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FINAL

Contamination Assessment/ Remedial Activities Investigation Industrial Waste Sewer (Site 36) Volume I: Report and Map Plates November 1992

Naval Air Station Pensacola
Pensacola, Florida

Interim Data Report

Southern Division
Naval Facilities
Engineering Command
Charleston, South Carolina
29411-0068

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19 ABSTRACT (Continue on reverse if necessary and identify by block number)

* This Interim Data Report contains the results of Phase I of the Contamination Assessment/Remedial Activities Investigation conducted at the Industrial Waste Sewer (Site 36), located on the Naval Air Station in Pensacola, Florida. This work was conducted as part of the U. S. Navy's Installation Restoration Program. The objective of the Phase I investigation at Site 36 was to identify principal areas and primary contaminants of concern at the site and to provide recommendations for subsequent phases of investigation. This investigation was the first step in the completion of a Remedial Investigation/Feasibility Study for the site. Soil and surficial zone groundwater contamination are present along Site 36. Lead, total recoverable petroleum hydrocarbons (TRPHs), polynuclear aromatic hydrocarbons (PAHs), and phenols are the primary soil contaminants. Lead, chromium, cadmium, TRPHs, volatile organic contaminants PAHs, and phenols are the primary groundwater contaminants. Overall, much of the detected contamination does not appear to reflect active, continuing leakage from the

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(803) 743-0582

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182

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S/N 0102-LF-014-6603

* Indicates item is all or partly site-specific.

19. (cont)

sewer line. This determination does not mean that the sewer line has never leaked and/or is not currently leaking, but rather that the Site 36 Phase I data simply do not support the unequivocable presence of active, continuing leakage at the sampling locations, especially when viewed in the context of the numerous other potential source areas present. Additional assessment activities will be required along the sewer line to identify the actual source(s) and extent of the detected Site 36 soil and groundwater contamination.

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RECORD OF DOCUMENT CHANGES

Revisions to this document were made based on comments received from the U.S. Environmental Protection Agency, Florida Department of Environmental Regulation, Florida Department of Natural Resources, and National Oceanic and Atmospheric Administration. All revisions are in bold and enclosed in brackets to denote changes to the last version of this document.

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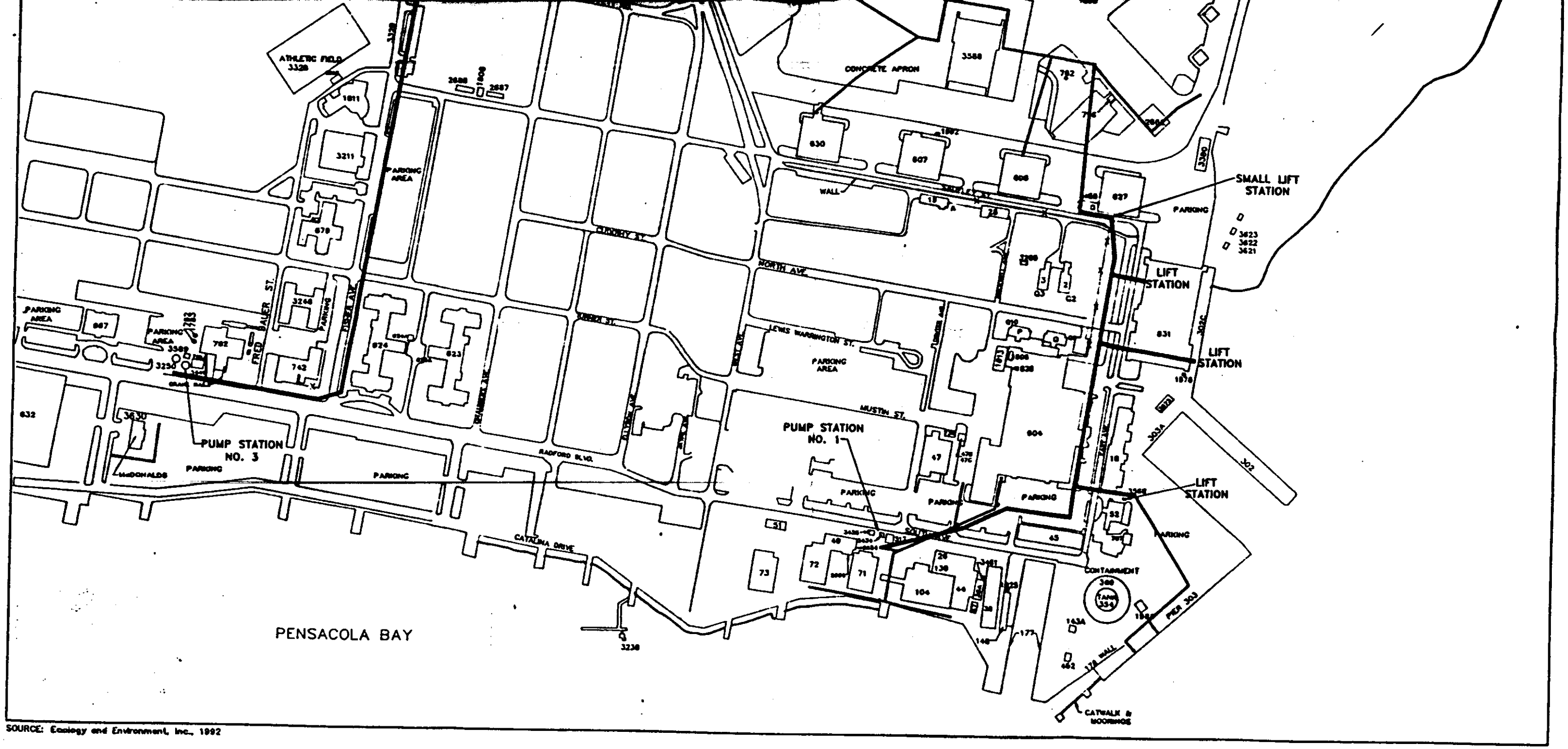
PENSACOLA BAY
BAYOU
N



SOURCE: Ecology and Environment, Inc., 1992

KEY:

3630 Building and Building Number

Force Main

Gravity Line

0 200 400 800

SCALE 1" = 400 FEET

Plate 1 PLAN MAP — NAS PENSACOLA SITE 36

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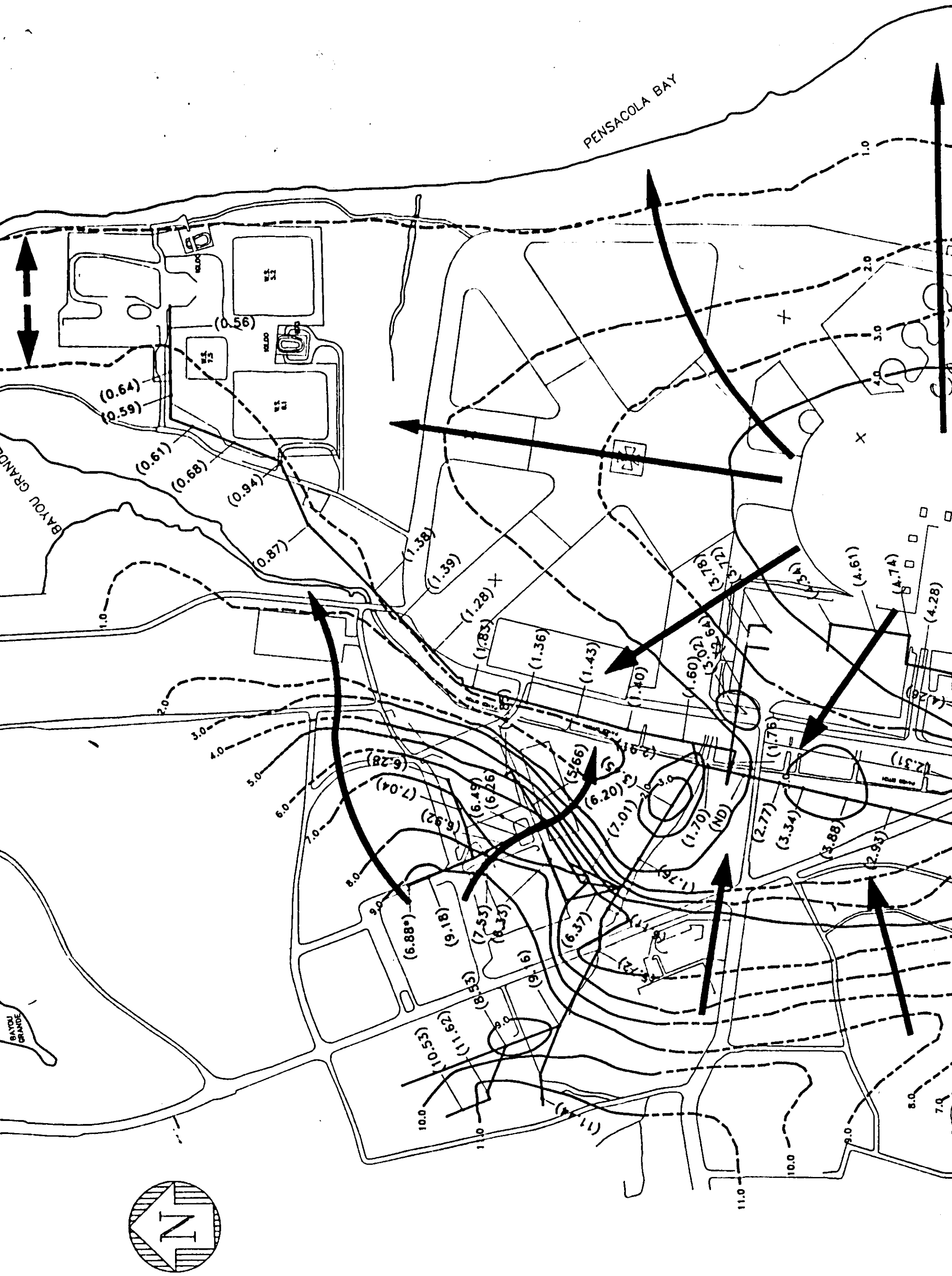
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(3.72)
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SOURCE: Ecology and Environment, Inc., 1992

KEY:

- • 215 Soil-Gas Sampling Location and Numerical Designation
- * Soil-Gas Samples Not Collected at These Locations (052 and 171; see text)
- ** Soil-Gas Sampling Locations Not Located along Sewer Line (214 and 215; see text)

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Plate 2 SOIL-GAS SAMPLING LOCATIONS — NAS PENSACOLA SITE 36

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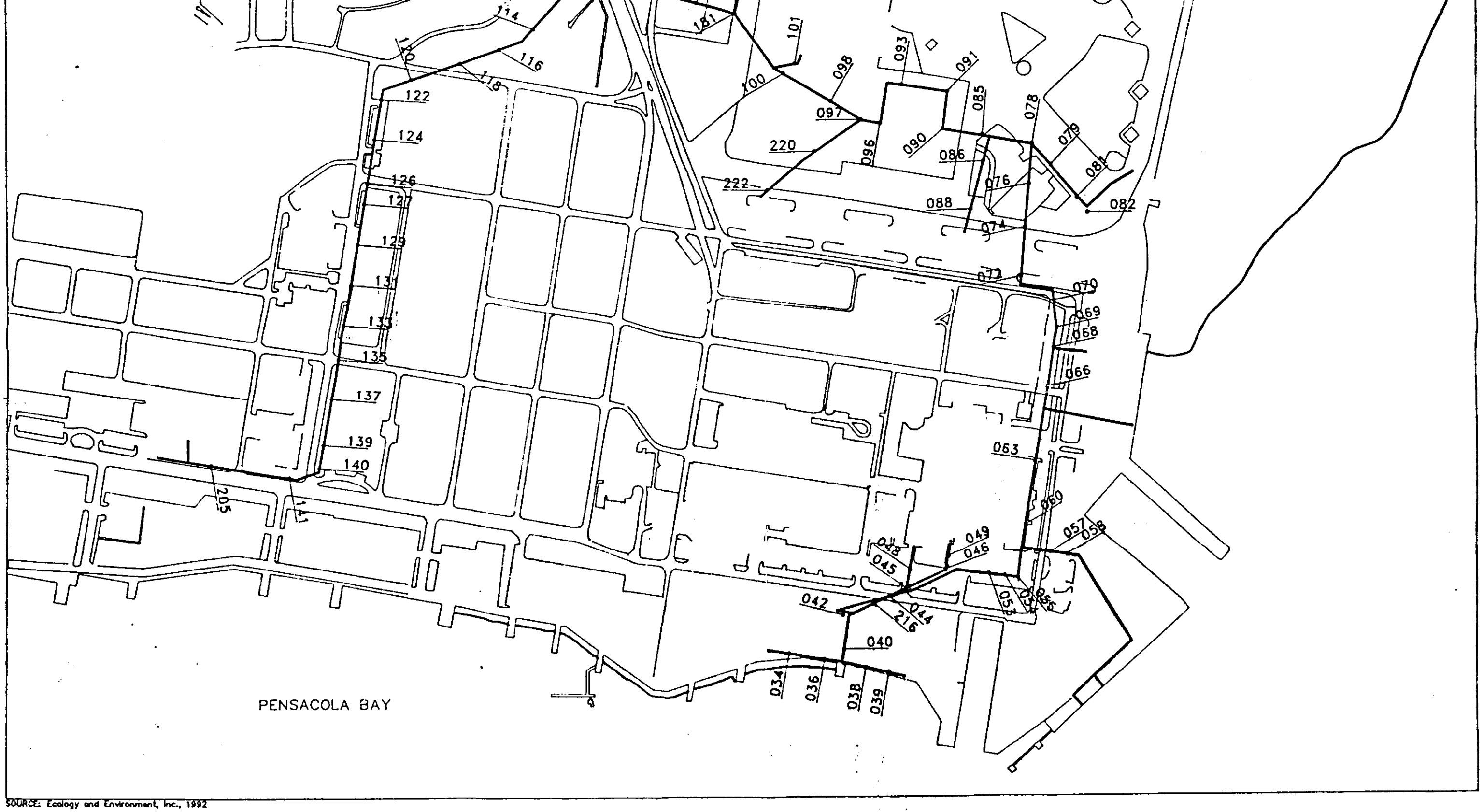

SOURCE: Ecology and Environment, Inc., 1992

0 200 400 800

SCALE 1" = 400 FEET

KEY:

- • 141 Soil Boring/Temporary Monitoring Well Location and Numerical Designation
- * Temporary Monitoring Wells Not Installed at These Locations (016 and 191; see text)

Plate 3 SOIL BORING AND TEMPORARY MONITORING WELL LOCATIONS — NAS PENSACOLA SITE 36

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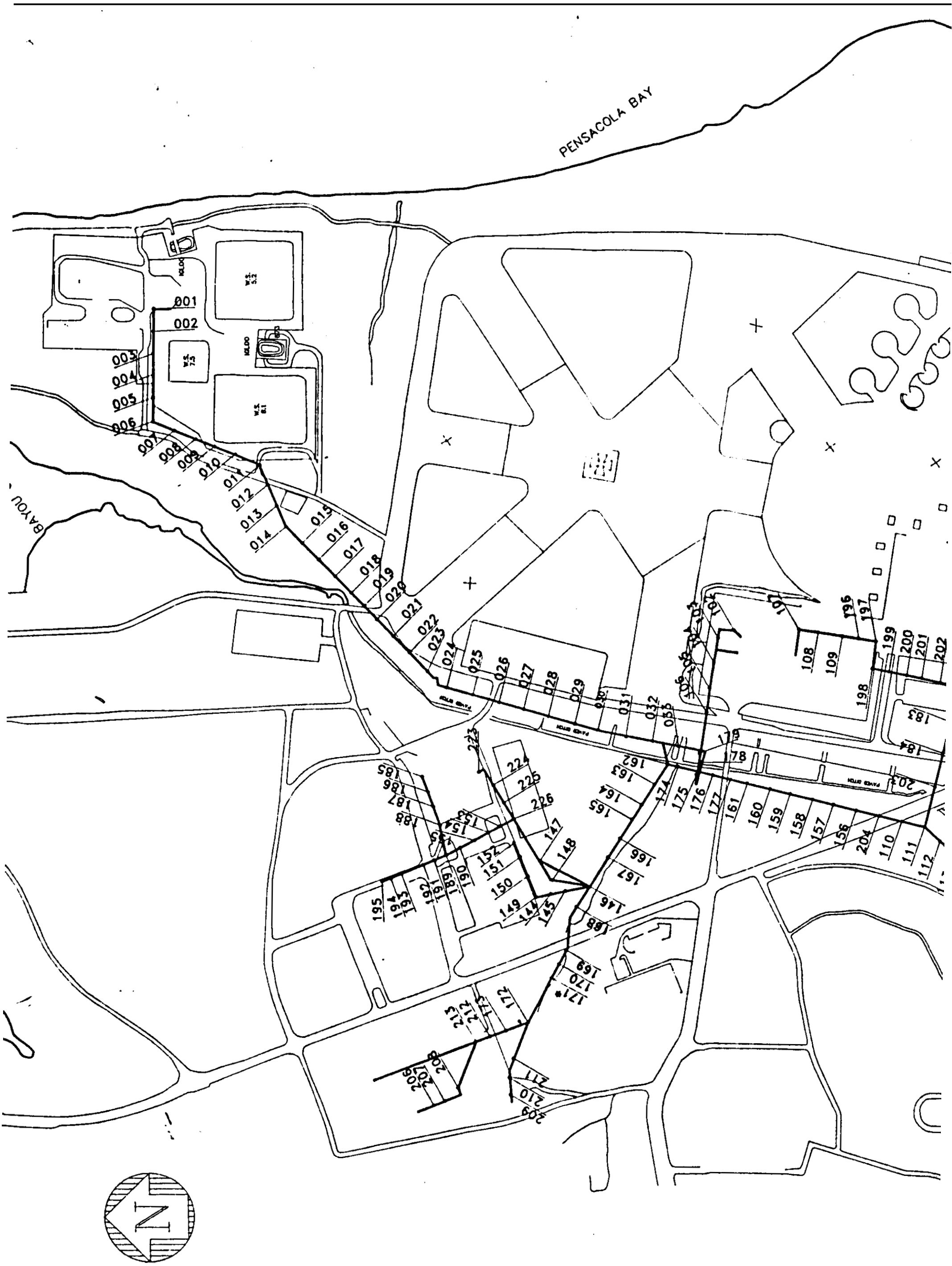
Attachment A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W.S. 8.1
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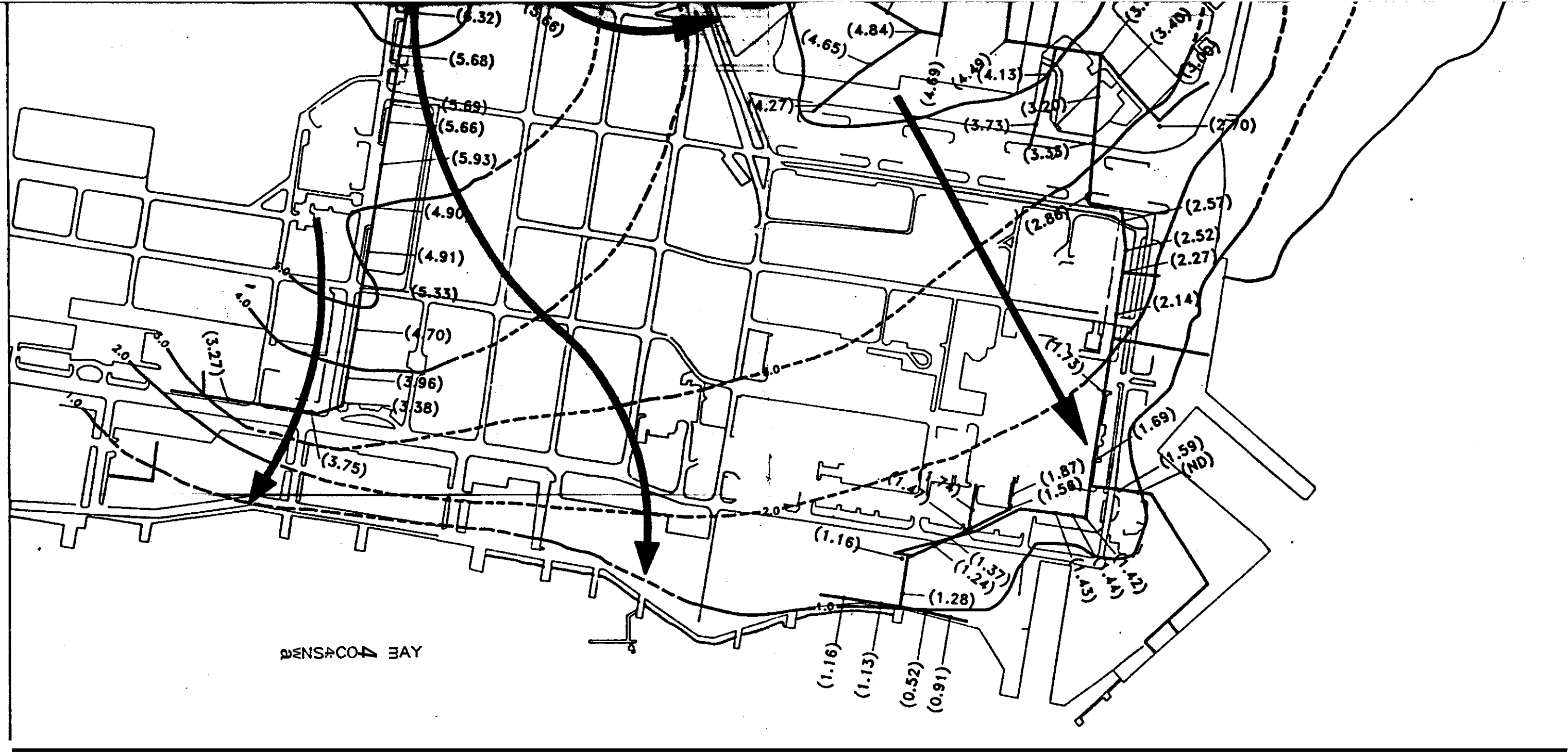

SOURCE: Ecology and Environment, Inc., 1992

0 200 400 600
SCALE 1" = 200 FEET

KEY:

- • (4.70) Temporary Monitoring Well Location and Water Level Elevation (feet above MSL)
- —1.0— Water Level Elevation Isopleth (feet above MSL; dashed where approximate; Isopleth Interval = 1.0)
- ➡ Groundwater Flow Direction
- • Data Point Not Honored (see text)
- (ND) No Data

Plate 4 SURFICIAL ZONE WATER LEVEL ELEVATIONS FOR TEMPORARY MONITORING WELLS (WATER LEVELS MEASURED JULY 9 – AUGUST 26, 1991)
NAS PENSACOLA SITE 36

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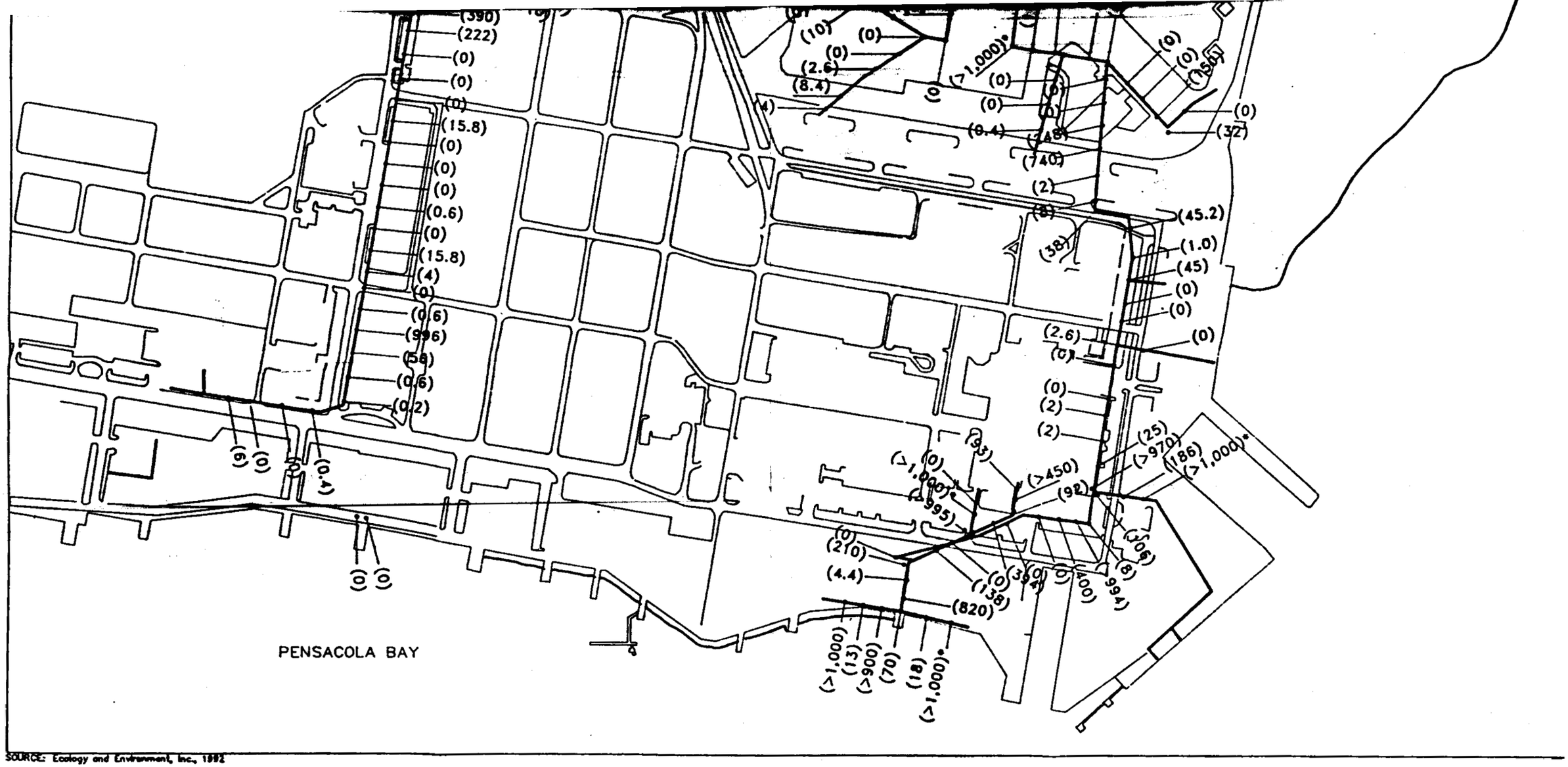
Attachment **A**

PENSACOLA BAY
TARMAC
CHEVALIER FIELD
STORAGE YARD
PARKING LOT
PUMP STATION NO. 2
LIFT STATION
LIFT STATION
BAYOU GRANDE
TAYLOR RD.
FARMAR RD.
GUARDIA ROAD
CLAY RD.
N



SOURCE: Ecology and Environment, Inc., 1992

KEY:

- • (56) Soil-Gas Sampling Location and Methane-Corrected OVA Reading
- • Unfiltered (Total Organic Vapor) and Filtered (Methane) Readings Both >1,000 ppm
- (NS) Not Sampled (see text)

0 200 400 800

SCALE 1" = 400 FEET

Plate 5 SOIL-GAS SURVEY READINGS — NAS PENSACOLA SITE 36

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Attachment A

PENSACOLA BAY
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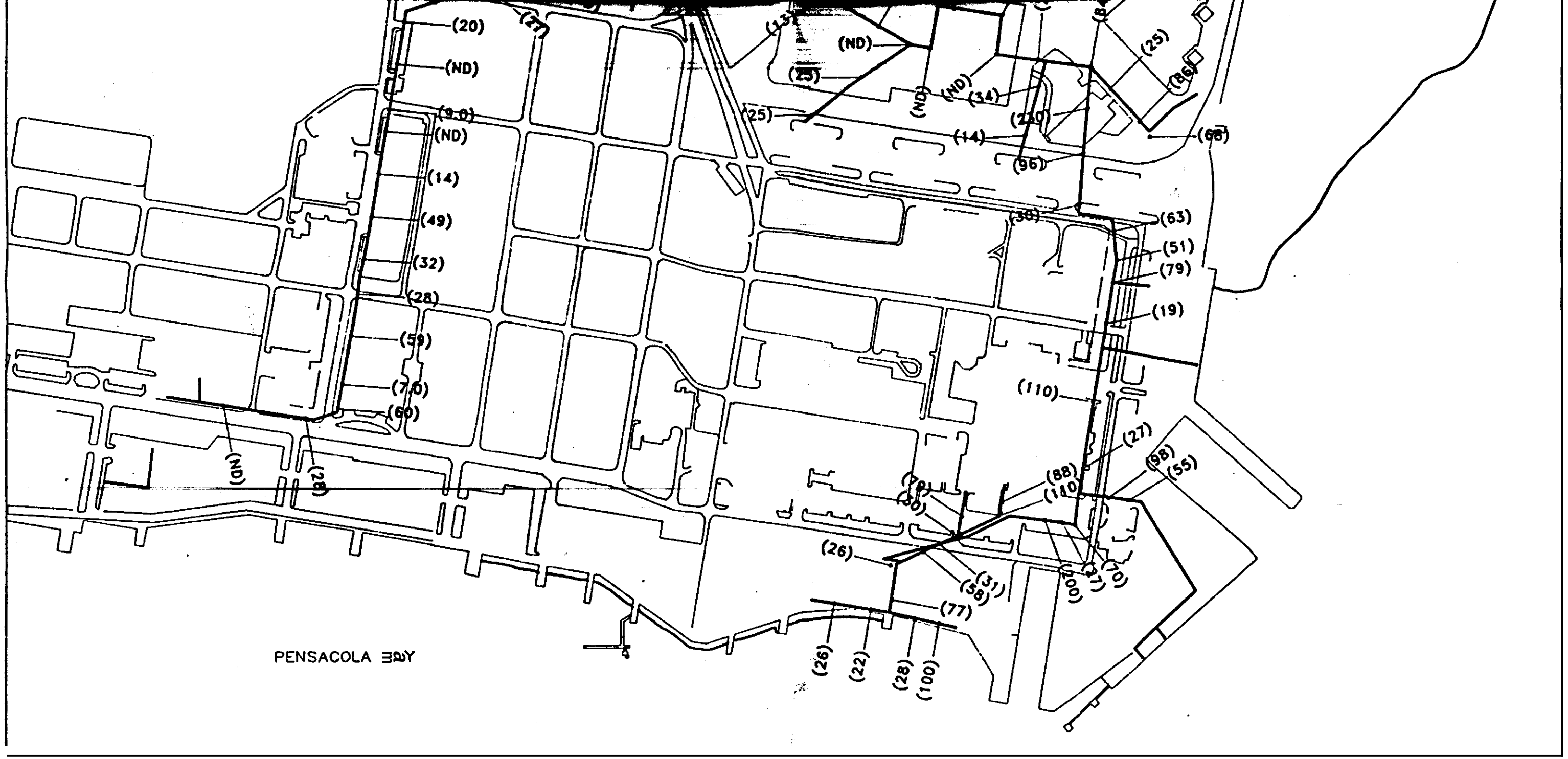

0 200 400 800
SCALE 1" = 400 FEET

KEY:

- (32) Soil Boring Location and Lead Concentration (mg/kg)
  (ND) Not Detected

Plate 6 LEAD CONCENTRATIONS IN A-INTERVAL SOIL SAMPLES NAS PENSACOLA SITE 36

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ON SUBSEQUENT IMAGES

Attachment A

PENSACOLA BAY
BAYOU GRANDE
BAYOU GRANDE
N

PENSACOLA BAY

SOURCE: Ecology and Environment, Inc., 1992

0 200 400 800
SCALE 1" = 400 FEET

KEY:

- (100) Soil Boring Location and Lead Concentration (mg/kg)
- (ND) Not Detected
- (NS) Not Sampled

Plate 7 LEAD CONCENTRATIONS IN 3-INTERVAL SOIL SAMPLES — NAS PENSACOLA SITE 36

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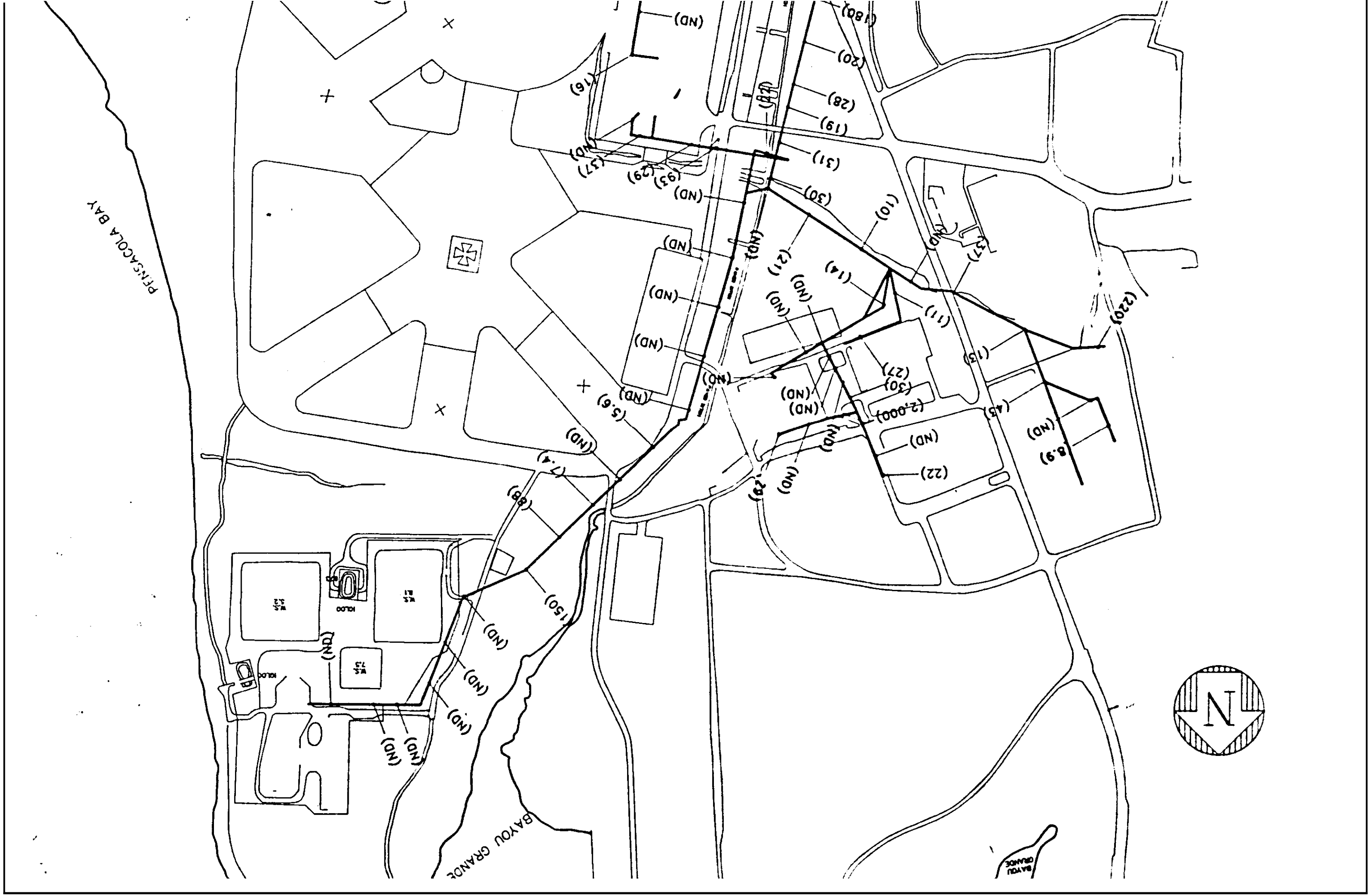
Attachment A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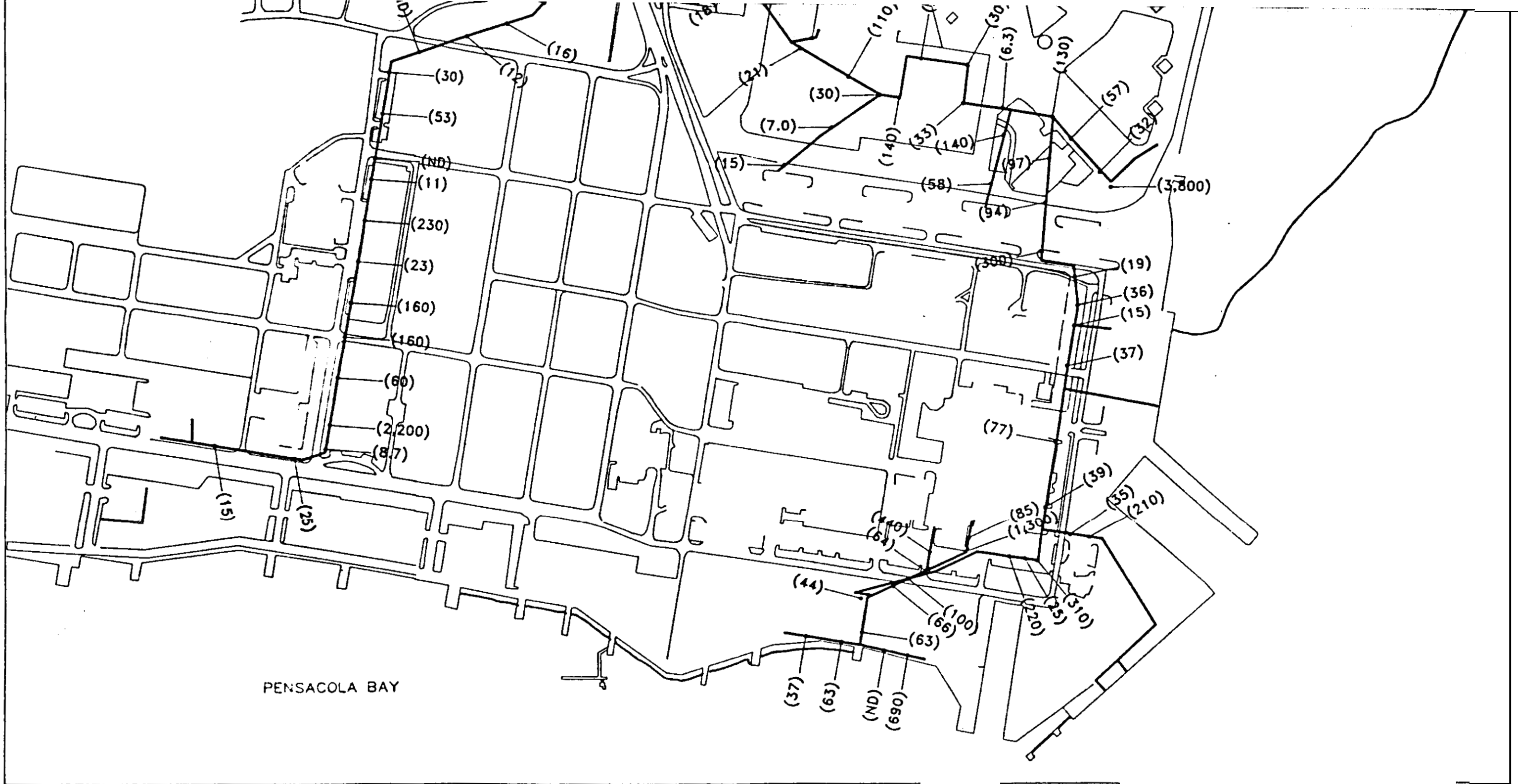
(37)



SOURCE: Ecology and Environment, Inc., 1992

0 200 400 800
SCALE 1" = 400 FEET

KEY:

- (160) Soil Boring Location and TRPH Concentration (mg/kg)
  (ND) Not Detected

Plate 8 TRPH CONCENTRATIONS IN A-INTERVAL SOIL SAMPLES NAS PENSACOLA SITE 36

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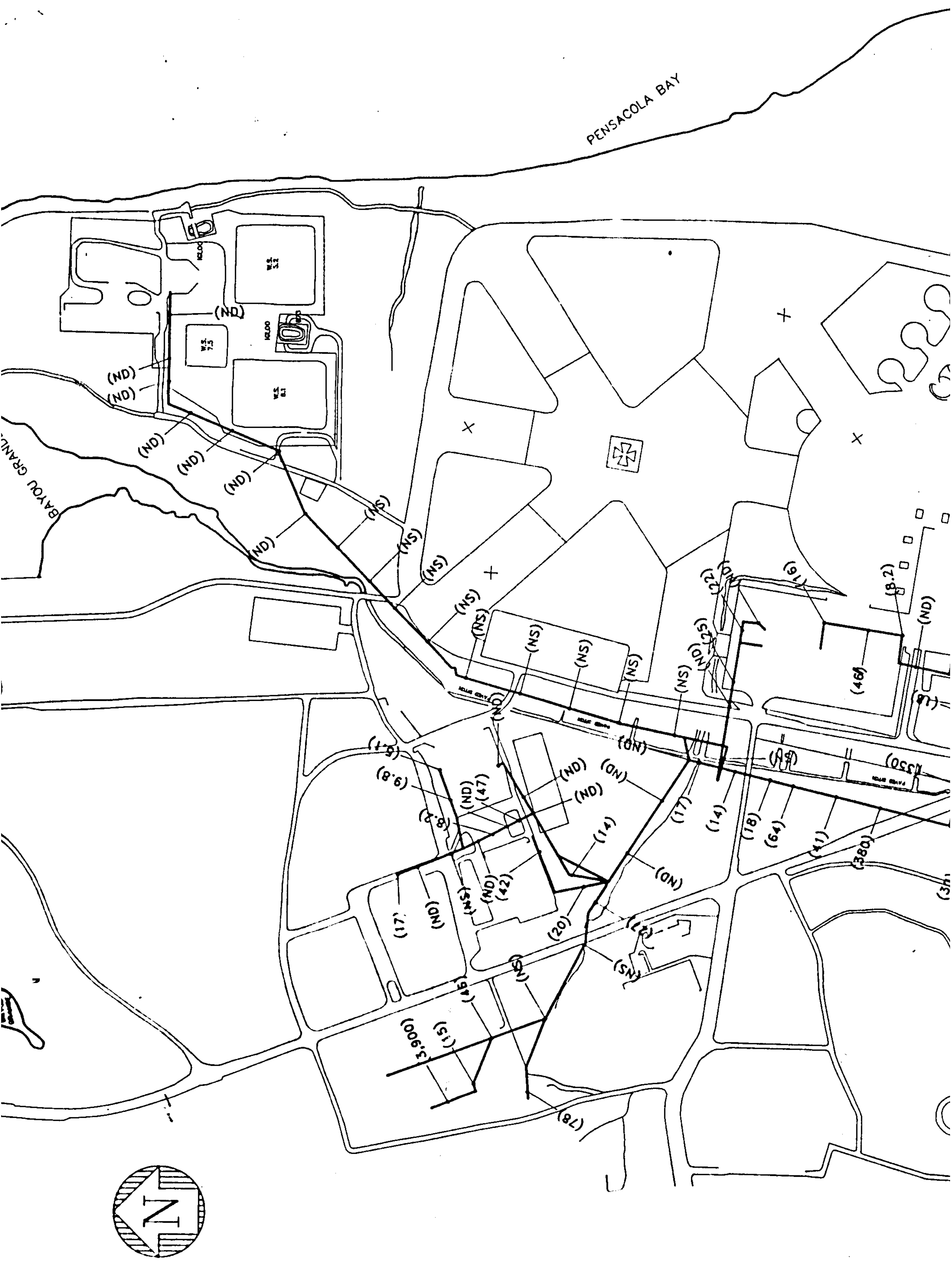
ON SUBSEQUENT IMAGES

Attachment A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(20)
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(41)
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(78)
(2.2)
(2.5)
(16)
(45)
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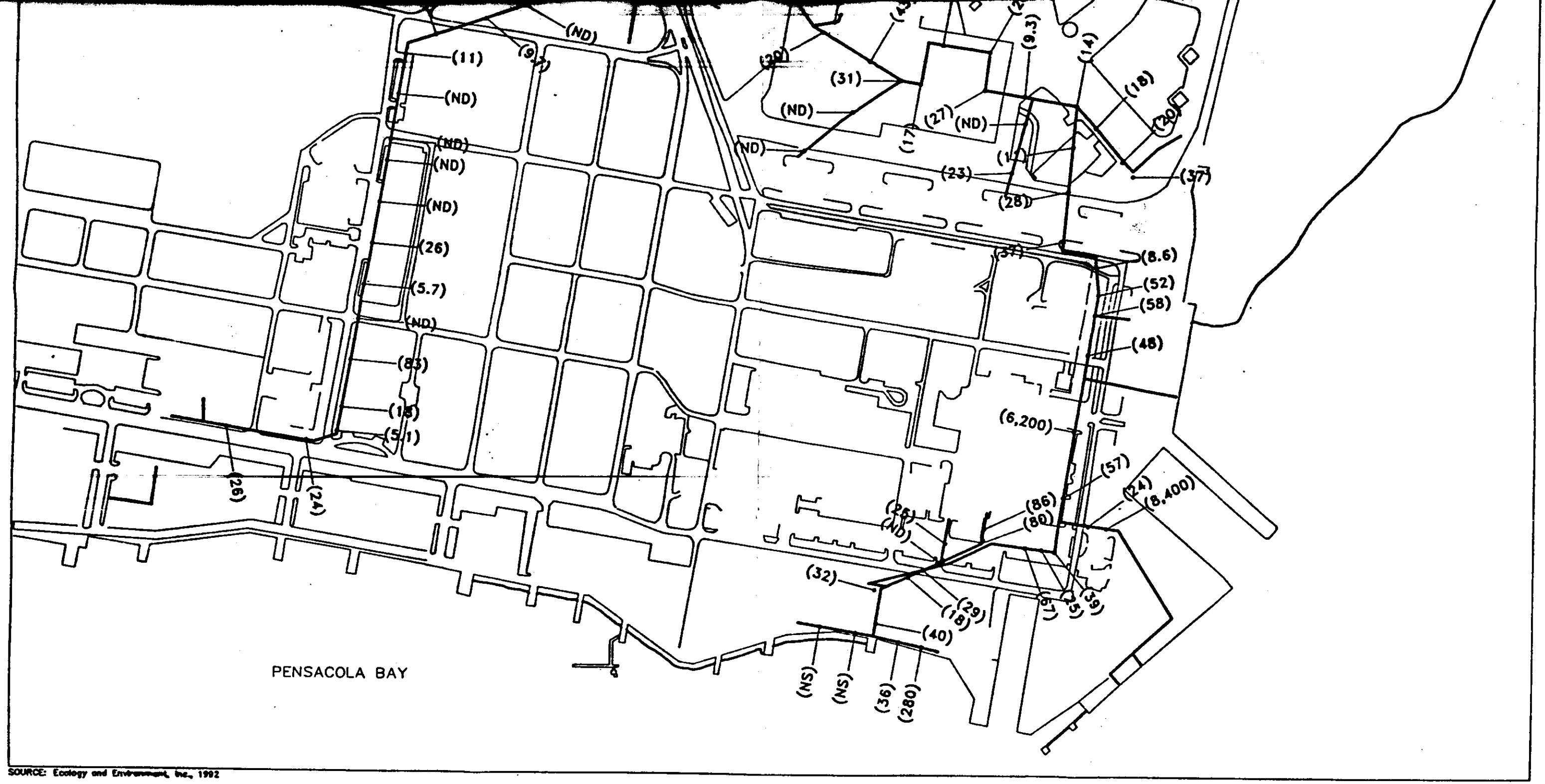

SOURCE: Ecology and Environment, Inc., 1992

0 200 400 800
SCALE 1" = 400 FEET

KEY:

- (26) Soil Boring Location and TRPH Concentration (mg/kg)
- (ND) Not Detected
- (NS) Not Sampled

Plate 9 TRPH CONCENTRATIONS IN B-INTERVAL SOIL SAMPLES NAS PENSACOLA S T≤ 36

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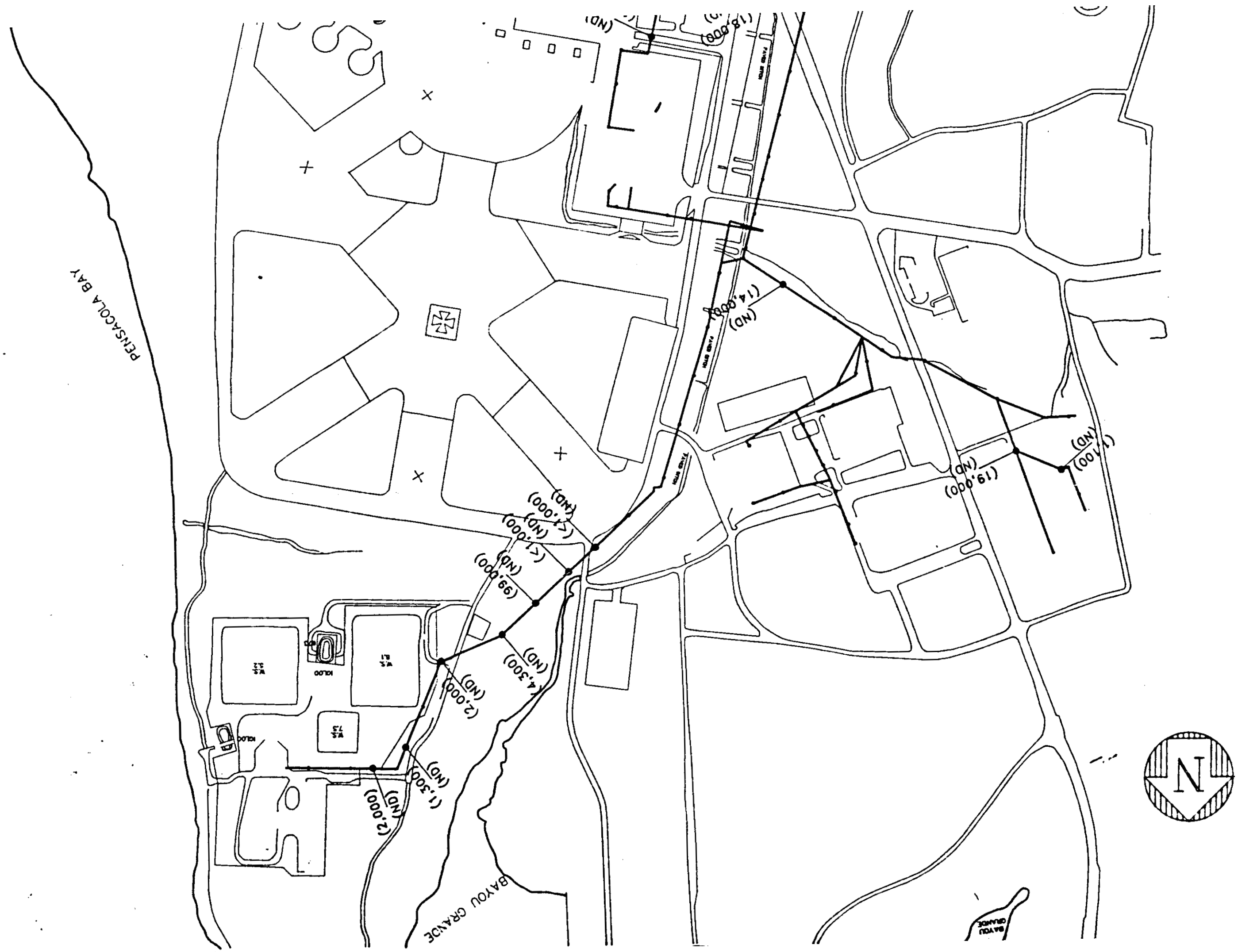
PENSACOLA BAY
BAYOU GRANDE
BAYOU GRANDE
MAIN DRIVE
MAIN DRIVE
MAIN DRIVE
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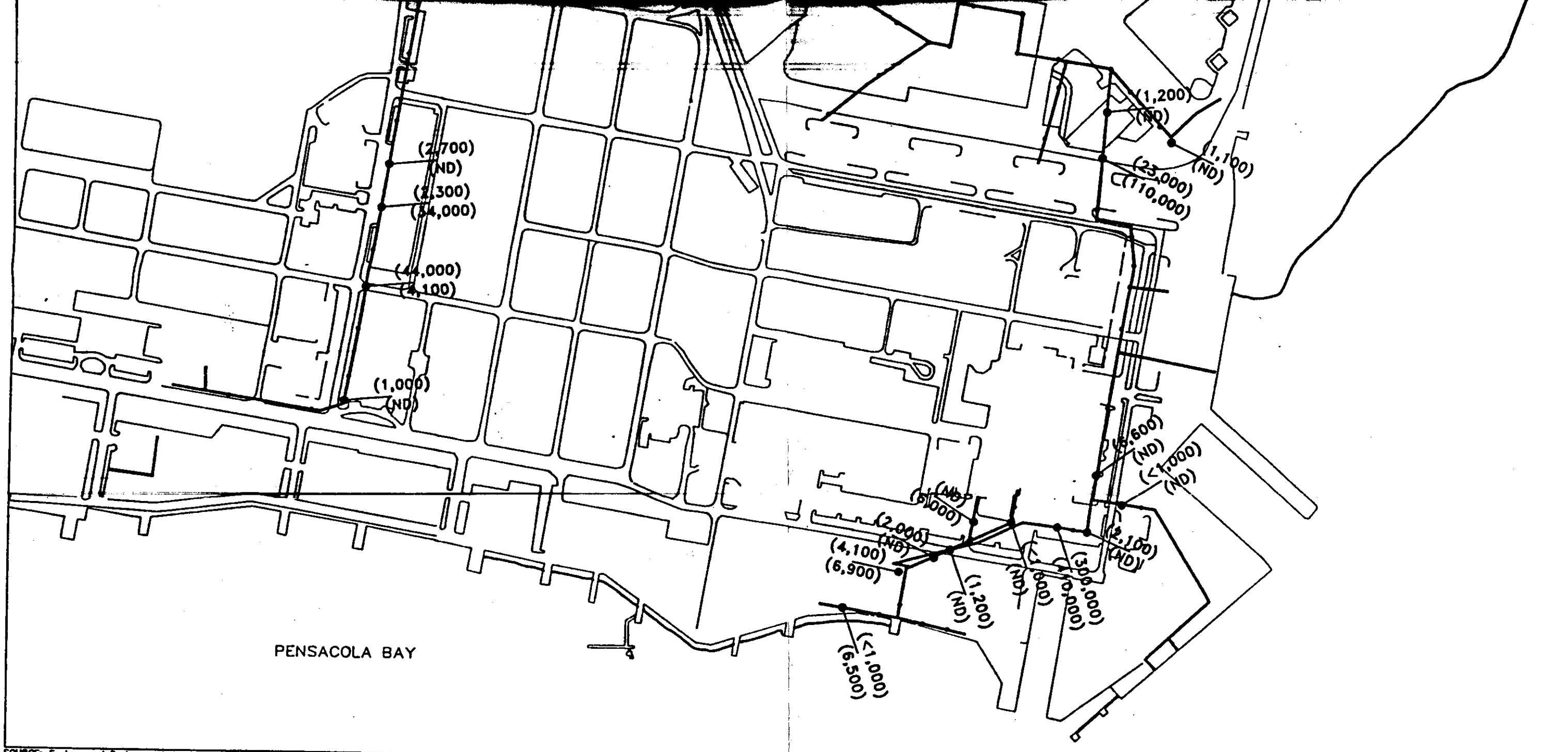
(ND)
(14,000)
(ND)
(19,000)
(ND)
(5,000)
(ND)
(5,000)
(ND)
(5,000)
(ND)
(99,000)
(ND)
(4,300)
(ND)
(2,000)
(ND)
(1,300)
(ND)
(2,000)
(ND)
KLOO
KLOO
WS 13
WS 61
WS 73
N



SOURCE: Ecology and Environment, Inc., 1992

KEY:

- • Soil Boring Location
- ● Soil Boring Location where PAHs and/or Phenols Detected
- (2,300) PAH Concentration (µg/kg)
- (34,000) Phenol Concentration (µg/kg)
- (ND) Not Detected

0 200 400 800
SCALE 1" = 400 FEET

Plate 10 A-INTERVAL SOIL SAMPLES WHERE PAHS AND/OR PHENOLS DETECTED AND CORRESPONDING CONCENTRATIONS — NAS PENSACOLA SITE 36

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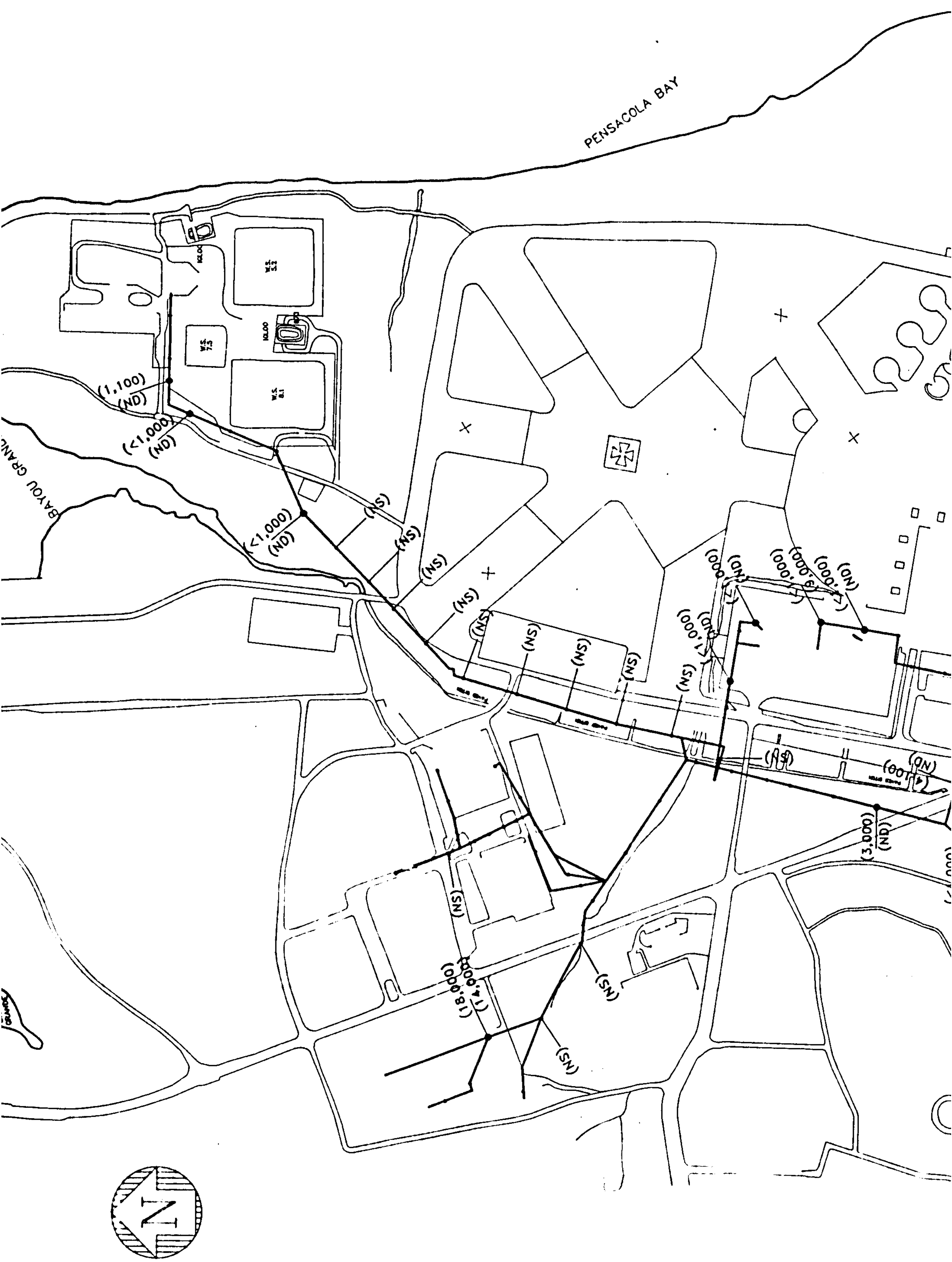
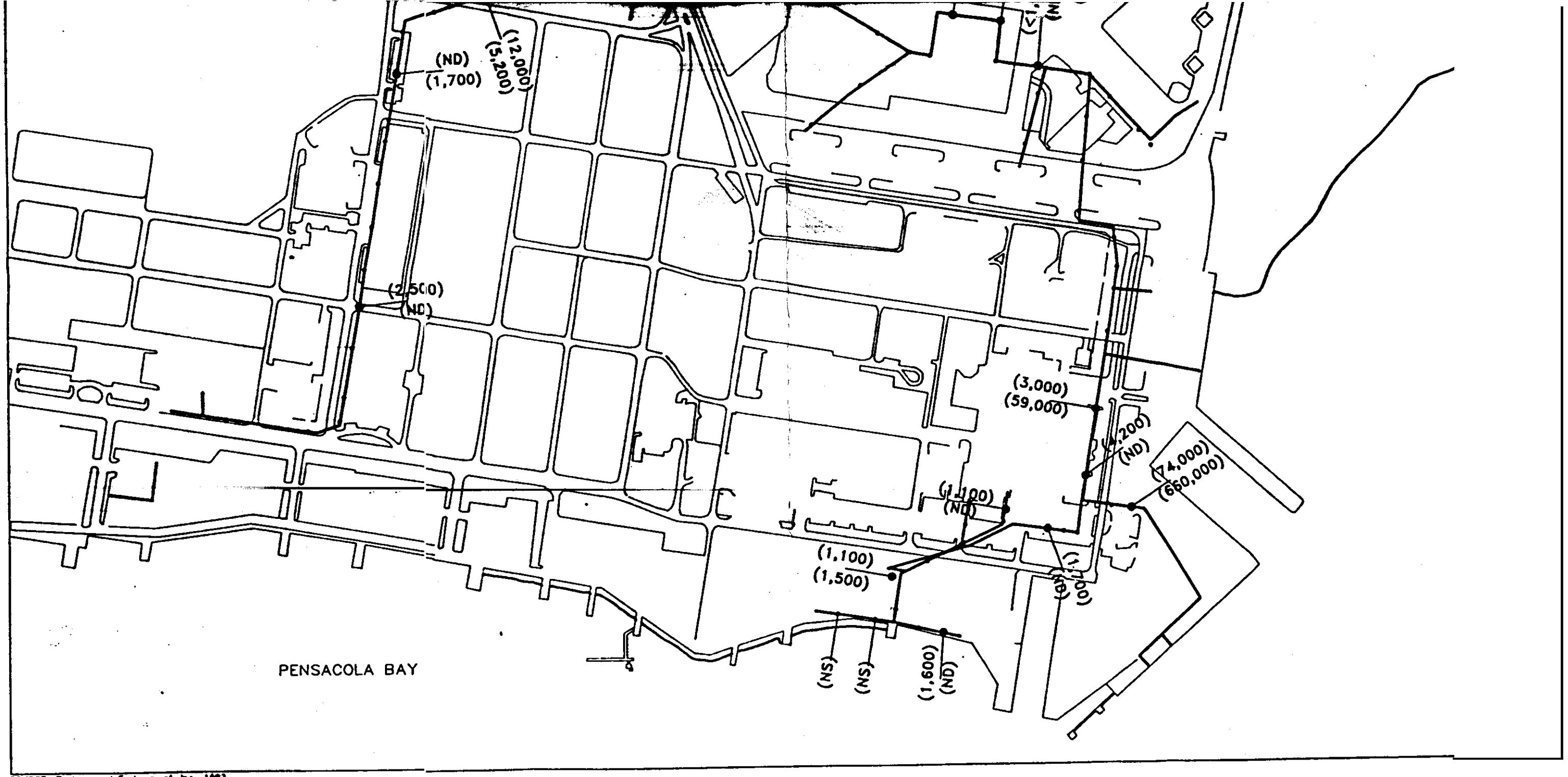

PENSACOLA BAY
BAYOU GRANDE
W.S. 5.2
W.S. 7.5
W.S. 8.1
IGLOO
(1,100)
(ND)
(<1,000)
(ND)
(<1,000)
(ND)
(NS)
(18,000)
(14,000)
(3,000)
(ND)
(4,100)
(ND)
(1,000)



SOURCE: Ecology and Environment, Inc., 1982

KEY:

- • Soil Boring Location
- ● Soil Boring Location where PAHs and/or Phenols Detected
- (1,100) PAH Concentration (µg/kg)
- (1,500) Phenol Concentration (µg/kg)
- (ND) Not Detected
- (NS) Not Sampled

0 200 400 800
SCALE 1" = 400 FEET

Plate 11 B-INTERVAL SOIL SAMPLES WHERE PAHS AND/OR PHENOLS DETECTED AND CORRESPONDING CONCENTRATIONS — NAS PENSACOLA SITE 36

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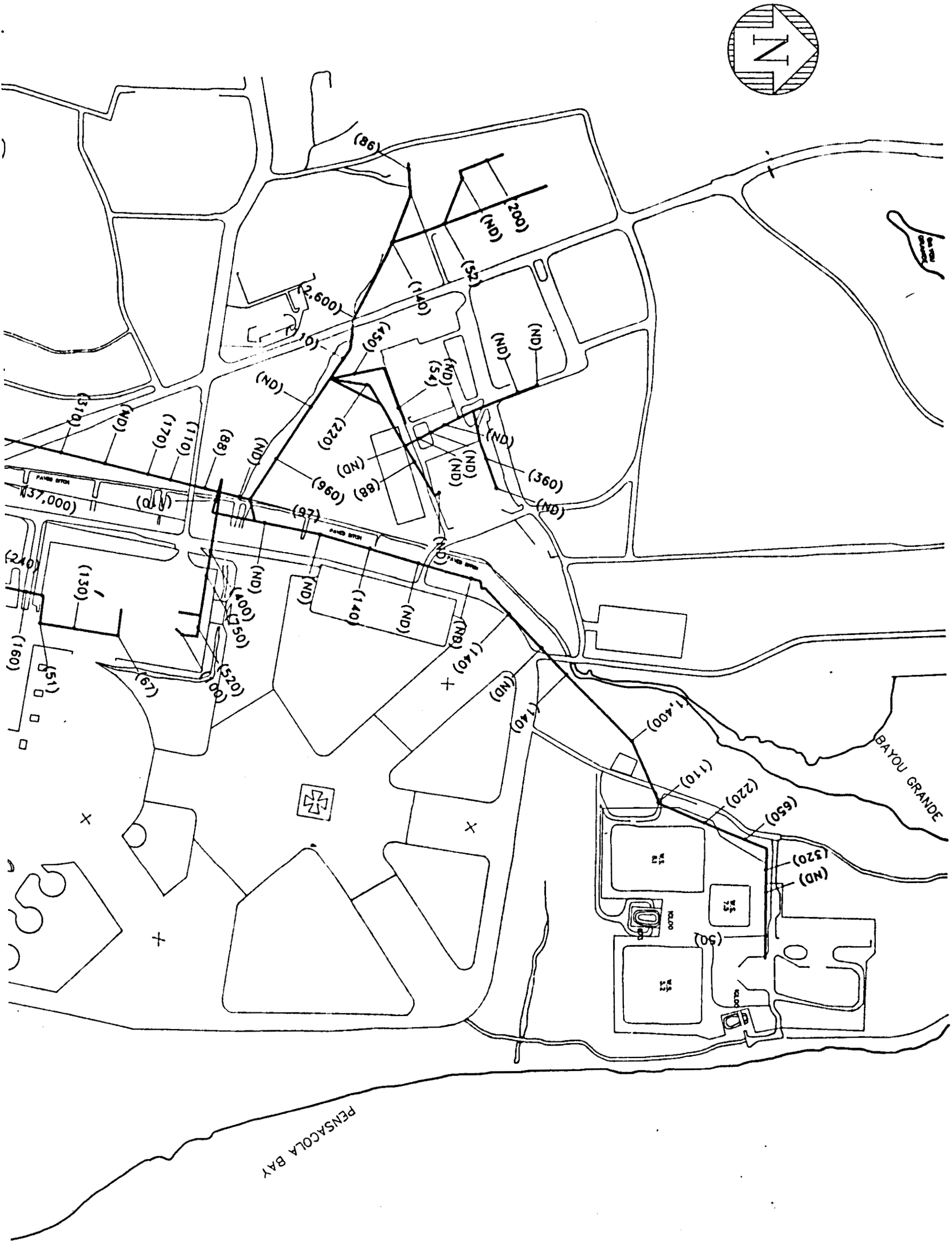
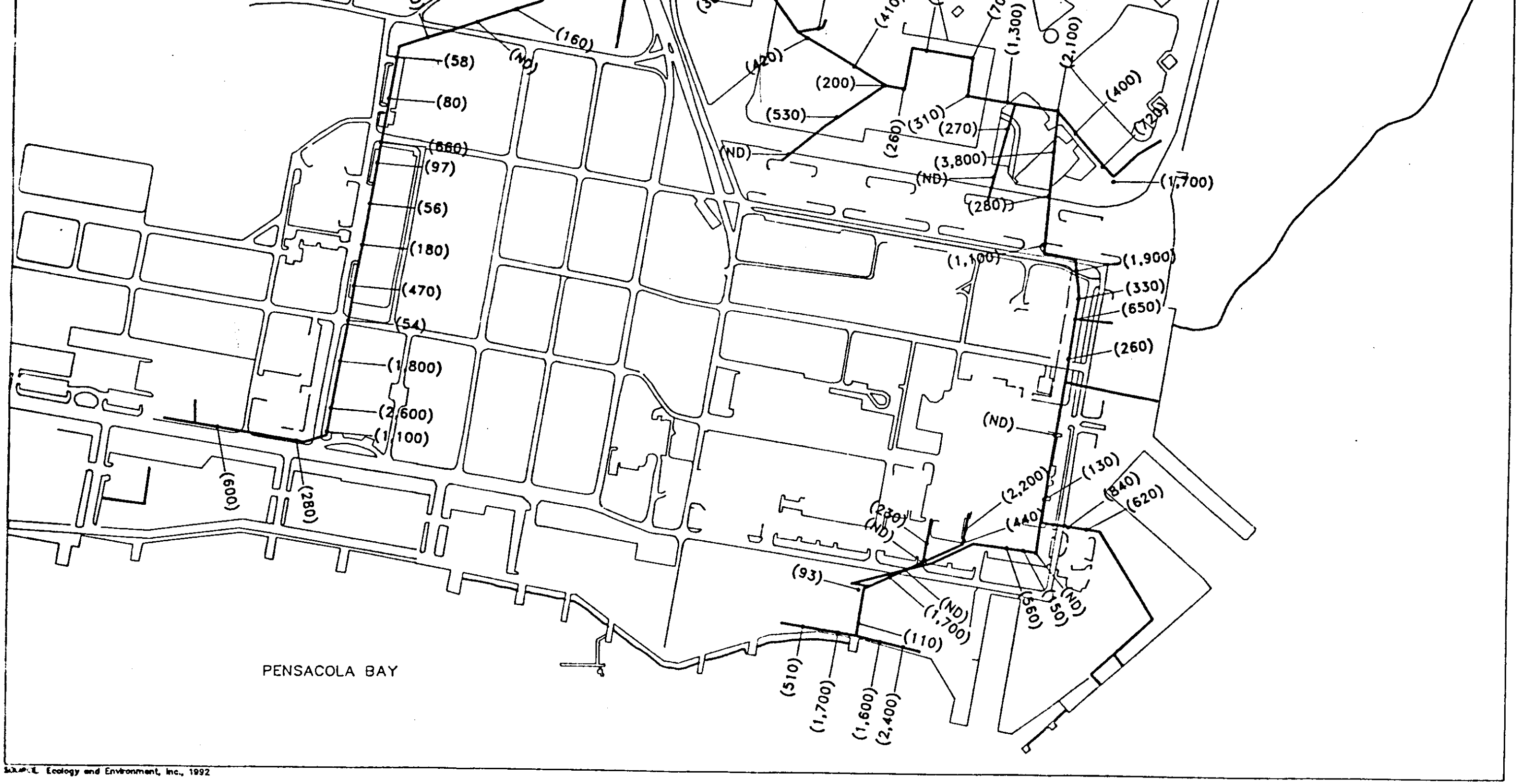
TO FOLLOW

ON SUBSEQUENT IMAGES

Attachment A


N
BAYOU GRANDE
PENSACOLA BAY
(86)
(200)
(ND)
(52)
(140)
(2,600)
(450)
(ND)
(54)
(ND)
(ND)
(ND)
(220)
(ND)
(ND)
(ND)
(ND)
(360)
(ND)
(88)
(960)
(97)
(37,000)
(ND)
(ND)
(ND)
(ND)
(ND)
(ND)
(140)
(140)
(140)
(ND)
(1,400)
(110)
(220)
(650)
(320)
(ND)
(50)
(510)
(ND)
(170)
(110)
(88)
(ND)
(240)
(130)
(160)
(51)
(67)
(400)
(750)
(520)
(00)



Ecology and Environment, Inc., 1992

0 200 400 800
SCALE 1" = 400 FEET

KEY:

- (470) Temporary Monitoring Well Location and Lead Concentration (µg/L)

(ND) Not Detected

Plate 12 LEAD CONCENTRATIONS IN GROUNDWATER SAMPLES — NAS PENSACOLA SITE 36

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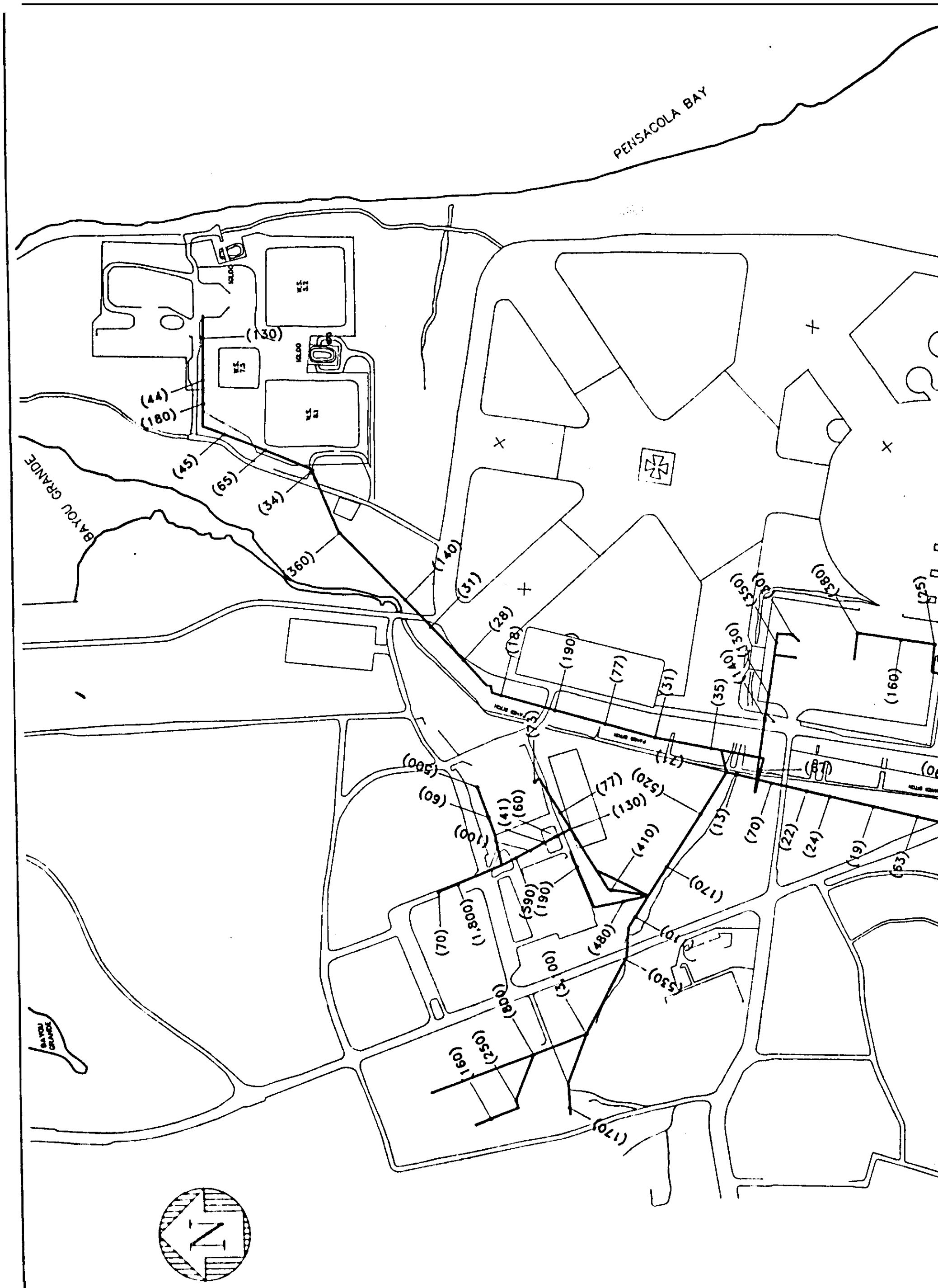
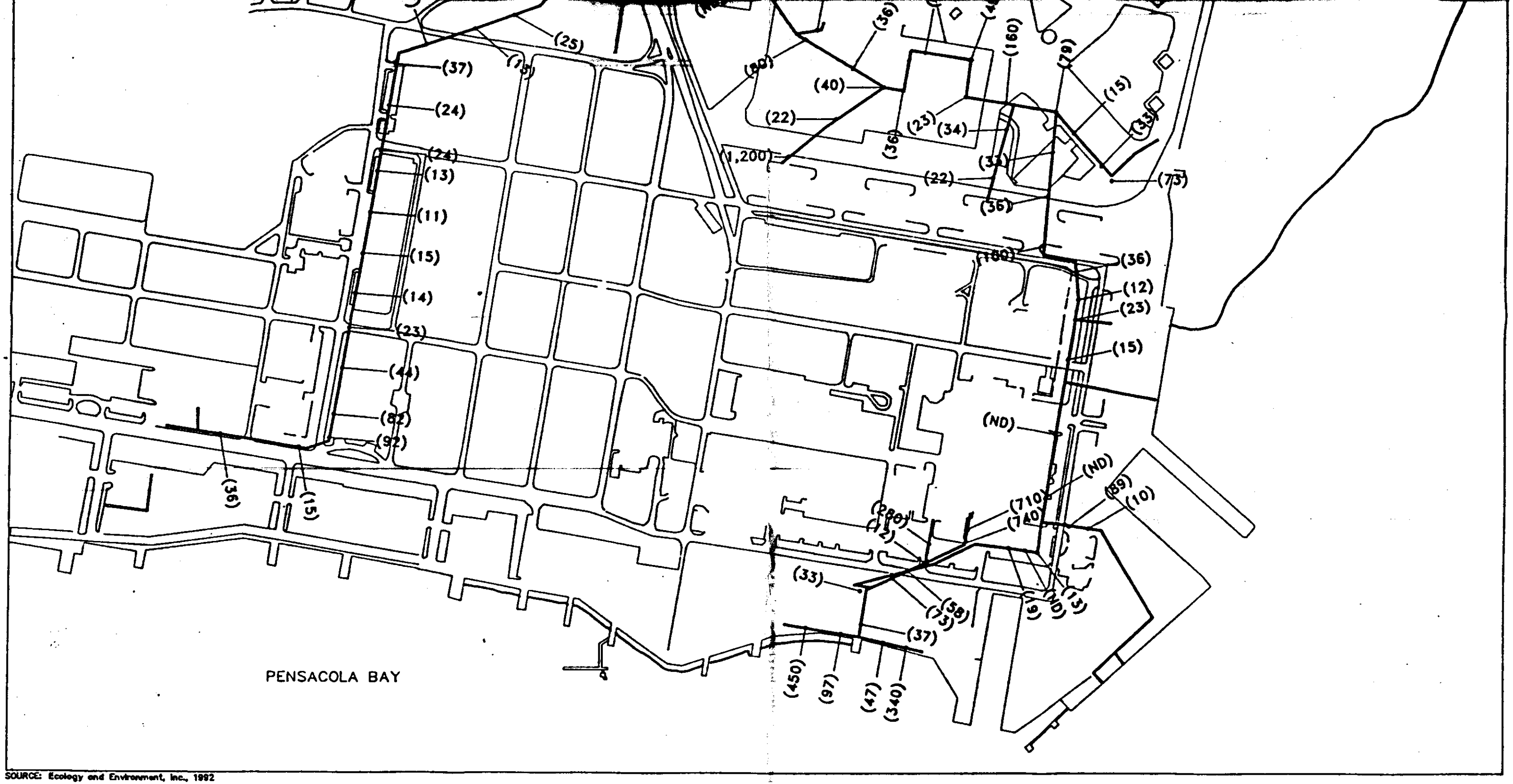
ON SUBSEQUENT IMAGES

Attachment A


PENSACOLA BAY
BAYOU GRANDE
BAYOU GRANDE
(130)
(44)
(180)
(45)
(65)
(34)
(360)
(140)
(31)
(28)
(18)
(190)
(77)
(31)
(35)
(140)
(130)
(350)
(580)
(25)
(160)
(75)
(71)
(87)
(500)
(60)
(41)
(60)
(100)
(77)
(130)
(520)
(410)
(13)
(70)
(22)
(24)
(19)
(63)
(170)
(590)
(190)
(70)
(1,800)
(480)
(530)
(800)
(250)
(160)
(170)
N



SOURCE: Ecology and Environment, Inc., 1992

0 200 800
SCALE 1" = 400 FEET

KEY:

- (44) Temporary Monitoring Well Location and Chromium Concentration (µg/L)
- (ND) Not Detected

Plate 13 CHROMIUM CONCENTRATIONS IN GROUNDWATER SAMPLES — NAS PENSACOLA SITE 36

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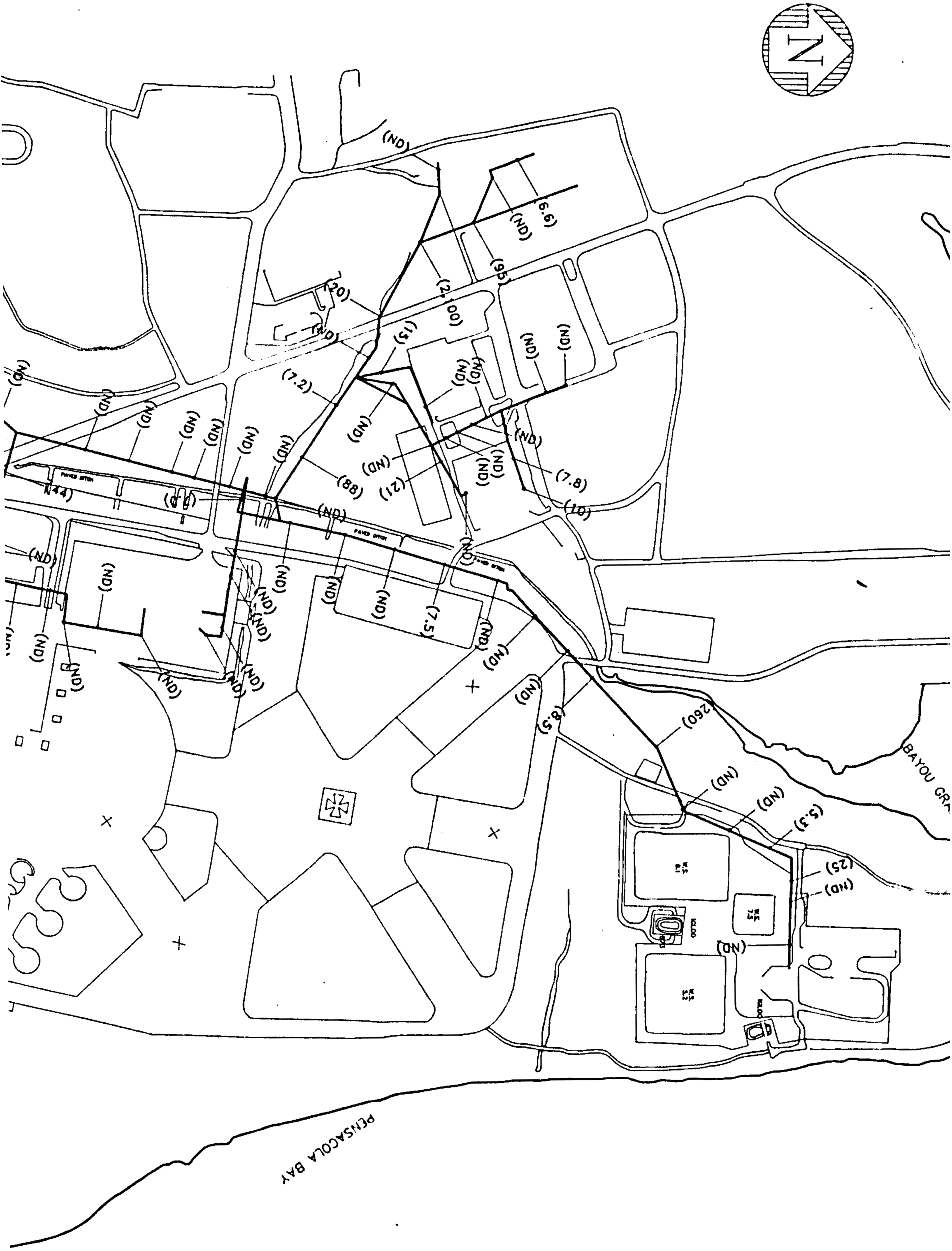
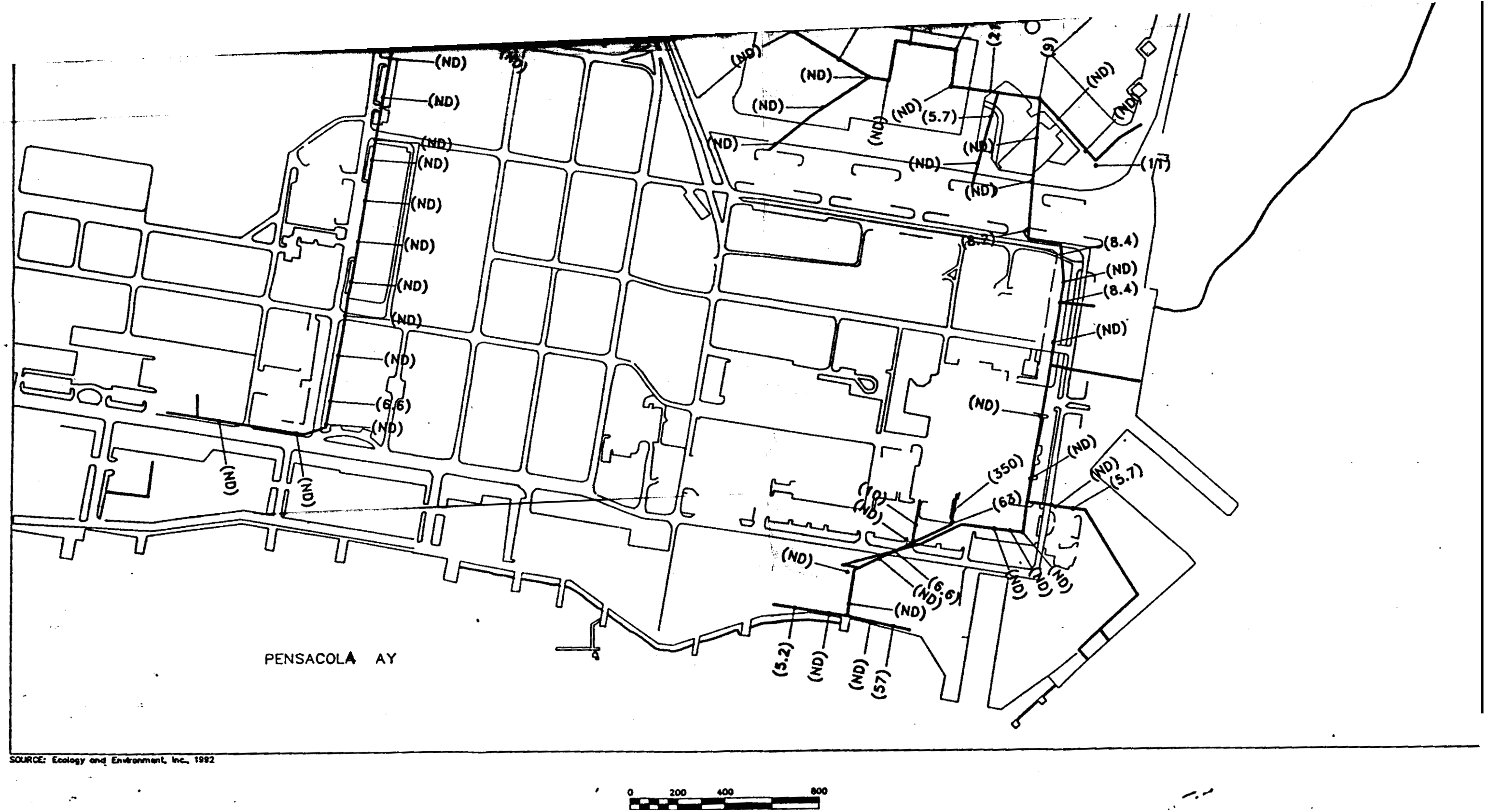
ON SUBSEQUENT IMAGES

Attachment A



PENSACOLA BAY
PAVED DITCH
(260)
(88)
(ND)



SOURCE: Ecology and Environment, Inc., 1992

Plate 14 CADMIUM CONCENTRATIONS IN GROUNDWATER SAMPLES NAS PENSACOLA SITE 36

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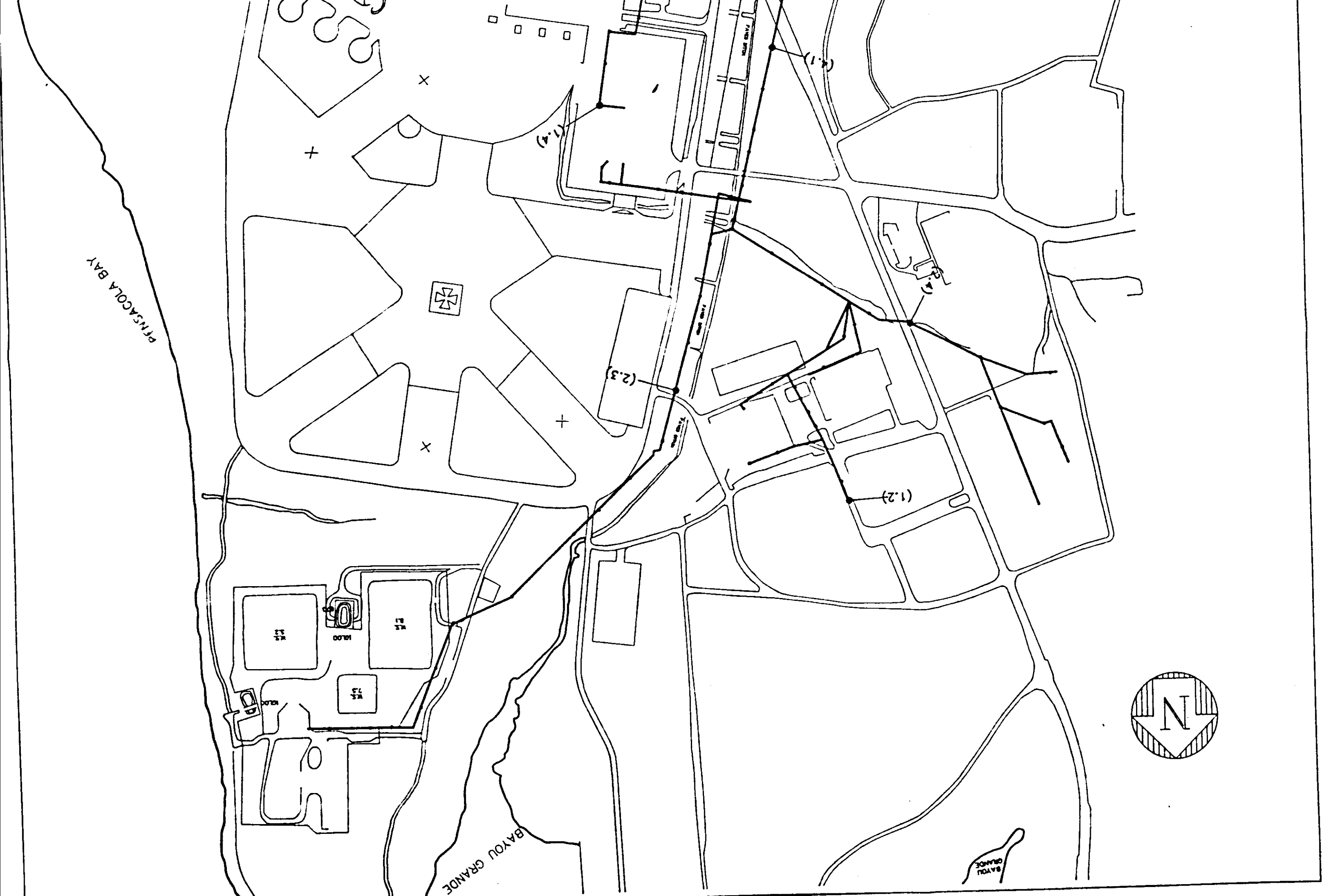
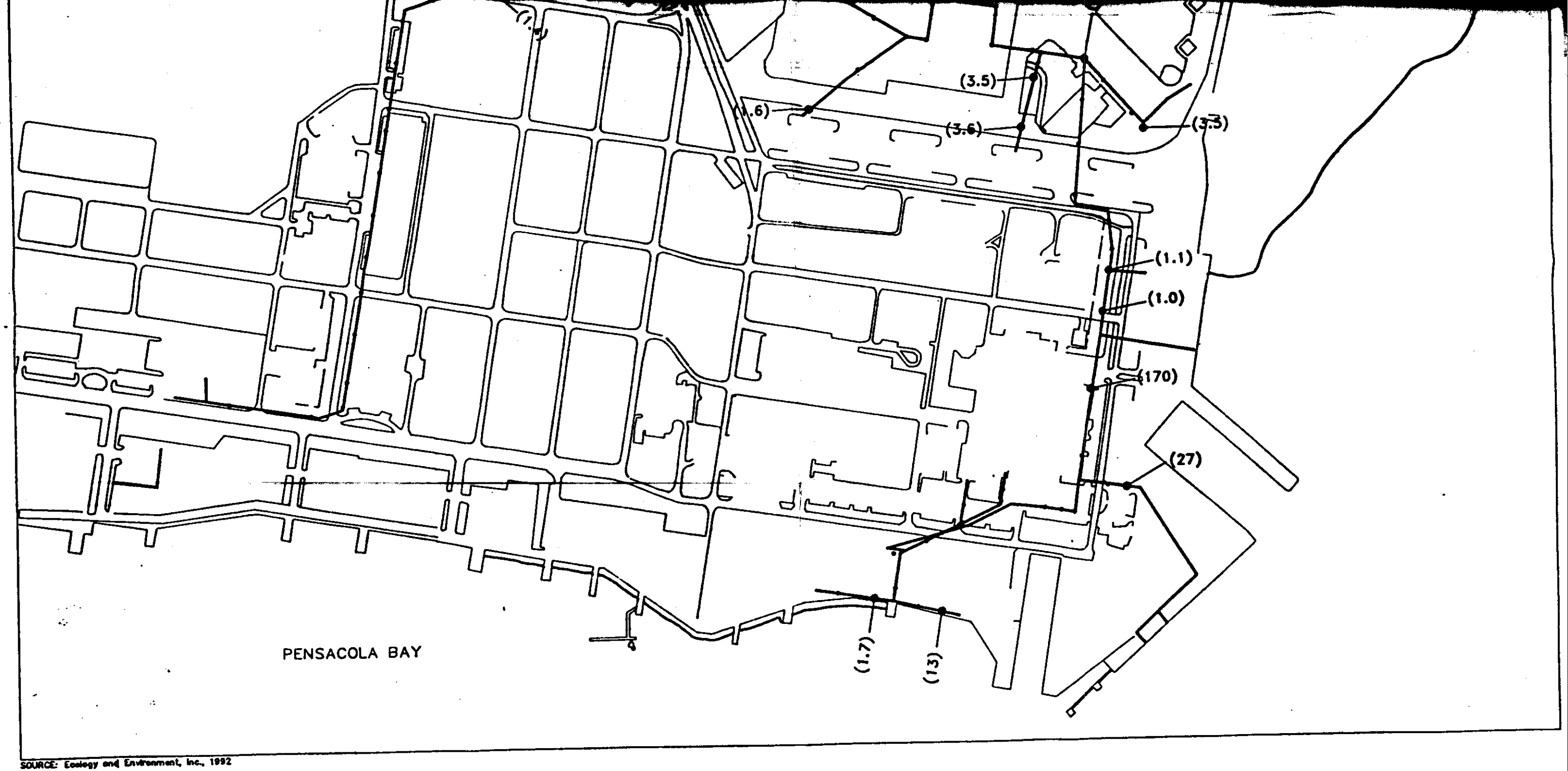
TO FOLLOW

ON SUBSEQUENT IMAGES

Attachment A


PENSACOLA BAY
BAYOU GRANDE
BAYOU GRANDE
(1.1)
(1.2)
(1.3)
(1.4)
(2.3)
(2.4)
N



SOURCE: Ecology and Environment, Inc., 1992

0 200 400 800
SCALE 1" = 400 FEET

KEY:

- • Temporary Monitoring Well Location
- ● (·.·) Temporary Monitoring Well Location where TRPHs Detected and TRPHs Concentration (mg/L)
- (·.·) Not Detected

Plate 15 GROUNDWATER SAMPLES WHERE TRPHS DETECTED AND CORRESPONDING CONCENTRATIONS — NAS PENSACOLA SITE 36

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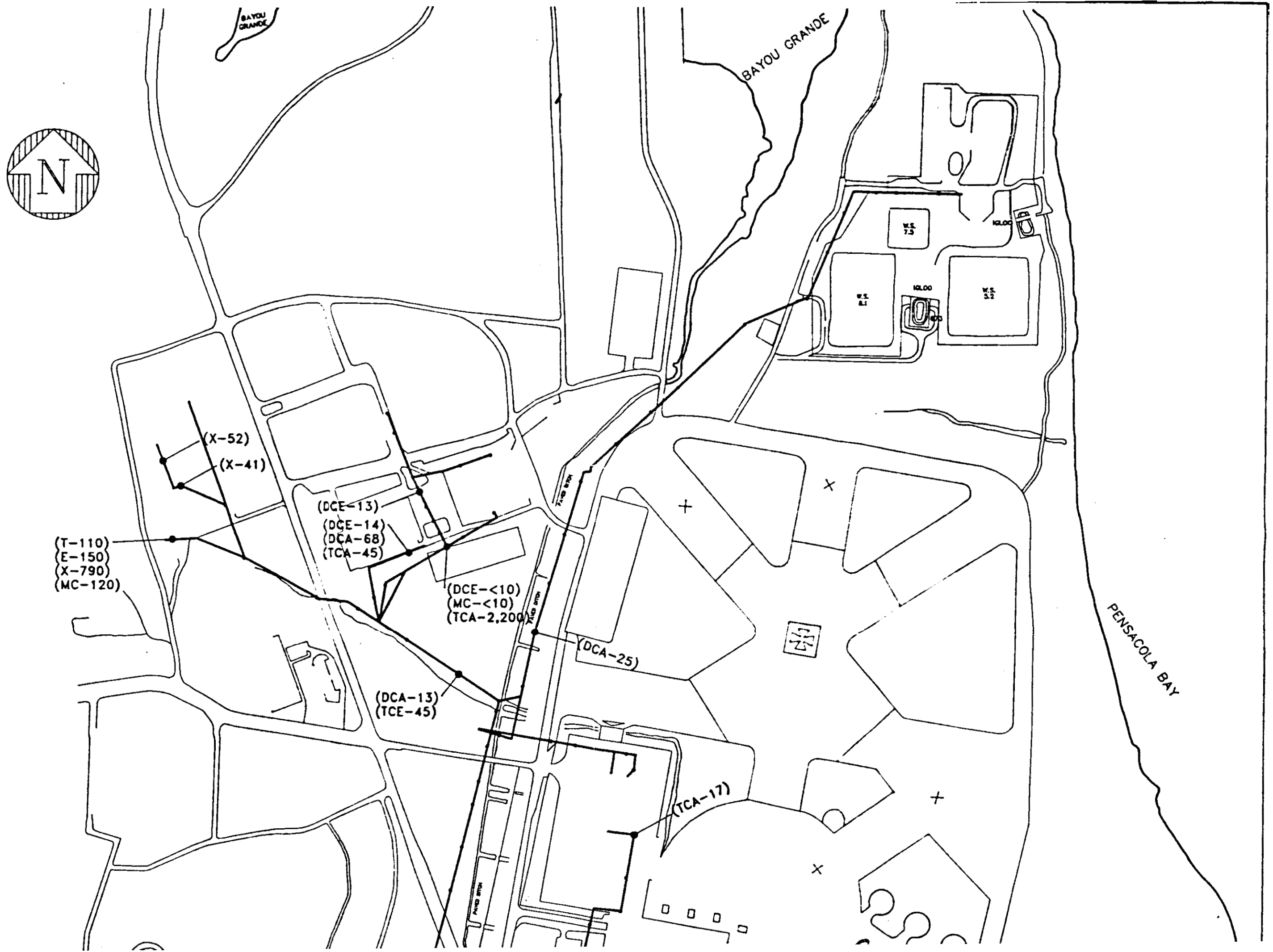
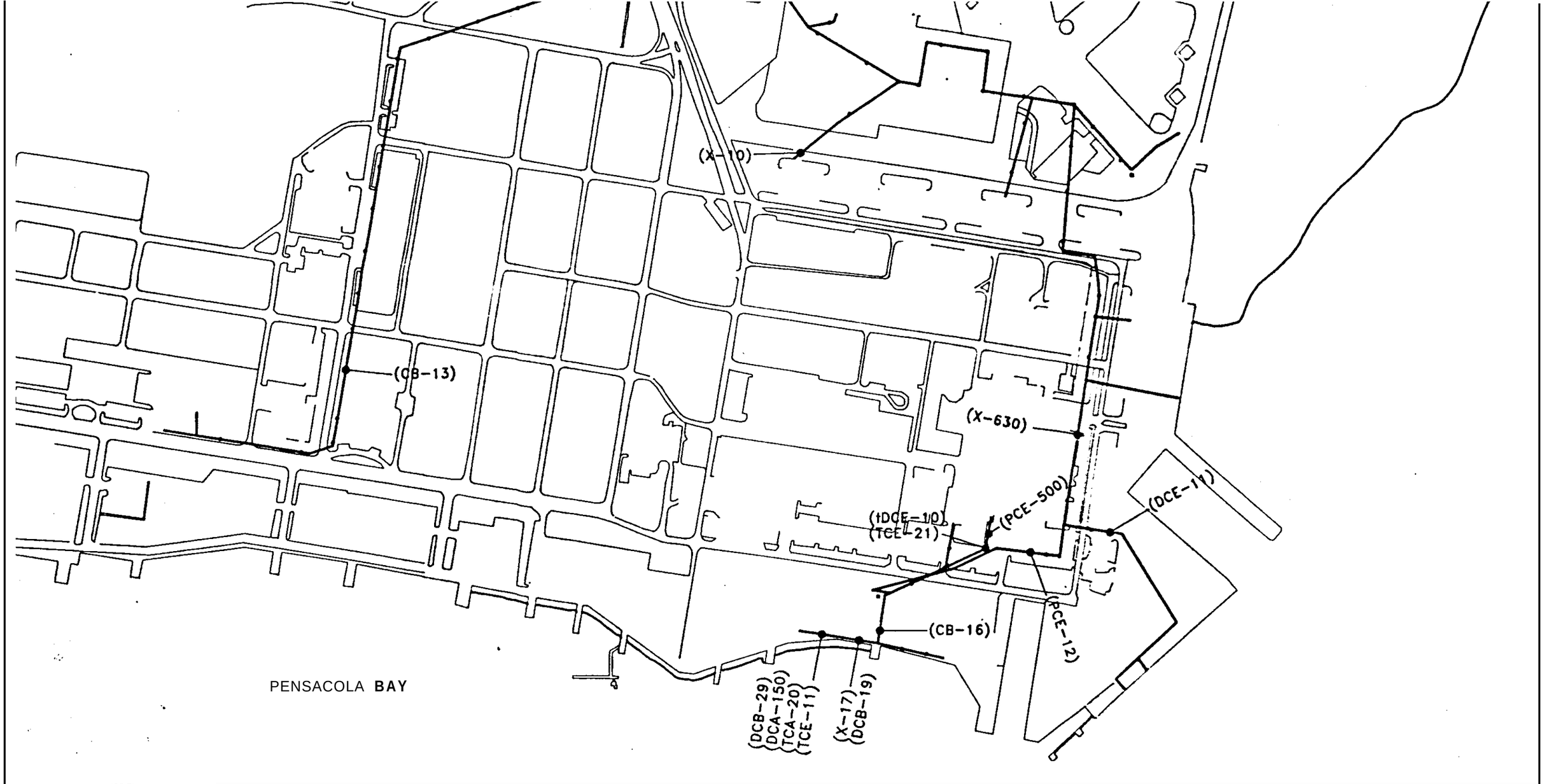
ON SUBSEQUENT IMAGES

Attachment A


N
BAYOU GRANDE
BAYOU GRANDE
W.S. 7.3
IGLOO
W.S. 8.1
IGLOO
W.S. 5.2
(X-52)
(X-41)
(DCE-13)
(DCE-14)
(DCA-68)
(TCA-45)
(T-110)
(E-150)
(X-790)
(MC-120)
(DCE-<10)
(MC-<10)
(TCA-2,200)
(DCA-25)
(DCA-13)
(TCE-45)
(TCA-17)
PENSACOLA BAY



JRCE: Ecology and Environment, Inc., 1992

0 200 400 800
SCALE 1" = 400 FEET

KEY:

- • Temporary Monitoring Well Location
- ● Temporary Monitoring Well Location where VOCs Detected
- (T-110) Toluene Concentration (µg/L)
- (E-150) Ethylbenzene Concentration (µg/L)
- (X-17) Xylene Concentration (µg/L)
- (DCS-29) 1.2-Dichlorobenzene Concentration (µg/L)
- (DCE-14) 1.1-Dichloroethene Concentration (µg/L)
- (MC-120) Methylene Chloride Concentration (µg/L)
- (tDCE-10) Trans-1,2-Dichloroethane Concentration (µg/L)
- (DCA-150) 1.1-Dichlomethane Concentration (µg/L)
- (TCA-20) 1,1,1-Trichloroethane Concentration (µg/L)
- (TCE-11) Trichloroethane Concentration (µg/L)
- (PCE-12) Tetrachloroethane Concentration (µg/L)
- (CB-13) Chlorobenzene Concentration (µg/L)

Plate 16 GROUNDWATER SAMPLES WHERE VOCS DETECTED AND CORRESPONDING CONCENTRATIONS — NAS PENSACOLA SITE 36

OVERSIZED PAGE

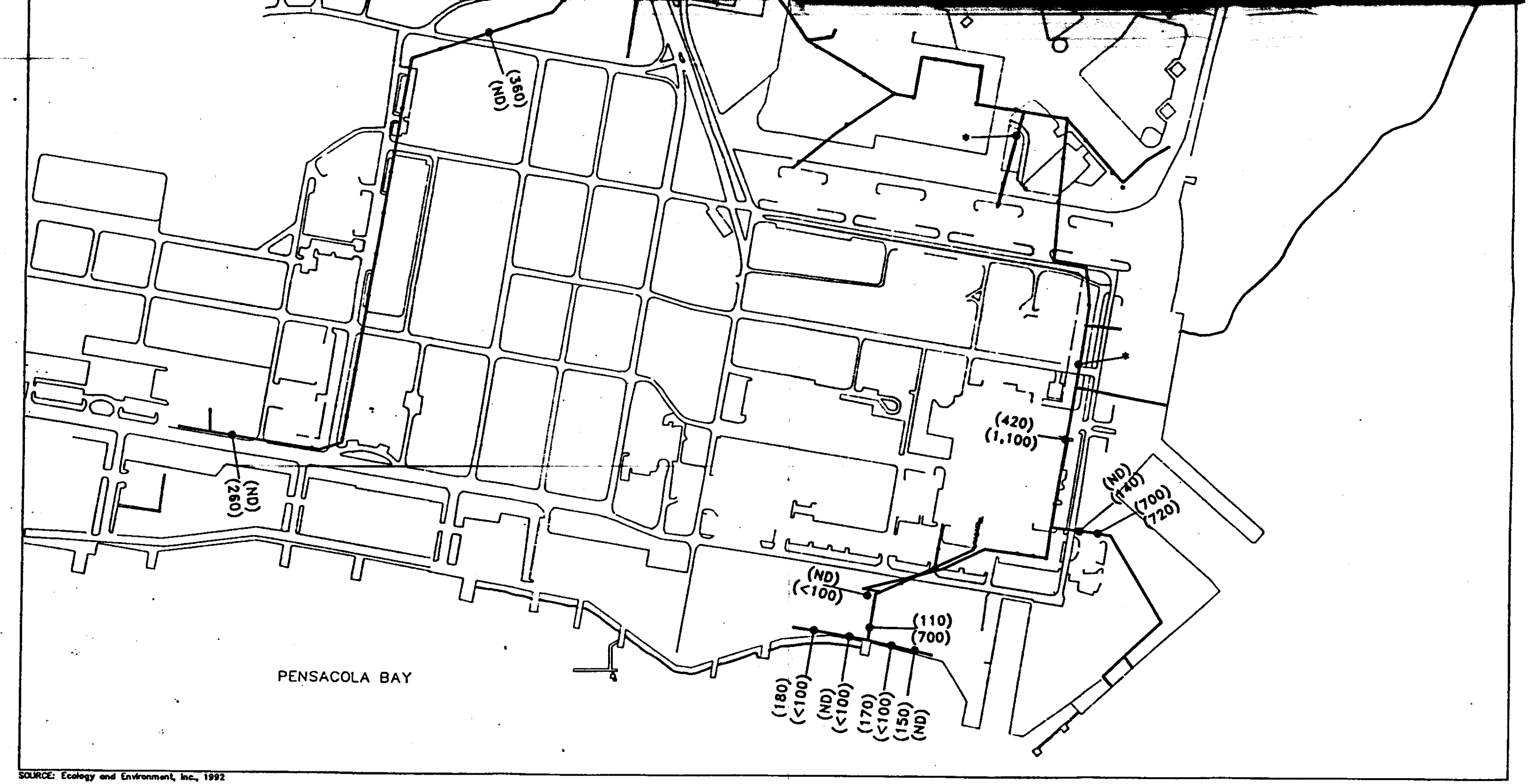
SCANNED IN SECTIONS

TO FOLLOW

ON SUBSEQUENT IMAGES

Attachment A

PENSACOLA BAY
BAYOU GRANDE
BAYOU GRANDE
(ND)
(160)
(ND)
(<100)
(ND)
(140)
(ND)
(190)
(ND)
(200)
(ND)
(1,300)
(ND)
(130)
(ND)
N



SOURCE: Ecology and Environment, Inc., 1992

0 200 400 800
SCALE 1" = 400 FEET

KEY:

- • Temporary Monitoring Well Location
- ● Temporary Monitoring Well Location where PAHs and/or Phenols Detected
- (420) PAH Concentration (µg/L)
- (1,100) Phenol Concentration (µg/L)
- * Not Determined due to Matrix Interference
- (ND) Not Detected

Plate 17 GROUNDWATER SAMPLES WHERE PAHS AND/OR PHENOLS DETECTED AND CORRESPONDING CONCENTRATIONS -- NAS PENSACOLA SITE 36

EXECUTIVE SUMMARY

As part of the U.S. Navy's Installation Restoration Program, Phase I of the Contamination Assessment/Remedial Activities' Investigation was conducted for the Industrial Waste Sewer (Site 36), located on the Naval Air Station in Pensacola, Florida. This work was performed by Ecology and Environment, Inc., (E & E) under contract to the Southern Division, U.S. Navy, Naval Facilities Engineering Command.

The industrial waste sewer line is about 23,000 feet long and is located in an area approximately 1 mile wide by 1.5 miles long in the southeastern portion of NAS Pensacola. Flow within the sewer line is toward the Industrial Waste Treatment Plant (IWTP; sites 32, 33, and 35), which is located at the northeast end of the site. Site 36 either crosses or runs adjacent to 14 of the other sites which have been identified on NAS Pensacola.

- Site 2 -- Waterfront Sediments;
- Site 9 -- Navy Yard Disposal Area;
- Site 11 -- North Chevalier Disposal Area;
- Site 20 -- Pier Pipe Leak Area;
- Site 23 -- Chevalier Field Pipe Leak;
- Site 25 -- Radium Spill Area;
- Site 27 -- Radium Dial Shop Sewer;
- Site 28 -- Transformer Accident Area;
- Site 29 -- Soil South of Building 3460;
- Site 30 -- Buildings 649 and 755;

- Site 32 -- IWTP Sludge Drying Beds;
- Site 33 -- IWTP Ponds:
- Site 34 -- Solvent Area North of Building 3557; and
- Site 35 -- Miscellaneous IWTP Solid Waste Management Units.

The sever line includes both force mains (about 9,300 feet) and gravity lines (about 12,700 feet). Along the majority of its length, the sever line is buried at depths of about 5 to 10 feet below land surface (BLS) and lies below the water table. However, the line (and water table) lies much closer to land surface (3 to 4 feet BLS) along most of the northeast segment (between Pump Station No. 2 and the IVTP) and is somewhat deeper (10 to 15 feet BLS) along most of the segment beginning at Pump Station No. 2 and running southwest to north of Building 1811. Across most of the northwestern area, the line lies about 5 to 10 feet above the water table. Piping is generally between 8 inches and 15 inches in diameter and encompasses a wide variety of construction materials: cast iron, vitrified clay, fiberglass-reinforced plastic, polyvinyl chloride, polypropylene, steel, and "metal." Site 36 may include piping installed prior to and after 1971 (the sewage treatment plant constructed in 1948 vas upgraded to the IVTP in 1971).

Most of the wastes that enter the sever line have not been subject to pretreatment or segregation. Consequently, the waste stream may include all materials used or generated on the base: paint stripping solvents and wastes, heavy metals, pesticides, radioactive wastes, fuels, cyanide wastes (prior to 1962), and waste oils.

The purpose of the Phase I investigation was to identify principal areas and primary contaminants of concern associated with potential leakage from the sewer line and to provide recommendations for subsequent phases of investigation. The Phase I fieldwork included a site reconnaissance, habitat/biota survey, surface emissions survey, radiation survey, utilities survey, soil-gas survey, the collection and analysis of soil and groundwater samples, and a hydrologic assessment.

3600190

Soil and surficial zone groundwater contamination are present along the industrial waste sewer line (Site 36). With the exception of metals in groundwater, the widespread occurrence of which is believed to be strongly influenced by acid preservative leaching/dissolution of entrained aquifer matrix sediments, the detected contamination is either sporadically distributed across a generally limited number of highly localized sampling locations and/or predominantly concentrated along the northwest and/or southeast portions of the sewer line.

Lead, total recoverable petroleum hydrocarbons (TRPHs), polynuclear aromatic hydrocarbons (PAHs), and phenols were the primary soil contaminants detected. Lead, chromium, cadmium, TRPHs, volatile organic compounds (VOCs), PAHs, and phenols were the primary groundwater contaminants. Lead, chromium, cadmium, and halocarbon-type VOCs (tetrachloroethene, trichloroethene, dichloroethene, and 1,1,1-trichloroethane) were all detected in groundwater at concentrations exceeding the Florida Primary Drinking Water Standard. TRPHs, aromatic-type VOCs (total benzene, toluene, ethylbenzene, and xylenes), and PAHs were all detected in groundwater at concentrations exceeding the applicable or (PAHs) potentially applicable Florida Groundwater Cleanup Standard. Phenols were detected in groundwater at concentrations exceeding the potentially applicable Florida Groundwater Guidance Concentrations for various phenolic compounds.

Overall, much of the detected contamination does not appear to reflect active, continuing leakage from the sewer line. This determination does not mean that the sewer line has never leaked and/or is not currently leaking, but rather that the Site 36 Phase I data simply do not support the unequivocable presence of active, continuing leaks at the sampling locations, especially when viewed in the context of the numerous other potential sources present. Additional assessment activities will be required along the sewer line to identify the actual source(s) and extent of the detected Site 36 soil and groundwater contamination.

1. INTRODUCTION

This Interim Data Report presents the findings of the Phase I investigation activities performed for the Industrial Waste Sewer (Site 36), located at the Naval Air Station (NAS) in Pensacola, Escambia County, Florida. This report has been prepared by Ecology and Environment, Inc., (E & E) for the Southern Division, U.S. Navy, Naval Facilities Engineering Command, under Contract No. N62467-88-C-0200. The information presented in this report is based on information and file documents provided by the Navy and on information gathered during the Phase I fieldwork conducted at the site from April to August 1991. The investigation was conducted in accordance with the administrative documents prepared by E & E for this project, which include the June 1990 Project Management Plan, June 1990 Site Management Plan, July 1990 Generic Quality Assurance Project Plan (GQAPP), July 1990 General Health and Safety Plan, and June 1990 Contamination Assessment/Remedial Activities Investigation Work Plan--Group N with appended Site-Specific Health and Safety Plan and Site-Specific Quality Assurance Plan. All references to these documents in this report apply only the 1990 versions.

This Interim Data Report for Site 36 is divided into five volumes, as follows:

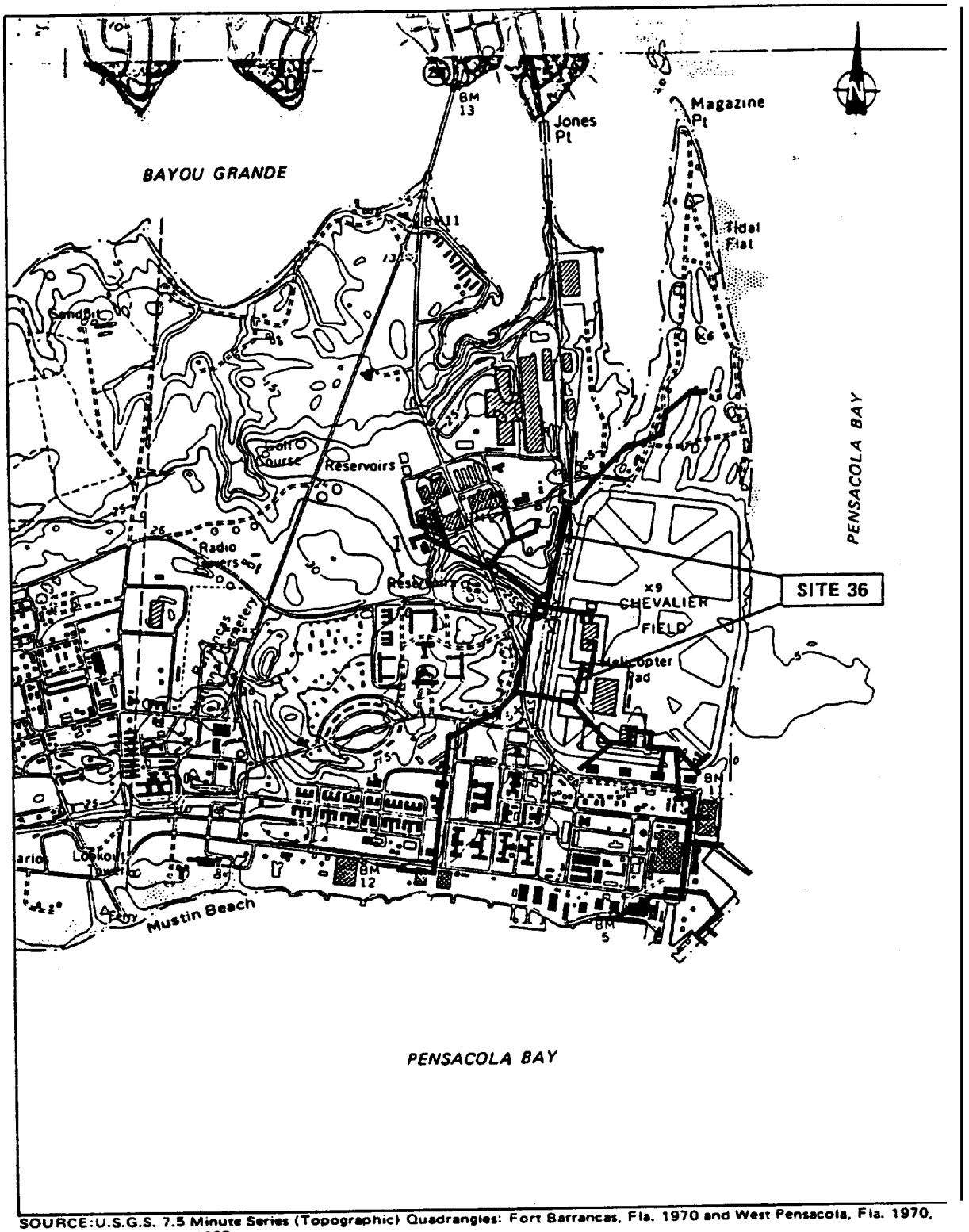
- Volume I -- Narrative, tables, figures 1-1 and 1-2, and map plates (showing site plan, sampling locations, water level elevations, and contaminant distributions);
- Volume II -- Appendices A through E;
- Volumes III and IV -- Appendix F (Soil Sampling Analytical Screening Results); and

- Volume V -- Appendix G (Temporary Monitoring Well Groundwater Sampling Analytical Screening Results).

The industrial waste sewer line is about 23,000 feet long and is located in an area approximately 1 mile wide by 1.5 miles long in the southeastern portion of NAS Pensacola (see Figure 1-1). Flow within the sever line is toward the Industrial Waste Treatment Plant (IVTP; sites 32, 33, and 35), which is located at the northeast end of the site (see Figure 1-2). Table 1-1 lists the buildings currently connected to the sever line. Site 36 either crosses or runs adjacent to 14 of the other sites which have been identified on NAS Pensacola (see Figure 1-2):

- Site 2 -- Vaterfront Sediments;
- Site 9 -- Navy Yard Disposal Area;
- Site 11 -- North Chevalier Disposal Area;
- Site 20 -- Pier Pipe Leak Area;
- Site 23 -- Chevalier Field Pipe Leak;
- Site 25 -- Radium Spill Area;
- Site 27 -- Radium Dial Shop Sewer;
- Site 28 -- Transformer Accident Area;
- Site 29 -- Soil South of Building 3460;
- Site 30 -- Buildings 649 and 755;
- Site 32 -- IVTP Sludge Drying Beds;
- Site 33 -- IVTP Ponds;
- Site 34 -- Solvent Area North of Building 3557; and
- Site 35 -- Hiscellaneous IWTP Solid Vaste Management Units.

The sewer line includes both force mains (about 9,300 feet) and gravity lines (about 12,700 feet; see Plate 1 and Appendix A). Along the majority of its length. the sewer line is buried at depths of about 5 to 10 feet belov land surface (BLS) and lies below the vater table. However, the line (and water table) lies much closer to land surface (3



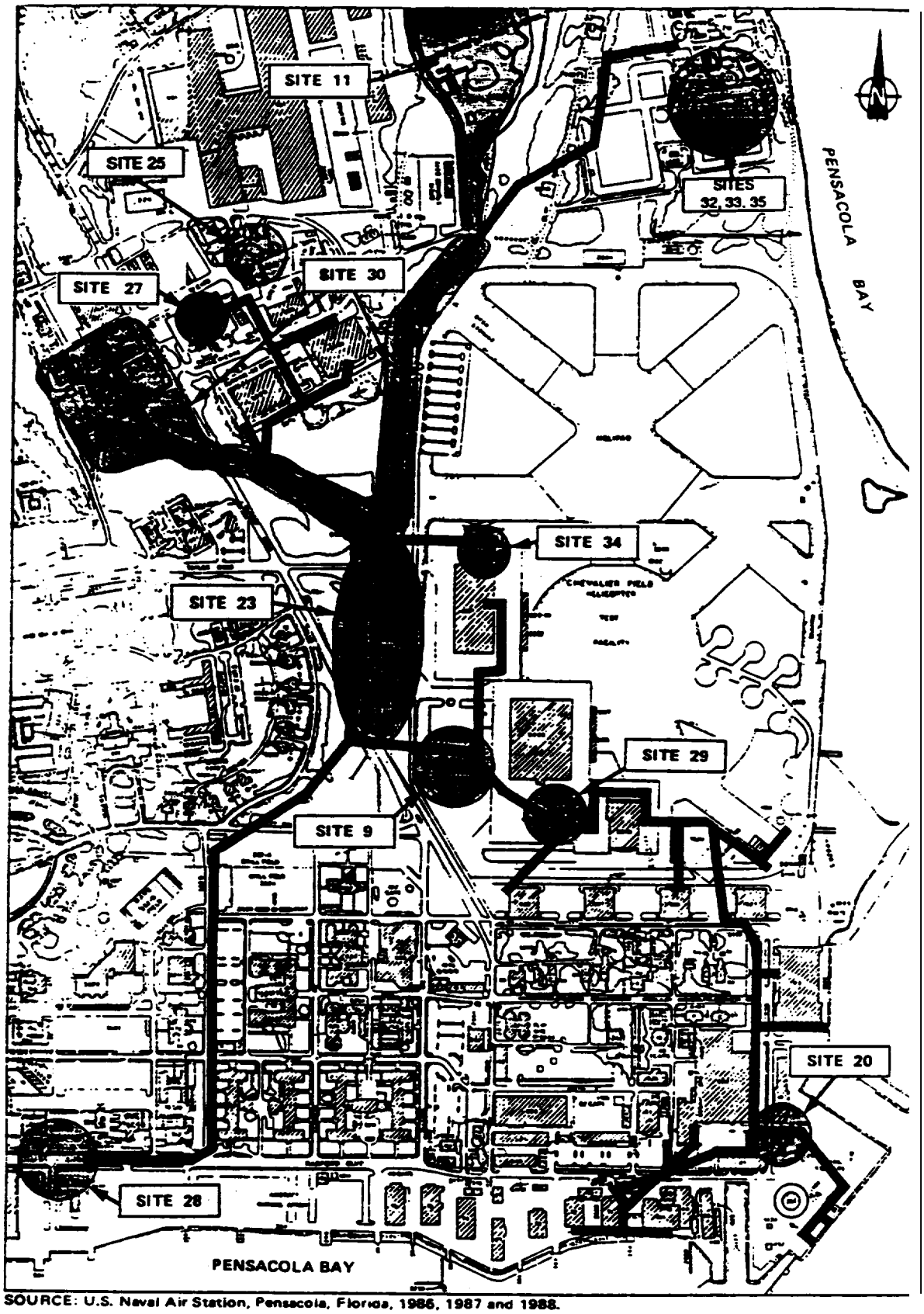
SOURCE: U.S.G.S. 7.5 Minute Series (Topographic) Quadrangles: Fort Barrancas, Fla. 1970 and West Pensacola, Fla. 1970, Photorevised 1987

SCALE

0 — .5 — 1 MILE

0 — .5 — 1 KILOMETER

Figure 1-1 LOCATION MAP - NAS PENSACOLA SITE 36



SOURCE: U.S. Naval Air Station, Pensacola, Florida, 1986, 1987 and 1988.

SCALE

0 250 500 1000 2000 FEET

Figure 1-2 SITE VICINITY *MAP* - NAS PENSACOLA SITE 36

3600193

Table 1-1

BUILDINGS CURRENTLY CONNECTED TO THE INDUSTRIAL WASTE SEWER LINE NAS PENSACOLA SITE 36

NE Portion	NW Portion	SE Portion	SW Portion
3644	647	44	782
	648	47	
3819	649	71	
	6498	72	
	692	104	
	741	604	
	755	606	
	2691	627	
	3214	630	
	3220	631	
	3450	2662	
	3483	3460	
		3557	
		3588	

14[NASP]UH8069:T0365/1149/31

Source: Ecology and Environment, Inc.. 1992.

to 4 feet BLS) along most of the northeast segment (betveen Pump Station No. 2 and the IVTP) and is somevhat deeper (10 to 15 feet BLS) along most of the segment beginning at Pump Station No. 2 and running southwest to north of Building 1811 (see Plate 1). Across most of the northwestern area, the line lies about 5 to 10 feet above the vater table. Piping is generally between 8 inches and 15 inches in diameter and encompasses a vide variety of construction materials: cast iron, vitrified clay, fiberglass-reinforced plastic, polyvinyl chloride, polypropylene, steel, and "metal" (see Appendix A). Site 36 may include piping installed prior to and after 1971 (the sewage treatment plant constructed in 1948 vas upgraded to the IVTP in 1971).

Most of the wastes that enter the sever line have not been subject to pretreatment or segregation. Consequently, the vaste stream may include all materials used or generated on the base: paint stripping solvents and wastes, heavy metals, pesticides, radioactive vastes, fuels, cyanide wastes (prior to 1962), and vaste oils. A complete site description and history are presented in the Group N investigation vork plan.

In this report, as a reference aid, locations will be identified according to which portion of the sever line they occur along, as follows: northvest portion includes the area northvest of Pump Station No. 2; northeast portion includes the area betveen Pump Station No. 2 and the IVTP; southvest portion includes segments lying southvest of Hurray Road; and southeast portion includes all other segments south, east, and southeast of Pump Station No. 2.

The purpose of the Phase I investigation vas to identify principal areas and primary contaminants of concern associated with potential leakage from the sever line and to provide recommendations for subsequent phases of investigation. The Phase I fieldwork included a site reconnaissance, habitat/biota survey, surface emissions survey, radiation survey, utilities survey, soil-gas survey, and the collection and analysis of soil and groundwater samples. In addition, a hydrologic assessment, which included the determination of groundwater elevations and flow direction(s), vas performed at the site. The recommendations for additional work at this site will be incorporated in the revised Group N vork plan.

2. INVESTIGATION METHODOLOGY

2.1 AERIAL PHOTOGRAPH AND EXISTING DATA ANALYSIS

Prior to the initiation of fieldwork, E & E personnel examined all available aerial photographs of NAS Pensacola for past and present conditions, features, and developments that might have had direct relevance to the fieldwork methodology. The aerial photograph analysis task involved assembling and stereoscopically analyzing historical photographic imagery and topographic maps available for the site area. Photographs were scaled to allow analysis of past and present surface conditions, drainage, and land use. The aerial photographs used in the analysis are listed in Table 2-1. The photographs were analyzed to obtain information regarding the evolution of site features that might have affected hydrologic conditions and to aid in the performance of such tasks as field reconnaissance and monitoring well placement.

2.2 SITE RECONNAISSANCE

A field reconnaissance survey was conducted along the full length of Site 36. The primary objectives of the reconnaissance survey were to identify the exact route of the sewer line system and to establish and mark proposed soil-gas sampling points at approximately 100-foot intervals along the system. In addition, during the reconnaissance survey, any surface conditions (e.g., stressed vegetation and drainage patterns) that could support the potential presence of contaminant sources other than leakage from the sewer line were inspected and recorded in the field logbook. All observations concerning the sewer line route and surface conditions along the route were used to update the site map.

The sewer line route was established using: 1) Naval Facilities Engineering Command (NAVFAC) drawings 5152541 through 5152546 (see Appendix A); 2) manhole locations (gravity line only); 3) surface

Table 2-1

PHOTOGRAPHS AND MAPS USED IN THE AERIAL PHOTOGRAPH ANALYSIS
NAS PENSACOLA SITE 36

Source	Photograph/Map Number	Date	Scale
Florida Department of Transportation	PD-3886-12-03	10/26/89	1:24,000
	PD-3886-12-04	10/26/89	1:24,000
	PD-3618-12-03	11/21/86	1:24,000
	PD-3618-12-04	11/21/86	1:24,000
	PD-3109-12-03	9/22/83	1:24,000
	PD-3109-12-04	9/22/83	1:24,000
	PD-2684-11-04	3/6/81	1:24,000
	PD-2684-11-05	3/6/81	1:24,000
	PD-2684-121-05	3/6/81	1:24,000
	PD-1888-11-03	4/28/76	1:24,000
	PD-1888-11-04	4/28/76	1:24,000
	PD-1331-11-03	5/4/73	1:24,000
	PD-1331-11-04	5/4/13	1:24,000
	PD-868-4-08	4/6/70	1:24,000
	PD-868-4-09	4/6/70	1:24,000
	PD-868-4-10	4/6/70	1:24,000
	PUS-7054-3-2	1/12/69	1:24,000
	PD-616-8-03	3/25/68	1:24,000
	PD-616-8-04	3/25/68	1:24,000
	PD-616-8-05	3/25/68	1:24,000
	PD-285-6-03	10/8/64	1:24,000
	PD-285-6-05	10/8/64	1:12,000
	PD-285-7-01	10/8/64	1:24,000
	PD-285-7-03	10/8/64	1:12,000
	PD-285-8-01	10/8/64	1:24,000
	PD-285-8-03	10/8/64	1:24,000
	PHS-7054-2-1	10/12/61	1:24,000
	PHS-7054-3-1	10/12/61	1:24,000
	CPF-4H-17	1/22/51	1:24,000

14[NASP]UH8069:T0365/1028/21

3600195

Table 2-1 (Cont.)

Source	Photograph/Map Number	Date	Scale
Naval Facilities Engineering Command	5152541	9/19/86	1:800
	5152542	9/19/86	1:100
	5152543	9/19/86	1:100
	5152544	9/19/86	1:100
	5152545	9/19/86	1:100
	5152546	9/19/86	1:100
	1281019	10/9/68	1:50 (Horiz.)
	1281019	10/9/68	1:5 (Vert.)
	1281020	10/9/68	1:5 (Horiz.
	1281020	10/9/68	1:5 (Vert.)
	1281021	10/9/68	1:5 (Horiz.
	1281021	10/9/68	1:5 (Vert.)
	1281022	10/9/68	1:5 (Horiz.)
	1281022	10/9/68	1:5 (Vert.)
	5117429	1/30/86	1:50
	5141430	1/30/86	1:50

14[NASP]UH8069:T0365/1028/21

Source: Ecology and Environmont, Inc., 1992.

indications (i.e., pavement cuts), including those visible on aerial photographs; and 4) information provided by NAS Pensacola Public Works Department staff. Proposed soil-gas sampling points were established as close to each gravity line manhole location as possible and at approximately 100-foot intervals along the rest of the sewer line. The marked soil-gas sampling points then provided a reference base for identifying surface emissions and radiation survey measurement locations (see sections 2.4 and 2.5).

The reconnaissance survey team utilized radiation and air monitoring equipment during walkovers of site areas, in accordance with Section 6.1.1 of the GQAPP. Areas with readings above background were located, flagged, and identified on a site map for future reference. All findings of the physical reconnaissance were mapped in detail and recorded in the field logbook.

23 HABITAT/BIOTA SURVEY

A habitat/biota survey was conducted for the site, as well as an evaluation of applicable literature pertaining to NAS Pensacola. During the physical reconnaissance, an E & E biologist/ecologist determined the on-site terrestrial and aquatic habitats and the surrounding habitats that could be affected by off-site contaminant migration. During the walkover survey, rare, threatened, and endangered species and their potential habitats were identified, and general site conditions were evaluated regarding the site's ability to support viable populations of plants and animals.

2.4 OVA SURFACE EMISSIONS SURVEY

A surface eaissions survey was conducted using an organic vapor analyzer (OVA). The survey was conducted in accordance with Section 6.1.1 of the GQAPP. Measurements were made at (or referenced to) each established soil-gas survey point, and readings were recorded in the field logbook.

25 RADIATION SURVEY

A radiation survey was conducted using a Bicron Micro-R-meter. The survey was conducted in accordance with Section 6.3.6 of the GQAPP.

Heasurements were made at (or referenced to) each established survey point, and readings were recorded in the field logbook.

2.6 SOIL-GAS SURVEY

A soil-gas survey was conducted at the 224 locations along the sewer line shown on Plate 2, using a hydraulically powered, van-mounted sampling device called a Geoprobe. Soil-gas samples could not be retrieved at two additional locations (SG052 and SG171; see Plate 2) due to the presence of an obstruction (SG052) or groundwater within 2 feet of land surface (SG171). Two soil-gas samples were also collected at locations SG214 and SG215 (southwest, along Catalina Drive) before it was determined that a storm drain line and not the sewer line was present at this location. No samples were collected along the south-easternmost extension of the system (pier area; see Plate 2) because the sewer line could not be traced at this location.

The Geoprobe hydraulics, with the aid of a percussion hammer and the weight of the vehicle, pushed 3-foot lengths of specially modified 0.5-inch inside-diameter (ID), 1-inch outside-diameter (OD), hardened steel rod with an expendable tip into the ground. The 3-foot rods were advanced to depth by adding 3-foot lengths of rod until the near-surface water table depth was located or until the lengths of rod were advanced to a maximum depth of 10 feet. (In some instances, in order to obtain a water level depth, the rods were driven deeper than 10 feet).- Once the rods had been driven to the desired depth, they were then retracted 8 to 10 inches, creating a void in which subsurface soil gas would collect. In all cases, the soil-gas sample was collected 8 to 10 inches above the near-surface water table depth or, if water was not present, at a depth of 10 feet. The depth to water was determined by inserting a Pro Water Level Meter (Model 6000) probe down the inside of the rods.

The soil-gas sample was collected by inserting a piece of disposable Teflon tubing with a threaded, stainless steel post and O-ring into the rods and threading the assembly into the expendable tip holder. This provided an airtight system that eliminated the possibility of any soil gas entering the system from a location other than the stainless steel post. The system was purged of three volumes of air, and then, by attaching an OVA probe to the Teflon tubing sticking out of the

aboveground portion of the 3-foot rods, two organic vapor readings were recorded: a total vapor reading and a methane (filtered) reading, obtained by passing the sample through an in-line activated charcoal filter. It should be noted that the probe hole vas alloved to reequilibrate for 5 minutes before collecting the methane sauple. All sampling locations, depths, and OVA readings were recorded in the field logbook.

A total of 10 duplicate soil-gas samples vere collected by co-locating a probe hole near (within 6 to 12 inches) the initial probe hole and following the procedures described above. The soil-gas sampling equipment was decontaminated on the inside and outside using a steam cleaner and detergent water wash and a tap water rinse. The tools vere then baked on a propane heater to burn off any volatiles that might have remained on the tools. After decontamination, the clean equipment vas screened with the OVA to confirm the absence of residual contamination. Teflon tubing was discarded after each sampling location. Teflon tubing, expendable tip holders, expendable tips, and the stainless steel post with its O-ring vere stored in a cool dry cooler with activated charcoal to prevent any external contamination from entering the sampling equipment.

2.7 UTILITIES SURVEY

Prior to conducting any augering, boring, or drilling, E & E located all underground cables, pipes, utilities, and other subsurface features that could potentially be damaged, create a safety hazard, or otherwise hinder fieldwork. The appropriate authorities (e.g., NAS Pensacola Public Works Department and Southern Bell) were contacted to identify the location of all underground utilities in the site area. In addition, E & E examined available maps and documents and conducted a metal detector survey to determine the potential presence of any other potentially hazardous subsurface features on site. The locations of all underground utilities and other obstructing features vere marked with surveyor flags, fluorescent paint, or by other methods, as appropriate.

2.8 DATA ANALYSIS

Information obtained from the results of the above-described physical surveys vas given primary consideration in the development of

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placement strategies for the Phase I soil borings and temporary monitoring wells. Prior to establishing the Phase I temporary monitoring well locations or other sampling points, the results of the aerial photograph analysis, site reconnaissance, surface emissions survey, radiation survey, soil-gas survey, and utilities survey were evaluated to identify potential locations of sewer line leaks.

The results of the soil-gas survey were given primary consideration in the development of placement strategies for the Phase I soil borings and temporary monitoring wells. In general, the sampling locations were keyed to locations where elevated soil-gas readings had been recorded and then distributed outward from these base points (at locations where soil-gas samples had been collected) to effect full coverage of Site 36. This revision to the proposed Phase I soil boring and temporary monitoring well placement strategy, shown on Figure 14-2 of the work plan, was implemented, as appropriate, upon approval by Southern Division.

2.9 SOIL BORINGS AND TEMPORARY MONITORING WELL INSTALLATION

A total of 121 soil borings were completed at Site 36 (see Plate 3; soil boring location numerical designations correspond to the numerical designation of the soil-gas survey hole completed at that location). At each boring location, composite soil samples were collected over approximately 5-foot intervals from land surface to a depth below the sewer line or until the water table was encountered, whichever was deeper. Each approximate 5-foot sampling interval was assigned a letter designation as follows: A interval = surface to 5 feet BLS; B interval = 5 to 10 feet BLS; C interval = 10 to 15 feet BLS; and so on. At all boring locations, except B016 and B191 (see Plate 3) where obstructions were encountered, the deepest sampling interval included soils collected below the depth of the sewer line. The depth of the sewer line was determined based on NAVFAC drawings 5152541 through 5152546 (gravity lines; see Appendix A), visual inspections of the manholes (gravity lines), NAVFAC drawings 1281019 through 1281022 (force main profiles), and information provided by NAS Pensacola Public Works Department staff. In addition, soil borings could not be completed as planned at soil-gas survey locations B013, B142, and B212 (see Plate 2), due to the presence of obstructions/rubble (B013 and B142) or combustible gases and elevated

breathing zone HNu readings (B212). The soil samples were collected using either hand-operated bucket augers or a solid-stea auger powered by a drill rig. Lithologic characteristics of the materials encountered in each borehole were recorded in the field logbook. All sampling, compositing, and lithologic logging activities were performed in accordance with Section 6.6 of the GQAPP. Equipment decontamination vas performed in accordance with Section 6.10 of the GQAPP.

Temporary, stainless steel monitoring wells were installed in 119 of the 121 borings, excluding B016 and B191 where obstructions had been encountered (see Plate 3). Each well was constructed with 5 feet of 0.01-inch slotted screen and was installed to a depth that allowed the well screen to bracket the vater table. Well boreholes were completed using solid-stem augers powered by a drill rig. Lithologic characteristics of materials encountered during installation of the wells vere recorded in the field logbook in accordance with Section 6.6 of the GQAPP. All equipment decontamination activities were performed in accordance with Section 6.10 of the GQAPP.

2.10 SOIL SAMPLING

Two hundred seventy-four soil samples (121 A interval, 106 B interval, 31 C interval, 13 D interval, and 3 E interval), plus 12 duplicate samples, vere collected as described in Section 2.9. All soil samples were shipped to E & E's Analytical Services Center (ASC) in Buffalo, New York, and analyzed for the screening parameters listed in Table 2-2.

2.11 GROUNDWATER SAMPLING

One hundred nineteen groundwater samples, plus nine duplicate samples, were collected from the 119 temporary monitoring wells shown on Plate 3 (temporary well numerical designations correspond to the numerical designation of the soil-gas survey hole completed at that location). Veather conditions; vater levels; purge volumes; and groundwater pH, specific conductance, and temperature measurements were recorded in the field logbook prior to sampling. In addition, prior to purging, each well was checked for the presence of floating and/or sinking immiscible hydrocarbons using a Solinst oil-vater interface

Table 2-2

SAMPLING AND ANALYTICAL SUMMARY
NAS PENSACOLA SITE 36

Medium	No. of Samples	Duplicates	Total	Analytical Suite[a,b]
Soil	214	12	286	A
Groundwater	119	9	128	A

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'Analytical suite designation is as follows:

A = Volatile organic compounds including chlorobenzono, polynuclear aromatic hydrocarbons, phenols, pesticides and total polychlorinated biphenyls, total recoverable petroleum hydrocarbons, and metals (total, unfiltered).

[b]Specific constituents encompassed by the various chemical groups included within analytical suite A are identified in tables 9-1 through 9-4 of the GQAPP.

Source: Ecology and Environment, Inc., 1992.

probe. Each groundwater sample was collected immediately following well purging. All well purging and sampling activities were performed in accordance with sections 6.8 and 6.11 of the GQAPP. Equipment decontamination was performed in accordance with Section 6.10 of the GQAPP. All groundwater samples collected from the temporary monitoring wells were shipped to E & E's ASC and analyzed for the screening parameters listed in Table 2-2.

2.12 HYDROLOGIC ASSESS——

The hydrologic assessment included determination of water level elevations in the temporary monitoring wells.

Wellhead top-of-casing (TOC) elevations for the temporary monitoring wells were measured, using a spirit level and tape measure, relative to a reference marker located adjacent to each well. Static groundwater levels in all but one (TW195) of the temporary monitoring wells were measured relative to the wellhead TOC over a 37-day period (July 9 through August 14, 1991); the static water level in temporary well TW195 was measured on August 26, 1991. Polloving groundwater sampling and removal of the temporary monitoring wells, the elevations of the reference markers were surveyed using a transit with reference to the previously established wellhead elevation of permanent monitoring well GM61, located on Site 34 (Geraghty and Hiller [G&M] 1984).

2.13 FIELD QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

All field tasks performed during the investigation were documented in the field logbooks according to the procedures specified in Section 7.2 of the GQAPP.

2.13.1 Field QA/QC Samples

Field QA/QC samples were prepared for all samples collected at Site 36 during the Phase I investigation according to the procedures described in Section 6.12 of the GQAPP. Chain-of-custody was maintained for all samples collected, packaged, and shipped to E & E's ASC for analysis. Sample management was performed as specified in Section 7 of the GQAPP. The collected field QA/QC samples and corresponding analytical parameters are listed in Table 2-2.

2.13.2 Decontamination Procedures

All equipment used during field activities was decontaminated in accordance with Section 6.10 of the GQAPP.

2.14 INVESTIGATION-DERIVED VASTE MANAGEMENT

Excess soil generated during soil boring and temporary monitoring well installation activities was temporarily contained adjacent to the well or boring and then backfilled into the borehole after the auger flights or temporary well casings had been removed following sample collection. Any soil material remaining after completion of borehole backfilling was. placed in 55-gallon drums, sealed, labeled, and moved to a central area on the site. Each drum has a painted-on label listing the site number and the type of material contained in the drum.

All water generated during development and purging of the temporary monitoring wells was temporarily contained adjacent to the well and then poured back into the well following collection of samples.

Potentially contaminated, personal protective clothing and disposable materials, wastes generated during decontamination activities, and other potentially contaminated, investigation-derived materials were placed in 55-gallon drums, labeled, and moved to a central area on the site. These drums are sealed and labeled "trash," All drummed investigation-derived materials were subsequently picked up and disposed of by NAS Pensacola.

3. RESULTS

3.1 AKRIAL PHOTOGRAPH AND EXISTING DATA ANALYSIS

Review of the available aerial photographs provided only limited information on the developmental history of the sewer line system. The earliest photograph examined (January 22, 1951) reveals that most of the buildings currrently connected to the northwest (e.g., buildings 647, 648, 649, 649B, and 755) and southeast (e.g., buildings 44, 47, 71, 72, 104, 604, 606, 627, 630, and 631) portions of the system were already in existence (see Plate 1). No significant developmental changes were observed on the October 12, 1961, aerial photographs.

The October 8, 1964, aerial photographs reveal that buildings 692, 741, 2691, 3214, 3483 (northwest portion of line), and 2662 (southeast portion of line) had been constructed. The March 25, 1968, aerial photographs reveal that buildings 782 (Steam Generation Power Plant Complex [SGPPC)) and 3220 had been constructed. Building 782 (SGPPC) is currently connected to the southwest portion of the sewer line system (see Plate 1), and Building 3220 is connected to the northwest portion of the system.

The April 6, 1970, aerial photographs reveal that Pump Station Nos. 1 (Building 3434), 2 (Building 3437), and 3, as well as associated force main and/or gravity lines, had been constructed (see Plate 1). In particular, visible cuts in the pavement reveal construction of the following:

- The main line between Pump Station No. 1 and Murray Road, and connection of buildings 627, 631, and 2662 to the force main portion of this line (see Plate 1);
- The force main between Pump Station No. 2 and the IWTP (see Plate 1);

- The force main/gravity line betveen Pump Station No. 2 and Pump Station No. 3 (see Plate 1); and

- Expansion/modification of the IVTP.

The May 4, 1973, aerial photographs reveal that Building 3450 (northvest portion of line) had been constructed; Building 630 (southeast portion of line) had been connected to the system; and construction at the IWTP had been completed (see Plate 1).

The April 28, 1976, aerial photographs reveal the construction of buildings 3460 (completed) and 3557 (in progress) in the southwestern part of Chevalier Field, and the connection of these buildings to the sever line system (see Plate 1). The March 6, 1981, aerial photographs reveal the completion of Building 3557 and the construction of Building 3588 to the southeast (see Plate 1).

The September 22, 1983, aerial photographs reveal the construction of Building 3819 (northeast portion of line; see Plate 1). No significant developmental changes vere observed on the November 21, 1986, aerial photographs. The October 26, 1989, aerial photographs reveal that Building 3644 had been constructed (northeast portion of line; see Plate 1).

32 SITE RECONNAISSANCE

During the site reconnaissance, the exact route of the sever line system vas established; soil-gas sampling locations vere marked; visual inspections vere made around the buildings connected to the system, the three primary pump stations, the six secondary lift stations, and the approximately 60 manholes along the gravity line portions of the system; and walkover air monitoring and radiation surveys vere performed. Plate 1 shows the identified route of the sever line system and the locations of the three primary pump stations and six secondary lift stations. The NAVPAC drawings included in Appendix A provide manhole locations and construction details, piping information (i.e., materials, diameter, and gravity line depth), and specific details on the connections betveen buildings and the main segments of the sever line system.

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As noted previously (see Section 2.6), the southeasternmost extension of the sewer line system (pier area; see Plate 1) could not be traced. In addition, gravity lines reported to have been present in the area south of Building 782 (southwest portion of line) also could not be traced. The location of the force main between pump station nos. 2 and 3 was identified based on aerial photographs (April 6, 1970) taken while this line was actually being installed (depth information for this part of the system was provided by NAS Pensacola Public Works Department staff).

No clear evidence of leaks or surface spills wa's observed during the various elements of the site reconnaissance, and a large portion of the sewer line system lies under asphalt or concrete pavement, which would limit the potential for subsurface contamination of soils and groundwater along the line from surface spills. However, the line does cross or run adjacent to many of the most active, known, previous and/or potential waste-generating facilities on NAS Pensacola, including 14 of the other sites that have been identified on the base (see Section 1). Consequently, a number of potential contaminant sources are present in the vicinity of Site 36.

3.3 HABITAT/BIOTA SURVEY

The habitat/biota survey focused only on three vegetated portions of Site 36. The remainder of Site 36 and the surrounding areas are paved and thus provide little, if any, habitat for wildlife.

One vegetated area is located behind Building 3220 in the northwestern portion of the site (see Plate 1). The canopy is dominated by sand live oak (Quercus geminata) and laurel oak (Q. hemisphaerica), along with lesser amounts of southern magnolia (Magnolia grandiflora) and hickory (Carya sp.). The understory consists of sparkleberry (Vaccinium arboreum), pawpaw (Asimina sp.), and southern magnolia. The dense groundcover in this area is dominated by grape vine (Vitis rotundifolia), pawpaw, sand live oak, yaupon holly (Ilex vomitoria), laurel oak, beautyberry (Callicarpa americana), sparkleberry, deerberry (Vaccinium stamineum), blackberry (Rubus cuneifolius), along with lesser amounts of ragweed (Ambrosia artemisiifolia), lantana (Lantana camara), blue curls (Trichostema setaceum), southern magnolia, saw palmetto

(Serenoa repens), stinging nettle (Cnidoscolus stimulosus), dog fennel (Eupatorium capillifolium), persimmon (Diospyros virginiana), sumac (Rhus copallina), deerberry, sand pine (Pinus clausa), red cedar (Juniperus viginiana), and aster (Aster sp.). The area is undisturbed and supports a large amount of viney undergrowth and very dense shrub cover and appears to be an excellent bird habitat. Birds utilizing this habitat include northern flicker, yellow-rumped warbler, brovn thrasher, song sparrow, and boat-tailed grackle (see Appendix B). Lizards, frogs, and small mammals likely take advantage of the dense undergrowth in this area.

Another vegetated area associated with Site 36 is located east of the intersection of Billingsley Drive and Moffet Road across from Site 23 (see Figure 1-2 and Plate 1). This park-like area consists of live oak (Quercus virginiana), southern magnolia, laurel oak, carolina laurel cherry (Prunus caroliniana), and chinaberry (Melia azedarach) in the canopy. The groundcover is mowed. Birds including blue jay, song sparrow, northern flicker, and brown thrasher, along with small mammals, such as gray squirrels and rabbits, utilize this habitat for nesting and foraging.

The third vegetated area associated with Site 36 has already been described in detail as part of the Site 30 Interim Data Report (E & E 1991).

The vegetation observed during the habitat/biota survey of Site 36 did not appear stressed, and no impacts of hazardous waste disposal were evident on site or within adjacent habitats.

3.4 SURFACE EMISSIONS SURVEY

Appendix C presents the results of the surface emissions survey conducted along the industrial waste sever line. All survey coordinate points correspond or are referenced to the soil-gas sampling locations shown on Plate 2. For example, coordinate SG002 + 10E indicates a reading taken 10 feet east of soil-gas sampling location SG002, usually directly along the sewer line route. In a very few cases, readings were recorded at offset locations transverse to the sewer line route; such locations will exhibit a coordinate offset direction (e.g., west or

east) transverse to the actual route of the sewer line (e.g., north to south).

Background readings of 4 and 7 parts per million (ppm) were recorded during the surface emissions survey. Table 3-1 identifies the locations where surface emission OVA readings above background were recorded. Excluding the readings obtained inside manholes and the lined trench north of Building 3557 (Site 34), very low readings (≤ 5 ppm above background) were recorded at only 11 locations, six of which were in the general vicinity of buildings 649 and 755 (Site 30; see Figure 1-2 and Plate *1).* In contrast, readings as high as 550 ppm above background were recorded inside several manholes and the lined trench north of Building 3557 (Site 34). The highest of these readings were again concentrated in the vicinity of Building 649 (Site 30), as well as in the vicinity of Building 3557 (the area north of which is Site *34).*

3.5 RADIATION SURVEY

Appendix C presents the results of the radiation survey conducted along the industrial waste sewer line. All survey coordinate points correspond or are referenced to the soil-gas sampling locations shown on Plate *2* and discussed above in relation to the surface emissions survey.

Background readings of between 21,333 and *24,667* disintegrations per minute (dpm) were recorded during the radiation survey. Table 3-2 identifies the locations where elevated radiation readings were recorded. Readings greater than 45,000 dpm (approximately 2 times the lower end of the background range) are considered elevated for the purpose of this report. Most of the locations where elevated readings were recorded were near (within 1 foot) areas of brick, asphalt, or gravel, which could contain naturally occurring and/or artificially generated radioactive materials. However, the elevated radiation readings cannot be uniquely attributed to such interfering sources given that many locations where lower readings were recorded were also proximate to areas of similar construction and/or pavement materials.

As shown in Table 3-2, elevated radiation readings appear to be "clustered" in the general vicinity of specific buildings. In particular, elevated readings were recorded at eight locations in the

Table 3-1

LOCATIONS WHERE SURFACE EMISSION OVA
READINGS ABOVE BACKGROUND[a] WERE RECORDED
NAS PENSACOLA SITE 36

Coordinate[b]	Portion of Line[c]	Location[d]	OVA Reading[e]
SG019+055W	NE	East of Building 3644	2.0
SG032+70S	NE	Manhole B-1A, west of Building 3819	20
SG079	SE	Northeast of Building 796	1.5
SG088+25S	SE	Manhole A-10-2, north of Building 606	1.5
SG102	SE	Lined trench north of Building 3557 (Site 341	200
SG108	SE	Manhole A-6C, east of Building 3557	280
SG150+30E	NW	southeast of Building 3220	2.0
SG170	NW	Southeast of Building 649 (Site 301	2.5
		Manhole B-5A, southeast of Building 649 (Site 301	550
SG170+10NW	NW	Southeast of Building 649 (Site 30)	2.5
SG170+50NW	NW	Southeast of Building 649 (Site 30)	1.2
SG171	NW	Southeast of Building 649 (Site 301	1.5
		Standing water southeast of Building 649 (Site 301	5.0
SG171+100NW	NW	Manhole B-6, south of Building 649 (Site 301	150
SG172	NW	Manhole B-7, wouth of Building 649 (Site 301	280
SG172+35NW	NW	South of Building 649 (Site 301	4.0
SG180+99E	SE	Manhole A-7, southwest of Building 3460	12
SO196	SE	Manhole A-6B, east of Building 3557	25
SG210	NW	East of Building 2691	5.0
SG218+170E	SE	West of Building 631	3.5
SG220	SE	Manhole (unidentified). west of Building 3588	1.5

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Key:

[a]The background levels for Site 36 were 4.0 and 7.0 parts per million (ppm).
[b]Coordinates referenced in Appendix C and described in Section 3.4 of text.
[c]See plates 1 and 2. as well as Appendix A NAVFAC drawings, to identify specific locations.
[d]Reading in ppm above background.

Source: Ecology and Environment, Inc., 1992.

Table 3-2

LOCATIONS WHERE ELEVATED RADIATION READINGS WERE RECORDED NAS PENSACOLA SITE 36

Coordinate[b]	Portion of Line[c]	Location[c]	Radiation Reading[a]
SG009+25NE	NE	West of IWTP	46,661
SG040+25W	SE	Between buildings 71 and 104	>100,000
SG040+25E	SE	Between buildings 71 and 104	>100,000
SG046	SE	South of Building 604	46,667
SG049	SE	South of Building 604	53,333
SG049+505W	SE	South of Building 604	46,667
SG050	SE	South of Building 604	48,000
SG053	SE	South of Building 604	45,333
SG057+10E	SE	South of Building 18, east of Building 604	61,333
SG057+99E	SE	South of Buildino 18, east of Building 604	50,000
SG062	SE	East of Building-604	46,667
SG073	SE	West of Building 627	60,000
SG074	SE	Northwest of Building 627	53,333
SG076	SE	West of Building 2662	46,667
SG078	SE	Northuost of Building 2662	46,667
SG078+255E	SE	Northwest of Building 2662	45,333
SG135+25S	SW	Northuost of Building 624	46,667
SG140+25SW	SW	Southwost of Building 624	46,667
SG140+35SW	SW	Southwost of Building 624	66,667
SG140+40SW	SW	Southwost of Building 624	53,333
SG171+100NW	NW	Manhole B-6, south of Building 649 (Site 30)	>66,667
SG173+99SE	NW	South of Building 649B (Site 30)	51,333
SG192	NW	Southeast of Building 141	40,667
SG192+20SE	NW	Southeast of Building 741	55,333
SG193	NW	East of Buildinq 741	55,333
SG194	NW	East of Building 741	52,000

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Key:

[a]Readings greater than 45.000 disintegrations per minute (dpm; approximately 2 times tho lower end of tho background range of 21,333 to 24.667 dpm) are considered elevated for tho purpose of this report.
[b]Coordinates referenced in Appondix C and described in Section 3.5 of text.
[c]See plates 1 and 2, as well as Appendix A NAVFAC drawings, to identify specific locations.
[d]Reading in dpr.

Source: Ecology and Environaont, Inc., 1992

vicinity of Building 604 (southeast portion of line), four locations in the vicinity of Building 741 (northwest portion of line), and four locations in the vicinity of Building 624 (southvest portion of line; see Plate 1). It should be noted that Building 741 is located in the general vicinity of the two potential radiation-contamination sites on NAS Pensacola: immediately east of Site 27 (Radium Dial Shop Sewer) and southwest of Site 25 (Radium Spill Area; see Figure 1-2). However, the highest radiation readings were recorded in areas about 25 feet west and 25 feet east of the sewer line betveen buildings 71 and 104 (>100,000 dpm; southeast portion of line) and in manhole B-6, south of Building 649 (>66,667 dpm; Site 30--northwest portion of line; see Plate 1).

3.6 HYDROLOGIC ASSESSMENT

3.6.1 Shallov Subsurface Lithology

Based on information collected during the completion of the borings along the sewer line, the shallow subsurface lithology beneath Site 36 can be generally characterized as unconsolidated; well-sorted; brown, tan, grey, and white; medium-grained quartz sands overlying unconsolidated; moderately sorted; vhite, grey, yellow, and tan; fine- to medium-grained quartz sands. However, fine-grained quartz sands were not uncommon in the upper 5 feet of the subsurface, and coarse-grained quartz sands were not uncommon to a depth of 10 feet BLS. No significant variation in shallov subsurface lithology across the length of the sewer line was readily apparent.

Fill material (red clay, shells, and/or wood debris) was locally present to a depth of 5 feet BLS, and organic peat layers were locally present to a depth of 10 feet BLS. Green-stained soil was encountered at boring location B063 (east of Building 604; see plates 1 and 3). Petroleum product-coated soils vere encountered at boring locations B039 (south of Building 104) and B058 (east of Building 604; see plates 1 and 3).

Appendix D presents the lithologic logs for the 121 soil borings completed along Site 36.

3.6.2 Water Levels and Groundvater Plov

Table 3-3 lists the water levels measured in the temporary wells installed along Site 36 and the corresponding water level elevations calculated using these data. Plate 4 is a plot of the calculated water level elevations for the upper portion of the surficial zone of the Sand-and-Gravel Aquifer across Site 36. Plate 4 also shows water level elevation isopleths and corresponding groundwater flow directions based on the Site 36 water level elevation data, as well as on groundwater flow maps generated using temporary and/or permanent well water level elevation data gathered during the Phase I investigations of the NAS Pensacola sites located near Site 36 (see Figure 1-2).

As shown in Table 3-3, the water table is most commonly encountered within 5 feet of land surface. Somewhat deeper water levels (5 to 10 feet BLS) were primarily encountered along the southwestern portion of the sewer line, the segment of the southeast portion of the sewer line between Pump Station No. 1 and the midpoint of Building 604, and the segment of the northwest portion of the sewer line immediately north of Pump Station No. 2 (see Plate 1). The depth to the water table was even greater (10 to 22 feet BLS) in the two topographically higher areas along the northwest portion of the sewer line: in the area of buildings 741, 3220, and 3450; and in the area west and northwest of Building 649 (see Plate 1).

Plate 4 indicates that a generally complex, multidirectional groundwater flow system exists in the upper portion of the surficial zone of the Sand-and-Gravel Aquifer across the area encompassed by Site 36. Overall, groundwater flow directions appear to reflect three major influences: 1) discharge into Pensacola Bay and Bayou Grande; 2) the presence of higher water level elevations in the topographically higher areas along the northwest portion of the sewer line; and 3) "mounding" of the water table in the southern half of Chevalier Field. However, other influences appear to be present on at least a local basis. Horizontal hydraulic gradients are steepest along the east and southeast flow paths emanating from the northwest corner of the site (on the order of 0.01) and much gentler along the flow paths reflecting discharge into Pensacola Bay (on the order of between 0.002 and 0.006).

Table 3-3

TEMPORARY MONITORING WELL CONSTRUCTION INFORMATION
AND WATER LEVEL ELEVATIONS
NAS PENSACOLA SITE 36

Well Number	Total Depth (BLS)	Depth to Water (BLS)	Depth to Water BTOC	TOC Elevation	Water Level Elevation	Date Measured
Two02	7.06	3.77	6.79	7.35	0.56	8/13/91
TW004	8.65	4.04	5.41	6.05	0.64	8/13/91
TW005	6.56	3.86	7.26	7.85	0.59	8/13/91
Two07	6.50	4.33	7.90	8.51	0.61	8/13/91
TW009	7.17	3.65	6.58	7.26	0.68	8/13/91
TW011	7.46	4.88	7.54	8.48	0.94	8/14/91
TW014	9.30	5.80	6.60	7.47	0.87	6/14/91
TW018	6.50	3.02	6.50	7.88	1.38	8/14/91
Two20	7.38	3.71	6.33	7.72	1.39	8/14/91
Two22	7.33	4.36	7.09	8.37	1.28	8/14/91
Two24	9.01	5.55	6.64	8.47	1.83	8/14/91
Two26	9.03	5.81	6.82	8.18	1.36	8/14/91
TW028	9.17	5.85	6.62	8.05	1.43	8/14/91
TW030	9.09	5.81	6.64	8.04	1.40	8/14/91
TW032	8.20	6.92	8.72	10.32	1.60	8/14/91
TW034	4.88	3.12	3.24	4.40	1.16	7/10/91
TW036	4.70	3.20	3.50	4.63	1.13	7/10/91
Two38	7.98	4.45	6.47	6.99	0.52	7/10/91
TW039	6.07	4.23	6.16	7.07	0.91	7/10/91
TU040	13.00	3.94	5.94	7.22	1.28	7/09/91
TW042	12.78	4.87	6.91	8.07	1.16	7/09/91
TW044	9.03	5.20	6.17	7.54	1.37	7/14/91
Two45	9.11	5.50	6.39	7.86	1.47	7/10/91
TW046	9.11	5.82	6.71	8.27	1.56	7/11/91
Two48	8.95	5.09	6.14	7.88	1.74	7/11/91
Two49	8.52	5.53	7.01	8.88	1.87	7/12/91

14[NASP]UH8069:T0365/737/22

Key at end of table.

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Table 3-3 (Cont.)

Well Numb. r	Total Depth (BLS)	Depth to Water (BLS)	Depth to Water BTOC	TOC Elevation	water Level Elevation	Date Measured
Two53	8.93	5.39	6.46	7.89	1.43	7/11/91
TW054	9.13	6.02	6.89	8.33	1.44	7/11/91
TW055	8.93	5.50	6.57	7.99	1.42	7/11/91
Two57	9.03	5.59	6.56	8.15	1.59	7/12/91
TW058	8.71	--	--	9.14	--	7/12/91
TW060	8.96	6.31	7.35	9.04	1.69	7/12/91
Two63	8.76	6.58	7.56	9.29	1.73	7/11/91
TW066	7.16	3.52	6.14	8.28	2.14	7/14/91
TW068	6.99	2.99	5.76	8.03	2.27	7/13/91
TW069	7.00	2.82	5.54	8.06	2.52	7/13/91
TW070	6.82	2.24	5.39	7.96	2.57	7/13/91
TW072	8.81	4.04	5.19	8.05	2.86	7/14/91
TW074	8.45	4.25	5.77	9.10	3.33	7/15/91
TW076	7.17	2.97	5.59	0.79	3.20	7/17/91
TW078	6.32	2.25	6.13	9.90	3.77	7/14/91
TW079	4.79	1.95	2.24	5.64	3.40	7/17/91
TW081	5.87	2.69	6.70	9.70	3.00	7/15/91
TW082	6.15	2.31	6.24	8.94	2.70	7/15/91
TW085	7.93	3.34	5.27	9.53	4.26	7/14/91
TW086	7.01	3.59	6.63	10.76	4.13	7/14/91
TW088	7.76	4.65	6.72	10.45	3.73	7/15/91
Two90	9.55	5.65	6.15	10.64	4.49	7/14/91
TW091	7.06	5.02	7.85	12.52	4.67	7/15/91
TW093	7.06	4.73	7.77	12.70	4.93	7/15/91
TW096	7.26	3.94	6.70	11.39	4.69	7/16/91
TW097	8.30	3.80	5.38	10.22	4.84	7/16/91
TW098	8.11	3.85	5.59	10.40	4.81	7/16/91
TW100	7.87	3.89	5.95	10.77	4.82	7/16/91
TW101	8.08	4.99	6.95	11.77	4.82	7/16/91
TW102	9.54	6.21	6.75	10.47	3.72	7/17/91
TW103	4.08	3.28	4.20	7.98	3.78	7/18/91
TW105	5.78	3.91	7.86	10.50	2.64	7/18/91
TW106	6.66	1.92	5.04	8.06	3.02	7/18/91
TW107	9.26	4.98	5.60	9.94	4.34	7/17/91
TW109	8.81	4.71	5.70	10.31	4.61	7/17/91
TW112	7.35	4.00	6.75	--	--	7/19/91
TW114	7.86	3.44	5.60	9.76	4.16	7/19/91
TW116	8.90	5.66	6.80	12.01	5.21	7/19/91

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Key at end of table.

Table 3-3 (Cont.)

Well Number	Total Depth (BLS)	Depth to Water (BLS)	Depth to Water BTOC	TOC Elevation	Water Level Elevation	Date Measured
TW118	9.70	6.72	7.14	12.80	5.66	7/19/91
TW120	12.34	8.63	11.27	17.64	6.37	7/19/91
m 2 2	13.51	9.52	11.08	17.40	6.32	7/19/91
TU124	11.53	7.24	10.72	16.40	5.68	7/19/91
TW126	9.71	6.31	6.60	12.29	5.69	7/19/91
TW127	9.39	5.77	6.40	12.06	5.66	7/19/91
TU129	9.22	5.22	5.85	11.78	5.93	7/19/91
TU131	9.27	5.15	5.80	10.70	4.90	7/19/91
TW133	9.04	5.17	6.15	11.06	4.91	7/19/91
TU135	9.27	4.95	5.68	11.01	5.33	7/19/91
TW137	9.09	6.16	7.19	11.89	4.70	8/01/91
TU139	8.98	6.86	7.98	11.94	3.96	8/01/91
TU140	9.99	7.13	1.24	10.62	3.38	8/01/91
TU141	11.41	7.93	11.59	15.34	3.75	8/08/91
TW145	16.75	11.93	15.33	21.70	6.37	8/09/91
TU148	19.84	17.34	17.57	24.58	7.01	8/07/91
TW151	24.80	20.40	25.32	31.65	6.33	8/06/91
TU153	26.39	21.54	25.09	31.35	6.26	8/05/91
TW154	22.90	20.82	22.92	29.41	6.49	8/05/91
TW155	22.42	19.40	22.12	29.04	6.92	8/06/91
TW156	7.06	2.60	5.58	8.51	2.93	8/08/91
TW158	4.81	1.91	2.28	6.16	3.88	8/08/91
TW160	5.74	1.54	5.58	8.92	3.34	7/18/91
TW161	7.64	2.56	5.11	7.88	2.77	7/18/91
TU162	9.19	5.58	6.47	9.38	2.91	8/05/91
TW164	11.65	6.37	10.32	13.77	3.45	8/05/91
TW167	11.27	6.98	10.81	12.57	1.76	8/05/91
TW168	12.61	8.74	11.10	17.11	6.11	8/05/91
TU169	4.98	1.14	1.24	6.96	5.72	8/06/91
TU172	3.67	1.44	2.84	12.00	9.16	8/05/91
TU174	8.11	4.77	6.76	8.46	1.70	8/03/91
TW176	8.54	4.44	6.00	--	--	7/18/91
TU178	6.98	3.98	7.10	8.86	1.76	8/05/91
TW181	7.36	3.09	5.53	9.11	3.58	7/17/91
TW183	5.77	1.43	5.66	9.92	4.26	7/18/91
TW185	19.28	16.67	17.54	23.82	6.28	8/02/91
TW187	18.63	15.52	17.02	24.06	7.04	8/02/91
TW190	19.20	17.36	18.22	25.75	7.53	8/03/91

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Key at end of table.

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Table 3-3 (Cont.)

Well Number	Total Depth (BLS)	Depth to Water (BLS)	Depth to Water BTOC	TOC Elevation	Water Level Elevation	Date Measured
TW193	17.72	13.33	15.65	24.83	9.18	8/02/91
TW195	14.36	13.61	14.13	21.01	6.88	8/26/91
TW197	7.66	2.95	5.35	10.09	4.74	7/17/91
TW199	7.02	2.50	5.49	9.77	4.28	8/02/91
TW201	7.07	3.24	6.26	10.61	4.35	8/02/91
TW203	7.44	2.94	5.52	7.83	2.31	8/03/91
TW205	11.63	6.93	10.40	13.67	3.27	8/06/91
TW206	21.95	17.67	20.61	31.14	10.53	8/07/91
TW208	20.91	16.34	20.43	32.05	11.62	8/07/91
TW209	19.18	15.04	15.67	27.11	11.44	8/07/91
TW213	19.23	18.04	18.87	27.40	8.53	8/07/91
TW216	9.50	4.73	5.23	6.47	1.24	7/10/91
TW220	6.16	3.10	7.03	11.68	4.65	7/18/91
TW222	7.73	3.79	6.17	10.44	4.27	8/02/91
TW223	21.83	17.82	20.89	25.74	4.85	8/08/91
TW225	25.66	21.70	26.04	31.70	5.66	8/09/91
TW226	20.18	17.88	22.70	28.90	6.20	8/09/91

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Notes :

All depths are in feet: all elevations are in feet referenced to mean sea level (MSL); and all wells were constructed of 2-inch diameter stainless steel with 5 feet of 0.01-inch screen.

Key :

A dash (--) indicates measurement not taken.

BLS = Below land surface.
TOC = Top of casing.
BTOC = Below top of casing.

Source: Ecology and Environment, Inc., 1992.

Although the water level elevations shovn on Plate 4 were calculated based on measurements performed over a 37-day period, the resulting isopleth map, groundwater flow directions, and hydraulic gradients overall appear to be representative of prevailing conditions. This conclusion is based on overall consistency with corresponding maps developed in conjunction with the Phase I investigations of nearby sites on NAS Pensacola (see Figure 1-Z), as well as overall consistency with the flow patterns that would be expected based on such physical controls on flow as topographic elevation and discharge to surface water bodies. However, it should be noted that the anomalous water level elevation determined for temporary well TW095 (see Plate 3) was not honored in the Plate 4 isopleth map because the water level measurement in this well vas performed 12 days after completion of all other water level measurements.

3.7 SOIL-GAS SURVEY

Appendix E presents the results of the soil-gas survey conducted along the industrial waste sever line. Plate 5 shovs the distribution of methane-corrected soil-gas readings along the sever line. For the purpose of this report, readings greater than 50 ppm are considered elevated. At a number of locations, both the filtered and unfiltered readings could only be quantified as being greater than 1,000 ppm. Although the high filtered readings could be entirely due to the presence of methane, they could also reflect the presence of "contaminant" organic vapors at concentrations sufficiently high to "break through" the filter. Consequently, these readings are listed as "(>1,000)*" on Plate 5 and referred to as "potentially elevated" in this report.

Sampling locations along the northwest and southeasternmost portions of the sever line exhibited the greatest concentrations of elevated and/or potentially elevated methane-corrected soil-gas readings. Along the northvest portion of the line, vhich encompasses buildings 649 and 755 (Site 30), the highest readings (>500 ppm) were recorded along the line segment between buildings 755 and 692 and along the line segment running southeast from Building 741 (see plates 1 and 5). Along the southeast portion of the line, which primarily includes all line segments south of Building 604 and encompasses at least a

portion of Site 20, locations where readings greater than 500 ppm were recorded are more widely distributed (see Figure 1-2 and plates 1 and 5).

Potentially elevated soil-gas readings (i.e., filtered and unfiltered readings were >1,000 ppm) were recorded at seven locations (SG013 and SG016 through SG021) along the line segment running northeast from the northwest corner of Chevalier Field (see plates 1 and 5). Elevated and/or potentially elevated readings were also detected at the following, more localized, sampling points (see plates 1 and 5):

- West of Building 624 (southwest portion of line; SG137 and SG138);
- East-northeast of Building 3328 (southwest portion of line; SG120, SG121, and SG122);
- Between Murray Road and Moffett Road (southwest portion of line; SG113 and SG114);
- Between Taylor Road and Murray Road (southwest portion of line; SG156 and SG160);
- North of Building 3557 (Site 34--southeast portion of line; SG102, SG103, and SG105);
- East of Murray Road (southeast portion of line; SG203);
- East of Building 3588 (southeast portion of line; SG090);
- Northwest of Building 627 (southeast portion of line; SG074 and SG075); and
- South of Building 2662 (southeast portion of line; SG081).

3.8 CHEMICAL ANALYSES

The following sections present the results of the laboratory analyses of the soil and groundwater samples collected along Site 36. The specific analytical parameters and parameter groups are listed or referenced in Table 2-2.

3.8.1 Soil

Table 3-4 summarizes the analytical screening results for soil samples collected along Site 36 and presents the Resource Conservation

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Table 3-4

SUMMARY ANALYTICAL SCREENING RESULTS FOR SOIL SAMPLES
NAS PENSACOLA SITE 36
(All results in μg/kg, unless noted)

Parameter	Detection Limit	Sample Number (Location and Depth Interval)						PCAL[a]
		P36S002A (B002A)	P36S002B (B0028)	P36S004A (B004A)	P36S004B (B004B)	P36S004BD[b] (B004BI	P36S005A (B005A)	
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	9.0	—	9.6	1.3	—	6.1	4×10^{2}
Zinc (mg/kg)	2.0	4.2	2.6	6.4	—	—	8.1	1.6×10^{4}
Lead (mg/kg)	4.0	—	—	—	—	—	16	
Cadmium (mg/kg)	0.50	—	—	—	—	—	1.3	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	—	—	—	—	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	—	—	—	—	—	—	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	—	—	—	—	—	2,000	
Phenols as Trichlorophenol	2,000	—	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

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Key at end of table.

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval) P36S005B (B005B)	P36S007A (B007A)	P36S007B (B007B)	P36S009A (B009A)	P36S009B (B009B)	P36S011A (B011A)	PCAL[a]
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	15	2.5	2.5	1.5	—	3.0	4×10^{2}
Zinc (mg/kg)	2.0	6.2	4.6	3.3	2.4	—	4.1	1.6×10^{4}
Lead (mg/kg)	4.0	18	43	21	7.7	—	18	
Cadmium (mg/kg)	0.5	1.1	—		—	—	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—		—	—	—	2×10^{3}
Copper (mg/kg)	2.5	—	7.7	4.1	—	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	—	—	—	—	—	—	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{5}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	1,100	1,300	(L)	—	—	2,000	
Phenols as Trichlorophenol	2,000	—	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

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Key at end of table.

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval)						PCAL[a]
		P36S011B (B011B)	P36S014A (B014A)	P36S014B (B014B)	P36S016A (B016A)	P36S018A (B018A)	P36S020A (B020A)	
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	—	13	2.4	5.7	11	—	4×10^{2}
Zinc (mg/kg)	2.0	—	50	2.1	63	3.5	2.9	1.6×10^{4}
Lead (mg/kg)	4..0	—	150	—	630	—	—	
Cadmium (mg/kg)	0.5	—	23	—	6.4	—	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	—	5.0	—	11	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	—	150	—	88	7.4	—	
Ethylbenzene	1,000	—		—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—		—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	—	4,300	(L)	99,000	(L)	(L)	
Phenols as Trichlorophenol	2,000	—	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

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Key at end of table.

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Table 3-4 (Coat.)

Parameter	Detection Limit	sample Number (Location and Depth Interval)						PCAL[a]
		P36S022A (B022A)	P36S024A (B024A)	P36S026A (B026A)	P36S028A (B028A)	P36S030A (B030A)	P36S032A (B032A)	
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	1.3	—	22	41	11	—	4×10^{2}
Zinc (mg/kg)	2.0	52	—	—	2.9	2.0	—	1.6×10^{4}
Lead (mg/kg)	4.0	—	—	—	12	—	—	
Cadmium (mg/kg)	0.5	—	—	—	—	—	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	3.0	—	—	—	2.5	12	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	5.6	—	—	—	—	—	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	—	—	—	—	—	—	
phenols as Trichlorophenol	2,000	—	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

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Key at end of table.

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval) P36S034A (B034A)	P36S036A (B036A)	P36S036AD[c] (B036A)	P36S038A (B038A)	P36S038B (B038B)	P36S039A (B039A)	PCAL[a]
Arsenic (mg/kg)	6.0	—[n]	—[n]	—[n]	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	7.9	2.6	3.8	—	—	30	4×10^{2}
Zinc (mg/kg)	2.0	15	7.3	9.2	14	11	58	1.6×10^{4}
Lead (mg/kg)	4.0	26	12	22	28	18	100	
Cadmium (mg/kg)	0.5	—	—	—	—	—	3.0	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	15	7.1	9.2	11	32	18	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	37	63	49	—	36	690	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	(L)	—	—	—	—	—	
Phenols as Trichlorophenol	2,000	6,500	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

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Key at end of table.

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval) P36.50398 (B039B)	P36S040A (B040A)	P36S040B (B040B)	P36S040C (B040C)	P36S042A (B042A)	P36S042B (B042B)	PCAL[a]
Arsonic (mg/kg)	6.0	—	—[n]	—[n]	—[n]	—[n]	—[n]	8×10^{1}
Chromium (mg/kg)	1.0	8.2	1.6	1.0	1.4	6.1	2.9	4×10^{2}
Zinc (mg/kg)	2.0	95	16	3.4	2.4	9.1	4.4	1.6×10^{4}
Lead (mg/kg)	4.0	78	77	—	6.3	26	13	
Cadmium (mg/kg)	0.5	1.2	—	—	—	—	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	460	11	—	—	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	280	63	40	19	44	32	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	1,600	—	—	—	4,100	1,100	
Phenols as Trichlorophenol	2,000	—	—	—	—	6,900	1,500	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

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Key at end of table.

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval)						PCAL[a]
		P36S042C (B042C)	P36S044A (B044A)	P36S044B (B044B)	P36S045A (B045A)	P36S045B (B045B)	P36S045C (B045C)	
Arsenic (mg/kg)	6.0	—[n]	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	1.3	2.4	—	—	—	—	4×10^{2}
Zinc (mg/kg)	2.0	—	20	—	19	—	2.4	1.6×10^{4}
Lead (mg/kg)	4.0	—	31	—	30	—	—	
Cadmium (mg/kg)	0.5	—	—	—	—	—	—	4×10^{1}
Nickel (mg/kg)	4.0	—		—	—	—	—	2×10^{3}
Copper (mg/kg)	2.s	—	10	—	4.9	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	9.9	100	29	64	—	13	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	—	1,200	—	—	—	4,900	
Phenols as Trichlorophenol	2,000	—	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

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Key at end of table.

1120211

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval)						PCAL[a]
		P36S046A (B046A)	P36S046B (B046B)	P36S048A (B048A)	P36S048B (B048B)	P36S049A (B049A)	P36S049B (B049B)	
Arsenic (mg/kg)	6.0	—	—	—	—	6.4	—	8×10^{1}
Chromium (mg/kg)	1.0	5.1	13	16	5.2	12	17	4×10^{2}
Zinc (mg/kg)	2.0	74	46	40	2.5	95	32	1.6×10^{4}
Lead (mg/kg)	4.0	110	56	79	—	88	66	
Cadmium (mg/kg)	0.5	3.7	5.7	3.0	—	4.7	3.8	4×10^{1}
Nickel (mg/kg)	4.0	—	5.5	9.1	—	4.6	—	2×10^{3}
Copper (mg/kg)	2.5	36	35	20	—	46	22	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	1,300	80	440	25	85	86	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	(L)	—	—	—	—	1,100	
Phenols as Trichlorophenol	2,000	—	—	6,000	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

14[NASP]UH8069:T0365/819/3

Key at end of table.

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval) P36S053A (B053A)	P36S053B (B053B)	P36S054A (B054A)	P36S054B (B054B)	P36S055A (B055A)	P36S055B (B055B)	PCAL[a]
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	1.8	—	2.3	—	2.0	—	4×10^{2}
Zinc (mg/kg)	2.0	14	12	5.9	4.7	24	—	1.6×10^{4}
Lead (mg/kg)	4.0	200	40	27	—	70	—	
Cadmium (mg/kg)	0.5	—	—	—	—	—	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2S	31	4.8	—	—	8.6	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	220	67	25	25	310	39	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	300,000	1,700	—	—	2,100	—	
Phenols as Trichlorophenol	2,000	410,000	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

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Key at end of table.

350021 2

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval)						PCAL[a]
		P36S057A (B057A)	P36S057B (B057B)	P36S058A (B058A)	P36S058B (B058B)	P36S060A (B060A)	P36S060B (80608)	
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{-1}
Chromium (mg/kg)	1.0	2.8	3.0	8.0	4.2	3.9	1.0	4×10^{2}
Zinc (mg/kg)	2.0	47	16	21	14	15	13	1.6×10^{4}
Lead (mg/kg)	4.0	98	31	55	51	27	17	
Cadmium (mg/kg)	0.5	—	—	0.69	—	—	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	5.1	—	8.2	7.2	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	2.5	3.0	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	35	24	210	8,400	39	57	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	(L)	—	—	74,000	6,600	4,200	
Phenols as Trichlorophenol	2,000	—	—	—	660,000	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

14[NASP]UH8069:T0365/819/3

Key at end of table.

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval) P36S063A (B063A)	P36S063B (B063B)	P36S066A (B066A)	P36S066B (B066B)	P36S068A (B068A)	P36S068B (B068B)	PCAL[a]
Arsenic (mg/kg)	6.0	6.0	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	3.8	—	1.1	—	4.8	1.3	4×10^{2}
Zinc (mg/kg)	2.0	28	6.3	7.8	—	73	4.4	1.6×10^{4}
Lead (mg/kg)	4.0	110	30	19	—	79	12	
Cadmium (mg/kg)	0.5	2.7	1.5	—	—	—	0.65	4×10^{1}
Nickel (mg/kg)	4.0	4.6	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.s	16	3.6	—	—	3.6	—	2.5×10^{3}
Silver (mg/kg)	1.0	2.0	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	77	6,200	37	48	15	58	
Ethylbenzene	1,000	—	2,100	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	9,400	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	—	3,000	—	—	—	—	
Phenols as Trichlorophenol	2,000	—	59,000	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

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Key at end of table.

3500213

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval)						PCAL[a]
		P36S069A (B069A)	83680698 (80698)	P36S070A (B070A)	P36S070B (B070B)	P36S072A (B072A)	P36S072B (B072B)	
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	5.6	1.0	2.5	—	1.8	1.9	4×10^{2}
Zinc (mg/kg)	2.0	14	2.8	16	3.1	8.3	2.4	1.6×10^{4}
Lead (mg/kg)	4.0	51	—	63	—	30	—	
Cadmium (mg/kg)	0.5	0.52	—	—	—	—	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	2.5	—	5.7	—	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	36	52	19	8.6	300	37	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	—	—	—	—	—	—	
Phenols as Trichlorophenol	2,000	—	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

14[NASP]UH8069:T0365/819/3

Key at end of table.

2600214

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval) P36S074A (B074A)	93650748 (B074B)	P36S076A (B076A)	P36S076B (B076B)	P36S078A (B078A)	P36S078B (B078B)	PCAL[a]
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	5.8	—	1.6	—	4.5	—	4×10^{2}
Zinc (mg/kg)	2.0	50	—	51	15	26	9.1	1.6×10^{4}
Lead (mg/kg)	4.0	96	—	230	25	84	—	
Cadmium (mg/kg)	0.5	—	—	—	—	0.55	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	6.3	—	5.0	—	8.1	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	94	28	97	11	130	14	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	23,000	—	1,200	—	—	—	
Phenols as Trichlorophenol	2,000	110,000		—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

14[NASP]UH8069:T0365/819/3

Key at end of table.

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval)						PCAL[a]
		P36S079A (079A)	P36S079B (B079B)	P36S081A (B081A)	P36S081B (B081B)	P36S082A (B082A)	P36S082AD[d] (B082A)	
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^1
Chromium (mg/kg)	1.0	—	—	2.1	—	3.4	3.4	4×10^2
Zinc (mg/kg)	2.0	8.9	—	31	—	16	16	1.6×10^4
Lead (mg/kg)	4.0	25	—	86	—	68	46	
Cadmium (mg/kg)	0.5	—	—	—	—	—	0.70	4×10^1
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^3
Copper (mg/kg)	2.5	—	—	5.7	—	—	2.8	2.5×10^3
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^2
TRPHs (mg/kg)	5.0	57	18	32	20	3,400	3,800	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^6
Total Xylenes	1,000	—	—	—	—	—	—	2×10^8
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^4
Total PAHs as Benzo-a-pyrene	1,000	—	—	—	—	1,100	1,100	
Phenols as Trichlorophenol	2,000	—	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^1

14[NASP]UH8069:T0365/819/3

Key at end of table.

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval) P36S082B (B082B)	P36S085A (B085A)	P36S085B (B085B)	P36S086A (B086A)	P36S086B (B086B)	P36S088A (B088A)	PCAL[a]
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	—	3.0	5.1	3.1	1.1	—	4×10^{2}
Zinc (mg/kg)	2.0	—	6.8	10	11	—	5.9	1.6×10^{4}
Lead (mg/kg)	4.0	—	20	14	34	—	14	
Cadmium (mg/kg)	0.5	—	—	0.63	0.83	—	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	—	—	—	s.4	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	37	6.3	9.3	140	—	58	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	—	—	(L)	—	—	—	
Phenols as Trichlorophenol	2,000	—	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

14[NASP]UH8069:T0365/819/3

Key at end of table.

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval) P36S088B (B088B)	P36S090A (B090A)	P36S090B (B090B)	P36S091A (B091A)	P36S091B (B091B)	P36S093A (B093A)	PCAL[a]
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	—	1.9	—	1.6	2.8	1.0	4×10^{2}
Zinc (mg/kg)	2.0	16	2.7	3.8	6.9	5.3	3.7	1.6×10^{4}
Lead (mg/kg)	4.0	—	—	10	12	—	—	
Cadmium (mg/kg)	0.5	0.87	—	—		—	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	—	—	—	10	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	23	33	27	30	280	25	
Ethylbeneeno	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	—	—	—	—	(L)	—	
Phenols as Tcichlorophenol	2,000	—	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

14[NASP]UH8069:T0365/819/3

Key at end of table.

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval) P36S093B (B093B)	P36S096A (B096A)	P36S096B (B096B)	P36S097A (B097A)	P36S097B (B097B)	P36S098A (B098A)	PCAL[a]
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	—	2.0	—	2.8	—	2.4	4×10^{2}
Zinc (mg/kg)	2.0	5.1	2.6	4.9	2.5	—	4.0	1.6×10^{4}
Lead (mg/kg)	4.0	14	—	—	—	—	—	
Cadmium (mg/kg)	0.5	—	—	—	—	—	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	—	—	—	—	—	3.7	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	42	140	17	30	31	110	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	(L)	—	—	—	—	—	
Phenols as Trichlorophenol	2,000	—	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

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Key at end of table.

3600216

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval) P36S098B (B098B)	P36S100A (B100A)	P36S100B (B100B)	P36S101A (B101A)	P36S101B (B101B)	P36S102A (B102A)	PCAL[a]
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	1.8	1.7	2.1	2.6	—	—	4×10^{2}
Zinc (mg/kg)	2.0	2.0	4.5	3.0	7.0	—	—	1.6×10^{4}
Lead (mg/kg)	4.0		13	—	16	—	—	
Cadmium (mg/kg)	0.5	—	—	—	—	0.73	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	—	—	—	—	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	43	21	20	58	30	—	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	—	—	—	—	—	—	
Phenols as Trichlorophenol	2,000	—	—	—	—	—	—	
Dieldrin	1,000	—	(L)	(L)	(L)	—	—	4×10^{1}

14[NASP]UH8069:T0365/819/3

Key at end of table.

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval) P36S102AD[a] (B102A)	P36S102B (B102B)	P36S103A (B103A)	P36S103B (B103B)	P36S105A (B105A)	P36S105B (B105B)	PCAL[a]
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	1.1	—	6.5	3.4	4.6	2.8	4×10^{2}
Zinc (mg/kg)	2.0	—	—	6.7	4.3	11	4.8	1.6×10^{4}
Lead (mg/kg)	4.0	—	—	—		—	11	
Cadmium (mg/kg)	0.5	—	—	0.54	0.71	0.51	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.s	—	—	—	—	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	—	—	37	22	29	25	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	—	(L)	—	—	—	(L)	
Phenols as Trichlorophenol	2,000	—	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

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Key at end of table.

360021 7

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval) P36S106A (B106A)	P36S106B (B106B)	P36S107A (B107A)	P36S107B (6107B)	P36S109A (B109A)	P36S109B (B109B)	PCAL[a]
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	4.0	1.9	24	24	1.2	8.9	4×10^{2}
Zinc (mg/kg)	2.0	3.6	2.6	3.5	2.9	2.1	—	1.6×10^{4}
Lead (mg/kg)	4.0	17	—	—	—	—	—	
Cadmium (mg/kg)	0.5	—	—	—	—	—	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	11	—	—	2×10^{3}
Copper (mg/kg)	2.5	—	—	—	—	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	93	—	16	16	—	46	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	—	—	—	(L)	—	(L)	
Phenols as Trichlorophenol	2,000	—	—	—	9,000	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

14[NASP]UH8069:T0365/819/3

Key at end of table.

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval) P36S112A (B112A)	P36S112B (B112B)	P36S112C (B112C)	P36S114A (B114A)	P36S114B (B114B)	P36S116A (B116A)	PCAL[a]
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	3.9	2.8	—	3.4	1.6	1.8	4×10^{2}
Zinc (mg/kg)	2.0	17	18	2.4	11	—	7.5	1.6×10^{4}
Lead (mg/kg)	4.0	57	29	—	30	—	—	
Cadmium (mg/kg)	0.5	—	—	—	—	—	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	3.2	—	—	—	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	15	30	11	7.4	—	16	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	(L)	(L)	—	—	—	—	
Phenols am Trichlorophenol	2,000	—	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

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Key at end of table.

360021 8

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval) P36S116AD[f] (B116A)	P36S116B (B116B)	P36S118A (B118A)	P36S118B (B118B)	P36S120A (B120A)	P36S120B (B120B)	PCAL[a]
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	2.2	2.0	2.6	—	1.9	2.3	4×10^{2}
Zinc (mg/kg)	2.0	3.3	4.9	2.1	4.6	2.0	2.9	1.6×10^{4}
Lead (mg/kg)	4.0	—	—	27	—	16	—	
Cadmium (mg/kg)	0.5	—	—	—	—	—	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	—	—	—	—	—		2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	—	—	12	9.7	—	—	
Ethylbenzbne	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	—	—	—	12,000	—	—	
Phenols as Trichlorophenol	2,000	—	—	—	5,200	—	—	
Dibldrin	1,000	—	—	—	—	—	—	4×10^{1}

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Key at end of table.

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval) P36S120C (B120C)	P36S122A (B122A)	P36S122B (B122B)	P36S122C (B122C)	P36S124A (B124A)	P36S124B (B124B)	PCAL[a]
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	—	3.1	—	—	1.7	—	4×10^{-2}
Zinc (mg/kg)	2.0	—	4.0	—	3.5	3.3	—	1.6×10^{4}
Lead (mg/kg)	4.0	—	20	—	—	—	—	
Cadmium (mg/kg)	0.5	—	—	—	—	—	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	—	—	—	—	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	—	30	11	—	53	—	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	—	—	—	—	—	—	
Phenols as Trichlorophenol	2,000	—	—	—	—	—	1,700	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

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Key at end of table.

3600219

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval) P36S124C (B124C)	P36S126A (B126A)	P36S126B (B126B)	P36S127A (B127A)	P36S127B (B127B)	P36S129A (B129A)	PCAL[a]
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	—	1.4	—	4.4	—	6.8	4×10^{2}
Zinc (mg/kg)	2.0	—	4.4	32	—	—	3.4	1.6×10^{4}
Lead (mg/kg)	4.0	—	9.0	83	—	—	14	
Cadmium (mg/kg)	0.5	—	—	—	—	—	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	4.4	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	—	—	3.4	—	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	35	—	—	11	—	230	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	—	—	—	—	—	2,700	
Phenols as Trichlorophenol	2,000	14,000	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

14[NASP]UH8069:T0365/819/3

Key at end of table.

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and kpth Interval)						PCAL[a]
		P36S129B (11296)	P36S131A (B131A)	P36S131B (B131B)	P36S133A (B133A)	P36S133B (B133B)	P36S135A (B135A)	
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	—	5.4	1.3	3.1	—	3.3	4×10^{2}
Zinc (mg/kg)	2.0	—	15	4.6	2.8	2.5	33	1.6×10^{4}
Lead (mg/kg)	4.0	—	49	—	32	—	28	
Cadmium (mg/kg)	0.5	—	—	—	—	—	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	—	3.4	—	—	—	9.9	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	—	23	26	160	5.7	160	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	—	2,300	—	—	—	44,000	
Phenols as Trichlorophenol	2,000	—	34,000	—	—	—	4,100	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

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Key at end of tabla.

0360020

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval)						PCAL[a]
		P36S135B (B135B)	P36S137A (B137A)	P36S137AD[g] (B137A)	P36S137B (B137B)	P36S139A (B139A)	P36S139B (B139B)	
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	—	3.0	3.1	2.1	2.0	—	4×10^{2}
Zinc (mg/kg)	2.0	—	32	15	32	10	3.3	1.6×10^{4}
Lead (mg/kg)	4.0	—	59	57	100	7.0	26	
Cadmium (mg/kg)	0.5	—	—	—	—	—	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	—	2.7	2.6	8.4	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	—	21	60	83	2,200	18	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	2,500	—	—	—	—	—	
Phenols as Trichlorophenol	2,000	—	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

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Key at end of table.

Mile 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval) P36S140A (B140A)	P36S140B (B140B)	P36S141A (B141A)	P36S141B (B141B)	P36S145A (B145A)	P36S145B (B145B)	PCAL[a]
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	1.2	1.9	1.4	1.2	1.8	1.6	4×10^{2}
Zinc (mg/kg)	2.0	24	50	17	—	—		1.6×10^{4}
Lead (mg/kg)	4.0	60	50	28	6.8	—	—	
Cadmium (mg/kg)	0.5	—	—	—	—	—		4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	3.0	3.1	—	—	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	8.7	5.1	25	24	11	20	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	1,000	—	—	—	—	—	
Phenols as Trichlorophenol	2,000	—	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

14[NASP]UH8069:T0365/819/3

Key at end of table.

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval)						PCAL[a]
		P36S145C (B145C)	P36S148A (B148A)	P36S148B (B148B)	P36S148C (B148C)	P36S148D (B148D)	P36S151A (B151A)	
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	—	1.7	—	—	1.8	1.8	4×10^{2}
Zinc (mg/kg)	2.0	—	—	—	—	3.1	24	1.6×10^{4}
Lead (mg/kg)	4.0	7.5	—	—	—	—	6.9	
Cadmium (mg/kg)	0.5		—	—	—	—	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	—	—	—	—	—	530	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	16	14	14	31	25	27	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	—	—	—	—	—	—	
Phenols as Trichlorophenol	2,000	—	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

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Key at end of table.

3600222

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and kpth Interval)						PCAL[a]
		P36S151B (B151B)	P36S151C (B151C)	P36S151D (B151D)	P36S151E (B151E)	P36S151ED[h] (B151E)	P36S153A (B153A)	
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	—	—	—	1.5	—	—	4×10^{2}
Zinc (mg/kg)	2.0	—	—	—	—	—	2.2	1.6×10^{4}
Lead (mg/kg)	4.0	—	—	—	—	—	—	
Cadmium (mg/kg)	0.5	—	—	—	—	—	—	4×10^{1}
Nickel (mg/kg)	4.0		—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5		—	—	—	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	42	34	42	13	—	—	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	—	—	—	—	—	—	
Phenols as Trichlorophenol	2,000	—	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

14[NASP]UH8069;T0365/819/3

Key at end of table.

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval)							PCAL[a]
		P36S153B (B153B)	P36S153C (B153C)	P36S153D (B153D)	P36S153E (B153E)	P36S154A (B154A)	P36S154B (B154B)	P36S154C (B154C)	
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	1.9	1.2	—	—	1.2	2.4	—	4×10^{2}
Zinc (mg/kg)	2.0	2.3	—	2.1	—	2.0	—	—	1.6×10^{4}
Lead (mg/kg)	4.0	—	—	—	—	—	—	—	
Cadmium (mg/kg)	0.5	—	—	—	—	—	—	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	—	—	—	—	—	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	47	22	19	11	—	—	—	
Ethylbenzene	1,000	—	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	—	—	—	—	—	—	—	
Phenols as Trichlorophenol	2,000	—	—	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	—	4×10^{1}

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Key at end of table.

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval) P36S154D (B154D)	P36S154E (B154E)	P36S155A (B155A)	P36S155B (B155B)	P36S155C (B155C)	P36S155D (B155D)	PCAL[a]
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	—	—	—	—	—	3.5	4×10^{2}
Zinc (mg/kg)	2.0	2.8	—	2.0	—	2.9	—	1.6×10^{4}
Lead (mg/kg)	4.0	—	—	—	—	—	—	
Cadmium (mg/kg)	0.5	—	—	—	—	—	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	—	—	—	—	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	—	15	—	8.2	—	—	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	—	—	—	—	—	—	
Phenols as Trichlorophenol	2,000	—	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

14[NASP]UH8069:T0365/819/3

Key at end of table.

3600223

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval)						PCAL[a]
		P36S156A (B156A)	P36S156B (B156B)	P36S156C (B156C)	P36S158A (B158A)	P36S158B (B158B)	P36S158C (B158C)	
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	1.4	1.1	1.2	1.3	1.9	—	4×10^{2}
Zinc (mg/kg)	2.0	6.3	10	4.1	—	—	—	1.6×10^{4}
Lead (mg/kg)	4.0	18	6.7	—	—	—	—	
Cadmium (mg/kg)	0.5	—	—	—	—	—	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	—	—	—	—	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	180	380	540	20	41	—	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	—	3,000	2,400	—	—	—	
Phenols as Trichlorophenol	2,000	—	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

14[NASP]UH8069:T0365/819/3

Key at end of table.

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval) P36S160A (B160A)	P36S160B (B160B)	P36S160C (B160C)	P36S161A (B161A)	P36S161B (61616)	P36S161C (B161C)	PCAL[a]
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	1.4	1.1	1.4	—	1.1	—	4×10^{2}
Zinc (mg/kg)	2.0	46	3.5	—	—	—	2.8	1.6×10^{4}
Lead (mg/kg)	4.0	—	11	—	—	—	—	
Cadmium (mg/kg)	0.5	—	—	—	—	—	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	—		—	—	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	28	64	40	19	18	26	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total **PAHs as Benzo-a-pyrene**	1,000	—	—	—	—	—	—	
Phenols as Trichlorophenol	2,000	—	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

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Key at end of table.

3600224

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval) P36S162A (B162A)	P36S162B (B162B)	P36S164A (B164A)	P36S164B (B164B)	P36S167A (B167A)	P36S167B (B167B)	PCAL[a]
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	4.0	—	30	3.9	48	—	4×10^{2}
Zinc (mg/kg)	2.0	—	—	8.1	6.2	5.6	2.7	1.6×10^{4}
Lead (mg/kg)	4.0	—	—	56	—	23		
Cadmium (mg/kg)	0.5	—	—	6.1	1.9	1.8	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—		—	2×10^{3}
Copper (mg/kg)	2.5	—	—	3.7	—	3.9	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	—	—	21	—	10	—	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyreno	1,000	—	—	—	—	—	—	
Phenols as Trichlorophenol	2,000	—	—	14,000	—[o]	—[p]	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

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Key at end of table.

3500225

Table 3-4 (oat.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval) P36S168A (B168A)	P36S168B (B168B)	P36S169A (B169A)	P36S172A (B172A)	P36S174A (B174A)	P36S174B (B174B)	PCAL[a]
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	3.0	—	7.1	30	1.4	—	4×10^{2}
Zinc (mg/kg)	2.0	3.1	3.0	10	—	—	—	1.6×10^{4}
Lead (mg/kg)	4.0	—	—	22	—	—	—	
Cadmium (mg/kg)	0.5	—	—	—	12	—	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	—	—	2.8	—	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	—	27	37	13	30	17	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	—	—	—	—	—	—	
Phenols as Trichlorophenol	2,000	—	—	—[o]	—	—	—[o]	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

14(NASP)UH8069:T0365/819/3

Key at ond of table.

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval)						PCAL[a]
		P36S174C (B174C)	P36S176A (B176A)	P36S176B (B176B)	P36S176C (B176C)	P36S178A (B178A)	P36S181A (B181A)	
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	—	4.9	—	1.2	—	—	4×10^{2}
Zinc (mg/kg)	2.0	—	3.2	—	—	4.6	2.0	1.6×10^{4}
Lead (mg/kg)	4.0	—	—	—	—	10	—	
Cadmium (mg/kg)	0.5	—	—	—	—	—	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	—	—	—	—	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	42	31	14	—	22	18	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	—	—	—	—	—	—	
Phenols as Trichlorophenol	2,000	—	—[q]	—[q]	—[q]	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

14[NASP]UH8069:T0365/819/3

Key at *end* of table.

3600226

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and kpth Interval) P36S181B (B181B)	P36S183A (B183A)	P36S183B (B183B)	P36S185A (B185A)	P36S185B (B185B)	P36S185C (B185C)	PCAL[a]
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	1.2	—	—	4.8	1.8	1.3	4×10^{2}
Zinc (mg/kg)	2.0	—	8.0	2.7	20	2.7	—	1.6×10^{4}
Lead (mg/kg)	4.0	—	—	—	10	—	—	
Cadmium (mg/kg)	0.5	—	—	—	—	—	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	—	—	—	—	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	16	17	18	29	5.1	60	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs am Benzo-a-pyrene	1,000	—	—	—	—	—	—	
Phenols as Trichlorophenol	2,000	—	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

14[NASP]UH8069:T0365/819/3

Key at end of tabla.

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval) P36S187A (B187A)	P36S187B (B187B)	P36S187C (B187C)	P36S190A (B190A)	P36S190B (B190B)	P36S190C (B190C)	PCAL[a]
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	2.2	2.3	1.8	1.9	2.0	2.1	4×10^{-2}
Zinc (mg/kg)	2.0	2.3	—	—	2.2	—	—	1.6×10^{4}
Lead (mg/kg)	4.0	—	—	—	—	—	—	
Cadmium (mg/kg)	0.5	—	—	—	—	—	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	—	—	—	—	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	—	9.8	—	30	—	—	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	—	—	—	—	—	—	
Phenols as Trichlorophenol	2,000	—	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

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Key at end of table.

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval) P36S190D (B190D)	P36S191A (B191A)	P36S193A (B193A)	P36S193B (B193B)	P36S193C (B193C)	P36S195A (B195A)	PCAL[a]
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	2.4	15	1.9	2.2	2.7	2.3	4×10^{2}
Zinc (mg/kg)	2.0		5.1	—	—	—	—	1.6×10^{4}
Lead (mg/kg)	4.0	—	12	—	—	—	11	
Cadmium (mg/kg)	0.5	—	0.72	—	—	—	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	—	3.1	—	—	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	19	2,000	—	—	—	22	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	—	—	—	—	—	—	
Phenols as Trichlorophenol	2,000	—	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

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Key at end of table.

3500227

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval) P36S195AD[i] (B195A)	P36S195B (B195B)	P36S195C (B195C)	P36S195CD[j] (B195C)	P36S197A (B197A)	PCAL[a]
Arsenic (mg/kg)	6.0	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	3.0	1.0	1.2	—	1.2	4×10^{2}
Zinc (mg/kg)	2.0	—	—	—	—	—	1.6×10^{4}
Lead (mg/kg)	4.0	—	—	—	—	—	
Cadmium (mg/kg)	0.5	—	—	—	—	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	—	—	—	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	5.9	17	80	—	170	
Ethylbenzene	1,000	—	—	—	—	—	8×10^{5}
Total **Xylenes**	1,000	—	—	—	—	—	2×10^{8}
Methylene chloride	1,000	—		—		—	9×10^{4}
Total PAHs as **Benzo-a-pyrene**	1,000	—	—	—	—	—	
Phenols as Trichlorophenol	2,000	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	4×10^{1}

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Key at end of table.

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval) 93651976 (B197B)	P36S199A (B199A)	P36S199B (B199B)	P36S201A (B201A)	P36S201B (B201B)	P36S203A (B203A)	PCAL[a]
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^1
Chromium (mg/kg)	1.0	—	6.2	—	1.1	—	17	4×10^2
Zinc (mg/kg)	2.0	12	8.6	—	4.2	2.1	1,500	1.6×10^4
Lead (mg/kg)	4.0	—	18	—	13	6.5	2,100	
Cadmium (mg/kg)	0.5	—	—	—	—	—	23	4×10^1
Nickel (mg/kg)	4.0	—	—	—	—	—	25	2×10^3
Copper (mg/kg)	2.5	—	3.2	—	—	—	1,100	2.5×10^3
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^2
TRPHs (mg/kg)	5.0	8.2	—	—	29	7.9	390	
Ethylbenzene	1,000	—	—	—	—	—	—	6×10^6
Total Xylenes	1,000	—	—	—	—	—	—	2×10^8
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^4
Total PAHs as Benzo-a-pyrene	1,000	—	—	—	—	—	18,000	
Phenols as Trichlorophenol	2,000	—	10,000	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^1

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Key at end of table.

2500228

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval)						PCAL[a]
		P36S203AD[k] (B203A)	P36S203B (62038)	P36S205A (B205A)	P36S205B (B205B)	P36S206A (B206A)	P36S206B (B206B)	
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	22	9.0	1.1	—	3.8	4.9	4×10^{2}
Zinc (mg/kg)	2.0	6,100	570	7.3	3.2	5.5	8.8	1.6×10^{4}
Lead (mg/kg)	4.0	12,000	940	—	10	12	19	
Cadmium (mg/kg)	0.5	4.1	0.82	—	—	—	—	4×10^{1}
Nickel (mg/kg)	4.0	39	15	—	—	6.4	20	2×10^{3}
Copper (mg/kg)	2.5	500	260	—	—	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	780	350	15	26	6.9	3,900	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	5,000	4,100	—	—	—	—	
Phenols as Trichlorophenol	2,000	—	—[p]	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

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Key at end of table

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval) P36S206C (B206C)	P36S206D (B206D)	P36S208A (B208A)	P36S208B (B208B)	P36S208C (B208C)	P36S208D (B208D)	PCAL[a]
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	1.5	2.1	8.8	4.1	2.3	3.0	4×10^{2}
Zinc (mg/kg)	2.0	2.1	2.1	3.1	2.2	—		1.6×10^{4}
Lead (mg/kg)	4.0	9.0	—	8.3	13	—	—	
Cadmium (mg/kg)	0.5	—	—	—	—	—	—	4×10^{1}
Nickel (mg/kg)	4.0	8.4	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	—	—	—	—	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	13	9.9	—	15	—	—	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	—	—	1,100	—	—	—	
Phenols as Trichlorophenol	2,000	—	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

14[NASP]UH8069:T0365/819/3

Key at end of table.

3600223

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval) P36S209A (B209A)	P36S209B (B209B)	P36S209C (B209C)	P36S209D (B209D)	P36S213A (B213A)	P36S213B (B213B)	PCAL[a]
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	9.2	1.6	—	1.9	3.0	5.3	4×10^{2}
zinc (mg/kg)	2.0	15	—	2.1	—	3.5	3.4	1.6×10^{4}
Lead (mg/kg)	4.0	14	—	—	—	13	14	
Cadmium (mg/kg)	0.5	0.62	—	—	—	1.8	1.4	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	10	—	—	—	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	220	78	18	11	43	46	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	—	—	—	—	19,000	18,000	
Phenols as Trichlorophenol	2,000	—	—	—	—	—	14,000	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

14[NASP]UH8069:T0365/819/3

Key at end of table.

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval) P36S213C (B213C)	P36S213D (B213D)	P36S213DD[1] (B213D)	P36S216A (B216A)	P36S216B (B216B)	P36S220A (B220A)	PCAL[a]
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	2.2	4.2	4.5	5.4	—	—	4×10^{2}
Zinc (mg/kg)	2.0	—	—	7.0	31	14	9.0	1.6×10^{4}
Lead (mg/kg)	4.0	—	—	5.6	58	36	25	
Cadmium (mg/kg)	0.5	—	0.90	0.61	—	—	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	—	—	—	12	3.8	2.8	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	29	26	12	66	18	7.0	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000		—	—	—	2,000	—	
Phenols as Trichlorophenol	2,000	—	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

14[NASP]UH8069:T0365/819/3

Key at ond of table.

3600230

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval)						PCAL[a]
		P36S220B (B220B)	P36S222A (B222A)	P36S222B (B222B)	P36S223A (B223A)	P36S223AD[m] (B223A)	P36S223B (B223B)	
Arsenic (mg/kg)	6.0	—		—	—	—		8×10^{1}
Chromium (mg/kg)	1.0	—	3.3	—	4.5	2.3	1.1	4×10^{2}
Zinc (mg/kg)	2.0	3.1	5.6	4.7	2.6	—	—	1.6×10^{4}
Lead (mg/kg)	4.0	5.0	25	—	—	—	—	
Cadmium (mg/kg)	0.5	—	—	—	—	—	—	4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	—	—	—	—	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	—	2×10^{2}
TRPHs (mg/kg)	5.0	—	15	—	—	—	—	
Ethylbenzene	,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	,000	—	—	—	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	—	—	—	—	—	—	
Phenols as Trichlorophenol	2,000	—	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

14[NASP]UH8069:T0365/819/3

Key at end of table.

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval) P36S223C (B223C)	P36S223D (B223D)	P36S225A (B225A)	P36S225B (B225B)	P36S225C (B225C)	P36S225D (B225D)	PCAL[a]
Arsenic (mg/kg)	6.0	—	—	—	—	—	—	8×10^{1}
Chromium (mg/kg)	1.0	1.2	—	1.1	1.5	1.6	—	4×10^{2}
Zinc (mg/kg)	2.0	—	4.5	3.0	2.4	—	—	1.6×10^{4}
Lead (mg/kg)	4.0	—	—	4.8	—	—	—	
Cadmium (mg/kg)	0.5	—	—	—	—	—		4×10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	—	—	2×10^{3}
Copper (mg/kg)	2.5	—	—	—	—	—	—	2.5×10^{3}
Silver (mg/kg)	1.0	—	—	—	—	—	1.2	2×10^{2}
TRPHs (mg/kg)	5.0	—	—	—	—	—	—	
Ethylbenzene	1,000	—	—	—	—	—	—	8×10^{6}
Total Xylenes	1,000	—	—	—	—	—	—	2×10^{8}
Methylene Chloride	1,000	1,800	1,900	1,300	—	—	—	9×10^{4}
Total PAHs as Benzo-a-pyrene	1,000	—	—	—	—	—	—	
Phenols as Trichlorophenol	2,000	—	—	—	—	—	—	
Dieldrin	1,000	—	—	—	—	—	—	4×10^{1}

14[NASP]UH8069:T0365/819/3

Key at end of table.

1620035

Table 3-4 (Cont.)

Parameter	Detection Limit	Sample Number (Location and Depth Interval) P36S226A (B226A)	P36S226B (82268)	P36S226C (B226C)	P36S226D (B226D)	PCAL[a]
Arsenic (mg/kg)	6.0	—	—	—	—	a x 10^{1}
Chromium (mg/kg)	1.0	1.4	1.6	1.1	1.0	4 x 10^{2}
Zinc (mg/kg)	2.0	3.9	2.8	—	—	1.6 x 10^{4}
Lead (mg/kg)	4.0	—	—	—	—	
Cadmium (mg/kg)	0.5	—	—	—	—	4 x 10^{1}
Nickel (mg/kg)	4.0	—	—	—	—	2 x 10^{3}
Copper (mg/kg)	2.5	—	—	—	—	2.5 x 10^{3}
Silver (mg/kg)	1.0	—	—	—	—	2 x 10^{2}
TRPHs (mg/kg)	5.0	—	—	—	—	
Ethylbenzene	1,000	—	—	—	—	a x 10^{6}
Total Xylenes	1,000	—	—	—	—	2 x 10^{8}
Methylene Chloride	1,000	—	—	—	—	9 x 10^{4}
Total PAHs as Benzo-a-pyrene	1,000	—	—	—	—	
Phenols as Trichlorophenol	2,000	—	—	—	—	
Dieldrin	1,000	—	—	—	—	4 x 10^{1}

14[NASP]UH8069:T0365/819/3

Key at end of table.

Table 3-4 (Cont.)

14[NASP]UH8069:T0365/819/3

Key:

PCAL = RCRA Proposed Corrective Action Level.
Dash (—) indicates compound not detected.

[a]PCAL listed for chromium is for hexavalent chromium.
[b]Duplicate of sample P36S004B.
[c]Duplicate of sample P36S036A.
[d]Duplicate of sample P36S082A.
[e]Duplicate of sample P36S102A.
[f]Duplicate of sample P36S116A.
[g]Duplicate of sample P36S137A.
[h]Duplicate of sample P36S151E.
[i]Duplicate of sample P36S195A.
[j]Duplicate of sample P36S195C.
[k]Duplicate of sample P36S203A.
[l]Duplicate of sample P36S213D.
[m]Duplicate of sample P36S223A.
[n]Detection limit for specified parameter increased by a factor of 1.15 in this sample.
[o]Detection limit for specified parameter increased by a factor of 4 tor this sample.
[p]Detection limit for specified parameter increased by a factor of 4.4 tor this sample.

Qualifier:

(L) = Present below stated detection limit.

Source: Ecology and Environment, Inc., 1992.

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and Recovery Act (RCRA) Proposed Corrective Action Levels (PCALs) for soil, where applicable (U.S. Environmental Protection Agency [EPA] 1990). Plate 3 shows the soil boring locations along Site 36. The complete analytical screening results for the Site 36 soil samples are presented in Appendix F.

In general, lead, total recoverable petroleum hydrocarbons (TRPHs), polynuclear aromatic hydrocarbons (PAHs), and/or phenols were the primary soil contaminants detected. These contaminants were detected most commonly, and generally at the highest concentrations, in the A-interval (0 to 5 feet BLS) samples. However, overall, significantly elevated levels of these contaminants were detected in comparatively few of the samples and at generally isolated locations widely distributed along the length of the sewer line.

Low levels of the volatile organic compounds (VOCs) ethylbenzene and xylenes were detected in one sample, and low levels of the VOC methylene chloride were detected in three samples. Trace levels of the pesticide dieldrin were detected in three samples. Polychlorinated biphenyls (PCBs) were not detected in any of the soil samples.

In reviewing the data presented below, the following information should be considered: 1) in general, A-interval samples were collected entirely or at least partially above the sewer line (see Section 1) and water table (see Table 3-3); 2) except in the northwesternmost portion of the sewer line (e.g., near building 649, 755, 3220, and 3450), B-interval and deeper samples were generally collected entirely or at least partially below the water table (see Table 3-3); and 3) analytical results for metals, TRPHs, and PAHs from duplicate samples S203A and S203AD differed by as much as a factor of 4, although very high concentrations were detected in both: therefore, heterogeneity of contaminant distribution should be assumed for the most highly contaminated samples (i.e., reported concentration should be viewed in terms of a range of values, rather than a precise number).

Metals

Tables 3-5 and 3-6 present the frequency distribution of detected metal concentrations in the Site 36 A- and B-interval soil samples, respectively. It is clear from these tables that: 1) detected metal

Table 3-5

FREQUENCY DISTRIBUTION OF DETECTED METAL CONCENTRATIONS IN A-INTERVAL SOIL SAMPLES— NAS PENSACOLA SITE 36

Metal	Detection Limit (mg/kg)	Number of Samples Exhibiting Indicated Concentration Range (mg/kg)										PCAL* (mg/kg)
		UD	0-10	11-20	21-30	31-40	41-50	51-70	71-100	101-150	>150 (detected concentrations in parentheses)	
Arsonic	6.0	119	2	0	0	0	0	0	0	0	0	8×10^{1}
Chromium	1.0	14	94	6	5	0	2	0	0	0	0	4×10^{2}
Zinc	2.0	14	67	17	5	5	5	2	5	0	1(6,100)	1.6×10^{4}
Lead	4.0	43	9	21	17	3	2	10	9	3	4(200; 230: 630: 12,000).	
Cadmium	0.50	103	17	0	1	0	0	0	0	0	0	4×10^{1}
Nickel	4.0	115	5	0	0	1	0	0	0	0	0	2×10^{3}
Copper	2.5	75	32	9	0	2	1	0	0	0	2 (530; 1,1001	2.5×10^{3}
Silver	1.0	119	2	0	0	0	0	0	0	0	0	2×10^{2}

14[NAS]UH8069:T0365/1151/2

Key:

UD = lot detected

***PCAL** Cor chromium is for hexavalent chromium;

Source: Ecology and Environment, Inc., 1992.

3600233

Table 3-6

FREQUENCY DISTRIBUTION OF DETECTED METAL CONCENTRATIONS IN B-INTERVAL SOIL SAMPLES— NAS PENSACOLA SITE 36

Metal	Detection Limit [mg/kg]	Number of Samples Exhibiting Indicated Concentration Range (mg/kg)									PCAL* (mg/kg)
		ND	0-10	11-20	21-30	31-40	41-50	51-70	71-100	>100 (detected concentrations in parentheses)	
Arsenic	6.0	106	0	0	0	0	0	0	0	0	8×10^{-1}
Chromium	1.0	49	53	3	1	0	0	0	0	0	4×10^{2}
Zinc	2.0	42	48	9	0	3	2	0	1	1 (570)	1.6×10^{4}
Lead	4.0	72	6	12	5	3	1	3	3	1 (940)	
Cadmium	0.50	94	12	0	0	0	0	0	0	0	4×10^{1}
Nickel	4.0	101	2	3	0	0	0	0	0	0	2×10^{3}
copper	2.5	94	8	0	1	2	0	0	0	1 (260)	2.5×10^{3}
Silver	1.0	105	1	0	0	0	0	0	0	0	2×10^{2}

14[NAS]UH8069:T0365/1152/8

Key:

ND = Not detected

*PCAL for chromium is for hexavalent chromium.

Source: Ecology and Environment, Inc., 1992.

concentrations are generally low; 2) detected metal concentrations (excluding lead) are well below the corresponding RCRA PCALs (a PCAL has not been established for lead); and 3) lead and zinc are the only metals to have been detected with any frequency at even slightly elevated concentrations (>20 milligrams per kilogram [mg/kg]). Because no metal was present above a concentration of 10 mg/kg in any of the C-, D-, or E-interval samples, the remainder of this discussion will focus on the distribution of lead in the Site 36 A- and B-interval soil samples.

Plates 6 and 7 shov the distribution of lead concentrations in the A- and B-interval soil samples across Site 36, respectively. Regarding the A-interval distribution, of the 26 sampling locations where lead concentrations greater than or equal to 50 mg/kg were detected, 19 were distributed along the southeast portion of the sewer line beginning east of Building 3588 (lead = 51 to 230 mg/kg; see plates 1 and 6). However, the highest A-interval lead concentrations were not detected along this portion of the line, but rather at the following locations: east of Hurray Road where the southeast and southwest portions of the sewer line separate (duplicate samples S203A/S203AD, lead = 2,800/12,000 mg/kg), and north of Building 3644 along the northeast portion of the line (sample S016A, lead = 630 mg/kg). It should be noted that duplicate samples S203A/S203AD also exhibited the highest A-interval concentrations of zinc, copper, and, to a lesser extent, nickel (see Table 3-4).

The remaining five sample locations exhibiting lead concentrations greater than or equal to 50 mg/kg were as follows (see plates 1, 3, and 6):

- Northeast of above-noted boring B016 (northeast portion of line; sample S014A = 150 mg/kg);
- Northwest of Pump Station No. 2 (northwest portion of line; sample S164A = 56 mg/kg);
- Between Hurray Road and Hoffet Road (southwest portion of line; sample S112A = 57 mg/kg); and
- West of Building 624 (southvest portion of line; sample S137A = 59 mg/kg and sample S140A = 60 mg/kg).

Plate 7 shows the distribution of B-interval soil sample lead concentrations across Site 36. Only eight of the B-interval sampling locations exhibited lead concentrations greater than or equal to 50 mg/kg. As in the case of the A-interval samples, the highest. B-interval lead (940 mg/kg) and zinc concentrations and the second highest copper concentration (see Table 3-4), were detected in the sample from boring B203 (east of Murray Road). Of the remaining seven locations, six correspond to borings that exhibited elevated A-interval Concentrations (see plates 1, 3, and 7):

- o North of Building 52 (southeast portion of line; sample S058B = 51 mg/kg);
- o South of Building 604 (southeast portion of line; sample S046B = 56 mg/kg and sample S049B = 66 mg/kg);
- o South of Building 104 (southeast portion of line; sample S039B = 78 mg/kg); and
- o West of Building 624 (southwest portion of line; sample S137B = 100 mg/kg and sample S140B = 50 mg/kg).

The one sampling location where only an elevated B-interval lead concentration was detected was positioned east of Building 1811 along the southwest portion of the sewer line (sample S126B = 83 mg/kg).

TRPHs

Plates 8 and 9 show the distribution of TRPH concentrations in the A- and B-interval soil samples across Site 36, respectively. Very high A-interval TRPH concentrations (>1,000 mg/kg) were detected at four locations (see plates 1, 3, and 6):

- o South of Building 2662 (southeast portion of line; sample S082A = 3,800 mg/kg);
- o West of Building 624 (southwest portion of line; sample S139A = 2,200 mg/kg);
- o Southeast of Building 741 (northwest portion of line; sample S191A = 2,000 mg/kg); and
- o South of Building 604 (southeast portion of line; sample S046A = 1,300 mg/kg).

A-interval TRPH concentrations equal to or greater than 100 mg/kg were detected at 19 additional sampling locations: six locations along the segments of the southeast portion of the sever line beginning south of Building 604; seven locations along the segments of the southeast portion of the line between Building 627 and Hurray Road; three locations along the segment of the southwest portion of the line east of buildings 679 and 3211; one location along the southeast portion of the line north of Hurray Road; one location east of Building 2691 along the northwest portion of the line; and one location north of Building 3644 along the northeast portion of the line (see plates 1 and 8). Of the 23 sampling locations where clearly elevated A-interval TRPE concentrations (>100 mg/kg) were detected, only 10 correspond to locations where elevated A-interval lead concentrations (>50 mg/kg) vere detected, and six of these 10 locations are along the southeasternmost portion of the sewer line (compare plates 6 and 8). Furthermore, the locations of the highest A-interval TRPH concentrations do not generally correspond to the locations of highest A-interval lead concentrations.

Plate 9 shows the distribution of B-interval soil sample TRPH concentrations across Site 36. Very high B-interval TRPE concentrations (>1,000 mg/kg) were detected at three locations, none of which correspond to locations where similarly high A-interval TRPE concentrations vere detected and only one of which corresponds to a location where clearly elevated A-interval TRPH concentrations (>100 mg/kg) were detected (see plates 1, 3, 8, and 9):

- East of Building 18 (southeast portion of line; sample S058B = 8,400 mg/kg);
- East of Building 604 (southeast portion of line; sample S063B = 6,200 mg/kg); and
- East of Building 692 (northwest portion of line; sample S206B = 3,900 mg/kg).

E-interval TRPE concentrations above 100 mg/kg were detected at only four additional sampling locations, three of which correspond to

locations where similarly elevated A-interval concentrations were detected (see plates 1, 3, 8, and 9):

- North and east of Murray Road (southeast portion of line; sample S156B = 380 mg/kg and sample S203B = 350 mg/kg);
- Northeast of Building 3588 (southeast portion of line; sample S091B = 280 mg/kg); and
- South of Building 104 (southeast portion of line; sample S039B = 280 mg/kg).

At four of the above seven locations exhibiting clearly elevated B-interval TRPH concentrations (>100 mg/kg), elevated lead concentrations were also detected (compare plates 7 and 9). As in the case of the A-interval samples, the highest B-interval TRPH concentrations did not generally occur at locations where the highest B-interval lead concentrations had been detected.

Table 3-4 presents the TRPH concentrations detected in the C- (31 locations), D- (13 locations), and E-interval (3 locations) soil samples collected across Site 36. Of these samples, most exhibited TRPH concentrations below 30 mg/kg, and only one exhibited a concentration above 100 mg/kg (sample S156C = 540 mg/kg). It should be noted that the B-interval sample at this location (north of Murray Road, southeast portion of the line; see plates 1, 3, and 9) had also exhibited an elevated TRPH concentration (380 mg/kg).

VOCs

Ethylbenzene and xylenes (one sample) and methylene chloride (three samples) were the only VOCs detected in the Phase I soil samples across Site 36. In all cases, the detected concentrations were well below the corresponding RCRA PCALs (see Table 3-4).

Ethylbenzene (2,100 micrograms per kilogram [µg/kg]) and xylenes (9,400 µg/kg) were detected only in the B-interval sample from location B063 (east of Building 604, southeast portion of sewer line; see plates 1 and 3). S063B also exhibited a very high TRPH concentration (6,200 mg/kg; see Plate 9). Methylene chloride was detected in the C- and D-interval samples from location B223 (south of Building 3450, northwest portion of line; 1,800 µg/kg and 1,900 µg/kg, respectively) and the

A-interval sample from location B225 (southwest of Building 3450; 1,300 µg/kg; see plates 1 and 3). No other organic contaminants and only lov levels of metals were detected in these samples (see Table 3-4). Although not detected in the associated laboratory method blanks, the presence of methylene chloride at such low levels in the three soil samples could nevertheless reflect laboratory-derived contamination.

PAHs

Plates 10 and 11, respectively, show the Site 36 A- and B-interval soil sampling locations where PAHs were detected and the corresponding concentrations. As shown on Plate 10, A-interval PAH occurrences were primarily concentrated along the southeasternmost, northeasternmost, and, to a much lesser extent, southwesternmost portions of the sewer line. Detected concentrations were generally low (six locations = <1,000 µg/kg; 12 locations = 1,000 to 2,700 µg/kg; and three locations = 4,100 to 6,600 µg/kg), but very high concentrations (18,000 to 300,000 µg/kg) were detected at six widely separated locations (see plates 1, 3, and 10):

- South of Building 604 (southeast portion of line; sample S053A = 300,000 µg/kg);
- North of Building 3644 (northeast portion of line; sample S016A = 99,000 µg/kg);
- Northwest of Building 624 (southwest portion of line; sample S135A = 44,000 µg/kg);
- Northvest of Building 627 (southeast portion of line; sample S074A = 23,000 µg/kg);
- Vest of Building 649 (northwest portion of line; sample S213A = 19,000 µg/kg); and
- East of Hurray Road (southeast portion of line; sample S203A = 18,000 µg/kg).

Of the above six A-interval locations where very high PAH concentrations were detected, two (B053 and B203) also exhibited coaparatively elevated lead and TRPH concentrations, two (B016 and B074) exhibited coaparatively elevated lead concentrations only, and one

(B135) exhibited a comparatively elevated TRPH concentration only (compare plates 10, 8, and 6). Furthermore, analogous to the lead/TRPH relationship discussed previously, the highest PAH concentrations were not generally detected at locations that exhibited the highest lead or TRPH concentrations.

Plate 11 shows the Site 36 B-interval soil sample locations where PAHs were detected and the corresponding concentrations. As in the case of the A-interval samples, the detected B-interval PAH concentrations were generally low (10 locations = <1,000 µg/kg; eight locations = 1,000 to 3,000 µg/kg; and two locations = 4,100 to 4,200 µg/kg), but very high concentrations (12,000 to 74,000 µg/kg) were detected at three widely separated locations, only one of which (B213) corresponds to locations where similarly high A-interval PAH Concentrations were detected (see plates 1, 3, 10, and 11):

- East of Building 18 (southeast portion of line; sample S058B = 74,000 µg/kg);
- West of Building 649 (northwest portion of line; sample S213B = 18,000 µg/kg); and
- North of Moffett Road (southwest portion of line; sample S118B = 12,000 µg/kg).

Overall, of the 23 locations where PAHs were detected in B-interval samples, only 10 correspond to locations where A-interval PAHs were detected (compare plates 10 and 11). Furthermore, of the three above locations where very high B-interval PAH concentrations were detected, only one (B058) exhibited comparatively elevated lead and/or TRPH concentrations (compare plates 7, 9, and 11).

Among the deeper C-, D-, and E-interval soil samples, PAHs were detected only in two of the C-interval samples (see Table 3-4): southwest of Building 604 (southeast portion of line; sample S045C = 4,900 µg/kg), and north of Murray Road (southeast portion of line; sample S156C = 2,400 µg/kg; see plates 1 and 3). Sample S156C also exhibited an elevated TRPH concentration (540 mg/kg).

It should be noted that PAHs were reported 'as benzo-a-pyrene for laboratory reporting purposes; however, PAHs other than benzo-a-pyrene may be present in the samples.

Wenols

Plates 10 and 11, respectively, show the Site 36 A- and B-interval soil sampling locations vhere phenols were detected and the corresponding concentrations. As shown on Plate 10, phenols vere detected at only nine A-interval sample locations at concentrations of 4,100 to 410,000 µg/kg. Similar to the A-interval PAH distribution (see Plate 8), the highest phenol concentrations (10,000 to 410,000 µg/kg) vere detected at five widely separated locations; however, only two of these locations (B053 and B074) correspond to locations where similarly high PAH concentrations were detected. The five locations where very high A-interval phenol concentrations vere detected are as follows (see plates 1, 3, and 10):

- o South of Building 604 (southeast portion of line; sample S053A = 410,000 µg/kg);
- o Northvest of Building 627 (southeast portion of line; sample S074A = 110,000 µg/kg);
- o Southeast of Building 3211 (southwest portion of line; sample S131A = 34,000 µg/kg);
- o Northvest of Pump Station No. 2 (northwest portion of line; sample S164A = 14,000 µg/kg); and
- o South of Building 3557 (southeast portion of line; sample S199A = 10,000 µg/kg).

As noted above, only two of these five locations correspond to locations where similarly high A-interval PAH concentrations were detected. Furthermore, only one of the locations (B053) exhibited comparatively elevated levels of both lead and TRPHs, and tvo of the remaining locations (B074 and B164) exhibited Comparatively elevated levels of lead only (compare plates 10, 8, and 6).

Plate 11 shows the Site 36 B-interval soil sample locations vhere phenols were detected and the corresponding concentrations. Phenols vere detected at only seven widely separated B-interval sample locations at concentrations of 1,500 to 660,000 µg/kg (see plates 1, 3, and 8).

- o East of Building 18 (southeast portion of line; sample S058B = 660,000 µg/kg);

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- o East of Building 604 (southeast portion of line; sample S063B = 59,000 µg/kg);
- o West of Building 649 (northwest portion of line; sample S213B = 14,000 µg/kg);
- o East of Building 3557 (southeast portion of line; sample S107B = 9,000 µg/kg);
- o North and south of Moffett Road (southwest portion of line; sample S118B = 5,200 µg/kg and sample S124B = 1,700 µg/kg); and
- o Northwest of Building 104 (southeast portion of line; sample S042B = 1,500 µg/kg).

Of the above seven locations, only one (S042B) corresponds to a location where phenols were detected in the A-interval sample. PAHs were also detected in six of the samples, usually at comparably elevated concentrations; however, the very high 59,000 µg/kg phenol concentration at location B063 was associated with a comparatively low 3,000 µg/kg PAH concentration. As previously discussed, in some cases corresponding 8-interval lead and/or TRPH concentrations were elevated, but no consistent correlation can be made among the distributions of these compounds.

Among the deeper C-, D-, and E-interval soil samples, phenols were detected only in sample S124C (14,000 µg/kg) collected south of Moffett Road along the southwest portion of the sewer line (see Table 3-4 and plates 1 and 3). No other contaminant species were detected at comparatively elevated concentrations in this sample; however, as discussed above, a phenol concentration of 1,700 µg/kg was detected in the B-interval sample at this location.

It should be noted that phenols were reported as trichlorophenol for laboratory reporting purposes; however, phenols other than trichlorophenol may be present in the samples.

Pesticides

Dieldrin at trace levels (<1,000 µg/kg) well below the RCRA PCAL (see Table 3-4) was the only pesticide detected and was detected at only two locations (see plates 1 and 3): B100 (A- and B-interval samples)

and B101 (A-interval sample only), which were collected south of Building 3460 (southeast portion of line). No other contaminant species were detected at significantly elevated levels in these samples.

3.8.2 Groundwater

3.8.2.1 Field Parameters

Table 3-7 lists the temperature, pH, and specific conductance values measured in the groundwater samples from the Site 36 surficial zone temporary monitoring wells. Temperature values were commonly between 25°C and 30°C, and the average temperature (28.4°C) was about 6°C higher than the average temperature (22.3°C) of 19 groundwater samples collected from the Sand-and-Gravel Aquifer in Escambia County (Clemens et al. 1989). Samples from four widely separated wells exhibited distinctly higher temperature values (34°C to 55°C; see plates 1 and 3):

- Temporary well TU223 (55°C; south of Building 3450, northwest portion of line);
- Temporary well TU057 (36°C; south of Building 18, southeast portion of line);
- Temporary well TW109 (36°C; east of Building 3557, southeast portion of line); and
- Temporary well TU049 (34°C; south of Building 604, southeast portion of line).

The very high 55°C value recorded in the well TW223 sample, and perhaps some of the other higher temperature values recorded, probably reflects the presence of an underground steam line near the well.

All but four of the measured pH values were between 5.2 and 7.9 standard units, well within the range of values reported by Clemens et al. (1989). The four samples exhibiting distinctly higher pH values (9.35 to 10.5) were collected at the folloving widely separated locations (one of which [TW057] also exhibited a high temperature value; see above and plates 1 and 3):

- Temporary well TW220 (pH = 10.5 units; northeast of Building 630, southeast portion of line);

Table 3-7

GROUNDWATER FIELD PARAMETERS
NAS PENSACOLA SITE 36

Well Number	Temperature (°C)	pH (units)	Specific Conductance (μmhos/cm)	Date Measured
TW002	28	6.0	140	8/13/91
TW004	28	5.9	165	8/13/91
TW005	29	6.1	225	8/13/91
TW007	29	6.3	240	8/13/91
TW009	29	6.2	140	8/13/91
TW011	29	6.1	90	8/14/91
TW014	29	6.4	240	8/14/91
TW018	27	6.6	160	8/14/91
TW020	28	6.5	120	8/14/91
TW022	29	6.7	105	8/14/91
TW024	29	6.5	170	8/14/91
TW026	27	6.3	40	8/14/91
TW028	28	6.2	130	8/14/91
TW030	28	6.2	100	8/14/91
TW032	27	6.0	110	8/14/91
TW034	28	7.15	242	7/10/91
TW036	28	9.35	218	7/10/91
TW038	29	7.25	195	7/10/91
TW039	30	7.1	230	7/10/91
TW040	25	6.8	130	7/9/91
TW042	27	6.9	122	7/9/91
TW044	26	6.6	302	7/14/91
Two45	29	7.1	238	7/10/91
TW046	28	7.5	360	7/11/91
TW048	28	6.8	285	7/11/91
TW049	34	7.2	270	7/12/91
TW053	2a	6.8	220	7/11/91
TW054	30	6.95	215	7/11/91
Two55	29	6.7	235	7/11/91
TW057	36	9.7	280	7/12/91
TW058	29	6.7	175	7/12/91
TW060	28	7.0	310	7/12/91
TW063	26	6.4	510	7/17/91
TW066	28	6.4	185	7/14/91
TW068	27	6.1	220	7/13/91
TW069	27.5	6.0	189	7/13/91
TW070	28	6.2	253	7/13/91
TW072	29	6.8	384	7/14/91
TW074	28	6.8	280	7/15/91
TW076	27	6.7	364	7/17/91
TW078	30	6.8	550	7/14/91
TW079	29	6.85	402	7/17/91
TW081	29	6.95	329	7/15/91
Two82	29	10.0	306	7/15/91
TW085	29	1.9	229	7/14/91
TW086	27	6.5	330	7/14/91
TW088	29	6.5	443	7/15/91
Two90	29	7.0	260	7/14/91
Two91	29	6.6	357	7/15/91
TW093	29	6.6	246	7/15/91
TW096	29	7.4	274	7/16/91
Two97	29	7.9	233	7/16/91
TW098	29	7.0	338	7/16/91
TW100	31	6.9	358	7/16/91
TW101	29	7.0	301	7/16/91
TW102	29	6.3	271	7/17/91

14[NASP]UH8069:T0365/735/25

Key at end of table.

Table 3-7 (Cont.)

Well Number	Temperature (°C)	pH (unit.)	Specific Coaductaaco (μmhos/cm)	Date Measured
TW103	28	6.2	153	7/18/91
TW105	28	6.4	330	7/18/91
TW106	27	6.2	210	7/18/91
TW107	29	6.3	375	7/17/91
TW109	36	6.2	295	7/17/91
TW112	27	6.4	259	7/19/91
TW114	28	6.4	210	7/19/91
TW116	26	5.9	163	7/19/91
TW118	26	6.2	182	7/19/91
M 2 0	25	6.4	265	7/19/91
TW122	27	6.7	172	7/19/91
TW124	29	6.6	226	7/19/91
M 2 6	28	6.3	338	7/19/91
TW127	32	6.7	230	7/19/91
TW129	30	6.5	255	7/19/91
TW131	30	6.8	267	7/19/91
M 3 3	30	6.9	350	7/19/91
M 3 5	28	6.5	294	7/19/91
M 3 7	27	6.0	130	8/01/91
M 3 9	28	6.3	180	8/01/91
M 4 0	28	6.2	180	8/01/91
TW141	27	6.4	170	8/08/91
TW145	25	6.2	70	8/09/91
TW148	26	5.9	120	8/07/91
TW151	26	6.0	120	8/06/91
TW153	27	6.3	79	8/05/91
M 5 4	27	6.3	100	8/05/91
TW155	26	5.9	95	8/06/91
TW156	28	6.6	160	8/08/91
TW158	28	6.7	120	8/08/91
M 6 0	27	6.5	354	7/16/91
M 6 1	26	5.5	104	7/18/91
M 6 2	26	5.5	70	8/05/91
M 6 4	26	5.2	68	8/05/91
M 6 7	27	5.7	80	8/05/91
M 6 8	25	5.8	90	8/05/91
M 6 9	28	6.0	145	8/06/91
TW172	27	5.9	80	8/05/91
TW174	28	6.7	150	8/03/91
TW176	26	5.6	139	7/18/91
M 7 8	28	6.0	178	8/05/91
TW181	28	6.5	128	7/17/91
TW183	27	6.6	381	7/18/91
TW185	28	6.1	170	8/02/91
TW187	28	6.1	180	8/02/91
TW190	27	6.1	100	8/03/91
M 9 3	27	5.8	120	8/02/91
TW195	22	5.9	230	8/26/91
M 9 7	30	6.0	426	7/17/91
TW199	26	6.4	180	8/02/91
TW201	27	6.4	200	8/02/91
M 0 3	29	6.6	200	8/03/91
TW205	28	6.7	120	8/06/91
M 0 6	25	6.0	180	8/07/91
TU208	25	6.3	220	8/07/91
TW209	26	6.3	110	8/07/91
TU213	27	6.0	145	8/07/91
M 1 6	27	7.4	220	7/10/91
TW220	29	10.5	384	7/18/91

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Table 3-7 (Cont.)

Well Number	Temperature (°C)	pH (units)	Specific Conductance (μmhos/cm)	Date Measured
TW222	29	7.0	100	8/02/91
TW223	55	6.6	60	8/08/91
TW225	26	6.5	65	8/09/91
TW226	25	6.0	120	8/09/91

14[NASP]UH8069:T0365/735/25

Source: Ecology and Environment, Inc., 1992.

- Temporary well TU082 (pH = 10.0 units; south of Building 2662, southeast portion of line);
- Temporary well TU057 (pH = 9.7 units; south of Building 18, southeast portion of line); and
- Temporary well TU036 (pH = 9.35 units; south of Building 71, southeast portion of line).

All measured specific conductance values were between 40 and 550 micromhos per centimeter (µmhos/cm). These values are well vithin the range of values reported by Clemens et at. (1989).

No floating or sinking immiscible hydrocarbons vere observed in any of the wells. Hovever, oily sheens were observed on the groundwater at the following five widely separated locations (see plates 1 and 3):

- Temporary well TU058 (east of Building 18, southeast portion of line; soils from 5.5 to 9 feet BLS had been coated with petroleum product at this boring, which was located near Site 20);
- Temporary well TW118 (north of Hoffett Road, southwest portion of line);
- Temporary well TW156 (north of Hurray Road, southeast portion of line);
- Temporary well TW169 (west of Hurray Road, northwest portion of line); and
- Temporary well TU213 (west of Building 649, northvest portion of line).

In addition to the above, the purge water from temporary well TU063 (east of Building 604, southeast portion of line) exhibited a greenish tinge and solvent odor (soils at this location had been stained green), and the purge water from well WOOS (north of IWTP, northeast portion of line) exhibited a sulfur odor.

Temporary monitoring well information, including field parameter data, is presented in Appendix E.

3.8.2.2 Analytical Screening Parameters

Table 3-8 summarizes the analytical screening results for groundwater samples collected from the 119 temporary monitoring wells

Table 3-8

SUMMARY ANALYTICAL SCREENING RESULTS FOR GROUNDWATER SAMPLES
(FROM TEMPORARY MONITORING WELLS)
NAS PENSACOLA SITE 36
(All results in µg/L, unless noted)

Parameter	Detection Limit	Sample Nurber (We11 Number)								FPDWS/ FSDWS
		P36GW002 (TW002)	P36GW002D[a] (TW002)	P36GW004 (TW004)	P36GW005 (TW005)	P36GW007 (TW007)	P36GW009 (TW009)	P3G6W011 (TW011)	P36GW014 (TW014)	
Arsenic	60	--	--	--	--	--	--	--	--	SO
Chromium	10	130	120	44	180	45	65	34	360	50
Zinc	20	51	51	78	140	130	140	120	790	5,000
Lead	40	50	--	--	320	650	220	110	1,400	50
Cadmium	5.0	--	--	--	25	5.3	--	--	260	10
Nickel	40	--	--	--	--	--	--	--	140	
copper	25	--	--	--	40	96	42	--	120	1,000
silver	10	--	--	--	--	--	--	--	--	50
TRPHs (mg/L)	1.0	--	--	--	--	--	--	--	--	
Toluene	10	--	--	--	--	--	--	--	--	
Ethylbenzene	10	--	--	--	--	--	--	--	--	
Total Xylenes	10	--	--	--	--	--	--	--	--	
1,2-Dichlorobenzene	10	--	--	--	--	--	--	--	--	
1,1-Dichloroethene	10	--	--	--	--	--	--	--	--	7.0
Methylene Chloride	10	--	--	--	--	--	--	--	--	
Trans-1,2-Dichloroethene	10	--	--	--	--	--	--	--	--	
1,1-Dichloroethane	10	--	--	--	--	--	--	--	--	
1,1,1-Trichloroethane	10	--	--	--	--	--	--	--	--	200
Trichloroethene	10	--	--	--	--	--	--	--	--	3.0
Tetrachloroethene	10	--	--	--	--	--	--	--	--	3.0
Chlorobenzene	10	--	--	--	--	--	--	--	--	
Total PAHs as Benzo-a-pyrene	100	--	--	--	--	--	130	--	--	
Phenols as Trichlorophenol	100	--	--	--	--	--	--	--	--	
Dieldrin	5.0	--	--	--	--	--	--	--	--	
Total PCBs	10	--	--	--	--	--	--	--	--	

14[NASP]UH8069:T0365/683/2

Key at end of table.

Table 3-8 (Cont.)

Parameter	Detection Limit	Sample Number (Well Number)								FPDWS/ FSDWS
		P36GW018 (TW018)	P36GW020 (TW020)	P36GW022 (TW022)	P36GW022D[b] (TW022)	P36GW024 (TW024)	P36GW026 (TW026)	P36GW028 (TW028)	P36GW030 (TW030)	
Arsenic	60	--	--	--	--	--	--	--	--	SO
Chromium	10	140	31	21	28	18	190	77	31	50
Zinc	20	120	90	29	44	24	89	130	54	5,000
Lead	40	140	--	110	140	--	--	140	--	SO
Cadmium	5.0	8.5	--	--	--	--	7.5	--	--	10
Nickel	40	46	--	--	--	--	--	--	--	
Copper	25	30	--	--	26	--	34	--	--	1,000
Silver	10	--	--	--	--	--	--	--	--	50
TRPHs (mg/L)	1.0	--	--	--	--	--	2.3	--	--	
Toluene	10	--	--	--	--	--	--	--	--	
Ethylbenzene	10	--	--	--	--	--	--	--	--	
Total Xylenes	10	--	--	--	--	--	--	--	--	
1,2-Dichlorobenzene	10	--	--	--	--	--	--	--	--	
1,1-Dichloroethene	10	--	--	--	--	--	--	--	--	7.0
Methylene Chloride	10	--	--	--	--	--	--	--	--	
Trans-1,2-Dichloroethene	10	--	--	--	--	--	--	--	--	
1,1-Dichloroethane	10	--	--	--	--	--	--	--	25	
1,1,1-Trichloroethane	10	--	--	--	--	--	--	--	--	200
Trichloroethene	10	--	--	--	--	--	--	--	--	3.0
Tetrachloroethene	10	--	--	--	--	--	--	--	--	3.0
Chlorobenzene	10	--	--	--	--	--	--	--	--	
Total PAHs as Benzo-a-pyrene	100	--	--	(L)	(L)	140	--	--	--	
Phenols as Trichlorophenol	100	--	--	--	--	--	--	--	--	
Dieldrin	5.0	--	--	--	--	--	--	--	--	
Total PCBs	10	--	--	--	--	--	--	--	--	

14[NASP]UH8069:T0365/683/2

Key [illegible]nd of table.

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Table 3-8 (Cont.)

Parameter	Detection Limit	Sample Number (Well Number) P36GW032 (TW032)	P36GW034 (TW034)	P36GW036 (TW036)	P36GW038 (TW038)	P36GW039 (TW039)	P36GW040 (TW040)	P36GW042 (TW042)	P36GW044 (T044)	FPDWS/ FSDWS
Arsenic	60	--	--	--	--	--	--	--	--	50
Chromium	10	35	450	97	47	340	37	33	58	50
Zinc	20	160	480(B)	260(B)	900(B)	2,300(B)	71(B)	75(B)	86	5,000
Lead	40	--	510	1,700	1,600	2,400	110	93	--	50
Cadmium	5.0	--	5.2	--	--	57	--	--	6.6	lo
Nickel	40	110	--	--	--	42	--	--		
Copper	25	--	730	320	3,600	2,800	30	--	31	1,000
Silver	10	--	--	--	--	--	--	--	--	50
TRPHs (mg/L)	1.0	--	--	1.7	--	13	--	--	--	
Toluene	10	--	--	--	--	--	--	--	--	
Ethylbenzene	10	--	--	--	--	--	--	--	--	
Total Xylenes	10	--	--	17	--	--	--	--	--	
1,2-Dichlorobenzene	10	--	29	19	--	--	--	--	--	
1,1-Dichloroethene	10	--	--	--	--	--	--	--	--	7.0
Methylene Chloride	10	--	--	--	--	--	--	--	--	
Trans-1,2-Dichloroethene	10	--	--	--	--	--	--	--	--	
1,1-Dichloroethane	10	--	150	--	--	--	--	--	--	
1,1,1-Trichloroethane	10	--	20	--	--	--	--	--	--	200
Trichloroethene	10	--	11	--	--	--	--	--	--	3.0
Tetrachloroethene	10	--	--	--	--	--	--	--	--	3.0
Chlorobenzene	10	--	--	--	--	--	16	--	--	
Total PAHs as Benzo-a-pyrene	100	--	180	--	170	150	110	--	--	
Phenols as Trichlorophenol	100	--	(L)	(L)	(L)	--	700	(L)	--	
Dieldrin	5.0	--	--	--	--	--	--	--	--	
Total PCBs	lo	--	--	--	--	--	--	--	--	

14[NASP]UH8069:T0365/683/2

Key at end of table.

Table 3-8 (Cont.)

Parameter	Detection Limit	Sample Number (Well Number) P36GW045 (TW045)	P36GW046 (TW046)	P36GW048 (TW048)	P36GW049 (TW049)	P36GW053 (TW053)	P36GW053D[c] (TW053)	P36GW054 (TW054)	P36GW055 (TW055)	FPDWS/ FSDWS
Arsonic	60	--	--	--	--	--	--	--	--	SO
Chromium	10	12	740	280	710	19	15	--	13	SO
Zinc	20	51(B)	320	120	2,200	170	190	40	75	5,000
Load	40	--	440	230	2,200	560	400	150	--	50
Cadmium	5.0	--	63	10	350	--	--	--		lo
Nickel	40	--	49	41	--	--	--	--	--	
Copper	25	--	190	48	1,100	66	62	37	--	1,000
Silver	10	--	13	--	--	--	--	--	--	SO
TRPHs (mg/L)	1.0	--	--	--	--	--	--	--	--	
Toluene	10	--	--	--	--[j]	--	--	--	--	
Ethylbenzene	10	--	--	--	--[j]	--	--	--	--	
Total Xylenes	10	--	--	--	--[j]	--	--	--	--	
1,2-Dichlorobenzene	10	--	--	--	--[j]	--	--	--	--	
1,1-Dichloroethene	10	--	--	--	--[j]	--	--	--	--	7.0
Methylene Chloride	10	--	--	--	--[j]	--	--	--	--	
Trans-1,2-Dichloroethene	10	--	10	--	--[j]	--	--	--	--	
1,1-Dichloroethane	10	--	--	--	--[j]	--	--	--	--	
1,1,1-Trichloroethane	10	--	--	--	--[j]	--	--	--	--	200
Trichloroethene	10	--	21	--	--[j]	--	--	--	--	3.0
Tetrachloroethene	10	--	--	--	500[j]	--	12	--	--	3.0
Chlorobenzene	10	--	--	--	--[j]	--	--	--	--	
Total PAHs as Benzo-a-pyrene	100	--	--	--	--	--	--	--	--	
Phenols as Trichlorophenol	100	--	--	--	--	--	--	--	--	
Dieldrin	5.0	--	--	--	--	--	--	--	--	
Total PCBs	10	--	--	--	--	--	--	--	--	

14[NASP]UH8069:T0365/683/2

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Table 3-8 (Coat.)

Parameter	Detection Limit	Sample Number (We11 Number) P36GW057 (TW057)	P36GW058 (TW058)	P36GW060 (TW060)	P36GW063 (TW063)	P36GW066 (TW066)	P36GW068 (TW068)	P36GW069 (TW069)	P36GW070 (TW070)	P36GW070D[d] (TW070)	FPDWS/ FSDWS
Arsenic	60	--	--	--	--	--	--	--	--	--	SO
Chromium	10	89	10	--	--	15	23	12	36	29	SO
Zinc	20	510	89	110	52	260	840	190	660	390	5,000
Load	40	840	620	130	--	260	650	330	1,900	1,200	50
Cadmium	5.0	--	5.7	--	--	--	8.4	--	8.4	--	10
Nickel	40	--	--	--	--	--	--	--	--	--	
Copper	25	85	64	--	--	71	79	--	210	120	1,000
Silver	10	--	--	--	--	--	--	--	--	--	SO
TRPHs (mg/L)	1.0	--	27	--	170	1.0	1.1	--	--	--	
Toluene	10	--	--	--	--[j]	--	--	--	--	--	
Ethylbenzene	10	--	--	--	--[j]	--	--	--	--	--	
Total Xylenes	10	--	--	--	630	--	--	--	--	--	
1,2-Dichlorobenzene	10	--	--	--	--[j]	--	--	--	--	--	
1,1-Dichloroethene	10	--	11	--	--[j]	--	--	--	--	--	7.0
Methylene Chloride	10	--	--	--	--[j]	--	--	--	--	--	
Trans-1,2-Dichloroethene	10	--	--	--	--[j]	--	--	--	--	--	
1,1-Dichloroethane	10	--	--	--	--[j]	--	--	--	--	--	
1,1,1-Trichloroethane	10	--	--	--	--[j]	--	--	--	--	--	200
Trichloroethene	10	--	--	--	--[j]	--	--	--	--	--	3.0
Tetrachloroethene	10	--	--	--	--[j]	--	--	--	--	--	3.0
Chlorobenzene	10	--	--	--	--[j]	--	--	--	--	--	
Total PAHs as Benzo-a-pyrene	100	--	700	--	420	--	--	--	--	--	
Phenols as Trichlorophenol	100	140	720	--	1,100	NO)	--	--	--	--	
Dieldrin	5.0	--	--	--	--	--	--	--	--	--	
Total PCBs	10	--	--	--	--	--	--	--	--	--	

14[NASP]UH8069:T0365/683/2

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Table 3-8 (Cont.)

Parameter	Detection Limit	Sample Number (Well Number) P36GW072 (TW072)	P36GW074 (TW074)	P36GW076 (TW076)	P36GW078 (TW078)	P36GW079 (TW079)	P36GW081 (TW081)	P36GW082 (TW082)	FPDWS/ FSDWS
Arsonic	60	--	--	--	--	--	100	--	SO
Chromium	10	100	36	33	79	15	33	73	SO
Zinc	20	360	250	1,800	1,200	200	580	430	5,000
Lord	40	1,100	280	3,800	2,100	400	720	1,700	50
Cadmium	5.0	8.2	--	--	9	--	--	11	10
Nickel	40	--	--	--	44	--	--	--	
Copper	25	100	SO	290	250	69	79	130	1,000
Silver	10	--	--	--	--	--	--	--	SO
TRPHs (mg/L)	1.0	--	--	--	1.0	--	--	3.5	
Toluene	10	--	--	--	--	--	--	--	
Ethylbenzene	10	--	--	--	--	--	--	--	
Total Xylenes	10	--	--	--	--	--	--	--	
1,2-Dichlorobenzene	10	--	--	--	--	--	--	--	
1,1-Dichloroethene	10	--	--	--	--	--	--	--	7.0
Methylene Chloride	10	--	--	--	--	--	--	--	
Trans-1,2-Dichloroethene	10	--	--	--	--	--	--	--	
1,1-Dichloroethane	10	--	--	--	--	--	--	--	
1,1,1-Trichloroethane	10	--	--	--	--	--	--	--	200
Trichloroethene	10	--	--	--	--	--	--	--	3.0
Tetrachloroethene	10	--	--	--	--	--	--	--	3.0
Chlorobenzene	10	--	--	--	--	--	--	--	
Total PAHs as Benzo-a-pyrene	100	--	--	--	--	--	--	--	
Phenols as Trichlorophenol	100	--	--	--	--	--	--	--	
Dieldrin	5.0	--	--	--	--	--	--	--	
Total PCBs	10	--	--	--	--	--	--	--	

14[NASP]UH8069:T0365/683/2

Key at end of table.

360024

Table 3-8 (Cont.)

Parameter	Detection Limit	P36GW085 (TW085)	P36GW086 (TW086)	P36GW088 (TW088)	P36GW090 (TW090)	P36GW091 (TW091)	P36GW093 (TW093)	P36GW096 (TW096)	P36GW097 (TW097)	FPDWS/ FSDWS
		sample Number (Well Number)								
Arsenic	60	--	--	--	--	--	--	--	--	SO
Chromium	10	160	34	22	23	49	66	36	40	50
Zinc	20	590	120	100	190	320	320	110	53	5,000
Lead	40	1,300	270	--	310	700	930	260	200	50
Cadmium	5.0	21	5.7	--	--	--	--	--	--	10
Nickel	40	48	--	--	--	--	44	--	43	
Copper	25	210	55	--	45	140	94	27	--	1,000
Silver	10	--	--	--	--	--	--	--	--	50
TRPHS (mg/L)	1.0	--	3.5	3.6	--	--	--	--	--	
Toluene	10	--	--	--	--	--	--	--	--	
Ethylbenzene	10	--	--	--	--	--	--	--	--	
Total Xylenes	10	--	--	--	--	--	--	--	--	
1,2-Dichlorobenzene	10	--	--	--	--	--	--	--	--	
1,1-Dichloroethene	10	--	--	--	--	--	--	--	--	7.0
Methylene Chloride	10	--	--	--	--	--	--	--	--	
Trans-1,2-Dichloroethene	10	--	--	--	--	--	--	--	--	
1,1-Dichloroethane	10	--	--	--	--	--	--	--	--	
1,1,1-Trichloroethane	10	--	--	--	--	--	--	--	--	200
Trichloroethene	10	--	--	--	--	--	--	--	--	3.0
Tetrachloroethene	10	--	--	--	--	--	--	--	--	3.0
Chlorobenzene	10	--	--	--	--	--	--	--	--	
Total PAHs as Benzo-a-pyrene	100	--	--	--	--	--	--	--	--	
Phenols as Trichlorophenol	100	--	(ND)	--	--	--	--	--	--	
Dieldrin	5.0	--	--	--	--	--	--	--	--	
Total PCBs	10	(L)	--	--	--	--	--	--	--	

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Key at end of table.

Table 3-8 (Cont.)

Parameter	Detection Limit	Sample Number (Well Number) P36GW098 (TW098)	P36GW100 (TW100)	P36GW101 (TW101)	P36GW102 (TW102)	P36GW103 (TW103)	P36GW104 (TW104)	P36GW106 (TW106)	P36GW107 (TW107)	FPDWS/ FSDWS
Arsenic	60	--	--	--	--	--	--	--	--	50
Chromium	10	36	80	34	30	350	130	140	380	50
Zinc	20	130	260	130	130	500	420	220	100	5 000
Lead	40	410	420	130	100	520	750	400	67	50
Cadmium	5.0	--	--	--	--	--	--	--	--	10
Nickel	40	--	--	--	--			--	--	
Copper	25	37	84	25	--	35	190	39	--	1 000
Silver	10	--	--	--	--	--	--	--	--	30
TRPH (mg/L	1 0	--	1	-	-	--	--	-	1 4	
Toluene	10	--	1	--	--	--	1	--	--	
Ethylbenzene	10	--	1	--	--	--	1	--	--	
Total Xylenes	10	--	1	--	--	--	1	--	--	
1,2-Dichlorobenzene	10	--	1	--	--	--	1	--	--	
1,1-Dichloroethene	10	--	1	--	--	--	1	--	--	7 0
Methylene Chloride	10	--	1	--	--	1	1	--	--	
Trans-1,2-Dichloroethene	10	--	1	--	--	1	1	--	--	
1,1-Dichloroethane	10	--	1	--	--	1	1	--	--	
1,1,1-Trichloroethane	10	--	1	--	--	1	1	--	17	200
Trichloroethene	10	--	1	--	--	1	1	--	--	3.0
Tetrachloroethene	10	--	1	--	--	1	1	--	--	3.0
Chlorobenzene	10	--	1	--	--	1	1	--	--	
Total PAHs as Benzo-a-pyrene	100	--	1	-	--	--	--	--	--	
Phenols as Trichlorophenol	100	--	--	--	--	--	--	-	-	
Oil & Grease	5 0	-	(L	--	--	--	-	-	1	
Total PCBs	10	--	--	-	--	--	-	-	-	

Key [illegible] on of Table.

Table 3-8 (Cont.)

Parameter	Detection Limit	P36GW109 (TW109)	P36GW112 (TW112)	P36GW114 (TW114)	P36GW116 (TW116)	P36GW118 (TW118)	P36GW120 (TW120)	P36GW122 (TW122)	P36GW122D* (TW122)	FPDWS/ FSDWS
		Sample Number (Well Number)								
Arsonic	60	--	--	--	--	--	--	--	--	50
Chromium	10	160	58	25	25	13	37	37	24	50
Zinc	20	54	560	190	150	69	100	120	96	5,000
toad	40	130	1,500	170	160	--	150	58	--	50
Cadmium	5.0	--	--	--	--	--	--	--	--	lo
Nickel	40	--	--	--	--	--	60	--	--	
Copper	25	--	92	37	26	--	--	--	--	1,000
Silver	10	--	--	--	--	--	--	--	--	50
TRPHs (mg/L)	1.0	--	--	--	--	1.4	--	--	--	
Toluene	10	--	--	--	--	--	--	--	--	
Ethylbenzene	10	--	--	--	--	--	--	--	--	
Total Xylenes	10	--	--	--	--	--	--	--	--	
1,2-Dichlorobenzene	10	--	--	--	--	--	--	--	--	
1,1-Dichloroethene	10	--	--	--	--	--	--	--	--	1.0
Methylene Chloride	10	--	--	--	--	--	--	--	--	
Trans-1,2-Dichloroethene	10	--	--	--	--	--	--	--	--	
1,1-Dichloroethane	10	--	--	--	--	--	--	--	--	
1,1,1-Trichloroethane	10	--	--	--	--	--	--	--	--	200
Trichloroethene	10	--	--	--	--	--	--	--	--	3.0
Totrachloroethene	10	--	--	--	--	--	--	--	--	3.0
Chlorobenzene	10	--	--	--	--	--	--	--	--	
Total PAHs as Benzo-a-pyrene	100	--	--	--	--	360	--	--	--	
Phenols as Trichlorophenol	100	--	--	--	--	--	--	--	--	
Dieldrin	5.0	--	--	--	--	--	--	--	--	
Total PCBs	10	--	--	--	--	--	--	--	--	

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Key at ond of table.

Table 3-8 (Cont.)

Parameter	Detection Limit	Sample Number (Well Number) P36GW124 (TW124)	P36GW126 (TW126)	P36GW127 (TW127)	P36GW129 (TW129)	P36GW131 (TW131)	P36GW133 (TW133)	P36GW135 (TW135)	P36GW137 (TW137)	FPDWS/ FSDWS
Arsenic	60	--	--	--	--	--	--	--	--	SO
Chromium	10	24	24	13	11	15	14	23	44	SO
Zinc	20	74	340	100	63	220	180	250	720	5,000
Load	40	80	660	97	56	180	470	54	1,800	50
Cadmium	5.0	--	--	--	--	--	--	--	--	10
Nickel	40	40	--	--	--	--	42	--	--	
Copper	25	--	54	--	--	59	86	--	200	1,000
Silver	10	--	--	--	--	--	--	--	--	SO
TRPHs (mg/L)	1.0	--	--	--	--	--	--	--	--	
Toluene	10	--	--	--	--	--	--	--	--	
Ethylbenzene	10	--	--	--	--	--	--	--	--	
Total Xylenes	10	--	--	--	--	--	--	--	--	
1,2-Dichlorobenzene	10	--	--	--	--	--	--	--	--	
1,1-Dichloroethene	10	--	--	--	--	--	--	--	--	7.0
Methylene Chloride	10	--	--	--	--	--	--	--	--	
Trans-1,2-Dichloroethene	10	--	--	--	--	--	--	--	--	
1,1-Dichloroethane	10	--	--	--	--	--	--	--	--	
1,1,1-Trichloroethane	10	--	--	--	--	--	--	--	--	200
Trichloroethene	10	--	--	--	--	--	--	--	--	3.0
Tetrachloroethene	10	--	--	--	--	--	--	--	--	3.0
Chlorobenzene	10	--	--	--	--	--	--	--	13	
Total PAHs as **Benzo-a-pyrene**	100	--	--	--	--	--	--	--	--	
Phenols as Trichlorophenol	100	--	--	--	--	--	--	--	--	
Dieldrin	5.0	--	--	--	--	(L)	--	--	--	
Total PCBs	10	--	--	--	--	--	--	--	--	

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Key at end of table.

3600245

Table 3-8 (Cont.)

Parameter	Detection Limit	Sample Number (Well Number) P36GW139 (TW139)	P36GW140 (TW140)	P36GW141 (TW141)	P36GW145 (TW145)	P36GW148 (TW148)	P36GW151 (TW151)	P36GW153 (TW1531	P36GW154 (TW154)	FPDWS/ FSDWS
Arsenic	60	--	--	--	--	--	--	--	--	50
Chromium	10	82	92	15	480	410	190	60	41	S0
Zinc	20	4,400	380	290	190	12	25	81	--	5,000
Load	40	2,600	1,100	280	450	220	54	--	--	S0
Cadmium	5.0	6.6	--	--	15	--	--	--	--	lo
Nickel	40	56	57	--	110	61	--	66	--	
copper	25	220	--	--	140	58	--	34	--	1,000
Silver	10	--	--	--	--	--	--	--	--	50
TRPHs (mg/L)	1.0	--	--	--	--	--	--	--	--	
Toluene	10	--	--	--	--	--	--	--	--	
Ethylbenzene	10	--	--	--	--	--	--	--	--	
Total Xylenes	10	--	--	--	--	--	--	--	--	
1,2-Dichlorobenzene	10	--	--	--	--	--	--	--	--	
1,1-Dichloroethene	10	--	--	--	--	--	14	--	--	7.0
Methylene Chloride	10	--	--	--	--	--	--	--	--	
Trans-1,2-Dichloroethene	10	--	--	--	--	--	--	--	--	
1.1-Dichloroethane	10	--	--	--	--	--	68	--	--	
1,1,1-Trichloroethane	10	--	--	--	--	--	45	--	--	200
Trichloroethene	10	--	--	--	--	--	--	--	--	*3.0*
Tetrachloroethene	10	--	--	--	--	--	--	--	--	*3.0*
Chlorobenzene	10	--	--	--	--	--	--	--	--	
Total PUs as Benzo-a-pyrene	100	--	--	--	--	--	--	--	--	
Phenols as Trichlorophenol	100	--	--	--	--	--	--	--	--	
Dieldrin	5.0	--	--	--	--	--	--	--	--	
Total PCBs	10	--	--	--	--	--	--	--	--	

14[NASP]UH8069:T0365/683/2

Key at ond of table.

Table 3-8 (Cont.)

Parameter	Detection Limit	Sample Number (Well Number)									FPDWS/ FSDWS
		P36GW155 (TW155)	P36GW156 (TW156)	P36GW156D[f] (TW156)	P36GW158 (TW158)	P36GW160 (TW160)	P36GW161 (TW161)	P36GW162 (TW162)	P36GW164 (TW164)	P36GW164D[g] (TW164)	
Arsenic	60	--	--	--	--	--	--	--	--	--	50
Chromium	10	100	63	61	19	24	22	71	520	410	50
Zinc	10	110	250	200	33	330	35	83	480	430	5,000
Lead	90	--	310	200	--	170	440	97	960	830	50
Cadmium	5.0	--	--	--	--	--	--		88	84	10
Nickel	90	--	--	--	--	--	--		50	53	
Copper	25	--	52	37	--	29	--	25	95	83	1,000
Silver	10	--	--	--	--	--	--	--	--	--	50
TRPHs (mg/L)	1.0	--	4.1	3.2	--	--	--	--	--	--	
Toluene	10	--	--	--	--	--	--	--	--	--	
Ethylbenzene	10	--	--	--	--	--	--	--	--	--	
Total Xylenes	10	--	--	--	--	--	--	--	--	--	
1,2-Dichlorobenzene	10	--	--	--	--	--	--	--	--	--	
1,1-Dichloroethene	10	--	--	--	--	--	--	--	--	--	7.0
Methylene Chloride	10	--	--	--	--	--	--	--	--	--	
Trans-1,2-Dichloroethene	10	--	--	--	--	--	--	--	--	--	
1,1-Dichloroethane	10	--	--	--	--	--	--	--	11	13	
1,1,1-Trichloroethane	10	--	--	--	--	--	--	--	--	--	200
Trichloroethene	10	--	--	--	--	--	--	--	37	45	3.0
Tetrachloroethene	10	--	--	--	--	--	--	--	--	--	3.0
Chlorobenzene	10	--	--	--	--	--	--	--	--	--	
Total PAHs as Benzo-a-pyrene	100	--	--	--	--	--	--	--	--	--	
Phenols as Trichlorophenol	100	--	--	--	--	--	--	--[m]	--[m]	--[k]	
Dieldrin	5.0	--	--	--	--	--	--	--	--	--	
Total PCBs	10	--	--	--	--	--	--	--	--	--	

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Key: [illegible] end of table.

360D246

Table 3-8 (Cont.)

Parameter	Detection Limit	P36GW167 (TW167)	P36GW168 (TW168)	P36GW169 (TW169)	P36GW172 (TW172)	P36GW174 (TW174)	P36GW176 (TW176)	P36GW178 (TW178)	P36GW181 (TW181)	FPDWS/ FSDWS
		Sample Number (Well Number)								
Arsenic	60	--	--	--	--	--	--	--	--	50
Chromium	10	170	110	530	3,100	13	70	67	--	50
Zinc	20	140	88	1,500	86	28	73	240	110	5,000
Lead	40	--	110	2,600	140	--	88	110	300	50
Cadaium	5.0	7.2	--	20	2,100	--	--	7.0	--	10
Nickel	40	--	--	110	58	--	--	--	--	
Copper	25	31	--	1,700	27	--	28	--	82	1,000
Silver	10	--	--	--	50	--	--	--	--	50
TRPHs (mg/L)	1.0	--	--	2.4	--	--	--	--	--	
Toluene	lo	--	--	--	--	--	--	--	--	
Ethylbenzene	10	--	--	--	--	--	--	--	--	
Total Xylenes	10	--	--	--	--	--	--	--	--	
1,2-Dichlorobenzene	10	--	--	--	--	--	--	--	--	
1,1-Dichloroethene	10	--	--	--	--	--	--	--	--	7.0
Methylene Chloride	10	--	--	--	--	--	--	--	--	
Trans-1,2-Dichloroethene	10	--	--	--	--	--	--	--	--	
1,1-Dichloroethane	10	--	--	--	--	--	--	--	--	
1,1,1-Trichloroethane	10	--	--	--	--	--	--	--	--	200
Trichloroethene	10	--	--	--	--	--	--	--	--	3.0
Tetrachloroethene	10	--	--	--	--	--	--	--	--	3.0
Chlorobenzene	10	--	--	--	--	--	--	--	--	
Total PAHs as Boneo-a-pyrene	100	--	--	--	--	--	--	--	--	
Phenols as Trichlorophenol	100	--	--	--	190	--	--	--	--	
Dieldrin	5.0	--	--	--	--	--	--	--	--	
Total PCBs	10	--	--	--	--	--	--	--	--	

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Koy at ond of table.

3900247

Table 3-0 (Cont.)

Parameter	Detection Limit	Sample Number (Well Number) P36GW183 (TW183)	P36GW185 (TW185)	P36GW187 (TW187)	P36GW190 (TW190)	P36GW193 (TW193)	P36GW195 (TW195)	P36GW197 (TW197)	P36GW199 (TW199)	FPDWS/ FSDWS
Arsenic	60	--	--		--	--	--	--	--	50
Chromium	10	--	500		590	1,800	70	25	72	50
Zinc	20	210	65		110	320	130	54	93	5,000
Lead	40	240	--		--	--	--	51	160	50
Cadmium	5.0	--	10		--	--	--	--	--	10
Nickel	40	--	--		80	--	--	--	--	
Copper	25	--	26		77	80	--	--	67	1,000
Silver	10	--	--		--	--	--	--	--	50
TRPHs (mg/L)	1.0	--	--		--	--	1.2	--	--	
Toluene	10	--	--		--	--	--	--	--	
Ethylbenzene	10	--	--		--	--	--	--	--	
Total Xylenes	10	--	--		--	--	--	--	--	
1,2-Dichlorobenzene	10	--	--		--	--	--	--	--	
1,1-Dichloroethene	10	--	--		13	--	--	--	--	7.0
Methylene Chloride	10	--	--		--	--	--	--	--	
Trans-1,2-Dichloroethene	10	--	--		--	--	--	--	--	
1,1-Dichloroethane	10	--	--		--	--	--	--	--	
1,1,1-Trichloroethane	10	--	--		--	--	--	--	--	200
Trichloroethene	10	--	--		--	--	--	--	--	3.0
Tetrachloroethene	10	--	--		--	--	--	--	--	3.0
Chlorobenzene	10	--	--		--	--	--	--	--	
Total PAHs am Benzo-a-pyrene	100	--	--		--	--	--	160	--	
Phenols am Trichlorophenol	100	--	--		--	--	--	--	--	
Dieldrin	5.0	--	--		--	--	--	--	--	
Total PCBs	10	--	--		--	--	--	--	--	

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K[illegible] end of table.

Table 3-8 (Cont.)

Parameter	Detection Limit	Sample Number (Well Number) P36GW201 (TW201)	P36GW203 (TW203)	P36GW205 (TW205)	P36GW206 (TW206)	P36GW206D[h] (TW206)	P36GW208 (TW208)	P36GW209 (Tu209)	P36GW213 (TW213)	FPDWS/ FSDWS
Arsonic	60	--	--	--	--	100	--	--	--	SO
Chromium	10	15	190	36	160	150	250	170	800	50
Zinc	20	79	24,000	440	70	85	80	55	69	5,000
Load	40	55	37,000	600	200	160	--	86	52	50
Cadmium	5.0	--	44	--	--	6.6	--	--	95	10
Nickel	40	--	440	--	210	220	48	--	140	
Copper	25	73	6,300	96	72	75	54	35	29	1,000
Silver	10	--	--	--	--	--	--	--	--	50
TRPHs (mg/L)	1.0	--	--	--	--	--	--	--	--	
Toluene	10	--	--	--	--	--[k]	--	110	--	
Ethylbenzene	10	--	--	--	--	--[k]	--	150	--	
Total Xylenes	10	--	--	--	52	(L)[k]	41	790	--	
1,2-Dichlorobenzene	10	--	--	--	--	--[k]	--	--[j]	--	
1,1-Dichloroethene	10	--	--	--	--	--[k]	--	--[j]	--	7.0
Methylene Chloride	10	--	--	--	--	--[k]	--	120	--	
Trans-1,2-Dichloroethene	10	--	--	--	--	--[k]	--	--[j]	--	
1,1-Dichloroethane	10	--	--	--	--	--[k]	--	--[j]	--	
1,1,1-Trichloroethane	10	--	--	--	--	--[k]	--	--[j]	--	200
Trichloroethene	10	--	--	--	--	--[k]	--	--[j]	--	3.0
Tetrachloroethene	10	--	--	--	--	--[k]	--	--[j]	--	3.0
Chlorobenzene	10	--	--	--	--	--[k]		--[j]		
Total PAHs as Benzo-a-pyrene	100	--	--	--	--	--	--	--	--	
Phenols as Trichlorophenol	100	--	--	260	1,300	1,200	--	200	--	
Dieldrin	5.0	--	--	--	--	--	--	--	--	
Total PCBs	10	--	--	--	--	--	--	--	--	

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Koy at end of table.

3600243

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Table 3-8 (Coot.)

Parametor	Detection Limit	Sample Number (Well Number) P36GW216 (TW216)	P36GW220 (TW220)	P36GW222 (TW222)	P36GW223 (TW223)	P36GW225 (TW225)	P36GW225D[1] (TW225)	P36GW226 (TW226)	FPDWS/ FSDWS
Arsonic	60	--	--	--	--	--	--	--	S0
Chromium	10	73	22	1,200	73	58	77	130	S0
Zinc	20	830(B)	240	140	57	41	150	21	5,000
Load	40	1,700	530	--	--	80	88	--	50
Cadmium	5.0	--	--	--	--	--	21	--	10
Nickel	40	--	--	--	--	42	76	--	
Copper	25	310	280	95	75	--	--	--	1,000
Silver	10	--	--	--	--	--	--	--	S0
TRPHs (mg/L)	1.0	--	--	1.6	--	--	--	--	
Toluene	10	--	--	--	--	--	--	--[1]	
Ethylbenzene	10	--	--	--	--	--	--	--[1]	
Total Xylenes	10	--	--	10	--	--	--	--[1]	
1,2-Dichlorobenzene	10	--	--	--	--	--	--	--[1]	
1,1-Dichloroethene	10	--	--	--	--	--	--	(L)[1]	7.0
Methylene Chloride	10	--	--	--	--	--	--	(L)[1]	
Trans-1,2-Dichloroethene	10	--	--	--	--	--	--	--[1]	
1,1-Dichloroethane	10	--	--	--	--	--	--	--[1]	
1,1,1-Trichloroethane	10	--	--	--	--	--	--	2,200[1]	200
Trichloroethene	10	--	--	--	--	--	--	--[1]	3.0
Tetrachloroethene	10	--	--	--	--	--	--	--[1]	3.0
Chlorobenzene	10	--	--	--	--	--	--	--[1]	
Total PAHs as Boato-a-gyrono	100	--	--	--	--	--	--	--	
Phenols as Trichlorophenol	100	--	--	--	--	--	--	--	
Dieldrin	5.0	--	--	--	--	--	--	--	
Total PCBs	10	--	--	--	--	--	--	--	

Key nd of table.

Table 3-8 (Cont.)

Key :

Dash (--) indicates compound not detected.

[a]Duplicate of samplo P36GW002.
[b]Duplicate of sample P36GW022.
[c]Duplicate of sample P36GW053.
[d]Duplicate of sample P36GW070.
[e]Duplicate of samplo P36GW122.
[f]Duplicate of sample P36GW156.
[g]Duplicate of sample P36GW164.
[h]Duplicate of samplo P36GW206.
[i]Duplicate of sample P36GW225.
[j]Detection limit tor specified parameter increased by a factor of 10 in this sample.
[k]Detection limit for specified parameter increased by a factor of 5 in this samplo.
[l]Detection limit for specified parameter incroasod by a factor of 100 in this sample.
[m]Detection limit for specified parameter increased by a factor of 4 in this samplo.

Qualifiers;
(B) = Compound also present in method blank.
(L) = Present below stated detection limit.
(ND) = Not determined duo to matrix interference.

Source: Ecology and Environment, Inc., 1992.

installed along Site 36. Plate 3 shows the locations of the Site 36 temporary monitoring wells. The complete analytical screening results for the groundwater samples are presented in Appendix G.

In general, the temporary monitoring well samples exhibited elevated concentrations of metals (most importantly, lead, chromium, and cadmium), VOCs, PAHs, and/or phenols. However, to some extent the elevated groundwater metal concentrations may reflect leaching and/or dissolution of aquifer matrix materials entrained in these samples by the acid employed as a preservative, rather than actual groundwater contamination (see Section 3.9). TRPHs were detected in 17 samples, but the detected concentrations in only three samples exceed the Florida Groundwater Cleanup Standard (FGCS) of 5 milligrams per liter (mg/L; Florida Department of Environmental Regulation [FDER] 1990). The pesticide dieldrin was detected at trace levels in only two samples, and PCBs were detected at trace levels in only one sample.

Metals

Table 3-9 presents the frequency distribution of the detected groundwater metal concentrations relative to the Florida Primary Drinking Water Standard (FPDWS) or the Florida Secondary Drinking Water Standard (FSDVS), as applicable (FDER 1991). This table clearly indicates that lead, chromium, and cadmium are by far the most significant groundwater metal contaminants detected in the Site 36 samples. Consequently, the remainder of this discussion will focus on the distribution of these three metals across Site 36.

Plate 12 shovs the distribution of lead concentrations in the Site 36 groundwater samples. Detected lead concentrations vere extremely high, with 18 locations exhibiting concentrations greater than 1,000 micrograms per liter (µg/L), an additional 15 locations exhibiting concentrations greater than 500 µg/L, and an additional 44 locations exhibiting concentrations equal to or greater than 100 µg/L, all well above the FPDWS of 50 µg/L (FDER 1991). As shown on Plate 12, these very high groundwater lead concentrations were more or less uniformly present across the entire length of the sewer line, although the frequency of occurrence appears clearly lower along the northwest portion of the line. The highest lead concentration (37,000 µg/L) was

Table 3-9

FREQUENCY DISTRIBUTION OF DETECTED METALS CONCENTRATIONS (RELATIVE TO FLORIDA PRIMARY AND SECONDARY DRINKING WATER STANDARDS) FOR GROUNDWATER SAMPLES FROM TEMPORARY MONITORING WELLS— NAS PENSACOLA SITE 36

Metal	Detection Limit (µg/L)	Number of Samples				
		ND	FPDWS	FSDWS	FPDWS (µg/L)	FSDWS (µg/L)
Arsenic	60	117	2[a]	NA	50	NA
Chromium	10	5	62	NA	50	NA
Zinc	20	1	NA	1	NA	5,000
Lead	40	26	92	NA	50	NA
Cadmium	5.0	88	14	NA	10	NA
Nickel[b]	40	92	NA	NA	NA	NA
Copper	25	41	NA	5	NA	1,000
Silver	10	118	0	NA	50	NA

14[NASP]UH8069:T0365/1150/19

Key:

ND = Rot detected.
FPDWS = Florida Primary Drinking Water Standard.
FSDWS = Florida Secondary Drinking Water Standard.
NA = Not applicable.

[a]Detection limit (60 µg/L) for arsenic exceeded the FPDWS of 50 µg/L.
[b]Detected nickel concentrations (220 µg/L and 440 µg/L) in two samples exceeded the Florida Grounduater Guidance Concentration of 150 µg/L.

Source: Ecology and Environment, Inc., 1992.

detected at temporary well location TW203 (east of Hurray Road, southeast portion of line; see plates 1 and 3). This sample also exhibited the highest detected concentrations of zinc (24,000 µg/L), copper (6,300 µg/L), and nickel (440 µg/L; see Table 3-8). As noted in Section 3.8.1, the A- and B-interval soil samples collected at location TU203 also exhibited the highest or (B-interval copper) second highest detected concentrations of three of these four metals (excluding nickel). However, a comparison of Plate 12 with plates 6 and 7 reveals that the Site 36 distribution of lead in groundwater is clearly more consistent with the A-interval soil sample lead distribution than the B-interval distribution, although even this correlation (groundwater versus A-interval soil lead) is tenuous. The significance of these groundwater versus soil lead distribution relationships will be discussed further in Section 3.9.

Plate 13 shows the distribution of chromium concentrations in the Site 36 groundvater samples. As in the case of lead, but to a much lesser extent, detected chromium concentrations were extremely high, vith three locations exhibiting concentrations greater than 1,000 µg/L, an additional seven locations exhibiting concentrations greater than 500 µg/L, and an additional 26 locations exhibiting concentrations equal to or greater than 100 µg/L, all well above the FPDWS of 50 µg/L (FDER 1991). However, comparison of plates 12 and 13 clearly reveals that the chromium distribution in Site 36 groundwater is distinctly different from the distribution of lead. In particular, elevated chromium concentrations are most common along the northwest portion of the line, much more sporadically distributed along the northeast and southeast portions of the line, and almost absent along the southvest portion of the line. Of the three locations where chromium groundvater concentrations exceed 1,000 µg/L (TW172 = 3,100 µg/L and TW193 = 1,800 µg/L, northwest portion of line, and TW222 = 1,200 µg/L, southeast portion of line; see Plate 3), two (TW193 and TW222) did not exhibit detectable levels of lead, but the third (TW172) exhibited a comparatively low lead concentration (140 µg/L).

Plate 14 shows the distribution of cadmium concentrations in the Site 36 groundwater samples. Cadmium vas detected at concentrations exceeding the PPDUS of 10 µg/L (FDER 1991) at 14 locations, half of

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which occur along the northwest portion of the sewer line. Extremely elevated concentrations (>50 µg/L) were detected at seven locations (see plates 1, 3, and 14):

- Southeast and east of Building 649 (northwest portion of line; TW172 = 2,100 µg/L and TW213 = 95 µg/L);
- South of Building 604 (southeast portion of line; TW049 = 350 µg/L and TU046 = 63 µg/L);
- West of IWTP (northeast portion of line; TW014 = 260 µg/L);
- West of Murray Road (northwest portion of line; TW164 = 88 µg/L); and
- South of Building 104 (southeast portion of line; TW039 = 57 µg/L).

Overall, the distribution of cadmium concentrations in the Site 36 groundwater samples appears consistent with, but not uniquely correlatable to, the distributions of chromium and, to a lesser extent, lead.

As noted previously, to some extent the detected presence of elevated metal concentrations in the Site 36 groundwater samples probably reflects acid preservative leaching and/or dissolution of aquifer matrix materials entrained in these unfiltered temporary well samples, rather than actual groundwater contamination. However, in combination, the magnitude and distribution of metals occurrences in Site 36 groundwater and soil samples suggest that, in most cases, the highest Concentrations of groundwater metals must at least in part reflect actual groundwater contamination, although not necessarily alvays related to leakage from the sewer line. This possibility will be discussed in greater detail in Section 3.9.

TRPHs

Plate 15 shows the 17 Site 36 groundwater sample locations where TRPHs were detected and the corresponding concentrations. TRPHs were detected at generally low concentrations, although the samples from

three separated locations did exhibit concentrations well above the FGCS of 5 mg/L (FDER 1990; see plates 1, 3, and 15):

- Temporary well TW063 (east of Building 604, southeast portion of line; TRPHs = 170 mg/L);
- Temporary well TW058 (east of Building 18, southeast portion of line; TRPHs = 27 mg/L); and
- Temporary well TW039 (south of Building 104, southeast portion of line; TRPHs = 13 mg/L).

Locations TU063 and TW058 correspond to soil boring locations where two of the three highest B-interval TRPH concentrations were detected (see Section 3.8.1). Location TW039 corresponds to a soil boring location where elevated A-interval and, to a lesser extent, B-interval TRPH concentrations were detected. Overall, however, the distribution of TRPHs in groundvater only poorly correlates with the distribution of the most elevated soil concentrations (compare Plate 15 with plates 8 and 9). Similarly, the groundvater TRPH distribution does not correlate very well vith the groundwater metals distribution (compare Plate 15 with plates 12, 13, and 14).

VOCs

Plate 16 shows the 18 Site 36 groundwater sample locations where one or more VOCs were detected, identifies the specific VOC(s) detected, and presents the corresponding concentration(s). VOCs were primarily detected along the southeast and northwest portions of the sewer line. In particular, the folloving locations exhibited VOC concentrations exceeding the FPDVS (FDER 1991) and/or FGCS (FDER 1990; see Table 3-8 and plates 1, 3, and 16):

- South of Building 604 (southeast portion of line; tetrachloroethene (PCEJ = 500 µg/L at TW049 and 12 µg/L at TW053; trichloroethene [TCE] = 21 µg/L at TW046);
- East of Building 604 (southeast portion of line; xylenes [X) = 630 µg/L at TW063, exceeds FGCS of 50 µg/L for total benzene + toluene + ethylbenzene + xylenes [BTEX]);
- Southeast of Building 72 (southeast portion of line; TCE = 11 µg/L at TW034);

- East of Building 18 (southeast portion of line; 1,1-dichloroethene [DCE] = 11 µg/L at TW058);

- West of Murray Road (northwest portion of line; TCE = 45 µg/L at TW164);

- Near buildings 3220 and 3450 (northwest portion of line; 1,1,1-trichloroethane [TCA] = 2,200 µg/L and DCE = <10 µg/L at TW226; DCE = 14 µg/L at TW151; and DCE = 13 µg/L at TW190);

- East of Building 2691 (northwest portion of line; total BTEX = 1,050 µg/L at TW209, exceeds FGCS of 50 µg/L); and

- East of Building 692 (northwest portion of line; X = 52 µg/L at TW206, exceeds FGCS for total BTEX of 50 µg/L).

It should be noted that the detection limits for PCE, TCE, and DCE were slightly above the FPDWS for these analytes (10 µg/L versus 3 µg/L, 3 µg/L, and 7 µg/L, respectively; see Table 3-8) and that the detection limit for benzene (also 10 µg/L; see Appendix G) was above the FGCS (1 µg/L; FDER 1990). Consequently, these contaminants could be present in other groundwater samples at levels slightly above the applicable standard.

The presence of xylenes in the sample from temporary well TW063 is consistent with the detected presence of xylenes in the B-interval soil sample collected at this location, which was the only soil sample to exhibit detectable levels of aromatic-type VOCs (see Section 3.8.1). The trace levels of methylene chloride also detected in the groundwater sample from temporary well TW226 could be related to the low levels of this contaminant detected in soil samples collected at nearby boring locations B223 and B225 (see Plate 3), which were the only other soil samples to exhibit detectable levels of any VOC (see Section 3.8.1).

Metals contamination, to varying degrees, was present in most of the groundwater samples exhibiting VOC contamination (compare Plate 16 with plates 12, 13, and 14). In contrast, only five of the 18 groundwater sample locations where VOCs were detected also exhibited measurable levels of TRPHs. In particular, the samples from wells TW063 (630 µg/L xylenes) and TW058 (11 µg/L DCE) exhibited the highest on-site TRPH groundwater concentrations (170 and 27 mg/L, respectively).

PAEs

Plate 17 shows the 11 Site 36 groundwater sample locations where PAEs were detected and the corresponding concentrations. Detected Concentrations ranged from <100 µg/L to 700 µg/L and could exceed the potentially applicable FGCSs (100 µg/L total naphthalenes or 10 µg/L any other PAH, excluding naphthalenes; FDER 1990). The highest PAH concentrations were detected in the samples from vells TW058 (700 µg/L; east of Building 18, southeast portion of line), TW063 (420 µg/L; east of Building 604, southeast portion of line), and TW118 (360 µg/L; north of Hoffett Road, southwest portion of line; see plates 1, 3, and 17). Two of these sample locations (TW058 and TW063) also exhibited groundwater VOC contamination, and all three exhibited groundwater TRPE contamination (see plates 15 and 16). To a moderate extent, the PAH groundvater distribution appears to correlate vith the B-interval soil distribution (compare plates 11 and 17).

It should be noted that PAEs were reported as benzo-a-pyrene for laboratory reporting purposes; hovever, PAEs other than benzo-a-pyrene may be present in the samples.

Pbenols

Plate 17 shows the 12 Site 36 groundwater sample locations where phenols were detected and the corresponding concentrations. Detected concentrations ranged from <100 µg/L to 1,300 µg/L and could exceed the Florida Groundwater Guidance Concentration (FGGC) for various phenolic compounds (e.g., chlorophenols, dichlorophenols, trichlorophenols, and 4-nitrophenol = 10 µg/L; phenol and 2-nitrophenol = 20 µg/L; and pentachlorophenol = 30 µg/L; FDER 1989). The highest phenol concentrations were detected in the samples from temporary wells TW206 (1,300 µg/L; east of Building 692, northwest portion of line), TW063 (1,100 µg/L; east of Building 604, southeast portion of line), TW058 (720 µg/L; east of Building 18, southeast portion of line), and TW040 (700 µg/L; between buildings 71 and 104, southeast portion of line; see plates 1, 3, and 17). Of these four locations, three (excluding TW206) also exhibited elevated PAH concentrations, tvo (TW058 and TW063) also exhibited groundwater TRPH contamination, and all four exhibited evidence of VOC contamination (compare plates 15, 16, and 17). Overall,

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only a poor to moderate correlation exists between the occurrence of phenols versus other organic groundwater contaminants and the occurrence of groundwater phenols versus B-interval soil phenols.

It should be noted that phenols were reported as trichlorophenol for laboratory reporting purposes; however, phenols other than trichlorophenol may be present in the samples.

Pesticides

The pesticide dieldrin was detected at trace levels (<5 µg/L) at two widely separated locations: TW100 (south of Building 3460, southeast portion of line) and TW131 (northeast of Building 679, southwest portion of line; see plates 1 and 3 and Table 3-8). Trace levels of dieldrin were also detected in soil samples from and near location TW100 (but not near location TW131; see Section 3.8.1). Lead was the only other potentially significant contaminant in these two groundwater samples.

PCBs

PCBs were detected at trace levels (<10 µg/L) only at location TW085 (east of Building 3588, southeast portion of line; see Table 3-8 and plates 1 and 3). Metals were also detected at elevated levels in this sample (see Table 3-8). PCBs were not detected in any soil sample.

3.9 CONTAMINATION DISTRIBUTION/SOURCE DISCUSSION

Both media, soil and groundwater, sampled along the route of the industrial waste sewer line (Site 36) exhibited clearly elevated levels of five of the contaminant groups (metals, VOCs, TRPHs, PAHs, and phenols) included in the Phase I investigation. With the exception of metals in groundwater, the occurrence of which (as will be discussed below) is believed subject to interferences, the detected contamination is either sporadically distributed across a generally limited number of highly localized sampling locations and/or predominantly concentrated along the northwest and/or southeast portions of the sewer line. Overall, much of the detected contamination does not appear to reflect

active, continuing leakage from the sewer line, but rather may be attributable to any one of a variety of other potential sources, such as:

- Spills or other releases from the numerous active facilities located along the line;
- Leakage from underground fuel, storm drain, and/or sanitary sewer lines present in the vicinity of the industrial waste sewer line;
- Incidental releases during periodic maintenance and/or upgrades of all of the above-noted underground lines, including the industrial waste sewer line, or during unrelated construction activities in the vicinity of these lines;
- Use of previously contaminated soils as backfill along the industrial waste sewer line route or other nearby underground line routes;
- Presence of buried waste materials along the sever line route; and/or
- Ambient contamination derived from the full spectrum of base-wide activities.

The remainder of this discussion will be divided into four sections. The first three sections will provide a brief summary of the key results of the Phase I soil-gas survey, soil sample analyses, and groundwater sample analyses, respectively, vith regard to contaminant occurrence and distribution. The fourth section will specifically consider these results from the perspective of the source(s) of contamination.

3.9.1 Soil-Gas Survey

Elevated methane-corrected soil-gas readings were heavily concentrated along the northvest and southeasternmost portions of the sewer line (see Plate 5). The extent to which elevated readings vere concentrated in these areas, and the degree to which the readings vere elevated, clearly suggested that very high levels of VOC or other organic species contamination vould be detected in almost all of the soil and/or groundwater samples collected in these areas.

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3.9.2 Soil Contamination

Lead, TRPHs, PAHs, and phenols were the primary soil contaminants detected. Overall, elevated concentrations of two or more of these contaminants were as likely not to be detected at the same location as they were to be detected at the same location.

Elevated lead concentrations were most common in the A-interval samples, but even across this depth range only 26 of the 121 sampling locations exhibited lead concentrations at or above 50 mg/kg (see plates 6 and 7). Elevated lead concentrations were most commonly detected along the southeasternmost portion of the line (19 of the above-noted 26 locations), but the two highest lead concentrations occurred at isolated locations separate from the main area of occurrence (east of Murray Road and north of Building 3644).

Elevated TRPH concentrations were also most common in the A-interval samples, but even across this depth range only 23 of the 121 sampling locations exhibited TRPH concentrations at or above 100 mg/kg (see plates 8 and 9). Elevated TRPH concentrations were most commonly detected along the southeast portion of the line (16 of the above-noted 23 locations), with the greatest frequency of detections occurring along the southeasternmost area (7 locations) as in the case of lead. However, the four highest concentrations were detected at widely separated locations, only two of which occurred along the southeast portion of the line.

PAHs were most commonly detected in the A- and B-interval samples, but again at comparatively few of the sampling locations (27 of 121 A-interval locations and 23 of 106 B-interval locations; see plates 10 and 11). However, detected concentrations were generally low (56,600 µg/kg) at all but six widely separated A-interval locations and three widely separated B-interval locations. Furthermore, PAHs were detected in both the A- and B-interval samples at only 10 locations, and only at one of these locations did both intervals exhibit very elevated concentrations. A-interval PAH detections did appear to "cluster" along six discrete, widely separated areas of the sewer line (in particular, the southeasternmost area), with each area encompassing one of the very high A-interval PAH occurrences (see Plate 10).

Phenols were detected at only nine of 121 A-interval sampling locations, seven of 106 8-interval sampling locations, and one of 61 C-interval sampling locations (see plates 10 and 11 for A- and B-interval detection locations). Of the seven locations vhere E-interval phenols were detected, only one corresponded to an A-interval detection location. Very high phenol Concentrations (≥10,000 µg/kg) were detected at four videly separated A-interval locations, three separated E-interval locations, and the one C-interval location, none of which correspond.

3.9.3 Groundvater Contamination

Lead, chromium, cadmium, VOCs, PAHs, and phenols vere the primary groundvater contaminants detected. In a number of samples, the detected concentrations vere well above the FPDVS (metals and VOCs), the applicable (total BTEX and TRPHs), ok potentially applicable (PAHs) FGCS, and/or the potentially applicable FGGC (phenols). As in the case of soil contamination, overall, elevated concentrations of two or more of the groundvater contauinants vere as likely not to be detected at the same location as they vere to be detected at the same location.

Of the 119 groundvater sampling locations, 93 locations exhibited lead concentrations exceeding the FPDWS, 59 locations exhibited chromium concentrations exceeding the PPDWS, and 14 locations exhibited cadmium concentrations exceeding the FPDWS (see Table 3-9 and plates 12, 13, and 14). Elevated lead concentrations vere more or less uniformly present across the entire length of the sever line except for the clearly lover detection frequency and magnitude along the northwest portion of the line (see Plate 12). In contrast, elevated chromium concentrations vere detected at almost all of the northwest sampling locations, sporadically detected along the southeast and northeast portions of the line, and essentially absent along the southvest portion of the line (see Plate 13). Elevated cadmium concentrations were predominantly detected at northwestern and southeastern sampling locations, exhibiting a general, but not fully consistent correlation to the chromium and lead distributions (see Plate 14).

The groundwater lead distribution was generally most consistent vith the A-interval soil lead distribution; chromium and cadmium were

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rarely detected in any of the soil samples at particularly elevated concentrations.

To varying degrees, the detection frequency of elevated concentra-'tions of the above three metals, as well as of the other metals detected in the Site 36 groundwater samples, is clearly impacted by leaching and/or dissolution of aquifer matrix sediments entrained in these unfiltered samples by the acid preservative. During the Phase I investigations conducted by E & E at many of the other identified NAS Pensacola sites, filtered and unfiltered samples for metals analysis (dissolved and total metals, respectively) were colle'cted from the existing, permanent shallow monitoring wells (installed by GCM) in addition to the unfiltered samples for total metals analysis collected from the E & E-installed temporary monitoring wells. With very few exceptions, the unfiltered, total metals concentrations from the permanent well samples were much lower than the corresponding concentrations in nearby temporary well samples. This result was clearly a reflection of the much lower turbidity of the samples collected from the more highly developed permanent wells. In most instances, dissolved metal concentrations for the primary contaminant species (e.g., lead, chromium, and cadmium versus calcium or sodium) in the permanent well samples were also much lower than the corresponding total metals concentrations.

It is clear that groundwater metals contamination along Site 36 is not likely to be as widespread as suggested by the total metals concentrations exhibited by the unfiltered temporary well samples. Rather, actual groundwater metals contamination is most likely reflected by the distribution of the more highly elevated concentrations (e.g., >500 µg/L for lead). The presence of groundwater metals contamination across Site 36 must occur given that: 1) soil contamination by metals is clearly present in many samples collected above the water table (primarily A-interval samples); 2) soil contamination by metals is generally absent in samples collected below the water table (primarily B- and C-interval samples); and 3) metal concentrations in soil samples collected below the water table (i.e., sediments from which would have been entrained in the groundwater samples) do not usually correlate with the groundwater metal concentrations detected at the corresponding

locations (i.e., similarly low, saturated zone, soil metal concentrations are associated with very wide ranges of groundwater metal concentrations).

TRPHs were detected at only 17 separated groundvater sampling locations, but the detected concentrations at only three separated locations along the southeasternmost portion of the sever line exceed the FGCS of 5 mg/L (see Plate 15). To a limited extent, the groundvater TRPR distribution matched the distribution of TRPHs in soils.

VOCs were detected at only 18 of the groundwater sampling locations, predominantly along the northwest and southeasternmost portions of the line (see Plate 16). At 12 locations, the detected VOC concentrations exceeded the FPDWS (PCE, TCE, DCE, and/or TCA) or FGCS (total BTEX; three locations only). VOCs were detected only at three soil sampling locations, but the same VOCs were also detected in corresponding or nearby groundvater sampling locations. More interestingly, although the overall groundwater VOC distribution closely corresponds to the soil-gas survey results, the number of northwest and southeasternmost samples actually exhibiting VOC contamination and the detected concentrations are both well below the results expected based on the soil-gas survey data. This anomaly will be considered in greater detail below in Section 3.9.4.

PAHs were detected at only 11 of the groundwater sampling locations, phenols at only 12 of the sampling locations, and both at only five of these sampling locations (see Plate 17). Both of these contaminants were most commonly detected along the southeasternmost portion of the line. Detected PAH concentrations could exceed the potentially applicable FGCSs for total naphthalenes and for specific PAHs. Detected phenol concentrations could exceed the FGGCs for specific phenolic compounds.

3.9.4 Source(s) of Contamination

As stated at the beginning of this section, the analytical results for the Phase I soil and groundwater samples collected along the industrial waste sewer line do not appear to indicate that much of the detected contamination is related to active, continuing leakage from the line. This conclusion is based on a variety of factors related to the

magnitude and distribution of the detected contamination, as well as the potential presence of other sources of the detected contamination. Magnitude and distribution factors include:

- The magnitude of the detected contamination does not appear to be as high as would be expected near an active, long-term, continuing leak;
- A greater frequency of co-occurrence of the various contaminants at extremely elevated concentrations would be expected near an active, long-term, continuing leak;
- Soil contamination is most commonly present in the A-interval samples, which were usually entirely or predominantly collected above the sewer line; although A-interval contamination along most of the sewer line could be impacted by upward movement of contaminated groundwaters during times of elevated water table conditions, the magnitude of detected groundwater and deeper soil contamination does not appear to support this potential mechanism of contaminating A-interval soils; and
- Contamination is just as likely to be detected away from manholes as near them and along force main sections of the line as gravity line sections; in contrast, leakage from the sewer lines might, be most commonly expected along the gravity line sections and especially near manholes.

If the Phase I analytical data do not, in fact, support active, continuing leakage from the sewer line as the source of detected contamination, then the extent to which the detected contamination can be potentially attributed to any of the additional sources in the site vicinity must be determined. In the evaluation of the potential presence of additional sources, the following should be noted:

- Location B058/TW058 (east of Building 18, southeasternmost portion of line), which exhibited very elevated soil TRPH, PAH, and phenol concentrations and elevated groundwater lead, TRPH, DCE, PAH, and phenol concentrations, is located within or at least close to Site 20 (see Figure 1-2 and plates 1 and 3), which has not yet been subject to a Phase I investigation;
- Location B203/TW203 (east of Murray Road, southeastern portion of line), which exhibited very elevated soil lead, TRPH, and PAH Concentrations and groundwater lead concentrations, is located in an area of Site 23 where

buried debris and the same contaminants vere detected during the Phase I investigation of that site (see Figure 1-2 and plates 1 and 3);

- Locations B011, B014, and B016 (north of Building 3644, northwest portion of line), which exhibited elevated soil PAH concentrations, are located near areas of Site 11 vhich also exhibited PAH contamination (see Figure 1-2 and plates 1 and 3).

- Location TW209 (east of Building 2691, northwest portion of line), vhich exhibited elevated BTEX concentrations, is located near (possibly downgradient) of a Site 30 groundvater sampling location which exhibited even higher Concentrations of the same contaminants (see Figure 1-2 and plates 1 and 3); and

- Locations TW151, TW190, and TW226 (near buildings 3220 and 3450, northvest portion of line), which exhibited elevated groundwater halocarbon-type VOC concentrations, are located in the vicinity (possibly downgradient) of Site 27 and Site 30 groundvater sampling locations which also exhibited elevated levels of halocarbon-type VOCs (see Figure 1-2 plates 1 and 3).

The frequency of groundwater VOC detections in the general vicinity of the northwest portion of the sewer line, evidenced by the combined data from sites 27, 30, and 36 described above, is particularly interesting because it may explain the previously described apparent anomaly between the high frequency of elevated soil-gas readings in this area (and along the southeasternnost portion of the line) versus the somewhat low frequency and magnitude of VOC detections in the sever line samples. These data may indicate that multiple, localized sources of VOC contamination in this area are so common as to "saturate" the vadose zone vith vapors volatilizing from these source areas. Consequently, elevated soil-gas readings vould be frequently encountered due to vadose zone migration of these vapors avay from these multiple source areas.

It is also important to note that vith very few exceptions (e.g., groundwater metal concentrations on sites 29 and 34), contaminant concentrations in the sewer line samples are not distinctly higher than concentrations detected in samples from adjacent sites for vhich Phase I investigations have been completed. Furthermore, very elevated concentrations of the same contaminants detected in the Site 36 samples (metals [particularly lead), TRPHs, VOCs, PAHs, and phenols) have been

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commonly detected in a random distribution at many of these other sites in the absence of any clear source. Consequently, the detection of contamination at comparatively few of the Site 36 sampling locations could in part be a further extension of the somewhat random occurrence of contamination across the base, which in turn reflects the multitude of activities, facility-specific localized sources, and base-wide ambient sources operative across NAS Pensacola.

Finally, the above discussion is not meant to imply that the industrial waste sewer line has never leaked and/or is not currently leaking. Rather, the Site 36 Phase I data simply do not support the unequivocable presence of active, continuing leaks at the sampling locations, especially when viewed in the context of the numerous other potential sources present. Additional work along the sewer line will be required to identify whether, in fact, the detected contamination reflects active leaks at nearby locations along the line, past leaks at specific locations, or is related to one or more of the other potential sources.

3.10 QA/QC

3.10.1 Field QA/QC Samples

Twelve soil field duplicate samples and nine groundwater field duplicate samples were collected with the Site 36 analytical screening samples. The analytical screening results for the field duplicate samples are presented in the summary analytical tables for soil and groundwater samples (see tables 3-4 and 3.-8, respectively). With the exception of duplicate soil sample set S203A/S203AD, all duplicate sample set results were in generally close agreement. Samples S203A and S203AD both exhibited very high metals, TRPH, and PAH concentrations, but the detected Concentrations differed by as much as a factor of 4. (e.g., lead = 2,800 mg/kg in S203A and 12,000 mg/kg in S203AD). These data suggest that significant heterogeneity of soil contaminant concentrations may be exhibited by the most contaminated samples (i.e., at high concentrations, the reported concentration for any soil contaminant cannot be viewed as a precise indicator, but as indicative of a potential range of concentrations).

3.10.2 Laboratory QA/QC Samples

Zinc was the only detected sample analyte also detected in the associated laboratory method blank, but was detected only in one blank associated with only seven groundwater samples (see Table 3-8). Phenol concentrations could not be determined in groundwater samples GW066 and GW086 due to matrix interference. All spike recovery and replicate analysis results vere within acceptable limits.

4. CONCLUSIONS

Soil and surficial zone groundwater contamination are present along the industrial waste sewer line (Site 36). With the exception of metals in groundwater, the widespread occurrence of which is believed to be strongly influenced by acid preservative leaching/dissolution of entrained aquifer matrix sediments, the detected contamination is either sporadically distributed across a generally limited number of highly localized sampling locations and/or predominantly concentrated along the northwest and/or southeast portions of the sewer line.

Lead, TRPHs, PAHs, and phenols were the primary soil contaminants detected. Lead, chromium, cadmium, TRPHs, VOCs, PAHs, and phenols were the primary groundwater contaminants. Lead, chromium, cadmium, and halocarbon-type VOCs (PCE, TCE, DCE, and TCA) were all detected in groundwater at concentrations exceeding the FPDWS. TRPHs, aromatic-type VOCs (total BTEX), and PAHs were all detected in groundwater at concentrations exceeding the applicable or (PAHs) potentially applicable FGCS. Phenols were detected in groundwater at concentrations exceeding the potentially applicable FGGCs for various phenolic compounds.

Overall, much of the detected contamination does not appear to reflect active, continuing leakage from the sewer line. This determination does not mean that the sewer line has never leaked and/or is not currently leaking, but rather that the Site 36 Phase I data simply do not support the unequivocable presence of active, continuing leaks at the sampling locations, especially when viewed in the context of the numerous other potential sources present. Additional assessment activities will be required along the sewer line to identify the actual source(s) and extent of the detected Site 36 soil and groundwater contamination.

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