57,000 | 110,000 | 11,000 | 19,000 | 18,000 |
| Lead | - | - | 800 | 1,300 | 260 | 250 | 75 |
| Magnesium | 3 | 2 | 7,100 | 2,000 | 10,000 | 5,100 | 3,300 |
| Manganese | 0.03 | 0.12 | 600 | 170 | 210 | 160 | 200 |
| Mercury | | | 1.2 | | | | |
| Nickel | 0.05 | 0.01 | 2,000 | 2,300 | 45 | 600 | - |
| Phosphorus | 0.19 | 0.2 | | 6,200 | 720 | 1,200 | 4,200 |
| Potassium | 6.6 | 3.3 | 2,400 | 900 | 1,400 | 2,100 | 1,400 |
| Silver | - | - | - | 45 | 10 | - | - |
| Sodium | 3 | 3 | 800 | 1,100 | 100 | 190 | 125 |
| Strontium | 0.08 | 0.07 | 100 | 140 | 210 | 47 | 43 |
| Vanadium | - | - | - | 50 | 22 | 31 | 35 |
| Zinc | 0.24 | - | 12,000 | 21,000 | 900 | 5,600 | 780 |
| PCB | - | - | 0.12 | 0.12 | 2.8 | 2 | - |

NOTE: All results in ppm.
Blanks indicate parameter not analyzed.
- Indicates below detection limits.

standard in both samples. This was the only parameter in either sample which exceeded the standards.

The sediment samples contained relatively high concentrations of cadmium, chromium, copper, lead, nickel, and zinc. Concentrations of these parameters were several times higher than those found in the background soil sample in the IEPA study (sample x121; see Creek Sector B, Table B-3). Arsenic was also detected in sample x101, but was not analyzed for in the other downstream samples. The highest concentrations of aluminum (12,000 ppm) and boron (76 ppm) in the IEPA study were found in downstream sediment samples x101 and x102, respectively. PCB was the only organic compound detected in the downstream sediment samples, with the highest concentration (2.8 ppm) found in x103. Sample x105 was the only downstream sample that did not contain PCBs. These results illustrate the uneven distribution of contaminants within Dead Creek. While some contaminants in Sectors C through F are lower than in CS-B, barium, cadmium, chromium, lead, and nickel were detected in comparable or higher concentrations than sediments in upstream samples. This could be attributable to the mechanical properties of stream flow, such as gradient, channel dimensions, and flow velocity, or to the existence of unknown contaminant sources located in downstream areas.

## Data Assessment and Recommendations

The scope of work for these sectors of the creek during the Dead Creek project includes collecting the following samples: CS-C, 2 surface water, 2 sediment; CS-D, 1 surface water, 2 sediment; CS-E, 3 surface water, 10 sediment; and CS-F, 4 surface water, 10 sediment. The sampling in CS-F will be postponed, pending review of data from the other creek sectors. A soil gas survey and ambient air monitoring will also be conducted in and around Creek Sectors C through E.

For Creek Sectors C through F, waste characterization for the feasibility study activities could be completed with sampling as

proposed provided assumptions regarding chemical profiles are made. However, in order to accurately estimate waste quantities and define to what depth contamination has occurred, a more detailed sampling program is necessary. This would include developing a depth profile of chemical constituents in the creek bed. Cores should be taken from upstream and downstream locations, with additional sampling at point sources as necessary.

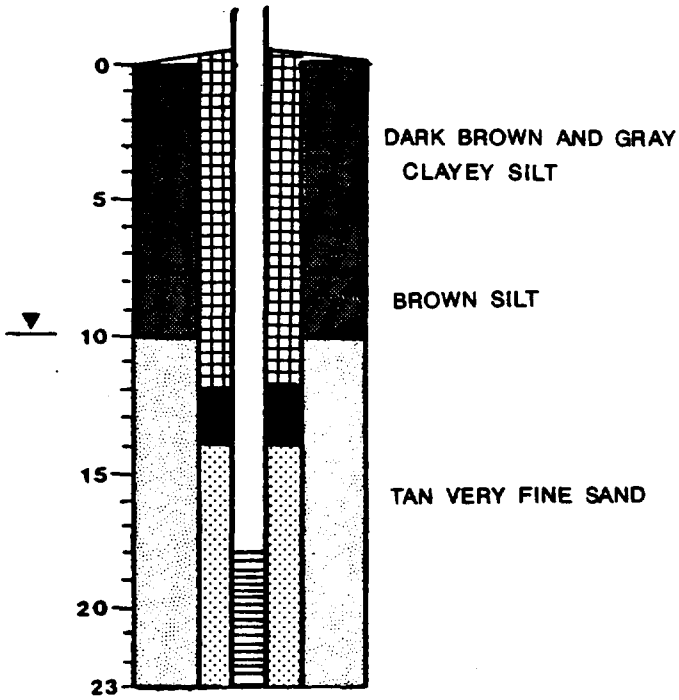
# APPENDIX B

## BORING LOGS AND MONITORING WELL DATA

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-25-87
Prepared by Kevin Phillips

Depth (ft) Description

EE-G101




(IEPA well replaced)
Boring/Well No. EE-G101
Location Site G
Owner IEPA
Top of Inner Casing Elev. 412.35
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/25, 2/25/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 23 ft.
Casing and Screen Diam. 2 in.
Screen Interval 18 - 23 ft.
Screen Type stainless steel 0.01" slot
Stickup 2.51 ft.
Well Type monitoring
Well Construction:
Filter Pack 22.5 - 14 ft.
Seal 14 - 12 ft.
Grout 12 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 396.86 Date 3-26-87
Static Water Elev. 398.22 Date 5-11-87
Slug Test Yes X No
Test Date 5-12-87
Hydraulic Conductivity 1.3 x 10 cm/sec
Other pH = 7.0
Cond. = 1600 umhos Temp. = 58° F
Cloudy, yellowish

**WATER QUALITY**

Samples Taken Yes X No
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-17-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes No X
Recipient

Comments

**REMARKS**

Site Dead Creek Site-G

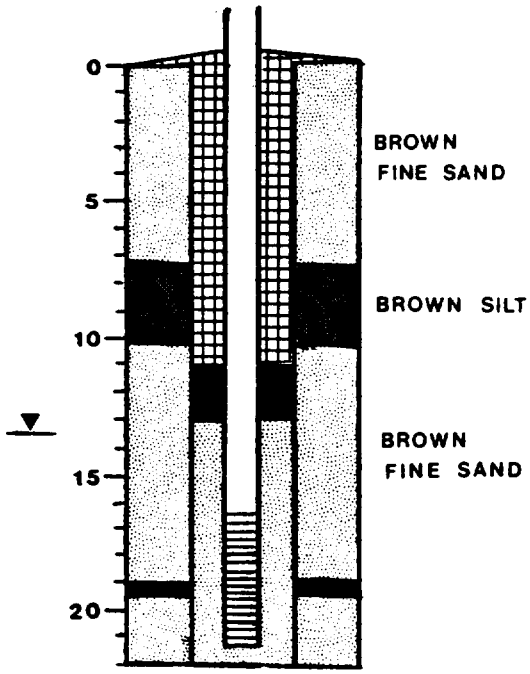
Boring/Well No. Well #EE-G101
IEPA replacement well

| Sample | Depth | Blow Count | Description |
|---|---|---|---|
| | | | Straight drill boring.<br><br>Stratigraphic sequence description taken from IEPA report (April 1981) log for monitoring well G-101 boring no. B-1 (10-8-80).<br><br>0-7.5' Dark brown and gray clayey SILT. Trace of natural organics.<br><br>7.5-10' Brown micaceous SILT.<br>Water level @ 9.5'.<br><br>10-15' Tan very fine grain SAND. Arenitic; moderately sorted to rounded. Contains ferro-magnesian minerals.<br><br>15-32' Tan fine to coarse grain SAND. Arkosic, moderately rounded, poorly sorted, contains ferro-magnesian minerals with some medium gravel.<br><br>E.O.B. @ 23 ft. (for replacement well #EEG101) |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-26-87
Prepared by Kevin Phillips

Depth (ft) Description

EE-G 102




(IEPA well replaced)
Boring/Well No. EE-G102
Location Site G
Owner IEPA
Top of Inner Casing Elev. 409.10
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/26, 2/26/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 21.5 ft.
Casing and Screen Diam. 2 in.
Screen Interval 16.5 - 21.5 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.22 ft.
Well Type monitoring
Well Construction:
Filter Pack 22 - 13 ft. Natural
Seal 13 - 11 ft.
Grout 11 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 397.37 Date 3-26-87
Static Water Elev. 398.57 Date 5-11-87
Slug Test Yes X No
Test Date 5-12-87
Hydraulic Conductivity 1.4 x 10 cm/sec
Other pH = 6.8
Cond. = 1000 umhos Temp. = 56° F
Clear to yellowish

**WATER QUALITY**

Samples Taken Yes X No
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-24-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes No X
Recipient

Comments

**REMARKS**

IEPA well

**Site** Dead Creek Site-G

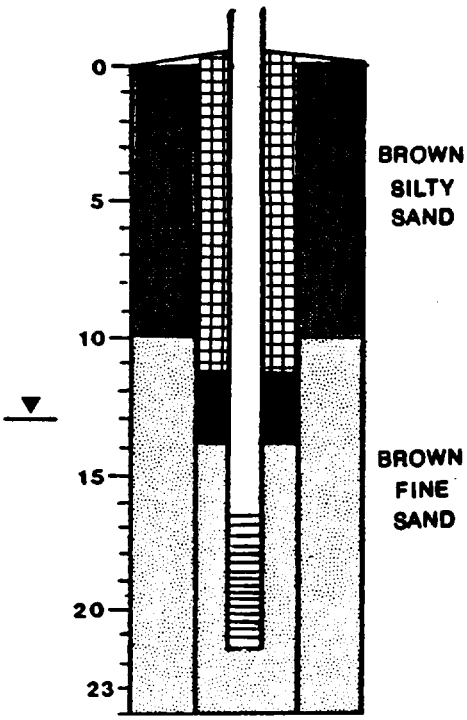
**Boring/Well No.** Well #EE-G102 (replacement well for IEPA G-102)

| Sample Depth | Blow Count | Description |
|---|---|---|
| 3.5 - 5 | 2-3-5 | 0-5 Loose brown silty fine grain SAND. Trace to little silt. Moist. |
| 8.5 - 10 | 2-2-4 | Loose brown sandy SILT. Some fine grain sand. Very moist. |
| 13.5 - 15 | 2-3-5 | Loose brown fine grain SAND. Well sorted and rounded to sub-rounded. Wet. |
| 18.5 - 20 | 1-2-4 | 18.5-19 Gray silty fine grain SAND. Wet.<br>19'-19'10" - Gray very sandy SILT. Wet.<br>19'10"-20' - Gray very silty fine grain SAND. Wet.<br>20-21.5" - Gray fine, coarse grain sand (from IEPA log).<br><br>E.O.B. @ 21.5' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-26-87
Prepared by Kevin Phillips

Depth (ft) Description

EE-G103




(IEPA well replaced)
Boring/Well No. EE-G103
Location Site G
Owner IEPA
Top of Inner Casing Elev. 408.74
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/26, 2/26/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 23.5 ft.
Casing and Screen Diam. 2 in.
Screen Interval 16.5 - 21.5 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.08 ft.
Well Type monitoring
Well Construction:
Filter Pack 22 - 14 ft. Natural
Seal 14 - 11.5 ft.
Grout 11.5 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 397.43 Date 3-26-87
Static Water Elev. 398.57 Date 5-11-87
Slug Test Yes ____ No X
Test Date
Hydraulic Conductivity
Other pH = 5.2
Cond. = 1200 umhos Temp. = 56° F
Cloudy, yellowish

**WATER QUALITY**

Samples Taken Yes X No ____
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-17-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes ____ No X
Recipient

Comments

**REMARKS**

Site Dead Creek Site-G

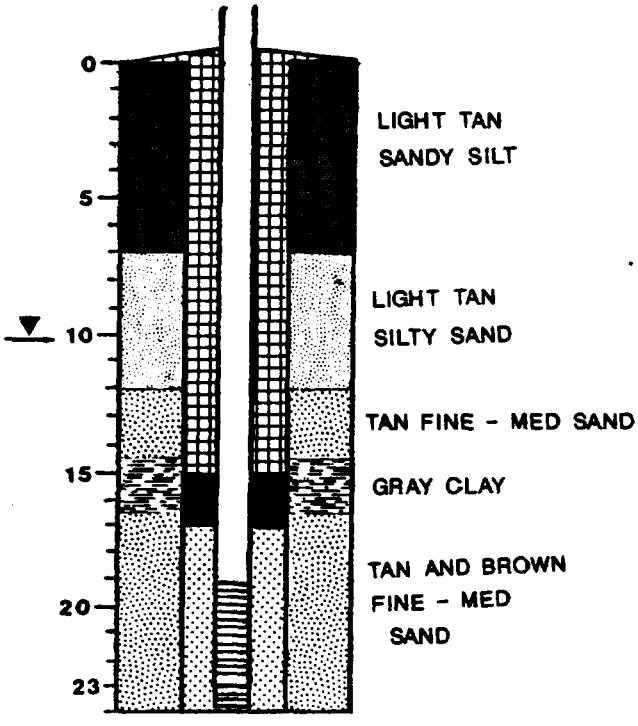
Boring/Well No. Well #EE-G103

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Straight drill to 8.5'. |
| | | Stratigraphic sequence based on auger cuttings. |
| 8.5 - 10 | 7-9-10 | 0-10 Firm brown very silty fine grain SAND. Some silt. Sand is well sorted and rounded to sub-rounded. Moist. |
| 13.5 - 15 | 5-17-12 | Firm brown fine grain SAND. Well sorted. Some black stained stringers throughout. Wet. Slight chemical odor. |
| 18.5 - 20 | 1-2-3 | Loose brown fine grain SAND. Well sorted and rounded. Trace of natural organic layers and wood particles. Wet. |
| 22 - 23.5 | 5-9-9 | Firm brown fine grain SAND. Trace of medium grain sand and small gravel. |
| | | E.O.B. @ 23.5'. |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-25-87
Prepared by Kevin Phillips

Depth (ft) Description

EE-G104




(IEPA well replaced)
Boring/Well No. EE-G104
Location Site G
Owner IEPA
Top of Inner Casing Elev. 408.96
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/25, 2/25/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 24 ft.
Casing and Screen Diam. 2 in.
Screen Interval 19 - 24 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.09 ft.
Well Type monitoring
Well Construction:
Filter Pack 24 - 17 ft.
Seal 17 - 15 ft.
Grout 15 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 397.01 Date 3-26-87
Static Water Elev. 398.24 Date 5-11-87
Slug Test Yes ____ No X
Test Date
Hydraulic Conductivity
Other pH = 6.5
Cond. = 1000 umhos Temp. = 54° F

**WATER QUALITY**

Samples Taken Yes X No ____
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-17-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes ____ No X
Recipient

Comments

**REMARKS**

Site Dead Creek Site-G

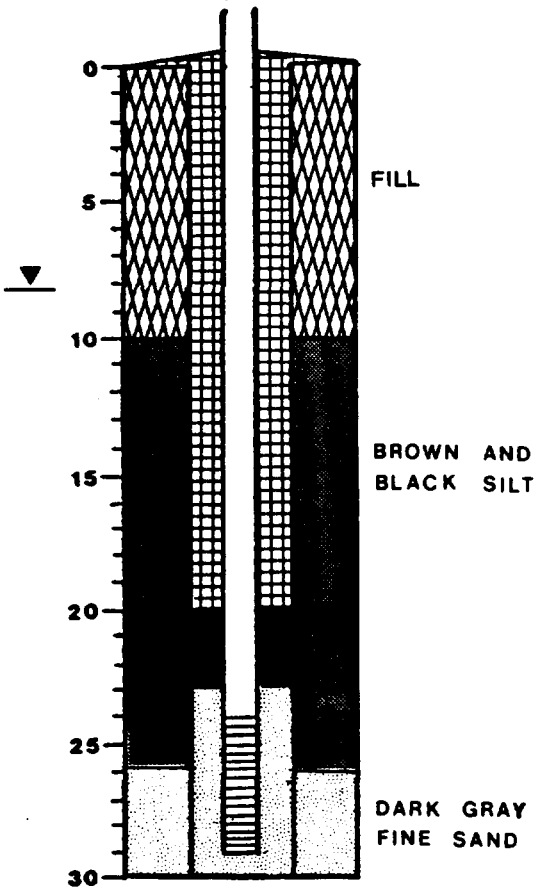
Boring/Well No. Well #EE-G104

| Sample | Depth | Blow Count | Description |
|---|---|---|---|
| | | | Straight drill boring.<br><br>Stratigraphic sequence description taken from IEPA report (April, 1981) log for monitoring well G-104 boring no. B-4 (10-9-80).<br><br>0-7 Light tan sandy SILT. Trace of clay.<br>7 - 12 Light tan silty SAND. Micaceous.<br>12-14.5 Tan fine to medium grain SAND. Arkosic.<br>14.5-16.5 Gray silty CLAY.<br>16.5-37.5 Tan and brown fine to medium grain SAND. Arkosic. Poorly sorted. Subrounded. Trace of small gravel.<br><br>E.O.B. @ 24' (for replacement well # EEG 104) |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 3-2-87
Prepared by Kevin Phillips

Depth (ft) Description

EE-G108




(IEPA well replaced)
Boring/Well No. EE-G108
Location Site G
Owner IEPA
Top of Inner Casing Elev. 407.21
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 3/2/87,3/2/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D.
hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 30 ft.
Casing and Screen Diam. 2 in.
Screen Interval 24 - 29 ft.
Screen Type stainless steel 0.01" slot
Stickup 0.93 ft.
Well Type monitoring
Well Construction:
Filter Pack 29 - 22 ft.
Seal 22 - 20 ft.
Grout 20 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 397.96 Date 3-26-87
Static Water Elev. 398.85 Date 5-11-87
Slug Test Yes ____ No X
Test Date
Hydraulic Conductivity
Other pH = 5.4
Cond. = 1800 umhos Temp. = 56° F
Clear to cloudy No odor

**WATER QUALITY**

Samples Taken Yes X No ____
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-18-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes X No ____
Recipient Enviropact

Comments

**REMARKS**

Site Dead Creek

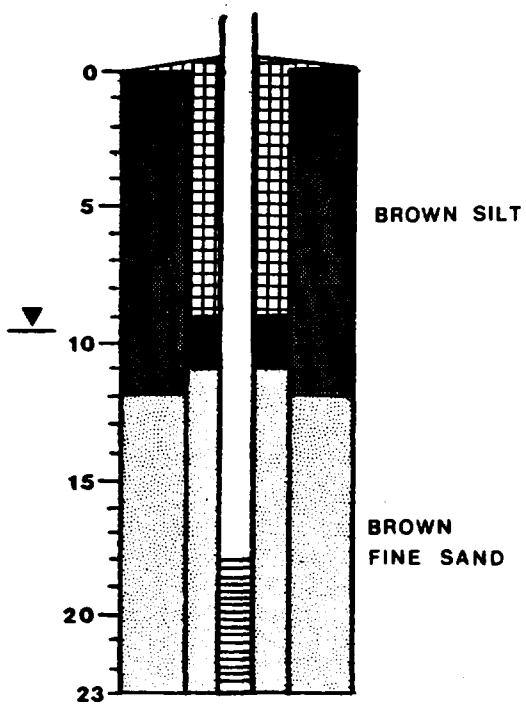
Boring/Well No. Well #EE-G108
(replacement well for IEPA G-108)

| Sample | Depth | Blow Count | Description |
|---|---|---|---|
| | | | Straight drill to 23.5' |
| | | | Stratigraphy sequence based on auger cuttings. |
| | | | 0-10 FILL consisting of brown-black very silty CLAY. |
| | | | 10-23.5 Brown clayey SILT. |
| | | | 23.5-25 Black very sandy SILT. Some fine grain sand. Very moist. |
| | | | 28.5-30 Black to dark gray silty fine SAND. Well sorted. Wet. |
| | | | E.O.B. @ 30'. |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 12-18-86
Prepared by Tim Maley

Depth (ft) Description

EE-G110




(IEPA well replaced)
Boring/Well No. EE-G110
Location Site G
Owner IEPA
Top of Inner Casing Elev. 409.00
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 12/18,12/18/86
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 23.0 ft.
Casing and Screen Diam. 2 in.
Screen Interval 18 - 23 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.82 ft.
Well Type monitoring
Well Construction:
Filter Pack 23 - 11 ft. Natural
Seal 11 - 9 ft.
Grout 9 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 397.49 Date 3-26-87
Static Water Elev. 398.52 Date 5-11-87
Slug Test Yes X No
Test Date 5-13-87
Hydraulic Conductivity 5.3 x 10 cm/sec
Other pH = 6.8
Cond. = 1200 umhos Temp. = 58° F
Clear to yellowish

**WATER QUALITY**

Samples Taken Yes X No
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-24-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes No X
Recipient

Comments

**REMARKS**

Site Dead Creek Site-G

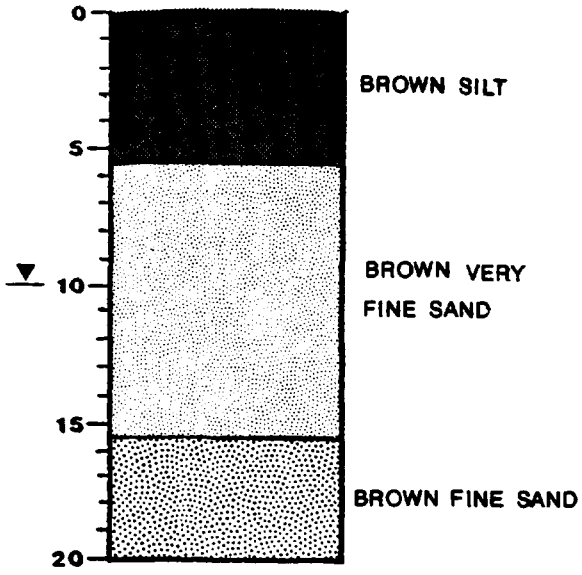
Boring/Well No. Well #EE-G110
IEPA replacement well

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Straight drill to 13.5'. |
| | | Stratigraphic sequence based on auger cuttings. |
| | | 0 to 1' black topsoil. |
| | | 1 to 12' brown sandy SILT |
| | | Begin sampling at 13.5'. |
| 13.5 - 15 | 3-7-6 | Brown silty SAND. Wet. |
| 18.5 - 20 | 3-4-5 | Brown to gray fine to medium grain SAND. Wet. |
| | | E.O.B. @ 23' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-12-87
Prepared by Tim Maley

Depth (ft) Description

G - 1




Boring/Well No. G-1
Location Site G
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/12, 1/12/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 20.0 ft.
Casing and Screen Diam. ____
Screen Interval ____
Screen Type ____
Stickup ____
Well Type ____
Well Construction:
Filter Pack ____
Seal ____
Grout ____
Lock No. ____

**TEST DATA**

Static Water Elev. ____ Date ____
Static Water Elev. ____ Date ____
Slug Test Yes ____ No ____
Test Date ____
Hydraulic Conductivity ____
Other ____

**WATER QUALITY**

Samples Taken Yes ____ No X
No. of Samples ____
Types of Samples ____

Date Sampled ____
Samplers ____
Samples Analyzed for ____

Split Samples Yes ____ No X
Recipient ____

Comments Subsurface soil samples from boring 0 - 10' and 10 - 20' analyzed for HSL compounds.

**REMARKS**

Ground elev. 407.31

Site Dead Creek Site-G

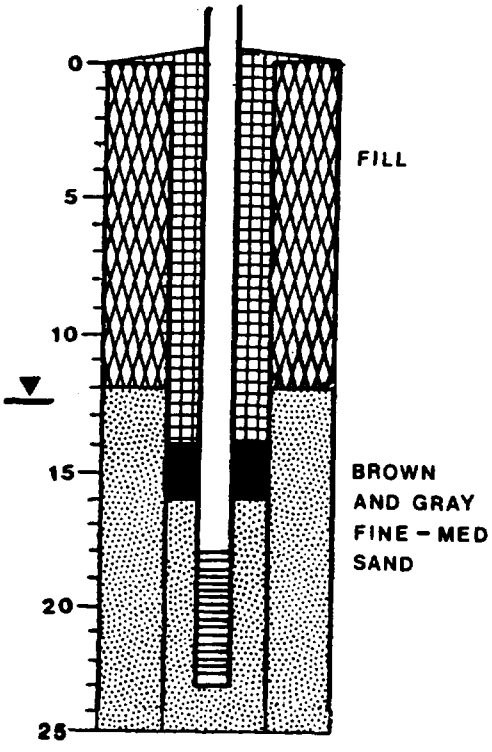
Boring/Well No. G-1

| Sample Depth | Blow Count | Description |
|---|---|---|
| 1 - 2.5 | 2-1-1 | Brown SILT. Trace of fine grain sand (dry). |
| 3.5 - 5 | 1-2-2 | Same as above. |
| 6 - 7.5 | 1-1-1 | Brown very fine grain SAND. Trace of silt (wet @ 7'). |
| 8.5 - 10 | 1-1-1 | Same as above. Trace of rust and gray coloring among brown very fine grain sand (wet). |
| 11 - 12.5 | 1-2-3 | Brown very fine grain SAND. Increasingly siltier (wet). |
| 13.5 - 15 | 6-4-8 | Same as above. |
| 16 - 17.5 | 2-7-6 | Brown fine grain SAND (wet). |
| 18.5 - 20 | 4-11-12 | Same as above. |
| | | E.O.B. @ 20'<br>Water level @ completion approx. 10'. |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-14-87
Prepared by Tim Maley

Depth (ft) Description

EE-05




Boring/Well No. G-2/EE-05
Location Site G
Owner IEPA
Top of Inner Casing Elev. 411.36
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/14, 1/14/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 25 ft.
Casing and Screen Diam. 2 in.
Screen Interval 18 - 23 ft.
Screen Type stainless steel 0.01" slot
Stickup 2.3 ft.
Well Type monitoring
Well Construction:
Filter Pack 23 - 16 ft.
Seal 16 - 14 ft.
Grout 14 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 396.69 Date 3-26-87
Static Water Elev. 398.17 Date 5-11-87
Slug Test Yes ____ No X
Test Date
Hydraulic Conductivity
Other pH = 5.2
Cond. = 2200 umhos Temp. = 56° F

**WATER QUALITY**

Samples Taken Yes X No ____
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-18-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes X No ____
Recipient Enviropact

Comments Subsurface soil sample from boring 5 - 15' analyzed for HSL compounds.

**REMARKS**

Slight organic odor

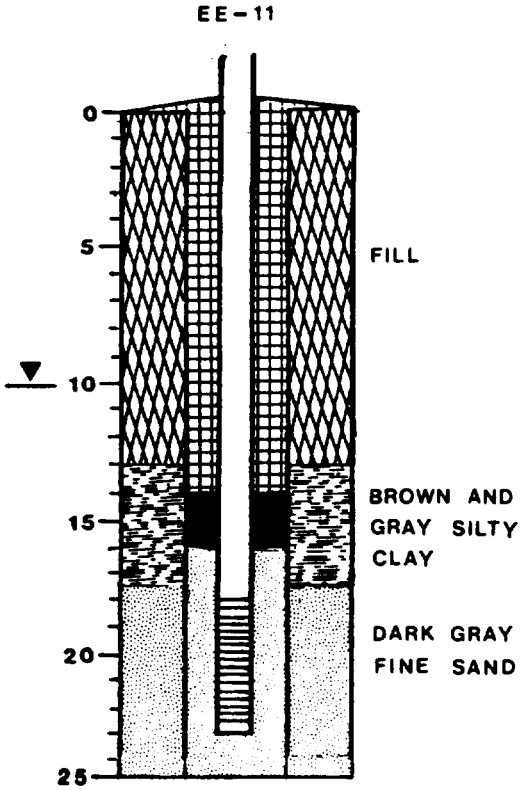
Site Dead Creek Site-G

Boring/Well No. G-2/Well #EE-05

| Sample Depth | Blow Count | Description |
|---|---|---|
| 1 - 2.5 | 3-15-6 | FILL consisting of black sandy CLAY with a variety of debris materials including slag, wood, crushed limestone, gravel, and iron fragments (dry). |
| 3.5 - 5 | 3-5-3 | FILL same as above (dry). |
| 6 - 7.5 | 1-1-1 | FILL consisting of brown silty CLAY. Trace of coarse grain sand and paper products (dry). |
| 8.5 - 10 | 1-0-1 | FILL consisting of light gray silty CLAY. Trace of asphalt and a purple paint-like residue substance (dry). |
| 11 - 12.5 | 1-3-5 | FILL (to 12 feet) consisting of dark brown silty CLAY. From 12 feet is gray medium grain sand (moist). |
| 13.5 - 15 | 3-4-5 | Brown-gray medium grain SAND (wet). |
| 16 - 17.5 | 2-5-10 | Brown fine grain SAND. Trace of silt (wet). |
| 18.5 - 20 | 1-1-5 | Same as above. With less silt. |
| 23.5 - 25 | 7-14-18 | Gray fine grain SAND. Trace of silt (wet). |
| | | E.O.B. @ 25 |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-26-87
Prepared by Tim Maley

Depth (ft) Description




Boring/Well No. G-3/EE-11
Location Site G
Owner IEPA
Top of Inner Casing Elev. 409.02
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/26-1/26/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 25 ft.
Casing and Screen Diam. 2 in.
Screen Interval 18 - 23 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.57 ft.
Well Type monitoring
Well Construction:
Filter Pack 23 - 16 ft.
Seal 16 - 14 ft.
Grout 14 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 397.04 Date 3-26-87
Static Water Elev. 398.26 Date 5-11-87
Slug Test Yes ____ No X
Test Date
Hydraulic Conductivity
Other pH = 7.2
Cond. = 7000 umhos Temp. = 56° F
Brown to black

**WATER QUALITY**

Samples Taken Yes X No ____
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-24-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes X No ____
Recipient Sverdrup, Inc. for Cerro Copper

Comments Subsurface soil samples from boring 10' - 20' analyzed for HSL compounds.

**REMARKS**

Slight organic odor

Site Dead Creek Site-G

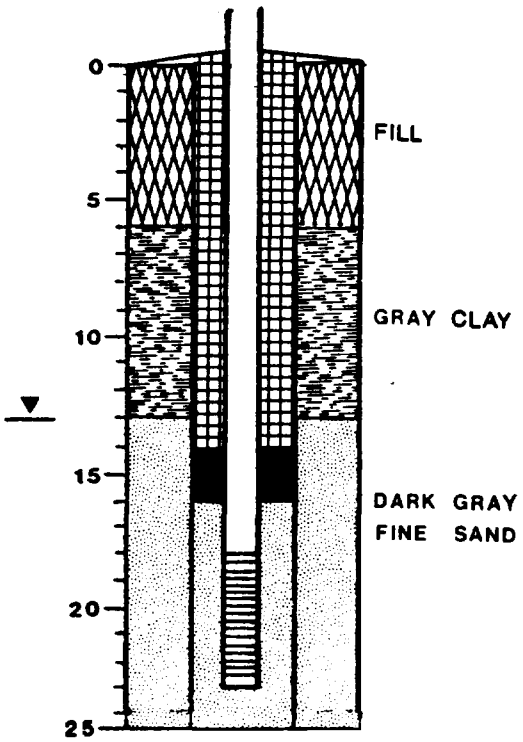
Boring/Well No. G-3/Well #EE-11

| Sample Depth | Blow Count | Description |
|---|---|---|
| 1 - 2.5 | 8-10-11 | FILL consisting of brown-black (mottled) silty CLAY. Trace of medium grain sand and wood particles (dry). |
| 3.5 - 5 | 1-0-6 | FILL consisting of dark brown silty CLAY. Trace of fine grain sand and wood particles (moist). |
| 6 - 7.5 | 6-5-8 | FILL consisting of brown-gray-black sandy CLAY. Trace of slag, coarse grain sand, gravel, and wood particles (moist). |
| 8.5 - 10 | 7-8-11 | FILL consisting of black silty CLAY. Trace of slag, coarse sand, and limestone fragments (moist). |
| 11 - 12.5 | 2-3-3 | FILL consisting of brown-gray silty CLAY. Trace of fine grain sand and wood particles (moist). |
| | | FILL discontinues @ approx. 13'. |
| 13.5 - 15 | 1-2-3 | Brown-gray silty CLAY. Trace of fine grain sand (moist). |
| 16 - 17.5 | 1-2-2 | Same as above. (tip of spoon showed gray fine grain sand, moist to wet). |
| 18.5 - 20 | 0-0-1 | Dark gray fine grain SAND (wet). |
| 21 - 22.5 | 0-4-8 | Dark gray very fine grain SAND. Increasingly siltier (wet). |
| 23.5 - 25 | 4-5-6 | Dark gray fine grain SAND. Trace of coarse grain sand and small gravel. Some black staining @ 25'. (wet). |
| | | E.O.B @ 25' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-27-87
Prepared by Tim Maley

Depth (ft) Description

EE-G106




(IEPA well replaced)
Boring/Well No. G-4/EE-G106
Location Site G
Owner IEPA
Top of Inner Casing Elev. 407.97
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/26, 1/27/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 25 ft.
Casing and Screen Diam. 2 in.
Screen Interval 18 - 23 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.44 ft.
Well Type monitoring
Well Construction:
Filter Pack 23 - 16 ft. Natural
Seal 16 - 14 ft.
Grout 14 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 397.40 Date 3-26-87
Static Water Elev. 398.52 Date 5-11-87
Slug Test Yes ____ No X
Test Date
Hydraulic Conductivity
Other pH = 7.4
Cond. = 4200 umhos Temp. = 58° F
Dark, cloudy Strong organic odor

**WATER QUALITY**

Samples Taken Yes X No ____
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-24-87
Samplers E & E
Samples Analyzed for HSL compounds, volatile organics

Split Samples Yes ____ No X
Recipient

Comments Subsurface soil samples from boring 5 - 20' analyzed for HSL compounds.

**REMARKS**

Site Dead Creek Site-G

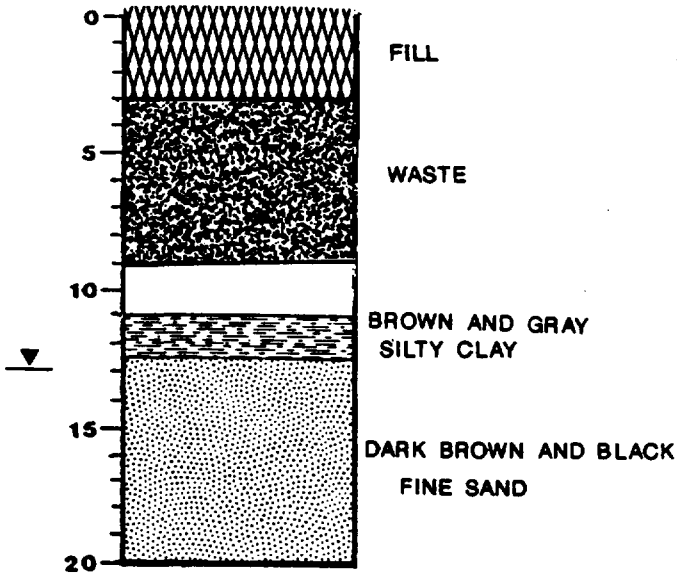
Boring/Well No. G-4/well #EE-G106
(IEPA replacement well)

| Sample Depth | Blow Count | Description |
|---|---|---|
| 1 - 2.5 | 15-7-9 | FILL 0-1.5' Black sandy CLAY<br>1.5-2' Crushed limestone<br>From 2' Gray silty clay. Trace of fine grain sand (dry). |
| 3.5 - 5 | 1-2-2 | FILL consisting of brown-black (mottled) silty CLAY. Trace of rust color and fine grain sand (dry). FILL discontinues @ approx. 6'. |
| 6 - 7.5 | 1-0-2 | Gray silty CLAY. Trace of very fine grain sand (moist). |
| 8.5 - 10 | 1-2-2 | Same as above with increased moisture and very fine grain sand. |
| 11 - 12.5 | 1-2-2 | Same as above. Some black staining at 12'. |
| 13.5 - 15 | 1-2-5 | Dark gray very fine grain SAND. Trace of silt and black staining (wet). |
| 16 - 17.5 | 0-1-3 | Black fine grain SAND (stained). Light and dark laminated banding of black staining (wet). |
| 18.5 - 20 | 1-2-5 | Dark gray fine grain SAND (wet). |
| 21 - 22.5 | 4-9-8 | Black fine grain SAND. Trace of silt (wet). |
| 23.5 - 25 | 7-13-21 | Gray fine grain SAND (wet). |
| | | E.O.B. @ 25' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-27-87
Prepared by Tim Maley

Depth (ft) Description

G – 5




Boring/Well No. G-5
Location Site G
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/27, 1/27/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 20.0 ft.
Casing and Screen Diam. ____
Screen Interval ____
Screen Type ____
Stickup ____
Well Type ____
Well Construction:
Filter Pack ____
Seal ____
Grout ____
Lock No. ____

**TEST DATA**

Static Water Elev. ____ Date ____
Static Water Elev. ____ Date ____
Slug Test Yes ____ No ____
Test Date ____
Hydraulic Conductivity ____
Other ____

**WATER QUALITY**

Samples Taken Yes ____ No X
No. of Samples ____
Types of Samples ____

Date Sampled ____
Samplers ____
Samples Analyzed for ____

Split Samples Yes ____ No X
Recipient ____

Comments Subsurface soil samples from boring 5 - 15' analyzed for HSL compounds.

**REMARKS**

Ground elev. 408.02

Site Dead Creek Site-G

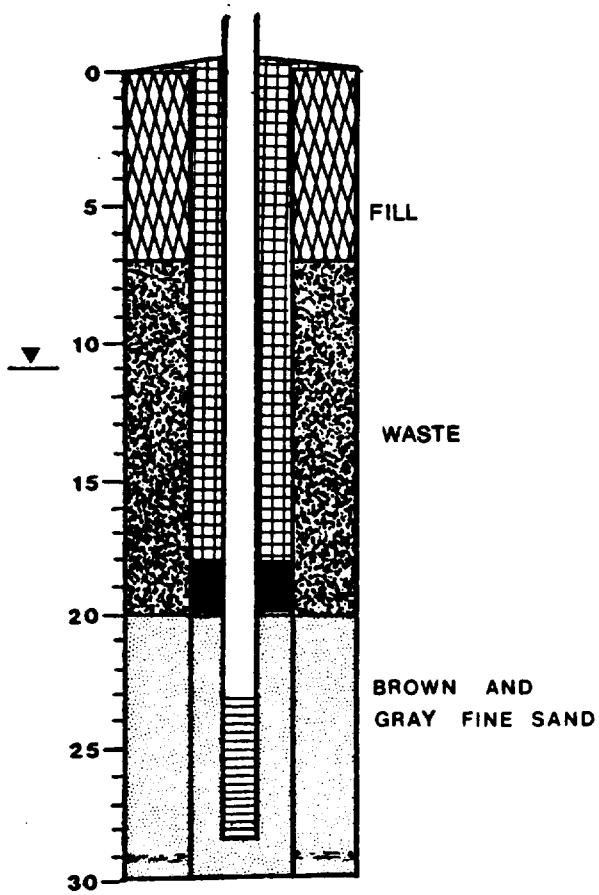
Boring/Well No. G-5

| Sample Depth | Blow Count | Description |
|---|---|---|
| 1 - 2.5 | 4-2-2 | FILL consisting of brown-black silty CLAY with a variety of debris including wood particles, coarse grain sand, yellow clay-like substance. |
| 3.5 - 5 | 1-2-2 | WASTE. CLAY and SAND with black tar-like substance. Moist. |
| 6 - 7.5 | 21-12-5 | No recovery. Black stained wood in tip of spoon. (wet) |
| 8.5 - 10 | 4-5-9 | WASTE consisting of brown-gray silty CLAY. Trace of wood particles and black staining. (wet) |
| | | WASTE discontinues @ approx. 9.0'. |
| 11 - 12.5 | 4-7-8 | Dark brown-gray silty CLAY. Trace of black staining and thin fine grain seams @ 12'. |
| 13.5 - 15 | 2-5-6 | Dark brown fine grain SAND. Trace of black staining and silt. (wet) |
| 16 - 17.5 | 2-6-7 | Black fine grain SAND. (wet) |
| 18.5 - 20 | 2-6-9 | Same as above. (wet) Thinly laminated with black staining. |
| | | E.O.B. @ 20' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-23-87
Prepared by Kevin Phillips

Depth (ft) Description

EE-G107




(IEPA well replaced)
Boring/Well No. G-6/EE-G107
Location Site G
Owner IEPA
Top of Inner Casing Elev. 406.67
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/23, 2/23/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D.
hollow stem augers, Rotary

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 30 ft.
Casing and Screen Diam. 2 in.
Screen Interval 23 - 28 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.12 ft.
Well Type monitoring
Well Construction:
Filter Pack 28 - 23 ft.
Seal 20 - 18 ft.
Grout 18 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 397.15 Date 3-26-87
Static Water Elev. 398.32 Date 5-11-87
Slug Test Yes ____ No X
Test Date
Hydraulic Conductivity
Other pH = 4.8
Cond. = 3600 umhos Temp. = 62° F

**WATER QUALITY**

Samples Taken Yes X No ____
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-18-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes X No ____
Recipient Enviropact

Comments

**REMARKS**

Site Dead Creek Site-G

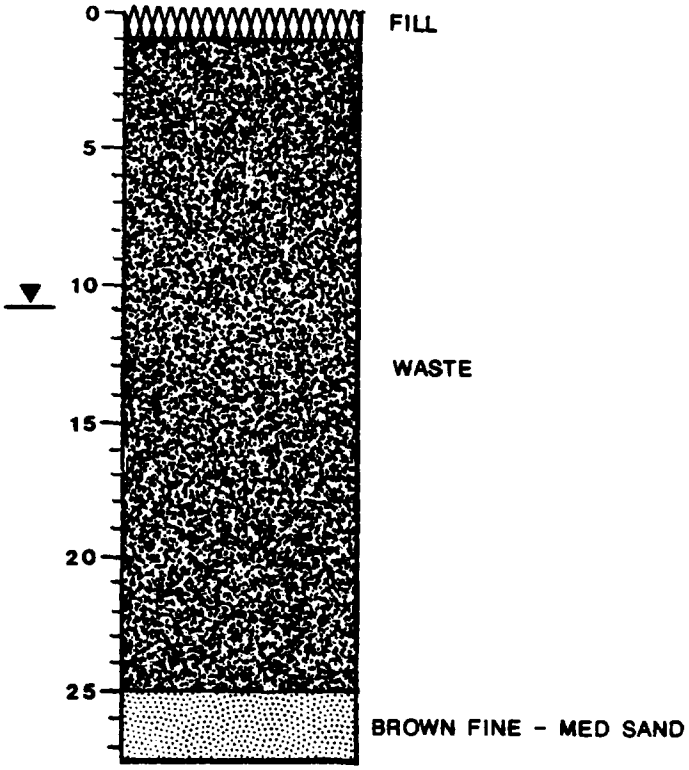
Boring/Well No. G-6/well #EE-G107
(IEPA Replacement well)

| Sample Depth | Blow Count | Description |
|---|---|---|
| 0 - 2.5 | 15-3-5 | FILL consisting of loose fine to medium grain SAND. Trace of medium gravel, slag, and wood particles. (moist) |
| 3.5 - 5 | 1-1-2 | No recovery. Possible void in fill/debris material. |
| 6 - 7.5 | 11-14-7 | FILL consisting of various debris including wood particles, rubber, sand, and gravel. (moist) |
| 8.5 - 10 | 2-3-24 | WASTE consisting of black flaky material. Shale-like and fissile. (dry) |
| 11 - 12.5 | 5-1-2 | WASTE - same as above. (wet) |
| 13.5 - 15 | 3-2-1 | WASTE consisting of small to medium crushed gravel and cloth products. (wet) |
| 16 - 17.5 | 1-1-1 | WASTE - same as above with paper products. (wet) |
| 18.5 - 20 | 1-1-1 | WASTE consisting of black silty sludge. Some glass fragments and gravel. (wet)<br>WASTE discontinues @ approx. 20'. |
| 21 - 22.5 | 1-2-2 | Brown-gray silty fine grain SAND. Well sorted and well rounded. 3 inch varved sandy silt layer in tip of spoon, sample stained throughout (wet). |
| 23.5 - 25 | 1-3-3 | Same as above. Obvious staining throughout sample. Soft gray silty organic clay layer @ 24'-24'3". (wet) |
| 28.5 - 30 | 8-12-12 | 28.5'-29' Brown fine grain SAND. Trace of silt. (wet)<br>29'-29'2" Gray very silty organic CLAY. Trace of fine grain sand.<br>29'2"-30' Black stained fine to medium grain SAND. Well sorted and well rounded. (wet)<br><br>E.O.B. @ 30' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-24-87
Prepared by Kevin Phillips

Depth (ft) Description

G - 7




Boring/Well No. G-7
Location Site G
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/24, 2/24/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 27.5 ft.
Casing and Screen Diam. ____
Screen Interval ____
Screen Type ____
Stickup ____
Well Type ____
Well Construction:
Filter Pack ____
Seal ____
Grout ____
Lock No. ____

**TEST DATA**

Static Water Elev. ____ Date ____
Static Water Elev. ____ Date ____
Slug Test Yes ____ No ____
Test Date ____
Hydraulic Conductivity ____
Other ____

**WATER QUALITY**

Samples Taken Yes ____ No X
No. of Samples ____
Types of Samples ____

Date Sampled ____
Samplers ____
Samples Analyzed for ____

Split Samples Yes ____ No X
Recipient ____

Comments Subsurface soil samples from boring 10 - 25' analyzed for HSL compounds.

**REMARKS**

Ground elev. 407.13

Site Dead Creek Site-G

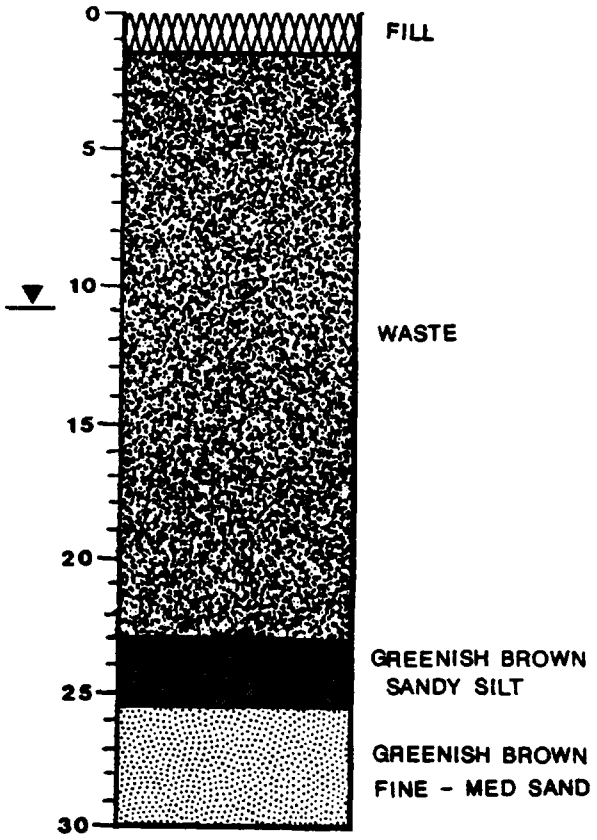
Boring/Well No. G-7

| Sample Depth | Blow Count | Description |
|---|---|---|
| 0 - 2.5 | 30-50/2 | WASTE consisting of reddish-brown and black mottled silty CLAY. Some small gravel. Trace of fine to medium grain sand, brick, wood, concrete, and large gravel. (dry) |
| 3.5 - 5 | 6-3-4 | WASTE - Brick, large gravel, concrete, medium sand. (dry) |
| 6 - 7.5 | 8-2-2 | WASTE 6'-7' Same as above<br>7'-7.5' Black silt-like sludge. Trace of wood chips. (moist) |
| 8.5 - 10 | 4-10-10 | WASTE 8.5'-9.5' Black silty-like sludge. Some fine grain sand. (very moist)<br>9.5'-10' Brown silty clay. Some fine grain sand. Trace of black staining. (moist) |
| 11 - 12.5 | 1-1-7 | WASTE Black material including oily stained paper and wood products. (wet) |
| 13.5 - 15 | 6-0-1 | WASTE - same as above. |
| 16 - 17.5 | 7-8-8 | No recovery - fill including paper products. |
| 18.5 - 20 | 3-1-1 | WASTE consisting of black (stained) fine grain SAND. Trace of paper products and wood. Very loose. (wet) |
| 21 - 22.5 | 8-7-5 | WASTE - same as above. |
| 23.5 - 25 | 5-4-21 | WASTE - consisting of black oily sandy material including paper and wood products. (wet) FILL discontinues @ approx. 25'. |
| 26 - 27.5 | 8-7-7 | Brown fine to medium grain SAND. Well rounded and well sorted. Wood fibers @ 26.5-27'. (wet)<br><br>E.O.B. @ 27.5' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-24-87
Prepared by Kevin Phillips

Depth (ft) Description

G - 8




Boring/Well No. G-8
Location Site G
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/24, 2/24/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 30.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

**TEST DATA**

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No X
Test Date
Hydraulic Conductivity
Other

**WATER QUALITY**

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples Yes No X
Recipient

Comments Subsurface soil samples from boring 10 - 20' analyzed for HSL compounds.

**REMARKS**

Ground elev. 406.57

Site Dead Creek Site-G

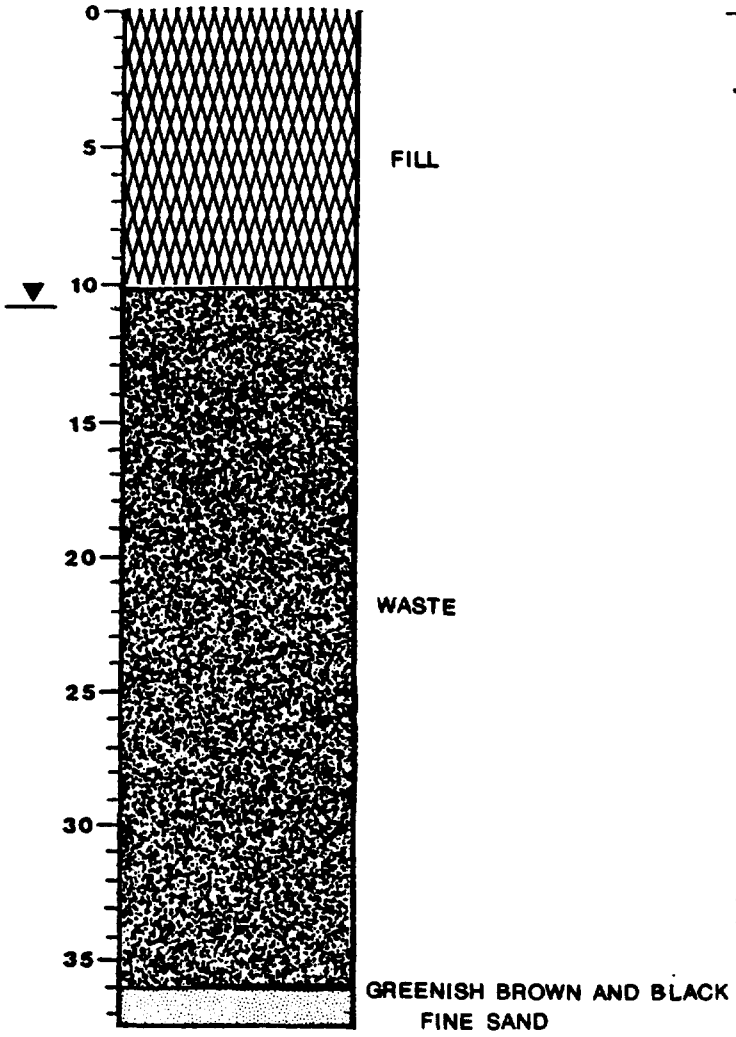
Boring/Well No. G-8

| Sample Depth | Blow Count | Description |
|---|---|---|
| 0 - 2.5 | 5-10-15 | FILL 0-1.5 Brown silty CLAY. Some fine grain sand, brick, and glass fragments.<br>WASTE 1.5-2.5 Black (oily stained) silty CLAY. Some paper products and glass fragments. (moist) |
| 3.5 - 5 | 5-9-3 | WASTE consisting of gray silty CLAY. Some crushed gravel and wood. Black stained sandy layers @ 3.5-4'. (moist) |
| 6 - 7.5 | 2-3-2 | WASTE consisting of black (stained) silty CLAY and small gravel. (moist) |
| 8.5 - 10 | 2-1-0 | WASTE consisting of black (stained) oily CLAY. Some small gravel and and medium grain sand. (very moist) |
| 11 - 12.5 | 1-3-5 | WASTE consisting of black (heavily stained) oily material. Mottled with with white chalky material. (wet) |
| 13.5 - 15 | 3-50/3 | WASTE consisting of black oily sludge-like material including wood. |
| 16 - 17.5 | 7-12-9 | WASTE - Black stained compacted cardboard, paper, and wood. (wet) |
| 18.5 - 20 | 3-14-31 | WASTE - Black sludge and compacted waste, metal and wood (wet). |
| 21 - 22.5 | 4-3-0 | WASTE - same as above.<br>WASTE discontinues @ approx. 23'. |
| 23.5 - 25 | 2-2-2 | Greenish-brown sandy SILT. Some black staining. (wet) |
| 26 - 27.5 | 3-5-7 | Greenish-brown fine grain SAND. Some black staining. Oily sheen. (wet) |
| 28.5 - 30 | 1-4-9 | Brown fine to medium grain SAND. Some black staining. (wet) |
| | | E.O.B. @ 30' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-24-87
Prepared by Kevin Phillips

Depth (ft) Description

G - 9




Boring/Well No. G-9
Location Site G
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/24, 2/24/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

'ole Diam. 8 in.
oring Depth 37.5 ft.
asing and Screen Diam. ____
creen Interval ____
creen Type ____
tickup ____
ell Type ____
ell Construction:
Filter Pack ____
Seal ____
Grout ____
Lock No. ____

**TEST DATA**

tatic Water Elev. ____ Date ____
tatic Water Elev. ____ Date ____
lug Test Yes ____ No ____
est Date ____
ydraulic Conductivity ____
ther ____

**WATER QUALITY**

amples Taken Yes ____ No X
o. of Samples ____
ypes of Samples ____

ate Sampled ____
amplers ____
amples Analyzed for ____

plit Samples Yes ____ No X
ecipient ____

omments Subsurface soil samples from boring 35 - 40' analyzed for HSL compounds.

**REMARKS**

Ground elev. 407.70

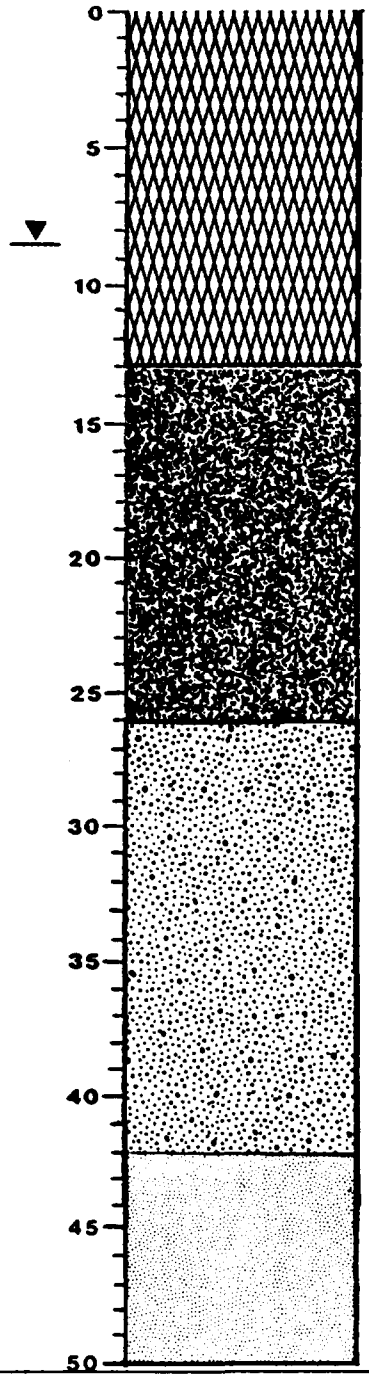
Site Dead Creek Site-G  Boring/Well No. G-9

| Sample Depth | Blow Count | Description |
|---|---|---|
| 0 - 2.5 | 3-5-5 | FILL consisting of black and reddish brown silty CLAY. Trace of small gravel. (moist) |
| 3.5 - 5 | 3-6-6 | FILL (uncompacted) consisting of brown silty CLAY with some medium grain sand and small to medium gravel. |
| 6 - 7.5 | 3-1-1 | 1" recovery of uncompacted fill. |
| 8.5 - 10 | 6-2-2 | Little recovery - still in uncompacted fill material including wood chips. |
| 11 - 12.5 | 1-0-0 | WASTE consisting of black fiberous material with pink grease-like glo bules. (wet) Pink globules float on water. |
| 13.5 - 15 | 1-2-2 | WASTE consisting of black sludge-like material including wood chips. (moist) |
| 16 - 17.5 | 4-5-6 | WASTE 16'-17 1/4' Black oily sludge material including small spherical beads. (approx BB. size) (wet)<br>17 1/4'-17 1/2' Gray sandy silt. Some black staining. (wet) |
| 18.5 - 20 | 5-7-9 | WASTE consisting of black (oily stained) sandy sludge. Some fiberous cloth products. (wet) |
| 21 - 22.5 | 5-2-2 | WASTE consisting of black (oily stained) sandy sludge including cardboard, wood, small spherical beads, paper products, and a thick peanut butter like substance @ 27'. (wet) |
| 23.5 - 25 | 3-7-24 | WASTE - Black paper, cardboard, and wood. (wet) |
| 26 - 27.5 | 4-7-9 | WASTE - Black sludge and wood fibers. Black fine sand in tip. |
| 28.5 - 30 | 10-50/4 | WASTE - same as above with metal banding. |
| 31 - 32.5 | 7-10-14 | WASTE - Black stained wood particles. |
| 33.5 - 35 | 3-2-8 | WASTE - Black sludge.<br>WASTE discontinues @ approx. 36'. |
| 36 - 37.5 | 8-15-12 | Greenish brown-black (stained) oily fine grain SAND. Well sorted and well rounded. (wet)<br><br>E.O.B. @ 37.5'. |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 12-18-86
Prepared by Tim Maley

Depth (ft) Description

H – 1




Boring/Well No. H-1
Location Site H
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 12-18-86
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers and rotary

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 50.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

**TEST DATA**

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

**WATER QUALITY**

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples Yes No X
Recipient

Comments Subsurface soil samples from boring 15 - 25' and 35 - 50' analyzed for HSL compounds.

**REMARKS**

Strong organic odor

Ground elev. 407.29

Site Dead Creek Site-H  Boring/Well No. H-1

| Sample Depth | Blow Count | Description |
|---|---|---|
| 1 - 2.5 | 3-3-8 | FILL consisting of black sandy CLAY with some brick and crushed limestone fragments (dry). |
| 3.5 - 5 | 1-3-2 | FILL consisting of brown-black silty CLAY. Trace of small to large gravel and medium grain sand (dry). |
| 6 - 7.5 | 16-5-4 | FILL same as above. Some black asphalt-like substance at 6'. |
| 8.5 - 10 | 12-7-6 | FILL consisting of brown fine to medium grain sand and small gravel. Some crushed limestone fragments. (wet). |
| 11 - 12.5 | 4-4-5 | FILL same as above. (wet) |
| 13.5 - 15 | 2-2-1 | WASTE - Broken glass and wood. |
| 16 - 17.5 | 5-8-22 | WASTE - same as above (wet). |
| 18.5 - 20 | 8-10-15 | WASTE - consisting of black (oily stained) sludge-like material including various debris such as concrete, rubber, paper products, wood chips, and small gravel. (wet). |
| 21 - 22.5 | 4-8-6 | WASTE - same as above. |
| 23.5 - 25 | 4-10-8 | WASTE - same as above. |
| | | WASTE discontinues @ approx. 26'. |
| 26 - 27.5 | 1-1-1 | Black (stained) medium to coarse grain SAND. Trace of small gravel. (wet) |
| 28.5 - 30 | 10-14-16 | Same as above. |
| 31 - 32.5 | 6-8-10 | Same as above with increased amount of small to large gravel. |
| 33.5 - 35 | 15-17-21 | Same as above with less black staining and less gravel. |
| 36 - 37.5 | 10-13-16 | Same black (stained) medium to coarse grain SAND. Decreasing amount of gravel. (wet) |
| 38.5 - 40 | 8-11-10 | Black (stained) medium grain SAND. (wet) |

Site Dead Creek Site-H

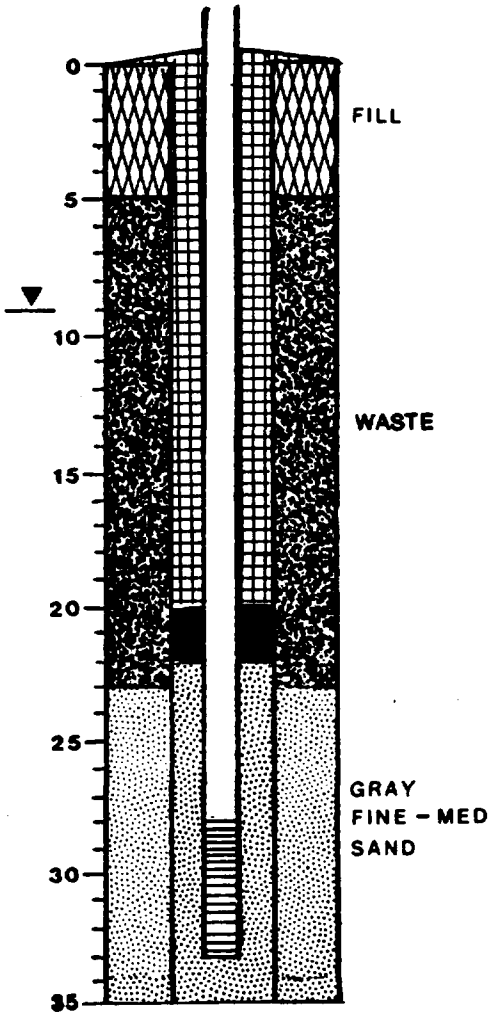
Boring/Well No. H-1 (con't)

| Sample Depth | Blow Count | Description |
|---|---|---|
| 41 - 42.5 | 11-19-21 | Same as above to 42'.<br>From 42' black (stained) fine grain SAND. (wet) |
| 43.5 - 45 | 11-11-14 | Same as above. |
| 46 - 47.5 | 10-14-14 | Same as above. |
| 48.5 - 50 | 10-15-18 | Same as above. |
| | | E.O.B. @ 50' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-6-87
Prepared by Kevin Phillips

Depth (ft) Description

EE-01




Boring/Well No. H-2/EE-01
Location Site H
Owner IEPA
Top of Inner Casing Elev. 408.84
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/5/87,1/6/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 35.0 ft.
Casing and Screen Diam. 2 in.
Screen Interval 28 - 33 ft.
Screen Type stainless steel 0.01" slot
Stickup 2.3 ft.
Well Type monitoring
Well Construction:
Filter Pack 33 - 22 ft.
Seal 22 - 20 ft.
Grout 10 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 397.41 Date 3-26-87
Static Water Elev. 398.55 Date 5-11-87
Slug Test Yes ____ No X
Test Date
Hydraulic Conductivity
Other ph = 6.8
Cond. = 2600 umhos Temp. = 56° F
Yellow-brown color, turbid

**WATER QUALITY**

Samples Taken Yes X No ____
No. of Samples 1 round
Types of Samples Groundwater

Date Sampled 3-17-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes ____ No X
Recipient

Comments Subsurface soil sample from boring 5 - 20' analyzed for HSL compounds.

**REMARKS**

Strong organic odor

Site Dead Creek Site-H

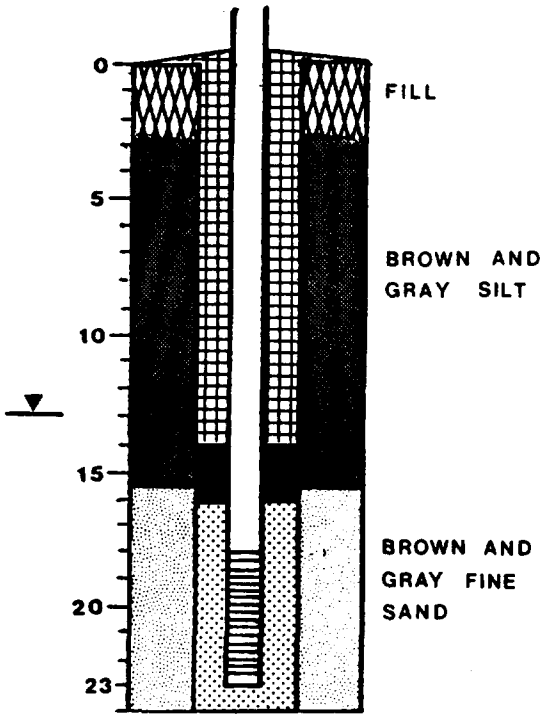
Boring/Well No. H-2/well # EE-01

| Sample Depth | Blow Count | Description |
|---|---|---|
| 1 - 2.5 | 3-3-4 | 0-1.5 FILL consisting of black cinders and small gravel. (dry)<br>1.5-2.5 FILL consisting of brownish cinders, slag, and medium grain sand. (dry) |
| 3.5 - 5 | 2-3-3 | 3.5-4 FILL - same as above.<br>4-5 FILL consisting of dark gray SILT. Soft and stained. Little of fine grain sand. (very moist) |
| 6 - 7.5 | 35-17-19 | WASTE steel and a coal-like dense black flaky substance. |
| 8.5 - 10 | 2-3-3 | WASTE - Wood and paper products, heavy black staining. |
| 11 - 12.5 | 3-3-5 | WASTE - same as above. |
| 13.5 - 15 | 2-3-5 | WASTE consisting of black (stained) silt, medium grain sand and wood. (wet) |
| 16 - 17.5 | 4-8-9 | WASTE - Wood chips. |
| 18.5 - 20 | 5-7-14 | WASTE - same as above. |
| 21 - 22.5 | 9-10-13 | WASTE - same as above. |
| | | WASTE discontinues @ approx. 23'. |
| 23.5 - 25 | 2-1-6 | Firm brownish-gray fine-medium grain SAND. Black staining throughout. Well-rounded and well sorted. Rounded to subangular. (wet) |
| 33.5 - 35 | 9-10-12 | Dense gray fine-medium grain SAND. Trace of coarse grain sand. Fairly well sorted and rounded to subangular. (wet) |
| | | E.O.B. @ 35 |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-6-87
Prepared by Kevin Phillips

Depth (ft) Description

EE-02




Boring/Well No. H-3/EE-02
Location Site H
Owner IEPA
Top of Inner Casing Elev. 409.91
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/6/87,1/6/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 23.0 ft.
Casing and Screen Diam. 2 in.
Screen Interval 18 - 23 ft.
Screen Type stainless steel 0.01" slot
Stickup 2.25 ft.
Well Type monitoring
Well Construction:
Filter Pack 23 - 16 ft.
Seal 16 - 14 ft.
Grout 14 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 397.58 Date 3-26-87
Static Water Elev. 398.61 Date 5-11-87
Slug Test Yes ____ No X
Test Date
Hydraulic Conductivity
Other pH = 4.0
Cond. = 4200 umhos Temp. = 54 F
Yellowish

**WATER QUALITY**

Samples Taken Yes X No ____
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-17-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes ____ No X
Recipient

Comments Subsurface soil samples from boring 10 - 20' analyzed for HSL compounds.

**REMARKS**

Slight organic odor

Site Dead Creek Site-H

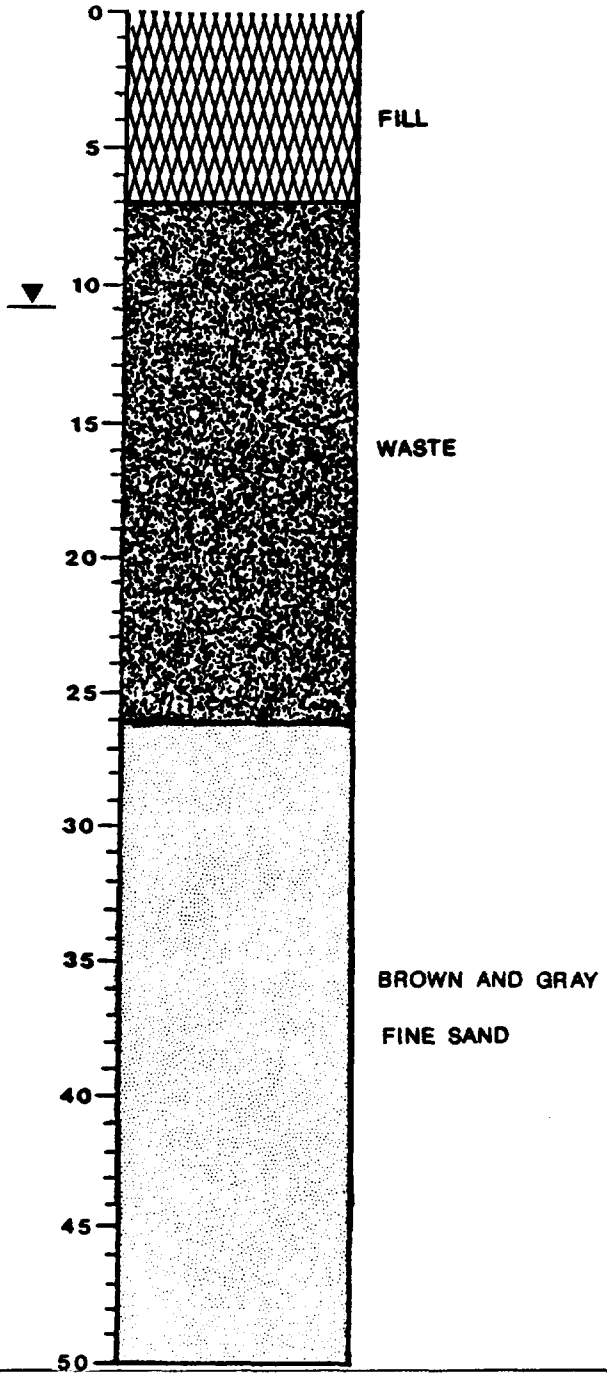
Boring/Well No. H-3/well #EE-02

| Sample Depth | Blow Count | Description |
|---|---|---|
| 1 - 2.5 | 6-10-13 | 0-2.5 FILL consisting of dense brown sandy CLAY including small gravel, cinders, and brick fragments. |
| 3.5 - 5 | 2-3-4 | Firm brown SILT and silty CLAY. Trace of fine grain sand. (moist). |
| 6 - 7.5 | 2-4-6 | Firm brown to yellowish brown very sandy SILT. Some fine grain sand and trace of silty clay. (moist) |
| 8.5 - 10 | 2-2-2 | Same as above. (very moist) |
| 11 - 12.5 | 5-11-14 | Dense brownish-gray silt and fine grain SAND. (wet) |
| 13.5 - 15 | 7-7-7 | Same as above. |
| | | Water table @ approx. 13 feet. |
| 16 - 17.5 | 9-10-20 | Very dense gray very silty fine grain SAND. Some silt. Wet. |
| 18.5 - 20 | 9-10-11 | (From 18 to 23 feet) tan dense very fine grain SAND. Very well sorted. Wet. |
| | | E.O.B. @ 23 feet. |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-8-87
Prepared by Kevin Phillips

Depth (ft) Description

H - 4




Boring/Well No. H-4
Location Site H
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/7 & 1/8/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers and rotary

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 50.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

**TEST DATA**

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

**WATER QUALITY**

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples Yes No X
Recipient

Comments Subsurface soil samples from boring 10 - 25' analyzed for HSL compounds.

**REMARKS**

Ground elev. 408.28

Site Dead Creek Site-H  Boring/Well No. H-4

| Sample Depth | Blow Count | Description |
|---|---|---|
| 1 - 2.5 | 6-9-12 | FILL consisting of black silty CLAY and cinders, brick fragments, and medium grain sand. Dry. |
| 3.5 - 5 | 2-3-10 | FILL consisting of black very sandy CLAY. Some slag and black staining. Moist. |
| 6 - 7.5 | 6-13-15 | 6-7' FILL same as above,<br>7-7.5' WASTE Very heavy black oil or tar like staining (approximately 3 inches thick) |
| 8.5 - 10 | 4-5-2 | 8.5-9 FILL consisting of brown silty CLAY.<br>9-10 WASTE Black (heavily stained) sludge-like material with a trace of flecks. Very moist. |
| 11 - 12.5 | 2-3-2 | WASTE black sludge. Wet. |
| 13.5 - 15 | 3-2-2 | WASTE same as above, including hard small spherical beads ( 1/8" dia.), and paper products. Wet with a visible oily sheen. |
| 16 - 17.5 | 2-2-2 | WASTE same as above, including granular material and broken glass fragments. (Some of the glass fragments appeared to have a threaded top such as a sample jar). Wet. |
| 18.5 - 20 | 3-4-5 | WASTE same as above, including a greenish-yellow jelly like material. Wet with an oil or tar like substance adhering to the spoon. |
| 21 - 22.5 | 9-16-11 | WASTE same as above, including a white granular material veined with brownish-red, glass fragments, and burnt wood. Wet. |
| 23.5 - 25 | 2-2-15 | WASTE consisting of multi-colored (red, green, brown, black, and white) materials; including a chunk of a waxy white substance that breaks into flakes.<br><br>WASTE discontinues @ approx. 26'. |
| 26 - 27.5 | 10-15-17 | Firm brownish-gray fine grain SAND. Some silt. Wet. Very clayey @ 26'-26.5'. |
| 28.5 - 30 | 1-1-1 | Very loose brown fine grain SAND. Trace of medium to coarse grain sand. Very well sorted. Wet. |

Site Dead Creek Site-H

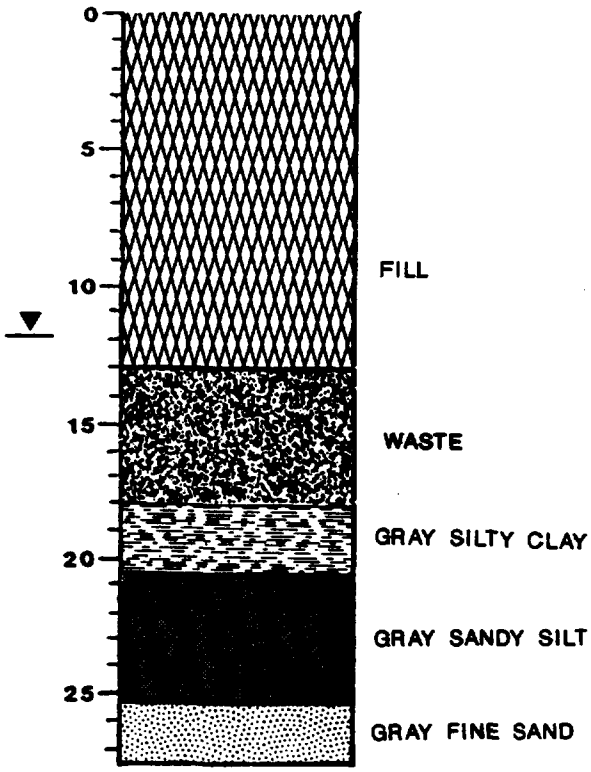
Boring/Well No. H-4 cont.

| Sample Depth | Blow Count | Description |
|---|---|---|
| 31 - 32.5 | 3-5-7 | Firm brown fine grain SAND. Trace of medium grain sand. Well sorted and well rounded. Some gray staining @ 31'-31.5'. |
| 33.5 - 35 | 6-7-13 | Firm gray very silty fine grain SAND. Some black banding @ 34 to 35'. Wet. |
| 36 - 37.5 | 8-12-18 | Dense gray fine grain SAND. Well rounded and well sorted. Wet. |
| 38.5 - 40 | 9-14-20 | Dense gray fine grain SAND; little silt. Well sorted and well rounded. Wet. 2-inch poorly sorted fine to coarse grain SAND. Seam @ 39.5'. Trace of small gravel. |
| 41 - 42.5 | 9-12-16 | Dense gray fine to coarse grain SAND. Well rounded. Wet. |
| 43.5 - 45 | 8-9-10 | Firm gray fine grain SAND. Wet. |
| 46 - 47.5 | 9-12-14 | Same as above. |
| 48.5 - 50 | 14-17-25 | Same as above. |
| | | E.O.B. @ 50' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-7-87
Prepared by Kevin Phillips

Depth (ft) Description

H - 5




Boring/Well No. H-5
Location Site H
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/7 & 1/7/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 27.5 ft.
Casing and Screen Diam. ____
Screen Interval ____
Screen Type ____
Stickup ____
Well Type ____
Well Construction:
Filter Pack ____
Seal ____
Grout ____
Lock No. ____

**TEST DATA**

Static Water Elev. ____ Date ____
Static Water Elev. ____ Date ____
Slug Test Yes ____ No ____
Test Date ____
Hydraulic Conductivity ____
Other ____

**WATER QUALITY**

Samples Taken Yes ____ No X
No. of Samples ____
Types of Samples ____

Date Sampled ____
Samplers ____
Samples Analyzed for ____

Split Samples Yes ____ No X
Recipient ____

Comments Subsurface soil samples from boring 0 - 10' analyzed for HSL compounds.

**REMARKS**

Ground elev. 409.75

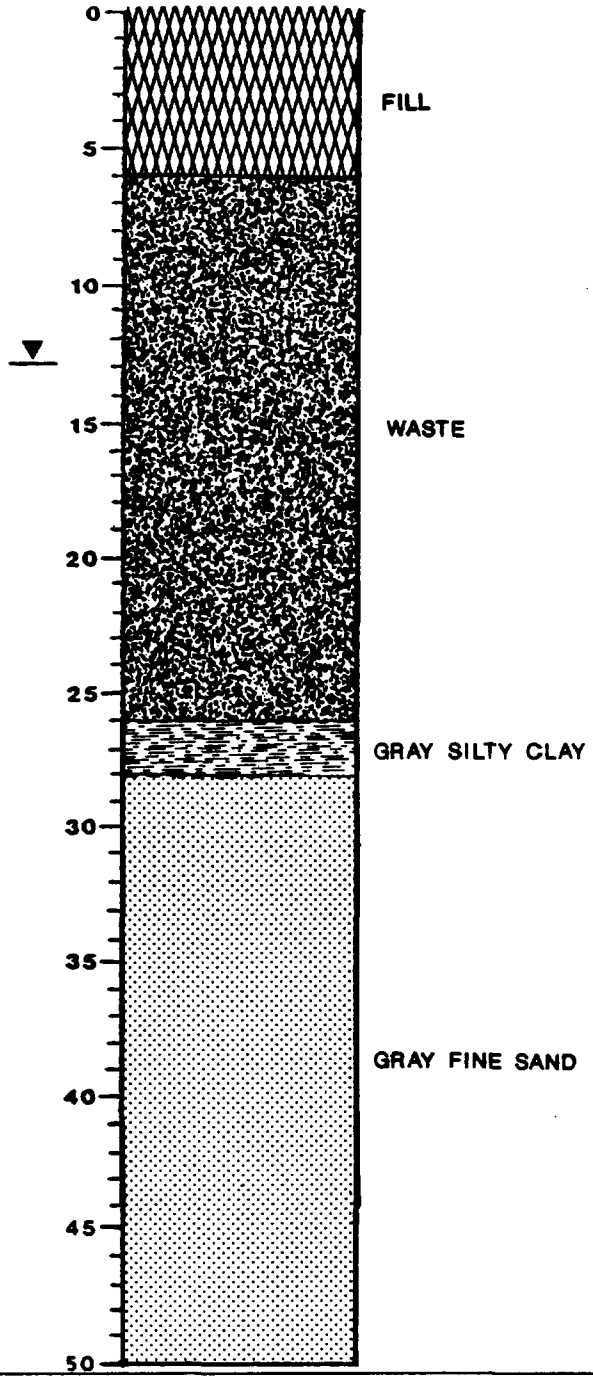
Site Dead Creek Site-H

Boring/Well No. H-5

| Sample Depth | Blow Count | Description |
|---|---|---|
| 1 - 2.5 | 5-9-14 | FILL consisting of brown silty CLAY including cinders, medium grain sand, and brick fragments. Dry. |
| 3.5 - 5 | 3-4-6 | FILL consisting of firm gray clayey SILT. Trace of small gravel and fine grain sand. Moist. |
| 6 - 7.5 | 1-3-3 | FILL same as above. Mottled with black silt. Moist. |
| 8.5 - 10 | 7-8-10 | FILL black cinders and small to medium gravel. Dry. |
| 11 - 12.5 | 1-5-4 | FILL same as above. (water @ approx. 12') |
| 13.5 - 15 | 9-17-20 | WASTE consisting of various debris materials, rubber, paper, and cloth products. |
| 16 - 17.5 | 6-4-1 | No recovery - probably same as above. Fill discontinues @ approx. 18'. |
| 18.5 - 20 | 1-2-1 | Soft gray very silty CLAY. Little fine grain sand. Moist. |
| 21 - 22.5 | 2-1-4 | Loose gray very sandy SILT. Some fine grain sand. Wet. |
| 23.5 - 25 | 3-2-3 | Same as above. |
| 26 - 27.5 | 1-1-2 | Loose gray fine grain SAND. Trace of silt. Well sorted. Wet. |
| | | E.O.B. @ 27.5' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-7-87
Prepared by Kevin Phillips

Depth (ft) H - 6 Description




Boring/Well No. H-6
Location Site H
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/7 & 1/7/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers and rotary

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 50.0 ft.
Casing and Screen Diam. ____
Screen Interval ____
Screen Type ____
Stickup ____
Well Type ____
Well Construction:
Filter Pack ____
Seal ____
Grout ____
Lock No. ____

**TEST DATA**

Static Water Elev. ____ Date ____
Static Water Elev. ____ Date ____
Slug Test Yes ____ No ____
Test Date ____
Hydraulic Conductivity ____
Other ____

**WATER QUALITY**

Samples Taken Yes ____ No X
No. of Samples ____
Types of Samples ____

Date Sampled ____
Samplers ____
Samples Analyzed for ____

Split Samples Yes ____ No X
Recipient ____

Comments Subsurface soil samples from boring 35 - 50' analyzed for HSL compounds.

**REMARKS**

Ground elev. 408.19

Site Dead Creek Site-H

Boring/Well No. H-6

| Sample Depth | Blow Count | Description |
|---|---|---|
| 1 - 2.5 | 6-14-5 | FILL 0-1.5 Black cinders, coarse grain sand and small gravel. 1.5-2.5 Brown silty CLAY. Some small gravel, black cinders, and brick fragments. |
| 3.5 - 5 | 5-7-10 | FILL consisting of dark brown coarse grain SAND and small gravel. Dry. |
| 6 - 7.5 | 5-9-5 | WASTE consisting of black-brown clayey SAND. Some small to large gravel. Also includes a black flaky substance. Moist. |
| 8.5 10 | 11-16-12 | WASTE 8.5-9.5 Black oil or tar-like stained sludge including a black flaky substance as above. 9.5-10 Brown and black coarse grain SAND and small gravel. Some black flaky material as above. |
| 11 - 12.5 | 4-3-2 | WASTE 11-11.5 Yellowish-brown chunky waste. Very moist. 11.5-12.5 Coarse grain SAND and small gravel. Stained black with viscous liquid. Very moist. Water @ 13'. |
| 13.5 - 15 | 5-4-3 | WASTE consisting of sand and gravel with various debris materials including paper and cloth products and black stained wood chips. |
| 16 - 17.5 | 3-2-2 | WASTE same as above. |
| 18.5 - 20 | 2-1-3 | WASTE consisting of brown-black stained sludge including small hard spherical beads (~1/8" dia.) and wood chips. Wet. |
| 21 - 22.5 | 1-1-4 | WASTE consisting of dark gray sludge with a soft and sticky red substance throughout; (turns hexane green). |
| 23.5 - 25 | 3-3-5 | WASTE same as above; with small spherical beads and more red substance. Fill discontinues @ approx. 26'. |
| 26 - 27.5 | 1-1-1 | Soft gray very silty CLAY. Black stains and streaks. Wet. |
| 28.5 - 30 | 2-4-7 | Firm gray fine grain SAND. Well rounded and sorted. Top 6 inches stained dark gray. Wet. |

Site Dead Creek Site-H

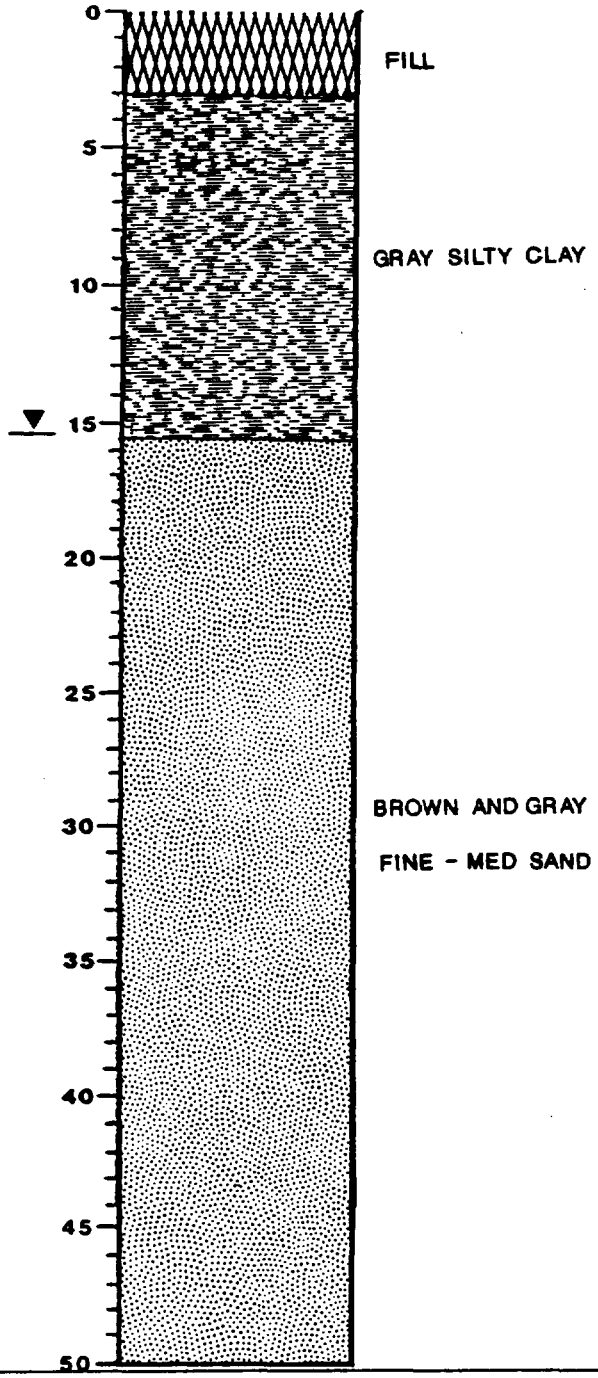
Boring/Well No. H-6 cont.

| Sample Depth | Blow Count | Description |
|---|---|---|
| 5 foot sample interval from 30'. | | |
| 33.5 - 35 | 9-12-18 | Same as above. |
| 38.5 - 40 | 12-20-24 | Gray very dense fine to coarse grain SAND. Wet. |
| 43.5 - 45 | 15-22-28 | Light gray very dense fine grain SAND. Trace of silt. Well sorted. Wet. |
| 48.5 - 50 | 10-10-17 | Same as above. |
| | | E.O.B. @ 50'. |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-8-87
Prepared by Kevin Phillips

Depth (ft) Description

H-7




Boring/Well No. H-7
Location Site H
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/8 & 1/8/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 50.0 ft.
Casing and Screen Diam. ____
Screen Interval ____
Screen Type ____
Stickup ____
Well Type ____
Well Construction:
Filter Pack ____
Seal ____
Grout ____
Lock No. ____

**TEST DATA**

Static Water Elev. ____ Date ____
Static Water Elev. ____ Date ____
Slug Test Yes ____ No ____
Test Date ____
Hydraulic Conductivity ____
Other ____

**WATER QUALITY**

Samples Taken Yes ____ No X
No. of Samples ____
Types of Samples ____

Date Sampled ____
Samplers ____
Samples Analyzed for ____

Split Samples Yes ____ No X
Recipient ____

Comments No subsurface soil samples analyzed.

**REMARKS**

Ground elev. 410.66

Site Dead Creek Site-H

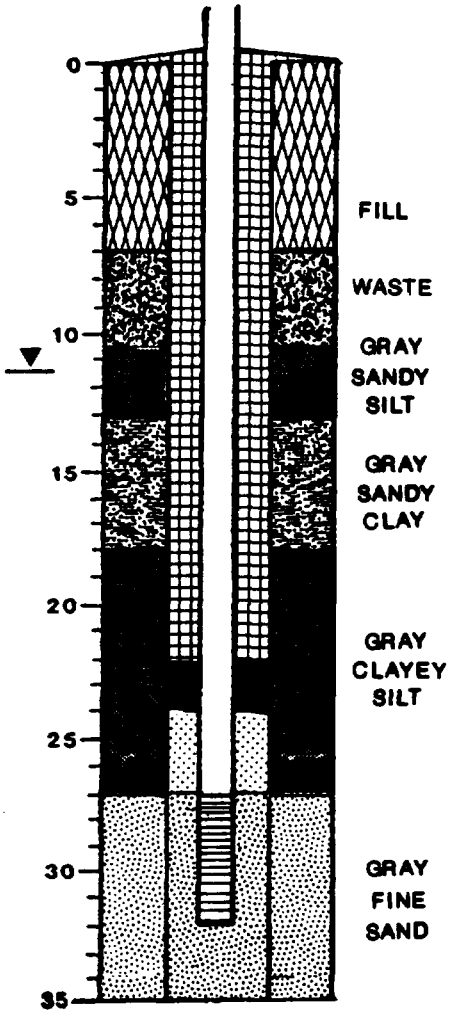
Boring/Well No. H-7

| Sample Depth | Blow Count | Description |
|---|---|---|
| 1 - 2.5 | 12-14-16 | FILL consisting of black silty CLAY with crushed limestone and brick fragments. Dry. Fill discontinues @ approx. 3'. |
| 3.5 - 5 | 2-4-5 | Gray stiff very silty CLAY. Trace of fine grain sand. Moist. Chemical odor. |
| 6 - 7.5 | 3-2-3 | Same as above. Some black and dark gray staining. Gasoline odor. |
| 8.5 - 10 | 3-4-6 | Same as above. No staining. Slight odor. |
| 11 - 12.5 | 2-3-4 | Brown and gray (mottled) firm very silty CLAY. Occasional silt stringers. Moist. No odor. |
| 13.5 - 15 | 3-3-4 | Same as above.<br>Water @ 15.5'. |
| 16 - 17.5 | 1-1-2 | Brownish-gray loose fine grain SAND. Some silt. Occasional iron stained pockets. Wet. |
| 18.5 - 20 | 1-1-5 | Brown loose fine to medium grain SAND. Trace of silt. Well sorted and rounded. Wet. Start sampling interval @ 20'. |
| 23.5 - 25 | 3-8-14 | Reddish-brown dense coarse grain SAND. Trace of small gravel. Some fine to medium grain sand. Poorly sorted and well rounded. Black stained sand seam (2") @ 24.5'. Wet. |
| 28.5 - 30 | 7-9-13 | Grayish-brown dense fine to medium grain SAND. Well rounded and sorted. Wet. |
| 33.5 - 35 | 12-12-14 | Brown dense fine grain SAND. Trace of medium grain sand. Well sorted and rounded. Wet. |
| 38.5 - 40 | 8-12-20 | Gray very dense fine grain SAND. Occasional natural organic layers. Wet. |
| 43.5 - 45 | 10-25-30 | Natural wood. (apparently drill and sample a buried tree @ 43') |
| 48.5 - 50 | 7-9-7 | Gray firm fine to coarse grain SAND. Rounded, wet. |
| | | E.O.B. @ 50' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-12-87
Prepared by Kevin Phillips

Depth (ft) Description

EE-03




Boring/Well No. H-8/EE-03
Location Site H
Owner IEPA
Top of Inner Casing Elev. 411.47
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/9 & 1/12/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 35.0 ft.
Casing and Screen Diam. 2 in.
Screen Interval 27 - 32 ft.
Screen Type stainless steel 0.01" slot
Stickup 2.36
Well Type monitoring
Well Construction:
Filter Pack 32 - 24 ft.
Seal 24 - 22 ft.
Grout 22 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 394.74 Date 3-26-87
Static Water Elev. 398.72 Date 5-11-87
Slug Test Yes X No
Test Date 5-11-87
Hydraulic Conductivity $10 \times 10^{-3}$ cm/sec
Other pH = 7.3
Cond. = 2800 umhos Temp. = 56° F
Yellowish

**WATER QUALITY**

Samples Taken Yes X No
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-17-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes No X
Recipient

Comments Subsurface soil samples from boring 5 - 15' analyzed for HSL compounds.

**REMARKS**

Slight organic odor

Site Dead Creek Site-H

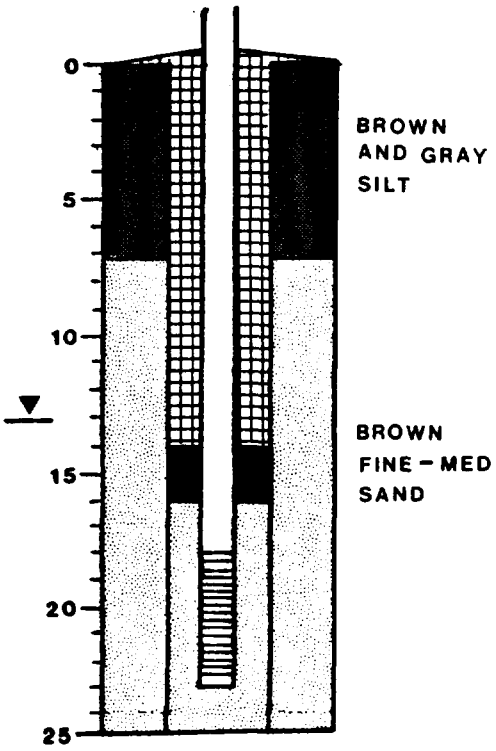
Boring/Well No. H-8/well #EE-03

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | 0-1.5 Black cinders |
| 1 - 2.5 | 4-5-7 | 1.5-2.5 Brown and gray silty CLAY. Trace of small gravel, brick, and concrete fragments. |
| 3.5 - 5 | 4-5-1 | FILL same as above. |
| 6 - 7.5 | 8-12-11 | FILL consisting of black and gray silty CLAY (possibly stained). 2 inches of black granular material and small spherical beads @ 7'. WASTE (moist) |
| 8.5 - 10 | 30/2 | WASTE - no recovery (rod bounced, probably rubber material). |
| | | Water @ 11' while drilling. |
| 11 - 12.5 | 1-1-1 | Gray very sandy SILT. Some fine grain sand. Wet. Slight chemical odor. |
| 13.5 - 15 | 2-3-5 | Gray firm very sandy silty CLAY. Some fine grain sand and silt. Horizontally bedded and slightly varved. Occasional fractures containing iron-like staining. Moist. |
| 16 - 17.5 | 1-2-3 | Same as above; bedding is 1/8" to 1/4" thick. Occasional fractures and root trails or burrows. |
| 18.5 - 20 | 1-1-1 | Gray loose very clayey SILT, some fine grain sand. No bedding. Wet. |
| 21 - 22.5 | 1-2-3 | Same as above; slightly bedded ( 1/8") and slightly varved. |
| 23.5 - 25 | 1-1-1 | Same as above. |
| 26 - 27.5 | 3-4-7 | Same as above. (Fine grain sand in tip of spoon). |
| 28.5 - 30 | 6-6-10 | From 27' dark gray fine grain SAND. Wet. Slight chemical odor. |
| 33.5 -35 | 3-9-9 | Firm gray fine to coarse grain SAND. Wet. Well rounded. |
| | | E.O.B. @ 35' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-13-87
Prepared by Kevin Phillips

Depth (ft) Description

EE-04




Boring/Well No. H-9/EE-04
Location Site H
Owner IEPA
Top of Inner Casing Elev. 413.26
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/13, 1/13/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 25 ft.
Casing and Screen Diam. 2 in.
Screen Interval 18 - 23 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.93 ft.
Well Type monitoring
Well Construction:
Filter Pack 23 - 16 ft.
Seal 16 - 14 ft.
Grout 14 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 398.07 Date 3-26-87
Static Water Elev. 399.01 Date 5-11-87
Slug Test Yes X No
Test Date 5-12-87
Hydraulic Conductivity 5.2 x $10^{-3}$ cm/sec
Other pH = 7.2
Cond. = 2000 umhos Temp. = 58° F
Clear-yellow

**WATER QUALITY**

Samples Taken Yes X No
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-17-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes No X
Recipient

Comments Subsurface soil sample from boring from 15 - 25' analyzed for HSL organics

**REMARKS**

Site Dead Creek Site-H

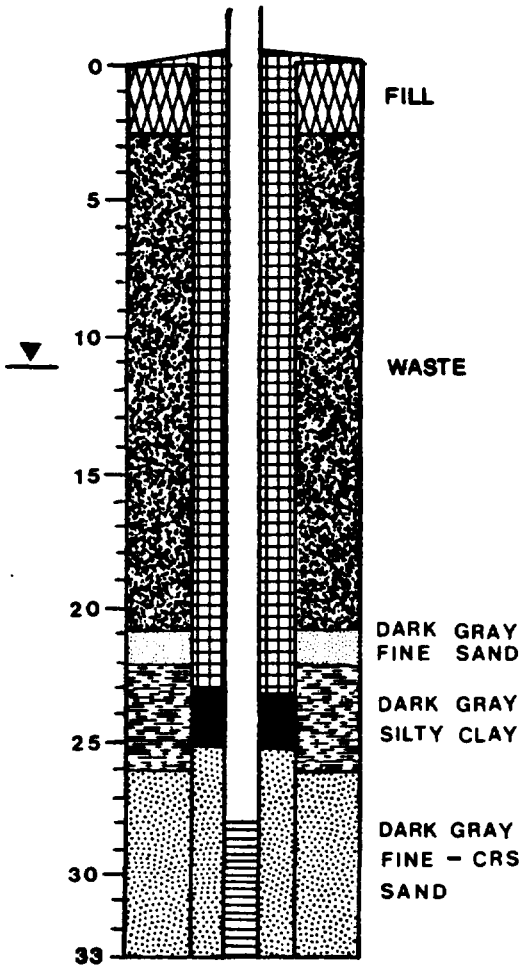
Boring/Well No. H-9/well #EE-04

| Sample Depth | Blow Count | Description |
|---|---|---|
| 1 - 2.5 | 5-5-3 | 0-2' Firm brownish-gray clayey SILT. Trace of fine grain sand. Moist. 2-2.5' Firm brown sandy SILT. Some fine grain sand. Dry. |
| 3.5 - 5 | 3-4-6 | Stiff brown and gray (mottled) very silty CLAY. Trace of fine grain sand. Occasional clayey silt layers ( 2"). Moist. |
| 6 - 7.5 | 3-5-8 | Same as above; becomes increasingly siltier at 7' then grades into brown very fine SAND at 7 1/4'. Trace of silt. Dry. |
| 8.5 - 10 | 3-5-7 | Brown very fine grain SAND. Trace of silt. Dry. |
| 11 - 12.5 | 2-2-5 | Same as above; a 4 inch silty clay layer appears at 12'. Trace of fine grain sand. |
| 13.5 - 15 | 2-6-8 | Brown fine grain SAND. Wet. |
| 16 - 17.5 | 2-6-7 | Brown fine grain SAND. Some medium grain sand. Wet. |
| 18.5 - 20 | 1-1-3 | Brown medium grain SAND. Trace of coarse grain sand. Wet. |
| 23.5 - 25 | 7-14-11 | Brown medium grain SAND. Trace of coarse grain sand and small gravel. Wet. |
| | | E.O.B. @ 25' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-28-87
Prepared by Tim Maley

Depth (ft) Description

EE-12




Boring/Well No. I-1/EE-12
Location Site I
Owner IEPA
Top of Inner Casing Elev. 409.16
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/27-1/28/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 33.5 ft.
Casing and Screen Diam. 2 in.
Screen Interval 28 - 33 ft.
Screen Type stainless steel 0.01" slot
Stickup 0.52 ft.
Well Type monitoring
Well Construction:
Filter Pack 33 - 25 ft. Natural
Seal 25 - 23 ft.
Grout 23 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 397.43 Date 3-26-87
Static Water Elev. 398.65 Date 5-11-87
Slug Test Yes ____ No X
Test Date
Hydraulic Conductivity
Other pH = 7.4
Cond. = 3200 umhos Temp. = 58° F

**WATER QUALITY**

Samples Taken Yes X No ____
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-23-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes X No ____
Recipient Sverdrup, Inc. for Cerro Copper

Comments Subsurface soil samples from boring 0 - 10' analyzed for HSL compounds.

**REMARKS**

Duplicate of DC-GW-24

Site Dead Creek Site-I

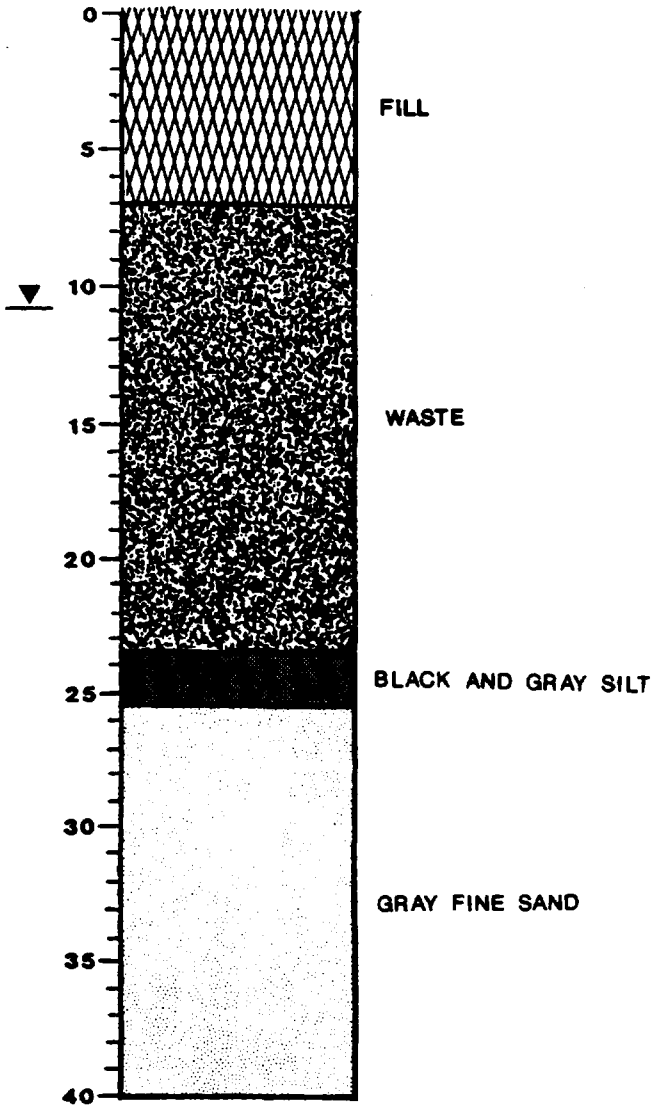
Boring/Well No. I-1/Well # EE-12

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Crushed limestone and gravel on surface - parking lot for semi-trailers. |
| 1 - 2.5 | 5-6-7 | FILL consisting of brown-black sandy CLAY including a mixture of asphalt, fine to coarse grain sand, large gravel, and slag. Dry. |
| 3.5 - 5 | 3-4-6 | WASTE consisting of brown-black gravelly SAND including slag, stained paper and wood products, and a white gravelly substance. Dry. |
| 6 - 7.5 | 3-5-4 | WASTE. Same as above; with more slag and small spherical beads. Dry. |
| 8.5 - 10 | 7-2-1 | WASTE - poor recovery; probably same as above. |
| 11 - 12.5 | 4-2-1 | WASTE - same as above; wet. |
| 13.5 - 15 | 7-10-14 | WASTE consisting of black (oily stained) sludge-like material including wood chips, coarse grain sand, and concrete fragments. Wet. |
| 16 - 17.5 | 1-3-4 | WASTE. Same as above; with brick and concrete fragments, sand and gravel, and soft clay. Wet. |
| 18.5 - 20 | 4-3-1 | WASTE. Same as above. Fill material discontinues @ 21'. |
| 21 - 22.5 | 0-0-2 | 21-22' Dark gray fine grain SAND. Some black staining. Wet.<br>22-22.5 Dark gray silty CLAY. Moist. |
| 23.5 - 25 | 2-2-2 | Dark gray silty CLAY. Moist. |
| 26 - 27.5 | 0-0-1 | Dark gray to black fine grain SAND. Trace of silt and medium grain SAND. Wet. |
| 28.5 - 30 | 6-8-10 | Dark gray medium to coarse grain SAND. Wet. |
| 31 - 32.5 | 7-8-9 | Same as above; with a trace of small gravel. Wet. |
| | | E.O.B. @ 33.5" |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-28-87
Prepared by Tim Maley

Depth (ft) Description

I-2




Boring/Well No. I-2
Location Site I
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/28, 1/28/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers and rotary

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 40 ft.
Casing and Screen Diam. ____
Screen Interval ____
Screen Type ____
Stickup ____
Well Type ____
Well Construction:
Filter Pack ____
Seal ____
Grout ____
Lock No. ____

**TEST DATA**

Static Water Elev. ____ Date ____
Static Water Elev. ____ Date ____
Slug Test Yes ____ No ____
Test Date ____
Hydraulic Conductivity ____
Other ____

**WATER QUALITY**

Samples Taken Yes ____ No X
No. of Samples ____
Types of Samples ____

Date Sampled ____
Samplers ____
Samples Analyzed for ____

Split Samples(soil) Yes X No ____
Recipient Sverdrup, Inc. for Cerro Copper

Comments Subsurface soil samples from boring 5 - 25' analyzed for HSL compounds.

**REMARKS**

Ground elev. 409.98

Site Dead Creek Site-I

Boring/Well No. I-2

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Crushed limestone parking lot surface. |
| 1 - 2.5 | 3-6-9 | FILL consisting of black sandy CLAY including a mixture of fine-medium grain sand, asphalt, cinders, gravel, and slag. Dry. |
| 3.5 - 5 | 1-1-2 | FILL - same as above. |
| 6 - 7.5 | 3-6-4 | FILL consisting of black-brown silty CLAY. Trace of fine grain sand (in seams) @ 7'. Including some slag and wood particles. Dry. |
| 8.5 - 10 | 3-2-2 | WASTE consisting of light brown silty CLAY (to 9') including very loose black cinder material and medium grain sand. Dry. |
| 11 - 12.5 | 51-11/1 | WASTE - spoon refusal - probably a large obstruction in fill material. Wet. |
| 13.5 - 15 | 2-2-2 | WASTE consisting of black oily stained sludge-like material. Including fine to coarse grain sand, cinders, clay, and stained wood. Wet (with oily sheen). |
| 16 - 17.5 | 16-7-6 | WASTE. Same as above; with more wood particles. |
| 18.5 - 20 | 0-1-2 | WASTE - poor recovery - probably same material. |
| 21 - 22.5 | 7-8-10 | WASTE - same as above. |
| | | Fill discontinues @ approx. 23.5'. |
| 23.5 - 25 | 4-6-8 | Black (stained) and gray SILT. Some very fine grain sand. Wet (with oily sheen). |
| 26 - 27.5 | 2-3-2 | Gray fine grain SAND. Some black staining. Wet. |
| 28.5 - 30 | 9-7-3 | Same as above. |
| 31 - 32.5 | 11-11-11 | Gray fine grain SAND. Interbedding of finer silty sand and coarser sand with small gravel; (approx. 4 inch layers). Wet. |
| 33.5 - 35 | 5-10-12 | Same as above. |

Site Dead Creek Site-I

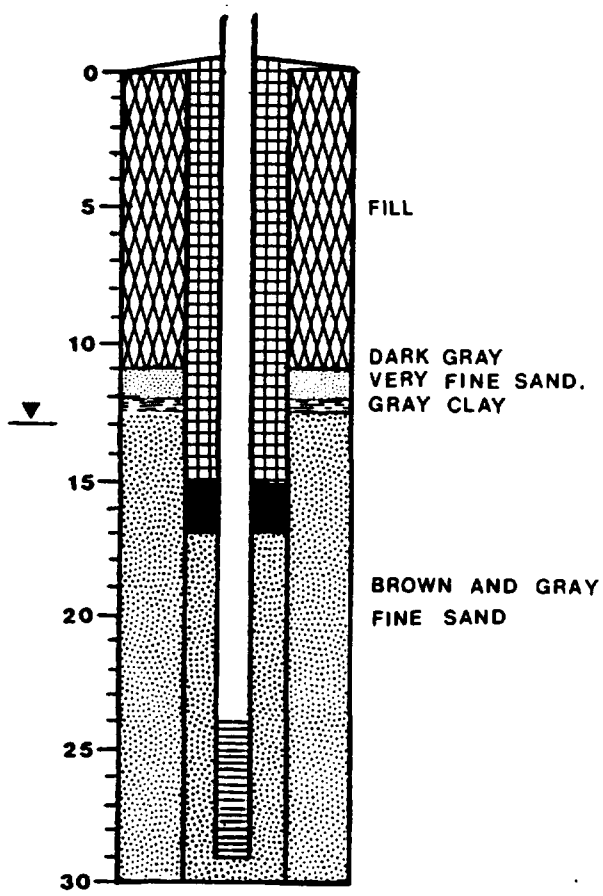
Boring/Well No. I-2 (cont.)

| Sample Depth | Blow Count | Description |
|---|---|---|
| 36 - 37.5 | 18-18-22 | Same as above. |
| 38.5 - 40 | 11-24-37 | Same as above. |
| | | E.O.B @ 40' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-3-87
Prepared by Tim Maley

Depth (ft) Description

EE-15




Boring/Well No. I-7/EE-15
Location Site I
Owner IEPA
Top of Inner Casing Elev. 406.41
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/3/87,2/3/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 30 ft.
Casing and Screen Diam. 2 in.
Screen Interval 24 - 29 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.33 ft.
Well Type monitoring
Well Construction:
Filter Pack 29 - 17 ft. Natural
Seal 17 - 15 ft.
Grout 15 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 397.63 Date 3-26-87
Static Water Elev. 398.93 Date 5-11-87
Slug Test Yes X No
Test Date 5-12-87
Hydraulic Conductivity 0.47 x$10^{-3}$cm/sec
Other pH = 7.2
Cond. = 1800 umhos Temp. = 56° F
Yellowish

**WATER QUALITY**

Samples Taken Yes X No
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-23-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes X No
Recipient Sverdrup, Inc. for Cerro Copper

Comments Subsurface soil samples from boring 3.5 - 12.5 feet and 13.5 - 22.5 feet analyzed for HSL compounds.

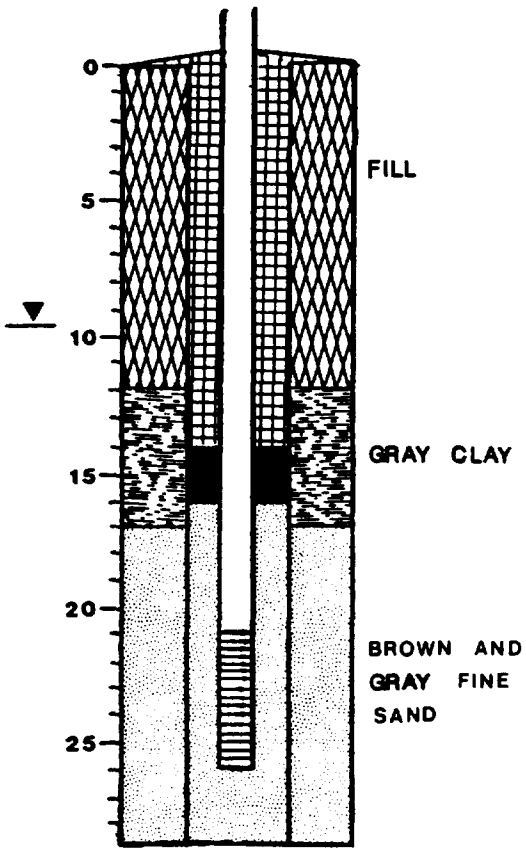
**REMARKS**

Slight odor

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-3-87
Prepared by Tim Maley

Depth (ft) Description

EE-G112




(IEPA well replaced)
Boring/Well No. I-8/EE-G112
Location Site I
Owner IEPA
Top of Inner Casing Elev. 407.87
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/3/87,2/3/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 29.0 ft.
Casing and Screen Diam. 2 in.
Screen Interval 21 - 26 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.19 ft.
Well Type monitoring
Well Construction:
Filter Pack 26 - 16 ft. Natural
Seal 16 - 14 ft.
Grout 14 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 397.00 Date 3-26-87
Static Water Elev. 398.39 Date 5-11-87
Slug Test Yes X No
Test Date 5-12-87
Hydraulic Conductivity 3.4 x 10 cm/sec
Other ph = 7.6
Cond. = 1600 umhos Temp. = 58° F
Yellowish, slight odor

**WATER QUALITY**

Samples Taken Yes X No
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-23-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes No X
Recipient

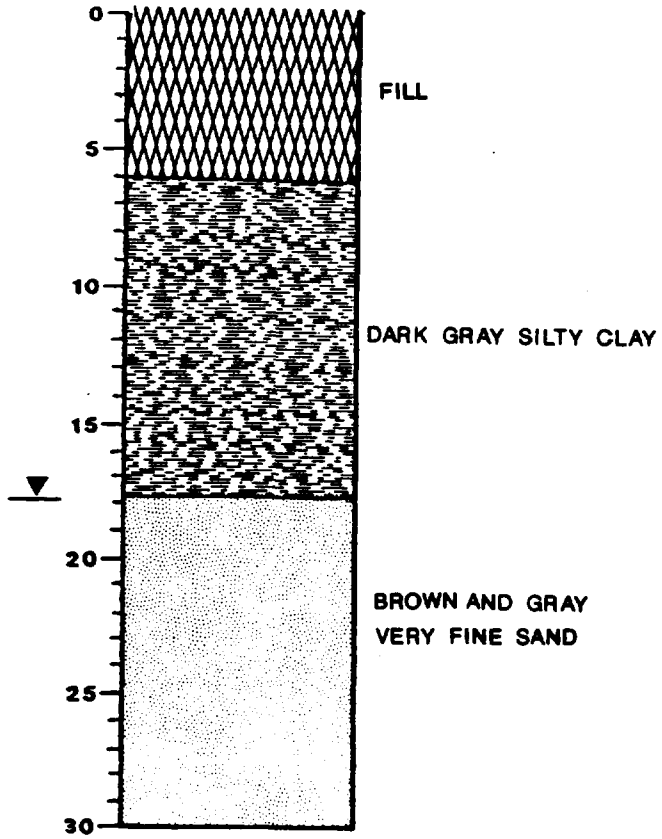
Comments

**REMARKS**

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-29-87
Prepared by Tim Maley

Depth (ft) Description

I – 3




Boring/Well No. I-3
Location Site I
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/29, 1/29/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 30.0 ft.
Casing and Screen Diam. ____
Screen Interval ____
Screen Type ____
Stickup ____
Well Type ____
Well Construction:
Filter Pack ____
Seal ____
Grout ____
Lock No. ____

**TEST DATA**

Static Water Elev. ____ Date ____
Static Water Elev. ____ Date ____
Slug Test Yes ____ No ____
Test Date ____
Hydraulic Conductivity ____
Other ____

**WATER QUALITY**

Samples Taken Yes ____ No X
No. of Samples ____
Types of Samples ____

Date Sampled ____
Samplers ____
Samples Analyzed for ____

Split Samples(soil)Yes X No ____
Recipient Sverdrup, Inc. for Cerro Copper

Comments Subsurface soil samples from boring 5 - 15' analyzed for HSL compounds.

**REMARKS**

Site Dead Creek Site-I

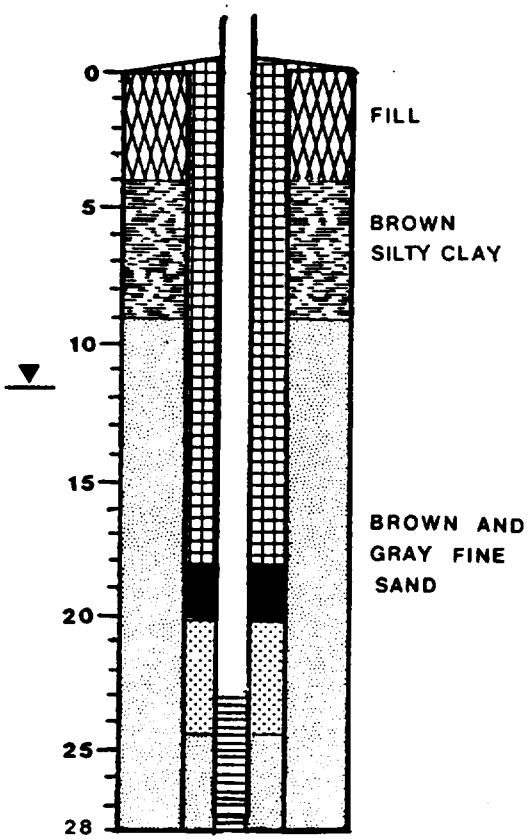
Boring/Well No. I-3

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Crushed limestone parking lot surface. |
| 1 - 2.5 | 56-21-19 | FILL consisting of brown and black sandy CLAY including crushed lime stone, small to medium gravel and slag material. Dry. |
| 3.5 - 5 | 5-11-5 | FILL - same as above; with some wood chips. |
| | | Fill discontinues @ approx. 6'. |
| 6 - 7.5 | 2-3-4 | Dark gray silty CLAY. Trace of fine grain sand. |
| 8.5 - 10 | 1-2-3 | Same as above; some rust color staining. |
| 11 - 12.5 | 1-2-2 | Same as above; mottled brown & gray. |
| 13.5 - 15 | 2-3-2 | Same as above. |
| 16 - 17.5 | 1-2-3 | Same as above. |
| | | Water @ 18'. |
| 18.5 - 20 | 1-1-3 | Brown very fine grain SAND. Some silt, thinnly bedded. Wet. |
| 21 - 22.5 | 2-3-3 | Gray very fine grain SAND. Wet. |
| 23.5 - 25 | 1-2-2 | Same as above. |
| 26 - 27.5 | 1-2-3 | Same as above. |
| 28.5 - 30 | 0-1-3 | Same as above. |
| | | E.O.B. @ 30' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-29-87
Prepared by Tim Maley

Depth (ft) Description

EE-13




Boring/Well No. I-4/EE-13
Location Site I
Owner IEPA
Top of Inner Casing Elev. 409.16
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/29,1/29/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 28.0 ft.
Casing and Screen Diam. 2 in.
Screen Interval 23 - 28 ft.
Screen Type stainless steel 0.01" slot
Stickup 0.52 ft.
Well Type monitoring
Well Construction:
Filter Pack 28 - 20 ft.
Seal 20 - 18 ft.
Grout 18 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 397.47 Date 3-26-87
Static Water Elev. 398.75 Date 5-11-87
Slug Test Yes X No
Test Date 5-12-87
Hydraulic Conductivity 1.3 x $10^{-3}$ cm/sec
Other pH = 7.2
Cond. = 1800 umhos Temp. = 56° F
Clear to yellowish

**WATER QUALITY**

Samples Taken Yes X No
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-23-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes X No
Recipient Sverdrup, Inc. for Cerro Copper

Comments

**REMARKS**

Site Dead Creek Site-I

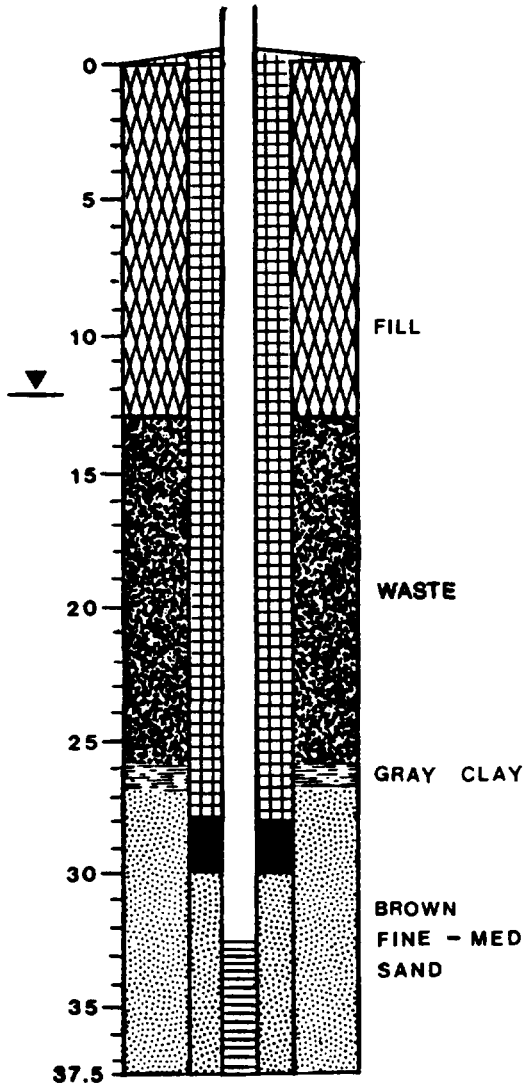
Boring/Well No. I-4/Well # EE-13

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Fill on surface. |
| 1 - 2.5 | 8-7-50 | FILL consisting of brown and black sandy CLAY, including a mixture of crushed limestone, small to medium gravel, and concrete fragments. |
| | | Fill discontinues @ approx. 4'. |
| 3.5 - 5 | 3-4-4 | From 4', brown very silty CLAY. Dry. |
| 6 - 7.5 | 3-4-5 | Brown silty CLAY; to 9'. |
| 8.5 - 10 | 2-3-2 | From 9', brown very fine grain SAND. Some silt. Thinly bedded. Water @ 9.5'. |
| 11 - 12.5 | 1-3-2 | Same as above. |
| 13.5 - 15 | 1-1-1 | Same as above; some interbedding of siltier material. Wet. |
| 16 - 17.5 | 1-2-3 | Same as above; to 19'. |
| 18.5 - 20 | 1-2-3 | From 19', brown (turning gray) SILT. Wet. |
| 21 - 22.5 | 1-2-2 | Gray fine grain SAND. Wet. |
| 23.5 - 25 | 0-1-0 | Same as above. |
| 26 - 27.5 | 0-1-2 | Same as above. |
| | | E.O.B. @ 28' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-30-87
Prepared by Tim Maley

Depth (ft) Description

EE-14




Boring/Well No. I-5/EE-14
Location Site I
Owner IEPA
Top of Inner Casing Elev. 410.95
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/30, 1/30/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 37.5 ft.
Casing and Screen Diam. 2 in.
Screen Interval 32.5 - 37.5 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.56 ft.
Well Type monitoring
Well Construction:
Filter Pack 37.5 - 30 ft. Natural
Seal 30 - 28 ft.
Grout 28 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 397.23 Date 3-26-87
Static Water Elev. 398.55 Date 5-11-87
Slug Test Yes ____ No X
Test Date ____
Hydraulic Conductivity ____
Other pH = 7.4
Cond. = 3400 umhos Temp. = 56° F
Cloudy, yellowish

**WATER QUALITY**

Samples Taken Yes X No ____
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-23-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes X No ____
Recipient Sverdrup, Inc. for Cerro Copper

Comments Subsurface soil samples from boring 5' - 27.5 feet and 28.5 - 37.5 feet analyzed for HSL compounds.

**REMARKS**

Site Dead Creek Site-I

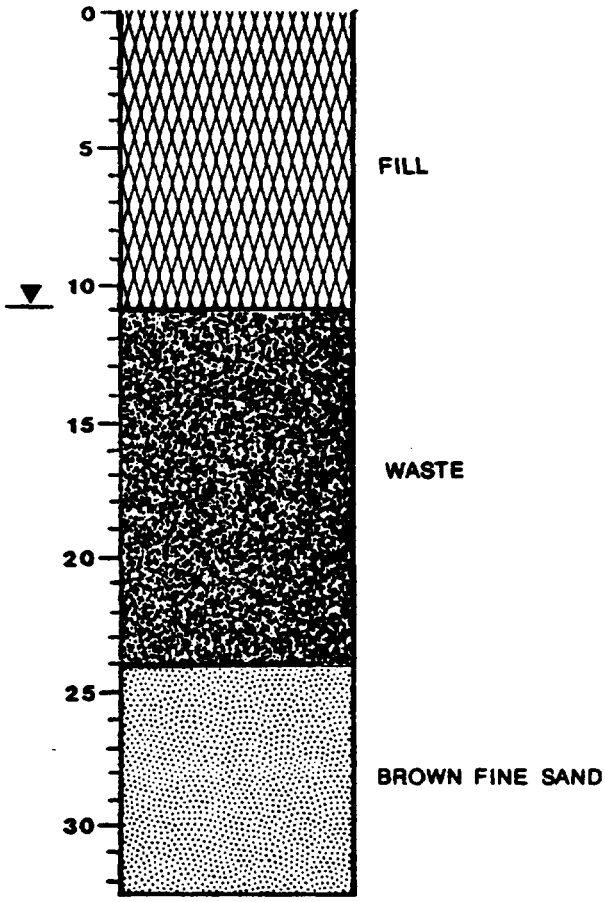
Boring/Well No. I-5/Well #EE-14

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Crushed limestone parking lot surface. |
| 1 - 2.5 | 24-00 | FILL consisting of dark brown-black sandy CLAY including a mixture of fine to coarse grain sand, limestone fragments, clay, and concrete (large obstruction caused spoon refusal). |
| 3.5 - 5 | 4-6-8 | FILL consisting of black-gray silty CLAY. |
| 6 - 7.5 | 11-14-8 | FILL consisting of light gray-black sandy CLAY including crushed limestone, small to large gravel, fine to coarse grain sand, and wood chips. Dry. |
| 8.5 - 10 | 4-17-4 | FILL - same as above; with some brick fragments. |
| 11 - 12.5 | 2-2-1 | FILL consisting of gray silty CLAY. Some black staining, trace of fill debris including cloth products and cinders. |
| 13.5 - 15 | 2-2-3 | WASTE consisting of black sandy CLAY including a mixture of cinders, slag, small to large gravel, and fine to coarse grain sand. (Moist) |
| 16 - 17.5 | 4-2-5 | No recovery - probably same fill material. Water @ 17.5'. |
| 18.5 - 20 | 3-5-3 | WASTE consisting of black sandy CLAY including some gravel and slag. Wet (with oily sheen). |
| 21 - 22.5 | 4-1-5 | No recovery - probably same fill material. |
| 23.5 - 25 | 5-9-5 | WASTE - same as above. Fill apparently discontinues @ approx. 26'. |
| 26 - 27.5 | 4-2-3 | 26-26 3/4' Black-gray-brown silty CLAY then black very fine grain SAND Some silt and black staining. Wet. |
| 28.5 - 30 | 3-4-3 | Black very fine grain SAND. Stained. Wet. From 29-29 1/4' is a gray silty CLAY layer. Then brown fine grain SAND. Slightly stained. Wet. Trace of medium grain sand. |
| 31 - 32.5 | 2-4-2 | Brown fine to medium grain SAND. Wet. |
| 36 - 37.5 | 8-16-24 | Brown medium to coarse grain SAND. Trace of small gravel. Wet. Tip of spoon (37.5') showed dark gray very fine grain SAND. Trace of small gravel. |
| | | E.O.B. @ 37.5' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-2-87
Prepared by Tim Maley

Depth (ft) Description

I - 6




Boring/Well No. I-6
Location Site I
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/2 & 2/2/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 32.5 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

**TEST DATA**

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

**WATER QUALITY**

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples(soil)Yes X No
Recipient Sverdrup, Inc. for Cerro Copper
Comments Subsurface soil sample from boring 10 - 25' analyzed for HSL compounds.

**REMARKS**

Ground elev. 408.30

Site Dead Creek Site-I

Boring/Well No. I-7/Well #EE-15

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | 0-1 Black clayey topsoil |
| 1 - 2.5 | 3-3-4 | FILL consisting of brown-gray silty CLAY. Dry. |
| 3.5 - 5 | 4-8-4 | FILL consisting of brown-gray silty CLAY. Trace of fine grain sand and crushed limestone. Dry. |
| 6 - 7.5 | 1-1-1 | FILL - same as above. Moist. |
| 8.5 - 10 | 3-4-8 | FILL consisting of brown-gray-black silty CLAY. Some fine to medium grain sand and crushed limestone. Dry. |
| | | Fill apparently discontinues @ approx. 11'. |
| 11 - 12.5 | 1-3-4 | 11-12' Dark gray very fine grain SAND. Moist.<br>12-12.5 Soft gray silty CLAY. Moist. Water @ 13'. |
| 13.5 - 15 | 1-3- | Brown fine grain SAND. Wet. |
| 16 - 17.5 | 1-3-5 | Same as above. |
| 18.5 - 20 | 2-6-8 | Same as above; slightly siltier. |
| 21 - 22.5 | 12-15-15 | Same as above; less silt. |
| 23.5 - 25 | 5-8-12 | Gray very fine grain SAND. Wet. |
| 26 - 27.5 | 12-10-10 | Same as above. |
| 28.5 - 30 | 6-8-10 | Same as above. |
| | | E.O.B. @ 30' |

Site Dead Creek Site-I

Boring/Well No. I-6

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Fill on surface. |
| 1 - 2.5 | 24-12-14 | FILL consisting of brown silty CLAY including a mixture of fine to coarse grain sand, gravel, and crushed limestone. |
| 3.5 - 5 | 3-60/3 | FILL - same as above. High blow count caused by brick obstruction. |
| 6 - 7.5 | 3-10-10 | FILL - same as above; with additional debris such as cardboard, cinders, and slag. |
| 8.5 - 10 | 3-2-2 | FILL - same as above; with increased amount of sand. Moist. |
| 11 - 12.5 | 3-2-1 | WASTE consisting of gray silty CLAY including black oily sludge, fine to coarse grain sand, gravel, brick fragments, and slag. Wet (with oily film). |
| 13.5 - 15 | 1-1-2 | WASTE consisting of black (heavily stained) sandy CLAY. Including black oily sludge, medium to coarse grain sand. Wood chips, cinders, and gravel. Wet. |
| 16 - 17.5 | 2-3-4 | WASTE - same as above. |
| 18.5 - 20 | 2-7-8 | WASTE - same as above, some black sludge or tar-like substance mixed with wood and cardboard. |
| 21 - 22.5 | 11-11-10 | WASTE consisted of various debris including black oily stained layered cardboard, paint pigments, burlap cloth, and a yellow sludge-like substance. Wet. |
| | | WASTE discontinues @ approx. 24'. |
| 23.5 - 25 | 10-11-12 | From 24', brown (some black staining) fine grain SAND. Some silt. Wet. |
| 26 - 27.5 | 4-4-5 | Same as above. A 1/4" gray silty clay layer @ 26.5'. |
| 28.5 - 30 | 0-1-1 | Brown fine grain SAND. Some black staining. Wet. |
| 31 - 32.5 | 10-13-18 | Same as above. |
| | | E.O.B. @ 32.5' |

Site Dead Creek Site-I

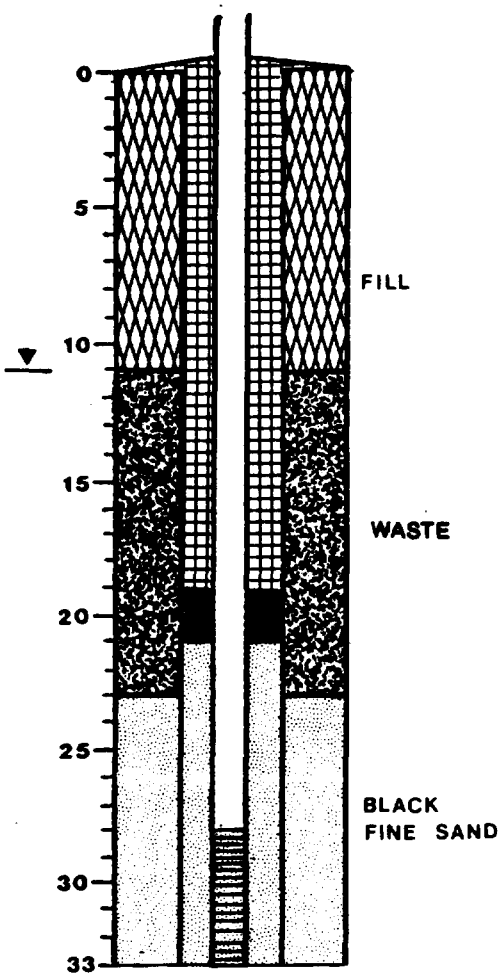
Boring/Well No. I-8/Well #EE-G112
IEPA replacement well

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Straight drill to 17.5'.<br><br>Stratigraphic sequence based on auger cuttings.<br><br>0'to 5' FILL consisting of brown fine to medium grain SAND including crushed limestone, gravel, and brick fragments.<br><br>5'to 12' FILL consisting of black asphaltic sand and gravel including oily cinders and soft clay.<br><br>Fill discontinues @ approx. 13'.<br><br>12' to 17' Gray silty clay.<br><br>17'to 23' Brown to gray fine grain SAND. Some silt. Wet.<br><br>23 to 27.5' Brown to gray medium grain SAND. Trace of small gravel. Wet.<br><br>27.5' to 27 3/4' Gray silty clay. Moist.<br><br>27 3/4' to 29' Gray fine grain SAND. |
| Three samples taken for screen placement. | | |
| 17.5 - 19 | 2-3-4 | Brown fine grain SAND. Wet. |
| 22.5 - 24 | 4-5-7 | Gray fine to medium grain SAND. Trace of coarse grain sand and small gravel. Wet. |
| 27.5 - 29 | 6-7-9 | 4" gray silty clay layer on top of gray fine grain SAND. Wet.<br><br>E.O.B. @ 29' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-4-87
Prepared by Tim Maley

Depth (ft) Description

EE – 16




Boring/Well No. I-9/EE-16
Location Site I
Owner IEPA
Top of Inner Casing Elev. 408.65
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/4/87,2/4/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 33 ft.
Casing and Screen Diam. 2 in.
Screen Interval 28 - 33 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.74 ft.
Well Type monitoring
Well Construction:
Filter Pack 33 - 21 ft. Natural
Seal 21 - 19 ft.
Grout 19 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 397.27 Date 3-26-87
Static Water Elev. 398.56 Date 5-11-87
Slug Test Yes ____ No X
Test Date
Hydraulic Conductivity
Other pH = 7.2
Cond. = 3000 umhos Temp. = 58° F
Dark, cloudy, strong odor

**WATER QUALITY**

Samples Taken Yes X No ____
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-23-86
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes X No ____
Recipient Sverdrup, Inc. for Cerro Copper

Comments Subsurface soil samples from boring 6.5 - 22.5 feet and 23.5 - 30' feet analyzed for HSL compounds.

**REMARKS**

Site Dead Creek Site-I

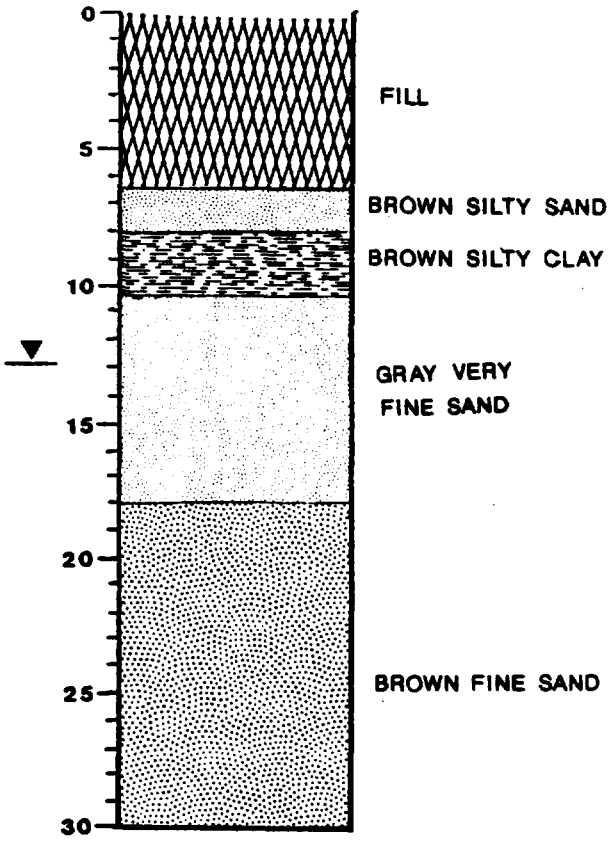
Boring/Well No. I-9/Well #EE-16

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Fill materials on surface. |
| 1 - 2.5 | 5-8-10 | FILL consisting of black clayey SAND and slag gravel. Dry. |
| 3.5 - 5 | 4-5-5 | FILL - same as above. |
| 6 - 7.5 | 2-6-6 | FILL consisting of black-brown sandy CLAY including a mixture of slag gravel, crushed limestone, and cinders. Dry. |
| 8.5 - 10 | 4-12-4 | FILL - same as above; mostly slag gravel and cinders. |
| 11 - 12.5 | 2-3-2 | WASTE consisting of black sandy oily stained sludge including a mixture of wood, cardboard, slag, and small spherical beads. Wet. |
| 13.5 - 15 | 4-10-19 | WASTE - same as above. Wet. |
| 16 - 17.5 | 100/6 | WASTE - no recovery; very difficult drilling due to large obstruction. |
| 18.5 - 20 | 6-12-9 | WASTE - cuttings from large obstruction showed a hard rubber or graphite material. |
| 21 - 22.5 | 72-100/6 | WASTE - no recovery; probably same fill materials. Fill appeared to discontinue @ 23'. |
| 23.5 - 25 | 4-4-5 | Black (stained) fine grain SAND. Wet (with oily sheen). |
| 26 - 27.5 | 5-6-12 | Same as above, heavy oily staining. |
| 28.5 - 30 | 7-12-9 | Same as above; with a trace of medium to coarse grain SAND. |
| | | E.O.B. - drill to 33' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-4-87
Prepared by Tim Maley

Depth (ft) Description

I-10




Boring/Well No. I-10
Location Site I
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/4 & 2/4/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 30.0 ft.
Casing and Screen Diam. ____
Screen Interval ____
Screen Type ____
Stickup ____
Well Type ____
Well Construction:
Filter Pack ____
Seal ____
Grout ____
Lock No. ____

**TEST DATA**

Static Water Elev. ____ Date ____
Static Water Elev. ____ Date ____
Slug Test Yes ____ No ____
Test Date ____
Hydraulic Conductivity ____
Other ____

**WATER QUALITY**

Samples Taken Yes ____ No X
No. of Samples ____
Types of Samples ____

Date Sampled ____
Samplers ____
Samples Analyzed for ____

Split Samples(soil) Yes X No ____
Recipient Sverdrup, Inc. for Cerro Copper

Comments Subsurface soil samples from boring 15 - 30' analyzed for HSL compounds.

**REMARKS**

Ground elev. 408.68

Site Dead Creek Site-I

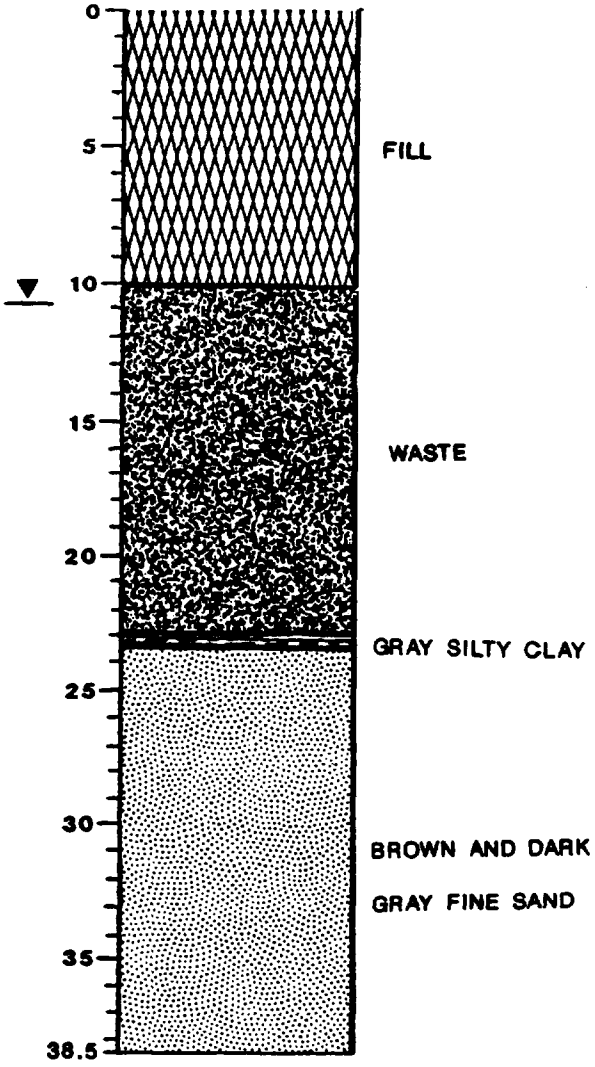
Boring/Well No. I-10

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | FILL material on surface. |
| 1 - 2.5 | 12-15-12 | FILL consisting of black-brown sandy CLAY including a mixture of wood, slag gravel, crushed limestone, a yellow powdery substance, and brick fragments. Dry. |
| 3.5 - 5 | 6-3-3 | FILL - same as above. |
| | | Fill discontinues @ approx. 6.5'. |
| 6 - 7.5 | 2-2-2 | From 6.5' - brown very fine silty SAND. Dry. Trace of clay @ 7.5'. |
| 8.5 - 10 | 4-3-3 | Brown silty CLAY. Trace of fine grain sand. Slightly mottled with gray stringers. Dry. |
| 11 - 12.5 | 6-6-8 | Gray very fine silty SAND. Moist. |
| 13.5 - 15 | 3-3-6 | Same as above. Wet. |
| 16 - 17.5 | 3-7-9 | Same as above. Less silty, wet. |
| 18.5 - 20 | 2-5-7 | Brown fine grain SAND. Black staining @ 19-19.5'. Wet. |
| 21 - 22.5 | 6-9-5 | Same as above. Becomes gray fine grain SAND. |
| 23.5 - 25 | 6-9-13 | Same as above. Black staining @ 24.5-25'. |
| 26 - 27.5 | 7-11-12 | Same as above. Black staining. |
| 28.5 - 30 | 11-12-14 | Same as above. |
| | | E.O.B. @ 30' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-5-87
Prepared by Tim Maley

Depth (ft) Description

I-11




Boring/Well No. I-11
Location Site I
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/5 & 2/5/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 38.5 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

**TEST DATA**

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

**WATER QUALITY**

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples(soil) Yes X No
Recipient Sverdrup, Inc. for Cerro Copper

Comments Subsurface soil samples from boring 6 - 20' & 26 - 38.5' analyzed for HSL compounds.

**REMARKS**

Ground elev. 405.88

Site Dead Creek Site-I  Boring/Well No. I-11

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Crushed limestone parking lot surface. |
| 1 - 2.5 | 11-7-13 | FILL consisting of black-dark brown sandy CLAY with brick fragments, crushed limestone, small gravel, and slag material. |
| 3.5 - 5 | 5-6-7 | Same as above. |
| 6 - 7.5 | 4-4-3 | FILL consisting of gray-black silty CLAY. Trace of medium grain sand and gravel. Moist. |
| 8.5 - 10 | 1-5-2 | FILL consisting of soft black-gray silty CLAY. Slightly mottled. Moist. |
| 11 - 12.5 | 3-2-2 | WASTE consisting of black soft sandy clay (sludge) with some debris including a hard rubber material and coarse grain sand. Wet with an oily sheen. |
| 13.5 - 15 | 4-5-4 | WASTE - same as above. More hard rubber material and black stained debris. |
| 16 - 17.5 | 7-11-9 | WASTE - same as above. Trace of paper products, clay, and small gravel. Wet with black oily sheen. |
| 18.5 - 20 | 7-22-9 | WASTE - same as above. |
| | | * Very difficult drilling @ 21'. Possible large metalic object encountered. Destroyed fish-tail bit on end of plug. Re-locate boring ~20' east. Continue logging @ 21-22.5'. |
| 21 - 22.5 | 2-2-4 | Poor recovery - WASTE consisting of black oily material with a hard rubber like debris. Wet. |
| | | WASTE discontinues @ approx. 23'. |
| 23.5 - 25 | 2-10-14 | 23.5-23 3/4 Thin soft gray silty clay layer. (~1" to 2" thick) Then brown fine grain SAND. Some black staining. Wet. |
| 26 - 27.5 | 1-2-5 | Dark gray fine grain SAND. Trace of medium to coarse grain sand. Wet with some black staining. |
| 28.5 - 30 | 5-8-14 | Same as above. Trace of small to medium gravel @ 29-30'. |
| 31 - 32.5 | 9-13-20 | Same as above. |

Site Dead Creek Site-I

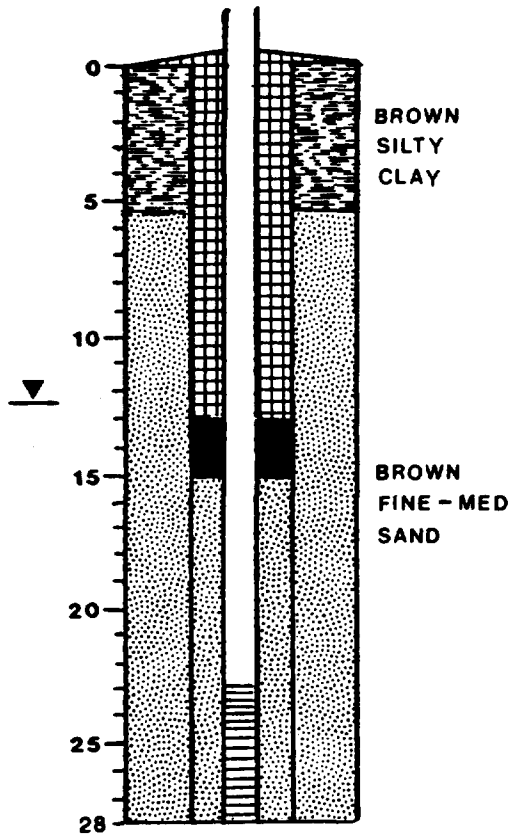
Boring/Well No. I-11 (cont.)

| Sample Depth | Blow Count | Description |
|---|---|---|
| 33.5 - 35 | 4-7-13 | Same as above. |
| 37 - 38.5 | 8-17-16 | Same as above. |
| | | E.O.B. @ 38.5' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-13-87
Prepared by Tim Maley

Depth (ft) Description

EE-20




Boring/Well No. I-12/EE-20
Location Site I
Owner IEPA
Top of Inner Casing Elev. 411.41
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/13, 2/13/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 28 ft.
Casing and Screen Diam. 2 in.
Screen Interval 23 - 28 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.41 ft.
Well Type monitoring
Well Construction:
Filter Pack 28 - 15 ft. Natural
Seal 15 - 13 ft.
Grout 13 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 397.49 Date 3-26-87
Static Water Elev. 398.91 Date 5-11-87
Slug Test Yes ____ No X
Test Date ____
Hydraulic Conductivity ____
Other ____

**WATER QUALITY**

Samples Taken Yes X No ____
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-23-87
Samplers E & E
Samples Analyzed for HSL compounds, volatile organics

Split Samples Yes X No ____
Recipient Sverdrup, Inc. for Cerro Copper

Comments Subsurface soil samples from boring 3.5 - 12.5 feet analyzed for HSL compounds.

**REMARKS**

Background location

Site Dead Creek Site-I

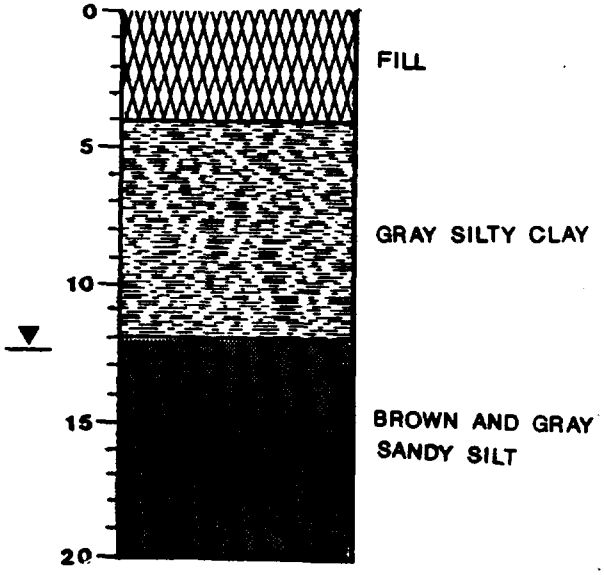
Boring/Well No. I-12/Well #EE-20

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Dark brown sandy clay topsoil on surface. |
| 1 - 2.5 | 2-3-2 | Brown silty CLAY. Dry. |
| 3.5 - 5 | 3-3-2 | Same as above. |
| 6 - 7.5 | 3-3-5 | Brown fine to medium grain SAND. Dry. |
| 8.5 - 10 | 3-5-8 | Same as above. |
| 11 - 12.5 | 3-5-8 | Same as above. Moist @ 12.5'. |
| 13.5 - 15 | 4-8-13 | Same as above. Wet. |
| 16 - 17.5 | 1-2-4 | Same as above. |
| 18.5 - 20 | 2-5-9 | Same as above. |
| 21 - 22.5 | 3-5-11 | Same as above. |
| 23.5 - 25 | 4-7-11 | Brown medium grain SAND. Wet. Trace of coarse grain sand @ 24-25'. |
| 26 - 27.5 | 7-11-20 | Same as above. Trace of small gravel. Wet. |
| | | E.O.B. @ 28' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 12-17-86
Prepared by Tim Maley

Depth (ft) Description

J-1




Boring/Well No. J-1
Location Site J
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 12/17,12/17/86
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 20.0 ft.
Casing and Screen Diam. ____
Screen Interval ____
Screen Type ____
Stickup ____
Well Type ____
Well Construction:
Filter Pack ____
Seal ____
Grout ____
Lock No. ____

**TEST DATA**

Static Water Elev. ____ Date ____
Static Water Elev. ____ Date ____
Slug Test Yes ____ No ____
Test Date ____
Hydraulic Conductivity ____
Other ____

**WATER QUALITY**

Samples Taken Yes ____ No X
No. of Samples ____
Types of Samples ____

Date Sampled ____
Samplers ____
Samples Analyzed for ____

Split Samples(soil) Yes X No ____
Recipient Sterling steel

Comments Subsurface soil sample from boring 10 - 20' analyzed for HSL compounds.

**REMARKS**

Ground elev. 411.76

Site Dead Creek Site-J

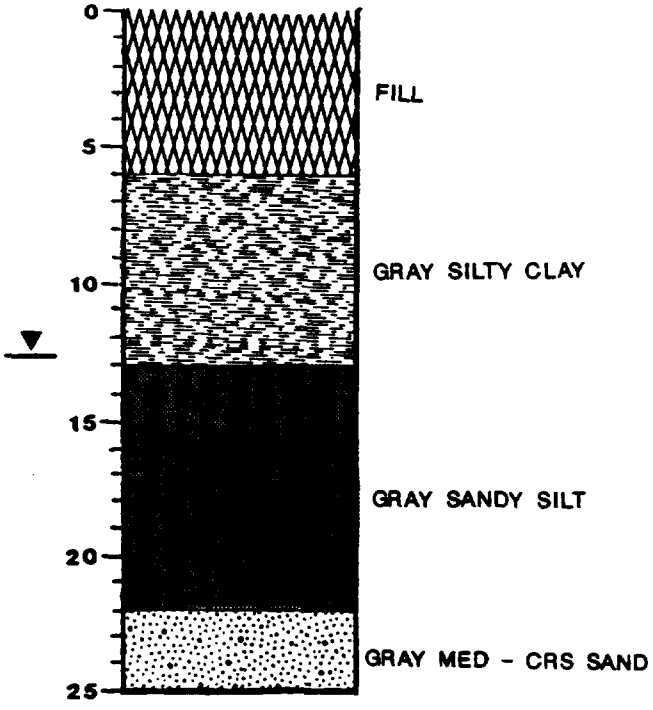
Boring/Well No. J-1

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Black foundry SAND on surface. |
| 1 - 2.5 | 4-4-8 | FILL consisting of black-dark brown-rust colored medium grain SAND. Trace of crushed limestone and brick fragments. |
| 3.5 - 5 | 2-5-6 | Foundry sand FILL to 4'. Then: Gray silty CLAY. Slightly mottled. Trace of fine grain sand. |
| 6 - 7.5 | 2-2-4 | Same as above. |
| 8.5 - 10 | 3-3-4 | Same as above. Siltier @ 10'. |
| 11 - 12.5 | 3-4-6 | Light brown silty SAND. Becomes sandy SILT at 12'. |
| 13.5 - 15 | 2-4-5 | Brown sandy SILT. Wet. |
| 16 - 17.5 | 3-5-6 | Same as above. |
| 18.5 - 20 | 2-2-3 | Dark gray sandy SILT. Some fine grain sand. Wet. |
| | | E.O.B. @ 20' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 12-17-86
Prepared by Tim Maley

Depth (ft) Description

J - 2




Boring/Well No. J-2
Location Site J
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 12/17,12/17/86
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 25.0 ft.
Casing and Screen Diam. ____
Screen Interval ____
Screen Type ____
Stickup ____
Well Type ____
Well Construction:
Filter Pack ____
Seal ____
Grout ____
Lock No. ____

**TEST DATA**

Static Water Elev. ____ Date ____
Static Water Elev. ____ Date ____
Slug Test Yes ____ No ____
Test Date ____
Hydraulic Conductivity ____
Other ____

**WATER QUALITY**

Samples Taken Yes ____ No X
No. of Samples ____
Types of Samples ____

Date Sampled ____
Samplers ____
Samples Analyzed for ____

Split Samples(soil) Yes X No ____
Recipient Sterling steel

Comments Subsurface soil samples from boring 15 - 25' analyzed for HSL compounds.

**REMARKS**

Gasoline odor

Ground elev. 413.10

Site Dead Creek Site-J

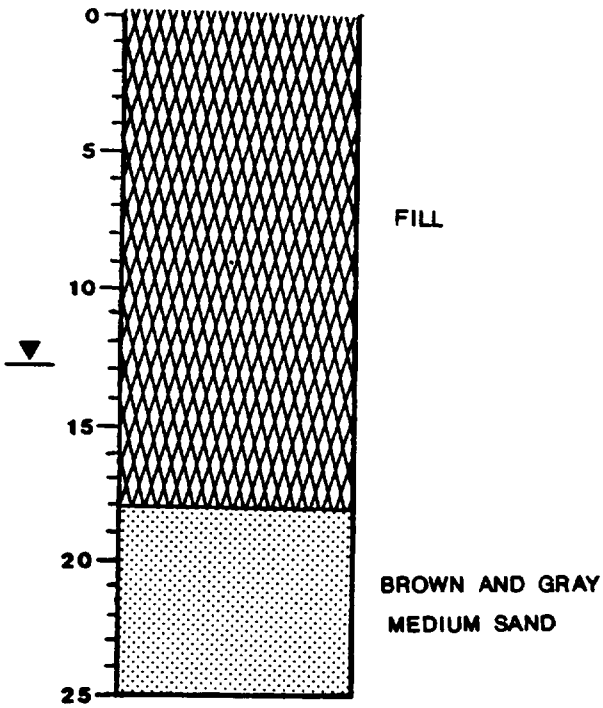
Boring/Well No. J-2

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Black foundry sand on surface. |
| 1 - 2.5 | 5-5-27 | FILL consisting of black-dark gray sandy CLAY. Some foundry sand and crushed limestone fragments. |
| 3.5 - 5 | 5-6-7 | Same as above. Fill discontinues @ approx. 6'. |
| 6 - 7.5 | 2-2-3 | Gray silty CLAY. Slightly mottled. Trace of fine grain sand. |
| 8.5 - 10 | 2-3-4 | Same as above. Siltier and trace of small gravel @ 10'. |
| 11 - 12.5 | 2-3-3 | Gray fine grain sandy SILT. Wet @ 13'. |
| 13.5 - 15 | 3-4-4 | Same as above. Wet. |
| 16 - 17.5 | 2-2-2 | Same as above. |
| 18.5 - 20 | 1-1-2 | Same as above. Varved @ 19'. |
| 21 - 22.5 | 1-1-9 | Gray medium to coarse grain SAND. Trace of small gravel. Wet. Gasoline odor. |
| 23.5 - 25 | 4-9-14 | Same as above. Wet. |
| | | E.O.B. @ 25' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 12-17-86
Prepared by Tim Maley

Depth (ft) Description

J - 3




Boring/Well No. J-3
Location Site J
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 12/17,12/17/86
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 25.0 ft.
Casing and Screen Diam. ____
Screen Interval ____
Screen Type ____
Stickup ____
Well Type ____
Well Construction:
Filter Pack ____
Seal ____
Grout ____
Lock No. ____

**TEST DATA**

Static Water Elev. ____ Date ____
Static Water Elev. ____ Date ____
Slug Test Yes ____ No ____
Test Date ____
Hydraulic Conductivity ____
Other ____

**WATER QUALITY**

Samples Taken Yes ____ No X
No. of Samples ____
Types of Samples ____

Date Sampled ____
Samplers ____
Samples Analyzed for ____

Split Samples(soil) Yes X No ____
Recipient Sverdrup, Inc. for Cerro Copper

Comments Subsurface soil sampled from boring 0 - 10' analyzed for HSL compounds.

**REMARKS**

Ground elev. 412.89

Site Dead Creek Site-J

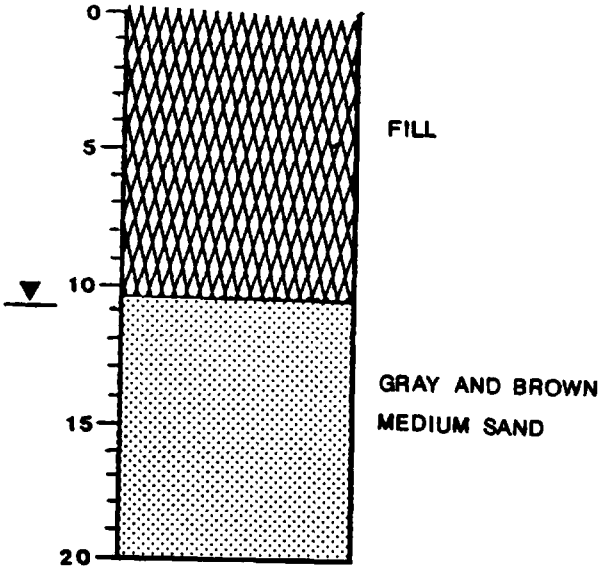
Boring/Well No. J-3

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Foundry sand on surface. |
| 1 - 2.5 | 4-5-8 | FILL consisting of black-dark brown sandy CLAY. Trace of medium grain sand (foundry) and brick fragments. |
| 3.5 - 5 | 6-9-14 | Same as above. Auger refusal at 5'. Large obstruction encountered. Moved boring 6' north. Continue sampling. |
| 6 - 7.5 | 2-2-3 | FILL consisting of black-dark brown sandy CLAY. Trace of medium grain foundry sand and slag material. Loose and dry @ 10'. |
| 8.5 - 10 | 3-3-3 | Same as above. |
| 11 - 12.5 | 2-2-1 | Same as above. Moist. |
| 13.5 - 15 | 1-2-3 | Same as above. Wet. |
| 16 - 17.5 | 1-2-8 | Same as above. Fill discontinues @ approx. 18'. |
| 18.5 - 20 | 2-5-7 | Brown-gray medium grain SAND. Wet. |
| 23.5 - 25 | 4-7-10 | Same as above. Increased coarse grain sand. |
| | | E.O.B. @ 25' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 12-16-86
Prepared by Tim Maley

Depth (ft) Description

K-1




Boring/Well No. K-1
Location Site K
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 12/16,12/16/86
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 20.0 ft.
Casing and Screen Diam. ____
Screen Interval ____
Screen Type ____
Stickup ____
Well Type ____
Well Construction:
Filter Pack ____
Seal ____
Grout ____
Lock No. ____

**TEST DATA**

Static Water Elev. ____ Date ____
Static Water Elev. ____ Date ____
Slug Test Yes ____ No ____
Test Date ____
Hydraulic Conductivity ____
Other ____

**WATER QUALITY**

Samples Taken Yes ____ No X
No. of Samples ____
Types of Samples ____

Date Sampled ____
Samplers ____
Samples Analyzed for ____

Split Samples Yes ____ No X
Recipient ____

Comments Subsurface soil samples from boring 0 - 10' analyzed for HSL compounds.

**REMARKS**

Ground elev. 405.86

Site Dead Creek Site-K

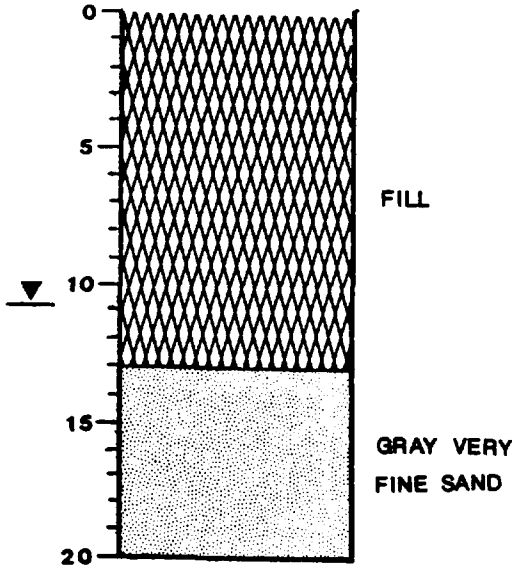
Boring/Well No. K-1

| Sample Depth | Blow Count | Description |
|---|---|---|
| 1 - 2.5 | 14-11-11 | FILL consisting of dark brown silty CLAY. With crushed limestone and brick fragments. Trace of medium grain sand and small gravel. |
| 3.5 - 5 | 2-2-1 | Same as above. Moist. |
| 6 - 7.5 | 1-2-1 | Same as above. |
| 8.5 - 10 | 2-3-6 | Same as above. Slightly stained. FILL discontinues @ approx. 10.5'. |
| 11 - 12.5 | 3-6-9 | Gray-brown medium grain SAND. Wet. Some black staining @ 11'. Thin clay layer at 12' (~3.5"). |
| 13.5 - 15 | 3-5-7 | Gray-brown medium grain SAND. Wet. |
| 16 - 17.5 | 3-3-4 | Gray-brown medium to coarse grain SAND. Trace of small gravel. Wet. |
| 18.5 - 20 | 2-3-4 | Same as above. |
| | | E.O.B. @ 20' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1/12/87
Prepared by Kevin Phillips

Depth (ft) Description

K – 2




Boring/Well No. K-2
Location Site K
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/12, 1/12/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 20.0 ft.
Casing and Screen Diam. ____
Screen Interval ____
Screen Type ____
Stickup ____
Well Type ____
Well Construction:
Filter Pack ____
Seal ____
Grout ____
Lock No. ____

**TEST DATA**

Static Water Elev. ____ Date ____
Static Water Elev. ____ Date ____
Slug Test Yes ____ No ____
Test Date ____
Hydraulic Conductivity ____
Other ____

**WATER QUALITY**

Samples Taken Yes ____ No X
No. of Samples ____
Types of Samples ____

Date Sampled ____
Samplers ____
Samples Analyzed for ____

Split Samples Yes ____ No X
Recipient ____

Comments Subsurface soil samples from boring 0 - 10' analyzed for HSL compounds.

**REMARKS**

Ground elev. 405.45

Site Dead Creek Site-K

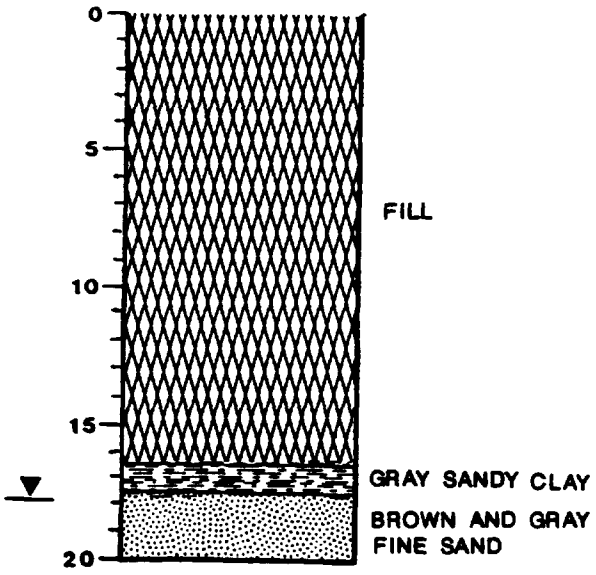
Boring/Well No. K-2

| Sample Depth | Blow Count | Description |
|---|---|---|
| 1 - 2.5 | 10-11-25 | FILL consisting of brown-gray-black sandy CLAY with crushed limestone, gravel, and brick fragments. Moist. |
| 3.5 - 5 | 3-4-5 | Same as above. |
| 6 - 7.5 | 1-2-2 | Same as above. Silty and soft. |
| 8.5 - 10 | 2-2-1 | Same as above. Trace of medium grain sand and small gravel. Very moist. |
| 11 - 12.5 | 3-3-4 | Same as above. Trace of wood chips. Wet. Fill discontinues @ approx. 13'. |
| 13.5 - 15 | 1-6-8 | Firm dark gray-gray very fine grain SAND. Well rounded and well sorted. Black streaking @ 13 3/4' (~2"). Wet. |
| 16 - 17.5 | 2-4-4 | Same as above. Natural black staining. |
| 18.5 - 20 | 10-11-14 | Same as above. Cleaner. Wet. |
| | | E.O.B. @ 20' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-22-87
Prepared by Tim Maley

Depth (ft) Description

K-3




Boring/Well No. K-3
Location Site K
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/22, 1/22/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 20.0 ft.
Casing and Screen Diam. ____
Screen Interval ____
Screen Type ____
Stickup ____
Well Type ____
Well Construction:
Filter Pack ____
Seal ____
Grout ____
Lock No. ____

**TEST DATA**

Static Water Elev. ____ Date ____
Static Water Elev. ____ Date ____
Slug Test Yes ____ No ____
Test Date ____
Hydraulic Conductivity ____
Other ____

**WATER QUALITY**

Samples Taken Yes ____ No X
No. of Samples ____
Types of Samples ____

Date Sampled ____
Samplers ____
Samples Analyzed for ____

Split Samples Yes ____ No X
Recipient ____

Comments Subsurface soil samples from boring 10 - 20' analyzed for HSL compounds.

**REMARKS**

Ground elev. 405.26

Site Dead Creek Site-K

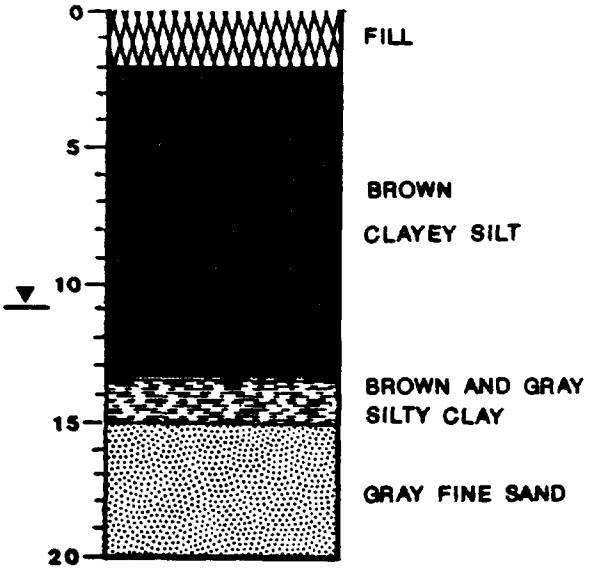
Boring/Well No. K-3

| Sample Depth | Blow Count | Description |
|---|---|---|
| 1 - 2.5 | 6-7-12 | FILL consisting of brown-black silty CLAY. Some small gravel and crushed limestone fragments. |
| 3.5 - 5 | 6-7-9 | FILL consisting of black sandy CLAY with small gravel, slag material, asphalt, and cinders. |
| 6 - 7.5 | 1-1-1 | FILL consisting of black clayey SAND. Trace of small gravel. Wet. |
| 8.5 - 10 | 1-2-1 | Same as above. |
| 11 - 12.5 | 1-2-2 | No recovery. |
| 13.5 - 15 | 4-10-5 | FILL consisting of soft black silty CLAY. Trace of fine to medium grain sand, small gravel, and limestone fragments. Wet. |
| | | Fill discontinues @ approx. 16.5'. |
| 16 - 17.5 | 2-3-6 | Gray sandy CLAY. Very moist. |
| 18.5 - 20 | 1-3-4 | Brown-gray fine grain SAND. Wet. |
| | | E.O.B. @ 20' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 12-11-86
Prepared by Kevin Phillips

Depth (ft) Description

L – 1




Boring/Well No. L-1
Location Site L
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 12/11,12/11/86
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 20.0 ft.
Casing and Screen Diam. ____
Screen Interval ____
Screen Type ____
Stickup ____
Well Type ____
Well Construction:
Filter Pack ____
Seal ____
Grout ____
Lock No. ____

**TEST DATA**

Static Water Elev. ____ Date ____
Static Water Elev. ____ Date ____
Slug Test Yes ____ No ____
Test Date ____
Hydraulic Conductivity ____
Other ____

**WATER QUALITY**

Samples Taken Yes ____ No X
No. of Samples ____
Types of Samples ____

Date Sampled ____
Samplers ____
Samples Analyzed for ____

Split Samples Yes ____ No X
Recipient ____

Comments Subsurface soil samples from boring 5 - 10' analyzed for HSL compounds.

**REMARKS**

Ground elev. 408.31

Site Dead Creek Site-L

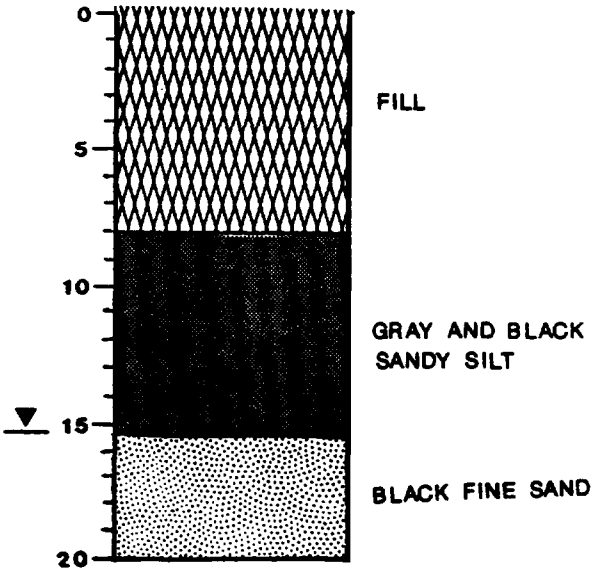
Boring/Well No. L-1

| Sample Depth | Blow Count | Description |
|---|---|---|
| 1 - 2.5 | 4-6-7 | 0-2 FILL consisting of black sandy clay with asphalt, cinders, and gravel.<br><br>Fill discontinues @ approx. 2'.<br><br>2-2.5 Brown silty CLAY. Some small gravel. Moist. |
| 3.5 - 5 | 4-4-3 | Brown clayey SILT. Little fine grain sand. Moist. |
| 6 - 7.5 | 3-3-6 | Same as above. |
| 8.5 - 10 | 2-2-2 | Same as above. Very moist. |
| 11 - 12.5 | 2-1-1 | Soft gray clayey SILT. Little fine grain sand. Wet. |
| 13.5 - 15 | 1-1-1 | Soft brownish-gray very silty CLAY. Trace of fine grain sand. Occasional thin seams of gray clayey silt. Moist. |
| 16 - 17.5 | WOR | Loose gray fine grain SAND. Wet. |
| 18.5 - 20 | 5-5-7 | Same as above. Wet.<br><br>E.O.B. @ 20' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 12-12-86
Prepared by Kevin Phillips

Depth (ft) Description

L-2




Boring/Well No. L-2
Location Site L
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 12/12,12/12/86
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 20.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

**TEST DATA**

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

**WATER QUALITY**

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples Yes No X
Recipient

Comments Subsurface soil samples from boring 5 - 15' analyzed for HSL compounds.

**REMARKS**

Strong organic odor

Ground elev. 407.32

Site Dead Creek Site-L

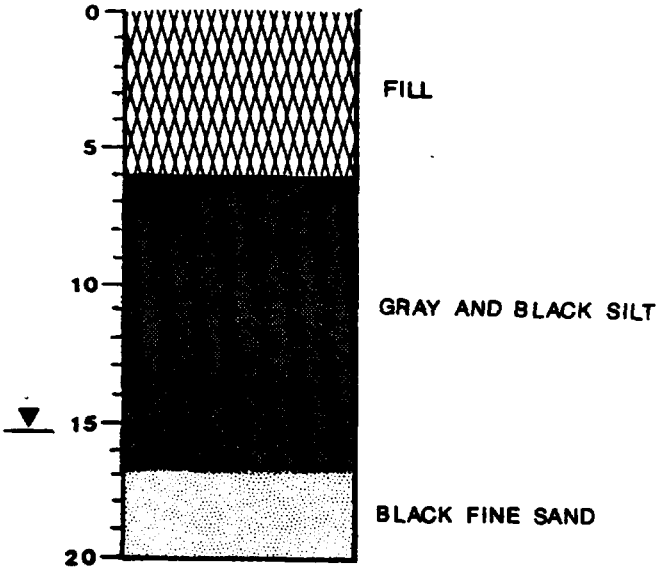
Boring/Well No. L-2

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | 0-1 Fill on surface - black cinders. |
| 1 - 2.5 | 4-12-60 | FILL consisting of black silty CLAY. Trace of small gravel and concrete fragments. Moist. |
| 3.5 - 5 | 8-5-7 | FILL consisting of hard dark gray silty CLAY. Trace of small gravel, brick fragments, and wood chips. |
| 6 - 7.5 | 2-4-8 | FILL consisting of black-gray silty CLAY. Trace of small gravel and wood chips. Very moist. Stained black. |
| | | Fill discontinues @ 8'. |
| 8.5 - 10 | 2-2-3 | Soft gray very sandy SILT. Some fine grain sand. Very moist. Black staining throughout. |
| 11 - 12.5 | 6-7-14 | Same as above. |
| 13.5 - 15 | 4-8-9 | Loose black sandy SILT. Some fine grain sand. Very moist. |
| 16 - 17.5 | 2-2-3 | Loose black fine grain SAND. Wet. |
| 18.5 - 20 | 2-3-6 | Same as above. Trace of silt. Wet. |
| | | E.O.B. @ 20'. |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 12-12-86
Prepared by Kevin Phillips

Depth (ft) Description

L-3




Boring/Well No. L-3
Location Site L
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 12/12,12/12/86
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 20.0 ft.
Casing and Screen Diam. ____
Screen Interval ____
Screen Type ____
Stickup ____
Well Type ____
Well Construction:
Filter Pack ____
Seal ____
Grout ____
Lock No. ____

**TEST DATA**

Static Water Elev. ____ Date ____
Static Water Elev. ____ Date ____
Slug Test Yes ____ No ____
Test Date ____
Hydraulic Conductivity ____
Other ____

**WATER QUALITY**

Samples Taken Yes ____ No X
No. of Samples ____
Types of Samples ____

Date Sampled ____
Samplers ____
Samples Analyzed for ____

Split Samples Yes ____ No X
Recipient ____

Comments Subsurface soil samples from boring 0 - 20' analyzed for HSL compounds.

**REMARKS**

Strong organic odor

Ground elev. 407.90

Site Dead Creek Site-L

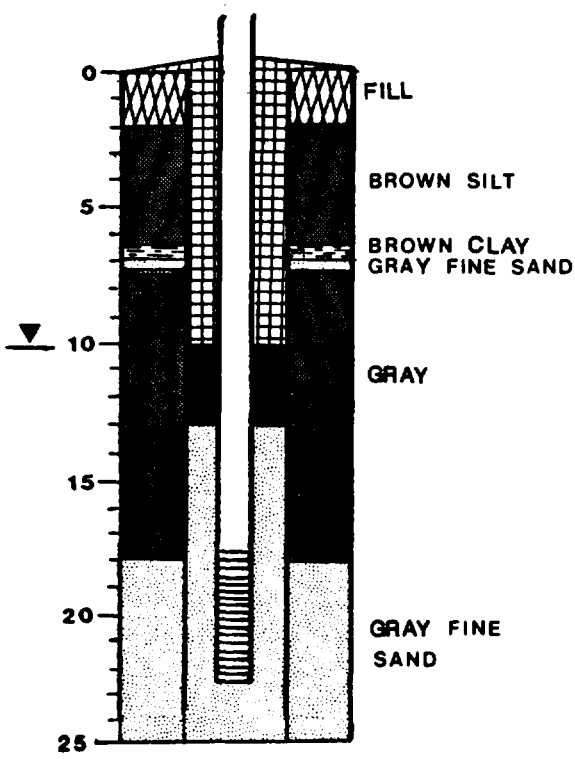
Boring/Well No. L-3

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | 0-1 Black cinders FILL |
| 1 - 2.5 | 6-7-9 | FILL consisting of stiff brown-gray silty CLAY. Trace of fine grain sand, small gravel, and brick fragments. Moist. |
| 3.5 - 5 | 5-5-6 | FILL consisting of stiff gray silty CLAY. Little small gravel; trace of fine grain sand, large gravel, brick fragments, and wood chips. Moist. |
| | | Fill apparently discontinues @ approx. 6'. |
| 6 - 7.5 | 2-2-3 | 6-6.5 Loose dark gray SILT. Stained black.<br>6.5-7.5 Loose brownish gray very sandy SILT. Some fine grain sand. Moist. |
| 8.5 - 10 | 3-4-6 | Firm, gray clayey SILT. Some brownish staining. Trace of fine grain sand. Moist. Mottled. |
| 11 - 12.5 | 3-3-5 | Firm black clayey SILT. Some clay. Little fine grain sand. Very moist. |
| 13.5 - 15 | 3-3-5 | Firm black-gray sandy SILT. Some fine grain sand. Little clay. Moist. |
| 16 - 17.5 | 2-5-10 | 16-17 Same as above. Wet.<br>17-17.5 Black silty SAND. Wet. |
| 18.5 - 20 | 1-2-4 | Firm black fine grain SAND. Well sorted. Wet. |
| | | E.O.B. @ 20' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 12-16-86
Prepared by Tim Maley

Depth (ft) Description

EE-G109




(IEPA well replaced)
Boring/Well No. L-4/EE-G109
Location Site L
Owner IEPA
Top of Inner Casing Elev. 409.71
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 12/16,12/16/86
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 25.0 ft.
Casing and Screen Diam. 2 in.
Screen Interval 17.5 - 22.5 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.94 ft.
Well Type monitoring
Well Construction:
Filter Pack 25 - 13 ft.
Seal 13 - 10 ft.
Grout 10 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 397.42 Date 3-26-87
Static Water Elev. 398.45 Date 5-11-87
Slug Test Yes ____ No X
Test Date
Hydraulic Conductivity
Other pH = 5.0
Cond. = 4500 umhos Temp. = 58° F
Cloudy, dark, strong odor

**WATER QUALITY**

Samples Taken Yes X No ____
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-24-87
Samplers E & E
Samples Analyzed for HSL compounds, volatile organics

Split Samples Yes ____ No X
Recipient

Comments Subsurface soil samples from boring 10' - 20' analyzed for HSL compounds.

**REMARKS**

Site Dead Creek Site-L

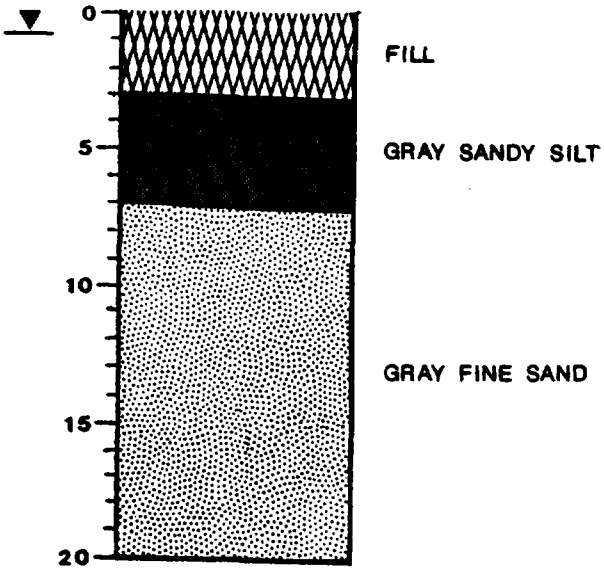
Boring/Well No. L-4/Well # EE-G109
(IEPA Replacement Well)

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | 0-2' FILL consisting of black asphalt and clay. |
| 1 - 2.5 | 5-6-7 | from 2' Brown sandy SILT. Moist. |
| 3.5 - 5 | 3-3-4 | Brown sandy SILT. Trace of medium grain sand. |
| 6 - 7.5 | 3-4-4 | 6.5-7 Brown silty CLAY. Trace of fine grain sand.<br>7-7.5 Gray fine grain SAND. Trace of silt and clay. |
| 8.5 - 10 | 3-4-6 | Brown-gray (mottled) clayey SILT. Trace of fine grain sand. Moist. |
| 11 - 12.5 | 4-7-8 | Gray sandy SILT. Wet. |
| 13.5 - 15 | 6-11-13 | Same as above. Trace of fine grain sand. |
| 16 - 17.5 | 8-14-34 | Stiff gray sandy SILT. Thin laminated black-gray layering. |
| 18.5 - 20 | 8-13-15 | Gray fine grain SAND. Wet. |
| 21 - 22.5 | 9-12-17 | Same as above. |
| 23.5 - 25 | 7-14-18 | Dark gray fine to coarse grain SAND. Some black staining. Wet. |
| | | E.O.B. @ 25' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 12-15-86
Prepared by Kevin Phillips

Depth (ft) Description

N - 1




Boring/Well No. N-1
Location Site N
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 12/15,12/15/86
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 20.0 ft.
Casing and Screen Diam. ____
Screen Interval ____
Screen Type ____
Stickup ____
Well Type ____
Well Construction:
Filter Pack ____
Seal ____
Grout ____
Lock No. ____

**TEST DATA**

Static Water Elev. ____ Date ____
Static Water Elev. ____ Date ____
Slug Test Yes ____ No ____
Test Date ____
Hydraulic Conductivity ____
Other ____

**WATER QUALITY**

Samples Taken Yes ____ No X
No. of Samples ____
Types of Samples ____

Date Sampled ____
Samplers ____
Samples Analyzed for ____

Split Samples Yes ____ No X
Recipient ____

Comments Subsurface soil samples from boring 0 - 10' analyzed for HSL compounds.

**REMARKS**

Site Dead Creek Site-N

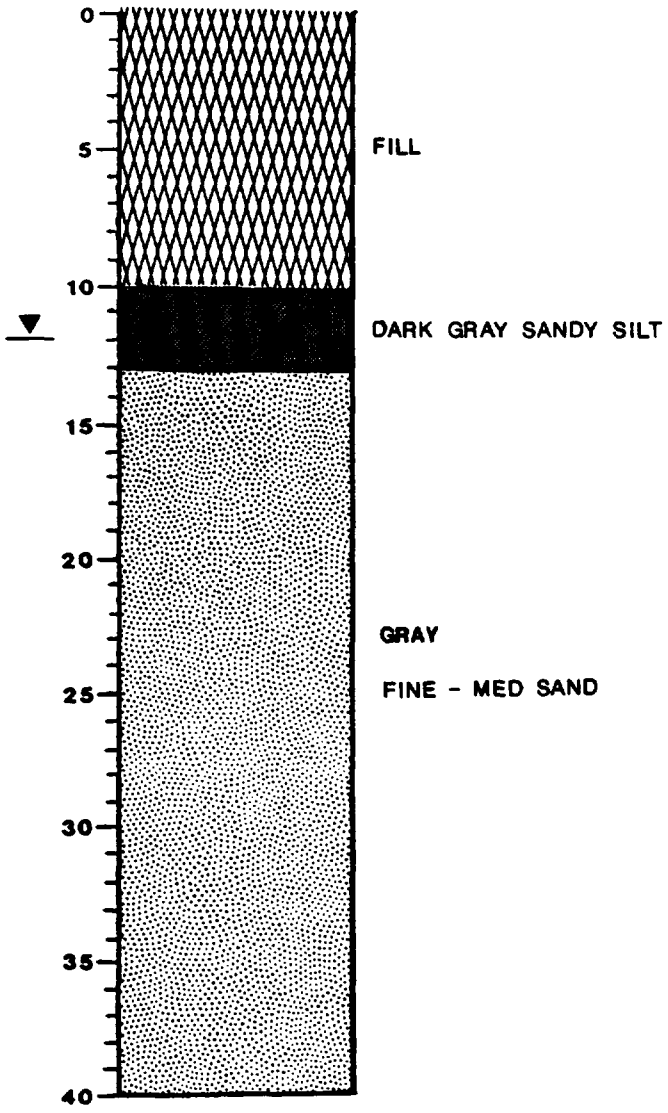
Boring/Well No. N-1

| Sample Depth | Blow Count | Description |
|---|---|---|
| 1 - 2.5 | 4-6-10 | 0-2.5 FILL consisting of crushed limestone, gravel, and fine to coarse grain sand. Wet.<br><br>Fill discontinues @ 3'. |
| 3.5 - 5 | 3-9-9 | 3.5-4 Stiff gray very sandy SILT. Some fine grain sand. Wet.<br>4-5 Brown silty fine grain SAND. Wet. |
| 6 - 7.5 | 2-4-3 | 6-7 Loose gray very sandy SILT. Some fine grain sand. Black and reddish staining throughout. Wet.<br>7-7.5 Loose brownish gray fine to medium grain SAND. Some reddish staining. Wet. |
| 8.5 - 10 | 2-4-7 | Loose gray sandy SILT. Some fine grain sand. Trace of organic material (wood, etc.). Stained black. Wet. |
| 11 - 12.5 | 1-2-5 | Loose brown very silty fine grain SAND. Some silt. Black stained layer at 12' (-1") |
| 13.5 - 15 | 1-3-3 | Same as above. |
| 16 - 17.5 | 2-5-7 | Firm gray silty fine grain SAND. Trace of small to medium gravel. Wet. |
| 18.5 - 20 | 2-3-7 | Firm gray fine grain SAND. Wet. |
| | | E.O.B. @ 20' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 12-15-86
Prepared by Kevin Phillips

Depth (ft) Description

N-2




Boring/Well No. N-2
Location Site N
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 12/15,12/15/86
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers and rotary

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 40.0 ft.
Casing and Screen Diam. ____
Screen Interval ____
Screen Type ____
Stickup ____
Well Type ____
Well Construction:
Filter Pack ____
Seal ____
Grout ____
Lock No. ____

**TEST DATA**

Static Water Elev. ____ Date ____
Static Water Elev. ____ Date ____
Slug Test Yes ____ No ____
Test Date ____
Hydraulic Conductivity ____
Other ____

**WATER QUALITY**

Samples Taken Yes ____ No X
No. of Samples ____
Types of Samples ____

Date Sampled ____
Samplers ____
Samples Analyzed for ____

Split Samples Yes ____ No X
Recipient ____

Comments Subsurface soil samples from boring 5 - 15' analyzed for HSL compounds.

**REMARKS**

Site Dead Creek Site-N

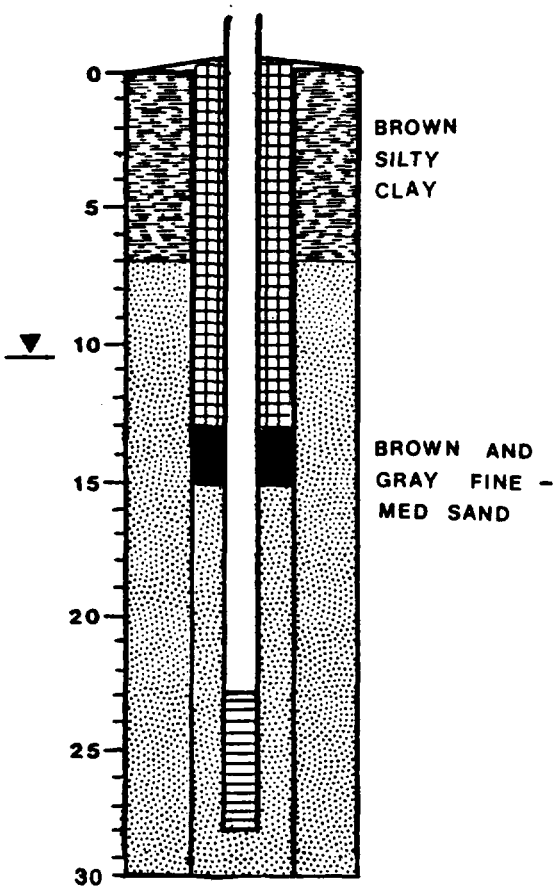
Boring/Well No. N-2

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | 0-1 Crushed limestone fill |
| 1 - 2.5 | 9-10-12 | 1-2 Crushed lime fill<br>2-2.5 FILL consisting of loose dark gray very sandy SILT. Some fine grain sand. Trace of organic material (wood & roots). |
| 3.5 - 5 | N | No recovery - possible rubber tire |
| 6 - 7.5 | N | No recovery - possible concrete |
| 8.5 - 10 | 47-6-2 | FILL consisting of dark gray silty clay with concrete material and gravel. Fill discontinues @ approx. 10'. |
| 11 - 12.5 | 6-10-9 | Firm dark gray very sandy SILT. Some very fine grain sand. Trace of organic material (wood and roots). Black streaks. Wet. |
| 13.5 - 15 | 3-4-4 | Firm gray fine to medium grain SAND. Trace of small to medium gravel. Wet. Sand is rounded to sub angular and fairly well to poorly sorted. |
| 16 - 17.5 | 7-11-12 | Gray fine to medium grain SAND. Trace of small gravel. Wet. |
| 18.5 - 20 | 8-12-14 | Dense brown fine to medium grain SAND. Well sorted. Wet. |
| 21 - 22.5 | 9-13-15 | Same as above. |
| 23.5 - 25 | 9-11-15 | Dense gray fine to medium SAND. Trace of coarse grain sand and small gravel. Wet. |
| 26 - 27.5 | 8-12-13 | Dense gray fine to coarse grain SAND. Trace of small gravel. Wet. |
| 28.5 - 30 | 9-14-23 | Same as above. |
| 31 - 32.5 | 7-9-11 | Dense gray very fine grain SAND. Wet. |
| 33.5 - 35 | 6-8-10 | Same as above. Darker gray. |
| 36 - 37.5 | 12-17-23 | Very dense. Gray fine to coarse grain SAND. Wet. |
| 38.5 - 40 | 8-9-12 | Same as above. |
| | | E.O.B. @ 40' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-16-87
Prepared by Tim Maley

Depth (ft) Description

EE-21




Boring/Well No. O-1/EE-21
Location Site O
Owner IEPA
Top of Inner Casing Elev. 407.41
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/16, 2/16/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 30 ft.
Casing and Screen Diam. 2 in.
Screen Interval 23 - 28 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.13 ft.
Well Type monitoring
Well Construction:
Filter Pack 28 - 15 ft. Natural
Seal 15 - 13 ft.
Grout 13 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 395.77 Date 3-26-87
Static Water Elev. 397.56 Date 5-11-87
Slug Test Yes X No
Test Date 5-12-87
Hydraulic Conductivity 2.3 x $10^{-3}$cm/sec
Other pH = 6.8
Cond. = 1800 umhos Temp. = 58° F
Cloudy, yellowish

**WATER QUALITY**

Samples Taken Yes X No
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-24-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes X No
Recipient Geraghty & Miller for the Village of Sauget

Comments Subsurface soil samples from boring 15 - 25 feet analyzed for HSL compounds.

**REMARKS**

Site Dead Creek Site-O

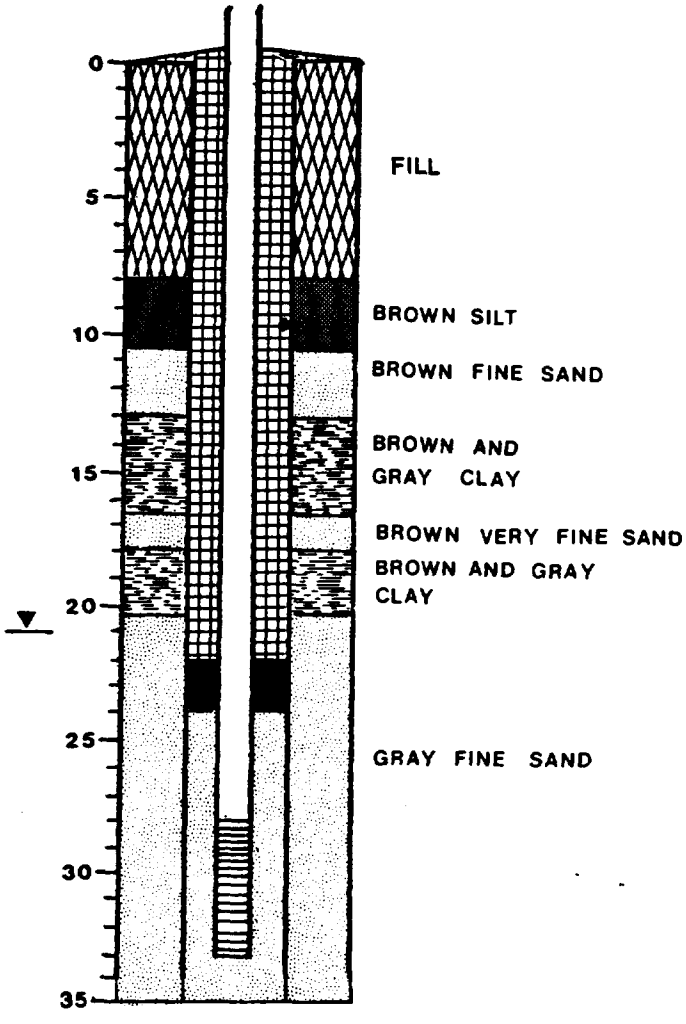
Boring/Well No. O-1/Well #EE-21

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Grassy field on surface |
| 1 - 2.5 | 4-5-4 | Brown silty CLAY. Trace of very fine grain sand. Dry. |
| 3.5 - 5 | 1-2-2 | Same as above. |
| 6 - 7.5 | 1-1-3 | Same as above. |
| 8.5 - 10 | 3-3-6 | Brown fine grain SAND. Trace of silt. Dry. |
| 11 - 12.5 | 5-5-6 | Same as above. Trace of medium grain sand. Moist. |
| 13.5 - 15 | 1-3-5 | Brown medium grain SAND. Trace of coarse grain sand. Wet. Thin gray silty clay layer at 14' ( 2") |
| 16 - 17.5 | 1-3-6 | Gray fine grain SAND. Wet. Trace of thin gray silty clay layers at 16.5' ( 1") |
| 18.5 - 20 | 1-5-5 | Gray medium grain SAND. Trace of coarse grain sand and small to large gravel. Wet. |
| 21 - 22.5 | 7-7-6 | Same as above. |
| 23.5 - 25 | 4-5-7 | Same as above. |
| 28.5 - 30 | 5-3-3 | Same as above. |
| | | E.O.B. @ 30' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-17-87
Prepared by Tim Maley

Depth (ft) Description

EE-22




Boring/Well No. O-2/EE-22
Location Site O
Owner IEPA
Top of Inner Casing Elev. 416.26
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/17, 1/17/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 35 ft.
Casing and Screen Diam. 2 in.
Screen Interval 28 - 33 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.54 ft.
Well Type monitoring
Well Construction:
Filter Pack 33 - 24 ft. Natural
Seal 24 - 22 ft.
Grout 22 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 394.98 Date 3-26-87
Static Water Elev. 396.57 Date 5-11-87
Slug Test Yes ____ No X
Test Date
Hydraulic Conductivity
Other pH = 69
Cond. = 3600 umhos Temp. = 56° F
Strong odor, cloudy, dark brown

**WATER QUALITY**

Samples Taken Yes X No ____
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-24-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes X No ____
Recipient Geraghty & Miller for the Village of Sauget

Comments Subsurface soil samples from boring 20 - 30' analyzed for HSL compounds.

**REMARKS**

Site Dead Creek Site-O

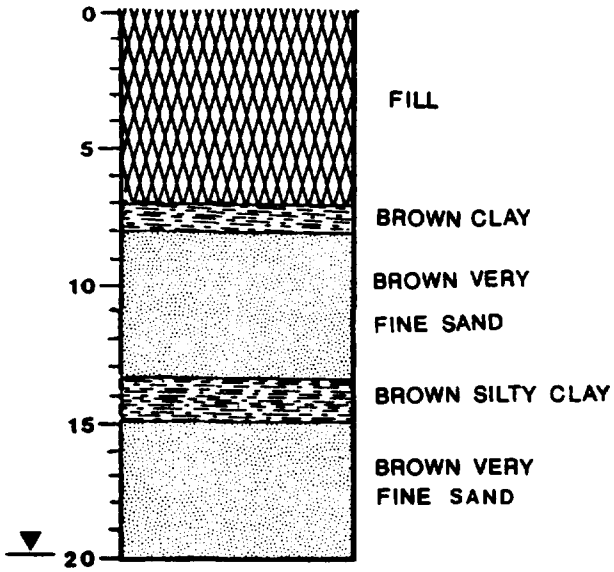
Boring/Well No. O-2/Well #EE-22

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Well vegetated clay cap. |
| 1 - 2.5 | 2-4-8 | FILL consisting of brown silty CLAY. Trace of very fine grain sand. |
| 3.5 - 5 | 3-5-6 | Same as above. |
| 6 - 7.5 | 2-2-2 | Soft black silty CLAY. Black sponge-like substance @ 7.5' ( .5') |
| | | Fill discontinues @ approx. 8'. |
| 8.5 - 10 | 3-5-7 | Brown sandy SILT. Trace of fine grain sand. Dry. |
| 11 - 12.5 | 3-5-7 | Brown fine grain SAND. Dry. |
| 13.5 - 15 | 1-1-1 | Soft brown-gray silty CLAY. Trace of very fine grain sand. Moist. |
| 16 - 17.5 | 3-6-6 | Brown very fine grain SAND. Dry. |
| 18.5 - 20 | 2-3-3 | Brown-gray silty CLAY: mottled. Trace of very fine grain sand. Moist. |
| 21 - 22.5 | 1-1-8 | Gray fine grain SAND. Wet. |
| 23.5 - 25 | 7-19-25 | Same as above. |
| 26 - 27.5 | 6-9-29 | Same as above. |
| 28.5 - 30 | 5-10-11 | Same as above. |
| 33.5 - 35 | 6-8-12 | Same as above: oily sheen @ 34' |
| | | E.O.B. @ 35' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-17-87
Prepared by Tim Maley

Depth (ft) Description

O-3




Boring/Well No. O-3
Location Site O
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/17, 2/17/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 20.0 ft.
Casing and Screen Diam. ____
Screen Interval ____
Screen Type ____
Stickup ____
Well Type ____
Well Construction:
Filter Pack ____
Seal ____
Grout ____
Lock No. ____

**TEST DATA**

Static Water Elev. ____ Date ____
Static Water Elev. ____ Date ____
Slug Test Yes ____ No ____
Test Date ____
Hydraulic Conductivity ____
Other ____

**WATER QUALITY**

Samples Taken Yes ____ No X
No. of Samples ____
Types of Samples ____

Date Sampled ____
Samplers ____
Samples Analyzed for ____

Split Samples(soil)Yes X No ____
Recipient Geraghty & Miller for the Village of Sauget

Comments Subsurface soil samples from boring 10 - 20' analyzed for HSL compounds.

**REMARKS**

Ground elev. 414.16

Site Dead Creek Site-O

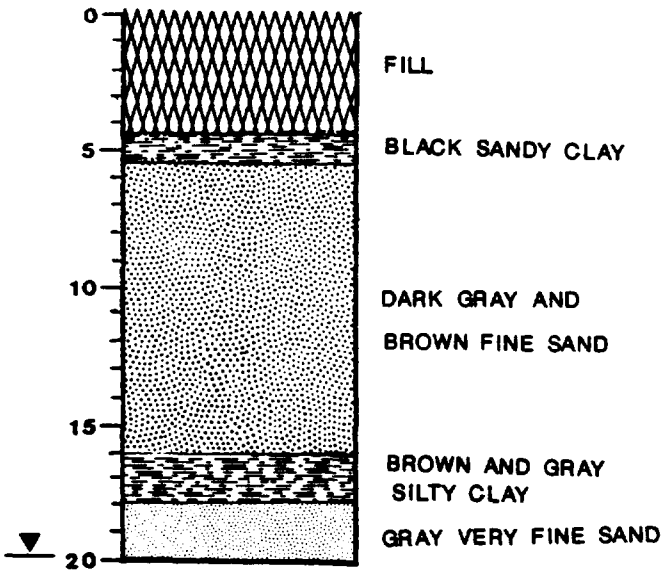
Boring/Well No. O-3

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Well vegetated clay cap. |
| 1 - 2 | 5-5-7 | FILL consisting of dense brown silty CLAY. Trace of very fine grain sand. |
| 3.5 - 5 | 2-1-2 | Same as above. |
| 6 - 7.5 | 1-2-2 | Same to 6.5'<br>6.5-8' Black sponge-like substance. Sludge.<br>Fill discontinues @ approx. 8'. |
| 8.5 - 10 | 3-6-7 | Brown very fine grain SAND. Trace of silt. Dry. |
| 11 - 12.5 | 3-2-3 | Same as above. |
| 13.5 - 15 | 3-2-3 | Brown silty CLAY. Trace of very fine grain sand. Slightly mottled. Moist. |
| 16 - 17.5 | 3-5-8 | Brown silty very fine grain SAND. Dry. |
| 18.5 - 20 | 7-7-7 | Brown very fine grain SAND. Wet @ 20'. |
| | | E.O.B. @ 20' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-17-87
Prepared by Tim Maley

Depth (ft) Description

O-4




Boring/Well No. O-4
Location Site O
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/17, 2/17/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 20.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

**TEST DATA**

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

**WATER QUALITY**

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples(soil) Yes X No
Recipient Geraghty & Miller for the Village of Sauget

Comments Subsurface soil samples from boring 0 - 10' analyzed for HSL compounds.

**REMARKS**

Strong organic odor

Ground elev. 412.62

Site Dead Creek Site-O

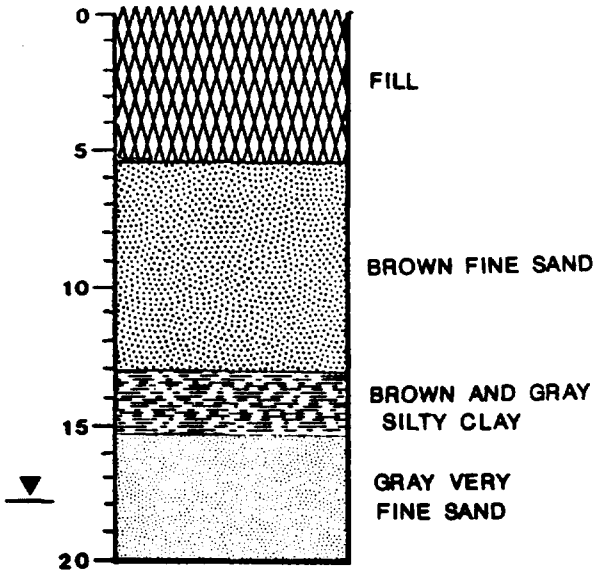
Boring/Well No. O-4

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Well vegetated clay cap. |
| 1 - 2.5 | 1-2-2 | FILL consisting of dense brown silty CLAY. Trace of fine grain sand. |
| 3.5 - 5 | 6-3-4 | Same as above to 4'.<br>4-5.5' Black clay-like sludge. |
| 6 - 7.5 | 1-3-4 | Dark greenish-gray very fine grain SAND. Trace of silt. Dry. |
| 8.5 - 10 | 4-6-8 | Dark brown very fine grain SAND. Trace of clay and silt in thin layers. |
| 11 - 12.5 | 4-4-5 | Light brown fine to medium grain SAND. Dry. |
| 13.5 - 15 | 3-4-5 | Brown very fine grain SAND. Trace of silt. Dry. |
| 16 - 17.5 | 1-3-4 | Brown-gray silty CLAY. Trace of very fine grain sand. Dry. Soft black silty clay layer @ 17 1/4' (~2") |
| 18.5 - 20 | 6-6-7 | Gray very fine grain SAND. Trace of silt and medium grain sand. Wet @ 20'. |
| | | E.O.B. @ 20' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-17-87
Prepared by Tim Maley

Depth (ft) Description

O-5




Boring/Well No. O-5
Location Site O
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/17, 2/17/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 20.0 ft.
Casing and Screen Diam. ____
Screen Interval ____
Screen Type ____
Stickup ____
Well Type ____
Well Construction:
Filter Pack ____
Seal ____
Grout ____
Lock No. ____

**TEST DATA**

Static Water Elev. ____ Date ____
Static Water Elev. ____ Date ____
Slug Test Yes ____ No ____
Test Date ____
Hydraulic Conductivity ____
Other ____

**WATER QUALITY**

Samples Taken Yes ____ No X
No. of Samples ____
Types of Samples ____

Date Sampled ____
Samplers ____
Samples Analyzed for ____

Split Samples(soil) Yes X No ____
Recipient Geraghty & Miller for the Village of Sauget

Comments Subsurface soil samples from boring 8.5 - 20' analyzed for HSL compounds.

**REMARKS**

Strong organic odor

Ground elev. 413.12

Site Dead Creek Site-O

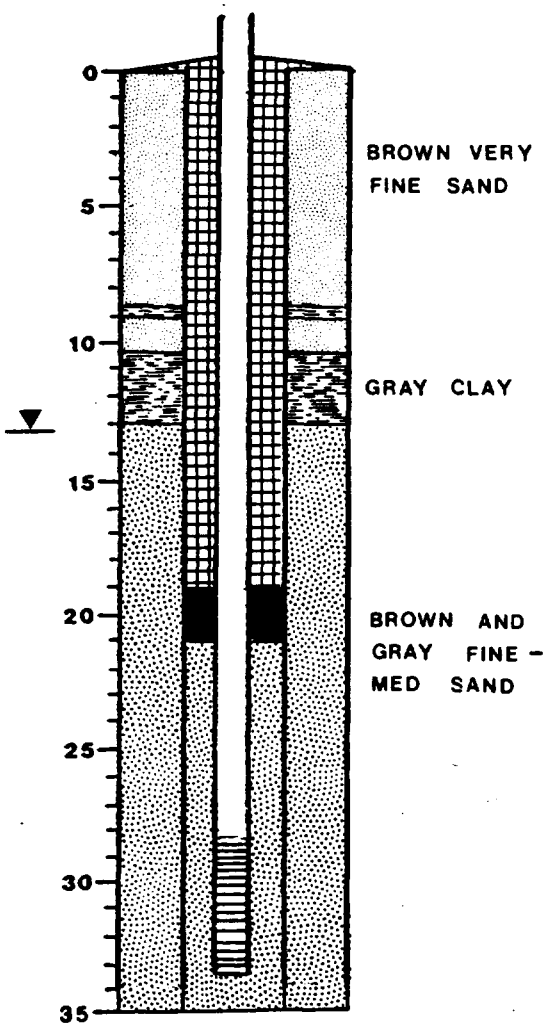
Boring/Well No. O-5

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Well Vegetated clay cap. |
| 1 - 2.5 | 1-2-2 | FILL consisting of soft brown silty CLAY. |
| 3.5 - 5 | 1-1-1 | Same as above.<br>Fill discontinues @ approx. 5.5'. |
| 6 - 7.5 | 4-4-4 | Brown very fine grain SAND. Some silt. Dry. |
| 8.5 - 10 | 2-5-7 | Brown fine grain SAND. |
| 11 - 12.5 | 3-4-3 | Same as above. |
| 13.5 - 15 | 2-3-4 | Brown-gray silty CLAY. Some interbedding of silty very fine grain sand. Dry. |
| 16 - 17.5 | 2-2-2 | Gray very fine grain SAND. Trace of silt. Moist @ 17'. |
| 18.5 - 20 | 3-6-8 | Same as above. Wet. |
| | | E.O.B. @ 20' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-18-87
Prepared by Tim Maley

Depth (ft) Description

EE-23




Boring/Well No. O-6/EE-23
Location Site O
Owner IEPA
Top of Inner Casing Elev. 410.67
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/18, 2/18/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 35.0 ft.
Casing and Screen Diam. 2 in.
Screen Interval 28.5 - 33.5 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.58 ft.
Well Type Monitoring
Well Construction:
Filter Pack 33.5 - 21 ft. Natural
Seal 21 - 19 ft.
Grout 19 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 395.95 Date 3-26-87
Static Water Elev. 397.77 Date 5-11-87
Slug Test Yes ____ No X
Test Date
Hydraulic Conductivity
Other pH = 7.0
Cond. = 1300 umhos Temp. = 56° F
Cloudy, yellowish green, slight odor

**WATER QUALITY**

Samples Taken Yes X No ____
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-24-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes X No ____
Recipient Geraghty & Miller for the Village of Sauget

Comments Subsurface soil samples from boring 15 - 25 feet analyzed for HSL compounds.

**REMARKS**

Site Dead Creek Site-O

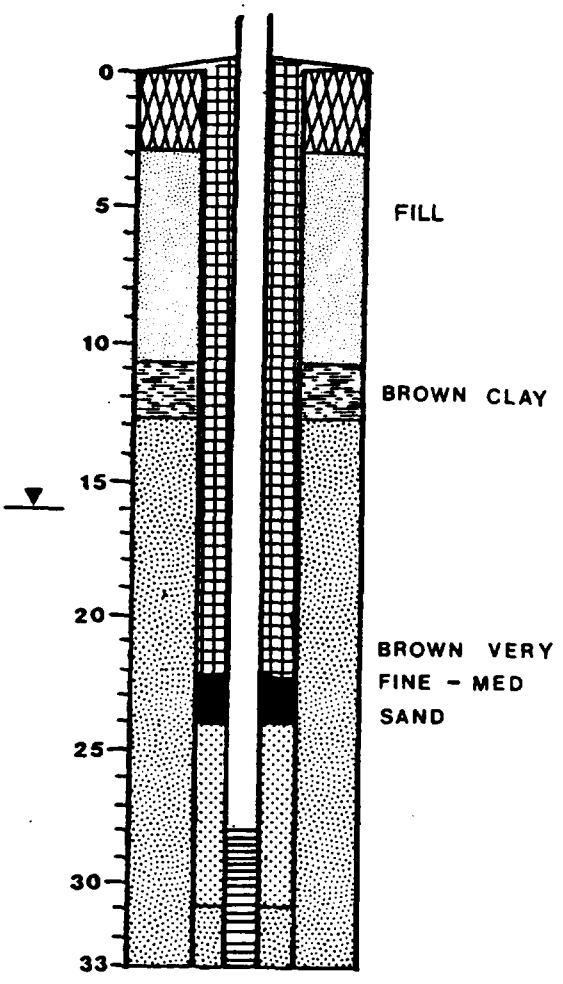
Boring/Well No. O-6/Well #EE-23

| Sample Depth | Blow Count | Description |
|---|---|---|
| 1 - 2.5 | 1-2-1 | Brown very fine grain SAND. Trace of silt. Dry. |
| 3.5 - 5 | 1-2-1 | Same as above. |
| 6 - 7.5 | 2-3-2 | Same as above. Increased amount of silt. |
| 8.5 - 10 | 1-2-2 | Same as above. Brown-gray silty CLAY layer @ 8.5-9'. |
| 11 - 12.5 | 1-1-2 | Soft gray silty CLAY. Trace of very fine grain sand. Moist. |
| 13.5 - 15 | 1-1-3 | Brown fine to medium grain SAND. Wet. |
| 16 - 17.5 | 2-6-10 | Brown very fine grain SAND. Trace of silt. Wet. Two thin gray silty clay layers (-1") @ 16 3/4'. |
| 18.5 - 20 | 2-6-10 | Brown fine to medium grain SAND. Wet. |
| 21 - 22.5 | 8-3-14 | Brown medium grain SAND. Trace of coarse grain sand and small gravel. Wet. |
| 23.5 - 25 | 4-7-10 | Same as above. |
| 26 - 27.5 | 4-8-16 | Gray fine to medium grain SAND. Trace of small gravel. Wet. |
| 28.5 - 30 | 4-6-9 | Same as above. |
| 33.5 - 35 | 5-7-11 | Same as above. |
| | | E.O.B. @ 35' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-19-87
Prepared by Tim Maley

Depth (ft) Description

EE-24




Boring/Well No. O-7/EE-24
Location Site O
Owner IEPA
Top of Inner Casing Elev. 411.00
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/19, 2/19/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 33.0 ft.
Casing and Screen Diam. 2 in.
Screen Interval 28 - 33 ft.
Screen Type stainless steel 0.01" slot
Stickup 0.98 ft.
Well Type Monitoring
Well Construction:
Filter Pack 33 - 24 ft.
Seal 24 - 22.5 ft.
Grout 22.5 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 395.04 Date 3-26-87
Static Water Elev. 396.84 Date 5-11-87
Slug Test Yes X No
Test Date 5-12-87
Hydraulic Conductivity 0.65 $x10^{-3}$cm/sec
Other pH = 7.2
Cond. = 4200 umhos Temp. = 58° F
Very cloudy, yellowish, slight odor

**WATER QUALITY**

Samples Taken Yes X No
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-24-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes X No
Recipient Geraghty & Miller for the Village of Sauget

Comments

**REMARKS**

Site Dead Creek Site-O

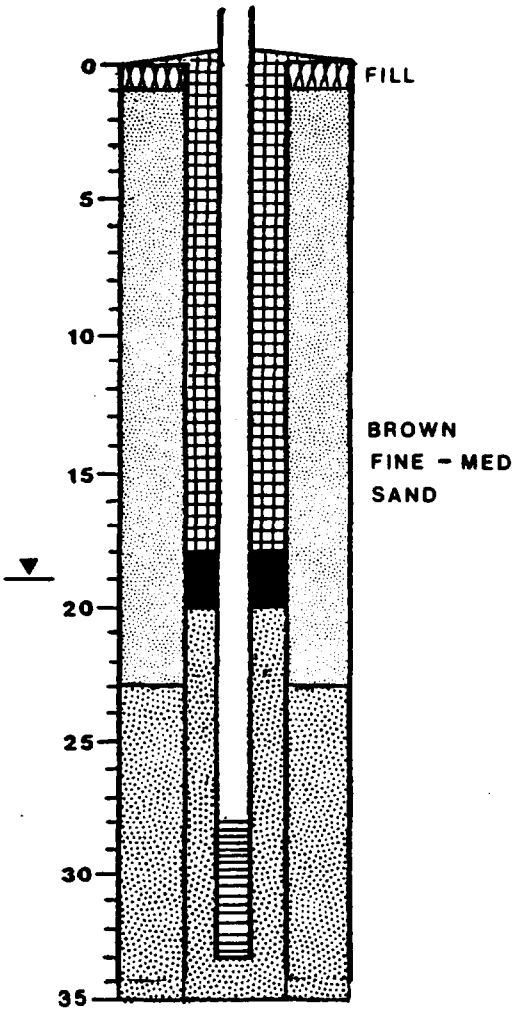
Boring/Well No. O-7/Well #EE-24

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Well vegetated clay cap. |
| 1 - 2.5 | 23-22-22 | FILL consisting of black silty CLAY. Some crushed limestone, gravel, fine to coarse grain sand, and silt. |
| | | Fill discontinues @ 3'. |
| 3.5 - 5 | 6-9-11 | Brownish-gray fine grain SAND. Trace of silt. Dry. |
| 6 - 7.5 | 4-4-4 | Gray very fine grain SAND. Some silt. Dry. |
| 8.5 - 10 | 6-7-7 | Brown fine to medium grain SAND. Dry. |
| 11 - 12.5 | 0-2-8 | Brown-silty CLAY. Slightly mottled. Trace of fine grain sand. Moist. |
| 13.5 - 15 | 6-7-9 | Gray very fine grain SAND. Very moist. |
| 16 - 17.5 | 7-8-10 | Brown medium grain SAND. Trace of coarse grain sand and small to medium gravel. Wet. |
| 18.5 - 20 | 3-2-3 | Same as above. |
| 21 - 22.5 | 3-4-13 | Brown very fine grain SAND. Trace of silt. Wet. |
| 23.5 - 25 | 11-15-25 | Brown medium grain SAND. Trace of clay @ 24'. Trace of coarse sand and small gravel. Wet. |
| 26 - 27.5 | 6-3-5 | Same as above. |
| 28.5 - 30 | NA | Gray medium grain SAND. Wet. |
| | | E.O.B. @ 33' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-20-87
Prepared by Tim Maley

Depth (ft) Description

EE-25




Boring/Well No. O-8/EE-25
Location Site O
Owner IEPA
Top of Inner Casing Elev. 411.25
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/20, 2/20/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 35 ft.
Casing and Screen Diam. 2 in.
Screen Interval 28 - 33 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.72 ft.
Well Type monitoring
Well Construction:
Filter Pack 33 - 20 ft. Natural
Seal 20 - 18 ft.
Grout 18 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 395.73 Date 3-26-87
Static Water Elev. 397.39 Date 5-11-87
Slug Test Yes X No
Test Date 5-12-87
Hydraulic Conductivity 16 x $10^{-3}$ cm/sec
Other pH =7.0
Cond. = 1400 umhos Temp. = 56° F
Cloudy, yellowish, slight odor

**WATER QUALITY**

Samples Taken Yes X No
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-24-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes X No
Recipient Geraghty & Miller for the Village of Sauget

Comments

**REMARKS**

Site Dead Creek Site-O

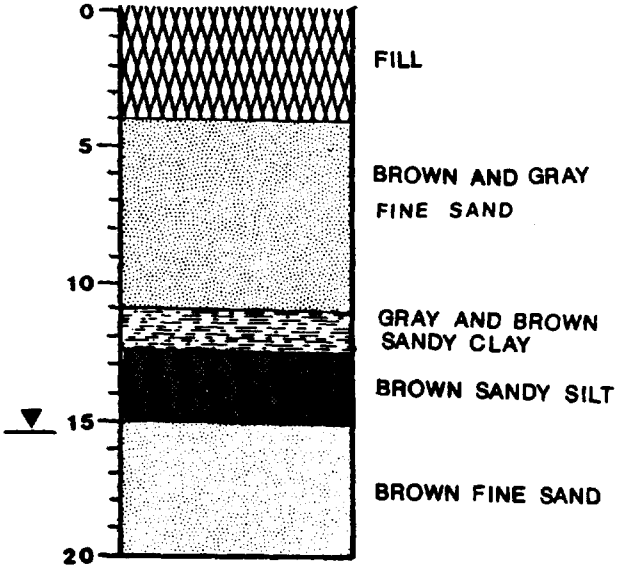
Boring/Well No. O-8/Well #EE-25

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Crushed limestone surface. |
| | | * Straight drill to 23.5<br>Approximate stratigraphy based on auger cuttings. |
| | | 0.5'-1.0' Black silty CLAY. Fill. |
| | | 1.0-20+' Brown fine grain SAND. Trace of silt. Water level while drilling ~19'. |
| 23.5 - 25 | 11-16-15 | Brown fine to medium grain SAND. Wet. |
| 28.5 - 30 | 9-17-17 | Brown-gray fine to medium SAND. Wet. |
| 33.5 - 35 | 5-8-13 | Brown medium grain SAND. Trace of coarse grain sand and small to medium gravel. |
| | | E.O.B. @ 35' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-26-87
Prepared by Kevin Phillips

Depth (ft) Description

O-9




Boring/Well No. O-9
Location Site O
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Robby Crachy, Dan Sewall, Kevin Phillips
Start & Completion Dates 2/26, 2/26/87
Type of Rig NA
Method of Drilling Hand auger

**WELL DATA**

Hole Diam. 4 in.
Boring Depth 20.0 ft.
Casing and Screen Diam.
Screen Interval
Screen Type
Stickup
Well Type
Well Construction:
Filter Pack
Seal
Grout
Lock No.

**TEST DATA**

Static Water Elev. Date
Static Water Elev. Date
Slug Test Yes No
Test Date
Hydraulic Conductivity
Other

**WATER QUALITY**

Samples Taken Yes No X
No. of Samples
Types of Samples

Date Sampled
Samplers
Samples Analyzed for

Split Samples Yes X No
Recipient Geraghty & Miller for the Village of Sauget

Comments Subsurface soil samples from boring 0 - 10' and 10 - 15' analyzed for HSL compounds.

**REMARKS**

Ground elev. 411.07

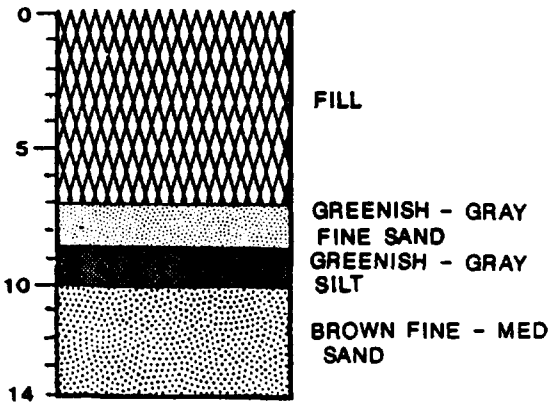
Site Dead Creek Site-O Boring/Well No. O-9

| Sample Depth | Blow Count | Description |
|---|---|---|
| | Hand auger | 0-1 Red-brown silty CLAY (fill-cap material). |
| 1 - 2.5 | Hand auger | FILL consisting of red-brown mottled silty CLAY. Trace of fine grain sand and roots. Moist. |
| 3.5 - 5 | Hand auger | 3.5-4' FILL consisting of grayish-brown silty CLAY. Trace of fine grain SAND. Trace of black hardened material throughout.<br><br>Fill discontinues @ 4'.<br><br>4-5' Brownish-gray very silty fine grain SAND. Some silt. Moist. |
| 6 - 7.5 | Hand auger | Loose grayish-brown very silty fine grain SAND. Thin reddish or black-gray staining in horizontal layers. |
| 8.5 - 10 | Hand auger | Firm grayish-brown very silty fine grain SAND. Similiar stain as seen in sample above. Very moist. Oily sheen. |
| 11 - 12.5 | Hand auger | Grayish-brown sandy silty CLAY. Some silt. Little fine grain sand. Oily sheen in very moist layers. |
| 13.5 - 15 | Hand auger | Brown very sandy SILT. Some fine grain sand. 2" fine grain sand layer @ 14.5' stained red-orange. Black-gray stained layers throughout. |
| 16 - 17.5 | Hand auger | Brown very silty fine grain SAND. Wet. |
| 18.5 - 20 | Hand auger | Same as above. Oily sheen in water.<br><br>E.O.B. @ 20' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-26-87
Prepared by Kevin Phillips

Depth (ft) Description

O – 10




Boring/Well No. O-10
Location Site O
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Kevin Phillips and Dan Sewall
Start & Completion Dates 2/26, 2/26/87
Type of Rig NA

Method of Drilling Hand auger

**WELL DATA**

Hole Diam. 4 in.
Boring Depth 14 ft.
Casing and Screen Diam. ____
Screen Interval ____
Screen Type ____
Stickup ____
Well Type ____
Well Construction:
Filter Pack ____
Seal ____
Grout ____
Lock No. ____

**TEST DATA**

Static Water Elev. ____ Date ____
Static Water Elev. ____ Date ____
Slug Test Yes ____ No ____
Test Date ____
Hydraulic Conductivity ____
Other ____

**WATER QUALITY**

Samples Taken Yes ____ No X
No. of Samples ____
Types of Samples ____

Date Sampled ____
Samplers ____
Samples Analyzed for ____

Split Samples Yes X No ____
Recipient Geraghty & Miller for the Village of Sauget

Comments Subsurface soil samples from boring 5 - 10' and 10 - 15' analyzed for HSL compounds.

**REMARKS**

Strong organic odor

Ground elev. 408.68

Site Dead Creek Site-O

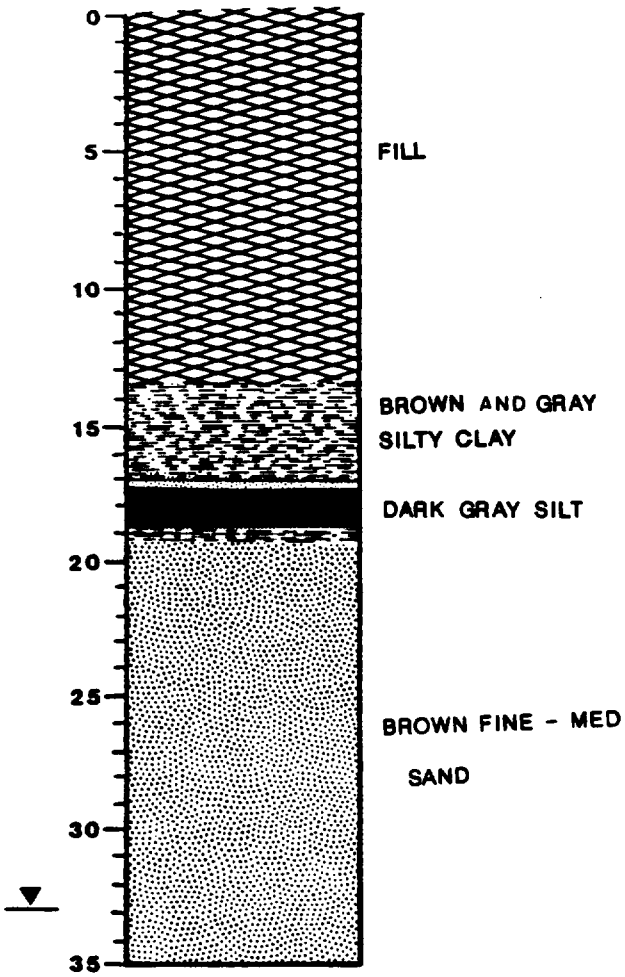
Boring/Well No. O-10

| Sample Depth | Blow Count | Description |
|---|---|---|
| 0 - 1 | Hand auger | FILL consisting of red-brown sandy silty CLAY |
| 1 - 3.5 | Hand auger | FILL consisting of black cinder-like material. Dry. |
| 3.5 - 5 | Hand auger | FILL consisting of black cinders. Dry. |
| 5 - 7 | Hand auger | FILL consisting of black to greenish-black sludge-like material and soft silty clay. Wet.<br><br>Fill discontinues @ 7'. |
| 7 - 8.5 | Hand auger | Greenish-gray fine grain SAND. Black staining throughout. Wet. |
| 8.5 - 10 | Hand auger | Greenish-gray very sandy SILT. Black staining. Very moist. |
| 10 - 14 | Hand auger | Light brown fine to medium grain SAND. Moist. No apparent staining.<br><br>E.O.B. @ 14' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-11-87
Prepared by Tim Maley

Depth (ft) Description

P – 1




Boring/Well No. P-1
Location Site P
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/11, 2/11/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 35.0 ft.
Casing and Screen Diam. _____
Screen Interval _____
Screen Type _____
Stickup _____
Well Type _____
Well Construction:
Filter Pack _____
Seal _____
Grout _____
Lock No. _____

**TEST DATA**

Static Water Elev. _____ Date _____
Static Water Elev. _____ Date _____
Slug Test Yes ____ No ____
Test Date _____
Hydraulic Conductivity _____
Other _____

**WATER QUALITY**

Samples Taken Yes ____ No X
No. of Samples _____
Types of Samples _____

Date Sampled _____
Samplers _____
Samples Analyzed for _____

Split Samples Yes ____ No X
Recipient _____

Comments Subsurface soil samples from boring 0 - 10' and 25 - 35' analyzed for HSL compounds.

**REMARKS**

Ground elev. 418.41

Site Dead Creek Site-P

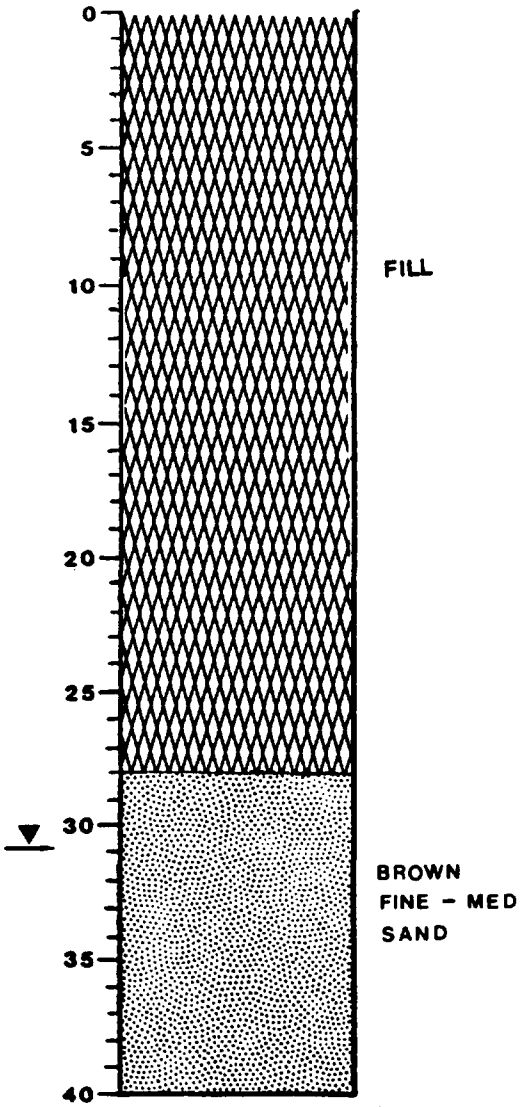
Boring/Well No. P-1

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Crushed limestone on surface. |
| 1 - 2.5 | 4-3-3 | FILL consisting of black sandy CLAY with crushed limestone, slag gravel, coal, and cinders. |
| 3.5 - 5 | 4-3-3 | Same as above. |
| 6 - 7.5 | 5-7-25/3 | FILL consisting of various debris including paper and plastic products, slag gravel, asphalt, and silty clay. Large obstruction encountered @ 7.5'. |
| 8.5 - 10 | 6-12-10 | FILL consisting of brown silty CLAY with various debris including paper products, small gravel, and fine to coarse grain sand. Wet. |
| 11 - 12.5 | 6-17-3 | Same as above. |
| | | FILL discontinues @ 13.5' |
| 13.5 - 15 | 3-6-7 | Dark brown-dark gray silty CLAY. Slightly mottled. Trace of very fine grain sand. Dry. |
| 16 - 17.5 | 2-4-6 | Same as above to 17'.<br>4" layer of gray fine grain sand @ 17-17 1/3'. Dry. Then dark gray SILT. Trace of very fine grain sand. Dry. |
| 18.5 - 20 | 3-5-8 | Dark gray very fine grain SAND. Trace of silt. 2" gray silty clay layer @ 19'.<br>Then light gray fine to medium grain SAND. Dry. |
| 21 - 22.5 | 6-10-12 | Brown medium grain SAND. Trace of coarse grain sand and small gravel. Dry. |
| 23.5 - 25 | 6-13-12 | Same as above. |
| 28.5 - 30 | 2-5-7 | Same as above. |
| 33.5 - 35 | 3-5-10 | Same as above. Wet. |
| | | E.O.B. @ 35'. |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-11-87
Prepared by Tim Maley

Depth (ft) Description

P - 2




Boring/Well No. P-2
Location Site P
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/11, 2/11/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 40.0 ft.
Casing and Screen Diam. ____
Screen Interval ____
Screen Type ____
Stickup ____
Well Type ____
Well Construction:
Filter Pack ____
Seal ____
Grout ____
Lock No. ____

**TEST DATA**

Static Water Elev. ____ Date ____
Static Water Elev. ____ Date ____
Slug Test Yes ____ No ____
Test Date ____
Hydraulic Conductivity ____
Other ____

WATER QUALITY

Samples Taken Yes ____ No X
No. of Samples ____
Types of Samples ____

Date Sampled ____
Samplers ____
Samples Analyzed for ____

Split Samples Yes ____ No X
Recipient ____

Comments ____

**REMARKS**

Ground elev. 423.62

Site Dead Creek Site-P

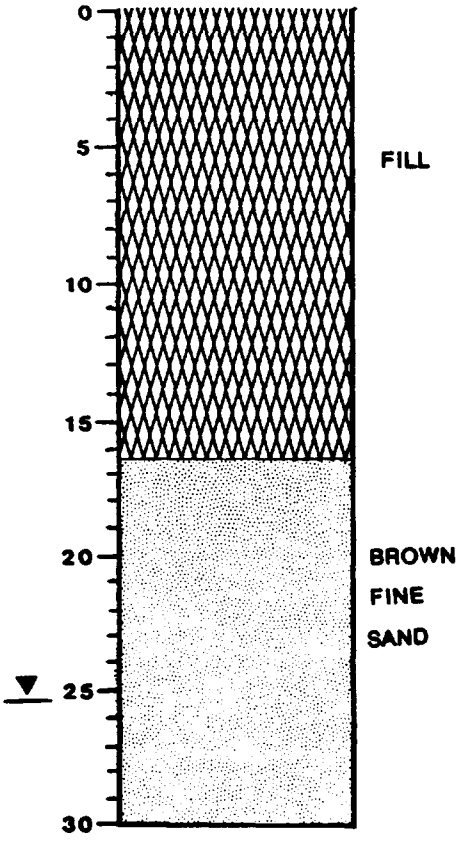
Boring/Well No. P-2

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Crushed limestone on surface. |
| 1 - 2.5 | 6-6-7 | FILL consisting of black-brown sandy CLAY with various debris including paper and plastic products, wood chips, slag, small gravel, fine to coarse grain sands, and brick fragments. Dry. |
| 3.5 - 5 | 3-3-7 | Same as above. |
| 6 - 7.5 | 3-4-4 | Same as above. |
| 8.5 - 10 | 2-6-6 | Same as above. |
| 11 - 12.5 | 5-5-7 | Same as above. |
| 13.5 - 15 | 7-7-8 | Same as above. |
| 16 - 17.5 | 4-3-14 | Same as above. Moist. |
| 18.5 - 20 | 6-6-8 | Same as above. |
| 21 - 22.5 | 6 - 50/3 | Same as above. Spoon refusal. |
| 23.5 - 25 | 10-6-28 | Same as above. Poor recovery. |
| 26 - 27.5 | 3-5-5 | No recovery. Probably same as above. |
| | | FILL apparently discontinues @ 28'. |
| 28.5 - 30 | 6-9-12 | Dark gray fine to medium grain SAND. Moist. |
| 33.5 - 35 | 7-11-10 | Brown medium grain SAND. Wet. |
| 38.5 - 40 | 7-12-14 | Dense brown fine to medium SAND. Wet. |
| | | E.O.B. @ 40'. |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-11-87
Prepared by Tim Maley

Depth (ft) Description

P - 3




Boring/Well No. P-3
Location Site P
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/11, 2/11/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 30.0 ft.
Casing and Screen Diam. ____
Screen Interval ____
Screen Type ____
Stickup ____
Well Type ____
Well Construction:
Filter Pack ____
Seal ____
Grout ____
Lock No. ____

**TEST DATA**

Static Water Elev. ____ Date ____
Static Water Elev. ____ Date ____
Slug Test Yes ____ No ____
Test Date ____
Hydraulic Conductivity ____
Other ____

**WATER QUALITY**

Samples Taken Yes ____ No X
No. of Samples ____
Types of Samples ____

Date Sampled ____
Samplers ____
Samples Analyzed for ____

Split Samples Yes ____ No X
Recipient ____

Comments ____

**REMARKS**

Ground elev. 419.36

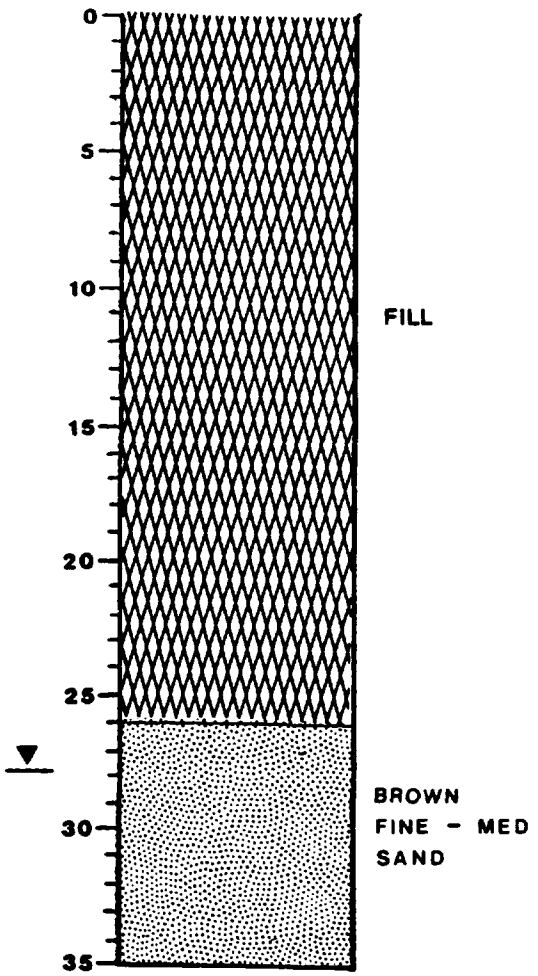
Site Dead Creek Site-P Boring/Well No. P-3

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Black cinder fill on surface. |
| 1 - 2.5 | 7-9-12 | FILL consisting of black and brown sandy clay with various debris material including paper products, wood chips, cloth, tin, rubber, slag, cinders, crushed limestone, an off-white crystalline substance, hay, and fine to coarse grain sand. Dry. |
| 3.5 - 5 | 3-3-30/6 | FILL - same as above. |
| 6 - 7.5 | 3-3-6 | FILL - same as above. |
| 8.5 - 10 | 6-18-33 | FILL - same as above. |
| 11 - 12.5 | 12-12-13 | FILL - poor recovery. Strong moth ball (naphalene) odor. |
| 13.5 - 15 | 5-7-15 | No recovery. |
| 16 - 17.5 | 6-17-17 | FILL - same as above. |
| | | Fill discontinues @ approx. 16.5'. |
| | | Gray silty very fine grain SAND. Dry. |
| 18.5 - 20 | 5-7-9 | Brown fine grain SAND. Dry. |
| 21 - 22.5 | 4-6-9 | Same as above. |
| 23.5 - 25 | 3-3-5 | Same as above. Moist. |
| 26 - 27.5 | 4-10-8 | Same as above. Wet. |
| 28.5 - 30 | 5-9-11 | Same as above. Wet. |
| | | E.O.B. @ 30' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-12-87
Prepared by Tim Maley

Depth (ft) Description

P - 4




Boring/Well No. P-4
Location Site P
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/12, 2/12/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 35.0 ft.
Casing and Screen Diam. ____
Screen Interval ____
Screen Type ____
Stickup ____
Well Type ____
Well Construction:
Filter Pack ____
Seal ____
Grout ____
Lock No. ____

**TEST DATA**

Static Water Elev. ____ Date ____
Static Water Elev. ____ Date ____
Slug Test Yes ____ No ____
Test Date ____
Hydraulic Conductivity ____
Other ____

**WATER QUALITY**

Samples Taken Yes ____ No X
No. of Samples ____
Types of Samples ____

Date Sampled ____
Samplers ____
Samples Analyzed for ____

Split Samples Yes ____ No X
Recipient ____

Comments Subsurface soil samples from boring 0 - 10' and 25 - 35' analyzed for HSL compounds.

**REMARKS**

Slight organic odor.

Ground elev. 424.65

Site Dead Creek Site-P

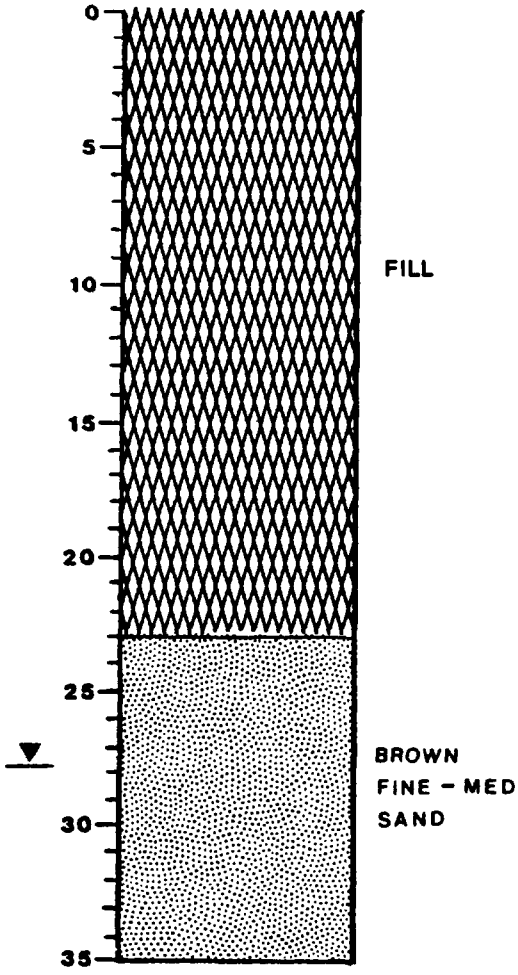
Boring/Well No. P-4

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Fill material on surface. |
| 1 - 2.5 | 3-3-5 | FILL consisting of dark brown-black silty clay; some crushed limestone, small gravel, and fine to medium grain sand. |
| 3.5 - 5 | 4-9-8 | FILL - same as above with more debris material including paper products and wood chips. |
| 6 - 7.5 | 3-4-6 | FILL - same as above. |
| 8.5 - 10 | 5-7-22 | FILL - same as above. |
| 11 - 12.5 | 6-7-7 | FILL - poor recovery. |
| 13.5 - 15 | 2-9-5 | No recovery. |
| 16 - 17.5 | 7-14-19 | FILL consisting of brown silty CLAY. Some medium-coarse grain sand and small gravel. Trace of a pale yellow solid (hard and brittle) substance. Dry. |
| 18.5 - 20 | 2-10-2 | FILL - same as above. Trace of paper products and wood chips. |
| 21 - 22.5 | 13-27-17 | FILL - same as above with additional debris including asphalt, slag, crushed limestone, wire, and gravel. |
| 23.5 - 25 | 4-6-8 | FILL - same as above. |
| | | Fill discontinues at approx. 26'. |
| 26 - 27.5 | 3-4-4 | Brown fine grain SAND. Trace of silt. Moist. |
| 28.5 - 30 | 5-10-10 | Same as above. Wet. |
| 31 - 32.5 | 3-6-10 | Brown fine to medium grain SAND. Wet. |
| 33.5 - 35 | 5-10-13 | Same as above. Trace of coarse grain sand. Wet. |
| | | E.O.B. @ 35' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-12-87
Prepared by Tim Maley

Depth (ft) Description

P-5




Boring/Well No. P-5
Location Site P
Owner IEPA
Top of Inner Casing Elev. NA
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/12, 2/12/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 35.0 ft.
Casing and Screen Diam. ____
Screen Interval ____
Screen Type ____
Stickup ____
Well Type ____
Well Construction:
Filter Pack ____
Seal ____
Grout ____
Lock No. ____

**TEST DATA**

Static Water Elev. ____ Date ____
Static Water Elev. ____ Date ____
Slug Test Yes ____ No ____
Test Date ____
Hydraulic Conductivity ____
Other ____

**WATER QUALITY**

Samples Taken Yes ____ No X
No. of Samples ____
Types of Samples ____

Date Sampled ____
Samplers ____
Samples Analyzed for ____

Split Samples Yes ____ No X
Recipient ____
Comments Subsurface soil samples from boring 10 - 25' analyzed for HSL compounds.

**REMARKS**

Slight organic odor

Ground elev. 422.98

Site Dead Creek Site-P

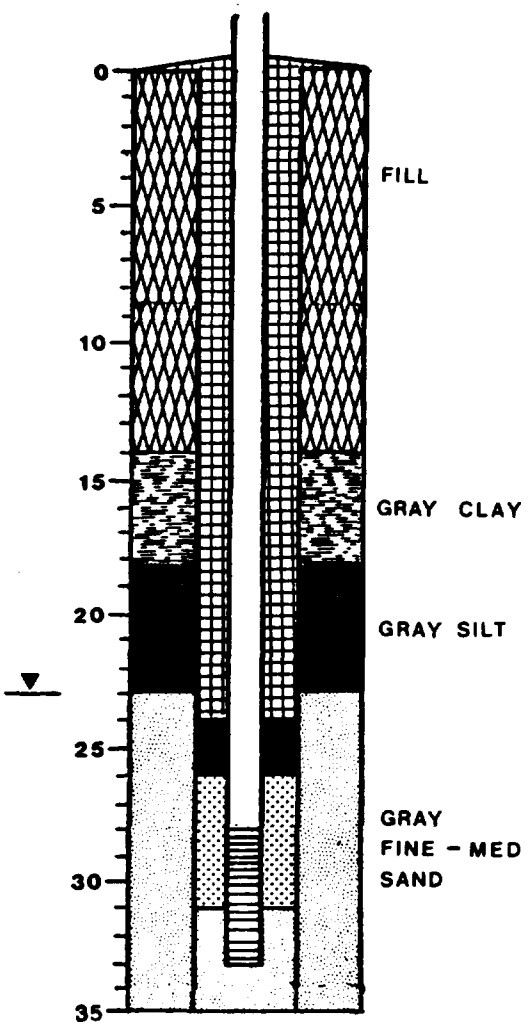
Boring/Well No. P-5

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Grass field area on surface. |
| 1 - 2.5 | 4-5-7 | FILL consisting of loose brown-black silty clay with crushed limestone, brick fragments, sand, and small gravel. Dry. |
| 3.5 - 5 | 4-3-4 | FILL - same as above with slag and cinder material. |
| 6 - 7.5 | 1-2-1 | FILL - same as above. |
| 8.5 - 10 | 1-1-2 | FILL consisting of brown-red silty clay. Mottled. Some medium grain sand and small gravel. |
| 11 - 12.5 | 2-2-2 | FILL consisting of brown silty CLAY. |
| 13.5 - 15 | 1-1-2 | FILL - same as above. |
| 16 - 17.5 | 1-1-1 | FILL consisting of brown silty CLAY. Trace of fine grain sand. Moist. |
| 18.5 - 20 | 1-1-4 | FILL - same as above. Trace of small gravel and asphalt. |
| 21 - 22.5 | 1-2-3 | FILL - same as above. Mottled. |
| | | Fill discontinues @ approx. 23'. |
| 23.5 - 25 | 2-4-7 | Light brown fine to medium SAND. Dry. |
| 26 - 27.5 | 2-4-6 | Light brown fine to medium grain SAND. Trace of silt. Dry. |
| 28.5 - 30 | 2-4-5 | Brown fine grain SAND. Wet. |
| 31 - 32.5 | 6-7-8 | Same as above. Trace of coarse grain sand. Wet. |
| 33.5 - 35 | 7-11-13 | Same as above. Trace of coarse grain sand and small gravel. Wet. |
| | | E.O.B. @ 35' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-19-87
Prepared by Tim Maley

Depth (ft) Description

EE-06




Boring/Well No. Q-1/EE-06
Location Site Q
Owner IEPA
Top of Inner Casing Elev. 423.51
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/19-1/19/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 35 ft.
Casing and Screen Diam. 2 in.
Screen Interval 28 - 33 ft.
Screen Type stainless steel 0.01" slot
Stickup 2.3 ft.
Well Type monitoring
Well Construction:
Filter Pack 33 - 26 ft.
Seal 26 - 24 ft.
Grout 5 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 395.53 Date 3-26-87
Static Water Elev. 394.42 Date 5-11-87
Slug Test Yes X No
Test Date 5-11-87
Hydraulic Conductivity 2.2 x 10 cm/sec
Other pH = 7.0
Cond. = 4400 umhos Temp. = 56° F
Yellowish, turbid

**WATER QUALITY**

Samples Taken Yes X No
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-16-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes No X
Recipient

Comments

**REMARKS**

Slight odor

Site Dead Creek Site-Q

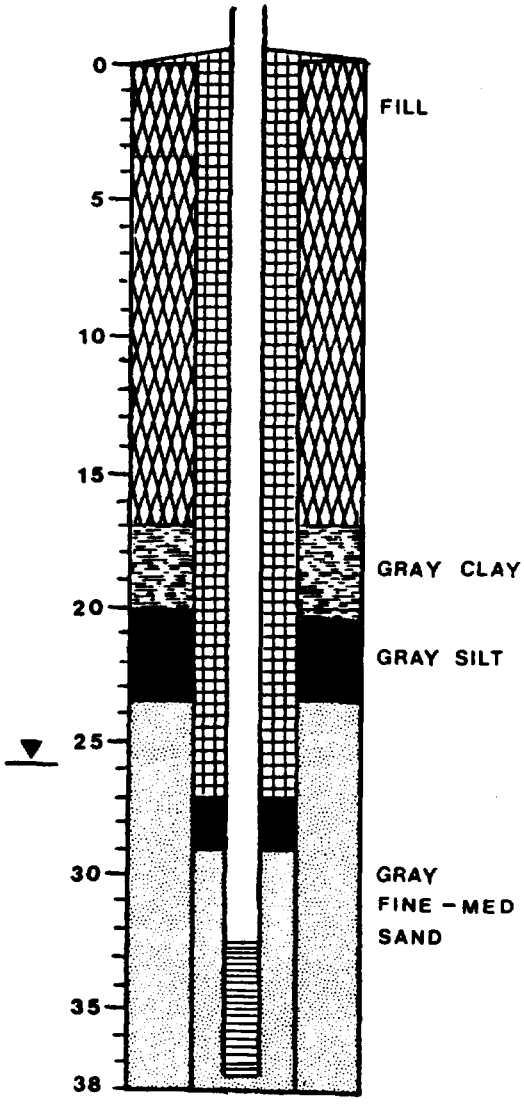
Boring/Well No. Q-1/Well #EE-06

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Black cinder fill on surface |
| 1 - 2.5 | 9-20-22 | FILL consisting of black-gray silty clay with asphalt, cinders, sand, and gravel. Dry. |
| 3.5 - 5 | 8-15-12 | FILL - same as above. |
| 6 - 7.5 | 5-9-3 | FILL - same as above. Some wood chips. |
| 8.5 - 10 | 3-6-2 | FILL - same as above. With increased amount of debris including traces of rope, paper products, wood chips, and black stained sand. |
| 11 - 12.5 | 1-3-13 | FILL - same as above. |
| 13.5 - 15 | 4-3-2 | FILL - same as above. Fill discontinues @ approx. 14' then dark gray silty CLAY. Moist. |
| 16 - 17.5 | 3-5-7 | Gray silty CLAY. Moist. |
| 18/5 - 20 | 2-4-4 | Gray sandy SILT. Trace of very fine grain sand. Dry. |
| 21 - 22.5 | 5-5-9 | Same as above. |
| 23.5 - 25 | 1-2-2 | Dark gray very fine grain SAND. Some silt. Wet. |
| 26 - 27.5 | 3-7-11 | Light gray fine grain SAND. Trace of silt. |
| 28.5 - 30 | 5-6-6 | Gray SILT. Trace of very fine sand. Wet |
| 31 - 32.5 | 3-8-11 | Same as above. More fine grain sand. Wet. |
| 33.5 - 35 | 1-3-6 | Same as above. |
| | | E.O.B. @ 35' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-20-87
Prepared by Tim Maley

Depth (ft) Description

EE-07




Boring/Well No. Q-2/EE-07
Location Site Q
Owner IEPA
Top of Inner Casing Elev. 423.31
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/20-1/20/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 38 ft.
Casing and Screen Diam. 2 in.
Screen Interval 32.5 - 37.5 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.66 ft.
Well Type monitoring
Well Construction:
Filter Pack 37.5 - 29 ft. Natural
Seal 29 - 27 ft.
Grout 6 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 395.48 Date 3-26-87
Static Water Elev. 394.72 Date 5-11-87
Slug Test Yes X No
Test Date 5-12-87
Hydraulic Conductivity $0.95 \times 10^{-3}$ cm/sec
Other

**WATER QUALITY**

Samples Taken Yes X No
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-16-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes No X
Recipient

Comments

**REMARKS**

Site Dead Creek Site-Q

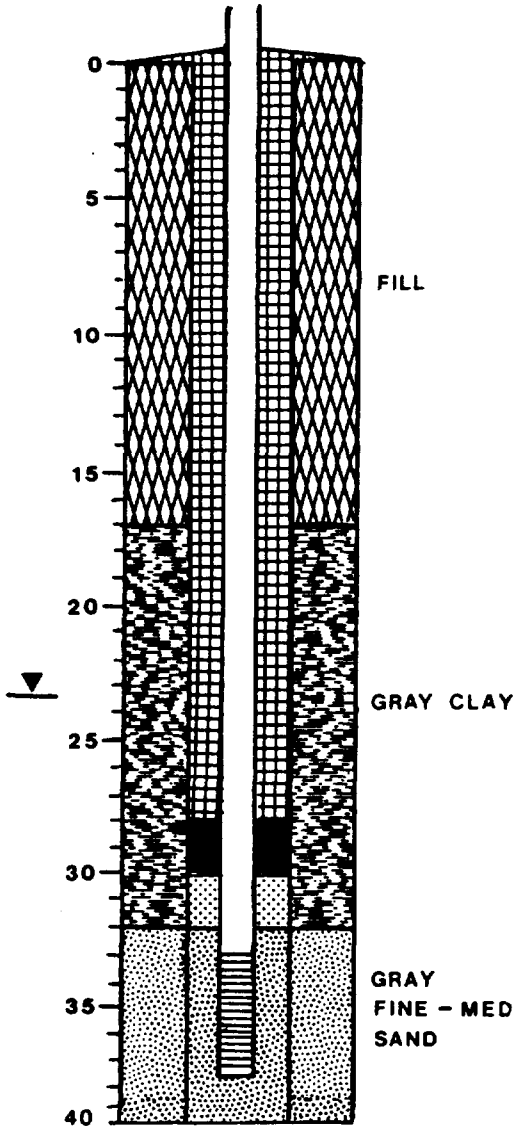
Boring/Well No. Q-2/Well #EE-07

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Black sandy CLAY with gravel and cinders. Fill on surface. |
| 3.5 - 5 | NA | FILL - spoon refusal (possible rubber tire) |
| 8.5 - 10 | NA | No recovery. |
| 13.5 - 15 | 33-10-8 | FILL - poor recovery. Appears to be various debris including paper products. Fill discontinues @ approx. 17'. |
| 18.5 - 20 | 5-8-13 | Gray silty CLAY. Trace of very fine grain sand. Dry. |
| 23.5 - 25 | 3-4-3 | Gray silt. Trace of very fine grain sand. Moist. |
| 28.5 - 30 | 5-10-13 | Gray fine grain SAND. Moist. |
| 33.5 - 35 | 6-6-13 | Gray fine to medium grain SAND. Wet. |
| 36 - 37.5 | - | Same as above. |
| | | E.O.B. @ 38' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-21-87
Prepared by Tim Maley

Description

EE-08




Boring/Well No. Q-3/EE-08
Location Site Q
Owner IEPA
Top of Inner Casing Elev. 421.14
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/21-1/21/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 40 ft.
Casing and Screen Diam. 2 in.
Screen Interval 33 - 38 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.56 ft.
Well Type monitoring
Well Construction:
Filter Pack 38 - 30 ft.
Seal 30 - 28 ft.
Grout 28-26 ft and 8 ft to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 395.78 Date 3-26-87
Static Water Elev. 392.92 Date 5-11-87
Slug Test Yes X No
Test Date 5-13-87
Hydraulic Conductivity $1.06 \times 10^{-2}$ cm/sec
Other

**WATER QUALITY**

Samples Taken Yes X No
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-16-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes No X
Recipient

Comments

**REMARKS**

Site Dead Creek Site-Q

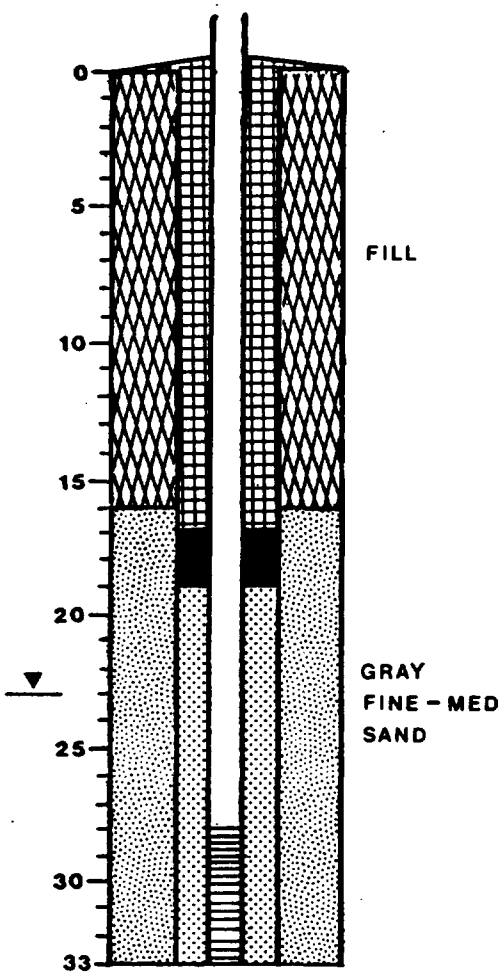
Boring/Well No. Q-3/Well #EE-08

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Brown-black-gray silty clay FILL on surface. |
| 3.5 - 5 | 1-1-2 | FILL consisting of black SILT. Trace of fine grain sand and black cinders. Thinnly laminated and crumbly. |
| 8.5 - 10 | 1-0-1 | Same as above. Moist at 9'. |
| 13.5 - 15 | 1-0-0 | Same as above. Wet. Fill apparently discontinues @ approx. 17'. |
| 18.5 - 20 | 2-3-4 | Dark gray silty CLAY. Dry. |
| 23.5 - 25 | 2-3-7 | Same as above. Some mottleness. Moist at 25'. |
| 28.5 - 30 | 2-2-4 | Same as above. |
| 33.5 - 35 | 3-6-13 | Gray fine to medium grain SAND. Wet. |
| 38.5 - 40 | 8-20-30 | Same as above. |
| | | E.O.B. @ 40' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-21-87
Prepared by Tim Maley

Depth (ft) Description

EE-09




Boring/Well No. Q-4/EE-09
Location Site Q
Owner IEPA
Top of Inner Casing Elev. 415.40
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/21-1/21/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 33 ft.
Casing and Screen Diam. 2 in.
Screen Interval 28 - 33 ft.
Screen Type stainless steel 0.01" slot
Stickup 2.02 ft.
Well Type monitoring
Well Construction:
Filter Pack 33 - 19 ft. Natural
Seal 19 - 17 ft.
Grout 17 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 395.24 Date 3-26-87
Static Water Elev. 395.83 Date 5-11-87
Slug Test Yes X No
Test Date 5-13-87
Hydraulic Conductivity 6.90 x $10^{-4}$ cm/sec
Other pH = 5.8
Cond. = 1700 umhos Temp. = 62° F

**WATER QUALITY**

Samples Taken Yes X No
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-16-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes No
Recipient

Comments

**REMARKS**

Site Dead Creek Site-Q

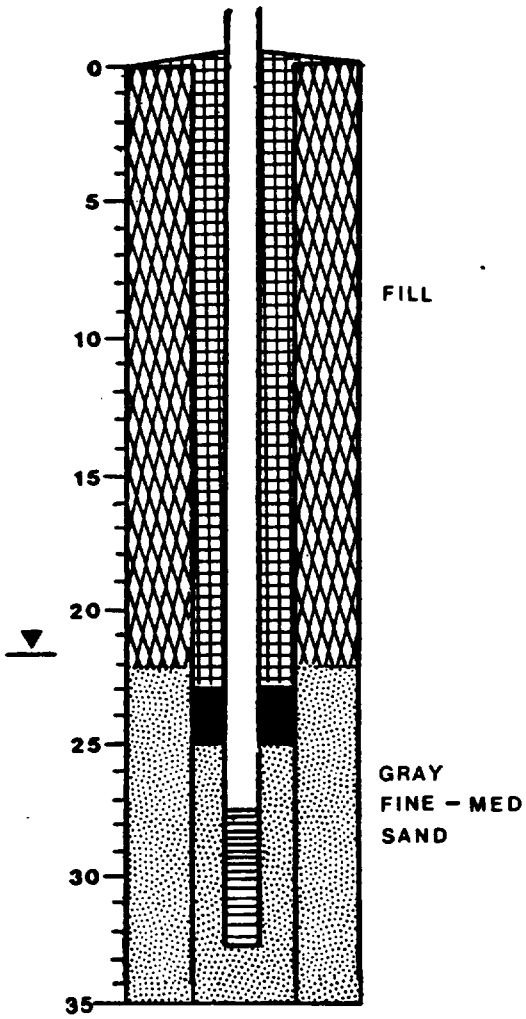
Boring/Well No. Q-4/Well #EE-09

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Brown-black silty CLAY FILL on surface. Trace of paper products and sand. |
| 3.5 - 5 | 6-7-1 | No recovery - FILL |
| 8.5 - 10 | 7-17-12 | FILL consisting of brown-black SILTY CLAY with some slag gravel, brick fragments, and broken glass. |
| 13.5 - 15 | 1-0-1 | FILL - same as above. Mostly black cinders, slag gravel, sand, and silt. Fill discontinues @ approx. 16'. |
| 18.5 - 20 | 9-14-17 | Gray to dark gray fine to medium grain SAND. Moist. |
| 23.5 - 25 | 1-2-5 | Same as above. Wet. |
| 28.5 - 30 | 2-3-12 | Same as above. |
| | | E.O.B. @ 33'. |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 1-22-87
Prepared by Tim Maley

Depth (ft) Description

EE-10




Boring/Well No. Q-5/EE-10
Location Site Q
Owner IEPA
Top of Inner Casing Elev. 419.40
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 1/22-1/22/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 35 ft.
Casing and Screen Diam. 2 in.
Screen Interval 27.5 - 32.5 ft.
Screen Type stainless steel 0.01" slot
Stickup 2.3 ft.
Well Type monitoring
Well Construction:
Filter Pack 32.5 - 25 ft.
Seal 25 - 23 ft.
Grout 6 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 395.37 Date 3-26-87
Static Water Elev. 395.44 Date 5-11-87
Slug Test Yes ____ No X
Test Date
Hydraulic Conductivity
Other pH = 6.8 cond. = 3800 umbos Temp. = 60° F turbid

**WATER QUALITY**

Samples Taken Yes X No ____
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-16-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes ____ No X
Recipient

Comments Strong hydrocarbon odor

**REMARKS**

Site Dead Creek Site-Q

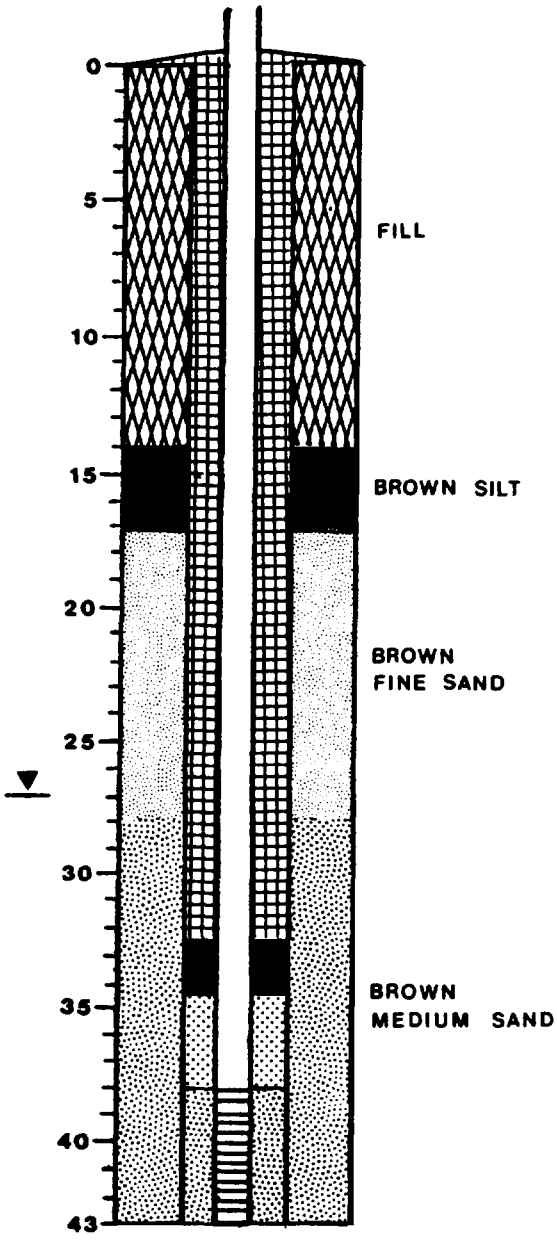
Boring/Well No. Q-5/Well #EE-10

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | FILL materials on surface. |
| 3.5 - 5 | 3-37-7 | FILL consisting of black clayey sand with some black cinders, fly ash, wood chips, and fine to coarse grain sand. Dry. |
| 8.5 - 10 | 2-4-2 | Same as above. |
| 13.5 - 15 | NA | No recovery. Possible rubber tire. |
| 18.5 - 20 | NA | No recovery - fill apparently discontinues @ 22'. |
| 23.5 - 25 | NA | No recovery. |
| 28.5 - 30 | 4-4-4 | Gray fine to medium grain SAND. Wet. |
| 33.5 - 35 | 22-20-22 | Same as above. |
| | | E.O.B. @ 35' |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-6-87
Prepared by Tim Maley

Depth (ft) Description

EE-17




Boring/Well No. Q-6/EE-17
Location Site Q
Owner IEPA
Top of Inner Casing Elev. 423.06
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/6/87,2/6/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers and rotary

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 43 ft.
Casing and Screen Diam. 2 in.
Screen Interval 38 - 43 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.06 ft.
Well Type monitoring
Well Construction:
Filter Pack 43 - 34.5 ft.
Seal 34.5 - 32.5 ft.
Grout 32.5 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 394.97 Date 3-26-87
Static Water Elev. 396.26 Date 5-11-87
Slug Test Yes ____ No X
Test Date
Hydraulic Conductivity
Other pH = 7.0
Cond. = 1500 umhos Temp. = 56° F

**WATER QUALITY**

Samples Taken Yes X No ____
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-16-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes ____ No X
Recipient

Comments

**REMARKS**

Background location

Site Dead Creek Site-Q

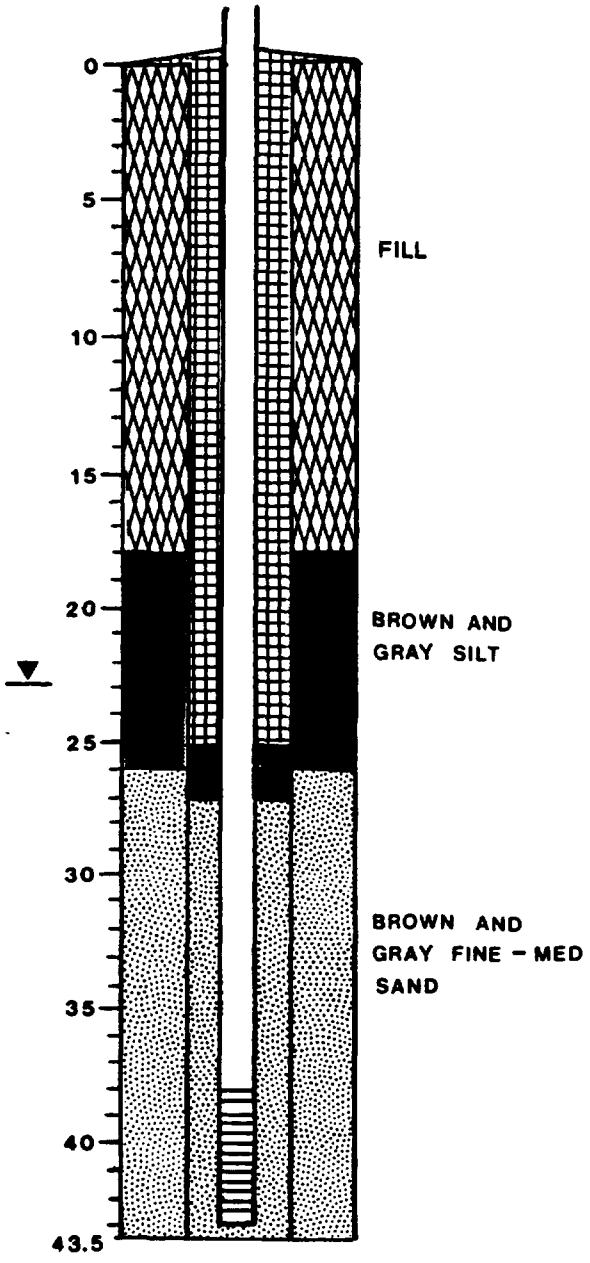
Boring/Well No. Q-6/Well #EE-17

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Well vegetated fill on surface. |
| 1 - 2.5 | 5-6-6 | FILL consists of brown silty CLAY. Trace of fine grain sand. |
| 3.5 - 5 | 3-3-5 | FILL consisting of dark brown silty CLAY and brown fine grain sand. Layered. Dry. |
| 6 - 7.5 | 12-20-22 | FILL consisting of brown very fine grain SAND. Some silt. Dry. |
| 8.5 - 10 | 13-20-40 | FILL consisting of brown silty clay and fine grain sand. Trace of coarse grain sand and brick fragments. |
| 11 - 12.5 | 6-9-5 | FILL consisting of brown medium to coarse grain SAND. Trace of small to large gravel and crushed limestone. Dry. Fill discontinues @ 14'. |
| 13.5 - 15 | 4-4-5 | Brown SILT. Trace of very fine grain sand. Dry. |
| 18.5 - 20 | 4-4-7 | Light brown fine grain SAND. Dry. |
| 23.5 - 25 | 9-18-20 | Same as above. |
| 28.5 - 30 | 10-15-19 | Light brown medium grain SAND. Trace of coarse grain sand and small gravel. Wet @ 30'. |
| 33.5 - 35 | 11-14-20 | Same as above. |
| 38.5 - 40 | 12-14-16 | Same as above. |
| | | E.O.B. @ 43'. |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-9-87
Prepared by Tim Maley

Depth (ft) Description

EE-18




Boring/Well No. Q-7/EE-18
Location Site Q
Owner IEPA
Top of Inner Casing Elev. 419.54
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/9/87,2/9/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 43.5 ft.
Casing and Screen Diam. 2 in.
Screen Interval 38 - 43 ft.
Screen Type stainless steel 0.01" slot
Stickup 1.34 ft.
Well Type monitoring
Well Construction:
Filter Pack 43 - 27 ft. Natural
Seal 27 - 25 ft.
Grout 25 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 395.10 Date 3-26-87
Static Water Elev. 396.26 Date 5-11-87
Slug Test Yes ____ No X
Test Date
Hydraulic Conductivity
Other High oil content, strong odor

**WATER QUALITY**

Samples Taken Yes X No ____
No. of Samples 1 round
Types of Samples groundwater

Date Sampled
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes ____ No X
Recipient

Comments

**REMARKS**

Site Dead Creek Site-Q

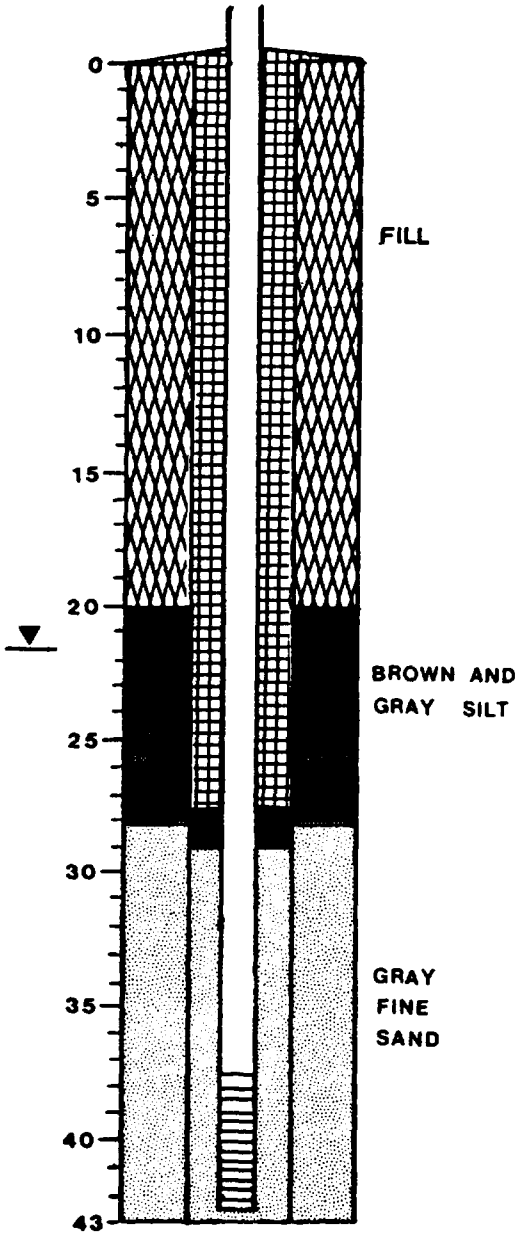
Boring/Well No. Q-7/Well #EE-18

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Black cinder fill on surface. |
| | | Straight drill to 20'. |
| | | Stratigraphy sequence based on auger cuttings. |
| | | 0-18' FILL consisting of black clayey SAND with some black cinders, slag material, plastic and paper products, and wood chips. |
| 18.5 - 20 | 10-17-24 | Dark brown - dark gray SILT. Trace of very fine grain sand. Moist. Rust color and oil-like staining. Laminated. |
| 23.5 - 25 | 4-4-5 | Same as above. |
| 28.5 - 30 | 3-5-8 | Brown fine to medium grain SAND. Wet. |
| 33.5 - 35 | 4-6-10 | Same as above. |
| 38.5 - 40 | 3-5-10 | Becomes gray. Same as above. Trace of coarse grain sand. |
| | | E.O.B. @ 43.5'. |

Project Name Dead Creek
Project No. IL 3140
Date Prepared 2-10-87
Prepared by Tim Maley

Depth (ft) Description

EE-19




Boring/Well No. Q-8/EE-19
Location Site Q
Owner IEPA
Top of Inner Casing Elev. 423.22
Drilling Firm Fox drilling
Driller Jerry Hammon
Start & Completion Dates 2/10,2/10/87
Type of Rig Mobile B-61

Method of Drilling 3 3/4" I.D. hollow stem augers, Rotary

**WELL DATA**

Hole Diam. 8 in.
Boring Depth 43 ft.
Casing and Screen Diam. 2 in.
Screen Interval 37.5 - 42.5 ft.
Screen Type stainless steel 0.01" slot
Stickup 2.1 ft.
Well Type monitoring
Well Construction:
Filter Pack 42.5 - 29 ft. Natural
Seal 29 - 27.5 ft.
Grout 27.5 ft. to surface
Lock No. 2834

**TEST DATA**

Static Water Elev. 399.27 Date 3-26-87
Static Water Elev. 403.24 Date 5-11-87
Slug Test Yes ____ No X
Test Date
Hydraulic Conductivity
Other Duplicate of DC-GW-07

**WATER QUALITY**

Samples Taken Yes X No ____
No. of Samples 1 round
Types of Samples groundwater

Date Sampled 3-16-87
Samplers E & E
Samples Analyzed for HSL compounds

Split Samples Yes ____ No X
Recipient

Comments

**REMARKS**

Site Dead Creek Site-Q

Boring/Well No. Q-8/Well #EE-19

| Sample Depth | Blow Count | Description |
|---|---|---|
| | | Spent coal coke in piles on surface. |
| | | Straight drill to 30'. |
| | | Stratigraphy sequence based on auger cuttings. |
| | | 0-20 FILL consisting of black cinders, slag gravel, and fine to coarse grain sand. Dry. Fill probably discontinues @ approx. 20'. |
| | | 20-28.5 Brown-gray SILT. Trace of clay. |
| 28.5 - 30 | 8-12-15 | Gray very fine grain SAND. Trace of silt. |
| 33.5 - 35 | 8-13-18 | Same as above. Trace of coarse grain sand. |
| 38.5 - 40 | 7-10-14 | Same as above. |
| | | E.O.B. @ 43'. |

# APPENDIX C

## AIR SAMPLING FLOW VOLUME CALCULATIONS AND CALIBRATION DATA

# High Volume Sampler
# Calibration Data

# CALIBRATOR ORIFICE for HIGH VOLUME AIR SAMPLER

## CERTIFICATE of CALIBRATION

SERIAL NO. 45-C

GENERAL METAL WORKS INC.
8368 BRIDGETOWN ROAD / VILLAGE OF CLEVES, OHIO 45002 / TEL. 513-941-2229

(7) and (8) are corrected to
(13) 760 mm of Hg (29.92 in. of Hg)
(14) 25°C (77°F)

# CALIBRATION WORK SHEET

| (1) Run Point No. | (2) Elapsed Time - Δt Min. | (3) Initial Volume $V_m$ $M^3$ | (4) Meter Inlet Static Pressure - ΔP in. of Hg | (5) Standard Volume $V_{STD}$ $M^3$ | (6) Calibrator Orifice Static Press. ΔH in. of $H_2O$ | (7) Flow Rate $Q_{STD}$ $M^3$/min. | (8) Flow Rate $Q_{STD}$ $ft^3$/min. | For application see ref. 1 $\sqrt{\Delta H \left(\frac{P_1}{P_{STD}}\right)} \left(\frac{536.58}{T_1}\right)$ |
|---|---|---|---|---|---|---|---|---|
| 1 | 6.994 | 1 | 0.2 | 1.012 | 2.0 | 0.145 | 5.1 | |
| 2 | 4.178 | 1 | 0.4 | 1.005 | 5.5 | 0.241 | 8.5 | |
| 3 | 3.356 | 1 | 0.6 | 0.998 | 8.5 | 0.297 | 10.5 | |
| 4 | 2.865 | 1 | 0.8 | 0.991 | 11.5 | 0.346 | 12.2 | |
| 5 | 2.538 | 1 | 1.0 | 0.984 | 14.5 | 0.388 | 13.7 | |
| 6 | | | | | | | | |
| 7 | | | | | | | | |

(9) $P_1$: 29.76 in. of Hg

(10) $T_1$= 64 °F + 459.58 = °R

R H: 54 %

Roots Meter No.: 7509364

Calibrator Orifice:
Model No.: GMW-40

Serial No.: 45-C

Calibration performed by: Pedro Verdugo

Date of Calibration: 12/10/86

Date placed in service: _____
(To be noted by user)

## EQUATIONS

$$V_{STD} = V_m \frac{(P_1 - \Delta P)}{P_{STD}} \frac{T_{STD}}{T_1}$$

$$= (3) \frac{(9) - (4)}{(13)} \frac{(14)}{(10)}$$

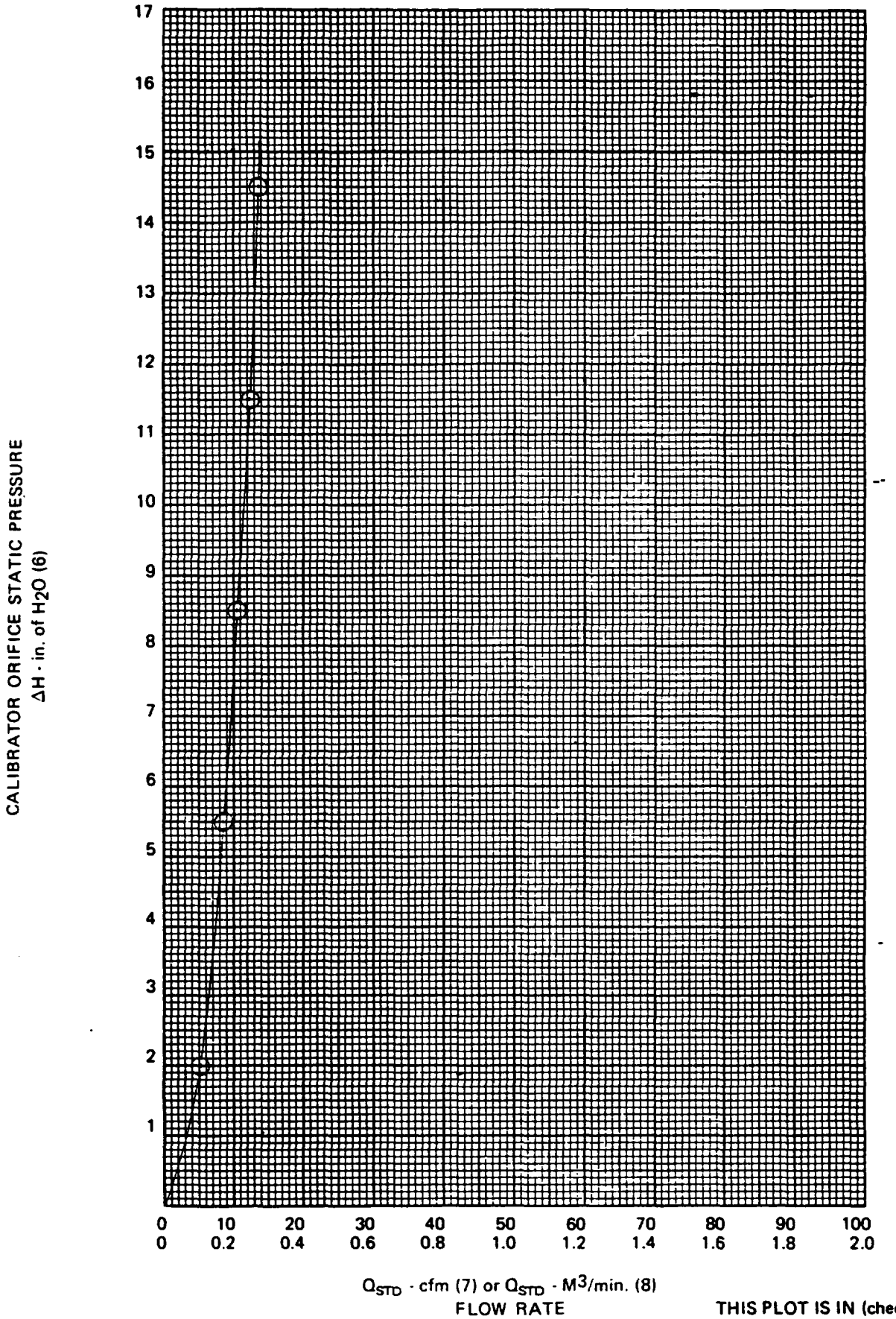
$$Q_{STD} = \frac{V_{STD}}{\Delta t}$$

$$= \frac{(5)}{(2)}$$

$M^3 \times 35.31 = Ft^3$

For additional information consult:
1. The Federal Register, Vol. 47, No. 234, pp. 54896-54921, December 6, 1982

Notes: 1. EPA recommends calibrators should be recalibrated after one year of field use.
2. Copies of this calibration are not kept on file.

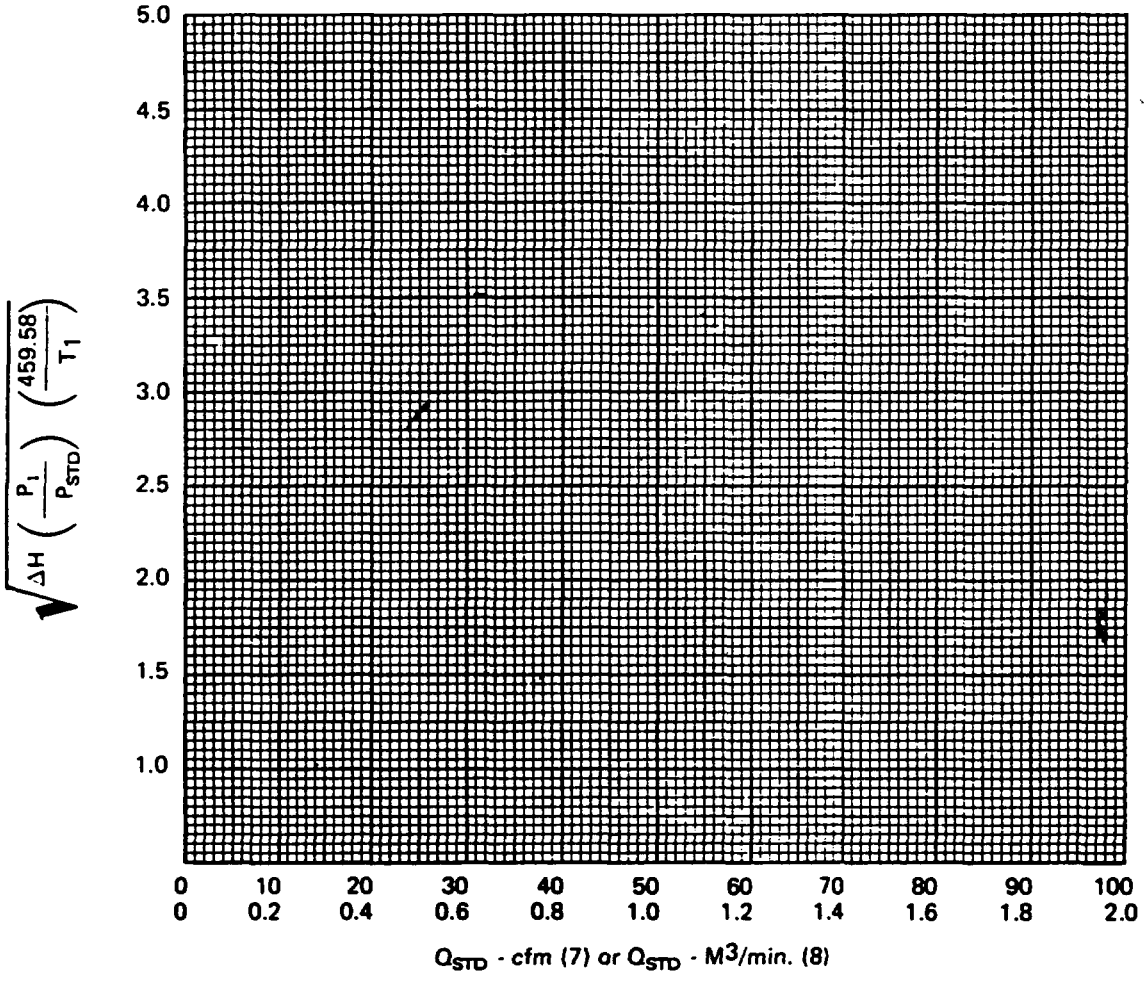



THIS PLOT IS IN (check one)

cfm ✓

$M^3$/min. _____

They are NOT EQUIVALENT




FLOW RATE

THIS PLOT IS IN (check one)

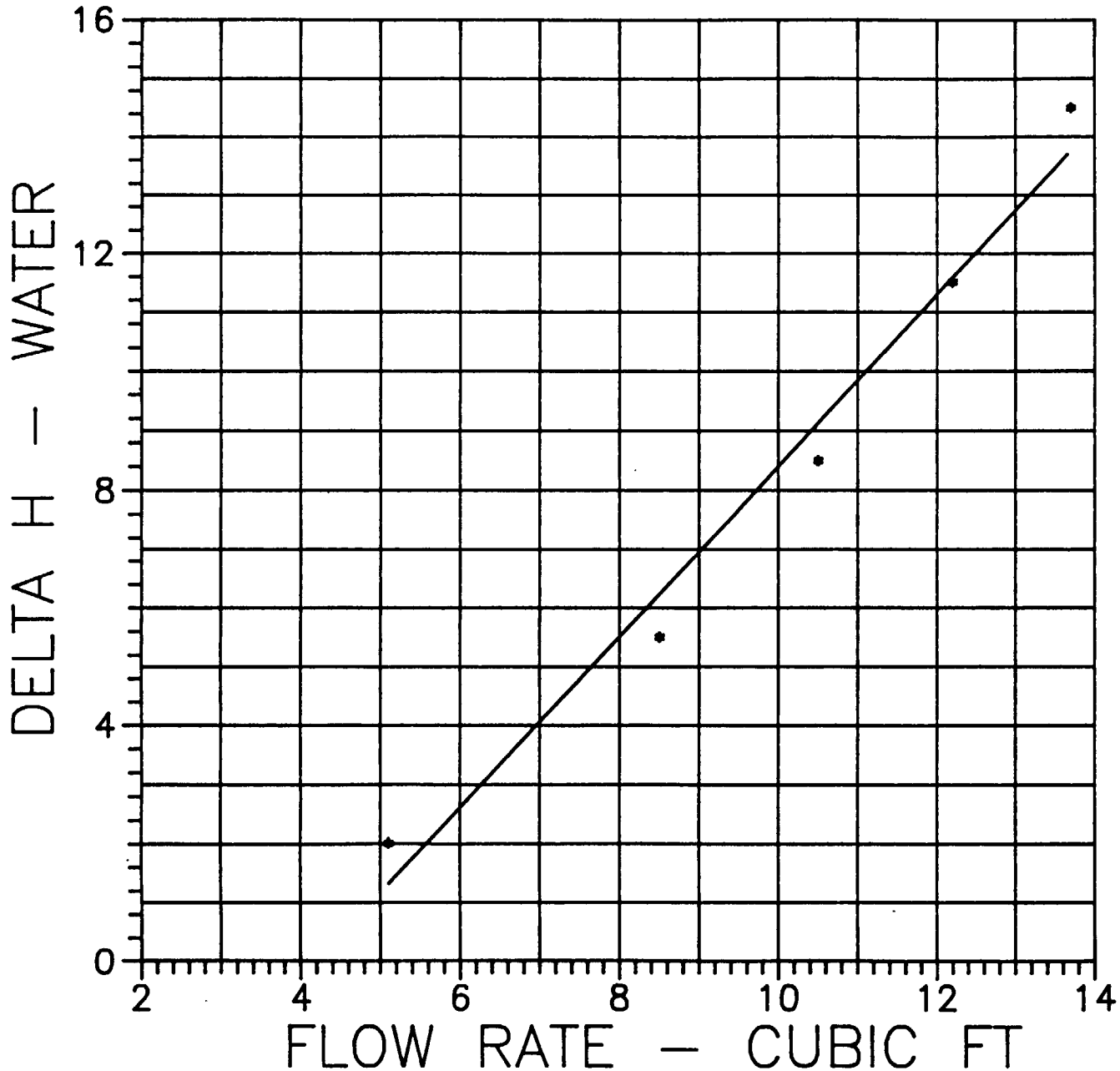
cfm _____

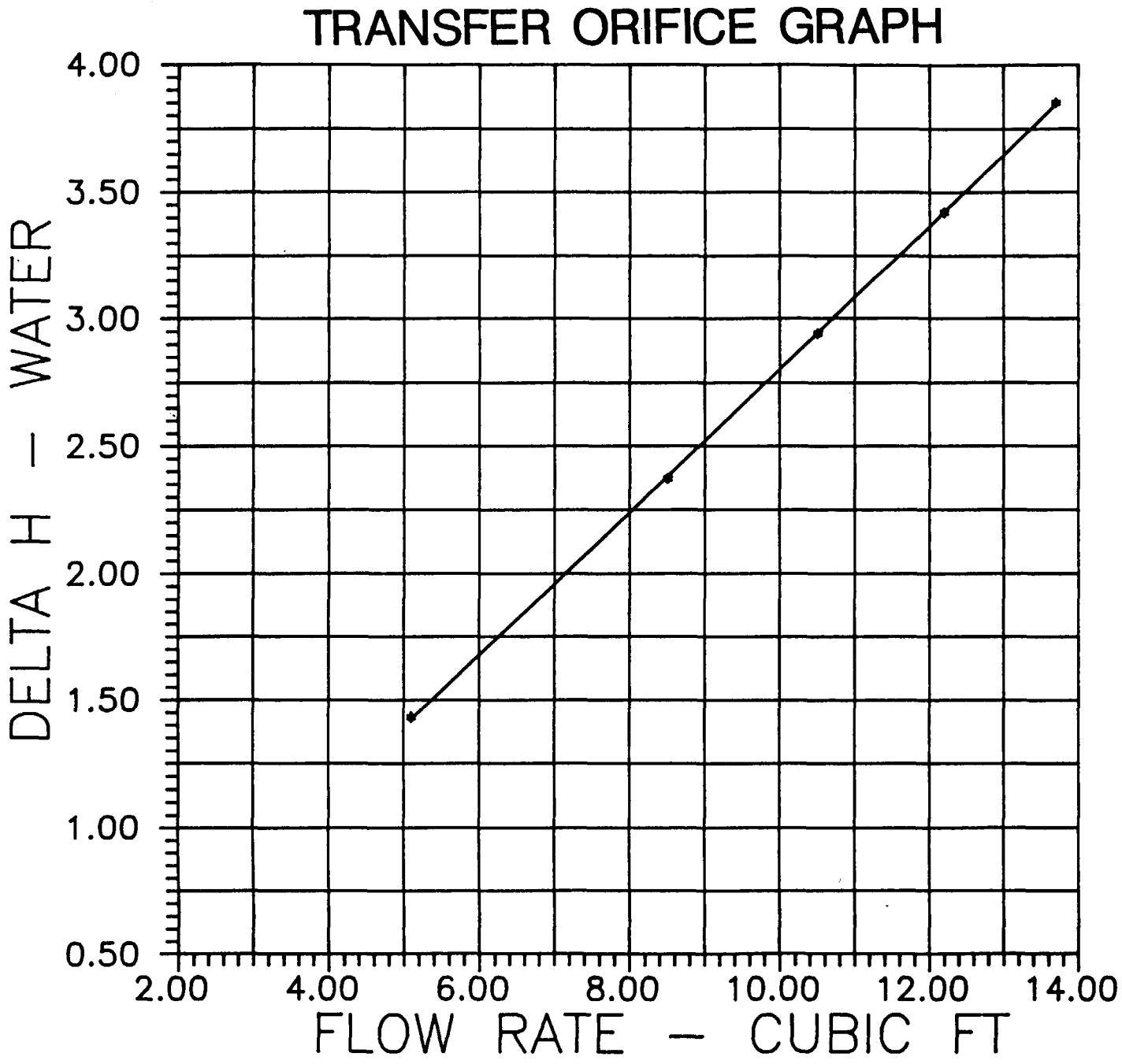
$M^3$/min. _____

They are NOT EQUIVALENT

For application see ref. 1

# STANDARD ORIFICE GRAPH




TRANSFER ORIFICE GRAPH
DELTA H - WATER
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
2.00
4.00
6.00
8.00
10.00
12.00
14.00
FLOW RATE - CUBIC FT

# GMW MODEL PS-1 CALIBRATION FORM

Name: A. SEWALL Date: 7/15/87

Site Address: DEAD CREEK - SITE G

PS-1 Shelter No.: EE-1 Station Pressure: 30.02

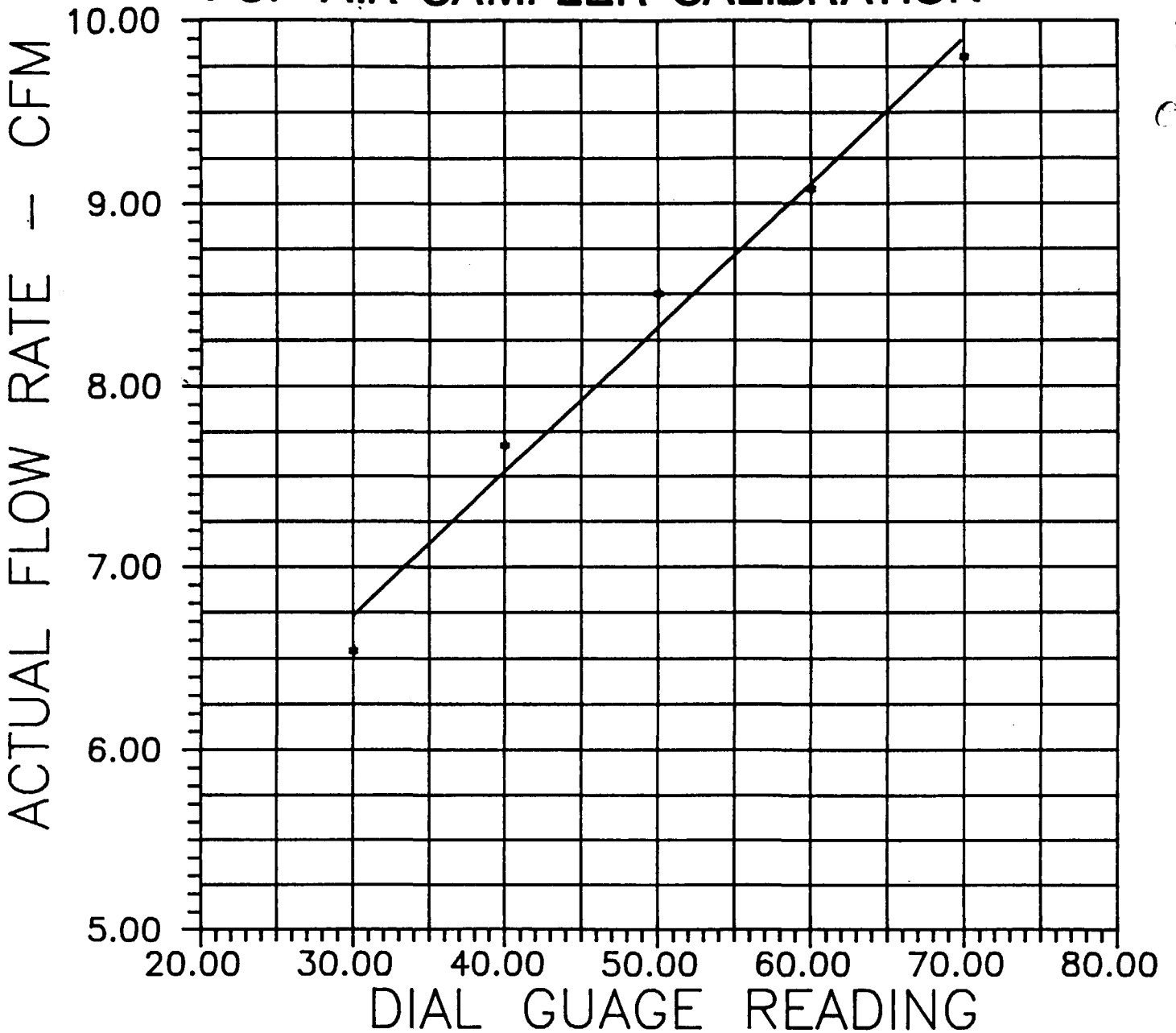
GMW Model 40° OCU No.: 45-C

| Magnehelic Gauge Reading | Manometer Reading (in. $H_2O$) | OCU Flow-Rate (tcfm) | Temp. (°C) |
|---|---|---|---|
| 70 | 3.7/3.6 ~~3.6/3.6~~ ATS. | | 64°F |
| 60 | 3.2/3.1 | | |
| 50 | 2.8/2.7 | | |
| 40 | 2.3/2.2 | | |
| 30 | 1.7/1.6 | | |
| | | | |
| | | | |

Comments: WIND SPEED 8 MPH

DIRECTION 220° (SW)

RH = 72%




$y = 0.725\theta - 0.66$

$\theta = 1.0 \cdot y + 0.71$

# GMW MODEL PS-1 CALIBRATION FORM

Name: A. SEWALL Date: 7/15/87

Site Address: DEAD CREEK - SITE G

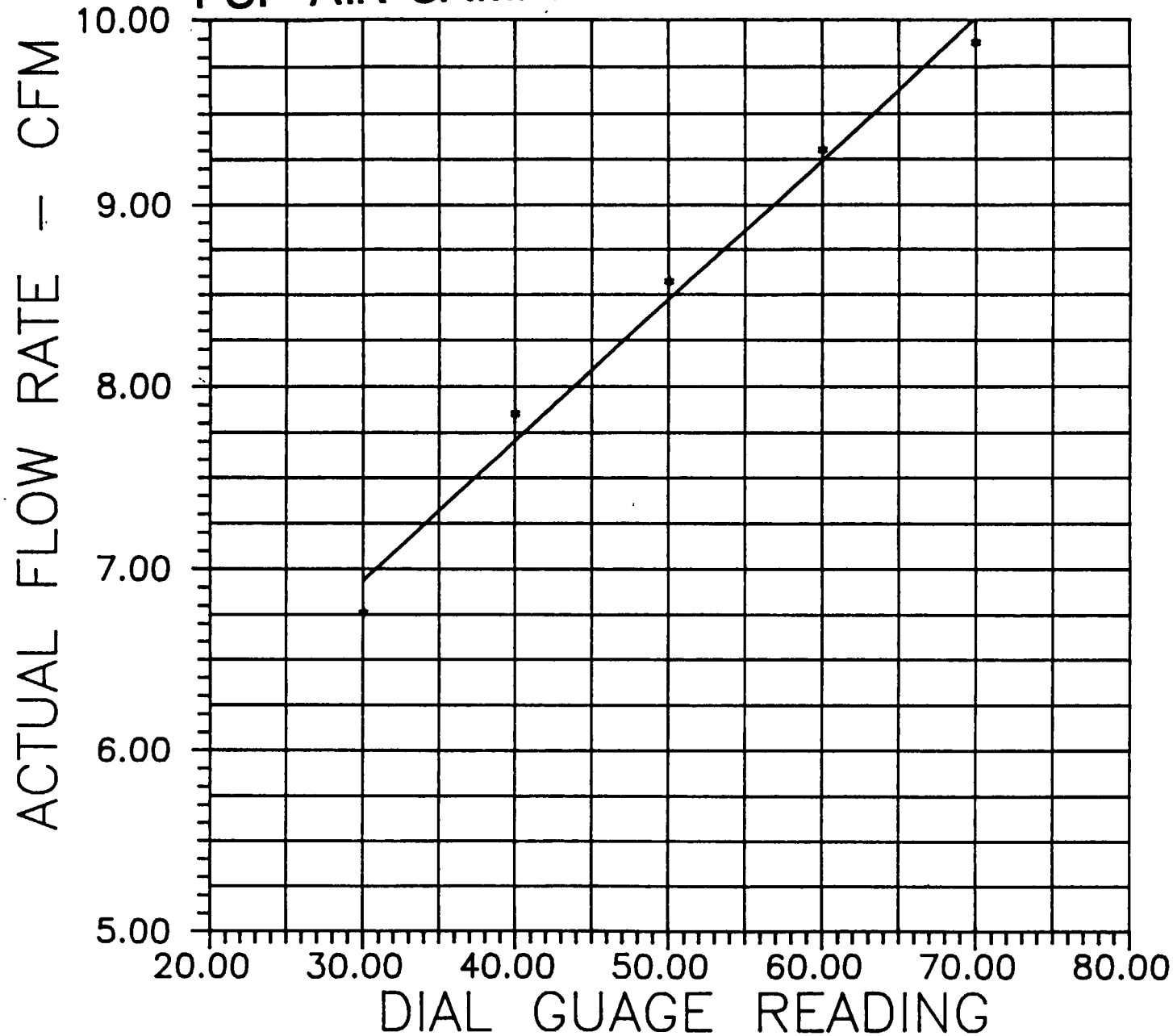
PS-1 Shelter No.: EE-7 Station Pressure: 30.02

GMW Model 40° OCU No.: 45-C

| Magnehelic Gauge Reading | Manometer Reading (in. $H_2O$) | OCU Flow-Rate (tcfm) | Temp. (°C) |
|---|---|---|---|
| 70 | 3.8/3.6 | | 64°F |
| 60 | 3.4/3.2 | | " |
| 50 | 2.9/2.7 | | " |
| 40 | 2.4/2.3 | | " |
| 30 | 1.8/1.7 | | " |
| | | | |
| | | | |

Comments: WIND SPEED 8 MPH
DIRECTION 220° (SW)

# PUF AIR SAMPLER CALIBRATION – EE2




y = .9569 – 1.0578

# GMW MODEL PS-1 CALIBRATION FORM

Name: A. STEWART Date: 7/15/87

Site Address: DEAD CREEK - SITE G

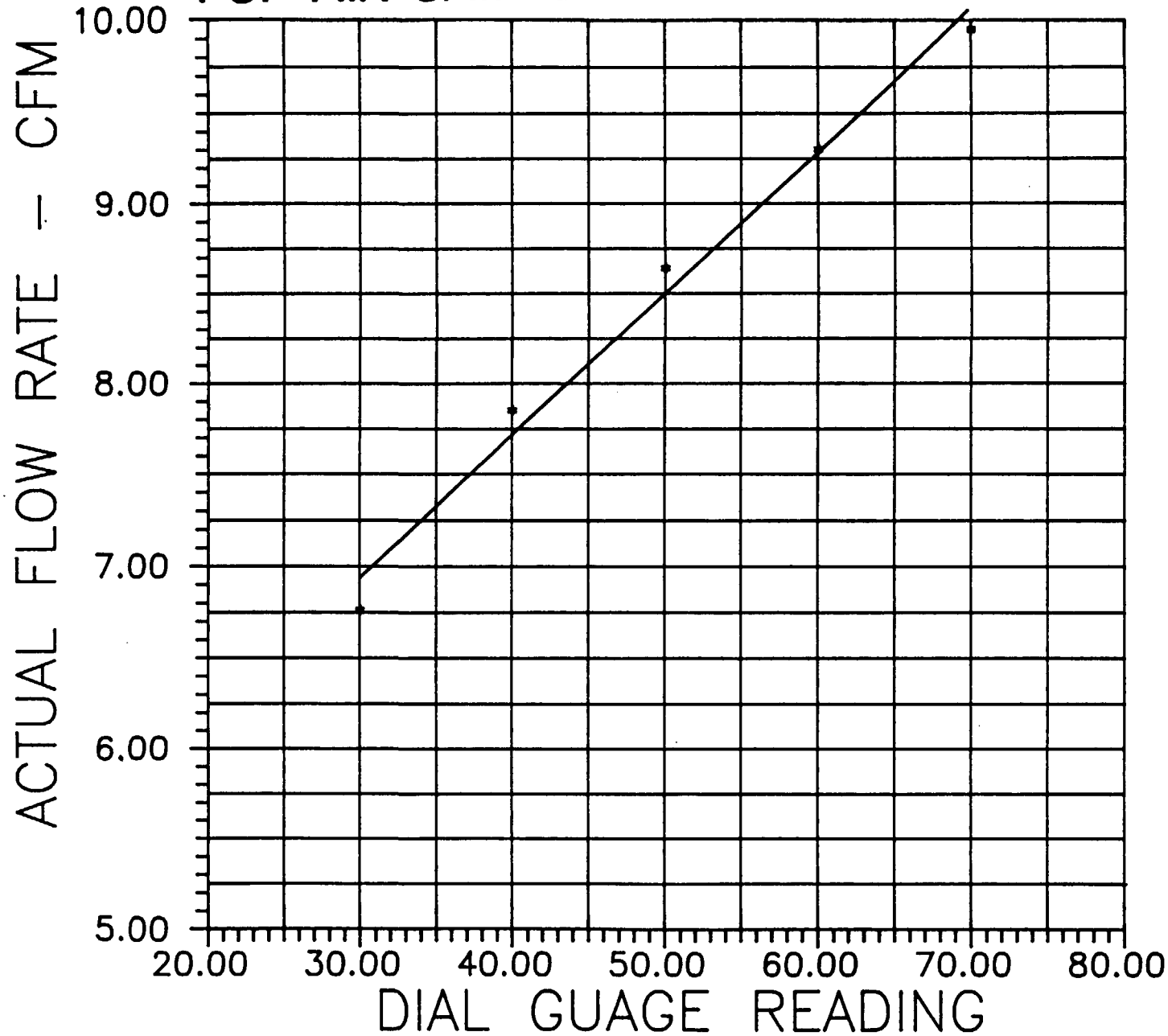
PS-1 Shelter No.: EE-3 Station Pressure: 30.02

GMW Model 40° OCU No.: 45-C

| Magnehelic Gauge Reading | Manometer Reading (in. $H_2O$) | OCU Flow-Rate (tcfm) | Temp. (°C) |
|---|---|---|---|
| 70 | 3.8/3.7 | | 64°F |
| 60 | 3.4/3.2 | | " |
| 50 | 2.9/2.8 | | " |
| 40 | 2.4/2.3 | | " |
| 30 | 1.8/1.7 | | " |
| | | | |
| | | | |

Comments: WIND SPEED 8 MPH

DIRECTION 220° (SW)


PUF AIR SAMPLER CALIBRATION - EE3
ACTUAL FLOW RATE - CFM
10.00
9.00
8.00
7.00
6.00
5.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
DIAL GUAGE READING

y = .183 a - 0.73

# GMW MODEL PS-1 CALIBRATION FORM

Name: D. SEWALL Date: 7/15/87

Site Address: BEAR CREEK - SITE G

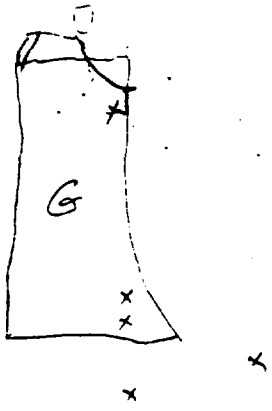
PS-1 Shelter No.: EE-4 Station Pressure: 30.02

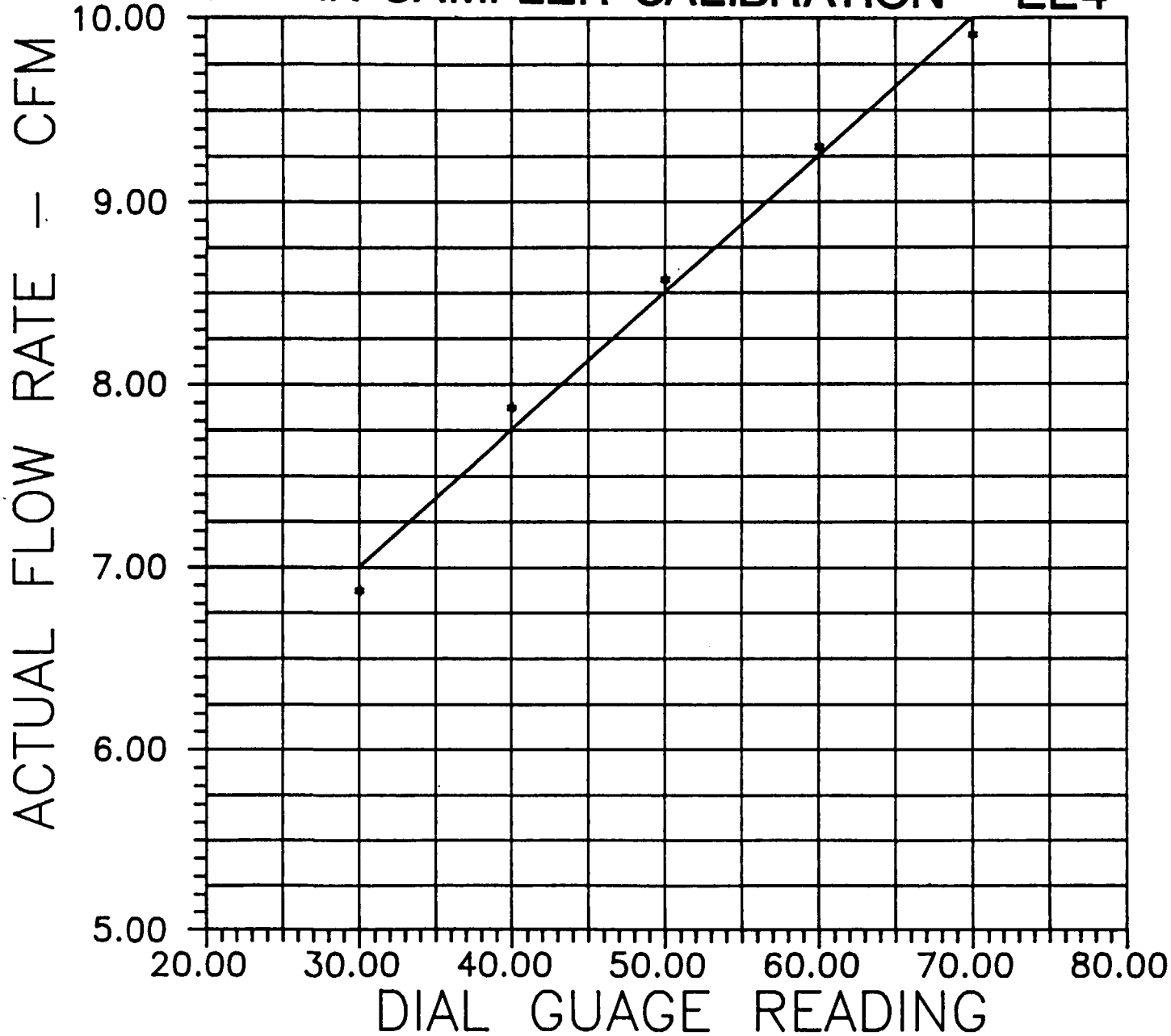
GMW Model 40° OCU No.: 45-C

| Magnehelic Gauge Reading | Manometer Reading (in. $H_2O$) HIGH / LOW | OCU Flow-Rate (tcfm) | Temp. (°C) |
|---|---|---|---|
| 70" | 3.7 / 3.7 | | 64°F |
| 60 | 3.3 / 3.3 | | " |
| 50 | 2.8 / 2.8 | | " |
| 40 | 2.3 / 2.4 | | " |
| 30 | 1.8 / 1.8 | | " |
| | | | |
| | | | |

Comments: WIND SPEED 8 MPH

DIRECTION 220° (SW)




PUF AIR SAMPLER CALIBRATION - EE4
ACTUAL FLOW RATE - CFM
10.00
9.00
8.00
7.00
6.00
5.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
DIAL GUAGE READING

y = .9[illegible] G - 1.356

# GMW MODEL PS-1 CALIBRATION FORM

Name: D. SEWALL Date: 7/15/87

Site Address: DEAD CREEK - SITE G

PS-1 Shelter No.: EE-5 Station Pressure: 30.02

GMW Model 40° OCU No.: 45-C

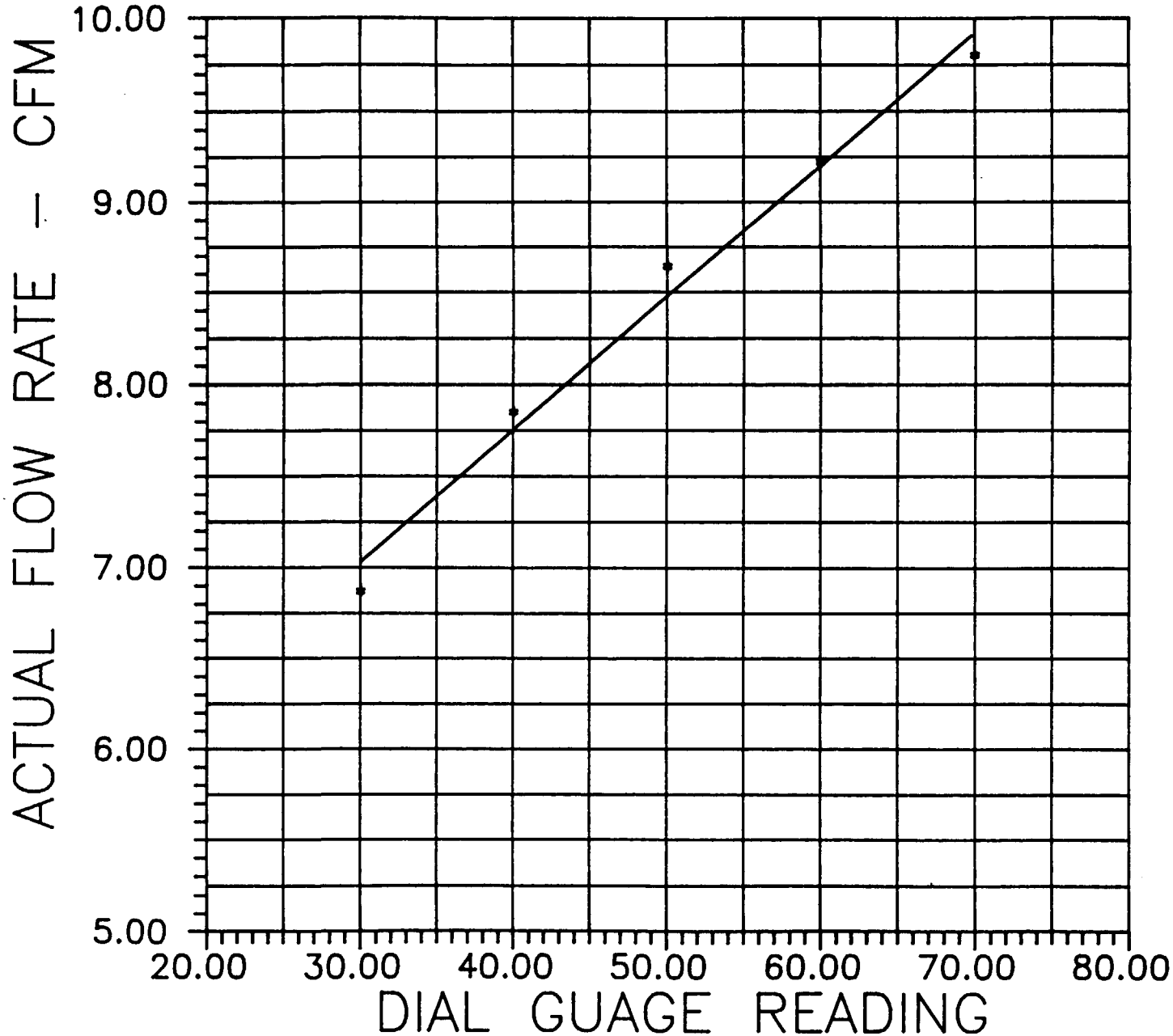
| Magnehelic Gauge Reading | Manometer Reading (in. $H_2O$) | OCU Flow-Rate (tcfm) | Temp. (°C) |
|---|---|---|---|
| 70 | 3.7/3.6 | | 64°F |
| 60 | 3.3/3.2 | | " |
| 50 | 2.9/2.8 | | " |
| 40 | 2.4/2.3 | | " |
| 30 | 1.5/1.8 | | " |
| | | | |
| | | | |

Comments: WIND SPEED 8 MPH

DIRECTION 220° (SW)

y = 0.196 G − 1.43

# PUF AIR SAMPLER CALIBRATION – EE5



# GMW MODEL PS-1 CALIBRATION FORM

Name: A. SEWALL Date: 7/15/87

Site Address: BEAR CREEK - SITE 6

PS-1 Shelter No.: EE6 Station Pressure: 30.02

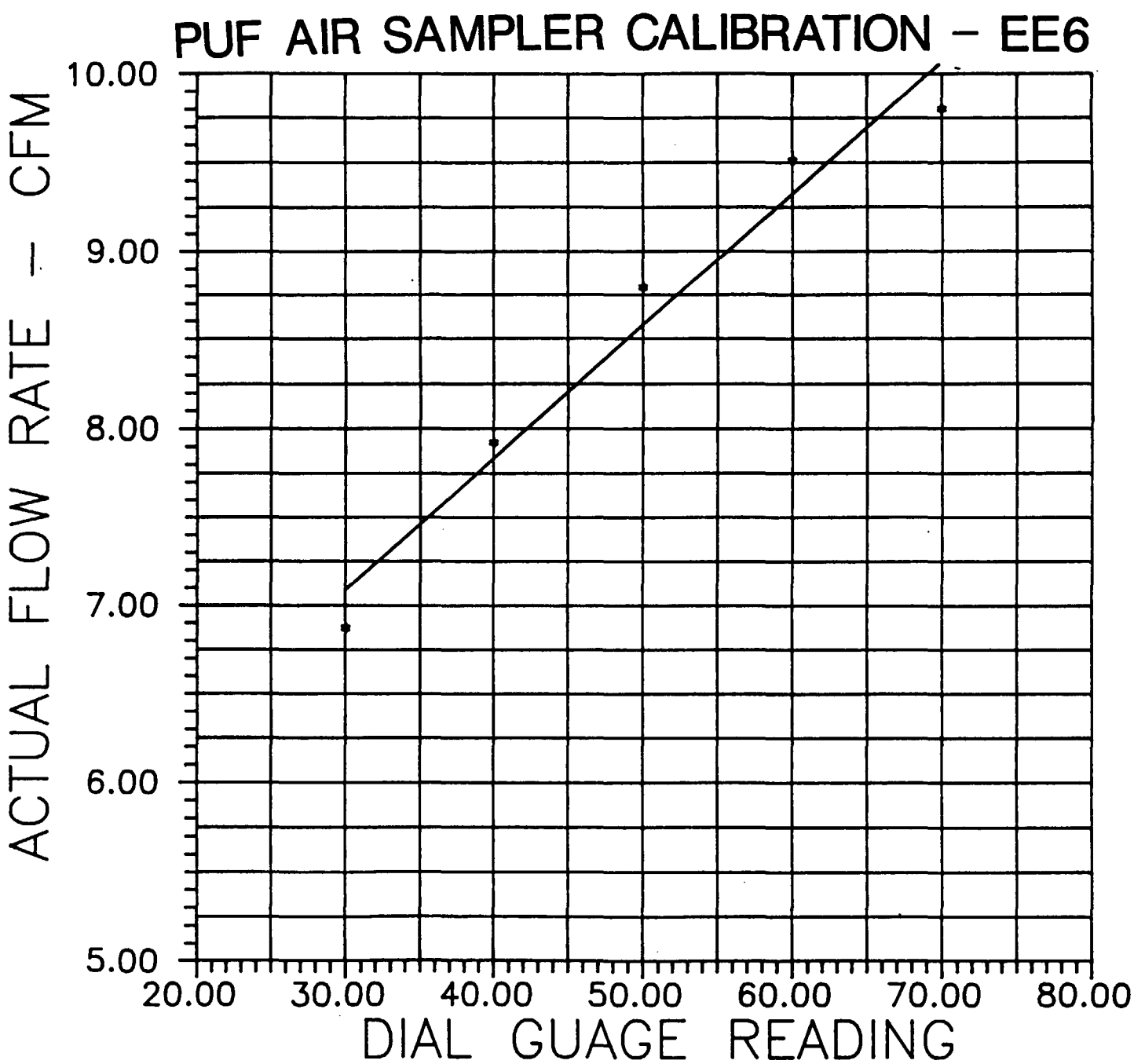
GMW Model 40° OCU No.: 45-C

| Magnehelic Gauge Reading | Manometer Reading (in. $H_2O$) | OCU Flow-Rate (tcfm) | Temp. (°C) |
|---|---|---|---|
| ~~70~~ 68 | 3.7/3.6 | | 64°F |
| 60 | 3.5/3.4 | | " |
| 50 | 3.0/2.9 | | " |
| 40 | 2.4/2.4 | | " |
| 30 | 1.8/1.8 | | " |
| | | | |
| | | | |

Comments: WIND SPEED 8 MPH

DIRECTION 220° (SW)

y = 0.964 c - 1.23


PUF AIR SAMPLER CALIBRATION – EE6
ACTUAL FLOW RATE – CFM
10.00
9.00
8.00
7.00
6.00
5.00
20.00
30.00
40.00
50.00
60.00
70.00
80.00
DIAL GUAGE READING

# GMW MODEL PS-1 CALIBRATION FORM

WIND 210° 9 MPH

Name: A. SEWALL Date: 7/20/87

Site Address: DEAD CREEK - SITE Q/R

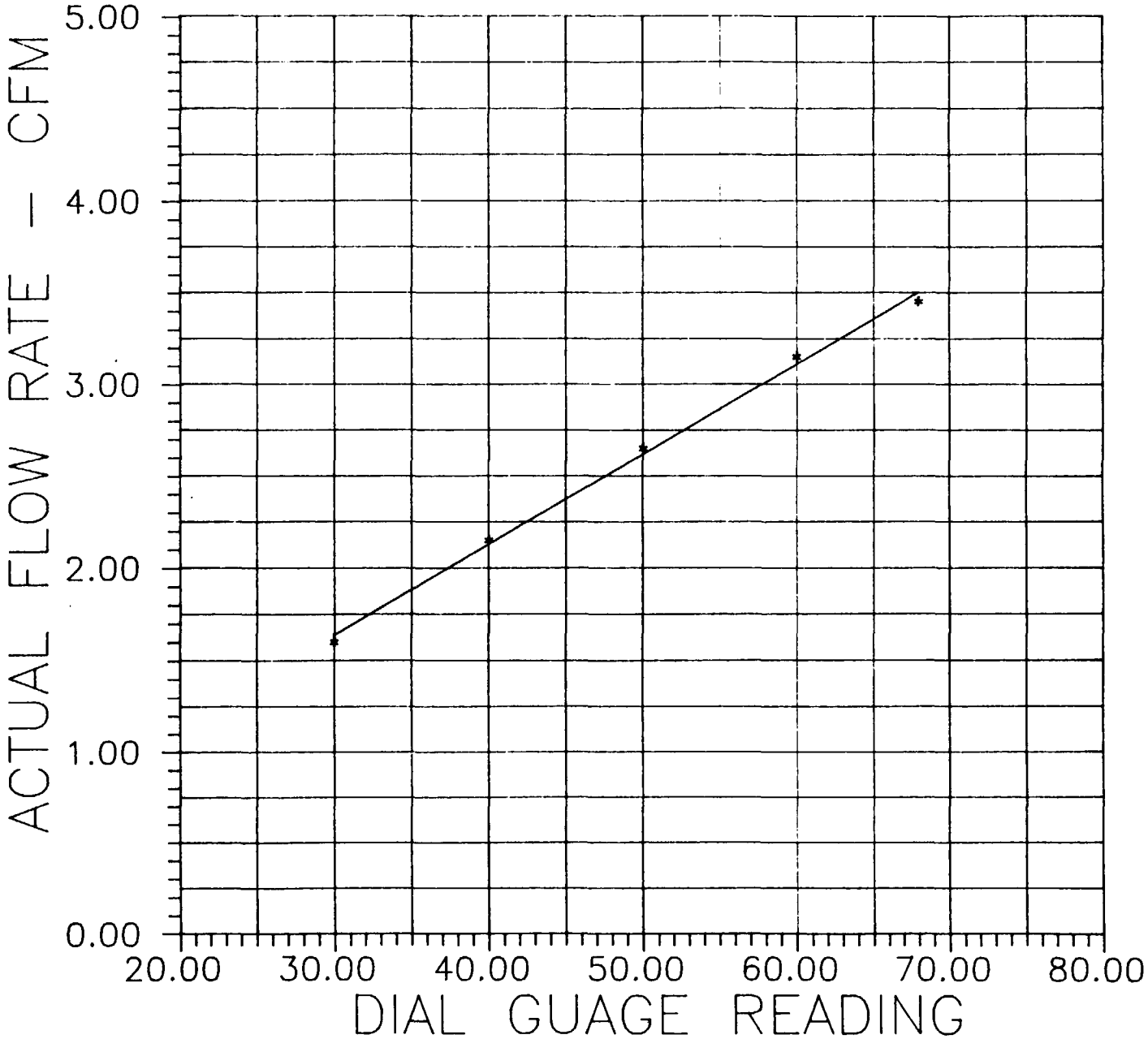
PS-1 Shelter No.: EE-1 Station Pressure: 30.21 =

GMW Model 40 OCU No.: 45-C

| Magnehelic Gauge Reading | Manometer Reading (in. $H_2O$) | OCU Flow-Rate (tcfm) | Temp. (°C) |
|---|---|---|---|
| ~~78~~ ~~63~~ 68 | ~~3.2/3.1~~ ATS 3.5/3.4 | | 89°F |
| 60 | 3.2/3.1 | | |
| 50 | 2.7/2.6 | | |
| 40 | 2.2/2.1 | | |
| 30 | 1.6/1.6 | | |
| | | | |
| | | | |

Comments:

# PUF AIR SAMPLER CALIBRATION - EE1



# GMW MODEL PS-1 CALIBRATION FORM

Name: S. SEWALL Date: 7/20/87

Site Address: DEAN CREEK - SITE O/R

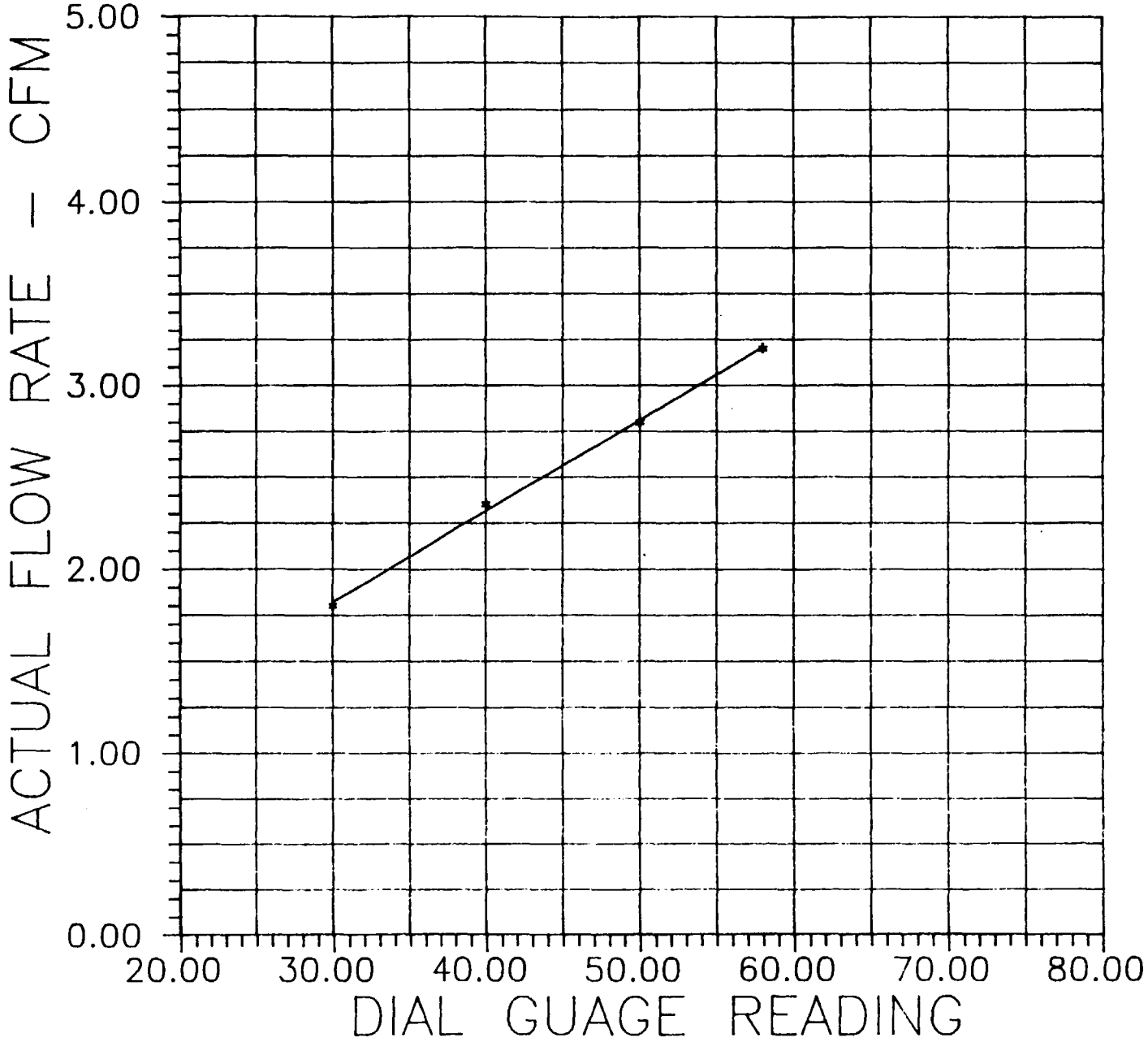
PS-1 Shelter No.: EE-2 Station Pressure: 30.21

GMW Model 40' OCU No.: 45-C

| Magnehelic Gauge Reading | Manometer Reading (in. $H_2O$) | OCU Flow-Rate (tcfm) | Temp. (°C) |
|---|---|---|---|
| | | | 89°F |
| 58 ~~60~~ | 3.2/3.2 | | |
| 50 | 2.8/2.8 | | |
| 40 | 2.4/2.3 | | |
| 30 | 1.8/1.8 | | |
| | | | |
| | | | |

Comments:

# PUF AIR SAMPLER CALIBRATION - EE2



# GMW MODEL PS-1 CALIBRATION FORM

Name: A. SEWALL Date: 7/20/87

Site Address: SEAM CREEK - SITE Q/R

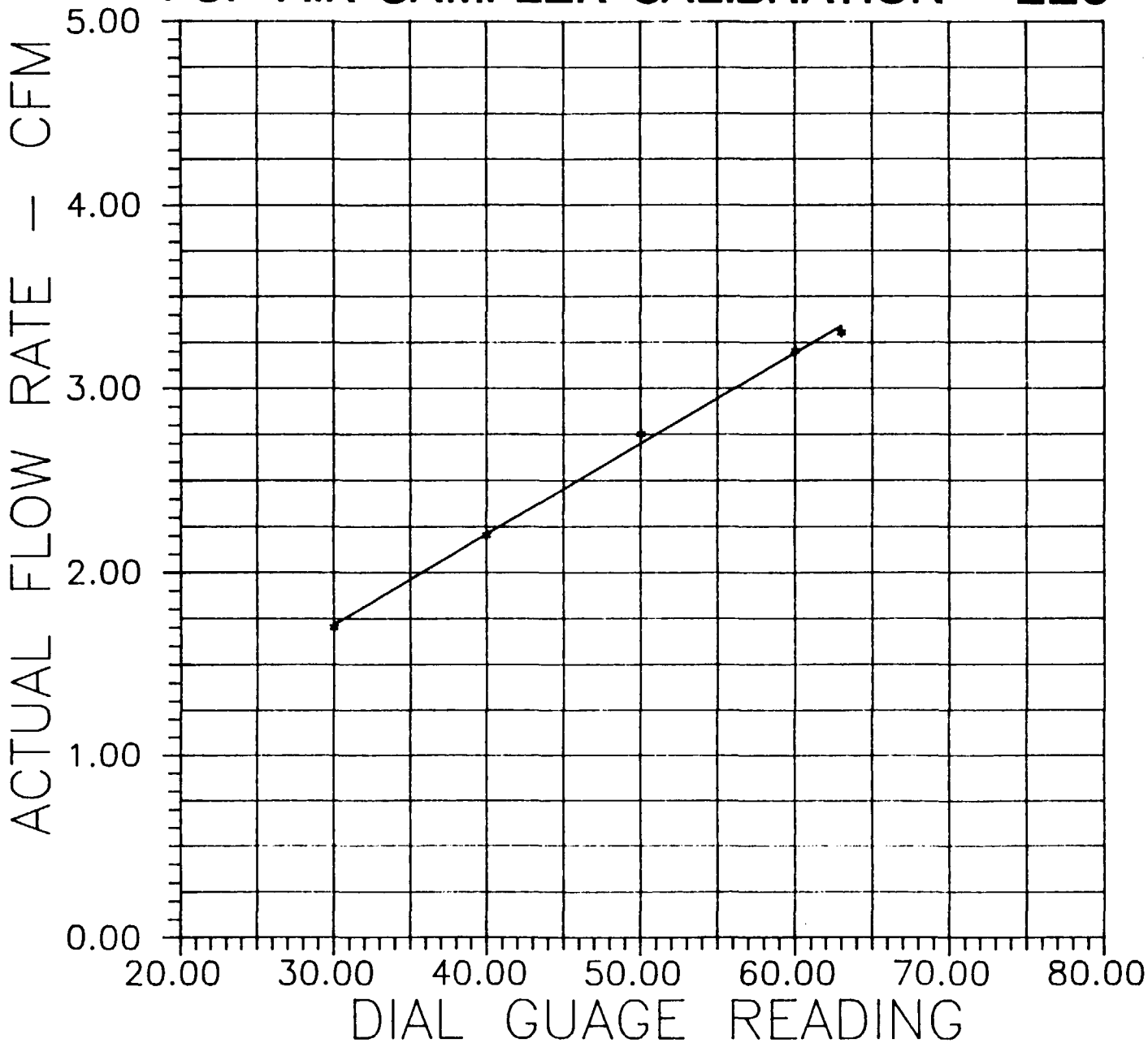
PS-1 Shelter No.: EE-3 Station Pressure: 30.21

GMW Model 40° OCU No.: 45-C

| Magnehelic Gauge Reading | Manometer Reading (in. $H_2O$) | OCU Flow-Rate (tcfm) | Temp. (°C) |
|---|---|---|---|
| 63 | 3.3/3.3 | | 89°F |
| 60 | 3.2/3.2 | | |
| 50 | 2.8/2.7 | | |
| 40 | 2.2/2.2 | | |
| 30 | 1.7/1.7 | | |
| | | | |
| | | | |

Comments:

# PUF AIR SAMPLER CALIBRATION - EE3



# GMW MODEL PS-1 CALIBRATION FORM

Name: A. SEWALL Date: 7/20/87

Site Address: DEAD CREEK - SITE Q/R

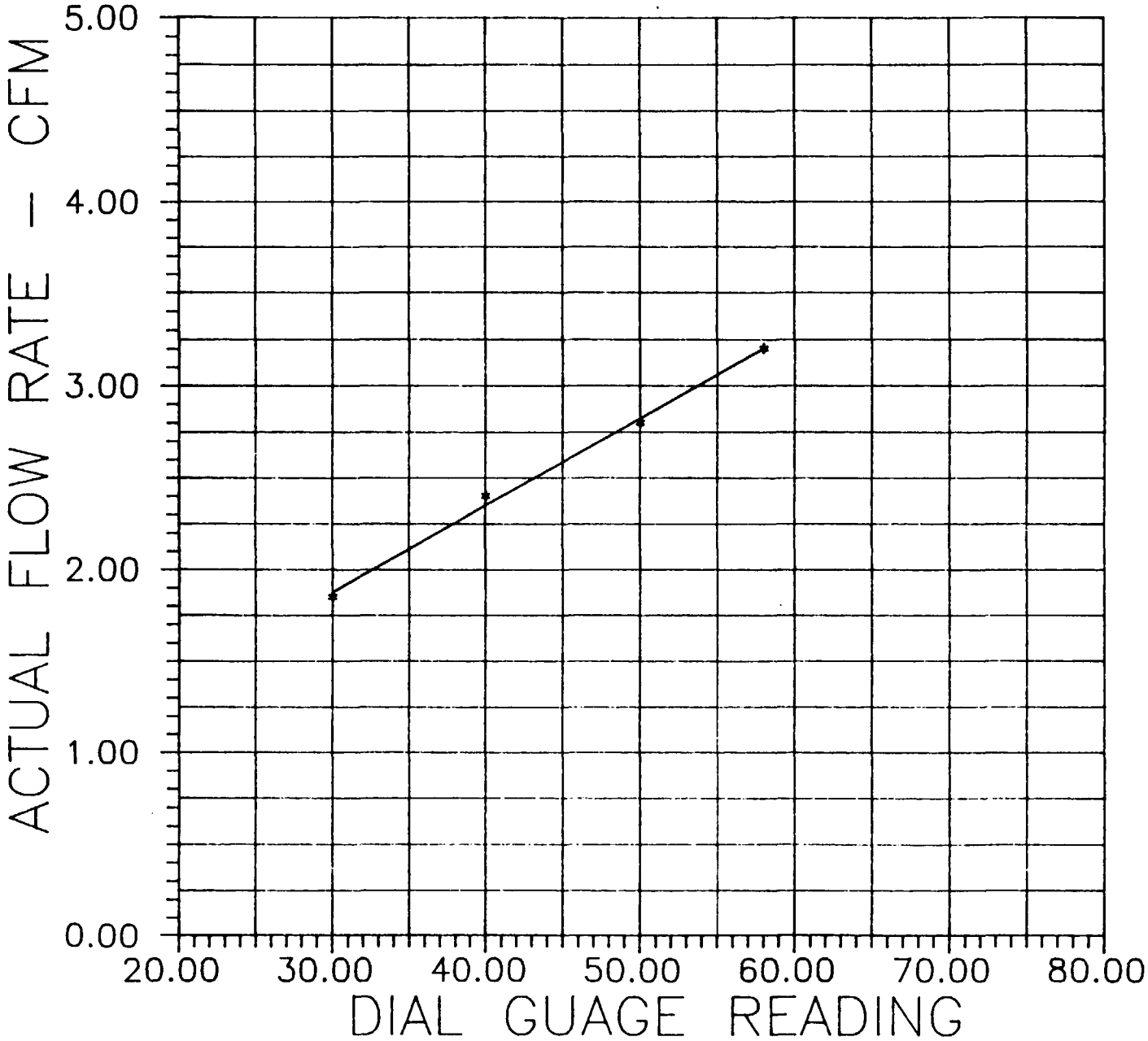
PS-1 Shelter No.: EE-4 Station Pressure: 30.21

GMW Model 40 OCU No.: 45-C

| Magnehelic Gauge Reading | Manometer Reading (in. $H_2O$) | OCU Flow-Rate (tcfm) | Temp. (°C) |
|---|---|---|---|
| | | | 89°F |
| 58 ~~60~~ | 3.3/3.1 | | |
| 50 | 2.9/2.7 | | |
| 40 | 2.4/2.3 | | |
| 30 | 1.9/1.8 | | |
| | | | |
| | | | |

Comments:

# PUF AIR SAMPLER CALIBRATION - EE4



# GMW MODEL PS-1 CALIBRATION FORM

Name: S. SEWALL Date: 7/20/87

Site Address: ARAS CREEK - SITE Q/R

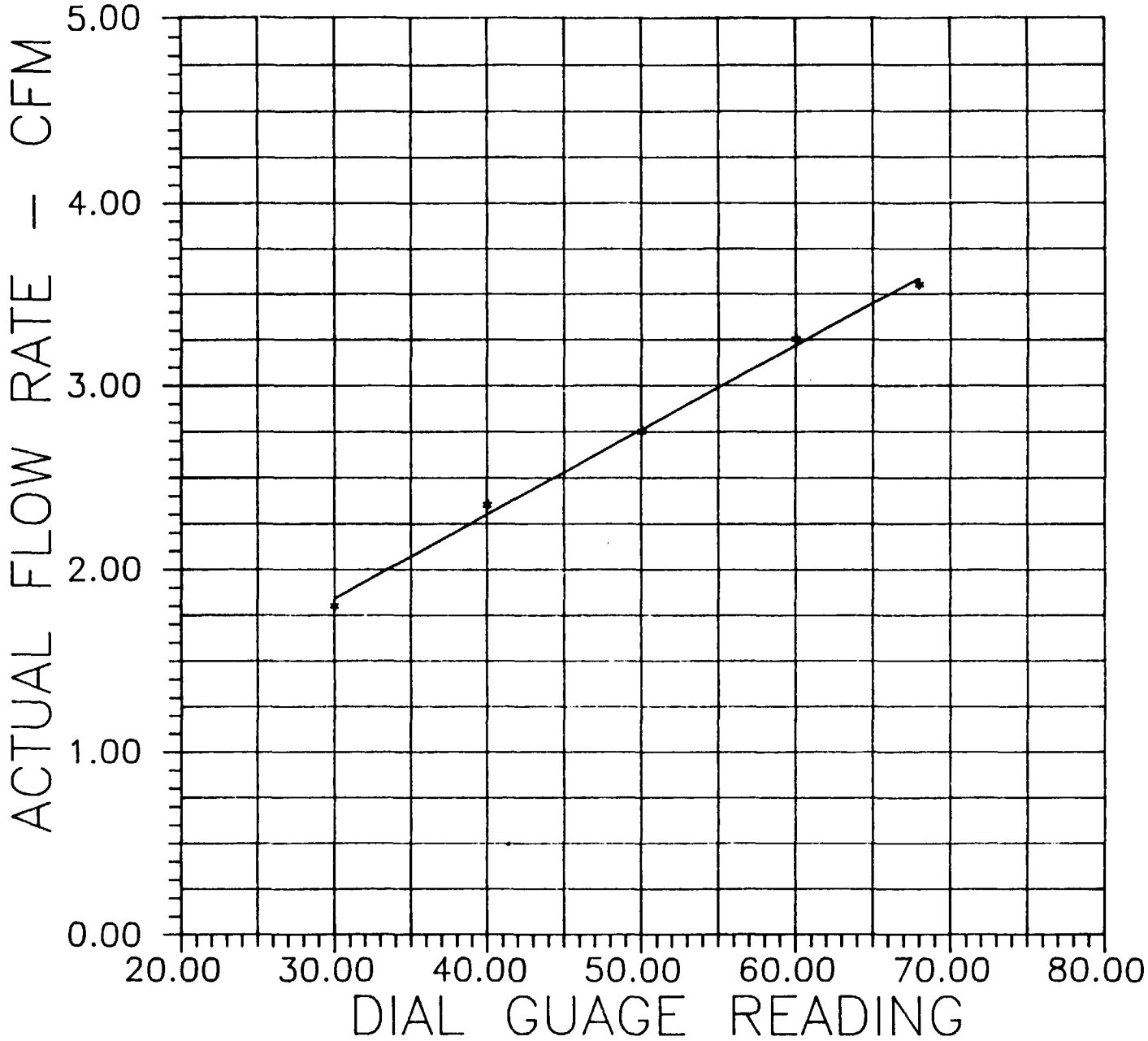
PS-1 Shelter No.: EE-5 Station Pressure: 30.21

GMW Model 40° OCU No.: 45-C

| Magnehelic Gauge Reading | Manometer Reading (in. $H_2O$) | OCU Flow-Rate (tcfm) | Temp. (°C) |
|---|---|---|---|
| 65 | 3.6/3.5 | | 89°F |
| 60 | 3.3/3.2 | | |
| 50 | 2.8/2.7 | | |
| 40 | 2.4/2.3 | | |
| 30 | 1.8/1.8 | | ✓ |
| | | | |
| | | | |

Comments:

# PUF AIR SAMPLER CALIBRATION - EE5



# GMW MODEL PS-1 CALIBRATION FORM

Name: A. SEWALL Date: 7/20/87

Site Address: DEAD CREEK - SITE Q/R

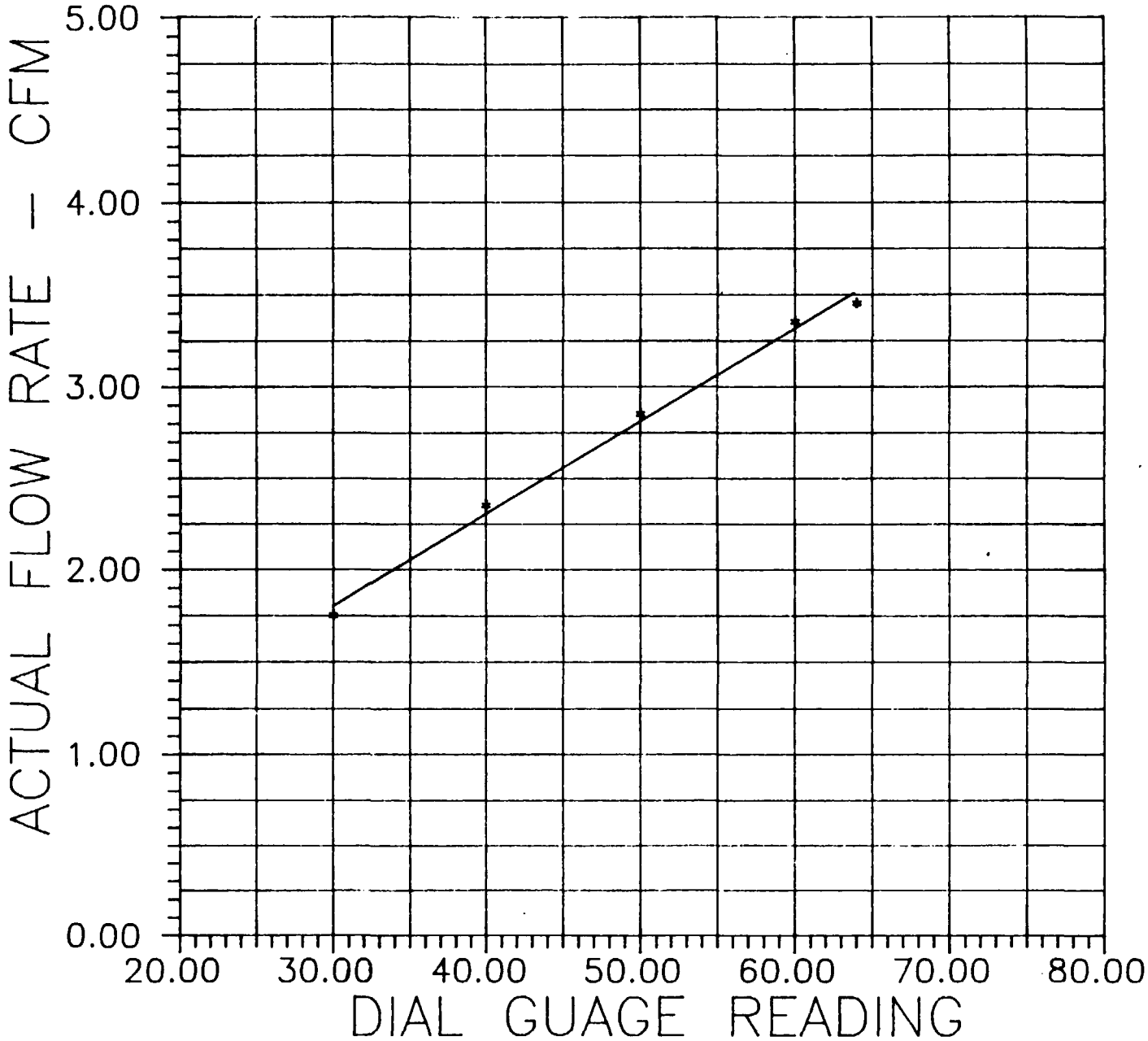
PS-1 Shelter No.: EE-6 Station Pressure: 30.21

GMW Model 40° OCU No.: 45-C

| Magnehelic Gauge Reading | Manometer Reading (in. $H_2O$) | OCU Flow-Rate (tcfm) | Temp. (°C) |
|---|---|---|---|
| 64 | 3.5/3.4 | | 89°F |
| 60 | 3.4/3.3 | | |
| 50 | 2.9/2.8 | | |
| 40 | 2.4/2.3 | | |
| 30 | 1.8/1.7 | | |
| | | | |
| | | | |

Comments:

# PUF AIR SAMPLER CALIBRATION – EE6



# GMW MODEL PS-1 CALIBRATION FORM

Name: A. SEWELL Date: 7/22/87

Site Address: BEAS CREEK - SITES O/R

PS-1 Shelter No.: EE-1 Station Pressure: _____

GMW Model 40° OCU No.: 45-C

| Magnehelic Gauge Reading | Manometer Reading (in. $H_2O$) | OCU Flow-Rate (tcfm) | Temp. (°C) |
|---|---|---|---|
| * | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Comments: * NO EWA CALIBRATION FOR EE-1 DUE TO MOTOR FAILURE.

# GMW MODEL PS-1 CALIBRATION FORM

Name: A. SEWALL Date: 7/23/87

Site Address: DEAD CREEK - SITES Q/R

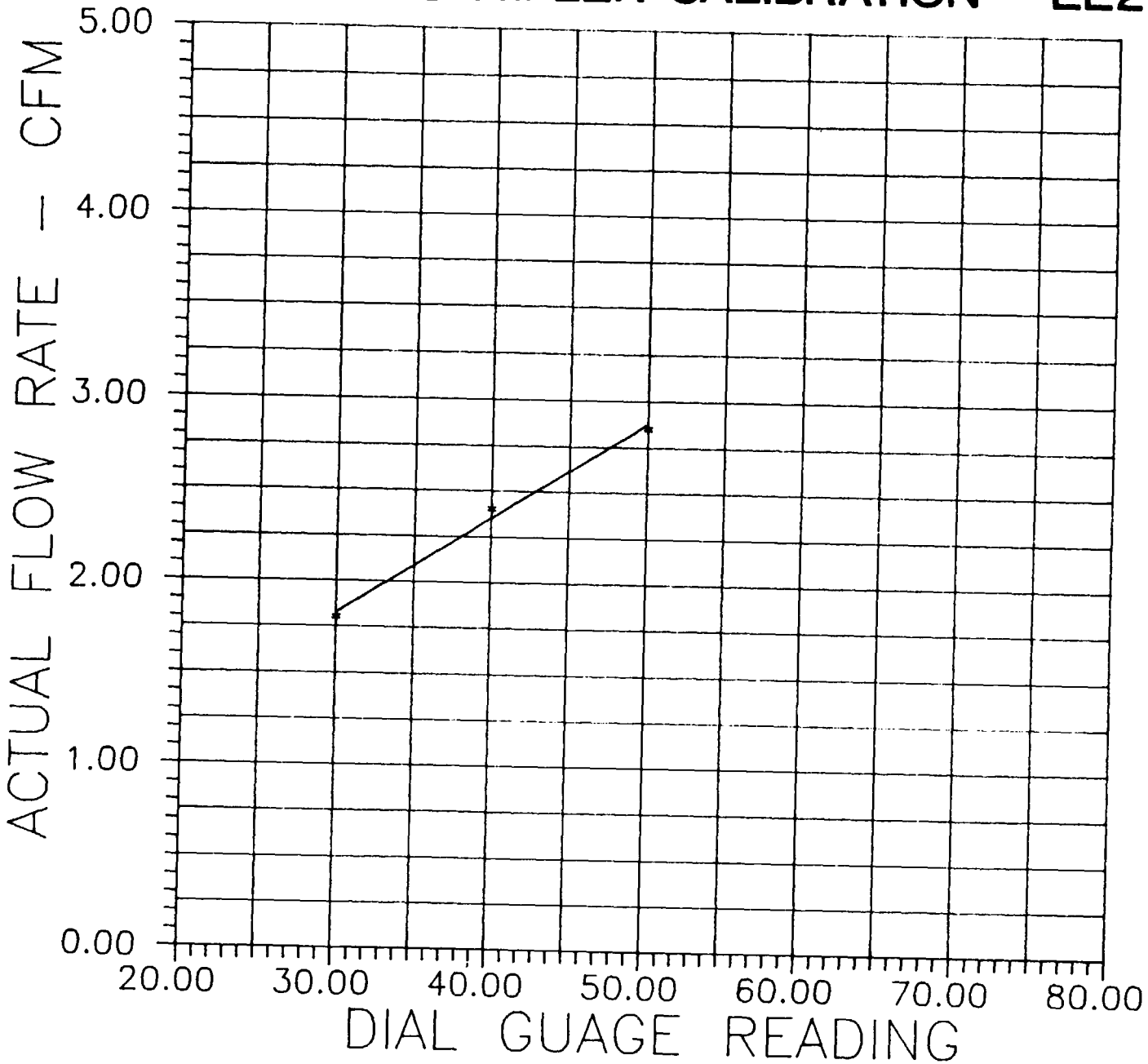
PS-1 Shelter No.: EE-2 Station Pressure: 30.10

GMW Model 40 OCU No.: 45-C

| Magnehelic Gauge Reading | Manometer Reading (in. $H_2O$) | OCU Flow-Rate (tcfm) | Temp. (°C) |
|---|---|---|---|
| 50 | 2.9/2.8 | | 86° |
| 40 | 2.4/2.4 | | ↓ |
| 30 | 1.8/1.8 | | |
| | | | |
| | | | |
| | | | |
| | | | |

Comments: GAUGE READING 50 AT START OF TEST WITH VALVE OPEN.

# PUF AIR SAMPLER CALIBRATION - EE2



# GMW MODEL PS-1 CALIBRATION FORM

Name: S. SEWALL Date: 7/22/87

Site Address: SEMA CREEK · SITES Q/R

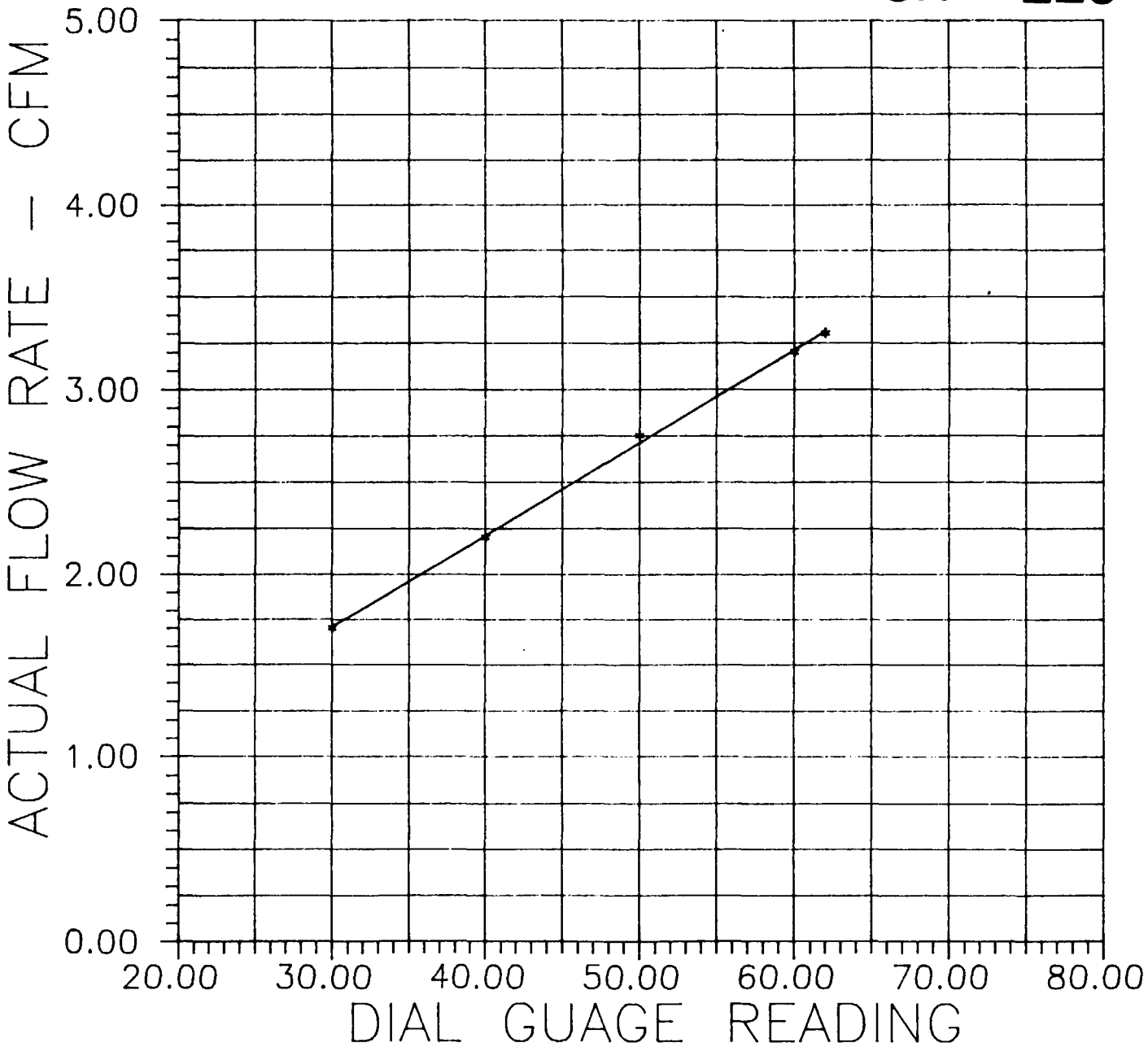
PS-1 Shelter No.: EE-3 Station Pressure: 30.10

GMW Model 40° OCU No.: 45-C

| Magnehelic Gauge Reading | Manometer Reading (in. $H_2O$) | OCU Flow-Rate (tcfm) | Temp. (°C) |
|---|---|---|---|
| 62 | 3.3/3.3 | | 86 |
| 60 | 3.2/3.2 | | |
| 50 | 2.8/2.8 | | |
| 40 | 2.2/2.2 | | |
| 30 | 1.7/1.7 | | ✓ |
| | | | |
| | | | |

Comments:

# PUF AIR SAMPLER CALIBRATION - EE3



# GMW MODEL PS-1 CALIBRATION FORM

Name: A. SEWALL Date: 7/22/87

Site Address: ARAS CREEK - SITES Q/R

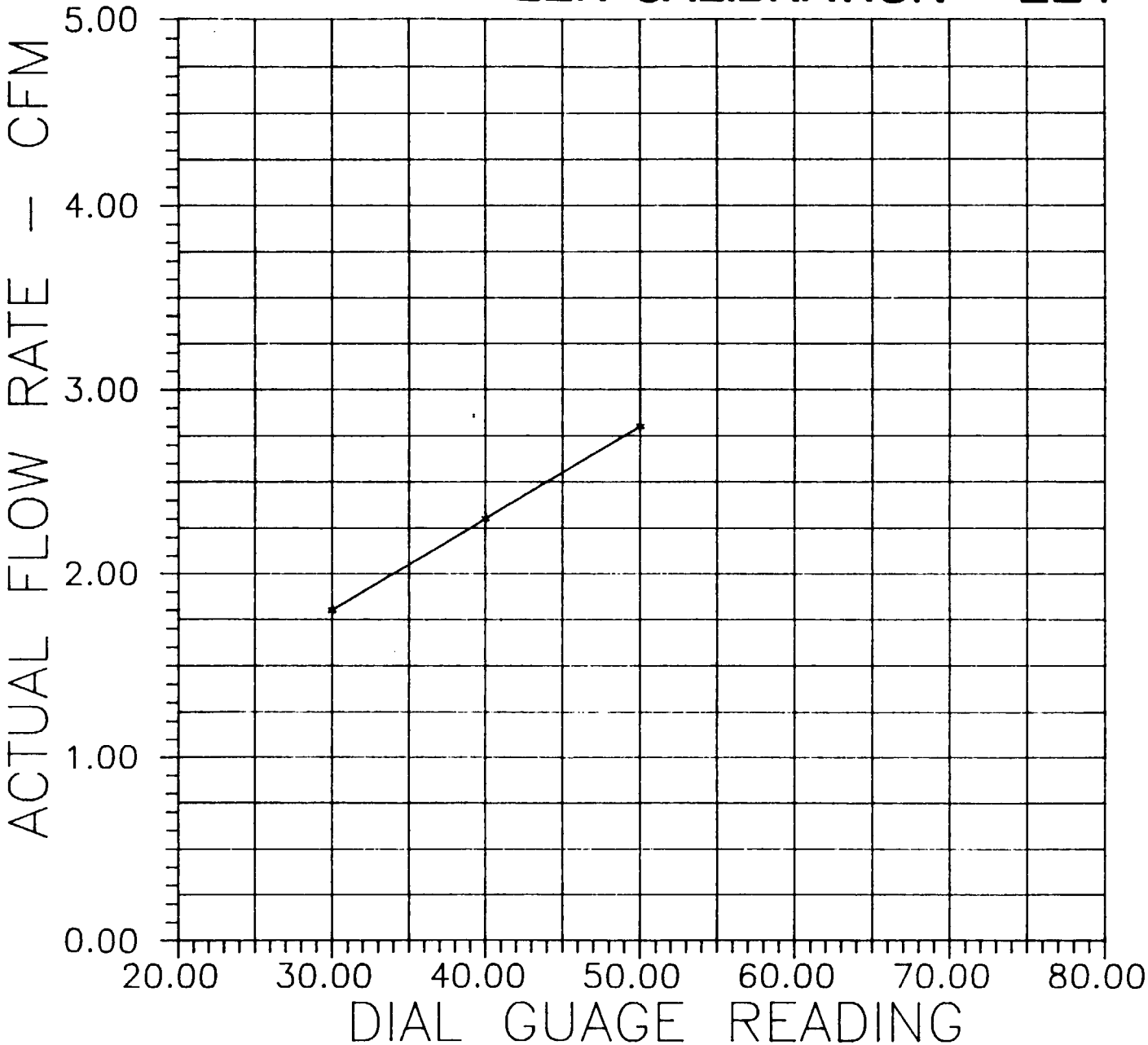
PS-1 Shelter No.: EE-4 Station Pressure: 30.10

GMW Model 40' OCU No.: 45-C

| Magnehelic Gauge Reading | Manometer Reading (in. $H_2O$) | OCU Flow-Rate (tcfm) | Temp. (°C) |
|---|---|---|---|
| 50 | 2.8/2.8 | | 86° |
| 40 | 2.3/2.3 | | ↓ |
| 30 | 1.8/1.8 | | |
| | | | |
| | | | |
| | | | |
| | | | |

Comments:

# PUF AIR SAMPLER CALIBRATION – EE4



# GMW MODEL PS-1 CALIBRATION FORM

Name: A. SEWALL Date: 7/22/87

Site Address: DEAD CREEK - SITES O/R

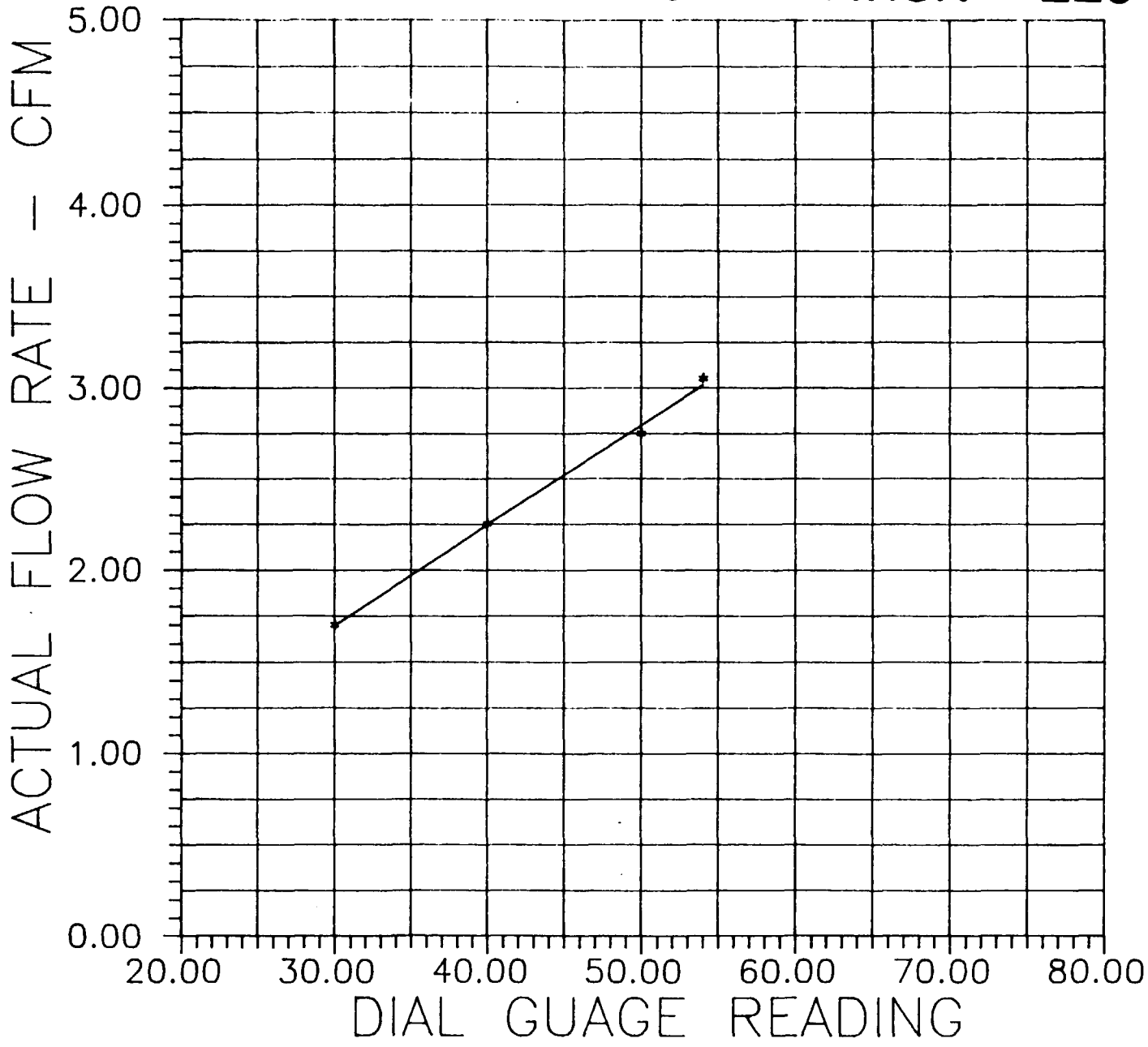
PS-1 Shelter No.: EE-5 Station Pressure: 30.10

GMW Model 40° OCU No.: 45-C

| Magnehelic Gauge Reading | Manometer Reading (in. $H_2O$) | OCU Flow-Rate (tcfm) | Temp. (°C) |
|---|---|---|---|
| 54 | 3.0/3.1 | | 86° |
| 50 | 2.8/2.7 | | ↓ |
| 40 | 2.3/2.2 | | ↓ |
| 30 | 1.7/1.7 | | |
| | | | |
| | | | |
| | | | |

Comments:

# PUF AIR SAMPLER CALIBRATION - EE5



# GMW MODEL PS-1 CALIBRATION FORM

Name: D. SEWALL Date: 7/22/87

Site Address: ARAD CREEK - SITES Q/R.

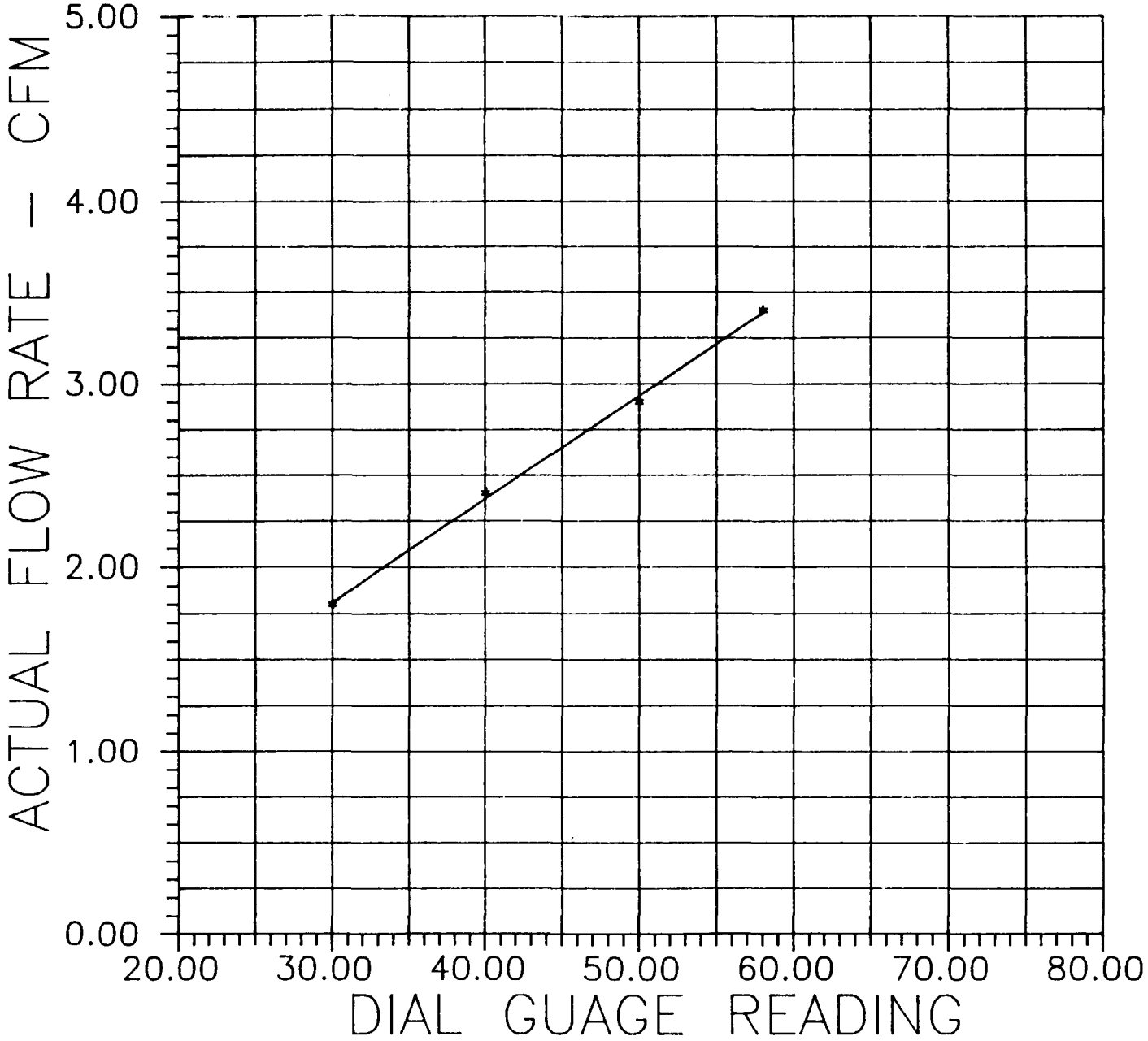
PS-1 Shelter No.: EE-6 Station Pressure: 30.10

GMW Model 40 OCU No.: 45-C

| Magnehelic Gauge Reading | Manometer Reading (in. $H_2O$) | OCU Flow-Rate (tcfm) | Temp. (°C) |
|---|---|---|---|
| 58 | 3.4/3.1 | | 86° |
| 50 | 2.9/2.9 | | ↓ |
| 40 | 2.4/2.4 | | ↓ |
| 30 | 1.8/1.8 | | |
| | | | |
| | | | |
| | | | |

Comments:

# PUF AIR SAMPLER CALIBRATION - EE6



# High Volume Sampler
# Air Volume Calculations

(1) Calculated by m.
10-21-87

Table for the Calculation Air vol. at standard temperature and pressure

# Summary Data

| Case # | site | shelter No. | Date | Sample Time Elapse Time (min) | Total Air vol. cu.ft. standard Temp/press. | Air volume cubic meter $\frac{1}{35.1}$ cubic |
|---|---|---|---|---|---|---|
| DC-01 | G | EE-1 | 7-16-87 | 733.6 | 3968 | 113.05 |
| DC-02 | // | EE-2 | // | 709.4 | 3598 | 102.51 |
| DC-03 | // | EE-3 | // | 718.6 | 3695 | 105.27 |
| DC-04 | // | EE-4 | // | 739.9 | 4017 | 114.44 |
| DC-05 | // | EE-5 | // | 668.6 | 3582 | 102.05 |
| DC-06 | // | EE-6 | // | 652 | 3351 | 95.47 |
| DC-07 | | Blank | | | | |
| DC-10 | G | EE-1 | 7-17-87 | 621.5 | 3160 | 90.03 |
| DC-8 | // | EE-2 | // | 719.3 | 3794 | 108.09 |
| DC-9 | // | EE-3 | // | 740.2 | 3531 | 100.60 |
| DC-13 | // | EE-4 | // | 740.7 | 4019 | 114.50 |
| DC-12 | // | EE-5 | // | 733.5 | 3671 | 104.59 |
| DC-11 | // | EE-6 | // | 556.6 | 2899 | 82.59 |
| DC-20 | G/R | EE-1 | 7-21-87 | 714.4 | 4055 | 115.53 |
| DC-15 | // | EE-2 | // | 566.5 | 3048 | 86.84 |
| DC-16 | // | EE-3 | // | 721.9 | 3668 | 104.50 |
| DC-17 | // | EE-4 | // | 566.5 | 2959 | 84.30 |
| DC-19 | // | EE-5 | // | 910.6 | ID | — |
| DC-18 | // | EE-6 | // | 711.4 | 4135 | 117.81 |
| DC-27 | G/R | EE-1 | 7-22-87 | ID | — | — |
| DC-22 | // | EE-2 | // | 622 | 3246 | 92.48 |
| DC-23 | // | EE-3 | // | 742.2 | 4135 | 117.81 |
| DC-24 | // | EE-4 | // | 621.9 | 2899 | 82.59 |
| DC-26 | // | EE-5 | // | 722.1 | 3927 | 111.88 |
| DC-25 | // | EE-6 | // | 735 | 3898 | 111.05 |
| -28 | | Blank | | | | |

ID: Inaccurate Data

(1) orifice Transfer standard cal. $Q_{std} = \frac{1}{0.28}\left[\sqrt{\Delta H \cdot \frac{P}{P_{std}} \cdot \frac{T_{std}}{T}} + 0.0156\right]$

Site: DEAD CREEK - SITE 6 Date: 7/17/87 Performed by: D. SEWALL

| Sampler S/N | Sampling Location I.D. | New Filter (√) | PUF Cert. No. | Vario Setting | Clock Time Start, hr CDT | Clock Time Stop, hr CDT | Clock Time Min Elapsed | Sampler Timer Start, min | Sampler Timer Stop, min | Sampler Timer Min Elapsed | Venturi Readings: Time/Magnehelic in. $H_2O$ START 1 | 2 | 3 | 4 | Ambient °C Temperature, °C Start | Stop | Barometric Pressure mm Hg Start | Stop | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EE-1 | NE CORNER | ✓ | | | 0600 | 1837 | 757 | 812.3 | 1433.8 | 621.5 | 53 | 33 | 32 | 33 | 69 | 85 | 30.14 | 30.10 | AC-08 AC-10 |
| EE-2 | E-AC FENCE | ✓ | | | 0610 | 1811 | 721 | 728.9 | 1448.2 | 719.3 | 44 | 37 | 34 | 34 | 69 | 85 | 30.14 | 30.10 | AC-08 |
| EE-3 | NE (CORR) | ✓ | | | 0608 | 1832 | 744 | 740.2 | 1480.4 | 740.2 | 38 | 30 | 28 | 28 | 69 | 85 | 30.14 | 30.10 | AC-09 |
| EE-4 | NW CORNER | ✓ | | | 0557 | 1827 | 750 | 778.3 | 1519.0 | 740.7 | 47 | 37 | 36 | 36 | 69 | 85 | 30.14 | 30.10 | AC-13 (NO CORP) |
| EE-5 | SW-BLG | ✓ | | | 0553 | 1820 | 747 | 684.7 | 1418.2 | 733.5 | 44 | 36 | 34 | 35 | 69 | 85 | 30.14 | 30.10 | AC-12 |
| EE-6 | NE CORNER | ✓ | | | 0602 | 1838 | 756 | 678.9 | 1235.5 | 556.6 | 40 | 36 | 34 | 32 | 69 | 85 | 30.14 | 30.10 | AC-11 (CO-LOCATED) |
| | WEATHER: | HI VOL - | | START: | | WIND | SE (140°) | 8 MPH, | 69°F, | 30.14, | DEW PT. | 65 | (0700) | | | | | | |
| | | | | MIDDLE: | | WIND | SW (180°) | 8 MPH, | 80°F | 30.10 | (1000) | | | | | | | | |
| | | | | STOP: | | WIND | SE (150°) | 8 MPH, | 85°F, | 30.10, | DEW PT. | 70 | (0640) | | | | | | |
| | | LO-VOL- | | START - | | WIND | SW (190°) | 10 MPH, | 76°F | 30.10, | (0900) | | | | | | | | |
| | | | | MIDDLE - | | WIND | SW (190°) | 10 MPH | 84°F, | 30.14, | (1240) | | | | | | | | |
| | | | | STOP - | | WIND | S (180°) | 12 MPH, | 88°F, | 30.10, | (1620) | DEW PT. | 69 | | | | | | |

(a) Record any evidence of tampering with sampler and/or abnormalities in sampler operation, PUF cartridge condition or handling, etc.

Data Checked By: _____ Date: _____

FIGURE 4. TYPICAL SAMPLING DATA FORM FOR HIGH VOLUME PESTICIDE/PCB SAMPLER

Site: DEAD CREEK - SITES Q/R  Date: 7/21/87  Performed by: B. SEWALL

| Sampler S/N | Sampling Location I.D. | New Filter (√) | PUF Cart. No. | Varian Sorbing | Clock Time Start, hr CDT | Clock Time Stop, hr CDT | Clock Time Min Elapsed | Sampler Timer Start, min | Sampler Timer Stop, min | Sampler Timer Min Elapsed | Vernier Readings: Time/Magnehelic in. $H_2O$ START | 10:30 | 1430 | 4 | Ambient °F Temperature °C Start | Ambient °F Temperature °C Stop | Barometric Pressure mm Hg Start | Barometric Pressure mm Hg Stop | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EE-1 | SE PORTION | ✓ | | | 0702 | 1904 | 722 | 1435.8 | 2150.2 | 714.4 | 56 | 46 | 46 | 44 | 73 | 87 | 30.23 | 30.17 | AC-20 |
| EE-2 | NW PORTION | ✓ | | | 0633 | 1920 | 767 | 1451.2 | 2017.7 | 566.5 | 46 | 40 | 36 | 34 | 73 | 87 | 30.23 | 30.17 | AC-15 |
| EE-3 | NE CORNER | ✓ | | | 0627 | 1834 | 727 | 1486.7 | 2208.6 | 721.9 | 42 | 35 | 33 | 36 | 73 | 87 | 30.23 | 30.17 | AC-16 |
| EE-4 | NW PORTION | ✓ | | | 0632 | 1918 | 766 | 1521.5 | 2088 | 566.5 | 46 | 36 | 32 | 32 | 73 | 87 | 30.23 | 30.17 | AC-17 CO-LOCATED |
| EE-5 | SW PORTION | ✓ | | | 0640 | 1944 | 729 | 1420.2 | 2330.8 | 910.6 | 48 | 40 | 40 | 41 | 73 | 87 | 30.23 | 30.17 | AC-19 |
| EE-6 | SE BKG | ✓ | | | 0654 | 1911 | 737 | 1237.6 | 1949.0 | 711.4 | 44 | 40 | 34 | 34 | 73 | 87 | 30.23 | 30.17 | AC-18 |

WEATHER - HI VOL START - WIND SW (220°) 6 MPH, 75°F, 30.23 (0720)
MIDDLE WIND SW (200°) 8 MPH, 86°F, 30.26 (1140)
END - WIND SW (210°) 7 MPH, 87°F 30.17 (1730)

LOW VOL START - WIND SE (160°) 5 MPH 84°F, 30.25 (0730)
MIDDLE - WIND SW (200°) 8 MPH 86°F, 30.26 (1140)
END - WIND S (180°) 6 MPH, 88°F 30.17 (1730)

(a) Record any evidence of tampering with sampler and/or abnormalities in sampler operation, PUF cartridge condition or handling, etc.

Data Checked By: _____ Date: _____

**FIGURE 4. TYPICAL SAMPLING DATA FORM FOR HIGH VOLUME PESTICIDE/PCB SAMPLER**

GENERATOR (YELLOW CAP) ON EE-5 BROKE DOWN 5 MIN. AFTER START UP (FLOW CHANGE). REPLACED GENERATOR.

FAULT ON LOW VOL PUMP @ EE-4 AT 10:30 A.M.
FAN ON LOW VOL PUMP @ EE-3 AT 10:40 A.M.

T04-20

Site: DEAD CREEK - SITES 9/R  Date: 7/22/87  Performed by: D. SEWALL

| Sampler S/N | Sampling Location I.D. | New Filter (✓) | PUF Cart. No. | Varies Setting | Clock Time Start, hr CDT | Clock Time Stop, hr CDT | Clock Time Min Elapsed | Sampler Timer Start, min | Sampler Timer Stop, min | Sampler Timer Min Elapsed | Venturi Readings Time/Magnehelic in. $H_2O$ 1 | 2 | 3 | 4 | Ambient Air Temperature, °F Start | Ambient Air Temperature, °F Stop | Barometric Pressure mm Hg Start | Barometric Pressure mm Hg Stop | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EE-1 | SE PORTION | ✓ | | | 0627 | — | — | 2150 | 2304.6 | 154.6* | 58 | — | ~~54~~ | — | 74 | 86 | 30.21 | 30.10 | AC-27 *MOTOR BREAKDOWN |
| EE-2 | NW PORTION | ✓ | | | 0608 | 1914 | 786 | 2019.0 | 2641 | 622 | 38 | 35 | 33 | 36 | 74 | 86 | 30.21 | 30.10 | AC-22 |
| EE-3 | NE CORNER | ✓ | | | 0635 | 1857 | 742 | 2208.6 | 2950.8 | 742.2 | 54 | 42 | 40 | 40 | 74 | 86 | 30.21 | 30.10 | AC-23 |
| EE-4 | NW PORTION | ✓ | | | 0607 | 1913 | 786 | 2089.1 | 2711 | 621.9 | 32 | 24 | 24 | 28 | 74 | 86 | 30.21 | 30.10 | AC-24 CO LOCATION |
| EE-5 | SW NORTHERN PORTION | ✓ | | | 0614 | 1826 | 732 | 2331.2 | 3053.3 | 722.1 | 47 | 38 | 37 | 37 | 74 | 86 | 30.21 | 30.10 | AC-26 |
| EE-6 | SW [illegible] | ✓ | | | 0621 | 1841 | 740 | 1948.2 | 2683.2 | 735 | 46 | 35 | 34 | 35 | 74 | 86 | 30.21 | 30.10 | AC-25 |
| BLANK | — | | | | | | | | | | | | | | | | | | AC-28 |

WEATHER: HI VOL START - WIND SE (100°) 6 MPH 74°F: 30.21 (0730)
MIDDLE - WIND SE (100°) [illegible] MPH 90°F 30.17 (1310)
END - WIND S (160°) 12 MPH 86°F 30.10

LOW VOL START - WIND 110° - SE 8 MPH 84°F. 30.22 (0915)
MIDDLE - SAME HI-VOL AROUND
END - WIND S (180°) 13 MPH, 87°F, 30.07 (1700)

(a) Record any evidence of tampering with sampler and/or abnormalities in sampler operation, PUF cartridge condition or handling, etc.

Data Checked By: _____ Date: _____

T04-20

**FIGURE 4. TYPICAL SAMPLING DATA FORM FOR HIGH VOLUME PESTICIDE/PCB SAMPLER**

0600 · WIND NE 0-5

* MOTOR ON EE-1 WENT DOWN @ ~ 9:00 A.M. FOR AN UNKNOWN REASON. ARMETURE TEETH & BRUSHES BROKEN - NOT REPAIRABLE AT THIS TIME. TOTAL SAMPLE TIME AT EE-1 154.6 MIN.

Steps for the calculation of linear relations between manometer data and flow rate



$$V_{std} = V_m * \frac{P_1 - \Delta P}{P_{STD}} * \frac{(T_{STD} + 460)}{(T_1 + 460)} \quad 1.025$$

537

524

$$\begin{cases} T_{STD} = 77^\circ F \\ T_1 = 64 \end{cases}$$

$$\begin{cases} P_{STD} = 29.92 \\ P_1 = 29.76 \end{cases}$$

$\Delta P = 0.2$

$$1 m^3/min = 35.3 ft^3/min = 35.1 cfm$$

$$Q_{std} = \frac{V_{std}}{Time}$$

$$Q_{STD\,1} = \frac{35.3}{6.994} * \underbrace{\frac{29.76 - 0.2}{29.92} * 1.025}_{} = 5.11 cfm$$

$$Q_{st\,2} = \frac{35.3}{4.178} * \frac{29.76 - 0.4}{29.92} * 1.025 = 8.498 cfm$$

$$Q_{st\,3} = \frac{35.3}{3.356} * \frac{29.76 - 0.6}{29.92} * 1.025 = 10.50 cfm$$

$$Q_{st\,4} = \frac{35.3}{2.865} * \frac{29.76 - 0.8}{29.92} * 1.025 = 12.22 cfm$$

$$Q_{st\,5} = \frac{35.3}{2.538} * \frac{29.76 - 1}{29.92} * 1.025 = 13.70 cfm$$

$$\sqrt{\Delta H \left(\frac{P_1}{P_{STD}}\right)\left(\frac{T_{STD}}{T_1}\right)} = \sqrt{\Delta H} * \sqrt{\frac{29.76}{29.92} * \frac{537}{524}} = \sqrt{\Delta H} * 1.0096$$

$\Delta H_1 = \sqrt{2} * 1.0096 = 1.428$

$\Delta H_2 = \sqrt{5.5} * 1.0096 = 2.367$

$\Delta H_3 = \sqrt{8.5} * 1.0096 = 2.943$

$\Delta H_4 = \sqrt{11.5} * 1.0096 = 3.424$

$\Delta H_5 = \sqrt{14.5} * 1.0096 = 3.844$

Table of calibration of manometer ($\sqrt{\text{corrected } \Delta H}$) versus $Q_{std}$

| $y = \sqrt{\Delta H * \frac{P_1}{P_{STD}} * \frac{T_{STD}}{T_1}}$ | $x = Q_{STD}$ (cfm) |
|---|---|
| 1.428 | 5.11 |
| 2.367 | 8.498 |
| 2.943 | 10.50 |
| 3.424 | 12.22 |
| 3.844 | 13.70 |

Linear Regression method $\quad y = mx + b$

$m = .28$

$b = -.0156$

$cc = 0.999$

$y = 0.28x - .0156$

$x = \frac{y + .0156}{0.28}$

$$Q_{std} = \frac{1}{0.28}\left[\sqrt{\Delta H_1 \frac{P_1}{P_{std}} * \frac{T_{std}}{T_1}} + .0156\right]$$

Dead Creek

Date of :7-22-87

EE-1 site Q/R [Table of Calibration of flow rate (Q) versus $M_{std}$] calculat by m.

| magnehelic Gage Reading (m) = | $M_{std}$ (1) (X) | manometer ($\Delta H$) Reading (in. $H_2O$) | $\sqrt{\text{corrected } \Delta H}$ (1) $= \sqrt{\Delta H \times \frac{P_2}{P_{std}} \cdot \frac{T_{std}}{T}}$ | Q (2) (cfm) (Y) |
|---|---|---|---|---|
| 68 | 8.246 | 3.5/3.4 | 1.846 | 6.648 |
| 60 | 7.70 | 3.2/3.1 | 1.764 | 6.356 |
| 50 | 7.03 | 2.7/2.6 | 1.618 | 5.834 |
| 40 | 6.286 | 2.2/2.1 | 1.457 | 5.259 |
| 30 | 5.44 | 1.6/1.6 | 1.28 | 4.63 |

(1)
$T = 460 + 89 = 549, \quad T_{std} = 537$

$P = 30.21$ in

$P_{std} = 29.92$

$\sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}} = \sqrt{\frac{30.21}{29.92} * \frac{537}{549}} = .994$

$\sqrt{\text{corrected } \Delta H} = \sqrt{\Delta H} * .994 \;/\; M_{std} = \sqrt{M} * 0.994$

(2) $Q = \frac{1}{0.28}\left[\sqrt{\Delta H \times \frac{P}{P_{std}} \cdot \frac{T_{std}}{T}} + .0156\right]$

$Q \searrow \quad M_{std} \swarrow$

$Y = mX + b$

$Y = 0.733X + 0.658$

$cc = 0.998$

Date of Calibration: 7-22-87

page

EE-2 site Q/R [Table of calibration of flow rate (Q) versus $M_{std}$]

Calculated

| magnehelic (M) | $M_{std}$ (1) (X) | manometer Reading in $H_2O$ (ΔH) | $\sqrt{\text{Corrected } \Delta H}$ (1) | Q (cfm) (2) (Y) |
|---|---|---|---|---|
| 58 | 7.57 | 3.2 | 1.778 | 6.406 |
| 50 | 7.03 | 2.8 | 1.663 | 5.995 |
| 40 | 6.29 | 2.4/2.3 | 1.524 | 5.498 |
| 30 | 5.44 | 1.8/1.8 | 1.333 | 4.816 |

(1)
$T_2 = 549$ , $T_{std} = 537$
$P_2 = 30.21$ $P_{std} = 29.92$
$\sqrt{\text{Correct } \Delta H} = \sqrt{\Delta H * \frac{P}{P_{std}} * \frac{T_{std}}{T}} = \sqrt{\Delta H} * 0.994$
$M_{std} = \sqrt{M} * .994$

(2)
$Q = \frac{1}{0.28}\left[\sqrt{\text{Corrected } \Delta H} + .0156\right]$
$Y = 0.74\,X + .809$
$cc = 0.999$

Dead Creek

Date of Calibration 7-22-87 [ Table of calibration of flow rate (Q) versus $M_{std}$ ]

EE-3 site Q/R

10-16-

pa

Calculat

| magnetic Gage Reading (M) | $M_{std}$ (1) (X) | manometer ($\Delta H$) Reading (in. $H_2O$) | $\sqrt{\text{corrected } \Delta H}$ (1) $= \sqrt{\Delta H \times \frac{P_2}{P_{std}} \cdot \frac{T_{std}}{T}}$ | Q (2) (cfm) (Y) |
|---|---|---|---|---|
| 63 | 7.89 | 3.3/3.3 | 1.806 | 6.506 |
| 60 | 7.70 | 3.2/3.2 | 1.778 | 6.406 |
| 50 | 7.03 | 2.8/2.7 | 1.648 | 5.941 |
| 40 | 6.29 | 2.2/2.2 | 1.474 | 5.32 |
| 30 | 5.44 | 1.7/1.7 | 1.296 | 4.684 |

(1)
$T = 460 + 89 = 549, \quad T_{std} = 537$

$P = 30.21$ in

$P_{std} = 29.92$

$\sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}} = \sqrt{\frac{30.21}{29.92} * \frac{537}{549}} = .994$

$\sqrt{\text{corrected } \Delta H} = \sqrt{\Delta H} * .994 \quad // \quad M_{std} = \sqrt{M} * .994$

(2) $Q = \frac{1}{0.28}\left[\sqrt{\Delta H \times \frac{P}{P_{std}} \cdot \frac{T_{std}}{T}} + .0156\right]$

Q magnetic Reading

$Y = mX + b$

$Y = 0.754\,X + 0.589$

$cr = .999$

Date of Calibrat 7-22-87 [Table of Calibration of flow rate (Q) versus $M_{std}$]

EE-4 site Q/R

| magnehelic Gage Reading (M) | $M_{std}$ (1) (X) | manometer (ΔH) Reading (in. $H_2O$) | $\sqrt{\text{Corrected } \Delta H}$ (1) $= \sqrt{\Delta H \cdot \frac{P}{P_{std}} \cdot \frac{T}{T}}$ | Q (2) (cfm) (Y) |
|---|---|---|---|---|
| 58 | 7.57 | 3.3/3.1 | 1.778 | 6.406 |
| 50 | 7.03 | 2.9/2.7 | 1.663 | 5.995 |
| 40 | 6.29 | 2.4/2.3 | 1.524 | 5.498 |
| 30 | 5.44 | 1.9/1.8 | 1.352 | 4.884 |

(1)
$T = 460 + 89 = 549, \quad T_{std} = 537$

$P = 30.21$ in

$P_{std} = 29.92$

$\sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}} = \sqrt{\frac{30.21}{29.92} * \frac{537}{549}} = .994$

$\sqrt{\text{corrected } \Delta H} = \sqrt{\Delta H} * .994$ // $M_{std} = \sqrt{M} * .994$

(2) $Q = \frac{1}{0.28}\left[\sqrt{\Delta H \cdot \frac{P}{P_{std}} \cdot \frac{T_{std}}{T}} + .0156\right]$

Q, magnehelic Reading

$Y = mX + b$

$Y = 0.711\,X + 1.013$

$cc = 0.999$

Date of Calc. - 1 7-22-87 [Table of calculations from Table (C) versus $M_{std}$] 10-10-page Calculated

EE-5 site Q/R

| magnehelic Gage Reading | $M_{std}^{(1)}$ (X) | manometer ($\Delta H$) Reading (in. $H_2O$) | $\sqrt{\text{corrected } \Delta H}$ (1) $= \sqrt{\Delta H * \frac{P_2}{P_{std}} * \frac{T}{T}}$ | $Q^{(2)}$ (cfm) (Y) |
|---|---|---|---|---|
| 68 | 8.196 | 3.6/3.5 | 1.873 | 6.745 |
| 60 | 7.70 | 3.3/3.2 | 1.778 | 6.406 |
| 50 | 7.03 | 2.8/2.7 | 1.648 | 5.941 |
| 40 | 6.286 | 2.4/2.3 | 1.524 | 5.498 |
| 30 | 5.44 | 1.8/1.8 | 1.333 | 4.816 |

(1)
$T = 460 + 89 = 549, \quad T_{std} = 537$

$P = 30.21$ in

$P_{std} = 29.92$

$\sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}} = \sqrt{\frac{30.21}{29.92} * \frac{537}{549}} = .994$

$\sqrt{\text{corrected } \Delta H} = \sqrt{\Delta H} * .994$ // $M_{std} = \sqrt{M} * 0.994$

(2) $Q = \frac{1}{0.28}\left[\sqrt{\Delta H * \frac{P}{P_{std}} * \frac{T_{std}}{T}} + .0156\right]$

Q magnehelic Reading

$Y = mX + b$

$Y = 0.689X + 1.10$

$cr = 0.999$

Calculated by mG
10-20-87

EE-1 7/16/87
site G

| Time (min) | Elapse Time (min) | Corrected Time (min) | Magnehelic Reading (M) | $M_{std}$ (1) | Avg. $M_{std}$ (X) | Avg. Q (2) | Air volume (3) |
|---|---|---|---|---|---|---|---|
| 702 | | | 42 | 6.56 | | | |
| | 448 | 443 | | | 6.50 | 5.42 | 2401 |
| 14:30 | | | 41 | 6.43 | | | |
| | 135 | 134 | | | 6.47 | 5.40 | 723 |
| 16:45 | | | 42 | 6.51 | | | |
| | 158 | 156 | | | 6.48 | 5.41 | 844 |
| 19:23 | | | 42 | 6.46 | | | |

Total Air vol. 3968 cu.ft.

(1)
$M_{std} = \overline{M} * \text{Correction factor}$

$\text{Correction factor} = \sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}}$

$cf_1 = \sqrt{\frac{30.05 * 537}{29.92 * 537}} = 1.012$

$cf_2 = \sqrt{\frac{30.03 * 537}{29.92 * 542}} = .997$

$cf_{Avg} = 1.004$

(2) $\overset{Q}{Y} = 0.733X + 0.658$

(3) Air volume = Q * Elapse Time

EE-2 7/16/87
site C

| Time (min) | Elapse Time (min) | Corrected Time (min) | Magnehelic Reading (M) | $M_{std}$ (1) | Avg. $M_{std}$ (X) | Avg. Q (2) | Air Volume (3) |
|---|---|---|---|---|---|---|---|
| 7:14 | | | 34 | 5.90 | | | |
| | 436 | 408 | | | 5.79 | 5.09 | 2077 |
| 14:30 | | | 32 | 5.68 | | | |
| | 135 | 126 | | | 5.72 | 5.04 | 635 |
| 16:45 | | | 33 | 5.77 | | | |
| | 186 | 174 | | | 5.79 | 5.09 | 886 |
| 19:51 | | | 34 | 5.81 | | | |

Total Air vol. 3598 cu.ft.

(1)
$M_{std} = \sqrt{M} * \text{Correction factor}$

$\text{Correction factor} = \sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}}$

$cf_1 = 1.012$ $cf_{Avg} = 1.004$
$cf_2 = .997$

(2) $\overset{Q}{Y} = 0.74\,X + 0.809$

(3) Air volume = Q * Elapse Time

E-3 7/16/87
Site G

| Time (min) | Elapse Time (min) | Corrected Time (min) | Magnehelic Reading (M) | $M_{std}$ (1) | Avg. $M_{std}$ (X) | Avg. Q (2) | Air Volume (3) |
|---|---|---|---|---|---|---|---|
| 7:10 | | | 38 | 6.24 | | | |
| | 440 | 410.6 | | | 6.09 | 5.17 | 2123 |
| 14:30 | | | 35 | 5.94 | | | |
| | 135 | 126 | | | 5.98 | 5.10 | 642 |
| 16:45 | | | 36 | 6.02 | | | |
| | 195 | 182 | | | 6.00 | 5.11 | 930 |
| 20:00 | | | 36 | 5.98 | | | |
| | | | | | Total Air | | 3695 |

(1)
$m_{std} = \sqrt{m} * \text{Correction factor}$

$\text{Correction factor} = \sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}}$

$cf_1 = 1.012$ $cf_{avg} = 1.004$
$cf_2 = .997$

(2) $\overset{Q}{Y} = 0.754X + 0.589$

(3) Air volume = Q * Elapse Time

EE-4 7/16/87
Site C

| Time (min) | Elapse Time (min) | Corrected Time (min) | Magnehelic Reading (M) | $M_{std}$ (1) | Avg. $M_{std}$ (X) | Avg. Q (2) | Air volume (3) |
|---|---|---|---|---|---|---|---|
| 7:18 | | | 40 | 6.40 | | | |
| | 432 | 432 | | | 6.25 | 5.46 | 2359 |
| 14:30 | | | 37 | 6.11 | | | |
| | 135 | 135 | | | 6.11 | 5.36 | 724 |
| 16:45 | | | 37 | 6.11 | | | |
| | 174 | 174 | | | 6.13 | 5.37 | 934 |
| 19:39 | | | 38 | 6.15 | | | |

Total Air vol. 4017 cu. ft.

(1)
$M_{std} = \sqrt{M} * \text{Correction factor}$

$\text{Correction factor} = \sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}}$

$Cf_1 = 1.012$ $Cf_{Avg} = 1.004$
$Cf_2 = .997$

(2) $\overset{Q}{Y} = 0.711\,X + 1.013$

3) Air volume = Q * Elapse Time

EE-5 7/16/87
Site G

| Time (min) | Elapse Time (min) | Corrected Time (min) | Magnehelic Reading (M) | $M_{std}$ (1) | Avg. $M_{std}$ (X) | Avg. Q (2) | Air volume (3) |
|---|---|---|---|---|---|---|---|
| 7:22 | | | 40 | 6.40 | | | |
| | 428 | 373 | | | 6.26 | 5.41 | 2018 |
| 14:30 | | | 37 | 6.11 | | | |
| | 135 | 117 | | | 6.06 | 5.27 | 617 |
| 16:45 | | | 36 | 6.02 | | | |
| | 205 | 178 | | | 6.12 | 5.32 | 947 |
| 20:10 | | | 39 | 6.23 | | | |

Total Air vol. 3582 cfl

(1)
$M_{std} = \sqrt{M} * \text{Correction factor}$

$\text{Correction factor} = \sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}}$

$C_{f_1} = 1.012$
$C_{f_2} = .997$
$C_{f_{avg}} = 1.004$

(2) $\overset{Q}{Y} = 0.689\overset{X}{} + 1.10$

3) Air volume = Q * Elapse Time

EE-6 7/16/87
site G

| Time (min) | Elapse Time (min) | Corrected Time (min) | Magnehelic Reading (M) | $M_{std}$ (1) | Avg. $M_{std}$ (X) | Avg. Q (2) | Air volume (3) |
|---|---|---|---|---|---|---|---|
| 704 | | | 36 | 6.07 | | | |
| | 446 | 392 | | | 5.96 | 5.19 | 2034 |
| 14:30 | | | 34 | 5.85 | | | |
| | 135 | 119 | | | 5.81 | 5.08 | 604 |
| 16:45 | | | 33 | 5.77 | | | |
| | 160 | 141 | | | 5.79 | 5.06 | 713 |
| 19:25 | | | 34 | 5.81 | | | |
| | | | | | | Total Air vol. | 3351 |

(1)
$M_{std} = \sqrt{M} * \text{Correction factor}$

$\text{Correction factor} = \sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}}$

$CF_1 = 1.012$
$CF_2 = .997$
$CF_{Avg} = 1.004$

(2) $\overset{Q}{Y} = 0.761X + 0.659$

(3) Air volume = Q * Elapse Time

Calculated by MG
10-20-87

E-1 7-17-87
Site G

| Time (min) | Elapse Time (min) | Corrected Time (min) | Magnehelic Reading (M) | $M_{std}$ (1) | Avg. $M_{std}$ (X) | Avg. Q (2) | Air volume (3) |
|---|---|---|---|---|---|---|---|
| 6:00 | | | 53 | 7.36 | | | |
| | 300 | 246 | | | 6.56 | 5.47 | 1346 |
| 11:00 | | | 33 | 5.76 | | | |
| | 210 | 172 | | | 5.71 | 4.84 | 832 |
| 14:30 | | | 32 | 5.67 | | | |
| | 247 | 203 | | | 5.7 | 4.84 | 982 |
| 18:37 | | | 33 | 5.73 | | | |

Total Air vol. 3160

(1)
$M_{std} = \sqrt{M} * \text{Correction factor}$

$\text{Correction factor} = \sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}}$

$cf_1 = \sqrt{\frac{30.14 * 537}{29.92 * 529}} = 1.011$

$cf_2 = \sqrt{\frac{30.10 * 537}{29.92 * 545}} = .997$

$cf_{Avg} = 1.003$

(2) $\overset{Q}{Y} = 0.733X + 0.658$

(3) Air volume = Q * Elapse Time

FE-2
Site G

7-17-87

| Time (min) | Elapse Time (min) | Corrected Time (min) | Magnehelic Reading (M) | $M_{std}$ (1) | Avg. $M_{std}$ (X) | Avg. Q (2) | Air volume (3) |
|---|---|---|---|---|---|---|---|
| 6:10 | | | 44 | 6.71 | | | |
| | 290 | 289 | | | 6.40 | 5.45 | 1575 |
| 11:00 | | | 37 | 6.10 | | | |
| | 210 | 209 | | | 5.97 | 5.23 | 1093 |
| 14:30 | | | 34 | 5.85 | | | |
| | 221 | 220 | | | 5.83 | 5.12 | 1126 |
| 18:11 | | | 34 | 5.81 | | | |

Total Air vol. 3794

(1)
$M_{std} = \sqrt{M} * \text{Correction factor}$

Correction factor $= \sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}}$

$Cf_1 = 1.011$

$Cf_2 = .997$

$Cf_{Avg} = 1.003$

(2) $Y = 0.74X + 0.809$

3) Air volume = Q * Elapse Time

EE-3 7-17-87
site G

| Time (min) | Elapse Time (min) | Corrected Time (min) | Magnehelic Reading (M) | $M_{std}$ (1) | Avg. $M_{std}$ (X) | Avg. Q (2) | Air Volume (3) |
|---|---|---|---|---|---|---|---|
| 6:08 | | | 38 | 6.23 | | | |
| | 292 | 290 | | | 5.86 | 5.01 | 1453 |
| 11:00 | | | 30 | 5.49 | | | |
| | 210 | 209 | | | 5.40 | 4.66 | 974 |
| 14:30 | | | 28 | 5.31 | | | |
| | 242 | 241 | | | 5.29 | 4.58 | 1104 |
| 18:32 | | | 28 | 5.27 | | | |

Total Air vol. 3531

(1)
$M_{std} = \sqrt{M} * \text{Correction factor}$

$\text{Correction factor} = \sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}}$

$cf_1 = 1.011$
$cf_2 = .997$
$cf_{Avg} = 1.003$

(2) $Y = 0.754X + 0.589$

3) Air volume = Q * Elapse Time

EE-4 7-17-87
te G

| Time (min) | Elapse Time (min) | Corrected Time (min) | Magnehelic Reading (M) | $M_{std}$ (1) | Avg. $M_{std}$ (X) | Avg. Q (2) | Air Volume (3) |
|---|---|---|---|---|---|---|---|
| 5:57 | | | 47 | 6.88 | | | |
| | 303 | 299 | | | 6.49 | 5.63 | 1683 |
| 11:00 | | | 37 | 6.10 | | | |
| | 210 | 207 | | | 6.06 | 5.32 | 1101 |
| 14:30 | | | 36 | 6.02 | | | |
| | 237 | 234 | | | 6.00 | 5.28 | 1235 |
| 18:27 | | | 36 | 5.98 | | | |

Total Air vol. 4019

(1)
$M_{std} = \sqrt{M}$ + Correction factor

Correction factor $= \sqrt{\frac{P}{P_{std}} \times \frac{T_{std}}{T}}$

$CF_1 = 1.003$
$CF_2 = .997$
$CF_{Avg} = 1.003$

(2) $Y = 0.711X + 1.013$

(3) Air volume = Q * Elapse Time

=E-5

7-17-87

| Time (Min) | Elapse Time (Min) | Corrected Time (min) | Magnehelic Reading (M) | $M_{std}$ (1) | Avg. $M_{std}$ (X) | Avg. Q (2) | Air Volume (3) |
|---|---|---|---|---|---|---|---|
| 5:53 | | | 44 | 6.71 | | | |
| | 307 | 301 | | | 5.36 | 4.79 | 1442 |
| 11:00 | | | 36 | 6.02 | | | |
| | 210 | 206 | | | 5.93 | 5.18 | 1067 |
| 14:30 | | | 34 | 5.85 | | | |
| | 230 | 226 | | | 5.87 | 5.14 | 1162 |
| 18:20 | | | 35 | 5.90 | | | |
| | | | | | Total Air Vol. | | 3671 |

(1)

$M_{std} = \sqrt{M} * \text{Correction factor}$

$\text{Correction factor} = \sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}}$

$cf_1 = 1.011$

$cf_2 = .997$

$cf_{Avg} = 1.003$

(2) $Y = 0.689X + 1.10$

(3) Air volume = Q * Elapse Time

EE-6
Site G 7-17-87

| Time (min) | Elapse Time (min) | Corrected Time (min) | Magnehelic Reading (M) | $M_{std}$ (1) | Avg. $M_{std}$ (X) | Avg. Q (2) | Air Volume (3) |
|---|---|---|---|---|---|---|---|
| 6:02 | | | 40 | 6.40 | | | |
| | 298 | 219 | | | 6.21 | 5.38 | 1178 |
| 11:00 | | | 36 | 6.02 | | | |
| | 210 | 155 | | | 5.93 | 5.17 | 801 |
| 14:30 | | | 34 | 5.85 | | | |
| | 248 | 183 | | | 5.74 | 5.03 | 920 |
| 18:38 | | | 32 | 5.64 | | | |
| | | | | | Total Air Vol. | | 2899 |

(1)
$M_{std} = \sqrt{M} * \text{Correction factor}$

$\text{Correction factor} = \sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}}$

$Cf_1 = 1.011$
$Cf_2 = .997$
$Cf_{Avg} = 1.003$

(2) $Y = 0.761\ X + 0.659$

(3) Air volume = Q * Elapse Time

Page 4

Calculated by mC
10-20-87

FE-1

Site Q/R 7-21-87

| Time (min) | Elapse Time (min) | Corrected Time (min) | Magnehelic Reading (M) | $M_{std}$ (1) | Avg. $M_{std}$ (X) | Avg. Q (2) Y (cfm) | Air volume (3) cft |
|---|---|---|---|---|---|---|---|
| 7:02 | | | 56 | 7.55 | | | |
| | 198 | 196 | | | 7.17 | 5.91 | 1158 |
| 10:20 | | | 46 | 6.79 | | | |
| | 250 | 247 | | | 6.79 | 5.63 | 1390 |
| 14:30 | | | 46 | 6.79 | | | |
| | 274 | 271 | | | 6.69 | 5.56 | 1507 |
| 19:04 | | | 44 | 6.60 | | | |
| | | | | | | | 4055 |

Total Air volume = 4055 cft.

(1) $M_{std} = \sqrt{M} * \text{Correction factor } (Cf)$

Correction factor $= \sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}}$

$Cf_{1\,start} = \sqrt{\frac{30.23}{29.92} * \frac{537}{533}} = 1.009$

$Cf_{2\,stop} = \sqrt{\frac{30.17}{29.92} * \frac{537}{547}} = 0.995$

$Cf_{avg} = \frac{Cf_1 + Cf_2}{2} = 1.002$

(2) $\overset{Q}{Y} = 0.733\,X + 0.658$

(3) Air volume = Q * Corrected Time

EE-2
site Q/R 7-21-87

| Time (min) | Elapse Time (min) | Corrected Time (min) | Magnehelic Reading (M) | $M_{std}$ (1) | Avg. $M_{std}$ (X) | Avg. Q (2) | Air volume (3) |
|---|---|---|---|---|---|---|---|
| 6:33 | | | 46 | 6.84 | | | |
| | 227 | 168 | | | 6.58 | 5.678 | 954 |
| 10:20 | | | 40 | 6.33 | | | |
| | 250 | 184 | | | 6.16 | 5.367 | 987 |
| 14:30 | | | 36 | 6.01 | | | |
| | 290 | 214 | | | 5.90 | 5.17 | 1107 |
| 19:20 | | | 34 | 5.80 | | | |

Total Air 3048 cu.ft. 3048

(1) $M_{std} = \sqrt{M} * \text{Correction factor}$ $Cf_1 = 1.009$ $Cf_{avg} = 1.002$

Correction factor $= \sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}}$ $Cf_2 = 0.995$

$P_{start} = 30.23$

2) $Q = Y = 0.74X + 0.809$

3) Air volume = Q * Corrected Time

E-03
site O/R 7-21-87

| Time (Min) | Elapse Time (Min) | Corrected Time (Min) | Magnehelic Reading (M) | $M_{std}$ (1) | Avg. $M_{std}$ (X) | Avg. Q (2) | Air Volume (3) |
|---|---|---|---|---|---|---|---|
| 6:27 | | | 42 | 6.54 | | | |
| | 233 | 231 | | | 6.23 | 5.286 | 1221 |
| 10:20 | | | 35 | 5.93 | | | |
| | 250 | 248 | | | 5.84 | 4.99 | 1237 |
| 14:30 | | | 33 | 5.75 | | | |
| | 244 | 242 | | | 5.86 | 5. | 1210 |
| 18:34 | | | 36 | 5.97 | | | |

Total Air Volume = 3668 cu. ft. 3668

(1) $M_{std} = \sqrt{M} * \text{Correction factor}$ $Cf_1 = 1.009$ $Cf_{Avg} = 1.002$

$Cf_2 = 0.995$

$\text{Correction factor} = \sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}}$

(2) $Q = Y = 0.754X + 0.589$

(3) Air volume = Q * Corrected Time

=E-04
site Q/R 7-21-87

| Time (Min) | Elapse Time (Min) | Corrected Time (min) | Magnehelic Reading (M) | $M_{std}$ (1) | Avg. $M_{std}$ (X) | Avg. Q (2) | Air volume (3) |
|---|---|---|---|---|---|---|---|
| 6:32 | | | 46 | 6.84 | | | |
| | 228 | 168 | | | 6.42 | 5.577 | 937 |
| 10:20 | | | 36 | 6.01 | | | |
| | 250 | 185 | | | 5.84 | 5.165 | 955 |
| 14:30 | | | 32 | 5.67 | | | |
| | 288 | 212 | | | 5.65 | 5.03 | 1067 |
| 19:18 | 1 | 1 | 32 | 5.62 | | | |
| | | | | | Total Air | | 2959 cu.ft. |

(1) $M_{std} = \sqrt{M} * \text{Correction factor}$

Correction factor $= \sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}}$

$cf_1 = 1.009$ $cf_{Avg} = 1.002$

$cf_2 = 0.995$

2) $Q = Y = 0.711X + 1.013$

3) Air volume = Q * Corrected Time

Data is not accurate

FE-5
te Q/R 7-21-87

| Time (min) | Elapse Time (min) | Corrected Time (min) | Magnehelic Reading (M) | $M_{std}$ (1) | Avg. $M_{std}$ (X) | Avg. Q (2) | Air Volume (3) |
|---|---|---|---|---|---|---|---|
| 6:40 | | | 46 | 6.84 | | | |
| | 220 | | | | 6.59 | 5.64 | |
| 10:20 | | | 40 | 6.34 | | | |
| | 250 | | | | 6.34 | 5.468 | |
| 14:30 | | | 40 | 6.34 | | | |
| | 259 | | | | 6.35 | 5.475 | |
| 8:49 | | | 41 | 6.37 | | | |

1) $M_{std} = \sqrt{M} * \text{Correction factor}$

$\text{Correction factor} = \sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}}$

Q

) $Y = 0.689X + 1.10$

) Air volume = Q * Elapse Time

= -06

Site Q/R 7-21-87

| Time (min) | Elapse Time (min) | Corrected Time (min) | Magnetic Reading (M) | $M_{std}$ (1) | Avg. $M_{std}$ (X) | Avg. Q (2) | Air volume (3) |
|---|---|---|---|---|---|---|---|
| 6:54 | | | 44 | 6.69 | | | |
| | 274 | 264 | | | 6.51 | 5.61 | 1481 |
| 10:20 | | | 40 | 6.34 | | | |
| | 250 | 241 | | | 6.09 | 5.29 | 1275 |
| 14:30 | | | 34 | 5.84 | | | |
| | 281 | 271 | | | 5.82 | 5.09 | 1379 |
| 9:11 | | | 34 | 5.80 | | | |
| | | | | | Total Air volume | | 4135 |

(1)

$M_{std} = \sqrt{M} * \text{Correction factor}$

$\text{Correction factor} = \sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}}$

(2) $Q = Y = 0.761 X + 0.659$

(3) Air volume = Q * Time

EE-1

site O/R 7/22/87 motor Breakdown

| Time (Min) | Elapse Time (Min) | Corrected Time (min) | Magnetic Reading (M) | $M_{std}$ (1) | Avg. $M_{std}$ (X) | Avg. Q (2) | Air volume (3) |
|---|---|---|---|---|---|---|---|

(1)

$M_{std} = \sqrt{M} * \text{Correction factor}$

$\text{Correction factor} = \sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}}$

Q

2)

) Air volume = Q * Time

calculated by MG

10-20-87

EE-2 7-22-87
site O/R

| Time (min) | Elapse Time (min) | Corrected Time (min) | Magnehelic Reading (M) | $M_{std}$ (1) | Avg. $M_{std}$ (X) | Avg. Q (2) | Air volume (3) |
|---|---|---|---|---|---|---|---|
| 6:08 | | | 38 | 6.21 | | | |
| | 352 | 279 | | | 6.07 | 5.31 | 1481 |
| 12.00 | | | 35 | 5.93 | | | |
| | 180 | 142 | | | 5.84 | 5.13 | 728 |
| 15.00 | | | 33 | 5.76 | | | |
| | 254 | 201 | | | 5.87 | 5.15 | 1037 |
| 19:14 | | | 36 | 5.98 | | | |
| | | | | | Total | | 3246 cu ft. |

(1)
$M_{std} = \sqrt{M} * \text{Correction factor (cf)}$

Correction factor $= \sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}}$

$cf_1$ (start) $= \sqrt{\frac{30.21 * 537}{29.92 * 534}} = 1.007$

$cf_2$ (stop) $= \sqrt{\frac{30.1 * 537}{29.92 * 546}} = 0.997$

$cf_{Avg} = 1.002$

(2) $Y = 0.74X + .809$

(3) Air volume = Q * Elapse Time

EE-3 7-22-87
site G/R

| Time (min) | Elapse Time (min) | Corrected Time (min) | Magnehelic Reading (M) | $M_{std}$ (1) | Avg. $M_{std}$ (X) | Avg. Q (2) | Air volume (3) |
|---|---|---|---|---|---|---|---|
| 6:35 | | | 54 | 7.40 | | | |
| | 325 | 325 | | | 6.94 | 5.82 | 1891 |
| 12.00 | | | 42 | 6.49 | | | |
| | 180 | 180 | | | 6.41 | 5.42 | 976 |
| 15:00 | | | 40 | 6.34 | | | |
| | 237 | 237 | | | 6.32 | 5.35 | 1268 |
| 18:57 | | | 40 | 6.30 | | | |
| | | | | | Total Air | | 4135 cu ft. |

(1)
$M_{std} = \sqrt{M} * \text{Correction factor}$ $cf_1 = 1.007$ $CF_{Avg} = 1.002$

Correction factor $= \sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}}$ $cf_2 = 0.997$

(2) $Y = 0.754X + 0.589$

3) Air volume = Q * Elapse Time

E-04 7-22-87

site G/R

| Time (Min) | Elapse Time (Min) | Corrected Time (min) | Magnehelic Reading (M) | $M_{std}$ (1) | Avg. $M_{std}$ (X) | Avg. Q (2) | Air Volume (3) |
|---|---|---|---|---|---|---|---|
| 6:07 | | | 32 | 5.70 | | | |
| | 353 | 279 | | | 5.30 | 4.78 | 1334 |
| 12.00 | | | 24 | 4.91 | | | |
| | 180 | 142 | | | 4.91 | 4.50 | 639 |
| 15.00 | | | 24 | 4.91 | | | |
| | 253 | 200 | | | 5.09 | 4.63 | 926 |
| 19:13 | | | 28 | 5.27 | | | |

Total Air 2899 cu.ft.

(1)
$M_{std} = \sqrt{M} * \text{Correction factor}$

$\text{Correction factor} = \sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}}$

$cf_1 = 1.007$ $cf_2 = 0.997$ $cf_{Avg} = 1.002$

(2) $Y = 0.711 X + 1.013$

3) Air volume = Q * Elapse Time

EE-05 7-22-87
site Q/R

| Time (min) | Elapse Time (min) | Corrected Time (min) | Magnehelic Reading (M) | $M_{std}$ (1) | Avg. $M_{std}$ (X) | Avg. Q (2) | Air volume (3) |
|---|---|---|---|---|---|---|---|
| 6:14 | | | 47 | 6.90 | | | |
| | 346 | 341 | | | 6.54 | 5.61 | 1913 |
| 12:00 | | | 38 | 6.18 | | | |
| | 180 | 177 | | | 6.13 | 5.32 | 942 |
| 15:00 | | | 37 | 6.09 | | | |
| | 206 | 203 | | | 6.07 | 5.28 | 1072 |
| 18:26 | | | 37 | 6.06 | | | |

Total air volume 3927 cu. ft.

(1)
$M_{std} = \sqrt{M} * \text{Correction factor}$

$\text{Correction factor} = \sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}}$

(2) $Y = 0.689\,X + 1.10$

3) Air volume = Q * Elapse Time

EE-6 7-22-87
site G/R

| Time (min) | Elapse Time (min) | Corrected Time (min) | Magnehelic Reading (M) | $M_{std}$ (1) | Avg. $M_{std}$ (X) | Avg. Q (2) | Air Volume (3) |
|---|---|---|---|---|---|---|---|
| 6:21 | | | 46 | 6.83 | | | |
| | 339 | 337 | | | 6.38 | 5.51 | 1857 |
| 12:00 | | | 35 | 5.93 | | | |
| | 180 | 179 | | | 5.88 | 5.13 | 918 |
| 15:00 | | | 34 | 5.84 | | | |
| | 221 | 219 | | | 5.87 | 5.13 | 1123 |
| 18:41 | | | 35 | 5.90 | | | |

Total Air volume 3898 cu.ft.

(1)
$M_{std} = \sqrt{M} * \text{Correction factor}$

$\text{Correction factor} = \sqrt{\frac{P}{P_{std}} * \frac{T_{std}}{T}}$

(2) $Y = 0.761X + 0.659$

3) Air volume = Q * Elapse Time

# Low Volume Sampler
# Air Volume Calculations and
# Calibration Data

prepared by mC
2-23-88

# Correction Factors for Calculation of Air volume at Standard Temperature and pressure

| Shelter NO | Date | Correction Factor for Standard Temp. & pres. (1) | | |
|---|---|---|---|---|
| | | Start of Test | End of Test | Avg value |
| EE1 | 7/16/87 | 1.02 | 0.994 | 1.007 |
| " | 7/17/87 | 1.02 | 0.991 | 1.006 |
| " | 7/21/87 | 1.018 | 1.0 | 1.009 |
| " | 7/22/87 | 1.015 | 0.995 | 1.005 |
| EE2 | 7/16/87 | 1.02 | 0.994 | 1.007 |
| " | 7/17/87 | 1.02 | 0.991 | 1.006 |
| " | 7/21/87 | 1.018 | 1.0 | 1.009 |
| " | 7/22/87 | 1.015 | 0.995 | 1.005 |
| EE3 | 7/16/87 | 1.02 | 0.994 | 1.007 |
| " | 7/17/87 | 1.02 | 0.991 | 1.006 |
| " | 7/21/87 | 1.018 | 1.0 | 1.009 |
| " | 7/22/87 | 1.015 | 0.995 | 1.005 |
| EE4 | 7/16/87 | 1.02 | 0.994 | 1.007 |
| " | 7/17/87 | 1.02 | 0.991 | 1.006 |
| " | 7/21/87 | 1.018 | 1.0 | 1.009 |
| " | 7/22/87 | 1.015 | 0.995 | 1.005 |
| EE5 | 7/16/87 | 1.02 | 0.994 | 1.007 |
| " | 7/17/87 | 1.02 | 0.991 | 1.006 |
| " | 7/21/87 | 1.018 | 1.0 | 1.009 |
| " | 7/22/87 | 1.015 | 0.995 | 1.005 |
| EE6 | 7/16/87 | 1.02 | 0.994 | 1.007 |
| " | 7/17/87 | 1.02 | 0.991 | 1.006 |
| " | 7/21/87 | 1.018 | 1 | 1.009 |
| " | 7/22/87 | 1.015 | 0.995 | 1.005 |

1) square root of these coefficients were used in the calculation of air volume of samples collected by high volume sampler

Table. Air volume calculations of samples collected by low volume sampler Contd.

prepared by 2/2 or G.
2-23-88

| Sample No. | Date | Shell Tag No. | Elapse Time (min.) | Average Flow Rate (ml/min) | Total Air volume ($m^3$) | Total Air ($m^3$) standard Temp. Pres. |
|---|---|---|---|---|---|---|
| DC-CT-15 | 7/21/87 | EE2 | 506 | 544.45 | 0.275 | 0.277 |
| DC-PT-15 | | EE2 | 504 | 986.4 | 0.497 | 0.501 |
| DC-CT-16 | | EE3 | 515 | 568.3 | 0.293 | 0.296 |
| DC-PT-16 | | EE3 | 515 | 377 | 0.194 | 0.196 |
| DC-CT-17 | | EE4 | 505 | 550.5 | 0.278 | 0.280 |
| DC-PT-17 | | // | 505 | 343.9 | 0.174 | 0.176 |
| DC-CT-18 | | EE6 | 505 | 492.2 | 0.248 | 0.250 |
| DC-PT-18 | | EE6 | 505 | 999.9 | 0.505 | 0.509 |
| DC-CT-19 | | EE5 | 506 | 502 | 0.254 | 0.256 |
| DC-PT-19 | | // | 506 | 918.9 | 0.465 | 0.469 |
| DC-CT-22 | 7-22-87 | EE2 | 500 | 535.2 | 0.268 | 0.269 |
| DC-PT-22 | | // | 500 | 972.75 | 0.486 | 0.488 |
| DC-CT-23 | | EE3 | 482 | 536.5 | 0.259 | 0.260 |
| DC-PT-23 | | // | 482 | 189.4 | .091 | .091 |
| DC-CT-24 | | EE4 | 482 | 489.6 | 0.236 | 0.237 |
| DC-PT-24 | | // | 482 | 180.15 | .089 | .089 |
| DC-CT-25 | | EE6 | 484 | 518 | 0.251 | 0.252 |
| DC-PT-25 | | // | // | 992.6 | 0.48 | 0.482 |
| DC-CT-26 | | FF5 | 483 | 516.95 | 0.25 | 0.251 |
| | | // | // | 903.3 | 0.436 | 0.438 |

Table: Air volume Calculations of samples Collected by low volume samples

1/2

prepared by mG
2-23-88

| Sample NO | Shelter NO. | Elapse Time (min) (min) | Average flow rate (ml/min) | Total Air volume ($m^3$) | * Total Air Standard Temp. pres. ($m^3$) (1) |
|---|---|---|---|---|---|
| DC-CT-02 (7/16/87) | EE2 | 480 | 464.9 | 0.223 | 0.225 |
| DC-PT-02 | | 480 | 1059 | 0.508 | 0.5120 |
| DC-CT-03 | EE3 | 478 | 562.85 | 0.269 | 0.271 |
| DC-PT-03 | | 478 | 1090.65 | 0.521 | 0.525 |
| DC-CT-01 | EE1 | 482 | 499 | 0.241 | 0.243 |
| DC-PT-01 | " | 482 | 789.5 | 0.38 | 0.383 |
| DC-CT-06 | EE6 | 478 | 352.75 | 0.169 | 0.170 |
| DC-PT-06 | " | 478 | 1065 | 0.509 | 0.513 |
| DC-CT-05 | EE5 | 477 | 468.9 | 0.224 | 0.226 |
| DC-PT-05 | EE5 | 477 | 1019.15 | 0.486 | 0.489 |
| DC-CT-08 7/17/87 | EE2 | 491 | 512.1 | 0.251 | 0.252 |
| DC-PT-08 | " | 491 | 991.95 | 0.487 | 0.490 |
| DC-CT-09 | EE3 | 486 | 559.5 | 0.272 | 0.274 |
| DC-PT-09 | EE3 | 486 | 717.6 | 0.349 | 0.351 |
| DC-CT-010 | EE1 | 481 | 500.55 | 0.241 | 0.242 |
| DC-PT-10 | EE1 | 481 | 622.35 | 0.299 | .301 |
| DC-CT-11 | EE6 | 478 | 393.7 | 0.188 | 0.189 |
| DC-PT-11 | EE6 | 478 | 1100 | 0.526 | 0.529 |
| DC-CT-12 | EE5 | 476 | 505.6 | 0.241 | 0.242 |
| DC-PT-12 | EE5 | 476 | 988.85 | 0.471 | 0.474 |

(1)

$$V_{std} = \underbrace{\frac{T_s}{P_s} * \frac{P}{T}}_{\text{Correction factor for standard Temp. \& pres. (see attached table for this coefficient)}} * V$$

AIR SAMPLING

PT - PUMP TUBE
PC - PUMP CANISTER
CT - CONTROL TUBE
FF - FILTER



| SAMPLE NO | DATE | START TIME | END TIME | SAMPLE LOCATION | SAMPLE TYPE | FLOW START | FLOW END | SAMPLER CODE | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|
| AC-CT-03 | 7/16/87 | 0945 | 1645 | E. of AC FENCE, 150' S. of QUARRY AV. | CT | 489 ml | 440.8 ml | EE-2 PUMP A (13935) MANIFOLD | |
| AC-PT-03 | 7/16/87 | 0945 | 1645 | " " " " | PT | 1069 ml | 1049 ml | EE-3 " | |
| AC-CT-03 | | 0851 | 1655 | NE of SITE 6, ADJ. CARRO FENCE (10' N of QUARRY, 40' E. of AC) | CT | 519.3 ml | 606.4 ml | EE-3 (L-PA) (13934) MAN. A | |
| AC-PT-03 | | 0851 | 1655 | " " " " | PT | 995.3 ml | 1186 ml | EE-3 | |
| AC-CT-01 | | 0908 | 1710 | SITE 6 - NE CORNER | CT | ~~496.0~~ 492.5 ml | 515.5 ml | EE-1 PUMP C (13936) MANIFOLD | |
| AC-PT-01 | | 0905 | 1710 | " " " | PT | 997.9 ml | 581.1 ml | EE-1 | |
| AC-CT-06* | | 0920 | 1718 | SITE 6 - NE CORNER | CT | 487.7 ml | 817.8 ml | EE-6 PUMP A (13938) MAN B | CO LOCATED SAMPLE AC-CT-01 |
| AC-PT-06* | | 0920 | 1718 | " " " | PT | 1060 ml | 1010 ml | EE-6 " | CO LOCATED SAMPLE AC-PT-01 |
| AC-CT-05 | | 0935 | 1732 | SW of SITE 6 - ADJ TO WELL EE-6101 | CT | 491.0 ml | 446.7 ml | EE-5 PUMP F (13937) MAN A | BACKGROUND SAMPLE |
| AC-PT-05 | | 0935 | 1732 | " " " " | PT | 997.3 ml | 1043 ml | EE-5 | BACKGROUND SAMPLE. |
| AC-CT-07* | | 1000 | — | BLANK | CT | — | — | — | |
| AC-PT-07* | | 1000 | — | BLANK | PT | — | — | — | |
| AC-PC-01 | | 0702 | 1923 | SITE 6 - NE CORNER | PC | 42 | 42 | EE-1 | |
| AC-FF-01 | | 0702 | 1923 | " " " | FF | " | " | EE-1 | |
| AC-PC-02 | | 0714 | 1951 | E. of AC FENCE, 150' S of QUARRY | PC | 34 | 34 | EE-2 | |
| AC-FF-02 | | 0714 | 1951 | " " " " | FF | " | " | EE-2 | |
| AC-PC-03 | | 0710 | 2000 | NE of SITE 6, ADJ. CARRO FENCE | PC | 38 | 36 | EE-3 | |
| AC-FF-03 | | 0710 | 2000 | " " " " | FF | " | " | EE-3 | |
| AC-PC-04 | | 0718 | 1939 | SITE 6 - NW CORNER | PC | 40 | 38 | EE-4 | |
| AC-FF-04 | | 0718 | 1939 | " " " | FF | " | " | EE-4 | |
| AC-PC-05 | | 0722 | 2010 | SW of SITE 6 - ADJ. TO WELL EE-6101 | PC | 40 | 39 | EE-5 | BACKGROUND SAMPLE |
| AC-FF-05 | | 0722 | 2010 | " " " " | FF | " | " | EE-5 | BACKGROUND SAMPLE |
| AC-PC-06* | | 0704 | 1925 | SITE 6 - NE CORNER | PC | 36 | 34 | EE-6 | CO-LOCATED SAMPLE AC-PC-01 |
| AC-FF-06* | | 0704 | 1925 | " " " | FF | " | " | EE-6 | CO-LOCATED SAMPLE AC-FF-01 |
| AC-PC-07* | | 1000 | — | BLANK | PC | — | — | — | |
| AC-FF-07* | ✓ | 1000 | — | BLANK | FF | — | — | — | |

| SAMPLE NO | DATE | START TIME | END TIME | SAMPLE LOCATION | MEDIUM | FLOW START | FLOW END | SAMPLER CODE | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|
| AC-CT-08 | 7/7/87 | 0820 | 1631 | E of AC FENCE, ~50' S of QUEBRADA AV. | CT | 506.1 ml | 518.1 ml | PUMP 13450, MAN C | |
| AC-PT-08 | | 0820 | | | PT | 1017 ml | 966.9 ml | " | |
| AC-PC-08 | | 0610 | | | PC | 44 | | EE-2 | |
| AC-FF-08 | | 0610 | | | FF | 44 | | EE-2 | |
| AC-CT-09 | | 0830 | 1636 | NE of SITE 6, ADJ. CERRO FENCE | CT | 545.8 ml | 573.2 ml | PUMP 13489, MAN B | |
| AC-PT-09 | | 0830 | 1636 | | PT | 1068 ml | 367.2 ml | " | |
| AC-PC-09 | | 0608 | | | PC | 38 | | EE-3 | |
| AC-FF-09 | | 0608 | | | FF | 38 | | EE-3 | |
| AC-CT-10 | | 0842 | 1643 | SITE 6 - NE CORNER | CT | 545.1 ml | 456.0 ml | PUMP 13426, MAN. B | |
| AC-PT-10 | | 0842 | 1643 | | PT | 889.5 ml | 355.2 ml | " | |
| AC-PC-10 | | 0600 | | | PC | 53 | | EE-1 | |
| AC-FF-10 | | 0600 | | | FF | 53 | | EE-1 | |
| AC-CT-11 * | | 0847 | 1645 | SITE 6 - NW CORNER | CT | 482 ml | 305.4 ml | PUMP 13428, MAN. B | CO-LOCATED (EE-1) |
| AC-PT-11 * | | 0847 | 1645 | | PT | 1055 ml | 1145 ml | " | |
| AC-PC-11 * | | 0602 | | | PC | 40 | | EE-6 | |
| AC-FF-11 * | | 0602 | | | FF | 40 | | EE-6 | |
| AC-CT-12 | | 0900 | 1656 | SW of SITE 6, ADJ. TO WELL EE-6101 | CT | 547.5 ml | 463.7 | PUMP 13437, MAN A | |
| AC-PT-12 | | 0900 | 1656 | | PT | 1041 ml | 936.7 | " | |
| AC-PC-12 | | 0553 | | | PC | 44 | | EE-5 | |
| AC-FF-12 | | 0553 | | | FF | 44 | | EE-5 | |
| AC-PC-13 | | 0557 | | SITE 6 - NW CORNER | PC | 47 | | EE-4 | |
| AC-FF-13 | | 0557 | | | FF | 47 | | EE-4 | |
| AC-CT-14 * | | | | BLANK | CT | – | – | – | |
| AC-PT-14 * | | | | BLANK | PT | – | – | – | |
| AC-PC-14 * | | | | BLANK | PC | – | – | – | |
| AC-FF-14 * | | | | BLANK | FF | – | – | – | |

AIR SAMPLING



| SAMPLE NO | DATE | START TIME | END TIME | SAMPLE LOCATION | MEDIUM | FLOW START | FLOW END | SAMPLER CODE | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|
| AC-CT-15 | 7/21/87 | 0821 | 1647 | NW PORTION - ADJ MONSANTO FENCE | CT | 534.9ml | 554.0ml | PUMP 13430, MANC | |
| AC-PT-15 | | 0821 | 1645 | " " " | PT | 994.2ml | 978.6ml | " | |
| AC-PC-15 | | 0633 | 1920 | NW PORTION - ADJ MONSANTO FENCE | PC | 46 | 34 | EE-2 | SAMPLER TIMER SHORT - POSSIBLY DUE TO GENERATOR FAILURE |
| AC-FF-15 | | 0633 | 1920 | " " " | FF | 46 | 34 | EE-2 | |
| AC-CT-16 | | 0800 | 1635 | NE CORNER - ADJ. PUMP STATION | CT | 580.0ml | 616.6ml | PUMP 13427, MANC | |
| AC-PT-16 | | 0800 | 1635 | " " " | PT | 515.0ml | 239.0ml | " | |
| AC-PC-16 | | 0627 | 1834 | NE CORNER - ADJ. PUMP STATION | PC | 42 | 36 | EE-3 | |
| AC-FF-16 | | 0627 | 1834 | " " " | FF | 42 | 36 | EE-3 | |
| AC-CT-17* | | ~~0800~~ AC 0820 | 1645 | NW PORTION - ADJ MONSANTO FENCE | CT | ~~520ml~~ 465.5ml | 635.5ml | PUMP 13426, MANC | CO-LOCATED SAMPLE (AC-15) |
| AC-PT-17* | | ~~0800~~ 0820 | 1645 | " " " | PT | ~~515.0ml~~ 502.4ml | 185.4ml | " | " " " |
| AC-PC-17* | | 0632 | 1918 | NW PORTION - ADJ MONSANTO FENCE | PC | 46 | 32 | EE-4 | CO-LOCATED SAMPLE (AC-15) |
| AC-FF-17* | | 0632 | 1918 | " " " | FF | 46 | 32 | EE-4 | SAMPLER TIMER SHORT (BELIEVED) |
| AC-CT-18 | | 0833 | 1658 | SW PORTION - BACKGROUND | CT | 513.0ml | ~~1007 ml~~ 471.4ml | PUMP 13438, MANC | |
| AC-PT-18 | | 0833 | 1658 | " " | PT | 992.8ml | 1007ml | " | |
| AC-PC-18 | | 0654 | 1911 | SW PORTION - BACKGROUND | PC | 44 | 34 | EE-6 | |
| AC-FF-18 | | 0654 | 1911 | " " " | FF | 44 | 34 | EE-6 | |
| AC-CT-19 | | 0826 | 1652 | SW - NORTHERN PORTION SITE Q | CT | 501.2ml | 502.2ml | PUMP 13437, MANC | |
| AC-PT-19 | | 0826 | 1652 | " " " | PT | 973.9ml | 863.9ml | " | |
| AC-PC-19 | | 0640 | 1849 | SW - NORTHERN PORTION OF SITE Q | PC | 46 | 41 | EE-5 | |
| AC-FF-19 | | 0640 | 1849 | " " " " | FF | 46 | 41 | EE-5 | |
| AC-PC-20 | | 0702 | 1904 | SE PORTION SITE Q | PC | 56 | 44 | EE-1 | |
| AC-FF-20 | | 0702 | 1904 | " " " | FF | 56 | 44 | EE-1 | |
| AC-CT-21* | | 0700 | — | BLANK | CT | — | — | — | |
| AC-PT-21* | | 0700 | — | BLANK | PT | — | — | — | |
| AC-PC-21* | | 0700 | — | BLANK | PC | — | — | — | |
| AC-FF-21* | | 0700 | — | BLANK | FF | — | — | — | |

| SAMPLE NO. | DATE | START TIME | END TIME | SAMPLE LOCATION | MEDIUM | FLOW START | FLOW END | SAMPLER CODE | NOTES |
|---|---|---|---|---|---|---|---|---|---|
| AC-CT-22 | 7/02/87 | 0825 | 1645 | NW PORTION - ADJ. MONSANTO FENCE | CT | 1540.8ml | 529.6ml | PUMP 3430, PANC | |
| AC-PT-22 | | 0825 | 1645 | " " " | PT | 970.2ml | 975.3ml | " | |
| AC-PC-22 | | 0608 | 1914 | NW PORTION - ADJ. MONSANTO FENCE | PC | 38 | 36 | EE-2 | |
| AC-FF-22 | | 0608 | 1914 | " " " | FF | 38 | 36 | EE-2 | |
| AC-CT-23 | | 0900 | 1702 | NE CORNER - ADJ. PUMP STATION | CT | 461.8ml | 611.2ml | PUMP 3429, PANA | |
| AC-PT-23 | | 0900 | 1702 | " " " | PT | 300ml | 76.8ml | " | |
| AC-PC-23 | | 0635 | 1857 | NE CORNER - ADJ. PUMP STATION | PC | 34 | 40 | EE-3 | |
| AC-FF-23 | | 0635 | 1857 | " " " | FF | 34 | 40 | EE-3 | |
| AC-CT-24 | | 0840 | 1642 | NW PORTION - ADJ. MONSANTO FENCE | CT | 446.2ml | 533ml | PUMP 3426, PANC | * PROBLEM w/ PUMP FAILING |
| AC-PT-24 | | 0840 | 1642 | " " " | PT | 320.0ml | 40.3ml | " | |
| AC-PC-24 | | 0607 | 1913 | NW PORTION - ADJ. MONSANTO FENCE | PC | 32 ~~446.2~~ | 28 | EE-4 | |
| AC-FF-24 | | 0607 | 1913 | " " " | FF | 32 | 28 | EE-4 | |
| AC-CT-25 | | 0850 | 1654 | SW PORTION - BACKGROUND | CT | 515ml | 521.0ml | PUMP 3428, PANB | |
| AC-PT-25 | | 0850 | 1654 | " " " | PT | 1001ml | 984.2ml | " | |
| AC-PC-25 | | 0621 | 1841 | SW PORTION - BACKGROUND | PC | 46 | 35 | EE-6 | |
| AC-FF-25 | | 0621 | 1841 | " " " | FF | 46 | 35 | EE-6 | |
| AC-CT-26 | | 0845 | 1648 | SW - NORTHERN PORTION - SITE Q | CT | 517.0ml | 516.9ml | PUMP 3427, PANA | |
| AC-PT-26 | | 0845 | 1648 | " " " | PT | 966.5ml | 840.1ml | " | |
| AC-PC-26 | | 0614 | 1826 | SW - NORTHERN PORTION SITE Q | PC | 47 | 37 | EE-5 | |
| AC-FF-26 | | 0614 | 1826 | " " " | FF | 47 | 37 | EE-5 | |
| AC-PC-27 | | 0627 | * — | SE PORTION SITE Q | PC | 58 | * — | EE-1 | * MOTOR FAILURE ON SAMPLER UNIT - TOTAL RUN TIME FROM SAMPLER FINAL: 1546 hr. NO PC, FF SAMPLES SUBMITTED. |
| AC-FF-27 | | 0627 | — | " " " | FF | 58 | — | EE-1 | |
| AC-CT-28 | | 0800 | — | BLANK | CT | — | — | — | |
| AC-PT-28 | | 0800 | — | BLANK | PT | — | — | — | |
| AC-PC-28 | | 0800 | — | BLANK | PC | — | — | — | |
| AC-FF-28 | | 0800 | — | BLANK | FF | — | — | — | |

# APPENDIX D

# ANALYTICAL RESULTS

## Explanation For Analytical Data Summary Tables

All ground water results in ug/l.
All soil/sediment organic results in ug/kg
All soil/ sediment inorganic results in mg/kg

For sample location headings, the following qualifiers are used :

| | |
|---|---|
| + | Denotes blank samples. |
| * | Denotes duplicate samples. |
| ^ | Denotes that sample was not analyzed for the compounds listed. |

For chemical results, the folling qualifiers are used :

| | |
|---|---|
| B | Compound detected in blank samples. |
| J | Estimated value . Result is less than the specified detection limit, but greater than zero. |
| E | Estimated value. Concentration detected exceeds the calibrated range. |
| C | Result confirmed by GC/MS. |
| * | Duplicate analysis not with in control limits. |
| R | Spike sample recovery not with in control limits. |

Ground Water Volatiles

| SITE | SITE D | SITE D | SITE D | SITE D | SITE D | SITE D | SITE D | SITE D | SITE D | SITE H | SITE H | SITE H | SITE H | SITE G | SITE G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-GW-01 | DC-GW-02 | DC-GW-03 | DC-GW-04 | DC-GW-05 | DC-GW-06 | DC-GW-07 | DC-GW-08 * | DC-GW-09 | DC-GW-10 | DC-GW-11 | DC-GW-12 | DC-GW-13 | DC-GW-14 | DC-GW-15 |
| WELL NUMBER | EE-06 | EE-07 | EE-09 | EE-10 | EE-17 | EE-08 | EE-19 | EE-19 | EE-18 | EE-01 | EE-02 | EE-03 | EE-04 | EE-G101 | EE-G103 |
| DATE SAMPLED | 3-16-87 | 3-16-87 | 3-16-87 | 3-16-87 | 3-16-87 | 3-16-87 | 3-16-87 | 3-16-87 | 3-16-87 | 3-17-87 | 3-17-87 | 3-17-87 | 3-17-87 | 3-17-87 | 3-17-87 |
| 1 Chloroethane | | | | | | | | | | | | | | | |
| 2 Bromoethane | | | | | | | | | | | | | | | |
| 3 Vinyl Chloride | | | | | | | | | | | | | | | |
| 4 Chloroethane | | | | | | | | | | | | | | | |
| 5 Methylene Chloride | | | | | | | 23 J | 61 J | 2200 BJ | | 140 J | 18 J | 68 | 6 B | 1 BJ |
| 6 Acetone | 15 | 9 BJ | 10 B | 14 B | 12 B | 13 B | 400 B | 210 B | 7100 B | 170 BJ | 910 BJ | 8 J | 9 BJ | | |
| 7 Carbon Disulfide | | | | | | | | | | | | | | | |
| 8 1,1-Dichloroethene | | | | | | | | | | | | | | | |
| 9 1,1-Dichloroethane | | | | | | | | | | | | | | | |
| 10 trans-1,2-Dichloroethene | | 1 J | | | 4 J | | | | | | | | | | |
| 11 Chloroform | | | | | 1 J | | | | | | 3000 | | | 2 J | 9 |
| 12 1-2-Dichloroethane | | | | | | | | | 3000 | | | | | | |
| 13 2-Butanone (MEK) | | | | | | | | | | | | | | | |
| 14 1,1,1-Trichloroethane | | | | | | | | | | | | | | | |
| 15 Carbon Tetrachloride | | | | | | | | | | | | | | | |
| 16 Vinyl Acetate | | | | | | | | | | | | | | | |
| 17 Bromodichloromethane | | | | | | | | | | | | | | | 1 J |
| 18 1,2-Dichloropropane | | | | | | | | | | | | | | | |
| 19 trans-1,3-Dichloropropene | | | | | | | | | | | | | | | |
| 20 Trichloroethene | | | | | 2 J | | | | | | | | | | |
| 21 Dibromochloromethane | | | | | | | | | | | | | | | |
| 22 1,1,2-Trichloroethane | | | | | | | | | | | | | | | |
| 23 Benzene | 9 | 24 | 1 J | 14 | 1 J | 1 J | 2000 | 2000 | 2000 J | 1900 | 4300 | 2 J | | 1 J | |
| 24 cis-1,3-Dichloropropene | | | | | | | | | | | | | | | |
| 25 2-Chloroethyl Vinyl Ether | | | | | | | | | | | | | | | |
| 26 Bromoform | | | | | | | | | | | | | | | |
| 27 4-Methyl-2-pentanone | | | | | | | 250 | 290 | 2700 J | 140 J | 3600 | | | | |
| 28 2-Hexanone | | 5 J | | | | | | | 3500 J | | | | | | |
| 29 Tetrachloroethene | | | | | | | | | | | | | | | |
| 30 1,1,2,2-Tetrachloroethane | | | | | | | | | | | | | | | |
| 31 Toluene | | 4 J | | | | | 450 | 410 | 1600 J | 48 J | 7300 | | | 2 J | |
| 32 Chlorobenzene | 14 | 1 J | 33 | 380 E | 29 | 7 | 1500 | 1400 | 6700 J | 1600 | 11000 | 11 | | | 5 |
| 33 Ethylbenzene | | 1 J | | | | | 33 J | 28 J | | 210 | | 1 J | | | |
| 34 Styrene | | | | | | | | | | | | | | | |
| 35 Total Xylenes | 2 | 230 | | | | | 180 | 160 | | 64 J | 120 J | | | | |

Ground Water Volatiles

| SITE | SITE G | BLANK | SITE L | SITE G | SITE G | SITE G | BLANK | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I | BLANK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-GW-16 | DC-GW-17 + | DC-GW-18 | DC-GW-19 | DC-GW-20 & | DC-GW-21 | DC-GW-22 + | DC-GW-23 | DC-GW-24 | DC-GW-25 | DC-GW-26 | DC-GW-27 | DC-GW-28 | DC-GW-29 & | DC-GW-30 + |
| WELL NUMBER | EE-G104 | | EE-G108 | EE-G107 | EE-G107 | EE-05 | | EE-13 | EE-12 | EE-G112 | EE-14 | EE-15 | EE-16 | EE-12 | |
| DATE SAMPLED | 3-17-87 | 3-17-87 | 3-18-87 | 3-18-87 | 3-18-87 | 3-18-87 | 3-18-87 | 3-23-87 | 3-23-87 | 3-23-87 | 3-23-87 | 3-23-87 | 3-23-87 | 3-23-87 | 3-23-87 |
| 1 Chloroethane | | | | | | | | | | | | | | | |
| 2 Bromoethane | | | | | | | | | | | | | | | |
| 3 Vinyl Chloride | | | | | | | | | | 5 J | | 76 | 790 | 6 J | |
| 4 Chloroethane | | | | | | | | | | | | | | | |
| 5 Methylene Chloride | 5 B | 1 BJ | | 110 BJ | 250 B | | 2 BJ | | | | 56 J | 2 J | | | 2 J |
| 6 Acetone | 5 BJ | 14 B | | 620 B | 530 B | | 4 BJ | 29 B | 40 B | 17 B | 180 J | 10 B | 190 B | 16 B | 23 B |
| 7 Carbon Disulfide | | | | | | | | | | | | | | | |
| 8 1,1-Dichloroethene | | | | | | | | | | | | 10 | | | |
| 9 1,1-Dichloroethane | | | | | | | | | | | | 120 | | | |
| 10 trans-1,2-Dichloroethene | | | | 180 J | 200 J | | | | | | 150 | 310 | 640 | | |
| 11 Chloroform | 3 J | 1 J | | | | | 1 J | | | | 110 J | | | | |
| 12 1-2-Dichloroethane | | | | 430 | 450 | | | | | | | | | | |
| 13 2-Butanone (MEK) | | | | | | | | | | | | | | | |
| 14 1,1,1-Trichloroethane | | | | | | | | | | | | | | | |
| 15 Carbon Tetrachloride | | | | | | | | | | | | | | | |
| 16 Vinyl Acetate | | | | | | | | | | | | | | | |
| 17 Bromodichloromethane | | | | | | | | | | | | | | | |
| 18 1,2-Dichloropropane | | | | | | | | | | | | | | | |
| 19 trans-1,3-Dichloropropene | | | | | | | | | | | | | | | |
| 20 Trichloroethene | | | | 320 | 300 | | | | | | 270 | 4 J | | | |
| 21 Dibromochloromethane | | | | | | | | | | | | | | | |
| 22 1,1,2-Trichloroethane | | | | | | | | | | | | | | | |
| 23 Benzene | 1 J | | 1 J | 4100 | 3700 | 2 J | 3 J | | 50 | 28 | 1400 | 5 | 550 | 75 | |
| 24 cis-1,3-Dichloropropene | | | | | | | | | | | | | | | |
| 25 2-Chloroethyl Vinyl Ether | | | | | | | | | | | | | | | |
| 26 Bromoform | | | | | | | | | | | | | | | |
| 27 4-Methyl-2-pentanone | | | | 1900 | 2200 | | | | | | 230 J | | | | |
| 28 2-Hexanone | | | | | | | 4 J | | | | | | | | |
| 29 Tetrachloroethene | | | | 420 | 350 | 14 | | | | | 470 | | | | |
| 30 1,1,2,2-Tetrachloroethane | | | | | | | | | | | | | | | |
| 31 Toluene | 3 J | | | 7300 | 6300 | 2 J | 4 J | | | | 240 | | 740 | 1 J | |
| 32 Chlorobenzene | 5 | 1 J | 1 J | 3100 | 3100 | 1 J | 2 J | | 270 | 33 | 3100 | 120 | 550 | 390 | |
| 33 Ethylbenzene | | | | 63 J | | | | | | 1 J | 190 | | 58 | 2 J | |
| 34 Styrene | | | | 50 J | | | | | | | | | | | |
| 35 Total Xylenes | | | | 280 | 240 J | | | | | | 61 J | | 58 | | |

Ground Water Volatiles

| | SITE | SITE I | SITE G | SITE G | SITE G | SITE G | BLANK | SITE H | SITE L | SITE O | SITE O | SITE O | SITE O | SITE O | SITE O | SITE O | SITE O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE NUMBER | DC-GW-31 | DC-GW-32 | DC-GW-33 | DC-GW-34 | DC-GW-34A | DC-GW-35 * | DC-GW-36 | DC-GW-37 | DC-GW-38 | DC-GW-38A | DC-GW-39 | DC-GW-39A | DC-GW-40 | DC-GW-40A | DC-GW-41 | DC-GW-41A |
| | WELL NUMBER | EE-20 | EE-11 | EE-G106 | EE-G102 | EE-G102 | | EE-G110 | EE-G109 | EE-21 | EE-21 | EE-22 | EE-22 | EE-23 | EE-23 | EE-24 | EE-24 |
| | DATE SAMPLED | 3-23-87 | 3-24-87 | 3-24-87 | 3-24-87 | 7-14-87 | 3-24-87 | 3-24-87 | 3-24-87 | 3-24-87 | 7-14-87 | 3-24-87 | 7-14-87 | 3-24-87 | 7-14-87 | 3-24-87 | 7-14-87 |
| 1 | Chloromethane | | | | | | | | | | | | | | | | |
| 2 | Bromomethane | | | | | | | | | | | | | | | | |
| 3 | Vinyl Chloride | | | | | | | | | | | | | | | | |
| 4 | Chloroethane | | | | | | | | | | | | | | | | |
| 5 | Methylene Chloride | | | 440 | | | 2 J | | 44 J | | | 52000 | 31000 | | | | |
| 6 | Acetone | 29 B | 1700 B | 210 | 7 BJ | | 13 B | | 650 B | 7 J | | 38000 B | 34000 | 6 J | | 10 | |
| 7 | Carbon Disulfide | | | | | | | | | | | | | | | | |
| 8 | 1,1-Dichloroethene | | | | | | | | | | | | | | | | |
| 9 | 1,1-Dichloroethane | | | | | | | | | | | | 1700 | | | | |
| 10 | trans-1,2-Dichloroethene | | | 110 | | | | | | | | | 14000 | | | | |
| 11 | Chloroform | | | | | | 1 J | | 730 | | | 3000 J | 1800 | | | | |
| 12 | 1-2-Dichloroethane | | | | | | | | | | | 4000 J | 2600 | | | | |
| 13 | 2-Butanone (MEK) | | | 560 | | 6 BJ | | | | | 13 B | 62000 | 54000 E | | 11 B | | |
| 14 | 1,1,1-Trichloroethane | | | 51 J | | | | | | | | 7800 | 5000 | | | | |
| 15 | Carbon Tetrachloride | | | | | | | | | | | | | | | | |
| 16 | Vinyl Acetate | | | | | | | | | | | | | | | | |
| 17 | Bromodichloromethane | | | | | | | | | | | | | | | | |
| 18 | 1,2-Dichloropropane | | | | | | | | | | | | | | | | |
| 19 | trans-1,3-Dichloropropene | | | | | | | | | | | | | | | | |
| 20 | Trichloroethene | | | 800 | | | | | | | | 83000 | 64000 E | | | | |
| 21 | Dibromochloromethane | | | | | | | | | | | | | | | | |
| 22 | 1,1,2-Trichloroethane | | | | | | | | | | | | | | | | |
| 23 | Benzene | | 460 | 1800 | | | | 1 J | 150 | | | 190000 | 150000 E | | | 10 | 20 |
| 24 | cis-1,3-Dichloropropene | | | | | | | | | | | | | | | | |
| 25 | 2-Chloroethyl Vinyl Ether | | | | | | | | | | | | | | | | |
| 26 | Bromoform | | | | | | | | | | | | | | | | |
| 27 | 4-Methyl-2-pentanone | | | 150 | | | | | 270 B | | | 38000 | 28000 | | | | |
| 28 | 2-Hexanone | | | | | | | | | | | | | | | | |
| 29 | Tetrachloroethene | | | | | | | | | | | 10000 | | | | | |
| 30 | 1,1,2,2-Tetrachloroethane | | | | | | | | | | | | 12000 | | | | |
| 31 | Toluene | | 100 BJ | 83 J | | | | | 970 B | | | 15000 | 1300 | | 17 | 1 J | |
| 32 | Chlorobenzene | | 2500 | 1200 | 20 | 36 | | 6 | | | | 150000 | 180000 E | | | 5 | 8 |
| 33 | Ethylbenzene | | 840 | | | | | | | | | | 860 | | | | |
| 34 | Styrene | | | | | | | | | | | | | | | | |
| 35 | Total Xylenes | | 400 | | | | | | | | | 4600 J | 2600 | | | 2 J | |

Ground Water Volatiles

| | SITE | SITE D | SITE D | SITE D | SITE R | SITE R | SITE R | SITE R | SITE R | SITE R | SITE R | BLANK | PRIVATE | PRIVATE | PRIVATE | PRIVATE | PRIVATE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE NUMBER | DC-GW-42 * | DC-GW-43 | DC-GW-43A | DC-GW-44 | DC-GW-45 | DC-GW-46 | DC-GW-47 | DC-GW-48* | DC-GW-49 | DC-GW-50 | DC-GW-51+ | DC-GW-52 | DC-GW-53 | DC-GW-54 | DC-GW-55 | DC-GW-56 |
| | WELL NUMBER | EE-24 | EE-25 | EE-25 | P-1 | B-28A | P-7 | B-26A | B-26A | B-25A | P-11 | | WRIGHT | SETTLES | SCHMIDT | McDONALD | CLAYTON |
| | DATE SAMPLED | 3-24-87 | 3-24-87 | 7-14-87 | 3-25-87 | 3-25-87 | 3-25-87 | 3-25-87 | 3-25-87 | 3-25-87 | 3-25-87 | 3-25-87 | 3-26-87 | 3-26-87 | 3-26-87 | 3-26-87 | 3-26-87 |
| 1 | Chloromethane | | | | | | | | | | | | | | | | |
| 2 | Bromomethane | | | | | | | | | | | | | | | | |
| 3 | Vinyl Chloride | | | | | | | | | | | | | | | | 17 |
| 4 | Chloroethane | | | | | | | | | | | | | | | | 10 |
| 5 | Methylene Chloride | 310 | | | | | | | | | | 2 J | 4 BJ | 12 B | | 37 B | |
| 6 | Acetone | 430 | 5J | | | 71 B | 1700 B | 3 BJ | 36 BJ | 1600 B | 26 BJ | 3 BJ | 18 B | 10 B | 8 BJ | 9 BJ | 5 J |
| 7 | Carbon Disulfide | | | | | | | | | | | | | 3 J | | | |
| 8 | 1,1-Dichloroethene | | | | | | | 7 | | | | | | | | | |
| 9 | 1,1-Dichloroethane | | | | | | | 3 J | | | | | | | | | |
| 10 | trans-1,2-Dichloroethene | 94 J | | | | | | | | | | | | | | | 6 |
| 11 | Chloroform | | | | | | | | | | | 1 J | | 2 J | | | |
| 12 | 1-2-Dichloroethane | | | | | | | | | 16000 | | | | | | | |
| 13 | 2-Butanone (MEK) | 570 | | 5 BJ | | | | | | | | | | | | | |
| 14 | 1,1,1-Trichloroethane | 43 J | | | | | | | | | | | | | | | |
| 15 | Carbon Tetrachloride | | | | | | | | | | | | | | | | |
| 16 | Vinyl Acetate | | | | | | | | | | | | | | | | |
| 17 | Bromodichloromethane | | | | | | | | | | | | | | | | |
| 18 | 1,2-Dichloropropane | | | | | | | | | | | | | | | | |
| 19 | trans-1,3-Dichloropropene | | | | | | | | | | | | | | | | |
| 20 | Trichloroethene | 1000 | | | | | | | | | | | | | | | |
| 21 | Dibromochloromethane | | | | | | | | | | | | | | | | |
| 22 | 1,1,2-Trichloroethane | | | | | | | | | | | | | | | | |
| 23 | Benzene | 1800 | | | 2 J | | 1500 | 41 | 44 J | | 150 | | | | | | 94 |
| 24 | cis-1,3-Dichloropropene | | | | | | | | | | | | | | | | |
| 25 | 2-Chloroethyl Vinyl Ether | | | | | | | | | | | | | | | | |
| 26 | Bromoform | | | | | | | | | | | | | | | | |
| 27 | 4-Methyl-2-pentanone | | | | | | | | | | | | | | | | 9 J |
| 28 | 2-Hexanone | | | | | | | | | | | | | | | | |
| 29 | Tetrachloroethene | | | | | | | | | | | | | | | | |
| 30 | 1,1,2,2-Tetrachloroethane | | | | | | | | | | | | | | | | |
| 31 | Toluene | 130 | | | | | 480 | 7 B | 13 BJ | 760 J | | | 1 BJ | 1 BJ | | 1 BJ | 5 |
| 32 | Chlorobenzene | 1000 | | | 350 E | 990 | 5000 | 190 | 199 | 8100 | 570 | 1 J | | | | | 120 |
| 33 | Ethylbenzene | | | | | | | 2 J | | | | | 4 J | | | | 1 J |
| 34 | Styrene | | | | | | | | | | | | | 2 J | | 2 J | |
| 35 | Total Xylenes | 27 J | | | | | 95 J | 7 | | | | | | | | | |

Ground Water Volatiles

| SITE | BLANK |
|---|---|
| SAMPLE NUMBER | DC-GW-57 + |
| WELL NUMBER | |
| DATE SAMPLED | 7-14-87 |

1 Chloromethane
2 Bromomethane
3 Vinyl Chloride
4 Chloroethane
5 Methylene Chloride
6 Acetone
7 Carbon Disulfide
8 1,1-Dichloroethene
9 1,1-Dichloroethane
10 trans-1,2-Dichloroethene
11 Chloroform
12 1-2-Dichloroethane
13 2-Butanone (MEK)
14 1,1,1-Trichloroethane
15 Carbon Tetrachloride
16 Vinyl Acetate
17 Bromodichloromethane
18 1,2-Dichloropropane
19 trans-1,3-Dichloropropene
20 Trichloroethene
21 Dibromochloromethane
22 1,1,2-Trichloroethane
23 Benzene
24 cis-1,3-Dichloropropene
25 2-Chloroethyl Vinyl Ether
26 Bromoform
27 4-Methyl-2-pentanone
28 2-Hexanone
29 Tetrachloroethene
30 1,1,2,2-Tetrachloroethane
31 Toluene
32 Chlorobenzene
33 Ethylbenzene
34 Styrene
35 Total Xylenes

Ground Water Semivolatiles

| | SITE | SITE D | SITE D | SITE D | SITE D | SITE D | SITE D | SITE D | SITE D | SITE D | SITE H | SITE H | SITE H | SITE H | SITE G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE NUMBER | DC-GW-01 | DC-GW-02 | DC-GW-03 | DC-GW-04 | DC-GW-05 | DC-GW-06 | DC-GW-07 | DC-GW-08 * | DC-GW-09 | DC-GW-10 | DC-GW-11 | DC-GW-12 | DC-GW-13 | DC-GW-14 |
| | WELL NUMBER | EE-06 | EE-07 | EE-09 | EE-10 | EE-17 | EE-08 | EE-19 | EE-19 | EE-18 | EE-01 | EE-02 | EE-03 | EE-04 | EE-GI31 |
| | DATE SAMPLED | 3-16-87 | 3-16-87 | 3-16-87 | 3-16-87 | 3-16-87 | 3-16-87 | 3-16-87 | 3-16-87 | 3-16-87 | 3-17-87 | 3-17-87 | 3-17-87 | 3-17-87 | 3-17-87 |
| 1 | Phenol | | | | | | | 110000 E | 190000 E | 6100 E | 66 | 950 | | | |
| 2 | bis(2-Chloroethyl)ether | | | | | | | | | | | | | | |
| 3 | 2-Chlorophenol | | | | 4 J | | | 20000 E | 33000 E | 2600 | 31 J | 47 J | | | |
| 4 | 1,3-Dichlorobenzene | | | | | | | | | | 120 | | | | |
| 5 | 1,4-Dichlorobenzene | | | | 4 | | | 220 J | 250 | 70 J | 2600 | 530 | 11 | | |
| 6 | Benzyl Alcohol | | | | | | | 460 | 490 | 180 | | 740 | | | |
| 7 | 1,2-Dichlorobenzene | | | | | | | 260 | 300 | 2000 | 560 | 430 | 3 | | |
| 8 | 2-Methylphenol | | | | | | | 190 J | 350 | 10 J | 26 J | 70 J | | | |
| 9 | bis(2-Chloroisopropyl) ether | | 3 J | | | | | | | | | | | | |
| 10 | 4-Methylphenol | | | | | | | 14000 E | 23000 E | 850 | 65 | 620 | | | |
| 11 | N-Nitroso-n-Dipropylamine | | | | | | | | | | | | | | |
| 12 | Hexachloroethane | | | | | | | | | | | | | | |
| 13 | Nitrobenzene | | | | | | | | 100 J | 820 | | 97 J | | | |
| 14 | Isophorone | | | | | | | | | | | 110 J | | | |
| 15 | 2-Nitrophenol | | | | | | | | | | | | | | |
| 16 | 2,4-Dimethylphenol | | 5 J | | | | | | 2800 | 62 | | 330 | | | |
| 17 | Benzoic Acid | | 10 J | | | | | | | 600 | 140 J | 5800 E | | | |
| 18 | bis-(2-Chloroethoxy)methane | | | | | | | | | | | | | | |
| 19 | 2,4-Dichlorophenol | | | | | | | 1900 E | 14000 E | 7600 E | | 1900 | | | |
| 20 | 1,2,4-Trichlorobenzene | | | | | | | | | 390 | 580 | 720 | | | |
| 21 | Naphthalene | | | | | | | 41 J | 42 J | 70 | 250 | 240 | | | 1 J |
| 22 | 4-Chloroaniline | 120 | | | | | | 14000 E | 15000 E | 4400 | 6400 E | 810 | 200 | | |
| 23 | Hexachlorobutadiene | | | | | | | | | | | | | | |
| 24 | 4-Chloro-3-methylphenol | | | | | | | | | | | | | | |
| 25 | 2-Methylnaphthalene | | | | | | | | | | 21 J | 47 J | | | |
| 26 | Hexachlorocyclopentadiene | | | | | | | | | | | | | | |
| 27 | 2,4,6-Trichlorophenol | | | | | | | 4100 | 6000 | 1800 | 140 | 1200 | | | |
| 28 | 2,4,5-Trichlorophenol | | | | | | | | | | 27 J | 580 J | | | |
| 29 | 2-Chloronaphthalene | | | | | | | | | | | | | | |
| 30 | 2-Nitroaniline | | | | | | | 1700 | 1800 | 2000 | | | | | |

Ground Water Semivolatiles

| SITE | SITE G | SITE G | BLANK | SITE L | SITE G | SITE G | SITE G | BLANK | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-GW-15 | DC-GW-16 | DC-GW-17 + | DC-GW-18 | DC-GW-19 | DC-GW-20 * | DC-GW-21 | DC-GW-22 + | DC-GW-23 | DC-GW-24 | DC-GW-25 | DC-GW-26 | DC-GW-27 | DC-GW-28 |
| WELL NUMBER | EE-G103 | EE-G104 | | EE-G108 | EE-G107 | EE-G107 | EE-05 | | EE-13 | EE-12 | EE-G112 | EE-14 | EE-15 | EE-16 |
| DATE SAMPLED | 3-17-87 | 3-17-87 | 3-17-87 | 3-18-87 | 3-18-87 | 3-18-87 | 3-18-87 | 3-18-87 | 3-23-87 | 3-23-87 | 3-23-87 | 3-23-87 | 3-23-87 | 3-23-87 |
| 1 Phenol | | | | | 6600 | 30000 | | | | | | 1800 | | 80 |
| 2 bis(2-Chloroethyl)ether | | | | | | | | | | | | | | |
| 3 2-Chlorophenol | | | | | 690 | 1900 | | | | 5 J | | 370 | | |
| 4 1,3-Dichlorobenzene | | | | | | | | | | 110 | | | | |
| 5 1,4-Dichlorobenzene | | | | | 570 | 470 J | | | | 640 | | 910 | 10 | 110 |
| 6 Benzyl Alcohol | | | | | 5400 | 8600 | | | | | | 230 J | | 350 |
| 7 1,2-Dichlorobenzene | | | | | 200 J | 180 J | | | | 110 | | 220 J | 4 J | 15 J |
| 8 2-Methylphenol | | | | | 280 J | 810 | | | | | | 89 J | | 76 |
| 9 bis(2-Chloroisopropyl) ether | | | | | | | | | | | | | | |
| 10 4-Methylphenol | | | | | 2200 | 9000 | | | | | | 350 | | |
| 11 N-Nitroso-n-Dipropylamine | | | | | | | | | | | | | | |
| 12 Hexachloroethane | | | | | | | | | | | | | | |
| 13 Nitrobenzene | | | | | | | | | | | | | | |
| 14 Isophorone | | | | | | | | | | | | | | |
| 15 2-Nitrophenol | | | | | | | | | | | | | | |
| 16 2,4-Dimethylphenol | | | | | 1400 | 4300 | | | | | | | | |
| 17 Benzoic Acid | | | | | 35000 E | 150000 E | | | | | | | | |
| 18 bis-(2-Chloroethoxy)methane | | | | | 2400 | 7300 | | | | 2 J | | 2900 | | |
| 19 2,4-Dichlorophenol | | | | | 480 J | 450 J | | | | 22 | | 1000 | | |
| 20 1,2,4-Trichlorobenzene | | | | | 1900 | 1700 | | | | | | 2700 | | |
| 21 Naphthalene | | 8 J | | | 21000 E | 18000 | | | | | | 57 J | | 230 |
| 22 4-Chloroaniline | | | | | | | | | | 140 | 14 | 8300 | 18 | 9600 E |
| 23 Hexachlorobutadiene | | | | | | | | | | | | | | |
| 24 4-Chloro-3-methylphenol | | | | | | | | | | | | 140 J | | |
| 25 2-Methylnaphthalene | | | | | | | | | | 1 J | | | | 9 J |
| 26 Hexachlorocyclopentadiene | | | | | | | | | | | | | | |
| 27 2,4,6-Trichlorophenol | | | | | | 350 | | | | | | 290 | | |
| 28 2,4,5-Trichlorophenol | | | | | | | | | | | | | | |
| 29 2-Chloronaphthalene | | | | | | | | | | | | | | |
| 30 2-Nitroaniline | | | | | | | | | | | | | | |

Ground Water Semivolatiles

| | SITE | SITE I | BLANK | SITE J | SITE G | SITE G | SITE G | SITE G | BLANK | SITE H | SITE L | SITE D | SITE D | SITE D | SITE D | SITE D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE NUMBER | DC-GW-29 & | DC-GW-30 + | DC-GW-31 | DC-GW-32 | DC-GW-33 | DC-GW-34 | DC-GW-34A | DC-GW-35 + | DC-GW-36 | DC-GW-37 | DC-GW-38 | DC-GW-38A | DC-GW-39 | DC-GW-39A | DC-GW-40 |
| | WELL NUMBER | EE-12 | | EE-20 | EE-11 | EE-G106 | EE-G102 | EE-G102 | | EE-G110 | EE-G109 | EE-21 | EE-21 | EE-22 | EE-22 | EE-23 |
| | DATE SAMPLED | 3-23-87 | 3-23-87 | 3-23-87 | 3-24-87 | 3-24-87 | 3-24-87 | 7-14-87 | 3-24-87 | 3-24-87 | 3-24-87 | 3-24-87 | 7-14-87 | 3-24-87 | 7-14-87 | 3-24-87 |
| 1 | Phenol | | | | | 2 J | | | | | 150 | | | 500 | 1100 | |
| 2 | bis(2-Chloroethyl)ether | | | | | | | | | | | | | | 91 J | |
| 3 | 2-Chlorophenol | | | | 130 | 9 J | | | | | 150 | | | 120 | 98 J | |
| 4 | 1,3-Dichlorobenzene | 110 | | | | 4 J | | | | | | | | 320 | 290 | |
| 5 | 1,4-Dichlorobenzene | 830 | | | 34 J | 350 | | | | | | | | 10000 E | 15000 E | |
| 6 | Benzyl Alcohol | | | | | | | | | | | | | | | |
| 7 | 1,2-Dichlorobenzene | 110 | | | | 6 J | | | | | | | | 7800 | 11000 E | |
| 8 | 2-Methylphenol | | | | | | | | | | 6 J | | | 78 J | 120 | |
| 9 | bis(2-Chloroisopropyl) ether | | | | | | | | | | | | | | | |
| 10 | 4-Methylphenol | | | | 37 J | | | | | | 75 | | | 820 | 1100 | |
| 11 | N-Nitroso-n-Dipropylamine | | | | | | | | | | | | | | | |
| 12 | Hexachloroethane | | | | | | | | | | | | | | | |
| 13 | Nitrobenzene | | | | | | | | | | | | | | | |
| 14 | Isophorone | | | | | | | | | | | | | | | |
| 15 | 2-Nitrophenol | | | | | | | | | | 41 | | | | | |
| 16 | 2,4-Dimethylphenol | | | | 240 | | | | | | | | | 350 | 400 | |
| 17 | Benzoic Acid | | | | | | | | | | | | | | | |
| 18 | bis-(2-Chloroethoxy)methane | | | | | | | | | | | | | | | |
| 19 | 2,4-Dichlorophenol | | | | | 11 | | | | | | | | 30 J | | |
| 20 | 1,2,4-Trichlorobenzene | | | | | 280 | | | | | | | | 270 | 200 | |
| 21 | Naphthalene | | | | 36 J | | | | | | | | | 160 | 100 | |
| 22 | 4-Chloroaniline | 78 | | | 15000 E | 110 | | | | 30 | 60 | | | 780 | | |
| 23 | Hexachlorobutadiene | | | | | | | | | | | | | | | |
| 24 | 4-Chloro-3-methylphenol | | | | | | | | | | | | | | | |
| 25 | 2-Methylnaphthalene | | | | | | | | | | | | | 6 J | | |
| 26 | Hexachlorocyclopentadiene | | | | | | | | | | | | | | | |
| 27 | 2,4,6-Trichlorophenol | | | | | 3 J | | | | | | | | | | |
| 28 | 2,4,5-Trichlorophenol | | | | | | | | | | | | | | | |
| 29 | 2-Chloronaphthalene | | | | | | | | | | | | | | | |
| 30 | 2-Nitroaniline | | | | | | | | | | | | | | | |

Ground Water Semivolatiles

| SITE | SITE U | SITE U | SITE U | SITE U | SITE U | SITE U | SITE R | SITE R | SITE R | SITE R | SITE R | SITE R | SITE R | BLANK | PRIVATE | PRIVATE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-GW-40A | DC-GW-41 | DC-GW-41A | DC-GW-42 & | DC-GW-43 | DC-GW-43A | DC-GW-44 | DC-GW-45 | DC-GW-46 | DC-GW-47 | DC-GW-48& | DC-GW-49 | DC-GW-50 | DC-GW-51 + | DC-GW-52 | DC-GW-53 |
| WELL NUMBER | EE-23 | EE-24 | EE-24 | EE-24 | EE-25 | EE-25 | P-1 | B-28A | P-7 | B-26A | B-26A | B-25A | P-11 | | WRIGHT | SETTLES |
| DATE SAMPLED | 7-14-87 | 3-24-87 | 7-14-87 | 3-24-87 | 3-24-87 | 7-14-87 | 3-25-87 | 3-25-87 | 3-25-87 | 3-25-87 | 3-25-87 | 3-25-87 | 3-25-87 | 3-25-87 | 3-26-87 | 3-26-87 |
| 1 Phenol | | | | | | | | | 25000 E | | | 60000 E | | | | |
| 2 bis(2-Chloroethyl)ether | | | | | | | | | | | | | | | | |
| 3 2-Chlorophenol | | | | | | | 4 J | 8 J | 2100 | 8 J | 9 J | 14000 E | | | | |
| 4 1,3-Dichlorobenzene | | | | | | | | | | | | | | | | |
| 5 1,4-Dichlorobenzene | | | | | | | 8 J | | 550 | 4 J | 3 J | | 54 J | | | |
| 6 Benzyl Alcohol | | | | | | | | | 750 | | | | | | | |
| 7 1,2-Dichlorobenzene | | | | | | | | | 340 | 1 J | 1 J | 91 J | | | | |
| 8 2-Methylphenol | | | | | | | | | | | | | | | | |
| 9 bis(2-Chloroisopropyl) ether | | | | | | | | | | | | | | | | |
| 10 4-Methylphenol | | | | | | | | | 120 J | | | 6100 | | | | |
| 11 N-Nitroso-n-Dipropylamine | | | | | | | | | | | | | | | | |
| 12 Hexachloroethane | | | | | | | | | 850 | | | | | | | |
| 13 Nitrobenzene | | | | | | | | | | 35 | 29 | 420 | | | | |
| 14 Isophorone | | | | | | | | | | | | | | | | |
| 15 2-Nitrophenol | | | | | | | | | | | | | | | | |
| 16 2,4-Dimethylphenol | | | | | | | | | | | | 160 | | | | |
| 17 Benzoic Acid | | | | | | | | | 270 J | | | 6800 | | | | |
| 18 bis-(2-Chloroethoxy)methane | | | | | | | | | | | | | | | | |
| 19 2,4-Dichlorophenol | | | | | | | | | 5500 | | | 14000 E | | | | |
| 20 1,2,4-Trichlorobenzene | | | | | | | | | | | | | | | | |
| 21 Naphthalene | | | | | | | | | 82 J | | | | | | | |
| 22 4-Chloroaniline | | | | | | | | | 25000 E | 680 | 540 | | 4100 | | | |
| 23 Hexachlorobutadiene | | | | | | | | | | | | | | | | |
| 24 4-Chloro-3-methylphenol | | | | | | | | | | | | | | | | |
| 25 2-Methylnaphthalene | | | | | | | | | 200 | | | | | | | |
| 26 Hexachlorocyclopentadiene | | | | | | | | | | | | | | | | |
| 27 2,4,6-Trichlorophenol | | | | | | | | | 2100 | | | 1500 | | | | |
| 28 2,4,5-Trichlorophenol | | | | | | | | | | | | | | | | |
| 29 2-Chloronaphthalene | | | | | | | | | | | | | | | | |
| 30 2-Nitroaniline | | | | | | | | | | | | | | | | |

Ground Water Semivolatiles

| SITE | PRIVATE | PRIVATE | PRIVATE | BLANK |
|---|---|---|---|---|
| SAMPLE NUMBER | DC-GW-54 | DC-GW-55 | DC-GW-56 | DC-GW-57 + |
| WELL NUMBER | SCHMIDT | McDONALD | CLAYTON | |
| DATE SAMPLED | 3-26-87 | 3-26-87 | 3-26-87 | 7-14-87 |
| 1 Phenol | | | | |
| 2 bis(2-Chloroethyl)ether | | | | |
| 3 2-Chlorophenol | | | | |
| 4 1,3-Dichlorobenzene | | | | |
| 5 1,4-Dichlorobenzene | | | 5 J | |
| 6 Benzyl Alcohol | | | | |
| 7 1,2-Dichlorobenzene | | | 3 J | |
| 8 2-Methylphenol | | | | |
| 9 bis(2-Chloroisopropyl) ether | | | | |
| 10 4-Methylphenol | | | | |
| 11 N-Nitroso-n-Dipropylamine | | | | |
| 12 Hexachloroethane | | | | |
| 13 Nitrobenzene | | | | |
| 14 Isophorone | | | | |
| 15 2-Nitrophenol | | | | |
| 16 2,4-Dimethylphenol | | | | |
| 17 Benzoic Acid | | | | |
| 18 bis-(2-Chloroethoxy)methane | | | | |
| 19 2,4-Dichlorophenol | | | | |
| 20 1,2,4-Trichlorobenzene | | | | |
| 21 Naphthalene | | | | |
| 22 4-Chloroaniline | | | | |
| 23 Hexachlorobutadiene | | | | |
| 24 4-Chloro-3-methylphenol | | | | |
| 25 2-Methylnaphthalene | | | | |
| 26 Hexachlorocyclopentadiene | | | | |
| 27 2,4,6-Trichlorophenol | | | | |
| 28 2,4,5-Trichlorophenol | | | | |
| 29 2-Chloronaphthalene | | | | |
| 30 2-Nitroaniline | | | | |

Ground Water Semivolatiles

| SITE | BLANK | SITE L | SITE G | SITE G | SITE G | BLANK | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I | BLANK | SITE I | SITE G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-GW-17+ | DC-GW-18 | DC-GW-19 | DC-GW-20* | DC-GW-21 | DC-GW-22+ | DC-GW-23 | DC-GW-24 | DC-GW-25 | DC-GW-26 | DC-GW-27 | DC-GW-28 | DC-GW-29 * | DC-GW-30+ | DC-GW-31 | DC-GW-32 |
| WELL NUMBER | | EE-G108 | EE-G107 | EE-G107 | EE-05 | | EE-13 | EE-12 | EE-G112 | EE-14 | EE-15 | EE-16 | EE-12 | | EE-20 | EE-11 |
| DATE SAMPLED | 3-17-87 | 3-18-87 | 3-18-87 | 3-18-87 | 3-18-87 | 3-18-87 | 3-23-87 | 3-23-87 | 3-23-87 | 3-23-87 | 3-23-87 | 3-23-87 | 3-23-87 | 3-23-87 | 3-23-87 | 3-24-87 |
| 1 Dimethyl Phthalate | | | | | | | | | | | | | | | | 98 |
| 2 Acenaphtylene | | | | | | | | | | | | | | | | |
| 3 3-Nitroaniline | | | | | | | | | | | | | | | | |
| 4 Acenaphthene | | | | | | | | | | | | | | | | |
| 5 2,4-Dinitrophenol | | | | | | | | | | | | | | | | |
| 6 4-Nitrophenol | | | | | | | | | | | | | | | | |
| 7 Dibenzofuran | | | | | | | | | | | | | | | | |
| 8 2,4-Dinitrotoluene | | | | | | | | | | | | | | | | |
| 9 2,6-Dinitrotoluene | | | | | | | | | | | | | | | | |
| 10 Diethylphthalate | | | | | | | | | 23 B | | 13 B | 140 B | | 13 B | 8 BJ | |
| 11 4-Chlorophenyl-Phenylether | | | | | | | | | | | | | | | | |
| 12 Fluorene | | | | | | | | | | | | 25 J | | | | |
| 13 4-Nitroaniline | | | | | | | | | | | | | | | | |
| 14 4,6-Dinitro-2-methylphenol | | | | | | | | | | | | | | | | |
| 15 N-Nitrosodiphenylamine | | | | | | | | | | | | | | | | |
| 16 4-Bromophenyl-phenylether | | | | | | | | | | | | | | | | |
| 17 Hexachlorobenzene | | | | | 6 J | | | | | | | | | | | |
| 18 Pentachlorophenol | | | 1300 J | 6300 | 12 J | | | | 6 J | 2400 | 7 J | 60 J | | | | |
| 19 Phenanthrene | | | | | | | | | | | | | | | | |
| 20 Anthracene | | | | | | | | | | | 2 JB | | | | | |
| 21 Di-n-butyl phthalate | | 9 BJ | | | 10 B | | 2 JB | 7 BJ | 2 JB | | | | | 2 JB | 4 BJ | |
| 22 Fluoranthene | | | | | | | | | | | | | | | | |
| 23 Pyrene | | | | | | | | | | | | | | | | |
| 24 Butyl Benzyl phthalate | | | | | | | | | | | | | | | | |
| 25 3,3'-Dichlorobenzidine | | | | | | | | | | | | | | | | |
| 26 Benzo(a)Anthracene | | | | | | | | | | | | | | | | |
| 27 bis(2-ethylhexyl) phthalate | | 18 B | | | 10 B | 4 BJ | 2 JB | 5 BJ | 3 JB | | 2 | 20 BJ | | 2 JB | 3 BJ | |
| 28 Chrysene | | | | | | | | | | | | | | | | |
| 29 Di-n-octyl phthalate | | | | | | | | | | | | | | 1 J | | |
| 30 Benzo(b)Fluoranthene | | | | | | | | | | | | | | | | |
| 31 Benzo(k)Fluoranthene | | | | | | | | | | | | | | | | |
| 32 Benzo(a)Pyrene | | | | | | | | | | | | | | | | |
| 33 Indeno(1,2,3-cd)Pyrene | | | | | | | | | | | | | | | | |
| 34 Benzo(g,h,i)Perylene | | | | | | | | | | | | | | | | |
| 35 Dibenz(a,h)Anthracene | | | | | | | | | | | | | | | | |

Ground Water Semivolatiles

| | SITE | SITE G | SITE G | SITE G | BLANK | SITE H | SITE L | SITE D | SITE D | SITE D | SITE D | SITE D | SITE D | SITE D | SITE D | SITE D | SITE D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE NUMBER | DC-GW-33 | DC-GW-34 | DC-GW-34A | DC-GW-35 * | DC-GW-36 | DC-GW-37 | DC-GW-38 | DC-GW-38A | DC-GW-39 | DC-GW-39A | DC-GW-40 | DC-GW-40A | DC-GW-41 | DC-GW-41A | DC-GW-42 * | DC-GW-43 |
| | WELL NUMBER | EE-G106 | EE-G102 | EE-G102 | | EE-G110 | EE-G109 | EE-21 | EE-21 | EE-22 | EE-22 | EE-23 | EE-23 | EE-24 | EE-24 | EE-24 | EE-25 |
| | DATE SAMPLED | 3-24-87 | 3-24-87 | 7-14-87 | 3-24-87 | 3-24-87 | 3-24-87 | 3-24-87 | 7-14-87 | 3-24-87 | 7-14-87 | 3-24-87 | 7-14-87 | 3-24-87 | 7-14-87 | 3-24-87 | 3-24-87 |
| 1 | Dimethyl Phthalate | | | | | | | | | | | | | | | | |
| 2 | Acenaphtylene | | | | | | | | | | | | | | | | |
| 3 | 3-Nitroaniline | | | | | | | | | | | | | | | | |
| 4 | Acenaphthene | | | | | | | | | | | | | | | | |
| 5 | 2,4-Dinitrophenol | | | | | | | | | | | | | | | | |
| 6 | 4-Nitrophenol | | | | | | | | | | | | | | | | |
| 7 | Dibenzofuran | | | | | | | | | | | | | | | | |
| 8 | 2,4-Dinitrotoluene | | | | | | | | | | | | | | | | |
| 9 | 2,6-Dinitrotoluene | | | | | | | | | | | | | | | | |
| 10 | Diethylphthalate | | | | | | | | | | | | | | | | |
| 11 | 4-Chlorophenyl-Phenylether | | | | | | | | | | | | | | | | |
| 12 | Fluorene | | | | | | | | | | | | | | | | |
| 13 | 4-Nitroaniline | | | | | | | | | | | | | | | | |
| 14 | 4,6-Dinitro-2-methylphenol | | | | | | | | | | | | | | | | |
| 15 | N-Nitrosodiphenylamine | | | | | | | | | | | | | | | | |
| 16 | 4-Bromophenyl-phenylether | | | | | | | | | | | | | | | | |
| 17 | Hexachlorobenzene | | | | | | | | | | | | | | | | |
| 18 | Pentachlorophenol | | | | | | | | | 23 J | | | | | | | |
| 19 | Phenanthrene | | | | | | | | | | | | | | | | |
| 20 | Anthracene | | | | | | | | | | | | | | | | |
| 21 | Di-n-butyl phthalate | 12 B | | | 6 BJ | | 6 BJ | | | | | | | 10 B | 7 J | 10 B | |
| 22 | Fluoranthene | | | | | | | | | | | | | | | | |
| 23 | Pyrene | | | | | | | | | | | | | | | | |
| 24 | Butyl Benzyl phthalate | | | | | | | | | | | | | | | | |
| 25 | 3,3'-Dichlorobenzidine | | | | | | | | | | | | | | | | |
| 26 | Benzo(a)Anthracene | | | | | | | | | | | | | | | | |
| 27 | bis(2-ethylhexyl) phthalate | 4 BJ | | | 2 BJ | | | | | | | | | 3 BJ | | | |
| 28 | Chrysene | | | | | | | | | | | | | | | | |
| 29 | Di-n-octyl phthalate | 2 BJ | | | 3 BJ | | | | | | | | | 2 BJ | | 11 B | |
| 30 | Benzo(b)Fluoranthene | | | | | | | | | | | | | | | | |
| 31 | Benzo(k)Fluoranthene | | | | | | | | | | | | | | | | |
| 32 | Benzo(a)Pyrene | | | | | | | | | | | | | | | | |
| 33 | Indeno(1,2,3-cd)Pyrene | | | | | | | | | | | | | | | | |
| 34 | Benzo(g,h,i)Perylene | | | | | | | | | | | | | | | | |
| 35 | Dibenz(a,h)Anthracene | | | | | | | | | | | | | | | | |

Ground Water Semivolatiles

| SITE | SITE D | SITE R | SITE R | SITE R | SITE R | SITE R | SITE R | SITE R | BLANK | PRIVATE | PRIVATE | PRIVATE | PRIVATE | PRIVATE | BLANK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-GW-43A | DC-GW-44 | DC-GW-45 | DC-GW-46 | DC-GW-47 | DC-GW-48* | DC-GW-49 | DC-GW-50 | DC-GW-51+ | DC-GW-52 | DC-GW-53 | DC-GW-54 | DC-GW-55 | DC-GW-56 | DC-GW-57 + |
| WELL NUMBER | EE-25 | P-1 | B-28A | P-7 | B-26A | B-26A | B-25A | P-11 | | WRIGHT | SETTLES | SCHMIDT | McDONALD | CLAYTON | |
| DATE SAMPLED | 7-14-87 | 3-25-87 | 3-25-87 | 3-25-87 | 3-25-87 | 3-25-87 | 3-25-87 | 3-25-87 | 3-25-87 | 3-26-87 | 3-26-87 | 3-26-87 | 3-26-87 | 3-26-87 | 7-14-87 |
| 1 Dimethyl Phthalate | | | | | | | | | | | | | | | |
| 2 Acenaphtylene | | | | | | | | | | | | | | | |
| 3 3-Nitroaniline | | | | | | | | | | | | | | | |
| 4 Acenaphthene | | | | | | | | | | | | | | | |
| 5 2,4-Dinitrophenol | | | | | | | | | | | | | | | |
| 6 4-Nitrophenol | | | | | | | | | | | | | | | |
| 7 Dibenzofuran | | | | | | | | | | | | | | | |
| 8 2,4-Dinitrotoluene | | | | | | | | | | | | | | | |
| 9 2,6-Dinitrotoluene | | | | | | | | | | | | | | | |
| 10 Diethylphthalate | | | | | | | | | | | | | | | |
| 11 4-Chlorophenyl-Phenylether | | | | | | | | | | | | | | | |
| 12 Fluorene | | | | | | | | | | | | | | | |
| 13 4-Nitroaniline | | | | | | | | | | | | | | | |
| 14 4,6-Dinitro-2-methylphenol | | | | | | | | | | | | | | | |
| 15 N-Nitrosodiphenylamine | | | | | | | | | | | | | | | |
| 16 4-Bromophenyl-phenylether | | | | | | | | | | | | | | | |
| 17 Hexachlorobenzene | | | | | | | | | | | | | | | |
| 18 Pentachlorophenol | | | | | | | | | | | | | | | |
| 19 Phenanthrene | | | | | | | | | | | | | | | |
| 20 Anthracene | | | | | | | | | | | | | | | |
| 21 Di-n-butyl phthalate | | 7 J | | | | | | | | | | | | | |
| 22 Fluoranthene | | | | | | | | | | | | | | | |
| 23 Pyrene | | | | | | | | | | | | | | | |
| 24 Butyl Benzyl phthalate | | | | | | | | | | | | | | | |
| 25 3,3'-Dichlorobenzidine | | | | | | | | | | | | | | | |
| 26 Benzo(a)Anthracene | | | | | | | | | | | | | | | |
| 27 bis(2-ethylhexyl) phthalate | | | 4 J | | 37 | 4 | | | 4 J | | | | | | |
| 28 Chrysene | | | | | | | | | | | | | | | |
| 29 Di-n-octyl phthalate | | | 4 J | | 40 | 26 | | | 5 J | 2 J | | 2 J | 4 J | 6 J | |
| 30 Benzo(b)Fluoranthene | | | | | | | | | | | | | | | |
| 31 Benzo(k)Fluoranthene | | | | | | | | | | | | | | | |
| 32 Benzo(a)Pyrene | | | | | | | | | | | | | | | |
| 33 Indeno(1,2,3-cd)Pyrene | | | | | | | | | | | | | | | |
| 34 Benzo(g,h,i)Perylene | | | | | | | | | | | | | | | |
| 35 Dibenz(a,h)Anthracene | | | | | | | | | | | | | | | |

Ground Water Semivolatiles

| SITE | SITE Q | SITE Q | SITE Q | SITE Q | SITE Q | SITE Q | SITE Q | SITE Q | SITE Q | SITE H | SITE H | SITE H | SITE H | SITE G | SITE G | SITE G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-GW-01 | DC-GW-02 | DC-GW-03 | DC-GW-04 | DC-GW-05 | DC-GW-06 | DC-GW-07 | DC-GW-08A | DC-GW-09 | DC-GW-10 | DC-GW-11 | DC-GW-12 | DC-GW-13 | DC-GW-14 | DC-GW-15 | DC-GW-16 |
| WELL NUMBER | EE-06 | EE-07 | EE-09 | EE-10 | EE-17 | EE-08 | EE-19 | EE-19 | EE-18 | EE-01 | EE-02 | EE-03 | EE-04 | EE-G101 | EE-G103 | EE-G104 |
| DATE SAMPLED | 3-16-87 | 3-16-87 | 3-16-87 | 3-16-87 | 3-16-87 | 3-16-87 | 3-16-87 | 3-16-87 | 3-16-87 | 3-17-87 | 3-17-87 | 3-17-87 | 3-17-87 | 3-17-87 | 3-17-87 | 3-17-87 |
| 1 Dimethyl Phthalate | | | | | | | | | | | 8 J | | | | | |
| 2 Acenaphtylene | | | | | | | | | | | | | | | | |
| 3 3-Nitroaniline | | | | | | | 3900 | | 460 J | | | | | | | |
| 4 Acenaphthene | | | | | | | | | | | | | | | | |
| 5 2,4-Dinitrophenol | | | | | | | | | | | | | | | | |
| 6 4-Nitrophenol | | | | | | | | | 80 J | | | | | | | |
| 7 Dibenzofuran | | | | | | | | | | 6 J | | | | | | |
| 8 2,4-Dinitrotoluene | | | | | | | | | | | | | | | | |
| 9 2,6-Dinitrotoluene | | | | | | | | | | | | | | | | |
| 10 Diethylphthalate | | | | | | | | | | | 22 J | | | | | |
| 11 4-Chlorophenyl-Phenylether | | | | | | | | | | 20 J | | | | | | |
| 12 Fluorene | | | | | | | | | | | | | | | | |
| 13 4-Nitroaniline | | | | | | | | | | | | | | | | |
| 14 4,6-Dinitro-2-methylphenol | | | | | | | | | | | | | | | | |
| 15 N-Nitrosodiphenylamine | | | | | | | | | | 800 | | | | | | |
| 16 4-Bromophenyl-phenylether | | | | | | | | | | | | | | | | |
| 17 Hexachlorobenzene | | | | | | | | | | | | | | | | |
| 18 Pentachlorophenol | | | | | | | 24000 E | 35000 E | 310 | 650 | | | | | | |
| 19 Phenanthrene | | | | | | | | | | 15 J | | | | | | |
| 20 Anthracene | | | | | | | | | | | | | | | | |
| 21 Di-n-butyl phthalate | 12 BJ | 8 BJ | 5 BJ | 8 BJ | 5 BJ | 5 BJ | | | | | | | | | 2 BJ | |
| 22 Fluoranthene | | | | | | | | | | | | | | | | |
| 23 Pyrene | | | | | | | | | | | | | | | | |
| 24 Butyl Benzyl phthalate | | | | | | | | | | | | | | | | |
| 25 3,3'-Dichlorobenzidine | | | | | | | | | | | | | | | | |
| 26 Benzo(a)Anthracene | | | | | | | | | | | | | | 32 | | |
| 27 bis(2-ethylhexyl) phthalate | 95 | 160 | 32 | | 26 | | | | | | 24 J | | | | | 24 |
| 28 Chrysene | | | | | | | | | | | | | | 6 J | | |
| 29 Di-n-octyl phthalate | | 7 J | 4 J | | | 2 J | | | | | | | | | | |
| 30 Benzo(b)Fluoranthene | | | | | | | | | | | | | | | | |
| 31 Benzo(k)Fluoranthene | | | | | | | | | | | | | | | | |
| 32 Benzo(a)Pyrene | | | | | | | | | | | | | | | | |
| 33 Indeno(1,2,3-cd)Pyrene | | | | | | | | | | | | | | | | |
| 34 Benzo(g,h,i)Perylene | | | | | | | | | | | | | | | | |
| 35 Dibenz(a,h)Anthracene | | | | | | | | | | | | | | | | |

Ground Water Pest/PCBs

| SITE | SITE Q | SITE Q | SITE Q | SITE Q | SITE Q | SITE Q | SITE Q | SITE Q | SITE Q | SITE H | SITE H | SITE H | SITE H | SITE G | SITE G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-GW-01 | DC-GW-02 | DC-GW-03 | DC-GW-04 | DC-GW-05 | DC-GW-06 | DC-GW-07 | DC-GW-08 | DC-GW-09 | DC-GW-10 | DC-GW-11 | DC-GW-12 | DC-GW-13 | DC-GW-14 | DC-GW-15 |
| WELL NUMBER | EE-06 | EE-07 | EE-09 | EE-10 | EE-17 | EE-08 | EE-19 | EE-19 | EE-18 | EE-01 | EE-02 | EE-03 | EE-04 | EE-G101 | EE-G103 |
| DATE SAMPLED | 3-16-87 | 3-16-87 | 3-16-87 | 3-16-87 | 3-16-87 | 3-16-87 | 3-16-87 | 3-16-87 | 3-16-87 | 3-17-87 | 3-17-87 | 3-17-87 | 3-17-87 | 3-17-87 | 3-17-87 |
| 1 Alpha-BHC | | | | | | | | | | | | | | | |
| 2 Beta-BHC | | | | | | | | | | | | | | | |
| 3 Delta-BHC | | | | | | | | | | | | | | | |
| 4 Gamma-BHC (Lindane) | | | | | | | | | | | | | | | |
| 5 Heptachlor | | | | | | | | | | | | | | | |
| 6 Aldrin | | | | | | | | | | | | | | | |
| 7 Heptachlor Epoxide | | | | | | | | | | | | | | | |
| 8 Edosulfan I | | | | | | | | | | | | | | | |
| 9 Dieldrin | | | | | | | | | | | | | | | |
| 10 4,4'-DDE | | | | | | | | | | | | | | | |
| 11 Endrin | | | | | | | | | | | | | | | |
| 12 Edosulfan II | | | | | | | | | | | | | | | |
| 13 4,4'-DDD | | | | | | | | | | | | | | | |
| 14 Endosulfan Sulfate | | | | | | | | | | | | | | | |
| 15 4,4'-DDT | | | | | | | | | | | | | | | |
| 16 Methoxychlor | | | | | | | | | | | | | | | |
| 17 Endrin Ketone | | | | | | | | | | | | | | | |
| 18 Chlordane | | | | | | | | | | | | | | | |
| 19 Toxaphene | | | | | | | | | | | | | | | |
| 20 AROCLOR-1016 | | | | | | | | | | | | | | | |
| 21 AROCLOR-1221 | | | | | | | | | | | | | | | |
| 22 AROCLOR-1232 | | | | | | | | | | | | | | | |
| 23 AROCLOR-1242 | | | | | | | | | | | | | | | |
| 24 AROCLOR-1248 | | | | | | | | | | | | | | | |
| 25 AROCLOR-1254 | | | | | | | | | | | | | | | |
| 26 AROCLOR-1260 | | | | | | | | | | 52 | | | | 14 J | |

Ground Water Pest/PCBs

| SITE | SITE G | BLANK | SITE L | SITE G | SITE G | SITE G | BLANK | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I | BLANK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-GW-16 | DC-GW-17+ | DC-GW-18 | DC-GW-19 | DC-GW-20 * | DC-GW-21 | DC-GW-22 + | DC-GW-23 | DC-GW-24 | DC-GW-25 | DC-GW-26 | DC-GW-27 | DC-GW-28 | DC-GW-29 * | DC-GW-30 + |
| WELL NUMBER | EE-G104 | | EE-G108 | EE-G107 | EE-G107 | EE-05 | | EE-13 | EE-12 | EE-G112 | EE-14 | EE-15 | EE-16 | EE-12 | |
| DATE SAMPLED | 3-17-87 | 3-17-87 | 3-18-87 | 3-18-87 | 3-18-87 | 3-18-87 | 3-18-87 | 3-23-87 | 3-23-87 | 3-23-87 | 3-23-87 | 3-23-87 | 3-23-87 | 3-23-87 | 3-23-87 |
| 1 Alpha-BHC | | | | | | | | | | | | | | | |
| 2 Beta-BHC | | | | | | | | | | | | | | | |
| 3 Delta-BHC | | | | | | | | | | | | | | | |
| 4 Gamma-BHC (Lindane) | | | | | | | | | | | | | | | |
| 5 Heptachlor | | | | | | | | | | | | | | | |
| 6 Aldrin | | | | | | | | | | | | | | | |
| 7 Heptachlor Epoxide | | | | | | | | | | | | | | | |
| 8 Edosulfan I | | | | | | | | | | | | | | | |
| 9 Dieldrin | | | | | | | | | | | | | | | |
| 10 4,4'-DDE | | | | | | | | | | | | | | | |
| 11 Endrin | | | | | | | | | | | | | | | |
| 12 Edosulfan II | | | | | | | | | | | | | | | |
| 13 4,4'-DDD | | | | | | | | | | | | | | | |
| 14 Endosulfan Sulfate | | | | | | | | | | | | | | | |
| 15 4,4'-DDT | | | | | | | | | | | | | | | |
| 16 Methoxychlor | | | | | | | | | | | | | | | |
| 17 Endrin Ketone | | | | | | | | | | | | | | | |
| 18 Chlordane | | | | | | | | | | | | | | | |
| 19 Toxaphene | | | | | | | | | | | | | | | |
| 20 AROCLOR-1016 | | | | | | | | | | | | | | | |
| 21 AROCLOR-1221 | | | | | | | | | | | | | | | |
| 22 AROCLOR-1232 | | | | | | | | | | | | | | | |
| 23 AROCLOR-1242 | | | | | | | | | | | | | | | |
| 24 AROCLOR-1248 | | | | | | | | | | | | | | | |
| 25 AROCLOR-1254 | | | | | | | | | | | | | | | |
| 26 AROCLOR-1260 | | | | 890 | 650 | | | | | | | | | | |

Ground Water Pest/PCBs

| SITE | SITE I | SITE G | SITE G | SITE G | SITE G | BLANK | SITE H | SITE L | SITE O | SITE O | SITE O | SITE O | SITE O | SITE O | SITE O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-GW-31 | DC-GW-32 | DC-GW-33 | DC-GW-34 | DC-GW-34A | DC-GW-35 + | DC-GW-36 | DC-GW-37 | DC-GW-38 | DC-GW-38A | DC-GW-39 | DC-GW-39A | DC-GW-40 | DC-GW-40A | DC-GW-41 |
| WELL NUMBER | EE-20 | EE-11 | EE-G106 | EE-G102 | EE-G102 | | EE-G110 | EE-G109 | EE-21 | EE-21 | EE-22 | EE-22 | EE-23 | EE-23 | EE-24 |
| DATE SAMPLED | 3-23-87 | 3-24-87 | 3-24-87 | 3-24-87 | 7-14-87 | 3-24-87 | 3-24-87 | 3-24-87 | 3-24-87 | 7-14-87 | 3-24-87 | 7-14-87 | 3-24-87 | 7-14-87 | 3-24-87 |
| 1 Alpha-BHC | | | 70 C | | | | | | | | | | | | |
| 2 Beta-BHC | | | | | | | | | | | | | | | |
| 3 Delta-BHC | | | | | | | | | | | | | | | |
| 4 Gamma-BHC (Lindane) | | | | | | | | | | | | | | | |
| 5 Heptachlor | | | | | | | | | | | | | | | |
| 6 Aldrin | | | | | | | | | | | | | | | |
| 7 Heptachlor Epoxide | | | | | | | | | | | | | | | |
| 8 Edosulfan I | | | | | | | | | | | | | | | |
| 9 Dieldrin | | | | | | | | | | | | | | | |
| 10 4,4'-DDE | | | | | | | | | | | | | | | |
| 11 Endrin | | | | | | | | | | | | | | | |
| 12 Edosulfan II | | | | | | | | | | | | | | | |
| 13 4,4'-DDD | | | | | | | | | | | | | | | |
| 14 Endosulfan Sulfate | | | | | | | | | | | | | | | |
| 15 4,4'-DDT | | | | | | | | | | | | | | | |
| 16 Methoxychlor | | | | | | | | | | | | | | | |
| 17 Endrin Ketone | | | | | | | | | | | | | | | |
| 18 Chlordane | | | | | | | | | | | | | | | |
| 19 Toxaphene | | | | | | | | | | | | | | | |
| 20 AROCLOR-1016 | | | | | | | | | | | | | | | |
| 21 AROCLOR-1221 | | | | | | | | | | | | | | | |
| 22 AROCLOR-1232 | | | | | | | | | | | | | | | |
| 23 AROCLOR-1242 | | | | | | | | | | | | | | | |
| 24 AROCLOR-1248 | | | | | | | | | | | | | | | |
| 25 AROCLOR-1254 | | | | | | | | | | | | | | | |
| 26 AROCLOR-1260 | | | | | | | | | | | | | | | |

Ground Water Pest/PCBs

| SITE | SITE O | SITE O | SITE O | SITE O | SITE R | SITE R | SITE R | SITE R | SITE R | SITE R | SITE R | BLANK | PRIVATE | PRIVATE | PRIVATE | PRIVATE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-GW-41A | DC-GW-42 * | DC-GW-43 | DC-GW-43A | DC-GW-44 | DC-GW-45 | DC-GW-46 | DC-GW-47 | DC-GW-48* | DC-GW-49 | DC-GW-50 | DC-GW-51+ | DC-GW-52 | DC-GW-53 | DC-GW-54 | DC-GW-55 |
| WELL NUMBER | EE-24 | EE-24 | EE-25 | EE-25 | P-1 | B-28A | P-7 | B-26A | B-26A | B-25A | P-11 | | WRIGHT | SETTLES | SCHMIDT | McDONALD |
| DATE SAMPLED | 7-14-87 | 3-24-87 | 3-24-87 | 7-14-87 | 3-25-87 | 3-25-87 | 3-25-87 | 3-25-87 | 3-25-87 | 3-25-87 | 3-25-87 | 3-25-87 | 3-26-87 | 3-26-87 | 3-26-87 | 3-26-87 |
| 1 Alpha-BHC | | | | | | | | | | | | | | | | |
| 2 Beta-BHC | | | | | | | | | | | | | | | | |
| 3 Delta-BHC | | | | | | | | | | | | | | | | |
| 4 Gamma-BHC (Lindane) | | | | | | | | | | | | | | | | |
| 5 Heptachlor | | | | | | | | | | | | | | | | |
| 6 Aldrin | | | | | | | | | | | | | | | | |
| 7 Heptachlor Epoxide | | | | | | | | | | | | | | | | |
| 8 Edosulfan I | | | | | | | | | | | | | | | | |
| 9 Dieldrin | | | | | | | | | | | | | | | | |
| 10 4,4'-DDE | | | | | | | | | | | | | | | | |
| 11 Endrin | | | | | | | | | | | | | | | | |
| 12 Edosulfan II | | | | | | | | | | | | | | | | |
| 13 4,4'-DDD | | | | | | | | | | | | | | | | |
| 14 Endosulfan Sulfate | | | | | | | | | | | | | | | | |
| 15 4,4'-DDT | | | | | | | | | | | | | | | | |
| 16 Methoxychlor | | | | | | | | | | | | | | | | |
| 17 Endrin Ketone | | | | | | | | | | | | | | | | |
| 18 Chlordane | | | | | | | | | | | | | | | | |
| 19 Toxaphene | | | | | | | | | | | | | | | | |
| 20 AROCLOR-1016 | | | | | | | | | | | | | | | | |
| 21 AROCLOR-1221 | | | | | | | | | | | | | | | | |
| 22 AROCLOR-1232 | | | | | | | | | | | | | | | | |
| 23 AROCLOR-1242 | | | | | | | | | | | | | | | | |
| 24 AROCLOR-1248 | | | | | | | | | | | | | | | | |
| 25 AROCLOR-1254 | | | | | | | | | | | | | | | | |
| 26 AROCLOR-1260 | | | | | | | | | | | | | | | | |

Ground Water Pest/PCBs

| SITE | PRIVATE | BLANK |
|---|---|---|
| SAMPLE NUMBER | DC-GW-56 | DC-GW-57 + |
| WELL NUMBER | CLAYTON | |
| DATE SAMPLED | 3-26-87 | 7-14-87 |
| 1 Alpha-BHC | | |
| 2 Beta-BHC | | |
| 3 Delta-BHC | | |
| 4 Gamma-BHC (Lindane) | | |
| 5 Heptachlor | | |
| 6 Aldrin | | |
| 7 Heptachlor Epoxide | | |
| 8 Edosulfan I | | |
| 9 Dieldrin | | |
| 10 4,4'-DDE | | |
| 11 Endrin | | |
| 12 Edosulfan II | | |
| 13 4,4'-DDD | | |
| 14 Endosulfan Sulfate | | |
| 15 4,4'-DDT | | |
| 16 Methoxychlor | | |
| 17 Endrin Ketone | | |
| 18 Chlordane | | |
| 19 Toxaphene | | |
| 20 AROCLOR-1016 | | |
| 21 AROCLOR-1221 | | |
| 22 AROCLOR-1232 | | |
| 23 AROCLOR-1242 | | |
| 24 AROCLOR-1248 | | |
| 25 AROCLOR-1254 | | |
| 26 AROCLOR-1260 | | |

Ground Water Inorganics

| SITE | SITE Q | SITE Q | SITE Q | SITE Q | SITE Q | SITE Q | SITE Q | SITE Q | SITE Q | SITE H | SITE H | SITE H | SITE H | SITE G | SITE G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-GW-01 | DC-GW-02 | DC-GW-03 | DC-GW-04 | DC-GW-05 | DC-GW-06 | DC-GW-07 | DC-GW-08 & | DC-GW-09 | DC-GW-10 | DC-GW-11 | DC-GW-12 | DC-GW-13 | DC-GW-14 | DC-GW-15 |
| WELL NUMBER | EE-06 | EE-07 | EE-09 | EE-10 | EE-17 | EE-08 | EE-19 | EE-19 | EE-18 | EE-01 | EE-02 | EE-03 | EE-04 | EE-G101 | EE-G103 |
| DATE SAMPLED | 3-16-87 | 3-16-87 | 3-16-87 | 3-16-87 | 3-16-87 | 3-16-87 | 3-16-87 | 3-16-87 | 3-16-87 | 3-17-87 | 3-17-87 | 3-17-87 | 3-17-87 | 3-17-87 | 3-17-87 |
| 1 Aluminum | | | | | | | | | | | 11800 | | | | |
| 2 Antimony | | | | | | | | | | | | | | | 63 R |
| 3 Arsenic | 64 | 82 | 18 | 100 | | | 11 | 11 | 15 | | 8490 | 26 | | | |
| 4 Barium | 384 | 482 | | 358 | | 336 | | | | | | | | 219 | |
| 5 Beryllium | | | | | | | | | | | | | | | |
| 6 Boron | | | | | | | | | | | | | | | |
| 7 Cadmium | | | | | | | | | | | 70 R | | | | |
| 8 Chromium, trivalent | | | | | | | | | 13 | | 24 | | | | |
| 9 Cobalt | | | | | | | | | 148 | | 758 | | | | |
| 10 Copper | | | | | | | | | | | 2410 | | | | |
| 11 Iron | 8960 | 54000 | 15800 | 20000 | 571 | 11300 | 36700 | 36500 | 41200 | 29600 | 104000 | 34900 | | 1280 | 1150 |
| 12 Lead | | | | | | | | | | | 28 R | | | | |
| 13 Manganese | 1320 | 1600 | 522 | 1090 | 1640 | 13200 | 2660 | 2600 | 6630 | 907 | 8020 | 1030 | 1800 | 2230 | 242 |
| 14 Mercury | | | | | | | | | | | | | | 1.4 | 2.1 |
| 15 Nickel | 64 | 74 | | | | | | | 112 | 261 | 17200 | | | | |
| 16 Selenium | | | | | | | | | | | | | | | |
| 17 Silver | | | | | | | | | | | | | | | |
| 18 Thallium | | | | | | | | | | | | | | | |
| 19 Tin | | | | | | | | | | | | | | | |
| 20 Vanadium | | | | | | | | | | | | | | | |
| 21 Zinc | 25 | 326 | 26 | 22 | 313 | 48 | 172 | 171 | 4.31 | 57 | 6840 | 25 | 24 | 31 | 42 |
| 22 Cyanide | 1560 | | | | | | | | | 460 | 21 | | | 157 | 101 |

Ground Water Inorganics

| SITE | SITE G | BLANK | SITE L | SITE G | SITE G | SITE G | BLANK | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I | BLANK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-GW-16 | DC-GW-17 + | DC-GW-18 | DC-GW-19 | DC-GW-20 ‡ | DC-GW-21 | DC-GW-22 + | DC-GW-23 | DC-GW-24 | DC-GW-25 | DC-GW-26 | DC-GW-27 | DC-GW-28 | DC-GW-29 ‡ | DC-GW-30 + |
| WELL NUMBER | EE-G104 | | EE-G108 | EE-G107 | EE-G107 | EE-05 | | EE-13 | EE-12 | EE-G112 | EE-14 | EE-15 | EE-16 | EE-12 | |
| DATE SAMPLED | 3-17-87 | 3-17-87 | 3-18-87 | 3-18-87 | 3-18-87 | 3-18-87 | 3-18-87 | 3-23-87 | 3-23-87 | 3-23-87 | 3-23-87 | 3-23-87 | 3-23-87 | 3-23-87 | 3-23-87 |
| 1 Aluminum | | | | | | | | | | | | | | | |
| 2 Antimony | | | | | | | | | | | | | | | |
| 3 Arsenic | | | | 14 | 12 | | | 12 | | 20 | 15 | 12 | | | |
| 4 Barium | | | 331 | 610 | 580 | | | | | 223 | | | 956 | | |
| 5 Beryllium | | | | | | | | | | | | | | | |
| 6 Boron | | | | | | | | | | | | | | | |
| 7 Cadmium | | | | 22 R | 22 R | | | | | | | | | | |
| 8 Chromium, trivalent | | | | 24 | 23 | | | | | | | | | | |
| 9 Cobalt | | | | 588 | 572 | | | | | | | | | | |
| 10 Copper | | | | | | | | | | | | | | | |
| 11 Iron | 1110 | | 21900 | 247000 | 241000 | | | 25400 | 23300 | 10800 | 24100 | 10500 | 9540 | 24900 | 107 |
| 12 Lead | | | | | | | | | | | | | | | |
| 13 Manganese | 103 | | 1280 | 7240 | 6850 | 286 | | 1520 | 1550 | 1650 | 1260 | 1270 | 1750 | 1580 | |
| 14 Mercury | | | | | | | | | | | | | | | |
| 15 Nickel | | | | 349 | 328 | | | | | | 95 | | | | |
| 16 Selenium | | | | | | | | | | | | | | | |
| 17 Silver | | | | | | | | | | | | | | | |
| 18 Thallium | | | | | | | | | | | | | | | |
| 19 Tin | | | | | | | | | | | | | | | |
| 20 Vanadium | | | | 93 | 94 | | | | | | | | | | |
| 21 Zinc | 24 | | 24 | 1910 | 1820 | 26 | | | | | 25 | 26 | | | |
| 22 Cyanide | | | | | | 350 | | | | | | | | | |

INORGANICS GROUND-WATER

| | SITE | SITE I | SITE G | SITE G | SITE G | SITE G | BLANK | SITE H | SITE L | SITE O | SITE O | SITE O | SITE O | SITE O | SITE O | SITE O | SITE O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE NUMBER | DC-GW-31 | DC-GW-32 | DC-GW-33 | DC-GW-34 | DC-GW-34A | DC-GW-35 + | DC-GW-36 | DC-GW-37 | DC-GW-38 | DC-GW-38A | DC-GW-39 | DC-GW-39A | DC-GW-40 | DC-GW-40A | DC-GW-41 | DC-GW-41A |
| | WELL NUMBER | EE-20 | EE-11 | EE-G106 | EE-G102 | EE-G102 | | EE-110 | EE-G109 | EE-21 | EE-21 | EE-22 | EE-22 | EE-23 | EE-23 | EE-24 | EE-24 |
| | DATE SAMPLED | 3-23-87 | 3-24-87 | 3-24-87 | 3-24-87 | 7-14-87 | 3-24-87 | 3-24-87 | 3-24-87 | 3-24-87 | 7-14-87 | 3-24-87 | 7-14-87 | 3-24-87 | 7-14-87 | 3-24-87 | 7-14-87 |
| 1 | Aluminum | | 85 | | | | | | | | 200 | | | | | | |
| 2 | Antimony | | | | | | | | | | | | | | | | |
| 3 | Arsenic | | 179 | 34 | 27 | | | | 14000 | 16 | | 133 | 123 | 25 | 17 | 18 | 15 |
| 4 | Barium | | | 192 | 48 | [51] | | 173 | | 159 | [35] | 536 | 500 | [161] | [152] | [170] | 204 |
| 5 | Beryllium | | | | | | | | | | | | | | | | |
| 6 | Boron | | | | | | | | | | | | | | | | |
| 7 | Cadmium | | | | | | | | 32 | | | 8 | 11 | | | | |
| 8 | Chromium, trivalent | | | 41 | | | | | | | | | | | | | |
| 9 | Cobalt | | | | | [10] | | | 84 | | | | | | | | |
| 10 | Copper | | | | | | | | | | | | | | | | |
| 11 | Iron | 124 | 43800 | 49500 | 3850 | 2860 | 111 | 2160 | 523000 | 20400 | 15900 | 147000 | 171000 | 19600 | 16800 | 36400 | 29200 |
| 12 | Lead | | | | | | | | | | 3270 | | 6350 | | | | |
| 13 | Manganese | | 2290 | 3940 | 1460 | 1510 | | 274 | 7660 | 4340 | | 5460 | | 1270 | 1330 | 4110 | 1520 |
| 14 | Mercury | | | | | | | | | | | | | | | | |
| 15 | Nickel | | | 37 | 72 | | | 111 | | | | | | | | | |
| 16 | Selenium | | | | | | | | | | | | | | | | |
| 17 | Silver | | | | | | | | | | | | | | | | |
| 18 | Thallium | | | | | | | | | | | | | | | | |
| 19 | Tin | | | | | | | | | | | | | | | | |
| 20 | Vanadium | | | | | | | | 159 | | | 42 | 55 | | | 504 | |
| 21 | Zinc | | 129 | 58 | 14 | 31 | 10 | 53 | 2210 | 41 | 57 | 101 | 40 | 95 | [15] | 23 | 24 |
| 22 | Cyanide | | 26 | | | | | | | 20 | | | | | | | |

*Ground Water Inorganics*

| | SITE | SITE O | SITE O | SITE O | SITE R | SITE R | SITE R | SITE R | SITE R | SITE R | SITE R | BLANK | PRIVATE | PRIVATE | PRIVATE | PRIVATE | PRIVATE | BLANK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE NUMBER | DC-GW-42 * | DC-GW-43 | DC-GW-43A | DC-GW-44 | DC-GW-45 | DC-GW-46 | DC-GW-47 | DC-GW-48 | DC-GW-49 | DC-GW-50 | DC-GW-51+ | DC-GW-52 | DC-GW-53 | DC-GW-54 | DC-GW-55 | DC-GW-56 | DC-GW-57 |
| | WELL NUMBER | EE-24 | EE-25 | EE-25 | P-1 | B-28A | P-7 | B-26A | B-26A | B-25A | P-11 | | WRIGHT | SETTLES | SCHMIDT | McDONALD | CLAYTON | |
| | DATE SAMPLED | 3-24-87 | 3-24-87 | 7-14-87 | 3-25-87 | 3-25-87 | 3-25-87 | 3-25-87 | 3-25-87 | 3-25-87 | 3-25-87 | 3-25-87 | 3-26-87 | 3-26-87 | 3-26-87 | 3-26-87 | 3-26-87 | 7-14-87 |
| 1 | Aluminum | | | | | | | | | | | | | | | | | |
| 2 | Antimony | | | | | | | | | | | | | | | | | |
| 3 | Arsenic | 23 | | | 34 | 41 | | 48 | 45 | | 35 | | | | 11 | 26 | | |
| 4 | Barium | [184] | 141 | [92] | 440 | [123] | [27] | [194] | 201 | | [168] | | [73] | [89] | 292 | [117] | 300 | |
| 5 | Beryllium | | | | | | | | | | | | | | | | | |
| 6 | Boron | | | | | | | | | | | | | | | | | |
| 7 | Cadmium | | | | | | | | | | | | | | | | | |
| 8 | Chromium, trivalent | | | | | | | | | | | | | | | | | |
| 9 | Cobalt | | | | | | 120 | | | | | | | | | | | |
| 10 | Copper | | | | | | | | | | | | | [10] | 115 | | | |
| 11 | Iron | 36600 | 3930 | 2360 | 10800 | 20800 | 15500 | 26900 | 27500 | | 11800 | | 2990 | 4600 | 21600 | 10600 | 17400 | [87] |
| 12 | Lead | | | | | | | | | | | [91] | | 12 R | 18 R | | | |
| 13 | Manganese | 4300 | 2300 | 1520 | 2190 | 6840 | 11200 | 3530 | 3570 | | 2640 | | 1060 | 665 | 1660 | 257 | 1950 | |
| 14 | Mercury | | | | | | | | | | | | | | 0.2 | | | |
| 15 | Nickel | | | | | | [18] | | | | | | | | | | | |
| 16 | Selenium | | | | | | | | | | | | | | | | | |
| 17 | Silver | | | | | | | | | | | | | | | | | |
| 18 | Thallium | | | | | | | | | | | | | | | | | |
| 19 | Tin | | | | | | | | | | | | | | | | | |
| 20 | Vanadium | | | | | | [18] | | | | | | | | | | | |
| 21 | Zinc | 34 | 26 | 24 | 45 R | 24 R | 102 R | 41 R | 62 R | | 39 R | [10] | 4140 R | 2000 R | 377 R | 1350 R | | |
| 22 | Cyanide | | | | | | | | | | 14 | | | | | | | |

Ground Water Inorganics

SITE

SAMPLE NUMBER +
WELL NUMBER
DATE SAMPLED

1 Aluminum
2 Antimony
3 Arsenic
4 Barium
5 Beryllium
6 Boron
7 Cadmium
8 Chromium, trivalent
9 Cobalt
10 Copper
11 Iron
12 Lead
13 Manganese
14 Mercury
15 Nickel
16 Selenium
17 Silver
18 Thallium
19 Tin
20 Vanadium
21 Zinc
22 Cyanide

Surface Water Volatiles

| | SITE | SITE M | SITE M | SITE M | CS-B | CS-B | CS-B | CS-C | CS-C | CS-D | CS-D | | CS-A | CS-A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE NUMBER | DC-SW-01 + | DC-SW-02 | DC-SW-03 | DC-SW-04 | DC-SW-05 | DC-SW-06 * | DC-SW-07 | DC-SW-08 | DC-SW-09 | DC-SW-10 | DC-SW-11 + | DC-SW-12 | DC-SW-13 |
| | DATE | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-6-86 | 11-6-86 | 11-6-86 |
| 1 | Chloromethane | | | | | | | | | | | | | |
| 2 | Bromomethane | | | | | | | | | | | | | |
| 3 | Vinyl Chloride | | | | | | | | | | | | | |
| 4 | Chloroethane | | | | | | | | | | | | | |
| 5 | Methylene Chloride | 6 B | | 3 BJ | 3 BJ | 3 BJ | 3 BJ | 3 BJ | 6 B | 5 B | 7 B | 6 B | 4 BJ | 4 |
| 6 | Acetone | 12 B | | | 7 BJ | 9 BJ | 12 B | 11 B | 13 B | 13 B | 11 B | 11 B | 17 B | 20 B | 6 |
| 7 | Carbon Disulfide | | | | | | | | | | | | | |
| 8 | 1,1-Dichloroethene | | | | | | | | | | | | | |
| 9 | 1,1-Dichloroethane | | | | | | | | | | | | | 3 |
| 10 | trans-1,2-Dichloroethene | | | | | | | | | | | | | |
| 11 | Chloroform | 27 | | | | | | | | | | 25 | 8 | 7 |
| 12 | 1-2-Dichloroethane | | | | | | | | | | | | | |
| 13 | 2-Butanone (MEK) | | | | | | | | | | | | | |
| 14 | 1,1,1-Trichloroethane | | | | | | | | | | | | 33 | 41 |
| 15 | Carbon Tetrachloride | | | | | | | | | | | | | 31 |
| 16 | Vinyl Acetate | | | | | | | | | | | | | |
| 17 | Bromodichloromethane | | | | | | | | | | | | | |
| 18 | 1,2-Dichloropropane | | | | | | | | | | | | | |
| 19 | trans-1,3-Dichloropropene | | | | | | | | | | | | | |
| 20 | Trichloroethene | | | | | | | | | | | | 6 | 16 |
| 21 | Dibromochloromethane | | | | | | | | | | | | | |
| 22 | 1,1,2-Trichloroethane | | | | | | | | | | | | | |
| 23 | Benzene | | | | | | | | | | | | 1 J | |
| 24 | cis-1,3-Dichloropropene | | | | | | | | | | | | | |
| 25 | 2-Chloroethyl Vinyl Ether | | | | | | | | | | | | | |
| 26 | Bromoform | | | | | | | | | | | | | |
| 27 | 4-Methyl-2-pentanone | | | | | | | | | | | | 6 J | |
| 28 | 2-Hexanone | | | | | | | | | | | | | |
| 29 | Tetrachloroethene | | | | | | | | | | | | | |
| 30 | 1,1,2,2-Tetrachloroethane | | | | | | | | | | | | | |
| 31 | Toluene | | | | | | | | | | | | | |
| 32 | Chlorobenzene | | | | | | | | | | | | 2 J | |
| 33 | Ethylbenzene | | | | | | | | | | | | | |
| 34 | Styrene | | | | | | | | | | | | | |
| 35 | Total Xylenes | | | | | | | | | | | | 2 J | |

Surface Water Semivolatiles

| SITE | BLANK | SITE M | SITE M | CS-B | CS-B | CS-B | CS-C | CS-C | CS-D | CS-D | BLANK | CS-A | CS-A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-SW-01 + | DC-SW-02 | DC-SW-03 | DC-SW-04 | DC-SW-05 | DC-SW-06 * | DC-SW-07 | DC-SW-08 | DC-SW-09 | DC-SW-10 | DC-SW-11 + | DC-SW-12 + | DC-SW-13 |
| DATE | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-6-86 | 11-6-86 | 11-6-86 |
| 1 Phenol | | | | | | | | | | | | | |
| 2 bis(2-Chloroethyl)ether | | | | | | | | | | | | | |
| 3 2-Chlorophenol | | | | | | | | | | | | | |
| 4 1,3-Dichlorobenzene | | | | | | | | | | | | | |
| 5 1,4-Dichlorobenzene | | | | | | | | | | | | | |
| 6 Benzyl Alcohol | | | | | | | | | | | | | |
| 7 1,2-Dichlorobenzene | | | | | | | | | | | | | |
| 8 2-Methylphenol | | | | | | | | | | | | | |
| 9 bis(2-Chloroisopropyl) ether | | | | | | | | | | | | | |
| 10 4-Methylphenol | | | | | | | | | | | | | |
| 11 N-Nitroso-n-Dipropylamine | | | | | | | | | | | | | |
| 12 Hexachloroethane | | | | | | | | | | | | | |
| 13 Nitrobenzene | | | | | | | | | | | | | |
| 14 Isophorone | | | | | | | | | | | | | |
| 15 2-Nitrophenol | | | | | | | | | | | | | |
| 16 2,4-Dimethylphenol | | | | | | | | | | | | | |
| 17 Benzoic Acid | | | | | | | | | | | | | |
| 18 bis-(2-Chloroethoxy)methane | | | | | | | | | | | | | |
| 19 2,4-Dichlorophenol | | | | | | | | | | | | | |
| 20 1,2,4-Trichlorobenzene | | | | | | | | | | | | | |
| 21 Naphthalene | | | | | | | | | | | | | |
| 22 4-Chloroaniline | | | | | | | | | | | | 3 J | |
| 23 Hexachlorobutadiene | | | | | | | | | | | | | |
| 24 4-Chloro-3-methylphenol | | | | | | | | | | | | | |
| 25 2-Methylnaphthalene | | | | | | | | | | | | | |
| 26 Hexachlorocyclopentadiene | | | | | | | | | | | | | |
| 27 2,4,6-Trichlorophenol | | | | | | | | | | | | | |
| 28 2,4,5-Trichlorophenol | | | | | | | | | | | | | |
| 29 2-Chloronaphthalene | | | | | | | | | | | | | |
| 30 2-Nitroaniline | | | | 9 J | | | | | | | | | |

Surface Water Semivolatiles

| | SITE | BLANK | SITE M | SITE M | CS-B | CS-B | CS-B | CS-C | CS-C | CS-D | CS-D | BLANK | CS-A | CS-A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE NUMBER | DC-SW-01 + | DC-SW-02 | DC-SW-03 | DC-SW-04 | DC-SW-05 | DC-SW-06 * | DC-SW-07 | DC-SW-08 | DC-SW-09 | DC-SW-10 | DC-SW-11 + | DC-SW-12 | DC-SW-13 |
| | DATE | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-6-86 | 11-6-86 | 11-6-86 |
| 1 | Dimethyl Phthalate | | | | | | | | | | | | | |
| 2 | Acenaphtylene | | | | | | | | | | | | | |
| 3 | 3-Nitroaniline | | | | | | | | | | | | | |
| 4 | Acenaphthene | | | | | | | | | | | | | |
| 5 | 2,4-Dinitrophenol | | | | | | | | | | | | | |
| 6 | 4-Nitrophenol | | | | | | | | | | | | | |
| 7 | Dibenzofuran | | | | | | | | | | | | | |
| 8 | 2,4-Dinitrotoluene | | | | | | | | | | | | | |
| 9 | 2,6-Dinitrotoluene | | | | | | | | | | | | | |
| 10 | Diethylphthalate | | | | | | | 1 J | | | | | | |
| 11 | 4-Chlorophenyl-Phenylether | | | | | | | | | | | | | |
| 12 | Fluorene | | | | | | | | | | | | | |
| 13 | 4-Nitroaniline | | | | | | | | | | | | | |
| 14 | 4,6-Dinitro-2-methylphenol | | | | | | | | | | | | | |
| 15 | N-Nitrosodiphenylamine | | | | | | | | | | | | | |
| 16 | 4-Bromophenyl-phenylether | | | | | | | | | | | | | |
| 17 | Hexachlorobenzene | | | | | | | | | | | | | |
| 18 | Pentachlorophenol | | | | | | | | | | | | | |
| 19 | Phenanthrene | | | | | | | | | | | | 4 J | |
| 20 | Anthracene | | | | | | | | | | | | | |
| 21 | Di-n-butyl phthalate | 15 B | 26 B | 25 B | 18 B | 15 B | 16 B | 19 B | 19 B | 19 B | 20 B | 17 B | 5 BJ | 27 B |
| 22 | Fluoranthene | | | | | | | | | | | | | |
| 23 | Pyrene | | | | | | | | | | | | | |
| 24 | Butyl Benzyl phthalate | | | | | | | | | | | | 12 J | |
| 25 | 3,3'-Dichlorobenzidine | | | | | | | | | | | | | |
| 26 | Benzo(a)Anthracene | | | | | | | | | | | | | |
| 27 | bis(2-ethylhexyl) phthalate | | | | | | | | | | | | 7 J | 5 J |
| 28 | Chrysene | | | | | | | | | | | | | |
| 29 | Di-n-octyl phthalate | | 4 J | 2 J | | | | | | | 1 J | | 36 J | 1 J |
| 30 | Benzo(b)Fluoranthene | | | | | | | | | | | | | |
| 31 | Benzo(k)Fluoranthene | | | | | | | | | | | | | |
| 32 | Benzo(a)Pyrene | | | | | | | | | | | | | |
| 33 | Indeno(1,2,3-cd)Pyrene | | | | | | | | | | | | | |
| 34 | Benzo(g,h,i)Perylene | | | | | | | | | | | | | |
| 35 | Dibenz(a,h)Anthracene | | | | | | | | | | | | | |

Surface Water Pest/PCBs

| SITE | BLANK | SITE M | SITE M | CS-B | CS-B | CS-B | CS-C | CS-C | CS-D | CS-D | BLANK | CS-A | CS-A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-SW-01 + | DC-SW-02 | DC-SW-03 | DC-SW-04 | DC-SW-05 | DC-SW-06 * | DC-SW-07 | DC-SW-08 | DC-SW-09 | DC-SW-10 | DC-SW-11 + | DC-SW-12 | DC-SW-13 |
| DATE | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-6-86 | 11-6-86 | 11-6-86 |
| 1 Alpha-BHC | | | | | | | | | | | | | |
| 2 Beta-BHC | | | | | | | | | | | | | |
| 3 Delta-BHC | | | | | | | | | | | | | |
| 4 Gamma-BHC (Lindane) | | | | | | | | | | | | | |
| 5 Heptachlor | | | | | | | | | | | | | |
| 6 Aldrin | | | | | | | | | | | | | |
| 7 Heptachlor Epoxide | | | | | | | | | | | | | |
| 8 Edosulfan I | | | | | | | | | | | | | |
| 9 Dieldrin | | | | | | | | | | | | | |
| 10 4,4'-DDE | | | | | | | | | | | | | |
| 11 Endrin | | | | | | | | | | | | | |
| 12 Edosulfan II | | | | | | | | | | | | | |
| 13 4,4'-DDD | | | | | | | | | | | | | |
| 14 Endosulfan Sulfate | | | | | | | | | | | | | |
| 15 4,4'-DDT | | | | | | | | | | | | | |
| 16 Methoxychlor | | | | | | | | | | | | | |
| 17 Endrin Ketone | | | | | | | | | | | | | |
| 18 Chlordane | | | | | | | | | | | | | |
| 19 Toxaphene | | | | | | | | | | | | | |
| 20 AROCLOR-1016 | | | | | | | | | | | | | |
| 21 AROCLOR-1221 | | | | | | | | | | | | | |
| 22 AROCLOR-1232 | | | | | | | | | | | | | |
| 23 AROCLOR-1242 | | | | | | | | | | | | | |
| 24 AROCLOR-1248 | | | | | | | | | | | | | |
| 25 AROCLOR-1254 | | | | | | | | | | | | | |
| 26 AROCLOR-1260 | | | | 3.6 | 34 | 44 | | | | | | | |

Surface-Water Inorganic

| | SITE | BLANK | SITE M | SITE M | CS-B | CS-B | CS-B | CS-C | CS-C | CS-D | CS-D | BLANK | CS-A | CS-A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE NUMBER | DC-SW-01 + | DC-SW-02 | DC-SW-03 | DC-SW-04 | DC-SW-05 | DC-SW-06 * | DC-SW-07 | DC-SW-08 | DC-SW-09 | DC-SW-10 | DC-SW-11 + | DC-SW-12 | DC-SW-13 |
| | DATE | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-6-86 | 11-6-86 | 11-6-86 |
| 1 | Aluminum | | 464 | | 1090 | 204 | 9080 | | 767 | 5000 | 1190 | 323 | 354 | 294 |
| 2 | Antimony | | | | | | | | | | | | 115 | |
| 3 | Arsenic | | | | | | 31 | | | | | | | |
| 4 | Barium | | 200 | | | | 7130 | | | 274 | | | | |
| 5 | Beryllium | | | | | | | | | | | | | |
| 6 | Boron | | | | | | | | | | | | | |
| 7 | Cadmium | | | | | | 25 | | | 8.1 | | | 75 | 23 |
| 8 | Chromium, trivalent | | 14 | | | | 99 | | | 12 | | | 81 | 65 |
| 9 | Cobalt | | | | | | | | | | | | | |
| 10 | Copper | | 51 | 46 | 660 | 239 | 17900 | 226 | 84 | 619 | 57 | | 7030 | 2410 |
| 11 | Iron | 255 | 937 | 350 | 1510 | 495 | 24500 | 528 | 2790 | 7470 | 1570 | | 2040 | 724 |
| 12 | Lead | | 6.4 | | 77 | 17 | 1300 | 710 | 30 | 89 | 36 | | 3060 | 76 |
| 13 | Manganese | | 97 | 95 | 188 | 66 | 222 | 141 | 234 | 196 | 28 | | 68 | 252 |
| 14 | Mercury | | | | 8.6 | | | 1.9 | 0.2 | 0.26 | | | 0.59 | 0.2 |
| 15 | Nickel | | 46 | | | | 1500 | 83 | | 189 | | | 2600 | 667 |
| 16 | Selenium | | | | | | | | | | | | | |
| 17 | Silver | | | | | | | | | | | | 16 | |
| 18 | Thallium | | | | | | | | | | | | | |
| 19 | Tin | | | | | | 60 | | 40 | | | | 499 | |
| 20 | Vanadium | | | | | | | | | | | | | |
| 21 | Zinc | | 186 | 73 | 404 | 302 | 10300 | 537 | 247 | 1090 | 185 | | 1450 | 480 |
| 22 | Cyanide | | | | | | | | | | | | | |

Sediment Volatiles

| | SITE | CS-B | CS-B | SITE M | SITE M | SITE M | CS-B | CS-B | CS-B | CS-C | CS-C | CS-C | CS-C | CS-D | CS-D | CS-D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE NUMBER | DC-SD-13 * | DC-SD-14 | DC-SD-15 | DC-SD-16 | DC-SD-17 | DC-SD-18 * | DC-SD-19 | DC-SD-20 | DC-SD-21 | DC-SD-22 | DC-SD-23 | DC-SD-24 | DC-SD-25 | DC-SD-26 | DC-SD-27 |
| | SAMPLE DEPTH | 0-6" | 2'-3' | 0-6" | 0-6" | 0-6" | 0-6" | 0-6" | 1.5'-2' | 0-6" | 2'-2.5' | 0-6" | 2'-2.5' | 0-6" | 1.5'-2' | 0-6" |
| | DATE SAMPLED | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 |
| 1 | Chloroethane | | | | | | | | | | | | | | | |
| 2 | Bromoethane | | | | | | | | | | | | | | | |
| 3 | Vinyl Chloride | | | | | | | | | | | | | | | |
| 4 | Chloroethane | | | | | | | | | | | | | | | |
| 5 | Methylene Chloride | 11000 B | 2200 B | 7800 B | 10000 B | 8400 B | 12000 B | 13000 B | 14000 B | 19000 B | 18000 B | 27000 B | 17000 B | 23000 B | 19000 B | 43000 B |
| 6 | Acetone | 15000 B | 820 | 4900 B | 5100 B | 5600 B | 4100 JB | 10000 B | 6100 B | 6400 B | 9900 B | 15000 B | 7300 B | 18000 B | 9800 B | 36000 B |
| 7 | Carbon Disulfide | | | | | | | | | | | | | | | |
| 8 | 1,1-Dichloroethene | | | | | | | | | | | | | | | |
| 9 | 1,1-Dichloroethane | | | | | | | | | | | | | | | |
| 10 | trans-1,2-Dichloroethene | | | | | | | | | | | | | | | |
| 11 | Chloroform | | | | | | | | | | | | | | | |
| 12 | 1-2-Dichloroethane | | | | | | | | | | | | | | | |
| 13 | 2-Butanone (MEK) | 21000 B | 510 | 11000 | 14000 | 13000 | 14000 | 14000 | 10000 B | 11000 B | 14000 B | 22000 B | 12000 B | 21000 B | 16000 B | 35000 B |
| 14 | 1,1,1-Trichloroethane | | | | | | | | | | | | | | | |
| 15 | Carbon Tetrachloride | | | | | | | | | | | | | | | |
| 16 | Vinyl Acetate | | | | | | | | | | | | | | | |
| 17 | Bromodichloromethane | | | | | | | | | | | | | | | |
| 18 | 1,2-Dichloropropane | | | | | | | | | | | | | | | |
| 19 | trans-1,3-Dichloropropene | | | | | | | | | | | | | | | |
| 20 | Trichloroethene | | | | | | | | | | | | | | | |
| 21 | Dibromochloromethane | | | | | | | | | | | | | | | |
| 22 | 1,1,2-Trichloroethane | | | | | | | | | | | | | | | |
| 23 | Benzene | | 87 J | | | | | | | | | | | | | |
| 24 | cis-1,3-Dichloropropene | | | | | | | | | | | | | | | |
| 25 | 2-Chloroethyl Vinyl Ether | | | | | | | | | | | | | | | |
| 26 | Bromoform | | | | | | | | | | | | | | | |
| 27 | 4-Methyl-2-pentanone | | 220 J | | | | | | | | | | | | | |
| 28 | 2-Hexanone | | | | | | | 52000 B | | | 1200 J | | | | | |
| 29 | Tetrachloroethene | | | | | | | | | | | | | | | |
| 30 | 1,1,2,2-Tetrachloroethane | | | | | | | | | | | | | | | |
| 31 | Toluene | | 810 | | | | | | | | | | | | | |
| 32 | Chlorobenzene | | 5200 | | | | | | | | | | | | | |
| 33 | Ethylbenzene | | 3600 | | | | | | | | | | | | | |
| 34 | Styrene | | | | | | | | | | | | | | | |
| 35 | Total Xylenes | | 990 | | | | | | | | | | | | | |

Sediment Volatiles

| | SITE | CS-D | BLANK | BLANK | CS-A | CS-A | CS-A | CS-A | CS-A |
|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE NUMBER | DC-SD-28 | DC-SD-29 + | DC-SD-31 + | DC-SD-32 | DC-SD-33 ‡ | DC-SD-34 ‡ | DC-SD-35 | DC-SD-36 |
| | SAMPLE DEPTH | 1.5'-2' | | | 1.5'-2' | 0-6" | 0-6" | 0-6" | 1.5'-2' |
| | DATE SAMPLED | 11-5-86 | 11-5-86 | 11-6-86 | 11-6-86 | 11-6-86 | 11-6-86 | 11-6-86 | 11-6-86 |
| 1 | Chloroethane | | | | | | | | |
| 2 | Bromoethane | | | | | | | | |
| 3 | Vinyl Chloride | | | | | | | | |
| 4 | Chloroethane | | | | | | | | |
| 5 | Methylene Chloride | 20000 B | 15000 B | 14000 B | 14000 B | 6300 B | 6600 B | 8800 B | 7200 B |
| 6 | Acetone | 7400 B | 6200 B | 4700 B | 11000 B | 12000 B | 5300 B | 23000 B | 6800 B |
| 7 | Carbon Disulfide | | | | | | | | |
| 8 | 1,1-Dichloroethene | | | | | | | | |
| 9 | 1,1-Dichloroethane | | | | | | | | |
| 10 | trans-1,2-Dichloroethene | | | | | | | | |
| 11 | Chloroform | | | | | | | | |
| 12 | 1-2-Dichloroethane | | | | | | | | |
| 13 | 2-Butanone (MEK) | 15000 B | 11000 B | 5400 B | 12000 B | 11000 B | 9200 B | | 12000 B |
| 14 | 1,1,1-Trichloroethane | | | | | | | | |
| 15 | Carbon Tetrachloride | | | | | | | | |
| 16 | Vinyl Acetate | | | | | | | | |
| 17 | Bromodichloromethane | | | | | | | | |
| 18 | 1,2-Dichloropropane | | | | | | | | |
| 19 | trans-1,3-Dichloropropene | | | | | | | | |
| 20 | Trichloroethene | | | | | | | | |
| 21 | Dibromochloromethane | | | | | | | | |
| 22 | 1,1,2-Trichloroethane | | | | | | | | |
| 23 | Benzene | | | | | | | | |
| 24 | cis-1,3-Dichloropropene | | | | | | | | |
| 25 | 2-Chloroethyl Vinyl Ether | | | | | | | | |
| 26 | Bromoform | | | | | | | | |
| 27 | 4-Methyl-2-pentanone | | | | | | | | |
| 28 | 2-Hexanone | | | | | | 930 JB | | |
| 29 | Tetrachloroethene | | | | | | | | |
| 30 | 1,1,2,2-Tetrachloroethane | | | | | | | | |
| 31 | Toluene | | | | | | | | |
| 32 | Chlorobenzene | | | | | | | | 480 J |
| 33 | Ethylbenzene | | | | | | | | |
| 34 | Styrene | | | | | | | | |
| 35 | Total Xylenes | | | | | | | | |

Sediment Semivolatiles

| SITE | CS-B | CS-B | SITE M | SITE M | SITE M | CS-B | CS-B | CS-B | CS-C | CS-C | CS-C | CS-C | CS-D | CS-D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-SD-13 * | DC-SD-14 | DC-SD-15 | DC-SD-16 | DC-SD-17 | DC-SD-18 * | DC-SD-19 | DC-SD-20 | DC-SD-21 | DC-SD-22 | DC-SD-23 | DC-SD-24 | DC-SD-25 | DC-SD-26 |
| SAMPLE DEPTH | 0-6" | 2'-3' | 0-6" | 0-6" | 0-6" | 0-6" | 0-6" | 1.5'-2' | 0-6" | 2'-2.5' | 0-6" | 2'-2.5' | 0-6" | 1.5'-2' |
| DATE SAMPLED | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 |
| 1 Phenol | | | | | | | | | | | 580 J | 81 J | | |
| 2 bis(2-Chloroethyl)ether | | | | | | | | | | | | | | |
| 3 2-Chlorophenol | | | | | | | | | | | | | | |
| 4 1,3-Dichlorobenzene | | | | | | | | | | 110 J | | | | |
| 5 1,4-Dichlorobenzene | | 220000 | | | | | 130 J | | | 690 J | | | | |
| 6 Benzyl Alcohol | | | | | | | | | | | | | | |
| 7 1,2-Dichlorobenzene | | 17000 J | | | | | | | | | | | | |
| 8 2-Methylphenol | | | | | | | | | | | | | | |
| 9 bis(2-Chloroisopropyl) ether | | | | | | | | | | | | | | |
| 10 4-Methylphenol | | | | | | | | | | | | | | |
| 11 N-Nitroso-n-Dipropylamine | | | | | | | | | | | | | | |
| 12 Hexachloroethane | | | | | | | | | | | | | | |
| 13 Nitrobenzene | | | | | | | | | | | | | | |
| 14 Isophorone | | | | | | | | | | | | | | |
| 15 2-Nitrophenol | | | | | | | | | | | | | | |
| 16 2,4-Dimethylphenol | | | | | | | | | | | | | | |
| 17 Benzoic Acid | | | | | | | | | | | | | | |
| 18 bis-(2-Chloroethoxy)methane | | | | | | | | | | | | | | |
| 19 2,4-Dichlorophenol | | | | | | | | | | | | | | |
| 20 1,2,4-Trichlorobenzene | | 5400 J | | | | | 390 J | 76 J | | 260 J | 130 J | 64 J | | |
| 21 Naphthalene | 400 J | 9500 J | | | | 190 J | 120 J | | | 330 J | 100 J | | | |
| 22 4-Chloroaniline | | | | | | | | | | | | | | |
| 23 Hexachlorobutadiene | | | | | | | | | | | | | | |
| 24 4-Chloro-3-methylphenol | | | | | | | | | | | | | | |
| 25 2-Methylnaphthalene | | 8400 J | | | | | | | | 100 J | | | | |
| 26 Hexachlorocyclopentadiene | | | | | | | | | | | | | | |
| 27 2,4,6-Trichlorophenol | | | | | | | | | | | | | | |
| 28 2,4,5-Trichlorophenol | | | | | | | | | | | | | | |
| 29 2-Chloronaphthalene | | | | | | | | | | | | | | |
| 30 2-Nitroaniline | | | | | | | | | | | | | | |

Sediment Semivolatiles

| | SITE | CS-D | CS-D | BLANK | BLANK | CS-A | CS-A | CS-A | CS-A | CS-A |
|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE NUMBER | DC-SD-27 | DC-SD-28 | DC-SD-29 + | DC-SD-31 + | DC-SD-32 | DC-SD-33 * | DC-SD-34 * | DC-SD-35 | DC-SD-36 |
| | SAMPLE DEPTH | 0-6" | 1.5'-2' | | | 1.5'-2' | 0-6" | 0-6" | 0-6" | 1.5'-2' |
| | DATE SAMPLED | 11-5-86 | 11-5-86 | 11-5-86 | 11-6-86 | 11-6-86 | 11-6-86 | 11-6-86 | 11-6-86 | 11-6-86 |
| 1 | Phenol | | | | | | | | | |
| 2 | bis(2-Chloroethyl)ether | | | | | | | | | |
| 3 | 2-Chlorophenol | | | | | | | | | |
| 4 | 1,3-Dichlorobenzene | | | | | 160 J | | | | 550 J |
| 5 | 1,4-Dichlorobenzene | | | | | 1000 | | 410 J | 130 J | 2900 |
| 6 | Benzyl Alcohol | | | | | | | | | |
| 7 | 1,2-Dichlorobenzene | | | | | 480 | 270 J | | | |
| 8 | 2-Methylphenol | | | | | | | | | |
| 9 | bis(2-Chloroisopropyl) ether | | | | | | | | | |
| 10 | 4-Methylphenol | | | | | | | | | |
| 11 | N-Nitroso-n-Dipropylamine | | | | | | | | | |
| 12 | Hexachloroethane | | | | | | | | | |
| 13 | Nitrobenzene | | | | | | | | | |
| 14 | Isophorone | | | | | | | | | |
| 15 | 2-Nitrophenol | | | | | | | | | |
| 16 | 2,4-Dimethylphenol | | | | | | | | | |
| 17 | Benzoic Acid | | | | | | | | | |
| 18 | bis-(2-Chloroethoxy)methane | | | | | | | | | |
| 19 | 2,4-Dichlorophenol | | | | | | | | | |
| 20 | 1,2,4-Trichlorobenzene | | | | | 580 | | | 90 J | 1500 J |
| 21 | Naphthalene | | | | | | | | 130 J | |
| 22 | 4-Chloroaniline | | | | | | | | 1000 J | |
| 23 | Hexachlorobutadiene | | | | | | | | | |
| 24 | 4-Chloro-3-methylphenol | | | | | | | | | |
| 25 | 2-Methylnaphthalene | | | | | | | 450 J | | |
| 26 | Hexachlorocyclopentadiene | | | | | | | | | |
| 27 | 2,4,6-Trichlorophenol | | | | | | | | | |
| 28 | 2,4,5-Trichlorophenol | | | | | | | | | |
| 29 | 2-Chloronaphthalene | | | | | | | | | |
| 30 | 2-Nitroaniline | | | | | | | | | |

Sediment Semivolatiles

| | SITE | CS-A | CS-B | SITE M | SITE M | SITE M | CS-B | CS-B | CS-A | CS-C | CS-C | CS-C | CS-C | CS-D | CS-D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE NUMBER | DC-SD-13 * | DC-SD-14 | DC-SD-15 | DC-SD-16 | DC-SD-17 | DC-SD-18 * | DC-SD-19 | DC-SD-20 | DC-SD-21 | DC-SD-22 | DC-SD-23 | DC-SD-24 | DC-SD-25 | DC-SD-26 |
| | SAMPLE DEPTH | 0-6" | 2'-3' | 0-6" | 0-6" | 0-6" | 0-6" | 0-6" | 1.5'-2' | 0-6" | 2'-2.5' | 0-6" | 2'-2.5' | 0-6" | 1.5'-2' |
| | DATE SAMPLED | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 |
| 1 | Diaethyl Phthalate | | | | | | | | | | | | | | |
| 2 | Acenaphtylene | | | | | | | | | | | | | | |
| 3 | 3-Nitroaniline | | | | | | | | | | | | | | |
| 4 | Acenaphthene | | | | | | | | | | 130 J | | | | |
| 5 | 2,4-Dinitrophenol | | | | | | | | | | | | | | |
| 6 | 4-Nitrophenol | | 2600 J | | | | | | | | | | | | |
| 7 | Dibenzofuran | | | | | | | | | | | | | | |
| 8 | 2,4-Dinitrotoluene | | | | | | | | | | | | | | |
| 9 | 2,6-Dinitrotoluene | | | | | | | | | | | | | | |
| 10 | Diethylphthalate | | | | | | | | | | | | | | |
| 11 | 4-Chlorophenyl-Phenylether | | | | | | | | | | | | | | |
| 12 | Fluorene | | 3900 J | | | | | | | | 370 J | | | | |
| 13 | 4-Nitroaniline | | | | | | | | | | | | | | |
| 14 | 4,6-Dinitro-2-methylphenol | | | | | | | | | | | | | | |
| 15 | N-Nitrosodiphenylamine | | | | | | | | | | | | | | |
| 16 | 4-Bromophenyl-phenylether | | | | | | | | | | | | | | |
| 17 | Hexachlorobenzene | | | | | | | 1900 | 210 J | | | | | | |
| 18 | Pentachlorophenol | | | | | | | 940 J | 370 J | | | | | | |
| 19 | Phenanthrene | | 15000 J | | | | | | | 280 J | 810 J | | 220 J | | |
| 20 | Anthracene | | | | | | | | | | 500 J | | | | |
| 21 | Di-n-butyl phthalate | | | 580 B | 570 BJ | 560 J | 300 J | | 280 J | | | | 120 J | 130 J | 79 J |
| 22 | Fluoranthene | | 11000 J | | | | | | | | 4600 | | 370 J | | 130 J |
| 23 | Pyrene | | 13000 J | | | | 1400 J | | 91 J | 440 J | 4500 | | 290 J | | 120 J |
| 24 | Butyl Benzyl phthalate | | | | | | 830 J | | | | | | | | |
| 25 | 3,3'-Dichlorobenzidine | | | | | | | | | | | | | | |
| 26 | Benzo(a)Anthracene | | | | | | 430 J | | | 380 J | 3300 | 650 J | 230 J | | |
| 27 | bis(2-ethylhexyl) phthalate | 9900 J | 9500 J | | 540 J | 150 J | 5300 | | 95 J | 740 J | | 660 J | | | 72 J |
| 28 | Chrysene | | | | | | 1200 J | | 180 J | 550 J | 4400 | 1000 | 300 J | | 83 J |
| 29 | Di-n-octyl phthalate | | 2600 J | 120 J | 270 J | | 940 J | | 96 J | | 190 J | | | | |
| 30 | Benzo(b)Fluoranthene | | 3400 J | | | | | 2400 | | | 7500 | 2000 | 1000 | | 200 J |
| 31 | Benzo(k)Fluoranthene | 720 J | | | | | 1500 J | | 410 J | 920 | 660 J | | | | |
| 32 | Benzo(a)Pyrene | 1100 J | 1800 J | | | | 490 J | 310 J | 95 J | 480 J | 4500 | 940 | 350 J | | 86 J |
| 33 | Indeno(1,2,3-cd)Pyrene | | | | | | 850 J | 1400 J | 200 J | 590 J | 4300 | 1700 | 530 J | | 100 J |
| 34 | Benzo(g,h,i)Perylene | | | | | | | 390 J | | | 1500 J | 640 J | 110 J | | |
| 35 | Dibenz(a,h)Anthracene | | | | | | 1400 J | 1800 | 210 J | 550 J | 4000 | 1700 | 470 J | | 91 J |

Sediment Semivolatiles

| | SITE | CS-D | CS-D | BLANK | BLANK | CS-A | CS-A | CS-A | CS-A | CS-A |
|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE NUMBER | DC-SD-27 | DC-SD-28 | DC-SD-29 + | DC-SD-31 + | DC-SD-32 | DC-SD-33 * | DC-SD-34 * | DC-SD-35 | DC-SD-36 |
| | SAMPLE DEPTH | 0-6" | 1.5'-2' | | | 1.5'-2' | 0-6" | 0-6" | 0-6" | 1.5'-2' |
| | DATE SAMPLED | 11-5-86 | 11-5-86 | 11-5-86 | 11-6-86 | 11-6-86 | 11-6-86 | 11-6-86 | 11-6-86 | 11-6-86 |
| 1 | Dimethyl Phthalate | | | | | | | | | |
| 2 | Acenaphtylene | | | | | | | | | |
| 3 | 3-Nitroaniline | | | | | | | | | |
| 4 | Acenaphthene | | | | | | | | | 170 J |
| 5 | 2,4-Dinitrophenol | | | | | | | | | |
| 6 | 4-Nitrophenol | | | | | | | | | |
| 7 | Dibenzofuran | | | | | | | | | |
| 8 | 2,4-Dinitrotoluene | | | | | | | | | |
| 9 | 2,6-Dinitrotoluene | | | | | | | | | |
| 10 | Diethylphthalate | | | | | | | | | |
| 11 | 4-Chlorophenyl-Phenylether | | | | | | | | | |
| 12 | Fluorene | | | | | | | | | |
| 13 | 4-Nitroaniline | | | | | | | | | |
| 14 | 4,6-Dinitro-2-methylphenol | | | | | | | | | |
| 15 | N-Nitrosodiphenylamine | | | | | 220 J | | | | |
| 16 | 4-Bromophenyl-phenylether | | | | | | | | | |
| 17 | Hexachlorobenzene | | | | | 110 J | | | 1100 J | |
| 18 | Pentachlorophenol | | | | | | | | 800 J | |
| 19 | Phenanthrene | | | | | 190 J | | | | |
| 20 | Anthracene | | | | | | | | | |
| 21 | Di-n-butyl phthalate | | | | | | | | | 900 J |
| 22 | Fluoranthene | | | | | | | | 600 J | |
| 23 | Pyrene | | | | | 110 J | | | 1000 J | 1400 J |
| 24 | Butyl Benzyl phthalate | | | | | 520 | | 2400 J | | |
| 25 | 3,3'-Dichlorobenzidine | | | | | | | | | |
| 26 | Benzo(a)Anthracene | | | | | | | | | |
| 27 | bis(2-ethylhexyl) phthalate | | | | | 280 J | 2200 J | 2900 | 130 J | |
| 28 | Chrysene | | | | | 110 J | | 710 J | 1000 J | 1700 J |
| 29 | Di-n-octyl phthalate | 170 J | | | | 300 J | 420 J | 2900 | 8100 | 11000 |
| 30 | Benzo(b)Fluoranthene | 500 J | | | | | | 330 J | 760 J | 1000 J |
| 31 | Benzo(k)Fluoranthene | | | | | | | | | |
| 32 | Benzo(a)Pyrene | 240 J | | | | | | | 430 J | 540 J |
| 33 | Indeno(1,2,3-cd)Pyrene | 310 J | | | | | | | 570 J | |
| 34 | Benzo(g,h,i)Perylene | | | | | | | | | |
| 35 | Dibenz(a,h)Anthracene | 360 J | | | | | | | 960 J | |

Sediment Pest/PCBs

| SITE | CS-D | CS-D | SITE M | SITE M | SITE M | CS-D | CS-D | CS-D | CS-C | CS-C | CS-C | CS-C | CS-D | CS-D | CS-D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-SD-13 & | DC-SD-14 | DC-SD-15 | DC-SD-16 | DC-SD-17 | DC-SD-18 & | DC-SD-19 | DC-SD-20 | DC-SD-21 | DC-SD-22 | DC-SD-23 | DC-SD-24 | DC-SD-25 | DC-SD-26 | DC-SD-27 |
| SAMPLE DEPTH | 0-6" | 2'-3' | 0-6" | 0-6" | 0-6" | 0-6" | 0-6" | 1.5'-2' | 0-6" | 2'-2.5' | 0-6" | 2'-2.5' | 0-6" | 1.5'-2' | 0-6" |
| DATE SAMPLED | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 |
| 1 Alpha-BHC | | | | | | | | | | | | | | | |
| 2 Beta-BHC | | | | | | | | | | | | | | | |
| 3 Delta-BHC | | | | | | | | | | | | | | | |
| 4 Gamma-BHC (Lindane) | | | | | | | | | | | | | | | |
| 5 Heptachlor | | | | | | | | | | | | | | | |
| 6 Aldrin | | | | | | | | | | | | | | | |
| 7 Heptachlor Epoxide | | | | | | | | | | | | | | | |
| 8 Edosulfan I | | | | | | | | | | | | | | | |
| 9 Dieldrin | | | | | | | | | | | | | | | |
| 10 4,4'-DDE | | | | | | | | | | | | | | | |
| 11 Endrin | | | | | | | | | | | | | 580 | | |
| 12 Edosulfan II | | | | | | | | | | | | | | | |
| 13 4,4'-DDD | | | | | | | | | | | | | | | |
| 14 Endosulfan Sulfate | | | | | | | | | | | | | | | |
| 15 4,4'-DDT | | | | | | | | | | | | | | | |
| 16 Methoxychlor | | | | | | | | | | | | | | | |
| 17 Endrin Ketone | | | | | | | | | | | | | | | |
| 18 Chlordane | | | | | | | | | | | | | | | |
| 19 Toxaphene | | | | | | | | | | | | | | | |
| 20 AROCLOR-1016 | | | | | | | | | | | | | | | |
| 21 AROCLOR-1221 | | | | | | | | | | | | | | | |
| 22 AROCLOR-1232 | | | | | | | | | | | | | | | |
| 23 AROCLOR-1242 | | | | 20000 | | | | | | | | | | | |
| 24 AROCLOR-1248 | | 480000 C | 660 | 8830 | 5200 | | | | | 8700 | | | | | |
| 25 AROCLOR-1254 | | | 670 | | 4200 | | 141000 C | 16000 C | | 9300 | 11000 | 1600 J | | | 7500 |
| 26 AROCLOR-1260 | 10300 J | 66000 C | 430 J | | 2700 J | 7700 | 54000 JC | 5600 JC | | 5000 J | 7800 J | | | | 4500 |

Sediment Pest/PCBs

| | SITE | CS-D | BLANK | BLANK | CS-A | CS-A | CS-A | CS-A | CS-A |
|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE NUMBER | DC-SD-28 | DC-SD-29 + | DC-SD-31 + | DC-SD-32 | DC-SD-33 * | DC-SD-34 * | DC-SD-35 | DC-SD-36 |
| | SAMPLE DEPTH | 1.5'-2' | | | 1.5'-2' | 0-6" | 0-6" | 0-6" | 1.5'-2' |
| | DATE SAMPLED | 11-5-86 | 11-5-86 | 11-6-86 | 11-6-86 | 11-6-86 | 11-6-86 | 11-6-86 | 11-6-86 |
| 1 | Alpha-BHC | | | | | | | | |
| 2 | Beta-BHC | | | | | | | | |
| 3 | Delta-BHC | | | | | | | | |
| 4 | Gamma-BHC (Lindane) | | | | | | | | |
| 5 | Heptachlor | | | | | | | | |
| 6 | Aldrin | | | | | | | | |
| 7 | Heptachlor Epoxide | | | | | | | | |
| 8 | Edosulfan I | | | | | | | | |
| 9 | Dieldrin | | | | | | | | |
| 10 | 4,4'-DDE | | | | | | | | |
| 11 | Endrin | | | | | | | | |
| 12 | Edosulfan II | | | | | | | | |
| 13 | 4,4'-DDD | | | | | | | | |
| 14 | Endosulfan Sulfate | | | | | | | | |
| 15 | 4,4'-DDT | | | | | | | | |
| 16 | Methoxychlor | | | | | | | | |
| 17 | Endrin Ketone | | | | | | | | |
| 18 | Chlordane | | | | | | | | |
| 19 | Toxaphene | | | | | | | | |
| 20 | AROCLOR-1016 | | | | | | | | |
| 21 | AROCLOR-1221 | | | | | | | | |
| 22 | AROCLOR-1232 | | | | | | | | |
| 23 | AROCLOR-1242 | | | | | | | | |
| 24 | AROCLOR-1248 | | | | 21000 C | 7900 | 11000 | | |
| 25 | AROCLOR-1254 | 1900 | | | 13000 JC | 6500 | 10600 | 71000 C | 38000 |
| 26 | AROCLOR-1260 | | | | | 2000 J | 2200 J | 24000 C | 13000 J |

Sediment Inorganic

| | SITE | CS-B | CS-B | SITE M | SITE M | SITE M | CS-B | CS-B | CS-B | CS-C | CS-C | CS-C | CS-C | CS-D | CS-D | CS-D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE NUMBER | DC-SD-13 * | DC-SD-14 | DC-SD-15 | DC-SD-16 | DC-SD-17 | DC-SD-18 * | DC-SD-19 | DC-SD-20 | DC-SD-21 | DC-SD-22 | DC-SD-23 | DC-SD-24 | DC-SD-25 | DC-SD-26 | DC-SD-27 |
| | SAMPLE DEPTH | 0-6" | 2'-3' | 0-6" | 0-6" | 0-6" | 0-6" | 0-6" | 1.5'-2' | 0-6" | 2'-2.5' | 0-6" | 2'-2.5' | 0-6" | 1.5'-2' | 0-6" |
| | DATE SAMPLED | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 | 11-5-86 |
| 1 | Aluminum | 4900 | 6380 | 6560 | 2430 | 7510 | 5380 | 9750 | 12900 | 12600 | 7530 | 8450 | 12600 | 11250 | 12500 | 6400 |
| 2 | Antimony | | | | | | | | | | | | | | | |
| 3 | Arsenic | 14 R | 20 R | 3.6 R | 12 R | 16 R | 16 R | 21 | 13 R | 5.1 R | 9 R | 33 R | 30 R | 3.2 R | 7.8 * | 4.7 R |
| 4 | Barium | 410 | 1110 | 156 | 131 | 196 | 467 | 17300 | 3120 | 376 | 570 | 1700 | 1010 | 239 | 622 | 214 |
| 5 | Beryllium | | | | | | | | | | | | | | | |
| 6 | Boron | | | | | | | | | | | | | | | |
| 7 | Cadmium | 22 | 36 | 1.5 | 11 | 8 | 24 | 30 | 8.2 | 17 | 34 | 27 | 42 | 12 | 42 | 23 |
| 8 | Chromium, trivalent | 62 | 153 | 15 | 37 | 53 | 79 | 118 | 113 | 41 | 60 | 54 | 68 | 33 | 48 | 34 |
| 9 | Cobalt | 6.6 | 9.2 | 7.7 | 7.2 | 5 | 6 | 11 | 6.9 | 7.5 | 10 | 6.6 | 7.2 | 5 | 12 | |
| 10 | Copper | 8740 * | 6700 * | 167 * | 1270 * | 1780 * | 8640 * | 15300 * | 2610 * | 580 * | 5910 * | 6540 * | 2440 * | 379 * | 1630 * | 1320 * |
| 11 | Iron | 16400 | 19500 | 11100 | 26000 | 14400 | 16300 | 58200 | 21300 | 18400 | 18000 | 35800 | 50900 | 22800 | 46200 | 31300 |
| 12 | Lead | 853 | 931 | 26 | 65 | 71 | 983 | 1460 | 330 | 467 | 593 | 975 | 661 | 146 | 480 | 309 |
| 13 | Manganese | 197 | 153 | 100 | 97 | 139 | 218 | 82 | 70 | 177 | 98 | 161 | 151 | 190 | 273 | 178 |
| 14 | Mercury | 0.73 | 1.3 | 0.13 | 0.56 | 0 | 0.9 | 1.68 | 0.89 | 0.71 | 0.95 | 1.64 | 2.81 | 1 | 0.89 | 0.34 |
| 15 | Nickel | 56 R* | 502 R* | 356 R* | 258 R* | 309 R* | 82 | 1520 R* | 867 R* | 116 R* | 838 R* | 1290 R* | 748 R* | 174 R* | 665 R* | 537 R* |
| 16 | Selenium | 3.3 | 4.1 | | | | 4 | 2 | | | | | 2.5 | | | |
| 17 | Silver | 10 | 11 | | | | 14 | 15 | | | | | | | | |
| 18 | Thallium | | | | | | | 4 | | | | | | | | |
| 19 | Tin | 32 | 28 | | 23 | | | 16 | | | | | | | | |
| 20 | Vanadium | 23 | 27 | 19 | | 19 | 24 | 48 | 25 | 32 | 22 | 27 | 36 | 37 | 32 | |
| 21 | Zinc | 3310 | 6650 | 868 | 872 | 1010 | 3410 | 11900 | 6610 | 1370 | 15600 | 6880 | 6430 | 1010 | 6590 | 2380 |
| 22 | Cyanide | | 3.8 | | | | | | | | | | | | | |

Sediment Inorganic

| | SITE | CS-B | BLANK | BLANK | CS-A | CS-A | CS-A | CS-A | CS-A |
|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE NUMBER | DC-SD-28 | DC-SD-29 + | DC-SD-31 + | DC-SD-32 | DC-SD-33 ‡ | DC-SD-34 ‡ | DC-SD-35 | DC-SD-36 |
| | SAMPLE DEPTH | 1.5'-2' | | | 1.5'-2' | 0-6" | 0-6" | 0-6" | 1.5'-2' |
| | DATE SAMPLED | 11-5-86 | 11-5-86 | 11-6-86 | 11-6-86 | 11-6-86 | 11-6-86 | 11-6-86 | 11-6-86 |
| 1 | Aluminum | 5870 | 11800 | 10500 | 8570 | 6720 | 8310 | 7210 | 9180 |
| 2 | Antimony | | | | | | | | |
| 3 | Arsenic | 5.1 R | 5.6 R | 5.2 R | 18 R | 30 R | 76 R | 21 R | 12 R |
| 4 | Barium | 199 | 362 | 277 | 430 | 287 | 287 | 732 | 328 |
| 5 | Beryllium | | | | | | | | |
| 6 | Boron | | | | | | | | |
| 7 | Cadmium | 5.6 | 2.5 | 2.1 | 18 | 25 | 22 | 31 | 17 |
| 8 | Chromium, trivalent | 13 | 15 | 13 | 34 | 102 | 121 | 206 | 75 |
| 9 | Cobalt | 6.4 | 5.8 | 5.4 | 8.9 | 3.2 | | 27 | 11 |
| 10 | Copper | 247 ‡ | 35 ‡ | 31 ‡ | 2620 ‡ | 4630 ‡ | 3130 ‡ | 11400 ‡ | 10300 ‡ |
| 11 | Iron | 15000 | 16600 | 15700 | 25000 | 37400 | 36100 | 36600 | 21900 |
| 12 | Lead | 44 | 47 | 30 | 225 | 1900 | 2030 | 1600 | 910 |
| 13 | Manganese | 191 | 412 | 384 | 123 | 69 | 66 | 296 | 153 |
| 14 | Mercury | 0.18 | | | 2.81 | 4.06 | 5.62 | 3 | 1.18 |
| 15 | Nickel | 236 R‡ | 18 R‡ | 19 R‡ | 765 R‡ | 310 R‡ | 255 R‡ | 559 R‡ | 307 R‡ |
| 16 | Selenium | | | | | 3.3 | | 3 | |
| 17 | Silver | | | | 6 | 26 | 23 | 33 | 13 |
| 18 | Thallium | | | | | | | | |
| 19 | Tin | | | | 14 | 76 | 412 | 57 | |
| 20 | Vanadium | 17 | 27 | 24 | 24 | 20 | 23 | 25 | 22 |
| 21 | Zinc | 917 | 197 | 172 | 1590 | 1510 | 1230 | 3420 | 2740 |
| 22 | Cyanide | | | | | | | | |

Surface Soil Volatiles

| SITE | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-SS-01 | DC-SS-02 | DC-SS-03 | DC-SS-04 | DC-SS-05 | DC-SS-06 | DC-SS-07 | DC-SS-08 | DC-SS-09 | DC-SS-10 | DC-SS-11 | DC-SS-12 | DC-SS-13 | DC-SS-14 | DC-SS-15 |
| LOCATION/GRID | C-1 | G-1 | D-2 | E-2 | H-2 | H-2 | I-2 | I-2 | A-3 | B-3 | C-3 | D-3 | E-3 | F-3 | G-3 |
| DATE SAMPLED | 11-10-86 | 11-10-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 |
| 1 Chloromethane | | | | | | | | | | | | | | | |
| 2 Bromomethane | | | | | | | | | | | | | | | |
| 3 Vinyl Chloride | | | | | | | | | | | | | | | |
| 4 Chloroethane | | | | | | | | | | | | | | | |
| 5 Methylene Chloride | 34 B | 32 B | 33 B | 35 B | 42 B | 63 B | 61 B | 27 B | 51 B | 59 B | 59 B | 105 B | 43 B | 95 B | 26 B |
| 6 Acetone | 28 BJ | 23 BJ | 25 BJ | | 48 B | 41 B | 25 JB | | 55 B | | 37 B | 27 BJ | 32 B | | 18 B |
| 7 Carbon Disulfide | | | | | | | | | | | | | | | |
| 8 1,1-Dichloroethene | | | | | | | | | | | | | | | |
| 9 1,1-Dichloroethane | | | | | | | | | | | | | | | |
| 10 trans-1,2-Dichloroethene | | | | | | | | | | | | | | | |
| 11 Chloroform | | | | | | | | | | | | | | | |
| 12 1-2-Dichloroethane | | | | | | | | | | | | | | | |
| 13 2-Butanone (MEK) | | 43 B | | | 51 B | | 51 B | 37 B | 57 B | | | | 42 B | 61 B | 16 B |
| 14 1,1,1-Trichloroethane | | | | | | | | | | | | | | | |
| 15 Carbon Tetrachloride | | | | | | | | | | | | | | | |
| 16 Vinyl Acetate | | | | | | | | | | | | | | | |
| 17 Bromodichloromethane | | | | | | | | | | | | | | | |
| 18 1,2-Dichloropropane | | | | | | | | | | | | | | | |
| 19 trans-1,3-Dichloropropene | | | | | | | | | | | | | | | |
| 20 Trichloroethene | | | | | | | | | | | | | | | |
| 21 Dibromochloromethane | | | | | | | | | | | | | | | |
| 22 1,1,2-Trichloroethane | | | | | | | | | | | | | | | |
| 23 Benzene | | | | | | | | | | | | | | | |
| 24 cis-1,3-Dichloropropene | | | | | | | | | | | | | | | |
| 25 2-Chloroethyl Vinyl Ether | | | | | | | | | | | | | | | |
| 26 Bromoform | | | | | | | | | | | | | | | |
| 27 4-Methyl-2-pentanone | | | | | | | | | 9 J | 8 J | 16 J | 280 | | | 14 J |
| 28 2-Hexanone | | | | | | | | | | | | | | 22 B | |
| 29 Tetrachloroethene | | | | | | | | | 22 | 11 J | 63 | 50 | | 24 | |
| 30 1,1,2,2-Tetrachloroethane | | | | | | | | | | | | | | | |
| 31 Toluene | | | | | | | | 18 B | | | 36 B | | 30 B | | 12 |
| 32 Chlorobenzene | | | | | | | | | | | | | | | |
| 33 Ethylbenzene | | | | | | | | | | | | | | | |
| 34 Styrene | | | | | | | | | | | | | | | |
| 35 Total Xylenes | | | | | | | | | | | | | | | |

Surface Soil Volatiles

| SITE | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-SS-16 ‡ | DC-SS-17 | DC-SS-18 | DC-SS-19 | DC-SS-20 | DC-SS-21 | DC-SS-22 | DC-SS-23 | DC-SS-24 | DC-SS-25 ‡ | DC-SS-26 | DC-SS-27 | DC-SS-28 | DC-SS-29 | DC-SS-30 |
| LOCATION/GRID | G-3 | H-3 | A-4 | B-4 | C-4 | D-4 | E-4 | F-4 | G-4 | G-4 | H-4 | I-4 | J-4 | A-5 | B-5 |
| DATE SAMPLED | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 |
| 1 Chloromethane | | | | | | | | | | | | | | | |
| 2 Bromomethane | | | | | | | | | | | | | | | |
| 3 Vinyl Chloride | | | | | | | | | | | | | | | |
| 4 Chloroethane | | | | | | | | | | | | | | | |
| 5 Methylene Chloride | 56 B | 90 B | 36 B | 81 B | 73 B | 160 B | 62 B | 58 B | 71 B | 79 B | 68 B | 63 B | 63 B | 80 B | 62 B |
| 6 Acetone | 28 BJ | 13 BJ | 67 B | 140 B | 99 B | 400 B | | 41 | 39 B | 90 | 14 BJ | 17 BJ | 13 BJ | 37 B | 16 BJ |
| 7 Carbon Disulfide | | | | | | | | | | | | | | | |
| 8 1,1-Dichloroethene | | | | | | | | | | | | | | | |
| 9 1,1-Dichloroethane | | | | | | | | | | | | | | | |
| 10 trans-1,2-Dichloroethene | | | | | | | | | | | | | | | |
| 11 Chloroform | | | | | | | | | | | | | | | |
| 12 1-2-Dichloroethane | | | | | | | | | | | | | | | |
| 13 2-Butanone (MEK) | 46 B | | | 180 B | | | | 42 | | | 40 B | 46 B | 36 B | 36 B | |
| 14 1,1,1-Trichloroethane | | | | | | | | | | | | | | | |
| 15 Carbon Tetrachloride | | | | | | | | | | | | | | | |
| 16 Vinyl Acetate | | | | | | | | | | | | | | | |
| 17 Bromodichloromethane | | | | | | | | | | | | | | | |
| 18 1,2-Dichloropropane | | | | | | | | | | | | | | | |
| 19 trans-1,3-Dichloropropene | | | | | | | | | | | | | | | |
| 20 Trichloroethene | | | | | | | | | | | | | | | |
| 21 Dibromochloromethane | | | | | | | | | | | | | | | |
| 22 1,1,2-Trichloroethane | | | | | | | | | | | | | | | |
| 23 Benzene | | | | | | | | | | | | | | | |
| 24 cis-1,3-Dichloropropene | | | | | | | | | | | | | | | |
| 25 2-Chloroethyl Vinyl Ether | | | | | | | | | | | | | | | |
| 26 Bromoform | | | | | | | | | | | | | | | |
| 27 4-Methyl-2-pentanone | | | 55 | 220 B | 510 B | 160 | 49 B | | 320 | 610 | | | | | 47 |
| 28 2-Hexanone | | | | 17 BJ | 58 B | 23 BJ | 28 BJ | 20 J | 51 B | | | | | | |
| 29 Tetrachloroethene | | | | 13 J | | 40 J | | | | | 12 J | | | | |
| 30 1,1,2,2-Tetrachloroethane | | | | | | | | | | | | | | | |
| 31 Toluene | | | | | | | | | | 45 | 37 | | | | |
| 32 Chlorobenzene | | | | | | | | | | | | | | | |
| 33 Ethylbenzene | | | | | | | | | | | | | | | |
| 34 Styrene | | | | | | | | | | | | | | | |
| 35 Total Xylenes | | | | | | | | | | | | | | | |

Surface Soil Volatiles

| SITE | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | BLANK | BLANK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-SS-31 | DC-SS-32 | DC-SS-33 | DC-SS-34 | DC-SS-35 | DC-SS-36 | DC-SS-37 | DC-SS-38 | DC-SS-39 | DC-SS-40 | DC-SS-41 | DC-SS-42 | DC-SS-43 | DC-SS-44+ | DC-SS-45+ |
| LOCATION/GRID | B-5 | C-5 | D-5 | E-5 | F-5 | G-5 | H-5 | A-6 | B-6 | C-6 | D-6 | F-6 | B-7 | | |
| DATE SAMPLED | 11-11-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-13-86 | 11-11-86 |
| 1 Chloroethane | | | | | | | | | | | | | | | |
| 2 Bromoethane | | | | | | | | | | | | | | | |
| 3 Vinyl Chloride | | | | | | | | | | | | | | | |
| 4 Chloroethane | | | | | | | | | | | | | | | |
| 5 Methylene Chloride | 90 B | 35 B | 230 B | 46 B | 23 B | 55 B | 69 B | 40 B | 63 B | 40 B | 37 B | 60 B | 29 B | 52 B | 65 B |
| 6 Acetone | 36 B | 30 B | 170 B | 19 BJ | | 25 B | 48 B | 43 B | 66 B | 150 B | 41 B | 58 B | 21 BJ | 18 BJ | 28 J |
| 7 Carbon Disulfide | | | | | | | | | | | | | | | |
| 8 1,1-Dichloroethene | | | | | | | | | | | | | | | |
| 9 1,1-Dichloroethane | | | | | | | | | | | | | | | |
| 10 trans-1,2-Dichloroethene | | | | | | | | | | | | | | | |
| 11 Chloroform | | | | | | | | | | | | | | | |
| 12 1-2-Dichloroethane | | | | | | | | | | | | | | | |
| 13 2-Butanone (MEK) | | 43 B | | 37 B | | 48 B | 34 B | 35 B | 59 B | 46 B | 37 B | 39 B | 40 B | | |
| 14 1,1,1-Trichloroethane | | | | | | | | | | | | | | | |
| 15 Carbon Tetrachloride | | | | | | | | | | | | | | | |
| 16 Vinyl Acetate | | | | | | | | | | | | | | | |
| 17 Bromodichloroethane | | | | | | | | | | | | | | | |
| 18 1,2-Dichloropropane | | | | | | | | | | | | | | | |
| 19 trans-1,3-Dichloropropene | | | | | | | | | | | | | | | |
| 20 Trichloroethene | | | | | | 11 J | | 19 | | | | | | | |
| 21 Dibromochloroethane | | | | | | | | | | | | | | | |
| 22 1,1,2-Trichloroethane | | | | | | | | | | | | | | | |
| 23 Benzene | | | | | | | 2 J | 80 | | | | | 4 J | | |
| 24 cis-1,3-Dichloropropene | | | | | | | | | | | | | | | |
| 25 2-Chloroethyl Vinyl Ether | | | | | | | | | | | | | | | |
| 26 Bromoform | | | | | | | | | | | | | | | |
| 27 4-Methyl-2-pentanone | 190 | 29 J | 2000 | 68 | 100 | | | 140 | 12 J | 31 | 34 | | | | |
| 28 2-Hexanone | 16 BJ | | 89 B | | | | | | | | | | | | |
| 29 Tetrachloroethene | 21 | | | | | | 12 J | | | | | | | | |
| 30 1,1,2,2-Tetrachloroethane | | | | | | | | | | | | | | | |
| 31 Toluene | | | | 32 | | | | 1400 | | 33 | | | | | |
| 32 Chlorobenzene | | | | 18 | | | | 40 | | | | | | | |
| 33 Ethylbenzene | | | | | | | 55 | 140 | | | | | | | |
| 34 Styrene | | | | | | | | | | | | | | | |
| 35 Total Xylenes | | | | | | | 150 | 170 | | | | | | | |

Surface Soil Volatiles

| SITE | SITE J | SITE J | SITE J |
|---|---|---|---|
| SAMPLE NUMBER | DC-SS-46 | DC-SS-47 | DC-SS-48 |
| LOCATION/GRID | SE | NE | NE |
| DATE SAMPLED | 11-13-86 | 11-13-86 | 11-13-86 |
| 1 Chloromethane | | | |
| 2 Bromomethane | | | |
| 3 Vinyl Chloride | | | |
| 4 Chloroethane | | | |
| 5 Methylene Chloride | 40 B | 32 B | 24 B |
| 6 Acetone | 18 BJ | 33 B | 12 BJ |
| 7 Carbon Disulfide | | | |
| 8 1,1-Dichloroethene | | | |
| 9 1,1-Dichloroethane | | | |
| 10 trans-1,2-Dichloroethene | | | |
| 11 Chloroform | | | |
| 12 1-2-Dichloroethane | | | |
| 13 2-Butanone (MEK) | 34 B | 30 B | 35 B |
| 14 1,1,1-Trichloroethane | | | |
| 15 Carbon Tetrachloride | | | |
| 16 Vinyl Acetate | | | |
| 17 Bromodichloromethane | | | |
| 18 1,2-Dichloropropane | | | |
| 19 trans-1,3-Dichloropropene | | | |
| 20 Trichloroethene | | | |
| 21 Dibromochloromethane | | | |
| 22 1,1,2-Trichloroethane | | | |
| 23 Benzene | | | |
| 24 cis-1,3-Dichloropropene | | | |
| 25 2-Chloroethyl Vinyl Ether | | | |
| 26 Bromoform | | | |
| 27 4-Methyl-2-pentanone | | | |
| 28 2-Hexanone | | | |
| 29 Tetrachloroethene | | | |
| 30 1,1,2,2-Tetrachloroethane | | | |
| 31 Toluene | | | |
| 32 Chlorobenzene | | | |
| 33 Ethylbenzene | | | |
| 34 Styrene | | | |
| 35 Total Xylenes | | | |

Surface Soils Semivolatiles

| SITE | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-SS-01 | DC-SS-02 | DC-SS-03 | DC-SS-04 | DC-SS-05 | DC-SS-06 | DC-SS-07 | DC-SS-08 | DC-SS-09 | DC-SS-10 | DC-SS-11 | DC-SS-12 | DC-SS-13 | DC-SS-14 |
| LOCATION/GRID | C-1 | G-1 | B-2 | E-2 | H-2 | H-2 | I-2 | I-2 | A-3 | B-3 | C-3 | D-3 | E-3 | F-3 |
| DATE SAMPLED | 11-10-86 | 11-10-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 |
| 1 Phenol | | | | | | | | | | | | | | |
| 2 bis(2-Chloroethyl)ether | | | | | | | | | | | | | | |
| 3 2-Chlorophenol | | | | | | | | | | | | | | |
| 4 1,3-Dichlorobenzene | | | | | | | | | | | | | | |
| 5 1,4-Dichlorobenzene | | | | | | | | | | | | | | |
| 6 Benzyl Alcohol | | | | | | | | | | | | | | |
| 7 1,2-Dichlorobenzene | | | | | | | | | | | | | | |
| 8 2-Methylphenol | | | | | | | | | | | | | | |
| 9 bis(2-Chloroisopropyl) ether | | | | | | | | | | | | | | |
| 10 4-Methylphenol | | | | | | | | | | | | | | |
| 11 N-Nitroso-n-Dipropylamine | | | | | | | | | | | | | | |
| 12 Hexachloroethane | | | | | | | | | | | | | | |
| 13 Nitrobenzene | | | | | | | | | | | | | | |
| 14 Isophorone | | | | | | | | | | | | | | |
| 15 2-Nitrophenol | | | | | | | | | | | | | | |
| 16 2,4-Diethylphenol | | | | | | | | | | | | | | |
| 17 Benzoic Acid | | | | | | | | | | | | | | |
| 18 bis-(2-Chloroethoxy)methane | | | | | | | | | | | | | | |
| 19 2,4-Dichlorophenol | | | | | | | | | | | | | | |
| 20 1,2,4-Trichlorobenzene | | | | | | | | | | | | | | |
| 21 Naphthalene | | | | | | | | | 810 J | | 14000 | | | |
| 22 4-Chloroaniline | | | | | | | | | | | | | | |
| 23 Hexachlorobutadiene | | | | | | | | | | | | | | |
| 24 4-Chloro-3-methylphenol | | | | | | | | | | | | | | |
| 25 2-Methylnaphthalene | | | | | | | | | | | 1000 J | | | |
| 26 Hexachlorocyclopentadiene | | | | | | | | | | | | | | |
| 27 2,4,6-Trichlorophenol | | | | | | | | | | | | | | |
| 28 2,4,5-Trichlorophenol | | | | | | | | | | | | | | |
| 29 2-Chloronaphthalene | | | | | | | | | | | | | | |
| 30 2-Nitroaniline | | | | | | | | | | | | | | |

Surface Soils Semivolatiles

| SITE | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-SS-15 | DC-SS-16 * | DC-SS-17 | DC-SS-18 | DC-SS-19 | DC-SS-20 | DC-SS-21 | DC-SS-22 | DC-SS-23 | DC-SS-24 | DC-SS-25 * | DC-SS-26 | DC-SS-27 | DC-SS-28 |
| LOCATION/GRID | G-3 | G-3 | H-3 | A-4 | D-4 | C-4 | D-4 | E-4 | F-4 | G-4 | G-4 | H-4 | I-4 | J-4 |
| DATE SAMPLED | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 |
| 1 Phenol | | | | | | | | | 78 J | | | | | |
| 2 bis(2-Chloroethyl)ether | | | | | | | | | | | | | | |
| 3 2-Chlorophenol | | | | | | | | | | | | | | |
| 4 1,3-Dichlorobenzene | | | | | | | | | | | | | | |
| 5 1,4-Dichlorobenzene | | | | | | | 22000000 | | | | | | | |
| 6 Benzyl Alcohol | | | | | | | | | | | | | | |
| 7 1,2-Dichlorobenzene | | | | | | | | | 89 J | | | | | |
| 8 2-Methylphenol | | | | | | | | | | | | | | |
| 9 bis(2-Chloroisopropyl) ether | | | | | | | | | | | | | | |
| 10 4-Methylphenol | | | | | | | | | | | | | | |
| 11 N-Nitroso-n-Dipropylamine | | | | | | | | | | | | | | |
| 12 Hexachloroethane | | | | | | | | | | | | | | |
| 13 Nitrobenzene | | | | | | | | | | | | | | |
| 14 Isophorone | | | | | | | | | | | | | | |
| 15 2-Nitrophenol | | | | | | | | | | | | | | |
| 16 2,4-Dimethylphenol | | | | | | | | | | | | | | |
| 17 Benzoic Acid | | | | | | | | | | | | | | |
| 18 bis-(2-Chloroethoxy)methane | | | | | | | | | | | | | | |
| 19 2,4-Dichlorophenol | | | | | | | | | 120 J | | | | | |
| 20 1,2,4-Trichlorobenzene | | | 990 J | | | | | | 180 J | | | | 140 J | 1800 J |
| 21 Naphthalene | | | 120000 | | | 1800 J | | | 110 J | | | | | |
| 22 4-Chloroaniline | | | | | | | | | | | | | | |
| 23 Hexachlorobutadiene | | | | | | | | | | | | | | |
| 24 4-Chloro-3-methylphenol | | | | | | | | | | | | | | |
| 25 2-Methylnaphthalene | | | | | | | | | | | | | | |
| 26 Hexachlorocyclopentadiene | | | | | | | | | | | | | | |
| 27 2,4,6-Trichlorophenol | | | | | | | | | | | | | | |
| 28 2,4,5-Trichlorophenol | | | | | | | | | | | | | | |
| 29 2-Chloronaphthalene | | | | | | | | | | | | | | |
| 30 2-Nitroaniline | | | | | | | | | 1000 J | | | | | 34000 J |

Surface Soils Semivolatiles

| SITE | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-SS-29 | DC-SS-30 | DC-SS-31 | DC-SS-32 | DC-SS-33 | DC-SS-34 | DC-SS-35 | DC-SS-36 | DC-SS-37 | DC-SS-38 | DC-SS-39 | DC-SS-40 | DC-SS-41 | DC-SS-42 | DC-SS-43 |
| LOCATION/GRID | A-5 | B-5 | B-5 | C-5 | D-5 | E-5 | F-5 | G-5 | H-5 | A-6 | B-6 | C-6 | D-6 | F-6 | B-7 |
| DATE SAMPLED | 11-11-86 | 11-11-86 | 11-11-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 |
| 1 Phenol | | | | | | | | | | | | | | | |
| 2 bis(2-Chloroethyl)ether | | | | | | | | | | | | | | | |
| 3 2-Chlorophenol | | | | | | | | | | | | | | | |
| 4 1,3-Dichlorobenzene | | | | | | | | | | | | | | | |
| 5 1,4-Dichlorobenzene | | | | | | | | 240 J | | 2600 J | | | | | 210 J |
| 6 Benzyl Alcohol | | | | | | | | | | | | | | | |
| 7 1,2-Dichlorobenzene | | | | | | | | | | | | | | | |
| 8 2-Methylphenol | | | | | | | | | | | | | | | |
| 9 bis(2-Chloroisopropyl) ether | | | | | | | | | | | | | | | |
| 10 4-Methylphenol | | | | | | | | | | | | | | | |
| 11 N-Nitroso-n-Dipropylamine | | | | | | | | | | | | | | | |
| 12 Hexachloroethane | | | | | | | | | | | | | | | |
| 13 Nitrobenzene | | | | | | | | | | | | | | | |
| 14 Isophorone | | | | | | | | | | | | | | | |
| 15 2-Nitrophenol | | | | | | | | | | | | | | | |
| 16 2,4-Dimethylphenol | | | | | | | | | | | | | | | |
| 17 Benzoic Acid | | | | | | | | | | | | | | | |
| 18 bis-(2-Chloroethoxy)methane | | | | | | | | | | | | | | | |
| 19 2,4-Dichlorophenol | | | | | | | | | | | | 6200 | | | |
| 20 1,2,4-Trichlorobenzene | | | | | | 35000 | | 65 J | 5300 J | | 1800 J | | | | |
| 21 Naphthalene | | | | | | | | 71 J | 26000 | 110000 | | 140 J | | 290 J | 110 J |
| 22 4-Chloroaniline | | | | | | | | | | | | | | | |
| 23 Hexachlorobutadiene | | | | | | | | | | | | | | | |
| 24 4-Chloro-3-methylphenol | | | | | | | | | | | | | | | |
| 25 2-Methylnaphthalene | | | | | | | | 50 J | | 850 J | | | | | |
| 26 Hexachlorocyclopentadiene | | | | | | | | | | | | | | | |
| 27 2,4,6-Trichlorophenol | | | | | | | | | | | | 1500 J | | | |
| 28 2,4,5-Trichlorophenol | | | | | | | | | | | | | | | |
| 29 2-Chloronaphthalene | | | | | | | | | | | | | | | |
| 30 2-Nitroaniline | | | | | | | | 1100 J | 220000 | | | | | | |

Surface Soils Semivolatiles

| SITE | BLANK | BLANK | SITE J | SITE J | SITE J |
|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-SS-44+ | DC-SS-45+ | DC-SS-46 | DC-SS-47 | DC-SS-48+ |
| LOCATION/GRID | | | SE | NE | NE |
| DATE SAMPLED | 11-13-86 | 11-11-86 | 11-13-86 | 11-13-86 | 11-13-86 |
| 1 Phenol | | | | | |
| 2 bis(2-Chloroethyl)ether | | | | | |
| 3 2-Chlorophenol | | | | | |
| 4 1,3-Dichlorobenzene | | | | | |
| 5 1,4-Dichlorobenzene | | | | | |
| 6 Benzyl Alcohol | | | | | |
| 7 1,2-Dichlorobenzene | | | | | |
| 8 2-Methylphenol | | | | | |
| 9 bis(2-Chloroisopropyl) ether | | | | | |
| 10 4-Methylphenol | | | | | |
| 11 N-Nitroso-n-Dipropylamine | | | | | |
| 12 Hexachloroethane | | | | | |
| 13 Nitrobenzene | | | | | |
| 14 Isophorone | | | | | |
| 15 2-Nitrophenol | | | | | |
| 16 2,4-Dimethylphenol | | | | | |
| 17 Benzoic Acid | | | | | |
| 18 bis-(2-Chloroethoxy)methane | | | | | |
| 19 2,4-Dichlorophenol | | | | | |
| 20 1,2,4-Trichlorobenzene | | | | | |
| 21 Naphthalene | | | | | |
| 22 4-Chloroaniline | | | | | |
| 23 Hexachlorobutadiene | | | | | |
| 24 4-Chloro-3-methylphenol | | | | | |
| 25 2-Methylnaphthalene | | | | | |
| 26 Hexachlorocyclopentadiene | | | | | |
| 27 2,4,6-Trichlorophenol | | | | | |
| 28 2,4,5-Trichlorophenol | | | | | |
| 29 2-Chloronaphthalene | | | | | |
| 30 2-Nitroaniline | | | | | |

Surface Soil Semivolatiles

| SITE | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-SS-01 | DC-SS-02 | DC-SS-03 | DC-SS-04 | DC-SS-05 | DC-SS-06 | DC-SS-07 | DC-SS-08 | DC-SS-09 | DC-SS-10 | DC-SS-11 | DC-SS-12 | DC-SS-13 | DC-SS-14 |
| LOCATION/GRID | C-1 | G-1 | B-2 | E-2 | H-2 | H-2 | I-2 | I-2 | A-3 | B-3 | C-3 | D-3 | E-3 | F-3 |
| DATE SAMPLED | 11-10-86 | 11-10-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 |
| 1 Diethyl Phthalate | | | | | | | | | | | | | | |
| 2 Acenaphtylene | | | | | | | | | | | | | | |
| 3 3-Nitroaniline | | | | | | | | | | | | | | |
| 4 Acenaphthene | | | | | | | | | | | 570 J | | | |
| 5 2,4-Dinitrophenol | | | | | | | | | | | | | | |
| 6 4-Nitrophenol | | | | | | | | | | | | | | |
| 7 Dibenzofuran | | | | | | | | | | | 920 J | | | |
| 8 2,4-Dinitrotoluene | | | | | | | | | | | | | | |
| 9 2,6-Dinitrotoluene | | | | | | | | | | | | | | |
| 10 Diethylphthalate | | | | | | | | | | | | | | |
| 11 4-Chlorophenyl-Phenylether | | | | | | | | | | | | | | |
| 12 Fluorene | | | | | | | | | | | | | | |
| 13 4-Nitroaniline | | | | | | | | | | | | | | |
| 14 4,6-Dinitro-2-methylphenol | | | | | | | | | | | | | | |
| 15 N-Nitrosodiphenylamine | | | | | | | | | | | | | | |
| 16 4-Bromophenyl-phenylether | | | | | | | | | | | | | | |
| 17 Hexachlorobenzene | | | | | | | | | | | | | | |
| 18 Pentachlorophenol | | | | | | | | | 2600 J | | 4700 J | 7800 J | | |
| 19 Phenanthrene | | | | | | | | | | | 4800 J | | | |
| 20 Anthracene | | | | | | | | | | | | | | |
| 21 Di-n-butyl phthalate | | | | 170 BJ | 2800 B | | 460 BJ | 320 BJ | | | | | | |
| 22 Fluoranthene | | | | | | | 480 | | 540 J | | | 1300 J | | |
| 23 Pyrene | | | | | | | 290 J | | | | | 1100 J | | |
| 24 Butyl Benzyl phthalate | | | | | | | | | | | | | | |
| 25 3,3'-Dichlorobenzidine | | | | | | | | | | | | | | |
| 26 Benzo(a)Anthracene | | | | | | | 220 J | | 950 J | | | | | |
| 27 bis(2-ethylhexyl) phthalate | | 910 | 230 J | 470 | | | 170 J | 140 J | 240 J | | 6000 | 820 J | | |
| 28 Chrysene | | | | | | | 310 J | | | | | | | 8400 J |
| 29 Di-n-octyl phthalate | | | | | | | | | | 610 BJ | 2600 BJ | 3100 B | | 14000 B |
| 30 Benzo(b)Fluoranthene | | | | | | | 610 | | 750 J | | | 1200 J | | |
| 31 Benzo(k)Fluoranthene | | | | | | | | 160 J | | | | | | |
| 32 Benzo(a)Pyrene | | | | | | | 190 J | 47 J | | | | 520 J | | |
| 33 Indeno(1,2,3-cd)Pyrene | | | | | | | 280 J | | | | | | | |
| 34 Benzo(g,h,i)Perylene | | | | | | | 84 J | | | | | | | |
| 35 Dibenz(a,h)Anthracene | | | | | | | 230 J | | 1100 J | | | | | |

Surface Soil Semivolatiles

| SITE | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-SS-15 | DC-SS-16 * | DC-SS-17 | DC-SS-18 | DC-SS-19 | DC-SS-20 | DC-SS-21 | DC-SS-22 | DC-SS-23 | DC-SS-24 | DC-SS-25 * | DC-SS-26 | DC-SS-27 | DC-SS-28 |
| LOCATION/GRID | G-3 | G-3 | H-3 | A-4 | B-4 | C-4 | D-4 | E-4 | F-4 | G-4 | G-4 | H-4 | I-4 | J-4 |
| DATE SAMPLED | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 |
| 1 Dimethyl Phthalate | | | | | | | | | | | | | | |
| 2 Acenaphtylene | | | | | | | | | | | | | | |
| 3 3-Nitroaniline | | | | | | | | | | | | | | |
| 4 Acenaphthene | | 1800 J | 1100 J | | | | | | 70 J | | | | | |
| 5 2,4-Dinitrophenol | | | | | | | | | | | | | | |
| 6 4-Nitrophenol | | | | | | | | | | | | | | |
| 7 Dibenzofuran | | | | | | | | | | | | | | |
| 8 2,4-Dinitrotoluene | | | | | | | | | | | | | | |
| 9 2,6-Dinitrotoluene | | | | | | | | | | | | | | |
| 10 Diethylphthalate | | | | | | | | | | | | | | |
| 11 4-Chlorophenyl-Phenylether | | | | | | | | | | | | | | |
| 12 Fluorene | | | | | | | | | | | | | | |
| 13 4-Nitroaniline | | | | | | | | | | | | | | |
| 14 4,6-Dinitro-2-methylphenol | | | | | | | | | | | | | | |
| 15 N-Nitrosodiphenylamine | | | | | | | | | | | | | | |
| 16 4-Bromophenyl-phenylether | | | | | | | | | | | | | | |
| 17 Hexachlorobenzene | | | 10000 J | | | | | | | | | | | |
| 18 Pentachlorophenol | 1200000 | 1400000 | | | | | | | 12000 | | 18000 J | | | 25000 J |
| 19 Phenanthrene | 40000 J | 37000 J | 8700 J | | | | | | 1200 | | | | 180 J | |
| 20 Anthracene | | | | | | | | | 300 J | | | | | |
| 21 Di-n-butyl phthalate | | | | | | 3800 BJ | | 360 BJ | 1700 B | | | | 330 BJ | |
| 22 Fluoranthene | 44000 | 45000 | | | | | | | 2200 | | 6700 J | 4800 J | | |
| 23 Pyrene | 85000 | 71000 | 3800 J | | | | | | 850 | 5500 J | 9000 J | | | |
| 24 Butyl Benzyl phthalate | | | | | | | | | | | | | | |
| 25 3,3'-Dichlorobenzidine | | 86000 | | | | | | | | | | | | |
| 26 Benzo(a)Anthracene | | 27000 J | | | | | | | 960 | | 5100 J | | | |
| 27 bis(2-ethylhexyl) phthalate | | | | | | | | | 660 | | | | | |
| 28 Chrysene | 39000 J | 39000 J | | | | | | | 1100 | | 6400 J | | 270 J | |
| 29 Di-n-octyl phthalate | | | | | | | | 140 BJ | 99 BJ | | | | | |
| 30 Benzo(b)Fluoranthene | 47000 | 48000 | | | | | | | 1800 | | | | | |
| 31 Benzo(k)Fluoranthene | | | | | | | | | | 10000 J | 10000 J | | | |
| 32 Benzo(a)Pyrene | 22000 J | 20000 J | | | | | | | 840 | | 4500 J | | | |
| 33 Indeno(1,2,3-cd)Pyrene | | | | | | | | | 1100 | | | | | |
| 34 Benzo(g,h,i)Perylene | | | | | | | | | 430 | | | | | |
| 35 Dibenz(a,h)Anthracene | | | | | | | | | 1200 | | | | | |

Surface Soil Semivolatiles

| SITE | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-SS-29 | DC-SS-30 | DC-SS-31 | DC-SS-32 | DC-SS-33 | DC-SS-34 | DC-SS-35 | DC-SS-36 | DC-SS-37 | DC-SS-38 | DC-SS-39 | DC-SS-40 | DC-SS-41 | DC-SS-42 | DC-SS-43 |
| LOCATION/GRID | A-5 | B-5 | B-5 | C-5 | D-5 | E-5 | F-5 | G-5 | H-5 | A-6 | B-6 | C-6 | D-6 | F-6 | B-7 |
| DATE SAMPLED | 11-11-86 | 11-11-86 | 11-11-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 |
| 1 Diethyl Phthalate | | | | | | | | | | | | | | | |
| 2 Acenaphtylene | | | | | | | | | | | | | | | |
| 3 3-Nitroaniline | | | | | | | | | | | | | | | |
| 4 Acenaphthene | | | | | | | | 200 J | | | | | | | 770 J |
| 5 2,4-Dinitrophenol | | | | | | | | | | | | | | | |
| 6 4-Nitrophenol | | | | | | | | | | | | 1000000 | | | |
| 7 Dibenzofuran | | | | | | | | 95 J | | | | | | | 460 J |
| 8 2,4-Dinitrotoluene | | | | | | | | | | | | | | | |
| 9 2,6-Dinitrotoluene | | | | | | | | | | | | | | | |
| 10 Diethylphthalate | | | | | | | | | | | | | | | |
| 11 4-Chlorophenyl-Phenylether | | | | | | | | | | | | | | | |
| 12 Fluorene | | | | | | | | | | | | | | | 1500 J |
| 13 4-Nitroaniline | | | | | | | | | | | | | | | |
| 14 4,6-Dinitro-2-methylphenol | | | | | | | | | | | | | | | |
| 15 N-Nitrosodiphenylamine | | | | | | | | | | | | | | | |
| 16 4-Bromophenyl-phenylether | | | | | | | | | | | | | | | |
| 17 Hexachlorobenzene | | | | | | | | | | | | | | | |
| 18 Pentachlorophenol | | | | | | 9900 J | | 1600 J | | | 21000000 | 1100 J | | 20000 | 25000 |
| 19 Phenanthrene | | | | | | | | 2800 | 4900 J | | | 920 J | | | 15000 |
| 20 Anthracene | | | | | | | | 600 | | | | 810 J | | | 4100 |
| 21 Di-n-butyl phthalate | | | | | | | | | | | | 880 J | | | |
| 22 Fluoranthene | | | | | | | | 4600 | | | | 2600 | | | 20000 |
| 23 Pyrene | | | | | | | | 3100 | | 5800 J | | 2400 | | | 19000 |
| 24 Butyl Benzyl phthalate | | | | | | | | | | | | | | | |
| 25 3,3'-Dichlorobenzidine | | | | | | | | | | | | | | | |
| 26 Benzo(a)Anthracene | | | | | | | | 2100 | | | | 1400 J | | | 10000 |
| 27 bis(2-ethylhexyl) phthalate | 2900 J | | | | 1400 J | | | | | | | 2500 | | | |
| 28 Chrysene | | | | | | | | 2700 | | 8400 J | | 2500 | | | 10000 |
| 29 Di-n-octyl phthalate | | | | | 2000 BJ | | | | | | | | | | |
| 30 Benzo(b)Fluoranthene | | | | | | | | 4800 | | | | 3600 | | | 15000 |
| 31 Benzo(k)Fluoranthene | | | | | | | | | | | | | | 750 J | |
| 32 Benzo(a)Pyrene | | | | | | | | 1900 | | 1900 J | 3900 J | 1700 J | | 180 J | 7800 |
| 33 Indeno(1,2,3-cd)Pyrene | | | | | | | | 1700 | | | | 2100 | | | 5200 |
| 34 Benzo(g,h,i)Perylene | | | | | | | | 550 J | | | | 530 J | | | 1500 J |
| 35 Dibenz(a,h)Anthracene | | | | | | | | 1500 | | | | 2400 | | | 5400 |

Surface Soil Semivolatiles

| SITE | BLANK | BLANK | SITE J | SITE J | SITE J |
|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-SS-44+ | DC-SS-45+ | DC-SS-46 | DC-SS-47 | DC-SS-48 |
| LOCATION/GRID | | | SE | NE | NE |
| DATE SAMPLED | 11-13-86 | 11-11-86 | 11-13-86 | 11-13-86 | 11-13-86 |
| 1 Dimethyl Phthalate | | | | | |
| 2 Acenaphtylene | | | | | |
| 3 3-Nitroaniline | | | | | |
| 4 Acenaphthene | | | | | |
| 5 2,4-Dinitrophenol | | | | | |
| 6 4-Nitrophenol | | | | | |
| 7 Dibenzofuran | | | | | |
| 8 2,4-Dinitrotoluene | | | | | |
| 9 2,6-Dinitrotoluene | | | | | |
| 10 Diethylphthalate | | | | | |
| 11 4-Chlorophenyl-Phenylether | | | | | |
| 12 Fluorene | | | | | |
| 13 4-Nitroaniline | | | | | |
| 14 4,6-Dinitro-2-methylphenol | | | | | |
| 15 N-Nitrosodiphenylamine | | | | | |
| 16 4-Bromophenyl-phenylether | | | | | |
| 17 Hexachlorobenzene | | | | | |
| 18 Pentachlorophenol | | | | | |
| 19 Phenanthrene | | | | | |
| 20 Anthracene | | | | | |
| 21 Di-n-butyl phthalate | 150 J | 1500 B | 1600 B | 230 J | |
| 22 Fluoranthene | | | | | |
| 23 Pyrene | | | | | |
| 24 Butyl Benzyl phthalate | | | | | |
| 25 3,3'-Dichlorobenzidine | | | | | |
| 26 Benzo(a)Anthracene | | | | | |
| 27 bis(2-ethylhexyl) phthalate | | | 240 J | | |
| 28 Chrysene | | | | | |
| 29 Di-n-octyl phthalate | | 79 BJ | | | |
| 30 Benzo(b)Fluoranthene | 81 J | | | | |
| 31 Benzo(k)Fluoranthene | | | | | |
| 32 Benzo(a)Pyrene | | | | | |
| 33 Indeno(1,2,3-cd)Pyrene | | | | | |
| 34 Benzo(g,h,i)Perylene | | | | | |
| 35 Dibenz(a,h)Anthracene | | | | | |

Surface Soils Pest/PCBs

| SITE | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-SS-01 | DC-SS-02 | DC-SS-03 | DC-SS-04 | DC-SS-05 | DC-SS-06 | DC-SS-07 | DC-SS-08 | DC-SS-09 | DC-SS-10 | DC-SS-11 | DC-SS-12 | DC-SS-13 | DC-SS-14 | DC-SS-15 |
| LOCATION/GRID | C-1 | G-1 | B-2 | E-2 | H-2 | H-2 | I-2 | I-2 | A-3 | B-3 | C-3 | D-3 | E-3 | F-3 | G-3 |
| DATE SAMPLED | 11-10-86 | 11-10-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 |
| 1 Alpha-BHC | | | | | | | | | | | | | | | |
| 2 Beta-BHC | | | | | | | | | | | | | | | |
| 3 Delta-BHC | | | | | | | | | | | | | | | |
| 4 Gamma-BHC (Lindane) | | | | | | | | | | | | | | | |
| 5 Heptachlor | | | | | | | | | | | | | | | |
| 6 Aldrin | | | | | | | | | | | | | | | |
| 7 Heptachlor Epoxide | | | | | | | | | | | | | | | |
| 8 Edosulfan I | | | | | | | | | | | | | | | |
| 9 Dieldrin | | | | | | | | | | | | | | | |
| 10 4,4'-DDE | | 31 J | | | 79 | 51 | 290 | 84 | | | | | | | |
| 11 Endrin | | | | | | | | | | | | | | | |
| 12 Edosulfan II | | | | | | | | | | | | | | | |
| 13 4,4'-DDD | | | | | | | | | | | | | | | |
| 14 Endosulfan Sulfate | | | | | | | | | | | | | | | |
| 15 4,4'-DDT | | | | | | | | | | | | | | | |
| 16 Methoxychlor | | | | | | | | | | | | | | | |
| 17 Endrin Ketone | | | | | | | | | | | | | | | |
| 18 Chlordane | | | | | | | | | | | | | | | |
| 19 Toxaphene | | | | | | | | | | | | | | | |
| 20 AROCLOR-1016 | | | | | | | | | | | | | | | |
| 21 AROCLOR-1221 | | | | | | | | | | | | | | | |
| 22 AROCLOR-1232 | | | | | | | | | | | | | | | |
| 23 AROCLOR-1242 | | | | | | | | | | | | | | | |
| 24 AROCLOR-1248 | | | | | | | | | 2730000 C | 44000 | 24000000 C | | | | 184000 |
| 25 AROCLOR-1254 | | | | | | | | 1430 | | | 29000000 C | | | | |
| 26 AROCLOR-1260 | | 450 | | 751 | 990 | 740 | 3800 | 1830 | | | 21000000 C | 174000 C | 165000 J | 887000 | 305000 J |

Surface Soils Pest/PCBs

| SITE | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-SS-16 * | DC-SS-17 | DC-SS-18 | DC-SS-19 | DC-SS-20 | DC-SS-21 | DC-SS-22 | DC-SS-23 | DC-SS-24 | DC-SS-25 * | DC-SS-26 | DC-SS-27 | DC-SS-28 | DC-SS-29 | DC-SS-30 |
| LOCATION/GRID | G-3 | H-3 | A-4 | B-4 | C-4 | D-4 | E-4 | F-4 | G-4 | G-4 | H-4 | I-4 | J-4 | A-5 | B-5 |
| DATE SAMPLED | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 |
| 1 Alpha-BHC | | | | | | | | | | | | | | | |
| 2 Beta-BHC | | | | | | | | | | | | | | | |
| 3 Delta-BHC | | | | | | | | | | | | | | | |
| 4 Gamma-BHC (Lindane) | | | | | | | | | | | | | | | |
| 5 Heptachlor | | | | | | | | | | | | | | | |
| 6 Aldrin | | | | | | | | | | | | | | | |
| 7 Heptachlor Epoxide | | | | | | | | | | | | | | | |
| 8 Edosulfan I | | | | | | | | | | | | | | | |
| 9 Dieldrin | | | | | | | | | | | | | | | |
| 10 4,4'-DDE | | | | | | | | | | | | | | | |
| 11 Endrin | | | | | | | | | | | | | | | |
| 12 Edosulfan II | | | | | | | | | | | | | | | |
| 13 4,4'-DDD | | | | | | | | | | | | | | | |
| 14 Endosulfan Sulfate | | | | | | | | | | | | | | | |
| 15 4,4'-DDT | | | | | | | | | | | | | | | |
| 16 Methoxychlor | | | | | | | | | | | | | | | |
| 17 Endrin Ketone | | | | | | | | | | | | | | | |
| 18 Chlordane | | | | | | | | | | | | | | | |
| 19 Toxaphene | | | | | | | | | | | | | | | |
| 20 AROCLOR-1016 | | | | | | | | | | | | | | | |
| 21 AROCLOR-1221 | | | | | | | | | | | | | | | |
| 22 AROCLOR-1232 | | | | | | | | | | | | | | | |
| 23 AROCLOR-1242 | | | | | | | | | | | | | | | |
| 24 AROCLOR-1248 | 171000 | | 1700000 | 3600000 C | | | 145000 JC | 110000 C | | | | | | 21000 | 30300 |
| 25 AROCLOR-1254 | | | | 7500000 C | | 2700000 | | | | | | | 246000 J | | |
| 26 AROCLOR-1260 | 232000 J | 2700000 JC | | 8000000 C | 639000 | | 547000 C | 218000 C | 117000 J | 122000 J | 120000 | 2200000 C | 625000 | 23000 | 35600 |

Surface Soils Pest/PCBs

| SITE | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | BLANK | BLANK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-SS-31 | DC-SS-32 | DC-SS-33 | DC-SS-34 | DC-SS-35 | DC-SS-36 | DC-SS-37 | DC-SS-38 | DC-SS-39 | DC-SS-40 | DC-SS-41 | DC-SS-42 | DC-SS-43 | DC-SS-44 | DC-SS-45 |
| LOCATION/GRID | B-5 | C-5 | D-5 | E-5 | F-5 | G-5 | H-5 | A-6 | B-6 | C-6 | D-6 | F-6 | B-7 | | |
| DATE SAMPLED | 11-11-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-13-86 | 11-11-86 |
| 1 Alpha-BHC | | | | | | | | | | | | | | | |
| 2 Beta-BHC | | | | | | | | | | | | | | | |
| 3 Delta-BHC | | | | | | | | | | | | | | | |
| 4 Gamma-BHC (Lindane) | | | | | | | | | | | | | | | |
| 5 Heptachlor | | | | | | | | | | | | | | | |
| 6 Aldrin | | | | | | | | | | | | | | | |
| 7 Heptachlor Epoxide | | | | | | | | | | | | | | | |
| 8 Edosulfan I | | | | | | | | | | | | | | | |
| 9 Dieldrin | | | | | | | | | | | | | | | |
| 10 4,4'-DDE | | | | | | | | | | | | | | | |
| 11 Endrin | | | | | | | | | | | | | | | |
| 12 Edosulfan II | | | | | | | | | | | | | | | |
| 13 4,4'-DDD | | | | | | | | | | | | | | | |
| 14 Endosulfan Sulfate | | | | | | | | | | | | | | | |
| 15 4,4'-DDT | | | | | | | | | | | | | | | |
| 16 Methoxychlor | | | | | | | | | | | | | | | |
| 17 Endrin Ketone | | | | | | | | | | | | | | | |
| 18 Chlordane | | | | | | | | | | | | | | | |
| 19 Toxaphene | | | | | | | | | | | | | | | |
| 20 AROCLOR-1016 | | | | | | | | | | | | | | | |
| 21 AROCLOR-1221 | | | | | | | | | | | | | | | |
| 22 AROCLOR-1232 | | | | | | | | | | | | | | | |
| 23 AROCLOR-1242 | | | | | | | | | | | | | | | |
| 24 AROCLOR-1248 | | | | | | | | | | | 26600 J | | 17000 | | |
| 25 AROCLOR-1254 | | | | | | | | | | 119000 JC | | | | | |
| 26 AROCLOR-1260 | | 12600 J | 25600 J | 5250000 C | 96000 | 144000 C | 151000 J | 8700 | 544000 | 279000 C | 85800 | 52800 | 30100 | | |

Surface Soils Pest/PCBs

| SITE | SITE J | SITE J | SITE J |
|---|---|---|---|
| SAMPLE NUMBER | DC-SS-46 | DC-SS-47 | DC-SS-48 |
| LOCATION/GRID | SE | NE | NE |
| DATE SAMPLED | 11-13-86 | 11-13-86 | 11-13-86 |
| 1 Alpha-BHC | | | |
| 2 Beta-BHC | | | |
| 3 Delta-BHC | | | |
| 4 Gamma-BHC (Lindane) | | | |
| 5 Heptachlor | | | |
| 6 Aldrin | | | |
| 7 Heptachlor Epoxide | | | |
| 8 Edosulfan I | | | |
| 9 Dieldrin | | | |
| 10 4,4'-DDE | | | |
| 11 Endrin | | | |
| 12 Edosulfan II | | | |
| 13 4,4'-DDD | | | |
| 14 Endosulfan Sulfate | | | |
| 15 4,4'-DDT | | | |
| 16 Methoxychlor | | | |
| 17 Endrin Ketone | | | |
| 18 Chlordane | | | |
| 19 Toxaphene | | | |
| 20 AROCLOR-1016 | | | |
| 21 AROCLOR-1221 | | | |
| 22 AROCLOR-1232 | | | |
| 23 AROCLOR-1242 | | | |
| 24 AROCLOR-1248 | | | |
| 25 AROCLOR-1254 | | | |
| 26 AROCLOR-1260 | | | |

Surface Soil Inorganic

| | SITE | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE NUMBER | DC-SS-01 | DC-SS-02 | DC-SS-03 | DC-SS-04 | DC-SS-05 | DC-SS-06 | DC-SS-07 | DC-SS-08 | DC-SS-09 | DC-SS-10 | DC-SS-11 | DC-SS-12 | DC-SS-13 | DC-SS-14 |
| | LOCATION/GRID | C-1 | G-1 | B-2 | E-2 | H-2 | H-2 | I-2 | I-2 | A-3 | B-3 | C-3 | D-3 | E-3 | F-3 |
| | DATE SAMPLED | 11-10-86 | 11-10-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 |
| 1 | Aluminum | 11400 | 10900 | 7820 | 9670 | 15300 | 16500 | 7610 | 5950 | 9290 | 7880 | 2790 | 23300 | 4780 | 4710 |
| 2 | Antimony | | | | | | | | | | | | | | |
| 3 | Arsenic | 6.8 R | 4.9 R | 5.7 R | 5.8 R | 5.8 | 5.7 R | 7.5 | 5.6 R | 13 R | 5.4 R | 5.6 R | 26 R | 12 R | 8 R |
| 4 | Barium | 163 | 174 | 151 | 145 | 222 | 224 | 202 | 138 | 13800 | 575 | 20200 | 7340 | 169000 | 67300 |
| 5 | Beryllium | | | | | | | | | | | | | | |
| 6 | Boron | | | | | | | | | | | | | | |
| 7 | Cadmium | 2.6 | 3.4 | 1.8 | 1.7 | 6.3 | 4.8 | 10 | 3.3 | 10 | 4.4 | 4.5 | 8.1 | 6 | 4 |
| 8 | Chromium, trivalent | 16 | 15 | 12 | 14 | 21 | 22 | 19 | 11 | 119 | 52 | 39 | 46 | 24 | 52 |
| 9 | Cobalt | 6.2 | 7.8 | 6.4 | 6.4 | 8 | 9.3 | 6 | 5.6 | 15 | 8.5 | 12 | 13 | 89 | 27 |
| 10 | Copper | 327 | 344 | 162 | 245 | 392 | 572 | 2220 | 675 | 1200 | 260 | 487 | 1430 | 624 | 483 |
| 11 | Iron | 19000 | 20300 | 15700 | 17400 | 25900 | 27600 | 20300 | 13800 | 38600 | 18000 | 29800 | 45000 | 22200 | 22400 |
| 12 | Lead | 103 * | 134 * | 68 * | 99 * | 232 * | 230 * | 514 * | 131 * | 655 * | 334 * | 614 * | 711 * | 310 * | 2950 * |
| 13 | Manganese | 336 | 295 | 300 | 329 | 339 | 390 | 291 | 217 | 322 | 171 | 96 | 150 | 129 | 191 |
| 14 | Mercury | 0.16 | 0.23 | | | 0.11 | 0 | 0 | | 6.6 | 1.3 | 1.7 | 14 | 2 | 7.4 |
| 15 | Nickel | 22 | 25 | 18 | 22 | 35 | 33 | 24 | 16 | 360 | 84 | 61 | 382 | 62 | 48 |
| 16 | Selenium | | | | | | | | | | | | | | |
| 17 | Silver | | | | | | | | | 4.2 | 5 | | | | |
| 18 | Thallium | | | | | | | | | | | | | | |
| 19 | Tin | | | | | | | | | | | | | | |
| 20 | Vanadium | 25 | 26 | 20 | 23 | 35 | 38 | 22 | 16 | 139 | 31 | 75 | 129 | 29 | 46 |
| 21 | Zinc | 299 | 406 | 188 | 281 | 619 | 613 | 975 | 354 | 4580 | 5130 | 794 | 23900 | 8110 | 1840 |
| 22 | Cyanide | | | | | | | | | | | 4.8 | 3.3 | 2 | 2.8 |

Surface Soil Inorganic

| SITE | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G | SITE G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-SS-15 | DC-SS-16 ‡ | DC-SS-17 | DC-SS-18 | DC-SS-19 | DC-SS-20 | DC-SS-21 | DC-SS-22 | DC-SS-23 | DC-SS-24 | DC-SS-25 ‡ | DC-SS-26 | DC-SS-27 | DC-SS-28 |
| LOCATION/GRID | G-3 | G-3 | H-3 | A-4 | B-4 | C-4 | D-4 | E-4 | F-4 | G-4 | G-4 | H-4 | I-4 | J-4 |
| DATE SAMPLED | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 | 11-11-86 |
| 1 Aluminum | 6960 | 6170 | 8890 | 4860 | 4790 | 9510 | 6960 | 4990 | 9620 | 4470 | 5720 | 16300 | 5040 | 14900 |
| 2 Antimony | 14 | 21 | | | | | | | | | | | | |
| 3 Arsenic | 36 R | 38 R | 33 R | 64 R | 57 R | 40 R | 14 R | 23 R | 22 R | 39 ‡ | 24 ‡ | 11 ‡ | 10 ‡ | 11 ‡ |
| 4 Barium | 1180 | 869 | 1560 | 13900 | 1810 | 4780 | 10600 | 19300 | 4340 | 6320 | 2220 | 3190 | 1460 | 1000 |
| 5 Beryllium | | | | | | | | | | | | | | 1.4 |
| 6 Boron | | | | | | | | | | | | | | |
| 7 Cadmium | 46 | 45 | 17 | 7.2 | 10 | 11 | 3 | 8.7 | 20 | 17 R‡ | 20 R‡ | 21 R‡ | 27 R‡ | 5.2 R‡ |
| 8 Chromium, trivalent | 147 | 98 | 66 | 137 | 47 | 34 | 44 | 81 | 48 | 41 R‡ | 50 R‡ | 137 R‡ | 22 R‡ | 92 R‡ |
| 9 Cobalt | 11 | 11 | 7.3 | 15 | 3.8 | 6.7 | 12 | 18 | 59 | | [5.0] | [6.3] | [5.2] | [3.9] |
| 10 Copper | 2170 | 1620 | 914 | 246 | 637 | 639 | 444 | 684 | 1950 | 1480 | 1900 | 1020 | 648 | 4880 |
| 11 Iron | 75800 | 108000 | 46000 | 46800 | 48600 | 25800 | 33600 | 15900 | 39900 | 26800 ‡ | 29200 ‡ | 33900 ‡ | 28700 ‡ | 35600 ‡ |
| 12 Lead | 1240 ‡ | 1610 ‡ | 1470 ‡ | 207 ‡ | 263 ‡ | 1470 ‡ | 482 ‡ | 296 ‡ | 11700 ‡ | 418 ‡ | 437 ‡ | 580 ‡ | 440 ‡ | 873 ‡ |
| 13 Manganese | 770 | 874 | 534 | 193 | 223 | 144 | 116 | 278 | 10800 | 184 R‡ | 204 R‡ | 326 R‡ | 259 R‡ | 247 R‡ |
| 14 Mercury | 3.2 | 5.8 | 6.6 | 0.57 | 12 | 2.3 | 3 | 2.7 | 11 | 1.02 | 1.13 | 1.6 | 26 | 3 |
| 15 Nickel | 122 | 109 | 87 | 95 | 84 | 39 | 52 | 33 | 50 | 105 ‡ | 135 ‡ | 60 ‡ | 34 ‡ | 86 ‡ |
| 16 Selenium | | | | | 3 | | | | | | | | | |
| 17 Silver | 6.4 | 5.4 | 6.1 | | | 3.3 | | | 33 | 3.7 R‡ | 3.4 R‡ | 3.5 R‡ | | |
| 18 Thallium | | | | | 21 | | | | | | | | | |
| 19 Tin | 34 | 34 | | | 163 | | | | | | 16 | | | 43 |
| 20 Vanadium | 133 | 140 | 211 | 25 | 19400 | 20 | 69 | 41 | 166 | 64 | 75 | 108 | 59 | 75 |
| 21 Zinc | 22800 | 15600 | 5100 | 32100 | 3.9 | 46700 | 814 | 7100 | 24200 | 32200 | 41400 | 4660 | 4520 | 3280 |
| 22 Cyanide | 1.6 | | | | | | 4.4 | 3.2 | 2.7 | 1.3 | 1.7 | | | 2.5 |

Surface Soil Inorganic

| | SITE | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 | SITE 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE NUMBER | DC-SS-29 | DC-SS-30 | DC-SS-31 | DC-SS-32 | DC-SS-33 | DC-SS-34 | DC-SS-35 | DC-SS-36 | DC-SS-37 | DC-SS-38 | DC-SS-39 | DC-SS-40 | DC-SS-41 | DC-SS-42 | DC-SS-43 |
| | LOCATION/GRID | A-5 | B-5 | B-5 | C-5 | D-5 | E-5 | F-5 | G-5 | H-5 | A-6 | B-6 | C-6 | D-6 | F-6 | B-7 |
| | DATE SAMPLED | 11-11-86 | 11-11-86 | 11-11-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 | 11-12-86 |
| 1 | Aluminum | 19500 | 2890 | 4790 | 12700 | 14300 | 5720 | 2830 | 6370 | 4560 | 2630 | 4890 | 7640 | 10300 | 5540 | 8960 |
| 2 | Antimony | | | | | 19 | | | | | | 16 | 18 | | | |
| 3 | Arsenic | 10 * | 84 * | 74 * | 8.6 * | 16 * | 25 * | 16 * | 4.6 * | 5.2 * | 4.1 * | 17 * | 18 * | 42 * | 12 * | 8 * |
| 4 | Barium | 3760 | 1430 | 1250 | 1390 | 1340 | 9200 | 533 | 1750 | 3870 | 18300 | 4480 | 1940 | 5210 | 1960 | 360 |
| 5 | Beryllium | | | | | | | | | | | | | | | |
| 6 | Boron | | | | | | | | | | | | | | | |
| 7 | Cadmium | 8 R* | 11 R* | 8.7 R* | 8.1 R* | 5.2 R* | 6.5 R* | 3.3 R* | 15 R* | 26 R* | 2 R* | 9.7 R* | 26 R* | 8.1 R* | 13 R* | 14 R* |
| 8 | Chromium, trivalent | 12 R* | 20 R* | 29 R* | 21 R* | 14 R* | 24 R* | 28 R* | 49 R* | 45 R* | 19 R* | 26 R* | 106 R* | 20 R* | 21 R* | 66 R* |
| 9 | Cobalt | [18] | [3.3] | | [4.0] | | [12] | [2.4] | [9.7] | [5.9] | [20] | [6.3] | [16] | [4.6] | [10] | [4.4] |
| 10 | Copper | 489 | 852 | 624 | 1420 | 596 | 435 | 317 | 5500 | 2260 | 327 | 1090 | 1660 | 1510 | 1090 | 753 |
| 11 | Iron | 12500 R* | 34000 * | 82900 * | 17500 | 12400 * | 16400 * | 23400 * | 28400 * | 53900 * | 9780 * | 22000 * | 75100 * | 15300 * | 26500 * | 17700 * |
| 12 | Lead | 279 R* | 304 * | 232 * | 1270 * | 417 * | 318 * | 205 * | 689 * | 724 * | 105 * | 725 * | 18400 * | 516 * | 411 * | 326 * |
| 13 | Manganese | 75 R* | 238 R* | 408 R* | 191 R* | 43 R* | 119 R* | 102 R* | 243 R* | 746 R* | 30 R* | 193 R* | 457 R* | 77 R* | 331 R* | 159 R* |
| 14 | Mercury | 0.66 | 23 | 18 | 0.91 | 0.9 | 2 | 2.2 | 5 | 3 | 0.49 | 2.9 | 2.2 | 1.2 | 3 | 3.4 |
| 15 | Nickel | 111 * | 52 * | 35 * | 29 * | | 21 * | 15 * | 95 * | 53 * | 35 * | 159 * | 70 * | 30 * | 145 * | 27 * |
| 16 | Selenium | | | | | | | | 1.9 | 4.1 | | 1.8 | 1.3 | | | |
| 17 | Silver | | 3.6 R* | | 5.4 R* | 4.1 R* | | | 8.9 R* | 8 R* | | 6.9 R* | 19 R* | 3.9 R* | 3 R* | 3 R* |
| 18 | Thallium | | | | | | | | | | | | | | | |
| 19 | Tin | | 12 | 14 | | | | | 14 | 18 | 16 | 17 | 22 | | | |
| 20 | Vanadium | 11 | 284 | 632 | 30 | 16 | 112 | 39 | 132 | 118 | 23 | 120 | 33 | 17 | 550 | 16 |
| 21 | Zinc | 3080 | 67000 | 20600 | 1890 | 44400 | 12000 | 21700 | 4980 | 4720 | 239 | 1660 | 6350 | 39000 | 2360 | 1500 |
| 22 | Cyanide | | | | | | 2 | 22 | | 2.3 | 1.4 | | 13 | 1.8 | 1 | |

Surface Soil Inorganic

| SITE | BLANK | BLANK | SITE J | SITE J | SITE J |
|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-SS-44+ | DC-SS-45+ | DC-SS-46 | DC-SS-47 | DC-SS-48‡ |
| LOCATION/GRID | | | SE | NE | NE |
| DATE SAMPLED | 11-13-86 | 11-11-86 | 11-13-86 | 11-13-86 | 11-13-86 |
| 1 Aluminum | 7520 | 9260 | 4810 | 630 | 651 |
| 2 Antimony | | | | | |
| 3 Arsenic | | 7 R | 5.3 ‡ | 9.1 ‡ | 6.4 ‡ |
| 4 Barium | 441 | 326 | 346 | 25 | 24 |
| 5 Beryllium | | | | | |
| 6 Boron | | | | | |
| 7 Cadmium | 1.5 R‡ | 1.4 | 2.3 R‡ | 13 R‡ | 9.9 R‡ |
| 8 Chromium, trivalent | 11 R‡ | 13 | 123 R‡ | 690 R‡ | 500 R‡ |
| 9 Cobalt | [4.1] | 4.9 | | [19] | [13] |
| 10 Copper | 33 | 31 | 135 | 614 | [615] |
| 11 Iron | 13400 ‡ | 16200 | 52500 ‡ | 243000 ‡ | 201000 |
| 12 Lead | 60 ‡ | 68 ‡ | 34 ‡ | 23 ‡ | 30 ‡ |
| 13 Manganese | 336 R‡ | 381 | 627 R‡ | 2180 R‡ | 1430 R‡ |
| 14 Mercury | | | 0.41 | | |
| 15 Nickel | 15 ‡ | 16 | 59 ‡ | 350 ‡ | 377 ‡ |
| 16 Selenium | | | | | |
| 17 Silver | | | | | |
| 18 Thallium | | | | | |
| 19 Tin | | | | | |
| 20 Vanadium | 19 | 22 | | | |
| 21 Zinc | 170 | 162 | 65 | 46 | 34 |
| 22 Cyanide | | | | | |

Subsurface Soils Volatiles

| SITE | SITE 6 | SITE 6 | BLANK | SITE 6 | SITE 6 | SITE 6 | BLANK | SITE 6 | SITE 6 | SITE 6 | SITE 6 | BLANK | SITE 6 | SITE 6 | SITE 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-61-26 | DC-61-27 | DC-68-29 + | DC-62-30 | DC-62-31 * | DC-63-33 | DC-68-34 | DC-64-35 | DC-64-36 | DC-65-37 * | DC-66-67 | DC-68-68 + | DC-67-69 | DC-68-70 | DC-69-71 |
| SAMPLE DEPTH | 0-10' | 10'-20' | | 5'-15' | 5'-15' | 10'-20' | | 5'-20' | 5'-20 | 5'-15' | 20'-30' | | 10'-25' | 10'-20' | 35'-40' |
| DATE SAMPLED | 1-12-87 | 1-12-87 | 1-14-87 | 1-14-87 | 1-14-87 | 1-26-87 | 1-26-87 | 1-26-87 | 1-26-87 | 1-27-87 | 2-23-87 | 2-24-87 | 2-24-87 | 2-24-87 | 2-24-87 |
| 1 Chloroethane | | | | | | | | | | | | | | | |
| 2 Bromomethane | | | | | | | | | | | | | | | |
| 3 Vinyl Chloride | | | | | | | | | | | | | | | |
| 4 Chloroethane | | | | | | | | | | | | | | | |
| 5 Methylene Chloride | 8 BJ | 15 B | 9 BJ | 6223 B | 7112 B | 602 B | 4 BJ | 3 BJ | 3 BJ | 851 BJ | 1082 BJ | 48 B | 646 BJ | 871 BJ | 465 BJ |
| 6 Acetone | 32 B | 266 B | | 4699 B | 3048 BJ | 10500 B | 20 B | 1980 EB | 2250 EB | 3302 B | 4118 B | 18 B | 15385 B | 12857 B | 6047 B |
| 7 Carbon Disulfide | | | | | | | | | | | | | | | |
| 8 1,1-Dichloroethene | | | | | | | | | | | | | | | |
| 9 1,1-Dichloroethane | | | | | | | | | | | | | | | |
| 10 trans-1,2-Dichloroethene | | | | | | | | | | | | | | 700 J | |
| 11 Chloroform | | | | | | | | | | | | | | | 11628 |
| 12 1-2-Dichloroethane | | | | | | | | | | | 435 J | | | | |
| 13 2-Butanone (MEK) | 36 B | 29 B | 27 B | 15240 B | 17780 B | 4100 B | | 22 B | 15 B | 3683 B | 8941 B | 27 B | 9692 B | 12286 | 9535 B |
| 14 1,1,1-Trichloroethane | | | | | | | | | | | | | | | |
| 15 Carbon Tetrachloride | | | | | | | | | | | | | | | |
| 16 Vinyl Acetate | | | | | | | | | | | | | | | |
| 17 Bromodichloromethane | | | | | | | | | | | | | | | |
| 18 1,2-Dichloropropane | | | | | | | | | | | | | | | |
| 19 trans-1,3-Dichloropropene | | | | | | | | | | | | | | | |
| 20 Trichloroethene | | | | | | | | | | 762 J | 1141 J | | 3846 | 2000 J | |
| 21 Dibromochloromethane | | | | | | | | | | | | | | | |
| 22 1,1,2-Trichloroethane | | | | | | | | | | | | | | | |
| 23 Benzene | | | | | | | | 3 J | 5 J | 10160 | 9882 | | 21538 | 5143 | 45349 |
| 24 cis-1,3-Dichloropropene | | | | | | | | | | | | | | | |
| 25 2-Chloroethyl Vinyl Ether | | | | | | | | | | | | | | | |
| 26 Bromoform | | | | | | | | | | | | | | | |
| 27 4-Methyl-2-pentanone | | | | | | | | | | 635 J | 1176 J | | 4154 | 6000 | |
| 28 2-Hexanone | | | | | | | | | | | | | | | |
| 29 Tetrachloroethene | | 9 J | | 13970 | 5207 | | | | | 3556 | 11765 | | 44615 | 58571 | 12791 |
| 30 1,1,2,2-Tetrachloroethane | | | | | | | | | | | | | | | 581 J |
| 31 Toluene | | | | 406 J | | | | | | 27940 | 117647 | | 38462 | 12143 | 94186 |
| 32 Chlorobenzene | | | | 584 J | | 1600 | | 107 | 150 | 2413 | 27059 B | 1 J | 538462 E | 100000 B | 197674 E |
| 33 Ethylbenzene | | | | | | 164 J | | | | 1245 J | 988 J | | 16923 | 14286 | 7209 |
| 34 Styrene | | | | | | | | | | | | | | | |
| 35 Total Xylenes | | | | | | 92 | | | | 2794 | 2235 | | 41538 | 35714 | 16279 B |

Subsurface Soils Volatiles

| | SITE | SITE H | SITE H | SITE H | SITE H | SITE H | SITE H | BLANK | SITE H | SITE H | SITE H | SITE H | SITE H | SITE I | SITE I | SITE I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE NUMBER | DC-H1-14 | DC-H1-15 | DC-H2-16 | DC-H3-17 | DC-H3-18 * | DC-H4-19 | DC-HB-20 + | DC-H5-21 | DC-H6-22 | DC-H7-23 | DC-H8-24 | DC-H9-28 | DC-I1-38 | DC-I2-39 | DC-I3-40 |
| | SAMPLE DEPTH | 15'-25' | 35'-50' | 5'-20' | 10'-20' | 10'-20' | 10'-25' | | 0-10' | 35'-50' | 35'-50' | 5'-15' | 15'-25' | 0-10' | 5'-25' | 5'-15' |
| | DATE SAMPLED | 12-18-86 | 12-18-87 | 1-5-87 | 1-6-87 | 1-6-87 | 1-6-87 | 1-7-87 | 1-7-87 | 1-8-87 | 1-8-87 | 1-9-87 | 1-13-87 | 1-27-87 | 1-28-87 | 1-29-87 |
| | | | | | | | | 66 | | | | | | | | |
| 1 | Chloromethane | | | | | | | | | | | | | | | |
| 2 | Bromomethane | | | | | | | | | | | | | | | |
| 3 | Vinyl Chloride | | | | | | | | | | | | | | | |
| 4 | Chloroethane | | | | | | | | | | | | | | | |
| 5 | Methylene Chloride | 710 BJ | 13 J | 13137 B | 52 B | 38 B | 55600 B | 59 B | 39 B | 32 B | 38 B | 38 B | 6 BJ | 740 BJ | 2160 B | 6769 B |
| 6 | Acetone | 7099 B | 30 B | 21140 B | 461 B | 1135 BE | 18070 B | 49 B | 15 BJ | 2835 BE | 319 B | 754 BE | 1524 BE | 2192 BJ | 11340 B | 16920 B |
| 7 | Carbon Disulfide | | | | | | | | | | | | | | | |
| 8 | 1,1-Dichloroethene | | | | | | | | | | | | | | | |
| 9 | 1,1-Dichloroethane | | | | | | | | | | | | | | | |
| 10 | trans-1,2-Dichloroethene | | | | | | | | | | | | | | | |
| 11 | Chloroform | | | | 192 | 53 | | | | | | | | | | |
| 12 | 1-2-Dichloroethane | | | | 12 J | | | | | | | | | | | |
| 13 | 2-Butanone (MEK) | 10968 B | | 27180 B | | | 25020 B | | | | 33 | | 36 B | 3562 B | 10530 B | 16920 B |
| 14 | 1,1,1-Trichloroethane | | | | | | | | | | | | | | | 1692 |
| 15 | Carbon Tetrachloride | | | | | | | | | | | | | | | |
| 16 | Vinyl Acetate | | | | | | | | | | | | | | | |
| 17 | Bromodichloromethane | | | | | | | | | | | | | | | |
| 18 | 1,2-Dichloropropane | | | | | | | | | | | | | | | |
| 19 | trans-1,3-Dichloropropene | | | | | | | | | | | | | | | |
| 20 | Trichloroethene | | | | 10 J | | | | | | | | | | | |
| 21 | Dibromochloromethane | | | | | | | | | | | | | | | |
| 22 | 1,1,2-Trichloroethane | | | | | | | | | | | | | | | |
| 23 | Benzene | 61290 | 4 J | 22650 | 256 | 71 | 22240 | | | 19 | | | | 397 J | 5265 | |
| 24 | cis-1,3-Dichloropropene | | | | | | | | | | | | | | | |
| 25 | 2-Chloroethyl Vinyl Ether | | | | | | | | | | | | | | | |
| 26 | Bromoform | | | | | | | | | | | | | | | |
| 27 | 4-Methyl-2-pentanone | | | 7852 J | 909 E | 554 | | 14 J | | 9 J | | | | | | |
| 28 | 2-Hexanone | | | | | | | | | | | | | | | |
| 29 | Tetrachloroethene | 5645 | | | | | | | | | | | | | 5265 | 1354 J |
| 30 | 1,1,2,2-Tetrachloroethane | | | | | | | | | | | | | | | |
| 31 | Toluene | 25806 | | 11174 | 486 | 145 | 76450 | | | | | | | 658 J | 7425 | 677 BJ |
| 32 | Chlorobenzene | 451613 E | 24 | 120800 | 307 | 77 | 12788 | | | | | | | 90420 E | 13500 | 126900 |
| 33 | Ethylbenzene | 10000 | | 4379 J | | | 12788 | | | | | | | 15070 | 3375 | |
| 34 | Styrene | | | | | | | | | | | | | | | |
| 35 | Total Xylenes | 19355 | | 1510 J | | | 23630 | | | | | | | 19180 | 8100 | |

Subsurface Soils Volatiles

| | SITE | SITE I | SITE I | SITE I | BLANK | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I | SITE J |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE NUMBER | DC-15-41 | DC-15-42 | DC-16-43 | DC-18-44 | DC-17-45 | DC-17-46 | DC-17-47 | DC-19-48 | DC-19-49 | DC-110-50 | DC-111-51 | DC-111-52 | DC-112-57 | DC-112-58 | DC-J1-11 |
| | SAMPLE DEPTH | 5'-27.5' | 28'-38' | 10'-25' | | 3.5'-12.5' | 13'-23' | 13'-23' | 6'-23' | 24'-30' | 15'-30' | 6'-20' | 26'-39' | 3.5'-12.5' | 18.5'-27.5' | 10'-20' |
| | DATE SAMPLED | 1-30-87 | 1-30-87 | 2-2-87 | 2-3-87 | 2-3-87 | 2-3-87 | 2-3-87 | 2-4-87 | 2-4-87 | 2-4-87 | 2-5-87 | 2-5-87 | 2-13-87 | 2-13-87 | 12-17-86 |
| 1 | Chloromethane | | | | | | | | | | | | | | | |
| 2 | Bromomethane | | | | | | | | | | | | | | | |
| 3 | Vinyl Chloride | | | | | | | | | | | | | | | |
| 4 | Chloroethane | | | | | | | | | | | | | | | |
| 5 | Methylene Chloride | 5207 B | 5310 B | 1047 BJ | 6 B | 7 B | 15 B | 13 B | 1117 BJ | 418 BJ | 636 BJ | 852 BJ | 46 B | 17 B | 17 B | 5 BJ |
| 6 | Acetone | 10541 B | 6726 B | 13398 B | 10 JB | 1950 EB | 850 EB | 914 EB | 13377 B | 5289 B | 6480 B | 13861 B | 708 B | 1461 BE | 549 BE | 562 BE |
| 7 | Carbon Disulfide | | | | | | | | | | | | | | | |
| 8 | 1,1-Dichloroethene | | | | | | | | | | | | | | | |
| 9 | 1,1-Dichloroethane | | | | | | | | | | | | | | | |
| 10 | trans-1,2-Dichloroethene | | | | | 3 J | | | | | | | | | | |
| 11 | Chloroform | | | | | | | | | | | | | | | |
| 12 | 1-2-Dichloroethane | | | | | | | | | | | | | | | |
| 13 | 2-Butanone (MEK) | 13970 B | 9794 B | 9702 B | 18 | 30 | | 23 | 10731 B | 4059 B | 8640 B | 14696 B | 168 B | 12 B | 27 B | 22 B |
| 14 | 1,1,1-Trichloroethane | | | | | | | | | | 432 J | | | | | |
| 15 | Carbon Tetrachloride | | | | | | | | | | | | | | | |
| 16 | Vinyl Acetate | | | | | | | | | | | | | | | |
| 17 | Bromodichloromethane | | | | | | | | | | | | | | | |
| 18 | 1,2-Dichloropropane | | | | | | | | | | | | | | | |
| 19 | trans-1,3-Dichloropropene | | | | | | | | | | | | | | | |
| 20 | Trichloroethene | 3810 | | | | | | | | | 648 J | | | | | |
| 21 | Dibromochloromethane | | | | | | | | | | | | | | | |
| 22 | 1,1,2-Trichloroethane | | | | | | | | | | | | | | | |
| 23 | Benzene | 24130 | 637 J | 2156 | | | | | 1000 J | 107 J | 1008 J | 3340 | 23 J | | | |
| 24 | cis-1,3-Dichloropropene | | | | | | | | | | | | | | | |
| 25 | 2-Chloroethyl Vinyl Ether | | | | | | | | | | | | | | | |
| 26 | Bromoform | | | | | | | | | | | | | | | |
| 27 | 4-Methyl-2-pentanone | | | 4158 | | | | | | | | | | | 1 BJ | |
| 28 | 2-Hexanone | | | | | | | | | | | | | | | |
| 29 | Tetrachloroethene | 2667 | 2950 | | | | | | | | 612 J | | | | | |
| 30 | 1,1,2,2-Tetrachloroethane | | | | | | | | | | | | | | | |
| 31 | Toluene | 24130 B | 1657 JB | 5087 | | | | | 77910 | 1353 B | 3120 | 1837 | 48 | | | |
| 32 | Chlorobenzene | 45720 | 14160 | 7854 | | 10 | | | 3234 | 935 | 2640 | 108550 | 2040 | | | |
| 33 | Ethylbenzene | 9779 | 3068 | 5082 | | | | | 588 J | 283 J | 8160 | 1035 J | 96 | | | |
| 34 | Styrene | | | | | | | | | | | | | | | |
| 35 | Total Xylenes | 11049 | 1652 J | 4158 | | | | | 867 J | 102 J | 2760 | 1620 J | 80 | | | |

Subsurface Soils Volatiles

| | SITE | SITE J | SITE J | SITE K | SITE K | SITE K | BLANK | SITE L | SITE L | SITE L | SITE L | SITE L | SITE N | SITE N | BLANK | SITE P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE NUMBER | DC-J2-12 | DC-J3-13 | DC-K1-08 | DC-K2-25 | DC-K3-32 | DC-LB-01 + | DC-L1-02 | DC-L2-03 | DC-L3-04 | DC-L4-09 | DC-L4-10 * | DC-N1-05 | DC-N2-06 | DC-NB-07 + | DC-P1-53 |
| | SAMPLE DEPTH | 15'-25' | 0-10' | 0-10' | 0-10' | 10'-20' | | 5'-10' | 5'-15' | 5'-15' | 10'-20' | 10'-20' | 0-10' | 5'-15' | | 0-10' |
| | DATE SAMPLED | 12-17-86 | 12-17-86 | 12-16-87 | 1-12-87 | 1-22-87 | 12-12-86 | 12-12-86 | 12-12-86 | 12-12-86 | 12-17-86 | 12-17-86 | 12-15-86 | 12-15-86 | 12-16-86 | 2-11-87 |
| 1 | Chloromethane | | | | | | | | | | | | | | | |
| 2 | Bromomethane | | | | | | | | | | | | | | | |
| 3 | Vinyl Chloride | | | | | | | | | | | | | | | |
| 4 | Chloroethane | | | | | | | | | | | | | | | |
| 5 | Methylene Chloride | 372 BJ | 3 BJ | 6 B | 13 B | 9 B | 17 B | 14 B | 141 B | 2278 B | 8 | 5 J | 4 BJ | 6 J | 4 BJ | 18 B |
| 6 | Acetone | 4487 B | 467 BE | 212 B | 44 B | 1003 EB | 32 B | 907 B | 449 B | 4557 B | 32 B | 81 B | 45 B | 11 BJ | 23 B | 1025 BE |
| 7 | Carbon Disulfide | | | | | | | | | | | | | | | |
| 8 | 1,1-Dichloroethene | | | | | | | | | | | | | | | |
| 9 | 1,1-Dichloroethane | | | | | | | | | | | | | | | |
| 10 | trans-1,2-Dichloroethene | | | | | | | | | | | | | | | |
| 11 | Chloroform | | | | | | | | | 20253 | 96 | 49 | | | | 13 |
| 12 | 1-2-Dichloroethane | | | | | | | | | | | | | | | |
| 13 | 2-Butanone (MEK) | 6026 B | | 25 B | 29 B | 29 B | | 16 | | 10000 B | 16 B | | | 14 J | | 188 B |
| 14 | 1,1,1-Trichloroethane | | | | | | | | | | | | | | | |
| 15 | Carbon Tetrachloride | | | | | | | | | | | | | | | |
| 16 | Vinyl Acetate | | | | | | | | | | | | | | | |
| 17 | Bromodichloromethane | | | | | | | | | | | | | | | |
| 18 | 1,2-Dichloropropane | | | | | | | | | | | | | | | |
| 19 | trans-1,3-Dichloropropene | | | | | | | | | | | | | | | |
| 20 | Trichloroethene | | | | | | | | | | | | | | | |
| 21 | Dibromochloromethane | | | | | | | | | | | | | | | |
| 22 | 1,1,2-Trichloroethane | | | | | | | | | | | | | | | |
| 23 | Benzene | | | | | | | | 141 | 4177 | 7 J | 4 J | | | | 49 |
| 24 | cis-1,3-Dichloropropene | | | | | | | | | | | | | | | |
| 25 | 2-Chloroethyl Vinyl Ether | | | | | | | | | | | | | | | |
| 26 | Bromoform | | | | | | | | | | | | | | | |
| 27 | 4-Methyl-2-pentanone | | 4 J | 11 J | | | | 8 J | 167 | | 68 B | 49 B | 4 J | | | 49 |
| 28 | 2-Hexanone | | | | | | | | | | | | | | | 38 |
| 29 | Tetrachloroethene | | | | | | | | | | | | | | | |
| 30 | 1,1,2,2-Tetrachloroethane | | | | | | | | | | | | | | | |
| 31 | Toluene | | | 15 | | | | | 2179 | 26582 | 93 | 50 | | | | 413 |
| 32 | Chlorobenzene | | | | | | | | | | | | | | | 138 |
| 33 | Ethylbenzene | 2051 | | | | | | | 40 J | | | | | | | 119 |
| 34 | Styrene | | | | | | | | | | | | | | | |
| 35 | Total Xylenes | 7949 | | | | | | | 179 | 670 J | | | | | | 450 |

Subsurface Soils Volatiles

| SITE | SITE P | SITE P | SITE P | SITE O | SITE O | SITE O | SITE O | SITE O | SITE O | BLANK | SITE O | SITE O | SITE O | SITE O | SITE O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-P2-54 | DC-P5-55 | DC-P5-56 * | DC-01-59 | DC-02-60 | DC-03-61 | DC-04-62 | DC-05-63 | DC-05-64 * | DC-08-65 + | DC-06-66 | DC-09-72 | DC-09-73 | DC-010-74 | DC-010-75 |
| SAMPLE DEPTH | 25'-35' | 10'-25 | 10'-25' | 15'-25' | 20'-30' | 10'-20' | 0-10' | 8.5'-20' | 8.5'-20' | | 15'-25' | 0-10' | 15'-25' | 5'-10' | 10'-15' |
| DATE SAMPLED | 2-11-87 | 2-12-87 | 2-12-87 | 2-16-87 | 2-17-87 | 2-17-87 | 2-17-87 | 2-17-87 | 2-17-87 | 2-18-87 | 2-18-87 | 2-26-87 | 2-26-87 | 2-26-87 | 2-26-87 |
| 1 Chloromethane | | | | | | | | | | | | | | | |
| 2 Bromomethane | | | | | | | | | | | | | | | |
| 3 Vinyl Chloride | | | | | | | | | | | | | | | |
| 4 Chloroethane | | | | | | | | | | | | | | | |
| 5 Methylene Chloride | 5 BJ | 2 BJ | 5 BJ | | 35 | 10 J | 833 BJ | | 18 J | 139 B | 4 J | 878 BJ | 519 BJ | 731 BJ | 341 BJ |
| 6 Acetone | 1036 BE | 333 BE | 413 BE | 1379 BE | 9103 BE | 4405 BE | 7692 B | 8659 BE | 11463 BE | | 457 B | | 2593 B | 5846 B | 2514 B |
| 7 Carbon Disulfide | | | | | | | | | | | | | | | |
| 8 1,1-Dichloroethene | | | | | | | | | | | | | | | |
| 9 1,1-Dichloroethane | | | | | 10 J | | | | | | | | | | |
| 10 trans-1,2-Dichloroethene | | | | | 192 | 6 J | | | | | | | | | |
| 11 Chloroform | | | | | | | | | | | | | | | |
| 12 1-2-Dichloroethane | | | | | 23 | | | | | | | | | | |
| 13 2-Butanone (MEK) | 76 B | 22 B | 26 B | 30 B | 25641 BE | 36 B | 7179 B | 244 B | 171 B | | 20 B | | 4444 B | 7436 B | 6705 B |
| 14 1,1,1-Trichloroethane | | | | | | | 1410 | | | | | | | | |
| 15 Carbon Tetrachloride | | | | | | | | | | | | | | | |
| 16 Vinyl Acetate | | | | | | | | | | | | | | | |
| 17 Bromodichloromethane | | | | | | | | | | | | | | | |
| 18 1,2-Dichloropropane | | | | | | | | | | | | | | | |
| 19 trans-1,3-Dichloropropene | | | | | | | | | | | | | | | |
| 20 Trichloroethene | | | | | 69 | | | | | | | | | | |
| 21 Dibromochloromethane | | | | | | | | | | | | | | | |
| 22 1,1,2-Trichloroethane | | | | | | | | | | | | | | | |
| 23 Benzene | | | | | 667 | 24 | 30769 | | 18 J | | | | | 1795 | |
| 24 cis-1,3-Dichloropropene | | | | | | | | | | | | | | | |
| 25 2-Chloroethyl Vinyl Ether | | | | | | | | | | | | | | | |
| 26 Bromoform | | | | | | | | | | | | | | | |
| 27 4-Methyl-2-pentanone | 29 B | | | | 1244 B | | 7692 | | | | | | | | |
| 28 2-Hexanone | 2 BJ | | | | 63 | | | | | | | | | | |
| 29 Tetrachloroethene | | | | | | | | | | | | | | | |
| 30 1,1,2,2-Tetrachloroethane | | | | | 28 | | | | | | | | | | |
| 31 Toluene | | | | | | | 29487 | | | | | 293 J | | 4339 | |
| 32 Chlorobenzene | | | | | 1667 | 62 | 38462 | 74 | 159 | | | 841 J | | 58974 | 1250 |
| 33 Ethylbenzene | | | | | 46 | 167 | 166667 E | 37 J | 57 J | | | 2439 | 74 J | 9103 | 341 J |
| 34 Styrene | | | | | | | | | | | | | | | |
| 35 Total Xylenes | | | | | 141 | 976 | 615385 E | 244 | 256 | | | 21951 | 235 J | 29487 | 1114 J |

Subsurface Soils Volatiles

| | |
|---|---|
| | SITE |
| | SAMPLE NUMBER |
| | SAMPLE DEPTH |
| | DATE SAMPLED |
| 1 | Chloromethane |
| 2 | Bromomethane |
| 3 | Vinyl Chloride |
| 4 | Chloroethane |
| 5 | Methylene Chloride |
| 6 | Acetone |
| 7 | Carbon Disulfide |
| 8 | 1,1-Dichloroethene |
| 9 | 1,1-Dichloroethane |
| 10 | trans-1,2-Dichloroethene |
| 11 | Chloroform |
| 12 | 1-2-Dichloroethane |
| 13 | 2-Butanone (MEK) |
| 14 | 1,1,1-Trichloroethane |
| 15 | Carbon Tetrachloride |
| 16 | Vinyl Acetate |
| 17 | Bromodichloromethane |
| 18 | 1,2-Dichloropropane |
| 19 | trans-1,3-Dichloropropene |
| 20 | Trichloroethene |
| 21 | Dibromochloromethane |
| 22 | 1,1,2-Trichloroethane |
| 23 | Benzene |
| 24 | cis-1,3-Dichloropropene |
| 25 | 2-Chloroethyl Vinyl Ether |
| 26 | Bromoform |
| 27 | 4-Methyl-2-pentanone |
| 28 | 2-Hexanone |
| 29 | Tetrachloroethene |
| 30 | 1,1,2,2-Tetrachloroethane |
| 31 | Toluene |
| 32 | Chlorobenzene |
| 33 | Ethylbenzene |
| 34 | Styrene |
| 35 | Total Xylenes |

Subsurface Soils Semivolatiles

| | SITE | SITE 6 | SITE 6 | BLANK | SITE 6 | SITE 6 | SITE 6 | BLANK | SITE 6 | SITE 6 | SITE 6 | SITE 6 | BLANK | SITE 6 | SITE 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE NUMBER | DC-61-26 | DC-61-27 | DC-68-29 + | DC-62-30 | DC-62-31 * | DC-63-33 | DC-68-34 | DC-64-35 | DC-64-36 | DC-65-37 * | DC-66-67 | DC-68-68 + | DC-67-69 | DC-68-70 |
| | SAMPLE DEPTH | 0-10' | 10'-20' | | 5'-15' | 5'-15' | 10'-20' | | 5'-20' | 5'-20 | 5'-15' | 20'-30' | | 10'-25' | 10'-20' |
| | DATE SAMPLED | 1-12-87 | 1-12-87 | 1-14-87 | 1-14-87 | 1-14-87 | 1-26-87 | 1-26-87 | 1-26-87 | 1-26-87 | 1-27-87 | 2-23-87 | 2-24-87 | 2-24-87 | 2-24-87 |
| 1 | Phenol | | | | | | | | | | 177800 | | | | |
| 2 | bis(2-Chloroethyl)ether | | | | | | | | | | | | | | |
| 3 | 2-Chlorophenol | | | | | | | | | | 8763 J | | | | |
| 4 | 1,3-Dichlorobenzene | | | | | | | | | | | | | | |
| 5 | 1,4-Dichlorobenzene | | | | 3556 J | | | | 2376 | 3750 J | | | | | |
| 6 | Benzyl Alcohol | | | | | | | | | | 6095 J | | | | |
| 7 | 1,2-Dichlorobenzene | | | | | | | | | | | | | | |
| 8 | 2-Methylphenol | | | | | | | | | | 3556 J | | | | |
| 9 | bis(2-Chloroisopropyl) ether | | | | | | | | | | | | | | |
| 10 | 4-Methylphenol | | | | | | | | | | | | | | |
| 11 | N-Nitroso-n-Dipropylamine | | | | | | | | | | | | | | |
| 12 | Hexachloroethane | | | | | | | | | | | | | | |
| 13 | Nitrobenzene | | | | | | | | | | | | | | |
| 14 | Isophorone | | | | | | | | | | | | | | |
| 15 | 2-Nitrophenol | | | | | | | | | | | | | | |
| 16 | 2,4-Dimethylphenol | | | | | | | | | | | | | | |
| 17 | Benzoic Acid | | | | | | | | | | | | | | |
| 18 | bis-(2-Chloroethoxy)methane | | | | | | | | | | | | | | |
| 19 | 2,4-Dichlorophenol | | | | | | | | | | 38100 | 14118 J | | | 141429 J |
| 20 | 1,2,4-Trichlorobenzene | | | | | | | | | | 7874 J | 103529 | | 120000 J | |
| 21 | Naphthalene | | | | 4953 J | 4826 J | | | | | 254000 | 341176 | | 109231 J | 5428571 |
| 22 | 4-Chloroaniline | | | | | | | | | | 5969 J | | | 239769 J | |
| 23 | Hexachlorobutadiene | | | | | | | | | | | | | | |
| 24 | 4-Chloro-3-methylphenol | | | | | | | | | | | | | | |
| 25 | 2-Methylnaphthalene | | | | | | | | | | 13970 J | 8706 J | | | 37143 J |
| 26 | Hexachlorocyclopentadiene | | | | | | | | | | | | | | |
| 27 | 2,4,6-Trichlorophenol | | | | | | | | | | 49530 | | | | |
| 28 | 2,4,5-Trichlorophenol | | | | | | | | | | | | | | |
| 29 | 2-Chloronaphthalene | | | | | | | | | | | | | | |
| 30 | 2-Nitroaniline | | | | | | | | | | | | | | |

Subsurface Soils Semivolatiles

| SITE | SITE B | SITE H | SITE H | SITE H | SITE H | SITE H | SITE H | BLANK | SITE H | SITE H | SITE H | SITE H | SITE H | SITE I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-G9-71 | DC-H1-14 | DC-H1-15 | DC-H2-16 | DC-H3-17 | DC-H3-18 * | DC-H4-19 | DC-H8-20 + | DC-H5-21 | DC-H6-22 | DC-H7-23 | DC-H8-24 | DC-H9-28 | DC-I1-38 |
| SAMPLE DEPTH | 35'-40' | 15'-25' | 35'-50' | 5'-20' | 10'-20' | 10'-20' | 10'-25' | | 0-10' | 35'-50' | 35'-50' | 5'-15' | 15'-25' | 0-10' |
| DATE SAMPLED | 2-24-87 | 12-18-86 | 12-18-87 | 1-5-87 | 1-6-87 | 1-6-87 | 1-6-87 | 1-7-87 | 1-7-87 | 1-8-87 | 1-8-87 | 1-9-87 | 1-13-87 | 1-27-87 |
| 1 Phenol | | | | | | 422 J | | | | | | | | |
| 2 bis(2-Chloroethyl)ether | | | | | | | | | | | | | | |
| 3 2-Chlorophenol | | | | | | | | | | | | | | |
| 4 1,3-Dichlorobenzene | | 241935 J | | 13288 J | | | 7645 J | | | | | | | |
| 5 1,4-Dichlorobenzene | | 30645161 E | 1190 | 890000 | | | 68110 | | | | | 62 J | | 10960 J |
| 6 Benzyl Alcohol | | | | | | | 7923 J | | | | | | | |
| 7 1,2-Dichlorobenzene | | 19354839 E | 548 | 90600 | | | | | | | | | | 8905 J |
| 8 2-Methylphenol | | | | | | | | | | | | | | |
| 9 bis(2-Chloroisopropyl) ether | | | | | | | | | | | | | | |
| 10 4-Methylphenol | | | | | | 172 J | | | | | | | | |
| 11 N-Nitroso-n-Dipropylamine | | | | | | | | | | | | | | |
| 12 Hexachloroethane | | | | | | | | | | | | | | 3014 J |
| 13 Nitrobenzene | | | | | | | | | | | | | | |
| 14 Isophorone | | | | | | | | | | | | | | |
| 15 2-Nitrophenol | | | | | | | | | | | | | | |
| 16 2,4-Dimethylphenol | | | | | | 92 J | | | | | | | | |
| 17 Benzoic Acid | | | | | 1408 J | 2640 | | | | | | | | |
| 18 bis-(2-Chloroethoxy)methane | | | | | | | | | | | | | | |
| 19 2,4-Dichlorophenol | | 741935 | 167 J | | 294 J | 330 J | 8479 J | | | | | | | |
| 20 1,2,4-Trichlorobenzene | 15116 J | 7580645 | 4048 | 211400 | | 145 J | 194600 | | | 61 J | | | | 6713 J |
| 21 Naphthalene | 109302 | | | 2265000 | 282 J | 1320 | | | | | | 44 J | | 2877 J |
| 22 4-Chloroaniline | 8023 J | | | | | | | | | | | | | |
| 23 Hexachlorobutadiene | | | | | | | | | | | | | | |
| 24 4-Chloro-3-methylphenol | | | | | | | | | | | | | | |
| 25 2-Methylnaphthalene | 13953 J | | | 347300 | | 277 J | | | | | | 156 J | | 3425 J |
| 26 Hexachlorocyclopentadiene | | | | | | | | | | | | | | |
| 27 2,4,6-Trichlorophenol | | 612903 | 179 J | | | | | | | | | | | |
| 28 2,4,5-Trichlorophenol | | | | | | | | | | | | | | |
| 29 2-Chloronaphthalene | | | | | | | | | | | | | | |
| 30 2-Nitroaniline | | | | | | | | | | | | | | |

Subsurface Soils Semivolatiles

| SITE | SITE I | SITE I | SITE I | SITE I | SITE I | BLANK | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-12-39 | DC-13-40 | DC-15-41 | DC-15-42 | DC-16-43 | DC-18-44 | DC-17-45 | DC-17-46 | DC-17-47 & | DC-19-48 | DC-19-49 | DC-110-50 | DC-111-51 | DC-111-52 |
| SAMPLE DEPTH | 5'-25' | 5'-15' | 5'-27.5' | 28'-38' | 10'-25' | | 3.5'-12.5' | 13'-23' | 13'-23' | 6'-23' | 24'-30' | 15'-30' | 6'-20' | 26'-39' |
| DATE SAMPLED | 1-28-87 | 1-29-87 | 1-30-87 | 1-30-87 | 2-2-87 | 2-3-87 | 2-3-87 | 2-3-87 | 2-3-87 | 2-4-87 | 2-4-87 | 2-4-87 | 2-5-87 | 2-5-87 |
| 1 Phenol | 27000 J | | | | 15246 J | | | | | | | | | |
| 2 bis(2-Chloroethyl)ether | | | | | | | | | | | | | | |
| 3 2-Chlorophenol | | | | | | | | | | | | | | |
| 4 1,3-Dichlorobenzene | 18900 J | | | | | | | | | | | | 70140 | |
| 5 1,4-Dichlorobenzene | 32400 | 3666 J | 558800 | 22420 | 72380 | | | | | | | | 1837000 | 1596 J |
| 6 Benzyl Alcohol | | | | | | | | | | | | | | |
| 7 1,2-Dichlorobenzene | 324000 | 2679 J | 139700 J | 6490 J | 15400 J | | | | | | | | | |
| 8 2-Methylphenol | | | | | | | | | | | | | | |
| 9 bis(2-Chloroisopropyl) ether | | | | | | | | | | | | | | |
| 10 4-Methylphenol | | | | | | | | | | | | | | |
| 11 N-Nitroso-n-Dipropylamine | | | | | | | | | | | | | | |
| 12 Hexachloroethane | | | | | | | | | | | | | | |
| 13 Nitrobenzene | | | | | | | | | | | | | | |
| 14 Isophorone | | | | | | | | | | | | | | |
| 15 2-Nitrophenol | | | | | | | | | | | | | | |
| 16 2,4-Dimethylphenol | | | | | | | | | | | | | | |
| 17 Benzoic Acid | 62100 J | | | | | | | | | | | | | |
| 18 bis-(2-Chloroethoxy)methane | | | | | | | | | | | | | | |
| 19 2,4-Dichlorophenol | | | | | | | | | | | | 9000 J | | |
| 20 1,2,4-Trichlorobenzene | 1485000 | | 8255000 E | 637200 E | 477400 | | | | | | | 116400 | 100200 | 112800 |
| 21 Naphthalene | 58050 | | 63500 J | 1100 J | 44660 J | | | | | 514500 | 1845 J | | | |
| 22 4-Chloroaniline | | | 43180 J | | | | | | | | | | | |
| 23 Hexachlorobutadiene | | | | | | | | | | | | | | |
| 24 4-Chloro-3-methylphenol | | | | | | | | | | | | | | |
| 25 2-Methylnaphthalene | 7020 J | | 58420 J | 1700 J | 169400 | | | | | 5880 J | | | 23380 J | |
| 26 Hexachlorocyclopentadiene | | | | | | | | | | | | | | |
| 27 2,4,6-Trichlorophenol | | | | | | | | | | | | | | |
| 28 2,4,5-Trichlorophenol | | | | | | | | | | | | | | |
| 29 2-Chloronaphthalene | | | | | | | | | | | | | | |
| 30 2-Nitroaniline | | | | | | | | | | | | | | |

Subsurface Soils Semivolatiles

| SITE | SITE I | SITE I | SITE J | SITE J | SITE J | SITE K | SITE K | SITE K | BLANK | SITE L | SITE L | SITE L | SITE L | SITE L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-I12-57 | DC-I12-58 | DC-J1-11 | DC-J2-12 | DC-J3-13 | DC-K1-00 | DC-K2-25 | DC-K3-32 | DC-LB-01 + | DC-L1-02 | DC-L2-03 | DC-L3-04 | DC-L4-09 | DC-L4-10 * |
| SAMPLE DEPTH | 3.5'-12.5' | 18.5'-27.5' | 10'-20' | 15'-25' | 0-10' | 0-10' | 0-10' | 10'-20' | | 5'-10' | 5'-15' | 5'-15' | 10'-20' | 10'-20' |
| DATE SAMPLED | 2-13-87 | 2-13-87 | 12-17-86 | 12-17-86 | 12-17-86 | 12-16-87 | 1-12-87 | 1-22-87 | 12-12-86 | 12-12-86 | 12-12-86 | 12-12-86 | 12-17-86 | 12-17-86 |
| 1 Phenol | | | | | | | | | | | 346 J | 1519 J | | |
| 2 bis(2-Chloroethyl)ether | | | | | | | | | | | | | | |
| 3 2-Chlorophenol | | | | | | | | | | | | 2152 | | |
| 4 1,3-Dichlorobenzene | | | | | | | | | | | | | | |
| 5 1,4-Dichlorobenzene | | | | | 211 J | | | | | | | 215 J | | |
| 6 Benzyl Alcohol | | | | | | | | | | | | | | |
| 7 1,2-Dichlorobenzene | | | | | 100 J | | | | | | | | | |
| 8 2-Methylphenol | | | | | | | | | | | | | | |
| 9 bis(2-Chloroisopropyl) ether | | | | | | | | | | | | | | |
| 10 4-Methylphenol | | | | | | | | | | | 88 J | 1089 J | | |
| 11 N-Nitroso-n-Dipropylamine | | | | | | | | | | | | | | |
| 12 Hexachloroethane | | | | | | | | | | | | | | |
| 13 Nitrobenzene | | | | | | | | | | | | | | 49 J |
| 14 Isophorone | | | | | | | | | | | | | | |
| 15 2-Nitrophenol | | | | | | | | | | | | | | |
| 16 2,4-Dimethylphenol | | | | | | | | | | | | | | |
| 17 Benzoic Acid | | | | | | | | | | | | | | |
| 18 bis-(2-Chloroethoxy)methane | | | | | | | | | | | | | | |
| 19 2,4-Dichlorophenol | | | | | | | | | | | | | | |
| 20 1,2,4-Trichlorobenzene | | | | | | 96 J | | | | | | | | |
| 21 Naphthalene | | | | 17949 | | 153 J | 48 J | | | | 154 J | 532 J | | |
| 22 4-Chloroaniline | | | | | | | | | | | | | | |
| 23 Hexachlorobutadiene | | | | | | | | | | | | | | |
| 24 4-Chloro-3-methylphenol | | | | | | | | | | | | | | |
| 25 2-Methylnaphthalene | | | | 61538 | | 118 J | | | | | 333 J | 1000 J | | |
| 26 Hexachlorocyclopentadiene | | | | | | | | | | | | | | |
| 27 2,4,6-Trichlorophenol | | | | | | | | | | | | | | |
| 28 2,4,5-Trichlorophenol | | | | | | | | | | | | | | |
| 29 2-Chloronaphthalene | | | | | | | | | | | | | | |
| 30 2-Nitroaniline | | | | | | | | | | | | | | |

Subsurface Soils Semivolatiles

| SITE | SITE N | SITE N | BLANK | SITE P | SITE P | SITE P | SITE P | SITE O | SITE O | SITE O | SITE O | SITE O | SITE O | BLANK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-N1-05 | DC-N2-06 | DC-NB-07 + | DC-P1-53 | DC-P2-54 | DC-P5-55 | DC-P5-56 ‡ | DC-01-59 | DC-02-60 | DC-03-61 | DC-04-62 | DC-05-63 | DC-05-64 ‡ | DC-0B-65 + |
| SAMPLE DEPTH | 0-10' | 5'-15' | | 0-10' | 25'-35' | 10'-25 | 10'-25' | 15'-25' | 20'-30' | 10'-20' | 0-10' | 8.5'-20' | 8.5'-20' | |
| DATE SAMPLED | 12-15-86 | 12-15-86 | 12-16-86 | 2-11-87 | 2-11-87 | 2-12-87 | 2-12-87 | 2-16-87 | 2-17-87 | 2-17-87 | 2-17-87 | 2-17-87 | 2-17-87 | 2-18-87 |
| 1 Phenol | | | | 3875 J | | | | | | | | | | |
| 2 bis(2-Chloroethyl)ether | | | | | | | | | | | | | | |
| 3 2-Chlorophenol | | | | | | | | | | | | | | |
| 4 1,3-Dichlorobenzene | | | | | | | | | | | | | | |
| 5 1,4-Dichlorobenzene | | | | 8875 J | | | | | | | | | | |
| 6 Benzyl Alcohol | | | | | | | | | | | | | | |
| 7 1,2-Dichlorobenzene | | | | 3625 J | | | | | | | 24359 J | | | |
| 8 2-Methylphenol | | | | | | | | | | | | | | |
| 9 bis(2-Chloroisopropyl) ether | | | | | | | | | | | | | | |
| 10 4-Methylphenol | | | | | | | | | | | | | | |
| 11 N-Nitroso-n-Dipropylamine | | | | | | | | | | | | | | |
| 12 Hexachloroethane | | | | | | | | | | | | | | |
| 13 Nitrobenzene | | | | | | | | | | | | | | |
| 14 Isophorone | | | | | | | | | | | | | | |
| 15 2-Nitrophenol | | | | | | | | | | | | | | |
| 16 2,4-Dimethylphenol | | | | | | | | | | | | | | |
| 17 Benzoic Acid | | | | | | | | | | | | | | |
| 18 bis-(2-Chloroethoxy)methane | | | | | | | | | | | | | | |
| 19 2,4-Dichlorophenol | | | | | | | | | | | | | | |
| 20 1,2,4-Trichlorobenzene | | | | | | | | | | | 26923 J | | | |
| 21 Naphthalene | | | | | | | | | | | 34615 J | | | |
| 22 4-Chloroaniline | | | | | | | | | | | | | | |
| 23 Hexachlorobutadiene | | | | | | | | | | | | | | |
| 24 4-Chloro-3-methylphenol | | | | | | | | | | | | | | |
| 25 2-Methylnaphthalene | | | | | | | | | | | 160256 | | | |
| 26 Hexachlorocyclopentadiene | | | | | | | | | | | | | | |
| 27 2,4,6-Trichlorophenol | | | | | | | | | | | | | | |
| 28 2,4,5-Trichlorophenol | | | | | | | | | | | | | | |
| 29 2-Chloronaphthalene | | | | | | | | | | | | | | |
| 30 2-Nitroaniline | | | | | | | | | | | | | | |

Subsurface Soils Semivolatiles

| SITE | SITE 0 | SITE 0 | SITE 0 | SITE 0 | SITE 0 |
|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-06-66 | DC-09-72 | DC-09-73 | DC-010-74 | DC-010-75 |
| SAMPLE DEPTH | 15'-25' | 0-10' | 15'-20' | 5'-10' | 10'-15' |
| DATE SAMPLED | 2-18-87 | 2-26-87 | 2-26-87 | 2-26-87 | 2-26-87 |
| 1 Phenol | | | | | |
| 2 bis(2-Chloroethyl)ether | | | | | |
| 3 2-Chlorophenol | | | | | |
| 4 1,3-Dichlorobenzene | | | | | |
| 5 1,4-Dichlorobenzene | | 4634 J | | 112821 | |
| 6 Benzyl Alcohol | | | | | |
| 7 1,2-Dichlorobenzene | | 32927 | | 100000 | |
| 8 2-Methylphenol | | | | | |
| 9 bis(2-Chloroisopropyl) ether | | | | | |
| 10 4-Methylphenol | | | | | |
| 11 N-Nitroso-n-Dipropylamine | | | | | |
| 12 Hexachloroethane | | | | | |
| 13 Nitrobenzene | | | | | |
| 14 Isophorone | | | | | |
| 15 2-Nitrophenol | | | | | |
| 16 2,4-Dimethylphenol | | | | | |
| 17 Benzoic Acid | | | | | |
| 18 bis-(2-Chloroethoxy)methane | | | | | |
| 19 2,4-Dichlorophenol | | | | | |
| 20 1,2,4-Trichlorobenzene | | 25610 | | | |
| 21 Naphthalene | | 4707 J | | | |
| 22 4-Chloroaniline | | | | | |
| 23 Hexachlorobutadiene | | | | | |
| 24 4-Chloro-3-methylphenol | | | | | |
| 25 2-Methylnaphthalene | | 31707 | | 7308 | |
| 26 Hexachlorocyclopentadiene | | | | | |
| 27 2,4,6-Trichlorophenol | | | | | |
| 28 2,4,5-Trichlorophenol | | | | | |
| 29 2-Chloronaphthalene | | | | | |
| 30 2-Nitroaniline | | | | | |

Subsurface Soils Semivolatiles

| SITE | SITE 6 | SITE 6 | BLANK | SITE 6 | SITE 6 | SITE 6 | BLANK | SITE 6 | SITE 6 | SITE 6 | SITE 6 | BLANK | SITE 6 | SITE 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-61-26 | DC-61-27 | DC-60-29 + | DC-62-30 | DC-62-31 * | DC-63-33 | DC-60-34 | DC-64-35 | DC-64-36 | DC-65-37 * | DC-66-67 | DC-60-68 + | DC-67-69 | DC-68-70 |
| SAMPLE DEPTH | 0-10' | 10'-20' | | 5'-15' | 5'-15' | 10'-20' | | 5'-20' | 5'-20 | 5'-15' | 20'-30' | | 10'-25' | 10'-20' |
| DATE SAMPLED | 1-12-87 | 1-12-87 | 1-14-87 | 1-14-87 | 1-14-87 | 1-26-87 | 1-26-87 | 1-26-87 | 1-26-87 | 1-27-87 | 2-23-87 | 2-24-87 | 2-24-87 | 2-24-87 |
| 1 Dimethyl Phthalate | | | | | | | | | | | | | | |
| 2 Acenaphtylene | | | | | | | | | | | | | | |
| 3 3-Nitroaniline | | | | | | | | | | | | | | |
| 4 Acenaphthene | | | | | | | | | | | | | | |
| 5 2,4-Dinitrophenol | | | | | | | | | | | | | | |
| 6 4-Nitrophenol | | | | | | | | | | | | | | |
| 7 Dibenzofuran | | | | | | | | | | | | | 33846 J | |
| 8 2,4-Dinitrotoluene | | | | | | | | | | | | | | |
| 9 2,6-Dinitrotoluene | | | | | | | | | | | | | | |
| 10 Diethylphthalate | | | | | | | | | | | | | | 22857 |
| 11 4-Chlorophenyl-Phenylether | | | | | | | | | | | | | | |
| 12 Fluorene | | | | | | | | | | | | | | |
| 13 4-Nitroaniline | | | | | | | | | | | | | | |
| 14 4,6-Dinitro-2-methylphenol | | | | | | | | | | | | | | |
| 15 N-Nitrosodiphenylamine | | | | | | | | | | 177800 | | | | |
| 16 4-Bromophenyl-phenylether | | | | | | | | | | | | | | |
| 17 Hexachlorobenzene | | | | 40640 | 27940 | | | | | | | | | |
| 18 Pentachlorophenol | | | | 620000 E | 990600 | | | | | | 23529 J | | 4769231 | 185714 J |
| 19 Phenanthrene | | | | | | | | | | 26670 | 12941 J | | | 31429 J |
| 20 Anthracene | | | | | | | | | | | | | | |
| 21 Bi-n-butyl phthalate | 279 BJ | 293 BJ | 368 BJ | | | | | | | | 17647 J | 10000 B | | |
| 22 Fluoranthene | | | | | | | | | | | 6588 J | | | |
| 23 Pyrene | | | | | | | | | | 19050 | | | | |
| 24 Butyl Benzyl phthalate | | | | | | | | | | | | | | |
| 25 3,3'-Bichlorobenzidine | | | | | | | | | | | | | | |
| 26 Benzo(a)Anthracene | | | | | | | | | | | | | | |
| 27 bis(2-ethylhexyl) phthalate | | | | | | | | | | | | | | |
| 28 Chrysene | | | | | | | | | | 22860 | | | | |
| 29 Di-n-octyl phthalate | | | | | | | | | | | | | | |
| 30 Benzo(b)Fluoranthene | | | | | | | | | | | | | | |
| 31 Benzo(k)Fluoranthene | | | | | | | | | | | | | | |
| 32 Benzo(a)Pyrene | | | | | | | | | | | | | | |
| 33 Indeno(1,2,3-cd)Pyrene | | | | | | | | | | | | | | |
| 34 Benzo(g,h,i)Perylene | | | | | | | | | | | | | | |
| 35 Dibenz(a,h)Anthracene | | | | | | | | | | | | | | |

Subsurface Soils Semivolatiles

| SITE | SITE G | SITE H | SITE H | SITE H | SITE H | SITE H | SITE H | BLANK | SITE H | SITE H | SITE H | SITE H | SITE H | SITE I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-G9-71 | DC-H1-14 | DC-H1-15 | DC-H2-16 | DC-H3-17 | DC-H3-18 * | DC-H4-19 | DC-HB-20 * | DC-H5-21 | DC-H6-22 | DC-H7-23 | DC-H8-24 | DC-H9-28 | DC-I1-38 |
| SAMPLE DEPTH | 35'-40' | 15'-25' | 35'-50' | 5'-20' | 10'-20' | 10'-20' | 10'-25' | | 0-10' | 35'-50' | 35'-50' | 5'-15' | 15'-25' | 0-10' |
| DATE SAMPLED | 2-24-87 | 12-18-86 | 12-18-87 | 1-5-87 | 1-6-87 | 1-6-87 | 1-6-87 | 1-7-87 | 1-7-87 | 1-8-87 | 1-8-87 | 1-9-87 | 1-13-87 | 1-27-87 |
| 1 Dimethyl Phthalate | | | | | | | | | | | | | | |
| 2 Acenaphtylene | | | | 377500 | | 251 J | | | | | | 130 J | | |
| 3 3-Nitroaniline | | | | | | | | | | | | | | |
| 4 Acenaphthene | 2674 J | | | | | | | | | | | | | |
| 5 2,4-Dinitrophenol | 13953 J | | | | | | | | | | | | | |
| 6 4-Nitrophenol | | | | | | | | | | | | | | |
| 7 Dibenzofuran | 4302 J | | | 604000 | 205 J | 1188 | | | | | | 143 J | | |
| 8 2,4-Dinitrotoluene | | | | | | | | | | | | | | |
| 9 2,6-Dinitrotoluene | | | | | | | | | | | | | | |
| 10 Diethylphthalate | | | | | | | | | | | | | | |
| 11 4-Chlorophenyl-Phenylether | | | | | | | | | | | | | | |
| 12 Fluorene | 11279 | | | 483200 | | 647 | | | | | | 247 J | | |
| 13 4-Nitroaniline | | | | | | | 1834000 E | | | | | | | |
| 14 4,6-Dinitro-2-methylphenol | | | | | | | | | | | | | | |
| 15 N-Nitrosodiphenylamine | | | | | | | 6681 J | | | | | | | |
| 16 4-Bromophenyl-phenylether | | | | | | | | | | | | | | |
| 17 Hexachlorobenzene | | | 714 | | | | | | | | | | | |
| 18 Pentachlorophenol | | | | | | | | | | | | | | 191800 |
| 19 Phenanthrene | 25581 | | | 2114000 | 256 J | 1320 | | | 947 | 47 J | | 169 J | | 7946 J |
| 20 Anthracene | 8400 J | | | 679500 | | 198 J | | | 221 J | | | 129 J | | |
| 21 Di-n-butyl phthalate | 17442 BJ | | | 25670 BJ | 1152 B | 1267 B | | 1126 B | 824 B | 878 B | 1062 B | 1014 B | 343 BJ | |
| 22 Fluoranthene | | | | 1330000 | | 145 J | | | 972 | | | 351 J | | 8905 J |
| 23 Pyrene | 7558 J | | | 664400 | | | | | 935 | | | 1209 | | 2877 J |
| 24 Butyl Benzyl phthalate | 23256 | | | | | | | | | | | | | |
| 25 3,3'-Dichlorobenzidine | | | | | | | | | | | | | | |
| 26 Benzo(a)Anthracene | | | | 377500 | | | | | 554 | | | 1157 | | 2466 J |
| 27 bis(2-ethylhexyl) phthalate | | | | | | 251 J | | | 541 | | 614 | | 305 J | 15070 |
| 28 Chrysene | | | | 332200 | | | | | 750 | | | 3380 | | 3973 J |
| 29 Di-n-octyl phthalate | | | | | | | | | | | | | | |
| 30 Benzo(b)Fluoranthene | | | | 211400 | | | | | 1021 | | | 442 | | 1507 J |
| 31 Benzo(k)Fluoranthene | | | | | | | | | | | | | | |
| 32 Benzo(a)Pyrene | | | | 271800 | | | | | | | | 780 | | 2466 J |
| 33 Indeno(1,2,3-cd)Pyrene | | | | 135900 | | | | | | | | | | |
| 34 Benzo(g,h,i)Perylene | | | | 113250 | | | | | | | | 494 | | |
| 35 Dibenz(a,h)Anthracene | | | | 31710 J | | | | | | | | | | |

Subsurface Soils Semivolatiles

| SITE | SITE I | SITE I | SITE I | SITE I | SITE I | BLANK | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-12-39 | DC-13-40 | DC-15-41 | DC-15-42 | DC-16-43 | DC-18-44 | DC-17-45 | DC-17-46 | DC-17-47 | DC-19-48 | DC-19-49 | DC-110-50 | DC-111-51 | DC-111-52 |
| SAMPLE DEPTH | 5'-25' | 5'-15' | 5'-27.5' | 28'-38' | 10'-25' | | 3.5'-12.5' | 13'-23' | 13'-23' | 6'-23' | 24'-30' | 15'-30' | 6'-20' | 26'-39' |
| DATE SAMPLED | 1-28-87 | 1-29-87 | 1-30-87 | 1-30-87 | 2-2-87 | 2-3-87 | 2-3-87 | 2-3-87 | 2-3-87 | 2-4-87 | 2-4-87 | 2-4-87 | 2-5-87 | 2-5-87 |
| 1 Diaethyl Phthalate | | | | | | | | | | | | | | |
| 2 Acenaphtylene | | | | | | | | | | | | | | |
| 3 3-Nitroaniline | | | | | | | | | | | | | | |
| 4 Acenaphthene | | | | | 14014 | | | | | | | | | |
| 5 2,4-Dinitrophenol | | | | | | | | | | | | | | |
| 6 4-Nitrophenol | | | | | | | | | | | | | | |
| 7 Dibenzofuran | | | | | | | | | | 5586 J | | | | |
| 8 2,4-Dinitrotoluene | | | | | | | | | | | | | | |
| 9 2,6-Dinitrotoluene | | | | | | | | | | | | | | |
| 10 Diethylphthalate | | | | | 16940 J | | | | | | | | | |
| 11 4-Chlorophenyl-Phenylether | | | | | | | | | | | | | | |
| 12 Fluorene | | | | | 35420 J | | | | | 6174 J | 3075 J | | | |
| 13 4-Nitroaniline | | | | | | | | | | | | | | |
| 14 4,6-Dinitro-2-methylphenol | | | | | | | | | | | | | | |
| 15 N-Nitrosodiphenylamine | 45900 J | | 100330 J | | | | | | | | | | | |
| 16 4-Bromophenyl-phenylether | | | | | | | | | | | | | | |
| 17 Hexachlorobenzene | 117450 | | 1270000 | 177000 | 32340 J | | | | | | | 100800 | 63460 | 46800 |
| 18 Pentachlorophenol | | | | | | | | | | | | | | |
| 19 Phenanthrene | | | 48000 J | | 101640 J | | | | | 12495 J | | | | 1320 J |
| 20 Anthracene | | | 203200 | | 23100 J | | | | | | | | | |
| 21 Di-n-butyl phthalate | | | 203200 | | 36960 J | 9728 | 15600 | 8500 | 10668 | | 10332 | | | 11280 |
| 22 Fluoranthene | | | 203200 | | 18480 J | | | | | | | | | |
| 23 Pyrene | | | 24000 J | | 49280 J | | | | | 2205 J | | | | |
| 24 Butyl Benzyl phthalate | | | 139000 J | | | | | | | | | | | |
| 25 3,3'-Dichlorobenzidine | | | | | | | | | | | | | | |
| 26 Benzo(a)Anthracene | | | | | | | | | | | | 6720 J | | |
| 27 bis(2-ethylhexyl) phthalate | 31050 J | | | | 130900 | | | 2375 | | | 5535 | | 48430 J | 11000 |
| 28 Chrysene | | | | | | | | | 5588 | | | | | |
| 29 Di-n-octyl phthalate | | | | | | | | | | | | | | |
| 30 Benzo(b)Fluoranthene | | | | | 32430 J | | | | | | | | | |
| 31 Benzo(k)Fluoranthene | | | | | | | | | | | | | | |
| 32 Benzo(a)Pyrene | | | | | | | | | | | | | | |
| 33 Indeno(1,2,3-cd)Pyrene | | | | | | | | | | | | | | |
| 34 Benzo(g,h,i)Perylene | | | | | | | | | | | | | | |
| 35 Dibenz(a,h)Anthracene | | | | | | | | | | | | | | |

Subsurface Soils Semivolatiles

| SITE | SITE I | SITE I | SITE J | SITE J | SITE J | SITE K | SITE K | SITE K | BLANK | SITE L | SITE L | SITE L | SITE L | SITE L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-I12-57 | DC-I12-58 | DC-J1-11 | DC-J2-12 | DC-J3-13 | DC-K1-08 | DC-K2-25 | DC-K3-32 | DC-LB-01 + | DC-L1-02 | DC-L2-03 | DC-L3-04 | DC-L4-09 | DC-L4-10 * |
| SAMPLE DEPTH | 3.5'-12.5' | 18.5'-27.5' | 10'-20' | 15'-25' | 0-10' | 0-10' | 0-10' | 10'-20' | | 5'-10' | 5'-15' | 5'-15' | 10'-20' | 10'-20' |
| DATE SAMPLED | 2-13-87 | 2-13-87 | 12-17-86 | 12-17-86 | 12-17-86 | 12-16-87 | 1-12-87 | 1-22-87 | 12-12-86 | 12-12-86 | 12-12-86 | 12-12-86 | 12-17-86 | 12-17-86 |
| 1 Dimethyl Phthalate | | | | | | | | | | | | | | |
| 2 Acenaphtylene | | | | | | | 220 J | | | | | | | |
| 3 3-Nitroaniline | | | | | | | | | | | | | | |
| 4 Acenaphthene | | | | 2179 J | | 150 J | | | | | 44 J | | | |
| 5 2,4-Dinitrophenol | | | | | | | | | | | | | | |
| 6 4-Nitrophenol | | | | | | | | | | | | | | |
| 7 Dibenzofuran | | | | 1013 J | | 129 J | 104 J | | | | | | | |
| 8 2,4-Dinitrotoluene | | | | | | | | | | | | | | |
| 9 2,6-Dinitrotoluene | | | | | | | | | | | | | | |
| 10 Diethylphthalate | | | | | | | | | | | | | | 310 J |
| 11 4-Chlorophenyl-Phenylether | | | | | | | | | | | | | | |
| 12 Fluorene | | | | 3462 J | | | 195 J | | | | | | | |
| 13 4-Nitroaniline | | | | | | | | | | | | | | |
| 14 4,6-Dinitro-2-methylphenol | | | | | | | | | | | | | | |
| 15 N-Nitrosodiphenylamine | | | | | | | | | | | | | | |
| 16 4-Bromophenyl-phenylether | | | | | | | | | | | | | | |
| 17 Hexachlorobenzene | | | | | | | | | | | | | | |
| 18 Pentachlorophenol | | | | | | | | | | | 11538 | 58228 | | |
| 19 Phenanthrene | | | | 14103 | | 1529 J | 1708 | 559 | 45 J | | 602 | 1772 J | | |
| 20 Anthracene | | | | 910 J | | 294 J | 415 | | | | | | | |
| 21 Di-n-butyl phthalate | | 134 J | | | | | 378 BJ | 1329 B | | 171 J | 372 J | 2784 | | |
| 22 Fluoranthene | | | | | | 1765 J | 2196 | 1208 | | | 448 | | | |
| 23 Pyrene | | | | 462 J | | 1765 J | 1342 | 634 | | | 282 J | | | |
| 24 Butyl Benzyl phthalate | | | | | | | | | | | | | | |
| 25 3,3'-Dichlorobenzidine | | | | | | | | | | | | | | |
| 26 Benzo(a)Anthracene | | | | | | 941 J | 878 | 332 J | | | | 911 J | | |
| 27 bis(2-ethylhexyl) phthalate | | | 1027 | 2949 J | 1100 | 21176 E | 1074 | 4681 B | | | 1217 | | 750 | 1297 |
| 28 Chrysene | | | | | | 1035 J | 891 | 544 | | | 205 J | | | |
| 29 Di-n-octyl phthalate | | | | | | 2941 | 146 J | 302 J | | | | | | |
| 30 Benzo(b)Fluoranthene | | | | | | 1035 | 1220 | 619 | | | | | | |
| 31 Benzo(k)Fluoranthene | | | | | | | | | | | | | | |
| 32 Benzo(a)Pyrene | | | | | | 929 J | 939 | 378 J | | | | | | |
| 33 Indeno(1,2,3-cd)Pyrene | | | | | | | 610 | | | | | | | |
| 34 Benzo(g,h,i)Perylene | | | | | | | 598 | | | | | | | |
| 35 Dibenz(a,h)Anthracene | | | | | | | | | | | | | | |

Subsurface Soils Semivolatiles

| SITE | SITE N | SITE N | BLANK | SITE P | SITE P | SITE P | SITE P | SITE O | SITE O | SITE O | SITE O | SITE O | SITE O | BLANK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-N1-05 | DC-N2-06 | DC-NB-07 + | DC-P1-53 | DC-P2-54 | DC-P5-55 | DC-P5-56 ‡ | DC-01-59 | DC-02-60 | DC-03-61 | DC-04-62 | DC-05-63 | DC-05-64 ‡ | DC-OB-65 + |
| SAMPLE DEPTH | 0-10' | 5'-15' | | 0-10' | 25'-35' | 10'-25 | 10'-25' | 15'-25' | 20'-30' | 10'-20' | 0-10' | 8.5'-20' | 8.5'-20' | |
| DATE SAMPLED | 12-15-86 | 12-15-86 | 12-16-86 | 2-11-87 | 2-11-87 | 2-12-87 | 2-12-87 | 2-16-87 | 2-17-87 | 2-17-87 | 2-17-87 | 2-17-87 | 2-17-87 | 2-18-87 |
| 1 Dimethyl Phthalate | | | | | | | | | | | | | | |
| 2 Acenaphtylene | | | | | | | | | | | | | | |
| 3 3-Nitroaniline | | | | | | | | | | | | | | |
| 4 Acenaphthene | | | | | | | | | | | | | | |
| 5 2,4-Dinitrophenol | | | | | | | | | | | | | | |
| 6 4-Nitrophenol | | | | | | | | | | | | | | |
| 7 Dibenzofuran | | | | | | | | | | | | | | |
| 8 2,4-Dinitrotoluene | | | | | | | | | | | | | | |
| 9 2,6-Dinitrotoluene | | | | | | | | | | | | | | |
| 10 Diethylphthalate | | | | | | | | | | | | | | |
| 11 4-Chlorophenyl-Phenylether | | | | | | | | | | | | | | |
| 12 Fluorene | | | | | | | | | | | | | | |
| 13 4-Nitroaniline | | | | | | | | | | | | | | |
| 14 4,6-Dinitro-2-methylphenol | | | | | | | | | | | | | | |
| 15 N-Nitrosodiphenylamine | | | | | | | | | | | 50000 J | | | |
| 16 4-Bromophenyl-phenylether | | | | | | | | | | | | | | |
| 17 Hexachlorobenzene | | | | | | | | | | | | | | |
| 18 Pentachlorophenol | | | | | | | | | | 22619 | 474359 J | | | |
| 19 Phenanthrene | 434 | 203 J | | | | | | | | | 217949 | 963 J | | |
| 20 Anthracene | | | | | | | | | | 5357 | | | | |
| 21 Di-n-butyl phthalate | | | | 16250 J | 155 J | 63 J | 325 J | 5287 | | | | 3780 J | | 2785 J |
| 22 Fluoranthene | 684 | 253 J | | | | | | | | | 43590 J | | | |
| 23 Pyrene | 553 | 215 J | | | | | | | | | 282051 | | | |
| 24 Butyl Benzyl phthalate | | | | | | | | | | | | | | |
| 25 3,3'-Dichlorobenzidine | | | | | | | | | | | | | | |
| 26 Benzo(a)Anthracene | 263 J | | | | | | | | | | 121795 | | | |
| 27 bis(2-ethylhexyl) phthalate | 934 | 1266 | | | | | 225 J | 1379 BJ | | 1905 BJ | | | 2439 JB | |
| 28 Chrysene | 276 J | | | | | | | | | | 282051 | | 1931 J | |
| 29 Di-n-octyl phthalate | | | | | | | | | | | | | | |
| 30 Benzo(b)Fluoranthene | 289 J | 152 J | | | | | | | | | 79487 J | | | |
| 31 Benzo(k)Fluoranthene | | | | | | | | | | | | | | |
| 32 Benzo(a)Pyrene | 211 J | | | | | | | | | | 66667 J | | | |
| 33 Indeno(1,2,3-cd)Pyrene | | | | | | | | | | | | | | |
| 34 Benzo(g,h,i)Perylene | | | | | | | | | | | 52564 J | | | |
| 35 Dibenz(a,h)Anthracene | | | | | | | | | | | | | | |

Subsurface Soils Semivolatiles

| | SITE | SITE D | SITE D | SITE D | SITE D | SITE D |
|---|---|---|---|---|---|---|
| | SAMPLE NUMBER | DC-06-66 | DC-09-72 | DC-09-73 | DC-010-74 | DC-010-75 |
| | SAMPLE DEPTH | 15'-25' | 0-10' | 15'-20' | 5'-10' | 10'-15' |
| | DATE SAMPLED | 2-18-87 | 2-26-87 | 2-26-87 | 2-26-87 | 2-26-87 |
| 1 | Dimethyl Phthalate | | | | | |
| 2 | Acenaphtylene | | | | | |
| 3 | 3-Nitroaniline | | | | | |
| 4 | Acenaphthene | | 2561 J | | | |
| 5 | 2,4-Dinitrophenol | | | | | |
| 6 | 4-Nitrophenol | | | | | |
| 7 | Dibenzofuran | | 1463 J | | | |
| 8 | 2,4-Dinitrotoluene | | | | | |
| 9 | 2,6-Dinitrotoluene | | | | | |
| 10 | Diethylphthalate | | | | | |
| 11 | 4-Chlorophenyl-Phenylether | | | | | |
| 12 | Fluorene | | 3049 J | | | |
| 13 | 4-Nitroaniline | | | | | |
| 14 | 4,6-Dinitro-2-methylphenol | | | | | |
| 15 | N-Nitrosodiphenylamine | | 10244 J | | | |
| 16 | 4-Bromophenyl-phenylether | | | | | |
| 17 | Hexachlorobenzene | | | | | |
| 18 | Pentachlorophenol | | 329268 | 6420 J | 112821 J | 7159 J |
| 19 | Phenanthrene | | 21951 | 469 J | 42308 | 863 J |
| 20 | Anthracene | | 4146 J | | | |
| 21 | Di-n-butyl phthalate | | 7195 J | 6049 | | 5000 J |
| 22 | Fluoranthene | | 7317 J | | 11026 J | |
| 23 | Pyrene | | 62195 | 1605 J | 82051 | 1477 J |
| 24 | Butyl Benzyl phthalate | | | | 3846154 E | 67045 |
| 25 | 3,3'-Dichlorobenzidine | | | | | |
| 26 | Benzo(a)Anthracene | | 25610 | | | |
| 27 | bis(2-ethylhexyl) phthalate | | | 914 J | | 1080 J |
| 28 | Chrysene | | 62195 | 1605 J | 82051 | 1818 J |
| 29 | Di-n-octyl phthalate | | | | | |
| 30 | Benzo(b)Fluoranthene | | 17073 J | | | |
| 31 | Benzo(k)Fluoranthene | | | | | |
| 32 | Benzo(a)Pyrene | | 19512 | | | |
| 33 | Indeno(1,2,3-cd)Pyrene | | | | | |
| 34 | Benzo(g,h,i)Perylene | | 17073 J | | | |
| 35 | Dibenz(a,h)Anthracene | | | | | |

Subsurface Soils Semivolatiles

| SITE | SITE I | SITE I | SITE I | SITE I | SITE I | BLANK | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-12-39 | DC-13-40 | DC-15-41 | DC-15-42 | DC-16-43 | DC-18-44 | DC-17-45 | DC-17-46 | DC-17-47 | DC-19-48 | DC-19-49 | DC-110-50 | DC-111-51 | DC-111-52 |
| SAMPLE DEPTH | 5'-25' | 5'-15' | 5'-27.5' | 28'-38' | 10'-25' | | 3.5'-12.5' | 13'-23' | 13'-23' | 6'-23' | 24'-30' | 15'-30' | 6'-20' | 26'-39' |
| DATE SAMPLED | 1-28-87 | 1-29-87 | 1-30-87 | 1-30-87 | 2-2-87 | 2-3-87 | 2-3-87 | 2-3-87 | 2-3-87 | 2-4-87 | 2-4-87 | 2-4-87 | 2-5-87 | 2-5-87 |
| 1 Diethyl Phthalate | | | | | | | | | | | | | | |
| 2 Acenaphtylene | | | | | | | | | | | | | | |
| 3 3-Nitroaniline | | | | | | | | | | | | | | |
| 4 Acenaphthene | | | | | 14014 | | | | | | | | | |
| 5 2,4-Dinitrophenol | | | | | | | | | | | | | | |
| 6 4-Nitrophenol | | | | | | | | | | | | | | |
| 7 Dibenzofuran | | | | | | | | | | 5586 J | | | | |
| 8 2,4-Dinitrotoluene | | | | | | | | | | | | | | |
| 9 2,6-Dinitrotoluene | | | | | | | | | | | | | | |
| 10 Diethylphthalate | | | | | 16940 J | | | | | | | | | |
| 11 4-Chlorophenyl-Phenylether | | | | | | | | | | | | | | |
| 12 Fluorene | | | | | 35420 J | | | | | 6174 J | 3075 J | | | |
| 13 4-Nitroaniline | | | | | | | | | | | | | | |
| 14 4,6-Dinitro-2-methylphenol | | | | | | | | | | | | | | |
| 15 N-Nitrosodiphenylamine | 45900 J | | 100330 J | | | | | | | | | | | |
| 16 4-Bromophenyl-phenylether | | | | | | | | | | | | | | |
| 17 Hexachlorobenzene | 117450 | | 1270000 | 177000 | 32340 J | | | | | | | 100800 | 63460 | 46800 |
| 18 Pentachlorophenol | | | | | | | | | | | | | | |
| 19 Phenanthrene | | | 48000 J | | 101840 J | | | | | 12495 J | | | | 1320 J |
| 20 Anthracene | | | 203200 | | 23100 J | | | | | | | | | |
| 21 Di-n-butyl phthalate | | | 203200 | | 36960 J | 9728 | 15600 | 8500 | 10668 | | 10332 | | | 11280 |
| 22 Fluoranthene | | | 203200 | | 18480 J | | | | | | | | | |
| 23 Pyrene | | | 24000 J | | 49280 J | | | | | 2205 J | | | | |
| 24 Butyl Benzyl phthalate | | | 139000 J | | | | | | | | | | | |
| 25 3,3'-Dichlorobenzidine | | | | | | | | | | | | | | |
| 26 Benzo(a)Anthracene | | | | | | | | | | | | 6720 J | | |
| 27 bis(2-ethylhexyl) phthalate | 31050 J | | | | 130900 | | | 2375 | | | 5535 | | 48430 J | 11000 |
| 28 Chrysene | | | | | | | | | 5588 | | | | | |
| 29 Di-n-octyl phthalate | | | | | | | | | | | | | | |
| 30 Benzo(b)Fluoranthene | | | | | 32430 J | | | | | | | | | |
| 31 Benzo(k)Fluoranthene | | | | | | | | | | | | | | |
| 32 Benzo(a)Pyrene | | | | | | | | | | | | | | |
| 33 Indeno(1,2,3-cd)Pyrene | | | | | | | | | | | | | | |
| 34 Benzo(g,h,i)Perylene | | | | | | | | | | | | | | |
| 35 Dibenz(a,h)Anthracene | | | | | | | | | | | | | | |

Subsurface Soils Semivolatiles

| SITE | SITE I | SITE I | SITE J | SITE J | SITE J | SITE K | SITE K | SITE K | BLANK | SITE L | SITE L | SITE L | SITE L | SITE L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-I12-57 | DC-I12-58 | DC-J1-11 | DC-J2-12 | DC-J3-13 | DC-K1-08 | DC-K2-25 | DC-K3-32 | DC-LB-01 + | DC-L1-02 | DC-L2-03 | DC-L3-04 | DC-L4-09 | DC-L4-10 * |
| SAMPLE DEPTH | 3.5'-12.5' | 18.5'-27.5' | 10'-20' | 15'-25' | 0-10' | 0-10' | 0-10' | 10'-20' | | 5'-10' | 5'-15' | 5'-15' | 10'-20' | 10'-20' |
| DATE SAMPLED | 2-13-87 | 2-13-87 | 12-17-86 | 12-17-86 | 12-17-86 | 12-16-87 | 1-12-87 | 1-22-87 | 12-12-86 | 12-12-86 | 12-12-86 | 12-12-86 | 12-17-86 | 12-17-86 |
| 1 Dimethyl Phthalate | | | | | | | | | | | | | | |
| 2 Acenaphtylene | | | | | | | 220 J | | | | | | | |
| 3 3-Nitroaniline | | | | | | | | | | | | | | |
| 4 Acenaphthene | | | | 2179 J | | 150 J | | | | | 44 J | | | |
| 5 2,4-Dinitrophenol | | | | | | | | | | | | | | |
| 6 4-Nitrophenol | | | | | | | | | | | | | | |
| 7 Dibenzofuran | | | | 1013 J | | 129 J | 104 J | | | | | | | |
| 8 2,4-Dinitrotoluene | | | | | | | | | | | | | | |
| 9 2,6-Dinitrotoluene | | | | | | | | | | | | | | |
| 10 Diethylphthalate | | | | | | | | | | | | | | 310 J |
| 11 4-Chlorophenyl-Phenylether | | | | | | | | | | | | | | |
| 12 Fluorene | | | | 3462 J | | | 195 J | | | | | | | |
| 13 4-Nitroaniline | | | | | | | | | | | | | | |
| 14 4,6-Dinitro-2-methylphenol | | | | | | | | | | | | | | |
| 15 N-Nitrosodiphenylamine | | | | | | | | | | | | | | |
| 16 4-Bromophenyl-phenylether | | | | | | | | | | | | | | |
| 17 Hexachlorobenzene | | | | | | | | | | | | | | |
| 18 Pentachlorophenol | | | | | | | | | | | 11538 | 58228 | | |
| 19 Phenanthrene | | | | 14103 | | 1329 J | 1708 | 559 | 45 J | | 602 | 1772 J | | |
| 20 Anthracene | | | | 910 J | | 294 J | 415 | | | | | | | |
| 21 Di-n-butyl phthalate | | 134 J | | | | | 378 BJ | 1329 B | | 171 J | 372 J | 2784 | | |
| 22 Fluoranthene | | | | | | 1765 J | 2196 | 1208 | | | 448 | | | |
| 23 Pyrene | | | | 462 J | | 1765 J | 1342 | 634 | | | 282 J | | | |
| 24 Butyl Benzyl phthalate | | | | | | | | | | | | | | |
| 25 3,3'-Dichlorobenzidine | | | | | | | | | | | | | | |
| 26 Benzo(a)Anthracene | | | | | | 941 J | 878 | 332 J | | | | 911 J | | |
| 27 bis(2-ethylhexyl) phthalate | | | 1027 | 2949 J | 1100 | 21176 E | 1074 | 4681 B | | | 1217 | | 750 | 1297 |
| 28 Chrysene | | | | | | 1035 J | 891 | 544 | | | 205 J | | | |
| 29 Di-n-octyl phthalate | | | | | | 2941 | 146 J | 302 J | | | | | | |
| 30 Benzo(b)Fluoranthene | | | | | | 1035 | 1220 | 619 | | | | | | |
| 31 Benzo(k)Fluoranthene | | | | | | | | | | | | | | |
| 32 Benzo(a)Pyrene | | | | | | 929 J | 939 | 378 J | | | | | | |
| 33 Indeno(1,2,3-cd)Pyrene | | | | | | | 610 | | | | | | | |
| 34 Benzo(g,h,i)Perylene | | | | | | | 598 | | | | | | | |
| 35 Dibenz(a,h)Anthracene | | | | | | | | | | | | | | |

Subsurface Soils Semivolatiles

| SITE | SITE 0 | SITE 0 | SITE 0 | SITE 0 | SITE 0 |
|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-06-66 | DC-09-72 | DC-09-73 | DC-010-74 | DC-010-75 |
| SAMPLE DEPTH | 15'-25' | 0-10' | 15'-20' | 5'-10' | 10'-15' |
| DATE SAMPLED | 2-18-87 | 2-26-87 | 2-26-87 | 2-26-87 | 2-26-87 |
| 1 Diaethyl Phthalate | | | | | |
| 2 Acenaphtylene | | | | | |
| 3 3-Nitroaniline | | | | | |
| 4 Acenaphthene | | 2561 J | | | |
| 5 2,4-Dinitrophenol | | | | | |
| 6 4-Nitrophenol | | | | | |
| 7 Dibenzofuran | | 1463 J | | | |
| 8 2,4-Dinitrotoluene | | | | | |
| 9 2,6-Dinitrotoluene | | | | | |
| 10 Diethylphthalate | | | | | |
| 11 4-Chlorophenyl-Phenylether | | | | | |
| 12 Fluorene | | 3049 J | | | |
| 13 4-Nitroaniline | | | | | |
| 14 4,6-Dinitro-2-aethylphenol | | | | | |
| 15 N-Nitrosodiphenylamine | | 10244 J | | | |
| 16 4-Bromophenyl-phenylether | | | | | |
| 17 Hexachlorobenzene | | | | | |
| 18 Pentachlorophenol | | 329268 | 6420 J | 112821 J | 7159 J |
| 19 Phenanthrene | | 21951 | 469 J | 42308 | 863 J |
| 20 Anthracene | | 4146 J | | | |
| 21 Di-n-butyl phthalate | | 7195 J | 6049 | | 5000 J |
| 22 Fluoranthene | | 7317 J | | 11026 J | |
| 23 Pyrene | | 62195 | 1605 J | 82051 | 1477 J |
| 24 Butyl Benzyl phthalate | | | | 3846154 E | 67045 |
| 25 3,3'-Dichlorobenzidine | | | | | |
| 26 Benzo(a)Anthracene | | 25610 | | | |
| 27 bis(2-ethylhexyl) phthalate | | | 914 J | | 1080 J |
| 28 Chrysene | | 62195 | 1605 J | 82051 | 1818 J |
| 29 Di-n-octyl phthalate | | | | | |
| 30 Benzo(b)Fluoranthene | | 17073 J | | | |
| 31 Benzo(k)Fluoranthene | | | | | |
| 32 Benzo(a)Pyrene | | 19512 | | | |
| 33 Indeno(1,2,3-cd)Pyrene | | | | | |
| 34 Benzo(g,h,i)Perylene | | 17073 J | | | |
| 35 Dibenz(a,h)Anthracene | | | | | |

Subsurface Soils Pest/PCBs

| SITE | SITE G | SITE G | BLANK | SITE G | SITE G | SITE G | BLANK | SITE G | SITE G | SITE G | SITE G | BLANK | SITE G | SITE G | SITE G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-G1-26 | DC-G1-27 | DC-GB-29 + | DC-G2-30 | DC-G2-31 ‡ | DC-G3-33 | DC-GB-34 | DC-G4-35 | DC-G4-36 | DC-G5-37 ‡ | DC-G6-67 | DC-GB-68 + | DC-G7-69 | DC-G8-70 | DC-G9-71 |
| SAMPLE DEPTH | 0-10' | 10'-20' | | 5'-15' | 5'-15' | 10'-20' | | 5'-20' | 5'-20 | 5'-15' | 20'-30' | | 10'-25' | 10'-20' | 35'-40' |
| DATE SAMPLED | 1-12-87 | 1-12-87 | 1-14-87 | 1-14-87 | 1-14-87 | 1-26-87 | 1-26-87 | 1-26-87 | 1-26-87 | 1-27-87 | 2-23-87 | 2-24-87 | 2-24-87 | 2-24-87 | 2-24-87 |
| 1 Alpha-BHC | | | | | | | | | | | | | | | |
| 2 Beta-BHC | | | | | | | | | | | | | | | |
| 3 Delta-BHC | | | | | | | | | | | | | | | |
| 4 Gamma-BHC (Lindane) | | | | | | | | | | | | | | | |
| 5 Heptachlor | | | | | | | | | | | | | | | |
| 6 Aldrin | | | | | | | | | | | | | | | |
| 7 Heptachlor Epoxide | | | | | | | | | | | | | | | |
| 8 Edosulfan I | | | | | | | | | | | | | | | |
| 9 Dieldrin | | | | | | | | | | | | | | | |
| 10 4,4'-DDE | | | | 3073 | 3683 | | | | | | 52941 | | 135385 J | | |
| 11 Endrin | | | | | | | | | | | | | | | |
| 12 Edosulfan II | | | | | | | | | | | | | | | |
| 13 4,4'-DDD | | | | | | | | | | | | | | | |
| 14 Endosulfan Sulfate | | | | | | | | | | | | | | | |
| 15 4,4'-DDT | | | | | | | | | | | | | | | |
| 16 Methoxychlor | | | | | | | | | | | | | | | |
| 17 Endrin Ketone | | | | | | | | | | | | | | | |
| 18 Chlordane | | | | | | | | | | | | | | | |
| 19 Toxaphene | | | | | | | | | | | | | | | |
| 20 AROCLOR-1016 | | | | | | | | | | | | | | | |
| 21 AROCLOR-1221 | | | | | | | | | | | | | | | |
| 22 AROCLOR-1232 | | | | | | | | | | | | | | | |
| 23 AROCLOR-1242 | | | | | | | | | | | | | | | |
| 24 AROCLOR-1248 | | | | | | | | | | | | | | | 174419 C |
| 25 AROCLOR-1254 | | | | | | | | | | | | | | | |
| 26 AROCLOR-1260 | 130 J | | | | | | 1792 J | | | 57150 | 764706 | | 661538 J | 4428571 | 267442 C |

Subsurface Soils Pest/PCBs

| SITE | SITE H | SITE H | SITE H | SITE H | SITE H | SITE H | BLANK | SITE H | SITE H | SITE H | SITE H | SITE H | SITE I | SITE I | SITE I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-H1-14 | DC-H1-15 | DC-H2-16 | DC-H3-17 | DC-H3-18 * | DC-H4-19 | DC-H8-20 + | DC-H5-21 | DC-H6-22 | DC-H7-23 | DC-H8-24 | DC-H9-28 | DC-I1-38 | DC-I2-39 | DC-I3-40 |
| SAMPLE DEPTH | 15'-25' | 35'-50' | 5'-20' | 10'-20' | 10'-20' | 10'-25' | | 0-10' | 35'-50' | 35'-50' | 5'-15' | 15'-25' | 0-10 | 5'-25' | 5 -15' |
| DATE SAMPLED | 12-18-86 | 12-18-87 | 1-5-87 | 1-6-87 | 1-6-87 | 1-6-87 | 1-7-87 | 1-7-87 | 1-8-87 | 1-8-87 | 1-9-87 | 1-13-87 | 1-27-87 | 1-28-87 | 1-29-87 |
| 1 Alpha-BHC | | | | | | | | | | | | | | | |
| 2 Beta-BHC | | | | | | | | | | | | | | | |
| 3 Delta-BHC | | | | | | | | | | | | | | | |
| 4 Gamma-BHC (Lindane) | | | | | | | | | | | | | | | |
| 5 Heptachlor | | | | | | | | | | | | | | | |
| 6 Aldrin | | | | | | | | | | | | | | | |
| 7 Heptachlor Epoxide | | | | | | | | | | | | | | | |
| 8 Edosulfan I | | | | | | | | | | | | | | | |
| 9 Dieldrin | | | | | | | | | | | | | | | |
| 10 4,4'-DDE | | | | | | | | 504 | | | 780 | | | | |
| 11 Endrin | | | | | | | | | | | | | | | |
| 12 Edosulfan II | | | | | | | | | | | | | | | |
| 13 4,4'-DDD | | | | | | | | 431 | | | | | | | |
| 14 Endosulfan Sulfate | | | | | | | | | | | | | | | |
| 15 4,4'-DDT | | | | | | | | 923 | | | 780 | | | | |
| 16 Methoxychlor | | | | | | | | | | | | | | | |
| 17 Endrin Ketone | | | | | | | | | | | | | | | |
| 18 Chlordane | | | | | | | | | | | | | | | |
| 19 Toxaphene | | | | | | | | | | | | | | | |
| 20 AROCLOR-1016 | | | | | | | | | | | | | | | |
| 21 AROCLOR-1221 | | | | | | | | | | | | | | | |
| 22 AROCLOR-1232 | | | | | | | | | | | | | | | |
| 23 AROCLOR-1242 | | | | | | | | | | | | | | | |
| 24 AROCLOR-1248 | | | | | | | | | | | | | | | |
| 25 AROCLOR-1254 | | | | | | | | | | | | | | | |
| 26 AROCLOR-1260 | 985483 | 1130 J | 139524 | | 251 | 18000000 | 205 | 5166 | 1755 | | | | | 270000 J | 183300 |

Subsurface Soils Pest/PCBs

| SITE | SITE I | SITE I | SITE I | BLANK | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I | SITE J |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-I5-41 | DC-I5-42 | DC-I6-43 | DC-IB-44 | DC-I7-45 | DC-I7-46 | DC-I7-47 | DC-I9-48 | DC-I9-49 | DC-I10-50 | DC-I11-51 | DC-I11-52 | DC-I12-57 | DC-I12-58 | DC-J1-11 |
| SAMPLE DEPTH | 5'-27.5' | 28'-38' | 10'-25' | | 3.5'-12.5' | 13'-23' | 13'-23' | 6'-23' | 24'-30' | 15'-30' | 6'-20' | 26'-39' | 3.5'-12.5 | 18.5'-27.5' | 10'-20' |
| DATE SAMPLED | 1-30-87 | 1-30-87 | 2-2-87 | 2-3-87 | 2-3-87 | 2-3-87 | 2-3-87 | 2-4-87 | 2-4-87 | 2-4-87 | 2-5-87 | 2-5-87 | 2-13-87 | 2-13-87 | 12-17-86 |
| 1 Alpha-BHC | | | | | | | | | | | | | | | |
| 2 Beta-BHC | | | | | | | | | | | | | | | |
| 3 Delta-BHC | | | | | | | | | | | | | | | |
| 4 Gamma-BHC (Lindane) | | | | | | | | | | | | | | | |
| 5 Heptachlor | | | | | | | | | | | | | | | |
| 6 Aldrin | | | | | | | | | | | | | | | |
| 7 Heptachlor Epoxide | | | | | | | | | | | | | | | |
| 8 Edosulfan I | | | | | | | | | | | | | | | |
| 9 Dieldrin | | | | | | | | | | | | | | | |
| 10 4,4'-DDE | | | | | | | | | | | | | | | |
| 11 Endrin | | | | | | | | | | | | | | | |
| 12 Edosulfan II | | | | | | | | | | | | | | | |
| 13 4,4'-DDD | | | | | | | | 29694 | 6642 | | | | | | |
| 14 Endosulfan Sulfate | | | | | | | | | | | | | | | |
| 15 4,4'-DDT | | | | | | | | | 4305 | | | | | | |
| 16 Methoxychlor | | | | | | | | | | | | | | | |
| 17 Endrin Ketone | | | | | | | | | | | | | | | |
| 18 Chlordane | | | | | | | | | | | | | | | |
| 19 Toxaphene | | | 492800 | | | | | | | | | | | | |
| 20 AROCLOR-1016 | | | | | | | | | | | | | | | |
| 21 AROCLOR-1221 | | | | | | | | | | | | | | | |
| 22 AROCLOR-1232 | | | | | | | | | | | | | | | |
| 23 AROCLOR-1242 | | | | | | | | | | | | | | | |
| 24 AROCLOR-1248 | | | | | | | | | | | | | | | |
| 25 AROCLOR-1254 | | | | | | | | | | | | | | | |
| 26 AROCLOR-1260 | 342900 J | 86140 | | | | | | | | 20400 J | | | | | |

Subsurface Soils Pest/PCBs

| SITE | SITE J | SITE J | SITE K | SITE K | SITE K | BLANK | SITE L | SITE L | SITE L | SITE L | SITE L | SITE N | SITE N | BLANK | SITE P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-J2-12 | DC-J3-13 | DC-K1-08 | DC-K2-25 | DC-K3-32 | DC-LB-01 + | DC-L1-02 | DC-L2-03 | DC-L3-04 | DC-L4-09 | DC-L4-10 * | DC-N1-05 | DC-N2-06 | DC-NB-07 + | DC-P1-53 |
| SAMPLE DEPTH | 15'-25' | 0-10' | 0-10' | 0-10' | 10'-20' | | 5'-10' | 5'-15' | 5'-15' | 10'-20' | 10'-20' | 0-10' | 5'-15' | | 0-10' |
| DATE SAMPLED | 12-17-86 | 12-17-86 | 12-16-87 | 1-12-87 | 1-22-87 | 12-12-86 | 12-12-86 | 12-12-86 | 12-12-86 | 12-17-86 | 12-17-86 | 12-15-86 | 12-15-86 | 12-16-86 | 2-11-87 |
| 1 Alpha-BHC | | | | | | | | | | | | | | | |
| 2 Beta-BHC | | | | | | | | | | | | | | | |
| 3 Delta-BHC | | | | | | | | | | | | | | | |
| 4 Gamma-BHC (Lindane) | | | | | | | | | | | | | | | |
| 5 Heptachlor | | | | | | | | | | | | | | | |
| 6 Aldrin | | | | | | | | | | | | | | | |
| 7 Heptachlor Epoxide | | | | | | | | | | | | | | | |
| 8 Edosulfan I | | | | | | | | | | | | | | | |
| 9 Dieldrin | | | | | | | | | | | | | | | |
| 10 4,4'-DDE | | | | | | | | | | | | | | | |
| 11 Endrin | | | | | | | | | | | | | | | |
| 12 Edosulfan II | | | | | | | | | | | | | | | |
| 13 4,4'-DDD | | | | | | | | | | | | | | | |
| 14 Endosulfan Sulfate | | | | | | | | | | | | | | | |
| 15 4,4'-DDT | | | | | | | | | | | | | | | |
| 16 Methoxychlor | | | | | | | | | | | | | | | |
| 17 Endrin Ketone | | | | | | | | | | | | | | | |
| 18 Chlordane | | | | | | | | | | | | | | | |
| 19 Toxaphene | | | | | | | | | | | | | | | |
| 20 AROCLOR-1016 | | | | | | | | | | | | | | | |
| 21 AROCLOR-1221 | | | | | | | | | | | | | | | |
| 22 AROCLOR-1232 | | | | | | | | | | | | | | | |
| 23 AROCLOR-1242 | | | | | 19000 | | | | | | | | | | |
| 24 AROCLOR-1248 | | | 117647 C | 4880 | | | | | | | | | | | |
| 25 AROCLOR-1254 | | | | | | | | | | | | | | | |
| 26 AROCLOR-1260 | | 179 | | 6344 | | | | | | | | | | | |

Subsurface Soils Pest/PCBs

| SITE | SITE P | SITE P | SITE P | SITE O | SITE O | SITE O | SITE O | SITE O | SITE O | BLANK | SITE O | SITE O | SITE O | SITE O | SITE O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-P2-54 | DC-P5-55 | DC-P5-56 * | DC-01-59 | DC-02-60 | DC-03-61 | DC-04-62 | DC-05-63 | DC-05-64 * | DC-08-65 + | DC-06-66 | DC-09-72 | DC-09-73 | DC-010-74 | DC-010-75 |
| SAMPLE DEPTH | 25'-35' | 10'-25 | 10'-25' | 15'-25' | 20'-30' | 10'-20' | 0-10' | 8.5'-20' | 8.5'-20' | | 15'-25' | 0-10' | 15'-20' | 5'-10' | 10'-15' |
| DATE SAMPLED | 2-11-87 | 2-12-87 | 2-12-87 | 2-16-87 | 2-17-87 | 2-17-87 | 2-17-87 | 2-17-87 | 2-17-87 | 2-18-87 | 2-18-87 | 2-26-87 | 2-26-87 | 2-26-87 | 2-26-87 |
| 1 Alpha-BHC | | | | | | | | | | | | | | | |
| 2 Beta-BHC | | | | | | | | | | | | | | | |
| 3 Delta-BHC | | | | | | | | | | | | | | | |
| 4 Gamma-BHC (Lindane) | | | | | | | | | | | | | | | |
| 5 Heptachlor | | | | | | | | | | | | | | | |
| 6 Aldrin | | | | | | | | | | | | | | | |
| 7 Heptachlor Epoxide | | | | | | | | | | | | | | | |
| 8 Edosulfan I | | | | | | | | | | | | | | | |
| 9 Dieldrin | | | | | | | | | | | | | | | |
| 10 4,4'-DDE | | | | | | | | | | | | | | | |
| 11 Endrin | | | | | | | | | | | | | | | |
| 12 Edosulfan II | | | | | | | | | | | | | | | |
| 13 4,4'-DDD | | | | | | | | | | | | | | | |
| 14 Endosulfan Sulfate | | | | | | | | | | | | | | | |
| 15 4,4'-DDT | | | | | | | | | | | | | | | |
| 16 Methoxychlor | | | | | | | | | | | | | | | |
| 17 Endrin Ketone | | | | | | | | | | | | | | | |
| 18 Chlordane | | | | | | | | | | | | | | | |
| 19 Toxaphene | | | | | | | | | | | | | | | |
| 20 AROCLOR-1016 | | | | | | | | | | | | | | | |
| 21 AROCLOR-1221 | | | | | | | | | | | | | | | |
| 22 AROCLOR-1232 | | | | | | | | 26829 C | 30366 | | | | | | |
| 23 AROCLOR-1242 | | | | | | | 1871795 | | | | | 634146 | 24691 | 461539 | 11364 |
| 24 AROCLOR-1248 | | | | | | | | | | | | | | | |
| 25 AROCLOR-1254 | | | | | | | | | | | | | | | |
| 26 AROCLOR-1260 | | | | | | | | 5488 JC | 3902 J | | | | | | |

Results in mg/kg

Subsurface Soil Inorganics

| | SITE | SITE G | SITE G | BLANK | SITE G | SITE G | SITE G | BLANK | SITE G | SITE G | SITE G | SITE G | BLANK | SITE G | SITE G | SITE G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE NUMBER | DC-G1-26 | DC-G1-27 | DC-GB-29 + | DC-G2-30 | DC-G2-31 * | DC-G3-33 | DC-GB-34 | DC-G4-35 | DC-G4-36 | DC-G5-37 * | DC-G6-67 | DC-GB-68 + | DC-G7-69 | DC-G8-70 | DC-G9-71 |
| | SAMPLE DEPTH | 0-10' | 10'-20' | | 5'-15' | 5'-15' | 10'-20' | | 5'-20' | 5'-20 | 5'-15' | 20'-30' | | 10'-25' | 10'-20' | 35'-40' |
| | DATE SAMPLED | 1-12-87 | 1-12-87 | 1-14-87 | 1-14-87 | 1-14-87 | 1-26-87 | 1-26-87 | 1-26-87 | 1-26-87 | 1-27-87 | 2-23-87 | 2-24-87 | 2-24-87 | 2-24-87 | 2-24-87 |
| 1 | Aluminum | 9760 | 18667 | 12821 | 5304 | 3380 | 12767 | 14359 | 8671 | 8200 | 9304 | 1859 | 6785 | 16615 | 4343 | 966 |
| 2 | Antimony | | | | | | | | | | | | | | | |
| 3 | Arsenic | 4 R | 2 R | 6 R | 3 R | 2 R | 5 | 7 | 4 | 4 | 5 | | 6 R | 123 R | 16 R | |
| 4 | Barium | 213 | 168 | 359 | 45949 | 15570 | 206 | 424 | 117 | 140 | 233 | 142 | 363 | 1554 | 284 | 133 |
| 5 | Beryllium | | | | | | | | | | | | | | | |
| 6 | Boron | | | | | | | | | | | | | | | |
| 7 | Cadmium | | | 2 | 2 | | | 3 | | | | | 2 | 14 | 5 | |
| 8 | Chromium, trivalent | 9 | 6 | 13 | 18 | 5 | 16 | 13 | 9 | 7 | 16 | 12 | 11 | 985 | 109 | 11 |
| 9 | Cobalt | | | | 56 | 19 | | | | | 16 | | | | | 13 |
| 10 | Copper | 16 | | 31 | 28 | 8 | 8 | 33 | 18 | 3 | 16 | 18 | 30 | 2215 | 507 | 10 |
| 11 | Iron | 14000 | 9853 | 16282 | 13544 | 6392 | 12712 | 13846 | 8829 | 9900 | 11418 | 6035 | 12354 | 53692 | 12243 | 4056 |
| 12 | Lead | 12 R | 8 R | 68 R | 30 R | 16 R | 11 * | 51 * | 8 * | 32 * | 14 * | 25 * | 57 * | 3123 * | 833 * | 22 * |
| 13 | Manganese | 308 | 179 | 410 | 242 | 92 | 278 R | 382 R | 182 R | 209 R | 461 | 73 * | 357 * | 282 * | 193 * | 43 * |
| 14 | Mercury | 0.3 | | | | | | | | | | | | | 34.3 | |
| 15 | Nickel | 13 | | 17 | 35 | | 15 | 19 | 13 | 13 | 89 | 10 * | 14 | 123 * | 399 * | |
| 16 | Selenium | | | | | | | | | | | | | | | |
| 17 | Silver | | | | | | | | | | | | | | 12 | |
| 18 | Thallium | | | | | | | | | | | | | | | |
| 19 | Tin | | | | | | | | | | | | | 80 | 26 | |
| 20 | Vanadium | 28 | 21 | 36 | 22 | 14 | 25 | 28 | | 19 | 27 | 31 | 16 | 1315 | 109 | |
| 21 | Zinc | 103 | 27 | 167 | 115 | 39 | 44 | 190 | 50 | 65 | 224 | 86 * | 168 * | 2954 * | 4257 * | 51 |
| 22 | Cyanide | | | | | | | | | | | | | | | |

Subsurface Soil Inorganics

| SITE | SITE H | SITE H | SITE H | SITE H | SITE H | SITE H | BLANK | SITE H | SITE H | SITE H | SITE H | SITE H | SITE I | SITE I | SITE I |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-H1-14 | DC-H1-15 | DC-H2-16 | DC-H3-17 | DC-H3-18 * | DC-H4-19 | DC-HB-20 + | DC-H5-21 | DC-H6-22 | DC-H7-23 | DC-H8-24 | DC-H9-28 | DC-I1-38 | DC-I2-39 | DC-I3-40 |
| SAMPLE DEPTH | 15'-25' | 35'-50' | 5'-20' | 10'-20' | 10'-20' | 10'-25' | | 0-10' | 35'-50' | 35'-50' | 5'-15' | 15'-25' | 0-10' | 5'-25' | 5'-15' |
| DATE SAMPLED | 12-18-86 | 12-18-87 | 1-5-87 | 1-6-87 | 1-6-87 | 1-6-87 | 1-7-87 | 1-7-87 | 1-8-87 | 1-8-87 | 1-9-87 | 1-13-87 | 1-27-87 | 1-28-87 | 1-29-87 |
| 1 Aluminum | 2403 | 1452 | 4015 | 450 | 697 | 7167 | 10974 | 7074 | 2811 | 2282 | 12117 | 2203 | 13548 | 1259 | 12324 |
| 2 Antimony | | | | | | | | | | | | | | | |
| 3 Arsenic | 26 * | 3 * | 7 R | 15 R | 13 R | 388 R | 6 R | 42 R | | | 4 R | 3 R | 11 | | 6 |
| 4 Barium | 3242 | 38 | 1879 | 85 | 97 | 607 | 372 | 331 | 55 | 46 | 218 | 52 | 3603 | 919 | 334 |
| 5 Beryllium | | | | | | | | | | | | | | | |
| 6 Boron | | | | | | | | | | | | | | | |
| 7 Cadmium | 232 | | 5 | | | 294 | | 221 | | | | | 11 | 6 | 3 |
| 8 Chromium, trivalent | 100 | 4 | 97 | | | 51 | 15 | 56 | 6 | 5 | 18 | | 115 | 15 | 16 |
| 9 Cobalt | 19 | 3 | 105 | | | 47 | 6 | 8 | | | | | | 27 | 14 |
| 10 Copper | 374 | 3 | 415 | 13 | 12 | 2444 | 29 | 972 | | | 51 | | 630 | 84 | 598 |
| 11 Iron | 48226 | 3810 | 84545 | 510 | 564 | 54167 | 15641 | 27160 | 5905 | 4741 | 20519 | 5215 | 41507 | 10135 | 18732 * |
| 12 Lead | 1150 * | 4 * | 174 R | 5 R | 4 R | 4500 R | 44 R | 3827 R | 4 R | 3 R | 60 R | 5 R | 171 * | 81 * | 373 |
| 13 Manganese | 2403 | 51 | 621 | 7 | 9 | 2292 | 376 | 36543 | 78 | 71 | 336 | 66 | 256 R | 96 R | 404 R |
| 14 Mercury | 0.8 | | | | | 3.9 | | | | | 1.4 | | 2.2 | 0.5 | |
| 15 Nickel | 15097 | 90 | 298 | 6 | 4 | 2083 | 17 | 42 | 9 | 9 | 16 | | 111 | 981 | 28 |
| 16 Selenium | 2 | | | | | | | | | | | | | | |
| 17 Silver | 4 R | | | | | 9 | | 44 | | | | | | | |
| 18 Thallium | | | | | | | | 1 | | | | | | | |
| 19 Tin | 111 | | 14 | | | 40 | | | | | | | 35 | | 53 |
| 20 Vanadium | 95 | | | | | 28 | 27 | 28 | 9 | 7 | 27 | | 553 | 20 | 32 |
| 21 Zinc | 39516 | 39 | 248 | 8 | 10 | 3875 | 153 | 8099 | 23 | 15 | 308 | 20 | 6329 | 491 | 331 |
| 22 Cyanide | 2 | | 2 | | | | | | | | | | | | |

Subsurface Soil Inorganics

| SITE | SITE I | SITE I | SITE I | BLANK | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I | SITE I | SITE J |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-I5-41 | DC-I5-42 | DC-I6-43 | DC-I8-44 | DC-I7-45 | DC-I7-46 | DC-I7-47 * | DC-I9-48 | DC-I9-49 | DC-I10-50 | DC-I11-51 | DC-I11-52 | DC-I12-57 | DC-I12-58 | DC-J1-11 |
| SAMPLE DEPTH | 5'-27.5' | 28'-38' | 10'-25' | | 3.5'-12.5' | 13'-23' | 13'-23' | 6'-23' | 24'-30' | 15'-30' | 6'-20' | 26'-39' | 3.5'-12.5' | 18.5'-27.5' | 10'-20' |
| DATE SAMPLED | 1-30-87 | 1-30-87 | 2-2-87 | 2-3-87 | 2-3-87 | 2-3-87 | 2-3-87 | 2-4-87 | 2-4-87 | 2-4-87 | 2-5-87 | 2-5-87 | 2-13-87 | 2-13-87 | 12-17-86 |
| 1 Aluminum | 2063 | 1060 | 1252 | 8103 | 7195 | 2863 | 2747 | 8897 | 1556 | 1687 | 6650 | 1011 | 1449 | 1205 | 6904 |
| 2 Antimony | | 14 | 18 | 15 | | | | | | | 6663 | | | | |
| 3 Arsenic | 3 | | 14 | 7 | 5 | 3 | 2 | 14 | | 1 | | | 2 R | | 3 * |
| 4 Barium | 3544 | | 400 | 347 | 338 | 83 | 82 | 519 | | | 8 | | | | 156 |
| 5 Beryllium | | | | | | | | | | | 1530 | | | | |
| 6 Boron | | | | | | | | | | | | | | | |
| 7 Cadmium | 2 | | 2 | 2 | 2 | | | 13 | | | | | | | |
| 8 Chromium, trivalent | 35 | | 731 | 12 | 23 | 5 | 5 | 96 | 4 | 6 | 7 | | 4 | 4 | 9 |
| 9 Cobalt | 22 | | 22 | | | | | 34 | | 13 | 140 | | | | 4 |
| 10 Copper | 157 | | 149 | 28 | 258 | | | 575 | | | 23 | | | | 9 |
| 11 Iron | 11418 | 3553 | 23231 | 14744 | 14935 | 7300 | 7468 | 27647 | 4667 | 4687 | 543 | 2867 | 4899 | 4207 | 10000 |
| 12 Lead | 232 * | 6 * | 292 * | | | 10 * | 10 * | 5647 * | 704 | 9 * | 23333 | 29 * | 7 * | 3 * | 7 * |
| 13 Manganese | 115 R | 35 R | 143 R | 395 R | 248 R | 124 R | 125 R | 240 R | 35 R | 61 R | 5483 * | 43 R | 98 * | 63 * | 238 |
| 14 Mercury | 1.1 | | 1.5 | | | | | 3.2 | | | 240 R | | | | |
| 15 Nickel | 2405 | 31 | 51 | 15 | 35 | | 11 | 206 | | 145 | 6.9 | 11 | | | 11 |
| 16 Selenium | | | | | | | | | | | 1320 | | | | |
| 17 Silver | | | | | | | | | | | | | | | |
| 18 Thallium | | | | | | | | | | | | | | | |
| 19 Tin | | | 14 | 4 | 11 | 4 | 3 | 24 | 5 | 2 | | | | | |
| 20 Vanadium | 20 | | 69 | 21 | 18 | | | 40 | | | | | | | 15 |
| 21 Zinc | 201 | 13 | 652 | 203 | 439 | 29 | 27 | 1156 | 125 | 89 | 43 | 18 | 21 * | 20 * | 36 |
| 22 Cyanide | 3 | | | | | | | 2 | | | 3183 | | | | |

Subsurface Soil Inorganics

| SITE | SITE J | SITE J | SITE K | SITE K | SITE K | BLANK | SITE L | SITE L | SITE L | SITE L | SITE L | SITE N | SITE N | BLANK | SITE P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-J2-12 | DC-J3-13 | DC-K1-08 | DC-K2-25 | DC-K3-32 | DC-LB-01 + | DC-L1-02 | DC-L2-03 | DC-L3-04 | DC-L4-09 | DC-L4-10 ‡ | DC-N1-05 | DC-N2-06 | DC-NB-07 + | DC-P1-53 |
| SAMPLE DEPTH | 15'-25' | 0-10' | 0-10' | 0-10' | 10'-20' | | 5'-10' | 5'-15' | 5'-15' | 10'-20' | 10'-20' | 0-10' | 5'-15' | | 0-10' |
| DATE SAMPLED | 12-17-86 | 12-17-86 | 12-16-87 | 1-12-87 | 1-22-87 | 12-12-86 | 12-12-86 | 12-12-86 | 12-12-86 | 12-17-86 | 12-17-86 | 12-15-86 | 12-15-86 | 12-16-86 | 2-11-87 |
| 1 Aluminum | 5026 | 2522 | 4788 | 9073 | 10076 | 9397 | 10697 | 5205 | 7380 | 1120 | 1378 | 4763 | 1924 | 9385 | 5013 |
| 2 Antimony | | | | | | | | 32 | | | | | | | |
| 3 Arsenic | 2 ‡ | 6 ‡ | 9 ‡ | 8 R | 9 R | 6 ‡ | 5 ‡ | | 172 | 55 ‡ | 68 ‡ | 3 ‡ | 2 ‡ | 6 ‡ | |
| 4 Barium | 106 | 44 | 112 | 202 | 192 | 410 | 197 | 192 | 192 | 114 | 142 | 130 | 46 | 358 | 126 |
| 5 Beryllium | | | | | | | | | | | | | | | |
| 6 Boron | | | | | | | | | | | | | | | |
| 7 Cadmium | | 4 | 2 | 1 | 4 | | | 6 | | | | | | 2 | 4 |
| 8 Chromium, trivalent | 7 | 55 | 351 | 22 | 15 | | 16 | 15 | 10 | | 3 | 8 | 5 | 13 | 16 |
| 9 Cobalt | 4 | 5 | 11 | | | | 6 | 9 | 9 | | | 4 | 3 | 7 | |
| 10 Copper | 6 | 83 | 44 | 39 | 129 | | 12 | 105 | 141 | 82 | 101 | 10 | 5 | 33 | 50 |
| 11 Iron | 7320 | 5489 | 17765 | 22439 | 20000 | 13846 | 16053 | 5564 | 11899 | 1500 | 1446 | 820 | 6253 | 16026 | 12750 |
| 12 Lead | 5 ‡ | 10 ‡ | 107 ‡ | 132 R | 238 R | 43 ‡ | 9 ‡ | 106 | 41 | 5 ‡ | 5 ‡ | 24 | 34 ‡ | 78 ‡ | |
| 13 Manganese | 113 | 827 | 499 | 388 | 606 | 345 | 255 | 44 | 149 | 10 | 10 | 164 | 82 | 429 | 201 ‡ |
| 14 Mercury | | | 2.2 | 0.4 | 0.2 | | | | 0.1 | | | | 9 | | 3.9 |
| 15 Nickel | 8 | 72 | 20 | 20 | 21 | 14 | 21 | 408 | 2392 | 83 | 93 | 11 | | 18 | 25 ‡ |
| 16 Selenium | | | | | | | | | | | | | | | |
| 17 Silver | | | | | | | | | | | | | | | |
| 18 Thallium | | | | | | | | | | | | | | | |
| 19 Tin | | | | | 13 | | | | | | | | | | |
| 20 Vanadium | | | 16 | 29 | 27 | 22 | 25 | 10 | 19 | | | | | 21 | 19 |
| 21 Zinc | 24 | 70 | 235 | 245 | 503 | 178 | 59 | 144 | 166 | 11 | 10 | 42 | 65 | 182 | 463 ‡ |
| 22 Cyanide | | | 9 | | | | | | | | | | | | |

Subsurface Soils Semivolatiles

| SITE | SITE N | SITE N | BLANK | SITE P | SITE P | SITE P | SITE P | SITE O | SITE O | SITE O | SITE O | SITE O | SITE O | BLANK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-N1-05 | DC-N2-06 | DC-NB-07 + | DC-P1-53 | DC-P2-54 | DC-P5-55 | DC-P5-56 ‡ | DC-01-59 | DC-02-60 | DC-03-61 | DC-04-62 | DC-05-63 | DC-05-64 ‡ | DC-OB-65 + |
| SAMPLE DEPTH | 0-10' | 5'-15' | | 0-10' | 25'-35' | 10'-25 | 10'-25' | 15'-25' | 20'-30' | 10'-20' | 0-10' | 8.5'-20' | 8.5'-20' | |
| DATE SAMPLED | 12-15-86 | 12-15-86 | 12-16-86 | 2-11-87 | 2-11-87 | 2-12-87 | 2-12-87 | 2-16-87 | 2-17-87 | 2-17-87 | 2-17-87 | 2-17-87 | 2-17-87 | 2-18-87 |
| 1 Dimethyl Phthalate | | | | | | | | | | | | | | |
| 2 Acenaphtylene | | | | | | | | | | | | | | |
| 3 3-Nitroaniline | | | | | | | | | | | | | | |
| 4 Acenaphthene | | | | | | | | | | | | | | |
| 5 2,4-Dinitrophenol | | | | | | | | | | | | | | |
| 6 4-Nitrophenol | | | | | | | | | | | | | | |
| 7 Dibenzofuran | | | | | | | | | | | | | | |
| 8 2,4-Dinitrotoluene | | | | | | | | | | | | | | |
| 9 2,6-Dinitrotoluene | | | | | | | | | | | | | | |
| 10 Diethylphthalate | | | | | | | | | | | | | | |
| 11 4-Chlorophenyl-Phenylether | | | | | | | | | | | | | | |
| 12 Fluorene | | | | | | | | | | | | | | |
| 13 4-Nitroaniline | | | | | | | | | | | | | | |
| 14 4,6-Dinitro-2-methylphenol | | | | | | | | | | | | | | |
| 15 N-Nitrosodiphenylamine | | | | | | | | | | | 50000 J | | | |
| 16 4-Bromophenyl-phenylether | | | | | | | | | | | | | | |
| 17 Hexachlorobenzene | | | | | | | | | | | | | | |
| 18 Pentachlorophenol | | | | | | | | | | 22619 | 474359 J | | | |
| 19 Phenanthrene | 434 | 203 J | | | | | | | | | 217949 | 965 J | | |
| 20 Anthracene | | | | | | | | | | 5357 | | | | |
| 21 Di-n-butyl phthalate | | | | 16250 J | 155 J | 63 J | 325 J | 5287 | | | | 3780 J | | 2785 J |
| 22 Fluoranthene | 684 | 253 J | | | | | | | | | 43590 J | | | |
| 23 Pyrene | 553 | 215 J | | | | | | | | | 282051 | | | |
| 24 Butyl Benzyl phthalate | | | | | | | | | | | | | | |
| 25 3,3'-Dichlorobenzidine | | | | | | | | | | | | | | |
| 26 Benzo(a)Anthracene | 263 J | | | | | | | | | | 121795 | | | |
| 27 bis(2-ethylhexyl) phthalate | 934 | 1266 | | | | | 225 J | 1379 BJ | | 1905 BJ | | | 2439 JB | |
| 28 Chrysene | 276 J | | | | | | | | | | 282051 | | 1951 J | |
| 29 Di-n-octyl phthalate | | | | | | | | | | | | | | |
| 30 Benzo(b)Fluoranthene | 289 J | 152 J | | | | | | | | | 79487 J | | | |
| 31 Benzo(k)Fluoranthene | | | | | | | | | | | | | | |
| 32 Benzo(a)Pyrene | 211 J | | | | | | | | | | 66667 J | | | |
| 33 Indeno(1,2,3-cd)Pyrene | | | | | | | | | | | | | | |
| 34 Benzo(g,h,i)Perylene | | | | | | | | | | | 52564 J | | | |
| 35 Dibenz(a,h)Anthracene | | | | | | | | | | | | | | |

Subsurface Soil Inorganics

| SITE | SITE P | SITE P | SITE P | SITE O | SITE O | SITE O | SITE O | SITE O | SITE O | BLANK | SITE O | SITE O | SITE O | SITE O | SITE O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE NUMBER | DC-P2-54 | DC-P5-55 | DC-P5-56 * | DC-01-59 | DC-02-60 | DC-03-61 | DC-04-62 | DC-05-63 | DC-05-64 * | DC-08-65 + | DC-06-66 | DC-09-72 | DC-09-73 | DC-010-74 | DC-010-75 |
| SAMPLE DEPTH | 25'-35' | 10'-25 | 10'-25' | 15'-25' | 20'-30' | 10'-20' | 0-10' | 8.5'-20' | 8.5'-20' | | 15'-25' | 0-10' | 15'-20' | 5'-10' | 10'-15' |
| DATE SAMPLED | 2-11-87 | 2-12-87 | 2-12-87 | 2-16-87 | 2-17-87 | 2-17-87 | 2-17-87 | 2-17-87 | 2-17-87 | 2-18-87 | 2-18-87 | 2-26-87 | 2-26-87 | 2-26-87 | 2-26-87 |
| 1 Aluminum | 1274 | 6136 | 5538 | 2023 | 1923 | 3786 | 5885 | 3232 | 3061 | 6215 | 2148 | 4902 | 3346 | 5038 | 2114 |
| 2 Antimony | | | | | | | | | | | | | | | |
| 3 Arsenic | | 3 R | 4 R | | | 4 R | | 3 R | 3 R | 8 R | 2 R | 6 R | 3 R | 7 R | 3 R |
| 4 Barium | | 81 | 119 | 57 | | 131 | 214 | 106 | 101 | 411 | | 163 | 129 | 158 | 45 |
| 5 Beryllium | | | | | | | | | | | | | | | |
| 6 Boron | | | | | | | | | | | | | | | |
| 7 Cadmium | | | | | | | 31 | | | 2 | | 4 | | 11 | |
| 8 Chromium, trivalent | 3 | 14 | 10 | 5 | 6 | 9 | 18 | 7 | 6 | 10 | 5 | 13 | 6 | 22 | 4 |
| 9 Cobalt | | | | | | | | | | | | | | | |
| 10 Copper | | 16 | 24 | | | 8 | 205 | 7 | | 33 | | 59 | | 341 | 15 |
| 11 Iron | 4131 | 15309 | 13000 | 5230 | 5705 | 9548 | 11859 | 8902 | 8232 | 12658 | 4815 | 11793 | 7580 | 11910 | 5648 |
| 12 Lead | 4 * | 526 * | 90 * | 3 * | 6 * | 7 * | 147 * | 7 * | 9 * | 54 * | 4 * | 18 * | 5 * | 71 * | 6 * |
| 13 Manganese | 93 * | 623 * | 710 * | 106 * | 108 * | 233 * | 329 * | 207 * | 187 * | 357 * | 79 * | 190 * | 152 * | 206 * | 101 * |
| 14 Mercury | 0.6 | | | | | | 6.3 | | | | | 1.7 | 0.3 | 1.9 | |
| 15 Nickel | | 15 * | 23 * | | | | 45 * | 11 * | 10 * | 15 * | | 38 | | 136 * | 11 * |
| 16 Selenium | | | | | | | | | | | | | | | |
| 17 Silver | | | | | | | | | | | | | | | |
| 18 Thallium | | | | | | | | | | | | | | | |
| 19 Tin | | | | | | | | | | | | | | | |
| 20 Vanadium | | 22 | 16 | | | 13 | 18 | | | 15 | | 19 | | 15 | |
| 21 Zinc | 17 * | 49 * | 74 * | 18 * | 18 * | 54 * | 1398 | 37 * | 35 * | 181 * | 17 * | 277 | 30 * | 688 * | 43 * |
| 22 Cyanide | 13 | 15 | | | | | | | | | | | | | |

# APPENDIX E

## SUMMARY TABLES FOR SITE-SPECIFIC CONTAMINANT LOADING TO THE MISSISSIPPI RIVER

Table E-1

CONTAMINANT LOADING TO RIVER DUE TO HORIZONTAL FLOW IN SITE G

| | Area ($ft^2$) | Horizontal Flow Rate Q ($ft^3$/day) | TOCs* Ave. Conc. (ug/L) | Loading to River (lb/day) | Volatiles Ave. Conc. (ug/L) | Loading to River (lb/day) | Carcinogenic PNAs** Ave. Conc. (ug/L) | Loading to River (lb/day) | Non-Carcinogenic PNAs** Ave. Conc. (ug/L) | Loading to River (lb/day) | Total PNAs** Loading to River (lb/day) | Total PCBs Ave. Conc. (ug/L) | Loading to River (lb/day) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 2,420.98 | -13.00 | 35,129.6 | $-3.03 \times 10^{-2}$ | 2,986.5 | $-2.58 \times 10^{-3}$ | 4.75 | $-4.10 \times 10^{-6}$ | ND | -- | $-4.10 \times 10^{-6}$ | 83 | $-7.16 \times 10^{-5}$ |
| February | 2,370.08 | -14.04 | 35,129.6 | $-3.08 \times 10^{-2}$ | 2,986.5 | $-2.62 \times 10^{-3}$ | 4.75 | $-4.17 \times 10^{-6}$ | ND | -- | $-4.17 \times 10^{-6}$ | 83 | $-7.28 \times 10^{-5}$ |
| March | 2,473.61 | -9.89 | 35,129.6 | $-2.17 \times 10^{-2}$ | 2,986.5 | $-1.85 \times 10^{-3}$ | 4.75 | $-2.94 \times 10^{-6}$ | ND | -- | $-2.94 \times 10^{-6}$ | 83 | $-5.13 \times 10^{-5}$ |
| April | 2,431.51 | -6.57 | 35,129.6 | $-1.44 \times 10^{-2}$ | 2,986.5 | $-1.23 \times 10^{-3}$ | 4.75 | $-1.95 \times 10^{-6}$ | ND | -- | $-1.95 \times 10^{-6}$ | 83 | $-3.41 \times 10^{-5}$ |
| May | 2,652.55 | -3.18 | 35,129.6 | $-6.98 \times 10^{-3}$ | 2,986.5 | $-5.94 \times 10^{-4}$ | 4.75 | $-9.44 \times 10^{-7}$ | ND | -- | $-9.44 \times 10^{-7}$ | 83 | $-1.65 \times 10^{-5}$ |
| June | 2,736.76 | -4.38 | 35,129.6 | $-9.12 \times 10^{-3}$ | 2,986.5 | $-8.18 \times 10^{-4}$ | 4.75 | $-1.30 \times 10^{-6}$ | ND | -- | $-1.30 \times 10^{-6}$ | 83 | $-2.27 \times 10^{-5}$ |
| July | 2,747.29 | -8.24 | 35,129.6 | $-1.81 \times 10^{-2}$ | 2,986.5 | $-1.54 \times 10^{-3}$ | 4.75 | $-2.45 \times 10^{-6}$ | ND | -- | $-2.45 \times 10^{-6}$ | 83 | $-4.27 \times 10^{-5}$ |
| August | 2,663.08 | -13.85 | 35,129.6 | $-3.04 \times 10^{-2}$ | 2,986.5 | $-2.30 \times 10^{-3}$ | 4.75 | $-4.11 \times 10^{-6}$ | ND | -- | $-4.11 \times 10^{-6}$ | 83 | $-7.18 \times 10^{-5}$ |
| September | 2,494.66 | -17.46 | 35,129.6 | $-3.83 \times 10^{-2}$ | 2,986.5 | $-3.26 \times 10^{-3}$ | 4.75 | $-5.18 \times 10^{-6}$ | ND | -- | $-5.18 \times 10^{-6}$ | 83 | $-9.06 \times 10^{-5}$ |
| October | 2,420.98 | -16.95 | 35,129.6 | $-3.72 \times 10^{-2}$ | 2,986.5 | $-3.16 \times 10^{-3}$ | 4.75 | $-5.03 \times 10^{-6}$ | ND | -- | $-5.03 \times 10^{-6}$ | 83 | $-8.79 \times 10^{-5}$ |
| November | 2,473.61 | -12.37 | 35,129.6 | $-2.72 \times 10^{-2}$ | 2,986.5 | $-2.31 \times 10^{-3}$ | 4.75 | $-3.67 \times 10^{-6}$ | ND | -- | $-3.67 \times 10^{-6}$ | 83 | $-6.42 \times 10^{-5}$ |
| December | 2,484.14 | -11.92 | 35,129.6 | $-2.62 \times 10^{-2}$ | 2,986.5 | $-2.22 \times 10^{-3}$ | 4.75 | $-3.54 \times 10^{-6}$ | ND | -- | $-3.54 \times 10^{-6}$ | 83 | $-6.18 \times 10^{-5}$ |

* Total organic carbon.

** Polynuclear aromatics.

ND Not detected.

Negative sign designates contaminant migration toward the river.

Source: Ecology and Environment, Inc. 1988.

Table E-2

CONTAMINANT LOADING TO RIVER DUE TO HORIZONTAL FLOW IN SITE H

| | Area ($ft^2$) | Horizontal Flow Rate Q ($ft^3$/day) | TOCs* Ave. Conc. (ug/L) | Loading to River (lb/day) | Volatiles Ave. Conc. (ug/L) | Loading to River (lb/day) | Carcinogenic PNAs** Ave. Conc. (ug/L) | Loading to River (lb/day) | Non-Carcinogenic PNAs** Ave. Conc. (ug/L) | Loading to River (lb/day) | Total PNAs** Loading to River (lb/day) | Total PCBs Ave. Conc. (ug/L) | Loading to River (lb/day) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 8,612.86 | -0.465 | 12,278.20 | $-3.57 \times 10^{-2}$ | 5,981.60 | $-1.74 \times 10^{-2}$ | ND | -- | 3 | $-8.72 \times 10^{-6}$ | $-8.72 \times 10^{-6}$ | 10.4 | $-3.02 \times 10^{-5}$ |
| February | 8,536.10 | -0.504 | 12,278.20 | $-3.87 \times 10^{-2}$ | 5,981.60 | $-1.88 \times 10^{-2}$ | ND | -- | 3 | $-9.45 \times 10^{-6}$ | $-9.45 \times 10^{-6}$ | 10.4 | $-3.28 \times 10^{-5}$ |
| March | 8,797.10 | -0.369 | 12,278.20 | $-2.83 \times 10^{-2}$ | 5,981.60 | $-1.38 \times 10^{-2}$ | ND | -- | 3 | $-6.92 \times 10^{-6}$ | $-6.92 \times 10^{-6}$ | 10.4 | $-2.40 \times 10^{-5}$ |
| April | 8,582.16 | -0.275 | 12,278.20 | $-2.11 \times 10^{-2}$ | 5,981.60 | $-1.03 \times 10^{-2}$ | ND | -- | 3 | $-3.44 \times 10^{-6}$ | $-3.44 \times 10^{-6}$ | 10.4 | $-1.79 \times 10^{-5}$ |
| May | 9,058.09 | -0.127 | 12,278.20 | $-9.75 \times 10^{-3}$ | 5,981.60 | $-4.75 \times 10^{-3}$ | ND | -- | 3 | $-2.38 \times 10^{-6}$ | $-2.38 \times 10^{-6}$ | 10.4 | $-8.26 \times 10^{-6}$ |
| June | 9,288.38 | -0.167 | 12,278.20 | $-1.28 \times 10^{-2}$ | 5,981.60 | $-6.24 \times 10^{-3}$ | ND | -- | 3 | $-3.13 \times 10^{-6}$ | $-3.13 \times 10^{-6}$ | 10.4 | $-1.09 \times 10^{-5}$ |
| July | 9,564.73 | -0.287 | 12,278.20 | $-2.20 \times 10^{-2}$ | 5,981.60 | $-1.07 \times 10^{-2}$ | ND | -- | 3 | $-5.38 \times 10^{-6}$ | $-5.38 \times 10^{-6}$ | 10.4 | $-1.87 \times 10^{-5}$ |
| August | 9,150.21 | -0.458 | 12,278.20 | $-3.51 \times 10^{-2}$ | 5,981.60 | $-1.71 \times 10^{-2}$ | ND | -- | 3 | $-8.59 \times 10^{-6}$ | $-8.59 \times 10^{-6}$ | 10.4 | $-2.98 \times 10^{-5}$ |
| September | 9,042.74 | -0.597 | 12,278.20 | $-4.58 \times 10^{-2}$ | 5,981.60 | $-2.23 \times 10^{-2}$ | ND | -- | 3 | $-1.12 \times 10^{-5}$ | $-1.12 \times 10^{-5}$ | 10.4 | $-3.88 \times 10^{-5}$ |
| October | 8,735.69 | -0.577 | 12,278.20 | $-4.43 \times 10^{-2}$ | 5,981.60 | $-2.16 \times 10^{-2}$ | ND | -- | 3 | $-1.08 \times 10^{-5}$ | $-1.08 \times 10^{-5}$ | 10.4 | $-3.75 \times 10^{-5}$ |
| November | 8,889.21 | -0.462 | 12,278.20 | $-3.55 \times 10^{-2}$ | 5,981.60 | $-1.73 \times 10^{-2}$ | ND | -- | 3 | $-8.66 \times 10^{-6}$ | $-8.66 \times 10^{-6}$ | 10.4 | $-3.00 \times 10^{-5}$ |
| December | 9,012.03 | -0.424 | 12,278.20 | $-3.25 \times 10^{-2}$ | 5,981.60 | $-1.59 \times 10^{-2}$ | ND | -- | 3 | $-7.95 \times 10^{-6}$ | $-7.95 \times 10^{-6}$ | 10.4 | $-2.76 \times 10^{-5}$ |

* Total organic carbon.

** Polynuclear aromatics.

ND Not detected.

Negative sign designates contaminant migration toward the river.

Source: Ecology and Environment, Inc. 1988.

Table E-3

**CONTAMINANT LOADING TO RIVER DUE TO HORIZONTAL FLOW IN SITE I**

| | Area ($ft^2$) | Horizontal Flow Rate Q ($ft^3$/day) | TOCs* Ave. Conc. (ug/L) | Loading to River (lb/day) | Volatiles Ave. Conc. (ug/L) | Loading to River (lb/day) | Carcinogenic PNAs** Ave. Conc. (ug/L) | Loading to River (lb/day) | Non-Carcinogenic PNAs** Ave. Conc. (ug/L) | Loading to River (lb/day) | Total PNAs** Loading to River (lb/day) | Total PCBs Ave. Conc. (ug/L) | Loading to River (lb/day) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 8,182.99 | -0.442 | 5,736.63 | $-1.58 \times 10^{-2}$ | 1,204.5 | $-3.33 \times 10^{-3}$ | ND | -- | 3.38 | $-9.34 \times 10^{-6}$ | $-9.34 \times 10^{-6}$ | ND | -- |
| February | 8,060.17 | -0.467 | 5,736.63 | $-1.67 \times 10^{-2}$ | 1,204.5 | $-3.52 \times 10^{-3}$ | ND | -- | 3.38 | $-9.87 \times 10^{-6}$ | $-9.87 \times 10^{-6}$ | ND | -- |
| March | 8,198.34 | -0.344 | 5,736.63 | $-1.23 \times 10^{-2}$ | 1,204.5 | $-2.59 \times 10^{-3}$ | ND | -- | 3.38 | $-7.27 \times 10^{-6}$ | $-7.27 \times 10^{-6}$ | ND | -- |
| April | 8,182.99 | -0.254 | 5,736.63 | $-9.11 \times 10^{-3}$ | 1,204.5 | $-1.91 \times 10^{-3}$ | ND | -- | 3.38 | $-5.37 \times 10^{-6}$ | $-5.37 \times 10^{-6}$ | ND | -- |
| May | 8,597.51 | -0.129 | 5,736.63 | $-4.63 \times 10^{-3}$ | 1,204.5 | $-9.71 \times 10^{-4}$ | ND | -- | 3.38 | $-2.73 \times 10^{-6}$ | $-2.73 \times 10^{-6}$ | ND | -- |
| June | 8,609.62 | -0.156 | 5,736.63 | $-5.59 \times 10^{-3}$ | 1,204.5 | $-1.17 \times 10^{-3}$ | ND | -- | 3.38 | $-3.30 \times 10^{-6}$ | $-3.30 \times 10^{-6}$ | ND | -- |
| July | 8,812.45 | -0.264 | 5,736.63 | $-9.47 \times 10^{-3}$ | 1,204.5 | $-1.99 \times 10^{-3}$ | ND | -- | 3.38 | $-5.58 \times 10^{-6}$ | $-5.58 \times 10^{-6}$ | ND | -- |
| August | 8,612.86 | -0.431 | 5,736.63 | $-1.55 \times 10^{-2}$ | 1,204.5 | $-3.24 \times 10^{-3}$ | ND | -- | 3.38 | $-9.10 \times 10^{-6}$ | $-9.10 \times 10^{-6}$ | ND | -- |
| September | 8,305.80 | -0.556 | 5,736.63 | $-1.99 \times 10^{-2}$ | 1,204.5 | $-4.19 \times 10^{-3}$ | ND | -- | 3.38 | $-1.17 \times 10^{-5}$ | $-1.17 \times 10^{-5}$ | ND | -- |
| October | 8,198.34 | -0.549 | 5,736.63 | $-1.97 \times 10^{-2}$ | 1,204.5 | $1.97 \times 10^{-2}$ | ND | -- | 3.38 | $-1.16 \times 10^{-5}$ | $-1.16 \times 10^{-5}$ | ND | -- |
| November | 8,229.04 | -0.420 | 5,736.63 | $-1.51 \times 10^{-2}$ | 1,204.5 | $-3.16 \times 10^{-3}$ | ND | -- | 3.38 | $-8.87 \times 10^{-6}$ | $-8.87 \times 10^{-6}$ | ND | -- |
| December | 8,459.33 | -0.355 | 5,736.63 | $-1.27 \times 10^{-2}$ | 1,204.5 | $-2.67 \times 10^{-3}$ | ND | -- | 3.38 | $-7.50 \times 10^{-6}$ | $-7.50 \times 10^{-6}$ | ND | -- |

* Total organic carbon.

** Polynuclear aromatics.

ND Not detected.

Negative sign designates contaminant migration toward the river.

Source: Ecology and Environment, Inc. 1988

Table E-4

CONTAMINANT LOADING TO RIVER DUE TO HORIZONTAL FLOW IN SITE L

| | Area ($ft^2$) | Horizontal Flow Rate Q ($ft^3$/day) | TOCs* Ave. Conc. (ug/L) | Loading to River (lb/day) | Volatiles Ave. Conc. (ug/L) | Loading to River (lb/day) | Carcinogenic PNAs** Ave. Conc. (ug/L) | Loading to River (lb/day) | Non-Carcinogenic PNAs** Ave. Conc. (ug/L) | Loading to River (lb/day) | Total PNAs** Loading to River (lb/day) | Total PCBs Ave. Conc. (ug/L) | Loading to River (lb/day) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 2,005.57 | -10.03 | 2,602 | $-1.76 \times 10^{-3}$ | 1,390 | $-9.41 \times 10^{-4}$ | ND | -- | ND | -- | -- | ND | -- |
| February | 1,976.40 | -11.27 | 2,602 | $-1.83 \times 10^{-3}$ | 1,390 | $-9.79 \times 10^{-4}$ | ND | -- | ND | -- | -- | ND | -- |
| March | 2,022.24 | -8.49 | 2,602 | $-1.38 \times 10^{-3}$ | 1,390 | $-7.38 \times 10^{-4}$ | ND | -- | ND | -- | -- | ND | -- |
| April | 1,997.24 | -6.39 | 2,602 | $-1.04 \times 10^{-3}$ | 1,390 | $-5.55 \times 10^{-4}$ | ND | -- | ND | -- | -- | ND | -- |
| May | 2,420.85 | -3.87 | 2,602 | $-6.29 \times 10^{-4}$ | 1,390 | $-3.36 \times 10^{-4}$ | ND | -- | ND | -- | -- | ND | -- |
| June | 2,226.41 | -4.01 | 2,602 | $-6.52 \times 10^{-4}$ | 1,390 | $-3.48 \times 10^{-4}$ | ND | -- | ND | -- | -- | ND | -- |
| July | 2,240.29 | -6.72 | 2,602 | $-1.09 \times 10^{-3}$ | 1,390 | $-5.84 \times 10^{-4}$ | ND | -- | ND | -- | -- | ND | -- |
| August | 2,175.02 | -10.88 | 2,602 | $-1.77 \times 10^{-3}$ | 1,390 | $-9.45 \times 10^{-4}$ | ND | -- | ND | -- | -- | ND | -- |
| September | 2,080.57 | -13.94 | 2,602 | $-2.27 \times 10^{-3}$ | 1,390 | $-1.21 \times 10^{-3}$ | ND | -- | ND | -- | -- | ND | -- |
| October | 2,015.29 | -13.50 | 2,602 | $-2.20 \times 10^{-3}$ | 1,390 | $-1.17 \times 10^{-3}$ | ND | -- | ND | -- | -- | ND | -- |
| November | 2,030.57 | -10.56 | 2,602 | $-1.72 \times 10^{-3}$ | 1,390 | $-9.17 \times 10^{-4}$ | ND | -- | ND | -- | -- | ND | -- |
| December | 2,044.46 | -9.81 | 2,602 | $-1.60 \times 10^{-3}$ | 1,390 | $-8.52 \times 10^{-4}$ | ND | -- | ND | -- | -- | ND | -- |

* Total organic carbon

** Polynuclear aromatics.

ND Not detected.

Negative sign designates contaminant migration toward the river.

Source: Ecology and Environment, Inc. 1988.

Table E-5

CONTAMINANT LOADING TO RIVER DUE TO VERTICAL FLOW IN SITE G

| | Area ($ft^2$) | Vertical Flow Rate Q ($ft^3$/day) | TOCs* Ave. Conc. (ug/L) | Loading to River (lb/day) | Volatiles Ave. Conc. (ug/L) | Loading to River (lb/day) | Carcinogenic PNAs** Ave. Conc. (ug/L) | Loading to River (lb/day) | Non-Carcinogenic PNAs** Ave. Conc. (ug/L) | Loading to River (lb/day) | Total PNAs** Loading to River (lb/day) | Total PCBs Ave. Conc. (ug/L) | Loading to River (lb/day) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 79,751 | 8,670.39 | 35,129 | 19.00 | 2,986.5 | 1.61 | 4.75 | $2.57 \times 10^{-3}$ | ND | -- | $2.57 \times 10^{-3}$ | 83 | $4.49 \times 10^{-2}$ |
| February | 79,751 | 8,826.04 | 35,129 | 19.34 | 2,986.5 | 1.64 | 4.75 | $2.61 \times 10^{-3}$ | ND | -- | $2.61 \times 10^{-3}$ | 83 | $4.57 \times 10^{-2}$ |
| March | 79,751 | 8,826.04 | 35,129 | 19.34 | 2,986.5 | 1.64 | 4.75 | $2.61 \times 10^{-3}$ | ND | -- | $2.61 \times 10^{-3}$ | 83 | 4.57 x 10-2 |
| April | 79,751 | 3,841.92 | 35,129 | 8.42 | 2,986.5 | 0.72 | 4.75 | $1.14 \times 10^{-3}$ | ND | -- | $1.14 \times 10^{-3}$ | 83 | $1.99 \times 10^{-2}$ |
| May | 79,751 | 7,787.69 | 35,129 | 17.06 | 2,986.5 | 1.45 | 4.75 | 2.31 x 10-3 | ND | -- | $2.31 \times 10^{-3}$ | 83 | $4.03 \times 10^{-2}$ |
| June | 79,751 | 8,826.04 | 35,129 | 19.34 | 2,986.5 | 1.64 | 4.75 | $2.61 \times 10^{-3}$ | ND | -- | $2.61 \times 10^{-3}$ | 83 | $4.57 \times 10^{-2}$ |
| July | 79,751 | 8,306.86 | 35,129 | 18.20 | 2,986.5 | 1.55 | 4.75 | $2.46 \times 10^{-3}$ | ND | -- | $2.46 \times 10^{-3}$ | 83 | $4.30 \times 10^{-2}$ |
| August | 79,751 | 6,230.15 | 35,129 | 13.65 | 2,986.5 | 1.16 | 4.75 | $1.85 \times 10^{-3}$ | ND | -- | $1.85 \times 10^{-3}$ | 83 | $3.22 \times 10^{-2}$ |
| September | 79,751 | 5,191.79 | 35,129 | 11.37 | 2,986.5 | 0.97 | 4.75 | $1.54 \times 10^{-3}$ | ND | -- | $1.54 \times 10^{-3}$ | 83 | $2.69 \times 10^{-2}$ |
| October | 79,751 | 6,749.33 | 35,129 | 14.79 | 2,986.5 | 1.26 | 4.75 | $2.00 \times 10^{-3}$ | ND | -- | $2.00 \times 10^{-3}$ | 83 | $3.49 \times 10^{-2}$ |
| November | 79,751 | 8,826.04 | 35,129 | 19.34 | 2,986.5 | 1.64 | 4.75 | $2.61 \times 10^{-3}$ | ND | -- | $2.61 \times 10^{-3}$ | 83 | $4.57 \times 10^{-2}$ |
| December | 79.751 | 9,345.22 | 35,129 | 20.47 | 2,986.5 | 1.74 | 4.75 | $2.77 \times 10^{-3}$ | ND | -- | $2.77 \times 10^{-3}$ | 83 | $4.84 \times 10^{-2}$ |

* Total organic carbon.

** Polynuclear aromatics.

ND Not detected.

Negative sign designates contaminant migration toward the river.

Source: Ecology and Environment, Inc. 1988.

Table E-6

CONTAMINANT LOADING TO RIVER DUE TO VERTICAL FLOW IN SITE M

| | Area ($ft^2$) | Vertical Flow Rate Q ($ft^3$/day) | TOCs* Ave. Conc. (ug/L) | Loading to River (lb/day) | Volatiles Ave. Conc. (ug/L) | Loading to River (lb/day) | Carcinogenic PNAs** Ave. Conc. (ug/L) | Loading to River (lb/day) | Non-Carcinogenic PNAs** Ave. Conc. (ug/L) | Loading to River (lb/day) | Total PNAs** Loading to River (lb/day) | Total PCBs Ave. Conc. (ug/L) | Loading to River (lb/day) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 116,540 | 13,656.16 | 12,270 | 10.46 | 5,981.6 | 5.09 | ND | -- | 3 | $2.56 \times 10^{-3}$ | $2.56 \times 10^{-3}$ | 10.4 | $8.86 \times 10^{-3}$ |
| February | 116,540 | 14,414.03 | 12,270 | 11.04 | 5,981.6 | 5.38 | ND | -- | 3 | $2.70 \times 10^{-3}$ | $2.70 \times 10^{-3}$ | 10.4 | $9.35 \times 10^{-3}$ |
| March | 116,540 | 14,414.03 | 12,270 | 11.04 | 5,981.6 | 5.38 | ND | -- | 3 | $2.70 \times 10^{-3}$ | $2.70 \times 10^{-3}$ | 10.4 | $9.35 \times 10^{-3}$ |
| April | 116,540 | 5,007.26 | 12,270 | 3.83 | 5,981.6 | 1.87 | ND | -- | 3 | $9.37 \times 10^{-4}$ | $9.37 \times 10^{-4}$ | 10.4 | $3.25 \times 10^{-3}$ |
| May | 116,540 | 10,621.46 | 12,270 | 8.13 | 5,981.6 | 3.96 | ND | -- | 3 | $1.99 \times 10^{-3}$ | $1.99 \times 10^{-3}$ | 10.4 | $6.89 \times 10^{-3}$ |
| June | 116,540 | 12,897.48 | 12,270 | 9.88 | 5,981.6 | 4.81 | ND | -- | 3 | $2.41 \times 10^{-3}$ | $2.41 \times 10^{-3}$ | 10.4 | $8.37 \times 10^{-3}$ |
| July | 116,540 | 12,897.48 | 12,270 | 9.88 | 5,981.6 | 4.81 | ND | -- | 3 | $2.41 \times 10^{-3}$ | $2.41 \times 10^{-3}$ | 10.4 | $8.37 \times 10^{-3}$ |
| August | 116,540 | 11,380.13 | 12,270 | 8.71 | 5,981.6 | 4.25 | ND | -- | 3 | $2.13 \times 10^{-3}$ | $2.13 \times 10^{-3}$ | 10.4 | $7.38 \times 10^{-3}$ |
| September | 116,540 | 10,621.46 | 12,270 | 8.13 | 5,981.6 | 3.96 | ND | -- | 3 | $1.99 \times 10^{-3}$ | $1.99 \times 10^{-3}$ | 10.4 | $6.89 \times 10^{-3}$ |
| October | 116,540 | 11,380.13 | 12,270 | 8.71 | 5,981.6 | 4.25 | ND | -- | 3 | $2.13 \times 10^{-3}$ | $2.13 \times 10^{-3}$ | 10.4 | $7.38 \times 10^{-3}$ |
| November | 116,540 | 12,897.48 | 12,270 | 9.88 | 5,981.6 | 4.81 | ND | -- | 3 | $2.41 \times 10^{-3}$ | $2.41 \times 10^{-3}$ | 10.4 | $8.37 \times 10^{-3}$ |
| December | 116,540 | 13,656.16 | 12,270 | 10.46 | 5,981.6 | 5.09 | ND | -- | 3 | $2.56 \times 10^{-3}$ | $2.56 \times 10^{-3}$ | 10.4 | $8.86 \times 10^{-3}$ |

* Total organic carbon.

** Polynuclear aromatics.

ND Not detected.

Negative sign designates contaminant migration toward the river.

Source: Ecology and Environment, Inc. 1988.

Table E-7

CONTAMINANT LOADING TO RIVER DUE TO VERTICAL FLOW IN SITE I

| | Area ($ft^2$) | Vertical Flow Rate Q ($ft^3$/day) | TOCs* Ave. Conc. (ug/L) | Loading to River (lb/day) | Volatiles Ave. Conc. (ug/L) | Loading to River (lb/day) | Carcinogenic PNAs** Ave. Conc. (ug/L) | Loading to River (lb/day) | Non-Carcinogenic PNAs** Ave. Conc. (ug/L) | Loading to River (lb/day) | Total PNAs** Loading to River (lb/day) | Total PCBs Ave. Conc. (ug/L) | Loading to River (lb/day) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 164,441 | 18,198.69 | 5,736.6 | 6.51 | 1,204.5 | 1.37 | ND | -- | 3.38 | $3.84 \times 10^{-3}$ | $3.84 \times 10^{-3}$ | ND | -- |
| February | 164,441 | 19,269.20 | 5,736.6 | 6.89 | 1,204.5 | 1.45 | ND | -- | 3.38 | $4.06 \times 10^{-3}$ | $4.06 \times 10^{-3}$ | ND | -- |
| March | 164,441 | 19,269.20 | 5,736.6 | 6.89 | 1,204.5 | 1.45 | ND | -- | 3.38 | $4.06 \times 10^{-3}$ | $4.06 \times 10^{-3}$ | ND | -- |
| April | 164,441 | 7,600.63 | 5,736.6 | 2.72 | 1,204.5 | 0.57 | ND | -- | 3.38 | $1.60 \times 10^{-3}$ | $1.6 \times 10^{-3}$ | ND | -- |
| May | 164,441 | 14,987.15 | 5,736.6 | 5.36 | 1,204.5 | 1.13 | ND | -- | 3.38 | $3.16 \times 10^{-3}$ | $3.16 \times 10^{-3}$ | ND | -- |
| June | 164,441 | 18,198.69 | 5,736.6 | 6.51 | 1,204.5 | 1.37 | ND | -- | 3.38 | $3.84 \times 10^{-3}$ | $3.84 \times 10^{-3}$ | ND | -- |
| July | 164,441 | 17,128.17 | 5,736.6 | 6.13 | 1,204.5 | 1.29 | ND | -- | 3.38 | $3.61 \times 10^{-3}$ | $3.61 \times 10^{-3}$ | ND | -- |
| August | 164,441 | 14,987.15 | 5,736.6 | 5.36 | 1,204.5 | 1.13 | ND | -- | 3.38 | $3.16 \times 10^{-3}$ | $3.16 \times 10^{-3}$ | ND | -- |
| September | 164,441 | 13,916.64 | 5,736.6 | 4.98 | 1,204.5 | 1.05 | ND | -- | 3.38 | $2.93 \times 10^{-3}$ | $2.93 \times 10^{-3}$ | ND | -- |
| October | 164,441 | 14,987.15 | 5,736.6 | 5.36 | 1,204.5 | 1.13 | ND | -- | 3.38 | $3.16 \times 10^{-3}$ | $3.16 \times 10^{-3}$ | ND | -- |
| November | 164,441 | 18,198.69 | 5,736.6 | 6.51 | 1,204.5 | 1.37 | ND | -- | 3.38 | $3.84 \times 10^{-3}$ | $3.84 \times 10^{-3}$ | ND | -- |
| December | 164,441 | 19,269.20 | 5,736.6 | 6.89 | 1,204.5 | 1.45 | ND | -- | 3.38 | $4.06 \times 10^{-3}$ | $4.06 \times 10^{-3}$ | ND | -- |

* Total organic carbon.

** Polynuclear aromatics.

ND Not detected.

Negative sign designates contaminant migration toward the river.

Source: Ecology and Environment, Inc. 1988.

Table E-8

CONTAMINANT LOADING TO RIVER DUE TO VERTICAL FLOW IN SITE L

| | Area ($ft^2$) | Vertical Flow Rate Q ($ft^3$/day) | TOCs* Ave. Conc. (ug/L) | Loading to River (lb/day) | Volatiles Ave. Conc. (ug/L) | Loading to River (lb/day) | Carcinogenic PNAs** Ave. Conc. (ug/L) | Loading to River (lb/day) | Non-Carcinogenic PNAs** Ave. Conc. (ug/L) | Loading to River (lb/day) | Total PNAs** Loading to River (lb/day) | Total PCBs Ave. Conc. (ug/L) | Loading to River (lb/day) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 25,678.5 | 2,942.14 | 2,602 | $4.77 \times 10^{-1}$ | 1,390 | $2.55 \times 10^{-1}$ | ND | -- | ND | -- | -- | ND | -- |
| February | 25,678.5 | 3,176.17 | 2,602 | $5.15 \times 10^{-1}$ | 1,390 | $2.75 \times 10^{-1}$ | ND | -- | ND | -- | -- | ND | -- |
| March | 25,678.5 | 3,176.17 | 2,602 | $5.15 \times 10^{-1}$ | 1,390 | $2.75 \times 10^{-1}$ | ND | -- | ND | -- | -- | ND | -- |
| April | 25,678.5 | 1,153.45 | 2,602 | $1.87 \times 10^{-1}$ | 1,390 | $1.00 \times 10^{-1}$ | ND | -- | ND | -- | -- | ND | -- |
| May | 25,678.5 | 2,340.34 | 2,602 | $3.80 \times 10^{-1}$ | 1,390 | $2.03 \times 10^{-1}$ | ND | -- | ND | -- | -- | ND | -- |
| June | 25,678.5 | 2,841.84 | 2,602 | $4.61 \times 10^{-1}$ | 1,390 | $2.46 \times 10^{-1}$ | ND | -- | ND | -- | -- | ND | -- |
| July | 25,678.5 | 2,841.84 | 2,602 | $4.61 \times 10^{-1}$ | 1,390 | $2.46 \times 10^{-1}$ | ND | -- | ND | -- | -- | ND | -- |
| August | 25,678.5 | 2,340.34 | 2,602 | $3.80 \times 10^{-1}$ | 1,390 | $2.03 \times 10^{-1}$ | ND | -- | ND | -- | -- | ND | -- |
| September | 25,678.5 | 2,173.17 | 2,602 | $3.53 \times 10^{-1}$ | 1,390 | $1.88 \times 10^{-1}$ | ND | -- | ND | -- | -- | ND | -- |
| October | 25,678.5 | 2,340.34 | 2,602 | $3.80 \times 10^{-1}$ | 1,390 | $2.03 \times 10^{-1}$ | ND | -- | ND | -- | -- | ND | -- |
| November | 25,678.5 | 2,841.84 | 2,602 | $4.61 \times 10^{-1}$ | 1,390 | $2.46 \times 10^{-1}$ | ND | -- | ND | -- | -- | ND | -- |
| December | 25,678.5 | 3,009.00 | 2,602 | $4.88 \times 10^{-1}$ | 1,390 | $2.61 \times 10^{-1}$ | ND | -- | ND | -- | -- | ND | -- |

* Total organic carbon.

** Polynuclear aromatics.

ND Not detected.

Negative sign designates contaminant migration toward the river.

Source: Ecology and Environment, Inc. 1988.

Table E-9

CONTAMINANT LOADING TO RIVER DUE TO HORIZONTAL FLOW AT SHALLOW ZONE IN SITE O***

| | Area ($ft^2$) | Flow Rate Q ($ft^3$/day) | TOCs* Weighted Ave. Conc. (ug/L) | Loading to River (lb/day) | Volatiles Weighted Ave. Conc. (ug/L) | Loading to River (lb/day) | Carcinogenic PNAs** Weighted Ave. Conc. (ug/L) | Loading to River (lb/day) | Non-Carcinogenic PNAs** Weighted Ave. Conc. (ug/L) | Loading to River (lb/day) | Total PNAs** Loading to River (lb/day) | Total PCBs Weighted Ave. Conc. (ug/L) | Loading to River (lb/day) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 95,142 | -789.69 | 132,000 | -6.51 | 119,000 | -5.87 | ND | -- | ND | -- | -- | ND | -- |
| February | 94,729 | -672.58 | 132,000 | -5.55 | 119,000 | -5.00 | ND | -- | ND | -- | -- | ND | -- |
| March | 10,260 | -122.83 | 132,000 | -1.01 | 119,000 | -0.91 | ND | -- | ND | -- | -- | ND | -- |
| April | 105,668 | 359.27 | 132,000 | 2.96 | 119,000 | 2.67 | ND | -- | ND | -- | -- | ND | -- |
| May | 111,833 | 335.50 | 132,000 | 2.77 | 119,000 | 2.49 | ND | -- | ND | -- | -- | ND | -- |
| June | 111,270 | -44.51 | 132,000 | -0.37 | 119,000 | -0.33 | ND | -- | ND | -- | -- | ND | -- |
| July | 107,547 | -451.70 | 132,000 | -3.73 | 119,000 | -3.36 | ND | -- | ND | -- | -- | ND | -- |
| August | 99,691 | -917.16 | 132,000 | -7.57 | 119,000 | -6.82 | ND | -- | ND | -- | -- | ND | -- |
| September | 94,128 | -1,035.41 | 132,000 | -8.54 | 119,000 | -7.70 | ND | -- | ND | -- | -- | ND | -- |
| October | 93,113 | -875.27 | 132,000 | -7.22 | 119,000 | -6.51 | ND | -- | ND | -- | -- | ND | -- |
| November | 99,654 | -318.89 | 132,000 | -2.63 | 119,000 | -2.37 | ND | -- | ND | -- | -- | ND | -- |
| December | 100,029 | -470.12 | 132,000 | -3.88 | 119,000 | -3.50 | ND | -- | ND | -- | -- | ND | -- |

* Total Organic Carbon.

** Polynuclear aromatics.

*** Data from monitoring wells EE-21, EE-22, EE-23, and EE-24 were used to calculate weighted average concentrations.

ND Not detected.

Negative sign designates contaminant migration toward the river.

Source: Ecology and Environment, Inc. 1988.

Table E-10

CONTAMINANT LOADING TO RIVER DUE TO HORIZONTAL FLOW AT INTERMEDIATE ZONE IN SITE O***

| | Area ($ft^2$) | Flow Rate Q ($ft^3$/day) | TOCs* Weighted Ave. Conc. (ug/L) | Loading to River (lb/day) | Volatiles Weighted Ave. Conc. (ug/L) | Loading to River (lb/day) | Carcinogenic PNAs** Weighted Ave. Conc. (ug/L) | Loading to River (lb/day) | Non-Carcinogenic PNAs** Weighted Ave. Conc. (ug/L) | Loading to River (lb/day) | Total PNAs** Loading to River (lb/day) | Total PCBs Weighted Ave. Conc. (ug/L) | Loading to River (lb/day) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 52,363 | -434.62 | 100 | -0.00259 | 71 | -0.001917 | ND | -- | ND | -- | -- | ND | -- |
| February | 52,363 | -371.78 | 100 | -0.0023 | 71 | -0.00165 | ND | -- | ND | -- | -- | ND | -- |
| March | 52,363 | -62.83 | 100 | -0.00039 | 71 | -0.00028 | ND | -- | ND | -- | -- | ND | -- |
| April | 52,363 | 178.03 | 100 | 0.00111 | 71 | +0.00079 | ND | -- | ND | -- | -- | ND | -- |
| May | 52,363 | 157.09 | 100 | 0.00098 | 71 | +0.000697 | ND | -- | ND | -- | -- | ND | -- |
| June | 52,363 | -20.95 | 100 | -0.00013 | 71 | -0.000093 | ND | -- | ND | -- | -- | ND | -- |
| July | 52,363 | -219.93 | 100 | -0.00137 | 71 | -0.000976 | ND | -- | ND | -- | -- | ND | -- |
| August | 52,363 | -481.75 | 100 | -0.003 | 71 | -0.00214 | ND | -- | ND | -- | -- | ND | -- |
| September | 52,363 | -576.00 | 100 | -0.0036 | 71 | -0.00256 | ND | -- | ND | -- | -- | ND | -- |
| October | 52,363 | -492.22 | 100 | -0.0031 | 71 | -0.00218 | ND | -- | ND | -- | -- | ND | -- |
| November | 52,363 | -167.57 | 100 | -0.00104 | 71 | -0.00074 | ND | -- | ND | -- | -- | ND | -- |
| December | 52,363 | -246.10 | 100 | -0.00154 | 71 | -0.00109 | ND | -- | ND | -- | -- | ND | -- |

* Total organic carbon.

** Polynuclear aromatics.

*** Data from monitoring wells GM19B and GM20B (Geraghty & Miller 1986; 1986a) were used to calculate weighted average calculations.

ND Not detected.

Negative sign designates contaminant migration toward the river.

Source: Ecology and Environment, Inc. 1988.

Table E-11

CONTAMINANT LOADING TO RIVER DUE TO HORIZONTAL FLOW AT SHALLOW ZONE IN SITE Q***

| | Area ($ft^2$) | Flow Rate Q ($ft^3$/day) | TOCs* Weighted Ave. Conc. (ug/L) | Loading to River (lb/day) | Volatiles Weighted Ave. Conc. (ug/L) | Loading to River (lb/day) | Carcinogenic PNAs** Weighted Ave. Conc. (ug/L) | Loading to River (lb/day) | Non-Carcinogenic PNAs** Weighted Ave. Conc. (ug/L) | Loading to River (lb/day) | Total PNAs** Loading to River (lb/day) | Total PCBs Weighted Ave. Conc. (ug/L) | Loading to River (lb/day) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 105,370 | -1,369.32 | 235 | -0.02011 | 130 | -0.01112 | ND | -- | ND | -- | -- | ND | -- |
| February | 109,801 | -867.42 | 235 | -0.0127 | 130 | -0.00700 | ND | -- | ND | -- | -- | ND | -- |
| March | 135,036 | 783.21 | 235 | 0.0115 | 130 | 0.00636 | ND | -- | ND | -- | -- | ND | -- |
| April | 146,401 | 1,551.05 | 235 | 0.0228 | 130 | 0.01261 | ND | -- | ND | -- | -- | ND | -- |
| May | 150,783 | 889.62 | 235 | 0.01307 | 130 | 0.00723 | ND | -- | ND | -- | -- | ND | -- |
| June | 140,815 | -267.55 | 235 | -0.00393 | 130 | -0.00217 | ND | -- | ND | -- | -- | ND | -- |
| July | 129,257 | -930.65 | 235 | -0.01367 | 130 | -0.00756 | ND | -- | ND | -- | -- | ND | -- |
| August | 108,549 | -1,639.10 | 235 | -0.0241 | 130 | -0.01330 | ND | -- | ND | -- | -- | ND | -- |
| September | 99,158 | -1,556.70 | 235 | -0.0229 | 130 | -0.01265 | ND | -- | ND | -- | -- | ND | -- |
| October | 103,733 | -1,130.68 | 235 | -0.0166 | 130 | -0.00920 | ND | -- | ND | -- | -- | ND | -- |
| November | 120,390 | 372.31 | 235 | 0.0055 | 130 | 0.00300 | ND | -- | ND | -- | -- | ND | -- |
| December | 121,359 | -594.67 | 235 | -0.0087 | 130 | -0.00483 | ND | -- | ND | -- | -- | ND | -- |

* Total organic carbon.

** Polynuclear aromatics.

*** Data from monitoring wells EE-09, EE-10, and EE-06 were used to calculate weighted average concentrations.

ND Not detected.

Negative sign designates contaminant migration toward the river.

Source: Ecology and Environment, Inc. 1988.

Table E-12

CONTAMINANT LOADING TO RIVER DUE TO HORIZONTAL FLOW AT SHALLOW ZONE IN SITE R***

| | Area ($ft^2$) | Flow Rate Q ($ft^3$/day) | TOCs* Weighted Ave. Conc. (ug/L) | Loading to River (lb/day) | Volatiles Weighted Ave. Conc. (ug/L) | Loading to River (lb/day) | Carcinogenic PNAs** Weighted Ave. Conc. (ug/L) | Loading to River (lb/day) | Non-Carcinogenic PNAs** Weighted Ave. Conc. (ug/L) | Loading to River (lb/day) | Total PNAs** Loading to River (lb/day) | Total PCBs Weighted Ave. Conc. (ug/L) | Loading to River (lb/day) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 52,293 | -852.38 | 12,510 | -0.67 | 1,555 | -0.083 | ND | -- | ND | -- | -- | ND | -- |
| February | 54,492 | -403.25 | 12,510 | -0.31 | 1,555 | -0.039 | ND | -- | ND | -- | -- | ND | -- |
| March | 67,015 | 737.17 | 12,510 | 0.58 | 1,555 | 0.072 | ND | -- | ND | -- | -- | ND | -- |
| April | 72,656 | 1,068.00 | 12,510 | 0.84 | 1,555 | 0.1038 | ND | -- | ND | -- | -- | ND | -- |
| May | 74,831 | 471.43 | 12,510 | 0.37 | 1,555 | 0.046 | ND | -- | ND | -- | -- | ND | -- |
| June | 69,083 | -230.58 | 12,510 | -0.18 | 1,555 | -0.022 | ND | -- | ND | -- | -- | ND | -- |
| July | 64,148 | -641.48 | 12,510 | -0.50 | 1,555 | -0.062 | ND | -- | ND | -- | -- | ND | -- |
| August | 53,871 | -953.50 | 12,510 | -0.75 | 1,555 | -0.091 | ND | -- | ND | -- | -- | ND | -- |
| September | 49,210 | -536.40 | 12,510 | -0.42 | 1,555 | -0.052 | ND | -- | ND | -- | -- | ND | -- |
| October | 51,480 | -561.16 | 12,510 | -0.44 | 1,555 | -0.054 | ND | -- | ND | -- | -- | ND | -- |
| November | 63,717 | 522.47 | 12,510 | 0.41 | 1,555 | 0.051 | ND | -- | ND | -- | -- | ND | -- |
| December | 60,229 | -361.37 | 12,510 | -0.28 | 1,555 | -0.035 | ND | -- | ND | -- | -- | ND | -- |

* Total Organic Carbon.

** Polynuclear Aromatics.

*** Data from monitoring wells P-1, P-7, P-11, B-26A, and B-28A (Geraghty & Miller 1986; 1986a) were used to calculate weighted average concentrations.

ND Not detected.

Negative sign designates contaminant migration toward the river.

Source: Ecology and Environment, Inc. 1988.

Table E-13

CONTAMINANT LOADING TO RIVER DUE TO HORIZONTAL FLOW AT INTERMEDIATE ZONE IN SITE R***

| | Area ($ft^2$) | Flow Rate Q ($ft^3$/day) | TOCs* Weighted Ave. Conc. (ug/L) | Loading to River (lb/day) | Volatiles Weighted Ave. Conc. (ug/L) | Loading to River (lb/day) | Carcinogenic PNA** Weighted Ave. Conc. (ug/L) | Loading to River (lb/day) | Non-Carcinogenic PNAs** Weighted Ave. Conc. (ug/L) | Loading to River (lb/day) | Total PNAs** Loading to River (lb/day) | Total PCBs Weighted Ave. Conc. (ug/L) | Loading to River (lb/day) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| January | 107,700 | -74,313 | 8,998 | -41.79 | 4,440 | -20.62 | ND | -- | ND | -- | -- | ND | -- |
| February | 107,700 | -23,694 | 8,998 | -13.32 | 4,440 | -6.57 | ND | -- | ND | -- | -- | ND | -- |
| March | 107,700 | 62,466 | 8,998 | 35.13 | 4,440 | 17.33 | ND | -- | ND | -- | -- | ND | -- |
| April | 107,700 | 70,543 | 8,998 | 39.67 | 4,440 | 19.57 | ND | -- | ND | -- | -- | ND | -- |
| May | 107,700 | 30,048 | 8,998 | 16.90 | 4,440 | 8.34 | ND | -- | ND | -- | -- | ND | -- |
| June | 107,700 | -17,771 | 8,998 | -9.99 | 4,440 | -4.93 | ND | -- | ND | -- | -- | ND | -- |
| July | 107,700 | -42,003 | 8,998 | -23.62 | 4,440 | -11.66 | ND | -- | ND | -- | -- | ND | -- |
| August | 107,700 | -81,852 | 8,998 | -46.03 | 4,440 | -22.71 | ND | -- | ND | -- | -- | ND | -- |
| September | 107,700 | -85,621 | 8,998 | -48.15 | 4,440 | -23.76 | ND | -- | ND | -- | -- | ND | -- |
| October | 107,700 | -37,156 | 8,998 | -20.89 | 4,440 | -10.31 | ND | -- | ND | -- | -- | ND | -- |
| November | 107,700 | 48,465 | 8,998 | 27.25 | 4,440 | 13.45 | ND | -- | ND | -- | -- | ND | -- |
| December | 107,700 | -21,540 | 8,998 | -12.11 | 4,440 | -5.98 | ND | -- | ND | -- | -- | ND | -- |

* Total Organic Carbon.

** Polynuclear Aromatics.

*** Data from monitoring wells GM27B and GM28B (Geraghty & Miller 1986; 1986a) were used to calculate weighted average concentrations.

ND Not Detected.

Negative sign designates contaminant migration toward the river.

Source: Ecology and Environment, Inc. 1988.

# APPENDIX F

# TOXICITY PROFILES FOR SELECTED CONTAMINANTS OF CONCERN

ARSENIC

Environmental Chemistry and Fate

Arsenic may be released to the atmosphere as a gas or vapor; or absorbed to particulate matter and transported to other media by dry or wet deposition (ATSDR 1987a). Because trivalent arsenic may undergo oxidation in the air, atmospheric arsenic is usually a mixture of trivalent and pentavalent forms. Most airborne arsenic is usually adsorbed on small diameter particulate matter. Photolysis is not considered to be an important fate process for arsenic.

Arsenic in surface water can undergo a complex pattern of transformations: oxidation-reduction, ligand exchange, biotransformation, and precipitation and adsorption (Callahan 1979). As a consequence of these reactions, arsenic is extremely mobile in aquatic systems, and river-borne arsenic is capable of being transported great distances. Factors most strongly influencing the rates of these reactions include: Eh, Ph, metal sulfide and sulfide ion concentrations, iron concentration, presence of phosphorus minerals, temperature, salinity, and distribution and composition of biota (Callahan 1979).

Sorption onto clays, iron oxides, manganese compounds, and organic matter is an important fate in surface water, with sediment serving as a reservoir for most of the arsenic entering surface water. Sediment-bound trivalent and pentavalent arsenic, methylated by aerobic and anaerobic microorganisms, may be released back into the water column.

Soluble forms of arsenic adsorb to soil and travel with the soil matter with which they are associated. Shifts in oxidation state may occur in either direction, depending on the particular characteristics of the soil and groundwater. Volatilization of methylated arsenics from groundwater is possible.

Arsenic in soil is predominantly found in an insoluble, adsorbed form. Clay with high anion-exchange capacity strongly adsorbs pentavalent arsenic. Other important adsorption processes include complexation and chelation by organic material, iron, or calcium. Leaching of arsenic is usually important in the top 30 centimeters of soil, but may also be important at greater depth in sandy soils. Arsenate predominates in aerobic soils; arsenite in slightly reduced soils; arsine,

methylated arsenicals and elemental arsenics in very reduced conditions (e.g., swamps and bogs)(ATSDR 1987a).

As noted above, microorganisms may reduce and methylate arsenicals in water and soil, resulting in volatilization and emission to the air. The volatilization rate is heavily dependant on whether soil is oxygenated or anaerobic, the pH, and the microbe types and concentrations in soils.

In aquatic systems, bioconcentration of arsenic primarily occurs in algae and lower invertebrates, but biomagnification does not appear to be significant (Callahan 1979).

Plants may accumulate arsenic via root uptake, with uptake being dependent on the species, soil arsenic concentration, and soil characteristics.

Noncarcinogenic Effects

At high doses, arsenic compounds have been shown to produce acute and chronic toxic effects including irreversible systemic damage. The trivalent compounds are the most toxic and tend to accumulate in the body. Animal studies have shown that chronic arsenic exposure may cause body weight changes, decreased blood hemoglobin, liver damage, and kidney damage.

There is evidence that arsenic is an essential element enchancing growth and development in certain animal species, and it has been suggested that arsenic may be an essential element for humans (NAS 1980). Whether or not arsenic is an essential element is the subject of continuing research.

Teratogenic effects of arsenic compounds at relatively high exposure levels have been demonstrated in a number of animal species (EPA 1984f, ATSDR 1987a). Generally, these effects have been observed following parenteral (injection) administration; whereas, administration at lower doses by the more relevant oral route has not resulted in any significant reproductive or developmental effects.

Mutagenicity and Carcinogenicity

Arsenic has been shown to be mutagenic in several assay systems and to induce chromosomal aberrations *in vivo* and *in vitro*. Animal carcino-

genicity studies have reported conflicting results. Several studies have reported an increased incidence of bronchogenic carcinomas in rats exposed intratracheally to an arsenic-containing pesticide. Reasons for inconsistent carcinogenicity findings in animals may include inappropriate selection of an animal model, and use of flawed study designs. In humans, epidemiologic studies and case reports have reported that arsenic is associated with tumors of the skin, lungs, genital organs, and visual organs (EPA 1984f, EPA 1985c, ATSDR 1987a).

EPA has classified arsenic in Group A, i.e., a human carcinogen, based on extensive evidence of human carcinogenicity through inhalation and ingestion exposure (EPA 1985c).

Drinking Water Standards and Criteria

Standards. The current MCL for arsenic under the National Interim Drinking Water Regulations is 50 ug/L. The NAS Drinking Water Committee has analyzed the toxicology of arsenic (NAS 1983a). Based upon this evaluation, NAS recommended the retention of the MCL pending resolution of the question whether arsenic is an essential element in the human diet.

NAS also examined the available epidemiologic studies which were designed to investigate the relationship between arsenic exposure and skin cancer in the United States. The conclusion of the report was that these studies lacked statistical power to determine if arsenic causes skin cancer. However, the report stated that precursors of skin cancer, normally seen in cases of arsenic-induced skin cancer, were not seen in these studies.

Consistent with the NAS recommendations, EPA has proposed that the MCLG remain at the current MCL of 50 ug/L. In its determination, EPA stated that the MCL was below concentrations at which noncarcinogenic toxicity had been demonstrated and was within the concentration range which might be, based on further investigation, essential for humans (EPA 1985c).

Criteria. Based upon recommendations of NAS, EPA has proposed that all health advisories for arsenic be set at 50 ug/L (EPA 1985d). The EPA ambient water quality criterion for the protection of human health

is 22 ug/L, corresponding to $1 \times 10^{-5}$ lifetime excess cancer risk calculated on the basis of an epidemiological study of skin cancer among Taiwanese exposed via drinking water (EPA 1980a).

BENZENE

Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of benzene (CAS No. 71-43-2) are summarized below (EPA 1986a).

| | |
|---|---|
| Molecular Weight (g/mole) | 78 |
| Water Solubility (mg/L at 25°C) | 1,750 |
| Vapor Pressure (mmHg at 25°C) | 95.2 |
| Henry's Law Constant ($atm\text{-}m^3/mole$) | $5.6 \times 10^{-3}$ |
| Log $K_{ow}$ | 2.12 |
| $K_{oc}$ | 83 |
| BCF | 5.2 |

Benzene has a high water solubility and vapor pressure. As a consequence of these two properties, benzene can be characterized as a highly mobile chemical. For benzene released to air, some rainwater washout is anticipated. After deposition in water or soil, volatilization is expected to return some portion back to the atmosphere. Based on its high Henry's Law Constant, volatilization will result in substantial loss to the atmosphere following release to water.

Due to its high water solubility and high vapor pressure, transport to sediments is not expected to be major surface water fate process.

Benzene released to soil can be transported to air via volatilization, to surface water via runoff, and to groundwater via leaching. The first two pathways predominate in surficial soil, whereas the latter pathway predominates at lower soil depths.

According to criteria developed by Kenaga (1980), benzene with a $K_{oc}$ of 83 would be considered to be mobile in soils. Other factors

which influence soil mobility include soil type, the amount of rainfall, the depth to groundwater, and the extent of degradation (ATSDR 1987b).

Benzene is rapidly degraded in the atmosphere via reaction with the hydroxy radical. In soils and waters, biodegradation is an important process.

Noncarcinogenic Effects

The best known and longest recognized toxic effect of benzene in humans is depression of bone marrow function. Benzene-exposed individuals have been found to display anemia, leucopenia, and/or thrombocytopenia (EPA 1985c, ATSDR 1987b). When simultaneous depression of all three cell types (pancytopenia) is accompanied by bone marrow necrosis, the syndrome is called aplastic anemia.

Carcinogenicity and Mutagenicity

Excess leukemia mortality, particularly acute myelogenous and monocytic leukemia, has been demonstrated among humans occupationally exposed to benzene. In addition to this definitive human evidence, several long-term bioassays have demonstrated increased incidences of tumors and leukemia following administration in animals. Based primarily upon the direct evidence in man, EPA has classified benzene according to weight-of-evidence carcinogenicity criteria in Group A, human carcinogen-sufficient evidence from epidemiological studies (EPA 1987a).

Benzene has been tested extensively for genotoxic properties. Benzene was not mutagenic in several bacterial and yeast systems. Equivocal results have been reported for clastogenic results *in vitro*; several investigators have reported positive results in mouse micronucleus assays, as well as studies of chromosomal observations in rabbits.

Many investigators have reported significant increases in chromosomal aberrations in symptomatic and asymptomatic workers with either a current or past history of exposure to benzene.

## Drinking Water Standards

EPA has established a final drinking water MCL of 5 ug/L (EPA 1987a).

CADMIUM

Environmental Chemistry and Fate

The primary sources of atmospheric cadmium are combustion of coal and petroleum products. Cadmium from these sources is primarily adsorbed on small, highly respirable particles, which can be transported over large distances and transferred to other environmental compartments via wet deposition. Cadmium adsorbed to small particulates is more persistant than that adorbed to larger particulates. Photochemical reactions are apparently not involved in the environmental fate of cadmium (ATSDR, 1987h).

Relative to other metals, cadmium is mobile in surface water. In natural waters, cadmium exists as a hydrated ion, metal-inorganic complexes with carbonate hydroxyl, chlorine or sulfate anions; or as metal-organic complexes with humic acids (ATSDR, 1987h).

Because it exists only as the divalent cation, aqueous cadmium is not strongly influenced by the redox potential of water. However, under reducing conditions forming sulfide, cadmium will precipitate in sediments as cadmium sulfide. The concentration of aqueous cadmium is usually inversely related to the pH value and the amount of organic material present (ATSDR 1987h). Humic acid substances account for most of the organic complexes, with solubility dependant on the nature of the humic substance. Sorption by clays and iron oxides is important in reducing aquatic cadmium concentrations.

Cadmium concentrations are typcially low in groundwater due to several factors. These factors include sorption by mineral matter and clay, binding to humic substances, precipitation as cadmium sulfide in the presence of sulfide, and precipitation as cadmium carbonate at high pHs.

In soil, cadmium may occur as free cadmium compounds or as the divalent ion dissolved in soil. As a consequence of cation exchange, cadmium may be bound to soil minerals or organic constituents. The aerobic nature of topsoils tends to reduce the amount of cadmium bound to sulfide. High soil acidity favors release of the divalent cadmium cation and its uptake by plants.

Cadmium is not reduced or methylated by microorganisms. However, the biological production of sulfide results in cadmium precipitation. Cadmium is strongly accumulated by all organisms, with concentrations in freshwater and marine organisms hundreds to thousands of times higher than in water being typical. Bioaccumulation of cadmium is strongly correlated with soil cation-exchange capacity (CEC), decreasing with increasing CEC. Bioconcentration in aquatic life is greatest for bottom feeders (e.g. mollusks and crustaceons), followed by fish and aquatic plants (ATSDR, 1987h). Bioaccumulation due to the use of cadmium-containing pesticides on food crops has been noted in beef and poultry.

Noncarcinogenic Effects

Acute and chronic exposure to cadmium in animals and humans results in renal dysfunction, hypertension, anemia, and altered liver microsomal activity. The kidney is considered to be the critical target organ in humans chronically exposed to cadmium by ingestion. The early clinical signs of renal injury include proteinuria, glucosuria, and amino-aciduria.

To calculate a drinking water equivalent level (DWEL), EPA used renal dysfunction as an endpoint, and the most widely accepted estimate for the critical (threshold) concentration of cadmium in the renal cortex--200 ug/g. Using a 4.5% absorption of the daily dose and 0.01% excretion in the total body burden per day, EPA calculated an LOAEL of 352 ug/day for renal effects in humans. Incorporating an uncertainty factor of 10, EPA has developed an RfD of 35 ug/day. Adjusting the RfD for consumption of 2 liters of water per day, EPA has derived a provisional DWEL of 18 ug/L (EPA 1985c).

Embryotoxic and teratogenic effects have been demonstrated in many mammalian species following parenteral administration of high doses of cadmium. In contrast, there is little evidence of these effects at lower doses by either of the more relevant inhalation or oral exposure routes (EPA 1981, ATSDR 1987h).

Carcinogenicity and Mutagenicity

Cadmium chloride aerosol administered by inhalation for 18 months produced lung tumors in rats. In contrast, all cancer bioassays in

which cadmium has been administered orally have been negative. Recent epidemiological studies indicated that workers chronically exposed to cadmium are at risk of elevated lung cancer mortality. According to its weight-of-evidence carcinogenicity criteria, EPA has classified cadmium in Group B1 (probable human carcinogen) for inhalation based on the epidemiological data (EPA 1986a).

While the Agency has concluded that cadmium is a carcinogen by the inhalation route, EPA has classified the chemical in Group D, inadequate evidence for carcinogenicity for the oral route of exposure, because of the negative results reported for cancer bioassays in which cadmium was administered orally (EPA 1986a). Consistent with this categorization, EPA has proposed that the MCL for cadmium be set based upon noncarcinogenic toxicological endpoints.

Drinking Water Standards

The current MCL for cadmium, under the National Interim Primary Drinking Water Regulations, is 10 ug/L. This level was designed to prevent renal dysfunction, and was based on a critical value of cadmium in the kidney cortex of 200 ug/g, and assumptions on gastrointestinal absorption, excretion of the absorbed dose, daily excretion of the total body burden, and daily dietary cadmium intakes. The World Health Organization (WHO) guideline for drinking water is 5 ug/L. This value was based on a value for provisional tolerable weekly cadmium intake, assuming that 25% of the total cadmium intake was attributable to drinking water. EPA has proposed an MCLG of 5 ug/L based upon the WHO guidelines and the NAS SNARL (EPA 1985c).

CHLOROBENZENE

## Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of chlorobenzene (CAS No. 108-90-7) are summarized below (EPA 1986a).

| | |
|---|---|
| Molecular Weight (g/mole) | 113 |
| Water Solubility (mg/L at 25°C) | 466 |
| Vapor Pressure (mmHg at 25°C) | 11.7 |
| Henry's Law Constant ($atm\text{-}m^3/mole$) | $3.7 \times 10^{-3}$ |
| Log $K_{ow}$ | 2.84 |
| $K_{oc}$ | 330 |
| BCF | 10 |

Chlorobenzene's moderate water solubility, vapor pressure, and Henry's Law Constant indicate that volatilization from surficial soils and surface water is a major transport pathway.

Once adsorbed on soil, the moderate solubility and $K_{oc}$ (330) indicate that chlorobenzene will leach and be transported to groundwater. The degree and rate of leaching will depend on a variety of factors including the soil type, organic carbon content, and the presence of organic solvents in the soil. Once chlorobenzene reaches the groundwater, the $K_{oc}$ indicates that retardation relative to the groundwater flow will occur due to partitioning and adsorption to soil particles.

Current data indicate that degradation of chlorobenzene in aquatic systems is slow (EPA 1985). The estimated BCF of 10 indicates that monochlorobenzene is only slightly bioconcentrated in aquatic life.

## Noncarcinogenic Effects

Chlorobenzene exerts its toxicity primarily on the central nervous system, liver, and kidney. Liver effects include necrosis and interference with porphyrin metabolism. Kidney effects include swelling of the tubular and glomerular epithelia. Hematopoietic effects (e.g., lymphocytosis and leukopenia) have been reported among chlorobenzene-exposed workers; however, it is uncertain whether these effects can be attributed to chlorobenzene or to other contaminants (EPA 1985g).

## Carcinogenicity and Mutagenicity

In a single National Toxicology Program (NTP) bioassay, chlorobenzene was found not to be carcinogenic in mice and rats. The NTP report did note that chlorobenzene induced a statistically significant increased incidence of neoplastic nodules in rates exposed to the highest dose. On this basis, EPA classified chlorobenzene according to weight-of-evidence carcinogenicity criteria in Group C -- limited evidence in animals, no evidence in humans (EPA 1985g).

Most mutagenicity assays of chlorobenzene in bacteria, fungal, and mammalian tissue cultures have been negative (EPA 1985h). One study, however, in *Streptomyces antibioticus* reported that chlorobenzene induced reversion to vitamin B1 prototrophy, and one study in *Saccharomyces cerevisiae* showed increased mitotic crossing (EPA 1985k).

## Drinking Water Standards and Criteria

Standards. EPA has not established an MCL or MCLG for chlorobenzene in drinking water.

Criteria. In the absence of suitable data, EPA has not derived a 1-day HA for chlorobenzene. EPA has, however, developed 10-day, longer-term, and lifetime HAs by application of 100-fold uncertainty factors and various intake assumptions and physiological parameters to NOAELs reported in animal studies (EPA 1985g). The 10-day advisory of 1,800 ug/L for a 10-kg child was derived from a NOAEL of 345 $mg/m^3$ reported in an inhalation teratology study in rats and rabbits; the longer-term HAs of 9,000 ug/L (child) and 30,000 ug/L (adult) were derived using a NOAEL of 125 mg/kg/day reported in a subchronic gavage study in mice and rats.

The lifetime HA of 600 ug/L was derived from the NOAEL used in the derivation of the longer-term HA, using an additional uncertainty factor of 10 and assuming that drinking water comprises 20% of the total daily intake.

NAS has estimated, based upon the draft NTP, that a drinking water concentration of 2.3 ug/L would correspond to an estimated one-in-a-million incremental excess lifetime cancer risk (NAS 1983).

EPA has developed an ambient water quality criterion for the protection of human health of 488 ug/L and for organoleptic (odor and taste) effects of 20 ug/L (EPA 1980a).

CHLOROPHENOLS (2-CHLOROPHENOL AND 2,4-DICHLOROPHENOL)

Environmental Chemistry and Fate

The relevant physical and chemical properties of chlorophenol (CP-CAS No. 95-57-8) and 2,4-dichlorophenol (DCP-CAS No. 12-83-2) are summarized in the Table below (Arthur D. Little, Inc. 1982).

| Compound | 2-chlorophenol | 2,4-dichlorophenol |
|---|---|---|
| Molecular Weight (g/mole) | 129 | 163 |
| Water Solubility (mg/L at 25°C) | 28,500 (20°C) | 4,600 (20°C) |
| Vapor Pressure (mmHg at 25°C) | 2.2 | 0.11 |
| Henry's Law Constant ($atm\text{-}m^3/mole$) | $1.3 \times 10^{-3}$ | $5.0 \times 10^{-6}$ |
| Log $K_{ow}$ | 2.17 | 2.75 |
| $K_{oc}$ | No data | 380 |
| BCF | 214 | 130 |

The above data show that both CP and DCP have high water solubilities and low vapor pressures. Additionally, using the $K_{oc}$ of DCP, the two chlorophenols have moderate $K_{oc}$s. These three values indicate that both volatilization from surface soils and infiltration to groundwater are important transport pathways. The high Henry's law constant, along with the high water solubility and moderate $K_{oc}$, indicates that volatilization is an important transport pathway from surface water. However, its low Henry's law constant indicates that both volatilization and partitoning to sediments are important pathways in surface water.

Biodegradation in soils and surface water are significant transformation processes (Aurthur D. Little, Inc., 1982). No data were found concerning biodegradation in groundwater.

Bioconcentration factors (BCFs) indicate moderate bioconcentration in aquatic species.

## Noncarcinogenic Effects

In rodents subjected to acute high oral exposures, CP and DCP elicited respiratory excitation, clonic convulsions, and/or motor weakness (hypotonia). Few long-term animal studies are available. Those few that are available show reduction in hematological parameters or enzyme changes. No data were found concerning effects of CP and DCP on the developing embryo or the reproductive process.

## Carcinogenicity and Mutagenicity

No data were found concerning the potential carcinogenicity of CP or DCP by the oral route. However, CP and DCP were reported to promote tumors following a single dermal application of dimethylbenzanthracene on mouse skin (Boutwell and Bosch, 1959).

CP has been shown to be mutagenic in Sprague Dawley rats fed 130 mg/kg CP every other day for one week (Chung 1978). In these rats a six-fold increased incidence of chromatid deletions (12% vs. 2% in controls) was seen. Complete inhibition of mitosis was reported in bone marrow cells taken from treated rats.

DCP, tested using the Ames *Salmonella* microsomal assay, was reported as not mutagenic with and without activation.

Consequently, whereas CP can be classified as mutagenic, there are insufficient data to evaluate the mutagenicity of DCP.

## Drinking Water Standards

EPA has not issued any drinking water standards, health advisories, or other criteria for CP or DCP.

DICHLOROBENZENES

## Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of 1,2-dichlorobenzene (CAS No. 95-50-1); 1-3-dichlorobenzene (CAS No. 541-73-1); and 1,4-dichlorobenzene (CAS No. 106-16-7) are presented below.

| Compound | 1,2-DCB | 1,3-DCB | 1,4-DCB |
|---|---|---|---|
| Molecular Weight (g/mole) | 147 | 147 | 147 |
| Water Solubility (mg/L at 25°C) | 100 | 123 | 79 |
| Vapor Pressure (mmHg at 25°C) | 1 | 2.3 | 1.2 |
| Henry's Law Constant ($atm\text{-}m^3/mole$) | $1.9 \times 10^{-3}$ | $3.6 \times 10^{-3}$ | $2.9 \times 10^{-3}$ |
| Log $K_{ow}$ | 3.6 | 3.6 | 3.6 |
| $K_{oc}$ | 1700 | 1700 | 1700 |
| BCF | 5 | 5 | 5 |

The log $K_{ow}$, high $K_{oc}$, and low vapor pressure indicate that adsorption onto soils is the major fate process of DCB isomers in soils. Similarly, adsorption to these media will dominate transport and fate of the isomers discharged into aquatic media.

The log $K_{ow}$s suggest that DCB isomers will bioaccumulate. Biodegradation is not likely to be a significant degradation pathway for DCB isomers, based upon data which indicate that chlorobenzene is resistent to biodegradation and that resistance increases with increasing chlorination of the benzene ring (ATSDR 1987i).

## Noncarcinogenic Effects

The principal toxic effects of o-dichlorobenzene (1,2-dichlorobenzene or o-DCB) and p-dichlorobenzene (1,4-dichlorobenzene or p-DCB) in humans and other animals from acute and longer-term exposures include

CNS depression; blood dyscrasias; and lung, kidney, and liver damage. Similar data are not available for m-dichlorobenzene (1,3-dichlorobenzene or m-DCB). However, based upon short-term assays, EPA has determined that short-term assessments developed for o-DCB should apply to m-DCB.

Carcinogenicity and Mutagenicity

The few studies available on the carcinogenic potential of the DCBs have been negative or insufficient to clearly classify any DCB isomer as carcinogenic. Preliminary results of an NTP gavage bioassay indicate that o-DCB was not carcinogenic under the conditions of the experiment. Pending receipt of the final NTP report for o-DCB, EPA has categorized o-DCB according to Agency weight-of-evidence carcinogenicity criteria in Group D, not classifiable as to human carcinogenicity (EPA 1987d). EPA has classified p-DCB in group C, limited evidence of carcinogenicity in animal studies (EPA 1987a).

In general, DCBs have shown little or no mutagenic activity in a range of bacterial systems. However, several studies with mold and plant cultures treated with DCBs have reported mutations and chromosomal alterations (EPA 1987d).

Drinking Water Standards and Criteria

EPA has established a final drinking water MCL for p-dichlorobenzene of 75 ug/l (EPA 1987a). This MCL was based on a reference dose of 0.1 mg/kg/day, an uncertainty factor of 10, allocation of 20% of total human intake from all exposure sources to drinking water and various intake and physiological assumptions. EPA is also in the process of establishing an enforceable MCL for o-DCB and p-DCB, but not m-DCB. As a first step in the process, EPA has issued a proposed MCLG for o-DCB based upon a NOAEL reported in a subchronic gavage study in mice and rats. Based upon a NOAEL of 125 mg/kg/day, an uncertainty factor of 100, and the same assumptions as for p-DCB, EPA has derived a proposed MCLG for o-DCB of 620 ug/L.

In the absence of sufficient data, EPA has not developed, and is not in the process of developing, a drinking water standard for m-DCB.

## 1,2-DICHLOROETHANE (ETHYLENE DICHLORIDE OR EDC)

### Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of 1,2-dichloroethane (CAS No. 107-06-2) are summarized below (EPA 1986a).

| | |
|---|---|
| Molecular Weight (g/mole) | 99 |
| Water Solubility (mg/L at 25°C) | $8.5 \times 10^{-3}$ |
| Vapor Pressure (mmHg at 25°C) | 64 |
| Henry's Law Constant ($atm\text{-}m^3/mole$) | $9.8 \times 10^{-4}$ |
| Log $K_{ow}$ | 1.48 |
| $K_{oc}$ | 14 |
| BCF | 1.2 |

A half-life of 1,2-dichloroethane from soil could not be located in the available literature; however, based on its moderate vapor pressure, evaporation is expected to be the predominant loss mechanism from the top layer of soil. In subsurface soil, biochemical and chemical biodegradation are expected to be slow. Therefore, based on its low $K_{oc}$, 1,2-dichloroethane is expected to leach and be transported to groundwater. Once in groundwater, the low $K_{oc}$ indicates 1,2-dichloroethane will be mildly adorbed to soil particulate and will be subject to low retardation relative to the groundwater flow. In addition, its high Henry's Law Constant indicates evaporation from surface water is an important fate mechanism. Based on its low BCF, 1,2-dichloroethane is not expected to bioconcentrate in aquatic life.

### Noncarcinogenic Effects

At relatively high doses, 1,2-dichloroethane (EDC) produces CNS depression as well as injury to the liver, kidney, and adrenals. Symptoms of CNS depression typically include headache, dizziness,

nausea, and general weakness. Effects on the liver include necrosis and epithelial cell damage, and on the kidney, degeneration of the proximal tubule (EPA 1985b)

Carcinogenicity and Mutagenicity

In a NCI bioassay, EDC administered by gavage was shown to increase the incidence of tumors in both mice and rats. Based upon these data, EPA has classified EDC according to weight-of-evidence carcinogenicity criteria in Group $B_2$ - probable human carcinogen (EPA 1987a).

EDC has shown to induce gene mutations in bacteria, plants, *Drosophilia melanogaster*, and cultured Chinese hamster ovary cells (EPA 1985i). In addition, EDC has been reported to cause meiotic chromosomal disjunction in *Drosophilia*. Based upon these data, EPA has determined based upon weight-of-evidence criteria that EDC is a mutagen that may have the potential for causing adverse effects in humans (EPA 1985i).

Drinking Water Standards and Criteria

Standards. In the first stage of a procedure to establish an enforceable MCL for EDC in drinking water, EPA has established a MCLG of 0. This MCLG was predicated on the EPA conclusion that no exposure to a "probable human carcinogen" is acceptable. Based upon considerations of analytical feasibility and feasibility of control, EPA has issued a MCL for EDC of 5 ug/L.

Criteria. In the absence of suitable data, EPA has not developed 1-day or 10-day HAs for EDC. EPA has, however, developed a longer-term HA based upon a NOAEL reported in a rat inhalation study. Based upon a NOAEL of 405 $mg/m^3$, an uncertainty factor of 100 and various intake assumptions and physiological parameters, EPA derived longer-terms HAs of 740 ug/L (10-kg child) and 2,600 ug/L (70-kg adult) (EPA 1985d). Because EDC was judged to be a probable human carcinogen, EPA did not develop a lifetime HA for noncarcinogenic effects.

EPA has not developed an ambient water quality criterion for EDC for the protection of human health.

HEXACHLOROBENZENE (HCB)

## Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of hexachlorobenzene (CAS No. 118-74-1) are summarized below (EPA 1986a).

| | |
|---|---|
| Molecular Weight (g/mole) | 285 |
| Water Solubility (mg/L at 25°C) | 0.006 |
| Vapor Pressure (mmHg at 25°C) | $1.1 \times 10^{-5}$ |
| Henry's Law Constant ($atm\text{-}m^3/mole$) | $6.8 \times 10^{-4}$ |
| Log $K_{ow}$ | 5.23 |
| $K_{oc}$ | 3900 |
| BCF | 8690 |

Hexachlorobenzene (HCB) has a low water solubility, a high log $K_{ow}$, and relatively high $K_{oc}$, indicating that the chemical will be strongly adsorbed in soil or sediments following discharge to surface water. The low vapor pressure and Henry's law constant indicate that votilization will not be a major transport mechanism from either soils or surface water. In addition, based on the log $K_{ow}$ and high $K_{oc}$, significant leaching from source soils is not anticipated.

HCB is expected to be slowly degraded by soil or sediment microorganisms. HCB is expected to significantly bioconcentrate in aquatic life with BCFs ranging from 5,500 to 44,437 in vertebrates (EPA 1985g).

## Noncarcinogenic Effects

Porphyria cutonea tardea (PCT) has been demonstrated in Turkish citizens who accidentally consumed bread contaminated with HCB. PCT-associated symptoms observed included skin lesions and hyperpigmentation. In addition, HCB caused neurotoxicity, liver damage, arthritic conditions, and in children, reduced growth. Studies in rodents re-

ceiving HCB orally reported both fetotoxicity and teratogenicity (EPA 1985g). The effects noted in these studies included cleft palate, reduced fetal viability, reduced neonatal weight gain and reduced relative fetal weight (EPA 1987g).

Carcinogenicity and Mutagenicity

Lifetime animal carcinogenicity studies have revealed that HCB elicited statistically significant increased tumor incidences in rats, mice, and hamsters. Based on these data, EPA has placed HCB in its carcinogenicity category $B_2$ as a probable human carcinogen.

Drinking Water Standards and Criteria

EPA has not developed a drinking water standard for HCB. The EPA one-day and 10-day and longer health advisories (HAs) for a 10-kg child are each 50 ug/L. The longer-term HA is 175 ug/L for a 70-kg adult. The EPA reference concentration for a potential carcinogen risk of $1 \times 10^{-6}$ is 0.02 ug/L.

LEAD

Noncarcinogenic Effects

When toxicity information is considered for noncarcinogenic effects of substances, the data are evaluated based on their dose-related response characteristics and the establishment of an exposure level below which no adverse effects are observed. Historically, the observed threshold or no-effect level for lead-induced toxic effects has continued to decline as more sophisicated experimental and clinical measures are employed to detect more subtle effects. These include alterations in physiological functions at blood lead (PbB) levels below the currently accepted maximum safe level for exposure to children, a segment of the population currently regarded to be at highest risk of lead-induced effects (EPA 1985c, ATSDR, 1987j).

The most serious effects associated with markedly elevated PbB levels are severe neurotoxic effects that include irreversible brain damage. For most adults, such damage does not occur until PbB levels exceed 100 to 120 micrograms per deciliter (ug/dl). At these PbB levels, severe gastrointestinal symptoms and effects on several other organ systems are often found. Precise thresholds for occurrence of overt neurological and gastrointestinal signs and symptoms of lead exposure in cases of subencenpthalopathic lead intoxication have yet to be established, but such effects have been observed in chronically exposed adult lead workers at PbB levels as low as 40 to 50 ug/dl.

Toward the lower range of PbB levels associated with overt lead intoxication, less severe but important signs of impairment in normal physiological functioning in several organ systems are evident among apparently asymptomatic lead-exposed adults (EPA 1985c). These include:

- Slowed nerve conduction velocities indicative of peripheral nerve dysfunction (at PbB levels as low as 30 to 40 ug/dl);

- Altered testicular function (at PbB levels of 40 to 50 ug/dl); and

- Reduced hemoglobin production (at approximately 50 ug/dl).

EPA has concluded that all of the above effects point toward a generalized impairment of normal physiological functioning of several different organ systems as adult PbB levels exceed 30 to 40 ug/dl. Evidence of impaired heme synthesis effects in blood occur at even lower levels.

More recent research has indicated that there is a relationship between PbB levels and increases in blood pressure. Preliminary review of this work indicates a statistically significant correlation between PbB levels and diastolic blood pressure in white males, ages 40 to 50, with no threshold apparent in the range of 6 to 30 ug/dl. Of particular concern is the finding of a 2 mm Hg increase in diastolic pressure per incremental PbB level increase of 0.5 ug/dl. Possible increases in risk of more severe medical events (stroke, heart attack, death) associated with lead-induced increases in blood pressure are also estimated in one of the recently published studies.

Children represent a sensitive subpopulation with regard to lead toxicity. As with adults, lead affects many different ogan systems and biochemical/physiological processes across a wide range of exposure levels. Effective PbB levels for producing encephalopathy or death in children are lower than in adults, starting at approximately 80 to 100 ug/dl. Permanent metal retardation and other marked neurological deficits are among lasting neurological sequelae typically seen in cases of nonfatal childhood lead encephalopathy. Other overt neurological signs and symptoms of subencepthalopathic lead intoxication, such as peripheral neuropathies (functional and/or pathological changes in the peripheral nervous system), have been detected in some children at PbB levels as low as 40 to 60 ug/dl. Chronic kidney disease is not evident at PbB levels above 100 ug/dl. Moreover, colic and other overt gastrointestinal symptoms occur in children, at least down to 60 ug/dl. Rank anemia is also evident at 70 ug/dl, representing an extreme manifestation of reduced hemoglobin synthesis at PbB levels as low as 40 ug/dl. All these effects are widely accepted as adverse health effects, and are reflective of widespread marked impact of lead on the normal physiological functioning of many different organ systems (EPA 1984d, 1985c, ATSDR 1987j).

Additional studies demonstrate further important health effects occurring in non-overtly lead-intoxicated children at similar or lower PbB levels than those indicated above. Among the most important and controversial of these electrophysiological and neuropsychlological effects are indications of peripheral nerve dysfunction, indexed by slowed nerve conduction velocities (NCV) found in children with PbB levels lower than 30 ug/dl. EPA has concluded that while none of these studies on CNS effects can individually be regarded as conclusively proving significant cognitive (IQ) or behavioral effects occurring below 30 ug/dl, they clearly indicate likely assoications between neuropsychologic deficits and PbB levels as low as 30 to 50 ug/dl. The magnitude of average observed IQ deficits is approximately 5 points at mean PbB levels of 50 to 70 ug/dl and about 4 points at mean levels of 30 to 50 ug/dl. Whether a smaller risk exists at somewhat lower levels (15 to 30 ug/dl) cannot be determined at this time (EPA 1984d, 1985c).

Many different impacts (representing potentially impaired functioning and depleted reserve capacities of many different tissues and organs) have been noted at PbB levels below 30 ug/dl.

At PbB levels around 10 to 15 ug/dl, initial signs of detectable heme synthesis impairment occur in many different organic systems, indications of increasing degrees of pyrimidine metabolism interference, signs of altered nervous system activity, and interference in vitamin-D metabolism. EPA has stated that, on the basis of these data, these effects might be viewed as becoming sufficiently adverse to warrant avoidance as PbB levels exceed 20 to 25 ug/dl (EPA 1985c).

## Reproduction and Development

There is a paucity of data on which to evaluate the effects of lead on reproduction and development in humans. Early studies of pregnant women exposed to high levels of lead indicated toxic, but not teratogenic, effects on the conceptus. One recently reported study hints at birth anomalies possibly associated with exposure to low lead levels (mean cord blood level of 15 ug/dl) among women in the general population. However, the significance of these studies has been questioned because of the absence of reported statistically significant associations between cord blood levels and specific types of minor anomalies or

any major anomalies. There are also no reliable data pointing to adverse effects in human offspring following lead exposure to fathers.

EPA has concluded that the current collective human data regarding lead's effects on reproduction on in utero development are insufficient for accurate estimation of exposure-effect or no-effect levels (EPA 1984d). In the absence of sufficient data, it has been suggested that it would be prudent to avoid lead exposures resulting in PbB levels exceeding 25 to 30 ug/dl to pregnant women and women of child-bearing age in general. This conclusion was based on the known equilibration between maternal and fetal blood lead concentrations and growing evidence of deleterious effects in young children as PbB levels approach 25 to 30 ug/dl. Industrial lead exposure of men with PbB levels of 40 to 50 ug/dl also appears to result in altered testicular function.

Carcinogenicity

Several studies have reported renal tumors in Wistar rats following ingestion of high doses of a lead salt (lead acetate). Lead subacetate (another lead salt) has produced benign tumors (renal carcinomas or adenomas) in Swiss mice and seveal strains of rats, but not golden hamsters. Glimomas (CNS tumors) were also observed in many of these studies.

There have been a number of epidemiological studies which have assessed the mortality experience of lead-exposed workers. In some of the studies, no excess cancer mortality was observed. In one study, non-statistically significant excess cancer mortality of the respiratory system and cancer of the digestive organs and peritoneum was reported which on evaluation by other statistical techniques by another investigator was reported to achieve statistical significance. Another study has reported increased mortality from renal cancer among a group of lead smelting workers. However, this excess mortality, based on only six cases, did not achieve statistical significance. On review of all of these studies, EPA concluded that the absence of good lead exposure documentation made it difficult to assess the contribution of lead to the observed results.

The International Agency for Research on Cancer (IARC) has classified lead in Group 3, inadequate evidence for carcinogenicity in humans,

sufficient evidence for carcinogenicity in animals (for some salts). EPA has classified lead in category $B_2$ (sufficient evidence in animals, insufficient evidence in humans) according to the Agency's Guidelines for Carcinogen Risk Assessment (EPA, 1986b). However, the Agency noted that the doses inducing kidney tumors in positive rat studies were beyond the human lethal dose, and several epidemiological studies have not demonstrated an association between lead exposure and elevated cancer occupationally exposed workers. Consequently, EPA has recently proposed to set an MCLG in drinking water based on noncarcinogenic endpoints (EPA 1985c).

Drinking Water Standards

The current EPA and drinking water MCL for lead is 50 ug/L. This limit was designed to limit PbB levels in 99.5% of the population to below 30 ug/dl.

NAS (1977) has stated that the current MCL, in view of other environmental sources of exposure, may not provide a sufficient margin of safety, particularly for fetuses and young children.

EPA, in agreement with this assessment, has recently taken the first step in lowering the MCL by issuing a proposed MCLG of 20 ug/L. This level was derived based on a target PbB level of 15 ug/dl for protecting children and infants, using a conversion factor of 6.25 to translate PbB to lead in drinking water (assuming a consumption of 1 liter of water per day) and an uncertainty factor of 5 (EPA 1985c). After finalization of the MCLG, EPA would then factor in other data, such as technological feasibility, to establish a revised MCL.

4-METHYL-2-PENTANONE

## Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of 4-methyl-2-pentanone are summarized below (Verscheuren 1983).

| | |
|---|---|
| Molecular Weight (g/mole) | 100 |
| Water Solubility (mg/L at 25°C) | 19,000 |
| Vapor Pressure (mmHg at 25°C) | 6 (20°C) |
| Henry's Law Constant ($atm\text{-}m^3/mole$) | no data found |
| Log $K_{ow}$ | no data found |
| $K_{oc}$ | no data found |
| BCF | no data found |

4-methyl-2-pentanone (MIBK) has a high water solubility and moderate vapor pressure. As a consequence of these two properties, benzene can be characterized as a moderately mobile chemical. For MIBK released to air, some rainwater washout is anticipated. After deposition in water or soil, volatilization is expected to return some portion back to the atmosphere.

Due to its high water solubility and moderate vapor pressure, some transport to sediments is expected.

MIBK released to soil can be transported to air via volatilization, to surface water via runoff, and to groundwater via leaching. The first two pathways predominate in surficial soil whereas the latter pathway predominates at lower soil depths.

## Noncarcinogenic Effects

In high concentrations, MIBK produces narcosis with symptoms of headache, nausea, lightheadedness, and vomiting.

## Carcinogenicity and Mutagenicity

MIBK has not been tested in a long-term animal carcinogenesis bioassay. Consequently MIBK would be categorized according to EPA carcinogenic risk criteria in group D - insufficient data, MIBK has not been shown to be mutagenic.

## Standards and Criteria

There are no EPA drinking water standards, health advisories or ambient water quality criteria for the protection of human health for MIBK.

NAPHTHALENE

## Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of naphthalene (CAS No. 91-20-3) are summarized below (EPA 1984).

| | |
|---|---|
| Molecular Weight (g/mole) | 128 |
| Water Solubility (mg/L at 25°C) | 31.7 |
| Vapor Pressure (mmHg at 25°C) | 0.082 |
| Henry's Law Constant ($atm\text{-}m^3/mole$) | no data found |
| Log $K_{ow}$ | 3.37 |
| $K_{oc}$ | no data found |
| BCF | 1.46 |

Naphthalene has a moderate water solubility and moderate vapor pressure. As a consequence of these two properties, benzene can be characterized as a moderately mobile chemical. For naphthalene release to air, some rainwater washout is anticipated. After deposition in water or soil, volatilization is expected to return some portion back to the atmosphere.

Due to its moderate water solubility and moderate vapor pressure, transport to sediments is expected to be a major surface water fate process.

Naphthalene released to soil can be transported to air via volatilization, to surface water via runoff, and to groundwater via leaching. The first two pathways predominate in surficial soil, whereas the latter pathway predominates at lower soil depths.

## Noncarcinogenic Effects

Exposure to naphthalene by the ingestion, inhalation and dermal routes has been reported to result in intravascular hemolysis, corneal

ulceration and cataracts, eye irritation, headache, confusion, malaise, nausea, vomiting, and bladder irritation in humans. In severe cases hemolytic anemia with associated jaundice and occasionally renal disease and death have been reported. Individuals with a deficiency of glucose-6-phosphate dehydrogenase (G6PD) and infants appear to be at greater risk for developing hemolytic anemia.

In a study recently reported by Shopp et al. (1984) male and female CD-1 mice were exposed for 14 or 90 day by gavage to 3 different doses of the compound. Both males and females showed a 5-10% mortality and depressed body weights at the high dose of 133 mg/kg/day. At this dose the males had decreased thymus weights and the females had decreased spleen and increased lung weights. No toxic effects were observed at the two lower doses of 53 mg/kg/day and 27 mg/kg/day. For all exposure groups, no alterations were observed in the hepatic drug metabolizing system except for a dose-related inhibition of aryl hydrocarbon hydroxylase (AHH) activity.

Harris and coworkers (1970 as reported in USEPA 1982) reported a statistically significant increase in retarded cranial ossification and heart development in offspring of Sprague Dawley dams that had received intraperitoneal injections of 395 mg/kg naphthalene on days 1-15 of gestation. In a recent study by Plasterer and coworkers (1985) single doses of naphthalene were administered by gavage to pregnant CD-1 mice on days 7 through 14 of pregnancy. The compound was given at a dose estimated to be at or just below the threshold of adult lethality. A significant reduction in the average number of live pups per litter was reported for the naphthalene-dosed females.

## Carcinogenicity and Mutagenicity

Overall, the results of carcinogenicity testing with napthalene have been negative. Knake (1956 as reported in USEPA 1980) treated 40 white rats with 500 mg/kg of coal tar naphthalene in sesame oil subcutaneously every two weeks for a total of seven treatments. Five out of thirty-four rats developed invasive or metastatic lymphosarcoma prior to death. These result are equivocal, however, because the injection sites were first painted with carbolfuchsin (a known carcinogen) prior

to each injection. The naphthalene also contained approximately 10% methylnaphthalene.

In a second study, Knake (1956 as reported in USEPA 1980) painted a group of mice with either benzene or a solution of coal tar naphthalene in benzene and noted an excess of lymphatic leukemia in the group treated with the napthalene/benzene solution as compared to those treated with benzene alone (4 vs. 0 cases, respectively). These results are difficult to interpret because benzene is a known animal carcinogen.

Naphthalene when combined with rat microsomal fractions has been found to be nonmutagenic in bacterial mutagenesis assays (EPA 1980).

## Drinking Water Standards and Criteria

EPA has not developed any drinking water standards or health advisories or ambient water quality criteria for human health for napthalene.

NICKEL

## Environmental Chemistry and Fate

In the atmosphere, nickel exists predominantly as an aerosol. Atmospheric residence times depend on the nickel concentrations, the density and size of particles, and precipitation. The typical residence times of nickel in the atmosphere ranges from 1 to 21 days. Nickel species in the air most likely include soil minerals, oxide, and sulfates.

Depending on the chemical and physical properties of the water, nicekl exists in numerous soluble and insoluble forms in aqueous systems. Due to precipitation, iron oxide and manganese oxide are the primary determinants of the aqueous mobility of nickel. However, variation of other factors such as sulfate concentration and pH can significantly influence nickel's mobility.

Nickel is persistent in soils and has the potential to leach to groundwater. Sorption of nickel to soil is dependent on soil-water pH, total iron and surface area. Organic complexing agents in soil tend to restrict nickel movement due to formation of organo-nickel complexes. Nickel may also be immobilized as nickel ferrite, as other more common compounds (e.g., carbonates, sulfates, or halides) are too soluble to precipitate out of soil-water.

Nickel is moderately mobile in low pH and high cation-exchange capacity soils, but less mobile in mineral soils and soils with high organic content (ATSDR 1987j). Extractability of nickel from soil effects uptake by plant roots. The extractability is influenced by a number of complex physical, chemical, and biological factors.

Nickel is bioconcentrated in some aquatic organisms. Bioconcentration factors typically range from 20-1,000, with higher values for phytoplankton, algae, and seaweed.

## Noncarcinogenic Effects

Laboratory studies in animals have demonstrated depressed body weight gain, alterations in hematology parameters, cytochrome oxidase activity, and iron contents of organs following high oral nickel exposure.

Studies evaluating the effects of nickel administration on animal reproductive systems have produced varying results. Nickel is known to cross the placental barrier in animals, and some data suggest this is also true for humans. Intraperitoneal and intravenous injections of nickel compounds have produced some tetratogenic effects in animals. Increased fetal mortality and reduced fetal weights also were observed. In some studies, high dosages resulted in reduced fetal survival and decreased fetal weights in the absence of frank teratogenesis.

Feeding studies involving administration of various nickel compounds to rats are more applicable to human exposure situations. Various studies have reported a correlation between nickel concentration in food or water and reproductive performance (ATSDR, 1987b). Nickel exposure has also been reported to impair male gametogenesis in mice and rats. No adverse reproductive effects linked to nickel exposure have been reported in humans.

Carcinogenicity and Mutagenicity

The chemical form and route of exposure may be important factors in determining the carcinogenic potential of nickel. Insoluble nickel compounds (e.g., metallic nickel, nickel subsulfide, and nickel carbonyl) have been shown to produce tumors following inhalation exposure. However, multiple studies in which nickel was administered orally to rats and mice have been uniformly negative (EPA 1985c). In humans, excess respiratory cancer mortality has been demonstrated in epidemiological studies of nickel smelting and refining workers.

EPA has classified nickel in group $B_2$--sufficient evidence for carcinogenicity in animals, limited evidence in humans--according to guidelines for carcinogenic risk assessment (EPA, 1986b) for the inhalation route, based upon the positive animal evidence for nickel subsulfide and carbonyl compounds. However, reflecting the negative animal carcinogenicity data, the Agency has categorized nickel in Group D - inadequate evidence for the oral route of exposure.

Nickel chloride was not mutagenic, whereas nickel sulfate was found to be mutagenic in *in vitro* assays.

## Drinking Water Standards

There is no federal drinking water standard for nickel. EPA, however, has established a lifetime drinking water health advisory of 150 ug/L (EPA 1985c).

PENTACHLOROPHENOL (PCP)

## Introduction

Commercial pentachlorophenol (PCP) is contaminanted with two chemicals - hexachlorobenzene (HCB), and hexachlorodibenzo-p-dioxin (HxCDD) which are currently categorized by EPA in its category $B_2$ as probable human carcinogens. Both are also potential reproductive toxins. PCP is also contaminated with polychlorinated dibenzofurans. This profile primarily addresses the toxicity of commercial PCP. The reader is referred to the profiles for HCB, HxCDD, and dibenzofurans for further information relevant to evaluating the potential toxicity of commercial PCP.

## Environmental Chemistry and Fate

The relevant physical and chemical properties for pentachlorophenol (CAS No. 87-86-5) are summarized below (EPA 1986a).

| | |
|---|---|
| Molecular Weight (g/mole) | 266 |
| Water Solubility (mg/L at 25°C) | 14 |
| Vapor Pressure (mmHg at 25°C) | $1.1 \times 10^{-4}$ |
| Henry's Law Constant ($atm\text{-}m^3/mole$) | $2.8 \times 10^{-6}$ |
| Log $K_{ow}$ | 5 |
| $K_{oc}$ | 53,000 |
| BCF | 770 |

Pentachlorophenol (PCP) has a moderate water solubility, low vapor pressure, low Henry's Law Constant, and high $K_{oc}$. Based upon its $K_{oc}$ and low vapor pressure, PCB would be strongly bound to surface soil. The $K_{oc}$ of 53,000 indicates that leaching from soils and transport to groundwater is a slow process. PCP is resistant to biodegradation. The low Henry's Law Constant and high $K_{oc}$ indicate that PCP will be strongly partitioned to surface water sediments. Finally, the BCF indicates

that, like many lipophilic organics, PCP will bioconcentrate in aquatic life.

Noncarcinogenic Effects

PCP has elicited a wide variety of symptoms following subchronic oral administration in animals, including: secondary anemia, increased blood sugar levels, hemorrhages and congestion in the lungs and kidneys, degenerative changes in the kidney tubules, and lesions of the brain and spinal cord (EPA 1985n). Commercial PCP containing chlorinated dibenzo-p-dioxins and dibenzofurans are significantly more toxic than the purified pentachlorophenol used in subchronic animal studies.

In humans, local irritation, allergic responses, and systemic effects are found. Pentachlorophenol poisoning is characterized by profuse sweating, accompanied by fever, weight loss, and gastrointestinal distress. Occupational epidemiological studies have revealed an increased incidence of low-grade infections or inflammations, and depression of kidney functions, which are partially reversible (EPA 1985h).

Reproduction and Development

Pentachlorophenol has not been shown to be teratogenic in any of the many animal studies designed to assess the toxicological endpoint.

Fetoxicity has been elicited by both purified and commercial PCP, with the effects probably secondary to maternal toxicity. Fetotoxic effects noted in rat studies include increases in resorptions, alterations in the sex ratio, and a number of skeletal anomalies regarded by the investigators as indicative of fetotoxicity rather than teratogenicity. EPA has developed a NOEL of 3 mg/kg/day (EPA 1987g) based on a one-generation rat study.

HxCDD, an important contaminant in commercial PCP, has elicited both fetotoxicity and teratogenicity in rat studies. Teratogenic effects observed include cleft palate, dilated renal pelvis, and abnormal vertebrae. EPA has derived a NOEL of 0.1 ug/kg/day for fetotoxicity (EPA 1987g), which is lower than the NOEL for teratogenicity.

HCB, another important contaminant of commercial PCP, has elicited fetotoxicity and teratogenicity in rodent studies. Abnormalities ob-

served in fetuses include cleft palate, reduced fetal viability, reduced neonatal weight gain, and reduced relative neonatal weight. Based on these studies, EPA set the NOEL for HCB at 1.0 mg/kg/day (EPA 1987g).

Carcinogenicity and Mutagenicity

Pure pentachlorophenol has not been reported to be carcinogenic in a number of animal studies (EPA 1987g). It has also produced negative results in an initiation/promotion study. These results are consistent with mutagenicity studies which have primarily been negative (EPA 1987g).

However, HxCDD and HCB have both been found to be oncogenic in animal studies (EPA 1987g). The EPA estimated 95% upper bound carcinogenic potencies of $6.2 \times 10^3$ and 1.67 mg/kg/day, for HxCDD and HCB, respectively (EPA 1986a, EPA 1987g).

Drinking Water Standards and Criteria

EPA has issued no drinking water standards for PCP, HCB, or HxCDD. EPA has issued a proposed MCLG for PCP of 200 ug/L, based upon a DWEL of 1.01 mg/L, and assuming a drinking water contribution of 20% to total daily PCP intake (EPA 1985a).

EPA has developed health advisories for a 10 kg child and a 70 kg adult for PCP and HCB, but not for HxCDD. The EPA health advisory limits and reference concentrations for potential carcinogens for PCP and its major contaminants are summarized in the following table.

| | One-day | Ten-day | Long term | | Lifetime | Reference |
|---|---|---|---|---|---|---|
| | 10 kg | 10 kg | 10 kg | 70 kg | 70 kg | Concentration* |
| Pentachlorophenol | 1000 | 300 | 300 | 1050 | 1050 | -- |
| Hexachlorobenzene | 50 | 50 | 50 | 175 | -- | 0.02 |
| HxCDD | -- | -- | -- | -- | -- | -- |
| Dibenzofurans | -- | -- | -- | -- | -- | -- |

Source: EPA, 1986a

- No limit developed.

* Corresponding to a $1 \times 10^{-6}$ cancer risk.

All concentrations in ug/L.

PHENOL

## Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of phenol (CAS No. 108-95-2) are summarized below (EPA 1986a).

| | |
|---|---|
| Molecular Weight (g/mole) | 94 |
| Water Solubility (mg/L at 25°C) | 93,000 |
| Vapor Pressure (mmHg at 25°C) | 0.341 |
| Henry's Law Constant ($atm\text{-}m^3/mole$) | $4.5 \times 10^{-7}$ |
| Log $K_{ow}$ | 1.42 |
| $K_{oc}$ | 14.2 |
| BCF | 14 |

Phenol has a high water solubility and vapor pressure. As a consequence of these two properties, phenol can be characterized as a highly mobile chemical. For phenol released to air, some rainwater washout is anticipated. After deposition in water or soil, volatilization is expected to return some portion back to the atmosphere. Based on its low Henry's Law Constant, substantial volatilization loss should not occur to the atmosphere following release to water.

Due to its high water solubility and high vapor pressure, transport to sediments is not expected to be a major surface water fate process.

Phenol released to soil can be transported to air via volatilization, to surface water via runoff, and to groundwater via leaching. The first two pathways predominate in surficial soil, whereas the latter pathway predominates at lower soil depths.

According to criteria developed by Kenaga (1980), phenol with a $K_{oc}$ of 14.2 would be considered to be mobile in soils. Other factors which influence soil mobility include soil type, the amount of rainfall, the depth to groundwater, and the extent of degradation.

## Noncarcinogenic Effects

Phenol is a highly toxic compound that may enter the body via skin absorption, vapor inhalation, and ingestion. Based on the available human and animal data, exposure to large doses by any route of exposure can lead to serious illness or death. Toxic doses in human and species exhibit similar symptoms: initial increases in heart rate, labored breathing, cyanosis, and pulmonary edema. The present data do not indicate that phenol to be teratogenic.

## Carcinogenicity and Mutagenicity

Based upon the limited animal data, the EPA has classified phenol in category D - inadequate evidence to evaluate carcinogenicity.

The mutagenicity data are equivocal presenting on balance, equivocal evidence of mutagenicity.

## Drinking Water Standards and Criteria

EPA has not classified drinking water standards or criteria for phenol.

POLYCHLORINATED BIPHENYLS (PCB)

## Introduction

Polychlorinated biphenyls (PCBs) are a class of compounds with varying degrees of chlorine substitution on two phenyl rings bound at the 1-1′ position. PCBs, previously used in commerce, are mixtures of various substituted biphenyls formed by a reaction of chlorine with biphenyl. Because of their heat stability and resistance, low water solubility, and favorable dielectric properties, PCBs found considerable use in hydraulic fluids, compressor lubricants, heat transfer fluids, paints, lacquers, and ink (EPA 1987f).

PCBs have the empirical formula $C_{12}H_{10-n}Cl_n$ with n=1 to 10. The numbering system is based upon ring-ring chlorine bonds, with identical numbering systems on each ring. By convention, the ring with the fewest chlorine substitutes, or substituted in the highest numerical positions, is designated as prime (ATSDR, 19871).

Individual PCB registered trademarks or brand names vary according to both the manufacturer and the country of origin.

PCBs, formerly produced in the United States by a single manufacturer, are called Aroclors. All Aroclors are designated by a four-digit numbering system. The first two digits denote the type of compound; the last two digits give the percentage by weight of chlorine. The only exception is Aroclor 1016. The trademarks by manufacturers in other countries include Phenoclor, Clophen, and Kaneclor.

## Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fates of polychlorinated biphenyls are summarized in Table 1 (ATSDR 19871).

In water, adsorption to sediments or other organic water is a major fate process for PCBs (EPA 19871). Based on their water solubilities and octanol-water partition coefficients, the lower chlorinated components of the Aroclors will sorb less strongly than the higher chlorinated isomers.

Volatilization is also an important environmental fate process for PCBs dissolved in natural water. The estimated Henry's Law Constants

Table 1

PHYSICAL AND CHEMICAL PROPERTIES OF PCBs*

| Aroclor Designation | Molecular Weight (average) | Color | Physical State | Solubility water, mg/L | Density $g/cm^3$ at 25°C | Partition Coefficient Log Octanol-Water* | Vapor Pressure (mm Hg at 25°C) | Henry's Law** Constant $atm\text{-}m^3/mol$ at 25°C | Biocentration Factor*** |
|---|---|---|---|---|---|---|---|---|---|
| 1016 | 257.9 | Clear | Oil | 0.42 | 1.33 | 5.6 | $4 \times 10^{-4}$ | $2.9 \times 10^{-4}$ | 42,500 |
| 1221 | 200.7 | Clear | Oil | 0.59 (24°C) | 1.15 | 4.7 | $6.7 \times 10^{-3}$ | $3.5 \times 10^{-3}$ | |
| 1232 | 232.2 | Clear | Oil | Unknown | 1.24 | 5.1 | $4.06 \times 10^{-3}$ | Unknown | |
| 1242 | 266.5 | Clear | Oil | 0.24 | 1.35 | 5.6 | $4.06 \times 10^{-4}$ | $5.2 \times 10^{-4}$ | |
| 1248 | 299.5 | Clear | Oil | 0.054 | 1.41 | 6.2 | $4.94 \times 10^{-4}$ | $2.8 \times 10^{-3}$ | 70,500 |
| 1254 | 328.4 | Lt. Yellow | Viscous liquid | 0.012 | 1.50 | 6.5 | $7.71 \times 10^{-5}$ | $2.8 \times 10^{-3}$ | 100,000 |
| 1260 | 375.7 | Lt. Yellow | Sticky resin | 0.0027 | 1.58 | 6.8 | $4.05 \times 10^{-5}$ | $4.6 \times 10^{-3}$ | 190,000 |

* These log Kow values represent an average value for the major components of the individual Aroclor.

** Henry's Law constants were estimated by dividing the vapor pressure by the water solubilities, and represent average values for the Aroclor mixtures as a whole (ATSDR 1987r).

*** From Lyman, Reehl, and Rosenbladt (1982).

Source: Unless otherwise specified, from ATSDR (1987l).

are indicative of significant volatilization from environmental waters (ATSDR 19871). However, strong adsorption to sediments significantly reduces the concentrations of PCBs available for volatilization, with longer volatilization half-lives for the higher chlorinated PCBs.

The low water solubility, high log $K_{ow}$s, and demonstrated strong adsorption to soils and sediments indicate that significant leaching should not occur in soil under most conditions. Lower chlorinated PCBs will leach at rates greater than the higher chlorinated PCBs. In the presence of organic solvents, significant leaching of PCBs in soil can occur (ATSDR 19871).

PCBs with vapor pressures ranging from $10^{-3}$ to $10^{-5}$ mm Hg should exist almost entirely in the vapor phase in the atmosphere (Eisenreich et al, 1981). The tendency of PCBs to adsorb to particulates increases with increasing degree of chlorination. PCBs in the atmosphere are physically removed by wet and dry deposition (Eisenreich et al, 1981).

In general, the rate of degradation or transformation in the environment decreases with increasing chlorination. In the atmosphere, the vapor phase reaction of PCBs with hydroxyl radicals may be the dominant transformation process (ATSDR 19871). In the aquatic environment PCBs are not significantly degraded by hydrolysis and oxidation, and photolysis appears to be the only potentially important process (ATSDR 19871).

In general, mono-, di-, and trichlorinated biphenyls (Aroclor 1221 and 1232) biodegrade relatively rapidly; tetrachlorinated biphenyls (Aroclors 1016 and 1242) biodegrade slowly; and higher chlorinated biphenyls (Aroclors 1248, 1254 and 1260) are resistant to biodegradation (ATSDR 19871). In addition to the degree of chlorination, chlorine substitution patterns also appear to be important in influencing the rate of biodegradation.

Experimentally determined bioconcentration factors (BCFs) for various Aroclors (1016, 1248, 1254, and 1260) in aquatic species (fish, shrimp, oyster) range from 26,000 to 660,000 (Leifer et al, 1983).

## Noncarcingenic Effects

Several complications exist in assessing the toxicity of PCBs. Different mixtures nominally depicted by PCB type and chlorine sub-

stitution may, in fact, vary significantly in isomer composition. Additionally, highly toxic contaminants are often present in PCB mixtures.

In general, however, it can be concluded that short and intermediate-term studies of toxicological effects following oral administration of PCBs to animals result in a variety of physiological and morphological alterations in the liver, including: enlargement, fatty infiltration, centrilobular lesions, and effects on liver porphyrin metabolism. The major biochemical effects include induction of mixed function oxidase enzymes and modification of porphyrin metabolism. PCBs can also inhibit the immune system. Skin applications to rabbits has been shown to cause erythema, keratosis, and chloracne.

Human studies related to PCB exposures have been done on the health of occupationally exposed workers, as well as on health effects noted following two incidents in which cooking oils contaminated with PCBs were ingested. Occupationally exposed workers typically demonstrated dermal problems such as chloracne, rashes, and burning sensations. While most biochemical parameters in these studies were found to be within normal ranges, one study reported an elevation of liver enzymes in exposed workers.

The two incidents, or outbreaks, concerning the ingestion of PCB-tainted cooking oils occurred in east Asia. The first incident, designated as the "Yusho" outbreak, occurred among Japanese (Higachi, 1976; Kurotsone and Shapiro, 1984); while the second, designated "Taichung", occurred among Taiwanese (Hsu et al, 1984; Lu and Wang, 1984). Health effects observed in humans following exposure included: chloracne, increased discharge from the eyes, soreness and weakness of limbs, headaches, dizziness, and general malaise. Because the cooking oil in the Yusho study was also found to be contaminated with highly toxic polychlorinated dibenzofurans, implications cannot be limited to PCBs alone in this study.

## Reproduction and Development

The range of reported effects on reproduction in animals include: a lengthening of the estrus cycle, weak estrogenic activity, fetotoxicity, fetal deaths, decreased survival of the neonate, small birth weight, and

a variety of teratogenic effects. Rats and mice appear to be more resistant to reproductive toxicity than mink or monkeys, which have also been used in studies. These differences may possibly be attributable to the duration of the studies and to differences in metabolic rates and pharmacokinetics.

Most of the studies used dosages that were maternally toxic. Maternal toxicity obviously is an important consideration when assessing reproductive and developmental toxicity. This consideration, frequently referred to as Karnofsky's rule, states that "any compound administered at the proper dosage, at the proper stage of development, or to embryos of the proper species will be effective in causing disturbances in embryonic development". This calls attention to the fact that if a pregnant animal is sick, the delicate balance between the mother and fetus is affected or disrupted, and adverse fetal effects can be expected.

There have been studies of the reproductive and developmental effects of combined exposure to PCBs subsequent to outbreaks of poisoning in Japan (Yusho) and Taiwan (Taichung). Findings in newborn children of exposed mothers include: fetal growth inhibition, low birth weight, dry brown skin pigmentation, precocious dentition, gingival hyperplasia, and abnormal calcification of the skull (DHHS 1985a).

Carcinogenicity and Mutagenicity

There have been a number of studies designed to assess carcinogenicity in animals. All but one study have been negative. The positive study by Kimbrough et al. (1975) reported a statistically significant increase in hepatocellular carcinomas among mice and rats administered Aroclor 1260 in the diet.

Epidemiological studies have not reported significant increases in cancer in occupationally exposed workers. Explanations for these findings may include an insufficient latency period and small sample sizes in the studies.

Based upon the above evidence, EPA has classified PCBs in Group $B_2$, with adequate evidence of carcinogenesis in animals, and inadequate evidence in humans (EPA 1985). IARC (1978) has classified PCBs in category 2B, based on studies indicating inadequate evidence for carcinogenicity

in humans, sufficient evidence in animals, and inadequate evidence of activity in short-term mutagenicity tests.

EPA's cancer assessment group has calculated a unit cancer risk of 4.34 $(mg/kg/day)^{-1}$, using the upper 95 percent value of the doses used in the positive study (Kimbrough et al 1975).

## Standards and Criteria

### Drinking Water

As the first stage in developing a maximum contaminant level (MCL) for PCBs in drinking water, the EPA has recently proposed an MCLG of zero. EPA will establish an MCL taking into account technological feasibility of control and analytical feasibility (EPA 1988).

### Surface Water

The EPA has established ambient water quality criteria for the protection of freshwater and saltwater aquatic life of 0.014 ug/l and 0.03 ug/l, respectively. For human health, EPA has estimated the drinking water concentration corresponding to one-in-a-million cancer excess of 0.0079 ng/l.

POLYCYCLIC AROMATIC HYDROCARBONS (PAHs)

Environmental Chemistry and Fate

In general, most priority pollutant PAHs can be characterized as having low vapor pressure, low water solubility, low Henry's Law Constants, high logarithms of the octanol-water partition coefficients (log $K_{ow}$s) and high organic carbon partition coefficients ($K_{oc}$s). The high $K_{oc}$s indicate that most PAHs are strongly sorbed to organic matter in the soils. This factor, combined with the low water solubilities, indicate that the rate of transport of most PAHs from the unsaturated zone via infiltration to the saturated zone will be extremely low. Low vapor pressure and low Henry's Law Constants indicate that most PAHs will not readily volatilize from surface water, and these factors, in combination with high $K_{oc}$s, also indicate low volatilization rates from surface soils.

The exceptions to the groundwater transport argument are four PAHs (acenaphthene, fluorene, fluoranthene, and pyrene) with water solubilities greater than 100 ug/L. Although these four compounds have high $K_{oc}$s ($10^3$ or greater) relative to other PAHs, their solubilities indicate that they are mobile, and may be observed in groundwater. The chemical and physical properties for the 14 priority pollutant PAHs are presented in Table 1.

Typically, although PAHs are regarded as persistent in the environment, they are degradable by soil microorganisms.

Degradation rates and degree of degradation are influenced by environmental factors, microbial flora and physicochemical properties of the PAHs themselves. Important environmental factors include temperature, pH, oxygen status, soil type, moisture, and nutrient status (Sims and Overcash 1983). Microbial factors include acclimation status, populations present, and the relative proportions of bacteria, fungi, and actinomycetes (Sims and Overcash, 1983). Physico-chemical properties include chemical structure, concentration, and lipophilicity.

Compounds which are easily and rapidly biodegraded include acenaphthene, naphthalene, and phenanthrene. Compounds which are persistent, requiring long time periods or specialized conditions for degradation, include benzo(k)fluoranthene, benzo(g,h,i)perylene, benzo(a)pyrene,

Table 2

PHYSICAL AND CHEMICAL PROPERTIES OF SELECTED PAHs*

| Chemical Name | Molecular Weight (g) | CAS No. | Vapor Pressure (mm Hg) | Water Solubility (mg/L) | Henry's Law Constant | log Kow | Koc (mL/g) | BCF (L/kg) |
|---|---|---|---|---|---|---|---|---|
| acenaphthene | 154 | 83-32-9 | $1.55 \times 10^{-3}$ | 3.42 | $9.2 \times 10^{-5}$ | 4.0 | $4.6 \times 10^{3}$ | 242** |
| anthracine | 178 | 120-12-7 | $1.95 \times 10^{-4}$ | $4.5 \times 10^{-2}$ | $1.2 \times 10^{-3}$ | 4.45 | $1.4 \times 10^{4}$ | 1,210** |
| benzo(a)anthracene | 228 | 56-55-3 | $2.2 \times 10^{-8}$ | $5.7 \times 10^{-3}$ | $1.16 \times 10^{-6}$ | 5.6 | $1.38 \times 10^{6}$ | 11,700** |
| benzo(b)fluoranthene | 252 | 205-99-2 | $5.0 \times 10^{-7}$ | $1.4 \times 10^{-2}$ | $1.19 \times 10^{-3}$ | 6.06 | $5.5 \times 10^{5}$ | |
| benzo(k)fluoranthene | 252 | 207-08-9 | $5.1 \times 10^{-7}$ | $4.3 \times 10^{-3}$ | $3.94 \times 10^{-3}$ | 6.06 | $5.5 \times 10^{5}$ | |
| benzo(g,h,i)perylene | 276 | 191-24-2 | $1.03 \times 10^{-10}$ | $7.0 \times 10^{-4}$ | $5.34 \times 10^{-8}$ | 6.51 | $1.6 \times 10^{6}$ | 68,200** |
| benzo(a)pyrene | 252 | 50-32-8 | $5.6 \times 10^{-9}$ | $1.2 \times 10^{-3}$ | $1.55 \times 10^{-6}$ | 6.06 | $5.5 \times 10^{6}$ | 28,200** |
| chrysene | 228 | 208-01-9 | $6.3 \times 10^{-4}$ | $1.8 \times 10^{-3}$ | $1.05 \times 10^{-6}$ | 5.61 | $2.0 \times 10^{5}$ | 11,700** |
| dibenzo(a,h)anthracene | 278 | 53-70-3 | $1.0 \times 10^{-10}$ | $5.0 \times 10^{-4}$ | $7.33 \times 10^{-8}$ | 6.8 | $33 \times 10^{6}$ | |
| fluoranthene | 202 | 206-44-0 | $5.0 \times 10^{-6}$ | $2.6 \times 10^{-1}$ | $6.46 \times 10^{-6}$ | 4.9 | $3.8 \times 10^{4}$ | 2,920 |
| fluorene | 116 | 86-73-7 | $7.1 \times 10^{-4}$ | 1.69 | $6.42 \times 10^{-5}$ | 4.2 | $7.3 \times 10^{3}$ | 1,300*** |
| indeno(1,2,3-cd)perylene | 276 | 193-39-5 | $1.0 \times 10^{-10}$ | $5.3 \times 10^{-4}$ | $6.86 \times 10^{-8}$ | 6.5 | $1.6 \times 10^{6}$ | |
| phenanthrene | 178 | 85-01-3 | $6.8 \times 10^{-4}$ | 1.0 | $1.59 \times 10^{-4}$ | 4.46 | $1.44 \times 10^{4}$ | 2,630** |
| pyrene | 202 | 129-00-3 | $2.5 \times 10^{-6}$ | $1.32 \times 10^{-3}$ | $5.4 \times 10^{-6}$ | 4.88 | $3.8 \times 10^{4}$ | 2,800** |

* Unless otherwise footnoted, data taken from EPA (1986a).

** EPA (1984i)

*** Lyman, Reihl, and Rosenblatt (1982).

chrysene, dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene. The ease of biodegradation generally decreases with increasing molecular weight. Biodegradation products generally include hydroxylated PAH derivatives.

## Noncarcinogenic Effects

Very little attention has been paid to the noncarcinogenic effects of PAHs. It is known, however, that rapidly proliferating tissues (e.g., bone marrow, lymphoid organs, testes, etc.) appear to be the preferred targets for PAH-induced cytotoxicity.

Acute and chronic exposure to various PAHs classified as carcinogens has resulted in the destruction of specific hematopoietic and lymphoid elements, ovotoxicity, anti-spermagenic effects, adrenal necrosis, and changes in the intestinal and respiratory epithelia. This tissue damage occurs at doses expected to induce carcinogens and malignancy risks predominant in evaluating PAH toxicity. For PAHs classified as noncarcinogenic, very little is known about toxic responses or mechanisms.

## Carcinogenicity and Mutagenicity

The EPA has issued finalized carcinogenicity risk assessment guidelines (EPA, 1986b) to establish criteria for evaluating and categorizing chemicals into five groups, according to weight-of-evidence categories. According to this categorization scheme, five of the 15 priority pollutant PAHs have been placed in category $B_2$ (probable human carcinogens) with sufficient evidence of carcinogenicity in animals, and inadequate data for humans. A sixth PAH (indeno (1,2,3-cd) perylene) has been placed in category C, denoting possible human carcinogenicity based on limited evidence of carcinogenicity in animals in the absence of human data (EPA, 1986b). Table 2 contains EPA's most current categorization of priority pollutant PAHs (EPA, 1986b). Following its risk assessment guidelines, EPA typically performs quantitative risk assessments for groups B or A, and, in some cases (depending on the quality of the data), for group C.

To date, EPA has estimated a carcinogenicity slope (unit cancer risk) for carcinogenic PAHs using data for a single PAH, benzo(a)pyrene (BaP). This limited effort does not take into account the clearly docu-

Table 2

EPA CARCINOGENICITY CATEGORIZATION FOR ORAL AND INHALATION ROUTES OF EXPOSURE FOR THE 15 PRIORITY POLLUTANTS POLYCYCLIC AROMATIC HYDROCARBONS

| | EPA Carcinogenicity Classifications* | |
|---|---|---|
| Compound | Inhalation | Oral |
| acenaphthene | D | D |
| anthracene | D | D |
| benzo(a)anthracene | $B_2$ | $B_2$ |
| benzo(b)fluoranthene | $B_2$ | $B_2$ |
| benzo(k)fluoranthene | D | D |
| benzo(g,h,i)perylene | D | D |
| benzo(a)pyrene | $B_2$ | $B_2$ |
| chrysene | $B_2$ | $B_2$ |
| dibenzo(a,h)anthracene | $B_2$ | $B_2$ |
| fluoranthene | D | D |
| fluorene | D | D |
| indeno(1,2,3-cd)perylene | C | C |
| naphthalene | D | D |
| phenanthrene | D | D |
| pyrene | D | D |

* Unless otherwise footnoted, classification taken from EPA (1986a).

mented differences in quantitative dose-response relationships for the other PAHs. Two specialists in EPA's carcinogenic assessment group have evaluated the relative potency estimates for the other five carcinogenic PAHs to benzo(a)pyrene (Thorslund et al, 1986).

Using a series of sophisticated statistical procedures, these authors have derived estimated relative potencies for the five other "carcinogenic" PAHs relative to BaP. For the potency estimation, the authors used bioassays from individual laboratories in which BaP and the other PAHs were tested in common. The results of this procedure for developing relative potency estimates are summarized in Table 3.

Table 3

RELATIVE POTENCY ESTIMATES DERIVED FOR POLYCYCLIC AROMATIC HYDROCARBONS CATEGORIZED IN GROUP A, B, OR C ACCORDING TO EPA'S WEIGHT OF EVIDENCE CRITERIA

| Compound | Relative Potency Estimates |
|---|---|
| benzo(a)pyrene | 1 |
| benzo(a)anthracene | 0.145 |
| benzo(b)fluoranthene | 0.140 |
| chrysene | 0.0044 |
| dibenzo(a,h)anthracene | 2.82 |
| indeno(1,2,3-cd)perylene | 0.232 |

Source: Thorslund et. al. (1986)

TETRACHLOROETHENE (PERCHOLOROETHYLENE OR PERC)

## Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of tetrachloroethene (CAS No. 127-18-4) are summarized below (EPA 1986a).

| | |
|---|---|
| Molecular Weight (g/mole) | 166 |
| Water Solubility (mg/L at 25°C) | 150 |
| Vapor Pressure (mmHg at 25°C) | 17.8 |
| Henry's Law Constant ($atm\text{-}m^3/mole$) | $2.6 \times 10^{-2}$ |
| Log $K_{ow}$ | 2.6 |
| $K_{oc}$ | 364 |
| BCF | 31 |

Tetrachloroethene's moderate water solubility and vapor pressure indicate that volatilization is the major loss mechanism from surface soil and surface water. Its moderate $K_{oc}$ indicates that leaching to groundwater from lower soil depths is an important mechanism. In addition, tetrachloroethene is biodegraded by certain soil microorganisms by a sequential series of monodechlorinations. Once it reaches the groundwater, its moderate $K_{oc}$ indicates that tetrachloroethene will be moderately absorbed to soil particles and will be moderately retarded relative to groundwater transport. Finally, tetrachloroethene is subject to low bioconcentration in aquatic species.

## Noncarcinogenic Effects

The principal toxic effects following acute exposure in animals to tetrachloroethene (PERC) are depression of the CNS, ataxia (failure of muscular coordination), and respiratory cardiac arrest (ATSDR 1987m, EPA 1985f). Subchronic and chronic effects in animals include damage to the

liver and kidneys. In humans, the principal effects are CNS depression and liver toxicity.

## Carcinogenicity and Mutagenicity

A 1977 NCI bioassay in which PERC was administered by gavage reported increased incidence of liver tumors in mice but not rats (EPA 1985d). A draft report of a NTP inhalation bioassay, currently under internal review, has noted an increased incidence of tumors in mice and rats. Although EPA has previously categorized tetrachloroethylene in Group $B_2$--probable human carcinogen (EPA 1985b, 1985h)--the Agency is awaiting final results of the NTP bioassay before commencing a rule-making for the chemical in drinking water.

PERC has been evaluated for its ability to cause gene mutation, chromosomal aberrations, unscheduled DNA synthesis, and mitotic recombination. In general, these responses have been weak and were observed at high concentrations that were cytotoxic (EPA 1985h). Additionally, no dose-dependent relationships were demonstrated in these studies (EPA 1985h).

## Drinking Water Standards

EPA has not established an MCL for PERC in drinking water. The agency is scheduled to begin rule-making procedures to establish an MCL in the near future.

TOLUENE

## Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of toluene (CAS No. 108-88-3) are summarized below (EPA 1986a).

| | |
|---|---|
| Molecular Weight (g/mole) | 92 |
| Water Solubility (mg/L at 25°C) | 535 |
| Vapor Pressure (mmHg at 25°C) | 28.1 |
| Henry's Law Constant ($atm\text{-}m^3/mole$) | $6.4 \times 10^{-3}$ |
| Log $K_{ow}$ | 2.73 |
| $K_{oc}$ | 300 |
| BCF | 10.7 |

Toluene has a high water solubility, moderate vapor pressure, high Henry's Law Constant, and moderate $K_{oc}$. Based on the vapor pressure and $K_{oc}$, volatilization from surface soils is an important transport pathway. Based on the water solubility and moderate $K_{oc}$, toluene will be readily transported to groundwater, and upon reaching groundwater, be subject to a low degree of retardation relative to the groundwater flow. Based on the water solubility and high Henry's Law Constant, volatilization will be a major transport pathway from surface water.

## Noncarcinogenic Effects

Acute or chronic exposure to high levels of toluene in animals results in CNS depression and effects on the lungs, liver, and kidney.

EPA has derived an AADI for drinking water consumption based upon a 24-month inhalation study in rats (EPA 1985c). Based upon a NOAEL of 1,130 $mg/m^3$, an uncertainty factor of 100, and assuming 50 percent pulmonary absorption, EPA derived an AADI of 10,100 ug/L (EPA 1985c).

## Carcinogenicity and Mutagenicity

Only one long-term carcinogenicity bioassay of toluene has been reported. This study concluded that toluene was not carcinogenic following inhalation in rats. NTP is conducting carcinogenicity studies in which toluene is being administered by inhalation and gavage to rats and mice. In addition, carcinogenicity studies by European investigators are expected to be published in the next few years. According to weight-of-evidence carcinogenicity criteria, EPA has classified toluene in Category D, not classifiable as to human carcinogenicity (EPA 1985c).

Toluene has not been shown to be mutagenic in *in vivo* or *in vitro* assays (EPA 1985c).

## Drinking Water Standards and Criteria

*Standards*. In the first stage of the rule-making process designed to establish a MCL for toluene in drinking water, EPA has issued a proposed MCLG of 2,600 ug/L derived from the AADI of 10,100 ug/L by allocating a 20 percent of drinking water contribution to total intake from all sources of exposure (EPA 1985c). Subsequent to finalization of the MCLG, EPA will evaluate analytical feasibility and feasibility of control in establishing an enforceable MCL.

*Criteria*. In the absence of adequate dose-response data for oral exposure to toluene, EPA derived a 1-day HA, based on NOAEL of 377 $mg/m^3$ reported in studies of humans, the subjects of single inhalation exposures of up to 8 hours. Based upon the NOAEL, an uncertainty factor of 100, and a variety of physiological parameters and intake assumptions, EPA derived 1-day HAs of 18,000 ug/L and 63,000 ug/L for a 10-kg child and 70-kg adult, respectively (EPA 1985d).

In the absence of sufficient data, EPA derived 10-day HAs of 6,000 ug/L (child) and 21,000 ug/L (adult), by applying an uncertainty factor of 3 to the 1-day HA. The Agency utilized a three-fold rather than the usual 10-fold uncertainty factor because toluene is rapidly distributed and excreted, and because the chemical presents little bioaccumulation potential relative to typical toxicants (EPA 1985d).

The EPA ambient water quality criterion for the protection of human health is 14,300 ug/L (EPA 1980a).

## 1,1,1-TRICHLOROETHANE (TCA)

### Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of 1,1,1-trichloroethane (CAS No. 71-55-6) are summarized below. (EPA 1986a).

| | |
|---|---|
| Molecular Weight (g/mole) | 133 |
| Water Solubility (mg/L at 25°C) | 1,500 |
| Vapor Pressure (mmHg at 25°C) | 123 |
| Henry's Law Constant ($atm\text{-}m^3/mole$) | $1.4 \times 10^{-2}$ |
| Log $K_{ow}$ | 2.5 |
| $K_{oc}$ | 152 |
| BCF | 5.6 |

1,1,1-trichloroethane (TCA) can be characterized as having a high water solubility, a high vapor pressure, a high Henry's Law Constant, and a moderate $K_{oc}$. The high vapor pressure and moderate $K_{oc}$ indicate that volatilization will be a major transport pathway in surfical soil. In subsurface soils, the high water solubility and moderate $K_{oc}$ indicate that transport to groundwater represents a major pathway, and once the water table is reached, chemical transport will be moderately retarded relative to the groundwater flow. The high vapor pressure, high Henry's Law Constant, and high water solubility indicate that volatilization from surface water will be a major transport pathway.

### Noncarcinogenic Effects

The principal noncarcinogenic effects of 1,1,1-trichloroethane (TCA) following exposure in animals and man are depression of the CNS, increase in liver weight, and cardiovascular changes. Current data do not suggest that TCA is a reproductive or developmental toxin.

EPA has developed a risk reference dose (RRfD) of 0.35 mg/kg/day based upon a NOAEL of 1,365 $mg/m^3$ reported in a study in which mice were exposed by inhalation for 14 weeks. EPA derived the RRfD by application of an uncertainty factor of 100, a 30% absorbed dose, and standard physiological parameters (EPA 1985g).

Carcinogenicity and Mutagenicity

There have been two TCA carcinogenicity bioassays. The first, conducted by NCI, was judged to be inadequate due to poor survival in treated animals. Preliminary results of the second, by NTP, showed elevated incidences of hepatocellular carcinomas. These initial results have been questioned and the study is currently being audited (EPA 1985b). Based upon these results, EPA has classified TCA according to weight-of-evidence criteria in Group D, not classifiable--inadequate human and animal evidence of carcinogenicity (EPA 1987a).

Drinking Water Standards and Criteria

Standards. EPA has established a drinking water MCL for TCA of 200 ug/L.

Criteria. EPA has developed a 1-day HA based upon a LOEL of 1.4 g/kg/day reported in a study of rats receiving a single oral dose of TCA. Based upon the LOEL, and standard weight and intake assumptions, EPA derived a 1-day HA of 14,000 ug/L for a 10-kg child (EPA 1984d). In the absence of sufficient data, EPA has not developed a 10-day HA. EPA has developed longer-term HAs of 35,000 ug/L (child) and 125,000 ug/L (adult), based upon a NOAEL of 0.5 g/kg/day reported in a study in rats receiving TCA by gavage for 12 weeks (EPA 1985d).

The EPA lifetime HA of 200 ug/L is equivalent to and was derived by the same methodology as the RMCL (EPA 1985d).

The EPA ambient water quality criterion for TCA for the protection of human health is 18,700 ug/L (EPA 1980a).

TRICHLOROETHENE (TCE)

## Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of trichloroethene (TCE) (CAS No. 79-01-6) are summarized below (EPA 1986a).

| | |
|---|---|
| Molecular Weight (g/mole) | 131 |
| Water Solubility (mg/L at 25°C) | 1,100 |
| Vapor Pressure (mmHg at 25°C) | 57.9 |
| Henry's Law Constant ($atm\text{-}m^3/mole$) | $9.1 \times 10^{-3}$ |
| Log $K_{ow}$ | 2.38 |
| $K_{oc}$ | 126 |
| BCF | 10.6 |

The high water solubility and high vapor pressure of TCE indicate that volatilization will be the predominant loss mechanism from surficial soils. In soils and groundwater, trichloroethene is degraded to cis and trans 1,2-dichloroethylene, vinylidene chloride, and vinyl chloride (ATSDR 1987n). TCEs moderate organic-carbon partition coefficient indicates it is moderately adsorbed to soils, and will leach to groundwater. In light of its moderate Henry's Law Constant, volatilization will be the major fate process for TCE from surface water.

Trichloroethene is only moderately bioconcentrated in aquatic life.

## Noncarcinogenic Effects

The principal toxicological effect of concern for trichloroethene (TCE) is carcinogenicity. Noncarcinogenic effects include CNS disturbances and kidney and liver damage following exposure to relatively high airborne concentrations (ATSDR 1987n).

## Carcinogenicity and Mutagenicity

Six studies of the carcinogenicity of TCE in animals have been published. Two have reported significant increases in liver tumors in mice. EPA has judged three others as technically flawed. A sixth reported that TCE, containing epichlorohydrin and epoxybutane, was carcinogenic in a less responsive mouse strain, but pure TCE was not (EPA 1985b). Recognizing the lower responsiveness of the mice in the latter study, EPA has classified TCE based upon weight-of-evidence carciongenicity guidelines in Category B2--probable human carcinogen (EPA 1987a).

Commercial TCE containing stabilizers has been reported to be weakly mutagenic in a variety of *in vitro* and *in vivo* assays representing a wide evolutionary range of organisms (EPA 1985g). Based on these data, EPA has concluded that commercial TCE may have the potential to cause weak or borderline increases above the spontaneous level of mutagenic effects in exposed human tissues (EPA 1985g).

## Drinking Water Standards

EPA has established a drinking water MCL for TCE of 5 ug/l (EPA 1987a).

2,4,6-TRICHLOROPHENOL (TCP)

Environmental Chemistry and Fate

The relevant physical and chemical properties and environmental fate of 2,4,6-trichlorophenol (CAS No. 88-06-2) are summarized below (EPA 1986a).

| | |
|---|---|
| Molecular Weight (g/mole) | 197 |
| Water Solubility (mg/L at 25°C) | 800 |
| Vapor Pressure (mmHg at 25°C) | $1.2 \times 10^{-2}$ |
| Henry's Law Constant ($atm\text{-}m^3/mole$) | $3.9 \times 10^{-6}$ |
| Log $K_{ow}$ | 3.87 |
| $K_{oc}$ | 2000 |
| BCF | 150 |

Based upon its high $K_{oc}$ and low vapor pressure, volatilization is not an important fate mechanism for TCP from surface soil. Reportedly, TCP is subject to some degradation. In light of the low vapor pressure and high $K_{oc}$, degradation may be an important fate mechanism in soils. The high $K_{oc}$ indicates that TCP is only slowly leached and transported to groundwater. Should it reach groundwater, TCP will be strongly absorbed to soil organic carbon, and will be strongly retarded relative to groundwater flow.

In surface water, sorption to sediment appears to be the most important fate mechanism. In addition, based on its BCF, TCP is subject to moderate bioconcentration in aquatic life.

Noncarcinogenic Effects

In preliminary subchronic feeding studies, single strains of mice and rats received TCP ad libitum in the diet for seven weeks. Observations extended one week following cessation of the diet. A significant reduction in growth rate was observed in rats receiving 10,000

ug/g and mice receiving 14,700 ug/g. Assuming that rats weighed 0.4 kg and consumed 0.02 kg/day, NAS estimated a minimum toxic dose of 500 mg/kg/day (NAS 1982).

Carcinogenicity and Mutagenicity

Technical grade TCP was administered in the diet to male and female F344 rats and male $B_6C_3F_1$ mice at concentrations of 5,000 ug/g and 10,000 ug/g, respectively, for 105 to 107 weeks (NCI 1979 as cited in NAS 1982). Female $B_6C_3F_1$ mice received TCP at 10,000 ug/g to 20,000 ug/g, but at 38 weeks, the doses were reduced by a factor of 4 because of reduced weight gain. Under the conditions of the experiment, TCP was reported to be carcinogenic in male F344 rats (lymphomas or leukemias) and $B_6C_3F_1$ mice (hepatocellular carcinomas or adenomas) (NAS 1982). Polychlorinated dibenzofurans and dioxins may be formed during the chemical synthesis of TCP. The dioxin content of the technical grade TCP used in these studies was not reported.

Based upon the positive animal studies, EPA has categorized TCP as a $B_2$, probable human carcinogen (EPA 1986a).

TCP was not reported as mutagenic in the Ames assay with or without activation by hepatic microsomes (EPA 1984c). TCP did increase the mutation rate but not the intragenic recombination in S. cervisiac (EPA 1984c).

Drinking Water Standards and Criteria

EPA has not developed drinking water standards or health advisories for TCP. EPA has established ambient water quality criteria (AWQC), based upon TCPs carcinogenicity in animals, for the protection of human health. The AWQC criteria are 1.2 ug/L for water and fish consumption, and 3.6 ug/L for fish consumption only. These criteria are equivalent to the estimated incremental increased $1 \times 10^{-6}$ lifetime cancer risk, based upon the animal carcinogenicity study results (EPA 1986g).